ATARI 8-BIT COMPUTERS

FREQUENTLY ASKED QUESTIONS

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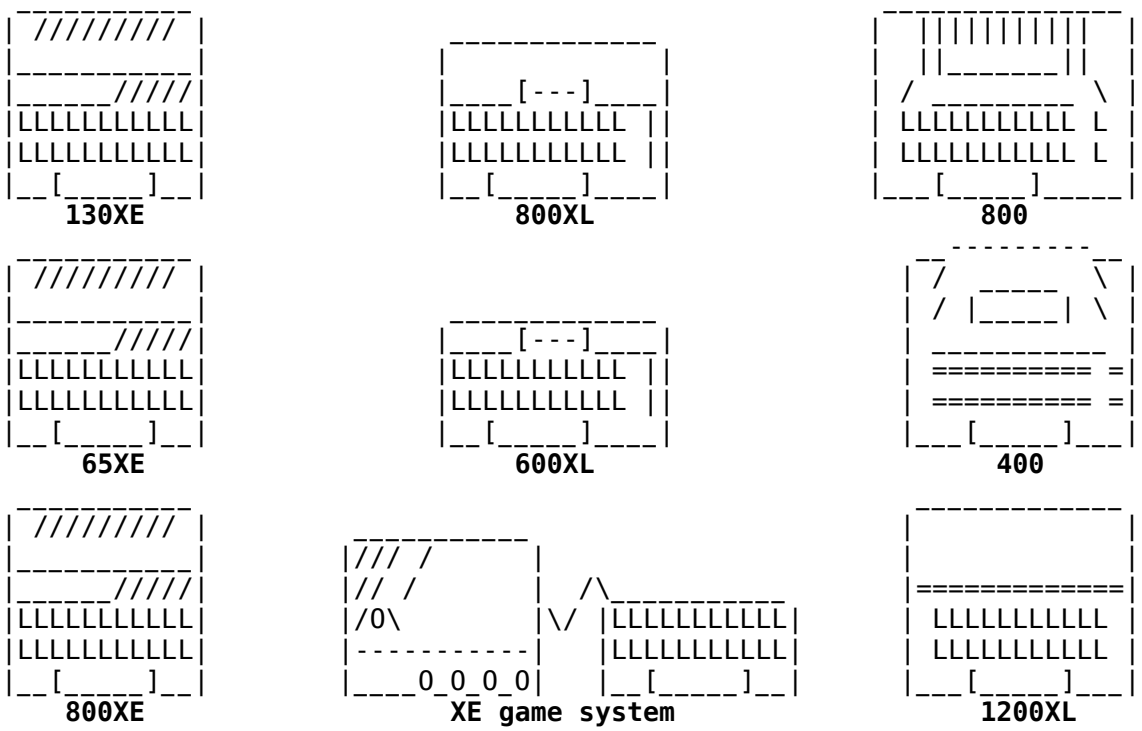
Last-modified: **July 8th, 2024**
Welcome to the `comp.sys.atari.8bit` newsgroup!

Atari 8-Bit Computers
Frequently Asked Questions List



Additions / suggestions / comments / corrections are needed! Please send to:
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This document is in a constant state of development and comes with no guarantees. If you see any problems, I need to hear from you!

Special thanks to Laurent Delsarte for his numerous suggestions / comments / corrections for this FAQ list over many years.

The latest version of this document is irregularly posted to these Usenet newsgroups: `comp.sys.atari.8bit`, `comp.answers`, `news.answers`

It is also kept at: https://mcurrent.name/atari-8-bit/faq.txt
Enhanced versions (Text, A4 PDF, US Letter PDF): https://www.atari800xl.eu/

You may also request my latest working version at: michael@mcurrent.name

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Updates since previous posting

2024.07.08	11.1 finished various revisions related to Atari UK revisit
2024.06.27	11.1 Atari UK revisit, including support, service and software
2024.06.21	1.3 fall 1982 units shipped with 48K, thanks Steven Posey
2024.06.21	11.1 revisit 400/800 prices/promotions fall 82, thanks Steven Posey
2024.06.12	11.1 tweaks including spring/77 arrivals, thanks Laurent Delsarte
2024.06.12	11.1 and others, batch of typos & similar, thanks Laurent Delsarte
2024.06.11	11.1 GBP -> £
2024.06.07	6.11 completed thorough section overhaul
2024.06.07	6.2 Atari#: C070046-01, thanks John S
2024.06.06	7.3.3 SuperDOS and MachDOS DSDD 360 KiB formats
2024.06.06	7.3.3 TOP-DOS disk allocation/filesystems, especially DSDD 360K
2024.06.06	7.3.3 DOS XLE revisit including credit, thanks Laurent Delsarte
2024.06.03	7.3.3 Turbo-DOS XL/XE revisit
2024.06.03	7.3.3 Bibo-DOS Quad format (DSDD 360K)
2024.05.04	5.2.3 added SIO2MIDI-S2 and MIDIcar
2024.04.14	8.16 added: Technical Difficulties
2024.03.14	11.1 Unimport Ibérica (Spain), thanks Laurent Delsarte
2024.03.13	7.3.3 SuperDOS official vs unofficial versions
2024.03.13	1.2 - 1.8 keyboard details, thanks Laurent Delsarte
2024.03.12	4.6 7.1.2 ROM-Wizard printer interface
2024.03.03	1.16 11.1 deep revisit, focusing on early software people and on the evolution of Candy to the 400
2024.02.10	1.7 1.8 C072018-009, thanks Laurent Delsarte
2024.02.10	latest typos, thanks Laurent Delsarte

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To do? list

- Atari Cartridge
  - Diagnostic cartridges, eg Star Raiders, Basketball
  - In his Antic Podcast interview, Crane calls bit 7 of the option byte: The "Alan Miller bit"
- Boot cartridge/disk/cassette formats
- DOS 2 binary file format
- Commercial telecommunications programs
- Programs supporting Axlon or Mosaic banked memory
  - Axlon list: OmniWriter,
  - Mosaic list: RAMbrandt
- RAM cartridges
  - Persistent RAM by Intra-Tech Computer Products http://atariage.com/forums/topic/287343-the-persistent-ram-cartridge/
  - Intra-Tech Hyper Drive
  - https://retrogames.cl/mcturbosoft.html
  - http://atarionline.pl/forum/comments.php?DiscussionID=5337&page=1#Item_0
  - https://atariage.com/forums/topic/311971-cartridge-ram/
  - HyperCartridge by Chameleon Computing (1983)

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Chapter 1

Computers & Custom chipsets

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1.1) What is an Atari 8-bit computer?

Atari, based in Sunnyvale California and already known for coin-operated and home video games, produced a line of computers from 1979 to 1992 often referred to collectively as the "Atari 8-bits," the "8-bit Ataris," the "400/800/XL/XE series," etc.

The computers in the series eventually included the 400, 800, 1200XL, 600XL, 800XL, 65XE, 130XE, 800XE, and the XE game system.

With the exception of the XE game system, Atari marketed these computers as personal computers or home computers.

In the 1970s the product category of personal computers for the home, or home computers, emerged out of other product categories including terminals for accessing time-sharing mainframe and minicomputers; business, industrial, and scientific microcomputers; desktop and pocket programmable calculators; computer kits marketed to home hobbyists; home consumer video games; and handheld electronic games.

Some notable examples include:

1968	Hewlett-Packard HP-9100A (desktop scientific calculator).
1971	Datapoint 2200 (computer), Kenbak-1 (computer).
1972	Hewlett-Packard HP-35 (pocket calculator), Magnavox Odyssey (home game console)
1973	Hewlett-Packard HP-9830A (programmable calculator), Micral N (computer), TV Typewriter (Radio Electronics magazine project), Wang 2200 (computer).
1974	Hewlett-Packard HP-65 (programmable pocket calculator), Mark-8 (Radio Electronics magazine computer project), Micro Computer Machines MCM/70 (computer), Scelbi-8H (computer kit or assembled).
1975	Epoch TV Tennis Electrotennis (home game console), IBM 5100 (computer), IMSAI 8080 (computer kit or assembled), MITS Altair 8800 (computer kit or assembled), **Sears Tele-Games Pong by Atari** (home game console), SWTPC 6800 (computer kit or assembled).
1976	Apple-1 (computer kit), Coleco Telstar (home game console), Compucolor 8001 (computer kit for Intercolor 8001 terminal), Fairchild Video Entertainment System (VES) (Channel F) (home game console), MOS Technology KIM-1 (computer kit), Mattel Auto Race (handheld game), Micral M (computer), OSI Model 400 Superboard, Ohio Scientific OSI Model 300 Computer Trainer, Polymorphic Systems Micro-Altair (Poly 88) (computer), Sol-20 (computer kit or assembled), Texas Instruments Little Professor (electronic educational toy)

The mass-market personal computer for the home consumer, or home computer, arrived in 1977 in the form of products from Apple Computer, Commodore, and Tandy Radio Shack.

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Here is a brief presentation of release dates for the 8-bit Atari computers, listed alongside notable contemporary home computers, business oriented personal computers (which increasingly encroached on the home computer market over this time period), pocket/handheld computers, and home video game consoles (technologically very similar to home computers):

1977	
Home computers	Apple II, Commodore PET (2001 / CBM 3000 series), Cromemco Z-2 (kit or assembled), Heathkit H8 (kit or assembled), Nascom (kit), North Star Horizon (kit or assembled), OSI Challenger III, OSI Model 500 / Challenger II / Super Kit, Science of Cambridge MK14 (kit), Tandy Radio Shack TRS-80 (Model I), VideoBrain.
Video games	**Atari Video Computer System (VCS 2600)**, Bally Astrocade, Nintendo Color TV-Game 6, RCA Studio II.

1978	
Home computers	ARI Cybervision 2001, Compucolor II, Exidy Sorcerer, Heathkit H88 (kit), OSI Challenger 1P / Superboard II / Model 600, Rockwell AIM 65, Synertek VIM-1 (SYM-1).
Business PCs	Altos ACS-8000, Heathkit H11 (kit), IBM 5110, Logabax LX500 series, Micral V Portable.
Video games	APF MP1000, Interton VC 4000.

1979	
Home computers	Acorn Microcomputer, APF Imagination Machine, Apple II Plus, **Atari 400/800**, Interact, Texas Instruments TI-99/4.
Business PCs	AVL Eagle, Heathkit H89 (Zenith Z-89), Intertec SuperBrain, Micral 8031 D, NEC PC-8000 series, Tandy Radio Shack TRS-80 Model II.
Video games	Bally Professional Arcade, Philips/Magnavox Odyssey 2/Videopac G7000.

1980	
Home computers	Acorn Atom, Commodore PET/CBM 4000 Series, Elektor Junior Computer project, Tandy Radio Shack TRS-80 Color Computer, Tandy Radio Shack TRS-80 Model III, Sinclair ZX80.
Business PCs	Apple III, Commodore CBM 8000 series, Hewlett-Packard HP-85, IBM 5120, R2E CCMC Portal.
Video games	Mattel Intellivision.

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1981	
Home computers	BBC Micro (by Acorn), Commodore VIC-20, NEC PC-6000 series, Panasonic HHC, Sharp PC-1500, Sinclair ZX81 (Timex Sinclair 1000), Texas Instruments TI-99/4A.
Business PCs	Alspa Computer ACI-1, AVL Eagle II, Casio FX-9000P, Commodore SuperPET SP9000/MMF 9000, Digilog Series 1000, Fujitsu Micro 8 (FM-8), Hewlett-Packard HP-125, IBM 5150 (IBM PC), Osborne 1, Sharp MZ-80B, Victor 9000 / ACT Sirius 1, Xerox 820, Zenith Z-90.
Video games	Epoch Cassette Vision.

1982	
Home computers	Commodore 64, Commodore CBM-II P series (500 series), Commodore Max Machine, Dragon 32, Franklin Ace 1000, Hewlett-Packard HP-75, Pineapple, Sinclair ZX Spectrum, Thomson TO 7.
Business PCs	AVL Eagle IV, Borroughs B21/B22, CDP MPC 1600, Commodore CBM-II B series (600/700 series), DEC Rainbow 100, Epson HX-20/HC-20, Hewlett-Packard HP-120, Hewlett-Packard HP-87, Kaypro II, Leading Edge Model M, North Star Advantage, Olivetti M20, Sanyo MBC-1000, Sanyo MBC-550, TeleVideo TS 802, Wang PC, Zenith Z-100.
Video games	**Atari 5200**, ColecoVision, Emerson Radio Arcadia 2001, SHG Black Point, Vectrex, VTech CreatiVision.

1983	
Home computers	Acorn Electron, Apple IIe, **Atari 1200XL**, **Atari 600XL/800XL**, Coleco Adam, Dragon 64, MSX, Matra & Hachette Alice, Mattel Aquarius, Oric-1, Panasonic JR-200U, Sega SC-3000, Spectravideo SV-318, Spectravideo SV-328, Syscom 2, Tandy Radio Shack TRS-80 Color Computer 2, Tandy Radio Shack TRS-80 MC-10, Tandy Radio Shack TRS-80 Model 4, Texas Instruments CC-40.
Business PCs	ACT Apricot, Apple Lisa, Borroughs B25, Compaq Portable, Epson QX-10, Hewlett-Packard HP-150, IBM PC XT, Kaypro 10, Kaypro IV, Olivetti M24 (AT&T PC 6300, Xerox 6060), Texas Instruments TIPC and TIPPC, Tulip PC.
Video games	Casio PV-1000, Gakken Compact Vision TV Boy, Nichibutsu My Vision, Nintendo Family Computer (Famicom), Philips Videopac+ G7400, Sega SG-1000.

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1984	
Home computers	Amstrad CPC, Apple IIc, Apple Macintosh, Commodore 16/116, Commodore Plus/4, IBM PCjr, Sinclair QL.
Business PCs	Apple Lisa 2, Borroughs B26, Bull Micral 30, Compaq Deskpro, IBM PC AT, Tandy 1000, Wyse 1000.
Video games	Epoch Super Cassette Vision.

1985	
Home computers	**Atari 520ST**, **Atari 65XE/130XE**, Commodore 128, Commodore Amiga (Amiga 1000).
Business PCs	Amstrad PCW, Apple Macintosh XL, Hewlett-Packard HP Vectra, Hewlett-Packard HP-150II, Leading Edge Model D, PC's Limited Turbo PC.
Video games	Nintendo Entertainment System (Famicom), Sega Mark III.

1986	
Home computers	Apple IIgs, Apple Macintosh Plus, **Atari 1040ST**, Tandy Color Computer 3.
Business PCs	Compaq Deskpro 386, DEC VAXmate.
Video games	**Atari 7800**, Sega Master System.

1987	
Home computers	Acorn Archimedes, Apple Macintosh SE, **Atari 800XE**, Cambridge Computer Z88, Commodore Amiga 500.
Business PCs	Apple Macintosh II, **Atari Mega ST**, Commodore Amiga 2000, IBM PS/2.
Video games	**Atari XE game system**, NEC PC Engine (TurboGrafx-16), Worlds of Wonder Action Max.

In marketing their computers to the public, Atari always had to contend with their company history and reputation as a maker of video games. While the 8-bit Atari computers in their heyday were technically quite comparable if not superior relative to contemporary home computers, they also live up to the name "Atari" with a huge library of video games which were often outstanding for their time.

The 8-bit Atari computers do not use the same cartridges or floppy disks as any other Atari platforms, such as the 2600 Video Computer System (VCS), the 5200 SuperSystem, the 7800 ProSystem, or the ST/TT/Falcon computers.

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The controller ports of the 8-bit Atari computers are 100% compatible with the joystick ports of the 2600 VCS, allowing controllers designed for either system to be used interchangeably between the two platforms. The Atari 7800 and Atari ST/TT/Falcon also feature very similar controller ports, as do the Commodore VIC-20, Commodore 64, Commodore Amiga, Commodore CD32, Amstrad CPC, MSX, Sega Master System, and Sega Genesis/Mega Drive. Simple controllers (single-button joysticks) may work across all of these systems, while more advanced controllers may work with only a subset of these systems.

The Atari 5200 hardware platform is very closely related the 8-bit Atari computers, including use of the same custom chipset (SALLY/ANTIC/GTIA/POKEY). Differences in the 5200 include a fixed 16 KiB of RAM, fixed 32 KiB ROM cartridge size, physically different cartridge and controller ports, and a much smaller 2 KiB operating system.

Here are some of the hardware performance specifications of the 8-bit Atari computers:

6502 MICROPROCESSOR:
- MOS Technology MCS6502A or equivalent (most NTSC 400/800 machines)
- Atari SALLY (late NTSC 400/800, all PAL 400/800, and all XL/XE)

6502 CLOCK RATE:
- 1.789773 MHz (NTSC machines)
  Engineering target = 1/2 the standard NTSC color subcarrier frequency of 315/88 Hz, or 3.57954545 MHz)
- 1.7734475 MHz (PAL/SECAM machines)
  Engineering target = 2/5 the PAL color subcarrier frequency of 4.43361875 MHz

COLOR CLOCKS per MACHINE CYCLE: 2

MACHINE CYCLES per SCAN LINE: 114

COLOR CLOCKS per SCAN LINE:
228 (2 color clocks/machine cycle * 114 machine cycles/scan line)

SCAN LINES per FRAME
- 262 (NTSC machines)
- 312 (PAL/SECAM machines)

MACHINE CYCLES per FRAME:
- 29,868 (NTSC machines: 114 machine cycles/scan line * 262 lines/frame)
- 35,568 (PAL/SECAM machines: 114 cycles/scan line * 312 lines/frame)

FRAME REFRESH RATE:
- 59.92 Hz (NTSC machines) (1.789773 MHz / 29,868 cycles/frame)
- 49.86 Hz (PAL/SECAM machines) (1.7734475 MHz / 35,568 cycles/frame)

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MAXIMUM RESOLUTION = GRAPHICS PIXEL: 0.5 color clock (width) x 1 scan line (height)

MAXIMUM HORIZONTAL FRAME RESOLUTION (Standard Playfield):
320 pixels (160 color clocks * 2 pixels/color clock)

MAXIMUM VERTICAL FRAME RESOLUTION (Standard/Narrow/Wide Playfields):
192 pixels (192 scan lines)

MAXIMUM HORIZONTAL FRAME RESOLUTION (Wide Playfield):
352 pixels (176 displayable color clocks * 2 pixels/color clock)

MAXIMUM VERTICAL FRAME RESOLUTION (custom display list):
240 pixels (240 displayable scan lines)

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GRAPHICS MODES:
The ANTIC chip supports 14 graphics modes (2-F), and the GTIA/FGTIA chip supports 4 color interpretations for each mode (1 normal and 3 alternate), for a total of 56 combinations. However, only ANTIC modes 2, 3, and F are capable of fully expressing the color palettes of the alternate color interpretations, for a total of 23 distinct fully-functional graphics modes. (Atari marketing and consumer documentation often only acknowledged the 16 modes supported by the Operating System, referenced as 11 graphics modes and 5 text modes.)
Explore all 56 modes: https://www.atarimagazines.com/v3n5/allmodes.html

ANTIC Mode	GTIA Mode (1)	AtariOS Mode	Display Type	Resolution		Colors (Color Registers)
				Screen	Each char	
2		0	Char	40 x 24	8x8	3 (3)
2	1	-	Char	40 x 24	2x8	16 or 8 (4)
2	2	-	Char	40 x 24	2x8	9
2	3	-	Char	40 x 24	2x8	16 (5)
3		-	Char	40 x 19	8x8	3 (3)
3	1	-	Char	40 x 19	2x8	16 or 8 (4)
3	2	-	Char	40 x 19	2x8	9
3	3	-	Char	40 x 19	2x8	16 (5)
4		12 (2)	Char	40 x 24	4x8	5
5		13 (2)	Char	40 x 12	4x8	5
6		1	Char	20 x 24	8x8	5
7		2	Char	20 x 12	8x8	5
8		3	Map	40 x 24		4
9		4	Map	80 x 48		2
A		5	Map	80 x 48		4
B		6	Map	160 x 96		2
C		14 (2)	Map	160 x 192		2
D		7	Map	160 x 96		4
E		15 (2)	Map	160 x 192		4
F		8	Map	320 x 192		3 (3)
F	1	9	Map	80 x 192		16 or 8 (4)
F	2	10	Map	80 x 192		9
F	3	11	Map	80 x 192		16 (5)

(1) GTIA Modes require GTIA chip or FGTIA chip
(With CTIA these modes are considered valid by the OS but do not work.)
(2) Supported by the XL OS (not supported by the 400/800 OS)
(3) 2 of the 3 available color registers share the same color/hue in this mode
(3) Modes capable of color artifacting on the NTSC Atari
(4) GTIA: 16 luminances of one color/hue
FGTIA: 8 luminances of one color/hue
(5) 16 colors/hues all sharing the same luminance

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GRAPHICS INDIRECTION (COLOR REGISTERS AND CHARACTER SETS):
Nine Color Registers are provided:

- Background (used in all graphics modes)
- Playfield 0-3 (at least one used in all graphics modes but GTIA 1 & 3)
- Player-Missile 0-3 (used in GTIA Mode 2; Player-Missiles discussed below)

Each color register holds both a color/hue setting and a luminance/brightness setting. In most graphics modes, each of the available color registers may hold any one of 16 colors/hues combined with any one of 8 luminance/brightness settings, for a total palette of 128 possible colors.

In GTIA Mode 1 only, with the GTIA chip only, the 16 available colors/hues can each be combined with 16 different luminance/brightness settings, for a total palette of 256 possible colors.

Character sets of 128 8x8 characters, each with a normal and an inverse video incarnation, are totally redefinable.

PLAYER-MISSILE GRAPHICS:
The Atari term for "sprites" where a sprite is a graphical video display object handled independently from the memory bitmap of the video display.

Four 8-bit wide, 120 or 240 byte high single color Players, and four 2-bit wide, 120 or 240 byte high single color Missiles are available. A mode to combine the 4 Missiles into a 5th 8-bit wide Player is also available, as is a mode to OR colors or blacken out colors when Players overlap (good for making three colors out of two Players!) Players and Missiles have adjustable priority and collision detection.

DISPLAY LIST:
Screen modes can be mixed (by lines) down the screen using the Display List - a program which is executed by the ANTIC graphics chip every screen refresh.

DISPLAY LIST INTERRUPTS (DLIs):
Other screen attributes (color, player/missile horizontal position, screen width, player/missile/playfield priority, etc.) can be adjusted at any point down the screen via DLIs.

SCROLLING:
Fine scrolling (both vertical and horizontal) can be enabled on any line on the screen.

SOUND:
Up to 5 distinct sounds can be produced simultaneously: four main voices plus the Console Speaker.

Sound output is monaural/monophonic/single channel, except for the 400/800 where Console Speaker sounds are output separately to a speaker inside the computer.

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The four main voices can be configured in one of the following three ways:

- 4 voices, each with one of 256 unique frequencies / pitches
- 2 voices, each with one of 65,536 unique frequencies / pitches
- 1 voice with one of 65,536 frequencies/pitches and 2 voices with one of 256 frequencies / pitches each

Each of the main voices may produce 8 types of tones: pure tones (square wave type), or tones produced with one of 7 types of "noise" which is known as "distortion" on the Atari.

Each of the main voices may be produced at one of 16 volumes.

Direct control of the position of the speaker cone, known today as pulse-code modulation or PCM, is available at a bit depth of 4 bits, for a volume resolution of 16 possible values (4-bit PCM). This is known as "Volume Control Only" or "Volume Only" sound on the Atari.

The Console Speaker was intended only for system keyclick and buzzer, but it may also be programmed as 1-bit PCM.

VERTICAL BLANK INTERRUPTS (VBIs):
A software routine may be designed to execute as a VBI. There are two varieties of VBI: Immediate and Deferred. An Immediate VBI completes execution within the vertical blank time, which is the time allotted for a CRT display to shut the electron beam off at the lower-right of the display and reposition it back on the top-left of the display to commence drawing of the next frame. A Deferred VBI routine completes execution between the initiation of one vertical blank and the next.

Atari 8-bit computers were supplied with the proprietary Atari Operating System contained in Read Only Memory (ROM) as an integral feature of the computer. The Atari OS is described elsewhere in this FAQ List.

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1.2) What is the Atari 400?

Introduced at a New York news conference on December 14, 1978 alongside the Atari 800 and shipped the following fall, the Atari 400 was the reduced feature set version of the new Atari personal computer system.

The 400 is the only 8-bit Atari with a membrane keyboard rather than a full-stroke keyboard, and is one of the few 8-bit Atari computers lacking a composite monitor port. Controller jacks #1-3 on the 400 are the only ones on any 8-bit Atari that do not support a light pen / light gun. The 400 was originally released with just 8 KiB RAM, but most were sold with 16 KiB RAM. As of June 1983 Atari released the 48K RAM Expansion Kit for the 400, installed through Atari service centers or offered as a kit through the Atari Program Exchange (APX).

Any internal plug-in RAM board for the 400 can also be used in the front RAM slot of the 800.

Features unique to the 400/800 models relative to other Atari computers:

- Four "function keys" found to the right of the main keyboard, from top to bottom: [SYSTEM RESET] [OPTION] [SELECT] [START]
- Television (TV) connecting cable, not designed to be removable, emerges directly from center of rear of computer case
- Four controller (joystick) ports
- Internal speaker for keyclicks and system buzzer
- Memo Pad / Blackboard mode
- 12 volt supply on pin 12 of the SIO port
- Internal plug-in 400/800 CPU Board (28/56 pin edge connector)
- Internal "test points" 28/56 pin PCB edge for factory quality assurance and diagnostics

System initialization types supported:

- Memo Pad: Turn on computer with no cartridge inserted and no powered disk drive #1.
- Cartridge: Turn on computer with cartridge inserted.
- Cassette boot: (boot cassette may or may not require cartridge inserted)
  1. Hold down [START] while turning on the computer. (System buzzer sounds)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the computer.
- Disk boot: (boot disk may or may not require cartridge inserted)
  - Turn on computer with boot disk inserted in powered disk drive #1.

Versions of the Atari 400:

- Pre-production: outline "Atari" label, solid "400" label, "Model No. C7000" label
- Domestic version ("DOM") for NTSC M television (North America)
  - 1979 "400A" demo units: 16 KiB of RAM (https://tinyurl.com/4rvbzpun)
  - 1979-1981 systems shipped with:
    - 8 KiB of RAM
    - Atari BASIC Programming Language cartridge CXL4002
    - Atari BASIC book (Wiley Self-Teaching Guide) C014385
    - Atari 400 Operator's Manual C014768

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  - 1981-1983 systems shipped with:
    - 16 KiB of RAM
    - The Basic Computer Owner's Guide C017711
  - Microprocessor:
    - Most units: 6502 (MOS Technology MCS6502A or equivalent), C014377
    - Late units: 6502 (Atari SALLY), C014806
  - ANTIC NTSC version, C012296
  - Early units: CTIA, C012295
    Most units: GTIA NTSC version, C014805
  - 10 KiB Operating System ROM
    - 400/800 OS, C012399 Floating-Point Package (FPP) + C012499 + C014599
    - Early units: 400/800 OS REV. A/NTSC
    - Most units: 400/800 OS REV. B/NTSC
  - No Monitor port
  - Built-in TV connecting cable for TV antenna input
  - Switch (unlabeled) on back of computer selects TV output RF channel: 2 or 3
  - TV Switch Box supplied with computer
- "PAL"/"UK" versions for PAL B/G television (Western Europe) or PAL I television (United Kingdom), respectively
  - Most units (but not late units made in Hong Kong):
    Underside label marked "400 P" on PAL B/G units, or marked "400 U" on UK units
  - Shipped 1981-1983
  - 16 KiB RAM
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC PAL 'A' version, C014887
  - GTIA PAL version, C014889
  - 10 KiB Operating System ROM
    - 400/800 OS REV. A/PAL, C012399 (FPP) + C015199 + C015299
  - No Monitor port
  - Built-in TV connecting cable for TV antenna input
  - Switch (unlabeled) on back of computer selects TV output RF channel:
    - Some units: 36 (PAL/UK) or 4 (PAL)
    - Some units (Germany): 3 or 4
    - Some units: Channel is fixed to either 36 or 4
  - Manual: The Atari 400 Computer Owner's Guide C060200
- "Peritel/PTL" version (France) is the same as the "PAL" version (for PAL B/G television) but has a second built-in TV connecting cable for RGB TV input.
  - Apparently: Localized modification by Atari France
  - Visual tour:
    https://www.atari800xl.eu/hardware/computers/peritel-atari-400.html
  - Other links:
    http://www.atariage.com/forums/index.php?showtopic=62346&st=25
    http://preview.tinyurl.com/ngsxhd8
  - Rare! See L'Atarien #7 page 33 for further reference.

Technical manuals:

- Atari 400/800 Personal Computer System Service Manual
  - August 1980
  - April 1981, Revised May 1981

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- Atari 400/800 Home Computer Field Service Manual FD100001
  - June 1982
  - REV. 02 May 1983
- Atari 400/800 PAL-UK field service manual FD100002

Power: Requires 9V AC as supplied by the Atari CA014748 power adapter or equivalent (such as the Atari CA017964).
Power usage: 19W.

Atari marketing used the trademark, The Basic Computer, as an alternative name for the 400 from 1981-1982.

The 400 was manufactured at Atari's plant at 1173 Borregas Avenue, Sunnyvale, California from November 1979 to May 1983, and was also made by Atari in Hong Kong from January to May 1983.

Serial numbers:
http://atariage.com/forums/topic/176199-calling-all-400s/

1.3) What is the Atari 800?

Introduced at a New York news conference on December 14, 1978 alongside the Atari 400 and shipped the following fall, the Atari 800 was the full feature set version of the new Atari personal computer system.

The 800 is the only 8-bit Atari with a Right Cartridge slot, in addition to the Left Cartridge slot as present on all 8-bit Ataris. The 800 was originally released with just 8 KiB RAM, many were sold with 16 KiB, and later on 48 KiB was standard.

The 800 is the only 8-bit Atari where the Operating System is contained in a plug-in Personality Module (Atari CX801 10K ROM or compatible), and where RAM is contained in one, two, or three plug-in Memory Modules (Atari CX852 8K RAM, Atari CX853 16K RAM, or compatibles). 800 RAM totals of 8 KiB, 16 KiB, 24 KiB, 32 KiB, 40 KiB, or 48 KiB were thus supported by Atari.

Features unique to the 400/800 models relative to other Atari computers:
- Four "function keys" found to the right of the main keyboard, from top to bottom: [SYSTEM RESET] [OPTION] [SELECT] [START]
- Television (TV) connecting cable, not designed to be removable, emerges directly from center of rear of computer case
- Four controller (joystick) ports
- Internal speaker for keyclicks and system buzzer
- Memo Pad / Blackboard mode
- 12 volt supply on pin 12 of the SIO port
- Internal plug-in 400/800 CPU Board (28/56 pin edge connector)
- Internal "test points" 28/56 pin PCB edge for factory quality assurance and diagnostics

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System initialization types supported:

- Memo Pad: Turn on computer with no cartridge inserted and no powered disk drive #1.
- Cartridge: Turn on computer with cartridge inserted.
- Cassette boot: (boot cassette may or may not require cartridge inserted)
  1. Hold down [START] while turning on the computer. (System buzzer sounds)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the computer.
- Disk boot: (boot disk may or may not require cartridge inserted)
  - Turn on computer with boot disk inserted in powered disk drive #1.

Versions of the Atari 800:

- Pre-production: Atari fuji logo includes "Atari", outline "Atari" label, solid "800" label, controller jacks panel colored black
- Domestic version ("DOM") for NTSC M television (North America)
  - 1979-1980 systems shipped with:
    - 8 KiB of RAM as one CX852 Memory Module
    - 410 Program Recorder
    - Educational System Master Cartridge CXL4001
    - Atari BASIC Programming Language cartridge CXL4002
    - Atari BASIC book (Wiley Self-Teaching Guide) C014385
    - Atari 800 Operator's Manual C014769
  - 1980-1982 systems shipped with:
    - 16 KiB of RAM as one CX853 Memory Module
      On a promotional basis, fall 1982 systems shipped with two additional CX853 modules for 48 KiB total
    - Atari BASIC Programming Language cartridge CXL4002
    - Atari BASIC book (Wiley Self-Teaching Guide) C014385
    - BASIC Reference Manual C015307
    - The Atari 800 Home Computer Owner's Guide C060057 REV. 1 (17 pages)
  - 1983 systems shipped with:
    - 48 KiB of RAM as 3 CX853 Memory Modules (slot compartment screwed shut)
    - The Atari 800 Home Computer Owner's Guide C060057 REV. A (13 pages)
  - Microprocessor:
    - Most units: 6502 (MOS Technology MCS6502A or equivalent), C014377
    - Late units: 6502 (Atari SALLY), C014806
  - ANTIC NTSC version, C012296
  - Early units: CTIA, C012295
    Most units: GTIA NTSC version, C014805
  - CX801 10K ROM Personality Module
    - Detailed elsewhere in this FAQ List (800 personality boards)
  - Monitor port is Atari 5-pin
  - Channel switch on side of computer selects TV output RF channel: 2 or 3
  - TV Switch Box supplied with computer
- "PAL"/"UK" versions for PAL B/G television (Western Europe) or PAL I television (United Kingdom), respectively
  - Most units (but not late units made in Hong Kong):
    Underside label marked "800 P" on PAL B/G units, or marked "800 U" on UK units
  - Shipped 1981-1983
  - 16 KiB RAM (earlier units) or 48 KiB RAM (later units)

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    - 6502 microprocessor (Atari SALLY), C014806
    - ANTIC PAL 'A' version, C014887
    - GTIA PAL version, C014889
    - CX801-P 10K ROM Personality Module
        - Detailed elsewhere in this FAQ List (800 personality boards)
    - Monitor port is Atari 5-pin
    - Built-in TV connecting cable for TV antenna input
    - Channel switch on side of computer selects TV output RF channel: 36 (PAL/UK) or 4 (PAL)
    - Manual: The Atari 800 Home Computer Owner's Guide C060497
- "Peritel/PTL" version (France) is the same as the "PAL" version (for PAL B/G television):
    - The Peritel connection is made in one of two ways:
        - Either a second built-in TV connecting cable for RGB TV input.
        - Or an added RGB monitor port on the left side of the unit toward the rear (utilizing internal Peritel Adaptor board CA061034).
    - Apparently: Localized modifications by Atari France
    - Visual tour: https://www.atari800xl.eu/hardware/computers/peritel-atari-800.html
    - More pictures: http://msx.fab.free.fr/mpc2/atari/patari80.htm
    - Rare! See L'Atarien #7 page 33 for further reference
    - Discussions:
      http://preview.tinyurl.com/p6myda9
      http://atariage.com/forums/topic/191254-peritel-boards/
      http://atariage.com/forums/topic/38412-8-bit-video-out/?p=455736
      http://www.dragonslairfans.com/smfor/index.php?topic=4997.55;wap2
    - Micro-ordinateur Atari 800 Manuel d'instructions
- "Collette" cost-reduced 1982 design (never shipped) was to incorporate the Mainboard, OS Board, CPU Board and 48 KiB RAM into a single board.

4 different types of 800 keyboards were nicely documented by ACML here:
http://atariage.com/forums/topic/221978-atari-800-not-xl-keyboard-basics/

Technical Manuals:

- Atari 400/800 Personal Computer System Service Manual
    - August 1980
    - April 1981, Revised May 1981
- Atari 400/800 Home Computer Field Service Manual FD100001
    - June 1982
    - REV. 02 May 1983
- Atari 400/800 PAL-UK field service manual FD100002

Power: Requires 9V AC as supplied by the Atari CA014748 power adapter or equivalent (such as the Atari CA017964).
Power usage: 19W.

The 800 was manufactured at Atari's plant at 1173 Borregas Avenue, Sunnyvale, California from December 1979 to May 1983 (most units), and late units were made by Atari in Hong Kong in May-June 1983 (rare).

Serial numbers:

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http://atariage.com/forums/topic/242227-calling-all-800s/

1.4) What is the Atari 1200XL?

Introduced in December 1982 and shipped in March 1983, the Atari 1200XL was designed to replace the Atari 800 while maintaining compatibility with the earlier model.

The project that led to the introduction of the 1200XL had been known inside Atari by names including: "Z800", "Sweet-16" / "S-16", "1000X", "1200X"

Innovations relative to the 400/800 include a full 64 KiB of RAM (62 KiB usable) and a significantly revised XL Operating System (ROM expanded from 10 KiB to 16 KiB).

The 1200XL is the only 8-bit Atari computer to feature two LED indicator lights (L1, L2). Normally they are both <OFF>.
L1 <ON> means the keyboard is disabled.
L2 <ON> means the new International Character Set is selected.

Keyboard enhancements introduced with the 1200XL include the new [HELP] key as well as four programmable functions keys ([F1], [F2], [F3], [F4]). The [Reverse] key ("Atari logo" key on the 400/800) and the [BREAK] key were moved from the main keyboard to be among the total of 11 "function keys" found along the top of the main keyboard. From left to right these are: [RESET] [START] [SELECT] [OPTION] [F1] [F2] [F3] [F4] [HELP] [Reverse] [BREAK].

The labels on several of the 1200XL main keyboard keys differ slightly from those of the 400/800:

400/800	**1200XL**
[CTRL]	[CONTROL]
[CAPS LOWR]	[CAPS]
[DELETE BACK S]	[DELETE BACK SPACE]

Console Speaker sounds (keyclicks and system beeps) output through the built-in speaker on the 400/800 are heard from the television or monitor speaker on the 1200XL.
The toggle action of the [CAPS] key was altered compared to the 400/800.
The key auto-repeat rate is user-alterable.
The [RESET] key is directly wired to the SALLY 6502 reset line.

1200XL Function key effects, redefinable:	
[F1] Cursor up	[SHIFT]+[F1] Cursor to upper-left corner (home)
[F2] Cursor down	[SHIFT]+[F2] Cursor to lower-left corner
[F3] Cursor left	[SHIFT]+[F3] Cursor to start of physical line
[F4] Cursor right	[SHIFT]+[F4] Cursor to end of physical line

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[**1200XL Function key effects, non-redefinable:**
[CONTROL]+[F1] Keyboard enable/disable (console keys unaffected)
[CONTROL]+[F2] Screen DMA (ANTIC) enable/disable
[CONTROL]+[F3] Key click sound enable/disable
[CONTROL]+[F4] Domestic/International character set toggle

Additional 1200XL Operating System enhancements compared to the 400/800 OS:

- Dynamic "ATARI" rainbow graphics demo screen
- Self Test program
- Automatic quick RAM/ROM integrity check on system start-up. If tests fail then the memory self test routine of the Self Test program launches automatically.
- Text screen fine scrolling is available
- Universal OS for both NTSC and PAL systems (including independent values for cassette timings and for keyboard auto-repeat functions)

Color frequencies generated by the 1200XL are user-adjustable via a variable resistor (VR1) accessible via a small hole in the bottom of the case (just below the FCC label, toward the front of the case).

The audio carrier for the RF (television) output signal generated by the 1200XL is user-adjustable via an adjustable inductor (L11) accessible via a small hole in the bottom of the case (above the FCC label, toward the back of the case).
See: https://forums.atariage.com/topic/338150-1200xl-questions/

The 1200XL is the only 8-bit Atari computer with an internal Option Jumper that, if removed, causes the Self Test program to launch at system start-up.
(see: OS Manual XL Addendum page 15 and
https://atariage.com/forums/topic/274231-1200xl-jumper-w1-mystery/)

A few features from the 400/800 are lacking in the 1200XL. Most prominently, the 1200XL has only 2 controller ports, and no Memo Pad / Blackboard mode.

With the 1200XL Atari made an apparent decision to preclude peripherals from drawing their power from the computer via the SIO bus:

- SIO pin 12 is not connected (+12V on the 400/800)
- SIO pin 10 is Ready (rather than +5V/Ready as on the 400/800)
  - "Fix" to convert pin 10 to +5V/Ready:
    Replace 100 Ohm resistor R63 with a 0 Ohm to 1 Ohm resistor, or a jumper wire

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System initialization types supported:

- Dynamic "ATARI" rainbow graphics demo screen: Turn on computer with no cartridge inserted and no powered disk drive #1.
  - Press [HELP] from the "ATARI" logo screen to access Self Test program.
- Cartridge: Turn on computer with cartridge inserted.
- Cassette boot: (boot cassette may or may not require cartridge inserted)
  1. Hold down [START] while turning on the computer. (System buzzer sounds)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the computer.
- Disk boot: (boot disk may or may not require cartridge inserted)
  - Turn on computer with boot disk inserted in powered disk drive #1.

Box: "A Step Into the Future"

Single version of the Atari 1200XL:

- Domestic version for NTSC M television (North America)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC NTSC version, C012296
  - GTIA NTSC version, C014805
  - 16 KiB Operating System ROM: XL OS REV. A, C060616A + C060617A
    - Floating-Point Package (FPP) included, identical to the 400/800 FPP
    - From September 1983 service centers were authorized to upgrade the OS to: XL OS REV. B, C060616B + C060617B (see Tech Tip 18A, 29-Sep-1983)
  - Monitor port is Atari 5-pin
    - Pin 5 (chrominance on 800) is not connected
  - Switch Box jack for RF output for TV
  - Channel switch on back of computer selects TV output RF channel: 2 or 3
  - TV Switch Box and TV connecting cable both supplied with computer
  - Manual: The Atari 1200XL Home Computer Owner's Guide C061418

Power: Requires 9V AC as supplied by the Atari CA014748 power adapter or equivalent (such as the Atari CA017964).
Power usage: 31VA (about 19W).

Technical manual:

- Atari 1200XL Home Computer Field Service Manual FD100217

1200XL visual tour:
https://www.atari800xl.eu/hardware/computers/atari-1200xl.html

Scott Stilphen mentioned this 1200XL Easter egg on 10 Feb 2006:
On 1200XLs, if you select 'all tests', when it gets to the keyboard test it'll type out the programmer's name.

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The 1200XL was manufactured at Atari's plant at 1215 Borregas Avenue, Sunnyvale, California from January 1983 to May 1983, and was also made by Atari Taiwan Manufacturing Corp. from April 1983 to July 1983.

Serial numbers:
http://atariage.com/forums/topic/107234-1200xl-owners-club-serial-tracker/

1.5) What is the Atari 600XL?

Introduced in June 1983 alongside the 800XL, 1400XL (never shipped), and 1450XLD (never shipped), and shipped that fall, the Atari 600XL was designed to replace the Atari 400 while maintaining compatibility with the earlier model.

The project that led to the introduction of the 600XL had been known inside Atari by names including: "600", "Liz", "Crazy 8", "S-8" / "Sweet-8", "Surely".

The 600XL/800XL include most of the features of the 1200XL, minus the 4 Function keys, the 2 LED lights, and the "ATARI" logo screen. But both the 600XL and 800XL have the Atari BASIC language built-in. In addition, these two systems offer the Parallel Bus Interface (PBI), providing fast parallel access to the heart of the computer.

600XL/800XL SIO pin 10 is +5V/Ready as on the 400/800, restoring compatibility with SIO devices designed to draw power from that line which would not work on the 1200XL.

The 600XL contains 16 KiB RAM. The Atari 64K Memory Module (1064) expands the 600XL from 16 KiB to 64 KiB RAM (62 KiB usable).

Keyboard changes for the 600XL/800XL relative to the 1200XL:
- The [BREAK] key was moved to the main part of the keyboard – at the upper-right, where it had been on the 400/800.
- The [Reverse] key was moved to the main part of the keyboard – at the lower-right, to the right of the right [SHIFT] key.
  Note that on the 400/800 the equivalent "Atari Logo" key had been immediately to the left side of the right [SHIFT] key.
- Five "function keys" placed to the right of the main keyboard, from top to bottom:
  [RESET] [OPTION] [SELECT] [START] [HELP]
- No function keys [F1][F2][F3][F4] as found on the 1200XL

Color frequencies generated by the 600XL are user-adjustable via a variable resistor (R43) accessible via a small hole in the bottom of the case.

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System initialization types supported:

- Atari BASIC: Turn on computer with no cartridge inserted and no powered disk drive #1.
- Self Test program: Hold down [OPTION] while turning on the computer with no cartridge inserted and no powered disk drive #1.
- Cartridge: Turn on computer with cartridge inserted. (disables BASIC)
- Cassette boot: (boot cassette may or may not require BASIC or cartridge)
  1. With BASIC or with cartridge (cartridge disables BASIC):
     Hold down [START] while turning on the computer.
     With no cartridge and without BASIC:
     Hold down both [START] and [OPTION] while turning on the computer.
     (System buzzer sounds)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the computer.
- Disk boot: (boot disk may or may not require BASIC or cartridge inserted)
  - With BASIC or with cartridge (cartridge disables BASIC):
    Turn on computer with boot disk inserted in powered disk drive #1.
  - With no cartridge and without BASIC:
    Hold down [OPTION] while turning on computer with boot disk inserted in powered disk drive #1.

Box: "Feature For Feature, Your Best Value"

Versions of the Atari 600XL:

- Domestic version for NTSC M television (North America)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC NTSC 'E' version, C021697
    - Possibly some early units incorrectly shipped with ANTIC NTSC version C012296, see Tech Tip 20, 8/17/83.
  - GTIA NTSC version, C014805
  - 16 KiB Operating System ROM
    - Early units: XL OS REV. 1, C062024
    - Standard as of October 1983 (FSM): XL OS REV. 2, C061598
  - Atari BASIC (8 KiB ROM)
    - Most units: Atari BASIC REV. B, C060302
    - Late units: Atari BASIC REV. C, C024947
  - No Monitor port
  - Switch Box jack for RF output for TV
  - Channel switch on back of computer selects TV output RF channel: 2 or 3
  - TV Switch Box and TV connecting cable both supplied with computer
  - Manuals:
    - The Atari 600XL Home Computer Owner's Guide C061530 (USA; 21 pages)
    - Atari Computer 600XL C061946 (international; 61 pages)
    - Connection Instructions for NTSC TV Systems C062228 (international)

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    - Also included in KX7110 "AtariWriter System All-In-One-Pak": 600XL + 1027 + AtariWriter + paper stock + "One Way to Write Anything" book. http://www.rhod.fr/ataripics/hardwarewriterpackkompleet.jpg
    - A small number of 600XLs were sold in Canada with 64 KiB RAM. The box had a round gold foil sticker reading: "64k Memory – Now with a full 64k of memory built-in." The computer contains an internal memory upgrade daughterboard by BOT Engineering (based near Toronto).
- PAL versions for PAL B/G television (Europe) or PAL I television (UK)
    - 6502 microprocessor (Atari SALLY), C014806
    - ANTIC PAL 'B' version, C021698
        - First 24,000 units incorrectly shipped with ANTIC PAL 'A' version C014887, see Tech Tip 20, 8/17/83
    - GTIA PAL version, C014889
    - 16 KiB Operating System ROM
        - Early units: XL OS REV. 1, C062024
        - Standard as of October 1983 (FSM): XL OS REV. 2, C061598
    - Atari BASIC REV. B (8 KiB ROM), C060302
    - Monitor port is Atari 5-pin
        - Pin 1 (luminance on 800) is not connected
        - Pin 5 (chrominance on 800) is Ground
    - T.V. jack for RF output for TV
    - No TV RF Channel select switch
    - TV output: RF channel 4 (PAL B version) or 36 (PAL G/PAL I versions).
    - RF Cable for TV connection supplied with computer
    - Manuals:
        - Atari Computer 600XL C061946 (international; 61 pages)
        - Connection Instructions for PAL TV Systems C061947
    - Evidence of version localized for Finland: http://www.atarimania.com/documents/atari_600xl_manual_finnish.pdf
    - Evidence of version localized for Sweden: https://atariage.com/forums/topic/113499-dump-my-atari-os-rom/
- A SECAM 600XL ("Pauline") for France was announced but never shipped.

5 different types of 600XL/800XL keyboards were nicely documented by Beetle here: http://atariage.com/forums/topic/105170-600800xl-keyboard-variants/

Power: Requires 1.5A at 5V DC as supplied by the Atari C061982 or C061763 power adapters or equivalent.

Technical manual:

- Atari 600XL Computer Field Service Manual FD100610 REV. 1 October 1983

The 600XL was made for Atari by Chelco Sound (Hong Kong) Limited from July to December 1983 (NTSC units with "black label" 7YJ serial numbers) and by Atari in Hong Kong from September 1983 to April 1984 (most NTSC and all PAL units). A handful of NTSC units were remanufactured at Atari Taiwan Manufacturing Corp. (ATMC) between 1984 and 1986.

The Atari 600XL was utilized by Exidy as an embedded system in their Max-A-Flex coin-operated arcade conversion system (configurable to play: Astro Chase, Boulder Dash, Bristles, or Flip and Flop). (My Atari Magazine, January 2003.)

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1.6) What is the Atari 800XL?

Introduced in June 1983 alongside the 600XL, 1400XL (never shipped), and 1450XLD (never shipped), and first shipped late that year, the Atari 800XL was designed as the 64 KiB RAM (62 KiB usable) version of the low-end 600XL. Small quantities of 800XL computers shipped in the US late in 1983, before mass shipments commenced worldwide late winter/early spring, 1984.

The project that led to the introduction of the 800XL had been known inside Atari by names including: "600", "Liz", "Crazy 8", "S-8" / "Sweet-8", "Surely Plus".

The 600XL/800XL include most of the features of the 1200XL, minus the 4 Function keys, the 2 LED lights, and the "ATARI" logo screen. But both the 600XL and 800XL have the Atari BASIC language built-in. In addition, these two systems offer the Parallel Bus Interface (PBI), providing fast parallel access to the heart of the computer.

600XL/800XL SIO pin 10 is +5V/Ready as on the 400/800, restoring compatibility with SIO devices designed to draw power from that line which would not work on the 1200XL.

Keyboard changes for the 600XL/800XL relative to the 1200XL:

- The [BREAK] key was moved to the main part of the keyboard – at the upper-right, where it had been on the 400/800.
- The [Reverse] key was moved to the main part of the keyboard – at the lower-right, to the right of the right [SHIFT] key.
  Note that on the 400/800 the equivalent "Atari Logo" key had been immediately to the left side of the right [SHIFT] key.
- Five "function keys" placed to the right of the main keyboard, from top to bottom:
  [RESET] [OPTION] [SELECT] [START] [HELP]
- No function keys [F1][F2][F3][F4] as found on the 1200XL

Color frequencies generated by the 800XL are user-adjustable via a variable resistor (R38) accessible via a small hole in the bottom of the case.

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System initialization types supported:

- Atari BASIC: Turn on computer with no cartridge inserted and no powered disk drive #1.
- Self Test program: Hold down [OPTION] while turning on the computer with no cartridge inserted and no powered disk drive #1.
- Cartridge: Turn on computer with cartridge inserted. (disables BASIC)
- Cassette boot: (boot cassette may or may not require BASIC or cartridge)
  1. With BASIC or with cartridge (cartridge disables BASIC):
     Hold down [START] while turning on the computer.
     With no cartridge and without BASIC:
     Hold down both [START] and [OPTION] while turning on the computer.
     (System buzzer sounds)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the computer.
- Disk boot: (boot disk may or may not require BASIC or cartridge inserted)
  - With BASIC or with cartridge (cartridge disables BASIC):
    Turn on computer with boot disk inserted in powered disk drive #1.
  - With no cartridge and without BASIC:
    Hold down [OPTION] while turning on computer with boot disk inserted in powered disk drive #1.

Box: "More Memory Means More Power"

Versions of the Atari 800XL:

- Domestic version for NTSC M television (North America)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC NTSC 'E' version, C021697
    - Substituted in earlier units: ANTIC NTSC version, C012296
  - GTIA NTSC version, C014805
  - 16 KiB Operating System ROM: XL OS REV. 2, C061598
  - Atari BASIC (8 KiB ROM)
    - Most units: Atari BASIC REV. B, C060302
    - Late units: Atari BASIC REV. C, C024947
  - Monitor port is Atari 5-pin
    - Pin 5 (chrominance on 800) is not connected
  - Switch Box jack for RF output for TV
  - Channel switch on back of computer selects TV output RF channel: 2 or 3
  - TV Switch Box and TV connecting cable both supplied with computer
  - Manuals:
    - The Atari 800XL Home Computer Owner's Guide C061589 (USA; 22 pages)
    - Atari Computer 800XL C024450 (international; 64 pages)
    - Connection Instructions for NTSC TV Systems C062228 (international)
  - PAL N version is NTSC version internally modified by Atari's distributor in Argentina, Skydata S.A., for 220 V/50 Hz power and for PAL N television/video output
- PAL versions for PAL B/G television (Europe) or PAL I television (UK)
  - Later unit motherboards (9/84 revision): "800XLF"
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC PAL 'B' version, C021698
    - Substituted in earlier units: ANTIC PAL 'A' version, C014887
  - GTIA PAL version, C014889

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  - 16 KiB Operating System ROM: XL OS REV. 2, C061598
  - Atari BASIC (8 KiB ROM)
    - Most units: Atari BASIC REV. B, C060302
    - Later units: Atari BASIC REV. C, C024947
  - Monitor port is Atari 5-pin
    - Earlier units: Pin 5 (chrominance on 800) is not connected
    - Later/"800XLF" units: Pin 5 is chrominance video (as on the 800)
  - Switch Box jack for RF output for TV
  - No TV RF Channel select switch
  - TV output: RF channel 4 (PAL B version) or 36 (PAL G/PAL I versions)
  - RF Cable for TV connection supplied with computer
  - Manuals:
    - Atari Computer 800XL C024450 (international; 64 pages)
    - Connection Instructions for PAL TV Systems C061947
  - Visual tour: https://www.atari800xl.eu/hardware/computers/pal-atari-800xl.html
  - UK version also included in the 800XL 64K Personal Computer Pack:
    - 800XL + 1010 + CX4101 Invitation to Programming 1 cassette + TX8034 Pole Position/Atari Demo cassette
    - https://tinyurl.com/438k69uv (see also Atari User #1 May 1985 page 19)
- SECAM version (France)
  - Motherboard: "SECAM ROSE"
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC PAL 'B' version, C021698
  - FGTIA, C020120
  - Monitor port is Atari SECAM 6-pin
  - No Switch Box jack
  - No TV RF Channel select switch
  - Internal color/monochrome switch
  - TV cable (Monitor port to SCART/Peritel) supplied with computer
  - 16 KiB Operating System ROM: XL OS REV. 2, C061598
  - Atari BASIC REV. C (8 KiB ROM), C024947
  - Manuals:
    - Atari Computer 800XL C024450 (international; 64 pages)
    - Connection Instructions for SECAM Television Systems C025342
  - Visual tour: https://www.atari800xl.eu/hardware/computers/secam-atari-800xl.html

5 different types of 600XL/800XL keyboards were nicely documented by Beetle here: http://atariage.com/forums/topic/105170-600800xl-keyboard-variants/

Power: Requires 1.5A at 5V DC as supplied by the Atari C061982 or C061763 power adapters or equivalent.

Technical manuals:

- Atari 800XL Computer Field Service Manual FD100740
  - REV. 01 February 1984
  - REV. 02 June 1985

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The 800XL was made by Atari in Hong Kong from November 1983 to April 1984 (NTSC/PAL units), by Chelco Sound (Hong Kong) Limited for Atari from December 1983 to May 1984 (NTSC units with "black label" 7YJ serial numbers), and by Atari Taiwan Manufacturing Corp. (ATMC) from March 1984 to April 1985 (NTSC/PAL/SECAM units) and again from January 1987 to February 1987 (PAL units). A handful of units were remanufactured at ATMC between 1985 and 1987.

Serial numbers:
http://atariage.com/forums/topic/132201-800-xl-serial-numbers-secampalntsc/

1.7) What is the Atari 65XE?

Introduced in January 1985 alongside the 130XE, the Atari 65XE was the low-end machine in the new range of XE computers that would replace the Atari 600XL/800XL while maintaining compatibility with the earlier models.

The 65XE does not include the PBI port as on the 600XL/800XL, but many 65XE machines include the similar (though physically incompatible) Enhanced Cartridge Interface (ECI).

The 65XE offers 64 KiB RAM (62 KiB usable), and has the Atari XL OS and Atari BASIC on ROM.

On the 65XE/130XE the five "function keys" are found along the top of the main keyboard, from left to right: [HELP] [START] [SELECT] [OPTION] [RESET]

While 1200XL/600XL/800XL keyboard key labels used capital letters exclusively, on 65XE/130XE keyboards only the first letter of the word is capitalized. Also, the [DELETE BACK SPACE] key from the 1200XL/600XL/800XL is abbreviated as [DELETE BK SP] on the 65XE/130XE.

Color frequencies generated by the 65XE are user-adjustable via a variable resistor (R38) accessible via a small hole in the bottom of the case.

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System initialization types supported:

- Atari BASIC: Turn on computer with no cartridge inserted and no powered disk drive #1.
- Self Test program: Hold down [OPTION] while turning on the computer with no cartridge inserted and no powered disk drive #1.
- Cartridge: Turn on computer with cartridge inserted. (disables BASIC)
- Cassette boot: (boot cassette may or may not require BASIC or cartridge)
  1. With BASIC or with cartridge (cartridge disables BASIC):
     Hold down [START] while turning on the computer.
     With no cartridge and without BASIC:
     Hold down both [START] and [OPTION] while turning on the computer.
     (System buzzer sounds)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the computer.
- Disk boot: (boot disk may or may not require BASIC or cartridge inserted)
  - With BASIC or with cartridge (cartridge disables BASIC):
    Turn on computer with boot disk inserted in powered disk drive #1.
  - With no cartridge and without BASIC:
    Hold down [OPTION] while turning on computer with boot disk inserted in powered disk drive #1.

Versions of the Atari 65XE:

- Domestic version for NTSC M television (North America)
  - Most units: No ECI
    Late units: NTSC 130XE motherboard (including ECI, but only 64 KiB RAM)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC NTSC 'E' version, C021697
  - GTIA NTSC version, C014805
  - Monitor port is Atari 5-pin
  - Television Jack for RF output
  - TV Channel Select Switch on back of computer selects RF channel: 2 or 3
  - TV Switch Box and TV Video Cable both supplied with computer
  - 16 KiB Operating System ROM
    - Most units: XL OS REV. 2, C061598
    - Late units: XL OS REV. 3, C300717
  - Atari BASIC REV. C (8 KiB ROM), C024947
  - Manuals:
    - Atari 65XE Personal Computer Owner's Manual C072018-001
      REV. A (1984) or REV. B (1987)
  - NOM version ("Normas Oficiales Mexicanas") is the standard NTSC version, certified for sale in Mexico. Such units were distributed in a Spanish language box.
    - Manual: Manual Atari XE

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    - Also sold in Chile by Coelsa (official Atari importer) as part of a 65XE game system package: 65XE + XG-1 Light Gun + CX40 Joystick
        - Box design #1: https://retrogames.cl/imagenes/varios/zz/65xeblu.jpg
        - Box design #2: http://tinyurl.com/mwccatcw http://tinyurl.com/bdd2u7dk
    - PAL N version is NTSC version internally modified by Atari's distributor in Argentina, Skydata S.A., for 220 V/50 Hz power and for PAL N television/video output
- PAL versions for PAL B/G television (Europe) or PAL I television (UK)
    - Early units: No ECI
      Most units: PAL 130XE motherboard (including ECI, but only 64 KiB RAM)
    - 6502 microprocessor (Atari SALLY), C014806
    - ANTIC PAL 'B' version, C021698
    - GTIA PAL version, C014889
    - Monitor port is Atari 5-pin
    - Television Jack for RF output
    - No TV Channel Select Switch
    - TV output: RF channel 4 (PAL B version) or 36 (PAL G/PAL I versions)
    - TV Video Cable supplied with computer
    - 16 KiB Operating System ROM
        - Most units: XL OS REV. 2, C061598
        - Late units: XL OS REV. 3, C300717
    - Atari BASIC REV. C (8 KiB ROM), C024947
    - Manuals:
        - Atari XE Ordenador Personal Guia del Usuario C072018-007
        - Atari Computer 65XE/130XE Instrukcje Obsługi C072018-009 (1991)
- Najm ("Star") version for PAL television (Middle East)
    - "65XEN" motherboard
    - ECI port
    - 6502 microprocessor (Atari SALLY), C014806
    - ANTIC PAL 'B' version, C021698
    - GTIA PAL version, C014889
    - Monitor port is Atari 5-pin
    - Television Jack for RF output
    - No TV Channel Select Switch
    - TV output: Unknown, likely either RF channel 4 (PAL B) or 36 (PAL G)
    - TV Video Cable supplied with computer
    - 16 KiB Operating System ROM: XL OS REV. 3B (Arabic localized OS), C101700
    - Atari BASIC REV. C (8 KiB ROM), C024947
    - Manual: Yes (Arabic language)
    - Sold/distributed exclusively by Atari distributor for the Middle East, aDawliah Universal Electronics APL (of Saudi Arabia), as part of the package: 65XE + (XC12 or NA-R25 Najm or NC-60 Najm) + (2 x CX40) https://preview.tinyurl.com/yaz7e2lo
    - Visual tour: https://www.atari800xl.eu/hardware/computers/star-arabic-atari-65xe.html
    - Another analysis (Polish): http://preview.tinyurl.com/jnl2l2l
    - More info (Polish): http://atariki.krap.pl/index.php/Arabski_65XE
    - Prototype NTSC Arabic 65XE: http://www.savetz.com/vintagecomputers/arabic65xe/

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Power: Requires 1.0A at 5V DC as supplied by the Atari C070042, C070045, or C070046 power adapters or equivalent (such as the Atari C061982 or C061763).

The 65XE was made by Atari Taiwan Manufacturing Corp. (most units), by Sistemas Inteligentes, S.A. de C.V. (earlier name)/Atari (Mexico) Fabricante, S.A. de C.V. (later name) (units for Mexico), and in China (late production 1991 or 1992 units).

The Atari 65XE was utilized by Medalist as an embedded system in their Dart Star coin-operated electronic dart boards (1988-1989 units only?).
Details wanted!
https://atariage.com/forums/topic/306473-65xe-arcade-game/

1.8) What is the Atari 130XE?

Introduced in January 1985 alongside the 65XE, the Atari 130XE was the high-end machine in the new range of XE computers that would replace the Atari 600XL/800XL while maintaining compatibility with the earlier models.

The 130XE offers 128 KiB RAM (126 KiB usable), and has the Atari XL OS and Atari BASIC on ROM.

The 130XE does not include the PBI port as on the 600XL/800XL, but it does include the similar (though physically incompatible) Enhanced Cartridge Interface (ECI).

On the 65XE/130XE the five "function keys" are found along the top of the main keyboard, from left to right: [HELP] [START] [SELECT] [OPTION] [RESET]

While 1200XL/600XL/800XL keyboard key labels used capital letters exclusively, on 65XE/130XE keyboards only the first letter of the word is capitalized. Also, the [DELETE BACK SPACE] key from the 1200XL/600XL/800XL is abbreviated as [DELETE BK SP] on the 65XE/130XE.

Color frequencies generated by the 130XE are user-adjustable via a variable resistor (R38) accessible via a small hole in the bottom of the case.

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System initialization types supported:

- Atari BASIC: Turn on computer with no cartridge inserted and no powered disk drive #1.
- Self Test program: Hold down [OPTION] while turning on the computer with no cartridge inserted and no powered disk drive #1.
- Cartridge: Turn on computer with cartridge inserted. (disables BASIC)
- Cassette boot: (boot cassette may or may not require BASIC or cartridge)
  1. With BASIC or with cartridge (cartridge disables BASIC):
     Hold down [START] while turning on the computer.
     With no cartridge and without BASIC:
     Hold down both [START] and [OPTION] while turning on the computer.
     (System buzzer sounds)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the computer.
- Disk boot: (boot disk may or may not require BASIC or cartridge inserted)
  - With BASIC or with cartridge (cartridge disables BASIC):
    Turn on computer with boot disk inserted in powered disk drive #1.
  - With no cartridge and without BASIC:
    Hold down [OPTION] while turning on computer with boot disk inserted in powered disk drive #1.

Versions of the Atari 130XE:

- Domestic version for NTSC M television (North America)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC NTSC 'E' version, C021697
  - GTIA NTSC version, C014805
  - 16 KiB Operating System ROM
    - Most units: XL OS REV. 2, C061598
    - Late units: XL OS REV. 3, C300717
  - Atari BASIC REV. C (8 KiB ROM), C024947
  - Monitor port is Atari 5-pin
  - Television Jack for RF output
  - TV Channel Select Switch on back of computer selects RF channel: 2 or 3
  - TV Switch Box and TV Video Cable both supplied with computer
  - Manuals:
    - Atari 130XE Personal Computer Owner's Manual C025951 REV. A 1985
    - Atari 130XE Personal Computer Owner's Manual C025951 REV. A 1986
- PAL versions for PAL B/G television (Europe) or PAL I television (UK)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC PAL 'B' version, C021698
  - GTIA PAL version, C014889
  - 16 KiB Operating System ROM
    - Most units: XL OS REV. 2, C061598
    - Late units: XL OS REV. 3, C300717
  - Atari BASIC REV. C (8 KiB ROM), C024947
  - Monitor port is Atari 5-pin
  - Television Jack for RF output
  - No TV Channel Select Switch
  - TV output: RF channel 4 (PAL B version) or 36 (PAL G/PAL I versions)
  - TV Video Cable supplied with computer

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  - Manuals:
    - Atari 130XE Personal Computer Manuale d'Uso C026071
    - Atari 130XE Personal Computer Gebruikershandleiding C026072
    - Das 130XE Handbuch C026073, c1985
    - Das Atari XE Handbuch (130XE/800XE) C072018-004, c1987
    - Atari XE Ordenador Personal Guia del Usuario C072018-007
    - Atari Computer 65XE/130XE Instrukcje Obsługi C072018-009 (1991)
  - UK version also included in the 130XE Starter Pack:
    130XE + XC12 + CX40 Joystick + TX9043 Compilation Tape
    (Typo Attack, Missile Command, Centipede, Tennis, Star Raiders)
    http://www.rhod.fr/ataripics/130xestarter.JPG
- SECAM version (France)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC PAL 'B' version, C021698
  - FGTIA, C020120
  - 16 KiB Operating System ROM
    - Most units: XL OS REV. 2, C061598
    - Late units: XL OS REV. 3, C300717
  - Atari BASIC REV. C (8 KiB ROM), C024947
  - Monitor port is Atari SECAM 6-pin
  - No Television Jack
  - No TV Channel Select Switch
  - Color Mono switch on back of computer to affect video output
  - TV cable (Monitor port to SCART/Peritel) supplied with computer
  - Manual: Atari 130XE Ordinateur Personnel Manuel d'utilisation C026059
  - Also sold in a package with the 1050 Floppy Disk Drive:
    http://www.rhod.fr/images_recherches/frenchpack.jpg

Power: Requires 1.0A at 5V DC as supplied by the Atari C070042, C070045, or C070046 power adapters or equivalent (such as the Atari C061982 or C061763).

Technical manual:

- Atari 130XE Reference Manual (field service manual)

The 130XE was made by Atari Taiwan Manufacturing Corp. (most units) and in China (late production 1991 or 1992 units).

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1.9) What is the Atari XE game system?

With the February 1987 introduction of the Atari XE game system, Atari both extended the established 65XE/130XE product line and also added a third game system to complement the established 2600 and 7800 product lines.

Termed variously by Atari as the XE Video Game System, the XE Game System, or the XE System, the name was actually trademarked by Atari as simply: XE. (For clarity, this FAQ List will normally use "XE game system" or "XEgs".)

The core component of the XEgs is the XE System console, which is essentially a complete 65XE but without a keyboard. A companion XE System keyboard was produced and often sold with the console.

The XE System console offers 64 KiB RAM (62 KiB usable) and has the Atari XL OS, Atari BASIC, and Missile Command on ROM.

Distinctive hardware features of the XE System console:
- Keyboard Port (for the separate XE System keyboard)
- Audio jack (phono)
- Video jack (phono, providing composite video)

65XE/130XE features not present on the XE System console:
- No Enhanced Cartridge Interface (ECI)
- NTSC/PAL versions: No Monitor port
- SECAM version: No Television jack

System initialization types supported:
- Cartridge: Press [Power] on the console with cartridge inserted.
  (disables BASIC and Missile Command)
- Atari BASIC, Missile Command, Self Test, Cassette boot, or Disk boot:
  (boot cassette or boot disk may or may not require BASIC or cartridge)

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Keyboard Attached	Held down while pressing [POWER]: [OPTION]	[SELECT]	[START]	Result
N	N	N	N	Start Missile Command
N	N	N	Y	Cassette boot, Missile Command enabled
N	N	Y	N	Disk #1 boot if present, BASIC enabled
N	N	Y	Y	Cassette boot, BASIC enabled
N	Y	N	N	Disk #1 boot if present, else Self Test
N	Y	N	Y	Cassette boot, BASIC/Missile Command disabled
N	Y	Y	N	Start Missile Command
N	Y	Y	Y	Cassette boot, Missile Command enabled
Y	N	N	N	Disk #1 boot if present, BASIC enabled
Y	N	N	Y	Cassette boot, BASIC enabled
Y	N	Y	N	Start Missile Command
Y	N	Y	Y	Cassette boot, Missile Command enabled
Y	Y	N	N	Disk #1 boot if present, else Self Test
Y	Y	N	Y	Cassette boot, BASIC/Missile Command disabled
Y	Y	Y	N	Disk #1 boot if present, BASIC enabled
Y	Y	Y	Y	Cassette boot, BASIC enabled

- Cassette boot further steps:
  (System buzzer sounds.)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the Keyboard if present, else press [START].

Versions of the XE System console:

- Domestic version for NTSC M television (North America)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC NTSC 'E' version, C021697
  - GTIA NTSC version, C014805
  - 32 KiB ROM, C101687: XL OS REV. 4 + Atari BASIC REV. C + Missile Command
  - No Monitor port
  - Monitor Video Jack (phono) for composite video output
  - Television jack for RF output
  - TV Channel Selector switch on back of console selects RF channel 2 or 3
  - TV Switch Box and TV Cable both supplied with console
  - XE 4001 package: XE System console + XE System keyboard + XG-1 Light Gun + CX40 Joystick + Flight Simulator II + Bug Hunt
    http://www.rhod.fr/ataripics/xegamesystem.jpg
  - Console and Keyboard manuals:
    - Atari XE System Owner's Manual C100608 / C033514 (26 pages)
    - Atari XE System keyboard Owner's Manual C100609 / C033513 (99 pages)
  - PAL N version is NTSC version internally modified by Atari's distributor in Argentina, Skydata S.A., for 220 V/50 Hz power and for PAL N television/video output

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- PAL versions for PAL B/G television (Europe) or PAL I television (UK)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC PAL 'B' version, C021698
  - GTIA PAL version, C014889
  - 32 KiB ROM, C101687: XL OS REV. 4 + Atari BASIC REV. C + Missile Command
  - No Monitor port
  - Monitor Video Jack (phono) for composite video output
  - Television jack for RF output
  - No TV Channel Selector switch
  - TV output: RF channel 4 (PAL B version) or 36 (PAL G/PAL I versions)
  - TV Cable supplied with console
  - XE 4001 package: (English)
    XE System console + XE System keyboard + XG-1 Light Gun +
    CX40 Joystick + Flight Simulator II + Bug Hunt
    http://www.rhod.fr/ataripics/xegamesystem.jpg
  - XE 3001 package: (English/German/French/Italian/Spanish)
    XE System console + CX40 Joystick
    http://www.rhod.fr/ataripics/xesystem1.jpg
    Unboxing - Benelux https://www.youtube.com/watch?v=EJ-eAyav5G4
  - XE 2002 package: (English/German/French/Italian/Spanish)
    XE System keyboard + Flight Simulator II
    http://www.rhod.fr/ataripics/xesystem3.jpg
  - Console manuals:
    - Atari XE System Owner's Manual C100608 / C033514 (26 pages)
    - Atari XE System Benutzerhandbuch C100608-004
    - Atari XE System Manuale d'uso C100608 (26 pages)
    - Atari XE System Manual del usuario
  - Keyboard manuals:
    - Atari XE System keyboard Owner's Manual C100609 / C033513 (99 pages)
    - Atari XE System Tastiera Manuale d'uso C100609 (103 pages)
- SECAM version (France)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC PAL 'B' version, C021698
  - FGTIA, C020120
  - 32 KiB ROM, C101687: XL OS REV. 4 + Atari BASIC REV. C + Missile Command
  - Monitor port is Atari SECAM 6-pin
  - Monitor Video Jack (phono) for composite video output
  - No Television jack
  - No TV Channel Selector switch
  - TV cable (Monitor port to SCART/Peritel) supplied with console
  - XE 5001 package:
    XE System console + XG-1 Light Gun + Bug Hunt + CX40 Joystick
    https://preview.tinyurl.com/ydgju6nl
  - XE 2012 package:
    XE System keyboard + XC12 + Flight Simulator II
    https://preview.tinyurl.com/ydgju6nl
  - Console and Keyboard manuals:
    - Atari XE System console de jeu Manuel d'utilisation
    - Atari XE System clavier XE Manuel d'utilisation C100609-003
  - http://www.atarimania.com/catalog-atari-atari-france-10-88_273_8.html

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Power: Requires 1.0A at 5V DC as supplied by the Atari C070042, C070045, or C070046 power adapters or equivalent (such as the Atari C061982 or C061763).

The XE System console and the XE System keyboard were made by Atari Taiwan Manufacturing Corp.

1.10) What is the Atari 800XE?

The Atari 800XE was announced (not by name at the time) in March 1987 in West Germany, and shipped later that year as a regional (West Germany, Austria, Switzerland) complement to the Atari 65XE and 130XE. The 800XE name was selected in a marketing attempt to capitalize on the recent and surprisingly swift final sellout of available inventory of new 800XL units. (The 800XE was never introduced in the US)

The 800XE is identical to the common PAL B version of the 65XE, utilizing the same PAL 130XE motherboard with Enhanced Cartridge Interface (ECI).

The 800XE offers 64 KiB RAM (62 KiB usable), and has the Atari XL OS and Atari BASIC on ROM.

Color frequencies generated by the 800XE are user-adjustable via a variable resistor (R38) accessible via a small hole in the bottom of the case.

System initialization types supported:

- Atari BASIC: Turn on computer with no cartridge inserted and no powered disk drive #1.
- Self Test program: Hold down [OPTION] while turning on the computer with no cartridge inserted and no powered disk drive #1.
- Cartridge: Turn on computer with cartridge inserted. (disables BASIC)
- Cassette boot: (boot cassette may or may not require BASIC or cartridge)
  1. With BASIC or with cartridge (cartridge disables BASIC):
     Hold down [START] while turning on the computer.
     With no cartridge and without BASIC:
     Hold down both [START] and [OPTION] while turning on the computer.
     (System buzzer sounds)
  2. Press [PLAY] on the program recorder with boot cassette inserted.
  3. Press [RETURN] on the computer.
- Disk boot: (boot disk may or may not require BASIC or cartridge inserted)
  - With BASIC or with cartridge (cartridge disables BASIC):
    Turn on computer with boot disk inserted in powered disk drive #1.
  - With no cartridge and without BASIC:
    Hold down [OPTION] while turning on computer with boot disk inserted in powered disk drive #1.

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Versions of the Atari 800XE:

- PAL versions for PAL B/G television (Europe)
  - PAL 130XE motherboard (including ECI, but only 64 KiB RAM)
  - 6502 microprocessor (Atari SALLY), C014806
  - ANTIC PAL 'B' version, C021698
  - GTIA PAL version, C014889
  - 16 KiB Operating System ROM: XL OS REV. 3, C300717
  - Atari BASIC REV. C (8 KiB ROM), C024947
  - Monitor port is Atari 5-pin
  - Television Jack for RF output
  - TV Channel Select Switch: Either not present, or has no effect
  - TV output: RF channel 4 (PAL B version) or 36 (PAL G version)
  - TV Video Cable supplied with computer
  - Manual: Das Atari XE Handbuch (130XE/800XE) C072018-004, © 1987

Some images of the 800XE: http://www.silicium.org/oldskool/atari/800xe.htm

Power: Requires 1.0A at 5V DC as supplied by the Atari C061763 or C070045 power adapters or equivalent (such as the Atari C061763).

Jindrich Kubec writes, "The problematic Chinese 800XEs with GTIA problems were manufactured in 1992."

The 800XE was made by Atari Taiwan Manufacturing Corp. (most units) and in China (late production 1991 or 1992 units).

1.11) What were the Atari 1400XL, 1450XLD, 65XEP, and 65XEM?

Atari publicly introduced or announced several computers in the tradition of the 400/800/XL/XE series that ultimately never shipped.

The **Atari 1400XL computer** was introduced in June 1983 alongside the 600XL, 800XL, and 1450XLD (never shipped), and was promised to ship in September 1983.
Expected to replace the 1200XL, and resembling the 1200XL in appearance, the 1400XL was to provide the features of the 800XL plus a built-in 300 baud modem with ModemLink software and a built-in speech synthesizer (Votrax SC-01).
Earlier internal names at Atari for the 1400XL: "1201", "1200XLT".
Power jack is a female DIN-7 270 Socket: pins 1,6 +5V; pin 2 -5V; pin 4 +12V; pins 3,5,7 GND. Used with an external DC power supply such as the Atari C062023 (https://mcurrent.name/powersupplies/62023.jpg) or equivalent.
Prototype units exist, but the 1400XL (and the C062023) never shipped.
https://tinyurl.com/2p9ctuyy

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The **Atari 1450XLD computer** was introduced in June 1983 alongside the 600XL, 800XL, and 1400XL (never shipped), and was originally promised to ship in October 1983.
As introduced, the 1450XLD was to provide the features of the 1400XL plus a built-in double-sided, dual/enhanced density 260 KiB 5.25" floppy disk drive – connected directly to the computer's PBI processor bus for high-speed operation – with expansion space for a second drive. Integral Disk Drives would be capable of operating either as a single logical drive ("large" mode) or as two logical drives (one per physical side of the disk; "small" mode).
A revised 1984 design ("TONG" motherboard) would instead feature a double-sided, double density 360 KiB 5.25" floppy disk drive – also supporting both single and dual/enhanced densities – and would include the newer Silicon Systems SSI-263, equivalent to the Votrax SC-02 speech synthesis chip.
Atari continued to promote the 1450XLD by name through May 1984, and privately showed the 1984 design at the June 1984 CES. Earlier internal names at Atari for the 1450XLD: "6402", "1251", "1250", "1200XLD", "1250XLD". Also: "1450XL" (without internal disk drive).
Power jack is a female DIN-8 270 Socket: pins 1,6 +5V; pin 2 -5V; pin 4 +12V; pins 3,5,7,8 GND. Used with an external DC power supply such as the Atari C062297 (https://mcurrent.name/powersupplies/62297.jpg) or equivalent.
Prototype units exist, but the 1450XLD (and the C062297) never shipped.
https://tinyurl.com/mwvkcu99

The **Atari 65XEP computer** was previewed concurrently with the introductions of the 65XE and 130XE in January 1985. The portable 65XEP was to provide the features of the 65XE, plus built-in 5" monochrome CRT display and 360 KiB 3.5" disk drive. The 65XEP never shipped, and possibly only the single prototype unit ever existed.
Image from CES: https://www.stcarchiv.de/hc1985/04/ces-1985-kampf-der-kolosse

The **Atari 65XEM computer** was pre-announced in advance of the January 1985 introductions of the 65XE and 130XE but it was never introduced. The 65XEM was to provide the features of the 65XE, plus advanced sound/voice synthesis capabilities thanks to the addition of the AMY Sound Processor chip.

Eight voices giving rich music giving the following features:
(Page 6 #14 Mar/Apr 1985; https://tinyurl.com/7kvnubu9)

- Digital sample rate in excess of 30 kHz
- Over 60 dB dynamic range
- Fundamental Frequency Range of 4.8 Hz to 7.8 kHz (10 2/3 octave range)
- Fundamental Frequency Resolution of 1/64 semitones (1.56 cents)
- Precise control of harmonic amplitudes with 1/4 dB
- 64 harmonics
- 8 voices maximum
- Number of harmonics per voice is any multiple of two

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Earlier internal names at Atari for the 65XEM: "XL/M", "900XLA"
No more than a handful of prototype 65XEM units may exist.
https://tinyurl.com/2p84sysy

1.12) What are SALLY, ANTIC, CTIA/GTIA/FGTIA, POKEY, and FREDDIE?

Portions of this section derived from De Re Atari.

The internal layout of the Atari 8-bit computer is very different from other systems. It of course has a microprocessor (a 6502), random-access memory (RAM), read-only memory (ROM), and a peripheral interface adapter (PIA). However, it also has three special-purpose large-scale integration (LSI) chips known as ANTIC, one of CTIA/GTIA/FGTIA, and POKEY. These chips were designed by Atari engineers primarily to take much of the burden of housekeeping off of the 6502, thereby freeing the 6502 to concentrate on computations. While they were at it, they designed a great deal of power into these chips. Each of these chips is almost as big (in terms of silicon area) as a 6502, so the three of them together provide a tremendous amount of power. Mastering the Atari 8-bit computers is primarily a matter of mastering these three chips.

1.12.1) 6502/SALLY microprocessor

MOS Technology MCS6502A or equivalent (400/800, most NTSC): C014377
Atari SALLY (400/800, late NTSC & all PAL; XL/XE, all): C014806

The Atari 400/800 were designed around the MOS Technology MCS6502A (6502 rated for 2 MHz) microprocessor, an 8-bit processor with a 16-bit address bus. The MCS6502 primary designers were **Chuck Peddle** (architecture) and **Bill Mensch** (engineering), and it was introduced by MOS Technology in September 1975. MOS Technology was acquired by Commodore (CBM) in November 1976, and would later operate as Commodore Semiconductor Group (CSG). Before appearing in the Atari 400/800, the 6502 had already gained wide market acceptance in products including the Apple II and Commodore PET microcomputers, and the derivative 6507 was used in the Atari Video Computer System (VCS).

While the 6502 is not proprietary to Atari, the standard 6502 chips shipped in most Atari NTSC 400/800 computers were usually manufactured for Atari and have the Atari C014377 part number.

Later production NTSC 400/800 computers, all PAL 400/800 computers, and all of the Atari XL/XE computer models contain Atari's proprietary version of the 6502 chip. This chip was originally named SALLY by Atari engineers, but Atari Customer Support documents (Field Services Manuals) variously described it as "6502 (Modified)", "6502 Modified", "Custom 6502", or "6502C". Field Service Manuals published by Atari, Corp./Atari Corporation reverted to using the chip's original name, SALLY, while Atari, Corp./Atari Corporation XE consumer owner's manuals (unfortunately) continued to use "6502C" in reference to the SALLY 6502.

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Several manufacturers produced the SALLY 6502 for Atari, including MOS Technology, Synertek, Rockwell, NCR, and United Microelectronics (UMC). It is important to note that chips marked "6502C" such as the MOS Technology MCS6502C, MOS Technology MPS6502C, Synertek SY6502C, Rockwell R6502C, or UMC UM6502C are NOT the Atari "6502C" but rather equivalents to the standard MCS6502 that are certified for 4 MHz operation. Atari SALLY 6502 chips are never marked "6502C" but, other than the UMC UM6502I, always carry the Atari part number C014806.

In contrast to the MCS6502 and equivalents, the SALLY 6502 has the addition of a /HALT signal on pin 35. The SALLY 6502 also has a second R/W signal on pin 36 (in addition to pin 34). Pins 35 and 36 are not connected on the MCS6502 and equivalents.

The Atari's second microprocessor, ANTIC, must routinely interrupt the 6502 in order to utilize the processor bus for itself for direct memory access (DMA). /HALT on the SALLY 6502 facilitates this system design. Atari's earlier implementation of the same functionality in the 400/800 using the MCS6502 or equivalent requires a series of 4 additional chips that are unnecessary in computers designed for the SALLY 6502.

Other systems utilizing the Atari SALLY 6502 chip: Atari 5200, Atari 7800

6502.org "The 6502 microprocessor resource": http://www.6502.org/

1.12.2) ANTIC

ANTIC NTSC (pre-'E'): C012296
ANTIC NTSC 'E': C021697
ANTIC PAL 'A': C014887
ANTIC PAL 'B': C021698
C012296/C014887 shipped in the 400/800/1200XL and some 800XL units.
C021697/C021698 shipped in the 600XL, some 800XL, and all XE units.

ANTIC ("AlphaNumeric Television Interface Controller" – FD100001 REV. 02 pages 1-8) is a microprocessor dedicated to the television display. It is a true microprocessor; it has an instruction set, a program (called the display list), and data. The display list and the display data are written into RAM by the 6502. ANTIC retrieves this information from RAM using direct memory access (DMA). It processes the higher level instructions in the display list and translates these instructions into a real-time stream of simple instructions to CTIA/GTIA/FGTIA.

Specific ANTIC functions include:

- Object DMA (Direct Memory Access) control.
  Two types of display DMA (uses 6502 halt for "cycle stealing"):
  1. Playfield DMA - Execution of display list instructions in RAM.
  2. Player-Missile DMA - Automatic fetching of player-missile graphics data from RAM for CTIA/GTIA/FGTIA.

  The ANTIC chip also generates DMA addresses for the (entirely automatic) refresh of on-board dynamic memory RAM (DRAM). ANTIC versions C012296/C014887 use an 8-bit refresh cycle counter, supporting DRAM chips including those requiring 128 cycle/2ms or 256 cycle/4ms refresh (standard 16 KiB and 64 KiB DRAM chips). The C021697/C021698

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ANTIC versions use a 9-bit refresh cycle counter, supporting additional DRAM chips that require more refresh cycles (standard 256 KiB DRAM chips).

- NMI (Non-Maskable Interrupt) control. 3 types of NMIs on the Atari are:
  1. Display List Interrupt (DLI)
  2. [RESET] key
  3. Vertical Blank Interrupt (VBI)
- Vertical and Horizontal fine scrolling
- Vertical line counter (VCOUNT)
- Light pen / light gun position registers
  - New values are stored when any one of the joystick triggers lines (except jacks 1-3 on the 400) is pulled low by the pen/gun, which happens when the light detector in the pen/gun detects the CRT electron beam.
  - Horizontal value is the color clock count (with offset/wraparound), yielding possible values from 0-227.
  - Vertical value is the vertical line counter (VCOUNT) value, or the number of scan lines divided by two, yielding possible values from 0-130 (NTSC ANTIC) or 0-155 (PAL ANTIC).
- WSYNC (wait for horizontal sync) command – allows the 6502 to synchronize itself to the TV horizontal line rate

Another system utilizing the Atari ANTIC chip: Atari 5200

ANTIC C012296 (NTSC) REV. D technical documentation by Atari:
http://preview.tinyurl.com/y8vlcvuq

1.12.3) CTIA/GTIA/FGTIA

CTIA (NTSC): C012295
GTIA (NTSC): C014805
GTIA (PAL): C014889
FGTIA (SECAM): C020120

CTIA	"Color Television Interface Adaptor" – FD100001 REV. 02 p.1-10
	"Colleen Television Interface Adaptor" (probable original)
GTIA	"Graphics Television Interface Adaptor" – FD100001 REV. 02 p.1-10
	"George's Television Interface Adaptor" (probable original)
FGTIA	"French Graphics Television Interface Adaptor" (probable)

Early NTSC 400/800 units shipped with CTIA. Later NTSC 400/800 units, all PAL 400/800 units, and all NTSC XL/XE and PAL XL/XE systems include GTIA. SECAM 800XL, 130XE and XE System console units include FGTIA.

The NTSC versions of CTIA/GTIA were designed to interface with the NTSC version of ANTIC. The PAL version of GTIA and the FGTIA were designed to interface with the PAL version of ANTIC.

The CTIA, GTIA, or FGTIA is the television interface chip. ANTIC directly controls most of the operations of the CTIA/GTIA/FGTIA, although the 6502 can also be programmed to intercede

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and control some or all of the functions of the CTIA/GTIA/FGTIA. The CTIA/GTIA/FGTIA converts the digital commands from ANTIC (or the 6502) into the video signal output.

In addition to its basic television/video interface function, the CTIA/GTIA/FGTIA performs color-luminance control for the entire video signal, player-missile control, and both priority control and collision detection among player-missiles and the background. The CTIA/GTIA/FGTIA also reads the controller port trigger inputs and the console keys (Start/Select/Option), and it generates console speaker sounds. In the XL/XE, the GTIA/FGTIA senses the presence of an active ROM cartridge, and in the XE System console the GTIA/FGTIA senses the presence of an XE Keyboard.

The GTIA is backward compatible with the CTIA, with the GTIA simply making available three additional graphics modes (GTIA Modes 1-3). Notably, both the 400/800 OS REV. A and Atari BASIC REV. A were GTIA-ready from their 1979 release. By way of explanation, Robin Sherer of Santa Cruz Education Software was quoted in InfoWorld 15-Mar-1982 regarding GTIA:
"They had it designed before the computer even went to market. They had already ordered 100,000 of the CTIAs – that's the rumored number. Not wanting to throw away chips, they introduced [computers] in this country with the CTIA."

The FGTIA is software compatible with the GTIA. However, in GTIA Mode 1 the FGTIA can only display 8 distinct luminances, compared to the 16 distinct luminances that can be displayed in GTIA Mode 1 by the GTIA.

Whether CTIA or GTIA/FGTIA is installed can be determined by observing what happens as a result of trying to enter a GTIA graphics mode. In Atari BASIC, at the "READY" prompt, type POKE 623,64 [RETURN]. If the screen blackens, you have the GTIA or FGTIA chip. If it stays blue, you have the early CTIA chip.

Bill Wilkinson offers a technique whereby software can determine whether a CTIA or a GTIA is installed in his "Insight: Atari" column in the January 1983 (#32) issue of Compute! magazine, page 171, see:
http://www.atarimagazines.com/compute/issue32/085_1_INSIGHT_ATARI.php

A substantial number of late-production Atari XE computer systems, especially later 800XE computers made in China, shipped with moderately defective GTIA chips. This page (in Polish) details the scope of the issue, including how to detect whether a given computer contains one of the faulty GTIA chips:
http://atariki.krap.pl/index.php/GTIA
Simius designed a GTIA Fixer in 2010:
(Polish) http://atariki.krap.pl/index.php/Simius_GTIA_Fixer
Jurgen van Radecke (tfhh) offers the Simius-designed GTIA Fixer (2015):
http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf

Pawel Rosowski published this detailed description of the highly-obscure temperature-dependent "Delayed GTIA Functions" ("DGF") phenomenon in 2013:
http://preview.tinyurl.com/zcjl6cl

Another system utilizing the Atari GTIA chip: Atari 5200

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Technical documentation by Atari:

GTIA (NTSC) C014805: http://blog.3b2.sk/igi/file.axd?file=2012%2F12%2Fgtia.pdf

FGTIA C020120:
http://ftp.pigwa.net/stuff/collections/nir_dary_cds/Tech%20Info/FGTIA.PDF

1.12.4) POKEY

C012294

POKEY (name derived from POtentiometer and KEYboard) is a digital input/output (I/O) chip. It handles such disparate tasks as the serial I/O bus (SIO), audio generation, keyboard scan, timers, and random number generation. It also digitizes the resistive paddle inputs (potentiometer or "pot" ports) and controls selected maskable interrupt (IRQ) requests from peripherals (other IRQs are handled by the PIA).

- The 8 pot ports (pot input lines) are used to convert analog voltages to digital values by measuring internal dump resistor rise/charge times to logic "1" once per each video output scan line. Timing counters for each pot line increment once per color clock, and there are 228 color clocks per scan line, yielding possible counts/values from 1-228.
- The POKEY two-tone mode is used to produce the sounds that comprise the digital track when saving data to cassette with an Atari program recorder.
- The POKEY volume control only mode (4-bit PCM) is used to produce the tones for tone dialing by the Atari 1030 Modem.

Other systems utilizing the Atari POKEY chip:
- 40 production coin-operated arcade games released by Atari or Atari Games, from Missile Command (June 1980) to Tetris and Vindicators Part II (both released February 1989). (Thanks to Laurent Delsarte for the list.)
- Centuri Tunnel Hunt, coin-operated arcade game licensed from Atari
- Atari 5200
- Atari Ballblazer and Commando cartridges for the Atari 7800

POKEY Technical documentation by Atari:
http://visual6502.org/images/C012294_Pokey/pokey.pdf

1.12.5) FREDDIE

800XL ("800XLF" and SECAM), XE (all): C061922/C061991

According to Atari's design specification (C061922), the "Freddie RAM" Memory Control Unit is a custom LSI chip providing dynamic RAM (DRAM) control functions. It replaces a number of small-scale integration (SSI) and medium-scale integration (MSI) transistor-transistor logic (TTL) parts, including a custom delay line. FREDDIE multiplexes 16-bit RAM addresses from the processor bus into 8-bit row and 8-bit column addresses for direct use in the DRAM, and it generates row and column DRAM address timing strobes.

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Any functional difference between the C061922 and C061991 FREDDIE versions is not well established. It is theorized that the original C061922 was designed to work with the earlier C012296/C014887 ANTIC versions with 7-bit DRAM refresh address counter for 128 row addresses, while the later C061991 also supports an 8-bit counter for 256 row addresses as generated by the later C021697/C021698 ANTIC versions. Both versions carry the 1983 copyright date.

"FREDDIE" or "FREDDY"?
Atari technical documentation consistently uses "FREDDIE" while Atari consumer documentation (Owner's Manuals for all XE systems) consistently uses "FREDDY."
This FAQ List adopts the convention from Atari's technical documentation: "FREDDIE"

FREDDIE technical documentation by Atari: https://tinyurl.com/bdemtkzc

According to the preliminary Atari 600 product specification at
https://archive.org/details/AtariA600XLProductStatusMeetingHandout
an earlier name for the chip was "FRED", and it had the additional purpose to make possible a low-cost external 5200 adaptor for the upcoming Atari computers (600XL/800XL).

1.12.6) 6520 PIA

MOS Technology MCS6520A or equivalent: C012298/C014795/C014812

The 8-bit Atari uses the MOS Technology MCS6520A (6520 rated for 2 MHz) or equivalent as a peripheral interface adapter (PIA). Introduced in 1976, the MCS6520 was a direct pin-for-pin replacement, with identical electrical specifications, for the Motorola MC6820 PIA which had been introduced in 1974. 6820 principal designer at Motorola: **Bill Mensch**.

Also in 1976, Motorola introduced the MC6821 PIA, a functionally equivalent replacement for the MC6820 with slightly different electrical specifications.

While the 6520 is not proprietary to Atari, the PIA chips shipped in Atari computers were usually manufactured for Atari and have an Atari part number:
- C012298 = Synertek P6520A (early 400/800 units)
- C014795 = Any 2 MHz 6520 equivalent (replaced the C012298 part number)
- C014812 = 68B21 (Motorola MC6821 rated for 2 MHz) or equivalent.

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1.12.7) Hardware manuals from Atari

- Hardware Manual, © 1980 edition, October 1980
  - Section VI.C. Schematics is published single-sided.
  - Pages B-10 and B-11 (Memory Configurations) are hand-drawn.
  - BLUE line-printed title page. Included in:
    - "Atari Personal Computer System Operating System User's Manual and Hardware Manual" November 1980 C016555 with ORANGE cover page
    - "Atari Personal Computer System Operating System User's Manual and Hardware Manual" January 1982 C016555 with YELLOW cover page
  - BLUE title page (with Atari logo). Included in:
    - "Atari Personal Computer System Technical Reference Notes includes: Operating System User's Manual and Hardware Manual" C016555 REV. 1 (mid-1982) with GOLD title page
- Hardware Manual, © 1980 edition, October 1980
  - Section VI.C. Schematics is published double-sided.
  - Pages B-10 and B-11 (Memory Configurations) are machine-produced.
  - BEIGE title page (with Atari logo). Included in:
    - "Atari Home Computer System Technical Reference Notes includes: Operating System User's Manual, Operating System Source Listing and Hardware Manual" C016555 REV. A (late 1982) with BLUE title page
- De Re Atari: A Guide to Effective Programming
  - C060070, © 1981 editions (early versions for registered developers)
    https://archive.org/details/DeReAtari_Alternate_Early_Version
    https://archive.org/details/DeReAtari_early_version
  - APX-90008, © 1982 edition (common version sold via APX)
    http://www.atariarchives.org/dere/
  - Also published in German and French language editions

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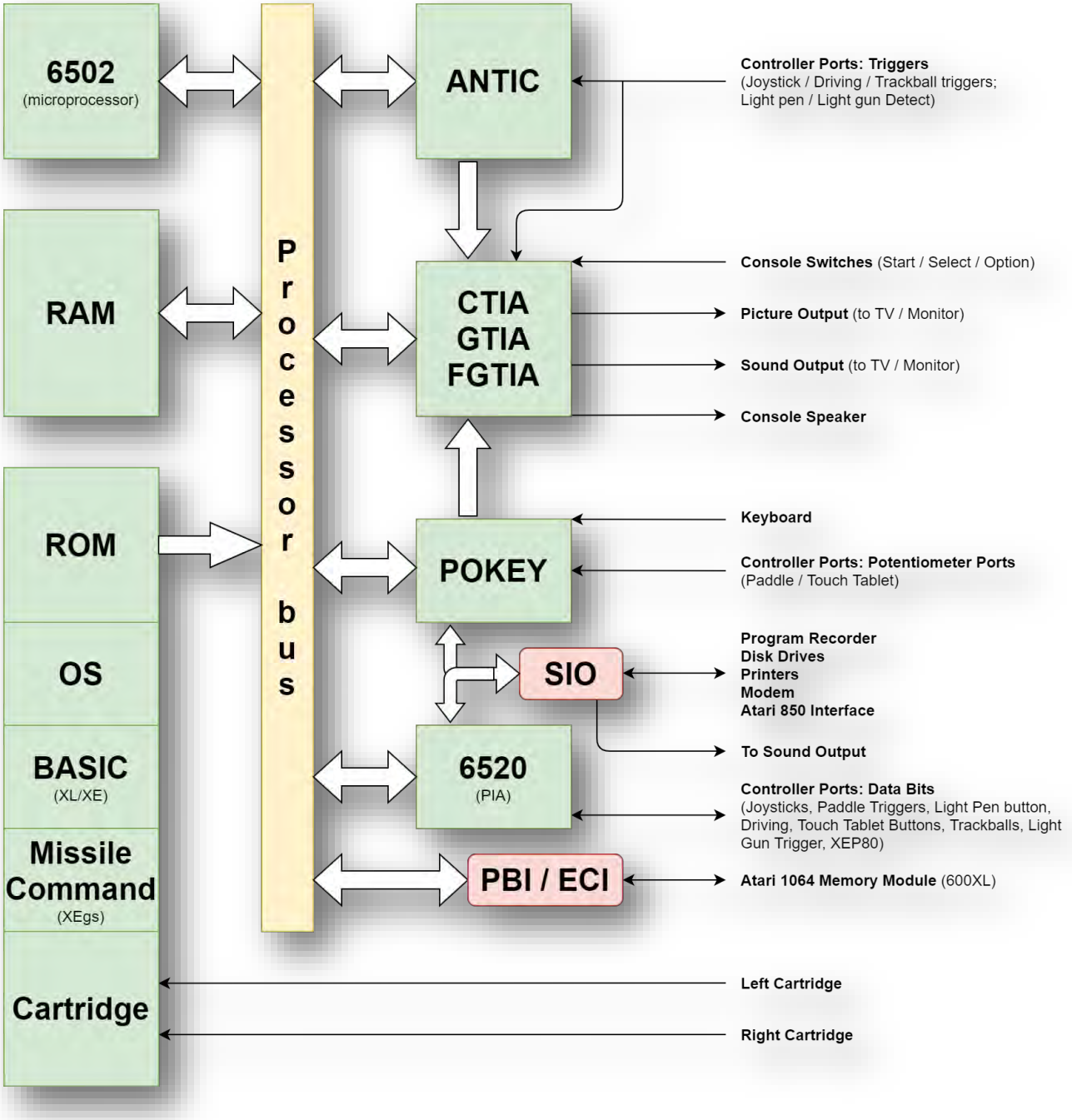
1.13) What is the internal hardware arrangement of the 8-bit Atari?



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Notes:

- Processor bus includes an 8-bit data bus and a 16-bit address bus
- 6502:
  - Most NTSC 400/800: MOS Technology MCS6502A or equivalent
  - Late NTSC 400/800, all PAL 400/800, and all XL/XE: Atari SALLY
- CTIA/GTIA/FGTIA:
  - CTIA: Earlier NTSC 400/800
  - GTIA: Later NTSC 400/800 and all NTSC/PAL XL/XE
  - FGTIA: SECAM XL/XE
- Right Cartridge: 800 only
- Controller Ports: 400/800 have 4; XL/XE have 2
- Controller Port Triggers: Not connected to ANTIC on jacks 1-3 on the 400
- Console Speaker:
  - 400/800: An internal physical speaker
  - XL/XE: Mixed into Sound Output to TV/Monitor
- PBI: 600XL/800XL only
- ECI: 130XE/65XE (later)/800XE only

1.14) What is the Atari memory map and how is banked memory managed?

The 8-bit 6502 and ANTIC processors can directly address 64 KiB distinct memory locations, addressed as 0-65535 (decimal) or $0-$FFFF (hexadecimal).

Bank-selection techniques allow the use of multiple banks of memory that share the same ranges of memory addresses.

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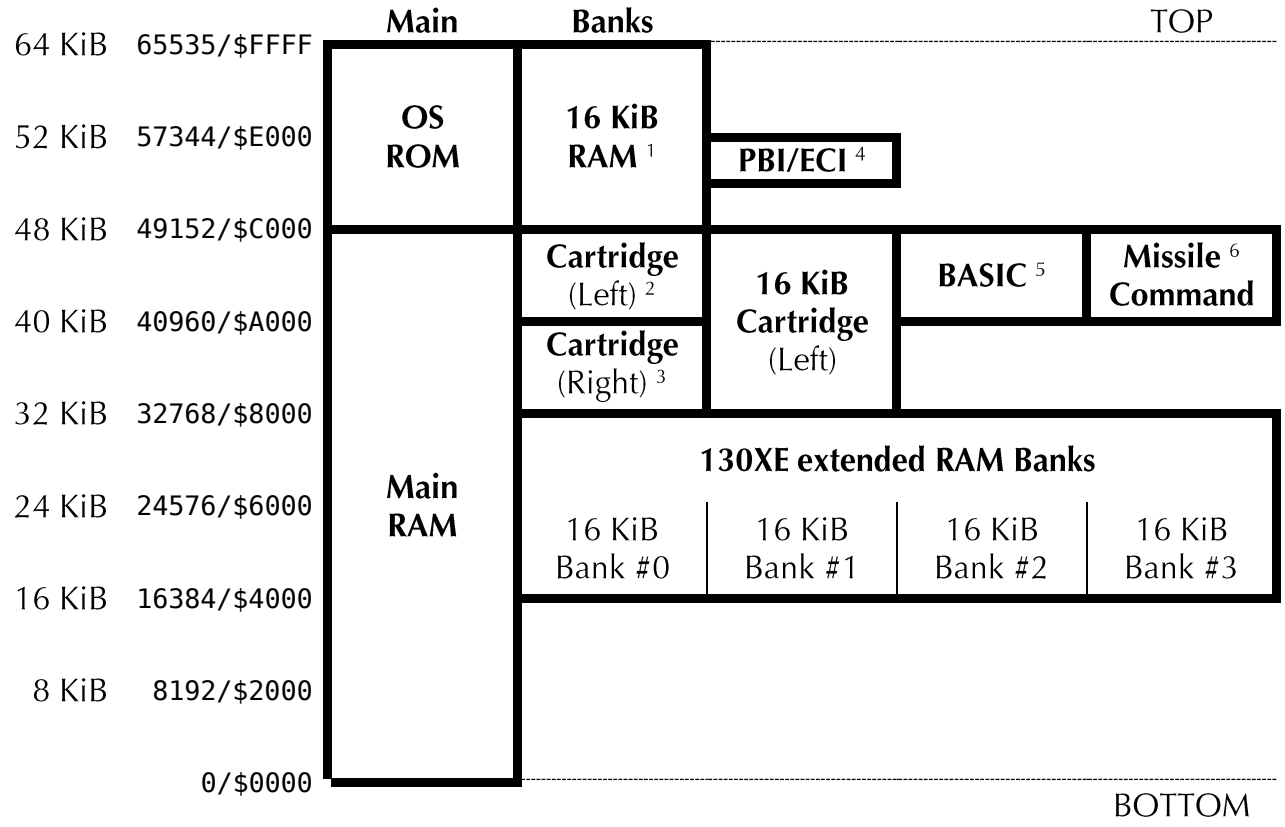
MEMORY MAP OVERVIEW



Main RAM Notes:

- 0-1535 / $0000-$05FF are used by the Atari OS
- 1792-5377 / $0700-$1501 are used by Atari DOS

Available Main RAM:

400/800	with	8	KiB	0- 8191	/	$0000-$1FFF
400/800/600XL	with	16	KiB	0-16383	/	$0000-$3FFF
800	with	24	KiB	0-24575	/	$0000-$5FFF
800	with	32	KiB	0-32767	/	$0000-$7FFF
800	with	40	KiB	0-40959	/	$0000-$9FFF
400/800	with	48	KiB	0-49151	/	$0000-$BFFF
XL/XE	with	64	KiB	0-49151	/	$0000-$BFFF
130XE	with	128	KiB	0-49151	/	$0000-$BFFF

Bank RAM Notes:

1. RAM in XL/XE except 600XL
2. 8 KiB "Left" Cartridge ROM
3. 8 KiB "Right" Cartridge ROM in 800 only
4. PBI/ECI on XL/XE except 1200XL
5. BASIC in XL/XE except 1200XL
6. Missile Command in XEgs only

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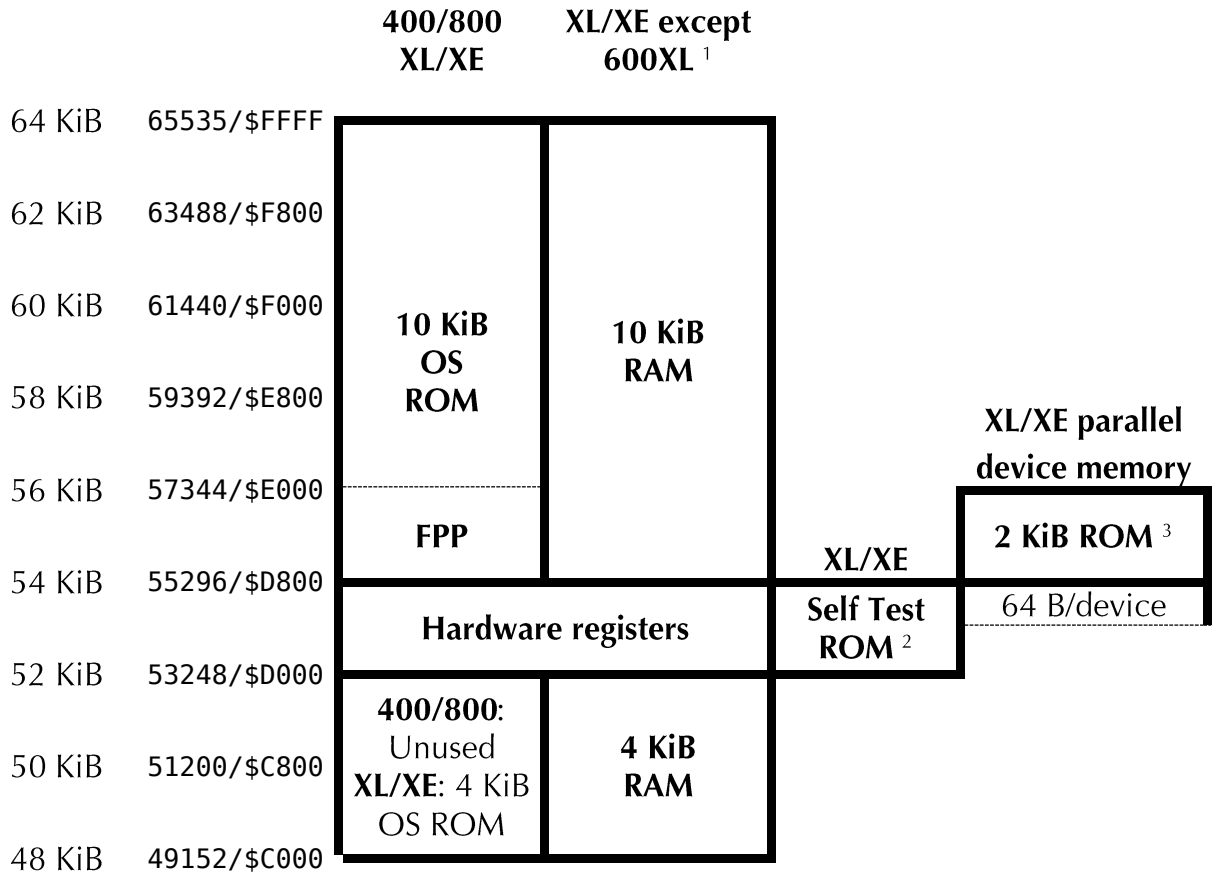
49152-65535/$C000-$FFFF (16 KiB) detail:



Notes:
1. But including 600XL with Atari 64K Memory Module (1064)
2. 2 KiB physically present but not accessed here
3. Full 2 KiB ROM per device

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53248-55295/$D000-$D7FF (2 KiB) detail:
This address space is used by hardware registers, or by XL/XE parallel device handlers and drivers, as follows:

$D7C0-D7FF	Parallel device #7 RAM (64 bytes)
$D780-D7BF	Parallel device #6 RAM (64 bytes)
$D740-D77F	Parallel device #5 RAM (64 bytes)
$D700-D73F	Parallel device #4 RAM (64 bytes)
$D6C0-D6FF	Parallel device #3 RAM (64 bytes)
$D680-D6BF	Parallel device #2 RAM (64 bytes)
$D640-D67F	Parallel device #1 RAM (64 bytes)
$D620-D63F	Parallel device #x RAM (32 bytes) meant for a modem device (One parallel device may utilize 96 bytes total.)
$D600-D61F	Parallel device #0 RAM (32 bytes)
$D6xx	800 rear RAM slot device
$D5xx	Cartridge device or 800 rear RAM slot device
$D4xx	ANTIC
$D3xx	PIA
$D2xx	POKEY
$D1xx	PBI/ECI Parallel Device (hardware registers)
$D0xx	CTIA/GTIA/FGTIA

Banked memory management

- In XL/XE computers (including XEgs with keyboard attached) except the 1200XL, the BASIC ROM is normally enabled at 40960-49151/$A000-$BFFF and RAM there is disabled.
- In the XE System console, with no keyboard attached, the Missile Command ROM is normally enabled at 40960-49151/$A000-$BFFF and the BASIC and RAM there are disabled.
- A Right Cartridge ROM, if present (800 only), disables any RAM at 32768-40959/$8000-$9FFF.
- An 8 KiB Left Cartridge ROM, if present, disables any RAM or other ROM at 40960-49151/$A000-$BFFF.
- A 16 KiB Cartridge ROM, if present, disables any RAM or other ROM at 32768-49151/$8000-$BFFF.

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In XL/XE computers, memory location 54017/$D301, known as PIA Port B (PORTB), is used for banked memory management as follows:

Bit	Memory Control
#0	OS ROM / RAM area (16 KiB at 49152-65535/$C000-$FFFF) 1 = OS ROM enabled / RAM disabled 0 = RAM enabled / OS ROM disabled
#1	BASIC / RAM area (8 KiB at 40960-49151/$A000-$BFFF) 1 = RAM enabled / BASIC disabled 0 = BASIC enabled / RAM disabled
#2	130XE bank selection least significant bit (LSB) Bits 2 and 3 together select 130XE extended RAM bank 0, 1, 2, or 3.
#3	130XE bank selection most significant bit (MSB) Bits 2 and 3 together select 130XE extended RAM bank 0, 1, 2, or 3.
#4	130XE 6502 Bank /Enable (CBE) at 16384-32767/$4000-$7FFF (16 KiB) 1 = 6502 accesses main RAM 0 = 6502 accesses extended RAM bank selected with bits 2 and 3
#5	130XE Video Bank /Enable (VBE) at 16384-32767/$4000-$7FFF (16 KiB) 1 = ANTIC accesses main RAM 0 = ANTIC accesses extended RAM bank selected with bits 2 and 3
#6	XE System console Missile Command (8 KiB at 40960-49151/$A000-$BFFF) 1 = Missile Command disabled and defer to Bit 1 for BASIC/RAM control 0 = Missile Command enabled, if Bit 1 is set to 1. If bit 1 is also set to 0 then BASIC is enabled rather than Missile Command.
#7	Self Test routine / RAM area (2 KiB at 20480-22527/$5000-$57FF) 1 = RAM enabled / Self Test disabled 0 = Self Test enabled / RAM disabled When the Self Test feature is invoked, the 2 KiB physical ROM at 53248-55295 / $D000-$D7FF is accessed at 20480-22527/$5000-$57FF.

In XL/XE computers except the 1200XL, memory location 53759/$D1FF, known as the parallel device select hardware register or PDVS, is also used for banked memory management. Setting one of the bits (0-7) of PDVS to 1 de-selects the Floating-Point Package (FPP) ROM at 55296-57343/$D800-$DFFF (2 KiB) and selects the device (0-7) ROM in its place. Clearing all bits of PDVS re-enables the FPP ROM. Note that, due to this memory banking, the FPP is not available to PBI/ECI parallel devices.

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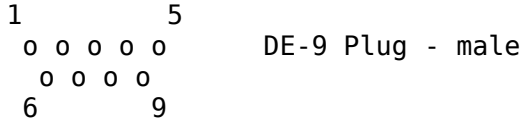
1.15) What are the pinouts for the various connectors on the Atari?

Controller port 1 (all machines):



1. PIA Port A Input/Output Bit 0
   - Joystick #1 Forward/Up
   - Driving Controller #1 Bit 0 (of 2-bit Gray code)
   - Trackball #1 X Direction (high=right low=left)
   - Touch Tablet #1 Stylus Button
   - Light Pen Button / Light Gun Trigger
   - XEP80 Data to 80 Column (serial output from computer)
2. PIA Port A Input/Output Bit 1
   - Joystick #1 Back/Down
   - Driving Controller #1 Bit 1 (of 2-bit Gray code)
   - Trackball #1 X Motion (square wave)
   - XEP80 Data From 80 Column (serial input to computer)
3. PIA Port A Input/Output Bit 2
   - Joystick #1 Left
   - Trackball #1 Y Direction (high=down low=up)
   - Touch Tablet #1 Left Button
   - Paddle #1 Trigger
4. PIA Port A Input/Output Bit 3
   - Joystick #1 Right
   - Trackball #1 Y Motion (square wave)
   - Touch Tablet #1 Right Button
   - Paddle #2 Trigger
5. Potentiometer Port 1 (POKEY) (analog input, 0V-5V)
   - Paddle #2 Position
   - Touch Tablet #1 Vertical Position
6. Trigger 0
   - Joystick/Driving/Trackball #1 Trigger (CTIA/GTIA/FGTIA)
   - 800/XL/XE (not 400): Light Pen/Light Gun Detect (ANTIC)
7. +5V
8. Ground
9. Potentiometer Port 0 (POKEY) (analog input, 0V-5V)
   - Paddle #1 Position
   - Touch Tablet #1 Horizontal Position

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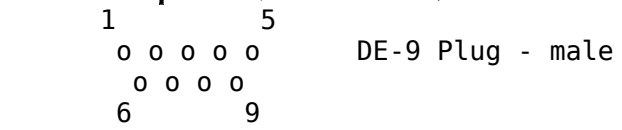
Controller port 2 (all machines):



1. PIA Port A Input/Output Bit 4
   - Joystick #2 Forward/Up
   - Driving Controller #2 Bit 0 (of 2-bit Gray code)
   - Trackball #2 X Direction (high=right low=left)
   - Touch Tablet #2 Stylus Button
   - Light Pen Button / Light Gun Trigger
   - XEP80 Data to 80 Column (serial output from computer)
2. PIA Port A Input/Output Bit 5
   - Joystick #2 Back/Down
   - Driving Controller #2 Bit 1 (of 2-bit Gray code)
   - Trackball #2 X Motion (square wave)
   - XEP80 Data From 80 Column (serial input to computer)
3. PIA Port A Input/Output Bit 6
   - Joystick #2 Left
   - Trackball #2 Y Direction (high=down low=up)
   - Touch Tablet #2 Left Button
   - Paddle #3 Trigger
4. PIA Port A Input/Output Bit 7
   - Joystick #2 Right
   - Trackball #2 Y Motion (square wave)
   - Touch Tablet #2 Right Button
   - Paddle #4 Trigger
5. Potentiometer Port 3 (POKEY) (analog input, 0V-5V)
   - Paddle #4 Position
   - Touch Tablet #2 Vertical Position
6. Trigger 1
   - Joystick/Driving/Trackball #2 Trigger (CTIA/GTIA/FGTIA)
   - 800/XL/XE (not 400): Light Pen/Light Gun Detect (ANTIC)
7. +5V
8. Ground
9. Potentiometer Port 2 (POKEY) (analog input, 0V-5V)
   - Paddle #3 Position
   - Touch Tablet #2 Horizontal Position

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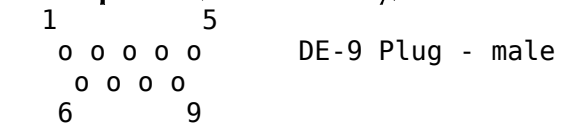
Controller port 3 (400/800 only):



1. PIA Port B Input/Output Bit 0
   - Joystick #3 Forward/Up
   - Driving Controller #3 Bit 0 (of 2-bit Gray code)
   - Trackball #3 X Direction (high=right low=left)
   - Touch Tablet #3 Stylus Button
   - Light Pen Button / Light Gun Trigger
2. PIA Port B Input/Output Bit 1
   - Joystick #3 Back/Down
   - Driving Controller #3 Bit 1 (of 2-bit Gray code)
   - Trackball #3 X Motion (square wave)
3. PIA Port B Input/Output Bit 2
   - Joystick #3 Left
   - Trackball #3 Y Direction (high=down low=up)
   - Touch Tablet #3 Left Button
   - Paddle #5 Trigger
4. PIA Port B Input/Output Bit 3
   - Joystick #3 Right
   - Trackball #3 Y Motion (square wave)
   - Touch Tablet #3 Right Button
   - Paddle #6 Trigger
5. Potentiometer Port 5 (POKEY) (analog input, 0V-5V)
   - Paddle #6 Position
   - Touch Tablet #3 Vertical Position
6. Trigger 2
   - Joystick/Driving/Trackball #3 Trigger (CTIA/GTIA)
   - 800 only (not 400): Light Pen/Light Gun Detect (ANTIC)
7. +5V
8. Ground
9. Potentiometer Port 4 (POKEY) (analog input, 0V-5V)
   - Paddle #5 Position
   - Touch Tablet #3 Horizontal Position

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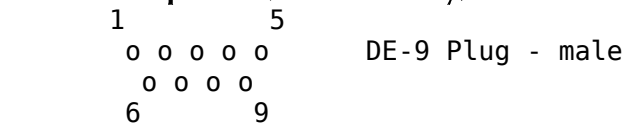
Controller port 4 (400/800 only):



1. PIA Port B Input/Output Bit 4
   - Joystick #4 Forward/Up
   - Driving Controller #4 Bit 0 (of 2-bit Gray code)
   - Trackball #4 X Direction (high=right low=left)
   - Touch Tablet #4 Stylus Button
   - Light Pen Button / Light Gun Trigger
2. PIA Port B Input/Output Bit 5
   - Joystick #4 Back/Down
   - Driving Controller #4 Bit 1 (of 2-bit Gray code)
   - Trackball #4 X Motion (square wave)
3. PIA Port B Input/Output Bit 6
   - Joystick #4 Left
   - Trackball #4 Y Direction (high=down low=up)
   - Touch Tablet #4 Left Button
   - Paddle #7 Trigger
4. PIA Port B Input/Output Bit 7
   - Joystick #4 Right
   - Trackball #4 Y Motion (square wave)
   - Touch Tablet #4 Right Button
   - Paddle #8 Trigger
5. Potentiometer Port 7 (POKEY) (analog input, 0V-5V)
   - Paddle #8 Position
   - Touch Tablet #4 Vertical Position
6. Trigger 3
   - Joystick/Driving/Trackball #4 Trigger (CTIA/GTIA)
   - Light Pen/Light Gun Detect (ANTIC)
7. +5V
8. Ground
9. Potentiometer Port 6 (POKEY) (analog input, 0V-5V)
   - Paddle #7 Position
   - Touch Tablet #4 Horizontal Position

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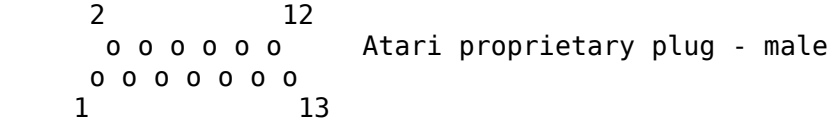
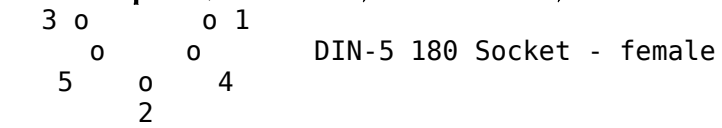
Serial I/O (SIO) / Peripheral port (all machines, also peripherals):



1. Computer Clock Input (POKEY)
2. Computer Clock Output (POKEY)
3. Computer Data Input (POKEY)
4. Ground (signal/shield)
5. Computer Data Output (POKEY)
   Normally digital, but can also be two-tone audio for cassette data
6. Ground (signal/shield)
7. /Command (PIA)
8. Motor Control (PIA)
9. /Proceed (PIA)
10. All except 1200XL: +5V/Ready,
    1200XL: Ready
11. Audio Input (175mV)
12. 400/800 only: +12V,
    XL/XE: Not Connected
13. /Interrupt (PIA)

Monitor port (all but 400, NTSC 600XL, SECAM 800XL/130XE/XEgs):



1. PAL 600XL: NC Not Connected
   All others: Composite Luminance ("Y")
2. Ground
3. Audio Output
4. Composite Video (NTSC or PAL standard)
5. 1200XL/NTSC 800XL/earlier PAL 800XL: NC Not Connected
   PAL 600XL: Ground
   All others: Composite Chrominance ("C"; NTSC or PAL standard)

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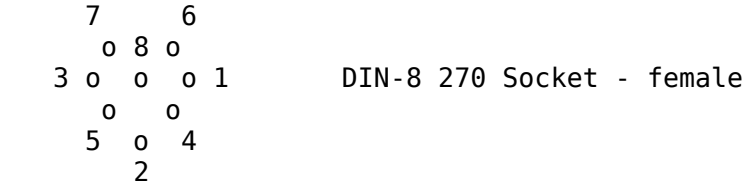
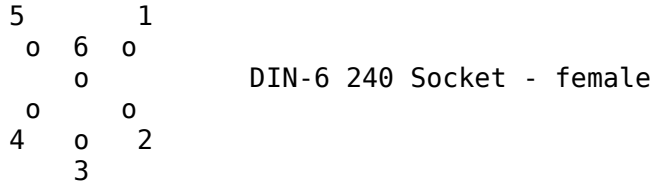
Monitor port, Peritel (later? PAL 800 Peritel only):
Thanks Laurent Delsarte for cable verification



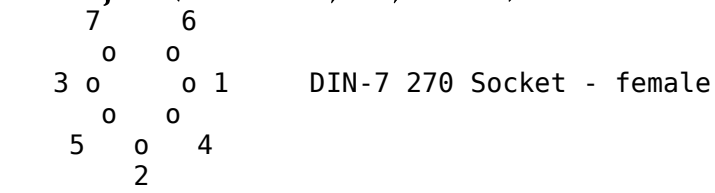
1. RGB Sync
2. Ground (for Peritel Video Ground)
3. [unknown, verification needed!!]
4. RGB Red
5. RGB Green
6. +12V (for Peritel Slow Switching AV Mode 4:3)
7. Audio
8. RGB Blue

Monitor port (SECAM 800XL/130XE/XEgs):



1. +12V (5mA max, for Peritel Slow Switching AV Mode 4:3)
2. RF Modulator Audio (amplitude about 6x regular Audio)
3. Peritel Audio
4. Composite Video (SECAM standard)
5. Video Ground
6. +5V Mod (100mA max, power for an RF Modulator)

Power jack (all but 400,800,1200XL):



1. +5V
2. Shield
3. Ground
4. +5V
5. Ground
6. +5V
7. Ground

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Cartridge slot (present on all machines; Left Cartridge/Cartridge A on 800):

```
A  B  C  D  E  F  H  J  K  L  M  N  P  R  S    Edge Connector
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -    15/30 (15x2P 30P)
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -    0.100" contact pitch
1                                       15
```

1.	/S4 Select $8000-$9FFF	**A.**	RD4 RAM Deselect $8000-$9FFF except 400: NC Not Connected
2.	A3 Address bus line 3	**B.**	Vss GND Ground
3.	A2 Address bus line 2	**C.**	A4 Address bus line 4
4.	A1 Address bus line 1	**D.**	A5 Address bus line 5
5.	A0 Address bus line 0	**E.**	A6 Address bus line 6
6.	D4 Data bus line 4	**F.**	A7 Address bus line 7
7.	D5 Data bus line 5	**H.**	A8 Address bus line 8
8.	D2 Data bus line 2	**J.**	A9 Address bus line 9
9.	D1 Data bus line 1	**K.**	A12 Address bus line 12
10.	D0 Data bus line 0	**L.**	D3 Data bus line 3
11.	D6 Data bus line 6	**M.**	D7 Data bus line 7
12.	/S5 Select $A000-$BFFF	**N.**	A11 Address bus line 11
13.	Vcc +5V	**P.**	A10 Address bus line 10
14.	RD5 RAM Deselect $A000-$BFFF except 400: NC Not Connected	**R.**	400/800/1200XL: R/W Early 600XL/800XL/XE: R/W Read/Write
15.	/CCTL Cartridge Control $D5xx	**S.**	400/800: RASTIME Row Address Strobe Time XL/XE: BPhi2 Buffered Phase 2 Clock

Right Cartridge/Cartridge B slot (800 only):

```
A  B  C  D  E  F  H  J  K  L  M  N  P  R  S    Edge Connector
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -    15/30 (15x2P 30P)
-  -  -  -  -  -  -  -  -  -  -  -  -  -  -    0.100" contact pitch
1                                       15
```

1.	R/W Late 1 - Read/Write Late 1	**A.**	Phi2 Phase 2 clock
2.	A3 Address bus line 3	**B.**	Vss GND Ground
3.	A2 Address bus line 2	**C.**	A4 Address bus line 4
4.	A1 Address bus line 1	**D.**	A5 Address bus line 5
5.	A0 Address bus line 0	**E.**	A6 Address bus line 6
6.	D4 Data bus line 4	**F.**	A7 Address bus line 7
7.	D5 Data bus line 5	**H.**	A8 Address bus line 8
8.	D2 Data bus line 2	**J.**	A9 Address bus line 9
9.	D1 Data bus line 1	**K.**	A12 Address bus line 12
10.	D0 Data bus line 0	**L.**	D3 Data bus line 3
11.	D6 Data bus line 6	**M.**	D7 Data bus line 7
12.	/S4 Select $8000-$9FFF	**N.**	A11 Address bus line 11
13.	Vcc +5V	**P.**	A10 Address bus line 10
14.	RD4 RAM Deselect $8000-$9FFF	**R.**	R/W Early
15.	/CCTL Cartridge Control $D5xx	**S.**	RASTIME Row Address Strobe Time

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ROM Module/Personality Module slot (800 only):

```
  A  B  C  D  E  F  H  J  K  L  M  N  P  R  S  T  U  V  W  X  Y  Z    Edge
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  Connector
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    22/44
  1                                                                22
```

1.	D0 Data bus line 0	**A.**	D1 Data bus line 1
2.	D2 Data bus line 2	**B.**	D4 Data bus line 4
3.	D3 Data bus line 3	**C.**	D5 Data bus line 5
4.	D7 Data bus line 7	**D.**	D6 Data bus line 6
5.	A0 Address bus line 0	**E.**	A2 Address bus line 2
6.	A7 Address bus line 7	**F.**	A9 Address bus line 9
7.	A1 Address bus line 1	**H.**	/S7 Select $E000-$FFFF (OS)
8.	A8 Address bus line 8	**J.**	A6 Address bus line 6
9.	A5 Address bus line 5	**K.**	A4 Address bus line 4
10.	A3 Address bus line 3	**L.**	A11 Address bus line 11
11.	A10 Address bus line 10	**M.**	/S6 Select $C000-$DFFF (hardware I/O decodes; FPP)
12.	A12 Address bus line 12	**N.**	/S5 Select $A000-$BFFF (Cart)
13.	CTIA/GTIA /CS Chip Select $D0xx	**P.**	/S4 Select $8000-$9FFF (Cart)
14.	/EXSEL External Select	**R.**	A15 Address bus line 15
15.	/GBA [data bus select]	**S.**	Phi2 Phase 2 clock
16.	/WRITIME	**T.**	GBA [data bus select]
17.	Phi1 Clock	**U.**	R/W Early
18.	PIA /CS Chip Select $D3xx	**V.**	RASTIME Row Address Strobe Time
19.	POKEY /CS Chip Select $D2xx	**W.**	D6XX /CS Chip Select $D6xx
20.	NC Not Connected	**X.**	D5XX /CS Chip Select $D5xx
21.	Vcc +5V	**Y.**	Vcc +5V
22.	Vss GND Ground	**Z.**	Vss GND Ground

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RAM Module Slot 1 (front RAM slot; 800 only):

```
   A  B  C  D  E  F  H  J  K  L  M  N  P  R  S  T  U  V  W  X  Y  Z    Edge
   -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  Connector
   -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    22/44
   1                                                                22
```

1.	D0 Data bus line 0	**A.**	D1 Data bus line 1
2.	D2 Data bus line 2	**B.**	D4 Data bus line 4
3.	D3 Data bus line 3	**C.**	D5 Data bus line 5
4.	D7 Data bus line 7	**D.**	D6 Data bus line 6
5.	A0 Address bus line 0	**E.**	A2 Address bus line 2
6.	A7 Address bus line 7	**F.**	A9 Address bus line 9
7.	A1 Address bus line 1	**H.**	A13 Address bus line 13
8.	A8 Address bus line 8	**J.**	A4 Address bus line 4
9.	A5 Address bus line 5	**K.**	A11 Address bus line 11
10.	A3 Address bus line 3	**L.**	A12 Address bus line 12
11.	A10 Address bus line 10	**M.**	Select line input from Slot 2 pin N
12.	A6 Address bus line 6	**N.**	Select line output to Slot 3 pin U
13.	R/W Late 1	**P.**	Select line input from Slot 2 pin R
14.	Phi2 Phase 2 clock	**R.**	Select line output to Slot 3 pin 18
15.	RASTIME Row Address Strobe Time	**S.**	Select line input from Slot 2 pin T
16.	R/W Early	**T.**	Select line output to Slot 2 pin 18
17.	/REF RAM Refresh	**U.**	/S1 Select $2000-$3FFF
18.	/S0 Select $0000-$1FFF	**V.**	NC Not Connected
19.	Vcc +5V	**W.**	Vcc +5V
20.	Vbb -5V	**X.**	Vbb -5V
21.	Vdd +12V	**Y.**	Vdd +12V
22.	Vss GND Ground	**Z.**	Vss GND Ground

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RAM Module Slot 2 (middle RAM slot; 800 only):

```
  A  B  C  D  E  F  H  J  K  L  M  N  P  R  S  T  U  V  W  X  Y  Z    Edge
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  Connector
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    22/44
  1                                                                22
```

1.	D0 Data bus line 0	**A.**	D1 Data bus line 1
2.	D2 Data bus line 2	**B.**	D4 Data bus line 4
3.	D3 Data bus line 3	**C.**	D5 Data bus line 5
4.	D7 Data bus line 7	**D.**	D6 Data bus line 6
5.	A0 Address bus line 0	**E.**	A2 Address bus line 2
6.	A7 Address bus line 7	**F.**	A9 Address bus line 9
7.	A1 Address bus line 1	**H.**	A13 Address bus line 13
8.	A8 Address bus line 8	**J.**	A4 Address bus line 4
9.	A5 Address bus line 5	**K.**	A11 Address bus line 11
10.	A3 Address bus line 3	**L.**	A12 Address bus line 12
11.	A10 Address bus line 10	**M.**	/S5 Select $A000-$BFFF
12.	A6 Address bus line 6	**N.**	Select line output to Slot 1 pin M
13.	R/W Late 2,3	**P.**	/S4 Select $8000-$9FFF
14.	Phi2 Phase 2 clock	**R.**	Select line output to Slot 1 pin P
15.	RASTIME Row Address Strobe Tie	**S.**	/S3 Select $6000-$7FFF
16.	R/W Early	**T.**	Select line output to Slot 1 pin S
17.	/REF RAM Refresh	**U.**	/S2 Select $4000-$5FFF
18.	Select line input from Slot 1 pin T	**V.**	NC Not Connected
19.	Vcc +5V	**W.**	Vcc +5V
20.	Vbb -5V	**X.**	Vbb -5V
21.	Vdd +12V	**Y.**	Vdd +12V
22.	Vss GND Ground	**Z.**	Vss GND Ground

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RAM Module Slot 3 (rear RAM slot; 800 only):

```
  A  B  C  D  E  F  H  J  K  L  M  N  P  R  S  T  U  V  W  X  Y  Z    Edge
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  Connector
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    22/44
  1                                                                22
```

1.	D0 Data bus line 0	**A.**	D1 Data bus line 1
2.	D2 Data bus line 2	**B.**	D4 Data bus line 4
3.	D3 Data bus line 3	**C.**	D5 Data bus line 5
4.	D7 Data bus line 7	**D.**	D6 Data bus line 6
5.	A0 Address bus line 0	**E.**	A2 Address bus line 2
6.	A7 Address bus line 7	**F.**	A9 Address bus line 9
7.	A1 Address bus line 1	**H.**	A13 Address bus line 13
8.	A8 Address bus line 8	**J.**	A4 Address bus line 4
9.	A5 Address bus line 5	**K.**	A11 Address bus line 11
10.	A3 Address bus line 3	**L.**	A12 Address bus line 12
11.	A10 Address bus line 10	**M.**	/EXSEL External Select
12.	A6 Address bus line 6	**N.**	NC Not Connected
13.	R/W Late 2,3	**P.**	D6XX /CS Chip Select $D6xx
14.	Phi2 Phase 2 clock	**R.**	NC Not Connected
15.	RASTIME Row Address Strobe Time	**S.**	NC Not Connected
16.	R/W Early	**T.**	NC Not Connected
17.	/REF RAM Refresh	**U.**	Select line in from Slot 1 pin N
18.	Select line input from Slot 1 pin R	**V.**	D5XX /CS Chip Select $D5xx
19.	Vcc +5V	**W.**	Vcc +5V
20.	Vbb -5V	**X.**	Vbb -5V
21.	Vdd +12V	**Y.**	Vdd +12V
22.	Vss GND Ground	**Z.**	Vss GND Ground

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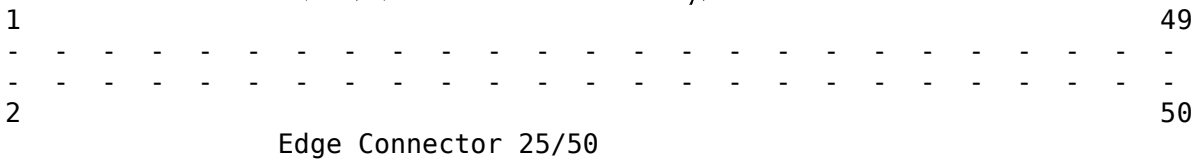
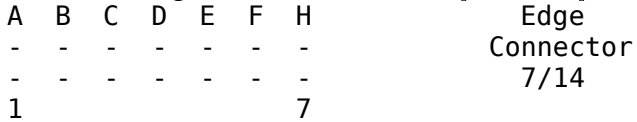
Parallel Bus Interface (PBI) (600XL and 800XL only):



1.	GND Ground	**2.**	/EXTSEL External Select (Input)
3.	A0 Address Line 0 (Output)	**4.**	A1 Address Line 1 (Output)
5.	A2 Address Line 2 (Output)	**6.**	A3 Address Line 3 (Output)
7.	A4 Address Line 4 (Output)	**8.**	A5 Address Line 5 (Output)
9.	A6 Address Line 6 (Output)	**10.**	GND Ground
11.	A7 Address Line 7 (Output)	**12.**	A8 Address Line 8 (Output)
13.	A9 Address Line 9 (Output)	**14.**	A10 Address Line 10 (Output)
15.	A11 Address Line 11 (Output)	**16.**	A12 Address Line 12 (Output)
17.	A13 Address Line 13 (Output)	**18.**	A14 Address Line 14 (Output)
19.	GND Ground	**20.**	A15 Address Line 15 (Output)
21.	D0 Data Line 0 (In/Out)	**22.**	D1 Data Line 1 (In/Out)
23.	D2 Data Line 2 (In/Out)	**24.**	D3 Data Line 3 (In/Out)
25.	D4 Data Line 4 (In/Out)	**26.**	D5 Data Line 5 (In/Out)
27.	D6 Data Line 6 (In/Out)	**28.**	D7 Data Line 7 (In/Out)
29.	GND Ground	**30.**	GND Ground
31.	BPhi2 Buffered Phase 2 Clock(Out)	**32.**	GND Ground
33.	Reserved	**34.**	/RST Reset (Output)
35.	/IRQ Interrupt Request (Input)	**36.**	RDY Ready (Input)
37.	Reserved	**38.**	EXTENB External Decoder Enable (Out)
39.	Reserved	**40.**	/REF Refresh (Output)
41.	/CAS Column Address Strobe (Out)	**42.**	GND Ground
43.	/MPD Math Pack Disable (Input)	**44.**	/RAS Row Address Strobe (Output)
45.	GND Ground	**46.**	LR/W Latched Read/Write (Output)
47.	600XL: +5V 800XL: Reserved	**48.**	600XL: +5V 800XL: Reserved
49.	AUDIO Audio In (Input)	**50.**	GND Ground

Enhanced Cartridge Interface (ECI)/Expansion port (130XE, 800XE, & many 65XE)



A.	Reserved	**1.**	/EXTSEL External Select (Input)
B.	/IRQ Interrupt Request (Input)	**2.**	/RST Reset (Output)
C.	/HALT (Input)	**3.**	D1XX /CS Chip Select $D1xx (In)
D.	A13 Address Line 13 (Output)	**4.**	/MPD Math Pack Disable (Input)
E.	A14 Address Line 14 (Output)	**5.**	AUDIO Audio In (Input)
F.	A15 Address Line 15 (Output)	**6.**	/REF Refresh (Output)
H.	GND Ground	**7.**	+5V

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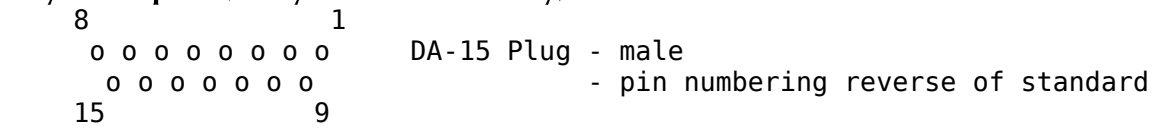
Keyboard port (XE System console only):



1.	/K2 Keyboard Scan (POKEY)	**9.**	+5V
2.	/K1 Keyboard Scan (POKEY)	**10.**	+5V
3.	/K0 Keyboard Scan (POKEY)	**11.**	KBDETECT (GTIA/FGTIA)
4.	/KR1 Keyboard Response (POKEY)	**12.**	NC Not Connected
5.	/K5 Keyboard Scan (POKEY)	**13.**	GND Ground
6.	/K4 Keyboard Scan (POKEY)	**14.**	NC Not Connected
7.	/K3 Keyboard Scan (POKEY)	**15.**	GND Ground
8.	/KR2 Keyboard Response (POKEY)		

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1.16) Who designed the Atari 8-bit computers?

Many people were involved in the planning, design and engineering of the 8-bit Atari computers. This section attempts to identify the key engineering personnel at Atari and their roles, with the understanding that such a list necessarily oversimplifies the true nature of complex product development.

Some sources: https://archive.org/details/JoeDecuirEngineeringNotebook1977 , https://archive.org/details/JoeDecuirEngineeringNotebook1978 , http://dougneubauer.com/atari/ ,
Goldberg/Vendel, Atari Inc.: Business is Fun, 2012, pages 446-461, 694-700.

Atari 400/800:

Steven T. Mayer	Chief system inventor; project proposal (Atari Cyan Engineering)
Jay G. Miner	Project chief engineer; system co-inventor (Synertek engineer/Atari consultant)
Douglas G. Neubauer	POKEY designer; system co- inventor – also wrote Star Raiders
Joe Decuir (Joseph C. Decuir)	ANTIC designer; system co-inventor; project proposal
François Michel	ANTIC co-designer
George McLeod	CTIA/GTIA designer
R. Scott Scheiman	Digital circuit design; serial bus protocol – also contributed to the 400/800 OS, wrote the Educational System Master Cartridge software, and wrote TeleLink I
Alan Miller	Hardware-software interface – also co-wrote the 400/800 OS and wrote Basketball
John Ellis	VP Consumer Engineering; project proposal review
Wade B. Tuma	Consumer engineering manager
Niles E. Strohl	Project engineer; engineering manager, computer line
John D. Vurich	Product marketing management
John Hayashi	Director of industrial design
Kevin P. McKinsey	800 industrial designer
Hugh M. Lee	800 industrial designer
Steve Bristow (Stephen D. Bristow)	VP Engineering, computer line
Jeffery O. Nelson	400 industrial designer
Douglas A. Hardy	400 industrial designer

Chipset development technicians:

- Jim Luby (ANTIC)
- Delwin Pearson (POKEY)
- Mark Shieu (POKEY)
- Steve Smith (CTIA)
- Steve Stone (POKEY, ANTIC)

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Idea contributors from Atari Cyan Engineering:

- Larry Emmons
- Dave Estes
- Ron Milner
- Rich Pap
- Gene Wise

(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, pages 4,41)

Idea contributors from among Atari (Consumer) VCS programmers:

- Larry Kaplan (also co-wrote the 400/800 OS and wrote Video Easel and Super Breakout),
- Bob Whitehead

(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, pages 33)

Idea contributors from Atari (Coin-Op):

- Mike Albaugh (also wrote: In-Store Demonstration Program, original disk version and follow-up cartridge version),
- Dave Stubben (David R. Stubben)

(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, pages 37)

Project proposal review:

- Bob Brown – Director of Microelectronics
- Al Alcorn – VP Research & Development

Atari 1200XL/600XL/800XL (Atari NY Lab/WCI Labs):

Steven T. Mayer	VP Research & Product Development, Corporate Research
Gregg Squires	Project Manager, Engineering Designer
Bob Card (Robert Card)	Principal Engineer
Steven Ray	Electronics Layout Designer
Joel Moskowitz	Mechanical Engineer
Philippe des Rioux	Project engineer
Glenn Boles	Project engineer

Atari 1200XL/600XL/800XL (California):

Ajay Chopra	System architect, 1200XL product specification author, 600XL/800XL Parallel Bus Interface specification
David Owen Sovey	Product engineering; 1200XL product specification
Larry Plummer	Director, Electrical Engineering (1981-83)
Dave Stubben (David R. Stubben)	VP Engineering (1982-83)
Mark A. Lutvak	Product marketing manager – 1200XL
Andrew Soderberg	Product marketing manager – 600XL/800XL
Regan L. Cheng	Industrial designer (cases)
Richard C. Pasco	FREDDIE logic design
Charles Pete Gerrard	Senior engineer, SECAM 800XL ("SECAM ROSE")
Dan H. Kramer	Project engineering, SECAM 800XL ("SECAM ROSE")

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Atari 800XL("800XLF")/65XE/130XE:

Phil Suen	Director of Engineering, XL/XE line
Thomas B. Brightman	VP Engineering
Ira Velinsky	65XE/130XE industrial designer (cases)

Atari XEgs/800XE:

Jose A. Valdes	Development engineer
Ira Velinsky	Industrial designer (cases)

Atari Operating System designers and programmers are given elsewhere in this FAQ List.

1.17) How do I use my Atari computer system?

This FAQ List is intended to answer many questions commonly asked about the 8-bit Atari computers, but one thing it doesn't do is offer a tutorial on basic usage of the system. Many such books were published, including those listed here. "Your Atari Computer" by Poole is often recognized as a classic among these.

1.17.1) 400/800

Your Atari Computer: A Guide to Atari 400/800 Personal Computers
Lon Poole with Martin McNiff & Steven Cook, 1982
www.atarimania.com/documents/Your-Atari-Computer.pdf

User's Handbook to the Atari 400/800 Computers
Jeffrey R. Weber and Stephen J. Szczecinski, 1983
www.atarimania.com/documents/Users-Handbook-to-the-Atari.pdf

Get More From the Atari
Ian Sinclair, 1983
www.atarimania.com/documents/Get_More_From_The_Atari.pdf

1.17.2) 400/800/1200XL

The User's Guide to Atari 400-800-1200XL Computers, Software, & Peripherals
By the editors of Consumer Guide, 1983
www.atarimania.com/documents/The-Users-Guide-to-the-Atari.pdf

How to use Atari Computers: An Introduction to the 400, 800, and 1200
Michael Boom, 1983
www.atarimania.com/documents/How-to-Use-Atari-Computers.pdf

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Atari for the Beginning Beginner
Judy Chamberlain and Tom Chamberlain, 1983
www.atarimania.com/documents/Atari-for-the-Beginning-Beginner.pdf

1.17.3) 600XL/800XL, and also earlier models

Your Atari Computer: A Guide to Atari 400/800 Personal Computers - XL Edition
Lon Poole with Martin McNiff & Steven Cook (1983?)
www.atarimania.com/documents/Your-Atari-Computer-XL-Edition.pdf

The Elementary Atari
William B. Sanders, 1983
www.atarimania.com/documents/The-Elementary-Atari.pdf

Atari XL User's Handbook
WSI Staff, 1984
www.atarimania.com/documents/Atari_XL_User_s_Handbook.pdf

Getting Started with the Atari 600XL
Peter Goode, 1984
www.atarimania.com/documents/Getting_Started_with_The_Atari_600XL.pdf

The Atari 800XL: A Practical Guide
Thomas Blackadar, 1984
www.atarimania.com/documents/The-Atari-800XL-A-Practical-Guide.pdf

The Atari XL Handbook
Peter Lupton & Fraser Robinson, 1984
www.atarimania.com/documents/The_Atari_XL_Handbook.pdf

The Atari User's Encyclopedia
Gary Phillips and Jerry White, 1984
www.atarimania.com/documents/The-Atari-Users-Encyclopedia.pdf

InfoWorld's Essential Guide to Atari Computers
Scott Mace, 1984
www.atarimania.com/documents/InfoWorlds-Essential-Guide-to-Atari.pdf

How to Excel on Your Atari 600XL and 800XL
Timothy O. Knight, 1985
www.atarimania.com/documents/How_To_Excel_On_Your_Atari.pdf

1.17.4) 65XE/130XE, and also earlier models

Atari XE User's Handbook
Weber Systems, Inc. Staff, 1985
www.atarimania.com/documents/Atari_XE_User_s_Handbook.pdf

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The Atari 130XE Handbook
Peter Lupton & Frazer Robinson, 1985
www.atarimania.com/documents/The_Atari_130XE_Handbook.pdf

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Chapter 2

Monitors & Video

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2.1) What are analog TV broadcasting systems and composite video?

The video display capabilities of the Atari computer are intimately related to the television (TV) broadcast systems of their time because, in part, consumer TVs were expected to be the primary display devices used with the system. The Atari was designed with the ability to output an analog radio-frequency (RF) audio/video signal that could be interfaced with a TV's antenna input, the input normally be used to receive terrestrial TV signals broadcast over the air.

The analog black-and-white RF television broadcast system standards that originally emerged throughout the world included System M (1941), System B (1950s), System I (1962), and System L (1967), plus System G. Broadcast signals compliant with these standards carried both audio and luminance ("Y") video information (plus synchronization information):

System M:
- 525 scan lines per frame
- 486 scan lines of video per frame including overscan
- 262 scan lines per field (frame = two interlaced fields)
- 243 scan lines of video per field including overscan
- 60 fields per second = 60 Hz (refresh rate corresponds to household electricity standard)
- Complete frame refresh rate = 30 frames per second (fps)
- 4:3 aspect ratio
- System M was used in most of the Americas and Caribbean, South Korea, Taiwan, Philippines, Brazil, and Laos.
- Japan used System J which was nearly identical to System M.
- Used with both very high frequencies (VHF channels 2-13) and ultra-high frequencies (UHF channels 14-83)

Systems BGIL:
- 625 scan lines per frame
- 576 scan lines of video per frame including overscan
- 312 scan lines per field (frame = two interlaced fields)
- 288 scan lines of video per field including overscan
- 50 fields per second = 50 Hz
  (Refresh rate corresponds to household electricity standard)
- Complete frame refresh rate = 25 fps
- 4:3 aspect ratio
- While G and I used the same UHF channel frequencies for video carriers, they each used different audio carrier frequencies for the same channels.
- B was used with VHF channels, while G was used with UHF channels. B/G were used together in most of western Europe.

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- System I was used in the UK over UHF channels only.
  The UK used System A over VHF channels until 1985.
- System L was used in France over UHF only until 1984, with VHF switching from System E to System L in 1984.
- Argentina used System N, which used frame parameters matching those of B/G/I/L, but bandwidth parameters nearly identical to System M.

Later, color (chrominance, or "C", being a combination of hue ("U") and saturation ("V") information) video encoding standards were adopted for combined use with the existing underlying RF broadcast system standards. Three analog video color encoding standards that emerged in different parts of the world were NTSC ("National Television Standards Committee"; 1953), PAL ("Phase Alternation by Line"; 1967), and SECAM ("Sequentiel couleur avec memoire"; 1967). NTSC was used in most countries using the System M broadcast standard, while PAL was used in countries using Systems B/G and System I, and SECAM was used in France over System L. Thus NTSC M, PAL B/G, and PAL I, plus SECAM L in France, became the most common color TV broadcast systems used around the world. Outliers: PAL N in Argentina/Paraguay/Uruguay; PAL M in Brazil; NTSC J in Japan.

NTSC M actually and officially uses a slightly altered System M, where the frame rate is approximately 59.940 fields per second, or 29.970 frames per second (fps). PAL B/G, PAL I and SECAM L frame rates are exactly 25 fps.

In the 1970s a commercial market emerged for video display devices that would be compatible with existing TV broadcast standard video, but where the RF modulation/demodulation circuitry for transmitting/receiving audio/video broadcast signals over the air was omitted. Such a video signal, containing both luminance (Y) and (optionally) chrominance (C) information, but no audio, became known as composite video (often just "video"). A color composite video signal can be characterized by the color encoding standard used, one of the same standards invented for broadcast television: NTSC, PAL, or SECAM.

The luminance (Y) and chrominance (C) components that make up a color composite video signal can also be transmitted as two separate signals. Such video is known as Y/C video, or S-video. Like both analog broadcast TV signals and color composite video, Y/C video can also be characterized by the color encoding standard used: NTSC, PAL, or SECAM.

A monochrome composite video signal contains luminance (Y) information but no chrominance (C) information, and is typically characterized by its refresh rate: 60 Hz (System M compatible) or 50 Hz (Systems B/G/I/L/N compatible).

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Each Atari computer version was designed to comply with video system standards used in the destination target market for that unit. Atari produced versions of their computers for NTSC, PAL, and SECAM markets, supporting combinations of color analog RF broadcast standards (NTSC M, PAL B, PAL G, PAL I), color composite video standards (NTSC, PAL, SECAM), composite luminance signals ("Y"), and composite chrominance signals ("C"; NTSC or PAL) as follows:

RF Out to TV	Ch.	.../ Monitor Port \... Composite	"Y"	"C"	Computer Model Versions
NTSC M	2/3	-	-	-	400, 600XL
NTSC M	2/3	NTSC	60 Hz	NTSC	800, 65XE, 130XE
NTSC M	2/3	NTSC	60 Hz	-	1200XL, 800XL
NTSC M	2/3	NTSC	-	-	XEgs
PAL B	3/4	-	-	-	400
PAL B	4	PAL	50 Hz	PAL	800, 800XL (later), 130XE, 800XE
PAL B	4	PAL	50 Hz	-	800XL (earlier)
PAL B	4	PAL	-	-	600XL, XEgs
PAL G	36	-	-	-	400
PAL G	36	PAL	50 Hz	PAL	800, 800XL (later), 65XE, 130XE, 800XE
PAL G	36	PAL	50 Hz	-	800XL (earlier)
PAL G	36	PAL	-	-	600XL, XEgs
PAL I	36	-	-	-	400
PAL I	36	PAL	50 Hz	PAL	800, 800XL (later), 65XE, 130XE
PAL I	36	PAL	50 Hz	-	800XL (earlier)
PAL I	36	PAL	-	-	600XL, XEgs
(1)	(1)	SECAM	-	-	800XL, 130XE, XEgs

(1) Monitor port includes provisions for an external in-line RF modulator

2.2) What kinds of TVs can display my Atari's RF output signal?

An Atari 8-bit computer produces a single video display channel and a single (monophonic) audio channel. The 400/800 models also produce some sounds (primarily the keyclick and system buzzer sounds) by way of an internal speaker.

Most Atari computers provide both their audio and video channels in a single Radio-Frequency (RF) modulated audio/video signal, equivalent to a standard (of the time) analog television (TV) NTSC or PAL encoded color broadcast signal. The Atari's RF signal may be used on a television that:

- Supports use of an external RF aerial antenna for receiving terrestrial TV broadcast signals
- Can decode an analog NTSC M, PAL I, PAL G, or PAL B color TV broadcast RF signal, matching the RF signal output by the computer

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NTSC M Atari computers (North America) use:
- TV Channel 2 standard: 55.25 MHz video carrier, 59.75 MHz audio carrier
- TV Channel 3 standard: 61.25 MHz video carrier, 65.75 MHz audio carrier

PAL I Atari computers (UK) use:
- TV Channel 36 standard: 591.25 MHz video carrier, 597.25 MHz audio carrier

PAL G Atari computers (Europe) use:
- TV Channel 36 standard: 591.25 MHz video carrier, 596.75 MHz audio carrier

NOTE: If a PAL I computer connected to a PAL G TV, or PAL G computer is connected to a PAL I TV, the result is normal video but lacking audio.

PAL B Atari computers (Europe, including: Germany, Italy, Finland) use:
- TV Channel 3 standard: 55.25 MHz video carrier, 60.75 MHz audio carrier (400, some 600XL)
- TV Channel 4 standard: 62.25 MHz video carrier, 67.75 MHz audio carrier
  - Equivalent to Channel B in Italy

NOTE: SECAM Atari computers (France) do not output an RF signal.

The Atari's RF signal is accessed in one of the following places on the computer:
- 400/800: Built-in coaxial cable with male phono plug (NTSC computer versions) or male Belling-Lee TV aerial plug (PAL computers)
- XL/XE: Switch Box / Television jack (phono jack - female)

Domestic 400/800/XL/XE computers (NTSC M) shipped with a TV Switch Box (CA010112 / CA014746 packaged). This includes a phono jack (female) for RF signal input from the Atari, input connector(s) for your TV/cable/satellite antenna, and 75-ohm and/or 300-ohm output connector(s) for connection to the antenna input on the television. (For optimal signal quality, a simple adapter (phono socket - female to F connector plug - male) in place of the standard TV Switch Box may be preferred.)

Domestic XL/XE computers (NTSC M) shipped with a coaxial RF Cable / TV Video Cable (1200XL: CA061177 - 12 feet; 3.65 m; other XL/XE: CA024624 toroid cable Domestic/NTSC versions). The input end is a phono plug (male) that plugs into the Switch Box/Television jack on the computer; the output end is also a phono plug (male).

PAL/UK XL/XE computers (PAL B/G or PAL I) shipped with a coaxial RF Cable / TV Video Cable (CA024624 Toroid Cable PAL versions). The input end is a phono plug that plugs into the Switch Box/Television jack on the computer; the output end is a TV aerial plug (Belling-Lee plug - male).

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2.3) What kinds of computer monitors can I use with my Atari?

An Atari 8-bit computer produces a single video display channel and a single (monophonic) audio channel. The 400/800 models also produce some sounds (primarily the keyclick and system buzzer sounds) by way of an internal speaker.

While most Atari computers provide an RF color television signal (described in another section of this FAQ list), many also (or alternatively) provide a composite video signal, and some also provide a composite luminance signal ("Y") or a composite chrominance signal ("C") or both, which together are known as Y/C video or S-video. The French Peritel 400/800 provide limited palette RGB video signals.

Except for the NTSC and PAL versions of the XE System console, Atari computer versions that provide composite, "Y", or "C" video signals output them through the computer's Monitor port, which also contains a line for the computer's audio output. The pinouts for the Atari Monitor ports are in the pinouts section of this FAQ list.

The XE System console (all versions) provides a phono Video jack for composite video output, and a phono Audio jack for the computer's audio output.

Color Composite Video Monitors
An 8-bit Atari computer, except the 400 and the NTSC version of the 600XL, provides an NTSC, PAL, or SECAM (depending on the computer version) composite video output signal. Any computer monitor, television, or video receiver that accepts a standard NTSC, PAL, or SECAM (matching the computer version) composite video input can be used with the Atari. For sound support, a monitor that also accepts a separate sound input and has a built-in speaker could be used. Such monitors were common for use with home computers at the time of the Atari, in part because the picture quality was superior to that offered by TVs of the time. Modern devices that accept a composite video input remain suitable as well.

The typical Atari (color) monitor cable includes the male 5-pin DIN connector on one end for the Atari Monitor port, and two phono plugs on the other end. One of the phono plugs will carry the monophonic sound signal, and the other will carry the composite video signal. Atari's own CX89 Color Monitor Cable is of this type.

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Monochrome Composite Video Monitors
Many 8-bit Atari computer models, including the 800, 1200XL, 800XL, 65XE, 130XE, and 800XE, provide a composite luminance video output signal ("Y"). The video signal refresh rate corresponds to the computer version: 60 Hz on NTSC computer versions or 50 Hz on PAL computer versions. Any computer monitor, television, or video receiver that accepts a standard 60 Hz or 50 Hz (matching the computer version) monochrome composite video input can be used with the Atari. For sound support, a monitor that also accepts a separate sound input and has a built-in speaker could be used. At the time of the Atari a monochrome composite monitor, when compared to a color composite monitor, was less expensive and generally provided a sharper and easier to read image. The monitor reduces the Atari's color graphics output to shades of green or amber (depending on the monitor), making the display less suitable for entertainment or education software, but more suitable for productivity applications.

An Atari monochrome monitor cable includes the male 5-pin DIN connector on one end for the Atari Monitor port, and two phono plugs on the other end. One of the phono plugs will carry the monophonic sound signal, and the other will carry the composite luminance "Y" signal. Atari's own CX82 Black and White Monitor Cable is of this type.

The Atari XEP80 Interface Module can be used to add a high-resolution monochrome composite video output to any 8-bit Atari computer. The XEP80 is detailed elsewhere in this FAQ list.

Y/C Video (S-Video) Monitors
Some 8-bit Atari computer models, including the 800, 800XL (later PAL units), 65XE, 130XE, and 800XE, provide both a composite luminance video output signal ("Y") as well as an NTSC or PAL (depending on the computer version) composite chrominance output signal ("C"). Any computer monitor, television, or video receiver that accepts standard NTSC or PAL (matching the computer version) Y/C video, also known as S-video, can be used with the Atari. For sound support, a monitor that also accepts a separate sound input and has a built-in speaker could be used. Y/C video quality is superior to color composite video, making supporting display devices the ideal for use with the Atari. Such monitors were highly sought after by savvy Atari users of the time.

The most flexible type of Atari monitor cable includes the male 5-pin DIN connector on one end for the Atari Monitor port, and includes 4 phono plugs at the output end, carrying the monophonic sound signal, the composite video signal, the composite luminance ("Y") signal, and the composite chrominance ("C") signal. Such a cable can be used to connect an Atari to a color monitor accepting separate "Y" and "C" inputs, to a color composite monitor, or to a monochrome composite monitor. (Atari themselves did not produce a monitor cable of this type.)

While the best color composite monitors of the time of the Atari accepted "Y" and "C" signal inputs through phono jacks, more modern television or video receivers may accept these input signals together in the form of an S-video Mini4 connector. "Atari to S-video" interfaces or cables allow such modern devices to work nicely with the highest quality video output signal produced by the Atari.

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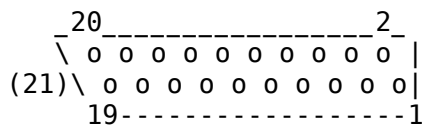
Television Sets in France
Entering the French market with the 400/800 was a challenge for Atari because they lacked SECAM versions of the computers to sell, and newer TVs also supporting PAL video were not yet widely available. Atari's initial workaround to support more French TVs was to offer PAL G computer versions modified to additionally provide an RGB video signal. It was only a partial solution, because the Atari's RGB signal output had a limited palette of only 8 possible colors, derived from the 8 luminance/brightness levels as generated by GTIA. Native Atari PAL color/hue information was ignored.

The 400 and early 800 Peritel versions have a built-in TV connecting cable that terminates with a Peritel connector. The later 800 Peritel version was supplied with a cable that plugs into the 800 Peritel Monitor port (8-pin DIN) at one end, with the Peritel connector at the other end. 400/800 Peritel cable connector pinout:



6.	Audio (mono)
7.	RGB Blue
8.	Slow Switching (+12V = AV Mode 4:3)
11.	RGB Green
15.	RGB Red
16.	Fast Switching (High / +1-3V = RGB)
17.	Video Ground
20.	RGB Sync

Not connected: pins 1-5,9-10,12-14,18-19

See:
http://atariage.com/forums/topic/252426-400pal-with-rf-and-scartperitel/
https://www.atari800xl.eu/hardware/computers/peritel-atari-800.html
https://www.atari800xl.eu/hardware/computers/peritel-atari-400.html

When development of native SECAM versions of the 600XL/800XL was delayed Atari chose to supply (unmodified) PAL G 600XL/800XL computers in France, as TVs supporting PAL video were becoming more common. Yet, to support older televisions requiring SECAM or RGB video, Atari also separately offered the Adaptateur PAL/Peritel PVP80 (by Compagnie Generale de Videotechnique or CGV) to provide an RGB video signal (and audio) via Peritel connector. The PVP80 plugs into the 600XL/800XL monitor port (5-pin DIN) at one end, with the Peritel connector at the other end. PVP80 Peritel connector pinout:

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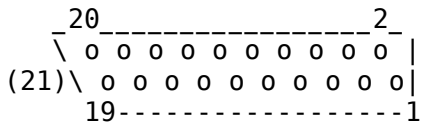
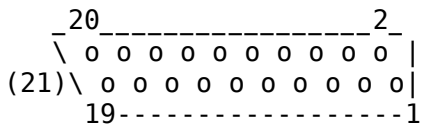


4.	Audio Ground
6.	Audio (mono)
7.	RGB Blue
8.	Slow Switching (+12V = AV Mode 4:3)
11.	RGB Green
15.	RGB Red
16.	Fast Switching (High / +1-3V = RGB)
17.	Video Ground
20.	RGB Sync

Ground: 4,5,9,13,17,18
Not connected: pins 1-3,10,12,14,19

The standard video cable provided by Atari France with SECAM 800XL, 130XE and XE System console units has the male 6-pin DIN on the end that plugs into the computer's Monitor port, and a Peritel connector on the other end, with this pinout:



2.	Audio (tied to pin 6)
4.	Audio Ground (tied to pin 17)
6.	Audio (tied to pin 2)
8.	Slow Switching (+12V = AV Mode 4:3)
16.	Fast Switching (Low / not connected = Composite)
17.	Video Ground (tied to pin 4)
20.	Composite video (SECAM standard)

Not connected: pins 1,3,5,7,9-16,18-19

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2.4) What were the Atari XC1411 and XM128 Monitors?

Introduced in January 1985, and previewed again in June 1987, the **Atari XC1411 Monitor** (some literature: "XC141") was a 14" color composite video monitor with built-in speaker, styled to match the Atari XE computers. There were two phono jacks, one for composite video and one for sound, and units were in the same case as the original Goldstar-produced Atari SC1224 monitor for Atari ST computers. The XC1411 never shipped, and no more than a handful of prototype units may exist.

Introduced in January 1985, the **Atari XM128 Monitor** (some literature: "XM148") was a 12" green monochrome composite monitor with built-in 80-column video adapter for an 8-bit Atari computer. The XM128 never shipped, and no more than a handful of prototype units may exist. The video adapter component of the XM128, however, eventually shipped as the major component of the XEP80 Interface Module.

2.5) What are composite video artifact colors, or artifacts?

Much of this section derived directly from De Re Atari, Appendix D:
"Television Artifacts": http://www.atariarchives.org/dere/chaptD.php
Appendix D is credited to Atari's **Lane Winner** with assistance from **Jim Cox**.

Composite video artifact colors arise when a spot or "pixel" on the screen displays a different color than the one assigned to it.

The possibility of artifacting is inherent to the nature of an NTSC or PAL composite video signal. The two major components of this signal are the luminance, or brightness, and the color, or tint. The luminance information is the primary signal, containing not only the brightness data but also the horizontal and vertical syncs and blanks. The color signal contains the color information and is combined or modulated into the luminance waveform.

The luminance of a pixel on the screen is directly dependent on the amplitude of the luminance signal at that point. The higher the amplitude of the signal, the brighter the pixel.

The color information, however, is a phase shifted signal. A phase-shifted signal is a constantly oscillating waveform that has been delayed by some amount of time relative to a reference signal, and this time delay is translated into the color.

In the NTSC standard, the color signal, or color subcarrier, oscillates at a constant rate of 315/88 MHz (approximately 3.579545 MHz or 3.58 MHz). In the PAL standard, the color subcarrier is 4.43361875 MHz. These color subcarrier frequencies set an upper boundary to the horizontal color resolution of an NTSC or PAL composite video signal. The horizontal unit of maximum resolution for color composite video is known as the color cycle.

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The Atari's system timing is built around the timing of the composite video color cycle. The Atari term "color clock" refers to one color cycle and is the term generally used throughout the Atari documentation to describe units of measurement across the screen. The OS graphics mode 7 (ANTIC mode D) is an example of one color clock resolution, where each color clock pixel can be a different color, for a horizontal resolution of 160 pixels in the playfield.

The Atari also offers "high resolution" graphics, where pixel width is half that of a color clock.

Since the luminance is the primary part of the composite video signal, whenever it changes, it also forces a change in the color phase shift. For one or more color clocks of constant luminance this is no problem, since the color phase shift will be unchanged in this area. However, if the luminance changes on a half color clock boundary it will force a fast color shift at that point.

For the NTSC Atari, where a machine cycle is precisely 1/2 of the NTSC color subcarrier frequency, varying the amplitude of the luminance signal at twice the color clock frequency (2*3.58 MHz) also means generating a signal at exactly twice the NTSC color subcarrier frequency. The result is stable NTSC color information for that pixel that was not generated as color information by the Atari.

Since the luminance can change on half color clock boundaries, this implies that two false color, or artifact pixel types can be generated. This is basically true. However, these two pixels can be combined to form two types of full color clock pixels.

This is illustrated below:

TV Scan Line	← 1 color clock →		← 1 color clock →		
	← 1 pixel →	← 1 pixel →	← 1 pixel →	← 1 pixel →	
	0	**1**	0	0	½ color clock pixel = color A
Luminance	**1**	0	0	0	½ color clock pixel = color B
(0=Off	**1**	**1**	0	0	1 color clock pixel = color C
1=On)	0	**1**	**1**	0	1 color clock pixel = color D

The actual colors A, B, C, D seen depends upon the version of the NTSC Atari computer used, due to variances in the designs of the video signal generation electronics leading to slightly different timings of fast color shifts and thus different sets of artifacting colors.

With an NTSC Atari, the ANTIC screen modes capable of artifacting colors on the computer's composite and RF video output signals are 2 (OS graphics mode 0), 3 (no corresponding OS graphics mode), and F (OS graphics mode 8). Each of these modes has a pixel resolution of one half color clock by one scan line. They are generally considered to have one color and two luminances. With the use of artifacts, pixels of four different colors can be displayed on the screen in each of these modes. Artifact colors are absent when using separate chrominance and luminance video output signals.

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With a PAL Atari, varying the amplitude of the luminance signal at twice the color clock frequency means about 7.08 MHz. This frequency does not have a simple mathematical relationship to the PAL color subcarrier frequency of 4.43 MHz. As a result, while some artifacting effects may be seen, there are no stable artifacting colors as seen on NTSC systems.

With a SECAM Atari, color information is encoded using frequency modulation rather than using a color subcarrier frequency, so there is no possibility of artifacting as seen on NTSC systems.

Recommended readings:
https://tinyurl.com/yv2zdnaf
http://atariage.com/forums/topic/275882-atari-800-ntsc-artifacting/

2.6) What is HDTV display lag?

Much software on the 8-bit Atari is highly interactive and timing-critical. For example, many games are highly responsive to input from the game player via a game controller (such as a joystick). The Atari software programmer can reasonably assume that the video display device can reflect changes as output by the Atari with no perceivable additional delay. Software timing considerations are normally limited to the capabilities and constraints of the Atari hardware itself.

However, in some cases a television or video monitor may introduce a noticeable lag time between the video signal as input by the Atari, and the video signal as actually displayed by the device. While any such effect is truly negligible with CRT televisions or monitors (the standard of the time of the Atari), the modern high-definition television (HDTV) has emerged as an important exception. An HDTV typically dedicates considerable processing efforts (hardware + software) toward presenting the most attractive picture possible. Since few HDTV applications require precise interactive timing, this video processing is generally not optimized for time efficiency. When used with an older but timing-precise device such as an 8-bit Atari computer, the resulting delay can be quite noticeable, making the HDTV essentially unusable for "serious" action gaming.

Fortunately, many HDTVs offer a "game mode" that circumvents much of the video processing otherwise performed, thereby eliminating most of the display lag otherwise introduced by the television. If an HDTV is to be used with the Atari for gaming, a "game mode" on the HDTV is essential.

Wikipedia on the topic: http://en.wikipedia.org/wiki/Display_lag

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Chapter 3

Mass storage

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3.1) Compact Cassette Players/Recorders

3.1.1) What are the Atari 410, 1010, XC11, & XC12 Program Recorders?

An Atari Program Recorder resembles an ordinary audio cassette tape player, providing secondary (not directly accessible by the computer's central processing unit) and offline (removable from the computer) magnetic storage and retrieval of digital data, using a standard (analog) compact cassette.

While the computer converts digital serial data into analog audio tones for recording/saving directly to cassette, the program recorder contains analog to digital circuitry for converting analog audio tones to digital serial data when playing/reading from cassette.

In addition to the digital information track, the program recorder can also play back an audio track, allowing the computer user to both load/run programs and listen to voice or music.

Under the Atari Operating System, the digital storage capacity of a 60-minute cassette is about 102,400 bytes (100 KiB). The Atari OS writes files in fixed-length blocks at 600 baud (physical bits/second).

Atari program recorders use SIO Motor Control; only one such device can be attached to the system at a time.

Specifications common to all Atari program recorders:

- Tape structure is standard 1/4 track stereo format:
  - 4 tracks, divided into 2 channels/sides ("Side A" and "Side B")
  - Each tape channel/side is stereo, consisting of 2 tracks:
    - Left / Audio track
    - Right / Digital track (Audio Frequency-Shift Keying – AFSK)
- Digital track consists of two tones: "mark" = 5,327 Hz; "space" = 3,995 Hz
- Automatic/software motor control: the computer can control tape motion start/stop (both play and record functions), if the recorder PLAY button has already been pressed by the user.
- Tape speed: 1.875 IPS (inches per second)
- 3-digit tape counter
- Any audio track plays through the television/monitor speaker, by way of the computer's audio output.
- Preset volume levels (both playback and recording)
- Media used is the Philips Compact Cassette or equivalent, containing Type I / ferric oxide / normal bias cassette tape. (Atari CX4100 Blank Cassettes - 12 Pack never shipped.)
  - Type II ("chrome") or Type IV ("metal") cassette tapes are not used with Atari program recorders. See: http://preview.tinyurl.com/jgbm9p7
- Cassettes can play/record on both sides – cassette must be removed, flipped-over, and re-inserted to access the reverse channel/side of the tape.

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- Cassette write protect notch status is respected – will not write to a cassette side missing the write protect notch corresponding to that side of the cassette.
- The cassette utilization / filesystem is controlled entirely by software, normally the C: Cassette Handler of the Atari Operating System. Specifications are provided elsewhere in this FAQ list.
- Only one program recorder can be operated on the Atari SIO bus.

410 Program Recorder (Common specifications)

- Produced 1979-1983. Replaced by the 1010.
- Connectivity: Built-in SIO cable - must end SIO daisy chain.
- 3 main versions, each with two different variations:
  1. Unreleased prototype 410 design
  2. Made in Japan by Bigston, 1979-1981
  3. Made in Hong Kong by Transtek, 1981-1983
- C015705 REV3 Atari sales flyer reads: "Two styles of the Atari 410 Program Recorder are currently manufactured, with equivalent performance." This refers to versions #2 and #3 above.
- Technical manuals:
  - Atari 410 Program Cassette Recorder Field Service Manual FD100004
    - May 1982 - Transtek 120V AC version
  - Atari 410 Program Cassette Recorder Field Service Manual PAL-UK FD100005

410 Program Recorder (#1, Unreleased prototype 410 design)

- Small/Narrow profile
- Chrome carrying handle
- "Atari 410" label between cassette bay door and buttons;
  outline "Atari" label, solid "410" label
- Above cassette bay door, left to right: Atari logo, tape counter, "Program Recorder"
- 6 Buttons, left to right: Rewind, REC, Play, Advance, Stop, Eject
- Two variations of the unreleased prototype 410:
  1. (Variation #1a) Buttons are black, except red REC button
  2. (Variation #1b) Buttons are white with black borders
     See: http://www.rhod.fr/images_periph/410/410proto.jpg

410 Program Recorder (#2, Made in Japan by Bigston, 1979-1981)

- Shipped with the earliest (1979-1980) 800 computer systems
- Carrying handle
- "Atari 410" label between cassette bay door and buttons
- Tape counter also between cassette bay door and buttons
- 5 Buttons, left to right: Record (red label), Rewind, Play, Advance, Stop/Eject
  - Notably, the only program recorder produced by Atari without a Pause button.

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- Two Bigston/Japan 410 version variations:
  1. (Variation #2a) North American version
     - Power: Requires 120V AC (North American household standard)
  2. (Variation #2b) 410P (Direct Current) version
     - Power jack on the RIGHT side of the unit. Center positive.
     - Power: Requires 6V DC as supplied by the Tadmod 6498 or Atari Type FW3199 power adapters or equivalent.
- Manual: Atari 410 Program Recorder Operator's Manual C014810, 1979

410 Program Recorder (#3, Made in Hong Kong by Transtek, 1981-1983)

- Was also included in the kit: CX482 The Educator
- No carrying handle
- "Atari 410" label on cassette bay door
- Tape counter above cassette bay door
- 6 Buttons, left to right: REC, Play, Rewind, Advance, Stop/Ej., Pause
- More powerful amplifier than in the Bigston/Japan 410, raising previously insignificant background noise to levels that degraded the recorder's ability to read data without errors. Issue caused Atari to remaster and replace the inventory of all cassette-based products as of March 1, 1982. (Tech Tip 5)
- Two Transtek/Hong Kong 410 version variations:
  1. (Variation #3a) North American version
     - Power: Requires 120V AC (North American household standard)
  2. (Variation #3b) 410P (Direct Current) version
     - Power jack on the BACK of the unit. Center positive
     - Power: Requires 6V DC as supplied by the Tadmod 6498 or Atari Type FW3199 power adapters or equivalent
- Power usage: 6W
- Manual: Atari 410 Program Recorder Owner's Guide C060055, 1981, USA or International (Holland) printings.

1010 Program Recorder

- Produced from 1983-1984. Replaced the 410.
- Also included in the 800XL 64K Personal Computer Pack (UK):
  - 800XL + 1010 + CX4101 An Invitation to Programming 1 cassette + TX8034 Pole Position/Atari Demo cassette
  - https://tinyurl.com/438k69uv (see also Atari User #1 May 1985 page 19)
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- Manual: The Atari 1010 Program Recorder Owner's Guide C061133

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- Two slightly different versions were manufactured:
  - 1010S. FCC ID: BPA99H1010
    - Made in Japan by Sanyo
    - 6 Buttons, left to right: Record, Play, Rewind, Advance, Pause, Stop/Ej
    - Orange sticker inside cassette bay
  - 1010C. FCC ID: BPA7YJ1010
    - Made by Chelco Sound (Hong Kong) Limited
    - 6 Buttons, left to right: Record, Play, Rewind, Advance, Stop/Ej, Pause
    - Silver sticker inside cassette bay
- Power: Requires 9V AC as supplied by the Atari C061515 or C061516 power adapters or equivalent (such as the Atari CA014748 or CA017964)
- Power usage: 3W
- In early production units the power indicator lights as soon as the power adapter is plugged in. In later models the power indicator will only light after you press Play, Rewind or Advance.
- Technical manual:
  - Atari 1010 Cassette Recorder Field Service Manual FD100223
    - REV. 02 April 1983
    - REV. 02 September 1983

XC11 Program Recorder

- Replacement for the 1010.
- Available in the UK from early 1986 to summer 1986 (Atari User), when it was replaced by the XC12. Very limited 1986-1987 release in the US
- Connectivity: Has a built-in SIO cable and one free SIO port
- 6 Buttons, left to right: Record, Play, Rewind, Advance, Stop/Eject, Pause
- Power: Requires 5V DC as supplied by SIO pin 10 (+5V/Ready except on the 1200XL)
- Made in Japan

XC12 Program Recorder

- Replacement for the XC11 (or for the 1010 in markets where the XC11 was never released).
- Shipped in mid-1986 in the UK. Wide distribution internationally, though never introduced in the US
- Also included in the 130XE Starter Pack (UK):
  - 130XE + XC12 + CX40 Joystick + TX9043 Compilation Tape
    (Typo Attack, Missile Command, Centipede, Tennis, Star Raiders)
    http://www.rhod.fr/ataripics/130xestarter.JPG
- Also included in the XEgs kit, XE 2012 (France)
- "Round" window
- Based on the Phonemark PM-4401A
  - Printed circuit board is marked "PM4401-4"
- Connectivity: Built-in SIO cable - must end SIO daisy chain
- 6 Buttons, left to right: Record, Play, Rewind, F.Fwd, Stop/Ejt, Pause
- Power: Requires 5V DC as supplied by SIO pin 10 (+5V/Ready except on the 1200XL)

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3.1.2) What other cassette recorders can I use with my Atari?

Important contributor to this section: Tomasz Krasuski

Unlike other microcomputer systems of the time period, only Atari-specific cassette tape recorders or interfaces could be used with Atari 8-bit computers.
Several such peripherals were produced by companies other than Atari:

Compu-Mate Computer Data Recorder by General Electric (GE, G.E.)

- 3-5148A (unit) / 3-5156 (box)
- 3-5149A Atari/Commodore Interface Module (IFM)
- 1st data cable: Data Recorder <-> IFM Interface or Data Recorder <-> C64
- 2nd data cable: IFM Interface <-> Atari computer SIO connector
- Monophonic – No support for audio track as supported by other program recorders for the Atari
- No second SIO port - must be at end of SIO chain
- Battery operated or uses an external power supply
- Switch on the bottom, Atari or "All other computers".
- More info: http://www.atariage.com/forums/index.php?showtopic=128505
- Pics: http://www.atariage.com/forums/topic/161936-atari-1010-problem/

Phonemark PM-4401A and derivatives

- Manufactured for Atari as the Atari XC12
- "Round" window and "notched" top case design
- No second SIO port - must be at end of SIO chain
- PM-4401A by Phonemark
  - Top of unit: "Phonemark" in white lettering on black label
  - Bottom of unit: "Computer Cassette Data Unit"
  - Box: Blue background, "Phonemark Computer Cassette" "PM-4401A" "Suitable For Use With Atari Home Computer"
- XG12 [by Phonemark for Datamark]
  - Atari XE case color
  - Top of some units: "Datamark XG12" in red lettering
  - Top of other units: Black label, no branding
  - Bottom of unit (some): "Datacorder" on gold label
  - Box: Datamark DM-6402A (see below). These units seemingly sometimes shipped by Datamark as a substitute for their own DM-6402A.
  - See below for the Datamark-derived version of the XG12.
- TurboData [by Phonemark for ?????]
  - Atari XE case color
  - Built-in Turbo upgrade???
  - Top of unit: "TurboData" in red lettering on white label
  - Box unknown
- XL12 [by Phonemark for Logical Design Works (LDW) on behalf of Atari]
  - Atari XE case color
  - Top of some units: "For Atari XL12" in red/silver
  - Top of other units: "For Atari XE, 800XL" in white lettering on black label

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    - Bottom of some units: "Computer Cassette Data Unit" "Model No XL12"
    - Bottom of other units: "For Atari"
    - Box: Atari-like, with red strip down ONE side of box, "XL 12" in large font (with space in middle), "XC12" mistake in smaller type, "For Atari" does NOT use Atari logo font, Phonemark unit is pictured
    - Utilized parts supplied by Atari, after Atari discontinued their own XC12
    - Sold in Chile by Coelsa (official Atari importer) and in Eastern Europe
    - Replacement for the Atari XC12; would be replaced in Europe by the XCA12
    - See below for Datamark-derived version of the XL12.
- XCA12 [by Phonemark for California Access (brand of LDW) on behalf of Atari]
    - Atari XE case color
    - Top of unit: "For Atari Computer" in black/red/black, "XCA12" in silver
    - Bottom of unit: "For Atari Computer" "Model Number XCA12"
    - Box: Atari-like, white with orange strip down one side of box, "For Atari Computer" with Atari logo font
        - Front (very small pic): http://img.archiwumallegro.pl/?876820703
        - Rear: http://preview.tinyurl.com/ogh8j9p
    - Utilized parts supplied by Atari, after Atari discontinued their own XC12
    - Sold in Eastern Europe, especially Poland
    - Replaced the XL12; would be replaced by the CA-12 (once Atari parts supply was exhausted)
- CA-12 [by Phonemark for California Access - brand of LDW]
    - Atari XE case color
    - Top of unit: "For Atari Computer" in black/red/black, "CA12" in silver
    - Bottom of unit: "For Atari Computer" "Model Number CA12"
    - Printed circuit board has the markings "P.M." "4401-5" "REVB"
    - Box: White with Orange highlights, "CA-12 Program Recorder" http://www.aceton.pl/images/105338.jpg
    - Sold in Eastern Europe, especially Poland
    - Replacement for the XCA12 (produced independently of Atari)

Datamark DM-1301A

- Similar dimensions to Phonemark PM-4401A and derivatives, but even more Atari-inspired case styling includes slanted lines matching those of Atari XE computers and peripherals.
- Top of unit: "Datamark" in red lettering
- Unit pictured in center: http://www.retrogames.cl/imagenes/varios/zz/caseteras.jpg
- Box: Atari-like, with red stripes down BOTH sides
- Box pictured at upper-left: http://www.retrogames.cl/imagenes/varios/zz/casencaja.jpg

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Datamark DM-6402A and derivatives

- "Square" window and "un-notched" top case design
- No second SIO port - must be at end of SIO chain
- DM-6402A by Datamark
  - Atari XL case color, black label (unlabeled), black buttons
  - Units exist????
  - Box: Black background, "Datacorder Unit" in yellow, "Model DM-6402A" in orange", "Power Without the Price" in red
- XG12 by Datamark
  - Atari XE case color
  - Top of unit: "Datamark XG12" in red lettering
  - Box: Datamark DM-6402A (see above)
  - See above for the Phonemark-derived version of the XG12.
- XL12 [by Datamark for Logical Design Works (LDW) on behalf of Atari]
  - Atari XE case color
  - Top of units: "XL12" in silver
  - Top of some units: "For Atari" in silver/red
  - Bottom of some units: "Datarecorder" "For Atari Computer" "DM-6402A"
  - Bottom of other units: "For Atari"
  - Box:
    Atari-like, with red strips down BOTH sides of box, "For ATARI" uses Atari logo font, features photo of Datamark original version unit
  - Utilized parts supplied by Atari, after Atari discontinued their own XC12
  - Sold in Chile by Coelsa (official Atari importer) and in Eastern Europe
  - Replacement for the Atari XC12; would be replaced in Europe by the XCA12
  - See above for the Phonemark-derived version of the XL12.
- Najm NA-R25 or Najm NC-60 [by Datamark for aDawliah Universal Electronics APL]
  - Atari XE case color
  - Top of unit: "Najm NA-R25" or "Najm NC-60" in red lettering
  - Bottom of NA-R25 unit: "Datacorder Model No. DM-6402
  - Bottom of NC-60: NC60 Casseette recorder for artari xe,xl computer" [sic]
  - Box: Datamark DM-6402A (see above)
  - Substitute for the Atari XC12 in later 65XE Najm packages

Taihaho Computer Cassette

- Box: Taihaho Data Cassette Recorder/Player
- 120V version (red) for North America or 240V version (black) for UK
- Photos: https://tinyurl.com/3axkhc2w
- Built-in SIO cable - must end SIO daisy chain
- Power supply is built-in (plugs directly into the wall)

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Crystal Cable Company TIC-600 interface

- Tape interface and controller that connects the Atari to a standard tape deck
- Supports reel-to-reel, 8-track, VCR, or standard cassette deck
- Auto mode - Computer starts and stops tape movement
- Manual mode - Tape player controls are used for tape movement
- Supports 900 baud; can be upgraded to support 1,200 baud
- Kit or assembled

ACI-3 Cassette Interface, by Micro Systems and Software

- Plugs into the SIO port of the Atari, interfaces any monoaural or stereo cassette tape recorder/player.

W.E. Electronics (W.E.E.) Cassette Interface

- Plugs into the serial I/O port of the computer and then, via a choice of leads into either a standard portable cassette recorder or a Hi-Fi stereo recorder with provision for remote control of the cassette motor if the recorder allows this.
- See: https://www.page6.org/archive/issue_14/page_30.htm

Links:
http://oldcomputer.info/8bit/aptaperec/

3.1.3) What speed upgrades are there for Atari program recorders?

Numerous methods were created for upgrading the (painfully) slow data transmission speed of the Atari program recorders. Most of these originated in regions of the world where program recorders were normally used with the Atari rather than (extremely expensive) disk drives.

Products/formats are presented in "families".

CASA Turbo Tape, by CASA (Dutch) (1985)

- Purely software

Rambit TurboCharger (1986?)

- From the UK
- For: 410, 1010, XC11, Phonemark, XC12
- Circuit board + conversion utility program on cassette. The software is used to convert standard Atari data cassettes to Rambit format cassettes.
- 3,300 - 3,600 bit/s achieved
- Review (Nov/Dec86): http://www.page6.org/archive/issue_24/page_30.htm

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Turbo 2000, by Jiri Richter (RICO or JRC; Czechoslovakia)

- Project published in Zpravodaj Atari Klubu – priloha 11/1987
  See: http://blog.3b2.sk/igi/file.axd?file=2013%2f12%2fTurbo+2000.pdf
- Software + modification project for XC12
- Transfer rates flexible; later standardized to 2,270 baud
- Software: Super Turbo cartridge software by RICO (1988)
- Released later: TT-DOS, a DOS 2.5 clone with high speed tape handler, B:
  - TT-DOS 1.1 © 1989 JR Computing (JRC)
  - TT-DOS 1.2 © 1989 JR Computing
  - TT-DOS 1.5 © 1991 JR Computing
- Released separately (West Germany): B-TAPE high speed system by **Jiri Bernasek** (BEWESOFT) for use with BW-DOS or SpartaDOS
- Clone (Poland): AutoTurbo, by Brodaty Software / INFO-CELL

Hard Turbo, by Computer Center (Poland)

- Hardware same as Turbo 2000
- Software loaders distributed on cassette or cartridge

Turbo 2T06, by Wojciech Zabolotny

- Published in the magazine IKS Nov-1988 pages 4-6, with follow-up information published in the next issue Dec-1988 page 14 and in Jan-1989 pages 28 and 31.
- "Cassette Operating System" (L1, L2, WIELOBLOK) software
- Reviewed in Bajtek Aug-1989 (compared with AST)

K.S.O. Turbo 2000

- Based on Turbo 2T06
- Separately: K.S.O. Turbo 2000 cartridge project for self-assembly
- Custom formats:
  - "New format" (Turbo 2000F+)
  - Speedy 2700, by *AJEK

Atari Super Turbo (AST) (late 1987)

- Designed by Slawomir Nienaltowski (designer of the SN-360 disk drive), sold to Atari Studio (AS; later: Mirage)
- The first Polish Turbo system
- Programs stored with AST can be read by Turbo 2000.
- Originally for the 1010, later released for XC12 and clones.
- Reviewed in Bajtek Mar-1989
- Later version(s) sold with software on cartridge: AST Turbo Cartridge
- Clones:
  - Atari Turbo Tape (ATT)
  - UM Turbo, by Unerring Masters

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Turbo 2000F, by MUEL (1989) and/or Rawa Soft
- 6,700 baud. Advertisement: Bajtek Aug-1989 page 26
- Can read other formats including AST, Atari Hard Turbo, Turbo 2000

TOMS Turbo 2001.
- Close derivative of Turbo 2000F. Several versions:
  - Cartridge
  - Cassette
  - Computer ROM
  - TurboDOS 2001 cartridge (with MYDOS 4.50T - TOMS MYDOS ROM version)
- TOMS OS for Atari XL/XE can also optionally include Turbo 2001

Turbo 6000 / Schleife '88 (Loop'88)
- From East Germany, for XC12
- Chaos System: Turbo 6000 interface + software: Chaos Loader, Chaos Copy
- 6,000 baud

Turbo Star, by Stach Soft (1989)
- Based on Turbo 6000

Turbo Star 6000, by Stach Soft
- Based on Turbo Star, with improvements
- Also known as Turbo Star Plus

Injector / Fast Injektor
- Hardware (for the XL12) + software
- Developed by Pedro P. Caraball Alvarez (Turbo Software, Argentina/Chile)
- Version 1.0 05/09/88 for Turbo Software, published by M.P.M. S.A. (Chile)
- Rights sold to Coelsa (official Atari importer in Chile) in 1990. Coelsa would sell many XL12 units with the Fast Injektor preinstalled.
- 4,000 baud
  http://www.retrogames.cl/injektor.html

STAC / Super Turbo Auto Corrector
- From Argentina by Jorge Cwik (ijor), 1988
- Purely software, with error recovery
- Available (sources): http://preview.tinyurl.com/ybrbt8qf

Iron Turbo (1988)
- Software only, requires optimally operating XC12, CA12 or XCA12

Turbo 2600, from Zaklad Elektroniczny SZOK and Vadim-Soft
- Software-compatible with Iron Turbo

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SITRE/S.I.T.R.E./"Sistema Inteligente Turbo con Recuperacion de Errores"

- From Chile by Victor Parada G. (++Vitoco)
- Purely software. Primarily a copying tool, but also turbo speed.
- Version 1.01 March 1989 via SYFCOM, then VCC (Video Compu Club) for 800XL
- Version 2.01 April 1989 for 130XE
- Version 1.11 June 1989 (800XL, attempted support for longer programs)
- Version 3.02 (2015, full support for XL/XE 64 KiB to 320 KiB)
- Available: http://www.vitoco.cl/atari/sitre/

Blizzard Turbo, by Atares (Poland, 1989)

- Software v1: Microloader, Turbo KOS, Short KOS, Looking
- Software v2: KOS+, Blizzard Turbo, Blizzard Copy, 3 Microloaders
- Available separately:
  - BIG2 cartridge by KNS Corporation
  - Phoenix cartridge by Hurek (1989)

Turbo ROM, jointly developed by PLUS and MAPASOFT (Poland) (1991?)

- Special software cartridge loader required to read such cassettes
- Reviewed in Tajemnice_Atari 5/91

Most of the above upgrades are described in detail at:
http://atariki.krap.pl/index.php/Systemy_turbo

3.2) Floppy disk drives

3.2.1) What is the Atari 810 Floppy Disk Drive?

Portions of this section developed by Laurent Delsarte from the Atari 810 Field Service Manual.

The Atari 810 is a floppy disk drive that provides secondary (not directly accessible by the computer's central processing unit) and offline (removable from the computer) magnetic storage and retrieval of digital data, using a standard (of its time) 5.25 inch diskette. Diskette storage capacity is 90 KiB. The Atari 810 Floppy Disk Drive is used with a single Atari 8-bit computer with a minimum of 16 KiB of RAM installed. Up to four Atari 810 Floppy Disk Drives may be attached and used with an Atari computer at the same time.

Connectivity: 2 Atari SIO ports for direct connection to Atari computers

- Shipped with SIO cable CA014122 (3-foot; 91.5 cm)

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The front of the 810 features a Power on/off switch, a "Power" indicator light, and a "Disk busy" indicator light. The rear of the unit includes two SIO ports ("I/O Connectors"), a power input jack, and drive number selector switches:

Left	Right	
Black & White		**Drive 1**
White	Black	**Drive 2**
	Black & White	**Drive 3**
Black	White	**Drive 4**

810 Performance Specifications

- Capacity per diskette:

40	tracks	x	18	sectors/track	=	720	sectors/disk
720	sectors	x	128	bytes/sector	=	92,160	bytes/disk (90 KiB)

- Average Data Transfer Rate: 6,000 bit/s
- Average Latency: 100 milliseconds
- Track to Track Access Time: 5 milliseconds
- Average Access Time: 74 milliseconds
- Head Settling Time: 15 milliseconds
- Head Loading Time: 35 milliseconds
- Power-up Delay: 0.5 seconds
- Maximum Data Access Time: 236 milliseconds

810 Functional Specifications

- Disk Rotation Speed:
  288 RPM (Revolutions Per Minute) ±1% (range: 285.12 - 290.88 RPM)
- Recording Density: 2,938 BPI (Bits Per Inch) (maximum)
- Flux Density: 5,876 FCI (Flux Changes per Inch) (maximum)
- Track density: 48 TPI (Tracks Per Inch)
- Tracks: 40 (track 1 is the outermost; track 40 is the innermost)
- Encoding method: Frequency Modulation (FM, or "single density")
- Drive heads: One (accesses the disk from below)
- Disk type used is the Atari CX8100 Blank Diskette or equivalent, which is an industry standard 5.25" micro-diskette / minidiskette / mini-disk / minifloppy diskette / mini-floppy diskette / floppy disk. (Atari specification: C016884)
  - Any one of the following certifications/marketing labels is in itself sufficient to indicate 5.25" disks suitable for use with the Atari 810:
    - 40 tracks, 48 TPI, Single Density (SD/1D), Double Density (DD/2D), Quad Density (QD/4D)
    - Exception: Early disks with room for only 35 tracks at 48 TPI, the original configuration for the format as introduced in 1976. Such 35 track disks have a noticeably smaller-length drive head access opening than the eventual standard 40 track disks, which were introduced in 1977. Production of disks supporting only 35 tracks was discontinued by the end of 1980.
  - NOTE: High Density (HD) 5.25" floppy disks – very commonly used for the MS-DOS 1,200 KiB format introduced with the IBM PC/AT in 1984 – can NOT be used with Atari 810 and compatible drives.

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  - Soft-sectored disks or hard-sectored disks may be used. The sector holes of hard-sectored disks would be ignored by the 810, so hard-sectored disks are unnecessary and very rarely used with the Atari.
  - Single-sided/One-sided (SS/1S) or Double-sided/Two-sided (DS/2S) disks may be used.
    - The 810 is a single-sided drive (one drive head). A disk is inserted into the drive with label side up and, from below, the drive head accesses the back (non-label) side media surface via the access opening on the back side of the disk.
    - Except for very early truly single-sided/one-sided disks, all disk media is actually two-sided, and all disks have drive head access openings on both the front and reverse sides of the disk, so that a drive head could access the disk media from either side. Single-sided/one-sided disks are certified for use on only one side (either side), while double-sided/two-sided disks are certified for use on both sides.
    - The reverse side of a disk (the front, label side media surface) may be accessed by the 810 by re-inserting the disk into the drive upside-down, label side down. The 810 thus sees the reverse side of the disk as another, entirely different, single-sided disk. A disk that is used as two single-sided disks, one on each side, is a "two-sided" or "flippy" disk.
    - Some double-sided/two-sided disks have a second index hole/timing hole, facilitating use as a two-sided/flippy disk. However, because the 810 ignores the index hole/timing hole such disks are unnecessary and rarely used with the Atari.
- Diskette write enable notch status is respected: will not write to diskette side lacking (or having a covered) write enable notch corresponding to that side of the disk.
- On the Atari, an empty floppy disk drive is powered on prior to inserting a diskette into the drive. Conversely, the diskette is removed from the drive before the drive is turned off. These procedures protect the integrity of data on diskettes.

810 Internals

- 6507 microprocessor (MOS Technology MCS6507 or equivalent) @ 500 kHz, C010745
- ROM, C011299 (some chips marked C001299)
- 6810 128 x 8-bit static RAM (1 KiB) (Motorola MCM6810), C014328
- 6532 PIA (MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent), C010750
- Western Digital FD1771 Floppy Disk Controller (FDC) @ 1 MHz, C014329
- Read/Write Head Gap: .013 inches
- Guard Band: .008 inches
- Pad Pressure: 17 grams

810 industrial design (case): Roy Nishi and Russ Farnell.

Pre-production units: Atari fuji logo includes "Atari", outline "Atari" label, solid "810" label.

The 810 underwent several significant design revisions over the course of its manufacture.

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Original Atari 810 Floppy Disk Drive (1980-1981 units: no Data Separator and "Pre-Analog") specifications:

- Micro Peripherals, Inc. (MPI) minifloppy diskette drive mechanism
- Two printed circuit boards: a Side Board and a Rear Board
- Power: Requires 9V AC as supplied by the rare early 20W variant of the Atari CA014748 power adapter or equivalent (such as the Atari CA017964)
- Power usage: 20W

810 drives manufactured after September 1, 1981 ("DS" sticker) shipped with an External Data Separator Board, which improves the drive's ability to distinguish between data pulses and clock pulses on the disk, lowering the chance of a misread. It is installed in the Side Board where the FDC chip would otherwise be installed. (Atari 810 Field Service Manual pages 1-9) The Side Board stepper motor circuit voltage was increased to regulated 12 volts DC as well.

- Power: Requires 9V AC as supplied by the Atari CA017964 power adapter or equivalent
- Power usage: 21W

The External Data Separator Board was also offered as an upgrade for earlier 810 drives. Earlier Side Boards must be upgraded in order to accept the Data Separator.

Next, Atari introduced the Atari 810 Revision C ROM in November 1981 ("C" sticker).
According to Antic (Oct. 82), "ROM C causes diskettes to be formatted with an improved sector layout which is more efficient than that used by earlier 810 control ROMs." Performance was reported to be 20% faster than with the original B ROM. The ROM C was also offered as an upgrade for older drives.

Atari 810 Floppy Disk Drives produced from February 1982 used the new "810 Analog" ("810M Analog") design, further improving reliability: (see Atari 810 Field Service Manual page 8B-1)

- The 3 new 810 Analog components were:
  - A Power Supply Board now bolts onto the common base plate where the Rear Board used to be.
    The Power Supply Board contains:
    - A redesigned Power Supply.
    - A Tachometer/Speed Switch I.C. (frequency to voltage converter) added as the Tach circuit to stabilize the motor speed.
  - An Analog Board now bolts to the top of the Drive Mechanism. This board contains the Analog circuitry which used to be on the Rear Board. The major changes are to the Read/Write circuitry.
    The Analog Board contains:
    - Operational amplifiers ("op-amps") and discrete transistors in place of transistor arrays.
    - A multiplexor chip for switching the Read/Write amplifiers.
  - A 10-pin ribbon cable connects the Analog Board to the Power Supply Board.
- Power: Requires 9V AC as supplied by the Atari CA017964 power adapter or equivalent
- Power usage: 30W

The 3 new 810 Analog components were also offered together as an upgrade:

- CB101128 "Grass Valley Analog Board Set" for Pre-Analog 810 drives.

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In November 1982, the drive mechanism of the 810 Analog disk drive was changed from MPI to Tandon. The Tandon version is known as the "810T Analog" disk drive.

	TANDON (810T Analog)	MPI (Pre-Analog & 810M Analog)
FRONT BEZEL	Operated by a front latch. No diskette eject mechanism. Raise the front latch to access diskette. Plastic guides and front latch inhibitor position the diskette.	Operated by a door release button. Contains a diskette eject mechanism.
UPPER ARM ASSEMBLY	Contains no pressure spring. Adjust by turning the two nuts which secure the upper arm to the carriage.	Contains pressure spring assembly. Adjust pressure spring.
STEPPER MOTOR ADJUSTMENT	Adjust by turning the cam screw at rear of Drive Mechanism.	Adjust by loosening setscrew to move Stepper Band Pulley.
TRACK 00 STOP	Adjust by monitoring increase and decrease in waveform amplitude.	Adjust for 0.010 clearance.
WRITE PROTECT CIRCUIT	Microswitch Assembly.	Phototransistor.

Manuals:

- Atari 810 Disk Drive Operator's Manual C014760 (earlier units)
- Atari 810 Disk Drive Owner's Guide C060056 (later units)

Technical manuals:

- Atari 810 Disk Drive Field Service Manual
  - Preliminary (~190 pages)
  - FS015854 REV. 1 July 1980 (~138 pages)
  - FD100003
    - July 1982 [REV. 02]
    - REV. 03 May,1983

Until fall 1981 the 810 shipped with the 810 Master Diskette CX8101 (boxed; DOS I).

From fall 1980 to fall 1981 the 810 additionally shipped with the Disk Operating System Reference Manual.
From fall 1981 to May 1983 the 810 shipped with the 810 Master Diskette II CX8104 (boxed; DOS II version 2.0S or DOS 2.0S).
Box contents for both are detailed elsewhere in this FAQ list.

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810 accessories from Atari:

- CX8100 - Atari 810: 5 Diskettes (unformatted)
- CX8202 - Atari 810/815: 5 Blank Diskettes (unformatted)
- CX8111 - Atari 810: Formatted Diskette II (5 per box; retail box never shipped, but individual CX8111 disks shipped with other products including the 810 Master Diskette II CX8104):
  - Format is equivalent to disks formatted with 810 drives containing the Revision C ROM.
  - Speculation: Product was released for users of older 810 drives with the Revision B ROM which could only create slower format disks.

Third-party upgrades for the 810

Fast-Chip, by Binary Corporation, 1982

- Disks formatted by an 810 with Fast-Chip utilize an improved sector layout which is more efficient than those created by standard 810 drives.
- 30% faster formatting for earlier 810 drives (prior to "ROM C"), or 10% faster formatting for 810 drives with "ROM C" (Nov. 1981 or later)

Happy 810 Enhancement, by Happy Computing (Richard Adams), 1982

- Company name became Happy Computers, Inc. in 1983
- Three versions:
  - HE810S-X for early 810 drives (no Data Separator)
    - Upgrade includes a data separator
  - HE810S-L for pre-Analog 810 drives with Data Separator
  - HE810S-H for 810 Analog drives
- RAM buffer: 1 track / 2304 bytes / 18 sectors
- "Happy" Warp Speed standard high speed "Reads disks up to 3 times faster than standard 810" with any software; supporting software also supports buffered fast write with verify
- Navigate/edit/create nonstandard format disks
- 1982-1983 units shipped with Happy Backup Program (single drive) disk, including standard 810 ROM emulator, Slow It Down and Diagnostic Program
- Software sold separately by Happy Computing, 1982-1983:
  - Multiple Drive Happy Backup Program
  - Happy Compactor Program
  - Happy Customizer Program (create non-standard disks track-by-track)
- 1983-1986 units shipped with Warp Speed Software disk Versions 5.x:
  Warp Speed 5 DOS (requires Atari DOS 2.0S), Slow It Down, Diagnostic, Sector Copier, Happy Backup, Happy Compactor, Multi Drive Happy Backup, Tracer
- 1986-1987 units shipped with Warp Speed Software REV. 7 for 810/1050 which includes: Warp Speed 7 DOS (modified Atari DOS 2.0S), Drive Options, Diagnostic, Sector Copier, Happy Backup, Happy Compactor, Multi Drive Happy Backup, Tracer
- 810 Version 7 Upgrade kit (1986) for earlier Happy 810 Enhancement units includes: hardware chip (2732 or 2532 versions) and rev 7 software:
  - Supports the addition of a slow/fast switch

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- 1987- units shipped with Warp Speed Software REV. 7.1 for 810/1050 which includes: Warp Speed 7 DOS (modified Atari DOS 2.0S), Drive Options, Diagnostic, Sector Copier, Happy Backup, Happy Compactor, Multi Drive Happy Backup, Tracer, and (for the Happy 810 Enhancement only):
  - HZPFIXR7.BAS - Patches the Happy Customizer Program (HZP) to work with the REV. 7 hardware upgrade
- Software sold separately by Happy Computers, requiring Version 7 hardware:
  - Warp Speed DOS XL, including under cartridge, under ROM, and Axlon banked memory versions (modified DOS XL by Optimized Systems Software – OSS)
  - TOP DOS version 1.5, by Eclipse Software
- Sold separately:
  Happy 810 Archiver, by Spartan Software of Minnesota
  - Navigate/edit/create non-standard format disks
  - Shipped with Archiver/Editor program
    - Disassembler, sector editor, custom formatter and mapper
  - Rights assumed by ICD in 1984
  - Re-released by B&C ComputerVisions as:
    Scan-It!/810 Happy version (Scan-It! H810) (1987)
  - Sold separately:
    - Archiver Enhancement, by Computer Software Services (CSS), 1986
  - Software sold separately:
    - Super Archiver, by Computer Software Services (CSS), marketed by B&C ComputerVisions, 1987
    - Super Archiver/Editor 3.02, Super Archiver (Skew) 3.12, Super Archiver Fuzzy Sector Maker, The Archiver Tracer, Super Archiver Diagnostic

The CHIP, by Spartan Software of Minnesota, 1983

- Popularly: "Archiver Chip", "810 Archiver", "Archiver/810"
- Navigate/edit/create nonstandard format disks
- Shipped with Archiver/Editor program
  - Disassembler, sector editor, custom formatter and mapper
- Rights assumed by ICD in 1984
- Re-released by B&C ComputerVisions as: Scan-It!/810 Chip version (Scan-It!/Chip) (1987)
- Sold separately:
  - Archiver Enhancement, by Computer Software Services (CSS), 1986
- Software sold separately:
  - Super Archiver, by Computer Software Services (CSS), marketed by B&C ComputerVisions, 1987
  - Super Archiver/Editor 3.02, Super Archiver (Skew) 3.12, Super Archiver Fuzzy Sector Maker, The Archiver Tracer, Super Archiver Diagnostic

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810 Turbo (810T), by Neanderthal Computer Things (NCT), 1983-1984

- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- Earlier (1983) units supplied with:
  - N/DOS Generator
    SD disk, patches a copy of Atari DOS 2.0S for single/double density support and more
  - NCT 810 Turbo OS Single/Double density
    OS/A+ Version 2, SD disk, by Optimized Systems Software (OSS)
  - NCT 810 Turbo OS Double density only
    OS/A+ Version 4, DD disk, by Optimized Systems Software (OSS)
  - 810T Utilities disk (SD), containing:
    Backemup, Packemup, Revcheck, Reconfigure, Diagnostics
  - BASIC A+, by Optimized Systems Software (OSS)
- Later (1984) units supplied with Mach DOS (Pre-release name: MACH 2XH DOS)

Separator, by Percom, 1982

- Data/clock separator circuit for 1980-1981 810 drives without Atari's Data Separator Board

Right-Write, by Gardner Computing, 1983

- Write to side 2 of any disk without notching out a hole in the disk
- Later: Wright-Right or Write-Right by Duplicating Technologies

DS-810 Disk-Switch, by Computer Software Center (CSC), 1983

- Write to side 2 of any disk without notching out a hole in the disk
- Write protection to any disk

Protector, by Computer Software Services (CSS), for 810/1050/Indus GT, 1983

- Includes hardware and software
- Bad sector generator; also move/rearrange data, scramble directories

Silencer, by CSS, for 810/1050, 1984

- Eliminates loud drive sounds when reading bad sectors
- Write to both sides of any disk without notching disks

Over-Write [810 version], by Computer Support, 1985

- Write to side 2 of any disk without notching out a hole in the disk

Bad Sector, by Computer Support, 1985

- Write bad sectors to any diskette; can back up some protected disks

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Electronic Phantom Sector Maker, by CSS, 1987 (Antic 9/87p28)

- Installs into any drive, no other modification needed
  - Can be combined with other upgrades including Happy and The Chip/Archiver
- Make fuzzy/phantom sectors or fuzz portions of sectors
- Find/Display valid data, CRC errors and phantom sectors
- Deluxe version: Allows you to switch between CRC and phantom sectors without having to readjust hardware module each time

3.2.2) What is the Atari 1050 Floppy Disk Drive?

Portions of this section developed by Laurent Delsarte from the 1050 Field Service Manual.

The Atari 1050 Floppy Disk Drive was introduced in June 1983 as a replacement for the Atari 810 Floppy Disk Drive. The 1050 is fully backward compatible with the 810, with the addition of a new "double density" mode of operation offering 130 KiB of storage capacity per diskette. The "double density" mode works with a standard (of its time) 5.25 inch soft-sectored diskette ("floppy disk") which is certified for double density (Modified Frequency Modulation encoding method) use.

While Atari called the new 1050 mode "double density", the 1050 is not capable of the 180 KiB double density standard offered in many third party Atari disk drives. Thus, the 1050's "double density" is usually referred to as "enhanced density" or "dual density."

Like the 810, the Atari 1050 Floppy Disk Drive has only one drive head, so it can only read/write to one side of the disk. Also, like the 810, the 1050 ignores the index hole/timing hole, so the reverse side of a two-sided/flippy disk can be used as a second single-sided disk by inserting the disk into the drive upside-down (no second index hole/timing hole needed).

Connectivity: 2 Atari SIO ports for direct connection to Atari computers

- Shipped with SIO cable CA014122 (3-foot; 91.5 cm)

The front of the 1050 features a Power on/off switch, a Power indicator light, and a "Disk busy" indicator light. The rear of the unit includes two SIO ports ("I/O Connectors"), a Power In jack, and Drive Select switches:

Left	Right	
Black & White		**Drive 1**
White	Black	**Drive 2**
	Black & White	**Drive 3**
Black	White	**Drive 4**

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More features/specifications of the 1050 Floppy Disk Drive:

- 6507 microprocessor (MOS Technology MCS6507 or equivalent) @ 1 MHz, C010745
- ROM, Custom 2732 FC100541
- 6810 128 x 8-bit static RAM (1 KiB) (Motorola MCM6810), C014328
- 6532 PIA (MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent), C010750
- Western Digital WD2793 Floppy Disk Controller (FDC) @ 1 MHz, FC100542
  - Late production units (fall 1985) substituted:
    Western Digital WD2797 FDC, FC100817
    - These units require 1050 ROM REV. L and do not work with earlier 1050 ROM versions.
- Media used is the same as for the Atari 810
- Read/Write head: 1
- Write protect sensor: Yes
- Track 00 sensor: Yes
- Rotational speed: 288 RPM
- Rotational speed accuracy: ±3% (range: 279.36 - 296.64 RPM)
- Average latency: 110 milliseconds
- Access time
  - Track to track (max): 40 milliseconds
  - Head settling (max): 30 milliseconds
  - Motor start (max): 1,000 milliseconds

	Single Density (Read/Write)		Double Density (Read/Write)	
• Tracks per surface	40		40	
• Tracks per inch	48	TPI	48	TPI
• Recording density (Track 39, max)	2,878	BPI	5,757	BPI
• Flux density (Track 39, max)	5,757	FCI	5,757	FCI
• Encoding method	FM		MFM	
• Capacity unformatted				
o Per track	3,382	bytes	6,510	bytes
o Per surface	135,280	bytes	260,400	bytes
• Capacity formatted				
o Sectors per track	18		26	
o Bytes per sector	128	bytes	128	bytes
o Bytes per track	2,304	bytes	3,328	bytes
o Bytes per surface	92,160	bytes	133,120	bytes
• Transfer rate	125,000	bit/s	250,000	bit/s

The 1050 drive features a horizontal slot with latch bar door mechanism. To complete the insertion of a disk, turn the latch bar clockwise ninety degrees. To release the disk, turn the latch counterclockwise.

1050 industrial design (case): **Tom Palecki**

Power: Requires 9V AC as supplied by the Atari CA017964 power adapter or equivalent.
Power usage, Standby: 15W; Operating: 30W; Start up: 50W.

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The 1050 was made for Atari in Singapore by Atari-PCI Enterprises Pte. Ltd. from May 1983 to December 1984 (very common), in Hong Kong by Atari from November 1984 to February 1985 (fairly rare), and again in Singapore by Atari-PCI Enterprises Pte. Ltd. from October 1985 to January 1986 (also fairly rare).

1050 drives made in Singapore use a Tandon drive mechanism, while 1050 drives made in Hong Kong use a World Storage Technology (WST) drive mechanism.

Several different 1050 ROM (Atari part FC100541) versions have been documented by Atari users, with no practical differences among them. 1983 units shipped with REV. J, 1984 Singapore units shipped with REV. K, 1984-1985 Hong Kong units shipped with an alternate version of REV. K, and 1985-1986 Singapore units shipped with REV. L.
See: http://atariage.com/forums/topic/156462-1050-roms/?p=3580891

1983 production units shipped with DOS 2.0S and in North America only, units produced winter 1984 to winter 1985 shipped (worldwide) with DOS 3, and units produced fall 1985 shipped with DOS 2.5.

Manuals:
- Atari 1050 Disk Drive Owner's Guide C061509 (6 pages)
- Atari 1050 Disk Drive Owner's Guide C024321 (international; 37 pages)
- Atari DOS 2.5: 1050 Disk Drive Owner's Manual C072033

Technical manuals:
- Atari 1050 Disk Drive Field Service Manual FD100330
  - REV. 01 October, 1983
  - REV. 03 October, 1985

Third-party upgrades for the 1050 (grouped by "family")

Happy 1050 Maximizer, by Happy Computers, Inc. (Richard Adams), 1984
- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- Hardware upgrades for Happy 1050 Maximizer:
  - Happy 1050 Controller
  - Happy 1050 Enhancement (Maximizer upgrade version)

Happy 1050 Controller, by Happy Computers, Inc., 1984
- Disk write protection with three position hardware switch and LED indicator
- When used with Happy Enhancement or Maximizer, write to reverse side of disks without punching holes
- When used with Happy Enhancement, adds hardware switch to select Happy Fast or Slow mode

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Happy 1050 Enhancement, by Happy Computers, Inc., 1985

- Two versions:
  1. Upgrade for 1050 with Happy 1050 Maximizer
  2. Full version upgrade for Atari 1050
     - Adds single-sided, double density (180 KiB) operation (Percom compatible)
- Board includes a 6502 microprocessor and a RAM buffer:
  Up to 36 sectors (SD mode: 2 tracks / 4,608 bytes)
- "Happy" Warp Speed standard high speed reads disks up to 500% times faster than standard 1050 with any software; supporting software also supports buffered fast write with verify
- Navigate/edit/create non-standard format disks
- (REV. 2 ROM) ICD US Doubler emulation for UltraSpeed software compatibility
- 1985-1986 units shipped with Warp Speed Software disk REV. 6.x for 1050 only which includes: Drive Options, Diagnostic, Sector Copier, Happy Backup, Happy Compactor, Tracer
- 1986 units shipped with Warp Speed Software disk REV. 7.0 for 1050 only which includes: 1050 Warp Speed DOS V 2.0, Drive Options, Diagnostic, Sector Copier, Happy Backup, Happy Compactor, Tracer
- 1986-1987 units shipped with Warp Speed Software REV. 7 for 810/1050 which includes: Warp Speed 7 DOS (modified Atari DOS 2.0S), Drive Options, Diagnostic, Sector Copier, Happy Backup, Happy Compactor, Multi Drive Happy Backup, Tracer
- 1987- units shipped with Warp Speed Software disk REV. 7.1 for 810/1050 which includes: Warp Speed 7 DOS (modified Atari DOS 2.0S), Drive Options, Diagnostic, Sector Copier, Happy Backup, Happy Compactor, Multi Drive Happy Backup, Tracer, and (for the Happy 1050 Enhancement only):
  - PC File Xfer Utility ("IBM file converter" IBMXFR.AUT) which supports SS-DD "IBM format": 40 tracks, 9 sectors of 512 bytes = 180 KiB
- Software sold separately by Happy Computers:
  - Warp Speed DOS XL, including under cartridge, under ROM, and Axlon banked memory versions (modified DOS XL by Optimized Systems Software – OSS)
  - TOP DOS version 1.5, by Eclipse Software
- Sold separately: Happy 1050 Controller
- Sold separately: Happy 1050 Archiver, by ICD, 1985:
  - Navigate/edit/create nonstandard format disks
  - Shipped with Archiver/Editor program
    - Disassembler, sector editor, custom formatter and mapper
  - Re-released by B&C ComputerVisions as:
    Scan-It!/1050 Happy version (Scan-It! H1050) (1987)
  - Sold separately:
    - Archiver Enhancement, by Computer Software Services (CSS), 1986
  - Software sold separately:
    - Super Archiver, by Computer Software Services (CSS), marketed by B&C ComputerVisions, 1987
    - Super Archiver/Editor 3.02, Super Archiver (Skew) 3.12, Super Archiver Fuzzy Sector Maker, The Archiver Tracer, Super Archiver Diagnostic

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- Sold separately: Imitator Controller, by Innovative Concepts, 1987
  - Hardware switch to select Happy Fast or Slow mode
  - 3-position switch for write protect mode:
    1) As normal, 2) Do not write, and 3) Will write to any disk
  - Two-color LED for write-protect status
- Sold separately: IC Chip, by Innovative Concepts, 1988-11-11
  - US Doubler compatible/UltraSpeed capable (replacement Happy ROM)

High Speed Board 1050, by Irata Verlag, 1985 (West Germany)
- Happy 1050 Enhancement clone

1050 Lazer Enhancement (Lazer Drive), from Utility House (1986) (UK)
- Near-clone of Happy 1050 Enhancement (REV. 1 ROM)
- Shipped with Lazer Ultraspeed 1050 Supercharger software

Warp Drive, from Stocksoft (UK), 1986
- Add-on control board replaces two chips
- Back up including most types of bad sectors
- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- Shipped with public domain backup software, double density Menu Maker
- Archiver Chip emulation (REV. 2 and up) (Archiver software compatible)

1050 IS Plate, by Innovated Software (Robert Perry), 1986
- Add-on board includes 6502 and 16 KiB RAM buffer. Plugs into 6507 socket.
- Happy 1050 Enhancement compatible/near-clone
- Emulation of: IS Doubler, US Doubler, standard 1050, Archiver Chip (UltraSpeed and Archiver software compatible)
- System supports up to 16 drives
- Shipped with two-sided/flippy disk including IS Doubler/US Doubler emulation, high speed disk copiers (standard and 130XE versions), file loader, custom disk formatter (including bad sectors), track tracer
  - Late units: Software instead built-in on ROM
- Sold separately for use with early units: ISP Gremlin Grabber
- Most units shipped with Gremlin Grammer II or Gremlin Grabber III

Klone, by Computer Software Services (CSS), 1986 (USA)
- Happy 1050 Enhancement clone (REV. 1 ROM)
- Happy Warp Speed Software (pre-7.0) included

Klone II, by Computer Software Services (CSS), 1987 (USA)
- Happy 1050 Enhancement clone (REV. 2 ROM)
- Happy Warp Speed Software (7.0) included

Copy Card 7.0, by ????, year ???? (Europe)
- Happy 1050 Enhancement compatible/near-clone

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Hyper Drive 1050, by HF Developments (UK)

- Later sold by Chaos! Computers (UK), 1994
- Clone of 1050 Lazer Enhancement (Lazer Drive)
- Software (version 1): HyperDrive 1050 Enhancement software (clone of Lazer Ultraspeed 1050 Supercharger software)
- Version II software package: Hyper Fast DOS, Hyper Sector Copier, Hyper Back-Up System, US Doubler Emulation, HyperCompaction, Diagnostic Tester, Archiver/810 Emulation, Multi Drive Back-Up
- See review & ad, Page 6's New Atari User #75 pages 30-37, 39

US Doubler, by ICD, 1984

- ROM replacement chip and 128 byte RAM chip; some drives require moving two jumpers also
- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- "UltraSpeed" standard high speed "54K baud" via sector skewing; supporting software required for high speed (initially: ICD SpartaDOS)
- As of 1985, provided with or without the ICD SpartaDOS Construction Set

SuperMax, by Super Products

- US Doubler clone, except:
  - Earlier units used unique format command supported only by SuperDOS
- Add-on board, switch between standard and replacement drive ROM

IS Doubler, by Innovated Software (Robert Perry), 1985?

- US Doubler clone

1050E Floppy Drive Turbo

- US Doubler clone
- https://lotharek.pl/productdetail.php?id=250
- https://retrolemon.co.uk/15-8-bit-upgrades

1050 Archiver, by ICD, 1985

- Also known as: "Archiver Chip", "Archiver/1050", "1050 Chip"
- Navigate/edit/create nonstandard format disks
- Shipped with Archiver/Editor program
  - Disassembler, sector editor, custom formatter and mapper
- Sold separately:
  - Archiver Enhancement, by Computer Software Services (CSS), 1986

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- Software sold separately:
  - Super Archiver, by Computer Software Services (CSS), marketed by B&C ComputerVisions, 1987
    - Super Archiver/Editor 3.02, Super Archiver (Skew) 3.12, Super Archiver Fuzzy Sector Maker, The Archiver Tracer, Super Archiver Diagnostic
  - Super Archiver II, by Computer Software Services (CSS), marketed by both CSS and B&C, 1988
    - Enhanced density version of CSS Super Archiver software
    - Included: Super Archiver/Editor 3.03, Super Archiver (Skew) 3.12, Fuzzy Sector Maker, The Archiver Tracer, Super Archiver Diagnostic, Enhanced Density Archiver/Editor 3.03

Super Archiver, by Computer Software Services (CSS), 1987
- Also known as: "Super Archiver/Chip"
- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- Archiver Chip compatible; US Doubler compatible/UltraSpeed capable
- Navigate/edit/create nonstandard format disks
- Included software: Super Archiver/Editor 3.0, Super Archiver (Skew) 3.1, Super Archiver Fuzzy Sector Maker, The Archiver Tracer, Super Archiver Diagnostic
- Bit-Writer upgrade sold separately by CSS (1988):
  - Writes bits rather than sectors, for increased copy capabilities

Super Archiver II, by Computer Software Services (CSS), 1988
- Same as CSS Super Archiver but with support for enhanced density
- Included software:
  Super Archiver/Editor 3.03, Super Archiver (Skew) 3.12, Fuzzy Sector Maker, The Archiver Tracer, Super Archiver Diagnostic, Enhanced Density Archiver/Editor 3.03

BitWriter 1050 Replica, by Jurgen van Radecke (tfhh), 2016
- Contains the Super Archiver 1050 and the BitWriter 1050 on one single PCB
- http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf

Reproducer, by Gardner Computing, 1984
- Hardware + software
- Navigate/edit/create nonstandard format disks

Density Doubler 1050, by Duplicating Technologies (DT), 1986
- 6502 microprocessor, 8 KiB RAM
- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- "High Speed": Whole track buffering (18 sectors, single or double density)
- ICD US Doubler emulation for UltraSpeed software compatibility
- Supplied with double density DOS (MachDOS? MYDOS?)

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1050 Duplicator, by Duplicating Technologies (DT), 1986

- 6502 microprocessor, 8 KiB ROM, 8 KiB RAM
- Adds single-sided, double density (180 KiB) operation (Percom compatible)
  - Physically formats boot sectors on a double density disk as 128-byte sectors. (Most, if not all, other double density Atari drives physically format all sectors on double density disks as 256-byte sectors, but the drive firmware reads/writes the boot sectors as 128-byte sectors.)
- "High Speed": Whole track buffering (18 sectors, single or double density)
- "Ultra High Speed" software support:
  - Earler versions: 52,000 baud (52,000 bit/s), but not for all 1050 drives
  - Later versions (4+?): Somewhat slower, for all 1050 drives
- US Doubler compatible/UltraSpeed capable
- Navigate/edit/create nonstandard format disks (including enhanced density)
- Supplied with double density DOS (MachDOS? MYDOS?)
- Sources: http://www.oldcrows.net/~patchell/atari/duplicator.html
- CheerUp Upgrade, by Happy Computers, Inc., 1987
  - Changes 1050 Duplicator to Happy 1050 Enhancement software compatible

1050 Turbo, by Bernhard Engl for Gerald Engl Computertechnik, 1986-1988

- Hardware includes replacement ROM (no microprocessor; no RAM buffer)
- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- "Turbodrive" standard high speed 68,200 bit/s ("70,000 baud") transmission protocol
- High speed supporting software NOT necessary for high speed, instead supporting software is loaded from drive ROM
- Software on ROM: Backup Machine II, Magic Formatter, Maintenance Box
- http://www.strotmann.de/~cas/Infothek/1050Turbo/

Top Drive 1050, by Ataserw (1987 or 1988)

- 1050 Turbo clone (ROM by P.Z. Karen, brand of LDW)
- Software: TURBO DOS ("TUR-DOS") disk or cartridge. Known versions:
  - TURBO DOS © 1989 ver 2.5 (disk?)
  - TUR DOS - © 1990 rev 4.0 (cartridge)
    wszelkie prawa JS & ATASERW Tychy
- Available upgrade project converts to Happy 1050 Enhancement compatible
  - Details here: http://preview.tinyurl.com/npla4t6

1050 Turbo II, by ABBUC, 2004

- 100% clone

Turbo 1050 Replica, by Jurgen van Radecke (tfhh), 2017

- http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf

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Speedy 1050 (Mini-Speedy), by Compy-Shop, 1986

- Includes 65C02 microprocessor, 8 KiB RAM buffer, 8 KiB program ROM space
- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- "Speedy" standard high speed; supporting software required for high speed
- Speedy 1050N: Internal add-on
- Speedy 1050NE: External add-on
- Speedy 1050T: Internal add-on with (external) track display
- Speedy 1050TE: External add-on with track display
  - Above models: Optional hardware switches for write-protect and fast/slow mode control
- Mini-Speedy N: Internal add-on (no extras)
- Mini-Speedy D: Internal add-on with 8 KiB mini-Bibo-DOS in ROM
- Mini-Speedy S: Internal add-on with 8 KiB Sector Copy program in ROM
- Mini-Speedy DS: Internal add-on with both Sector Copy and mini-Bibo-DOS programs in ROM, hardware switch selectable
- Super-Speedy prototype: equivalent to Mini-Speedy DS plus track display and 192 KiB RAM buffer, requiring special software support
- System disk includes: Speedy Test, Sector Copier. Mini-Speedy system disk also includes: Speedy Backup, Speed Init, DiskMapper, HSS Copier
- Sold separately by Martin Reitershan Computertechnik:
  - Turbo-Speedy DC – Upgrade replaces mini-Bibo-DOS with the company's Turbo-DOS XL/XE, also new firmware; 24 KiB ROM space total
- Modern reproductions by **Jurgen van Radecke** (tfhh):
  - Mini-Speedy 1050 (2015), Mini-Super-Speedy 1050 (2019)
  - http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf

Mega Speedy, by Guus Assmann & Matthias Reichl, 2014

- Out-of-the-box it supports the original 1050, Speedy, Super Speedy, a new Mega Speedy, 1050 Turbo and 1050 Duplicator modes.
- Hardware can also emulate Happy, US Doubler, Super Archiver, and SuperMax, but you need to provide the ROMs for these upgrades yourself.
- More info: http://www.realdos.net/MegaSpeedy.html
- Software and firmware: http://www.horus.com/~hias/megaspeedy/
- Documentation: http://www.realdos.net/MegaDocs.html

Tygrys 1050, by Marek Bojarski of Navitron, 1988

- Product Version 1.0
- Capabilities unverified - documentation wanted!
- (Direct predecessor to Tygrys 2000 for LDW Super 2000/CA-2001 drives

TOMS Multi Drive 1050 (1990)

- Adds single-sided, double density (180 KiB) operation (Percom compatible)
- Adds SS-DD "IBM format": 40 tracks, 9 sectors of 512 bytes = 180 KiB
- Compatibilities: Happy 1050 Enhancement, 1050 Turbo, 1050 Duplicator
- Software: TOMS Copier, Track Master, Tracer, Get Track, Weak Writer, Bad Formatter, Track Writer, IBM DOS, IBM 360, Turbo Drive Kopier

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Other

Protector, by Computer Software Services (CSS), for 810/1050/Indus GT, 1983
- Includes hardware and software
- Bad sector generator; also move/rearrange data, scramble directories

Silencer, by CSS, for 810/1050, 1984
- Eliminates loud drive sounds when reading bad sectors
- Write to both sides of any disk without notching disks

Over-Write [1050 version], by Computer Support, 1985
- Write to side 2 of any disk without notching out a hole in the disk

Bad Sector, by Computer Support, 1985
- Write bad sectors to any diskette; can backup some protected disks

Write-Right or Wright-Right, by Duplicating Technologies, 1986
- Write to side 2 of any disk without notching out a hole in the disk

Electronic Phantom Sector Maker, by CSS, 1987 (Antic 9/87p28)
- Installs into any drive, no other modification needed
  - Can be combined with other upgrades including Happy 1050 Enhancement, Archiver, and Duplicator
- Make fuzzy/phantom sectors or fuzz portions of sectors
- Find/Display valid data, CRC errors and phantom sectors
- Deluxe version: Allows you to switch between CRC and phantom sectors without having to readjust hardware module each time

IC1050 Controller, by Innovative Concepts, 1989
- 3-position switch for write protect mode:
  1. As normal
  2. Do not write
  3. Will write to any disk
- Two-color LED for write-protect status

3.2.3) What is the Atari XF551 Floppy Disk Drive?

The Atari XF551 Floppy Disk Drive was introduced in June 1987 as a replacement for the 1050 Floppy Disk Drive. The XF551 is fully backward compatible with the 1050, with the addition of two new modes of operation:

1. Mode 180 KiB
   A true "double density" mode offering 180 KiB of storage capacity per single-sided diskette (fully compatible with 3rd party double density drives for the Atari);
2. Mode 360 KiB
   Thanks to having two drive heads, a "double-sided double density" mode offering 360 KiB of data storage per double-sided diskette.

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The XF551 double-sided disk layout uses the first side of the disk from outside edge toward inside edge until the first side is filled (same as all Atari single-sided drives), then it switches to the second side starting from the inside edge working back toward the outside edge until the second side is filled. Disks formatted as double-sided disks for use with double-sided drives not following this standard would not be compatible with the XF551.

When working with double-sided double density 360 KiB disks, the XF551 is capable of communicating with the computer at about twice data rate of the earlier Atari 1050 or 810 drives. This XF551 high speed mode is supported by: DOS XE, SpartaDOS X, XDOS, MyPicoDos, Micro-SpartaDOS, SuperDOS, Turbo-DOS, BW-DOS. A patch was also developed for SpartaDOS 3.2d.

Connectivity: 2 Atari SIO ports for direct connection to Atari computers
- Shipped with SIO cable CA014122 (3-foot; 91.5 cm)

The front of the XF551 features a "Disk busy" indicator light. (Notably, there is no power indicator light on the XF551.) The rear of the unit includes a power on/off switch, a Power jack, two SIO ("Peripheral") ports, and Drive Select DIP switches:

Left	Right	
Down	Down	**Drive 1**
Down	Up	**Drive 2**
Up	Down	**Drive 3**
Up	Up	**Drive 4**

More features/specifications of the XF551 Floppy Disk Drive:
- Microcontroller. One of:
  - Intel 8040 @ 8.3333 MHz, CB101393
  - Intel 8050 @ 8.3333 MHz, C070235
    - The 8050 has provision for 4 KiB on-board ROM.

  (Early Atari and media reports incorrectly indicated a 6507 microprocessor.)
  (The DOS XE: XF551 manual incorrectly indicates 18.3333 MHz.)
- 4 KiB ROM firmware
  - Contained within the 8050 of some units, while other units with the 8050 and all units with the 8040 use ROM located on a separate chip.
- Western Digital WD1772 Floppy Disk Controller (FDC) C026028
  - Late production units substituted: Western Digital WD1770
- SIO Data rate

  (normal): 19,040 bit/s (NTSC), 18,688 bit/s (PAL)
  (high speed): 38,908 bit/s (NTSC), 38,553 bit/s (PAL)
  - High speed available in DS/DD 360 KiB mode operation only
- Rotation rate: 300 RPM
- Media used is the same as for the Atari 810
- The XF551 has been known to be more likely to destroy fragile, poor-quality diskettes in attempt to read them than other disk drives for the Atari. This is suggested to be a consequence of the XF551 drive heads pressing against the disk media with slightly more force compared to other drives.

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Operating modes	Single	Dual	Double	Double
Encoding Method	FM	MFM	MFM	MFM
Number of sides	1	1	1	2
Total tracks	40	40	40	80
Sectors per track	18	26	18	18
Bytes per sector (1)	128	128	256	256
Total Bytes (1)	92,160	133,120	184,320	368,640

(1) Total capacity

The XF551 drive features a horizontal slot with latch bar door mechanism. To complete the insertion of a disk, turn the latch bar clockwise ninety degrees. To release the disk, turn the latch counterclockwise.

XF551 drives were manufactured for Atari in two versions, both made in Japan.

XF551, Mitsumi version (most units)

- Earlier production; common in North America and Europe.
- Disk Busy light is rectangular, green, and is located below the "straight" drive latch
- See: http://farm5.static.flickr.com/4052/4669794021_de721aa12d_b.jpg
- When the drive latch is opened, an inserted disk stays in place until removed manually.
- Inserting a disk does not cause any drive activity.
- Like the Atari 810 and 1050, the Mitsumi XF551 ignores the disk's index hole/timing hole when reading/writing, so the Mitsumi XF551 CAN read from, and write to, the reverse side of a two-sided/flippy disk in single-sided (90 KiB, 130 KiB, or 180 KiB) mode if the disk is inserted into the drive upside-down (no second index hole/timing hole needed).

XF551, Chinon version (uncommon/rare late production units)

- Chinon FZ-502 mechanism
- Disk Busy light is round, red, and is located directly to the left of the "non-straight" drive-latch. http://www.atarimax.com/jindroush.atari.org/data/hardpics/xf551__f.jpg
- Opening the drive latch causes an inserted disk to be ejected.
- When a disk is inserted, the drive motor briefly spins and the Disk Busy light flashes accordingly.
- Unlike the Atari 810 and 1050, the Chinon XF551 utilizes the disk's index hole/timing hole when reading/writing, so the Chinon XF551 CANNOT read from, nor write to, the reverse side of a two-sided/flippy disk in single-sided (90 KiB, 130 KiB, or 180 KiB) mode if the disk is inserted into the drive upside-down, unless the disk has a second index hole/timing hole corresponding to the reverse side.

Unlike the Atari 810 and 1050, the XF551 (both Mitsumi and Chinon) utilizes the disk's index hole/timing hole when formatting the disk. As a result, the XF551 CANNOT format the reverse side of a two-sided/flippy disk in single-sided (90 KiB, 130 KiB, or 180 KiB) mode if the disk is inserted into the drive upside-down, unless the disk has a second index hole/timing hole corresponding to the reverse side.

Power: Requires 9V AC as supplied by the Atari CA017964 power adapter or equivalent.

The XF551 shipped with DOS 2.5 (1987-1988) or DOS XE (from 1989).

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Manuals:
- Atari DOS 2.5: XF551 Disk Drive Owner's Manual C033537
- Atari DOS XE: XF551 Disk Drive Owner's Manual C300557

The key engineer/designer of the XF551 was **Jose A. Valdes** at Atari.

Third-party upgrades for the XF551

XF35 Kit, by Innovative Concepts, 1988-11-11
- Developed by **Bob Woolley**
- A standard 3.5" 720 KiB drive mechanism (not included with Kit) may replace the 5.25" drive of the XF551, or it may be added to the drive making it possible to select one or the other using a toggle switch.
- Dual drive option requires several additional parts, not included with Kit
- Kit also includes replacement drive ROM: (thanks **Bob Woolley** for details)
  - Changes the number of tracks to 80,
  - Tweaks the track seek timing to match a typical 3.5,
  - Adds (or deletes) spin-up delay that improves write reliability, and
  - Provides for density retry.
- XF551 high speed remains available

XF Single Drive Upgrade, by Computer Software Services (CSS), 1991
- Replace the 5.25" drive mechanism with a 3.5" drive mechanism
- US Doubler compatible/UltraSpeed capable
- Can read:
  - 3.5" SS-DD MS-DOS format 360 KiB floppy disks
  - 3.5" DS-DD MS-DOS format 720 KiB floppy disks
  - Shipped with IBM/ST Transfer Utility disk, containing IBMREAD.COM

http://www.nleaudio.com/css/products/XFsingdrup.htm

XF Dual Drive Upgrade, by Computer Software Services (CSS), 1991
- Same as XF Single Drive Upgrade, except keep using the XF551 5.25" drive as well. Result is two disk drives; the new 3.5" drive assumes the next drive number higher than the 5.25" drive.

http://www.nleaudio.com/css/products/XFdualdrup.htm

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XF551 Enhancer

- By Computer Software Services (CSS)
- Provides a switch that allows the XF551 to read/write/format, in single-sided mode, the back side of a disk that has only one index hole/timing hole corresponding to the front side of the disk.
- No need for the disk to have a second write protect hole.
- A write protect disable is built in.
- 60 Hz version for North America or 50 Hz version for Europe

http://www.nleaudio.com/css/products/XF551enh.htm

XF Update

- By Computer Software Services (CSS), 1992
- Replacement drive operating system (ROM)
- "Runs more commercial software"
- Changes density properly
- US Doubler compatible/UltraSpeed capable
- Improved/optimized interleave in high speed formats
- Can read:
  - 5.25" SS-DD MS-DOS format 180 KiB floppy disks
  - 5.25" DS-DD MS-DOS format 360 KiB floppy disks
  - Shipped with IBM/ST Transfer Utility disk, containing IBMREAD.COM

http://www.nleaudio.com/css/products/XFupdate.htm

XF Speedy

- © 1994 **Klaus Peters** Elektronik + Software
- Converts drive to a Speedy 1050 clone with a DSDD 360 KiB mode
- Replaces the 8040 microcontroller with: a 65C02 microprocessor, ROM, Memory

Hyper-XF (or HyperXF)

- © 1998 **Stefan Dorndorf**
- Replacement drive operating system (ROM)
- Hyper-XF 1.0A is for original XF551 with 5.25" drive
- Hyper-XF 1.0B is for the XF551 with replacement 3.5" drive installed
- US Doubler compatible/UltraSpeed capable
- "Hyper Speed" is an UltraSpeed support routine in ROM
  - Allows the drive to support UltraSpeed using DOS versions that otherwise lack such support
- XF551 standard high speed is removed
- Can use disk partitions (2 on 5.25", 4 partitions on 3.5") with mixed Densities (S/E/D) or standard 360 KiB (5.25") / 720 KiB (3.5")
- Can theoretically read/write ST/PC 720 KiB disks (software is missing!)
- Improved double density detection

http://atariage.com/forums/topic/84017-xf551/#entry1023935 (XFTOOLS.ZIP)

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Reimaged XF551 Floppy Disk Drive Controller

- By Bits of the Past (Dropcheck / Lenore Underwood), 2014
- With Modern Power Supply or with Original Power Supply

http://www.bitsofthepast.com/

3.2.4) What were the Atari 815, XF521, and XF351 Floppy Disk Drives?

Introduced in June 1980, the **Atari 815 Dual Floppy Disk Drive** featured two single-sided, double density (MFM encoding) disk drives.

- The 815 operated in double density mode only
- Total storage capacity per diskette:

40	tracks	x	18	sectors/track	=	720	sectors/disk
720	sectors	x	256	bytes/sector	=	184,320	bytes/disk (180 KiB)

- Sectors 1-3 were treated as single density sectors (128 bytes/sector) by the drive's firmware (maintaining compatibility with the disk boot functionality of the Atari OS). All released double density disk drives for the Atari follow this convention as established by the unreleased 815.
- Diskettes created by or for the 815 used data bits encoded binary inverted relative to disks created by or for every other single-sided double density Atari compatible disk drive. For this reason, disks used with the 815 can only be used with the 815, and disks used with other single-sided double density Atari disk drives cannot be used with the 815.
- Internals:
  - 6507 microprocessor (MOS Technology MCS6507 or equivalent) @ 2 MHz, C016145
  - 3 x 6532 PIA (MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent) @ 2 MHz, C016150
  - MC68B52P Synchronous Serial Data Adapter (MC6852 SSDA) @ 2 MHz, C016531
  - 4 KiB ROM firmware
- Notably, the 815 did not use a standard floppy drive controller (FDC) chip.
- While most 815 sample drives utilized the same Tandon drive mechanism found in late-production Atari 810 drives, there were also 815 sample drives built that used the MPI drive mechanism found in earlier 810 drives (including all 810 drives manufactured while the 815 was under development).
- Power: Requires 120V AC (North American household standard).
- Manual: Atari 815 Operator's Manual C016377.
- The 815 was to ship with the 815 Master Diskette CX8201 (boxed; DOS II version 2.0D or DOS 2.0D).
- Atari continued to promote the 815 through the summer of 1981 (see Company Store price list for 24-Aug-1981 for a late reference); it was dropped from the product line by October 1981. Prototype units exist (according to the former atarimuseum.com: 60 units were produced), but the 815 never shipped.
- https://tinyurl.com/2p8nue3y

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Previewed in January 1985, the **Atari XF521 Floppy Disk Drive** was to be a 5.25", 130 KiB, XE-styled, feature-equivalent, and gradual replacement for the Atari 1050. The XF521 never shipped, and no more than a handful of prototype units may exist.
Pictures:
http://www.atari-computermuseum.de/pics/zubehoer/xe/xf521.jpeg
http://www.rhod.fr/ataripics/Xf521_xegs.jpg

The **Atari XF351 Floppy Disk Drive** was previewed several times from March 1986 through January 1987. With ADOS (would ship as: DOS XE), the 3.5", single-sided double density XF351 was reported to provide 325 KiB (6/1986 report) or 320 KiB (9/1986 report) of storage (formatted) per disk. The XF351 never shipped, and no more than a handful of prototype units exist.
Picture: http://www.atari-computermuseum.de/pics/zubehoer/xe/xf351.jpg
Discussion: http://atariage.com/forums/topic/231674-xf351-for-sale-on-ebay/

3.2.5) What other floppy disk drives were designed for my Atari?

Major contributors to this section: Glenn M. Saunders, Tomasz M. Tatar, James Bradford, Konrad M. Kokoszkiewicz, Don Schoengarth, Andreas Koch, TXG/MNX

This section attempts to comprehensively list released 3rd party floppy disk drives designed for use with the Atari. These attach to the computer via SIO and generally include two Atari SIO ports, unless stated otherwise. Top transfer rate is 19.2 kbit/s unless stated otherwise. Media requirements, unless stated otherwise, are the same as for the Atari 810.

Legend	
SD	**Single Density**, 5.25" floppy disks, 90 KiB/side, 810 compatible
ED	**Enhanced Density**, 5.25" floppy disks, 130 KiB/side, 1050 compatible
DD	**Double Density**, 5.25" floppy disks, 180 KiB/side, Percom compatible

Legend	
SS	**Single-Sided** Drive has only one drive head, so it can only read/write to one side of the disk. The reverse side of a two-sided/flippy disk may or may not be used by inserting the disk upside-down, depending on whether the disk has a second index hole/timing hole corresponding to the reverse side, in combination with whether or not the drive uses or ignores the index hole/timing hole.
DS	**Double-Sided** Drive has two heads for direct access to either side of the disk media without having to remove and re-insert the disk.

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More information about Double-Sided Floppy Disk Drives:

- Drive uses one of several mutually-incompatible styles of numbering the sectors on the second side of the disk. Disk tracks are always numbered sequentially starting at the outer edge of the disk, regardless of how the sectors are numbered across tracks/disk sides.
- Double-sided sector layout possibilities:
  - Side first, track-order (both sides);
  - Side first, track-order first side, reverse-track order 2nd side. Example: Atari XF551;
  - Track first ("interleaved", "head-first").

Amdek AMDC-II
SS SD/ED/DD dual drives. Media is Compact Floppy (CF) standard 3-inch (3.0"), 180 KiB/side, two-sided/flippy. Early units shipped with DD DOS Disk Builder to build DOS 2.1A (double density support) from a copy of Atari DOS 2.0S; later/most units shipped with DOS XL.

SN-360
DS SD/ED/DD. 8051 processor, WD2797 controller by Atari Studio AS (later, Mirage).

Astra 1620
SS SD/DD dual drives (spring 1983). Belt-driven; push-down door mechanism:

- Earliest units shipped with OS/A+ Version 2 and BASIC A+, both from Optimized Systems Software (OSS),
- then units shipped with DOS XL,
- later units shipped with SmartDOS.

Astra 2001
SS SD/DD dual drives. Direct-drive motors; rotary/flipper door mechanism.
Shipped with SmartDOS.

Astra "Big D"
DS SD/DD dual drives. Double-sided version of 2001.
Shipped with MYDOS 3.016 (earlier units) or Top-DOS 1.5 (later units).

Astra The "One"
DS SD/DD. Shipped with Top-DOS 1.5.

Astra 1001
SS SD/DD. Shipped with SmartDOS.

B&C 810
SS SD (B&C ComputerVisions house version of Atari 810)

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Best Electronics 910
SS SD (Best Electronics house version of Atari 810)

California Access CA-2001 by LDW, 1988 replacement for LDW Super 2000 (Poland)
SS SD/ED/DD, 4 MHz Z-80A microprocessor, Indus GT compatible/Synchromesh capable, sold with DOS XL 2.35I1 (manual: "DOS XL 2.35L")
Upgrades:

- Tygrys 2000 (2000T), by Marek Bojarski/Navitron, 1989?
  - Version 1.1:
    - US Doubler compatible/UltraSpeed capable (52.6 kbit/s)
    - Happy Enhancement compatible/Warp Speed capable (38.4 kbit/s)
    - Software supplied: Turbo DOS 2.9, Fast Formatter, Tygrys File Loader Initializer, Bad sector writer, Bad disk creator, Disk mapper, Setup, TCopy universal copier, Formatting utility, Diagnostic utility, MSDOS utility (read from/write to a 180 KiB MS-DOS floppy disk), Text converter, and more
  - Version 2.0 additional feature:
    - 1050 Turbo compatible/Turbodrive capable
- TOMS Turbo Drive LDW (1989)
  - SS DD IBM:40 tracks * 9 sectors * 512 bytes = 180 KiB
  - 1050 Turbo compatible/Turbodrive capable
  - Synchromesh support removed
  - Software: Turbo Kopier, Track Copier, Chaos Initializer, IBM DOS, IBM 360
- TOMS Multi Drive LDW (1990)
  - Same as TOMS Turbo Drive LDW but also Happy Enhancement compatible/Warp Speed capable, and 1050 Duplicator compatible, and with more software: Track Master, Tracer, Index Formatter, Get Track, Index Get Track, Bad Formatter, Weak Writer, Put Track, Hex Editor
- Atares Flash system (1991)
  - SS DD IBM: 40 tracks * 9 sectors * 512 bytes = 180 KiB
  - Unique: 40 tracks * 6 sectors * 1024 bytes = 240 KiB
  - "Flash Turbo" high speed 127 kbit/s
  - Supplied with FlashDOS
- SRAMCharger project by trub (2007)
  - Equivalent to the Indus/Future Systems RAM Charger 64 KiB RAM upgrade (drive becomes Synchromesh II 68.2 kbit/s and Indus/Future CP/M capable)
  - http://trub.atari8.info/
- SRAM Charger by Jurgen van Radecke (tfhh) (2018)
  - Equivalent to the Indus/Future Systems RAM Charger 64 KiB RAM upgrade (drive becomes Synchromesh II 68.2 kbit/s and Indus/Future CP/M capable)
  - http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf

Computer Palace RCP 810
SS SD (Computer Palace house version of Atari 810)

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Concorde C-221M
SS SD/DD; single SIO port - must be at end of SIO chain;
shipped with DOS XL; see Analog #23 page 12.
Rare pics: https://preview.tinyurl.com/y7uogwos
34 pin PCB edge connector for connecting up to three Concorde C-221S (SS SD/DD) slave drives.
Floppy Disk Controller (FDC): WD2797PL-02

Concorde C-222M
DS SD/DD see Analog #23 page 12 (probably never released)
Matching DS SD/DD slave drive: C-222S (also not released)

Flop VD 40 F
Same as Viatronic VD 40 described below but with standard Atari SIO ports.
http://preview.tinyurl.com/m3mhqp3

Floppy 2000 by Klaus Peters Elektronik & Software
DS SD/ED/DD Speedy 1050 clone with a DSDD 360 KiB mode, Copy 2000 program in ROM

Indus GT
by Indus Systems, Inc., shipped 1983
SS SD/ED/DD, 4 MHz Z-80A microprocessor, 2 KiB RAM, Synchromesh 38.4 kbit/s capable.
Early units shipped with DOS XL 2.20 or 2.30, 1984- units with DOS XL 2.35I1.
Service manual urges any drives found with ROM versions 1.00 or 1.10 ROMs be upgraded to version 1.20.

Except early units, shipped with "GT DrivingSystem":
- GT Estate Wordprocessor, © 1983 Elcomp Publishing author: H. C. Wagner for IJG, Inc.
- GT Albert E. Spreadsheet by SIM Computer Products Inc. © 1982-1983 by David H. Hewit
- GT Data Manager, © 1984 Vervan Software authors: Carl M. Evans and Richard M. Leonard

1986-1987 units (from Future Systems) additionally shipped with:
- GT Speller for GT Estate Word Processor
- RAM130 RAM drive for 130XE banked memory
- INITSYNC.COM – enables Synchromesh during boot up ("Super Synchromesh")

Upgrades released by Future Systems in 1986:
- RAM Charger: 64 KiB RAM upgrade (drive becomes Synchromesh II 68.2 kbit/s and Indus CP/M capable), supplied with Synchromesh II (DOS XL 2.35I2 with utilities) and Indus CP/M software
  - Indus GT ROM version 1.20 required to run CP/M
- Synchromesh II disk also sold separately

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Third-party upgrades:

- CSS Protector: Bad sector generator
- Indus Disk Drive Upgrade ROM by **Rich Andrews**
  - Based on ROM version 1.20
  - New fast sector mode 50-75% faster
  - Increased stepper rate 50% faster
  - Shortened motor timeout 9 to 2.5 seconds
  - Disables beeps on errors or button depressing
  - Available: https://www.best-electronics-ca.com/8-bit_.htm
- SRAMCharger project by trub (2007)
  - Equivalent to the Indus/Future Systems RAM Charger 64 KiB RAM upgrade (drive becomes Synchromesh II 68.2 kbit/s and Indus/Future CP/M capable)
  - http://trub.atari8.info/
- SRAM Charger by **Jurgen van Radecke** (tfhh) (2018)
  - Equivalent to the Indus/Future Systems RAM Charger 64 KiB RAM upgrade (drive becomes Synchromesh II 68.2 kbit/s and Indus/Future CP/M capable)
  - http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf

LDW Super 2000
by Logical Design Works, Inc., shipped December 1987 (Poland)
SS SD/ED/DD, 4 MHz Z-80A microprocessor, Indus GT compatible/Synchromesh capable.
Sold with DOS XL 3.25I1 (manual: "DOS XL 2.35L"), replaced with CA-2001 in 1988.

Upgrades:

- Tygrys 2000 (2000T), by Marek Bojarski/Navitron, 1989?, described at CA-2001 above
- TOMS Turbo Drive LDW (or just "TOMS Turbo Drive"), described at CA-2001 above
- TOMS Multi Drive LDW, described at CA-2001 above
- Atares Flash system (1991) described at CA-2001 above
- SRAMCharger project by trub (2007)
  - Equivalent to the Indus/Future Systems RAM Charger 64 KiB RAM upgrade (drive becomes Synchromesh II 68.2 kbit/s and Indus/Future CP/M capable)
  - http://trub.atari8.info/
- SRAM Charger by **Jurgen van Radecke** (tfhh) (2018)
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  - http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf

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Micro Mainframe MF-1681
SS SD/DD, 4 MHz Z-80A microprocessor, 16 KiB RAM, up to 76.8 kbit/s capable (no available DOS support), density both software and hardware selectable, firmware support for running a full Z-80 based operating system (planned: CP/M, OASIS, TRSDOS; products never shipped), for a hard disk host adapter (never shipped), and for disks of up to 2,097,150 sectors.

- Shipped with program disk of utilities, but no DOS
  (promised "MaxiDos A" or "Maxi-DOS A" never shipped).
- Supported: Atari DOS 2.0S, OSS OS/A+ Version 4, MYDOS.
  (One utility, SETDBL.V1, can use a copy of DOS 2.0S to create a bootable double density "DOS 2.0M" disk.)
- Upgrade:
  - 2nd internal drive, SS SD/DD (converts drive to unshipped model MF-1682)
  - 64 KiB RAM (converts drive to unshipped model MF-6481)
  - 2nd internal drive + 64 KiB RAM (converts drive to unshipped model MF-6482)

Percom RFD40-S1
SS SD/DD, introduced March 1982; first 810 alternative.
Early units shipped with "BLD" utility to build Percom DOS 2.0P (double density version) from a copy of Atari DOS 2.0S; later/most units shipped with OS/A+ Version 4.
Early units marked: RFD-40S1. See Analog #6 page 8.

Percom RFD44-S1
DS SD/DD (1982), shipped with OS/A+ Version 4.
Early units marked: RFD-44S1. See InfoWorld 26-Jul-1982.

- Double-sided format, early units (1982-1983):
  Side first, track-order 1st side, reverse-track order 2nd side. Format of last three sectors mirrors the first three sectors, resulting in unusable last 4 sectors.
  See: https://tinyurl.com/3axmynu9
- Double-sided format, later units (1983-):
  Side first, track-order (both sides).

Percom RFD40-S2
SS SD/DD dual drives (1982) shipped with OS/A+ Version 4.
Early units marked: RFD-40S2. Review: Antic vol. 2 no. 1, Apr-1983

Percom RFD 44-S2
DS SD/DD dual drives (1983) shipped with OS/A+ Version 4.
Double-sided format: Side first, track-order (both sides)

Percom AT88-S1
SS SD (1983), shipped with OS/A+ Version 2 and BASIC A+, both from Optimized Systems Software (OSS).
Also marketed/known as: AT-88.
Upgrade: Percom Doubler (double density) for the AT-88, supplied with OS/A+ Version 4

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Percom AT88-S2
SS SD dual drives (1983), shipped with OS/A+ Version 2 and BASIC A+, both from Optimized Systems Software (OSS).
Upgrade: Percom Doubler (double density) for the AT-88, supplied with OS/A+ Version 4.

Percom AT88-SPD
SS SD/DD (1983), earlier units marked AT88-S1PD, later units marked AT88-SPD.
Earlier units shipped with OS/A+ Version 4, later units shipped with DOS XL.

Rana 1000
SS SD/DD, standalone disk formatting, shipped with SmartDOS

San Jose Computer 810
SS SD (San Jose Computer house version of Atari 810)

San Jose Computer 810 Special Edition
SS SD (San Jose Computer house version of Atari 810,
with Happy 810 Enhancement pre-installed)

SBG D.8002 HS
DS SD/ED/DD ICD US Doubler compatible/UltraSpeed capable. See:
http://atariki.krap.pl/index.php/D.8002_HS

Skydata SK-551
DS SD/ED/DD. XF551 clone. See: https://tinyurl.com/45599u95

Spider
SS SD/ED/DD. XF551 clone, 70 units made. See:
https://tinyurl.com/ycx7fx9m

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TOMS 720
DS SD/ED/DD/QD/iD/ID/CD. 1991.
DS-DD 360 KiB format is XF551 compatible.
Unique formats:

DS-QD	2x80	tracks of	18	sectors of	256	bytes =	720 KiB
SS-iD IBM	40	tracks of	9	sectors of	512	bytes =	180 KiB
DS-ID IBM	2x40	tracks of	9	sectors of	512	bytes =	360 KiB
DS-CD ST	2x80	tracks of	9	sectors of	512	bytes =	720 KiB

Intel 8085 microprocessor, US Doubler compatible/UltraSpeed capable, 1050 Turbo compatible/Turbodrive capable; MYDOS 4.50T, IBMST (IBM/ST formats) and other utilities on ROM; 800.com supplied on disk for PC (for accessing ST format 720 KiB disks with 1,200 KiB HD drive)

TOMS 720C
Same as TOMS 720 with addition of Centronics printer port

TOMS 720CR
Same as TOMS 720C with addition of RS-232 interface

TOMS 710
DS SD/ED/DD/QD. 1994.
DS-DD 360 KiB format is XF551 compatible.
Other format: DS-QD 2x80 tracks of 18 sectors of 256 bytes = 720 KiB
8080 microprocessor, US Doubler compatible/UltraSpeed capable, 1050 Turbo compatible/Turbodrive capable; TOMS Navigator and other utilities on ROM

TOMS 360
DS SD/ED/DD/iD/ID. (1996 replacement for TOMS 710/720).
DS-DD 360 KiB format is XF551 compatible.
Unique formats:

- SS-iD IBM – 40 tracks of 9 sectors of 512 bytes = 180 KiB
- DS-ID IBM – 2x40 tracks of 9 sectors of 512 bytes = 360 KiB

1050 Turbo compatible/Turbodrive capable;
US Doubler compatible/UltraSpeed capable;
MYDOS 4.50T, IBMST (IBM/ST formats) and other utilities on ROM;
TOMS Navigator and other software supplied on disk

TOMS 360C
Same as TOMS 360 with addition of Centronics printer port

TOMS 360CR
Same as TOMS 360C with addition of RS-232 interface

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Trak AT-1
SS SD/DD. Shipped with Trak Automatic Density Select (TADS) for Atari DOS 2.0S, plus utilities and games.
Upgrade: Parallel printer interface with 2 KiB buffer
- Upgrade: 16 KiB print buffer
- Upgrade: Turbo Pak ROM (adds 2 KiB for 4 KiB total + track-buffered reads)

Trak AT-D1
SS SD, parallel printer interface with 2 KiB buffer.
Upgrade: double density (SS SD/DD). Shipped with Trak Automatic Density Select (TADS) for Atari DOS 2.0S, plus utilities and games.
Upgrade: 16 KiB print buffer
Upgrade: Turbo Pak ROM (adds 2 KiB for 4 KiB total + track-buffered reads)

Trak AT-D2
SS SD/DD, parallel printer interface with 2 KiB buffer.
Earlier units shipped with Trak Automatic Density Select (TADS) for Atari DOS 2.0S, plus utilities and games.
Later units also shipped with DOS XL.
Upgrade: 16 KiB print buffer
Upgrade: Turbo Pak ROM (adds 2 KiB for 4 KiB total + track-buffered reads)

Trak AT-D4
DS SD/DD, 4 KiB RAM, Turbo Software (reads 18 sectors at a time into on-board RAM).
Shipped with DOS XL, Trak Automatic Density Select (TADS) for Atari DOS 2.0S, plus utilities and games.
Double-sided operation: separate logical drives D1:, D2:.
D2: sector layout is reverse track order (inner to outer)
Upgrade: 16 KiB RAM

Viatronic VD 40
DS SS/ED/DD XF551 compatible including high speed, 8085 microprocessor, 8 KiB RAM, 8 KiB ROM, 300 RPM, WD2797A-PL controller, two ports with SIO signals require adapters to SIO.
http://preview.tinyurl.com/m7sfjwr

XFD601 (Jacek Zuk)
DS SD/ED/DD,
US Doubler compatible/UltraSpeed capable,
Indus GT compatible/Synchromesh capable,
1050 Turbo compatible/Turbodrive capable, disk rotation = 360 RPM, 16 KiB RAM
http://atariki.krap.pl/index.php/XFD601

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XFD602 (Jacek Zuk)
DS SD/ED/DD dual drives,
US Doubler compatible/UltraSpeed capable,
Indus GT compatible/Synchromesh capable,
1050 Turbo compatible/Turbodrive capable, disk rotation = 360 RPM, 16 KiB RAM
http://atariki.krap.pl/index.php/XFD602

3.2.6) What is the Percom configuration block?

Sources:
- MYDOS 4.3A User Guide, page 28
- Compute! magazine #65, Oct-1985, page 110-111, http://www.atarimagazines.com/compute/issue65/insight_atari.php

Percom and Percom compatible disk drives for the Atari computer maintain, in memory within the drive, information about the drive's current configuration, and the drive can provide that information to the Atari computer on demand. The drive may also allow for the computer to dynamically change one or more configurable options.

The configuration information consists of a block of 12 bytes. A drive's configuration block may be read by passing "N" ($4E) to it as an SIO command. A new configuration block may be written to a drive with an "O" ($4F) SIO command. The "N" and "O" commands closely parallel the "R" and "W" sector input/output commands, except the data length is always 12 bytes, and no sector number is needed. The 12 bytes were defined by Percom as follows:

Byte	Bit	Description
0		Tracks per side (40 for a standard disk drive)
1		Disk Drive Step Rate (as defined by Western Digital)
2		Sectors/Track – high byte (usually 0)
3		Sectors/Track – low byte (18 for standard diskettes)
4		Side Code (0=single-sided, 1=double-sided)
5		Disk Type Code
	2	0=single density (FM), 1=double density (MFM)
	1	0=5.25" diskette, 1=8" diskette drive
6		High byte of Bytes/Sector (0 for Atari 810 compatible)
7		Low byte of Bytes/Sector (128 for Atari 810)
8		Translation control
	7	1=40 track disk I/O on a 80 track drive
	6	Always 1 (to indicate drive present)
	1	1=Handle sectors 1, 2, and 3 as full size sectors
	0	1=Sectors number 0-17 (for example) not 1-18
9-11		Reserved

The Percom configuration block standard had the particular importance of allowing for Atari disk drives capable of either single or double density operations, and thus for Atari users with Percom compatible drives to use single or double density disks with those drives interchangeably.

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The extent of support for the full standard varies widely among disk drives designed for the Atari. Atari's own 810 and 1050 drives do not support the configuration block at all, while the Atari XF551 and most 3rd party drives for the Atari support at least portions of the Percom standard. For example, the Indus GT supports bytes 5-7 only.

3.2.7) How can I use an industry standard floppy disk drive?

The standard interface between 8" floppy disk drive (FDD) and controller was established in 1976 by Shugart Associates for their SA800/801 Diskette Storage Drive. The interface uses a 50-conductor ribbon cable, normally with 50 pin PCB edge connectors.
(The earlier SA900/SA901 8" drives used 44 conductor cables and 44 pin edge connectors.)

The standard interfaces between 5.25" or 3.5" floppy disk drive (FDD) and controller was established in 1976 by Shugart Associates for their SA400 Minifloppy Diskette Storage Drive (5.25"). The interface uses a 34-conductor ribbon cable, with 34 pin PCB edge connectors (5.25" drive convention) or 34 pin header (2x17) connectors (3.5" drive convention).

This section should list all devices for the Atari computer that provide a standard FDD interface for the system, allowing the addition of one or more standard 8", 5.25" or 3.5" floppy disk drives.

Unless stated otherwise, these FDD interfaces support single or double density drives, but not high density 1,440 KiB 3.5" or 1,200 KiB 5.25" drives.

Percom disk drives for the Atari (RFD, AT88, or AT88SPD series)

- Connect to the Atari via SIO (includes 2nd SIO port)
- All Percom drives for the Atari are master drives with a four-drive controller, with a standard FDD interface for controlling standard add-on drives (whether internal or external to the master drive unit). The master drive may be configured as any of D1:-D4:, with any add-on drives occupying subsequent drive numbers (up to three). A master drive configured as D4:, with three add-on drives (as drives 5-7) and three Atari 810s or equivalent configured as drives 1-3, would allow the maximum total system potential of 7 disk drives.
- Drive connector:
  Early units (1982-1983): 34 pin header;
  Later units (1983-1984): 34 pin PCB edge
- Master drive limited to single density supports only single density slave drives;
  Master drive supporting double density supports single or double density slave drives units.
- Master drive limited to single-sided operation supports only single-sided slave drives;
  Master drive supporting double-sided operation supports single- or double-sided slave drive units.
- Double-sided format, early double-sided master drives (1982-1983):
  - Side first, track-order 1st side, reverse-track order 2nd side
  - Format of last three sectors mirrors the first three sectors, resulting in unusable last sector in DS SD format, or unusable last 4 sectors in DS DD format.
    See: https://tinyurl.com/3axmynu9
- Double-sided format, later double-sided master drives (1983-1984):
  - Side first, track-order (both sides)

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Microlink Floppy Disk System / Easy Eight (1982), by California Microlink Corporation (CMC)

- Designers: Atari engineers Dave Shepperd & Mike Albaugh
- Two 50 pin PCB edge connectors for up to two standard 8" floppy disk drives
- Floppy Disk Controller (FDC): FD1795B-02
- 2 Atari SIO ports for direct connection to Atari computers
- 512,512 bytes (500.5 KiB) of capacity per disk (SS DD)
  - 77 tracks, 26 sectors/track, 256 bytes/sector
- See: Atari Special Editions Winter 1982 page 27, Summer/Fall 1982 page 38
- https://tinyurl.com/yckwht7j
- Prototypes only?

L.E. Systems disk drive (1982)

- Developer: two partners, including David Small
- Originally: "Leading Edge Systems"
- Device is a personality board (oversized) for the 800
- Board provides two 34 pin connectors for 5.25" floppy disk drives
- Each connector supports one master and up to three slave drives, for a total system potential of 8 disk drives.
- Drives may be single or double density
- High speed disk duplication: 17-22 seconds per diskette, up to 7 copies at a time (8 drive system)
- Duplicate Atari disks including non-standard formats and copy protection
- Can create disks with copy protection. Supports: Bad sectoring, custom track layout, deleted sector marks, complete track dumps
- Originally marketed as an 8 drive system (LEFDC-08) or a 4 drive system (LEFDC-04), later a 2 drive system (LEFDC-02) and a single drive system were offered as well. Sold with Tandon disk drives.
- Ads: Antic vol. 1 no. 3 Aug-1982 page 43 and vol. 1 no. 5 Dec-Jan1983 page 94

ATR8000, by Software Publishers / SWP Microcomputer Products (1982-1986)

- 16 KiB or 64 KiB RAM versions
  - 16 KiB units upgradeable to 64 KiB RAM
- Connects to the Atari via SIO (includes 2nd SIO port)
- Floppy Disk Controller (FDC): FD1797
- Drive connector: 34 pin PCB edge
  - Attach up to 4 standard floppy disk drives, any combination of:
    - 5.25" or 8";
    - Single, double or quad density;
    - Single- or double-sided
  - 8" drives require adapter cable
- Double-sided format: Track first ("interleaved", "head-first")
- Unit RAM can be used as a disk buffer
- Sold separately by SWP:
  - OSS OS/A+ Version 4 (1982-1983) or MYDOS 3.0x/3.1x (1983-1986) (5.25" or 8" disk)

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Micro Mainframe MF-1681 disk drive (1983)

- Floppy Disk Controller (FDC): WD1797
- Drive connector: 34 pin PCB edge
- Connect up to 3 standard floppy disk drives units, each single or dual drive units, for a system maximum of 8 floppy disk drives (including added second internal drive)
- Slave drives may be any mix of 5.25" or 8" floppy disk drives, single or double density, single- or double-sided
  - 8" drives require adapter cable
- Double-sided format: Track first ("interleaved", "head-first")

Amdek AMDC-II 3" dual disk drive (1984)

- Floppy Disk Controller (FDC): FD1797
- Drive connector: 34 pin header
- Connect one standard floppy disk drive slave unit
- Slave unit can be single or dual drives, single or double density, single- or double-sided
- Double-sided format: unknown
- Matching add-on drive: Amdek IIIB 3" dual disk drive (released?)

Trak 'AT' Series disk drives (AT-1, AT-D1, AT-D2, AT-D4), 1983-1984

- Floppy Disk Controller (FDC): WD1770 (at least some units)
- Drive connector: 34 pin header
- Attach one standard 5.25" 360 KiB floppy disk drive
- Master drive limited to single-sided operation supports only single-sided slave drives; master drive supporting double-sided operation supports single- or double-sided slave drive units
- Double-sided operation: separate logical drives;
  second side sector layout is reverse track order (inner to outer)

HDI High-density Disk Interface, by Erhard Puetz (1990/1991?)

1.44 MegaByte Floppycontroller fuer Atari XL/XE

- Floppy Disk Controller (FDC): WD37C65-PL 00-02
- Connects to the Atari via SIO (must be at end of SIO chain)
- Connect up to 4 standard PC floppy drives
- Drive connector: 34 pin header
- Drives must support the Disk Change signal at pin 34 of the Shugart bus
- Drive types:
  - 5.25": 360 KiB, 1,200 KiB,
  - 3.5": 720 KiB, 1,440 KiB

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- Double-sided format: unknown
- Maximum transfer rate: 500 kbit/s (1,440 KiB 3.5" disks)
- Software compatible with Happy 1050, US Doubler, Speedy 1050
- US Doubler compatible/UltraSpeed capable (version 2.0 ROM, 1991)
- Speedy 1050 high speed (version 3.0 ROM, 1998)
- Does not support enhanced density
- See:
  http://www.atari-central.de/floppyservice/floppy/gb/hdi.htm
  http://atariage.com/forums/topic/158701-hid-disk-interface/

Floppy Board by Computer Software Services (CSS, 1992)

- Enables floppy drive port (34 pin PCB edge) of the CSS Black Box (which connects to the Atari XL/XE via PBI or Cartridge + ECI)
- Connect up to 4 standard PC floppy disk drives
- Drive types:
  - 5.25": 180 KiB, 360 KiB, 1,200 KiB
  - 3.5": 360 KiB, 720 KiB, 1,440 KiB
  - 8" (requires custom cable): 1,001 KiB
- Read & write enhanced density disks (single-sided formats only)
- Double-sided formats supported:
  - "ATR8000" - Track first ("interleaved", "head-first")
  - "Percom" - Side first, track-order (both sides)
  - "XF551" - Side first, track-order 1st side, reverse-track order 2nd side
- Reads/writes 5.25" and 3.5" MS-DOS disks, BBXFER software utility included
- Built-in Black Box Enhancer (Task Master program) and Archiver programs
- See: http://www.nleaudio.com/css/products/floppy.htm

720K Atari Disk Drive Interface (ADD Interface) (Micro-Discount, 1994)

- Floppy Disk Controller (FDC): WD1772
- Drive types: 5.25" 360 KiB or 3.5" 720 KiB
- Double-sided format: Unknown
  - "Can format Double-sided, double density 360 KiB similar to the XF551"
- Drive ID number is selectable from 1-4
- Drive connector: 34 pin PCB edge
- Connects to the Atari via SIO (must be at end of SIO chain)
- Shipped with MYDOS 4.5 on 3.5" 720 KiB floppy disk
  - Disk also includes IBM/ST disk reader (BBXFER software utility) by Computer Software Services

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Karin Maxi Disk Drive by Mariusz Geisler for Karin (1995?)

- A FDD controller with interface
- Parallel device, connects to Cartridge + ECI (internal version also produced)
  - Design errors result in conflicts with other parallel device peripherals
    - Fix available: http://atariki.krap.pl/index.php/Karin_Maxi
- Drive connector: 34 pin PCB edge
- Floppy Disk Controller (FDC): WD1770 or WD1772
- Supports one or two floppy disk drives, each of which can be any of:
  - 5.25" 360 KiB, 5.25" 720 KiB, 3.5" 720 KiB
- Supports single, enhanced, and double density
- Double-sided format: Track first ("interleaved", "head-first")
- Modified ROM by trub includes support for 512-byte sectors
- See:
  http://blog.3b2.sk/igi/post/ATARI-floppy-disk-drive-KARIN-MAXI.aspx
  http://atariki.krap.pl/index.php/Karin_Maxi

Karin Maxi Disk Drive 2012

- by Stryker / Trub / Konrad M. Kokoszkiewicz / Sebastian Bartkowicz (Candle'O'Sin)
- Original Karin Maxi design with original design errors fixed
- See: http://karinmaxidrive.pigwa.net/

3.2.8) Can I use modern storage media as emulated floppy drives?

SIO2USB, by ABBUC Regional Group Frankfurt / Main (2003-2007)

The SIO2USB Interface is a peripheral device that can be attached to an Atari 8-bit computer using the SIO-Bus. It emulates one or more Atari Floppy-Drive(s) and does not require any special drivers or Operating-Systems, it is fully compatible with all Atari DOS Systems and extensions. Because the device is connected to the SIO-Bus, it is not necessary to open or modify the Atari. The device is powered by the SIO-Bus and does not need an external Power Adapter. The data are stored on standard USB Mass Storage Devices (USB FLASH Drives) as Atari disk image files (ATR or XFD) on a standard FAT filesystem.

Features:

- Can boot an Atari 8-bit Computer without physical Floppy Drive
- Emulation of up to 3 (virtual) Disk drives simultaneously
- Simple device, attached to SIO-Port, no modification of computer necessary
- Mixed operation of real Floppy and SIO2USB possible
- Fully compatible with all Atari DOS and OS and all Atari compatible extensions
- Storage of Atari disk image files on standard USB FLASH Drives
- Configuration of the device by built-in keys and LC-Display or configuration program on the Atari
- Built-in Real Time Clock (RTC)
- Power supply for the device and USB FLASH Drive from SIO-Bus
- Updated SIO2USB Firmware can be applied from within the Atari (no additional device or computer required)

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- Updates available via Internet (USB FLASH Drive) or direct from the Atari
- (Real Disk Drive)

Information: https://tinyurl.com/3u7skjhe

SIO2SD, open-source project, 2007

Device inventor and AVR software developer: Jakub Kruszona-Zawadzki
Atari software developer and tester: Paweł Nowak (Pajero/MadTeam)
NVC developer: **Marcin Sochacki (Montezuma)**
Tester (also new SMD PCB designer): Jakub Husak
Allows you to load games/applications into 8-bit Atari computers via SIO interface from SD/MMC cards.

Features as of v.3.0:

- Supported cards: MMC/SDSC/SDHC (and very likely with SDXC, but only FAT32 formatted)
- Supported partitioning schemas: no partition, MBR (Master Boot Record), GPT (GUID Partition Table - EFI)
- Supported formats: FAT12, FAT16 and FAT32
- Handles ATR (rw), XFD (ro) and COM/XEX (ro) file types
- 16x2 LCD display allows to "walk" catalog tree and choose files to load (40x2 LCD displays are also supported)
- TURBO: 7th bit of command switches turbo. This is new turbo mode very similar to XF551 turbo mode.
- All densities with 128B and 256B sectors, including 16 MiB disks
- Number of simulated drives: 15 + 100
- Configuration program:
  - has to be present on SD card, but any program can be used
- New ATR files and new folders can be created using SIO commands
- "Empty disk" mode (ATR file created automatically during format command)
- Deleting files from card using SIO commands
- Renaming files and folders using SIO commands
- Reading and writing all files using SIO commands (inside Atari folder and subfolders)
- 100 extra "virtual drives" V0..V99, which can be mapped to any drive from D1 to D15
- Fast mapping - Drives V0 to V3 have additional, special meaning. When one of keys from K1 to K4 is pressed during start then device overrides mapping of D1 and maps one of those drives to D1 (K1 = V0, K2 = V1 etc.).
- Built-in very simple TURBO loader (for 7th bit mode - turbo mode similar to one used in XF551)
- Software includes
  - AVR software/firmware for the device
  - Atari software
  - PC software
    - NVC - a tool for organizing files on SD cards for SIO2SD
    - DriveSort - a tool for sorting files and directories

Wiki: http://sio2sd.gucio.pl/wiki/English

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Available:

- http://www.mega-Hz.de/Angebote/angebote.html several variations
- https://lotharek.pl/ many variations
- https://retrolemon.co.uk/12-atari several variations

SDrive, by C.P.U. (Radek Sterba (Raster) & Robert Petruzela (Bob!k)), 2008

The SDrive is a device that connects to Atari XL/XE's serial (SIO) port and simulates an Atari floppy disk drive with full read/write access to programs and data stored on a Secure Digital (SD) flash memory card.

- ATmega8-16PU microcontroller

Main features:

- Supported flash cards: Secure Digital up to 2GB size, FAT16 filesystem
- Maximum number of drives: 4 (D1: to D4:) + 1 special boot drive
- Supported SIO transfer rates: 3.5 to 128 kbit/s (standard 19 and 69 kbit/s)
- Supported disk images: ATR, XFD, size up to 16 MiB, 128 or 256B sectors
- Supported executable files: COM, XEX, BIN.... (any filename extension).
- Device controlled by software running on Atari from the SD card, which can be therefore easily updated/replaced
- Drives swappable on the fly by buttons
- Write protect/enable switch
- SDrive ID number selection switch - simultaneous use of up to 4 SDrives
- Low cost design - no LCD, a few LEDs, cheap DIL28 Atmega8 microcontroller, single-sided PCB
- Firmware and software source code freely available

Special features:

- Buffered reads for speedup
- Delayed writes for speedup and greatly reduced flash write cycles
- Built-in bootloader requiring less than 256 bytes including sector buffer, relocatable in the $0500-$05F7 to $BE00-$BEF7 range, with SKCTL initialization before every block. Supports executable files of up to 8 MiB size.
- Directory with filename simulated for active files in drives, data handled through standard 128B sectors. Executable files can be run from most DOSes or Q-MEG. Random data files with arbitrary suffix can be activated and opened by a program through DOS or copied to disk images. (Note: 80 KiB file size limit applies to standard DOSes, 8 MiB to Q-MEG and MyDOS)

http://raster.infos.cz/atari/hw/sdrive/sdrive.htm

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SDrive NUXX, by Steve Vigneau / c0nsumer, 2009
Based on SDrive by C.P.U.

- A readily available enclosure and custom end panels with cutouts and artwork.
- An SIO connector footprint. This allows a standard Atari SIO connector to be used, allowing easy connectivity with any of the compatible Atari 8-bit computers.
- Incorporates a low-cost AVR programmer allowing a SDrive builder who doesn't have AVR programming hardware readily available an easy method of loading the firmware on the microcontroller.
- The built-in Brown-Out Detector has been enabled with a 4.0V threshold.

https://nuxx.net/wiki_archive/A/SDrive_NUXX

SIO2Arduino, by Dan Noguerol (Farb), 2012

- SIO2Arduino is an Atari 8-bit (800/XL/XE) device emulator that runs on the Arduino platform. It currently emulates a single Atari 1050 Floppy Disk Drive (D1:) but there are plans to extend it to support multiple drives as well as other devices.
- In its current state, SIO2Arduino allows you to put single and enhanced density Atari 8-bit disk images (ATR, XFD, XEX and many PRO and ATX) onto a microSD card and boot them on real Atari hardware.
- SIO2Arduino is an open-source implementation of the Atari SIO device protocol that runs on Arduino hardware. Arduino hardware is open-source and can be assembled by hand or purchased preassembled.
- Note: You will need the SdFat library (https://github.com/greiman/SdFat) in your Arduino libraries directory in order to compile.
- For more information on the Arduino platform, go to: http://www.arduino.cc

http://www.whizzosoftware.com/sio2arduino/

SDrive Micro, by santosp, 2012
Based on SDrive by C.P.U.

- Small form factor: 70 x 50 x 20 mm including enclosure
- The printed circuit board is dual layer with only surface mount device components, including the microcontroller.
- The SIO cable is permanently connected to the device.
- The ID switch can be set from a small hole at bottom.
- The SD socket is a push on - push off type.
- Includes an internal header for any future programming.

https://atariage.com/forums/topic/192131-sdrive-micro-for-8-bit-atari/

SIO2MicroSD, by Don Peruski (2013)
An Arduino board was used as the platform. Features:

- 4 Virtual Drives (D1: - D4:)
- Supports standard SD/ED/DD ATR files
- Up to 4 sub-directories under the Atari sub-directory
- High Speed SIO [1]
- Load/Unload/Swap with 4 buttons and 16x2 LCD Display
- Optional "Game/Simple Mode" configuration to limit menu choices for easier use

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- LCD detail mode to view access commands and use
- XEX Boot-Loader [2]
- Ability to save current configuration of all settings
- S-Drive main functions compatible [3]
- Full board version has built-in USB to update firmware or use as SIO2PC device
- Because it is based on the Arduino, the hardware configuration options are Limitless

(1) Limited to mode 9 (about 56 kbit/s) due to 16 Mhz crystal used with the stock Arduino.
(2) XEX Bootloader code used from S-Drive source
(3) Only main portions of S-Drive were implemented based on documentation
http://diskwiz.wordpress.com/sio2microsd/

SDrive-NG (Next Generation) project by kbr (Klaus Brandl), 2014
Based on SDrive by C.P.U.
- SDcard detection and control generally enhanced
- Error detection (blink codes) for SDcard problems
- SDHC support
- FAT32 support
- Many code optimization
- SDrive control program converted to XA
- Bootloader support for updating flash and EEPROM data (V1.1)
- Create new disk images (V1.3)
- Image directory display in control program with key 'V' (V04)

http://www.kbrnet.de/projekte/sdrive-ng/index.html

A Little Atari 810 Disk Drive, by Rossum, 2015
- A tiny working model of an Atari 810 that uses 8 GB microSD cards
- Hardware: LPC1114 microcontroller, microSD slot, 3.3V regulator, LED, capacitors
- Enclosure: 3D print from Shapeways
- Microcontroller software: emulates up to 8 Atari drives.
  - At power on it checks for a microSD card, mounts a FAT16 or FAT32 file system and scans the card for .ATR and .XFD disk image files.
  - It also looks for .XEX files (Atari executables).
  - The code then "inserts" the BOOT.RUR image into drive 1 and waits for the Atari to start sending commands during bootup.
- Atari software: BOOT.RUR
  - Used to select disk images or applications.

https://github.com/rossumur/littleatari810

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SDriveARM project, by alsp / fintros, 2017
Based on SDrive by C.P.U.
- 5V compatible 32bit Cypress CY8C4245AXI ARM processor (48 MHz core, 32 KiB Flash, 4 KiB RAM)
- MicroSD card reader
- Capacitive buttons (Next drive, Prev drive, Boot drive)
- 6 LEDs (1 green, 1 red and 4 yellow)
- Reset button
- Each SIO pin connected to ARM I/O pin (Possibility for functionality extension)
- One RW/RO switch for microSD card
- Original drive ID's switching DIPs excluded

https://github.com/fintros/SDrive-ARM

SDrive-MAX project by kbr (Klaus Brandl), 2017
Based on SDrive-NG project, also by kbr (Klaus Brandl). Requires:
- Arduino UNO with ATmega328p
- Elegoo 2.8" TFT touchscreen shield resistive or comparable with ILI9341 compatible chip and 8-bit parallel mode.
- Micro-SD card (SD or SDHC)
- Diode: 1N4148 diode or similar
- Cable, SIO plug and power supply if necessary
- The software "avrdude" for programming
- USB drivers for the Arduino, if necessary

http://www.kbrnet.de/projekte/sdrive-max/index.html

AVGCART (Average Cart) by tmp, 2018
An SD card multi-cartridge for the Atari XL/XE except 1200XL
- Built around a Xilinx Spartan-6 FPGA chip
- Optional SIO cable adds full ATR support and support for ATX (copy protected floppy images) and CAS (cassette files, including support for turbo tapes)

https://avgcart.tmp.sk/

Available:
https://miscretro.com/product/avgcart/
https://miscretro.com/product/subcart/ (SUBCART variant, 2023)
https://retrolemon.co.uk/8-bit-mass-storage-devices/125-avgcart.html

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FujiNet, by Thomas Cherryhomes and others, 2019-

- MicroSD socket for storing disk images and/or cassette images
- Connectivity: Built-in SIO connector
- SIO port for daisy chain
- Emulated D: (Disk) device
  Load floppy disk images from onboard MicroSD
  Supports ATR, ATX, and XEX formats
- Emulated C: (Cassette) device
  Load CAS files from onboard MicroSD

https://fujinet.online/

3.3) High Capacity Disk Drives

3.3.1) What is the Corvus disk system?

For mass storage capacity beyond that of floppy disk drives, microcomputer users of the time of the Atari could turn to drives that utilized a "fixed" or "sealed" magnetic disk. Such devices were still widely known in the early 1980s as "Winchester" disks, after the code name for IBM's influential 3340 Direct Access Storage Facility (14"; 70MB or 140MB) introduced back in 1973. As they became much more common by the mid 1980s, the Winchester term mostly disappeared from common usage, along with the alternatives "fixed-disk" and "sealed disk", all ultimately replaced by today's: "hard disk drive"

One feature of early hard disk drives was that the disk controller was usually a separate component from the disk itself. In the late 1970s and early 1980s several different interface standards for communications between computer host, controller, and disk competed for market acceptance. This complicated market landscape, combined with the extreme costs involved, severely limited the sales of hard disks for early home computers.

Corvus Systems teamed with disk-maker International Memories Inc. (IMI) to develop and market complete, integrated Winchester disk systems compatible with many computer platforms, including the Atari 800. It was the first and remained the only hard disk drive solution available for an Atari computer for several years.
Corvus Systems Atari 800 Disk System (1982), marketed as 5MB, 10MB, or 20MB systems includes:

- Corvus Winchester Disk Drive unit, one of:
  - Corvus B-Series 5.25" 6MB (IMI 5007 disk with IMI 5000 Phase III controller)
  - Corvus B-Series 8" 11MB (IMI 7710 disk with embedded controller)
  - Corvus B-Series 8" 20MB (IMI 7720 disk with embedded controller)
  - Corvus H-Series 5.25" 6MB (Model 6) (IMI 5006H disk with IMI 5000H controller)
  - Corvus H-Series 5.25" 12MB (Model 11) (IMI 5012H disk with IMI 5000H controller)
  - Corvus H-Series 5.25" 18MB (Model 20) (IMI 5018H disk with IMI 5000H controller)
- Corvus Atari Interface (host adapter)
  - Attaches to Atari 800 controller jacks #3 + #4
  - Attaches to Processor port on Corvus drive (34 pin Corvus-IMI bus)
- Two different "AT Utilities" diskettes (v.1 and v.2)

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- Disk System Installation Guide and System Manager's Guide
- The power switch is on the front of the 8" drives, while it's on the back on the 5.25" drives.
- Drive units can be daisy-chained. The Processor port of an add-on drive can be connected to the Drive port of an existing drive (34 pin Corvus-IMI bus). Up to 4 Corvus hard drives (any of the above models) can be connected to one computer.
- Requires 48 KiB RAM, and 810 or equivalent floppy disk drive.
- SYSGEN utility divides the drive into any combination of 90 KiB and 180 KiB "volumes" for use by the Atari as logical drives. A Model 20 drive may contain up to 196 single-sized volumes (with no double-sized volumes) or up to 98 double-sized volumes (with no single-sized volumes).
- System must boot using Corvus bootstrap from either disk or cassette.
  - WRITEBOOT.OBJ utility creates a Corvus Boot Disk out of Atari DOS 2.0S, which boots to: Disk Operating System II Corvus A2.0D (25-Apr-1981)
  - CWRTBOOT.OBJ utility creates a boot cassette
- Multiple users support - each "user" can have access to up to 8 logical drives, which can be any combination of Corvus volumes or Atari drives (except logical drive 1 must be Corvus volume 1 or an Atari drive where a Corvus boot disk will be used).
  - Usage: User boots the system with uniquely-assigned boot disk, then uses the DOS L. BINARY LOAD option to load the user's unique "volume mount table" file, which maps the user's assigned Corvus volumes to logical drives.
- Optional: Corvus Mirror (internal)
  - Mirror video in and video out phono jacks connect to corresponding jacks on a VCR (VHS or Beta)
  - Corvus volumes or the entire Corvus drive can be backed-up or restored from backup.
- Sold separately by Corvus:
  - Corvus Multiplexer - Configured as a Host, unit connects to the Processor port of a Corvus drive and provides 8 Processor ports (34 pin Corvus-IMI bus) to the system, allowing up to 8 computers to be connected to the system. Configured as a Master, unit allows Multiplexer Host units to be attached to the 8 Processor ports of the Master unit. Thus up to 64 computers can share the same Corvus hard drive (or set of up to 4 daisy-chained Corvus hard drives).
    (System upper limit: 80MB of storage shared by 64 computers)
  - Corvus Mirror (external unit) - Same as internal Mirror, but is connected between the Corvus drive and the Atari Interface, or between a Corvus drive and a Corvus Multiplexer. (34 pin Corvus-IMI bus)
- Sold separately by ?????: Right Cartridge which boots the Atari from the Corvus. (source: Integrater manual. Details????)
- Sold separately by ADS: Integrater (1983)
  - Detailed elsewhere in this FAQ List (personality boards for the 800)

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3.3.2) How can I use an ST-506 interface hard disk (MFM or RLL)?

The 5 MiB ST-506 Micro Winchester was the first 5.25" hard disk drive, introduced in 1980 as the first product from Shugart Technology (renamed shortly thereafter to: Seagate Technology). The market success of the ST-506, along with the subsequent 10 MiB ST-412 and 20 MiB ST-225, led to the ST-506 interface between disk controller and drive being established as an industry standard for hard disk drives.

The ST-506 interface was itself an incremental derivation from the interface for the 8" 10 MiB Shugart Associates SA1000 hard disk from 1979.

Note that with ST-506 type hard disks, the disk itself is attached to a separate disk controller unit, which in turn attaches to a host computer interface/adapter.

Also note that at the time of the Atari, hard disks paired with ST-506 type controllers were popularly characterized not by the interface type but rather by the specific recording method used by the ST-506 type controller: either modified frequency modulation (MFM) or run-length limited (RLL).

One ST-506 controller host adapter was designed for use with the Atari:
SWP Host Adapter (1986)

- Upgrade for 64 KiB SWP ATR8000 units
- Supports up to 32 MiB of hard disk storage
- Supplied with:
  - WD1002-HDO MFM controller
    (ST-506 interface: 34 pin header drive control + 20 pin header data connectors)
  - 10 MiB hard disk drive (ST-412 or equivalent) with enclosure
  - Optional ZCPR (replacement/upgrade for the CP/M Console Command Processor – CCP)
  - Drive can be partitioned for MYDOS & CP/M, plus MS-DOS for CO-POWER
- See ad: Analog #41 4/86 p128, https://tinyurl.com/jupxtnun
- User/owner report: https://tinyurl.com/48cdhb66

Additionally, some hard disk "bridge" controllers allow an ST-506 type hard disk to be attached to a computer's SASI/SCSI interface. ST-506 type drive controllers with SASI/SCSI host interface and support for 256-bytes sectors, as required by many SASI/SCSI interfaces for the Atari, include: Adaptec ACB-4000A (SCSI), Adaptec ACB-4070 (SCSI), Western Digital WD1002-SHD (SASI), Xebec S1410 (SASI), Xebec S1410A (SASI).
Please see another section of this FAQ list for a list of SASI/SCSI interfaces for the Atari.

3.3.3) How can I use a SASI or SCSI interface hard disk / controller?

Shugart Associates System Interface (SASI) ("sassy") was a parallel interface developed initially at disk drive maker Shugart Associates in the early 1980s, which was adopted as a formal ANSI standard in June 1986 under the name, Small Computer Systems Interface (SCSI) ("scuzzy"). SCSI supports many types of computer peripherals, including hard disk drives.

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Many hard disk drives were produced with an embedded disk controller featuring a SASI or SCSI interface, though only some of these support 256-byte sectors as required by many SASI/SCSI interfaces for the Atari. Suitable SCSI drives meeting this requirement include: Seagate ST-225N (20 MiB), Rodime RO650 (10 MiB) and RO652 (20 MiB), Iomega Alpha 10H (10 MiB) and Beta removable cartridge drives

Additionally, some hard disk "bridge" controllers allow an ST-506 type hard disk to be attached to a computer's SASI/SCSI interface. ST-506 type drive controllers with SASI/SCSI host interface and support for 256-bytes sectors, as required by many SASI/SCSI interfaces for the Atari, include: Adaptec ACB-4000A (SCSI), Adaptec ACB-4070 (SCSI), Western Digital WD1002-SHD (SASI), Xebec S1410 (SASI), Xebec S1410A (SASI).

The following are SASI or SCSI interfaces for the Atari that allow the use of a SASI or SCSI interface hard disk drive or controller.

Z-Tec 1000

- SASI host adapter upgrade for 64 KiB SWP ATR8000 units
- Attaches to the ATR8000 internally
- SASI Connector: 50 pin Micro-Ribbon
  - Compatibility limited to controllers supporting 256-byte sectors
- User/owner report: https://tinyurl.com/542nrhe2
- Picture: https://tinyurl.com/3n2hdrjv

BTL 2004 SASI Hard Disk Adapter, by William Lurie & Associates, 1986

- Parallel device, choice of PBI or Cartridge + ECI connector
- SASI Connector: 50 pin header
  - Supports one or two physical hard drives for 128MB total system storage potential
  - Compatibility limited to controllers supporting 256-byte sectors
- BTL Hard Disk System includes:
  - Hard disk drive: 10MB standard; drives up to 85MB were offered
  - BTL 2004 SASI Hard Disk Adapter
  - One of: BTL 2001 PBI Connector or BTL 2002 Cartridge + ECI Connector
    - BTL 2002 includes pass-through cartridge port
  - Supplied with MYDOS 4.
- See:
  http://www.atarimagazines.com/v5n12/BTLHardDisk.html
  http://www.atarimagazines.com/v6n9/ShoppersGuide.html

Supra Hard Disk Interface, by Supra, 1986-1992
K-Products Interface (KPI), by K-Products, 1992-2002

- Parallel device, connects to PBI
  - Sold separately: Supra XE-XL Buss adapter for Cartridge + ECI
    - Adapter includes pass-through cartridge port
- Hard Disk Drive (SCSI) port: 50 pin header
  - Supports one or two physical hard drives
    - 2nd drive must have the name number of heads and cylinders as the 1st

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    - Compatibility limited to controllers supporting 256-byte sectors
    - Hard Disk is divided into two logical drives: D1: is the size of an Atari floppy disk (single or double density), and D3: is the remainder of the disk.
        - 2nd hard drive is likewise divided, where D2: is the size of an Atari floppy disk, and D4: is the remainder of the disk.
    - Atari floppy disk drive should be configured as D2: (1 hard drive system)
    - System normally boots from D1:; hold down [HELP] during startup to boot from D2:.
- Supplied with MYDOS 4 and hard drive software utilities
- SupraDrive Atari Hard Disk system includes:
    - SupraDrive AT hard disk drive, one of
        - 10MB drive = Xebec 4000 / Xebec Owl (5.25" SASI)
        - 20MB drive = Miniscribe 8425S (3.5" SCSI) (can anyone verify this????)
    - Supra Hard Disk Interface (including MYDOS 4 and software)
- See:
  http://www.atarimagazines.com/v5n6/Supradrivefor8Bit.html
  http://www.page6.org/archive/issue_29/page_12.htm
  https://tinyurl.com/yc65fex6

Multi I/O board (MIO), by ICD, 1987

- Parallel device, connects to PBI
    - ICD adapter for Cartridge + ECI provides two pass-through cartridge ports
- 256 KiB or 1 MiB RAM versions
- RAM drive: Use any amount of unit RAM as a RAM drive
    - Unit has its own power supply, allowing the RAM to retain its memory while the computer is off
- Hard Disk (SCSI) port: 50 pin header
    - Connect up to 8 controllers (SCSI specification)
    - Compatibility limited to controllers supporting 256-byte sectors
- Menu program on firmware ROM
    - Accessed by holding down the [SELECT] key while booting or by [SELECT] + [RESET]
        - Menu loads into the computer's main memory (RAM)
    - Allows booting from RAM drive or Hard Drive
    - Allows partitioning of hard drives and RAM for RAM drives (up to 8 total drives)

Black Box, by Computer Software Services (CSS), 1989

- Parallel device, with connectors for both PBI and Cartridge + ECI
    - PBI Connector: 50 pin header; ribbon cable to PBI interface included
    - Cartridge + ECI connector: standard PCB edge
- SASI/SCSI Hard Disk Port: 50 pin header
    - Connect up to 8 controllers (SCSI specification)
    - Hard disk floppy drive emulation (Single or Double density)
    - Compatibility includes controllers supporting 512-byte sectors
    - Manage up to 96 drive partitions, including write-protection
- High speed disk I/O: Happy, XF551, UltraSpeed
- Built-in 6502 machine language monitor

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- Software utilities, including MYDOS and hard drive utilities, on disk
- Black Box Enhancer (upgrade for older units; included with newer units):
  - Enhanced printing functions, Task Master sector editor, Archiver program
- Developer page: http://www.nleaudio.com/css/products/black.htm
- Black Box information/tips/tricks collected by Mathy van Nisselroy: https://www.mathyvannisselroy.nl/blackbox.htm
- Available ATASPI "Atari (Advanced) SCSI Programming Interface" for Black Box, developed by msc (Matthias Belitz) and **Lee Barnes**, https://www.mathyvannisselroy.nl/aspi.htm
  - Available utilities for ATASPI
    - ATASPI MON V0.12 © 2000 by msc (SCSI monitor)
    - ATASPI CD Audio Player (CDAP) 1.47 by msc and Mathy van Nisselroy
    - ATASPI CD/DVD Data Reader (DATA) 0.69 by Mathy van Nisselroy

    https://www.mathyvannisselroy.nl/aspi.htm

Multi I/O board (MIO) "new series" by Ken Jones / MEtalGuy66, 2006
Equivalent to the original ICD MIO, 1 MiB RAM version, with improvements.
- Hard Disk (SCSI) port:
  - Compatibility includes controllers supporting 512-byte sectors
- Available: http://www.rasterline.com/

3.3.4) Can I use an IDE / CompactFlash device as a high-capacity drive?

(Background derived from Wikipedia)

Parallel ATA (PATA) – previously AT Attachment (ATA) and originally Integrated Drive Electronics (IDE) – is an interface standard for the connection of storage devices such as hard disks, floppy drives, and optical disc drives in computers. The standard is maintained by X3/INCITS committee.

The IDE standard was first used in 1986 in the Compaq Deskpro 396 with integrated Western Digital hard disk drive controller. IDE was based on the IBM PC Industry Standard Architecture (ISA) 16-bit bus standard.

ATAPI is the standard protocol allowing the ATA interface to carry SCSI commands and responses. Common ATAPI devices include CD-ROM drives, DVD-ROM drives, and Zip drives.

CompactFlash (CF) is essentially a mass storage device format with a miniaturized ATA interface, normally using flash memory. The format was first specified and produced by SanDisk in 1994.

The following hardware interfaces were designed to allow PATA devices to be used as a high-capacity disk drive with the 8-bit Atari:

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KMK/JZ IDE, by Jacek Zuk (Simius) and Konrad M. Kokoszkiewicz, 1996

- Allows you to attach an ATA (IDE) hard drive, a CF (Compact Flash) card or an ATAPI device (e.g. a CD-ROM drive) to your Atari XE computer. Drive must be ATA-1 or later; at least ATA-2 is recommended. Dual drives supported.
- KMK/JZ IDE Interface
  - Hardware design by Jacek Zuk (Simius), 1995-2006
    - First generation: KMK/JZ IDE (aka 1.0)
    - Second generation: KMK/JZ IDE 1.2 (same, just more memory)
  - Parallel device, connects to Cartridge + ECI
- Software by Konrad M. Kokoszkiewicz. Firmware characteristics (10.11.2009):
  - Maximum drive capacity: 16777215 physical blocks on each device (8 GiB)
  - Maximum number of partitions: 16
  - Maximum capacity of a partition: 16777215 logical sectors (8 GiB)
  - Logical sector length: 512 bytes (native, same as physical block) or 256 bytes (emulation) or (as of BIOS v.1.8) 128 bytes (emulation)
  - Average speed (depends on the drive and DOS used):
    50-80 kB/s (native mode, R/W), or
    20-45 kB/s (emulation mode, reading), or
    7-12 kB/s (emulation mode, writing)
  - 16-bit data transfers
  - Fully Atari OS compliant (no Atari OS patches are needed)
  - Bus ID for the Atari OS configurable with a jumper
  - Can boot from any partition (of a hard drive or CF card)
  - Independent partitions can be write-protected
  - ATAPI support not provided by the BIOS
  - Available MNT SpartaDOS X Add-on by DLT enables the user to address a connected KMK/JZ IDE or IDEa device
    http://sdx.atari8.info/index.php?show=en_addons

Available: http://8bit.yarek.pl/interface/atari.kmk/
Utilities, tools and the system software: http://drac030.krap.pl/

msc-IDE Controller, by Stefan Birmanns and Matthias Belitz, 1995-1996

- Parallel device, connects to PBI
  - A Cartridge + ECI adapter can also be used
- Up to 240 partitions per hard disk supported
- Emulates D1: until D9: of disk devices (access to 9 partitions at one time)
- Full bootable from any partition (with standard XL-OS)
- Write protection capability
- Supports up to two hard drives (master/slave)
- Transfer rate > 30 kB/s file access with SpartaDOS 3.2 gx (reading)
- Transfer rate > 10 kB/s file access with SpartaDOS 3.2 gx (writing)
- Software partially supports CD-ROM and ZIP drives.
- Partially software compatible with the KMK/JZ IDE interface
- No longer in production
- More information, manual, software utilities: http://www.birmanns.de/atari/

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SmartIDE, project for the 1200XL by Bob Woolley, 1996

- Published as a series of articles in Atari Classics magazine
- "SmartOS" Sept/Oct 1995, pp. 25-29
  https://archive.org/details/AtariClassics1995-09/page/n24/mode/1up
- "Dallas 'ROMs'" Fall 1996, p. 16
  https://archive.org/details/AtariClassicsV5n2/page/n15/mode/1up
- "Smart IDE" Fall 1996, pp. 17-19
  https://archive.org/details/AtariClassicsV5n2/page/n16/mode/1up
- "The IDEal Hard Drive" Fall 1996, pp. 20-22
  https://archive.org/details/AtariClassicsV5n2/page/n19/mode/1up
- "IDE Driver Software" Fall 1996, pp. 23-27
  https://archive.org/details/AtariClassicsV5n2/page/n22/mode/1up
  Software (IDE38.ASM) download idecode.zip contained in
  ftp.pigwa.net/stuff/collections/atari_forever_ISO/Atari%20Forever%20CD2.tgz

BadSector "A" project by Gary Morton, 2001

- Control an IDE hard disk drive using the Atmel AT89S53 processor (or 8031 compatible processor).
- Compatible with all models of Atari due to the use of the SIO (serial bus)
- https://tinyurl.com/597h5t6p

SIO2IDE, project by Marek Mikolajewski (MMSoft), 2001-2005

Attach any IDE Disk Drive or CF Card (using CF2IDE adapter) to your 8-bit Atari computer.

ATARI side:

- Uses standard Atari SIO at a speed of 19,200 bit/s
- Works with Atari High Speed SIO (US and Happy) at a speed of 52,000 bit/s
- Emulates Atari disks D1: to D8: disk D1: can be swapped with Common disk D1: (HD1_ZW jumper, drive D9: in config file)
- Can be used with any Atari DOS and OS
- Available S2I SpartaDOS X Add-on by DLT enables the user to address a connected SIO2IDE device with firmware 3.x and 4.x.
  http://sdx.atari8.info/index.php?show=en_addons
- Can be used without any problems with other SIO devices
- Can be easy installed inside your Atari with 2.5' laptop HD or CF card
- Is easy to configure via special fdisk.com utility software (changing disks sequence and active directory)
- It uses ATR files to emulate real floppy disk or hard drive

IDE device side:

- All IDE ATA/ATAPI devices can be used: Disk Drives (2.5" and 3.5"), Compact Flash cards etc.
- Supports PC file systems, FAT16 and FAT32
- Supports CD file system, ISO9660
- Supports ATR disk images (SD, DD up to 16 MiB)
- Supports directory change (multiconfig)

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- Is easy to configure, many text configuration files (sio2ide.cfg) can be stored in different directories
- Disk configuration can be checked by special checkfs.exe PC utility
  NOTE: checkfs.exe does NOT work with HDD connected via USB port
- Standard system disk utilities can be used (defrag.exe, scandisk.exe etc)
- Long File Name (LFN) support for HDD
- TEST mode for checking HDD initializations
- Supports Master/Slave IDE devices
- Disk defragmentation is not required

USB port side (SIO2IDE Versions 4.x option):
- Interface allows the attached ATA drive to work as USB Mass Storage Class device (removable drive) on a Windows PC
- No drivers are needed for Windows 2K, ME, XP. Windows 98 driver available.
- SIO2IDE in USB mode is not working with Linux

Available, Version 3.3: http://www.mega-hz.de/Angebote/SIO2IDE33/SIO2IDE33.html
- Options: USB controller, SIO plug

SIO2IDE project home: http://www.atariarea.krap.pl/sio2ide/

MyIDE, by Mr.Atari (Sijmen Schouten), 2002
- Project first published (as Version 3) August 2002, for XL/XE
- Fall 2002: released as printed circuit board for use either in a grey Atari-cartridge shell or for internal installation
- Available MyIDE/Flash, Internal MyIDE and MyIDE 2 Soft Drivers for SpartaDOS X, by Jonathan Halliday: https://atari8.co.uk/apt/myide/
- http://www.mr-atari.com/myidehome.htmx

Available:
- MyIDE Internal Interface for XL/XE Computers (Except 1200XL & XEGS)
- MyIDE Internal Interface for 1200XL Computer
- MyIDE Internal Interface for XEGS Computer

https://www.atarimax.com/myide_old/documentation/

IDEa Interface, by Michal 'Pasiu' Pasiecznik, 2005
- Clone of KMK/JZ IDE 1.2
- Parallel device, connects to Cartridge + ECI
  - Can also be mounted inside any XL/XE

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MyIDE+Flash IDE Interface Cartridge, by Atarimax (Steven J. Tucker), 2006
Combines MyIDE interface with an Atarimax 1Mbit reprogrammable flash cartridge. For XL/XE.
- Interface is portable between computers and requires no internal installation.
- Available MyIDE/Flash, Internal MyIDE and MyIDE 2 Soft Drivers For SpartaDOS X, by Jonathan Halliday: https://atari8.co.uk/apt/myide/

Available: https://www.atarimax.com/myide_old/documentation/

IDE Plus 2.0, by Jacek Zuk (Simius) and Konrad M. Kokoszkiewicz, 2011
- Allows you to attach an ATA (IDE) hard drive, a CF (Compact Flash) card or an ATAPI device (e.g. a CD-ROM drive) to your Atari XL/XE computer. Drive must be ATA-3 or later. Dual drives supported.
- Hardware design by Jacek Zuk (Simius)
  - Parallel device, with both PBI and Cartridge + ECI connectors
    - Provides pass-through Cartridge port
  - Addresses well known problems with the PHI2 signal not being generated the same across various Atari XL and XE motherboard revisions, and across computers with different hardware extensions installed.
  - Does not require an external power-supply
  - Contains 96 KiB ISP Flash ROM and 32 KiB RAM available to the internal PBI BIOS and flashable from the Atari
  - Contains 512 KiB or 1024 KiB ISP Flash ROM for SpartaDOS X (or any other cartridge of such type), flashable from the Atari. This ROM can be physically disabled using a dedicated switch.
  - Contains a real time clock circuitry to be used with SpartaDOS X.
  - Contains a LED flashing during the I/O
  - AtariAge preorder thread: http://preview.tinyurl.com/nc7msfb
- Software by Konrad M. Kokoszkiewicz. Firmware characteristics (29.10.2011):
  - Maximum drive capacity: 268435456 sectors on either device (128 GiB)
  - Maximum number of partitions: 16
  - Maximum capacity of a partition: no practical limit
  - Logical sector length: 128 bytes (emulation), 256 bytes (emulation) or 512 bytes (native)
  - Average speed (depends on the drive and DOS used):
    50-80 kB/s (native mode, R/W), or
    30-45 kB/s (emulation mode, R/W)
  - 16-bit data transfers
  - Fully Atari OS compliant (no Atari OS patches are needed)
  - Independent partitions can be write-protected
  - ATAPI support not provided by the BIOS

Documentation, utilities, tools, system software: http://drac030.krap.pl/

SIDE Cartridge, by Sebastian Bartkowicz (Candle'O'Sin), 2011
- Optimized for CF cards
- Supported by SpartaDOS X
- Selectable "SIDE Loader" and SpartaDOS X modes of operation
- Real-Time Clock

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- Compact Flash card slot
- Available SIDE Loader: XEX Loader for SIDE and SIDE2 by **Jonathan Halliday**: https://atari8.co.uk/firmware/side/
- Available SIDE/SIDE2 Soft Drivers For SpartaDOS X by **Jonathan Halliday**: https://atari8.co.uk/apt/side/
- Production units by Zaxon, 2011

SIDE2 Cartridge, by Przemyslaw Krawczyk (Lotharek), 2012

- Based on SIDE Cartridge by **Sebastian Bartkowicz (Candle'O'Sin)** (2011)
- On-board SpartaDOS X
- Real-Time Clock
- Compact Flash card slot
  - CF card hot-swap functionality and enhanced ROM banking capabilities
- Switchable loader and SDX modes
- Programmable "SIDE button"
- 256 KiB external flash application cartridge space
- Available SIDE Loader: XEX Loader for SIDE and SIDE2 by **Jonathan Halliday**: https://atari8.co.uk/firmware/side/
- Available SIDE/SIDE2 Soft Drivers For SpartaDOS X by **Jonathan Halliday**: https://atari8.co.uk/apt/side/

https://lotharek.pl/productdetail.php?id=55
Available: https://retrolemon.co.uk/12-atari

MyIDE-II CompactFlash Cartridge, by Atarimax (Steven J. Tucker), 2012

- For XL/XE
- Compact Flash Hardware Interface
  - Software Power Control
  - Hardware Media Change Detection
  - Upgradable Hardware Core via Card Edge JTAG Interface
- Atarimax FAT32 Loader
  - EXE/XEX/COM Binary Support
  - Fast ATR Disk Image Buffered from Cartridge SRAM
  - Supports 8 KiB/16 KiB and larger converted XEgs/Banked ROM images
  - Supports Boot ROM Upgrade directly from CF Card
- Mr-Atari's "MyBIOS" Included
  - MyIDE-II MyBIOS with Full "Hot Swap" Media Change Support
  - Upgrade/Change MyBIOS by updating your Maxflash Studio Workbook
  - Purchase includes MyBIOS technical support from Mr-Atari
- 512 KiB On-Board User Customizable Flash Memory
  - Maxflash Studio & USB Programmer Integration
  - Menu Customizability using Maxflash Studio Workbooks
- 512 KiB On-Board Application SRAM
  - Develop advanced applications without requiring internal RAM upgrades
- Available MyIDE/Flash, Internal MyIDE and MyIDE 2 Soft Drivers For SpartaDOS X, by **Jonathan Halliday**: https://atari8.co.uk/apt/myide/

Available: https://www.atarimax.com/myide/documentation/

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Incognito, by Sebastian Bartkowicz (Candle'O'Sin), 2012

- Personality board for the Atari 800
- Firmware by **Jonathan Halliday**
- Built-in, configurable CF card storage (works as PBI in XL/XE mode, and through SDX driver in "Colleen" mode)
- SpartaDOS X
- Device detailed elsewhere in this FAQ list (800 personality boards)

3.3.5) Can I use an SD card as a high-capacity disk drive?

(SD background derived from Wikipedia)

Secure Digital (SD) is a flash memory (non-volatile) memory card format used since 1999 in portable devices, including digital cameras, handheld computers, PDAs and GPS units. SD was based on the MultiMediaCard (MMC), which was introduced in 1997 by SanDisk and Siemens.

The SD format includes four card families available in three different form factors. The four families are the original Standard-Capacity (SDSC), the High-Capacity (SDHC), the eXtended-Capacity (SDXC), and the SDIO, which combines input/output functions with data storage. The three form factors are the original size, the "mini" size, and the "micro" size. There are many combinations of form factors and device families.

SIO2SD, 2007
Device inventor and AVR software developer: Jakub Kruszona-Zawadzki
Atari software developer and tester: Paweł Nowak (Pajero/MadTeam)
Detailed in another section of this FAQ list.

- Available S2S SpartaDOS X Add-on by DLT enables the user to address a connected SIO2SD device. http://sdx.atari8.info/index.php?show=en_addons

http://sio2sd.gucio.pl/wiki/English

Available:

- http://www.mega-Hz.de/Angebote/angebote.html several variations
- https://lotharek.pl/ many variations
- https://retrolemon.co.uk/12-atari several variations

AVGCART (Average Cart) by tmp, 2018
An SD card multi-cartridge for the Atari XL/XE except 1200XL

- SIDE2 emulation (compatible with Ultimate 1MB and SpartaDOS X)
- Available SIDE Loader and SpartaDOS X for the AVG Cart by **Jonathan Halliday**: https://atari8.co.uk/firmware/avg/
- Available SDX Driver and ROMs for SIDE and SIDE2, by **Jonathan Halliday**, for hard disk access under SpartaDOS X: https://atari8.co.uk/apt/side/

https://avgcart.tmp.sk/

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Available:
- https://miscretro.com/product/avgcart/
- https://miscretro.com/product/subcart/ (SUBCART variant, 2023)
- https://retrolemon.co.uk/8-bit-mass-storage-devices/125-avgcart.html

SIDE3, 2020-
Hardware by **Sebastian Bartkowicz (Candle'O'Sin)**, features:
- Use of SD cards
- Emulation of a wide range of cartridge types, up to 1 MB in size
- Real time clock with battery-backed NVRAM
- 8 MB of flash ROM and 2 MB of fast SRAM
- Versatile ROM/RAM access with DMA engine
- Hot-swappable media
- Dual mode (SDX/Loader) operation, controlled by switch
- Menu button (doubles as ATR swap button when used with Ultimate 1MB)

SIDE3 Loader software (firmware, PBI routine) by **Jonathan Halliday**, features:
- Up to 1,024 FAT filenames in memory (no paging through long folders)
- Mount cartridges, ATRs and partitions simultaneously, all from the same menu
- Special RAM-based operating system permits booting of some ATRs without Ultimate 1MB
- Tight integration with Ultimate 1MB where present
  (using special SIDE3 Ultimate 1MB plugins)
- Powerful recursive search facility which runs in the background while you browse results
- Handling of up to fourteen FAT partitions
- APT browser allows dynamic mounting of hard disk partitions
- Mounting of multi-disk volumes via MAP files
- Built-in mini DOS allows read-only access to FAT16/FAT32 volumes on 'D1:'
- Built-in 'Pulse Density Modulation' (FujiConvert) audio file playback
- Built-in Covox support
- Built-in real time clock support

Available:
- https://retrolemon.co.uk/atari-8bit-storage-devices/53-side3-cartridge.html
- https://lotharek.pl/productdetail.php?id=143
- https://thebrewingacademy.com/products/side3

Firmware updates:
- https://atari8.co.uk/firmware/side3/

Soft Driver For SpartaDOS X:
- https://atari8.co.uk/apt/side3/

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3.4) Modern Computers as File Servers for the Atari

3.4.1) How can my Atari utilize my other computer's mass storage?

This section lists solutions that allow the Atari computer to utilize another computer's mass storage devices (disk drives) through Atari peripheral emulation.

The Atari and the other computer are either connected via a specialized cable, or perhaps by wireless SIO2BT Bluetooth connection.

ATARIBUS project by Dave Warker, 1982/1983
A hardware interface design and CP/M software package that links an Atari computer to CP/M compatible computers.

- Provides up to four pseudo-drives to the ATARI. To Atari DOS they appear as devices D1: through D4:. What they actually are is 90 KiB byte CP/M disk files. The records of these disk files are treated as sectors of the Atari disk.
- The standard extensions for Pseudo-Disk (PD) files are ATR, AT1, AT2, AT3 or AT4. 'ATR' is used in most cases. (Pre-dates the SIO2PC ATR standard!)

http://www.filewatcher.com/m/ataribus.lbr.47616-0.html

The Critical Connection, by USS Enterprises (Vincent Cate), 1982-1984
A hardware interface and CP/M software package that links an Atari computer to CP/M compatible computers.

- Utilize an entire CP/M disk as an emulated 600 KiB Atari disk drive
- Utilize 92 KiB CP/M disk files as emulated Atari 90 KiB disk drives
  - This feature requires CP/M 2.0 or above, and a copy of Atari DOS
- Can only access one CP/M drive at a time

Two versions:

- The Critical Connection (original) for Atari 400/800 computers, 1982
- The Critical Connection XL for Atari XL/XE computers, 1984

SIO2PC, by Nick Kennedy, 1989/1998
SIO2PC is a hardware & software package interfacing the 8-bit Atari to PC compatible computers (DOS). The hardware is known as an SIO2PC Cable.

- Emulates 1 to 4 Atari disk drives
- Store your Atari files on PC hard or floppy drives
- Boot from the PC, real drive not needed to start-up
- No software or drivers required for the Atari; no conflicts: use your favorite DOS
- Twice as fast as an Atari 810 drive and more reliable
- Co-exists with real drives in the Atari daisy chain

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- Compatible down to the hardware level: use sector copiers, etc.
- Convert Atari files to PC files and vice versa
- Supports (and originated) the .ATR Atari disk image file format on the PC

SIO2PC cable/interface designs and sources, PC RS-232/Serial interface:

- http://pages.suddenlink.net/wa5bdu/sio2pc.htm (Nick Kennedy)
- http://retrobits.net/atari/sio2pc.shtml (Rick Cortese)
- http://www.angelfire.com/80s/j131atari/
- http://raster.infos.cz/atari/hw/sio2pc.htm (Radek Sterba)
- http://preview.tinyurl.com/y8p2ktwb (Vladimir Tichy)
- Atarimax Universal SIO2PC/ProSystem interface, RS-232/Serial versions
  http://www.atarimax.com/sio2pc/documentation/ Atarimax (Steven J. Tucker)
- http://www.mega-hz.de/Angebote/SIO2PC/SIO2PC.html (Wolfram Fischer (mega-Hz))
- http://www.asselheim.de/atari/sio-pc.htm (Frank Heuser)
- http://atari.myftp.org/atari8bit/sio2pc/sio2pc.html (tOri)

SIO2PC cable/interface designs and sources, USB interface:

- Atarimax Universal SIO2PC/ProSystem interface, USB versions
  http://www.atarimax.com/sio2pc/documentation/ Atarimax (Steven J. Tucker)
- 10502PC / SIO2PC-USB, Przemyslaw Krawczyk (Lotharek)
  https://lotharek.pl/productdetail.php?id=157
  https://retrolemon.co.uk/12-atari
- https://13leader.net/download/SIO2PC_Build_Instructions.pdf

800XL DJ, by Kolja 'joust' Koischwitz & Christian 'chrisker' Krueger, 1994

- Hardware component: "SIO2ST" cable (or SIO2PC cable)
- Atari ST software simulates an Atari disk drive and uses disk images (.DI extension) to load programs.
- 800XLDJF.APP is for Falcon ; 800XLDJ.APP is for ST
- More info:
  http://www.gooddealgames.com/articles/Atari_800XLDJ.htm
  http://www.umich.edu/~archive/atari/Emulators/800xldj.lzh

Atari Peripheral Emulator (APE), by Atarimax (Steven J. Tucker), 1995/2007

APE for DOS developed 1995-1998 (v.1.18 package released 2001)
APE for Windows, 2000-2007, v.3.0.2 released 2007
Hardware component: APE / SIO2PC Interface Cable

- Emulate up to 8 Hard Drives & Floppy Drives
- Single, Double, Quad, or 1050 Enhanced Density for any floppy drive
- Disk images of up to 16 MiB in size, up to 8 hard drives at once
- High Speed SIO: US Doubler compatible/UltraSpeed capable, XF551 high speed, Happy compatible/Warp Speed capable, APE+ Warp Speed I/O (3x)
- Load EXE files directly from your PC Hard Drive
- PC Mirror drive gives access to files on your PC hard drive & MSDOS filesystem with any DOS and at all SIO speeds, including APE+ 3X SIO
- Registered users may write files, as well as read them from the PC mirror
- APE ProSystem support

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- Supports the .ATR and .PRO Atari disk image file formats on the PC
- Full cooperation with real SIO devices
- APETIME.COM - Downloads the PC time to the Atari and updates the SpartaDOS clock

http://www.atarimax.com/

Floppy EMULator, by Pavel Machek, 1997

Turn your Linux machine into the Atari computer's floppy drive.

- Hardware component: SIO2PC cable
- Writes are done, but not saved back to files.
- Only 90K .ATR files are supported, only D1: supported.
- "This is really alpha."

http://atrey.karlin.mff.cuni.cz/~pavel/atari/

SIO2Linux, by Preston Crow, 1998/2010

Turn your Linux machine into the Atari computer's floppy drive.

- Based on Floppy EMULator by Pavel Machek
- Hardware component: SIO2PC cable
- No kernel modules.
  Unlike the AtariSIO project, this is just a simple user-space program that uses a serial port device.
- Create new dynamically sized images
  Each image starts as a 3-sector image file, but grows to accommodate the highest-numbered sector written.
- Mount your native file system as an Atari disk
  It's read-only for now, and it doesn't support subdirectories, but each file is mapped to a different starting sector, and as that sector is read, it automatically maps in the rest of the file.
- Supports .ATR and .XFD disk image files

http://www.crowcastle.net/preston/atari/

Atari810, by Dan Vernon, 2001/2003

Emulate an Atari 8-bit floppy drive or hard disk on your PC.

- Hardware component: SIO2PC cable
- A PC, connected to the Atari via a serial port, appears to be a giant Atari disk drive, or rather, up to eight disk drives.
- Supports .ATR format files

http://retrobits.net/

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atariserver module of AtariSIO package, by Matthias Reichl, 2002-
An SIO-server for Linux (like SIO2PC or APE for MSDOS-machines). Requires a 2.2, 2.4, 2.6 or 3.x series Linux kernel (with enabled module support) and a serial port with a 16550 or 16C950 compatible chip.

- Hardware component: SIO2PC (except early two-chip design), 1050-2-PC, or APE ProSystem cable
- Supports several SIO speeds:
  - Standard 19,200 bit/s
  - 38,400 bit/s in XF551 compatibility mode
  - 57,600 bit/s
  - 57,600 bit/s with short pauses between bytes
- Virtual drive support (somewhat similar to the "PC mirror" feature of APE). Directly access files on your hard disk (without first creating an ATR image) and also store new files on your hard disk by simply writing to a virtual drive.
- Disk image file formats supported: .ATR/.DCM/.DI/.XFD

http://www.horus.com/~hias/atari/

VAPI2SIO, by Jorge Cwik, 2005
Vapi2sio is a mini SIO2PC/APE Windows program for running VAPI (.ATX) images under real Atari hardware.

- Hardware component: SIO2PC cable

http://vapi.fxatari.com

Multi-platform Distributive Operating System Professional for Atari, by Krishna Software (Krishnasoft), 2005/2006
MPDOS Professional for Atari Features:

- Cable connects between a PC parallel port (DB25 connector) and one or two Atari computer controller jacks.
- Simulates up to 4 Atari disk drives (D1:, D2:, D3:, D4:)
- Simulates Atari cassette player (C:)
- Includes easy to use parallel port cable (plug and play)
- Hardware level simulation (no drivers required, except for keyboard)
- Supports PC video overlay window
- KDOS4 – a fast binary file uploader
- Multimedia CDROM included (runs on PC and Atari using distributive programming)
- Simple GUI interface for simulating peripherals, compiling, and uploading
- On-line 100+ page manual with technical and general information

http://www.krishnasoft.com/sps.htm

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SIO2BSD, by Konrad M. Kokoszkiewicz, 2005/2012
A program that handles the SIO2PC cable or SIO2BT (Bluetooth) under: FreeBSD, Linux, MacOS X (preferably FreeBSD).

- Supported baud rates: 19,200 bit/s, 38,400 bit/s, 57,600 bit/s
- Configurable POKEY clock frequency
- Attach up to 15 disk images
- Supports the .ATR disk image file format
- PCLink server (DOS2DOS protocol) gives supporting software for the Atari (SpartaDOS X 4.4 with Toolkit, Ultimate 1MB firmware, Incognito firmware) direct read/write access to the server's filesystem.

http://drac030.krap.pl/en-inne-pliki.php
http://drac030.krap.pl/pl-inne-pliki.php

Sio2OSX, by Mark Grebe, 2006/2009
Allows the Atari computer to use an OSX based Macintosh as a disk drive or a cassette drive.

- Requires OS X 10.3.9 or higher, and a G4 or Intel processor or higher
- Hardware component: SIO2PC cable
- USB serial adapter with complete RS-232 hardware signal and driver support required.
  - Recommended from USBGear: http://www.usbgear.com/USBG-232MINI.html
    Corresponding drivers: http://www.ftdichip.com/Drivers/VCP.htm
- Supported disk image file types include VAPI (.ATX) and .PRO

http://www.atarimac.com/sio2osx.php

SIO Server, by mellis / Ellis Softworks, 2009
Allows the Atari computer to use up to four virtual disk drive devices located on a Mac OS X based computer, connected via an SIO2PC cable by way of a USB-to-RS-232 adapter.

- Supported image and file types: .ATR, .EXE, .XEX

AspeQt - Atari Peripheral Emulator - A8W Edition, Ray Ataergin, 2012-
A8W Edition is written for Windows and Ubuntu platforms in mind.

- Starting with v1.01 this branch of AspeQt will now be identified as "AspeQt vx.xx - A8W Edition" as there are now other forks and branches available from various other sources.
- Credits: Original code up to version 0.6.0 Copyright 2009 by Fatih Aygun.
  Updates since v0.6.0 Copyright 2012 by Ray Ataergin.
- Supports .ATR, .XFD, and .PRO formats
- Emulates 14 disk drives, labeled D1 through DN
- Can run Atari executable files
- Playback cassette images in .CAS format

https://www.facebook.com/AspeQt.Atari/
https://github.com/atari8warez/AspeQt
https://drive.google.com/drive/folders/1TBtwjdnZS1MjnBos4BjvR0ngwQ9K6-Jn

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SIO2BT Android App, by Marcin Sochacki (Montezuma), 2014-2019
Requires a Bluetooth hardware extension for the Atari (HC-06 Transceiver), specifically the SIO2BT hardware project or compatible, which is described elsewhere in this FAQ list.

- The device name has to start with "SIO2BT" or with "ATARI".
- Emulates up to 4 floppy disks
  - Can select disk images (*.ATR) and executable files (*.XEX, *.COM, *.EXE)
  - A "long touch" on an executable allows you to choose the XEX loader address (default value is $700).
  - Write protection mode (R/RW) for a disk image can be set with a "long touch", too.
  - The emulated disks (unless write protected) can be modified (SIO commands: format, write sector, etc. are supported).
- SIO Networking Device ($4E) - TCP/IP stack
- SIO Smart Device ($45)
  - Get Time / APETIME
  - URL Submission

AspeQt Atari Serial Peripheral Emulator for Android, 2015-2018
AspeQt emulates Atari SIO peripherals and in that respect it's similar to programs like APE and Atari810. On Android it works with two types of serial interfaces: SIO2PC-USB through an FTDI adapter (full USB OTG support is required for it to work), or SIO2BT by means of a SIO2BT dongle and this one should be supported by the majority of modern mobile devices.

SIO2PC-USB requirements:

- Android device with USB Host Support.
- OTG cable.
- SIO2PC-USB converter, such as https://lotharek.pl/productdetail.php?id=108
- Android minimum API >=16 which is 4.1 (JellyBean).
- No root necessary.
- No drivers necessary. [usb-serial-for-android] (https://github.com/greblus/usb-serial-for-android) Java driver is included.

SIO2BT requirements:

- Android device with BlueTooth adapter
- Android minimum API >=16 which is 4.1 (JellyBean).

https://github.com/greblus/aspeqt
https://play.google.com/store/apps/details?id=org.qtproject.example.AspeQt

RespeQt, Atari Serial Peripheral Emulator for Qt, 2015-
RespeQt emulates Atari SIO peripherals when connected to an Atari 8-bit computer with an SIO2PC cable. In that respect it's similar to programs like APE, Atari810, and AspeQt.

- Credits: Fatih Aygun (AspeQt to 2009), Ray Ataergin (AspeQt to 2012), Joseph Zatarski, DrVenkman, TheMontezuma, Jochen Schaefer, blind, ebiguy
- Qt based GUI with drag and drop support
- Cross-platform. (Windows, Linux, OSX)
- 15 disk drive emulation. (Drives 9-15 are only supported by SpartaDOS X)
- Cassette image playback

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- Folders can be mounted as simulated DOS 2.0S disks
  (Read-only, now with SDX compatibility, and bootable)
- Atari executables can be booted directly, optionally with high speed
- Contents of image files can be viewed / changed
- RespeQt Client module RCL.COM. Runs on the Atari and is used to get/set Date/Time on the Atari plus a variety of other remote tasks.
- APETIME client support
- Up to 6x SIO speed and more if the serial port adaptor supports it (FTDI chip based cables are recommanded)
- Multi-session support
- PCLink server (DOS2DOS protocol) gives supporting software for the Atari (SpartaDOS X 4.4 with Toolkit, Ultimate 1MB firmware, Incognito firmware) direct read/write access to the server's filesystem
- PRO and ATX images support in read/write mode with accurate (I hope so) protection emulation
- Spy mode to display data exchanged with Atari
- Happy 810 REV. 5 and Happy 1050 REV. 7 emulation to read/write real floppy disks from/to images
- Chip 810 and Super Archiver 1050 emulation to read/write real floppy disks from/to images
- Automatic Translator activation when OS-B is detected in the filename in drive D1:
- Favorite tool disk accessible in one click in drive D1:

https://github.com/RespeQt

AspeQt, Atari Serial Peripheral Emulator for Qt, 13L fork, 2021-

AspeQt-2k22 with 8Bit Cartridge emulates Atari SIO peripherals when connected to an Atari 8-bit computer with an SIO2PC cable.

- Credits:
  Fatih Aygun (to 2009),
  Ray Ataergin (to 2012),
  The 13th Leader (Paul Jones) (2021-present)
- Cross-platform GUI with drag and drop support
- Atari Cartridge images to control disk functions
- 15 emulated disk drives with support for 512 bytes per sector disk images
- High speed operation up to 6 times faster than the normal speed, when using compatible Atari OS / DOS
- Ability to use PC folders as emulated disks
- Disk image explorer for viewing and modifying disk image contents
- Ability to run Atari executables directly without using disc images and Doses
- Cassette image playback with custom baud rate
- Ability to save and restore AspeQt sessions with its UI settings.
- Normal and mini UI modes

https://13leader.net/#aspeqt

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3.4.2) How can my Atari use a TNFS networked file server?

TNFS (Tiny Network FileSystem) is a communication protocol developed by Dylan Smith around 2010. It was developed to allow a Sinclair ZX Spectrum computer with Spectranet (Ethernet interface) to access files on a TNFS file server over the Internet.

Atari Fujinet device developers have incorporated TNFS support into FujiNet.

FujiNet tnfsd sources:
https://github.com/FujiNetWIFI/spectranet/tree/master/tnfs/tnfsd

Pre-compiled Windows, Linux, and Rasberry Pi binaries for the FujiNet TNFSD server are available at https://fujinet.online/download/

A list of active public FujiNet TNFS servers is kept at:
https://atari8bit.net/projects/software/fujinet-server-status/

FujiNet, by Thomas Cherryhomes and others, 2019-

- MicroSD socket for storing disk images and/or cassette images
- Connectivity: Built-in SIO connector
- SIO port for daisy chain
- Emulated D: (Disk) device
  Load floppy disk images from onboard MicroSD
  Supports ATR, ATX, and XEX formats
- Emulated C: (Cassette) device
  Load CAS files from onboard MicroSD

https://fujinet.online/

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Chapter 4

Printers

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4.1) What are the Atari 820, 822, and 825 Printers?

The following printers were produced by Atari and styled to match the 400/800 computers.

4.1.1) Atari 820 Printer

- 40-column dot matrix impact printer
- 5x7 dot matrix
- 40 characters per line, upper- & lower-case alpha
- Horizontal and vertical alphanumeric characters
- 6507 microprocessor (MOS Technology MCS6507 or equivalent), C010745
- 6532 PIA (MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent), C010750
- 2 KiB ROM
- 40 characters per second
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P: and P1:
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- Included: bond paper roll, paper mandrel, ribbon
- Power: Requires 120V AC (North American household standard)
- Power usage: 18W
- Made in USA by Atari
- Industrial design (case): Roy Nishi and Russell W. Farnell
- Pre-production units: Atari fuji logo includes "Atari", outline "Atari" label, solid "820" label
- Manual: Atari 820 Printer Operator's Manual C014762
- Technical manuals:
  - Atari 820 40 Column Printer Service Manual
    - FS015893 REV. 1 January, 1980
  - Atari 820 40 Column Printer Field Service Manual
    - FD100048 July, 1981 © 1982
- Sold separately:
  - Atari 820 Paper Roll C014062
    - = Standard roll paper/adding machine paper, width = 3 7/8 inches
  - Atari 820 Mandrel C014853
  - Atari 820 Ribbon C014854
    - = Addressograph/Multigraph (AM) part no. 116-2395-366
      (also used in Eaton LRC 7000)

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4.1.2) Atari 822 Thermal Printer

- 37 characters per second
- 10 characters per inch (cpi)
- 40 characters per line, upper/lower case and point graphics
- 5x7 dot matrix
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P: and P1:
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- Included: One roll of white thermal paper (installed in printer), one pair of spring-loaded paper bearings (installed in printer)
- Power: Requires 9V AC as supplied by the Atari CA014748 power adapter or equivalent (such as the Atari CA017964)
- Power usage: 18W
- Print mechanism: Trendcom 100
- Made in USA by Trendcom for Atari
- Manual: Atari 822 Thermal Printer Operator's Manual C015954
- Sold separately:
  - Atari 822 Thermal Printer Paper (2 rolls, 80 feet; 24.4 m each) C016345
    - = 4 7/16 inch standard white thermal paper
  - Atari 822 Paper Roll Bearings (one pair) C016005

4.1.3) Atari 825 80-Column Printer

- Sold by Atari in the USA only
- Dot matrix impact printer
- 3 character sets:
  - Monospaced 7x8 dot matrix at 10 cpi (default)
  - Monospaced condensed at 16.7 cpi
  - Proportionately spaced Nx9 dot matrix at avg. of 14 cpi (N=6..18)
- Each character set with 96 standard ASCII characters
- All characters can be elongated (printer double width)
- Characters per line: 80 at 10 cpi; 132 at 16.7 cpi
- Speed: 50 cps at 10 cpi; 83 cps at 16.7 cpi; 79 cps avg. proportional
- Print buffer: 1,200 dot columns
- Controls along bottom of front of printer, left to right:
  - Online/Local
  - Paper Rev<->Fwd
  - Power Off On
- Paper: roll (3.5" to 8.5" wide), fanfold (9" pin-to-pin, 9.5" wide overall), or cut sheets (to 8.5" wide)
- Requires Atari 850 Interface Module or equivalent to connect to the Atari computer

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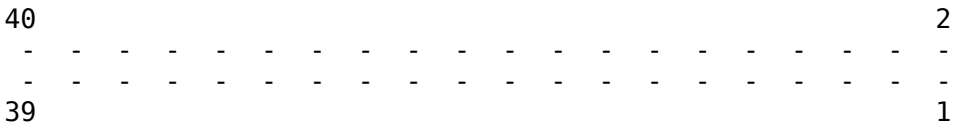
- Connectivity: 40 pin PCB edge
  - Pinout:



1.	/Data Strobe	**2.**	Twisted Pair Ground (/Data Strobe)
3.	Data Bit 1	**4.**	Twisted Pair Ground (Data Bit 1)
5.	Data Bit 2	**6.**	Twisted Pair Ground (Data Bit 2)
7.	Data Bit 3	**8.**	Twisted Pair Ground (Data Bit 3)
9.	Data Bit 4	**10.**	Twisted Pair Ground (Data Bit 4)
11.	Data Bit 5	**12.**	Twisted Pair Ground (Data Bit 5)
13.	Data Bit 6	**14.**	Twisted Pair Ground (Data Bit 6)
15.	Data Bit 7	**16.**	Twisted Pair Ground (Data Bit 7)
17.	Data Bit 8	**18.**	Twisted Pair Ground (Data Bit 8)
19.	/Acknowledge	**20.**	Twisted Pair Ground (/Acknowledge)
21.	Busy	**22.**	Twisted Pair Ground (Busy)
23.	Always Logic 0 (Ground)	**24.**	Twisted Pair Ground (Demand)
25.	On-Line	**26.**	Not Used
27.	Signal Ground	**28.**	Always Logic 1
29.	Not Used	**30.**	Ground
31.	Signal Ground	**32.**	+-+ Pin 32 jumpered to Pin 34 for
33.	Chassis Ground	**34.**	+-+ sensing printer connected
35.	+5V Signal (Power Supply On)	**36.**	Demand
37.	+17V	**38.**	Not Used
39.	+17V	**40.**	Not Used

- Shipped with an Atari CX86 Printer Cable (825 to 850 parallel)
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P:, P1:, and P2:
- Power: Requires 120V AC (North American household standard)
- Power usage: 100W
- Made in USA for Atari by Centronics, based on the Centronics Model 737-1
- Manual: Atari 825 80-Column Printer Operator's Manual C015506
- Technical manual: 825 Printer Field Service Manual
- Sold separately:
  - Atari 825 Printer Ribbon (3 per box) CA016087
    - = Zip-Pack mobius loop (Centronics Part No. 63701468-6003)
  - Atari 825 Printer Paper (Roll Paper) C016233
  - Atari 825 Paper Mandrel C016229
  - Atari 825 Paper Roll Support C016230
  - Atari 825 Paper Deflector C016231

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4.2) What are the Atari 1020, 1025, 1027, and 1029 Printers?

The following printers were produced by Atari and styled to match the XL series computers.

4.2.1) Atari 1020 Color Printer

- Type: Color printer/plotter
- Text Mode Operations:
  - Set Character Width. One of:
    - 10 characters per inch (cpi) (40 columns per line, regular/default)
    - 5 cpi (20 columns per line)
    - 20 cpi (80 columns per line)
  - Set Character Scale
    - 64 character sizes available
  - International Characters
- Graphics Mode Operations: Home, Change Color, Line Type, Draw, Initialize, Relative Draw, Move, Relative Move, Axis Drawing, Alpha Rotate
- Printing speed: 10 characters per second (10 cpi mode)
- Paper type: Standard roll paper (40-column width)
- 4-color print head
- Prints and plots vertically and horizontally
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P:, P1:, and P4:
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- Included:
  - 2 pens each: red, blue, green, black
  - TX9032 Graphics demonstration/Joystick Sketchpad Program Cassette
    - Side 1: Joystick Sketchpad (requires Atari BASIC): program to plot directly onto printer using a joystick
    - Side 2: Six sample graphics programs (all require Atari BASIC):

Program	Counter Number
SAMPLE	002
GRAPH	047
RANDOM	017
COLOR	061
TRANGLE	032
TRIANG2	070

- Manuals:
  - The Atari 1020 Color Printer Owner's Guide C061368
  - Joystick Sketchpad Instruction Guide C061578
- Self Test: On power-up the 1020 automatically prints a test pattern consisting of four squares, one for each of the four pens.

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- Technical manual: Atari 1020 Color Printer Field Service Manual FD100288
- Power: Requires 9V AC as supplied by the Atari CA014748 power adapter or equivalent (such as the Atari CA017964)
- Power usage: 15W
- Print mechanism: ALPS
  - Also found in: Commodore 1520, Tandy Radio Shack CGP-115, Sharp CE-150, Mattel Aquarius 4615, Texas Instruments HX-1000
- Made in Japan
- Sold separately:
  - Atari 1020 Standard Replacement Pens C061420-01 / BX4204 (4 pens; 1 each of: red, green, blue, black)
  - Atari 1020 Black Replacement Pens C061420-03 / BX4206 (4 pens)
  - Atari 1020 Replacement Roll Paper C061533 / BX4207 (2 rolls)

4.2.2) Atari 1025 80-Column Printer

- Type: 5 x 7 dot matrix impact
- Formats
  - Regular: 10 cpi (80 columns)
  - Extended: 5 cpi (40 columns)
  - Condensed: 16.7 cpi (132 columns)
- Printing Speed: 40 characters per second (10 cpi format)
- Paper type: computer fanfold, roll, or single-sheet
- Online switch
- Buffer: 132 characters at 16.7 cpi, 80 characters at 10 cpi
- European Character Set supported
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P:, P1:, and P3:
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- Intel 8051 microcontroller, FC100387
- 8155 RAM I/O: Intel 8155 2048-bit static MOS RAM with I/O ports and timer, FC100389
- Manual: The Atari 1025 Printer Owner's Guide C060505
- Technical manual: Atari 1025 Printer Field Service Manual FD100290
- Self Test mode: Enabled by moving an internal shorting jumper plug
- Two versions were released:
  1. North American version
     Power: Requires 120V AC (North American household standard)
     Current rating: 0.8A.
     Power usage: 100W
  2. European version
     Power: Requires 600mA at 29V AC and 1A at 8.6V AC, both of which are supplied by the Atari 14750 power adapter or equivalent
- The 1025 was not released in the UK
- Print mechanism: Okidata ML80 / Microline 80
- Made in Japan
- Sold separately: Atari 1025 80-Column Printer Ribbon C061419 / BX4202

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4.2.3) Atari 1027 Letter Quality Printer

- Type: Letter quality type wheel impact
- Format: Prestige Elite 12 pitch = 12 cpi (80 columns)
- Printing speed: 20 characters per second (cps) (best) / 10 cps (average)
- Paper type: Single-sheet (no roll paper, no label stock)
- Bi-directional printing
- Underlining capability
- International characters
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P:, P1:, and P5:
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- Intel 8049 microcontroller, FC100619
- Manual: The Atari 1027 Letter Quality Printer Owner's Guide C061387
- Technical manual: Atari 1027 Printer Field Service Manual FD100670 REV. 01 October 1983
- Power: Requires 9-9.5V AC as supplied by the Atari C061636 or C061605 power adapters or equivalent
  - Standard power adapter for 240V AC (UK) details needed, possible example: https://collections.museumsvictoria.com.au/items/406491
- Print mechanism: Mannesmann Tally Riteman LQ
- Remarkably, there are possibly NO working 1027 Printers today because it seems all 1027 print heads have deteriorated due to age.
- Made in Japan
- Sold separately: Atari 1027 Replacement Ink Roller CA061649 / BX4212
- Also included in KX7110 AtariWriter System All-In-One-Pak: 600XL + 1027 + AtariWriter + paper stock + One Way to Write Anything book.
  http://www.rhod.fr/ataripics/hardwarewriterpackkompleet.jpg

4.2.4) Atari 1029 Programmable Printer

- Printing method: 5 X 7 dot matrix impact
- Formats:
  - Regular width (10 cpi, 80 columns across)
  - Elongated (5 cpi, 40 columns across)
- Line spacing:
  - 6 lines per inch (regular width and elongated formats)
  - 9 lines per inch (graphics mode)
- Printing speed: 50 characters per second (regular width format)
- Character set: 132 characters (international and non-international)
- Feed mechanism:
  - Friction feed and pin (tractor) feed
  - Friction feed using platen knob
- Manual Feed: Forward and reverse using platen knob

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- Paper type:
  - Computer fanfold (4.5 to 9.5 inches wide)
  - Single-sheet (8.5 inches wide)
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P:, P1:, and P6:
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- Manual: Atari 1029 Programmable Printer C025907
- Self Test: Activated or de-activated using the Self Test switch on the back
- Two versions were released:
  1. Power: Requires 120V AC (North American household standard)
     Released in Canada but not released in the US
  2. Power: Requires 220-240V AC (European/UK mains standards)
     Current rating: 0.15A
- Print mechanism: Seikosha GP-500 ; clone of Seikosha GP-500AT
- Made in Japan
- Info sources:
  http://www.cpcwiki.eu/index.php/Amstrad_DMP1_printer
  http://www.strotmann.de/~cas/Infothek/AtariTenZwentynine/Atari1029Manual.pdf
- Industrial design (case): **Tom Palecki**
- Sold separately:
  - Atari 1029 Dot Matrix Printer Inked Ribbon For 10 Inch Model C070028

4.3) What are the Atari XMM801 and XDM121 Printers?

The following printers were produced by Atari and styled to match the XE series computers.

4.3.1) Atari XMM801 Dot-Matrix Graphics Printer

- Dot matrix impact printer; 8 pin impact head
- Character matrix: 8 dots high by 9 dots wide
- Character mode, Non-International: 96 ASCII characters
- Character mode, International: 91 ASCII and 36 international characters
- Fonts

Horizontal Pitches	Characters per Inch	Max. Characters per Line
Pica	10	80
Double Width Pica	5	40
Elite	12	96
Double Width Elite	6	48
Condensed	16.5	132
Double Width Condensed	8.25	66

- Proportional, bold, double strike, subscripts, superscripts, underlining

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- Graphics
  Normal density: 60 dots per inch / 480 dots per line
  High density: 120 dots per inch / 960 dots per line

- Speed: 80 characters per second (cps) at 10 characters per inch
- Buffer: 80 bytes
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P:, P1:, and P7:
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- NEC uPD7811 single-chip microcomputer
- Included:
  - Wire paper feed Rack
  - Multi Strike black Ribbon Cassette
- Manual: Atari XMM801 Dot-Matrix Graphics Printer Owner's Manual C025959
- Technical manual: Atari XMM801 Field Service Manual C070435 (1985)
- Self Test: Activated by turning on the printer while also holding down the Line Feed button on the control panel. Deactivated by turning the printer off.
- Power: Requires 120V AC (North American household standard). Current rating: 1A
- Power consumption, Standing: 100 mA ; Operating: 300-600 mA
- Planned but unreleased versions: 220V AC (Europe), 240V AC (UK)
  - Prototype 240V AC units exist, see:
    https://www.page6.org/archive/issue_26/page_08.htm
- Paper: Fanfold pin-feed or single sheets, 4 to 10 inches wide
- Friction feed or pin feed
- Ribbon:
  - Mannesmann Tally MT-80/MT-80 Plus/MT-81/SP-80/Spirit 80,
  - Commodore 1526/MPS802/4023,
  - Shinwa CP80
- Made in Japan

4.3.2) Atari XDM121 Letter-Quality Daisy-Wheel Printer

- Daisy wheel impact printer
- Underlining, subscripts, superscripts
- Courier 10 Print Wheel (10 pitch = 10 cpi), 80 characters per line
- 96 characters, including International Character Set support
- Speed: 12 characters per second
- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P:, P1:, and P8:
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
- Included: Multi Strike Black Ribbon Cassette
- Manual: Atari XDM121 Letter-Quality Daisy-Wheel Printer Owner's Manual C026323
- Self Test: Activated by turning on the printer while also holding down the Line Feed button on the control panel. Deactivated by turning the printer off.
- Power: Requires 120V AC (North American household standard). Current rating: 0.7A

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- Power usage: Operating: 55W
- Paper: Single sheets, up to 11.8 inches wide
- Planned but unreleased versions: 100V AC (Japan), 220V AC (Europe), 240V AC (UK)
- Sold separately: (Were any of these released?)
  - Pin-feed tractor feeder
  - Single-sheet feeder
  - Alternate daisy wheel: 12-pitch (12 cpi), 96 characters per line
- Ribbon: Silver Reed CF130, Olivetti ET201, ET221, Nu-Kote NK136
- Made in Japan

4.4) What were the Atari XTM201 and XTC201 Printers?

Introduced in January 1985, the **Atari XTM201 Printer** was a monochrome thermal printer that would accept single sheets of thermal paper or plain paper (Xerox 4024 or equivalent). It would have both ribbon-end and paper-out sensors, and the normal-density graphics mode would be Epson-compatible. Speed: 20 characters per second. The XTM201 never shipped, and no more than a handful of prototype units may exist.

Introduced in January 1985, the **Atari XTC201 Printer** was a color thermal printer, with support for monochrome (black) printing as well, that would accept single sheets of thermal paper or plain paper (Xerox 4024 or equivalent). It would have both ribbon-end and paper-out sensors, and the normal-density graphics mode would be Epson-compatible. Speed: 20 characters per second. The XTC201 never shipped, and no more than a handful of prototype units may exist.

4.5) What other printers were designed for my Atari?

This section should list all third-party printers that were designed with an Atari-specific interface.

These printers attach to the Atari via SIO, and are compatible with the P: device handler of the Atari OS.

Alphacom 42
+ Alphacom 42 Intelligent Interface Cable for Atari
- Must be at end of SIO chain
- Thermal printer
- Friction feed
- 40 columns / 4 1/2" max paper width
- 80 cps / 2 lines per second
- 10 characters per inch (cpi)
- One line buffer
- Graphics and full ATASCII character set support

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Alphacom 81 80-Column Printer (1983)
+ Alphacom 81 Intelligent Interface Cable for Atari

- Must be at end of SIO chain
- Thermal printer
- Friction feed
- 80 columns / 8.75" max paper width
- 100 characters per second
- 10 cpi
- One line buffer
- Graphics and full ATASCII character set support

Comrex ComRiter CR-220AT Dot Matrix Printer (1985) (Comrex = Epson)

- Seikosha GP-500AT (and Atari 1029) clone
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
- Dot matrix impact printer
- 80 columns, 50 cps
- 5x7 character set
- 5 or 10 cpi
- 6 or 9 lines per inch
- Standard and international character sets
- Graphics: 60 dots per inch (480 lines)

Epson HomeWriter-10 / GX-80
+ Printer Interface Cartridge (PIC or P.I.C.) for the Atari (Epson#8692 ?)

- PIC emulates the Atari 1025 (no graphics)
- Dot matrix impact printer
- Draft quality printing at 100 cps and near letter quality at 16 cps

Epson Spectrum LX-90
+ Printer Interface Cartridge (PIC or P.I.C.) for the Atari (Epson#8692 ?)

- PIC emulates the Atari 1025 (no graphics)
  (Printer's native graphics capabilities unavailable via Atari PIC)
- Dot matrix impact printer
- Draft quality printing at 100 cps and near letter quality at 16 cps

General Electric TXP-1000 / Letter Quality Printer (GE 3-8100) (GE 8100)
+ GE Model 3-8150A Interface for operating GE 3-8100 Printer with Atari and Commodore computers

- Thermal printer (not dot matrix as reported in Antic June 1985)
- 50 cps "draft" mode, 25 cps "normal" / "letter quality" mode

http://www.classiccomputer.de/com/getxp1000.jpg

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Okidata Okimate 10 Personal Color Printer
+ Plug 'n Print Interface for Atari

- 2 Atari SIO ports for direct connection to Atari computers
- Thermal printer
- Single-sheet or tractor-feed paper
- 26 colors
- 240 words per minute

Seikosha GP-100AT Economical Printer (AT-100) (1983)

- Marketed in the US by Axiom
- First Atari-specific 3rd party printer
- Built-in Atari interface, cable and connector; 2nd SIO port for daisy chain
- Dot matrix impact printer, 80 columns, 5x7 character set
- 50 cps (most units) or 30 cps (early units)
- Screen dump programs included
- Sold separately: GraphAX HiRes Dump (prints .MIC Micro-Painter files)

Seikosha GP-500AT

- 2 Atari SIO ports for direct connection to Atari computers
- Dot matrix impact printer
- 80 columns, 50 cps
- 5x7 character set
- 5 or 10 cpi
- 6 or 9 lines per inch
- Standard and international character sets
- Graphics: 60 dots per inch (480 lines)
- Sold widely in Poland
- Also sold as the Comrex CR-220AT and as the Atari 1029

Seikosha GP-550AT Dual Mode Printer (AT-550)

- Marketed in the US by Axiom
- Built-in Atari interface, cable and connector; 2nd SIO port for daisy chain
- Dot matrix impact printer
- Near letter quality and draft modes
- 86 cps (draft mode); 43 cps (nlq mode)
- Screen dump programs included
- Sold separately: GraphAX HiRes Dump (prints .MIC Micro-Painter files)

Seikosha GP-700AT Full Color Printer (AT-700)

- Marketed in the US by Axiom
- Built-in Atari interface, cable and connector; 2nd SIO port for daisy chain
- Dot matrix impact printer

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- Pin feed
- 4 hammer print heads, 4-color ribbon cartridge
- 25 colors
- 30 cps or 50 cps (different versions produced???)
- 5 cpi - 10 cpi
- One line buffer
- 80 columns / 9.5" max paper width
- Screen dump programs included
- Sold separately: GraphAX HiRes Dump (prints .MIC Micro-Painter files)

4.6) How can I use a Centronics or IBM parallel interface printer?

What is now known as IEEE 1284 originated as the "Parallel Interface Specification for Centronics Printers," a unidirectional 8-bit host-to-printer connection. This interface was introduced by Centronics Data Computer Corporation for a series of small serial-impact printers that began with 1970's Centronics Model 101. Centronics defined the interface timing and signals as well as the interface connector (at the printer), but not the host connector (at the computer). The Centronics parallel interface eventually became the primary interface used between most small computers and associated printers.

Even as Centronics themselves began utilizing alternative interface connectors on some of their own printers, the market success of 1980's Epson MX-80 helped the industry settle on Centronics' original choice of the 36-contact Amphenol 57-40360 (Micro-Ribbon brand) miniature-ribbon receptacle (female) as the standard interface connector found on parallel interface printers. The corresponding cable connector is the 36-contact Amphenol 57-30360 (Micro-Ribbon brand) miniature-ribbon plug (male). 36 contact miniature-ribbon connectors became known popularly as "Centronics" connectors; these are now known as the IEEE 1284-B Receptacle and Plug connectors.

IBM introduced the IBM PC in August 1981, with a Centronics-like Parallel Interface (with DB-25S connector), along with a series of Centronics-like parallel interface printers (with "Centronics" connector) starting with the IBM PC Graphics Printer (model 5152, a slightly-modified Epson MX-80). The Parallel Interface as implemented by IBM was compatible with a functional subset of the existing Centronics standard, but more complete implementations of the IBM and Centronics interfaces were not signal-compatible, and a new category of the "IBM" compatible printer was established. Market success of the IBM PC meant wide adoption of the IBM parallel interface standard. This included the DB-25S host connector, which is now also known as the IEEE 1284-A Receptacle.

Industry implementations of the Centronics/IBM parallel interface continued to vary until the 1994 publication and subsequent wide adoption of IEEE 1284, "IEEE Standard Signaling Method for a Bidirectional Parallel Peripheral Interface for Personal Computers." The current version is IEEE 1284-2000.

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The 8-bit Atari computer does not include a Centronics parallel output interface, but one may be added to the system. Atari provided the 850 Interface, and later the XEP80 Interface, for this purpose. Many 3rd party interfaces and other devices provide compatible interfaces.

The following should be a complete list of devices for the Atari providing the system with a Centronics parallel printer host interface. Interfaces connect to the Atari via SIO unless otherwise specified, and are compatible with the Atari 850 Printer port unless otherwise specified. The interface connector type is given if known.

72000 Centronics Printer Interface, by Stack Computer Services
- SIO cable to 36 contact miniature-ribbon plug

1050 Turbo (for Atari 1050), by Bernhard Engl for Gerald Engl Computertechnik
- Optional Centronics parallel printer interface - 36 pin PCB edge connector

Addcom Electronics Printer Interface (connector type????)

Amdek AMDC-II disk drive - DA-15S
- 2nd SIO port for daisy chain

Ape-Face 48P, by Digital Devices - 36 contact miniature-ribbon plug
- For the 400/800 (how is this????)

Ape-Face XLP, by Digital Devices - 36 contact miniature-ribbon plug
- For 400/800/XL/XE except 1200XL (draws power from SIO)

Ape-Face 12XLP, by Digital Devices - 36 contact miniature-ribbon plug
- Especially for 1200XL (uses external power supply)

Ape-Face XLP-S, by Digital Devices - 36 contact miniature-ribbon plug
- For 400/800/XL/XE except 1200XL (draws power from SIO)
- SIO port for daisy chain

Astra The "One" disk drive - DA-15S
- 2nd SIO port for daisy chain

Astra 1001 disk drive - DA-15S
- 2nd SIO port for daisy chain

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Atari 850 Interface Module - DA-15S
- Detailed elsewhere in this FAQ list
- Sold separately: CX86 Printer Cable, CA015900-02 (included with 825) (DA-15P to 20-pin dual Edge-on)

Atari XEP80 Interface Module - DB-25S
- Connects to controller jack #1 or #2
- Supplied with replacement P: device handler on disk
- Detailed elsewhere in this FAQ list

ATR8000 by SWP
- Printer port: 34 pin PCB edge
- Print buffer: 4 KiB (16 KiB units) or 48 KiB (64 KiB units)
- 2nd SIO port for daisy chain

AutoPrint Microconnection, by The Microperipheral Corp. (1983)
- Printer port - "Centronics" parallel output interface
- Connects via SIO, must be at end of SIO chain.
- Hardware ability to route incoming modem text directly to printer port

Black Box, by Computer Software Services (CSS)
- Parallel device, with connectors for both PBI and Cartridge + ECI
  - PBI Connector: 50 pin header; ribbon cable to PBI interface included
  - Cartridge + ECI connector: standard PCB edge
- Parallel Printer Port: 34 pin PCB edge
  - Definable as any of P1: - P8:
  - 64 KiB Printer spooler using XE memory or optional BB memory
  - Text or Graphics printer dump of most screens
- Black Box Enhancer (upgrade for older units; included with newer units):
  - Enhanced screen dump function

Blackthorn Printer Interface - 36 contact miniature-ribbon plug
- SIO port for daisy chain

California Microlink Corporation CMC Easy I/O (prototypes only?)
- For 800 only: plugs into 800 third (rear) RAM slot
- Two parallel 8-bit data ports - 26 pin header (2x 13)

California Microlink Corporation CMC LP/800 (prototypes only?)
- For 800 only: plugs into 800 third (rear) RAM slot
- Two parallel 8-bit data ports - 26 pin header (2x 13)

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CARD?/AT, by Cardco - SIO cable to 36 contact miniature-ribbon plug
Centronics Interface II, by Klaus Peters - 36 contact miniature-ribbon plug
- Based on the Compy-Shop Centronics-Druckerinterface (?)

Compu-Mate CM-1000 (1982) - Shipped?
- Automatic powerup compatibility with the Atari 825 on the parallel port

Compy-Shop Centronics-Druckerinterface - 36 contact miniature-ribbon plug
FCC Interface, by FCC Systems - SIO cable to 36 contact miniature-ribbon plug
Flop VD 40 F disk drive - DB-25S
- 2nd SIO port for daisy chain

Graphix AT, by Xetec
- SIO cable to interface with 36 contact miniature-ribbon plug
- Graphix mode (prints text and Atari ATASCII graphics) or transparent mode (prints text and passes control codes on to printer)
- Fully supported: Epson, Gemini, Okidata, Prowriter 8510/8023, Banana GX-100, Blue Chip Legend, Epson 132 column, daisy wheel (no graphics)

ICEPIC, by ICECo - joystick cable to 36 contact miniature-ribbon plug
- Supplied with replacement P: device handler, SIO simulator, and REBOOT program for software compatibility

Interfast-I, by Advanced Interface Devices (AID) - DA-15S
- Programmable, can translate ATASCII or any character set into graphics

KPI (K-Products Interface)
- Parallel device, connects to PBI
- Printer port: 40 pin PCB edge
  - Supplied with printer port software utilities

Macrotronics Parallel Printer Interface (1980)
- Interface connects to controller jacks #3 + #4
- One of four types of ribbon cable connects from interface to printer:
  - Type 1 – 20 pin header (2x10) (Trendcom 100 / 200)
  - Type 2 – 40 pin PCB edge (Atari 825 / Centronics 730 / 737 / 739)
  - Type 3 – 36 contact miniature-ribbon plug
  - Type 4 – DB-25S (IDS Paper Tiger 440 / 445)
- A4P/A8P Parallel Print Interface packages supplied with Parallel Print software (replacement P: device handler) (cassette + disk)

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- A4PG/A8PG Screen Print Interface packages supplied with Screen Print software (disk)
  - Earlier Screen Print software supports: Centronics 739, Trendom 200, IDS 440G / 445G, Epson/Graphtrax MX-70 / MX-80 / MX-100
  - Version 2.1 software additionally supports: Okidata/Okigraph, NEC 8023A
  - Later A4PG/A8PG packages also supplied with Parallel Print software

Mega Speedy (for the Atari 1050), by Guus Assmann & Matthias Reichl, 2014
- Centronics parallel printer interface - 26 pin header (2x 13)

Micro Mainframe MF-1681 disk drive
- Standard Centronics parallel printer port (34 pin PCB edge)
- 4 KiB print buffer, expandable to 38 KiB (16 KiB to 64 KiB drive RAM upgrade)

MicroPrint, by Microbits Peripheral Products
- SIO cable to 36 contact miniature-ribbon plug
- Later units produced by Supra

MPP-1100, by Microbits Peripheral Products - 36 contact miniature-ribbon plug
- Connects to controller jack #3, NTSC 400/800 only, supplied with required replacement OS ROM chip for Atari OS REV. A/NTSC chip C012499 (revised P: device handler)
- Acknowledged software incompatibilities:
  - Monkey Wrench II from Eastern House Software
  - Zaxxon from Datasoft (early release versions)
- Sold separately:
  - MPP-1102 Adapter Cable (40 pin PCB edge for Atari 825 or Centronics 737)
  - MPP-1104 REV. B Upgrade ROM set (for 400/800 with Atari OS REV. A/NTSC)

MPP-1150, by Microbits Peripheral Products - 36 contact miniature-ribbon plug
- SIO port for daisy chain
- Not for 1200XL (draws power from SIO)
- Later units produced by Supra

MPP-1151, by Microbits Peripheral Products - 36 contact miniature-ribbon plug
- SIO port for daisy chain
- Especially for 1200XL (uses external power supply)
- Later units produced by Supra

Multi I/O board (MIO) by ICD
- Parallel device, connects to PBI
  - ICD adapter for Cartridge + ECI provides two pass-through cartridge ports
- 256 KiB or 1 MiB RAM versions
- Printer port: DA-15S
  - Accessed as P1: or P2: with or without auto line feed
  - Use any amount of unit RAM as a printer spooler

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    - Pause/Resume, Repeat Copies, Clear

Multi I/O board (MIO) "new series" by Ken Jones / MEtalGuy66
- Parallel device, connects to PBI
- 1 MiB RAM
- Printer port: DB-25S
  - Accessed as P1: or P2: with or without auto line feed
  - Use any amount of unit RAM as a printer spooler
    - Pause/Resume, Repeat Copies, Clear
- Available: http://www.rasterline.com/

ParallAx-AT (AT-486), by Axiom - 36 contact miniature-ribbon plug

Percom AT88SPD (units marked AT88-S1PD or AT88-SPD)
- 34 pin header (2x17)
- 2nd SIO port for daisy chain

Portprint, by Computer Support (connector type????)
- Connects to controller jacks of any XL/XE computer
- Replacement P: device handler required

P:R: Connection, by ICD - DA-15S
- Built-in SIO cable
- SIO port for daisy chain

Printer Connection, by ICD - SIO cable to 36 contact miniature-ribbon plug
Printerface, by W.E. Electronics (W.E.E.) (connector type????)
- 36 contact miniature-ribbon plug (???? to be verified)
- Connects to a controller jack on the Atari
- Supplied with replacement P: device handler on cassette

PST-8B Parallel Printer Interface, by PS Technologies
- 36 contact miniature-ribbon plug
- Connects to a controller jack on the Atari
- Supplied with replacement P: device handler on disk
- For the XL series, included a replacement ROM operating system chip with a built-in translator
- For the 400/800 series, a revision B operating system chip was included

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Rambit PPP - Parallel Printer Port - 36 contact miniature-ribbon plug
- Connects to the Atari via PBI (600XL/800XL)

ROM-Wizard printer interface
- Connects to controller jacks 3+4 on the Atari 400/800
- Requires P: handler built into ROM-Wizard modified operating system
- https://archive.org/details/romwizardsummary

Spider disk drive - DA-15S and DB-25S dual printer ports
- 2nd SIO port for daisy chain

Supra Hard Disk Interface, by Supra
- Parallel device, connects to PBI
  - Sold separately: Supra XE-XL Buss adapter for Cartridge + ECI
    - Adapter includes pass-through cartridge port
- Printer port: 40 pin PCB edge
  - Supplied with printer port software utilities

TOMS printer interface - DB-25S (to verify)

TOMS 720C disk drive - DB-25S
- 2nd SIO port for daisy chain

TOMS 720CR disk drive - DB-25S
- 2nd SIO port for daisy chain

TOMS 360C disk drive - DB-25S (to verify)
- 2nd SIO port for daisy chain

TOMS 360CR disk drive - DB-25S (to verify)
- 2nd SIO port for daisy chain

Trak AT-D1 disk drive - 34 pin PCB edge
- 2nd SIO port for daisy chain
- 2 KiB print buffer
- Upgrade: 16 KiB print buffer

Trak AT-D2 disk drive - 34 pin PCB edge
- 2nd SIO port for daisy chain
- 2 KiB print buffer
- Upgrade: 16 KiB print buffer

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Trak AT-D4 disk drive - 34 pin PCB edge
- 2nd SIO port for daisy chain
- 4 KiB print buffer
- Upgrade: 16 KiB print buffer

TurboPrint/A, by Telesys - 36 contact miniature-ribbon plug
- TurboText page format controls (margins, page numbering)
- Explicit listing mode available where graphics/control characters are sent as 1 to 3 letter codes within brackets

TurboPrint/GTA, by Telesys - 36 contact miniature-ribbon plug
- TurboText page format controls (margins, page numbering)
- Graphics mode available for printing Atari graphics characters
- Optional plug-in TurboBuffer: B16 16 KiB or B32 32 KiB printer buffer

U-Print Model A, by Digial Devices - 36 contact miniature-ribbon plug
- SIO port for daisy chain
- Upgrade: 16 KiB buffer

U-Print Model A16, by Digial Devices - 36 contact miniature-ribbon plug
- SIO port for daisy chain
- 16 KiB buffer, Copy button, Reset (cancel) button
- Upgrade: to 32 KiB

U-Print Model A64, by Digial Devices - 36 contact miniature-ribbon plug
- SIO port for daisy chain
- 64 KiB buffer, Copy button, Reset (cancel) button

WW Interface 72000 Atari/Centr, by Wiesemann, Wuppertal
- SIO cable to 36 contact miniature-ribbon plug

Some of the most common Centronics type parallel interface printers used with the Atari included the Star Gemini 10X and SG-10, the C. Itoh ProWriter, and the Epson RX-80, FX-80, and MX-80.

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4.7) How can my Atari utilize my other computer's printer?

This section lists solutions that allow the Atari computer to utilize another computer's printer through Atari peripheral emulation.

The Atari and the other computer are either connected via a specialized cable, or perhaps by wireless SIO2BT Bluetooth connection.

ATARIBUS project by Dave Warker, 1982/1983
A hardware interface design and CP/M software package that links an Atari computer to CP/M compatible computers.

- Can intercept bus commands to the ATARI 'P:' or printer device and print them on the standard CP/M list device 'LST:'
- Can switch the printer device to the CP/M console screen
- Can strip off all the padded spaces after EOLs in printed data

http://www.filewatcher.com/m/ataribus.lbr.47616-0.html

The Critical Connection, by USS Enterprises (Vincent Cate), 1983/1984
A hardware interface and CP/M software package that links an Atari computer to CP/M compatible computers.

- Utilize the CP/M computer system's printer as an output device for the Atari

Two versions:

- The Critical Connection (original) for Atari 400/800 computers, 1983
- The Critical Connection XL for Atari XL/XE computers, 1984

SIO2PC, by Nick Kennedy, 1989/1998
SIO2PC is a hardware & software package interfacing the 8-bit Atari to PC compatible computers (DOS). The hardware is known as an SIO2PC Cable.

- Print-Thru captures Atari print-out and routes to PC's printer
- Please see another section of this FAQ list for SIO2PC cable/interface designs and sources

http://pages.suddenlink.net/wa5bdu/sio2pc.htm (Nick Kennedy)

Atari Peripheral Emulator (APE), by Atarimax (Steven J. Tucker)
APE for DOS developed 1995-1998 (v.1.18 package released 2001)
APE for Windows, 2000-2007, v.3.0.2 released 2007
Hardware component: APE / SIO2PC Interface Cable

- P: Printer Emulation
  - APE for DOS: Pass Atari print commands directly to your PC Printer, save the print data to a file, or use real Atari Printer
  - APE for Windows: Windows Printer Driver, Direct to Port, File, Print Monitor, Virtual 1020 Plotter, Virtual Epson MX-80, or Disabled (use real Atari printer)
- Full cooperation with real SIO devices

http://www.atarimax.com/

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atariserver module of AtariSIO package, by Matthias Reichl, 2002-
An SIO-server for Linux (like SIO2PC or APE for MSDOS-machines). Requires a 2.2, 2.4, 2.6 or 3.x series Linux kernel (with enabled module support) and a serial port with a 16550 or 16C950 compatible chip.

- Hardware component: SIO2PC (except early two-chip design), 1050-2-PC, or APE ProSystem cable.
- Printer data can either be saved to a file or be sent to an external program (like lpr).
- ATASCII EOL character (155) conversion support: no conversion, LF, or CR+LF

http://www.horus.com/~hias/atari/

Sio2OSX, by Mark Grebe, 2006/2009
Allows the Atari computer to use an OSX based Macintosh as a printer.

- Requires OS X 10.3.9 or higher, and a G4 or Intel processor or higher
- Hardware component: SIO2PC cable
- USB serial adapter with complete RS-232 hardware signal and driver support required.
  - Recommended from USBGear: http://www.usbgear.com/USBG-232MINI.html
    Corresponding drivers: http://www.ftdichip.com/Drivers/VCP.htm

http://www.atarimac.com/sio2osx.php

AspeQt - Atari Peripheral Emulator - A8W Edition, Ray Ataergin, 2012-
A8W Edition is written for Windows and Ubuntu platforms in mind.

- Starting with v1.01 this branch of AspeQt will now be identified as "AspeQt vx.xx - A8W Edition" as there are now other forks and branches available from various other sources.
- Credits: Original code up to version 0.6.0 Copyright 2009 by Fatih Aygun.
  Updates since v0.6.0 Copyright 2012 by Ray Ataergin.
- Emulates a generic text-only Atari printer.
- Only emulates the first printer device, that is "P1:"
- Support for ASCII and ATASCII is provided.

https://www.facebook.com/AspeQt.Atari/
https://github.com/atari8warez/AspeQt
https://drive.google.com/drive/folders/1TBtwjdnZS1MjnBos4BjvR0ngwQ9K6-Jn

RespeQt, Atari Serial Peripheral Emulator for Qt, 2015-
RespeQt emulates Atari SIO peripherals when connected to an Atari 8-bit computer with an SIO2PC cable. In that respect it's similar to programs like APE, Atari810, and AspeQt.

- Credits: Fatih Aygun (AspeQt to 2009), Ray Ataergin (AspeQt to 2012), Joseph Zatarski, DrVenkman, TheMontezuma, Jochen Schaefer, blind, ebiguy
- Text-only printer emulation with saving and printing of the output.

https://github.com/RespeQt

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AspeQt, Atari Serial Peripheral Emulator for Qt, 13L fork, 2021-
AspeQt-2k22 with 8Bit Cartridge emulates Atari SIO peripherals when connected to an Atari 8-bit computer with an SIO2PC cable.

- Credits:
  Fatih Aygun (to 2009),
  Ray Ataergin (to 2012),
  The 13th Leader (Paul Jones) (2021-present)
- Atari Cartridge images to control printer functions
- Printer emulation with preview and ATASCII support
- Emulates a generic text-only Atari printer.
- Only emulates the first printer device, that is "P1:"
- You can view, save or print the emulated printer output

https://13leader.net/#aspeqt

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Chapter 5

Modems & Networking

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5.1) Modems

5.1.1) What are the Atari 830, 835, 1030, XM301, and SX212 Modems?

Thanks to Laurent Delsarte for some of the research and writing for an earlier version of this section.

A modem (MOdulator-DEModulator) is a device that modulates an analog carrier signal to encode digital information for transmittal, and also demodulates such a carrier signal to decode received transmitted information. The common example from the main time period of the 8-bit Atari computers is the voice band modem, otherwise known as a "dial-up modem" that turns the digital data of a personal computer into modulated electrical signals in the voice frequency range of a telephone channel. These signals can be transmitted over telephone lines and demodulated by another modem at the receiver side to recover the digital data. Thus, in this pre-Internet form of computer networking, any two computers may communicate with each other over a standard telephone line.

Originally only equipment manufactured by AT&T could legally be connected directly to the AT&T's Bell telephone network in the US and Canada. Third-party manufacturers could either use "acoustic" modem designs to be used in conjunction with a standard Bell telephone's network connection, or they were required to connect to the network through an AT&T-sanctioned Data Access Arrangement (DAA) device. Third-party "direct-connect" modems, designed to connect directly to the telephone network without the use of AT&T equipment, became available beginning in 1978 (Micromodem II with Microcoupler, package for the Apple II computer by D.C. Hayes Associates).

A wide variety of modulation and communication techniques can be successfully implemented over a standard telephone line. In order for two modems to communicate, they have to initially successfully negotiate the technical nature of the communications to be used between them. Connection characteristics include modulation technique ("frequency shift keying", "phase shift keying", etc.), operation mode (one-way "half duplex" or bi-directional "full duplex"), synchronization ("asynchronous" data without clock signal or "synchronous" data accompanied by separate clock signal), and bitrate (measured in bits per second). Early modem users had to become familiar with arcane settings such as these in order to establish successful modem to modem communications. In time, modem modulation standards were established and adopted by the industry, allowing for the details to largely become transparent to the user. Newer modems would simply negotiate the fastest and most reliable connection possible between them, given the best capabilities of both modems.

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Major modem data-transmission standards:

Standard	Year appeared	Top Bitrate	Baud (symbols per second)	
Bell 101	1958	110 bit/s	110	
Bell 103	1962	300 bit/s	300	(US precursor to V.21)
Bell 202	1962	1,200 bit/s	1,200	half-duplex, or asymmetrical duplex with 5 or 150 bit/s back channel (US precursor to V.23)
V.21	1964	300 bit/s	300	(used in Europe)
V.23	1964	1,200 bit/s	1,200	half-duplex, or asymmetrical duplex with 75 bit/s back channel
Vadic VA3400	1972	1,200 bit/s	600	(early V.22 precursor)
Bell 212A	1976	1,200 bit/s	600	(US precursor to V.22)
V.22 (1)	1980	1,200 bit/s	600	(used in Europe)
V.22bis	1982	2,400 bit/s	600	
V.32	1984	9,600 bit/s	2,400	
V.42 (2)	1988			
V.42bis (3)	1989			
V.32bis	1991	14,400 bit/s	2,400	
V.34	1994	28,800 bit/s	3,600	(max)
V.34 ("V.34bis")	1996	33,600 bit/s	4,200	(max) ("V.34 Plus, V.34+"); last standard for modem-to-modem
V.90	1998	56,000 bit/s	8,000	(max upload: 33,600 bit/s); for ISP with digital signaling
V.92	2001	56,000 bit/s	8,000	(max upload: 48,000 bit/s); for ISP with digital signaling; incorporates V.44 compression

(1) The Hayes Stack Smartmodem, introduced in 1981, was the first RS-232 interface modem that could be program-controlled using ASCII character strings.
Hayes compatible modems would support this same "Hayes command set" or "AT command set".
(2) Error control standard, incorporating the earlier Microcom Networking Protocols MNP 1 - MNP 4
(3) Data compression standard (alternative to MNP 5)

The V.92 standard also incorporates a "Modem On Hold" capability, especially useful in combination with the phone company's "call waiting" and "caller ID on call waiting" features. Before V.92, when online using a dial-up modem, and before telephone services like voice mail were common, incoming callers would experience a "busy signal" as if someone was already talking on the line.

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In the early 1980s popular early commercial online services reached via dial-up modem included CompuServe Information Service, Dow Jones Information Service, and The Source. In addition to CompuServe, later online services popular with Atari users included Delphi and GEnie. Examples of prominent "viewtext" services in the UK included Prestel, Micronet, and Telecom Gold. Modem users would also dial in to mainframe computer systems at universities, or they would log in to privately-operated Bulletin Board Systems running on other personal computers. As long-distance telephone services were billed by the minute, telephone bill expenses were an important consideration.

The following modems were produced by Atari for use with the 8-bit Atari computers.

Software device handlers for modems and other serial interface devices are covered in another section of this FAQ list.

5.1.1.1) Atari 830 Acoustic Modem

- Also included, boxed, in the Communicator kit CX484
- Type: Acoustic, frequency shift keying (FSK)
- Speed: Up to 300 baud
- Data-transmission standard: Bell 103
- Requires Atari 850 Interface Module or equivalent to connect to the Atari computer
- Connectivity: RS-232 DCE device (modem) standard
  - Pinout:

```
14                      25
  o o o o o o o o o o o o      DB-25 Socket - female
 o o o o o o o o o o o o o
1                       13
```

2.	XMT Transmit Data	(Input to modem)
3.	RCV Receive Data	(Output from modem)
5.	CTS Clear to Send	(Output from modem)
6.	DSR Data Set Ready	(Output from modem)
7.	n/a Signal Ground	(Common)
8.	CRX Carrier Detect	(Output from modem)

- Shipped with an Atari CX87 Modem Cable
  (Atari 850 DE-9P to standard RS-232 DB-25P DCE device - modem)
- Made in USA for Atari by Novation, based on the Novation CAT modem
- Top: Ready and Power LED indicator lights
- Side (left-to-right):
  - "O / OFF / A" switch: Originate mode / Power Off / Answer mode
  - Power input jack
  - "F / TST / H" switch: Full duplex mode / Test mode / Half duplex mode
  - Serial port
- Transmitter frequencies
  - Originate: mark, 1,270 Hz; space 1,070 Hz
  - Answer: mark, 2,225 Hz; space 2,025 Hz

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- Receive frequencies
  - Originate: mark, 2,225 Hz; space 2,025 Hz
  - Answer: mark, 1,270 Hz; space 1,070 Hz
- Receive sensitivity: -45dBm
- Power: Requires 20-24V AC as supplied by the Atari CA016751/Novation 901017 power adapter or equivalent
- Power usage: 7W
- Manuals:
  - Atari 850 Interface Module Operator's Manual C015953 REV. 1 1980 (preliminary version shipped with earlier/most 850 units; 102 pages)
    - See Appendix 13: Atari 830 Modem, pages 97-102
  - Atari 850 Interface Module Operator's Manual C017651 REV. B 1982 (15 p.)
    - Contains instructions for both the 850 interface and the 830 Modem

5.1.1.2) Atari 835 Direct-Connect Modem

- Sold only as part of the Communicator II kit CX488
- Type: Direct-connect modem
- Speed: up to 300 baud
- Data-transmission standard: Bell 103
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Line jack (RJ11C standard)
  - Telephone jack (RJ11C standard)
- Intel 8048 microcontroller, C060549
- Texas Instruments TMS99532 frequency-shift-keyed modem, C062016 (FC100279)
- The 835 communicates with the computer using the normal SIO protocol at a rate of 300 baud. (Field Service Manual p.1-2)
- Made in USA for Atari by Racal-Vadic
- No speaker, but telephone sound can be routed to the computer audio output
- Pulse dialing only
- Power: Requires 20-22V AC as supplied by the Atari C060479 / CA060535 power adapter or equivalent
- Power usage: 18W
- Technical manual: Atari 835 Direct Connect Modem Field Service Manual FD100268

5.1.1.3) Atari 1030 Direct-Connect Modem

- Speed: up to 300 baud
- Data-transmission standard: Bell 103
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
  - Shipped with SIO cable CA014122 (3-foot; 91.5 cm)
  - Modular Telephone Jack (RJ11C standard)
  - Built-in telephone connector cable - for standard RJ11 jack on telephone
- Intel 8050 microcontroller, C070235
- 12 KiB firmware ROM: 4 KiB ROM on the 8050 and 8 KiB on a separate ROM chip
- Texas Instruments TMS99532 frequency-shift-keyed modem, C062016

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- The 1030 uses a non-standard protocol for communication commands on the SIO bus. When a connection is active, the computer and the modem exchange data directly on the bus at 300 baud, without using [SIO] command or data frames. (Altirra manual p.162)
- Made in USA; modem electronics by Penril
- Communications are possible with both originate-only and answer-only modems
- Built-in ModemLink telecommunications software
  - Bootstrap without disk drive – With no powered disk drive #1 present, ModemLink (with integrated T: modem device handler) loads from the ROM of a powered 1030 into computer RAM on system startup. (The 1030 masquerades as disk drive #1, responding to the Atari OS attempt to boot from disk.) An extended beep is emitted through the computer's audio signal as the program is loaded, then ModemLink runs.
  - The T: handler can also be loaded from 1030 ROM into computer RAM later.
- Controls, software selectable:
  - Full and Half duplex operation
  - Pulse or Tone dialing
    - Tones for tone dialing are generated by the computer and reach the 1030 via the SIO sound INPUT line (thanks to audio noise/leakage)
      - Tone dialing not available on the 400 (Owner's Guide page 7)
  - Memory buffer on/off
  - Printer on/off
- Box sticker: "Free Time Offer Enclosed: Dow Jones News/Retrieval Service" Shipped with CompuServe IntroPak as well
- Receive sensitivity: -43dBm
- Indicators:
  - Power ON/OFF
  - On-line (carrier detect) LEDs
- Power: Requires 9V AC as supplied by the Atari C062195 power adapter or equivalent
- Manual: The Atari 1030 Modem with ModemLink Telecommunications Program Owner's Guide C061798 (1983)
- 1030 Designers: **John Curran**, Ken Fowkes, **Sherwin Gooch** (project director), **Joe Miller (Joseph B. Miller III)**, **Songly Mu**, Bernie Poggi, Mark Rustad, Phil Schug, Dennis Smith, **Jose A. Valdes**, **Vincent H. Wu**
  - Tone Dialer:
    - Original version by: J. W. Tittsler, Feb. 1983
    - Final version by: M. D. Rustad, May, 1983
    - Modified by: **Joe Miller (Joseph B. Miller III)**, August, 1983

5.1.1.4) Atari XM301 Modem

- Type: Direct-connect modem
- Speed: up to 300 baud
- Data-transmission standard: Bell 103
- Incompatibilities: Cannot be used with an Atari 1200XL (see Power, below). The manual reads "You cannot use the XM301 modem with an Atari 1200XL computer unless it has been modified. Contact your local Atari service center for information on modifying your 1200XL computer."
- Additional hardware requirement: (none)
- Connectivity: Built-in SIO cable - must end SIO daisy chain

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    - Modular Telephone Jack (RJ11C standard)
- Intel 8048 microcontroller, C060549
- National Semiconductor MM74HC943 300 baud modem
- Software-compatible with the Atari 1030
- Key engineer/designer: **Jose A. Valdes** at Atari
- Made in Taiwan
- No speaker, but telephone sound can be routed to the computer audio output
- Auto-dial and auto-answer capabilities
- Dialing capabilities: Tone and pulse (rotary) dialing
- Shipped with XE Term Communications Program disk (DX5076)
    - Developed by Russ Wetmore for Atari
- Box sticker: "Free Inside/Special Offer: Money Saving Values from the Source, CompuServe, Dow Jones News/Retrieval Service, Knowledge-Index, and the Official Airline Guide."
- Transmitter frequency
    - Originate: Mark 1,270 Hz ± 0.5%; Space 1,070 Hz ± 0.5%
    - Answer: Mark 2,225 Hz ± 0.5%; Space 2,025 Hz ± 0.5%
- Transmit level: -9.0dBm to -16dBm
- Receiver frequency
    - Originate: Mark 2,225 Hz ± 30 Hz; Space 2,025 Hz ± 30 Hz
    - Answer: Mark 1,270 Hz ± 20 Hz; Space 1,070 Hz ± 20 Hz
- Sensitivity: -13dBm to -46dBm
- Carrier detect threshold
    - On: -44dBm
    - Off: -45dBm
- Bit error rate: No more than 1 in 10^5 bits
- Power: Requires 60mA at 5V DC as supplied by SIO pin 10 (+5V/Ready except on the 1200XL)
- Manual: Atari XM301 Modem Owner's Manual C026119 (1985)

5.1.1.5) Atari SX212 Modem

- Type: Direct-connect modem
- Speed: 75-300 and up to 1,200 bit/s
- Data-transmission standards: Bell 103 and Bell 212A
- Hayes AT command set compatible
- Connectivity:
    - Atari SIO (must be at end of SIO chain)
        - Uses SIO Motor Control; only one such device can be attached to the system at a time.
    - DB-25S RS-232 DCE device (modem) standard
    - Telephone Line Jack (RJ11C standard)
- Sierra Semiconductor SC11008 modem interface controller
- Sierra Semiconductor SC11004 300/1,200 Bit Per Second Modem
- Key engineer/designer: **Jose A. Valdes** at Atari
- Made in Taiwan
- Built-in speaker with adjustable volume for call monitoring
- Auto-dial and auto-answer capabilities
- Operation: Full duplex and half duplex

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- Dialing capabilities: Tone and pulse (rotary) dialing
- Carrier frequencies
  - 1,200 bit/s; Originate; Transmit 1,200 Hz, Receive 2,400 Hz
  - 1,200 bit/s; Answer; Transmit 2,400 Hz, Receive 1,200 Hz
  - 75-300 baud; Originate; Mark 1,270 Hz, Space 1,070 Hz
  - 75-300 baud; Answer; Mark 2,225 Hz, Space 2,025 Hz
- Receive signal frequency tolerance: ± 7 Hz
- Bit error rate: Less than 1 in 10^5 bits for signal-to-noise ratio of 8dB with 300 Hz to 3,400 Hz Gaussian noise over a receive level range of -10dBm to -35dBm
- Loss of carrier: Disconnects automatically in 1 ± 1 second after loss of carrier
- Command buffer: 40-character command buffer
- Receiver sensitivity: -40dBm
- Transmit level: -9dBm
- SX Express! sold separately (DX5089)
  - Package includes Program Disk, User's Manual, SIO cable CA014122 (3-foot; 91.5 cm)
  - SX Express! Program Disk (DX5089) includes:

Program	Description
DOS.SYS	DOS 2.5 File Management Subsystem (FMS)
DUP.SYS	DOS 2.5 Disk Utility Package (DUP)
AUTORUN.SYS	SX Express! Ver. 3.00 by Keith Ledbetter
RAMDISK.COM	Sets up DOS 2.5 RAM drive for 130XE banked memory
HANDLER.OBJ	R: device handler (by Paul Swanson)
HANDLER.DOC	SX212 Modem Handler Technical Description

- Power: Requires 9V DC as supplied by the Atari C010472, C016353, or C018084 power adapters or equivalent. Current rating: 0.5A
- Manual: Atari SX212 Modem Owner's manual C070878 C033506 (1987)

5.1.2) What other modems were marketed for use with my Atari?

This should be a complete list of third-party modems that were marketed for use with the Atari 8-bit computers.

Modems listed here were designed to connect to the Atari via SIO, to one of the Atari's joystick controller ports, or to the Atari 850 interface module.

All of these are direct-connect modems (plug directly into the phone line) unless stated otherwise.

Software device handlers for modems and other serial interface devices are covered in another section of this FAQ list.

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Microconnection A1, by The Microperipheral Corp. (1981)
- 300 bit/s, Bell 103 compatible
- Requires 850 interface, Atari cable included (Atari CX87 equivalent)
- Software included: Tariterm (both cassette and disk, version 1.1, 15-Sep-1981)
- Sold separately: TSMART (cassette; can be transferred to disk)
- Available Auto-Dial/Auto-Answer upgrade (pulse dialing, not touch tone)

Microconnection A1A, by The Microperipheral Corp. (1981)
- 300 bit/s, Bell 103 compatible
- Auto-Dial (pulse dialing, not touch tone) / Auto-Answer
- Requires 850 interface, Atari cable included (Atari CX87 equivalent)
- Software included: Tariterm (both cassette and disk, version 1.1, 15-Sept-1981)
- Sold separately: TSMART (cassette; can be transferred to disk)

Microconnection A2, by The Microperipheral Corp. (1981)
- 300 bit/s, Bell 103 compatible
- Connects via SIO, must be at end of SIO chain. Not a smart SIO device.
- Software included: Tariterm (both cassette and disk, version 1.1, 15-Sept-1981)
- Sold separately: TSMART (cassette; can be transferred to disk)
- Available Auto-Dial upgrade (pulse dialing, not touch tone)

Microconnection A2A, by The Microperipheral Corp. (1981)
- 300 bit/s, Bell 103 compatible
- Auto-Dial (pulse dialing, not touch tone)
- Connects via SIO, must be at end of SIO chain. Not a smart SIO device.
- Software included: Tariterm (both cassette and disk, version 1.1, 15-Sept-1981)
- Sold separately: TSMART (cassette; can be transferred to disk)

AutoPrint Microconnection, by The Microperipheral Corp. (1983)
- For Atari or Commodore computers
- 300 bit/s, Bell 103 compatible
- Auto-dial / auto-answer
- Connects via SIO, must be at end of SIO chain.
- Terminal software listings provided in the user manual. Sold separately:
  - TSMART (cassette; can be transferred to disk)

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RS-Coupler 9201, by International Quartz Limited (Interquartz) (1983?)

- Acoustic Modem
- 300 bit/s, CCITT V.21
- Originate / Answer
- Requires 850 interface
- Software listings for: IBM PC, Apple II, Atari 800, TI 99/4A, Commodore 64

http://preview.tinyurl.com/pgdcgdn

Signalman Mark II, by Anchor Automation (1983)

- Model 300-232 09M
- 300 bit/s, Bell 103 compatible
- Auto-dial (no auto-answer?)
- Requires 850 interface, Atari cable built-in (Atari CX87 equivalent)

Volksmodem VM1, by Anchor Automation (1983)

- 300 bit/s, Bell 103 compatible
- (no auto-dial, no auto-answer)
- Voice/data switch, full duplex/half-duplex switch
- Draws its power from the telephone line, with nine-volt battery backup
- Sold separately:
  - C Cable, requires 850 interface (Atari CX87 equivalent)
  - F Cable (1984), connects to Atari controller jack #2
    - Shipped with cassette based terminal software (what software????)
    - Uses MPP-1000C/MPP-1000E/300AT modem driver software

Pocket Modem, by BOT Engineering

- 300 baud
  - 1,200 baud upgrade was offered (but no apparent software support?)
- Auto-answer
- Connects via SIO, must be at end of SIO chain.
  - Uses SIO Motor Control; only one such device can be attached to the system at a time.
- Early version: Software supplied on cartridge
- Later versions: Software supplied on disk or cartridge
  - Intelligent Terminal Software (cartridge or disk), known versions:
    - Pocket Modem Software Ver 2.06 By ADCM Systems © Copyright 1984
    - Pocket Modem Software Ver 2.08 By ADCM Systems © Copyright 1984
  - Disk files, original disk release:
    - TERM.OBJ - Disk version of Pocket Modem Software
    - PDRIVE.OBJ - Driver utility used with MODEM.BAS
    - MODEM.BAS - Basic Terminal Program (public domain). Uses PDRIVE.OBJ
    - PDRIVE.DOC - Documentation for PDRIVE.OBJ
  - 1985 disk release by ACDM Systems includes Pocket Modem Driver:
    - MDRIVER.REL - M: modem device handler
    - Simple Terminal Program - uses M: modem device handler

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MPP-1000, by Microbits Peripheral Products (1982)
- Same as: Anchor Automation Signalman 300-232 09F
- 300 bit/s, Bell 103 compatible
- (no Auto answer / no Auto dial)
- Connects to controller jack #4 (400/800 only)
- Smart Terminal tape/disk both included

MPP-1000C, by Microbits Peripheral Products (1983)
- Same as: Anchor Automation Signalman Auto300-232
- 300 bit/s, Bell 103 compatible
- Auto answer / Auto dial
- Connects to controller jack
- Smart Terminal cartridge
- CompuServe DemoPak

MPP-1000E, by Microbits Peripheral Products (MPP) (1985)
- Later units sold/supported by Supra
- 300 bit/s, Bell 103 compatible
- Auto answer / Auto dial
- Connects to controller jack
- Smart Terminal cartridge
- CompuServe DemoPak

300AT, by Supra (1986)
- Supra-branded replacement for the identical MPP 1000E
- 300 bit/s, Bell 103 compatible
- Auto answer / Auto dial
- Connects to controller jack
- Smart Terminal disk
- CompuServe DemoPak and Delphi membership

1200AT, by Supra (1987)
- Same as: E+E DataComm Avatex 1200
- Low Speed Mode: 0-300 bit/s, binary, serial, asynchronous, Bell 103 compatible
- High Speed Mode: 1,200 bit/s character-asynchronous, Bell 212A compatible
- Command Set: 8 Hayes "AT" commands (other options fixed or not needed)
- Auto-answer / Auto dial (tone or pulse)
- (No speaker)
- Connects to SIO
- Smart Terminal disk
- CompuServe DemoPak and Delphi membership

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SupraModem 2400AT, by Supra (1988)
- Asynchronous operation at 300, 1,200, or 2,400 bit/s
- Compatibilities: Bell 103, Bell 212A, V.22, V.22bis
- Hayes "AT" command compatible (100%)
- Auto-answer
- Auto dial (tone or pulse)
- Speaker built-in
- Connects to SIO via included SupraVerter interface
- Smart Terminal disk

5.1.3) How can I connect an RS-232 modem without using an interface?

One way to connect a standard (of the time) external RS-232 serial interface modem with DB-25S connector DCE device (modem) to the Atari was to connect it directly to the Atari SIO port via a relatively simple interface cable. Such devices are not true RS-232 interfaces; rather, they are simplified interfaces supporting a subset of the RS-232 standard sufficient to drive an RS-232 modem.

This should be a complete list of such devices released for the Atari.

Software device handlers for modems and other serial interface devices are covered in another section of this FAQ list.

R-Verter Serial Bus Modem Adapter, 1984
- By Advanced Interface Devices (A.I.D.)
- Later sold as the SupraVerter by Supra
- A cable device: Atari SIO to DB-25P
- Uses SIO Motor Control; only one such device can be attached to the system at a time.
- Supplied with several R: software device handlers.

U-CALL Universal Modem Interface Model A/Model Am, by Digital Devices, 1985?
- Built-in SIO cable
- Built-in cable with DB-25P connector for modem
- SIO port for daisy chain
- Supplied with R: software device handler and AMODEM Plus Release 1.6

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Datatari Serial Interface by Miracle Technology (UK) Limited, 1985

- Later produced by Gralin International
- A cable device: Atari SIO to DB-25P
- Key feature: V.23 split baud (1200/75) operation, as used by systems using the UK Post Office Telecommunications's Viewdata technology, such as Prestel from British Telecom
- Uses SIO Motor Control; only one such device can be attached to the system at a time. (see Multi-Viewterm User Guide p7)
- Shipped with Multi-Viewterm ("Viewterm") software on disk
  - Full name: Multi standard Viewdata/Teletype Terminal program
  - Full Prestel facilities supported, including graphics
- Marketed for use in combination with the World Standard Modem WS2000, also by Miracle Technology
- Supported by the Communications module of Mini Office II by Database Software (1987)

5.1.4) How can my Atari use my PC's dial-up modem?

This section lists available solutions that allow the Atari computer to use a dial-up modem installed on a nearby PC.

Atari Peripheral Emulator (APE) for DOS, by Atarimax (Steven J. Tucker), 1995-1998
(v.1.18 package released 2001)

- Hardware component: APE / SIO2PC Interface Cable
- Full access to a PC's modem (whether internal or external) for the Atari
- Provides an R: modem device handler to the Atari upon any call to load the R: handler from the ROM of the Atari 850 interface
- Full cooperation with real SIO devices also attached to the Atari
- APE continues to provide access to your disk drives even when running in concurrent I/O. This allows you to do things such as run a BBS, download files, etc. all without having any real Atari disk drives or modems attached to your Atari computer.
  Note: Concurrent I/O is the special serial bus mode the Atari uses to communicate with the 850 interface, modems and other streaming serial devices.
- The registered version of APE provides automatic hardware flow control, allowing you to access modems transmitting data faster than 19.2 kbit/s. Unregistered users are limited to 2,400 baud.
- Registered users receive access to the concurrent I/O R: emulator at 38.4 kbit/s and above. Speeds of up to 56 kbit/s are possible using the enhanced registered version of APE.

http://www.atarimax.com/

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5.1.5) How can my Atari use a networked device as an Internet modem?

An "Internet modem" is solution that utilizes software emulation of a dial-up modem in combination with an Internet connection, allowing a computer to use telecommunications software designed for use with a dial-up modem to instead be used over an Internet connection.

This section lists several solutions that allow an Atari computer to make use of another device's Internet connection as an Internet modem.

Lantronix UDS-10 (2000) or UDS100 (2002) or UDS1100 (2009)
A series of serial-to-Ethernet device servers well suited for use with the Atari as an Internet modem.

- Ethernet Interface: RJ45
- Serial Interface: RS-232, RS-422 or RS-485 (configurable)
- Serial Connectivity: DB-25S DCE device (modem)
- Can be connected to an Atari computer via an Atari 850 interface and Atari CX87 modem cable or equivalent.
- Modem Replacement - Internet modem
  In modem emulation mode, the UDS is used to replace a dial-up modem. The unit accepts modem AT commands on the serial port. It then establishes a network connection to the end device, leveraging network connections and bandwidth to eliminate dedicated modems and phone lines.

https://www.lantronix.com/products/uds1100-uds1100-poe/

Atari Peripheral Emulator (APE) for Windows
by Atarimax (Steven J. Tucker), 2000-2007, v.3.0.2 released 2007

- Hardware component: APE / SIO2PC Interface Cable
- R: Modem Emulation: "Internet modem"
  - Client Mode (Outbound Only, TELNET Interface)
  - Server Mode (Inbound Mode, AT Modem Simulator)

http://www.atarimax.com/

Sio2OSX, by Mark Grebe, 2006/2009
Allows the Atari computer to use an OSX based Macintosh as a disk drive or a cassette drive or as a printer.

- Requires OS X 10.3.9 or higher, and a G4 or Intel processor or higher
- Hardware component: SIO2PC cable
- USB serial adapter with complete RS-232 hardware signal and driver support required.
  - Recommended from USBGear: http://www.usbgear.com/USBG-232MINI.html
  - Corresponding drivers: http://www.ftdichip.com/Drivers/VCP.htm
- Includes 850 Emulation to allow Internet Modem capability and the ability to connect serial devices.

http://www.atarimac.com/sio2osx.php

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SIO2WiFi project by Sijmen Schouten (Mr.Atari), 2018-2019

- Based on the Expressif Systems ESP8266 microcontroller chip (with Wi-Fi)
- Should work with any R-verter supporting software on the Atari (R-Verter compatible Internet modem)
- Software by Mr.Atari:
  - "Get the ESP8266 out of the box from 115k2 to 1200 baud"
  - "ESP8266 R-Verter" R: Driver
  - TinyTERM / Tiny Terminal
  - Lite850 R: Driver for 850 and APE - load/install the R: driver
  - PLATO (1.2.1 FAST-IO) patched version of PLATOTerm by **Thomas Cherryhomes**

http://www.mr-atari.com/Mr.Atari/SIO2WiFi/

USB_to_RS232 Connector (usbModem) project by Paul Jones, 2019

- Uses a USB to RS-232 Adapter with PL2303 Chipset (on Amazon)
- Software for Debian GNU/Linux; networked Raspberry Pi device recommended
- A RS-232 DTE (computer) device - Connect to the Atari 850 using a null modem cable.

https://13leader.net/#ser2tcp

FujiNet, by Thomas Cherryhomes and others, 2019-

- Espressif Systems ESP32-WROVER module for Wi-Fi and Bluetooth connectivity
- Connectivity: Built-in SIO connector
- SIO port for daisy chain
- Emulated R: (Modem) device - Supports Type 1 Poll to load handler

https://fujinet.online/

5.2) Industry Standard Serial Interfaces

5.2.1) What is the Atari 850 Interface Module?

While the Atari's SIO and controller ports did not conform to established industry standards, Atari produced the 850 Interface Module to provide access to devices complying with two important interface standards of the time, RS-232-C serial and Centronics parallel.

The **Atari 850 interface** provides the system with:

- Four RS-232-C serial interface ports (proprietary pinouts)
- One 8-bit parallel output Centronics interface port (proprietary pinout)

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Serial interface port key features:

- The 850 functions as RS-232-C Data Terminal Equipment (DTE).
- RS-232-C Circuits (signaling lines):

	(Send / Out)			(Receive / In)			
Port 1:	XMT	DTR	RTS	RCV	DSR	CTS	CRX
Port 2:	XMT	DTR		RCV	DSR		
Port 3:	XMT	DTR		RCV	DSR		
Port 4:	XMT			RCV			

- Port 4 primarily serves as a 20 mA current loop interface, supporting 20 mA current loop peripherals such as a teletype machine.
- Baud rates:

45	.5	bit/s	These baud rates are useful for communications with Baudot teletypes, for RTTY (radioteletype) applications. They are more commonly referred to as 60, 67, and 75 words per minute.
50		bit/s	
56	.875	bit/s	
75		bit/s	This baud rate is sometimes used for ASCII communications, and may also be used for 5-bit Baudot RTTY. The latter is commonly referred to as 100 words per minute.
110		bit/s	
134	.5	bit/s	
150		bit/s	
300		bit/s	
600		bit/s	
1,200		bit/s	
1,800		bit/s	
2,400		bit/s	
4,800		bit/s	
9,600		bit/s	

The Atari Operating System does not include a resident device handler for the serial ports of the 850, but the 850 contains an R: handler, supporting devices R1: through R4:, in its ROM.

- Bootstrap without disk drive – With no powered disk drive #1 present, the R: handler loads from the ROM of a powered 850 into computer RAM on system startup. (The 850 masquerades as disk drive #1, responding to the Atari OS attempt to boot from disk.) An extended beep is emitted through the computer's audio signal as the handler is loaded.
- Bootstrap with disk drive – The R: handler can be loaded from the 850 ROM as part of a Disk Boot. (Atari DOS 2.0S, DOS 3, DOS 2.5, and DOS XE include provisions for this.)
- The R: handler can be loaded from the 850 ROM by software after system boot.
- Software device handlers for modems and other serial interface devices are covered in another section of this FAQ list.

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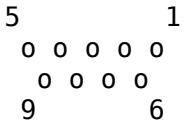
The Atari Operating System's resident P: Printer device handler supports the parallel output interface port of the 850.

- 400/800 OS: Responds to P: and ignores any device number
  XL OS: Responds to P:, P1:, and P2:

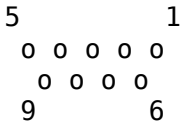
Pinouts

Serial Interface Port 1 (DE-9 Socket - female):



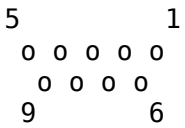
1.	DTR Data Terminal Ready	(Out)
2.	CRX Carrier Detect	(In)
3.	XMT Send Data	(Out)
4.	RCV Receive Data	(In)
5.	Signal Ground	
6.	DSR Data Set Ready	(In)
7.	RTS Request to Send	(Out)
8.	CTS Clear to Send	(In)

Serial Interface Port 2 (DE-9 Socket - female):



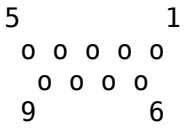
1.	DTR Data Terminal Ready	(Out)
3.	XMT Send Data	(Out)
4.	RCV Receive Data	(In)
5.	Signal Ground	
6.	DSR Data Set Ready	(In)

Serial Interface Port 3 (DE-9 Socket - female):



1.	DTR Data Terminal Ready	(Out)
3.	XMT Send Data	(Out)
4.	RCV Receive Data	(In)
5.	Signal Ground	
6.	DSR Data Set Ready	(In)

Serial Interface Port 4 (DE-9 Socket - female):



		/ 20 mA Current Loop Operation	
1.	+10V	/ TXD+ Send Data +	
3.	XMT	/ TXD- Send Data -	(Out)
4.	RCV	Receive Data	(In)
5.	Ground		
7.	+10V	/ RXD+ Receive Data +	
9.	-8V	/ RXD- Receive Data -	

```
--+
  |
--+
```

A 20 mA current loop device must tie together pins 4 and 7.

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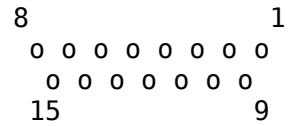
Parallel Interface Port (DA-15 Socket - female):



1.	/Data Strobe		
2.	Data bit 0		
3.	Data bit 1		
4.	Data bit 2		
5.	Data bit 3		
6.	Data bit 4		
7.	Data bit 5		
8.	Data bit 6		
9.	Data Pins Pull-Up (+5V)	--+	A device that cannot hold
11.	Signal Ground	|	/Fault high may instead tie
12.	/Fault (high required)	--+	together pins 12 and 9.
13.	Busy		
15.	Data bit 7		

Early 850 units are housed in a black anodized aluminum case, but most units are in a beige plastic case matching the 400/800 computers and peripherals.

Connectivity: 2 Atari SIO ports for direct connection to Atari computers
- Shipped with SIO cable CA014122 (3-foot; 91.5 cm)

Sold separately by Atari:
- CX86 Printer Cable, CA015900-02 (included with 825)
  (DA-15P to 20-pin dual Edge-on)
- CX87 Modem Cable, CA015900-03 (included with 830 modem)
  (Atari 850 DE-9P to standard RS-232 DB-25P DCE device - modem)
- CX88 Terminal Cable, CA015900-04
  (Atari 850 DE-9P to standard RS-232 DB-25P DTE device - computer)

Front of unit (left-to-right):
- Power In jack
- On power indicator light
- Power Off / On switch
- Two I/O Connectors (Atari SIO)

Right side of unit:
- Parallel Interface port

Rear of unit (left-to-right):
- Four Serial Interface ports, 4 - 3 - 2 - 1

850 internals:
- 6507 microprocessor (MOS Technology MCS6507 or equivalent), C010745
- 6532 PIA. Two of:
  - MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent, C010750
- 4 KiB X 8-bit ROM, C012099

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Power: Requires 9V AC as supplied by the Atari CA014748 power adapter or equivalent (such as the Atari CA017964).
Power usage: 17W.

Manuals:
- Atari 850 Interface Module Operator's Manual C015953 REV. 1 1980 (preliminary version shipped with earlier/most 850 units; 102 pages)
- Atari 850 Interface Module Operator's Manual C017651 REV. B 1982 (15 pages)
- Atari 850 Interface Module Technical Manual C017652 REV. B 1982 (106 pages)

Technical Manual: Atari 850 Interface Module Field Service Manual CS 400/800-S004-B 4/81 / FD100036 April, 1981

The 850 was manufactured by Atari in the USA.

5.2.2) What other RS-232 serial interfaces are there for the Atari?

The serial communications interface standard now known as TIA-232-F (R2012), entitled "Interface Between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) Employing Serial Binary Data Interchange" and maintained by the US-based Telecommunications Industry Association, has previously been known as RS-232 (1960), RS-232-A (1963), RS-232-B (1965), RS-232-C (1969), EIA-232-D (1986), TIA/EIA-232-E (1991), TIA/EIA-232-F (1997), and ANSI/TIA-232-F-1997 (R2002). It is a US standard that incorporates elements of several international standards, including the control signal definition of V.24, the electrical characteristics of V.28 and the connector and pin assignments defined in ISO 2110.

While original emphasis in 1960 was placed on interfacing between a modem unit and DTE, other applications for the standard gained popularity. By the early 1980s RS-232-C was widely adopted for low-cost serial interfaces between microcomputers and peripherals such as a modem, mouse, plotter, printer, scanner, digitizer, track ball, and myriad others. Manufacturers were able to design such devices not just for a single hardware platform, but for any platform or application that supported the RS-232 standard serial interface. TIA-232-F (R2012) has essentially been supplanted by USB in today's consumer electronics marketplace.

In keeping with the context of the time period, this FAQ will normally refer to the standard as RS-232.

The output signals on an RS-232 DTE port are inputs to an RS-232 DCE port, and output signals on a DCE port are inputs to a DTE port. The signal names match each other and connect pin for pin. Examples of DTE include most RS-232 interface devices which are not used to extend communications, including computers and serial printers. RS-232 devices that extend communications, like a modem, are DCE.

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Most commonly, RS-232 interfaces for the Atari, beginning with Atari's own 850 interface module, were used to interface an industry standard (of the time) RS-232 serial modem to the Atari. Typically, RS-232 serial modems featured a DB-25S DCE device connector for interfacing to a computer's RS-232 DTE device serial port. Early IBM PCs and compatibles featured a DB-25P DTE device serial port, the configuration already well-established for RS-232 interfaces at the time, but later the DE-9P DTE device serial port became the PC standard. Thus, the standard "modem cable" used to connect a PC to an RS-232 serial modem during most of the era of the Atari was a DE-9S (DTE device) to DB-25P (DCE device) cable.

Though Atari did not design an RS-232 interface into their 8-bit computers, they did offer RS-232 interface support in the form of the Atari 850 interface module (summarized below and detailed in another section of this FAQ list).

The following should be a complete list of devices for the Atari providing the system with an RS-232 standard DTE device serial interface. The interface connector type is given if known.

Software device handlers for modems and other serial interface devices are covered in another section of this FAQ list.

850 Interface Module, by Atari, 1980
- Detailed in another section of this FAQ list
- 2nd SIO port for daisy chain
- Four RS-232 serial ports: DE-9S (DTE device, proprietary pinout)
- Contains R: handler, supporting devices R1: through R4:, in its ROM.

Microconnection A2 and A2A, by The Microperipheral Corp. (1981)
- RS-232 DTE device serial printer port included
- Connects via SIO, must be at end of SIO chain. Not a smart SIO device.
- Sold separately: Typer-A (M: serial printer device handler on cassette)

Compu-Mate CM-1000 (1982) - Shipped?
- EIA standard serial port (standard synchronous protocol - for printers)
- Automatic powerup compatibility with Diablo printers on the serial port

ATR8000, by Software Publishers / SWP Microcomputer Products, 1982
- 2nd SIO port for daisy chain
- RS-232 port: 26 pin PCB edge
- R: device handler included with: MYDOS 3.1x, MYDOS 4.x, SpartaDOS

P:R: Connection, by ICD, 1986
- Built-in SIO cable
- SIO port for daisy chain
- Two RS-232 serial ports: DE-9S (Atari 850 standard)
- Contains R: handler, supporting devices R1: and R2:, in its ROM (largely 850-compatible)

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Multi I/O board (MIO), by ICD, 1987

- Parallel device, connects to PBI
  - ICD adapter for Cartridge + ECI provides two pass-through cartridge ports
- RS-232 serial port: DE-9S (Atari 850 standard)
  - R: device handler (850-compatible) on ROM (uses no user memory)
  - Up to 19.2 kbit/s
  - Hardware flow control (not all ROM versions)

RS-232 serial interface for XL/XE, Atari Magazin, 12/1988, pages 46-55

- Project by Andreas Binner and Harald Schoenfeld
- Parallel device, connects to PBI or to Cartridge + ECI
- Draws its power from the computer. On the 800XL, which does not provide power on the PBI, requires a connection to a controller jack for power.
- RS-232 serial port: DB-25
- Software: R: device handler and mini terminal program provided as type-in listings

Black Box, by Computer Software Services (CSS), 1989

- Parallel device, with connectors for both PBI and Cartridge + ECI
  - PBI Connector: 50 pin header; ribbon cable to PBI interface included
  - Cartridge + ECI connector: standard PCB edge
- RS-232 Serial Port: 34 pin PCB edge
  - R: device handler (850-compatible) on ROM (uses no user memory)
  - Up to 19.2 kbit/s
  - Hardware flow control

TOMS 720CR disk drive, 1991

- 2nd SIO port for daisy chain
- RS-232 serial port: simplified (5 lines) RS-232 interface
- R: handler?????

TOMS 360CR disk drive, 1996

- 2nd SIO port for daisy chain
- RS-232 serial port: simplified (5 lines) RS-232 interface
- R: handler?????

Multi I/O board (MIO) "new series" by Ken Jones / MEtalGuy66, 2006

- Parallel device, connects to PBI
- RS-232 serial port: DE-9P (PC standard)
- R: device handler (850-compatible) on ROM (uses no user memory)

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EASI/O Speedier:, by Detlefsen Enterprises, 2007

- Requires Detlefsen Enterprises EASI/O-S Cable or EASI/I-Spider, sold separately (EASI/O system DB-25S interface)
- 19.2 kbit/s RS-232 serial adapter
- RS-232 serial port: DB25-P (early PC standard)
- Shipped with high-speed driver and modem software on disk

Speedier: Type 2, by Detlefsen Enterprises, 2008

- Requires Detlefsen Enterprises EASI/O-S Cable or EASI/I-Spider, sold separately (EASI/O system DB-25S interface)
- 19.2 kbit/s RS-232 serial adapter
- RS-232 serial port: 8 wire RJ45 jack for standard ethernet type serial cable uses
- Shipped with high-speed driver and modem software on disk

5.2.3) What MIDI interfaces are there for the Atari?

From Wikipedia (Oct 28, 2012):
MIDI (Musical Instrument Digital Interface) is an electronic musical instrument industry specification that enables a wide variety of digital musical instruments, computers and other related devices to connect and communicate with one another. It is a set of standard commands that allows electronic musical instruments, performance controllers, computers and related devices to communicate, as well as a hardware standard that guarantees compatibility between them.

MIDI OUT, MIDI IN, and MIDI THRU interface connectors listed below are:
DIN-5 180 Socket - female

Several MIDI interfaces have been designed for the 8-bit Atari computers:

MIDIMATE and compatible

MIDIMate, by Hybrid Arts (Bob Moore)

- Has MIDI OUT, MIDI IN, SYNC OUT (phono jack), SYNC IN (phono jack) ports
- Connects to the Atari via SIO (must be at end of SIO chain)
  - Uses SIO Motor Control; only one such device can be attached to the system at a time.
- Introduced Jan. 1984 at NAMM (National Association of Music Manufacturers) with MIDITrack sequencer program
- Also shipped with: MIDITrack II (1984), MIDITrack III (1985; 128 KiB XL/XE)
- Sold separately or distributed by Hybrid Arts for the MIDIMate:
  - MIDITrack III (1985; 128 KiB XL/XE)
  - DX-Editor (for the Yamaha DX7 and TX series)
  - GenPatch (generic patch library system)
  - MIDICom (MIDI Telecommunications) (1986)
  - MIDIPatch for the Yamaha DX-7 & TX tone rack (1985)
  - MIDIPatch for the Casio CZ-101 & CZ-1000 (1985)

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    - Oasis (visual editing system for the Ensoniq Mirage & 128 KiB XL/XE; 1986)
    - MIDI Music System (MMS) (1986)
        - by Synthetic Software (Lee Actor/Gary Levenberg)
        - Based on Advanced MusicSystem II
        - Includes an AMS to MMS conversion program
    - K3 Wave Table Editor (64 KiB XL/XE) (Charles Faris for Kawai America)
- Other software:
    - MIDI Maze, by Michael Park for Xanth F/X (prototype for Atari, 1989)

MIDIMax, by Wizztronics (Steve Cohen) (1988)

- Provides MIDI OUT and MIDI IN ports
- Connects to the Atari via SIO; provides SIO port for daisy chain
- Compatible with the earlier MIDIMate by Hybrid Arts
    - Shipped with MIDI Music System (MMS) by Synthetic Software

MIDIMate-Interface V2, by Christoph Buessow (HardWareDoc/ABBUC), 2011

- Provides MIDI OUT, MIDI IN, and MIDI THRU ports
- Connects to the Atari via SIO
- Two versions:
    1. Must be at end of SIO chain
    2. Provides SIO port for daisy chain
- Compatible with the earlier MIDIMate by Hybrid Arts
- See: http://www.abbuc.de/~hardwaredoc/projekte/hardware/midi/midimate.html

MIDI Muse project, by Ivo van Poorten, 2018.

- MIDIMate compatible, except for the SIO port triggers
- Project website: https://github.com/ivop/midimuse

SIO2MIDI, by Michael St. Pierre (Mytek, AtariBits), 2019

- 2 Port MIDIMATE Compatible Interface
- You must create your own SIO cable
- https://ataribits.weebly.com/midi.html

SIO2MIDI-S2, by Michael St. Pierre (Mytek, AtariBits), 2021

- 2 Port MIDIMATE Compatible Interface
- SIO port included (requires standard SIO cable)
- Can accept a Serdaco DreamBlaster S2 MIDI Synthesizer
  (Creative Labs Wave Blaster compatible; based on the SAM2695 chip by Dream)
- Will not play sound through the computer, but does have a headphone/speaker jack built-in
- https://ataribits.weebly.com/midi.html

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MIDI Master and compatible

MIDI Master, by 2 Bit Systems (1986)

- Later units produced by Gralin International
- Cable connects to the Atari via SIO and provides two 5-pin DIN sockets (female) at the other end, for MIDI OUT and MIDI IN
  (cable must be at end of SIO chain)
- Shipped with several programs on disk
  - 8 track real time sequencer with tempo correction
  - Casio CZ series voice editor (edit and store voices on disk/tape)
  - Yamaha DX 100/21 series voice editor
  - Music player program (Music Computer or Advanced MusicSystem II)
  - DX7 voice editor
  - CZ menu and keyboard split utility
- Extensive review: http://www.page6.org/pd_lib/page6/pd_midimaster.htm

MIDIMaster II, by Gralin International (1992)

- Provides MIDI OUT and MIDI IN ports
- Connects to the Atari via SIO (must be at end of SIO chain)
- Compatible with the earlier MIDI Master by 2 Bit Systems
- Shipped with several programs on disk - updated versions of those shipped with the earlier MIDI Master by 2 Bit Systems

Other MIDI interfaces

Atari MIDI Interface, by Karlheinz Metscher

Appeared in the German magazine Computer Kontakt June/July 1986, pages 69-75, complete with documentation, schematics and its first program "MIDI Receiver"; in Computer Kontakt October/November 1986 appeared the second program, called "MIDI Disk" - a MIDI Recorder and Player program.

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MIDI Interface for Atari XE / XL (public domain project)

- Project published by Ireneusz Kuczek in Elektronika Praktyczna 6/98, p.86-88, see: http://ep.com.pl/files/6133.pdf
- Several versions:
  - Provides MIDI OUT port
  - Provides MIDI OUT and MIDI IN ports
  - Provides two MIDI OUT ports and one MIDI IN port
- Connects to the Atari via SIO (must be at end of SIO chain)
- Software:
  - MIDI Sequencer 1.15, by Maciej Sygit (1993)
  - MPE v2.3 MIDI Pattern Editor, version 2.3, by Radek Sterba (1995)
  - Recorder MIDI ver 1.1, by Ireneusz Kuczek (1997)
  - MIDI-Play v1.3, by Ireneusz Kuczek (1998)
- Project website: http://ixkuczek.republika.pl/ixkuczek.html

MidiJoy, by Phobotron (Frederik Holst), 2014

MidiJoy is a software/interface combination that allows you to use your Atari as a musical instrument. The interface part emulates a USB-MIDI (serial MIDI is optional) device that can be accessed by any kind of instrument as well as sequencer software on a PC or Mac that can output MIDI data. The MidiJoy software receives these data from the interface via the controller jacks and plays them on the POKEY sound-chip. In contrast to most SIO-based MIDI interfaces, a MidiJoy-driven Atari can be used as a live instrument in real time with up to four sound channels simultaneously. At the same time, all POKEY parameters (AUDCTL, AUDC1-4) can be changed on-the-fly as well as activation of ADSR envelopes. Music input can be recorded and saved to disk.
Project website: http://www.phobotron.de/midijoy_en.html

MIDICar, by Błażej Biernat/PTODT
(Polish Society for the Preservation ofTechnical Heritage), 2023

- Plays MIDI files
- Turns your 8-bit Atari into a sequencer for MIDI devices
- Can accept a Serdaco DreamBlaster S2 MIDI Synthesizer
  (Creative Labs Wave Blaster compatible; based on the SAM2695 chip by Dream)
- Transparent for other cartridges & interfaces
- 3D printed case
- Two case variants to fit both XL and XE
- Parallel device: Connection via CART/ECI (XE) or PBI (XL)
- MIDI IN, MIDI OUT, and MIDI THRU sockets
- AUDIO LEFT & RIGHT jacks (for DreamBlaster only)
- SERIAL TTL connector
- LED indicators for MIDI IN & MIDI OUT
- Software: MIDICar Player, by Paweł Banaś
- https://ptodt.org.pl/projekty/projekt-midicar/

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5.2.4) What general-purpose USB interfaces are there for the Atari?

"Universal Serial Bus Specification Revision 1.0" was published January 15, 1996, with industry participation from Compaq, Digital Equipment Corporation, IBM PC Company, Intel, Microsoft, NEC, and Northern Telecom. The specification describes the bus attributes, the protocol definition, types of transactions, bus management, and the programming interface required to design and build systems and peripherals that are compliant with this standard. The USB 1.0 full speed signaling bit rate is 12 Mbit/s; a limited capability low speed signaling mode is also defined at 1.5 Mbit/s. USB 2.0 (2000) added a 480 Mbit/s mode; USB 3.0 (2008) added a 5 Gbit/s mode.

Beginning in 1997 USB ports gradually replaced RS-232 serial and Centronics-type parallel ports on modern personal computers, becoming the primary means for connecting external devices such as a keyboard, mouse, joystick, speaker, microphone, modem, webcam, scanner, printer, or mass storage device.

The MicroUSB Project, https://atariwiki.org/wiki/Wiki.jsp?page=MicroUSB aims to bring a general-purpose USB interface to the 8-bit Atari.

Hardware project
- Project Name: USB Cartridge with two USB Slots
- Project Start: Summer 2002
- Project Member: Marc Brings, Thomas Grasel, Harry Reminder, Florian Dingler, Guus Assmann, Carsten Strotmann

https://atariwiki.org/wiki/Wiki.jsp?page=USB%20Cartridge

Available: Atarimax/ABBUC USB Cartridge, 2006
- A USB host adapter for the Atari 8-bit computers.
- Designed by ABBUC e.V. and manufactured in co-operation with Atarimax.
- Chipset supports communication with both "low speed" and "high speed" USB 1.1 compatible devices.

https://www.atarimax.com/usbcart/documentation/

Software
- Base HID Driver
- USB Device Driver Development Kit Disk
- Atari USB Enduser Driver Disk
- Keyboard Driver
- Digital Joypad Driver
- Logitech Rumblepad 2 USB Driver
- Analog Joystick Driver
- Thrustmaster Steering Wheel Driver
- Logitech GP Steering Wheel Driver
- Logitech VP Steering Wheel Driver
- Speedlink Competition Pro USB

https://sourceforge.net/projects/microusb/files/

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5.3) Local Networking, Classic

5.3.1) How can Atari computers share an SIO chain of peripherals?

Supra MicroNet (developed by MPP, released by Supra) (1985)
Share one SIO chain of peripherals (printers, disk drives, modems) among up to 8 computers. When one computer accesses a peripheral device, the entire bus is occupied so that the other computers on the "network" must wait. The bus is freed five seconds after a computer finishes interacting with the peripheral.
Shipped with modified Atari DOS 2.5 to support busy disk retry. For sharing a printer, a printer buffer such as the MPP/Supra MicroStuffer for each computer is recommended.
Reviewed:
http://www.atarimagazines.com/v4n10/productreviews.html

CSS Deluxe Quintopus (1989)
Can be used to "share" up to 4 SIO device chains between two computers. Unit includes 2 switched SIO ports and 4 unswitched SIO ports. Two computers can be connected to the two switched ports, but in this scenario only one of the switched ports can be switched on at a time.
http://www.nleaudio.com/css/products/quintopus.htm
(The standard Quintopus is identical except with only unswitched ports.)

Automatisches 2-Rechnerinterface = Automatic 2-Computer Interface (A2RI)
© 1994 by Thomas Grasel for the ABBUC Regionalgruppe Frankfurt / Main (RAF) Share one SIO chain of peripherals (printers, disk drives, modems) between two computers. When one computer accesses a peripheral device, the entire bus is occupied so that the other computer must wait. The bus is freed about one second after a computer finishes interacting with the peripheral.
https://www.mathyvannisselroy.nl/2r_bauan.PDF

5.3.2) How can I set up a local area network of Atari computers?

CSS Multiplexer ("MUX") (1989?)
Description from the CSS online catalog:
The Multiplexer is a collection of cartridge interface boards that allow up to 8 Ataris to read and write to the same drives (typically a hard disk), access the same printer(s), and talk to each other. It is the first practical networking system for the Atari 8-bit computer.
One "master" computer (any 8-bit) is equipped with the master Multiplexer interface. Then up to 8 "slave" computers hook up to this master, each having their own slave interface. The slave interface consists of a cartridge that plugs into the cartridge port. It has its own socket on the top so you can use whatever cartridges you desire with the system.

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The "common" peripherals (things that are to be shared) are connected to the master. On each slave, all disk and printer I/O is routed through the master so no extra disk drives are needed. The master computer can be configured in any manner you wish. You may have certain peripherals local to the slave or routed to a different number on the master.
Note that serial ports (R: RS-232 interfaces) are not multiplexed. All slaves are independent and do not need to have the same program running on them.
http://www.nleaudio.com/css/products/multiplexer.htm

GameLink and GameLink-II
Two hardware designs by **Chuck Steinman** of DataQue support the linking of two or more Atari computers. Each supports multiple user head-to-head gaming where each player uses a separate computer (each with separate TV/monitor).

(GameLink and GameLink-II descriptions by **Andreas Koch**)

- **GameLink**: This hardware was developed in 1989/90. It links two computers together via the controller jacks. It is limited to a maximum of 2 computers and thus 2 or 6 players, meaning one free port per XL/XE computer and 3 free ports per 400/800 computer. However, the few existing games for this hardware merely support 2 players.
- **GameLink-II**: This hardware was developed in 1991/92. It links 2 to 8 computers together via the SIO ports. One computer will then act as the master and has to boot up the software (from tape, disk, hard disk, etc.) first. Then all other "slave" computers connect to it and boot off of this master computer (one after another of course). In Europe we call this device "Multilink", mostly because of the games written by Bewesoft (**Jiri Bernasek**) called Multi-Dash, Multi-Race, Multi-Worms. A two-computer network can easily be done with one SIO cable, just open the end of the SIO cable and exchange cables number 3 and 5. You now have an easy two computer (2-4 players) network cable.

For some available software for hardware such as GameLink and GameLink-II please another section of this FAQ list, "What programs support Atari computer networking?"

AT-Link (Alphasys)
Arianne Slaager writes:
I was actually surprised to read about the GameLink, as I made a similar cable myself, called the AT-Link. This cable could also be used to communicate with Commodore 64 computers, and I made driver software for both systems at the time. There were 2 drivers. One as relocatable machine code, and another as device driver.
Also in the package was a 2 player Battleships type game where Side A had the Atari version, and Side B the Commodore 64 version.
...wasn't more than two old joystick cables in a crosslink configuration, (Pin 1 and 2 linked to pin 3 and 4 of the other cable respectively)

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EightLink (Alphasys)
Arianne Slaager writes:
I also made a special high-speed Atari to Atari cable, called the EightLink. This one was cartridge-based system, with a PIA inside, which boasted a 8-bit bidirectional, parallel databus, and a 4-bit crosslinked control bus.
Transfer speeds were such that two Ataris on opposite ends of a large hall could transfer disk data faster than it could be read or written. The actual cable connecting the two was a ribbon cable with 33 leads, alternating ground and a dataline across the width to minimize crossover disruption of data.
Also for this link system, I made drivers both in relocatable code, as well as a device driver.

5.3.3) How do I transfer files between computers by null modem cable?

A null modem cable can be used to transfer files between two computers that are physically near enough to each other to be connected by a cable. The cable has an RS-232 serial connector at both ends, for connecting to RS-232 Data Terminal Equipment (DTE) serial ports on both computers.

Minimally, the null modem cable contains just three connections: transmit data (TD or XMT), receive data (RD or RCV), and ground (GND), with the transmit and receive data pins crossed between the two ends of the cable. A null modem with these three lines is suitable for connections of up to 4800 bps. For faster connections, requiring hardware flow control, more pins must be connected, and additional lines crossed, between ends of the cable.

Null modem DTE-to-DTE wiring diagrams for DB-25 to DB-25 and for DE-9 to DE-9 standard RS-232 serial ports are available at https://en.wikipedia.org/wiki/Null_modem

The proprietary pinouts for the RS-232 DTE serial ports of the Atari 850 Interface are provided elsewhere in this FAQ list.

The Atari CX88 Terminal Cable (DE-9P to DB-25P) is a null modem cable for use between a serial port of the Atari 850 interface and a DTE device (computer) with a standard RS-232 DB-25S serial port.

Note, however, that the standard RS-232 serial port on a PC is not DB-25S, but either DE-9P or DB-25P. So, a standard gender changer, and possibly a standard DE-9 to DB-25 adapter, would be needed between the cable and the PC if using the Atari CX88 Terminal Cable as a null modem cable between the Atari 850 and a PC.

Terminal telecommunications software, designed to connect to a remote computer through an RS-232 serial modem connected to a standard phone line, and which supports standard file transfer protocols such as XMODEM, YMODEM, or ZMODEM, is run on both computers. Programs supporting XMODEM, YMODEM, or ZMODEM that are listed in another section of this FAQ list, "What noncommercial telecommunications programs are there?", are suitable for this purpose on the Atari.

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5.4) Local Networking, Modern

5.4.1) How can I connect my Atari to an Ethernet network?

Wikipedia:
Ethernet is a family of wired computer networking technologies commonly used in local area networks (LAN), metropolitan area networks (MAN) and wide area networks (WAN). It was commercially introduced in 1980 and first standardized in 1983 as IEEE 802.3.
Over time, Ethernet largely replaced competing wired LAN technologies such as Token Ring, FDDI and ARCNET.

This section lists projects to connect the Atari computer directly to a high-speed Ethernet network, with direct Internet connectivity.

Dragon Cart (Atari 8-Bit Ethernet Project) by Chris Martin, Mark Dusko
This is an open-source project, so you would have to build your own interface.
http://www.atari8ethernet.com/

Dracarys Ethernet device
Upcoming XL PBI or XE ECI parallel device. A cooperation between Glenn Jones, the manufacturer of Apple II Ethernet cards, and Oliver Schmidt, author of Contiki OS and IP65 for computers including the Atari. (Contiki and IP65 support both the Dragon Cart and the Dracarys device.)

There will be two variants - one for the XL PBI and one (a bit later) for the XE ECI. Both will have a pass-through design allowing to plug in another PBI/ECI device (or a cartridge on the XE).

https://atariage.com/forums/topic/287376-preannouncement-dragon-cart-ii/

5.4.2) How can I pair my Atari with another device using Bluetooth?

Wikipedia (2021): Bluetooth (BT) is a short-range wireless technology standard that is used for exchanging data between fixed and mobile devices over short distances and building personal area networks (PANs). It was originally conceived as a wireless alternative to RS-232 data cables. It is mainly used as an alternative to wire connections, to exchange files between nearby portable devices and connect cell phones and music players with wireless headphones. Bluetooth is managed by the Bluetooth Special Interest Group (SIG). (The IEEE standardized Bluetooth as IEEE 802.15.1, but no longer maintains the standard.)

Solutions listed in this section involve establishing a wireless Bluetooth connection between the Atari and another device. If the other device has Internet access, solutions listed here may provide the Atari with direct Internet connectivity.

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SIO2BT, by Marcin Sochacki (Montezuma), 2014-2016

- Uses SPP (Bluetooth Serial Port Profile)
  - Supported by Windows, Linux, Android; not supported by iOS
- Hardware project options:
  - External (Bluetooth dongle)
    - Not for use with other, real SIO devices
  - SIO2SD + BT combo device
  - Internal
- Modifications to the Atari OS are required for Bluetooth timing support
  - Provided PC tool SIO2BT_OS_Patcher.jar can be used to patch:
    - Atari OS ROM files (for Atari 800 and Atari XL/XE)
      Can force a "coldstart" with the [SHIFT] + [RESET] key combination.
    - Highspeed SIO patch for XL OS and MyIDE OS by HiassofT
    - The QMEG+OS 4.04 ROM file
      Can toggle with the TAB key between WARM and COLD reset settings.
  - The Atari XL OS (not the 400/800 OS) can also be patched at runtime.
    - Disk images provided for loading a game as D2: after OS patch: 600XL.atr, 1200XL(a).atr, 1200XL(b).atr, XL_XE_XEGS.atr.
    - Disk images provided for loading ATR games as D1: after OS patch: 600XL_SWAP.atr, 1200XL(a)_SWAP.atr, 1200XL(b)_SWAP.atr, XL_XE_XEGS_SWAP.atr
    - XBIOS loader for Bluetooth, two versions provided:
      XBIOS4BT_700.atr loads at $700
      XBIOS4BT_400.atr loads at $400
      xBIOS original version by xxl: https://xxl.atari.pl/
- Provides the Atari with an N: Networking device for Internet connectivity
- Provides the Atari with an E: Smart device. Supported commands include:
  - Get Time (APETIME compatible)
  - URL Submission
- Ultimate 1MB and Incognito firmware support for SIO2BT
  - The "SIO Driver" activates a serial I/O handler in the PBI BIOS which can be used with the SIO2BT device at any of three different baud rates:
    19.2 kbit/s, 38.4 kbit/s, or 57.6 kbit/s
- MyIDE II support for SIO2BT
  - SIO code supports Bluetooth communication with the following baud rates:
    57,600 bit/s, 38,400 bit/s, 19,200 bit/s
- Bluetooth Module software utilities provided for the Atari for configuration of baud rate, Bluetooth friendly name and the PIN code:
  - BTCONFIG.XEX - by Mr.Atari
  - btcfg.com - SpartaDOS X command line utility by **Jonathan Halliday**
- Compatible with SIO device emulators including SIO2BSD, RespeQt, SIO2BT Android App, AspeQt Android App
- SpartaDOS X support for SIO2BT
  - SDX native SIO can support SIO2BT using the SIOSET command:
    - Increased timeout setting
    - Specific disk baud rate is configurable
  - SDX can also use Atari OS native SIO code patched for SIO2BT
- LiteDOS-SE support for SIO2BT
  - 19.2 kbit/s Bluetooth support

http://abbuc.de/~montezuma/index.html#SIO2BT

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FujiNet, by Thomas Cherryhomes and others, 2019-

- Espressif Systems ESP32-WROVER module for Bluetooth connectivity
- Connectivity: Built-in SIO connector
- SIO port for daisy chain
- Provides the Atari with an SIO2BT compatible Bluetooth connection
  - NOTE: As of FujiNet Version `0.5.cec57d6a` firmware, Bluetooth / SIO2BT mode has been removed until the developers can implement a smaller BT stack.
  - FujiNet remains listed here in recognition of previous and planned future versions with Bluetooth / SIO2BT support.
- Provides the Atari with an N: Networking device for Internet connectivity (SIO2BT compatible)
- APETIME Real Time Clock (NTP)

https://fujinet.online/

5.4.3) How can I connect my Atari to a Wi-Fi network?

Wikipedia (2021): Wi-Fi is a family of wireless network protocols, based on the IEEE 802.11 family of standards, which are commonly used for local area networking of devices and Internet access, allowing nearby digital devices to exchange data by radio waves.

FujiNet, by Thomas Cherryhomes and others, 2019-

- Espressif Systems ESP32-WROVER module for Wi-Fi connectivity
- Connectivity: Built-in SIO connector
- SIO port for daisy chain
- Provides the Atari with an N: Networking device for Internet connectivity (SIO2BT compatible)
- APETIME Real Time Clock (NTP)

https://fujinet.online/

Available:
https://thebrewingacademy.com/
https://www.sellmyretro.com/user/profile/zaxon
https://miscretro.com/product/fujinet-1-3/

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Chapter 6

Hardware upgrades, enhancements & accessories

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6.1) Graphics Enhancements

6.1.1) What is the Atari XEP80 Interface Module?

The **Atari XEP80 Interface** connects to controller jack #1 or #2 on the Atari computer and provides the system with:

- An 80-column Video Display Controller with phono output jack, carrying a monochrome composite video signal which can be either 60 Hz (NTSC compatible) or 50 Hz (PAL/SECAM compatible), selectable in software.
- A Parallel Printer Port (Centronics output interface)

Note that the XEP80 does not include provision for audio.

Video display controller
The XEP80 video hardware generates an 80 column by 25 line text display through a video connector/cable plugged into a separately purchased monitor. The monitor can be any Composite Video input type, although for the best display a monochrome is strongly advised.

Internally, the XEP80 is a 256 character wide by 25 line high storage device with an 80 column wide display window. Characters may be placed anywhere within the device independent of the window location. The window may be scrolled across the 256 column wide field.

Optionally, the XEP80 may be placed into Pixel Graphics mode. This mode supports a bit mapped (pixel) screen of 320 dots (40 bytes) horizontal by 200 dots (lines) vertical. The output window displayed is approximately half the size of the text window.

The XEP80's composite video signal contains more horizontal scan lines per field than are used in NTSC or PAL/SECAM color broadcast, composite video, or Y/C video (S-video) signals. The XEP80 outputs 250 scan lines of video per field for the 60 Hz signal compared to the NTSC standard of 243, or 300 scan lines of video for the 50 Hz signal compared to the PAL standard of 288. Thus the XEP80's output was ideal for high-resolution CRT-based monochrome composite video monitors of the time, but settings on color televisions and monitors must typically be adjusted, if possible, in order for the entire video output signal to be viewable on the screen.

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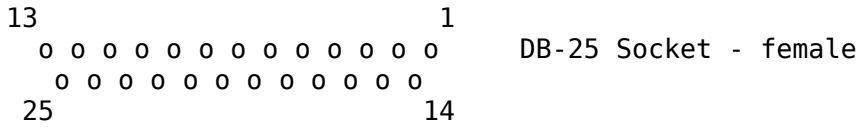
Parallel port
The XEP80 supports a functional subset of the Centronics or PC parallel printer interface (standards introduced elsewhere in this FAQ list), using the IBM PC standard (1981) connector. Note that the Atari Operating System resident P: device handler does not support a printer attached via controller jack, so a substitute P: handler must be installed in RAM in order for Atari software to recognize the XEP80 parallel port for printing.



1.	/Strobe	**11.**	Busy
2-9.	Parallel Data	**12-17.**	Not Used
10.	Not Used	**18-25.**	Ground

Software
The XEP80 Handler and Relocator is provided on diskette in the form of a DOS binary file named AUTORUN.SYS. This file is automatically loaded into memory and initialized by the DOS at boot (power on) time.

Contents of the XEP80 Boot Disk: (DX5087)

Program	Description
DOS.SYS	DOS 2.5 File Management Subsystem (FMS)
DUP.SYS	DOS 2.5 Disk Utility Package (DUP)
AUTORUN.SYS	XEP80 Handler and Relocator (1)
RELOC.SRC	Relocater in assembly source
XEP80HAN.SRC	Handler in assembly source
DEMO80.BAS	Demonstrates overall XEP80 features
MAKER.BAS	Program to generate an AUTORUN.SYS from a custom-made Handler
ATRIBUTE.BAS	Demonstrates special text features
WINDOW.BAS	Demonstrates the 256-character wide window
EIGHTY.BAS	Displays a spreadsheet-like grid using the full XEP80 display
GRAPHICS.BAS	Demonstrates graphics capability by drawing a sphere on screen
PRINTER.BAS	Program to revise the default printer port configuration
XEP80.DOC	Product Specification For XEP80 hardware and software

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(1) Substitute versions for three OS-resident device handlers:

- S: Display Handler
- E: Screen Editor
  Designed to be compatible with the standard E: device but for the XEP80 80-column screen display.
- P: Printer.
  Default configuration supports 8 different printer devices:
  - P1: XEP80 parallel port
  - P2: 850 Interface Module parallel port (e.g., Atari 825)
  - P3: 1025 Printer
  - P4: 1020 Color Plotter
  - P5: 1027 Printer
  - P6: 1029 Printer
  - P7: XMM801 Printer
  - P8: XDM121 Printer

  The handler interprets P: (no device number) to mean, P1:

Hold down [SHIFT] while loading the XEP80 Handler and Relocator (AUTORUN.SYS) to load the P: handler but not the S: and E: handlers (use the XEP80 for its parallel printer port only).

The key engineer/designer of the XEP80 was **Jose A. Valdes** at Atari. **Lane Winner** was software developer for the XEP80 at Atari. The XEP80 was made in Taiwan.

Power: Requires 9V DC as supplied by the Atari C010472, C016353, or C018084 power adapters or equivalent. Current draw: 400mA.

Manual: Atari XEP80 Interface Module Owner's Manual C100542-001 C026416-0B1 (1987)

6.1.2) What other graphics enhancements are there for the Atari?

Full-View 80, by Bit 3 Computer Corporation (1982)

- Plugs into RAM slot 3 (rear slot) of the Atari 800
- Composite video output
  Recommended: Display monitor having a minimum bandwidth of 10 MHz
- 80 x 24 character display (no graphics modes)
- Characters are in a 8 x 10 matrix with full lowercase descenders
- Total screen resolution: 640 x 240 pixels
- At launch, supporting software included:
  - Atari BASIC, BASIC A+, OS/A+, EASMD, Microsoft BASIC (mostly), Atari Pascal, Atari Assembler Editor, Atari Macro Assembler (mostly); 80 column versions of: LJK Letter Perfect, Data Perfect, Edit 6502

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Compu-Mate CM-1000/V (1982) - Shipped?

- Includes 80 column video display generator
- Connects to computer video monitor port
- Also promoted: CM-10/V kit to upgrade the CM-1000 to a CM-1000/V

Austin 80, by Austin Franklin Associates (1983)

- Video Processor Board plugs into RAM slot 3 (rear slot) of the Atari 800; Console Software cartridge plugs into right cartridge slot of the Atari 800
- Composite video output; Recommended: Display monitor having a minimum bandwidth of 10 MHz
- 4 RGBI color output bits
- Optional: RGBI Adapter Board for use with (color) RGB monitor
- 80 x 25 character screen (no graphics modes)
- 7 x 9 character size in a 8 x 10 block, with full descenders
- Sold separately by Austin Franklin in support of the Austin 80:
  - SWP 64K ATR8000 with CP/M 2.2;
  - MPP Smart Terminal;
  - 80 column versions of: LJK Letter Perfect, Data Perfect;
  - Austin 80 Console Software

XEP80 Interface Module, by Atari (1986)

- Plugs into controller jack #1 or #2
- Composite video output (high resolution monochrome recommended)
- Software driver on diskette
- 80 x 25 character screen (internal 256 x 25 character storage area)
- 7 x 10 character cells
- 320 x 200 Pixel Graphics mode
- See XEP80 section of this FAQ list for additional details

VBXE - VideoBoard XE

- First release: Version 1.2 by Tomasz Piorek (Electron/TQA) (2008)
- Versions 2.0 (2009) and 2.1 (2013) by **Sebastian Bartkowicz (Candle'O'Sin)**
- For Atari XL/XE
- Board mounts in the Atari in place of the ANTIC chip, which is moved to the VBXE board. Additional connections must be made between the VBXE board and the Atari motherboard as well.
- Functions like GTIA, though GTIA remains functional as well
- Provides RGB output (DE-9 or SCART connector options)
- Up to 1,024 colors on screen from 21-bit palette
- Graphics resolution up to:
  - 640x480i (640x240p) in 64 colors
  - 320x240p in 1024 colors
  - 160x240p in 1024
- True 80 character mode for text display

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- Blitter with 7 modes of operations capable of zooming displayed data, transparency, collision detection and many other features
- Fully downward compatible with GTIA chip
- VBXE 2.1 for XE available: http://lotharek.pl/product.php?pid=82
- VBXE 2.1 for XL available: http://lotharek.pl/product.php?pid=106
- VBXE software production list: http://gury.atari8.info/vbxe_prod.php

XEP80-II, by Michael St. Pierre (MyTek), 2021

- Modern reinvention of the XEP80 video display controller
- XEP80-II Main Board
  - Based on the National NS405 Terminal Management Processor (TMP) IC
  - 80-character wide by 24-line text display (640 x 240 resolution)
  - Compatible with software designed for the Atari XEP80 video output
  - Works with any software that uses the E: device for screen output, assuming the 80-column driver is present
  - 15 kHz CVBS output with HDMI option via Daughter Board
  - NTSC (can do PAL same as original Atari XEP80 with a supporting driver)
  - Serial communication is via 2-wire transmit and receive pins, utilizing bit-banged joystick I/O pins as the interface to the Atari (same as the original XEP80)
- AV-to-HDMI Daughter Board: WiiStar WS-Z51
  - Interfaces Atari standard video, Atari audio, and XEP80-II video to HDMI
- Original Atari XEP80's 320x200 graphics capability is not supported.
- Hardware designs and software: https://ataribits.weebly.com/xep80-ii.html
- Assembled and kit available: https://thebrewingacademy.com/

Atari 400 CPU and S-Video Card, by 5cFabrication, 2022

- Upgrades the Atari 400 to provide an S-Video output
- Utilizes a THS7314 filter/amplifier to create separate Luma and Chroma signals
- Replaces the CPU/Video card
- Supports both the 6502B and 6502C Sally processors
- Includes a 5-pin DIN cable, Atari XL/XE compatible, to connect to a television
- Includes a built-in audio amplifier for both POKEY and SIO audio
- RF output is disabled once this card is installed
- Video is NTSC
- Available: https://5cfab.com/product/atari-400-cpu-s-video/

Atari 600XL S-Video Card Parts Kit, by 5cFabrication, 2022

- Requires soldering and cutting a hole in the case where the RF switch is located
- Contains all components and instructions to install S-Video in the Atari 600XL using 2 jumper wires and OEM pads and lands already available on the system board
- Available: https://5cfab.com/product/atari-600xl-s-video/

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6.2) What are the power requirements for my Atari components?

Some of the pictures were scraped from various Internet web sites by MC;
Some of the pics are originals by: MC (generally, common 120V supplies),
Laurent Delsarte (many of the 220V supplies, the 16804, the 9W CX261, the C017945/566T, the C060529), Wood_JL ("Black Brick"), Dan of (http://www.southtown-homebrew.com/) (830 supply), Dean Rambler (C062195), E. Turner (C060479), Fred Meijer (C061763-107), Klas Olsson (FW6799), John S (C070046-01)

The household "mains" electricity supply is an alternating current (AC) that can be described with two parameters: the voltage (in volts) and the frequency (in Hz).

In North America, the standard household wall outlet offers 120 V/60 Hz AC power.
The rest of the world uses various AC standards including 230 V/50 Hz (UK/Europe), 220 V/50 Hz, 240 V/50 Hz, 110 V/60 Hz, 110 V/50 Hz, 127 V/60 Hz (parts of Brazil), 100 V/50 Hz (parts of Japan), and 100 V/60 Hz (other parts of Japan).
Here is the Wikipedia article listing current household power outlet standards in use around the world:
http://en.wikipedia.org/wiki/Mains_electricity_by_country

In the time of 8-bit Atari computers and peripherals, North America used 120 V/60 Hz, most of continental Europe used 220 V/50 Hz, and the UK used 240 V/50 Hz.

In any case, the household alternating current must be converted to a direct current (DC) for use by electrical devices such as Atari computers and peripherals:

- In some cases, the entire conversion is done via an external "power supply" that sits between the wall outlet and the electrical device. Such power supplies both transform the household power to a lower voltage, and they also rectify the current from AC to DC.
- In some cases, the external "power supply" is simply a transformer that lowers the household voltage. The lowered AC voltage is rectified to DC inside the device.
- In some cases, both the transformer and the rectifier are located inside the computer or peripheral itself. The device plugs directly into the wall outlet, with no external "power supply" needed.

The INPUT of an external power supply will indicate:
1. Input voltage in units of volts (120V for North America, 240V UK, 220V Europe)
2. Input frequency in units of hertz (60 Hz for North America, 50 Hz UK/Europe)
3. Peak power rating. The power rating is the highest amount of power the unit can supply, according to the manufacturer, but this is only for a very brief time. This peak power rating may be indicated in units of volt-amperes (VA) or in units of watts (W).

The OUTPUT of an external power supply will indicate:
1. Output voltage, in units of volts (V)
2. Whether the output voltage is AC or DC
3. Either:
   - Sustained output current, in units of amperes (A) or milliamperes (mA)
   - Sustained output power, in units of volt-amperes (VA) or watts (W)

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Higher-than-specified sustained power and current capacities are entirely usable, and often preferable because such supplies run cooler and last longer.

The power units W (watts) and VA (volt-amperes) are not identical:

Direct Current (DC):

Power (in watts) = current (in amperes) * voltage (in volts)

Alternating Current (AC):

Apparent Power (in volt-amperes) = current (in amperes) * voltage (in volts)

Effective/True Power (in watts) = current (in amperes) * voltage (in volts) * cosine(phase, or angle of lag) [1]

(1) cosine(phase) is known as the "power factor"

The following are details of original equipment external power supplies for use with 8-bit Atari computers and peripherals in Atari's major markets of USA/Canada, UK, and Western Europe. The XEP80 and SX212 power requirements are the same as for the Atari 2600, so 2600 original equipment power supplies for the same markets are also documented here.

Apparently inconsistent typography for the rest of this section matches what is printed on the units themselves.

6.2.1) USA/Canada (Input: 120V AC / 60 Hz)

6.2.1.1) AC supplies (external transformers)

Atari#: C014319 (unit) / CA014748 (order#)
"Power Supply"
Note: This rare unit is much smaller than the common C014319 version!
990N, Made in Sunnyvale, CA
Input: 120 VAC 60 Hz
Output: 9 VAC 1.7 Amps
Shipped with (1979-1980): 400, 800, 810 (no Data Separator), 822, 850
Also works with: 1010, 1020
https://mcurrent.name/powersupplies/14319-early-bottom.jpg
https://mcurrent.name/powersupplies/14319-early-top.jpg
https://mcurrent.name/powersupplies/14319-box.jpg (box version 1)
https://mcurrent.name/powersupplies/14748-usa.jpg (box version 2)

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Atari#: C014319 (unit) / CA014748 (order#)
"Power Supply"
UL Listed: 205E, Made in Sunnyvale CA
Input: 120 VAC 60 Hz 20W (early units) (example: 4080)
Input: 120 VAC 60 Hz 18.5W (most units) (examples: 4881, 182, 582)
Output: 9 VAC 15.3 VA
Shipped with (1980-1981 20W units): 400, 800, 810 (no Data Separator), 822, 850
Shipped with (1981-1982 18.5W units): 400, 800, 822, 850
Also works with: 1010, 1020
https://mcurrent.name/powersupplies/14319-alt-bottom.jpg (20W)
https://mcurrent.name/powersupplies/14319-bottom.jpg (18.5W)
https://mcurrent.name/powersupplies/14319-top.jpg
https://mcurrent.name/powersupplies/14319-box.jpg (box version 1)
https://mcurrent.name/powersupplies/14748-usa.jpg (box version 2)

Atari#: C016804 (unit) / CA017964 (order#)
"Class 2 Transformer"
UL Listed: 622T, Made in Taiwan. (examples: 6/81-11/81)
Input: 120V 60 Hz
Output: 9V AC 31 VA
Shipped with (1981-1982): 810 (with Data Separator)
Use with: 400, 800, 810, 822, 850, 1200XL, 1010, 1020, 1050, XF551, PCF554
https://mcurrent.name/powersupplies/16804-bottom.jpg
https://mcurrent.name/powersupplies/16804-top.jpg

Atari#: C017945 (unit) / CA017964 (order#) / CA014748 (order#)
"AC Adaptor"
"For Use With Atari 400/800 Personal Computer System" (top)
Note: This unit is the size/shape of the C014319 unit it replaced
UL Listed: 205E, Made in Sunnyvale, CA. (example: 782)
Input: 120 VAC 60 Hz 40 watts
Output: 9 VAC 3.4 AMP
Shipped with (mid-1982): 400, 800, 810, 822, 850
Use with: 400, 800, 810, 822, 850, 1200XL, 1010, 1020, 1050, XF551, PCF554
https://mcurrent.name/powersupplies/17945-early-bottom.jpg
https://mcurrent.name/powersupplies/17945-early-top.jpg

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Atari#: C017945 (unit) / CA017964 (order#) / CA014748 (order#)
"Power Supply"
"For Use With Atari 400/800 Personal Computer System" (top, 566T units)
UL Listed: 566T (uncommon/rare), Made in Japan (earlier units) or Taiwan or 771K (very common), Made in Taiwan (example dates: 8239 - 388)
Input: 120V 60 Hz 50W
Output: 9V AC 31 VA
771K units shipped with: 810 (Analog), 1200XL, 1050, XF551, PCF554
- Also shipped with Trak disk drives. Top: "Trak Microcomputer Corp."

566T units shipped with: 1020
Use with: 400, 800, 810, 822, 850, 1200XL, 1010, 1020, 1050, XF551, PCF554
https://mcurrent.name/powersupplies/17945-bottom.jpg
https://mcurrent.name/powersupplies/17945-top.jpg
https://mcurrent.name/powersupplies/17945-top-trak.jpg
https://mcurrent.name/powersupplies/17945-566T-bottom-japan.jpg
https://mcurrent.name/powersupplies/17945-566T-bottom.jpg
https://mcurrent.name/powersupplies/17945-566T-top.jpg
https://mcurrent.name/powersupplies/17964-usa.jpg (box)

Novation 901017 (unit) / Atari#: CA016751-01
Top: "Use with 830 Modem Only"
Bottom: "Novation AC Adaptor"
UL Listed: 883K, Made in Taiwan
Type: DV 2040
Input: 117V AC 60 Hz 15W
Output: 20V AC 400 mA
Shipped with: 830
https://mcurrent.name/powersupplies/901017-bottom.jpg
https://mcurrent.name/powersupplies/901017-top.jpg

Atari#: C060479 (unit) / Atari#: CA060535 (box)
Box: "Power Adaptor"
Top: "Use with 835 Modem Only"
Bottom: "Power Supply For Use With Modem"
UL Listed: 51B9, Made in USA
Input: 120 VAC 60 Hz 9 watts (unit) / 120 V.A.C. 60 Hz (box)
Output: 20 VAC 330 mA (unit) / 20 V.A.C. 164 M.A. (box)
Shipped with: CX488 Communicator II kit
https://mcurrent.name/powersupplies/60479-bottom.jpg
https://mcurrent.name/powersupplies/60479-top.jpg
https://mcurrent.name/powersupplies/60535.jpg

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Atari#: C061515
"For Use With Atari 1010 Program Recorder" (top)
"Plug-In Power Supply" (bottom)
UL Listed: 18J5, Made in Japan
Input: 120V 60 Hz 8 W
Output: 9V AC 5 VA
Shipped with: 1010
https://mcurrent.name/powersupplies/61515-bottom.jpg
https://mcurrent.name/powersupplies/61515-top.jpg

Atari#: C061516
"Plug in Power Supply" (bottom)
"For Use With Atari Inc. Model 1010 Program Recorder" (bottom)
UL Listed: 187Z (08-83) or 34J2 (11-83), Made in Hong Kong
Input: 120 VAC 60 Hz 7.5 VA
Output: 9 VAC 500 MA
Shipped with: 1010
https://mcurrent.name/powersupplies/61516-bottom-187Z.jpg
https://mcurrent.name/powersupplies/61516-bottom-34J2.jpg
https://mcurrent.name/powersupplies/61516-top.jpg

Atari#: C061636 (unit)
"Power Supply" (unit) / "Power Adaptor" (box)
UL Listed: 566T, Made in Japan
Input: 120V 60 Hz 60W
Output: 9.5V AC 40VA
Shipped with: 1027
https://mcurrent.name/powersupplies/61636-alt-bottom.jpg
https://mcurrent.name/powersupplies/61636-alt-top+box.jpg

Atari#: C061636 (unit/box)
"Power Supply" (unit) / "Power Adaptor" (box)
UL Listed: 771K, Made in Taiwan
Input: 120V 60 Hz 53W (unit/box)
Output: 9.5V AC 4.2A (unit/box)
Use with: 1027
https://mcurrent.name/powersupplies/61636-bottom.jpg
https://mcurrent.name/powersupplies/61636-top+box.jpg

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Atari#: C062195
"Power Adaptor" "For Use With 1030 Modem Only"
UL Listed: 967Z, Made in Taiwan
Type: DV-9750
Input: 120VAC 60 Hz 12VA
Output: 9VAC 5.4VA
Shipped with: 1030
https://mcurrent.name/powersupplies/62195-top.jpg
https://mcurrent.name/powersupplies/62195-bottom.jpg

6.2.1.2) DC power supplies (external adapters)

Atari#: C061982 (nicknames: Type I, White Brick, Beauty Queen)
XL colors (light top, dark bottom), "ATARI Power Supply" on top
"Power Supply"
UL Listed: 34J2, Made in Hong Kong
Input: 120V AC 60 Hz 30W
Output: 5V DC 1.5AMP
Shipped with: 600XL, 800XL (1983 units)
Use with/Recommended for: 600XL, 800XL, 65XE, 130XE, XEgs
https://mcurrent.name/powersupplies/61982-White_Brick-bottom.jpg
https://mcurrent.name/powersupplies/61982-White_Brick-top.jpg

Atari#: C061982 (nicknames: Type II, Ingot, Ugly Klunker)
"Power Supply"
UL Listed: 94H6, Made in Taiwan
Type: DV-512CM
Input: 120V AC 60 Hz 40W
Output: +5V DC 1.5A
Shipped with: 600XL, 800XL (1983-1984 units by Atari, Inc.)
Works with/NOT recommended for: 600XL, 800XL, 65XE, 130XE, XEgs
This unit is known for its ability to fail in such a way that it can damage your computer.
https://mcurrent.name/powersupplies/61982-Ingot.jpg

Atari#: C061982 (nicknames: Type III, Black Brick, Black Beauty)
All black; top up-left: "For Use On Atari 600XL Atari 800XL" or Atari logo
"Power Supply"
UL Listed: 94H6, Made in Taiwan
Type: DV-512CM
Input: 120V AC 60 Hz 40W
Output: +5V DC 1.5A
Shipped with: 600XL, 800XL (later 1984 units by Atari, Corp.)
Use with/Recommended for: 600XL, 800XL, 65XE, 130XE, XEgs
https://mcurrent.name/powersupplies/61982-Black_Brick-bottom.jpg
https://mcurrent.name/powersupplies/61982-Black_Brick-bottom-label.jpg
https://mcurrent.name/powersupplies/61982-Black_Brick-top.jpg
https://mcurrent.name/powersupplies/61982-Black_Brick-top-alt.jpg

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Atari#: C061982 (nicknames: Type IV, Box, Peanut)
"Power Supply"
UL Listed: 771K, Made in Taiwan
Type: SA R05-18
Input: 120V~60 Hz 25W
Output: 5V-1.5A 7.5VA
Shipped with: 800XL (1985 units), 130XE
Use with: 600XL, 800XL, 65XE, 130XE, XEgs
https://mcurrent.name/powersupplies/61982-Box.jpg

Atari#: C070042-011 (nickname: "Mini")
"Power Supply"
UL Listed: 94H6, Made in Taiwan (example dates: 0285, 3587)
Type: DV-51AAT
Input: 120V AC 60 Hz 17W
Output: +5V DC 1A
Shipped with: 65XE (earlier), XEgs (earlier/most)
Use with: 65XE, 130XE, XEgs
Considered not as rugged as the C070042-01 "Logo" unit.
https://mcurrent.name/powersupplies/70042-011.jpg

Atari#: C070042-01 (nickname: "Logo")
Atari logo molded into case, at lower-left of top
"Power Supply" ; "For Use With Atari Computer"
UL Listed: 13JS, Made in Singapore (example date: 4-87)
Input: 117V 60 Hz 22VA
Output: 5VDC 1A
Shipped with: 65XE (later/most), XEgs (later)
Use with: 65XE, 130XE, XEgs
https://mcurrent.name/powersupplies/70042-01-bottom.jpg
https://mcurrent.name/powersupplies/70042-01-top.jpg

Atari#: C010472 (unit/box, 1977-1978)
Gray with black lettering; square shape
"Atari, Inc. Los Gatos, CA" "Power Supply"
UL Listed: 205E, Made in USA. (Examples: 377, 387, 497)
Input: 120V 60 Hz 9W
Output: 9VDC 500MA (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003, 99713, 99729
https://mcurrent.name/powersupplies/10472-205E.jpg

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Atari#: C010472 (unit/box, 1977-1978)
Black with white lettering; slightly curved shape
"Sunnyvale CA. USA." "Power Supply"
UL Listed: 118D, Made in Mexico (example: 11 77)
Input: 120 VAC 60 HZ 10 watts
Output: 9 VDC @ 500 MA. (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003, 99713, 99729
https://mcurrent.name/powersupplies/10472-118D-bottom.jpg
https://mcurrent.name/powersupplies/10472-118D-top.jpg

Atari#: C010472 (unit/box) / CA014034 (box)
"Sunnyvale, CA. USA." "Power Supply" square shape
Two versions:

- Beige with black lettering (examples: 0777, 1177)
- Black with metallic lettering (example: 479)

UL Listed: ???? 998N ????. Black version: Assembled in Mexico
Type: B-355
Input: 120 VAC 60 HZ 8 W
Output: 9.0 VDC 500 MA (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003, 99713, 99729
https://mcurrent.name/powersupplies/10472-B-355-beige-bottom.jpg
https://mcurrent.name/powersupplies/10472-B-355-beige-top.jpg
https://mcurrent.name/powersupplies/10472-B-355-black-bottom.jpg
https://mcurrent.name/powersupplies/10472-B-355-black-top.jpg

Atari#: C010472 (unit) / CA014034 (box)
Model DC-950 or Model DC-950B "AC Adaptor"
Type: 666J, Made in Japan
Input, DC-950: AC 120V 60 Hz 8W
Input, DC-950B: AC 120V 60 Hz 12W
Output: DC 9V 500mA (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003, 99713, 99729
https://mcurrent.name/powersupplies/10472-DC-950-bottom.jpg
https://mcurrent.name/powersupplies/10472-DC-950-top.jpg
https://mcurrent.name/powersupplies/10472-DC-950B-bottom.jpg
https://mcurrent.name/powersupplies/10472-DC-950B-top.jpg

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Atari#: C010472 (earliest units) / C016353 (most units) / CX261 (box)
UL Listed, earlier units: 883K (examples: 1081, 0282, 0882)
UL Listed, many units: 967Z (example: 0183)
UL Listed, later units: 81J1, Made in Taiwan (example: 0586)
C010472 883K: "AC Adaptor"
C016353 967Z/81J1: "Power Supply For Use With Video Game"
C016353 81J1: "Used Only With Models CX-2000/2600"
Type: DV-9500
Input: 120V AC 60 Hz 11W
Output: 9V DC 500mA (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003,99713,99729
https://mcurrent.name/powersupplies/10472-883K.jpg
https://mcurrent.name/powersupplies/16353-883K.jpg
https://mcurrent.name/powersupplies/16353-967Z.jpg
https://mcurrent.name/powersupplies/16353-81J1.jpg

Atari#: C010472 (earliest) / C016353 / C016353-101 (later) / CX261 (box)
UL Listed, earlier units: 771K, Made in Taiwan (examples: 1080, 981, 1082)
UL Listed, later units: 20J8, Made in Taiwan (examples: 483, 887)
C016353/20J8 units:

- "Plug-In Power Supply For Use With Video Game"
- "Used Only With Models CX-2000/2600"

C016353-101/20J8 units: "Plug-In Power Supply For Use With Models 2600, XEP80 or SX212"
Type, C010472/771K: SA9500
Type, C016353/771K and 20J8: SA9500-1 or SA 9500-1
Input: 120V 60 Hz 9W
Output: 9V DC 500mA (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003, 99713, 99729
https://mcurrent.name/powersupplies/10472-771K.jpg
https://mcurrent.name/powersupplies/16353-771K.jpg
https://mcurrent.name/powersupplies/16353-20J8.jpg
https://mcurrent.name/powersupplies/16353-101-20J8.jpg

Atari#: C016353 (unit) / CX261 (box)
"AC/DC Adaptor"
UL Listed: 903K
Input: 120V 60 Hz 10W
Output: 9VDC 500mA (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003, 99713, 99729
https://mcurrent.name/powersupplies/16353-903K.jpg

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Atari#: C016353 (earlier units) or C016353-101 (later units) / CX261 (box)
UL Listed, earlier units: 689T, Made in Taiwan (examples, 0182, 0282)
UL Listed, later units: 17J2, Made in Taiwan (examples: 0184, 0787)
C016353/17J2 units:

- "Plug-In Power Supply For Use With Video Game"
- "Used Only with Models CX-2000/2600"

C016353-101/17J2 units: "Plug-In Power Supply For Use With Models 2600, XEP80 or SX212"
Type: SPA-4190-1
Input, C016353/689T units: 110-130V AC 60 Hz 12W
Input, C016353-101/17J2 units: 120V 60 Hz 12W
Output: 9V DC 500mA (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003, 99713, 99729
https://mcurrent.name/powersupplies/16353-689T.jpg
https://mcurrent.name/powersupplies/16353-17J2.jpg
https://mcurrent.name/powersupplies/16353-101-17J2.jpg

Atari#: C016353-101 (unit) / CX261 (box)
"For Use With Models 2600 XEP80"
Type: LIIIIA9, Made in China
Input: 120V AC 60 Hz 9W
Output: DC 9V 500mA (center positive)
Use with: Atari XEP80, SX212. Also Atari 2600, C-380, SC-450 and Sears 99743 / 99744 / 75001 / 75005 / 75006 / 75003, 99713, 99729
https://mcurrent.name/powersupplies/16353-101-LIIIIA9.jpg

6.2.2) United Kingdom (Input: 240V AC / 50 Hz)

6.2.2.1) AC/DC external power supply (external multi-device transformer / adapter)

Ingersoll Type 633498 / CA014748 (order#)
"Power Supply"
Made in England
Input: 240V ~ 50 Hz
Output 1: 9V - 15.3VA AC
Output 2: 6V - 1.8VA DC
Shipped with: 400 (early units), 800 (early units)
Use with (Output 1): 400, 800, 822, 850, 1010, 1020
Use with (Output 2): 410P
https://mcurrent.name/powersupplies/633498.jpg

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Tadmod TM 4498 / CA014748 (order#)
"Power Supply"
Made in England
Input: 240V ~ 50 Hz
Output 1: 9V - 15.3VA AC
Output 2: 6V - 2.4VA DC
Shipped with: 400, 800
Use with (Output 1): 400, 800, 822, 850, 1010, 1020
Use with (Output 2): 410P
https://mcurrent.name/powersupplies/tm4498.jpg
https://mcurrent.name/powersupplies/tm4498-box.jpg

6.2.2.2) AC supplies (external transformers)

Ingersoll XK 3498 / Tadmod TM 5498 / CA017964 (order#)
"Power Supply"
Made in England
Input: 240V ~ 50 Hz
Output: 9.5V ~ 1.5 AMP
Shipped with: 810 (earlier units)
https://mcurrent.name/powersupplies/xk3498.jpg
https://mcurrent.name/powersupplies/tm5498.jpg

Atari#: C060592-34 (unit) / CA014748 (order#) / CA017964 (order#)
Type: TM 7498, Made in United Kingdom
Input: 240V ~ 50 Hz 0.037Kw (unit) / 216~264V 50 Hz (box)
Output: 9V - 50 Hz 27VA (unit) / 9V.A.C. 3.4A (box)
Use with: 400, 800, 810, 822, 850, 1010, 1020, 1050, XF551, PCF554
https://mcurrent.name/powersupplies/60592-34.jpg
https://mcurrent.name/powersupplies/17964-uk.jpg (box)

Atari#: C061516-34
"A.C. Mains Adaptor"
"For Use Only With Atari 1010 Program Recorder"
Made in the UK
Input: 240v~ 50 Hz 5VA
Output: 8.5v~ 4.25VA
Shipped with: 1010
https://mcurrent.name/powersupplies/61516-34.jpg

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6.2.2.3) DC power supplies (external adapters)

Tadmod Mains Adaptor Model 6498
"For Use Only With Model 410 Tape Recorder"
Made in England
Input: 240v ~ 50 Hz
Output: 6v - 1.8VA
Shipped with: 410P (later units)
https://mcurrent.name/powersupplies/tm6498.jpg

Atari#: C061763-34
Type: T40/E, Made in UK
Input: 240V~50 Hz 24W
Output: 5V-7.5VA
Shipped with: 600XL, 800XL
Use with: 600XL, 800XL, 65XE, 130XE, XEgs
https://mcurrent.name/powersupplies/61763-34-alt-top.jpg
https://mcurrent.name/powersupplies/61763-34-alt-bottom.jpg

Atari#: C061763-34
Type: DV-515UK, Made in Taiwan (example: 3987)
Input: 240V~50 Hz 0.11A
Output: +5V - 1.5A
Use with: 600XL, 800XL, 65XE, 130XE, XEgs
https://mcurrent.name/powersupplies/61763-34.jpg

Atari#: C061763-24
"Power Supply"
Type: DV-515SAA, Made in Taiwan (example: 0288)
Input: 240V ~ 50 Hz
Output: 5V - 1.5A, 7.5VA
Use with: 600XL, 800XL, 65XE, 130XE, XEgs
https://mcurrent.name/powersupplies/61763-24-top.jpg
https://mcurrent.name/powersupplies/61763-24-bottom.jpg

Atari#: C070046-01
"For use with Atari computer only"
Type: PS35, Complies with BS 5850 (example: 4-87)
Made in Singapore by Magpower Manufacturers PTE LTD
Input: 240V ~ 50 Hz / 22VA
Output: 5V - 1.0A
Use with: 65XE, 130XE, XEgs
https://mcurrent.name/powersupplies/70046-01-top.jpg
https://mcurrent.name/powersupplies/70046-01-bottom.jpg

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Cherry Leisure Atari Power Unit
Made in UK to BS4435 Class IIB
Input: 240V ~ 50 Hz AC only
Output: 9V DC 500mA 4.5VA (center positive)
Shipped with: 2600
Use with: XEP80, SX212, 2600
https://mcurrent.name/powersupplies/cherry-leisure.jpg
https://mcurrent.name/powersupplies/cherry-leisure-box.jpg

Ingersoll XK2598/B / Tadmod Mains Adaptor
Produced to BS415, Made in England
Input: 240V ~ 50 Hz
Output: 9V - 3.6VA (center positive)
Shipped with: 2600
Use with: XEP80, SX212, 2600
https://mcurrent.name/powersupplies/xk2598-b.jpg
https://mcurrent.name/powersupplies/tm-2600.jpg

Atari#: C018084-309 (molded plastic logo)
"A.C. Mains Adaptor"
Produced to BS415, Made in United Kingdom
Input: 240V ~ 50 Hz
Output: 9V - 4.5 VA (center positive)
Shipped with: 2600
Use with: XEP80, SX212, 2600
https://mcurrent.name/powersupplies/18084-309-v1.jpg

Atari#: C018084-309 (printed: Type CAO 18084-309)
"Adaptor" "Use only with Models CX 2000/2600"
REF. 28399, Produced to BS415, Made in England
Input: 240V. 50 Hz. 8.2W ~A.C. only
Output: 9V. - 500mA. (center positive)
Shipped with: 2600
Use with: XEP80, SX212, 2600
https://mcurrent.name/powersupplies/18084-309-v2.jpg

Atari#: C018084-309 (black label)
"AC/DC Adaptor", BS415 (example: Jul-Sept 86)
"Use only with models PAL I-2600"
Input: 240V ~ 50 Hz 9W
Output: DC 9V 500mA (center positive)
Use with: XEP80, SX212, 2600
https://mcurrent.name/powersupplies/18084-309-v3.jpg

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Atari#: C018084-309 (silver label)
"AC/DC Adaptor", BS415 (example: Apr-Jun 92)
"For use with models CX2600 XEP80 or SX212"
Input: 240V ~ 50 Hz 9W
Output: DC 9V 500mA (center positive)
Use with: XEP80, SX212, 2600
https://mcurrent.name/powersupplies/18084-309-v4.jpg

6.2.3) Europe (Input: 220V AC / 50 Hz)

6.2.3.1) AC/DC external power supply (external multi-device transformer / adapter)

Etelac Type T 800
"Alimentation Secteur", made in France
Input: 220 V alternatif (AC) 50 Hz
Output:

- 2 x 9 V alternatif (AC) 1,7 A
- 1 x 6 V continu (DC) 350 mA

Shipped with: 400, 800 (France)
Use with (AC outputs): 400, 800, 822, 850, 1010, 1020
Use with (DC output): 410P
https://www.atari800xl.eu/hardware/computers/peritel-atari-800.html

6.2.3.2) AC supplies (external transformers)

Atari#: CA014748 (order#)
"AC/AC Adapter"
Type: FW6799
Input: 220V~/50 Hz/24VA
Output: 9,3V~/1,66A
Sticker for Sweden:

- Type: Block Typ NG/X
- Input: 20 VA / 220 V ~ / 50-60 Hz
- Output: 9 V ~ 1.66 A

Shipped with: 400, 800, 822, 850
Also works with: 1010, 1020
https://mcurrent.name/powersupplies/FW6799-1.jpg
https://mcurrent.name/powersupplies/FW6799-2.jpg
https://mcurrent.name/powersupplies/FW6799-3.jpg
https://mcurrent.name/powersupplies/FW6799-4.jpg

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Atari#: C060592-11 (unit) / CA017964 (order#) / Atari#: CA014748 (order#)
"AC Power Supply"
Type: PL028, Made in UK
Input: 220v~37W 50 Hz
Output: 9v~27VA
Use with: 400, 800, 810, 822, 850, 1010, 1020, 1050, XF551, PCF554
https://mcurrent.name/powersupplies/60592-11-PL028.jpg

Atari#: C060592 (unit) / CA017964 (order#) / Atari#: CA014748 (order#)
"AC/AC Adapter"
Type: FW6699 (samples: 0584, 2384, 4184)
Input, some units: 220V~/50 Hz/42VA
Input, some units: 220V~/50 Hz/50VA also marked: "For Atari 1020/1050"
Output: 9V~/3A
Some units have misprinted part number: C060529
Use with: 400, 800, 810, 822, 850, 1010, 1020, 1050, XF551, PCF554
https://mcurrent.name/powersupplies/60529.jpg
https://mcurrent.name/powersupplies/60592-bottom.jpg
https://mcurrent.name/powersupplies/60592-bottom-10201050.jpg
https://mcurrent.name/powersupplies/60592-top.jpg

Atari#: C060592-11 (unit) / CA017964 (order#) / Atari#: CA014748 (order#)
"Power Supply"
Made in Taiwan (sample: 1987-12)
Input: 220V~ 50 Hz 50W
Output: 9V~ 30.6VA
Use with: 400, 800, 810, 822, 850, 1010, 1020, 1050, XF551, PCF554
https://mcurrent.name/powersupplies/60592-11-alt-bottom.jpg
https://mcurrent.name/powersupplies/60592-11-alt-top.jpg

Atari#: C060592-11 (unit) / CA017964 (order#) / Atari#: CA014748 (order#)
"Power Supply"
Type: DV-9034A UP, Made in Taiwan (sample: 04-1988)
Input: 220V~ 50 Hz 35W
Output: 9V~ 3A 27VA
Use with: 400, 800, 810, 822, 850, 1010, 1020, 1050, XF551, PCF554
https://mcurrent.name/powersupplies/60592-11-DV-9034A.jpg

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Atari#: C061516 / C061516-11
"AC/AC Adapter"
Type: FW6399
Input: 220V~/50 Hz/7VA
Output: 9V~/0.5A
Shipped with: 1010
https://mcurrent.name/powersupplies/61516-6399-bottom.jpg
https://mcurrent.name/powersupplies/61516-6399-top.jpg
https://mcurrent.name/powersupplies/61516-11-bottom.jpg
https://mcurrent.name/powersupplies/61516-11-top.jpg

Atari#: C061605-11
"AC/AC Adapter"
Type: FW6699
Input: 220V~50 Hz/50VA
Output: 9V~/4,2A
Use with: 1027
https://mcurrent.name/powersupplies/61605-11-bottom.jpg
https://mcurrent.name/powersupplies/61605-11-top.jpg

Atari#: 14750 "AC/AC Adapter"
Type: 102501
Input: 220V~/50 Hz/38VA
Output:
- I) 29V~/600mA
- II) 8,6V~/1A

Use with: 1025 (European version)
https://mcurrent.name/powersupplies/14750-bottom.jpg
https://mcurrent.name/powersupplies/14750-top.jpg

6.2.3.3) DC power supplies (external adapters)

Atari#: n/a
"AC/DC Adapter"
Type: FW3199
Input: 220V~/50 Hz/5,5VA
Output: 6V-/300mA
Shipped with: 410P
https://mcurrent.name/powersupplies/3199-top.jpg
https://mcurrent.name/powersupplies/3199-bottom.jpg

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Atari#: C061763-107
"AC/DC Adapter"
Type: FW1999, Made by Friwo Equipment Manufacturing GmbH (FWGB)
Input: 220V~/50 Hz/33VA
Output: 5V- / 1,8A
Shipped with: 600XL, 800XL (early units)
Use with: 600XL, 800XL, 65XE, 130XE, XEgs, 800XE
https://mcurrent.name/powersupplies/61763-107-bottom.jpg
https://mcurrent.name/powersupplies/61763-107-top.jpg

Atari#: C061763-11
"AC/DC Adapter" (samples: 10-1984)
Type: FW1599, Made by Friwo Equipment Manufacturing GmbH (FWGB)
Input: 220V~/50 Hz/26VA
Output: 5V-/1.5A
Use with: 600XL, 800XL, 65XE, 130XE, XEgs, 800XE
https://mcurrent.name/powersupplies/61763-11-FW1599-bottom.jpg
https://mcurrent.name/powersupplies/61763-11-FW1599-top.jpg

Atari#: C061763-11
Type: DV-515UP, Made in Taiwan (samples: 0585, 2786, 2287)
Input: 220V~50 Hz
Output: 5V=/1.5A 7.5VA
Use with: 600XL, 800XL, 65XE, 130XE, XEgs, 800XE
https://mcurrent.name/powersupplies/61763-11-DV-515UP.jpg
https://mcurrent.name/powersupplies/61763-11-DV-515UP-top.jpg

Atari#: C061763-11/T
"Stromversorgungsgeraet" (sample: 3-89)
Type: PS40, Made in Singapore by Magpower Manufacturers Pte Ltd
Input: 220V~, 50 Hz 32VA
Output: 5V - 2A
Use with: 600XL, 800XL, 65XE, 130XE, XEgs, 800XE
https://mcurrent.name/powersupplies/61763-11-T-bottom.jpg
https://mcurrent.name/powersupplies/61763-11-T-top.jpg

Atari#: C070045-01/T
"Stromversorgungsgeraet" (sample: 4-88)
Type: PS35, Made in Singapore by Magpower Manufacturers Pte Ltd
Input: 220V~, 50 Hz, 18VA
Output: 5V-, 1A
Use with: 65XE, 130XE, XEgs, 800XE
https://mcurrent.name/powersupplies/70045-01-T-bottom.jpg
https://mcurrent.name/powersupplies/70045-01-T-top.jpg

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Atari#: C070045-01
"Power Supply"
Type: DV-51AUP, Made in China (sample: 08-91)
Input: 220V~50 Hz 19VA
Output: 5V - 1A 5VA
Shipped with: 800XE
Use with: 65XE, 130XE, XEgs, 800XE
https://mcurrent.name/powersupplies/70045-01-bottom.jpg
https://mcurrent.name/powersupplies/70045-01-top.jpg

Atari#: n/a
"AC/DC Adapter"
Top: "Atari" in white
Type: FW3399
Input: 220V~/50 Hz/7,9VA
Output: 9V-/400mA (center positive)
Use with: XEP80, SX212, 2600 (but not 2600S, see below)
https://mcurrent.name/powersupplies/3399-bottom.jpg
https://mcurrent.name/powersupplies/3399-top.jpg

Atari#: C018084-107
"AC/DC Adapter"
Top: "Atari" logo molded in black
Top: "Use only with model CX 2000 / 2600" painted in white
Type: FW3299 or FW4299
Input: 220V~/50 Hz/9VA
Output: 9V-/500mA (center positive)
Use with: XEP80, SX212, 2600 (but not 2600S, see below)
https://mcurrent.name/powersupplies/18084-107-4299-bottom.jpg
https://mcurrent.name/powersupplies/18084-107-3299-bottom.jpg
https://mcurrent.name/powersupplies/18084-107-3299-top.jpg

Atari#: C018084-107 (examples: May-Jul 86, Jan-Mar 87)
or C018084-117/A (examples: Jun-Aug 87, Jun-Aug 89)
Rounded/slightly oblong shape, label black (most) or silver (later units)
Cord attached at center-bottom of unit (relative to label)
"AC/DC Adaptor"
- 107 units: "use only with models CX-2600"
- 107 units, some: "Made in Taiwan"
- 117/A units: "For use with models CX2600 XEP80 or SX212"

Input: AC220V 50 Hz 9W
Output: DC9V 500mA (center positive)
Use with: XEP80, SX212, 2600 (but not 2600S, see below)
https://mcurrent.name/powersupplies/18084-107.jpg
https://mcurrent.name/powersupplies/18084-107-label.jpg
https://mcurrent.name/powersupplies/18084-117-a-black.jpg
https://mcurrent.name/powersupplies/18084-117-a-silver.jpg

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Atari#: C018084-117
Squarish unit, black label
Cord attached at top-right of unit (relative to label)
"AC/DC Adaptor" (examples: Jun-Aug 87, Feb-Apr 89, May-Juy 91)
"For use with models CX2600 XEP80 or SX212"
Input: AC 220V 50 Hz 9W
Output: DC 9V 500mA (center positive)
Use with: XEP80, SX212, 2600 (but not 2600S, see below)
https://mcurrent.name/powersupplies/18084-117.jpg

Atari#: C018084-117A
Squarish unit, silver label
Cord attached at bottom-right of unit (relative to label)
"AC/DC Adaptor" (example: 9026)
"For use with model 2600"
Input: AC 220V~50 Hz 9W
Output: DC 9V-500mA 4.5VA (center positive)
Use with: XEP80, SX212, 2600 (but not 2600S, see below)
https://mcurrent.name/powersupplies/18084-117a.jpg

Atari#: C018084-117A
Squarish unit, silver label
Cord attached at top-left of unit (relative to label)
"AC/DC Adaptor"
"For use with model 2600"
Input: AC 220V ~ 50 Hz
Output: DC 9V - 500mA 4.5VA (center positive)
Use with: XEP80, SX212, 2600 (but not 2600S, see below)
https://mcurrent.name/powersupplies/18084-117a-alt.jpg

Atari#: C016507 (unit) / CA017087 (box from US) / CA019055 (box from Hong Kong)
"AC Adaptor"
Some units: "Use Only With Models CX-2600"
Input: 220V 50 Hz 15W
Output: 9.5VDC 650mA (center positive)
Use with: 2600S (original SECAM VCS version for France, shipped in 1982)
https://mcurrent.name/powersupplies/16507--19055.jpg (unit with H.K. box)
https://mcurrent.name/powersupplies/16507-alt.jpg

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6.2.4) More Info

Devices by Atari that draw their power from SIO pin 10 (+5V/Ready except on the 1200XL):
XM301 (60mA), XC11, XC12

Device by Atari that draws its power from the 600XL PBI:
Atari 64K Memory Module (1064)
Devices by Atari that have built-in power supplies:
(The device plugs directly into the wall for power)

- 410 (120V AC versions for North America only)
- 820 (released for 120V AC for North America only)
- 825 (released for 120V AC for North America only)
- 1025 (120V AC version for North America only)
- 1029 (both 120V AC and 220-240V AC versions)
- XMM801 (released for 120V AC for North America only)
- XDM121 (released for 120V AC for North America only)

Section References:

- "Atari XL/XE Power Supplies: A Hardware Mystery Solved" by **Ben Poehland (Benjamin L. Poehland)**, Modern Electronics, May 1986, pages 46-54. https://preview.tinyurl.com/ybgtc63q
- "Secrets of XL/XE Power Supplies" by **Ben Poehland (Benjamin L. Poehland)**, Current Notes, 10(9), November 1990, pages 42-49. (Updated version of his earlier article) https://mcurrent.name/powersupplies/poehland.pdf
- http://www.best-electronics-ca.com/power%20guide.htm
- B&C ComputerVisions http://www.myatari.com/ebay/psxl.jpg

6.3) What accessories/controllers did Atari make for their computers?

(Thanks to Laurent Delsarte for help with CX10/CX11/CX12.)

This should be a complete list of accessories released by Atari and designated with a two-digit "CX" model number, plus several other compatible controllers that Atari did not designate with a "CX" model number.

While they can all be used with the 8-bit Atari computers, some of these accessories/controllers were originally and/or primarily intended for use with the Atari 2600 VCS, ST/TT/Falcon, or 7800, as indicated.

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CX10 Joystick Controller (X-Y Controller), CA010973 / CA011804

- Introduced June 1977 (for the Atari VCS)
- Greatly resembles the later iconic CX40, but identified by "ATARI" label on top of stick (or indentation at top of stick where the "ATARI" label belongs), and by the lack of the small "TOP" label at the base of the stick toward the up/forward position
- Internally, contains 5 large spring-loaded buttons
- Two units shipped with 1977-1978 VCS systems; replaced by CX40 in 1978
- Never sold separately
- CA010972 / CA011805 Sears version has "Sears" logo instead of the "ATARI" label; shipped with 1977 Sears Cartridge Tele-Games System Video Arcade systems before being replaced by the CX40 in 1978
- Industrial design: **Kevin P. McKinsey**, Gerald R. Aamoth

CX10 Printed circuit board for the CX40 Joystick

- Regional product of Atari International (Benelux) B.V.

CX11 Plastic insert replacements for the CX40 Joystick

- Regional product of Atari International (Benelux) B.V.

CX12 Cable replacement for the CX 40 Joystick

- Regional product of Atari International (Benelux) B.V.

CX20 / CA010889 / CA012759 Driving Controllers: One Pair

- Introduced June 1977 (for the Atari VCS)
- Marketed by Atari for use with the 400/800 in 1979 only
- Box contains two Driving Controller units
- Single unit attaches to single controller port
- Two CX20 units also shipped with Atari Indy 500 and Sears Tele-Games Race for the VCS
- Early units have Atari logo on base; most units have the word "driving" instead of the Atari logo
- Sears version of early units has "Sears" logo instead of Atari logo
- Manuals:
  - Pages 246-247 of the Operating System User's Manual (REV. A, 1982)
  - Atari 2600/2600A VCS Domestic (M/N) Field Service Manual FD100133
  - Atari 2600-2600A PAL B/G Field Service Manual FD100047

CX21 Video Touch Pad, CA019109 / CA019614

- Introduced June 1982 (marketed for the Atari VCS)
- Shipped with Star Raiders for the VCS, and also sold separately
- Compatible with the earlier CX50 and the later CX23
- Made in Taiwan

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CX22 Trak-Ball controller

- Previewed January 1983, introduced February 1983 (originally marketed for the Atari 2600)
- Shipped domestically only
- Dual buttons for left- or right-handed use – they cannot be read independently
- Two versions:
  1. Single mode version, CA020556 (uncommon; 15,000 unit initial production run)
     - A joystick emulator; no mode select switch; no true trackball mode
     - Unit colors: black top and bottom housings, white cue ball
     - Unit label: "Atari 2600 Pro-Line Trak-Ball" (prototype: "Atari 2600 Trak-Ball")
     - Manual: Atari Trak-Ball Controller Owner's Manual Model No. CX22
     - Marketing/box also carry the "Pro-Line" brand
     - Box mentions Atari Consumer division
     - Box mentions the Atari 400/800, but Owner's Manual does not
     - Manufactured by Atari, Inc. in El Paso, Texas, USA
     - Shipped summer 1983 (marketed for the Atari 2600)
  2. Dual mode version, CA024208 (common)
     - Mode select switch at rear of unit, labeled T and J, selects Joystick emulation or true Trackball operation
     - Trackball mode is compatible with that of the CX80 Trak-Ball
     - Unit colors: dark brown top housing, buff white bottom housing, buff white cue ball (prototype: dark brown cue ball)
     - Unit label: "Atari Trak-Ball"
     - Manual: Atari Trak-Ball Controller Owner's Manual Model No. CX22 C024237
     - Unit/box/Owner's Manual do not carry the "Pro-Line" brand
     - Box/Owner's Manual both mention Atari Home Computers
     - Made in Mexico
     - Shipped October 1983 (marketed for the Atari 2600 and for Atari home computers, supplanting the unshipped CX80 in Atari's domestic computer product line)
- Available: Atari CX22 Trakball Field Service Manual FD100660

CX23 Kid's Controller, CA020171

- Introduced January 1983 as the Action Control Base (marketed for the Atari 2600)
- Blue; and rather large
- Usually used with CCW Sesame Street Library titles for the 2600
- Sold separately only
- Compatible with the earlier CX50 and CX21

CX24 Pro-Line Joystick / Super Controller / Deluxe Joystick, CA021075

- Previewed January 1983, introduced February 1983 as: Pro-Line Joystick (marketed for the Atari 2600)
- Introduced in Europe summer/fall 1983 as: Super Controller
- One or two units shipped with 1984-1985 European 2600 systems
- Two units shipped with all NTSC 7800 systems (1986-1991)
- Beginning 1989 marketed as: Deluxe Joystick
- Dual buttons for left- or right-handed use – they can be read independently by the Atari 7800 only

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CX30 Paddle Controller (set of 2), CA010949 / CA012760

- Introduced June 1977 (for the Atari VCS)
- Each controller contains a linear 1 Megaohm potentiometer
- Dual controllers attach to one controller plug
- Early units have Atari logo on base; most units have the word "paddle" instead of the Atari logo
- CA010950 early Sears version has "Sears" logo instead of Atari logo
- One set/pair shipped with 1977-1982 VCS/2600 systems
- Manuals:
  - Atari 2600/2600A VCS Domestic (M/N) Field Service Manual FD100133
  - Atari 2600-2600A PAL B/G Field Service Manual FD100047
  - Atari 400/800 Home Computer Field Service Manual FD01
  - Atari 400/800 PAL-UK field service manual FD100002

CX40 Joystick Controller / Standard Joystick / X-Y Controller, CA011693 / CA011694 / CA011802 / CA012994 / CA020412

- Introduced January(?) 1978 (for the Atari VCS)
- The iconic Atari joystick, completely replaced the original CX10
- Greatly resembles the earlier CX10, but identified by lack of "ATARI" label on top of stick (or lack of indentation at top of stick where the "ATARI" label would belong), and by the small "TOP" label at the base of the stick toward the up/forward position.
- Normally black stick and base with red button. Units marketed for use with the XEgs specifically have an XE matching gray base.
- Internally, contains only one small spring, under the fire button
- Two units shipped with 1978-1984 VCS/2600 systems and with 1984-1985 NTSC 2600 systems; single unit shipped with all 1986-1991 2600 systems
- Units also shipped with a variety of kits/packs marketed for 8-bit Atari computer or XEgs users
- Manuals:
  - Atari 2600/2600A VCS Domestic (M/N) Field Service Manual FD100133
  - Atari 2600-2600A PAL B/G Field Service Manual FD100047
  - Atari 400/800 Home Computer Field Service Manual FD100001
  - Atari 400/800 PAL-UK field service manual FD100002
- Industrial design: Gerald R. Aamoth, **Kevin P. McKinsey**

CX41 Joystick Repair Kit, CA020476

- For the CX40 Joystick
- Includes: 1 Printed Circuit Board, 3 Springs, 1 Insert, 1 Boot, 1 Retaining Ring, Joystick Repair instructions C020484

CX42 Remote Control Wireless Joysticks, CA021060

- Introduced February 1983 (marketed for the Atari 2600)

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- Marketed for Atari home computers beginning June 1983, but the only shipped package version makes no mention of compatibility with Atari computers
- Package contains:
  - Remote Control Receiver
  - Two Remote Control Joysticks (Left Controller, Right Controller)
  - Installation Instructions C021059
  - Does not include power adapter
- Power: The receiver requires 9V DC as supplied by the Atari C010472, C016353, or C018084 power adapters or equivalent. The receiver, in turn, supplies 9V DC in place of the power adapter for the 2600 VCS. Each controller requires 9V DC as supplied by a standard 9V battery
- Despite early marketing, unit / packaging / documentation do not carry the "Pro-Line" brand
- Made in Korea by Cynex for Atari
- Prior to the Atari version, released by Cynex as: Game Mate 2

CX43 Space Age Joystick, CA023100
- Introduced June 1983 (marketed for the Atari 2600)
- Marketing/packaging also carry the "Pro-Line" brand
- Made for Atari by Milton Bradley

CX50 Keyboard Controllers: One Set, CA012758
- Introduced January 1978 (for the Atari VCS)
- Marketed by Atari for use with the 400/800 from 1980 to 1981
- Box contains two units
- Compatible with the later CX21 and CX23
- Manuals:
  - Atari 2600/2600A VCS Domestic (M/N) Field Service Manual FD100133
  - Atari 2600-2600A PAL B/G Field Service Manual FD100047

CX70 Light Pen, CA016311
- Introduced June 1980
- RARE - Only offered by Atari for a few months in 1981 (InfoWorld 26-dec-1983 – 2-Jan-1984)
- At least some, if not all units marked "Not For Retail Sale"
- Shipped with CX4124 demonstration program cassette
- Manual: Atari Light Pen Operator's Manual Model CX70 C016367

CX75 Light Pen
- Announced June 1983, introduced January 1984
- Shipped with RX8054 AtariGraphics cartridge
- Developed by Gibson Laboratories / Steve Gibson for Atari

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CX77 Touch Tablet

- Previewed June 1983, introduced with AtariArtist January 1984
- Shipped with RX8053 AtariArtist cartridge and Atari 810/1050 Master Diskette II CX8104 (DOS 2.0S) disk (Illustrator product by Island Graphics, Atari Touch Tablet version)
- Dual buttons for left- or right-handed use – they cannot be read independently
- The Atari Touch Tablet With AtariArtist Software Owner's Guide C061794
- Industrial design: **Tom Palecki**

CX78 Joypad Controller (Multi System Joypad Controller)

- Introduced June 1988
- Two units shipped with all European PAL and Peritel PAL/RGB 7800 systems (1989-1992)
- One unit shipped with late production (1991-1992) European PAL and Peritel PAL 2600 systems
- Dual buttons for left- or right-handed use – they can be read independently by the Atari 7800 only

CX80 Trak-Ball controller

- Introduced June 1983 (marketed for Atari home computers)
- Shipped internationally only (supplanted domestically by the CX22)
- Identified by large triangular buttons (duplicate function for left/right hands)
- Mode select switch at rear of unit, labeled JS and TB, selects JoyStick emulation or true TrackBall operation
- Trackball mode is compatible with that of the CX22 Trak-Ball
- Dual buttons for left- or right-handed use – they cannot be read independently
- Unit colors: dark brown top housing, dark brown bottom housing (prototype: buff white bottom housing), dark brown cue ball
- Unit label: "Atari Trak-Ball"
- Manuals:
  - Atari Trak-Ball Owner's Manual CX80 C061761
  - Atari CX80 Trakball Field Service Manual FD100750
- Box/Owner's Manual by Atari, Inc. International division
- Made in USA

CX81 Atari I/O Data Cord (5 Ft.; 1m50), CA015900-01 (SIO cable)

CX82 B & W Monitor Cable, CA015900-06. Includes (thanks Laurent Delsarte):

- Connection instructions
- Phono (RCA-type) adapter, part no. C016828
- BNC adapter, part no. C016829
- UHF adapter, part no. C016830

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CX85 Numerical Keypad, CA060140 / CA060413

- Announced January 1982
- Included with the CX419 Bookkeeper Kit; also sold separately
- Package includes:
  - CX8139 Numerical Keypad Handler Master Program Diskette
  - Keyboard overlay for use with additional programs
  - User's Guide C060488
  - Technical Reference Notes C061037
- Available: Atari CX85 Numeric Keypad Field Service Manual FD100176 November, 1982
- Made in Hong Kong

CX86 Printer Cable, CA015900-02 (included with 825)
(DA-15P to 20-pin dual Edge-on)

CX87 Modem Cable, CA015900-03 (included with 830 modem)
(Atari 850 DE-9P to standard RS-232 DB-25P DCE device - modem)

CX88 Terminal Cable, CA015900-04 (null modem cable)
(Atari 850 DE-9P to standard RS-232 DB-25P DTE device - computer)

CX89 Color Monitor Cable, CA015900-05

Track & Field Arcade Controller, CA025462-001

- Introduced June 1984
- Designed by Wico for Atari
- Shipped with Atari/AtariSoft Track & Field (Atari 2600, Atari home computers, Commodore 64, and Apple II versions)
- Apple II version requires/shipped with Apple II Game I/O port adapter

STM1 Mouse

- Introduced January 1985 (for the Atari 130ST/520ST)
- Atari ST/XE matching gray
- Right mouse button can be read by Atari ST or Atari PC mouse ports only
- Shipped with Atari ST/Mega/STe/Falcon desktop computers

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PCM1 Mouse
- Introduced January 1987 (for the Atari PC1)
- Physically/functionally identical to the STM1
- Early units: Atari PC1 matching gray
- Later units: Atari PC/TT lines matching white
- Right mouse button can be read by Atari ST or Atari PC mouse ports only
- Shipped with Atari PC/TT desktop computers

XG-1 Light Gun
- Previewed January 1987, introduced February 1987
- Single unit shipped with the XE 2001 kit and the XE 4001 and XE 5001 XEgs packages, plus the 65XE game system package sold by Coelsa in Chile. Each of these kits/packages are detailed elsewhere in this FAQ list.

6.4) What Kits/Add-A-Paks did Atari make for their 8-bit computers?

This should be a complete listing of packaged kits, including "Add-A-Pak" kits, that Atari sold for their 8-bit computers, most comprised of products also sold separately.

"All-In-One-Pak" and other system packages including a computer, the XE System console, or the XE System keyboard, are detailed in the sections of this FAQ list introducing those computer models instead of here.

CX418 The Home Manager
- The Home Filing Manager CX415
- Family Finances CX421

CX419 The Bookkeeper Kit
- CX414 The Bookkeeper
- CX85 Numerical Keypad
- Bookkeeper Kit Manual

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CX481 The Entertainer

- Contents: Star Raiders + Missile Command + CX40-04 joystick pair + The Entertainer Owner's Guide C017995
- Box style 1: (thanks Bill Demian)
  Text on the box indicates Computer Chess as the second game complementing Star Raiders. The illustration on the box actually shows a Music Composer box underneath the Star Raiders box.
- Box style 2: (thanks Laurent Delsarte)
  Text on the box correctly indicates Missile Command as the second game complementing Star Raiders. One illustration on the box shows an unidentified box underneath the Star Raiders box; another illustration (in color) shows a Music Composer box underneath the Star Raiders box.
- Replaced in 1983 by KX7101 The Entertainer Kit

CX482 The Educator

- 410 Program Recorder
- CXL4002 Atari BASIC cartridge
- CX4112 States & Capitals cassette
- The Educator Owner's Guide C017997

CX483 The Programmer

- Version 1:
  - Atari BASIC CXL4002
  - BASIC Reference Manual C015307
  - Atari BASIC book (Wiley Self-Teaching Guide) by Albrecht/Finkel/Brown C014385
  - The Programmer Owner's Guide C017996
- Version 2:
  - Atari BASIC CXL4002
  - BASIC Reference Manual C015307
  - Inside Atari BASIC book by Bill Carris C060992
  - The Programmer Owner's Guide C017996
  - $5 rebate coupon for An Invitation to Programming 1, 2, or 3

CX484 The Communicator (thanks Laurent Delsarte)

- 850 Interface Module unit
- 850 Power Supply unit, boxed (CA014748)
- SIO cable CA014122 (3-foot; 91.5 cm)
- 850 Interface Module Operator's Manual C015953
- 830 Acoustic Modem, boxed
- TeleLink I cartridge CXL4015
- TeleLink I manual C014189-15
- Dow Jones Information Services User's Guide C017251
- One free hour access to each of: Dow Jones Information Service, The Source, CompuServe
- Sold by Atari in the USA only

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CX488 The Communicator II

- 835 Direct Connect Modem
- 835 Power Adaptor unit C060479, boxed (CA060535)
- SIO cable CA014122 (3-foot; 91.5 cm)
- Modular telephone cable (RJ11 standard)
- The Communicator II: Getting Started C024438 (User's Guide)
- TeleLink II cartridge CXL4016
  - On-board 1 KiB (256 x 4-bit) nonvolatile static RAM (EEPROM) for saving the name, telephone number, and sign-on codes of two services in the cartridge memory
  - Supports both the 835 and 830 Modems
- TeleLink II Owner's Guide C061183
- Sold by Atari in the USA and Canada

KX7097 Atari Logo kit

- Atari Logo programming language cartridge RX8032, boxed
  - Quick Reference Guide C061583
- Atari Logo User Manuals BX4208, boxed
  - Reference Manual C061589
  - Introduction to Programming Through Turtle Graphics C061590

KX7099 BASIC Tutor I Add-A-Pak

- An Invitation to Programming 2:
  Writing Programs One and Two CX4106 including two cassettes
- An Invitation to Programming 3:
  Introduction to Sound and Graphics CX4117 including two cassettes
- Inside Atari BASIC book by Bill Carris C060992
- 101 Programming Tips & Tricks book by Alan North C061832 with cassette TX9033

http://www.rhod.fr/pages/atari_basic_tutor.html

KX7101 The Entertainer (1983 replacement for CX481 The Entertainer)

Star Raiders + Pac-Man + CX40-04 joystick pair + The Entertainer Owner's Guide C017995
Same box as CX481 but features round black on yellow sticker: "Includes Pac-Man & Star Raiders"

KX7102 Arcade Champ Add-A-Pak

Pac-Man + Qix + 2 CX40 joysticks + cartridge storage case
http://www.rhod.fr/pages/the-arcade-champ.html

KX7400 Game Kit (Donkey Kong cartridge + two CX40 Joysticks)

https://preview.tinyurl.com/y2x942qq

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KX7401 Game Kit (Centipede cartridge + two CX40 Joysticks)
https://preview.tinyurl.com/y53eoos3
(Released in West Germany only)

XE 2001 kit: (English / French / Italian / Spanish)
XG-1 Light Gun + Bug Hunt
http://www.mr-atari.com/afbeeldingen/hardwarediv/xesystemgun2.jpg

- Some packages shipped additionally with Barnyard Blaster:
  http://www.retrogames.cl/imagenes/varios/zz/pistola.jpg
- Some of these packages were shipped in G1 Light Gun boxes:
  https://tinyurl.com/f7jveufz
  (The actual G1 never shipped. It was to be the same as the XG-1 but red/orange instead of XE gray, and to be marketed for use with the 2600/7800.)

6.5) What graphics tablets were produced for the Atari?

According to Wikipedia, a graphics tablet (or digitizing tablet, graphics pad, drawing tablet) is a computer input device that allows one to hand-draw images and graphics, similar to the way one draws images with a pencil and paper. At the time of the Atari computer the more popular term was: touch tablet.

Several graphics tablets were produced and marketed for the Atari 8-bit computers:

Animation Station by Suncom
- Shipped with DesignLab disk (Suncom version of Blazing Paddles)
- Fully compatible with the earlier, popular KoalaPad
- Work surface is about the same size as the one on the Atari Touch Tablet - about 50% larger than the KoalaPad's
- A list of compatible software is elsewhere in the FAQ list.

Atari Touch Tablet CX77
- Shipped with AtariArtist cartridge RX8053 (Illustrator product by Island Graphics, Atari Touch Tablet version)
- Also shipped with Atari 810/1050 Master Diskette II CX8104 (DOS 2.0S) disk
- Similar to the popular, earlier KoalaPad, but returns reversed y-position values compared to the KoalaPad/Animation Station tablets
- Device measures 7.5" x 9.5" x 1.25"
- Drawing surface measures 5" x 6.5"
- A list of compatible software is elsewhere in the FAQ list.

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KoalaPad Touch Tablet by Koala Technologies

- Koala Model 004 for use with Atari computers
- Atari version shipped with one of:
  - Micro Illustrator (disk) by Steven Dompier for Koala, © 1983 (Illustrator product by Island Graphics, KoalaPad version)
  - KoalaPainter (cartridge) (Illustrator product by Island Graphics, KoalaPad version)
- Device measures 8.5" x 6.5" x 2"
- The square drawing area is 4.25" on each side.
- Very popular
- A list of compatible software is elsewhere in the FAQ list.

Kurta Graphics Tablet by Kurta Corporation

- Very early device
- 400/800 only: requires controller ports 1, 2, and 3
- Device measures 13" x 15.5"
- Shipped with Kurta Demo Disk
- Kurta Atari Graphics System, sold separately, includes software:
  - Road Map Distance Analysis
  - Length
  - Area - Calculation of areas (any shape)
  - Sound - display pen location by means of sound
  - Drawing
  - Graphics
- See ANALOG #1 for a review (p. 16) and an ad (p. 17)

PowerPad by Chalk Board, Inc.

- A unique and very large device
- Device measures 17" x 19" x 1.5"
- 12" x 12" square drawing area
- Shipped without software
- Cartridges released separately by Chalk Board for the PowerPad:
  - BearJam
  - Leo's 'Lectric Paintbrush
  - LogicMaster
  - MicroMaestro
  - Micro Illustrator (Illustrator product by Island Graphics, PowerPad version)

Super Sketch by Personal Peripherals, Inc. (PPI)

- Atari version
- Shipped with Graphics-Master cartridge
- A 10" X 14" tablet
- Similar to the earlier VersaWriter - trace or freehand a drawing into the computer.

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- Planned Atari software from PPI for used with Super Sketch (released???):
  - In-Store Demo (disk)
  - Printer Utility (disk)
  - Business Presentor (disk)
  - Master Home Planner (disk)
  - Super Music Box (cartridge)

VersaWriter Drawing Tablet by Versa Computing, later by Peripherals Plus

- Shipped with Graphics Software (2 disks)
- Trace or freehand a drawing into the computer
- Dimensions: 12" x 13.5"
- See ANALOG #4 (1981) p. 46 for ad, p. 47 for review
- See Creative Computing vol. 8 no. 4 April 1982 p. 79 for another ad.
- Reviewed: SoftSide #45, November 1983, pp. 90-91
- Reviewed (with picture) in Atari Classics June 1993 pp. 26-28

6.6) What light pens were produced for the Atari?

A light pen or light gun requires a cathode ray tube (CRT) television or monitor. Only one light pen or light gun may be used on the Atari at a time. Controller jacks #1-3 on the 400 do not support a light pen / light gun.

- Atari Light Pen CX70 (1980, shipped 1981)
  - Shipped with CX4124 demonstration program cassette
- Symtec Light Pen (1982)
- Edumate Light Pen by The Programmer's Institute/Futurehouse (1982)
  - Some later units shipped with Peripheral Vision software (1984)
- Tech Sketch LP-10 Light Pen (no switch)
  - Atari package supplied with demo cassette
- Tech Sketch LP-15 Light Pen (high resolution, with switch)
  - Earlier Atari package: Supplied with demo cassette
  - Atari packages: With Paint-N-Sketch Level I cassette, disk, or cartridge
  - Later Atari package: Micro Illustrator diskette included (Illustrator product by Island Graphics, light pen version)
- Tech Sketch LP-10S Light Pen (with switch)
  - Earlier Atari package: Supplied with demo cassette
  - Atari packages: With Paint-N-Sketch Level I cassette, disk, or cartridge
  - Later Atari package: Micro Illustrator diskette included (Illustrator product by Island Graphics, light pen version)
- Computapix PixStik (ad: YourComputer Feb 1984 pages 12-13)
  - Atari version shipped with PaintBox (by Eamonn Walsh) and "3 free games"
- Atari Light Pen CX75 (1984)
  - Shipped with AtariGraphics cartridge RX8054 by Gibson Laboratories / Steve Gibson for Atari
- Stack Light Pen by Stack Computer Services (1984)

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    - Later units shipped with LiteWriter software and 10 games: Othello, Seek and Destroy, Simon, Life, GO, Draughts, Drossword Twister, Lost in Labyrinth, Concentration, Shuffler
- Hoyt Light Pen by Hoyt Corporation (ad: Compute#49Jun84p48)
    - released????
- McPen light pen by Madison Computer (1984)
    - Came with a disk with 4 BASIC programs
- Koala Light Pen by Koala Technologies (1984, fall)
    - Box: "for Commodore 64"
    - Box sticker: "Contents work on Atari and Commodore 64 Computers"
    - Sold with KoalaPainter (light pen version) two-sided/flippy disk for Commodore 64 and Atari (Illustrator product by Island Graphics, light pen version)
- Turbo Light Pen by Turbo Software for M.P.M. (Chile), 1989?
    - Shipped with 2 cassettes

6.7) What light guns were produced for the Atari?

Just two:
- Atari XG-1 Light Gun (1987)
- Best Electronics "The Best" Video Light Gun (1989)

A light pen or light gun requires a cathode ray tube (CRT) television or monitor. Only one light pen or light gun may be used on the Atari at a time. Controller jacks #1-3 on the 400 do not support a light pen / light gun.

6.8) Is there a computer mouse I can use with my Atari?

This section lists computer mouse devices marketed for, or most typically used with, the 8-bit Atari computers.

Atari Mouse STM1 (1985) or PCM1 (1987)
- While the Atari mouse was designed for the Atari ST series of computers, the device can also be used with an 8-bit Atari given appropriate software support. Though never popular, this became the standard mouse used with the 8-bit Atari as other announced mouse devices (see below) failed to materialize

Zobian Controls RAT (original version)
- Marketed from late 1985 through late 1986
- Hardware was the Radio Shack TRS-80 Color Mouse #26-3025, with the addition of an interface for the Atari controller port
- To be shipped with software: Accu-Draw (Rat Trace) by Vision software, Control (RAT Control), BASIC subroutines, and (temporary promise) Atari-Artist
- Never shipped?

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Zobian Controls SuperRAT (or SuperRat)

- Marketed from late 1986 to 1987
- Hardware was the Commodore Amiga mouse (original "tank" version), provided with interface wired for 100% compatibility with the Atari STM1/PCM1 mouse
- Offered in two packages:
  1. With Accu-Draw software
  2. With RAOS (Rat Actuated Operating System) software package: Desktop, Screens 2.0, Accu-Draw
- Never shipped? Some packages were shipped with a different Atari STM1/PCM1 compatible mouse

6.9) What voice/speech synthesis hardware is there for the Atari?

Type 'n Talk (TNT) by Votrax (see CreativeComputing Sep 1981/pages 148-151)

- RS-232 device with available cable for Atari 850
- Output: Includes mini-phone jack for 8-ohm speaker (not included)
- Votrax SC-01-A Speech Synthesizer chip
- Programmer controls unit using regular Atari 850 R: device handler

Echo GP by Street Electronics Corp. (SEC), 1982

- RS-232 device with available cable for Atari 850
- Output: Built-in speaker, or optional external speaker
- Texas Instruments TMS 5200 or TMS 5220 Voice Synthesis Processor (VSP) chip
- Programmer controls unit using regular Atari 850 R: device handler

ITalkII by RealTime Electronics, 1982

- Marketed by Greenbrier Marketing International
- Connects to Atari 400/800 controller jacks #3 + #4
- Output: Routed via SIO to normal Atari Sound Output; also provides auxiliary output jack (phono jack) for optional external speaker
- SIO port for daisy chain
  - SIO Audio Input signal is combined with the device's sound output
- Votrax SC-01-A Speech Synthesizer chip
- Draws its power from the Atari controller jacks
- Software: Machine Language Driver, Word Editor, Sentence Builder, Dictionary, Word Blaster

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Voice Box by The Alien Group, 1982
- Built-in SIO cable - must end SIO daisy chain
- Output: Routed via SIO to normal Atari Sound Output
- Votrax SC-01-A Speech Synthesizer chip
- Draws its power from the Atari
- Cassette or Disk includes Random Sentence Generator and Talking Face

Voice Box II by The Alien Group, 1983
- Built-in SIO cable - must end SIO daisy chain
- Output: Routed via SIO to normal Atari Sound Output
- Votrax SC-01-A Speech Synthesizer chip
- Draws its power from the Atari
- Disks include 5 games: Concentration, Stud Poker, Spelling, Acey Deucey, Green Goblins

Cheap-Talk: Build Your Own Speech Synthesizer project
- By Lee Brilliant, M.D., ANALOG #29, April 1985, pages 59-67
- Connects to controller jacks #1 + #2, or #3 + #4 (400/800)
- Output: external speaker, or connects to SIO for output via normal Atari Sound Output
- General Instrument SP0256-AL2 speech synthesizer chip
- Draws its power from the Atari

Atari Speaks project, by Kevin Griffin, Page 6 #19 Jan/Feb 1986
- Connects to controller jacks #1 + #2, or #3 + #4 (400/800)
- Output: Built-in speaker
- General Instrument SP0256-AL2 speech synthesizer chip
- Draws its power from the Atari

Talking Typewriter project, by Bill Marquardt, ANTIC Jan 1987
- Connects to controller jacks #1 + #2
- Output: external speaker, or connects to SIO for output via normal Atari Sound Output
- General Instrument SP0256-AL2 speech synthesizer chip
- Draws its power from the Atari

W.E. Electronics (W.E.E.) Speech Synthesiser
- Allophone based (produces individual speech sounds rather than full words)
- Cassette of demo software is provided which includes three programs: the complete alphabet, demonstration of words, guessing numbers
- https://www.page6.org/archive/issue_14/page_30.htm

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6.10) What sound digitizers/samplers were produced for the Atari?

These are hardware/software analog/digital (A/D) audio conversion solutions that record an analog audio input signal as digital data for storage or playback. Some of these use the Atari's native 8-bit analog/digital conversion capability (potentiometer ports), and for playback most of these utilize the Atari's native support for 4-bit pulse-code modulation (PCM or "Volume Control Only" or "Volume Only") sound output.

Talk is Cheap project by Ed Stewart, Antic vol. 2 no. 4 Jul-1983 pages 64-66
https://www.atarimagazines.com/v2n4/talkischeap.html

- Device plugs into controller jack #3
- 8-bit sampling and 4-bit playback using native Atari capabilities
- Variable sample rate up to about 4.5 kHz

Parrot, by Tony Ramos for Alpha Systems, 1985

- Parrot Audio Interface (paddle-like device) plugs into controller jack #2 Includes mini-plug input jack for microphone, includes jumper wire for powered sound source
- Sample rate of up to 8 kHz; longer recording times reduce the sample rate
- Software included: SAMPLER, EMULATOR, PLAYER, GUESSNUM
- Uses .DIG digitized audio file format
- Distributed separately: Parrot Demo, Pre-Recorded Sounds, Pop-N-Rocker

Voice Master, by Covox, 1985

- "Speech and music processor"
- Functions: Speech synthesizer, word recognition, "Voice Harp"
- Plugs into controller jack #2
- Shipped with headset that plugs into unit's Mike and Ear mini-phone jacks
- Draws its power from the Atari
- Software included: Demo program, Bargraph, Calculator, Clock, Blackjack, Composer, Calibrate
- Software sold separately by Covox:
  - Speech Construction Set
  - Talking Disk

Digital-Mikrofon, by Zain, 1985? (Released?)

- Input and output connectors, via joystick controller ports
- Software included
- Happy Computer (magazine) #11 Nov-1985 page 130

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Replay, by 2 Bit Systems, 1986

- Cartridge device includes built-in cable with phono audio input jack
- Sample rate selectable from 6 kHz to 21 kHz
- 8-bit sampling depth; 4-bit playback with supplied software
- Software included: Replay (sampling/playback), DigiDrum, DigiSynth, Echo
- V2.0 Replay program with reverse and trigger options
- Distributed separately:
  - Percussion Master
    - External D/A and filter, plugs into controller jacks #1 & #2
    - Enhances Replay software with 8-bit playback
  - DigiDrum II (can use Replay samples)
- Package later marketed by Gralin International, 1992

Soundmeister, by Irata, 1986/1987? (Released?)

- See ad in Atari Magazin 2/87 p9
- Released for the Atari ST instead?
  http://www.stcarchiv.de/am1987/06/meister-digitizer-videomeister

Micro-Voice, by 2 Bit Systems, 1987

- Cable plugs into controller jack, records from a tape recorder/hi-fi
- 8-bit sampling and 4-bit playback using native Atari capabilities
- Software included: Micro-Seq, Micro-Synth, Echo, Sampler

Parrot II, by Tony Ramos for Alpha Systems, 1987

- Parrot II Audio Interface (paddle-like device) plugs into controller jack, has two input jacks, one for a microphone, one for a powered source
- Version 2.0 software enhanced for 130XE banked memory
- Fully compatible with software for the original Parrot by Alpha Systems

Sound'N'Sampler, by Ralf David, 1987

- Device plugs into joystick controller port 1
- 4-bit sampling depth
- 4-bit playback using native Atari capabilities
- Software included: Digital-Data-Editor

Voice Master Junior, by Covox, 1988?

- Plugs into Controller jack
- Built-in microphone
- Draws its power from the Atari
- Fully compatible with software for the original Voice Master by Covox

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Sound Sampler, project by Andreas Binner and Harald Schoenfeld (PPP) for Atari Magazin, 1/89 pages 44-49; for corrections: 5/89 page 84

- Device plugs into two joystick controller ports
- 67 kHz sampling rate
- 8-bit sampling depth
- 4-bit playback using native Atari capabilities
- Software: Sound Sampler (source listing), Sampler XL (boot file)

Antic Sampling Processor project by Steven Lashower, Antic vol. 8 no. 8 Feb-Mar-1990
https://www.atarimagazines.com/v8n8/anticsamplingproc.html

- Loosely based on "Talk is Cheap" project (see above)
- Device plugs into controller jack #2
- 8-bit sampling and 4-bit playback using native Atari capabilities
- Sampling rate approaching 5 kHz
- MIMI Playback software feature requires Hybrid Arts MIDIMate interface

Sample Cartridge by Alphasys Hardware, 1991

- Two audio input phono jacks for sampling two signals/stereo at once (into single signal/mono audio)
- 8-bit sampling depth
- 4-bit playback with supplied software by Solarsystems
- Software compatible with the Replay cartridge by 2 Bit Systems

A/D Converter, by Mirage, 1993

- Cartridge, with built-in cable to connect to a headphone output
- 4-bit sampling depth
- Software included: Audio Master
- Supports XL/XE extended memory
  http://atariki.krap.pl/index.php/Mirage_AD_Converter

6.11) What sound upgrades (stereo, 8-bit PCM, others) are there?

This section lists programmable system modifications or devices that upgrade the audio capabilities of the Atari.

Devices or modifications that manipulate the standard Sound Output beyond the software control of the Atari are not listed here.

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Bits 'N' Pieces: POPS, project by Lee S. Brilliant, ANALOG #66 Nov. 1988, pages 54-60

- External device connects to the Atari SIO port, using pin 1 (Clock Input) and pin 2 (Clock Output) to tap into the separate Atari audio voices independently, before the system mixes them into the normal single-channel Sound Output signal.
- POPS provides either stereo (Left and Right) or three (Left, Center, and Right) audio output channels.
  - Two channel operation:
    POKEY voice 4 is output to the POPS Left Speaker (via SIO pin 2);
    POKEY voices 1-3 are output to the POPS Right Speaker (via the normal system Sound Output)
  - Three channel operation:
    POKEY voice 2 is output to the Left Speaker (via SIO pin 2);
    POKEY voice 4 is output to the POPS Center speaker (via SIO pin 1);
    POKE voices 1 and 3 are output to the POPS Right Speaker (via the normal system Sound Output)
- Software: POKEY Player by Craig Chamberlain, modified by Lee Brilliant M.D.

Pokey Stereo - Upgrade project by Chuck Steinman, 12/16/1989 ("Gumby upgrade")

- Achieves stereo output through the addition of a second POKEY chip, sometimes referred to as "Gumby" (name of sidekick to "Pokey" children's character)
- Sources:
  - https://tinyurl.com/5fj2r7d2 (original plain text file)
  - 8:16 Issue #10 (Sept/Oct 1990): https://tinyurl.com/yeyraj9w
  - Mega Magazine ("MegaZine") #2 (fall 1991): https://tinyurl.com/yr4vz8fr

Pokey Stereo - Modification projects for the original upgrade:

- Atari 8-Bit in Stereo #2, by Frankenstein (Freddy Offenga / F#READY), Mega Magazine #3 (1992):
  - Add a stereo-mono switch to the original upgrade
  - Programming guide
  - Software to update SoftSynth and World of Wonders
  - https://tinyurl.com/yr4vz8fr
- Atari 8-Bit in Stereo #3 article by Frankenstein, Mega Magazine #5 (Winter 1993)
  - Modifications by Arianne Slaager (Alphasys) to the original upgrade:
    - Add a switch that optionally completely disables the upgrade (increases software compatibility)
    - Add a switch that optionally mixes both POKEY chip outputs into a single mono output channel
  - https://tinyurl.com/yr4vz8fr

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Pokey Stereo - Compatible projects/products (require a second POKEY chip unless otherwise indicated) include:

- Stereo upgrade/conversion kit by Micro Discount, 1992
  - Sold with disk which modifies certain games to play music in stereo
  - Reference: DGS News-Disk #10
- StereoPLUS by Gralin International, 1994
- Stereo w "małym" Atari (Stereo in the "small" Atari), by Monsoft (Ireneusz Pelech / Irek), 2002. Former links (schematic diagram lost?):
  - www.atari.cuprum.com.pl/stereo.htm or aim.pelech.net/stereo.htm
- Simple board for stereo upgrade by **Sebastian Bartkowicz (Candle'O'Sin)**, 2003
  - Later known as: SimpleStereo upgrade v.1
  - https://tinyurl.com/yc8avfyf
- Stereo, with Auto Stereo, by Michał Pasiecznik (Pasiu/SSG), 2004
  - http://hardware.atari8.info/stereo.php
- Dual-POKEY Stereo Sound Board, by MEtalGuy66 (Ken Jones), 2006
  - http://preview.tinyurl.com/jphxurn
  - http://www.rasterline.com/past.html
- STEREO by C.P.U. (Robert Petružela (Bob!k) & Radek Štěrba (Raster), 2006
  - http://raster.atariportal.cz/hw/stereo/stereo.htm
- Simple Stereo ("stereo upgrade FINAL"), by **Przemyslaw Krawczyk (Lotharek)**, 2006-2019
  - Uses the same schematic as STEREO by C.P.U. (2006)
  - https://tinyurl.com/bdz3k6px or https://tinyurl.com/5apk4xek
  - http://ftp.pigwa.net/stuff/projects/SimpleStereo/photos/
- Stereo project by Paweł Nowak (Pajero/MadTeam), 2007
  - http://madteam.atari8.info/index.php?prod=stereo
- Stereo Expansion rev.1.2 (Stereo Prototyp 2008), by **Wolfram Fischer** (mega-Hz), 2008
  - http://www.mega-hz.de/Angebote/Stereo/Stereo_big.html
- SimpleStereo v.2, by **Sebastian Bartkowicz (Candle'O'Sin)**, 2009
  - Introduction: https://tinyurl.com/wb6zrbwb
  - Schematics: https://tinyurl.com/3hpv7vtj
- Stereo Erweiterung rev.2.1 (Stereo Small 2010), by **Wolfram Fischer** (mega-Hz), 2010
  - http://www.mega-hz.de/Angebote/Stereo/Stereo_small.html
- Evie, by Pasiu/SSG, May 2014
  - Internal upgrade build around a Xilinx field-programmable gate array (FPGA). Features include emulated dual POKEY mode
  - http://atariki.krap.pl/index.php/Evie
- TK-II-Stereo by Michael St. Pierre (Mytek), 2016
  - https://ataribits.weebly.com/tk-ii-stereo.html
- PokeyMAX, by **Mark Watson**, 2018
  - A complete, pin-compatible replacement for the POKEY chip built around the Altera MAX10 FPGA chip. Features include dual POKEY mode
  - https://tinyurl.com/3tu264nn
- Simple Stereo v2, by **Przemyslaw Krawczyk (Lotharek)**, 2019
  - https://tinyurl.com/2dxawenp

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- PokeyMAX v2, by **Mark Watson**, March/April 2020
  - A complete, pin-compatible replacement for the POKEY chip built around the Altera MAX10 FPGA chip (10M02, 10M04, or 10M08).
    Six versions, five of which include dual POKEY mode
  - https://forums.atariage.com/topic/295242-pokeymax-v2/
- PokeyMAX v3, by **Mark Watson**, June 2021
  - A complete, pin-compatible replacement for the POKEY chip built around the Altera MAX10 FPGA chip (10M16). Features include dual POKEY mode
  - https://forums.atariage.com/topic/316324-pokeymax-version-3-preorder/
- PTODT Stereo, by kkrs/PTODT
  (Polish Society for the Preservation of Technical Heritage), November 2022
  - Sound output incorporates sounds from GTIA
  - https://ptodt.org.pl/wszyscy/ptodt-stereo-juz-dostepne/
- ShamaXL AME for 600XL/800XL by **Алексей Семёнов (Aleksey Semenov)**, April 2023
  - PBI device using an Altera MAX II CPLD chip to provide features including emulated dual POKEY stereo
  - External or PBI power required on 800XL
  - Two versions:
    1. DAC PCM5102A AUDIO OUT
    2. PWM AUDIO OUT - can directly connect headphones
  - https://tinyurl.com/yehjpxj2
  - Issue 1.1, August 2023, https://tinyurl.com/ytc7d7cj
    - DAC PCM5102A AUDIO OUT version
  - Available: https://tinyurl.com/4nh6zy53
- SUBCART (variant of AVGCART) by tmp/MiscRetro, May 2023
  - Cartridge device, build around a Xilinx Spartan-6 FPGA
  - Optional DAC cable allows stereo POKEY emulation (PBI or ECI cable required)
  - https://miscretro.com/product-category/atari/subcart/
- PTODT Stereo II, by kkrs/PTODT, December 2023
  - Sound output incorporates sounds from GTIA, SIO and PBI/ECI
  - https://ptodt.org.pl/wszyscy/ptodt-stereo-ii-juz-dostepny/

Pokey Stereo - Misc:
- More information http://atariki.krap.pl/index.php/Stereo
- Software supporting dual POKEY stereo:
  http://a8.fandal.cz/search.php?search=stereo&butt_details_x=x

Stereo Blaster Pro ("programmable"), by Portronic (Armin Stuermer), 1994
Details from **Andreas Koch**, 16 Oct 2009:
- Earlier/simpler Stereo Blaster and Stereo Phaser simply modify sound as output by the Atari.
- This hardware plugged into the monitor port (which was then available again on the Stereo Blaster/Phaser/Blaster Pro itself) and gave two cinch outputs and via various paddles one could change the frequencies, amplitudes and other stuff, thus generate a sound that was similar to stereo.

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- The Stereo Blaster Pro could be programmed with two simple POKEs
- Software:
  - "Stereo Blaster Pro" demo by Hermann Roettger / HU-Soft
    http://a8.fandal.cz/detail.php?files_id=3668
  - Several feature demos:
    http://atarionline.pl/forum/comments.php?DiscussionID=285#Item_36

"Covox" 8-bit digital-to-analog converter. 1996?

- Generates four 8-bit PCM audio voices = 4-channel, 8-bit audio.
- Based on the Covox Speech Thing for PC, which was released in late 1987.
- Original project for the Atari is credited to Michał Psychol Lange.
- Reference version by Zenon/DIAL: http://atariki.krap.pl/index.php/Covox
- Implementations use various memory addresses for software control, so Covox supporting software is not necessarily compatible with any given Covox hardware implementation.

Covox projects and supporting products:

- Easy 4 channels * 8-bit Covox C/A, by Gumi/Tight, 1996
  (and reprinted in Serious Magazine #3, 1998)
  - https://tinyurl.com/42fucjh9
- Covox, odsłona druga ("Covox, Part Two") by Pigula/Shpoon, NOP#1 (disk magazine), 1998
  - https://tinyurl.com/3epnsnfz
- Stereo Expansion rev.1.2 (Stereo Prototyp 2008), by **Wolfram Fischer** (mega-Hz), 2008
  - http://www.mega-hz.de/Angebote/Stereo/Stereo_big.html
- SimpleStereo v.2, by **Sebastian Bartkowicz (Candle'O'Sin)**, January 2009
  - Introduction: https://tinyurl.com/wb6zrbwb
  - Schematics: https://tinyurl.com/3hpv7vtj
- uCovox ("micro-Covox"), by Paweł Nowak (Pajero/MadTeam), July 2009
  - Add-on for the AKI Atari Keyboard Interface by **Przemyslaw Krawczyk (Lotharek)**:
    - https://www.lotharek.pl/productdetail.php?id=228
    - https://www.lotharek.pl/productdetail.php?id=311
  - Very small size
  - http://www.atari.org.pl/forum/viewtopic.php?id=7061
- Covox, by **Przemyslaw Krawczyk (Lotharek)**, 2010?
  - https://tinyurl.com/3s55bsj4
- SimCovox, by Simius, 2011
  - A simple, single-channel "Covox" project via standard joystick ports
  - http://atariki.krap.pl/index.php/SimCovox
- Evie, by Pasiu/SSG, May 2014
  - Internal upgrade built around a Xilinx field-programmable gate array (FPGA). Features include Covox implementation.
  - http://atariki.krap.pl/index.php/Evie
- RAM 320XE/576, by ctirad, for 130XE/800XE/65XE with ECI, December 2014
  - A memory upgrade that plugs into Cartridge + ECI
  - Can be optionally equipped with Covox compatible stereo four channel DAC, mapped to base address $280.
  - http://atariage.com/forums/topic/232856-ram320xe576-order-thread/
- PIA Covox, or P-Covox, by **Przemyslaw Krawczyk (Lotharek)**, 2018
  - https://tinyurl.com/mra69cxx

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- PokeyMAX v2, by **Mark Watson**, March/April 2020
  - A complete, pin-compatible replacement for the POKEY chip built around the Altera MAX10 FPGA chip (10M02, 10M04, or 10M08).
    Two of the six versions released include Covox support.
  - https://forums.atariage.com/topic/295242-pokeymax-v2/
- PokeyMAX v3, by **Mark Watson**, June 2021
  - A complete, pin-compatible replacement for the POKEY chip built around the Altera MAX10 FPGA chip (10M16). Features include Covox support.
  - https://forums.atariage.com/topic/316324-pokeymax-version-3-preorder/
- P-Covox v2, by **Przemyslaw Krawczyk (Lotharek)**, 2022
  - https://tinyurl.com/txs4c642
- ShamaXL AME for 600XL/800XL by **Алексей Семёнов (Aleksey Semenov)**, April 2023
  - PBI device using an Altera MAX II CPLD chip to provide features including Covox implementation: 4 channels in 1423 variants.
  - External or PBI power required on 800XL.
  - Two versions:
    1. DAC PCM5102A AUDIO OUT
    2. PWM AUDIO OUT - can directly connect headphones
  - https://tinyurl.com/yehjpxj2
  - Issue 1.1, August 2023, https://tinyurl.com/ytc7d7cj
    - DAC PCM5102A AUDIO OUT version
  - Available: https://tinyurl.com/4nh6zy53
- SUBCART (variant of AVGCART) by tmp/MiscRetro, May 2023
  - Cartridge device, built around a Xilinx Spartan-6 FPGA
  - Optional DAC cable supports Covox (PBI or ECI cable required)
  - https://miscretro.com/product-category/atari/subcart/

Covox-supporting software:
- Inertia 3.7, by Tebe/MadTeam, 1996
- Inertia 4.5, by Profi/MadTeam
- Protracker 1.51, by Profi/MadTeam, 1997
- NeoTracker 1.7, by Epi/Tristesse, 2002-2007
- More: http://a8.fandal.cz/search.php?search=covox&butt_details_x=x

The rest of this section lists upgrades that add one or more real or emulated sound generation chips to the Atari computer other than an Atari POKEY chip.

Slight-Sid (SlightSID), by Seban / Slight, October 2011
Cartridge device providing one (prototype) or dual (stereo final version) MOS Technology 6581/8580 SID (Sound Interface Device) chips to the Atari.
http://atariki.krap.pl/index.php/Slight_SID
http://www.atari.org.pl/slightsid/
- Software:
  - SID Player 1.00beta by Swiety
  - SlightSID Player by Chris 'xxl' Dudek, 2011
  - SID Hardware Player for SDX by Jerzy Kut (Mono/Tristesse), 2014-2016

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Evie, by Michal Pasiecznik (Pasiu/SSG), May 2014
Internal upgrade built around a Xilinx field-programmable gate array (FPGA) chip with features including emulated PSG (Programmable Sound Generator, specifically the Yamaha YM2149) and SID (Commodore 64 sound) chips.
http://atariki.krap.pl/index.php/Evie

- Software:
  - SID Hardware Player for SDX by Jerzy Kut (Mono/Tristesse), 2014-2016
  - PSG Hardware Player for SDX v.0.7, Jerzy Kut (Mono/Tristesse), 2014-2019
  - Let's Emu! ZX Spectrum emulator by **Konrad M. Kokoszkiewicz**
  - SlightSID Player by Chris 'xxl' Dudek

SIDari, by tOri, September 2014
Attach a MOS Technology 6581/8580 SID (Sound Interface Device) chip to the Atari.
http://atari.myftp.org/atari8bit/sidari/sidari.html

- Software:
  - SID Hardware Player for SDX by Jerzy Kut (Mono/Tristesse), 2014-2016

YAMari, by tOri, February 2015
Cartridge device providing a Yamaha YMF262 FM Operator Type L3 (OPL3) synthesis sound chip to the Atari.
http://atari.myftp.org/atari8bit/yamari/yamari.html

- Software:
  - RAD Hardware Player by Jerzy Kut (Mono/Tristesse), 2014-2016
- X-Angel (Daniel P.) YAMari site: http://ataripcb.pl/yamari.html

SONari, by tOri, May 2015
Cartridge device providing one or two General Instrument AY-3-8910 / Yamaha YM2149 PSG chips to the Atari.
http://atari.myftp.org/atari8bit/sonari/sonari.html

- Software:
  - PSG Player by Jerzy Kut (Mono/Tristesse)

SAMari, by tOri, May 2020
Cartridge device providing two Philips SAA1099 sound generator chips to the Atari.
http://atari.myftp.org/atari8bit/samari/samari.html

TIGari, by tOri, August 2020
Cartridge device providing two Texas Instruments SN76489 Digital Complex Sound Generator (DCSG) chips to the Atari.
http://atari.myftp.org/atari8bit/tigari/tigari.html

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NOMari, by tOri, April 2021
Cartridge device using a Xilinx XC9572XL CPLD chip to provide an emulated Swinkels SwinSID Nano (ATMEGA88) chip, itself a hardware replacement for the SID chip, to the Atari.
http://atari.myftp.org/atari8bit/nomari/nomari.html

PokeyMAX v3, by Mark Watson, June 2021
A complete, pin-compatible replacement for the POKEY chip built around the Altera MAX10 FPGA chip (10M16). Features include Dual SID and Dual PSG emulation.
https://forums.atariage.com/topic/316324-pokeymax-version-3-preorder/

6.12) What types of memory upgrades are there for the Atari?

Thanks to **Andreas Koch** for his earlier extensive work on RAM drive versions.

This section attempts to list all commercial or hobbyist project upgrades to the amount of (volatile) random access memory (RAM) installed in the 8-bit Atari.

Devices that use non-volatile mass storage media would be listed elsewhere in this FAQ list.

6.12.1) 400/800 Memory Upgrades

As intended by Atari, RAM management in the 800 is accomplished in hardware via the presence of one, two, or three 8 KiB or 16 KiB RAM Module boards in the computer's three RAM slots (filled front to back, 16 KiB boards before 8 KiB boards), for a system of 8 KiB, 16 KiB, 24 KiB, 32 KiB, 40 KiB, or 48 KiB of RAM.

The 400 was designed to use a single internal 8 KiB, 16 KiB, or 32 KiB RAM board of the same design as those for the 800 (though Atari only offered the 400 in 8 KiB or 16 KiB RAM versions).

6.12.1.1) 4 KiB boards

These make an additional 4 KiB available to the computer in the 4 KiB of memory address space (49152-53247 or $C000-$CFFF), unused by the 400/800 hardware or Operating System, directly beyond the normal 48 KiB RAM address space as intended for use by Atari. These can be used with standard 8 KiB, 16 KiB, 24 KiB, 32 KiB, 40 KiB, or 48 KiB RAM systems. See also: 52 KiB boards

- Ramrod, by Newell Industries (800 personality board), 1982
- MEM/EX, by Prairie Physics (800 personality board), 1983
- Impossible!, by Computer Software Services (CSS) (400/800), 1984
  - 4K Static RAM-Pac board also sold separately by CSS
- The Gap, by Computer Support (400/800), 1985

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6.12.1.2) 8 KiB boards

Boards may be used in any 800 RAM slot or in the 400 internal RAM slot.

- Atari CX852 (remove board from case for installation inside the 400)

6.12.1.3) 16 KiB boards/upgrades

Boards may be used in any 800 RAM slot or in the 400 internal RAM slot.

- Atari CX853 (remove board from case for installation inside the 400)
- JACC 16K (1980; first non-Atari memory expansion board)
- Microtek / MPC Peripherals Corp. AT-16 / AMB-16 (no imprint on board; 1980)
- Mosaic 8K to 16K RAM Expansion Kit (1980)
- Tiny Tek Anderson Peripherals 16K Memory Board (fits in 800 only) (1981)
- Intec 16K MM32001 (fits in 800 only) (1983)
- Bontek 16K

6.12.1.4) 32 KiB boards/upgrades

A 32 KiB board may be designed to work in the 400 internal RAM slot only, in the 400 and also in the 800 middle RAM slot, or in the 400, 800 middle RAM slot, or 800 first RAM slot. In the 800, a 32 KiB board may be combined with a 16 KiB board to achieve the maximum total of 48 KiB main RAM.

- Axlon RAMCRAM / RAMPOWER 32 (400 or 800 middle RAM slot; 1981)
- Mosaic 32K RAM Board (400 or 800 first two RAM slots; 1981)
  - Optional Companion Board for use in the 800 without another RAM board
  - Mosaic Expander is the same but shipped with 16 KiB and sockets for 16 KiB RAM chips taken from a 16 KiB board. Marketed for the 16 KiB 400.
  - Mosaic Adapter is the same but shipped with no memory but sockets for 32 KiB in RAM chips taken from two 16 KiB boards.
- Microtek / MPC Peripherals Corp. AT-32 / AMB-32 (400 or 800 middle RAM slot; 1981)
  - Some with no imprint; some with "MPC AT-32" imprint
- Microtek AMB-32A (400 or 800 first two RAM slots)
  - Board: "Microtek AMB-32"
  - "Slot Independent Memory Card"
- Intec 32K Board MM1632 (400 or 800 middle RAM slot) (1981)
- Tiny Tek Anderson Peripherals 32K Memory Board (400 or 800 middle RAM slot) (1981)
- Bit 3 32K Memory Plus (400 or 800 first two RAM slots)
- Tech-Data (TD) 32K (400 or 800)
- Calisto Computers 32K (400)
- Austin Franklin 32K Austin Board (400 or 800 first two RAM slots)
  - 800 installation without another RAM board requires 32K Loopback card
- Bontek 32K

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- High Country MicroSystems (HCMS) Ram-Page 32K
- Tara Computer Products 32K RAM Expansion Board (400 or 800 first RAM slot) (1982)
- HardStuff 32K RAM Board
- Memory Mill 32K Board (400 or 800)
- Dynamic Technologies 32K board (400 or 800) (1982)
  - (Distributed by Jersey Systems)
  - 32K Loopback allows 32K to be used alone in the 800

6.12.1.5) 48 KiB boards/upgrades

For use in the 400, the computer must be modified to support the S4 and S5 RAM chip select lines and, for continued cartridge support, the RAM deselect lines RD4 and RD5 as all supported in the 800.
If used in the 800, these are designed to be the only RAM board installed. Also, these physically used 64 KiB in DRAM chips because such designs were much simpler and less expensive than a design using chips actually totaling 48 KiB.

- Intec 48K MM6448 (400) (1981)
- Dynamic Technologies 48K Memory Expansion Kit (400) (1982)
  - 48K Loopback allows 48K to be used alone in the 800
- Axlon RAMCRAM Plus 48K / RAMPOWER 48 (400) (1982).
  Two installation options:
  - 40 KiB available, or 48 KiB with supplied board in cartridge slot
    - No computer modification required
  - 48 KiB available
    - Requires computer modification
- Sar-An Computer Products (SCP) 48K (400)
- Neotechnic Industries (NTI) 48K Ram Kit (400 or 800)
- Micro Systems Exchange (MSX) 48K Upgrade Kit (400) (1982)
- Austin Franklin 48K Austin Board (400 or 800 slot 1)
  - 800 installation requires 48K Loopback card in slot 2
- Mosaic 48K Converter Kit (400)
  - Converts an Atari 8K or 16K RAM board into a 48K RAM board
- Maplin/Mapsoft 48K RAM card (400)
- Calisto Computers 48K (400)
- Essence Peripheral 48K
- Polly Products 48400 (400)
- Hardsel Xtra HardWare XTRA48 (400 or 800) (1983)
- Tara Computer Products 48K RAM (400) (1982)
- A 48K Upgrade For Your 400, project by **Claus Buchholz**, MACE Newsletter, (Michigan Atari Computer Enthusiasts), (September 1982)
- Atari 400 48K Memory Modification Instructions, by Gary A. Crowell with Steven P. Davies, © 1983
- Atari 48K RAM Expansion Kit (400) (June 1983)
- Memory Mill 48K Board (400)
- 5cFabrication Atari 400 48k Memory Card (2022)
- 5cFabrication Atari 800 48k Memory Card (middle RAM slot) (2022)
  - Includes a Jumper Board for the first RAM slot

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6.12.1.6) 52 KiB boards/upgrades

These have the same features/capabilities as 48 KiB boards/upgrades but make an additional 4 KiB available to the computer in the 4 KiB of memory address space (49152-53247 or $C000-$CFFF), unused by the 400/800 hardware or Operating System, directly beyond the normal 48 KiB RAM address range. The result is 52 KiB of continuous, non-banked RAM available while still running the standard 400/800 OS in memory as well.

- Tiny Tek Anderson Peripherals 48K/52K Memory Board (400 only) (1982)
- Applied Computer Alternatives (ACA) cRAM by Cosmac Research (400 only) (1982)
  - Cartridge ROM and OS ROMs can both be replaced by RAM
- ECRL 48K+4 (400) (1982)
- Newell 48/52K Ram Board (400 or 800)
- Hardsel Xtra HardWare XTRA52 (400 or 800) (1983)
- 48/52 KByte RAM Card for Atari 400, by **Jurgen van Radecke** (tfhh), 2017
  http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf

6.12.1.7) 64 KiB and up boards/upgrades

Surpassing the limit of 52 KiB continuous RAM address space available in the 400/800 requires a memory-banking scheme for using software-selectable memory banks that share a range of memory addresses within the normal 52 KiB RAM address range. Atari never offered such a solution, but several different third-party schemes emerged.

"Axlon" bank-selection type

Banks are 16 KiB, visible at 16384-32767/$4000-$7FFF. Bank selection is controlled by writing a bank number to ANY address in the ranges 4032-4095 ($0FC0-$0FFF) (mirror) OR 53184-53247 ($CFC0-$CFFF) (latter range recommended by Axlon; byte 53247 ($CFFF) used by popular convention). A value of 0 selects the main/normal bank, and values from 1 to 255 select an extended bank. Scheme supports up to 4080 KiB of banked RAM (255 banks of 16 KiB each) for a total system RAM potential of 4128 KiB (4080 KiB + 48 KiB).

- Axlon RAMDISK 128K Memory System / RAMPOWER 128 (800 middle RAM slot) (1981). Provides 8 16 KiB banks of memory, one of which is available to the computer at a time as part of the normal RAM of up to 48 KiB. With a total of 32 KiB installed in the other two RAM slots, the total system potential is 160 KiB.
  - Toggle switch supports configuration as 128 KiB or 16 KiB for added software compatibility
  - Shipped with CREATE utility that modifies Atari DOS 2.0S into: Axlon Memory Management System (MMS) with D4: RAM drive.
  - First 3rd party RAM drive for Axlon banked memory: ADS Integrater (1983), detailed elsewhere in this FAQ List (800 personality boards)
- Newell Industries 128K RAM Upgrade for 800 (800 middle RAM slot) Provides 8 16 KiB banks of memory, one of which is available to the computer at a time as part of the normal RAM of up to 48 KiB. With a total of 32 KiB installed in the other two RAM slots, the total system potential is 160 KiB.

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- Crystal Computer Products (CCP) 128 K RAMCard (800 middle RAM slot) (1986) Provides 8 16 KiB banks of memory, one of which is available to the computer at a time as part of the normal RAM of up to 48 KiB. With a total of 32 KiB installed in the other two RAM slots, the total system potential is 160 KiB.
  - Can be configured as 128 KiB or 16 KiB for added software compatibility, either via jumper pins or via optional hardware switch.
- Crystal Computer Products (CCP) 256 K RAMCard (800 middle RAM slot) (1986) Provides 16 16 KiB banks of memory, one of which is available to the computer at a time as part of the normal RAM of up to 48 KiB. With a total of 32 KiB installed in the other two RAM slots, the total system potential is 288 KiB.
  - Can be configured as 256 KiB or 16 KiB for added software compatibility, either via jumper pins or via optional hardware switch.
- Super Products SuperRAM (256 KiB piggyback board for 16 KiB board in middle RAM slot) Provides 16 16 KiB banks of memory, one of which is available to the computer at a time as part of the normal RAM of up to 48 KiB. With a total of 48 KiB installed in the three RAM slots, the total system potential is 304 KiB.
- Magna Systems Ramcharger 256K (800 middle RAM slot) (1986) Provides 16 16 KiB banks of memory, one of which is available to the computer at a time as part of the normal RAM of up to 48 KiB. With a total of 32 KiB installed in the other two RAM slots, the total system potential is 288 KiB. Includes on-off switch for added compatibility.
- Magna Systems Ramcharger 512K (800 middle RAM slot) (1986) Provides 32 16 KiB banks of memory, one of which is available to the computer at a time as part of the normal RAM of up to 48 KiB. With a total of 32 KiB installed in the other two RAM slots, the total system potential is 544 KiB. Includes on-off switch for added compatibility.
- Axlon Compatible Atari 800 512K RAM Board, by 8-Bit Classics (2017)
  Available: https://tinyurl.com/22hssuxb
- Magna Systems Ramcharger 1 MiB (800 middle RAM slot) (1986) Provides 64 16 KiB banks of memory, one of which is available to the computer at a time as part of the normal RAM of up to 48 KiB. With a total of 32 KiB installed in the other two RAM slots, the total system potential is 1056 KiB. Includes on-off switch for added compatibility.
- Incognito, by **Sebastian Bartkowicz (Candle'O'Sin)**, 2012
  - 1 MiB Axlon compatible memory expansion for "Colleen" mode
  - Device detailed elsewhere in this FAQ list (800 personality boards)
- 5cFabrication The 1056 Board:
  PNP 48 KiB + 1,008 KiB Axlon Compatible Upgrade For the Atari 800
  (800 middle RAM slot), 2022
  - Supplied with "Jumper Board" for front memory slot
- 5cFabrication The 1056 Board:
  48 KiB + 1,008 KiB Axlon Compatible Upgrade For the Atari 400, 2022
- 5cFabrication Atari 800 "The Mega 4" Four MB Memory Card (4,128 KiB), 2022
  - 48 KiB of base memory plus 4,080 KiB of Axlon compatible banked memory
  - Supplied with "Jumper Board" for front memory slot

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"Mosaic" bank-selection type

Banks are 4 KiB, visible at 49152-53247 or $C000-$CFFF. Writes to 65472-65507 or $FFC0-$FFE3 enable specific banks (65472 or $FFC0 = bank 0, 65473 or $FFC1 = bank 1, etc.). Writes to 65280-65471 or $FF00-$FFBF, or to 65508-65535 or $FFE4-$FFFF, disable all banks. Scheme supports 36 banks, for a total system potential of 192 KiB (48 KiB + 36 banks of 4 KiB).

Mosaic 64K RAM Select (400 or 800 any RAM slot) (400/800 version or early 400-only version) (1982):

- Single board provides 48 KiB "hard-wired" plus 4 banks of 4 KiB addressed directly beyond the normal 48 KiB limit, for 52 KiB of continuous memory available to the computer.
- In the 800, may be used in combinations including two 16 KiB boards, one 32 KiB board, one 16 KiB board and one 32 KiB board, or with one or two additional 64K RAM Select boards (total of 10 possible configurations). Each 64K RAM Select allows the computer to see all the memory of the other boards, makes enough of its own memory available to the computer to reach the continuous RAM limit of 52K, and makes the rest of its memory available to the computer in banks of 4 KiB addressed directly beyond the normal 48 KiB limit. Total system potential with three 64K RAM Select boards is 192 KiB (48 KiB + 36 banks of 4 KiB).
- Cable Kit/Cable Connectors Package #1 required in 400 or with first 64K RAM Select in 800. Many units supplied with:
  - SuperDrive by Starship Enterprises © 1983 H.V. Stacey (Stace)
    - GENVDOS installation program modifies Atari DOS 2.0S to support a RAM drive for 64K RAM Select, and to support DUP.SYS and/or MEM.SAV residing on the RAM drive.
- Cable Kit/Cable Connectors Package #2 required with 2nd or 3rd 64K RAM Select in 800; use of one 64K RAM Select board with one 32 KiB board requires Companion Board in middle RAM slot in 800
- 48K Boot Fix program included for compatibility with software written to treat more than 48 KiB available as not enough memory available.
- Software sold separately by Mosaic:
  - Handyman by Holiday Software (software utility package; routines reside in bank select RAM; usable with BASIC and Assembler Editor)

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Neither Axlon nor Mosaic bank-selection type (but very similar to Axlon)

- "Suggestions for a 64K Modification" portion of A 48K Upgrade for Your 400 project by Claus Buchholz, MACE Newsletter (Michigan Atari Computer Enthusiasts), 1982-09.
  64 KiB Modification ("MACE Mod") provides one 16 KiB bank of memory, bank-switched with the "middle" 16 KiB of the 48 KiB RAM, visible at 16384-32767 or $4000-$7FFF, for a system total of 64 KiB RAM. Write a 1 to a memory location between $D700 and $D7FF (55040 to 55295 decimal) to enable the banked memory; write a 0 to the same location to enable the main/normal memory.
- Atari 800 Plus 256K, project by David G. Byrd (1985-1987)
  (Inspired by the Claus Buchholz 64 KiB "MACE Mod" upgrade for the 400)
  288 KiB total memory for the 800: 48 KiB of normal user memory and 240 KiB of extended memory available in 15 banks of 16 KiB visible at 16384-32767 ($4000-$7FFF). Bank selection is controlled by writing a bank number (0-15) to the bank select register 55040 ($D700). Value of 0 selects the main/normal memory.
  - First published in the July 1985 S.N.A.C.C Newsletter.
    (Southern Nevada Atari Computer Club)
  - REV. A - Oct 1985
  - REV. D - Jan 1987 - for Ad Astra Ver 1.6, January/February 1987
    - Credits Rodger King for circuit simplification and David Lloyd for improved circuit
    - Optional daughter board design for the circuitry added to the memory board
    - Type-in QUIKTEST.BAS Ver 0.1 included
    - 800 Plus 256K Software (two disks) offered separately, containing:
      More elaborate version of QUIKTEST: Extended Memory Diagnostics for 800 Plus
      MACHDOS 3.7A (DSDD RAMdisk) with backup, restore, & disk compare
      DOS 2.5A (two SSSD RAMdisks)
      GENEMDE (patch for DOS 2.0S) - produces EMDE/OS (Extended Memory Disk Emulator Operating System) by H. V. Stacey (stace) (1983) with 240 KiB RAM drive support for the 800 Plus 256K.
      Two single pass disk copy utilities:
      1) COPY288K.BAS - Backup Atari 288K by Clifford Caywood
      2) CPY800PL.EXE - patched 130XE copy utility by RICK + DAN
      "As the world turns demo"
  - REV. E with Improved Refresh Circuit, by Perry Thuente, Feb 2022
    - https://tinyurl.com/5c5fzap5
  - Also available for Atari 800 Plus 256K project:
    - PEEKPOKE.3 by Dan Wess 1985-11-07 modifies the DOS 2.5 RAM drive for 256 KiB XL or 800 Plus. ABDISKIO.XR1 is a modified DISKIO (utility by Bernard E. Oppenbeim) to use DOS 2.5 as modified for the 800 Plus 256K
    - MYDOS256 is a patch file to convert MYDOS 3.015 (MYDOS 3.x?) to MyDospls, including 946 sector double density RAM drive. By Ross Beers, originally put out by LAACE BBS.
    - MYDOS 4.0+ can be configured for a full 240 KiB RAMdisk using the 800 Plus addressing
    - Available SmartDOS version with 800 Plus support
    - Axlon RAMDISK Compatible Modification for 800+ 256K, by CHAOS
      (Capitol Hill Atari Owner's Society)

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- Intec 64K MM6464 (400)
  - Explicitly supported by later versions of MachDOS.
  - Seems rather likely this is a commercialized version of the 48K/64K "MACE Mod" by **Claus Buchholz**; can anyone confirm????
- The WindHover Atari 400 SuperRam Modification project by **Jay Torres** and Jerry Rombert, (1985?) clone of the 48K/64K "MACE Mod" by **Claus Buchholz**
- The Windhover Project memory upgrades for the 800, by **Jay Torres**. 96 KiB/160 KiB/288 KiB version appeared in the Manitoba Atari Computer Club, October 1985; Windhover DOS sold separately. Essentially the same as the Byrd upgrade. WindHover 288K SuperRam version 1986
- Atari 800 512K RAM Card, by Bob Hays
  - With battery backup
  - http://www.bobhays.com/atari512k.html

Others, bank-selection type unknown (WHO CAN VERIFY?????)

- High Country MicroSystems (HCMS) Ram-Page 64K RAM (400 or 800)
  - Manufactured by MaxRam Datawave Corporation
  - Can add to existing memory in the 800 for up to 96 KiB RAM
- Hardsel Xtra HardWare XTRA64 (400 or 800) (1983)
- HardStuff 64K RAM Board (400 or 800)
- Memory Mill 64K Board (400 factory installed, or 800) (includes software)
- Memory Mill 128K Board (800) (includes software)

6.12.2) XL/XE Memory Upgrades

In Atari XL/XE computers, memory location 54017 ($D301), known as PIA Port B (PORTB), is used to manage access to portions of built-in ROM and RAM that share ranges of memory addresses. See another section of this FAQ list describing the Atari memory map and banked memory management for details.

Memory upgrades that increase the RAM in the 16 KiB 600XL to 32 KiB or to 48 KiB provide the computer with additional main memory only.

Memory upgrades that increase the RAM in the 600XL to 64 KiB (62 KiB usable) are designed to give the 600XL the same RAM specifications as the 800XL.

Memory upgrades that increase the RAM of a 64 KiB XL/XE computer to 128 KiB (126 KiB usable) are designed to give the computer the same banked memory specifications as the 130XE.

"The Quarter-Meg Atari 800XL" project by **Claus Buchholz**, Byte Sep-1985, designed before the release of the 130XE, used a system of 8 32 KiB RAM banks available at 0-32767/$0-$7FFF, where banks were selected using PORTB bits 4-6 (bits which were unused in the 1200XL/600XL/800XL).

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In the 130XE there are 4 16 KiB extended RAM banks available at 16384-32767/$4000-$7FFF, where banks are selected using PORTB bits 2-3 and enabled for access by the 6502 and/or ANTIC chips using PORTB bits 4-5.

Following the standard set by the 130XE, XL/XE memory upgrades to more than 128 KiB RAM provide additional 16 KiB extended RAM banks at 16384-32767/$4000-$7FFF, and the additional banks are selected using additional bits of PORTB. Depending on the design of the upgrade, this MAY result in loss of functionality otherwise associated with the co-opted bits of PORTB, such as loss of "true ANTIC banking" capability (independent access to selected banked memory by the 6502 and/or ANTIC; bits 4-5), loss of access to the internal Self Test program (bit 7), loss of access to internal BASIC (bit 1), or loss of access to the 16 KiB of RAM "under" the Atari OS (bit 0).

6.12.2.1) 32 KiB system total, for the 600XL

- RC Systems AM2, plugs into the PBI, 1984
- W.E. Electronics (W.E.E.) 16K Expansion Pack, plugs into the PBI, 1985
  - May be upgraded from 16 KiB to 32 KiB (48 KiB system total)

6.12.2.2) 48 KiB system total, for the 600XL

- RC Systems AM1, plugs into the PBI, 1984
- FirstWare (Mosaic) 48K Expander (internal), 1984
  - Expander Package Upgrade Kit upgrades 48K Expander to 64K
- W.E. Electronics (W.E.E.) 32K Expansion Pack, plugs into the PBI, 1985

6.12.2.3) 64 KiB system total, for the 600XL unless otherwise indicated

- 64 KiB internal daughterboard by BOT Engineering, 1983
  - Some 600XL units were sold in Canada with this upgrade pre-installed.
- Atari 64K Memory Module (1064), plugs into the PBI, 1984
  - Provides pass-through interface for additional PBI devices
  - Only 48 KiB of 64 KiB in DRAM chips is used; the computer's internal 16 KiB RAM remains enabled as well for 64 KiB system total
- MPP MicroRam 64K Memory Board, plugs into the PBI, 1984
- RC Systems AM64, plugs into the PBI, 1984
- FirstWare (Mosaic) 64K Expander (internal), 1984
- WW.E. Electronics (W.E.E.) 64K RAM Expansion, plugs into the PBI, 1985
- 600XL 64K Kit, by Computer Service Land (internal), 1986
- 600XL to 64K RAMKit, by Computer Support, 1986
- 600XL to 64K internal upgrade kit, York Computer Centre, 1987
- Atari 600XL to 64K RAM project by Ken Sumrall, 1987
- Innovative Concepts Ramdrive + 64K (16 KiB to 64 KiB internal), 1987
- 64K Upgrade for 600XL project by Don Neff, February 1988 issue of Michigan Atari Magazine
- Compy-Shop 64 K RAM for Atari 600XL
- Atari Static RAM project by tOri, 2014
  - SRAM memory replacement for XL/XE including 600XL/800XL/65XE/800XE
  - http://atari.myftp.org/atari8bit/static/static.html

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- SRAM Module 64 KiB, by **Przemyslaw Krawczyk (Lotharek)**, 2019
  - Memory replacement for XL/XE including 600XL/800XL/65XE/800XE
  - https://lotharek.pl/productdetail.php?id=232
- SRAM Module 64 KiB Revised, by **Przemyslaw Krawczyk (Lotharek)**, 2020
  SRAM 64Kb v3, by **Przemyslaw Krawczyk (Lotharek)**, 2021
  - Memory replacement for XL/XE including 600XL/800XL/65XE/800XE
  - https://lotharek.pl/productdetail.php?id=291
- 5cFabrication Atari 600XL 64k PBI Memory Upgrade, 2022
  - Plugs into the PBI, uses SRAM, no external power necessary

6.12.2.4) 128 KiB system total (Atari 130XE banked memory standard)

PORTB bank-selection bits used: 2,3
2 bank-selection bits allows selection of $2^2 = 4$ (i.e. 4x 16 KiB memory banks).

- Turbo-Freezer XL or XL 2 with 64 KiB RAM, by **Bernhard Engl**, 1987.
  - For 600XL (64 KiB) or 800XL
  - Draws power from PBI, from controller jack, or computer internal power
  - Built-in DOS supports 1050 Turbo/Turbodrive
- Innovative Concepts Ramdrive + XL to XE (800XL/600XL 64 KiB to 128 KiB)
  - True ANTIC banking
- Innovative Concepts Ramdrive + 128K (65XE 64 KiB to 128 KiB)
  - True ANTIC banking
- Innovative Concepts Ramdrive + XE-GM1 (XEgs 64 KiB to 128 KiB) (1988)
  - True ANTIC banking
- 128k SRam memory substitute by **Bernd Herale** / BigBen, 2005?
  - For all PAL/NTSC Atari XL/XE.
  - Replaces built-in RAM.
  - All Ataris are 130XE compatible

6.12.2.5) 192 KiB system total

PORTB bank-selection bits used: 2,3,6
3 bank-selection bits allows selection of $2^3 = 8$ (i.e. 8x 16 KiB memory banks).

- Ron Boling 130XE project
- Compy-Shop 192 K RAM for Atari 600XL (128 KiB Ramdisk)
  (includes base RAM upgrade from 16 KiB to 64 KiB)
- Compy-Shop 192 K RAM for Atari 130XE (128 KiB Ramdisk)
- Turbo-Freezer XL or XL 2 with 128 KiB RAM, by **Bernhard Engl**, 1987.
  - For 600XL (64 KiB) or 800XL
  - Draws power from PBI, from controller jack, or computer internal power
  - Built-in DOS supports 1050 Turbo/Turbodrive
- Innovative Concepts Ramdrive + 192K (130XE 128 KiB to 192 KiB), 1988-11-11
  - True ANTIC banking
- Innovative Concepts Ramdrive + XE-GM2 (XEgs 128 KiB to 192 KiB).
  - For XEgs with IC's XE-GM1 128 KiB upgrade already installed
  - True ANTIC banking
- TOMS 128 KiB upgrade for 800XL

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6.12.2.6) 256 KiB system total

4 bank-selection bits allows selection of $2^4 = 16$ (i.e. 16x 16 KiB memory banks), but there are only 12 "extra" banks available because the computer's main 64 KiB RAM has been REPLACED. Main memory may or may not be protected from bank selection.

"Newell" bank-selection type

PORTB bank-selection bits used: 2,3,5,6 (only 12 banks available)
PORTB bit 5 use is inverted relative to the "Rambo" type.

- Newell Industries 256KXL for 800XL/1200XL, ANTIC 'E' required, 1985
  - Main memory is protected from bank-selection
  - ANTIC accesses main memory only
    - Optional toggle switch for manual control of whether ANTIC accesses main or banked memory when banking is enabled
  - Shipped with MYDOS 4.x, which can be configured for a "Newell" type RAM drive
  - Supplied with patches for:
    - SpartaDOS 3.2 RD.COM RAM drive (patched version known as RDNEW.COM)
    - Earlier versions of Paper Clip by Batteries Included
  - Modifications supplied by Newell
    1. True ANTIC banking
    2. Main memory (including RAM under the OS) can be bank-selected.
  - SCXM Sector Copier (1985) sold separately
  - NOTE: After the RAMBO XL gained strong marketplace acceptance, the Newell 256KXL was replaced with the Newell 256KXLE, see below.

"Rambo" bank-selection type

PORTB bank-selection bits used: 2,3,5,6 (only 12 banks available)
Due to the use of PORTB bit 5 (VBE), these may or may not support true ANTIC banking.
Also, PORTB bit 5 use is inverted relative to the "Newell" bank-selection type.

- 130XE-Compatible 800XL 256K Upgrade, project by **Claus Buchholz**
  - Revision of his "Quarter-Meg Atari 800XL" project
  - Main memory can be bank-selected
  - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
- Ramaster, by ABC Consulting, for 800XL
  - Commercialized version of the **Claus Buchholz** 130XE-Compatible 800XL 256K
- RAMBO XL by ICD, for 800XL or 1200XL, 1986
  - Commercialized version of upgrade of same name by Madison Area Atari Users Group (MAAUG) published Oct-Nov 1985, itself a close derivative of the **Claus Buchholz** 130XE-Compatible 800XL 256K Upgrade
  - Main memory can be bank-selected
  - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - North American market standard-bearer
  - Notably not for 800XL units with later "800XLF" motherboard

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- 800XE PLUS, by Triple "C" Computer, for 800XL or 1200XL, 1986
  "It's entirely compatible with the 130XE"
- 256k RAM for 800XL, by Computer Support, 1986
  - "Includes Ramdisc software for all DOS systems"
  - "Full 130XE compatibility"
- Allen Macroware XL 256K MacroRam board for the 800XL, 1986
  - "includes multidensity Ramdisk"
- Magna Systems Ramcharger 256K for 800XL or 1200XL, 1987
  - ANTIC accesses main memory only
- Innovative Concepts Ramdrive + XL (800XL 64 KiB to 256 KiB), 1987
  - "RAMBO XL compatible"
- Yorky, design by Dave Malham for York Computer Centre (1987), then Richard Gore (1993), for 800XL or 64 KiB 600XL
  - Plugs into the PBI
  - Uses the 600XL/800XL power supply; supplies power for the computer
  - 3-way switch: Off, 64K, or 256K
- Wizztronics 256K 800XL, © 1990 (by Steve Cohen)
  - Clone of RAMBO XL design, but for 800XL only
  - http://www.best-electronics-ca.com/wizztronics%202_256.htm
- Newell 256KXLE, for 800XL/1200XL, c1991
  - NOTE: Replaced the earlier Newell 256KXL
  - True ANTIC banking
  - Shipped with MYDOS 4.5x and COPY256E sector copier
- CSS Power Plus, later version for 800XL
  - Clone of RAMBO XL design, but for 800XL only
- Atarimax 256k Memory Upgrade for 800XL and 1200XL
  - Clone of RAMBO XL design, but for 800XL only
- Reimaged Rambo XL 256k Memory Upgrade, by Bits of the Past, (2011?)
  - Clone of RAMBO XL
- SuperRAM, by Super Products, for 600XL/800XL
  - No soldering required

"Compy-Shop" bank-selection type

PORTB bank-selection bits used: 2,3,6,7 (only 12 banks available)

- Compy-Shop 192 K Ramdisk for Atari 600XL
  - Also upgrades base memory from 16 KiB to 64 KiB
  - Despite the use of PORTB bit 7, the internal Self Test program remains available

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6.12.2.7) 320 KiB system total

4 bank-selection bits allows selection of $2^4 = 16$ (i.e. 16x 16 KiB memory banks).

"Atari Magazin" (Rambo) bank-selection type

Bank-selection is the same as the Rambo type but with 16 banks available.
PORTB bank-selection bits used: 2,3,5,6
Due to the use of PORTB bit 5 (VBE), these may or may not support true ANTIC banking.

- The 130XE/320K upgrade by **Scott Peterson**, 1985
  - Credits the 800/288K upgrade (D.G.Byrd) and the 800XL/256K upgrade (**Claus Buchholz**) for inspiration
  - ANTIC accesses main memory only
  - Further modification by Tom Harker of ICD, 25-Jan-1986:
    - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - Further modification by Ed Bachman, 3-Jan-1990:
    - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
- The Windhover SuperRam 130XE Upgrade, by **Jay Torres**/The Windhover Project
  - Published in the Windhover Newsletter 1985
  - Clone of the 130XE/320K Upgrade project by **Scott Peterson**
- The 65XE 130XE/320K Upgrade! by **Scott Peterson** (for the 65XE), 1986
  - 100% compatible with the previous 130XE/320K upgrade by **Scott Peterson**
  - ANTIC accesses main memory only
  - Further modification by Ed Bachman, 3-Jan-1990:
    - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
- Magna Systems Ramcharger 320K for 130XE, 1987
  - ANTIC accesses main memory only
- Atari Magazin "320 KByte im Eigenbau" for 800XL, by Rolf Schmidtke, issue 1987 #2 page 56; bugfixes/updates 1987 #3 page 54, 1988 #4 page 62, 1988 #5 page 86
  - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - Popular alternative to Compy-Shop upgrades in Europe
- TOMS 192 KiB upgrade for 130XE
- TOMS 256 KiB upgrade for 800XL
- Innovative Concepts Ramdrive + XE (130XE 128 KiB to 320 KiB), 1987
- Innovative Concepts Ramdrive + 320K (65XE 64 KiB to 320 KiB)
- CSS Power Plus, 130XE version or earlier version for 800XL
  - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
- Detlefsen Enterprises 320K kit for 130XE using four 4-bit RAM chips, 2007
- RAM 320XL, by ctirad, for 600XL/800XL, 2010
  - Plugs into the PBI
  - Standard mode ADDS 256 KiB of expansion memory. This gives a 16 KiB 600XL 272 KiB system total, while a 64 KiB 800XL has 320 KiB system total.
  - Remapped base RAM mode DISABLES internal RAM, makes 64 KiB main memory available from the RAM 320XL device, for 320 KiB total
  - http://atariage.com/forums/topic/162420-ram-320xl/
- SuperRAM, by Super Products, for 130XE
- 5cFabrication Atari 600XL/800XL 320k PBI Memory Upgrade, 2022
  - Plugs into the PBI; USB-C external power required for the 800XL only

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"Compy-Shop" bank-selection type

PORTB bank-selection bits used: 2,3,6,7
Due to the use of PORTB bit 7, the internal Self Test program may or may not remain available

- The Atari 130XE Memory Upgrade project by **Rich Andrews**, alternate install
  - Self Test is lost via software control (PORTB bit 7)
- Compy-Shop 256 K Ramdisk for Atari 800XL
  Compy-Shop 256 K Ramdisk for Atari 130XE
  - Internal Self Test program remains available
  - Popular alternatives to Atari Magazin upgrade in Europe
  - Supplied with Bibo-DOS
- Megaram XL/XE, by **Klaus Peters** (1990?)
  Megaram XL/XE REV. II, by **Klaus Peters** (1992)
  - Fix for refresh errors, modification for switchable Atari Magazin mode (with true ANTIC banking):
    http://www.b-pahl.de/atari8bit/RAM-Disk/doku/BugFix/bugfix.html

"Turbo-Freezer" bank-selection type

PORTB bank-selection bits used: 2,3,4,5

- Turbo-Freezer XL and XL 2 with 256 KiB RAM, by **Bernhard Engl**, 1987
  - For 600XL (64 KiB) or 800XL
  - Draws power from PBI, from controller jack, or computer internal power
  - Two bank selection modes, determined by PORTB bit 6:
    1=130XE standard 128 KiB banked RAM (PORTB bits 2,3 used)
    0=256 KiB banked RAM (PORTB bits 2,3,4,5 used)
  - Both modes: True ANTIC banking optional, otherwise PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - Built-in DOS supports 1050 Turbo/Turbodrive

"Andrews" bank-selection type

PORTB bank-selection bits used: 1,2,3,6

- The Atari 130XE Memory Upgrade project by **Rich Andrews**, standard install
  - Internal BASIC is lost via software control (PORTB bit 1)

Multiple bank-selection types supported

- 256 kByte im 800XL project by **Bernhard Pahl**
  - Two modes: Atari Magazin and Compy-Shop
  - http://www.b-pahl.de/atari8bit/RAM-Disk/800xl_1/800xl_1.html
- 256 kByte im 800XLF / 65XE / 800XE / XEgs project by **Bernhard Pahl**
  - Two modes: Atari Magazin and Compy-Shop
  - http://www.b-pahl.de/atari8bit/RAM-Disk/800xe_1/800xe_1.html
- 256 kByte im 130XE project by **Bernhard Pahl**
  - Two modes: Atari Magazin and Compy-Shop
  - http://www.b-pahl.de/atari8bit/RAM-Disk/130xe_1/130xe_1.html

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- RAM-Erweiterung 256kB fur 130XE, by Heuser Family (2005):
  - Two modes: Atari Magazin and Compy-Shop
  - http://www.asselheim.de

6.12.2.8) 512 KiB system total

5 bank-selection bits allows selection of $2^5 = 32$ (i.e. 32x 16 KiB memory banks), but there are only 28 "extra" banks available because the computer's main 64 KiB RAM has been REPLACED.
Main memory may or may not be protected from bank selection. If the PORTB bank-selection bits used include 2,3,5,6 then the upgrade is Rambo/Atari Magazin compatible; if they include 2,3,6,7 then the upgrade is Compy-Shop compatible.

- 512K Atari 800XL/1200XL V1.1, by Dan Schmidt. For computers that already have a 256K RAMBO XL or **Claus Buchholz** upgrade installed
  - NOTE: The original non-V1.1 version does not work!
  - PORTB bank-selection bits used: 2,3,5,6,7
  - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - Main memory can be bank-selected
- ShamaXL AME Issue 1.1, 600XL installation, by **Алексей Семёнов (Aleksey Semenov)**, 2023
  - Three RAM expansion modes: 576 KiB, 320 KiB, or off
  - 512 KiB mode PORTB bank-selection bits used: 2,3,5,6,7
  - 320 KiB mode PORTB bank-selection bits used: 2,3,5,6
  - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - PBI device

6.12.2.9) 576 KiB system total

5 bank-selection bits allows selection of $2^5 = 32$ (i.e. 32x 16 KiB memory banks).
If the PORTB bank-selection bits used include 2,3,5,6 then the upgrade is Rambo/Atari Magazin compatible; if they include 2,3,6,7 then the upgrade is Compy-Shop compatible.

- The 130XE/576K upgrade, by **Scott Peterson**. (1986) Two modes:
  - 576 KiB mode: PORTB bank-selection bits used: 1,2,3,5,6
    - Internal BASIC is lost via software control (PORTB bit 1)
    - ANTIC accesses main memory only
    - Further modification by Ed Bachman, 3-Jan-1990:
      PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - 130XE mode: 192 KiB RAM
    - "100% compatible 130XE"
- Irata Verlag 512K RAM 800XL RAM Floppy plugs into the 800XL PBI (1986)
  - Sold separately: 512K RAM BetriebsSystem Chip for 800XL + RAM Floppy
- Magna Systems Ramcharger 576K for 130XE (1987)
  - PORTB bank-selection bits used: 2,3,5,6,7
  - ANTIC accesses main memory only
  - Self Test is lost via software control (PORTB bit 7)

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- Innovative Concepts Ramdrive + 576K (130XE 320 KiB to 576 KiB), 1987
  - Upgrade for 130XE with IC's 130XE 320 KiB upgrade already installed.
- 512K im 800XL / 800XE project by **Bernhard Pahl**
  - Based on Megaram XL/XE REV. II, by **Klaus Peters**
  - Compatible with both Atari Magazin and Compy-Shop bank-selection types (PORTB bank-selection bits used: 2,3,5,6,7)
  - http://www.b-pahl.de/atari8bit/RAM-Disk/800xl_2/800xl_2.html
- 512K im 130XE project by **Bernhard Pahl**
  - Compatible with both Atari Magazin and Compy-Shop bank-selection types (PORTB bank-selection bits used: 2,3,5,6,7)
  - http://www.b-pahl.de/atari8bit/RAM-Disk/130xe_2/130xe_2.html
- 512K SRam Extension by **Bernd Herale** / BigBen, 2005
  - For XL/XE with at least 64 KiB RAM. Four modes:
    1. Memory expansion off
    2. 256 KiB "Compy Shop" mode (separate access for ANTIC and 6502)
    3. 256 KiB "Rambo/Atari Magazine" mode (no separate access)
    4. 512 KiB "Rambo" mode (no separate access)
  - Board layout with additional battery or battery backup by **Wolfram Fischer** (mega-Hz), 2006
- 512K SRAM extension for Atari XL/XE, project by **Matthias Reichl**, 2006-2010.
  For XL/XE with at least 64 KiB RAM. Four modes:
  - 0 KiB / off
  - 256 KiB using PORTB bits 2,3,5,6 ("RAMBO/Atari Magazine")
    - PORTB bit 4 is selected bank enable for 6502/ANTIC together
  - 256 KiB using PORTB bits 2,3,6,7 "Compy Shop" with true ANTIC banking
  - 512 KiB using PORTB bits 2,3,5,6,7
    - PORTB bit 4 is selected bank enable for 6502/ANTIC together
  - Project: http://www.horus.com/~hias/atari/#sram512k
  - Available: 512 KiB SRAM SMD Memory Expansion V3.x
    - Hardware + Layout by **Wolfram Fischer** (mega-Hz), 2011
    - Optional two switches to select the desired operating modes or to switch them off completely. If the switches are not connected, the memory always works in 512 KiB mode.
    - Optional battery backup
    - http://www.mega-Hz.de/Angebote/512K/512k.html
- 576K Atari 130XE Battery Backed Up RAMDISK
  - Project by **Stephen J. Carden**, 2006-06-25
  - http://www.realdos.net/576kxe%20battery%20backed.html
- Turbo-Freezer XL/XE 2011, by **Matthias Reichl**
  - Requires 64 KiB and XL adapter board for PBI; XE adapter board for ECI
  - Draws power from PBI/ECI or from controller jack
  - Hardware switch enables/disables 512 KiB RAM (battery backed) for a total system memory of 576 KiB
  - PORTB bank-selection bits used: 2,3,5,6,7
  - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - https://www.horus.com/~hias/atari/

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- RAM 320XE/576, by ctirad, for 130XE/800XE/65XE with ECI, 2014
  - Plugs into Cartridge + ECI
    - All cards have a cartridge pass-through connector
    - Optionally, the ECI port pass-through connector can be added
  - Supports four RAM configurations:
    - 128 KiB 130XE, 320 KiB Rambo, 320 KiB Compy-Shop, 576 KiB Rambo
  - 130XE and 320 KiB Compy-Shop modes: True ANTIC banking
  - http://atariage.com/forums/topic/232856-ram320xe576-order-thread/
- Sys-Check V2.2, by **Jurgen van Radecke** (tfhh), 2015, 2018, 2019
  - For XL/XE with PBI/ECI
  - Includes external 512 KiB Standard memory expansion using "Rambo" scheme
  - http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf
- AVGCART (Average Cart) by tmp, 2018
  - When used with optional ECI/PBI cable
  - PORTB bank-selection bits used: 2,3,5,6,7
  - Can also provide extra 48 KiB RAM to stock 16 KiB 600XL machines
  - https://avgcart.tmp.sk/
- 512 KiB SRAM Memory Expansion V4.4, by **Jurgen van Radecke** (tfhh), 2018
  - For all XL/XE except 600XL (physical space limitation)
  - Default 512 KiB Rambo mode
  - Can switch to 256 KiB Compy-Shop mode (with true ANTIC banking) or switch the whole expansion off
  - http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf
- 576 KiB SRAM Memory Expansion, by **Jurgen van Radecke** (tfhh), 2019
  - 64 KiB base/main & 512 KiB expanded memory for the Atari 600XL
  - Works in all XL/XE, but is specially made to work and fit in the 16 KiB RAM 600XL
  - Default 512 KiB Rambo mode
  - Can switch to 256 KiB Compy-Shop mode (with true ANTIC banking) or switch the whole expansion off
  - http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf
- ShamaXL on PAL/SECAM 800XL by **Алексей Семёнов (Aleksey Semenov)**, 2023
  - Three RAM expansion modes: 576 KiB, 320 KiB, or off
  - 576 KiB mode PORTB bank-selection bits used: 2,3,5,6,7
  - 320 KiB mode PORTB bank-selection bits used: 2,3,5,6
  - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
  - PBI device. External or PBI power required

6.12.2.10) 1,024 KiB system total

6 bank-selection bits allows selection of $2^6 = 64$ (i.e. 64x 16 KiB memory banks), but there are only 60 "extra" banks available because the computer's main 64 KiB RAM has been REPLACED.

- 1 Meg 1200XL Upgrade project, by **Bob Woolley**, San Leandro Computer Club (SLCC) Newsletter Apr-1992 pages 10-12
  - PORTB bank-selection bits used: 1,2,3,5,6,7
  - Internal BASIC is lost via software control (PORTB bit 1)
  - True ANTIC banking

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6.12.2.11) 1,088 KiB system total

6 bank-selection bits allows selection of $2^6 = 64$ (i.e. 64x 16 KiB memory banks).

- Scott Peterson 1088XE project for the 130XE
  - April 1986 (initial release); Version 2.0 (This one works!) June 1986
  - PORTB bank-selection bits used: 1,2,3,5,6,7
  - Internal BASIC is lost via software control (PORTB bit 1)
  - Internal Self Test program remains available
  - ANTIC accesses main memory only
  - Further modification by Ed Bachman, 3-Jan-1990:
    - PORTB bit 4 used as selected bank enable for 6502/ANTIC together
- Magna Systems Ramcharger 1088K for 130XE. (1987)
  - PORTB bank-selection bits used: 1,2,3,5,6,7
  - ANTIC accesses main memory only
  - Self Test is lost via software control (PORTB bit 7)
  - Internal BASIC is lost via software control (PORTB bit 1)
- Newell 1 Meg XL for 800XL/1200XL (1990)
  - Installation Method 1: (1,088 KiB accessible RAM)
    - PORTB bank-selection bits used: 1,2,3,5,6,7
    - Self Test is lost via software control (PORTB bit 7)
    - Internal BASIC is lost via software control (PORTB bit 1)
    - True ANTIC banking
  - Installation Method 2: (1,072 KiB accessible RAM)
    - PORTB bank-selection bits used: 2,3,4,5,6,7
    - Self Test is lost via software control (PORTB bit 7)
    - 6502/ANTIC simultaneous banked memory access is ALWAYS enabled; 16 KiB of main memory is not accessible
  - Installation Method 3: (1,072 KiB accessible RAM)
    - PORTB bank-selection bits used: 0,1,2,3,5,6
    - Internal BASIC is lost via software control (PORTB bit 1)
    - True ANTIC banking
    - 16 KiB RAM under the Operating System is not accessible
  - Shipped with MYDOS 4.50 M1 and M1Copy Sector Copier, both for use with Method 1 installation
- Newell Meg XL for 800XL/1200XL (1991), Meg 65 for 65XE (1991), or Meg 130 for 130XE (1991), 1 MiB installations
  - PORTB bank-selection bits used: 1,2,3,5,6,7
  - Self Test is lost via software control (PORTB bit 7)
  - Internal BASIC is lost via software control (PORTB bit 1)
    - Installation option: Toggle switch to select internal BASIC
  - True ANTIC banking
  - Shipped with MYDOS 4.50 M1 and M1Copy Sector Copier
- Megaram XL/XE REV. III 1 MiB (Super-Megaram), by Klaus Peters, 1992
  - 1 MiB installation:
    - PORTB bits 2,3,6,7 and memory location 54,784 ($D600) bits 0,1
    - Optional hardware switches for manual selection of 4 banks of 256 KiB
  - 256 KiB installation, PORTB bank-selection bits used: 2,3,6,7
  - Fix by Erhard Puetz for refresh errors on XL's without FREDDIE: http://www.b-pahl.de/atari8bit/RAM-Disk/doku/BugFix/bugfix.html#bug3fix

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- Satantronic 1 MiB SIMM RAM expansion project for 800XL, 800XE, 130XE, XEgs, by Dodo (Jozef Friedmansky). (2002, 2007, 2009)
  Internal upgrade, with or without switches, with or without GAL chip.
  - 1 MiB mode uses PORTB bits 1,2,3,5,6,7
  - 256 KiB Compy-Shop mode
  - 256 KiB Atari Magazin mode
  - 64 KiB 130XE mode
  - Optional 0 KiB 800XL/65XE mode
  - http://satantronic.atari.sk/?str=xe_1mbram
- 1,024 KiB im 800XL project by **Bernhard Pahl**
  - PORTB bits: 1,2,3,5,6,7
  - Two modes: 1,024 KiB without BASIC, or 512 KiB with BASIC
    http://www.b-pahl.de/atari8bit/RAM-Disk/800xl_3/800xl_3.html
- 1 MiB SIMM project for 800XL, 65XE, 130XE, 800XE, by Pasiu/SSG. (2004?) Internal upgrade works in two modes:
  - 512 KiB Compy-Shop with true ANTIC banking
  - 1,024 KiB with 6502/ANTIC simultaneous banking
  - http://hardware.atari8.info/simm.php
- mega-mem 1,024 KiB for 800XL, 800XE/65XE, 130XE, 1200XL, by **Matthias Reichl** and **Wolfram Fischer** (mega-Hz), 2009. 8 modes selectable with 3 switches:
  - 0 KiB (off)
  - 64 KiB 130XE compatible
  - 128 KiB
  - 256 KiB Compy-Shop compatible
  - 256 KiB Rambo/Atari Magazin compatible
  - 512 KiB with ANTIC access
  - 512 KiB without ANTIC access
  - 1,024 KiB (built-in BASIC not available)
  - Without switches: 1,024 KiB without BASIC, or 512 KiB with BASIC
  - http://www.mega-hz.de/Angebote/1024K/1mb.html
- Ultimate 1MB, by **Sebastian Bartkowicz (Candle'O'Sin)**, for all 64 KiB XL/XE RAM features:
  - RAM configurable with 4 modes of operation:
    - Disabled
    - 320 KiB "Rambo" (Atari Magazine)
    - 576 KiB "Compy-Shop" with True ANTIC banking
    - 1,088 KiB "Rambo"
  - Firmware BIOS and SIDE Loader by **Jonathan Halliday**:
    https://atari8.co.uk/firmware/ultimate-1mb/
    https://lotharek.pl/productdetail.php?id=56
    https://retrolemon.co.uk/12-atari
- Atari MegaRAM Cart project by Gianluca GP Renzi, 2019
  - For Atari Bus EXtender for Atari XE Computers with ECI
  - https://github.com/gianlucarenzi/abex-megaram
- SUBCART (variant of AVGCART) by tmp, 2023
  - When used with optional ECI/PBI cable
  - https://miscretro.com/product-category/atari/subcart/

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6.12.2.12) 4 MiB system total

8 bank-selection bits allows selection of $2^8 = 256$ (i.e. 256x 16 KiB memory banks).

- Newell Meg XL for 800XL/1200XL (1991), Meg 65 for 65XE (1991), or Meg 130 for 130XE (1991), 4 MiB installations (4,064 KiB accessible RAM)
  - PORTB bank-selection bits used: 0,1,2,3,4,5,6,7
  - Self Test is lost via software control (PORTB bit 7)
  - Internal BASIC is lost via software control (PORTB bit 1)
    - Installation option: Toggle switch to select internal BASIC
  - 6502/ANTIC simultaneous banked memory access is ALWAYS enabled; 16 KiB of main memory is not accessible
  - 16 KiB RAM under the Operating System is not accessible
    - Installation option makes RAM under the OS available, but only usable if OS is first moved to RAM
  - Shipped with MYDOS 4.50 M1 and M1Copy Sector Copier

6.13) What personality boards were produced for the Atari 800?

This should be a complete list of personality boards released for the 800.

Atari CX801 10K ROM Personality Module (1979)

- 400/800 OS, C012399 Floating-Point Package (FPP) + C012499 + C014599
- Early units: 400/800 OS REV. A/NTSC
- Most units: 400/800 OS REV. B/NTSC

Atari CX801-P 10K ROM Personality Module (1981)

- 400/800 OS REV. A/PAL, C012399 (FPP) + C015199 + C015299

L.E. Systems disk drive (1982)

- Device is a personality board (oversized) for the 800
- Detailed elsewhere in this FAQ list (using industry standard floppy disk drives)

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Ramrod MMOS Custom Operating System Board, by Newell Industries (1982)

- Five ROM chip sockets
  - Two sockets for standard 400/800 OS chips or direct replacements
  - One socket for standard 400/800 FPP chip or direct replacement
  - Two sockets for addressing the 4 KiB byte block of memory at $C000
    - Only one socket can address the entire 4 KiB block. In order to use two 4 KiB chips, a hardware toggle switch must be utilized.
    - These two sockets can be reconfigured to support standard 400/800 OS chips or direct replacements. A hardware toggle switch is then used to select between the two OS versions installed on the Ramrod.
- Earliest units shipped with Supermon! by David Young and 4 KiB RAM, and optionally also shipped with 8 KiB EPROM (two 4 KiB chips)
- Other early units shipped with Omnimon! by CDY Consulting and 4 KiB RAM, and optionally also shipped with 8 KiB EPROM (two 4 KiB chips)
- Later/Most units shipped with both Newell OSN and (standard 4 KiB) Omnimon!
- "Ramrod 2" shipped with OSN but without Omnimon!
- "Ramrod 3" shipped with neither OSN nor Omnimon!
- Board designed by System Innovations for Newell

RAM/ROM Personality Board, by Adam Peripherals (1982 - released?)

- Provides both 10 KiB OS ROM and 14 KiB RAM
- Requires 400/800 OS chips moved from a CX801
- By default, system operates from ROM at power on.
- User can configure system with 48 KiB external memory (3 CX853 16K RAM modules) as a 62 KiB RAM system (no OS).
- User can move OS from ROM to RAM to allow for OS modification
- 4 KiB of RAM at $C000-$CFFF available to cartridges
- With OS in RAM and 48 KiB external memory (3 CX853 16K RAM modules, no cartridges), system automatically configures itself as a 52 KiB RAM system
- Software provided for memory test, OS transfer from ROM to RAM, and an assembly language monitor residing at $C000 which can replace the Memo Pad

Integrater, by ADS (1983)

- For Corvus hard disk drive and/or Axlon banked memory
- Software & hardware design by D.S.S.A. (David & Sandy Small and Associates); sales support by Adams Computer Systems, Inc. (Allan Adams)
- Built-in software known as: smallDOS
- RAM drive emulates a 90 KiB single density DOS 2.0S disk (707 sectors)
- RAM drive is about 2 times faster than the original Axlon MMS RAM drive
- RAM drive can be designated as any drive without system reboot or using an application program
- Can boot the Atari directly from the Corvus
- The Corvus can boot directly into an application program using standard Atari AUTORUN.SYS techniques and programs
- Resident Mount Table Editor (part of smallDOS)

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MEM/EX, by Prairie Physics (1983)

- Requires 400/800 OS chips moved from a CX801
- Adds 4 KiB RAM at $C000
- Switch/program-selectable write-protection
- Shipped with COM/EX software utility package on diskette
  - Resides in MEM/EX RAM
  - Adds ten new direct-mode commands for use with Atari BASIC or Assembler Editor
  - Machine-language monitor

Incognito, by Sebastian Bartkowicz (Candle'O'Sin), 2012

- 4 slots for OS separate for "Colleen" and XL/XE mode
- 64 KiB of flash memory for future GUI
- 2 slots for BASIC/cartridge
- Built-in, configurable CF card storage (works as PBI in XL/XE mode, and through SDX driver in "Colleen" mode)
- Built-in FAT32 loader (SIDE) with both ATR and XEX file handling
- SpartaDOS X
- Onboard RTC - Real Time Clock
- 1 MiB Axlon compatible memory expansion for "Colleen" mode
- 64 KiB / 320 KiB / 576 KiB / 1,088 KiB total memory available in XL/XE mode
- Up to 52 KiB of memory in "Colleen" mode (configurable)
- Firmware BIOS and SIDE Loader by Jonathan Halliday:
  - A PBI implementation of Matthias Reichl's High-Speed SIO code which does not require OS patching and which works with external cartridges
  - The ability to set the system date and time from inside the BIOS setup utility
  - Expanded PBI BIOS settings on a dedicated menu page
  - System information page showing video standard, CPU speed, etc.
  - User-selectable BIOS hotkeys
  - Configuration profiles
  - BIOS plugin API for user-defined external device control
  - New, faster XEX loader supporting multiple FAT partitions, APT partition mounting and recursive searching
  - SIO2BT support (at up to 56kb/s) and high-speed SIO for PCLink and other serial devices
  - Built-in CIO "Z:" RTC device handler
  - https://atari8.co.uk/firmware/incognito/

Available:
https://lotharek.pl/productdetail.php?id=275
https://thebrewingacademy.com/products/incognito-with-fjcs-firmware
https://retrolemon.co.uk/12-atari

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Atari 800 RAMROM 2022 Personality Card, by 5cFabrication, 2022
- Has sockets for Atari's 2 ROM chips and a Math Pack chip
- Has a socket for a flash ROM chip
- Can be configured to provide the following:
  - Up to 4 Operating systems on a flash ROM chip
  - Fast Chip can be installed on the flash ROM
  - 4 KiB of extra RAM to provide 52 KiB of Base Memory
  - Add-on firmware such as Omniview and Omnimon
  - 128 KiB of Mosaic-banked memory
  - All RAM, on this card, can be configured with a CR2032 battery back-up
- Compatible with Axlon cards if on-board RAM is disabled
- Available: https://5cfab.com/product/atari-800-ramrom2022/

6.14) How can I upgrade my Atari to run CP/M or MS-DOS software?

The CP/M operating system was first released by Digital Research in 1976, and by the early 1980s CP/M had become the dominant software platform for 8-bit computers that were based on the Intel 8080 microprocessor (including the Zilog Z-80).
Sometimes referred retroactively as: CP/M-80

CP/M-86 arrived in late 1981 as a version of CP/M for 16-bit computers based on the Intel 8086 or 8088 (such as the IBM PC).

Microsoft DOS, or MS-DOS, was released with the IBM PC (branded as IBM PC DOS) in August 1981, soon becoming the dominant software platform for 16-bit computers based on the Intel 8086/8088.

As a 6502-based computer, the Atari itself is not capable of running CP/M or MS-DOS, but the following are add-ons for the Atari where the Atari system functions as a character-based terminal emulator providing an interface to 8080 or 8088 based hardware natively running the CP/M or MS-DOS operating systems and software applications.

ATR8000, by Software Publishers / SWP Microcomputer Products (1982-1986)
- 4 MHz Z-80A microprocessor, 16 KiB or 64 KiB RAM
- Connects to the Atari via SIO (includes 2nd SIO port)
- Supplied with 64 KiB RAM units and also sold separately for 16 KiB units upgraded to 64 KiB:
  - CP/M 2.2 with ATR8000 CP/M Supplement and Auto-Term terminal emulator for the Atari: Lear Siegler ADM-3A emulation with 80 column display supported via 40 column movable window or via "AUTOBIT3" utility for Bit 3 Full-View 80 support
    (5.25" or 8" disks)

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- Atari/Percom compatible disk drives not supported under CP/M
- Sold separately by SWP:
  - Autoterm80 (ADM-3A emulation with 80 column display for any Atari)
- Sold separately by Amiable Computer Enhancements (1984) or by Vintage Computer Center (2021):
  - DT-80 Atari/ATR8000 80-Column Dumb Terminal Emulator cartridge (ADM-3A compatible) (programmed by **Claus Buchholz**)

CO-POWER, by SWP Microcomputer Products (1984-1986)

- Upgrade for 64 KiB SWP ATR8000 units
- 5.33 MHz 8088 microprocessor
- CO-POWER-88: 128 KiB or 256 KiB RAM
- CO-POWER-Plus: 256 KiB, 512 KiB, 768 KiB, or 1,024 KiB RAM
- To August 1, 1985: Supplied with MS-DOS (SWP OEM version; all but early units: MS-DOS 2.11) and RAM drive software for CP/M 2.2 (5.25" or 8" disks)
- From August 1, 1985: Supplied with SWP PC-DOS Utility Disk (IBM PC format; IBM PC DOS 2.1 system disk required/not included) and a CP/M format disk with PC-DOS Load Files and RAM drive software for CP/M 2.2
- Sold separately by SWP for CO-POWER:
  - CP/M-86 (5.25" or 8" disks)

RAM Charger, by Indus Systems/Future Systems, for Indus GT disk drive (1986)

- 64 KiB RAM upgrade – drive becomes Indus CP/M capable. Supplied with:
  - Indus CP/M Terminal disk – Atari format disk containing two programs:
    - 40 column ADM-31 emulator
    - 80 column ADM-3A emulator
  - One of two disks – each in CP/M format:
    - Indus CP/M BIOS disk
      (contains Indus/Future Systems CP/M BIOS only; CP/M 2.2 not included)
      Boots to: FUTURE CPM 2.2 REV. 1.0
    - Indus CP/M Utility disk
      (contains CP/M 2.2 with Indus/Future Systems CP/M BIOS)
      Boots to: INDUS CPM 2.2 REV. 1.1
- Indus CP/M boot process:
  1. Load the terminal emulator using the Atari
  2. Insert the CP/M disk into the Indus
  3. While holding down the "drive type" button, press the "error" button; this will boot up CP/M, which will ask you to hit the [RETURN] key to continue
- Indus CP/M supports an Atari printer and a second disk drive
- Indus GT drives with early ROM versions 1.00 or 1.10 must be upgraded to ROM version 1.20 to run Indus CP/M
- More on running Indus CP/M: https://trub.atari8.info/index.php?ref=cpm_en

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SRAM Charger, by trub (2007)

- 64 KiB RAM upgrade project for Indus GT, LDW Super 2000, or CA-2001 disk drives; equivalent to the Indus GT RAM Charger by Indus Systems/Future Systems; drive becomes Indus CP/M capable.
- https://trub.atari8.info/index.php?ref=cpm_en

SRAM Charger, by Jurgen van Radecke (tfhh) (2018)

- 64 KiB RAM upgrade project for Indus GT, LDW Super 2000, or CA-2001 disk drives; equivalent to the Indus GT RAM Charger by Indus Systems/Future Systems; drive becomes Indus CP/M capable.
- Available: http://www.van-radecke.de/STUFF/tfhh_HW_info.pdf#page=16
- More on running Indus CP/M: https://trub.atari8.info/index.php?ref=cpm_en

FujiNet

- As of 2020-01-20, the #FujiNet firmware has support for CP/M, via the RunCPM software emulation layer. This provides a Z80 CPU, and enough of an emulation core to run almost all CP/M programs. RunCPM sources: https://github.com/MockbaTheBorg/RunCPM
- CP/M support is limited to the local SD card slot
- The Atari acts as a terminal. Two terminal options:
  1. DT-80 Atari/ATR8000 80-Column Dumb Terminal Emulator cartridge (ADM-3A compatible) by Amiable Computer Enhancements (1984) or by Vintage Computer Center (2021) (programmed by Claus Buchholz)
  2. An Atari MODEM program working over R:. Two steps:
     - Step #1: Set the baud rate to 9,600.
     - Step #2: Start CP/M with the command ATCPM.
- The currently selected FujiNet Printer is passed to CP/M's LST: device.
- More on running CP/M on FujiNet: https://github.com/FujiNetWIFI/fujinet-platformio/wiki/CP-M-Support

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6.15) What were the Atari CP/M Module and 1090 XL Expansion System?

The **Atari CP/M Module** (internally: "Sweetpea", "Sweet Pea", "1060") was introduced at the June 1983 Consumer Electronics Show (CES) in Chicago, Illinois.
Housed in a case resembling the 1050 Floppy Disk Drive, features were to include: Z-80 microprocessor (4.0 MHz Z-80A), 64 KiB RAM, CP/M 2.2 operating system (by Digital Research; supplied on diskettes for Atari disk drive), 80 column display capability (composite video output port for high resolution monochrome display; unit would also be able to use the Atari computer's display device in 40 or 80 column modes). Electrical and firmware design licensed from Add-on Computer Corp.
CP/M software applications supplied on diskettes formatted for Atari disk drive (810 and 1050 formats both supported by the unit) were to be marketed separately (catalog supplied in the box with the unit) by Add-on Software, Inc., who expected to initially offer:

- Wordstar (MicroPro International),
- dBASE II (Allied Computer Services),
- Peachpak (Peachtree Software),
- Pascal/MT+ (Digital Research),
- CBASIC (Digital Research),
- SuperWriter (Sorcim),
- SuperCalc (Sorcim),
- Multiplan (Microsoft),
- MBASIC (Microsoft),

and perhaps:

- MicroSort,
- Supersoft FORTH,
- Personal Pearl Database Manager.

Atari confirmed the cancellation of the unshipped CP/M Module in January 1984. No more than a handful of prototype units may exist.
https://tinyurl.com/46rm4u72
https://archive.org/details/AddOnCPM
https://archive.org/details/analog-computing-magazine-13/page/n36/mode/1up

Atari first previewed the Expansion Box (**Atari 1090 XL Expansion System**) at the June 1983 Consumer Electronics Show (CES) in Chicago, Illinois.
The Expansion Box was to provide eight expansion slots, two RS-232 ports, and a bi-directional parallel bus, and was expected to ship by the end of that year. Atari privately showed the (revised) 1090 XL Expansion System at the June 1984 CES (also in Chicago, Illinois).
The 1090 would connect directly to the PBI on XL computers and would accept up to five XL Expansion Cards (each 9"x5", with 50-pin card edge connector).
The 1090 was to ship with one 1090/1 XL 64K RAM Card (promised to expand a 600XL to 80 KiB, or expand a 600XL with 1064, an 800XL, or the promised 1450XLD to 128 KiB). (Up to two 1090/1 cards were to be usable at the same time, making each of the 600XL/800XL or promised 1450XLD expandable to 192 KiB.)
A handful of prototypes exist, but the 1090 was never shipped.
https://tinyurl.com/y7b8ejj3

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Chapter 7

OS, BASIC, DOS, GUIs, Modem handlers

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7.1) OS

7.1.1) What is the Atari Operating System?

"An operating system (OS) is a collection of software that manages computer hardware resources and provides common services for computer programs. The operating system is a vital component of the system software in a computer system. Application programs require an operating system to function."
(Wikipedia 8/15/2012)

Atari 8-bit computers were supplied with the proprietary Atari Operating System contained in Read Only Memory (ROM) as an integral feature of the computer. Major design elements of the Atari OS (derived here from De Re Atari):

MONITOR
Executed upon system power ("coldstart") or [RESET] keypress ("warmstart"). Sets up memory management, initializes I/O Subsystem, sets up System Vectors, boots (loads software into RAM) from cassette or diskette if present, selects and launches program execution environment

INTERRUPT PROCESSING STRUCTURE
The OS processes 6502 interrupts as generated by events including: keyboard keystrokes, the [Break] key, some serial bus events, system timer timeouts, and the vertical blank interval on the television/monitor. An Interrupt ReQuest (IRQ) Handler and a Non-Maskable Interrupt (NMI) Handler are both provided.

SYSTEM VECTORS
Design consideration allows for:
- User programs to directly utilize OS routines
- User programs to substitute for OS routines

INPUT/OUTPUT SUBSYSTEM
Multi-layered provision for user program access to hardware peripherals. Device Handlers may be added by user programs. Includes a complete Cassette Handler and a rudimentary Diskette Handler, but notably does not include a complete Disk Operating System. Described in greater detail in a separate section of this FAQ list.

REAL TIME PROGRAMMING
Hardware timers and system software timers are provided to facilitate predictable and controllable speeds of software routine execution.

ROM CHARACTER SET
Atari ASCII, or ATASCII. May be substituted by user programs. Described in greater detail in a separate section of this FAQ list.

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FLOATING-POINT PACKAGE (FPP)
Set of mathematical routines that use binary coded decimal (BCD) arithmetic to provide standard mathematical functions (+, -, *, /), exponential and logarithmic functions as well as conversion from ATASCII to BCD and BCD to ATASCII. Developed apart from the rest of the Atari OS by Shepardson Microsystems, Inc. (SMI) for internal use by Atari BASIC, but placed in operating system ROM by Atari for universal availability.

Software can reliably determine the version of the Atari Operating System running as follows. (primary source: OS Manual XL Addendum, p.28)

First, determine whether the system is running a 400/800 OS version or an XL OS version by checking the value of memory location $FCD8. In Atari BASIC, PEEK(64728) is the equivalent test.

Read Result	Means
$A2 (162)	400/800 OS
$4C (76)	XL OS

Then, if running a 400/800 OS version as determined above, now check the values of BOTH memory locations $FFF8 and $FFF9. In Atari BASIC, PEEK(65528) and also PEEK(65529) and interpret the results as follows:

$FFF8 (65528)	$FFF9 (65529)		400/800 OS Revision	Revision Date
$FF (255)		→	"Operating System 255"	1979-04 (VERY RARE)
$DD (221)	$57 (87)	→	REV. A/NTSC	1979-06 (uncommon)
$D6 (214)	$57 (87)	→	REV. A/PAL	1979-06 (common)
$F3 (243)	$E6 (230)	→	REV. B/NTSC	1981-09 (common)
$22 (34)	$58 (88)	→	REV. B/PAL	1981-09 (NOT SHIPPED?)

About "Operating System 255"
A pre-production demo unit release, possibly a few thousand once existed.
For more info see https://mcurrent.name/os255/410insert-os255.htm and
https://mcurrent.name/os255/softside.htm and the 17-Nov-79 essay
Atari_CASSETTE_TAPES.pdf found in post #2 in:
http://atariage.com/forums/topic/204930-some-early-atari-a8-development-docs/

If running an XL OS version as determined above, the Revision number of the XL OS is available at memory location $FFF7. In Atari BASIC, PEEK(65527) for the XL OS Revision number. XL OS Revisions released:

XL OS	(Dec.)	Hex	Revision Date	Shipped in
REV. A	(10)	$0A	1982-10-26	1200XL (all)
REV. B	(11)	$0B	1982-12-23	From September 1983 service centers were authorized to upgrade the OS to: XL OS REV. B (see Tech Tip 18A, 29-Sep-1983)
REV. 1	(1)	$01	1983-03-11	600XL (early/most) / 800XL (earliest)
REV. 2	(2)	$02	1983-05-10	600XL (later) / 800XL / 65XE / 130XE (most)
REV. 3	(3)	$03	1985-03-01	65XE / 130XE (late) / 800XE (all)
REV. 4	(4)	$04	1987-05-07	XE System console (all)
REV. 3B	(59)	$3B	1987-07-21	65XE Najm (earlier)
REV. 3B	(59)	$3B	1987-07-21	1988-09-22 - 65XE Najm (later)

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OS MANUALS FROM ATARI (FPP coverage included)

Operating System User's Manual

- Author: Harry B. Stewart, NEOTERIC consultant for Atari
- August 15, 1980 edition (pre-release edition)
  https://archive.org/details/AtariOperatingSystemUsersManualAugust1980
- November 1980 edition, © 1980
  - 215 numbered pages
  - Table of contents lacks page numbers
  - Contents of pages numbered 191 and 192 are reversed
  - The last two sections are:
    pp. 177-199 Appendix K. OS Database Variable Functional Descriptions
    pp. 200-215 Appendix L. Equate File (400/800 OS REV. A source excerpt)
  - GREEN line-printed title page. Included in:
    - "Atari Personal Computer System Operating System User's Manual and Hardware Manual" November 1980 C016555 with **ORANGE** cover page
- January 1982 edition, © 1980
  - 261 numbered pages
  - Identical to the earlier © 1980 edition through page number 191
    - Confusingly, this includes the portion of the superseded version of Appendix K from the earlier edition on pages numbered 177-191
  - Pages marked 192 through 261 marked: "C016555 - REV. 0.2"
  - Pages 192-197: Appendix K. Device Characteristics
    (content not included in the earlier edition)
  - Pages 198-261: Appendix L. OS Database Variable Functional Descriptions
    (complete revision of the Appendix K. from the earlier edition)
  - The Appendix L. Equate File content from the earlier edition is not included.
  - GREEN line-printed title page. Included in:
    - "Atari Personal Computer System Operating System User's Manual and Hardware Manual" January 1982 C016555 with **YELLOW** cover page
- Mid-1982 edition, © 1980
  - Content same as (reverted to) November 1980 edition, see above
  - BRIGHT GREEN title page (with Atari logo). Included in:
    - "Atari Personal Computer System Technical Reference Notes includes: Operating System User's Manual and Hardware Manual" C016555 REV. 1 (mid-1982) with **GOLD** title page
- © 1982 edition
  - 273 numbered pages
  - Completely revised table of contents, including page numbers
  - Completely revised layout; content is heavily revised in some places
  - Includes Index (pages 271-273)
  - GRAY title page (with Atari logo). Included in:
    - "Atari Home Computer System Technical Reference Notes includes: Operating System User's Manual, Operating System Source Listing and Hardware Manual" C016555 REV. A (late 1982) with **BLUE** title page

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De Re Atari: A Guide to Effective Programming

- C060070, © 1981 edition (early version for registered developers)
  https://archive.org/details/DeReAtari_early_version
- APX-90008, © 1982 edition (common version sold via APX)
  http://www.atariarchives.org/dere/
- Also published in German and French language editions

Operating System Manual: Supplement to Atari 400/800 Technical Reference

Supplement to Atari 400/800 Technical Reference Notes C024515
(ii + 36 pages covers changes from the 400/800 OS to the XL OS)

- REV. A with green cover: "Atari 1200XL: Atari Home Computer System"
- White cover: "Atari XL Addendum: Atari Home Computer System"
- Author (uncredited): Robert A. Peck

OS Source code published by ATARI

(excluding the FPP; see "What is Atari BASIC" FAQ section for FPP source code)

- Operating System Source Listing C017893 / CA016557 (order#)
  - August 1981, © 1981
  - "This is the original June 1979 Atari 400/800 computer operating system listing" (page 1)
  - 131 numbered pages (5,785 lines) + 24 un-numbered pages (Cross Reference)
  - Available: https://ksquiggle.neocities.org/800a.htm
- Operating System Source Listing, © 1982
  - "This is the modified September Atari 400/800 computer operating system listing" (page 1)
  - "This is the Revision B EPROM version" (page 1)
  - 129 numbered pages (5,805 lines) + 24 un-numbered pages (Cross Reference)
  - BLUE title page (with Atari logo). Included in:
    - "Atari Home Computer System Technical Reference Notes includes: Operating System User's Manual, Operating System Source Listing and Hardware Manual" C016555 REV. A (late 1982) with **BLUE** title page
  - Available: https://ksquiggle.neocities.org/800b.htm
- According to the "Mapping the Atari" book, Revised Ed. by Ian Chadwick, page 212, or http://www.atariarchives.org/mapping/appendix12.php :
  "Atari did produce a listed source code for the XL OS, although for some reason it was never published for public sale as it was intended...It is an excellent 500+ page resource document."

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OS DEVELOPER CREDITS AT ATARI
(see "What is Atari BASIC" FAQ section for FPP credits)

400/800 OS

Revision A

David Crane	Design/programming graphic assistance routines (line draw, area fill) (also wrote: APX Outlaw/Howitzer)
Alan Miller	Design/programming (also wrote: Basketball)
Larry Kaplan	Design/programming (also wrote: Video Easel, Super Breakout)
Harry B. Stewart	Documentation; Design input (NEOTERIC consultant for Atari; also wrote: APX Extended WSFN, Atari PILOT)
Gary Palmer	Worked on the I/O portion (consultant for Atari)
Ian Shepard	Developed the disk drive functions
R. Scott Scheiman	ATASCII

Revision B

Michael P. Mahar	Fix several problems
R. Scott Scheiman	Fix several problems

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XL OS

Revision A	
Harry B. Stewart	External Reference Specification (NEOTERIC consultant for Atari)
Lane Winner	(unknown contribution)
R. Scott Scheiman	Handler Loader
Amy Chen (Amy Liu) (Y. M. Chen)	Relocating Loader; International Character Set
Mike W. Colburn	Self Test
Richard K. (Hud) Nordin	(unknown contribution)
Revision B	
R. Scott Scheiman	Fix several problems
Revision 1	
R. Scott Scheiman	Support for PBI and on-board BASIC
Richard K. (Hud) Nordin	Support for PBI and on-board BASIC
Amy Chen (Amy Liu) (Y. M. Chen)	Support for PBI and on-board BASIC
Revision 2	
R. Scott Scheiman	Fix several problems
Revision 3	
(unidentified contributor)	Self Test updated; Fix one problem
Revision 4	
(unidentified contributor)	Support for detachable keyboard and on-board game
Revision 3B	
(unidentified contributor)	Arabic character set and right-to-left text entry

Source code and further details for all known shipped and prototype versions of the Atari OS, based on disassembled ROM images combined with published source listings, was (amazingly) published by Tomasz Krasuski at
http://www.atariage.com/forums/topic/201133-os-source-code-all-revisions/

7.1.2) What modified versions of the Atari OS were released?

This should be a complete list of modified versions of the Atari operating system ROM chips, or extensions to the OS released on ROM chips, released commercially by third-parties for the Atari.

Replacement personality boards for the 800, as well as 400/800 OS "translator" programs distributed as software, are listed in separate sections of this FAQ list.

Countless public domain modifications to the Atari OS have been produced as well. These are generally not listed here.

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7.1.2.1) For the 400/800/XL/XE

Fast Floating-Point routines by Charles W. Marslett, 1981-1984

- Replacement for the Floating-Point Package (FPP) component of the Atari OS
- Revision history:
  - Revision A: ASCII ➔ Floating conversion of 9 digits only (like Atari), 19-Nov-1981.
  - Revision B: Returned to using REDARG in LOG (like Atari), to allow inclusion of SIN/COS/SQR constants for Atari BASIC cartridge 27-Nov-1981.
  - Revision C: Eliminated use of DEGRAD and FRx in the FMUL/FDIV code and further speeded up FMUL by unrolling shift loop, 30-Nov-1981.
  - Revision D: Inserted copyright notice in the ROM, 1-Dec-1981.
  - Revision E: Added ASCII hex display routine, 4-Mar-1982.
  - Revision F: Modified EXP and LOG functions for the 600XL and 800XL BASIC ROM power routine bug, 17-Jun-1984.
- Marketed by Newell Industries as: Fastchip
- Also incorporated into:
  - OmnimonXL by CDY Consulting
  - OmniviewXL by CDY Consulting
  - Omniview XL/XE (Omniview XE) by CDY Consulting
  - Omniview 256 by CDY Consulting
  - Ultra Speed Plus (US+) by Computer Software Services (CSS)
  - TurBoss by Integrated Logic Systems (ILS)
- Source code available:
  - http://www.wordmark.org/mydos.html (REV. C)
  - http://websites.umich.edu/~archive/atari/8bit/Languages/Assembly/ (REV. F)
  - https://tinyurl.com/2p9bp7h4 (REV. F)

7.1.2.2) For the 400/800

Fastchip, by Newell Industries, 1981

- Replacement for the 400/800 OS C012399 Floating-Point Package (FPP) ROM
- Fast Floating-Point routines by Charles W. Marslett (see above)
- Early ad: Analog #8 page 93
- The first product release from Newell Industries

Supermon!, by CDY Consulting (David Young), 1982?

- Resident machine language monitor
- Installs into the 4 KiB byte block of memory at $C000.
- Shipped with earliest Ramrod units by Newell Industries
- For later released versions see: Omnimon! (1983?)

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Omnimon!, by CDY Consulting (David Young), 1983?

- Resident machine language monitor
- For earliest released version see: Supermon! (1982?)
- Installs into the 4 KiB byte block of memory at $C000.
- Standard Version (4 KiB): Has a HELP command (not present in other versions)
  - Shipped with Omnimon! piggyback board by The Peripheral Connection (Bill Williams)
  - Shipped with Newell Industries Ramrod personality board (800)
- Advanced Version A (4 KiB): Adds several utilities, plus support for Happy 810 Enhancement and Bit 3 Full-View 80
- Ramdisk Version R (4 KiB): Most features of Advanced Version A, including Happy 810 Enhancement and Bit 3 Full-View 80 support, plus RAM drive for Axlon banked memory
- Banked Version L (4 KiB): Same as Ramdisk Version R with additional disk I/O facilities, but without debugging commands of Standard Version
- Banked Version U (4 KiB): Designed to complement Banked Version L. Includes debugging commands of Standard Version plus a mini-assembler and a relocate command.
- 8K Omnimon! (1984)
  - Replacement for 4 KiB Versions A/R/L/U
  - Supplied on an 8 KiB chip with hardware toggle switch used to select between Version L and Version U. Characters on the screen are inverted to prompt the user to flip the switch when needed.

OSN (O.S.'N'), by Wes Newell for Newell Industries, 1983

- Complete replacement 400/800 operating system
- Shipped with Newell Ramrod 800 personality board
- Shipped with Newell "Ramrod 2" (Ramrod with OSN but without Omnimon!)
- OSN supplied on 2 4 KiB chips or on one 8 KiB chip.
- Provides all graphics modes, including modes 12-15 that are not in the standard 400/800 OS
- Cassette interface is programmable to any baud rate
- Keyboard delay and repeat functions have been modified to allow for faster typing and cursor movement.
- Cartridges can be disregarded on power up.

Omniview (Omniview 400/800), by CDY Consulting, 1984

- Adds 80 column E: and S: OS device drivers, using 3-bit wide characters in ANTIC mode F (BASIC GR. 8). Software can also be optimized to write to the Omniview screen output routines.
- RAM drive for Axlon banked memory (up to 1 MiB)
- Installs into the 4 KiB byte block of memory at $C000.
- Two versions: Omniview standard (4 KiB) or 8K Omniview.
- 8K Omniview consists of Omniview standard (4 KiB) version + CDY Omnimon! standard (4 KiB) version in an 8 KiB bankable ROM.
- On a CDY Omnimon! board, the Omniview chip replaces the Omnimon! chip
- On Newell Ramrod board, the Omniview chip either replaces the Supermon!/Omnimon! chip, or it can be installed alongside the Supermon!/Omnimon! chip through the use of a hardware toggle switch.

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- 1985 units supplied with SpeedScript 80 (based on Speedscript 3.0)
- 1986- units supplied with OmniWriter (SpeedScript 80), offer to patch an AtariWriter Plus disk, patch instructions for Bit 3 Full-View 80 supporting versions of LJK Letter Perfect and LJK Data Perfect, and OmniTerm (based on VT-10-Squared)
- Sold separately: VT100 emulator with Kermit (based on VT-10-Squared; later version not requiring OmniView known as: OmniCom)

ROMDOS / RDOS, by Wordmark Systems
- Equivalent to MYDOS 3.0 (described elsewhere in this FAQ list)
- Installs into the 4 KiB byte block of memory at $C000.
- For Newell Ramrod personality board or CDY Omnimon! board

OMNIDOS, by CDY Consulting / Wordmark Systems
- Wordmark ROMDOS/RDOS (4 KiB) and CDY Omniview standard (4 KiB) on one 8 KiB chip
- Installs into the 4 KiB byte block of memory at $C000.
- For Newell Ramrod personality board or CDY Omnimon! Board

Impossible!, by Computer Software Services (CSS), 1984
- 4K Static RAM-Pac board plugs in place of the C012499 OS ROM chip
- Adds 4 KiB RAM at $C000, hardware switch selectable
- Shipped with disk containing copying software

Ultimon, by Computer Support, 1986
- 6502 Monitor/Debugger

80 Column Pack!, by Computer Support, 1986
- 80 column text mode using a Graphics 8 screen

Super Chip!, by Computer Support, 1986
- Memory dumper with copying/archiving capabilities

ROM-Wizard, by ????, date unknown
- Supplied with a modified 400/800 OS with support for a built-in Monitor program, and with a P: handler supporting a printer interface (sold separately) that connects to controller jacks 3+4
- https://archive.org/details/romwizardsummary

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7.1.2.3) For the 800 only

Super800, by Super Products

- Piggyback board for CX801 personality board
- Run the 400/800 OS or the XL OS
- Includes Supermon, by Super Products
- 2 hardware switches: XL emulation on/off, Supermon on/off
- Includes 16 KiB RAM
- Can use Super Products SuperRAM (800 version)
  - Used as Axlon banked memory when running the 400/800 OS
  - Used as Port B banked memory when running the XL OS

7.1.2.4) For the 600XL/800XL/65XE/130XE/800XE (not 1200XL/XEgs unless specified)

XL Fix ROM, by Computer Software Services (CSS), 1984

- 400/800 OS translator based on the CSS XL Fix – which was released in disk or cassette versions earlier in 1984
- Access to 4 KiB RAM at $C000
- Will work with 16 KiB 600XL computers
- Hardware consists of two printed circuit boards wired together:
  - The smaller board replaces the Atari C061618 Memory Mangement Unit (MMU) chip, with a socket for the C061618
  - The larger board includes sockets for two XL OS ROM chips, intended for the XL Fix ROM and the standard Atari XL OS ROM
- A two-position hardware switch selects between the two OS chips

XL Boss, by Allen Macroware, 1984

- Single OS ROM chip version for 800XL/600XL (64 KiB RAM required), or dual ROM chips version for 1200XL
- Most entry points compatible with the 400/800 OS
- Access to 4 KiB RAM at $C000
- Can soft "coldstart" without clearing 4 KiB RAM at $C000
- Can pass control to program stored in 4 KiB RAM at $C000 (such as a machine language monitor) at any time
- Run the OS from ROM or RAM (where it is easily modified)
- Self Test program and PBI support removed
- Fall 1984- units shipped with MacroMon XL (machine language monitor) disk
- 1985- units shipped with dual operating system board
  - Toggle between XL Boss ROM and standard Atari XL OS ROM
  - For 800XL/600XL (64 KiB RAM required) only (not for 1200XL)

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OmnimonXL, by CDY Consulting, 1984

- Single OS ROM chip includes:
  - OSNXL (OSN XL/XE) operating system by Newell Industries
    - Most entry points compatible with the 400/800 OS; programmable cassette baud rate; increased keyboard speed
  - Fastchip: Fast Floating-Point routines by **Charles W. Marslett** (see above)
  - Resident machine language monitor
- Also supplied with Newell Industries Ramrod XL (for 800XL/65XE/130XE)
  (Ramrod XL board plugs in place of the OS ROM chip; has 3 XL/XE ROM sockets and hardware OS select switch)

OmniviewXL, by CDY Consulting, 1984

- Single OS ROM chip includes:
  - OSNXL operating system by Newell Industries
    - Most entry points compatible with the 400/800 OS; programmable cassette baud rate; increased keyboard speed
  - Fastchip: Fast Floating-Point routines by **Charles W. Marslett** (see above).
  - Adds 80 column E: and S: OS device drivers, using 3-bit wide characters in ANTIC mode F (BASIC GR. 8). Software can also be optimized to write to the Omniview screen output routines.
  - Built-in ATRMON terminal emulator for use with the ATR8000.
- 1985 units supplied with SpeedScript 80 (based on Speedscript 3.0)
- 1986- units supplied with OmniWriter (SpeedScript 80), offer to patch an AtariWriter Plus disk, patch instructions for Bit 3 Full-View 80 supporting versions of LJK Letter Perfect and LJK Data Perfect, and OmniTerm (based on VT-10-Squared)
- Sold separately: VT100 emulator with Kermit (based on VT-10-Squared; later version not requiring OmniView known as: OmniCom)

Bibomon, by Erwin Reuss for Compy-Shop, 1984

- Later known as: "4K-Bibomon"
- XL OS with added machine language monitor
- Includes piggyback socket for standard XL OS chip and hardware switch

Omniview XL/XE (Omniview XE), by CDY Consulting, 1985

- Single OS ROM chip includes:
  - Modified XL OS by Cal Com
    - Highly compatible with the 400/800 OS
    - Access to 4 KiB RAM at $C000
    - Reversed [OPTION] usage at startup
    - [CONTROL]+[1] replaced by [HELP]
    - No cassette handler
  - Fastchip: Fast Floating-Point routines by **Charles W. Marslett** (see above)
  - Adds 80 column E: and S: OS device drivers, using 3-bit wide characters in ANTIC mode F (BASIC GR. 8). Software can also be optimized to write to the Omniview screen output routines.
  - Built-in ATRMON terminal emulator for use with the ATR8000
  - 64 KiB RAM drive for 130XE banked memory

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- Supplied with SpeedScript 80 (based on Speedscript 3.0)
- 1986- units supplied with OmniWriter (SpeedScript 80), offer to patch an AtariWriter Plus disk, patch instructions for Bit 3 Full-View 80 supporting versions of LJK Letter Perfect and LJK Data Perfect, and OmniTerm (based on VT-10-Squared)
- Sold separately: VT100 emulator with Kermit (based on VT-10-Squared; later version not requiring OmniView known as: OmniCom)

512K RAM BetriebsSystem Chip, by Irata Verlag, 1985?
- XL OS with added RAM drive support for the company's 512K RAM 800XL RAMFloppy

High Chip XL, by Irata Verlag, 1985
- XL OS with added buffered fast write with verify SIO for use with the company's High Speed Board 1050 (Happy 1050 Enhancement clone)

High Chip XE mit RAMDisk, by Irata Verlag, 1985?
- High Chip XL with added RAM drive for 130XE banked memory

OldRunner Chip, by Irata Verlag, 1985?
- 400/800 OS translator in ROM

Supermon, by Will Visser for Super Products, 1985
- 400/800 OS translator, with enhancements
- Disassembler; DOS functions; 4 color screen dump
- Also included with Super Products Super800

XOS/80 Column Pack!, by Computer Support, 1985
- 600XL/800XL and 130XE banked memory separate versions
- Revised XL OS, known as XOS!, with most entry points compatible with the 400/800 OS and various enhancements
- 80 column text mode using a Graphics 8 screen

XOS/Ultimon!, by Computer Support, 1985
- 600XL/800XL and 130XE banked memory separate versions
- Revised XL OS, known as XOS!, with most entry points compatible with the 400/800 OS and various enhancements
- 6502 Monitor/Debugger
- Modern (2013) manual available: http://ultimon.com/

XOS/Fix!, by Computer Support, 1985
- Revised XL OS, known as XOS!, with most entry points compatible with the 400/800 OS and various enhancements

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Ultra Speed, by Computer Software Services (CSS), 1986

- Universal support for high speed read/write with upgraded disk drives including Klone/Happy, Duplicator, and US Doubler
- Numerous other OS enhancements
- Chip shipped with piggyback socket and switch for hardware toggle between Ultra Speed and standard Atari XL OS

XL/XE Boss II, by Allen Macroware (Jerry Allen), 1986

- For 130XE, 800XL, 1200XL
- Based on Allen Macroware XL Boss (1984) with improved compatibility with the 400/800 OS (moved flag area)
- Built-in MacroMon XL/XE V2.0 machine language monitor
- "Coldstart" with custom OS
- Disassembler included in MacroMon XL/XE
- "Coldstart" and keep user OS
- Create and save custom OS
- "Coldstart" from console keys
- BASIC off default – on with [OPTION]
- Default key repeat rate doubled
- Inverse key requires the [SHIFT] key to toggle (same as standard XL OS)
- Dual operating system board - toggle between XL/XE Boss II ROM and standard Atari XL OS ROM

Omniview 256, by CDY Consulting, 1986

- Same as Omniview XL/XE (see above) with added 192 KiB RAM drive for Port B banked memory
- Marketed for use with 800XL with Newell Industries 256K XL upgrade

XOS/Super Chip!, by Computer Support, 1986

- 600XL/800XL and 130XE banked memory separate versions
- Revised XL OS, known as XOS!, with most entry points compatible with the 400/800 OS and various enhancements
- Memory dumper with copying/archiving capabilities

16K-Bibomon, by Erwin Reuss for Compy-Shop, 1986

- Add on board includes:
  - Bibomon 16K machine language monitor ROM (occupies 4 KiB address space at $C000)
  - Oldrunner 400/800 OS ROM chip
  - Socket for standard XL OS ROM chip
  - Hardware clock
  - Centronics compatible printer port
  - Hardcopy Routine: Epson FX-80 and Okidata Microline compatible
  - mini-DOS: DOS 2.5 and OSS DOS XL compatible, plus Speedy 1050 high speed

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    - Hardware switches used to select between XL OS / Oldrunner, between BASIC On / BASIC Off under Oldrunner, and between Bibomon or International character set under Oldrunner

Expander / The Expanders, by R.G.T. for Synergy Concepts, © 1986

- For computers with up to 512 KiB of Port B banked memory (576 KiB total system RAM)
- XL OS with added Executive Program for managing up to four RAM drives
- All RAM drives contain 707 sectors. RAM drive configurations supported:
    - One RAM drive of 90 KiB (emulated SS/SD floppy disk drive)
    - Two RAM drives of 90 KiB (emulated SS/SD floppy disk drives)
    - Three RAM drives of 90 KiB (emulated SS/SD floppy disk drives)
    - Four RAM drives of 90 KiB (emulated SS/SD floppy disk drives)
    - One RAM drive of 180 KiB (emulated SS/DD floppy disk drive)
    - Two RAM drives of 180 KiB (emulated SS/DD floppy disk drives)
- Renumber drives and boot from any drive
- Built-in mini-DOS

QMEG-OS V3 ©'87 Stefan Dorndorf (1987)

- "Quarter-Mega Operating System"
- For computers with 192 KiB of Port B banked memory (256 KiB total system RAM)
- Three RAM drive configurations supported:
    1. Two RAM drives of 90 KiB each (emulated SS/SD floppy disk drives)
    2. One RAM drive of 128 KiB (emulated SS/ED floppy disk drive), one RAM drive of 64 KiB (compatible with the DOS II+/D v6.x RAM drive)
    3. One RAM drive of 180 KiB (emulated SS/DD floppy disk drive)
- Supports supplementary RAM drive of 5.25 KiB dedicated to storage of DOS.
    - Intended for use with DOS II+/D v6.x
- High speed support: US Doubler/UltraSpeed, Happy/Warp Speed
- Machine Language Monitor (MLM) with disassembler
- Disk copier
- File loader (COM, BIN)
- P2: Epson printer device driver supports full Atari ATASCII character set
- P3: Epson printer device driver supports double density printing
- Supports a computer modification, involving the installation of a second PIA chip, that adds a built-in Centronics parallel printer interface (addressed at $D6xx) to the Atari.
- Not available: PBI/ECI support, Self Test, International character set

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XL-Fix Plus OS, by Computer Software Services (CSS), 1988

- Built-in Translator – highly compatible with the 400/800 OS, based on the CSS XL Fix ROM version (1984)
- Built-in Binary file loader – based on Mach-Ten
- Mach Menu writer
- Reverse [OPTION] key when booting
- Faster keyboard speed
- Part of the CSS Ultra Speed Plus! Operating System Package, see: Ultra Speed Plus OS (US+), by Computer Software Services (CSS), 1988

Ultra Speed Plus OS (US+), by Computer Software Services (CSS), 1988

- Based on CSS Ultra Speed OS (1986)
- Fast disk I/O with modified drives: Super Archiver (1050), Happy (810 or 1050), US Doubler (1050), Duplicator (1050), Klone (1050), Density Doubler (1050), and XF-551 drive (unmodified)
- RAM drive handler can emulate single or double density floppy disks, supporting Port B banked memory from 128 KiB to 2 MiB
- Hi-speed disk I/O is switchable
- Improved detection of cartridge swapping
- Reconfigure & boot any drive, including RAM drive
  - With an optional hardware switch, make the RAM drive drive #1 at any time
- Easy 1 & 2 megabyte RAM expansion
- Keyboard lock
- Screen DMA toggle (turn off screen)
- Key click toggle
- Internal BASIC toggle
- Keyboard speed adjustable (key repeat rate)
- Screen colors adjustable
- Cold-start without RAM loss
- Built-in mini sector copier (single or double density)
- Built-in configuration editor
- Reverse [OPTION] key when booting
- Memory test routines - pinpoint defective RAM chips
- On/Off Disk I/O sound
- 38/40 Columns switchable
- Memo-Pad mode built-in
- FASCHIP: Fast Floating-Point routines by Charles W. Marslett (see above)
- Re-enables any OSS SuperCartridge on system reset
- Not included: Cassette routines, International Character set, 1200XL function key routines, Relocating Handler routines, ROM&RAM check on bootup

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- Part of the CSS Ultra Speed Plus! Operating System Package
  - Module replaces OS ROM chip, with several additional solder points
    - Eliminates RAM chip discharge delay time
  - OS select switch installed through hole drilled in back of computer case
  - Optional "RAM drive 1" switch is installed through a second hole drilled in back of computer case
  - Three operating systems, switch-selectable:
    - Ultra Speed Plus OS
    - XL-Fix Plus OS
    - Standard XL OS
  - http://nleaudio.com/css/products/ultraspdplus.htm

Turbo-OS, by DataQue Software (Chuck Steinman), 1989

- Shipped with DataQue Software Turbo-816 (65C816 16-bit microprocessor board)
- Single OS ROM chip standard version or dual chip version for 1200XL
- "Dual-Prom" installation option provides access to both the Turbo-OS and the standard Atari XL OS via a hardware toggle switch.
  - On the 1200XL, the Dual-Prom installation option can utilize either the standard dual-chip XL OS for the 1200XL (REV. A or REV. B), or a standard single-chip Atari XL OS (such as REV. 2)
- Compatible with software that uses the published, legal entry points into the Atari XL OS and legal RAM locations
- International character set and cassette device handler have been removed

TurBoss, by Integrated Logic Systems (ILS), 1990

- Enhances the screen display list speed in Graphics Mode 0
- Fast Floating-Point routines by Charles W. Marslett (see above)
- D.E.Mon real-time monitor built in
- Chip contains standard Atari XL OS as well, hardware switch selectable

http://www.realdos.net/prodturboss.html

25K Bibomon, by Klaus Peters / Elektronik und Software, 1992

- Add-on board is marked: Supermon V1.1
- Single chip includes two operating systems: Old OS (Oldrunner?) and XL OS
- Board also includes Bibomon machine language monitor and optional Bibo-Assembler
- Board includes socket for second OS chip
- Firmware allows software control of combinations of OS (Old OS / XL OS / Optional OS), with choices of international character set, Bibomon with Bibomon DOS, Bibo-Assembler, and internal BASIC enabled
- Universal Speedy 1050 high speed support

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APE Warp+ OS, by Atarimax (Steven J. Tucker), 1996

- Universal high speed SIO (3x), US Doubler emulation, other enhancements
- Shipped 1996-2005 as part of APE Warp+ Quad OS Upgrade Module, containing APE Warp+ OS, standard XL OS, a public domain Atari 800 compatible OS, and standard XL OS with Reverse BASIC
  - Includes chip and 2 toggle switches
- Beginning 2005 shipped as part of APE Warp+ 32-in-1 OS Upgrade Module
  - Module replaces OS ROM chip, with 3 other connections necessary
  - OS Selection Menu in ROM

QMEG+OS 4.04 ©'97 Stefan Dorndorf (1997)

- "Quarter-Mega Plus Operating System"
- For computers with 192 KiB of Port B banked memory (256 KiB total system RAM)
  - Explicitly supported: Compy-Shop, Megaram, **Claus Buchholz**, ABBUC, Atari Magazin, Klan Atari, Newell
  - When used in 64 KiB or 128 KiB computers RAM drives are not available
- Three RAM drive configurations supported:
  1. Two RAM drives of 90 KiB each (emulated SS/SD floppy disk drives)
  2. One RAM drive of 128 KiB (emulated SS/ED floppy disk drive), one RAM drive of 64 KiB (optionally compatible with DOS 2.5 RAM drive)
  3. One RAM drive of 180 KiB (emulated SS/DD floppy disk drive)
- High speed support: US Doubler/UltraSpeed, 1050 Turbo/Turbodrive, XF551
  - Drive types automatically detected
- Full support for large Bibo-DOS, Turbo-DOS, and MYDOS floppy disks, and MYDOS subdirectories
- Machine Language Monitor (MLM) with disassembler
- Disk copier
- File loader (COM, BIN, BAS, CAS)
- Boot from any drive
- CAS simulator (read only; no boot cassettes) replaces full C: device handler
- Not available: Self Test, International character set, standard C: handler

TOMS OS, by TOMS

- Two versions: with or without built-in Turbo 2001 high speed cassette handler
- High speed support: 1050 Turbo/Turbodrive
- International Character Set replaced with a set of Polish letters
- Series of shortcut keys
- Very compatible with standard XL OS
- Standard installation includes three operating systems, switch-selectable:
  - TOMS OS
  - QMEG
  - Standard XL OS
- See: http://www.atari.org.pl/forum/viewtopic.php?id=14226

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MyBIOS ROM versions, by Sijmen Schouten (Mr. Atari), 2002-

- ROM versions are a complete replacement OS for the computer
  - "The most compatible Atari XL/XE + 400/800 Operating system known"
- For all types of MyIDE interface
  - 'E' version for external MyIDE; 'I' version for internal MyIDE

http://www.mr-atari.com/myidehome.htm

65C816 XL OS (DracOS), by Konrad M. Kokoszkiewicz, 2004-

Top project goals:

- Make possible to use the 65C816 native mode on Atari XL/XE computers without problems and with interrupts enabled.
- Make the memory mapped at extra addresses ($010000-$FFFFFF) accessible and usable for programs.
- Provide some more extra services related to the 65C816 such as new interrupt vectors, basic memory management routines etc.
- Develop new system of entry points: current mechanism of making ROM calls is difficult to use, when the code resides above the address $FFFF.

http://drac030.krap.pl/en-specyfikacja.php

7.1.3) What is the ATASCII (Atari ASCII) encoding standard?

ASCII is an acronym for the American Standard Code for Information Interchange. Pronounced ask-ee, ASCII is a character and control code encoding standard used by computers, telecommunications equipment, and other devices. There are 128 valid codes in ASCII, including 95 printable characters (including the "space" character) and 33 control codes.

The 8-bit Atari computers use a modified version of ASCII called Atari ASCII, or ATASCII. The ATASCII character set, contained in Operating System (OS) ROM, includes 256 printable characters. Each character is a matrix of 8 x 8 pixels.

The XL OS contains both the standard ATASCII character set (as found in the 400/800 OS) and an alternate International Character Set, where 29 ATASCII standard "graphics characters" are replaced primarily with characters with European accent marks.

ATASCII printable characters are a functional superset of ASCII, with a few exceptions: ATASCII lacks the left curly bracket, right curly bracket, tilde, and grave accent printable ASCII characters. The similarity between ATASCII and ASCII character coding facilitates exchange of text between the Atari and other computers or devices also using character encodings based on ASCII.

16 of the ATASCII character codes also have control code functions when processed by the E: Screen Editor device of the Atari OS. ATASCII control codes are quite different from ASCII control codes. The most important functional difference between ATASCII and other variations of ASCII is how a "newline" (line ending, end of line (EOL), line break) is coded. The Atari's ATASCII uniquely uses the single decimal character code 155 to indicate a newline. Thus, when exchanging text files between the Atari and other computing devices a "text conversion"

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is necessary in order for newlines to be recognized as expected both before and after transmission.

The Wikipedia article on ATASCII provides links to several ATASCII/ASCII character tables, and a list of the ATASCII control codes.
https://en.wikipedia.org/wiki/ATASCII

7.1.4) How is the Input/Output subsystem of the Atari OS organized?

Derived primarily from the Operating System User's Manual and De Re Atari.

The Input/Output (I/O) subsystem of the Atari Operating System (OS) comprises a collection of software utilities/routines, offered at three different levels of abstraction (CIO, Device Handlers, SIO), that allow for user communication with local system and peripheral devices. Communications between adjacent levels of the I/O subsystem are carried via one of the three types of I/O system control blocks (IOCB, ZIOCB, DCB).

Presented in order from the highest level to the lowest level:

USER PROGRAM

INPUT/OUTPUT CONTROL BLOCK (IOCB)
Carries communications between a user program and Central I/O (CIO)
- 8 IOCBs (#0-#7) are provided by the OS.
- Each IOCB can be assigned to control any device/file.
- IOCB #0 is assigned by the OS to the E: Screen Editor at power-up and system reset.
- Software programming environments may reserve other IOCBs for internal use. For example, Atari BASIC uses IOCB #6 to interact with the S: device when using graphics modes other than zero, and uses IOCB #7 for I/O with the printer, disk drive, and cassette. (Patchett/Sherer, Master Memory Map, http://www.atariarchives.org/mmm/iocbs.php)

CENTRAL I/O (CIO) utility/routine
Intended for user program access to system and peripheral devices. A device consists of one or more "files" where each file consists of a sequential collection of data bytes. Files are optionally organized into "records" which are delineated by the End Of Line character/byte ($9B). 8 basic functions provided by CIO: OPEN, CLOSE, GET CHARACTERS, PUT CHARACTERS, GET RECORD, PUT RECORD, GET STATUS, Special (handler-specific)
Additional CIO features:
- Device independence
  - Single entry point for all devices (and for all operations)
  - Device-independent calling sequence
  - Uniform rules for data transfers, regardless of actual device storage block sizes
- Data access methods
  - Byte-aligned. Any number of bytes can be read or written, and the next operation will continue where the prior one left off.
  - Record-aligned. A single record of bytes can be read or written, and the next operation will continue at the beginning of the next record.

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- Multiple device/file concurrency
  - Up to 8 device/files can be accessed concurrently, each operating independently of the others.
- Unified error handling
- Device expansion: while the OS supplies several device handlers in ROM, CIO also supports the loading of additional CIO-compatible device handlers into RAM.

ZERO-PAGE I/O CONTROL BLOCK (ZIOCB)
Carries communications between higher-level CIO and lower-level device handlers. There is a single ZIOCB only.

DEVICE HANDLERS
Resident full device handlers provided by the Atari OS:

K: Keyboard Handler (read only)

S: Display Handler (read/write)
Offers the special CIO commands DRAW and FILL.

E: Screen Editor (read/write)
Uses the K: Keyboard Handler and the S: Display Handler to provide "line-at-a-time" input with interactive editing functions, as well as formatted output.

C: Cassette Handler (read/write)

P: Printer (write only)
- 400/800 OS: Supports a single printer device; any device number is ignored. All powered printers attached via SIO or the 850 parallel port respond to all print commands.
- XL OS: Supports 8 different printer devices: P1: - P8:
  P: (no device number) is interpreted to mean: P1:
  Printer devices are associated with specific models of Atari printers as follows:
  - P1: All printers attached via SIO or the 850 parallel port
  - P2: 850 Interface Module parallel port (e.g., Atari 825)
  - P3: 1025 Printer
  - P4: 1020 Color Plotter
  - P5: 1027 Printer
  - P6: 1029 Printer
  - P7: XMM801 Printer
  - P8: XDM121 Printer

  Tomasz Krasuski contributes (May 2011):
  This feature is buggy in XL OS REV. A / REV. B / REV. 1. Behavior was fixed to reliable operation as of XL OS REV. 2.

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Also provided by the Atari OS:
- Resident Diskette Handler
  - Not a full device handler / not CIO-compatible
  - Detailed in the section of this FAQ list introducing Disk Operating Systems
- Generic Parallel Device Handler (XL OS REV. 1+)
  - Responsible for invoking the handler routines within the parallel device ROMs.

Nonresident Handlers can be added to the system environment in several ways:
- Loaded from diskette or cassette
- Loaded from the ROM of an SIO device (850 Interface, 1030 Modem). May be loaded at system startup without disk drive ("bootstrap without disk drive"), may be loaded as part of a Disk Boot ("bootstrap with disk drive"), or may be loaded afterward.

DEVICE CONTROL BLOCK (DCB)
Carries communications between higher-level device handlers and lower-level Serial I/O (SIO). There is a single DCB only.

SERIAL I/O (SIO) utility/routine
Low-level communication with serial bus peripherals
- Control of all Serial bus I/O, conforming to the bus protocol
- Bus operation retries on errors
- Return of unified error statuses on error conditions
- Used by the OS-resident P: handler and the OS-resident Diskette Handler
- Not used by the OS-resident K: S: and E: handlers (non-SIO devices)
- While the OS-resident C: handler uses the SIO bus hardware, it does not use the SIO utility/routine.

Any lower level (lower than CIO) access to a device by a user program involves the direct reading and writing of the hardware registers associated with the device.

7.1.5) What is attract mode?

From the Atari Operating System User's Manual (1982) p. 215:
Attract mode is a mechanism that protects the television screen from having patterns "burned into" the phosphors due to a fixed display being left on the screen for extended periods of time. When the computer is left unattended for more than 9 minutes, the color intensities are limited to 50 percent of maximum and the hues are continually varied every 8.3 seconds. Pressing any keyboard data key will be sufficient to remove the attract mode for 9 more minutes.

Laurent Delsarte contributes:
To launch the attract mode from BASIC, use a "POKE 77,128"
To disable the attract mode from BASIC, use a "POKE 77,0"

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7.1.6) What is the Atari cassette utilization / filesystem?

(Section sources include: De Re Atari, OS Users Manual, XL Addendum)

The following are characteristics of the cassette utilization / filesystem as implemented by the Atari Operating System.

- Mark = 5,327 Hz (audible sound frequency)
- Space = 3,995 Hz (audible sound frequency)
- Bit = space (0) or mark (1)
- Byte = 10 bits:
  - 1 start bit (space)
  - 8 data bits
  - 1 stop bit (mark)
- Record = 6-132 bytes, as follows:
  - Speed measurement byte, first of two. Marker character = $55 (hex)
  - Speed measurement byte, second of two. Marker character = $55 (hex)
  - Control byte. One of three values:
    1. $FC = Record is a full data record.
    2. $FA = Record is a partially full data record, and the next record should be an end-of-file record.
    3. $FE = Record is an end-of-file record.
  - Data bytes. 128 bytes for a full data record or an end-of-file record, or 2-128 bytes if a partially full data record, where the last byte is not really a data byte, but rather contains the number of actual data bytes (1-127).
  - Checksum byte
- Pre-Record Write Tone (PRWT) = pure mark tone
- Post-Record Gap (PRG)
- Record Frame = PRWT + Record + PRG
- Inter-Record Gap (IRG) = PRG + PRWT
- Normal IRG Mode: Tape comes to stop after each record frame
- Short IRG Mode: Tape is not stopped between record frames.
  (Short IRG Mode is supported by the Atari BASIC commands CSAVE and CLOAD.)
- Normal IRG PRWT = 3 seconds of mark tone
- Short IRG PRWT = 0.25 second of mark tone
- Normal IRG PRG = Up to 1 second of unknown tones (motor stop/start time)
- Short IRG PRG = pure mark tone, duration set by user program (may be zero)
- File consists of:
  1. 20-second leader of mark tone
  2. Any number of data record frames (each frame contains one data record)
  3. End-Of-File record frame (contains an end-of-file record)

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7.1.7) What programs run only on the 400/800 (not the XL/XE) and why?

Fandal site search for games requiring 400/800 OS REV. B:
http://a8.fandal.cz/search.php?search=os-b&butt_details_x=x

Fandal site search for games requiring 400/800 OS REV. A:
http://a8.fandal.cz/search.php?search=os-a&butt_details_x=x

Utilities reported to require the 400/800 OS:

Program	Publisher
Atari Word Processor	Atari
File Manager 800+	Synapse
Letter Perfect (before v6)	LJK (all version 6.x releases OK on XL/XE)
Mac/65 [ver. 1.00, orange]	OSS (all releases after 1.00 OK on XL/XE)
Monkey Wrench	Eastern House
Synassembler	Synapse
Text Wizard	Datasoft
VT-10-Squared	Dave Bailey

Note that while some 400/800 programs fail to run on the XL/XE at all, others, such as Atari's own Missile Command and Space Invaders cartridges, run on the XL/XE with only minor problems such as sound glitches.

Many 400/800 programs incompatible with XL/XE computers can nevertheless be made to run flawlessly on the XL/XE using the Atari Translator (or equivalent) which is described in another section of this FAQ list.

Also, modern programmers have hacked many of the above titles and released fixed versions for use with XL/XE computers.

Thomas Richter contributes the following (16 Jan 2004):
There are a couple of reasons why some games don't run on the XL/XE models. I try to order them by "likeliness", of course biased by my personal observations:

7.1.7.1) Printer buffer

The printer buffer of the XL Operating System in page 3 is a couple of bytes shorter. The additional bytes are used for extended OS variables not available in the 800 series. Most prominent is the $3FA location, holding a shadow register of GTIA's TRIG3 signal. While a true joystick trigger line in the 400/800 series, this signal is used as "cartridge inserted" signal for XL/XE models. Unfortunately, the OS compares GTIA TRIG3 with the shadow register at $3FA in each vertical blank, running into an endless loop if the register contents don't match. This causes hangs for games using page 3 either as copy-buffer or for player-missile graphics. (Hangs by Ms. Pac-Man and Bacterion! are caused by this, and many others...) This is "fixable" either by the translator disk, or by a quick hack into the game, replacing the OS vertical blank or poking TRIG3 frequently into its shadow. The reason for the OS behavior might be that Atari wanted to prevent crashes if the cartridge is inserted or removed while the machine is running.

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The 400/800 is powered down when a cartridge is inserted, the XL/XE lacks the cover of the older models that triggered a little switch to interrupt the power line.

7.1.7.2) Writes to $3F8

Similar to the above, writes to $3F8. This OS equate defines whether on a "warmstart", the BASIC ROM shall be mapped back in. If its contents are altered, a program triggering a reset as part of its initialization will find itself then with 8 KiB less RAM occupied by a BASIC ROM, making it crash. Similarly, writes to the cartridge checksum $3EB could cause a cold-start on a "reset initialization". This is fixable by the translator disk.

7.1.7.3) Four joystick setup

Some games use a four-joystick setup, or at least initialize PIA itself. If this happens inadequately, PIA Port B (PORTB) bit 0 gets changed, disabling the ROM, and thus crashing the machine. This is not fixable by the translator since it is a hardware issue.

7.1.7.4) Direct jumps into the OS ROM

Direct jumps into the OS ROM, not using the documented vectors in the $E450 area. Interestingly, this fault is not as common as it may sound since games hardly ever use the OS. It causes failures of some "serious applications", most notably "QS Forth" and applications compiled by it. This is fixable by the translator disk.

7.1.8) Why do some programs run only on the XL/XE (not the 400/800)?

Section started by **Konrad M. Kokoszkiewicz**.

Software designed for the Atari XL/XE won't work on the 400/800 if:

1. It uses shadow RAM at $C000-$CFFF (4 KiB) or $D800-$FFFF (10 KiB). In other words, it requires 64 KiB RAM.
2. It uses RAM expansions at $4000-$7FFF controlled by PORTB $D301. In other words, it requires at least 128 KiB total RAM.
3. It uses XL OS vectors (routines) not present in the 400/800 OS. Some of these correspond to XL/XE specific hardware, such as the [HELP] key or the PBI/ECI interface.
4. Rather than using documented OS vectors, it "illegally" uses OS routines directly for routines that were located at different memory addresses in the 400/800 OS.
5. It uses the International Character Set.

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7.1.9) Can I run older programs using the Atari Translator?

While each later revision of the Atari Operating System (OS) was designed to be backward compatible with earlier versions, software incompatibilities were sometimes introduced. In particular, a number of programs written for the 400/800 OS versions do not run correctly or at all under the XL OS versions. In order to allow many "400/800-only" programs to be run on an XL (or later, XE) computer, Atari made the Atari Translator available via the Atari Program Exchange (APX) or Atari Customer Service.

The auto-booting Translator diskette installs the 400/800 OS in RAM "under" the ROM-based XL OS in an XL/XE Atari computer. Once this disk has been loaded, the user is prompted to remove it and insert the application diskette (or cassette) and press the [SELECT] key. When this occurs the system undertakes a "coldstart" in the new, RAM-based 400/800 OS environment.

The Translator disk is a two-sided/flippy disk, providing two slightly different versions of the Translator:
1. The Side A Translator provides a version of the 400/800 OS that is slightly modified to allow the [RESET] key to be pressed without reverting to the XL OS on ROM.
2. The Side B Translator provides an even higher degree of compatibility, including support for programs that boot the 850 interface, but the 400/800 OS in RAM would be disabled if the [RESET] key is pressed.

Atari shipped two versions of the Translator disk:
- Atari Translator DX5063 NTSC version: 400/800 OS REV. B/NTSC
- Atari Translator FK100807 PAL version: 400/800 OS REV. A/PAL

Translator programmers at Atari:
- **Greg Riker**: Original version 20-Mar-1983
- **Joe Miller (Joseph B. Miller III)**: Added graphics and code for [RESET] 15-Sep-1983

Atari Translator partial source code:
http://www.atariage.com/forums/topic/78381-xl-translator-source/

Similar "translator" programs from 3rd parties include:
- XL Fix, by Computer Software Services (CSS), winter 1984 (ad Antic Apr-1984 page 102)
  - Disk or cassette versions (for 1200XL/600XL/800XL with 64 KiB RAM)
  - Also included with CSS Miracle! (1984)
- OldOper ver. 1.0 by MasterSoft, April 1984
- The FIXXL by Belathiel (widely distributed by Antic magazine), 6/11/84
- The Emulator by ATCO int. systems (ATCO-IS) Stuttgart, version 4.0, 1984
- "Home-Made Translator" by Angelo Giambra, ANALOG July 1985 p.28-34
  - Follow-up by D.D. Davids II to above article, ANALOG Sept. 1985 p. 6
- XOS/Translator!, by Computer Support, 1985
  - Revised XL OS, known as XOS!, with most entry points compatible with the 400/800 OS and various enhancements
  - Also released in ROM version as: XOS/Fix!

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- Ultra Translator: Ultrafix/XL (400/800 OS REV. B or REV. A), by Tim Patrick
  - Revision 1.3, 1984/86
  - Revision 2.0, 1984/86
    - This version also produced on cartridge by Video 61
  - Revision 2.2, 1984/86
- Super Translator, by Duplicating Technologies

See a separate section of this FAQ list for 400/800 OS "translator" products sold on ROM chips (replacement operating systems)

7.1.10) How can software detect NTSC versus PAL/SECAM computer types?

Several techniques are available to programmers, as follows:

7.1.10.1) PALNTS Flag

The XL OS (not the 400/800 OS) provides a flag called PALNTS at decimal memory location 98 (hex: $62). PALNTS indicates whether the CTIA/GTIA/FGTIA has reported itself to be NTSC or PAL/SECAM, where 0 means NTSC, or 1 means PAL/SECAM. In Atari BASIC, enter "? PEEK(98)" to determine the value of the PALNTS flag.

7.1.10.2) Read and interpret the "PAL" memory flag

An approach which works on all 400/800/XL/XE systems is to use the same method used by the XL OS to set the value of the PALNTS flag described above. That is, to read and interpret the "PAL" memory flag, decimal location 53268 (hex: $D014). The value of PAL is provided by the CTIA/GTIA/FGTIA chip itself.
Meanings are:

```
  Bit 1-3   clear    (xxxx000x)   = PAL/SECAM
  Bit 1-3   set      (xxxx111x)   = NTSC
```

(Proper interpretation of the value returned by PEEK(53268) in Atari BASIC would thus be a bit of a programming challenge. This is left to the reader!)

7.1.10.3) Counting generated scan lines

Software may determine NTSC or PAL/SECAM by determining how many scan lines are being generated by ANTIC. This is done by monitoring the VCOUNT memory register. VCOUNT (54283 decimal, $D40B hex) is used by ANTIC to keep track of which line is currently being generated on the screen. Values reflect the line count divided by two. VCOUNT values range from zero to 130 for an NTSC ANTIC (131*2=262 scan lines), while VCOUNT values range from zero to 155 for a PAL ANTIC (156*2=312 scan lines).

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7.2) BASIC

7.2.1) What is Atari BASIC?

(Thanks to Laurent Delsarte for cartridge variation pics and testing.)

BASIC is an acronym for Beginner's All-purpose Symbolic Instruction Code. Developed by John Kemeney and Thomas Kurtz in the mid-1960s at Dartmouth College, BASIC is one of the earliest and simplest high-level programming languages, incorporating components of FORTRAN and ALGOL.

In October 1978 Atari contracted with Shepardson Microsystems, Inc. (SMI; headed by **Bob Shepardson**) to create a version of BASIC (as well as a File Management Subsystem) for the upcoming Atari personal computers.
Credits:

Paul Laughton	Main programmer (also wrote: FMS for DOS I and DOS 2.0S)
Kathleen O'Brien	Floating-point routines (also wrote: Assembler Editor)
Bill Wilkinson	Preliminary specifications for the language; floating-point scheme design
Paul Krasno	Implemented the math library routines following guidelines supplied by **Fred Ruckdeschel**
Mike Peters	Keypunching, operating

While SMI developed Atari BASIC to occupy 10 KiB of ROM, including a 2 KiB Floating-Point Package (FPP) for internal use by the language, Atari placed the FPP component in operating system ROM (memory locations 55296 to 57343 or $D800 to $DFFF) for universal availability. Thus, the Atari BASIC ROM was slimmed to 8 KiB. Please see the "What is the Atari OS" section of this FAQ for further information about the FPP.

Atari released 3 different Revisions of Atari BASIC:
1. Revision A
2. Revision B
3. Revision C

Revision A
- Shipped with the 400 computer systems from 1979-1981
- Shipped with the 800 computer systems from 1979-1982

Atari BASIC REV. A was produced by Atari on cartridge (CXL4002), standard 400/800-style brown label, which reads either "BASIC Computer Program" (early) or "BASIC Computing Language" (most).

The cartridge was produced in mass quantities before SMI had finished debugging it. One place these bugs are documented is in this article by Steve Hanson from Compute! magazine #17, Oct-1981:
http://www.atarimagazines.com/compute/issue17/171_1_DOCUMENTED_ATARI_BUGS.php

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On February 25, 1981, the source code to Atari BASIC (including the FPP) was purchased from SMI by Optimized Systems Software (OSS), headed by former SMI employees **Bill Wilkinson** and **Mike Peters**.

The Atari BASIC Source Book (Compute! Books, 1983, 0-942386-15-9), authored by **Bill Wilkinson**, **Kathleen O'Brien** and **Paul Laughton**, made the source code to Atari BASIC (REV. A; and including the FPP) available to the public.
Available:
http://users.telenet.be/kim1-6502/6502/absb.html or
https://ksquiggle.neocities.org/absb/ or
https://archive.org/details/ataribooks-the-atari-basic-source-book

Revision B

When the 600XL/800XL computers shipped in the fall of 1983 they included a newly debugged Atari BASIC REV. B built-in on ROM. Unfortunately, while most existing bugs were fixed, REV. B introduced a new bug more serious than any of the earlier problems.

In his article in the Compute! magazine #61, Jun-1985, **Bill Wilkinson** writes:
Each time you LOAD (or CLOAD or RUN "filename") a program, REV. B adds 16 bytes to the size of your program. If you then save the program, the next time you load it in it grows by ANOTHER 16 bytes, and so on.
http://www.atarimagazines.com/compute/issue61/323_1_INSIGHT_Atari.php

The problem can be alleviated by periodically, if not exclusively, using LIST instead of SAVE or CSAVE to save your programs.

Atari never produced Atari BASIC REV. B on cartridge.

"Revision C Converter: Type-in fix for buggy BASIC REV. B" by Matthew Ratcliff was published in the September 1985 issue of Antic:
http://www.atarimagazines.com/v4n5/revisioncconverter.html

Revision C

Atari BASIC REV. C is the final "fully debugged" version. It was first made available on cartridge from Atari Customer Service in June 1984 (free to 600XL/800XL owners still within warranty). The silver label on the first REV. C cartridges reads "© 1982 Atari, Inc." and "Made in USA" Atari, Corp. also produced REV. C on cartridge, using two different silver labels designs, both of which read "© 1985 Atari Corp." and "Made in Taiwan".

REV. C was also built-in on ROM in late-production 800XL computers as well as the 65XE, the 130XE, the XE System console, and the 800XE.

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Determining Revision version
When running Atari BASIC, memory location 43,234 ($A8E2, BASIC ROM) indicates which Revision of BASIC is running. At the READY prompt, enter: `? PEEK(43234)`

If the result is:	You have Revision:	Atari Part#:
162	A	C012402 + C014502
96	B	C060302A
234	C	C024947A

All 3 versions of Atari BASIC may be available for download here:
http://www.ataripreservation.org/websites/freddy.offenga/atari_dev.htm

Manuals from Atari:
(See the "What is the Atari OS" FAQ section for FPP documentation.)

- Atari BASIC book (Wiley Self-Teaching Guide) C014385 by Albrecht/Finkel/Brown © 1979, 332 pages (see: http://www.atariarchives.org/basic/)
  - Shipped with the 400 computer systems from 1979-1981
  - Shipped with the 800 computer systems from 1979-1982
- BASIC Reference Manual (400/800 ed.), C015307, © 1980, 120 pages
  - Authors: Carol Shaw and Keith Brewster
  - Shipped with the 800 computer systems from 1980-1982
- Inside Atari BASIC, C060992, Bill Carris for Reston, © 1983, 183 pages
- Atari BASIC Reference Manual Update, C061038, © 1982, 6 pages
- BASIC Reference Manual (400/800/1200XL ed.), C061456 / BX4211, © 1983, 126 pages
- Atari BASIC Reference Guide For Experience Programmers, C061570, © 1983, 14 pages
- Atari BASIC Reference Guide, C061948, © 1983 (international; 61 pages)

7.2.2) How do I load/run or save an Atari BASIC program on cassette?

7.2.2.1) Loading

To load and run an Atari BASIC program from cassette:
1. Insert the cassette into the recorder.
2. Use [REWIND] or [ADVANCE/F. FWD] on the recorder, if necessary, to bring the tape to the position where the program is located.
3. Boot the computer to the Atari BASIC READY prompt.
4. There are several possibilities for the next step, depending on how the program was saved, and whether you want to run the program or just load it into RAM. Enter one of the following four commands:
   a. `CLOAD` loads programs saved with CSAVE
   b. `LOAD "C:"` loads programs saved with SAVE "C:"
   c. `ENTER "C:"` loads programs saved with LIST "C:"
   d. `RUN "C:"` loads and runs programs saved with SAVE "C:"
5. The system buzzer sounds (to signal you to press [PLAY] on the recorder).
6. Press [PLAY] on the recorder.
7. Press the [RETURN] key on the computer keyboard.

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Tape motion starts, the program loads from the cassette into RAM, and then tape motion stops.
Then, if you entered RUN "C:" above, the loaded program runs; otherwise a READY prompt is displayed.
8. You may press [STOP] on the recorder once the program is loaded, unless the program is designed to control further tape motion start/stop.
9. If the loaded program is not running yet (you did not enter RUN "C:" above), now enter the command: RUN

7.2.2.2) Saving

To save an Atari BASIC program from computer RAM to cassette:
1. Insert a cassette into the recorder.
2. Use [REWIND] or [ADVANCE/F. FWD] on the recorder, if necessary, to bring the tape to the position where the program is to be recorded.
3. Enter one of the following three commands:
   a. `CSAVE`
      (short inter-record gap - fastest read/write speed - tokenized files)
      According to Atari Tech Tip 5, 17-Nov-1982, regarding the 400/800 computer models, pressing [RESET] does not reset the data I/O line in POKEY. Subsequent use of CSAVE is unreliable because the data I/O line is not clear, POKEY sends garbage, and the data stored is unrecoverable.
      Solution #1: Avoid using [RESET] before using CSAVE.
      Solution #2: Following use of [RESET], execute a serial bus command that properly resets POKEY and clears the data I/O line.
      Recommended: LPRINT
      (If a printer is not attached when the LPRINT is executed, an error 138 occurs. This is normal and does not interfere with the reset of POKEY and safe subsequent use of CSAVE.)
   b. `SAVE "C:"`
      (long inter-record gap - middle read/write speed - tokenized files)
   c. `LIST "C:"`
      (long inter-record gap - slowest read/write speeds - straight ATASCII - tape actually stops in between block reads/writes)
4. The system buzzer sounds twice (to signal you to press both [PLAY] and [RECORD] on the recorder).
5. Press both [PLAY] and [RECORD] on the recorder.
6. Press the [RETURN] key on the computer keyboard.
   Tape motion starts, the program is copied from RAM to the cassette, and then tape motion stops.
7. You may press [STOP] on the recorder once recording has finished.

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7.3) DOS

7.3.1) What is Atari DOS, and what versions did Atari release?

The 8-bit Atari Operating System (on ROM) includes a rudimentary Resident Diskette Handler that provides several functions:
1. GET SECTOR data
2. PUT SECTOR data (without verify) (XL OS only)
3. PUT SECTOR data WITH VERIFY
4. STATUS REQUEST
5. FORMAT

The unit of data transfer for the GET and PUT functions is one disk sector.

400/800 OS	128 bytes/sector
XL OS	128 bytes/sector at system boot; 1-65,536 bytes/sector supported after system boot

The Resident Diskette Handler is utilized by the Atari OS in a disk boot, where data is automatically loaded from the boot sectors (128 bytes/sector) of the disk in powered disk drive number 1 into RAM on system startup, and then optionally executed.

Advanced software programmers may utilize the Resident Diskette Handler for disk drive communications, though it is notably optional to do so.

While the Resident Diskette Handler provides limited functionality, a full-featured Disk Operating System (DOS) on the Atari consists of a flexible combination of software components provided in the Atari OS on ROM with software components loaded into RAM from disk:

1. **SIO (Serial I/O bus Utility) routine**
   - Resident component of the Atari OS
   - Generalized low level communications with SIO bus devices, including disk drives
   - Typically utilized directly by a File Management Subsystem
   - Also utilized by the Resident Diskette Handler
2. **FMS (File Management Subsystem)**
   - Must be loaded into RAM from disk
   - Software for organizing and managing data stored on disks into named files, freeing users/user programs from the need to keep track of what data is located in what physical locations on the disk
   - Typically provides a Disk File Manager ("D:") device handler that is compatible with CIO
   - Typically utilizes SIO directly, but may utilize SIO by way of the Resident Diskette Handler, or may use neither
3. **CIO (Central Input/Output Utility) routine**
   - Resident component of the Atari OS
   - Generalized high level, device independent access to device handlers, including a Disk File Manager ("D:") device handler provided by a FMS

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4. DUP (Disk Utility Package) or equivalent software program(s)
- Optionally provided with a FMS
- Typically a DOS menu program, but could take any form of software that provides a user interface to FMS management functions

Those DOS components loaded into RAM from disk, that is, a FMS and any additional programs distributed with that FMS (such as a DUP), are generally what is referred to as a "DOS" on the Atari.

The rest of this FAQ section describes the various DOS versions produced by Atari for use with their 8-bit computers: DOS I, DOS 2.0S, DOS 3, DOS 2.5, DOS XE

7.3.1.1) DOS I

DISK OPERATING SYSTEM 9/24/79 COPYRIGHT 1979 ATARI
- Contains two main parts:
  - A File Management Subsystem (FMS)
    - Developed by **Paul Laughton** (also wrote: Atari BASIC) for Shepardson Microsystems, Inc. (SMI) for Atari. **Paul Laughton** had previously developed Apple DOS for SMI for Apple Computer in 1978.
  - A Disk Utility Package (DUP)
- Shipped with Atari 810 Floppy Disk Drives manufactured until fall 1981
- Disk Utility Package (DOS menu) is loaded into memory with the FMS
- Uses the OS-resident Diskette Handler for all disk communications
- Disk drive type supported: Atari 810 (& compatible)
- Disk utilization / filesystem: "DOS I"
  - 128 total bytes/sector, with 3 bytes of each sector used to address the next sector
  - 40 tracks * 18 sectors/track = 720 total sectors, with 11 sectors used for software control or unused by the FMS.
  - Data capacity per diskette:
    709 sectors x 125 bytes/sector = 88,625 bytes/disk
  - Cannot read disks written with DOS II, which require a 3-sector boot
  - 11 special sectors:

Sector #	Description
1	Boot sector, containing the boot record accessed by the Atari OS at system power-up
360	Volume Table of Contents (VTOC) (sector usage)
361-368	File Directory (8 directory entries per sector)
720	Unused by the FMS (FMS interprets the VTOC sector bit map as sectors numbered 0-719, ignoring nonexistent sector 0, while the Atari 810 drive uses sectors numbered 1-720)

  - Maximum of 64 files per diskette (8-sector File Directory)
- Uses binary file format unsupported by any other DOS version for the Atari

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- D: Disk File Manager supports up to four Atari 810 Floppy Disk Drives, D1: through D4:
  - To configure DOS I for fewer drives (freeing system environment RAM), adjust memory location 1802 ($70A or DRVBYT):
    1. Boot the system to the BASIC READY prompt
    2. Enter one of:

POKE	Result
POKE 1802,1	for a one-drive system; saves 397 bytes
POKE 1802,3	for a two-drive system, saves 258 bytes
POKE 1802,7	for a three-drive system, saves 130 bytes
POKE 1802,15	for a four-drive system; DOS I default value

    3. Go to DOS and use menu item H (WRITE DOS FILE) to write the DOS.SYS file (with the new value of location 1802) to disk, replacing any existing copy of DOS on that disk.
- Can open up to 3 files simultaneously
  - Configurable by adjusting memory location 1801 ($709 or SABYTE) via the same process as described for adjusting the number of disk drives. Valid values for DOS I are 1-3 inclusive. Default is 3.
- AUTO.SYS can be used to automatically poke data in RAM locations on system startup.
- Files copied or duplicated in small buffer
- Must redisplay menu before issuing new command
- Can only write DOS system file to drive 1
- N. DEFINE DEVICE menu option: "The full implementation of this selection is not supported, so use it with caution." – DOS Reference Manual p.39
- DOS I is not compatible with the 850 Interface Module R: device handler
- Disk File Manager Master Copy CX8101 disk contains:
  DOS.SYS (both the FMS with D: Disk File Manager and DUP with DOS Menu)
- Manual: Disk Operating System Reference Manual C015200
  - Not included in the CX8101 Master Diskette box, but was additionally boxed with Atari 810 Floppy Disk Drives from fall 1981 to fall 1982

7.3.1.2) DOS 2.0S

DISK OPERATING SYSTEM II VERSION 2.0S COPYRIGHT 1980 ATARI

- Shipped with 810 and 1050 Floppy Disk Drives manufactured from 1981-1983.
  Master Diskette also shipped with the Atari Touch Tablet.
- FMS (DOS.SYS) component developed by **Paul Laughton** for Shepardson Microsystems, Inc. (SMI) for Atari, based on the Atari DOS I FMS.
  Released code version: "19-Aug-80" (19-Aug-1980)
- Disk Utility Package (DUP.SYS – DOS menu) is separate from the FMS, and optional for use of the FMS, freeing up memory for user programs when the DUP is not needed.
  Released code version: "ver 2.9 11/18/80" (18-Nov-1980)
  DUP component programmer: **Keith Ball** of Atari
- Does not use the OS-resident Diskette Handler after system boot
- Utilizes SIO for disk drive communications
- MEM.SAV file can be employed to preserve the contents of memory to disk when DUP.SYS is loaded.
- Introduces support for AUTORUN.SYS binary file launch upon system boot (replaces AUTO.SYS of DOS I)

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- Introduces "Burst I/O" for large data transfers
  - Feature is slightly buggy.
    Bill Wilkinson offered a fix in Compute! #26 pages 170-172, but as published this bug fix also contained a bug.
    For the de-bugged bug fix see the book, "Mapping the Atari" (original or Revised edition) by Ian Chadwick, page 95.
- Disk drive type supported: Atari 810 (& compatible)
- Disk utilization / filesystem: "DOS 2.0 Single Density"
  - 128 total bytes/sector, with 3 bytes of each sector used to address the next sector
  - 40 tracks * 18 sectors/track = 720 total sectors, with 13 sectors used for software control or unused by the FMS.
  - Data capacity per diskette:
    707 sectors x 125 bytes/sector = 88,375 bytes/disk
  - Special sectors:

Sector #	Description
1	Boot sector, containing the boot record accessed by the Atari OS at system power-up
2-255	Contiguous sectors following sector 1 are optional additional boot sectors (as specified in sector 1) for a maximum of 255 boot sectors
360	Volume Table of Contents (sector usage)
361-368	File Directory (8 directory entries per sector)
720	Unused by the FMS (same as DOS I)

  - Maximum of 64 files per diskette (8-sector File Directory)
- Established standard binary file format supported by ALL other DOS versions for the Atari (exception: Atari DOS I)
- By default, the CIO-compatible D: Disk File Manager supports up to two Atari 810 Floppy Disk Drives, D1: and D2:
  - To configure DOS 2.0S for the number of Atari 810 Floppy Disk Drives attached to the system (which affects system environment RAM), adjust memory location 1802 ($70A or DRVBYT):
    1. Boot the system to the BASIC READY prompt
    2. Enter one of:

POKE	Result
POKE 1802,1	D1:
POKE 1802,3	D1: and D2: – DOS 2.0S default value
POKE 1802,7	From D1: to D3:
POKE 1802,15	From D1: to D4:
POKE 1802,31	From D1: to D5:
POKE 1802,63	From D1: to D6:
POKE 1802,127	From D1: to D7:
POKE 1802,255	From D1: to D8:

    3. Go to DOS and use menu item H (WRITE DOS FILES) to write the DOS system files (with the new value of location 1802) to disk, replacing any existing copy of DOS on that disk.
- By default, can open up to 3 files simultaneously
  - Configurable by adjusting memory location 1801 ($709 or SABYTE) via the same process as described for adjusting the number of disk drives. Valid values for DOS 2.0S are 1-7 inclusive. Default is 3.
- Files copied or duplicated into buffer which can be as large as user memory area

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- SAVE BINARY FILE has "/A" option allowing two files to be appended together
- Can create load-and-go type file which enables you to select a file and have it automatically run without entering a RUN address
- Diskette with bad sectors detected cannot be formatted
- Screen margins are reset when DUP is entered
- DUP: May enter another command or redisplay menu after a command
- Can write DOS files to any drive
- NOTE/POINT are available for random file access
- Atari 810 Master Diskette II CX8104 or Atari 810/1050 Master Diskette II CX8104 disk contains:

Program	Description
DOS.SYS	FMS with D: Disk File Manager, loaded by OS-resident Diskette Handler on system startup
DUP.SYS	Disk Utility Package (DOS menu)
AUTORUN.SYS	Loads the R: device handler from an 850 Interface Module

- Shipped with one Atari Formatted Diskette II CX8111
- Manuals:
  - Disk Operating System II Reference Manual C016347 (included in box)
  - Disk Utilities Listing, February 1981 C016558 (without binder) (DUP.SYS source code, early release)
  - DOS Utilities Source Listing (DOS II), August 1981 C017894 ("Disk Utility Programs (DUP) ver 2.9 11/18/80")
    - Available: https://ksquiggle.neocities.org/dup2.htm
  - Atari 810 Disk Drive: An Introduction to the Disk Operating System C060054
  - Atari 1050 Disk Drive: An Introduction to the Disk Operating System C061529
- On February 25, 1981, the source code to the Atari DOS 2.0S FMS (DOS.SYS) was purchased from SMI by Optimized Systems Software (OSS), headed by former SMI employees **Bill Wilkinson** and **Mike Peters**.
  Inside Atari DOS (Compute! Books, 1982, 0-942386-02-7), authored by **Bill Wilkinson**, made the source code to the Atari DOS 2.0S FMS (DOS.SYS) available to the public. See: http://www.atariarchives.org/iad/ or https://ksquiggle.neocities.org/iad.htm
- Modified versions of DOS 2.0S were widely created and exchanged among Atari users. Also notably, the first 3rd party disk drive for the Atari, the Percom RFD40-S1, was initially (1982) distributed with a program ("BLD") to build Percom DOS 2.0P (double density version) from a copy of DOS 2.0S.

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7.3.1.3) DOS 3

Atari DOS 3 Copyright 1983

- Shipped with 1050 Floppy Disk Drives manufactured from 1984 through early 1985.
- Credits: (https://tinyurl.com/bdhbunrv)

Version	Authors	Release date
(Early versions probably for internal distribution only)	M. W. Colburn	1982-11-29
Release 2	M. W. Colburn	1982-12-29
Release 3	M. W. Colburn	1983-03-07
Release 4 (Provide documentation, fix problems)	R. K. Nordin	1983-07-05
Release 9 (bring up to coding standard)	R. K. Nordin	1983-09-21
Release 10 (fix APPEND and NOTE/POINT problems)	R. K. Nordin J. W. Clark	1984-03-20
Release 11	J. W. Clark Y. T. Jang	1984-05-01

- An earlier "DOS 3" project had been undertaken in 1981, headed by systems software supervisor **Brian Johnston** with consultant **Harry B. Stewart** of NEOTERIC
- Disk drive types supported:
  1. Atari 810 (1450XLD: "small" mode)
  2. Atari 1050 (1450XLD: "small" mode)
- Disk utilization / filesystems:
  1. "DOS 3 Single Density"
     - Sector = 128 bytes
     - Block = 8 sectors = 1,024 bytes
     - Track = 18 sectors = 2,304 bytes
     - Disk contains 40 tracks, or 720 sectors, or 90 blocks, with 3 blocks used for software control.
     - Data capacity per diskette: 87 blocks x 1,024 bytes/block = 89,088 bytes/disk
     - Blocks 1-3 are used by the system as 24 special sectors:

Sector #	Description
1-9	Boot sectors, containing the boot record accessed by the Atari OS at system power-up
10-15	unused
16-23	File Directory
24	File Allocation Table (block usage)

     - Maximum of 63 files per diskette (8-sector File Directory)

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2. "DOS 3 Double Density" (enhanced/dual density)
   - Sector = 128 bytes
   - Block = 8 sectors = 1,024 bytes
   - Track = 26 sectors = 3,328 bytes
   - Disk contains 40 tracks, or 1,040 sectors, or 130 blocks, with 3 blocks used for software control.
   - Data capacity per diskette: 127 blocks x 1,024 bytes/block = 130,048 bytes/disk
   - Blocks 1-3 are used by the system as 24 special sectors:

Sector #	Description
1-9	Boot sectors, containing the boot record accessed by the Atari OS at system power-up
10-15	unused
16-23	File Directory
24	File Allocation Table (block usage)

   - Backward compatible with DOS 3 Single Density
   - Maximum of 63 files per diskette (8-sector File Directory)
- Keyboard Command Processor (KCP) is separate from the FMS, and optional for use of the FMS, freeing up memory for user programs when the KCP DOS subfunctions and the DOS menu are not needed.
- KCP Overlay (DOS menu) is separate from the FMS and KCP, and optional for use of the FMS and KCP, freeing up memory for user programs when the DOS menu is not needed.
- MEM.SAV file can be employed to preserve the contents of memory to disk when the KCP Overlay (DOS menu) is loaded.
- Supports AUTORUN.SYS binary file launch upon system boot
- File manager and buffers now take up less space than the DOS 2 equivalents. All utilities, such as COPY, INIT, DUPLICATE (all UTL files) are called into memory only as needed. Each is maintained in a separate file.
- Provides a direct method for the user to modify the FMS parameters
- Provides an online HELP feature
- Compared to DOS 2: The NOTE and POINT commands return a pointer number relative to the start of a file (byte 0) rather than an absolute sector and byte location within the sector.

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- Master Diskette 3 (DX5052) contains:

Program	Description
FMS.SYS	FMS with D: Disk File Manager, loaded by OS-resident Diskette Handler on system startup. Contains subfunctions: ERASE FILE, RENAME FILE, PROTECT FILE, UNPROTECT FILE, LOAD
KCP.SYS	Keyboard Command Processor, loaded on system startup if a cartridge is present. Contains subfunctions: SAVE, GO AT HEX ADDRESS, TO CARTRIDGE, COPY FILE, INIT DISK, DUPLICATE DISK, ACCESS DOS 2
KCPOVER.SYS	KCP Overlay, displays the DOS menu and process commands
COPY.UTL	COPY/APPEND utility
DUPDISK.UTL	DUPLICATE utility
INIT.UTL	INIT Disk utility
CONVERT.UTL	ACCESS DOS 2 utility, use to copy files from a DOS 2.0S disk to aDOS 3 disk
HELP.UTL	HELP utility
HELP.TXT	Text information displayed by the HELP utility
HANDLERS.SYS	Loads the R: handler from an Atari 850 Interface Module during system boot up, if this file is on the drive 1 diskette.

- Manuals for DOS 3:
  - Atari Disk Operating System Reference Manual C062287 (100 pages)
    (makes no mention of the 1450XLD)
  - An Introduction to the Atari Disk Operating System C062288 (29 pages)
    (makes extensive mention of the 1450XLD)
  - Atari DOS 3 Reference Manual Errata, 05/01/84
    "Early versions of DOS 3 used a random access method that was incompatible with large files. To determine if you have an early version, boot your copy of DOS 3 with Atari BASIC, and execute the following BASIC command:

    ```
    PRINT PEEK(1816)
    ```

    If the value returned is '53', your copy of DOS 3 is the latest released.
    If the value returned is '51' or '56', Atari Customer Relations offered a program to update DOS 3 to the latest revision level."
  - Atari 1050 Disk Drive: An Introduction to the Atari Disk Operating System C024323 (international; 144 pages)

7.3.1.4) DOS 2.5

DISK OPERATING SYSTEM II VERSION 2.5 COPYRIGHT 1984 ATARI CORP.

- Shipped with 1050 Floppy Disk Drives manufactured in fall 1985, and with XF551 Floppy Disk Drives manufactured in 1987-1988.
- Developed by Optimized Systems Software (OSS - **Bill Wilkinson**) for Atari
- Disk drive types supported:
  1. Atari 810 (& compatible)
  2. Atari 1050 (& compatible)
  3. Atari 130XE RAM drive (65,408 bytes) for 130XE banked memory

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- Disk utilization / filesystems supported (detected automatically):
  1. "DOS 2.0 Single Density"
  2. "DOS 2.5 Enhanced Density" (or just "DOS 2.5")
     - 128 total bytes/sector, with 3 bytes of each sector used to address the next sector
     - 40 tracks * 26 sectors/track = 1,040 total sectors, with 30 sectors used for software control or unused by the FMS.
     - Data capacity per diskette:
     - 1,010 sectors x 125 bytes/sector = 126,250 bytes/disk
     - Special sectors:

Sector #	Description
1	Boot sector, containing the boot record accessed by the Atari OS at system power-up
2-255	Contiguous sectors following sector 1 are optional additional boot sectors (as specified in sector 1) for a maximum of 255 boot sectors
360	Volume Table of Contents (sectors 1-719 usage)
361-368	File Directory (8 directory entries per sector)
720	Unused by the FMS (same as DOS I and DOS 2.0S)
1024	Extended Volume Table of Contents (sectors 720-1023 usage)
1025-1040	Unused by the FMS (FMS uses a 10-bit sector address)

     - Maximum of 64 files per diskette (8-sector File Directory)
     - Backward compatible with DOS 2.0 Single Density
  3. "DOS 2.5 130XE RAM drive"
     - 128 total bytes/sector, with 3 bytes of each sector used to address the next sector
     - 508 total sectors, with 9 sectors used for software control.
     - Data capacity: 499 sectors x 125 bytes/sector = 62,375 bytes
     - 9 special sectors:

Sector #	Description
360	Volume Table of Contents (sector usage)
361-368	File Directory

     - Maximum of 64 files (8-sector File Directory)
     - Backward compatible with DOS 2.0 Single Density
- RAM memory locations 1802 ($70A or DRVBYT, the active drive map) and 1801 ($709 or SABYTE, the maximum number of concurrently open files) are utilized in the same way as by DOS 2.0S.
  - If the DOS 2.5 130XE RAM drive is enabled, the default value for SABYTE is 131, enabling D1:, D2:, and D8:, where D8: is the RAM drive.

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- DOS 2.5 (DX5075) disk contains:

Program	Description
DOS.SYS	FMS with D: Disk File Manager, loaded by OS-resident Diskette Handler on system startup
DUP.SYS	Disk Utility Package (DOS menu)
RAMDISK.COM	If present on startup disk with Port B banked memory: 1. Sets up a 64 KiB RAM drive as D8: 2. Copies DUP.SYS to D8: and establishes MEM.SAV on D8:
SETUP.COM	External utility has 3 functional options: 1. Change current drive number 2. Change system configuration. 3 configurable options: I. Active drives number (1 to 4) II. Max number of simultaneous files (1-7) III. Disk writes with or without verify 3. Create an AUTORUN.SYS that does either one or both of: o Load the R: handler from an Atari 850 Interface Module o Load and RUN a BASIC program from the boot disk
COPY32.COM	Utility to copy files from a DOS 3 disk to a DOS 2.5 or to a DOS 2.0S disk
DISKFIX.COM	DiskFix Utility can be used to: • Unerase a file (under certain circumstances) • Verify the soundness of every file on a disk • Rename a file by number (solves problem of files with duplicate names)

- Manuals:
  - Atari DOS 2.5: 1050 Disk Drive Owner's Manual C072033
  - Atari DOS 2.5: XF551 Disk Drive Owner's Manual C033537

7.3.1.5) DOS XE

DOS XE DISK OPERATING SYSTEM COPYRIGHT 1988 ATARI CORP. VERSION 01.00

- Shipped with late production XF551 Floppy Disk Drives starting in 1989
- Developed by **Bill Wilkinson** for Atari. Known as "ADOS" prior to release
- Requires an XL/XE; does not run on the 400/800
- Disk Utility Package (DOS menu) is loaded into memory with the FMS
- Disk drive types fully-supported (with internal provision for up to 8 drive types):
  1. Atari 810 (& compatible)
  2. Atari 1050 (& compatible)
  3. Atari XF551 (supports XF551 high speed)
  4. Atari 130XE RAM drive (64 KiB) for 130XE banked memory
  5. SSDD 5.25" Single-Sided, Double Density (Percom compatible)
- Disk utilization / filesystems:
  1. "DOS XE" via the native D: Disk File Manager [(1)]
  2. "DOS 2.0 Single Density" via the optional DOS 2.x A: Disk File Manager
  3. "DOS 2.5 Enhanced Density" via the optional DOS 2.x A: Disk File Manager
- Disk File Managers can address up to eight drives (D1: to D8:, A1 to A8:).
- Hybrid interface is both menu driven and command driven, including stacked command entry.

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- Batch files can be used to automate tasks; AUTOEXEC.BAT run automatically when DOS XE is booted.
- RAM memory locations 1802 ($70A or DRVBYT, the active drive map) and 1801 ($709 or SABYTE, the maximum number of concurrently open files) are utilized in the same way as by DOS 2.0S and DOS 2.5.
- DOS XE Master Diskette (DX5090) contains:

Program	Description
DOSXE.SYS	FMS with D: Disk File Manager, loaded by OS-resident Diskette Handler on system startup
DOS2.SYS	A: Disk File Manager for DOS 2.x filesystem support
SETUP.COM	External setup utility. Configures: • The number and type of drives • The number of file buffers • Installation of the 130XE RAM drive • Whether the RS-232 handler should be loaded automatically on system startup • Whether a BASIC program should be run automatically on system startup
RDRIVER.SYS	Used by DOS XE to load R: handler from 850 Interface
COPY3_XE.COM	DOS 3 to DOS XE copy program
WELCOME.BAS	Sample program provided for experimentation with SETUP.COM

- Manual: Atari DOS XE: XF551 Disk Drive Owner's Manual C300557

(1) About the "DOS XE" disk utilization / filesystem:

- All disks are addressed in 256 byte (logical) sectors.
  - Simulates 256 byte sectors on 810 and 1050 Floppy Disk Drives, which have 128 byte physical sectors, by reading and writing physical sector pairs.
- Five different types of sectors:
  1. **Boot sectors**
     - Disk sectors 1-3 contain the boot record accessed by the Atari OS at system power-up. 128 bytes/sector.
     - Contains a 32 byte Drive Table describing the physical and logical layout of the disk.
     - The DOS XE 130XE RAM drive does not have boot sectors.
  2. **Volume Table of Contents (VTOC) sectors**
     - Starts in sector 4 (one sector only for drive types supported by DOS XE).
     - The first 10 bytes give information about the current status of the disk and the rest is a bit map of the blocks on the disk.
  3. **Directory sectors**
     - The first directory block immediately follows the VTOC sector(s). Additional directory blocks are allocated as needed and may be scattered throughout the disk, linked by a two-byte pointer at the end of each block.
     - Each entry contains the file name, information about the file (including creation date and last modified date), and up to 12 two-byte pointers which point to the file map blocks for the file.
     - Includes a six byte sector label, containing the File ID number, Volume number, and Sequence number.

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4. **File Map sectors**
   - Contain from 1 to 125 two-byte data block pointers.
   - Includes a six-byte sector label, containing the File ID number, Volume number, and Sequence number.
5. **Data sectors**
   - 250 bytes allocated for data.
   - Includes a six-byte sector label, containing the File ID number, Volume number, and Sequence number.

- Files can be up to 8 MiB long.
- There is a limit of 1,250 files per directory/subdirectory, but no theoretical limit to the number of directories.
- There is an 80-character limit on pathnames.
- Up to 64 KiB sectors can exist on a single disk.
  (65,536 sectors x 256 bytes/sector = 16 MiB)
- Data capacity per disk for fully-supported drive types:

AT810:	347	usable sectors * 250 bytes/sector =	86,750	bytes
AT1050:	507	usable sectors * 250 bytes/sector =	126,750	bytes
XF551:	1,435	usable sectors * 250 bytes/sector =	358,750	bytes
130RAM:	251	usable sectors * 250 bytes/sector =	62,750	bytes
SSDD:	715	usable sectors * 250 bytes/sector =	178,750	bytes

  (Note that when DOS XE reports free disk space it truncates the number of bytes free to the nearest 1000 "K" bytes. For example, an empty AT810 disk is reported by DOS XE to have 86 KiB free.)
- Filesystem analysis by James Bradford (2009):
  https://atariage.com/forums/topic/154173-bored-so-i-did-this-part-2/

7.3.2) What is SpartaDOS X?

The continuing development of various modern mass storage options for the 8-bit Atari computers has necessitated ongoing development of a supporting disk operating system (DOS). This section describes a modern, full-featured DOS for the Atari.

SpartaDOS X 4.49 with Toolkit (7 Apr. 2020), by DLT Ltd.

- Past or present crew: Konrad M. Kokoszkiewicz (Draco), GoodByteXL (documentation), Monika Wesolowska (Innuendo), Wojciech Szychowski (Lizard), Trub
- Often abbreviated: SDX
- No source code in common with disk-based SpartaDOS
- 48 KiB RAM required; more recommended
- Needs at least a 128 KiB ROM cartridge (v.4.40+ ; earlier versions 64 KiB)
- Supported platforms for running SDX:
  - intSDX128 and intSDX128 "flash",
  - IDE Plus 2.0 interface,
  - Incognito,
  - Maxflash 1 MiB,
  - Maxflash 8 MiB,
  - Maxflash MyIDE+Flash,
  - MyIDE II RAM,
  - MyIDE II ROM,

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  - SIC! Cartridge 256k,
  - SIC! Cartridge 128k,
  - SIDE HDD cartridge,
  - SIDE2 HDD cartridge,
  - SuperCart cartridge,
  - Ultimate 1 MiB,
  - Turbo Freezer 2005,
  - Altirra and Atari800 emulators
- Proprietary kernel does not rely on the Central Input/Output (CIO) portion of the Atari OS to communicate with devices. Standard Atari CIO communication is also supported for full software compatibility.
- Disk utilization / filesystems: see below
- Number of drives or partitions: up to 15 (8 before v.4.40)
- Logical sector size: 128, 256, or 512 bytes (128 or 256 before v.4.40)
- Number of sectors per disk: up to 65,535
- Disk size: up to 32MB (16MB in versions before v.4.40)
- Directory size: up to 32 KiB
- Number of directories: unlimited
- Number of entries per directory: up to 1,423
- File size: up to 16 MiB
- Number of files open at a time: up to 16
- Path length: up to 64 characters
- Extended Memory: up to 1,024 KiB with Port B banked memory; up to 4,032 KiB with Axlon banked memory
- RAMDISK.SYS driver utilizes Extended Memory to support up to 3 RAM drives
- High speed support: Happy/Warp Speed, US Doubler/UltraSpeed, Indus GT/Synchromesh, Indus GT/Synchromesh II, XF551, 1050 Speedy
- RS232.COM provided for loading the R: handler from the 850 Interface ROM

Disk utilization / filesystems:

1. SpartaDOS File System (SDFS) - SPARTA.SYS
   - SpartaDOS X versions 4.1x and 4.2x use SDFS 2.0
     - Boot code stored in boot sectors 1-3 is not used with SDX.
     - The SDFS 2.0 standard is extended by SDX with support for hidden and archived directory entry (file) attributes.
   - SpartaDOS X versions 4.4x use SDFS 2.1
     - Supports sector sizes > 256 bytes
     - Unlike SDFS 2.0 storage devices using 256 bytes/sector, boot sectors of storage devices using 512 bytes per sector can utilize the full size of the sector. In this case, the boot region takes only one sector, the one number 1. The first 42 bytes of this sector carry the disk descriptor - same as SDFS 2.0 with added support for larger sector sizes. The remaining portion of the sector is occupied by a new boot loader, able to handle 512-byte sectors and larger ones.
2. Atari DOS 2 - ATARIDOS.SYS
   - Supports subdirectories in MYDOS up to a size of ~16 MiB (65,535 sectors, 256 bytes each)
   - Supports the extended sectors of DOS 2.5 for read only.
   - Does not support the ability to create/delete, or set a working directory on MYDOS media

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3. CP/M - CPMFS.SYS (as of SDX 4.46)
   - Read Indus CP/M 2.2 disks on Indus GT/LDW Super 2000/CA-2001
4. MS-DOS - FATxxx.SYS (as of SDX 4.46)
   - Read-only; hardware device must support 512-byte sectors
     - FAT12 media (floppies) without subdirectories - FAT12A.SYS
     - FAT12 only with full access to subdirectories - FAT12B.SYS
     - FAT16/FAT12 with subdirectories - FATFS.SYS (as of SDX 4.47)
       Maximum disk size 2 GiB
5. DOS2DOS protocol support - PCLINK.SYS (as of SDX 4.43)
   - Direct read/write access to the PCLink server's filesystem
     (PCLink servers include: SIO2BSD, RespeQt)

Old versions/release history:
SpartaDOS X was originally developed by **Mike Gustafson** for ICD.
ICD SpartaDOS X release history: (version numbering started with 4.0)
- SpartaDOS X 4.17 ??-??-88
- SpartaDOS X 4.18 10-29-88
- SpartaDOS X 4.19 1-16-89
- SpartaDOS X 4.20 2-06-89
- SpartaDOS X 4.21 7-10-89

The rights to SpartaDOS X were purchased from ICD by Fine Tooned Engineering (FTe, **Mike Hohman**) in 1993 (November?).
FTe SpartaDOS X release history:
- SpartaDOS X 4.22 11-05-95

DLT SpartaDOS X release history:
- SpartaDOS X 4.39RC (1 Oct. 2006)
- SpartaDOS X 4.41 (8 Feb. 2008)
- SpartaDOS X 4.42 (25 Dec. 2008)
- SpartaDOS X 4.43 (updated 14 Apr. 2011; first released 10 Apr. 2011)
- SpartaDOS X 4.45 (4 Nov. 2011)
- SpartaDOS X 4.46 with Toolkit (2 Jan. 2013)
- SpartaDOS X 4.47 with Toolkit (10 Feb. 2015)
- SpartaDOS X 4.48 with Toolkit (23 Jul. 2016)

Developer's website:
http://sdx.atari8.info/ or http://spartados.com or http://spartadosx.com

Manufacturers:
- Atarimax http://www.atarimax.com/
- **Przemyslaw Krawczyk (Lotharek)** http://lotharek.pl/

7.3.3) What other 3rd party DOS versions were released for the Atari?

This section attempts to list all released 3rd-party "full-featured" DOS versions, beyond SpartaDOS X (which is described in another section of this FAQ list).

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This list is presented in chronological order by date of first (known) release.

7.3.3.1) OSS OS/A+ 2.x Family

Release history:

- OSS CP/A - ATARI version 1.0 Copyright © 1981 OSS
- OSS OS/A+ - ATARI version 1.0 Copyright © 1981 OSS (May 1981 Version 1.1)
- OSS OS/A+ - ATARI version 1.2 Copyright © 1981 OSS
- OSS OS/A+ - ATARI version 1.2e Copyright © 1981 OSS
- OSS OS/A+ - ATARI version 2.00 Copyright © 1982 OSS, Inc.
- OSS OS/A+ - ATARI version 2.10 Copyright © 1982 OSS, Inc
- OSS DOS XL - ATARI version 2.20 Copyright © 1983 OSS, Inc.
- OSS DOS XL - ATARI version 2.30 Copyright © 1983 OSS, Inc.
- OSS DOS XL - ATARI version 2.30C Copyright © 1983 OSS, Inc.
- OSS DOS XL - ATARI version 2.30X Copyright © 1983 OSS, Inc.
- OSS DOS XL Atari v2.30 Axlon RamDisk Copyright © 1984 OSS, Inc.
- OSS DOS XL Atari v2.30C Axlon RamDisk Copyright © 1984 OSS, Inc.
- OSS DOS XL Atari v2.30 Mosaic RamDisk Copyright © 1984 OSS, Inc.
- OSS DOS XL Atari v2.30C Mosaic RamDisk Copyright © 1984 OSS, Inc.
- FTe DOS XL - ATARI version 2.30 Copyright © 1994 by FTe
- FTe DOS XL - ATARI version 2.30C Copyright © 1994 by FTe
- FTe DOS XL - ATARI version 2.30X Copyright © 1994 by FTe

Features:

- Developed by Optimized Systems Software (OSS), successor to Shepardson Microsystems, Inc. (SMI), developer of Atari DOS I and the File Manager System of Atari DOS II
  - SMI had developed Apple DOS for Apple Computer in 1978
  - SMI had released the OSS Control Program/Apple (CP/A), OSS Operating System (OS) and OSS Disk File Manager (DFM) for the Apple II in February 1980
- Introduced April 3-5, 1981 at the West Coast Computer Faire in San Francisco, California under the name CP/A (Command Processor/Advanced)
- Rights purchased from OSS by ICD in January 1988
  (but ICD discontinued DOS XL in favor of their own SpartaDOS)
- Rights purchased from ICD by Fine Tooned Engineering (FTe) in 1993
- FTe DOS XL 2.30 (including 2.30C and 2.30X) released on 6/22/94. They are identical to the OSS releases of the same versions.

Version 1

- The DOS.SYS file on the CP/A disk is the Atari DOS 2.0S FMS (written by OSS) and CP/A. (There are no DUP.SYS or MEM.SAV files with CP/A.)
- Programmer: **Paul Laughton**
- Command line driven
- Disk drive type supported: Atari 810 (& compatible)
- Disk allocation/filesystem: Atari DOS 2.0 Single Density
- Supplied with OSS EASMD - Editor/Assember/Debug

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Version 2

- Primarily by **Mark Rose**, with collaboration of **Bill Wilkinson** and **Mike Peters**.
- Command line driven, with optional menu available
- Disk drive types supported:
  1. Atari 810 (& compatible)
  2. SSDD 5.25" Single-Sided, Double Density (Percom compatible)
- Disk allocation/filesystems:
  1. "Atari DOS 2.0 Single Density"
  2. "Atari DOS 2.0 Double Density"
     - Standard established by the unreleased Atari DOS 2.0D
     - 256 total bytes/sector, with 3 bytes of each sector used to address the next sector.
     - 40 tracks * 18 sectors/track = 720 total sectors, with 13 sectors used for software control or unused by the FMS.
     - Data capacity per diskette: 707 sectors x 253 bytes/sector = 178,871 bytes/disk
     - 13 special sectors:

Sector #	Description
1-3	Boot sectors, containing the boot record accessed by the Atari OS at system power-up. 128 bytes/sector
360	Volume Table of Contents (sector usage)
361-368	File Directory
720	Unused by the FMS (same as Atari DOS I and 2.0S)

     - Maximum of 64 files per diskette (8-sector File Directory)
- Supports any mixture of up to 8 single and/or double density disk drives
- No smart density switching. Drive 1 acquires the density of the booted master disk. DOS XL automatically asks each drive what density it is during the boot process. From then on, may use the CONFIG command to manually change a disk drive's density.
- STARTUP.EXC batch file of DOS XL commands (ATASCII text) runs at system boot (after AUTORUN.SYS)
- RS232.COM provided for loading the R: handler from the 850 Interface ROM
- Version 2.10 new utilities: CLRDSK, INITDBL, SDCOPY
- Version 2.20 (DOS XL) announced release date: September 15, 1983 (OSS Newsletter, Summer 1983 page 4)
- Version 2.20: RS232FIX.COM provided as a debugged alternative to the R: handler contained in the ROM of the Atari 850 interface
- Version 2.20 can save 5 KiB of user RAM by occupying memory which is bank-switched with an OSS SuperCartridge, via DOSXL.SYS
- Version 2.30C is Version 2.30 with DOSXL.SUP enabled as DOSXL.SYS, which saves 5 KiB of user RAM by occupying memory which is bank-switched with an OSS SuperCartridge
- Version 2.30X is Version 2.30 with DOSXL.XL enabled as DOSXL.SYS, which saves 3 KiB of user RAM by occupying memory available under the Atari OS (requires an XL/XE computer with at least 64 KiB RAM).
- BitWedge (BIT3.COM) Version 1.1 - 20DEC83 Copyright © 1983 by Harald E. Striepe
  - Provided by OSS for use with the Bit 3 Full-View 80 on the Atari 800.
  - For use under DOS XL Version 2.30 and up
- v2.30 Axlon RamDisk. Version by Harald E. Striepe and OSS.
  - Same as Version 2.30 but with RAM drive support for Axlon banked memory. 883 single density sectors.

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- v2.30C Axlon RamDisk. Version by Harald E. Striepe and OSS.
  - Same as v2.30 Axlon RamDisk version but with DOSXL.SUP enabled as DOSXL.SYS, which saves 5 KiB of user RAM by occupying memory which is bank-switched with an OSS SuperCartridge.
- v2.30 Mosaic RamDisk. Version by Harald E. Striepe and OSS.
  - Same as Version 2.30 but with RAM drive support for Mosaic banked memory. From 371 sectors (one Mosaic 64K RAM Select board plus 32 KiB of standard RAM) to 896 sectors (two 64K RAM Select boards plus a 32 KiB board).
- v2.30C Mosaic RamDisk. Version by Harald E. Striepe and OSS.
  - Same as v2.30 Mosaic RamDisk version but with DOSXL.SUP enabled as DOSXL.SYS, which saves 5 KiB of user RAM by occupying memory which is bank-switched with an OSS SuperCartridge.
- Version 2.30p is a patched Version 2.30 that fixes two bugs:
  1. A boot disk created from the DOS XL menu couldn't boot unless the MENU.COM file was the disk.
  2. A boot disk initialized in a drive other than 1 would always boot up with that drive number as the working drive at the initial command line prompt.
  - OSS published a patch to convert version 2.30 to version 2.30p in their Spring 1984 Newsletter. OSS then published a corrected version of the 2.30p patch in their Fall 1986 Newsletter. See: http://preview.tinyurl.com/o6cn9mm
- Fall 1984- units (Version 2.30p): DOS XL with BUG/65 (debug program)
- Version 2.35I1 is OSS DOS XL 2.30 plus GTSYNC.COM Synchromesh Engager
  - Also known as Version 2.35I
  - Supports Synchromesh 38.4 kbit/s on:
    Indus GT, LDW Super 2000, CA-2001, XFD601, XFD602
  - Supplied by Indus Systems with the Indus GT (1984-1985)
  - "Put Synchromesh in High Gear" article by Richard Q. Fox (1985) modifies DOS XL 2.35I to increase boot speed through several changes, including engaging Synchromesh during boot, coining the result "Super Synchromesh"
  - Supplied by Future Systems with the Indus GT (1986), with the addition of:
    - RAM130.COM, written by Joseph Segura in 1985: a 64 KiB RAM drive for 130XE banked memory
      Synchromesh (GTSYNC.COM) must be disabled to use RAM130
    - INITSYNC.COM – Turns on Synchromesh during boot up
  - Supplied by Logical Design Works with the LDW Super 2000 (1987) and by California Access with the CA-2001 (1988), including RAM130.COM but without INITSYNC.COM and GTRPM.COM
    - Described in the user manuals as: "DOS XL 2.35L"
- Synchromesh II, by Future Systems (1986), supplied with RAM Charger 64 KiB RAM upgrade for Indus GT and also sold separately, includes:
  - DOS XL Version 2.35I2, comprised of OSS DOS XL 2.30 plus GTSYNC.COM Synchromesh Engager – RAM buffering version. Supports:
    - Synchromesh II 68.2 kbit/s on Indus GT/LDW Super 2000/CA-2001 drives upgraded to 64 KiB RAM
    - Synchromesh 38.4 kbit/s on Indus GT, LDW Super 2000, CA-2001, XFD601, XFD602
  - RAM130.COM and INITSYNC.COM, plus GTRPM.COM speed checker utilities

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- Warp Speed DOS XL, including under cartridge, under ROM, and Axlon banked memory versions, was distributed by Happy Computers, Inc. for use with Happy 810 Enhancement (Rev 7 capable units) or Happy 1050 Enhancement.
- Shipped with: Amdek AMDC-II, Astra 1620 (earlier units), CA-2001, Concorde C-221M, Indus GT, LDW Super 2000, NCT 810 Turbo (earlier units), Percom AT88-S1, Percom AT88-S2, Percom AT88SPD (later units), BASIC A+ (later units), MAC/65 (later disk-based units), Trak AT-D2 (later units), Trak AT-D4

7.3.3.2) K-DOS

K-DOS By K-Byte Copyright 1981 Kay Enterprises Co.
- By Kay Enterprises Co. (John Mathies, K-Byte general manager)
  (the makers of K-Razy Shoot-Out and K-Razy Kritters)
- Disk drive types supported: Atari 810 (& compatible)
- Disk allocation/filesystem: Atari DOS 2.0 Single Density
- Command line driven
- Memory resident

7.3.3.3) OSS OS/A+ 4.x Family

Release history:
- OS/A+ version 4.0 (1982 - MC is still looking for a copy of this version)
- OSS OS/A+ - ATARI version 4.10 Copyright © 1982 OSS

Features:
- Port by **Mark Rose** of Apple DOS for the Apple II – which was developed by **Paul Laughton** for Shepardson Microsystems, Inc. (SMI), predecessor to OSS
- Requires, and runs on, only double density or larger disk drives
- Filenames can be from one to thirty characters long;
  all characters are valid except CTRL characters, RETURNs, and commas (,)
- Disk allocation/filesystem:
  - Mapped file structure (true random access to data files)
  - Physical sectors of either 256 or 512 bytes
    - Disks with 128 bytes per sector would use pairs of sectors to emulate 256-byte sectors
  - To ensure compatibility with the Atari computer boot process, always reads and writes sectors 1, 2, and 3 in single density (128 byte) mode
  - Sectors are grouped into blocks of n sectors in length, where n is a power of two between 1 and 128
  - Files are at least one block in length, and up to 16 MiB long
  - Maximum number of files per disk depends on the disk capacity.
    For a single-sided, double density (180 KiB) disk the maximum is 105 files.
  - Disk drives ranging in storage size from 128 KiB to over 15 MiB
- Interoperability with OS/A+ version 2:
  - ADOS command allows the user to access version 4 disks as Dn: while accessing version 2 disks as An:.
  - COPY24 command can copy version 2 files to version 4 diskettes, or vice versa.

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- Version 4.1 revised utility: COPY24
- Version 4.1 incorporates a workaround for the bug in early Percom double-sided disk drives where the drive cannot access the last four sectors of a DS DD disk by hiding the inaccessible sectors from the disk directory.
  See: https://tinyurl.com/3axmynu9
- Version 4.2 (DOS XL Version 4) announced for fall 1983 released (never shipped).
  Sales of Version 4.1 resumed spring 1984 (OSS Newsletter, Spring 1984)
- Shipped with: Percom RFD40-S1 (except early units), Percom RFD44-S1, Percom RFD40-S2, Percom RFD44-S2, Percom AT88SPD (earlier units), Percom Doubler, NCT 810 Turbo (1983 units)
- Also sold by Software Publishers/SWP for use with ATR8000, 1982-1983

7.3.3.4) MYDOS

Release history:
- MYDOS 3.05 [reported to exist]
- MYDOS 3.07 -- copyright 1983, WORDMARK (August 16, 1983)
- MYDOS 3.08 -- copyright 1983, WORDMARK
- MYDOS 3.12 -- copyright 1983, WORDMARK ATR8000 RS232 Version, by **Charles W. Marslett**
- MYDOS 3.09 (December 19, 1983)
- MYDOS 3.13 (August 8, 1984)
- MYDOS 3.010 -- copyright 1983, WORDMARK
- MYDOS 3.011 -- copyright 1984, WORDMARK
- MYDOS 3.16 [reported to exist]
- MYDOS 3.012 -- copyright 1984, WORDMARK
- MYDOS 3.013 -- copyright 1984, WORDMARK (April 19, 1984)
- MYDOS 3.18 -- copyright 1984, WORDMARK ATR8000 RS232 Version, by **Charles W. Marslett**
- MYDOS 3.014 -- copyright 1985, WORDMARK (February 18, 1985)
- MYDOS 3.19 -- copyright 1985, WORDMARK ATR8000 RS232 Version, by **Charles W. Marslett**
- MYDOS 3.015 [reported to exist]
- MYDOS 3.016 -- copyright 1985, WORDMARK
- MYDOS 3.016AX -- copyright 1985, WORDMARK Axlon RAMdisk version
- MYDOS 3.116 -- copyright 1985, WORDMARK ATR8000 RS232 Version, by **Charles W. Marslett**
- MYDOS 4.0 -- copyright 1985, WORDMARK
- MYDOS 4.2 -- copyright 1985, WORDMARK
- MYDOS 4.2C -- copyright 1985, WORDMARK
- MYDOS 4.3A (October 21, 1986)
- MYDOS 4.3B -- copyright 1986, WORDMARK
- MYDOS 4.50 -- copyright 1988, WORDMARK (November 28, 1988, freeware, from **Bob Puff**)
- MYDOS 4.51 -- copyright 1989, WORDMARK (June 14, 1989)
- MyDOS 4.53/3 and 4.53/4 (**David R. Eichel** rel. ver. January 1st, 1990)
- MyDOS 4.55 Beta (**Lee Barnes** March 17, 2003)

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Features:

- Versions 3.0-4.3B developed by **Charles W. Marslett**, 1982-1986
- Version 3.0 was the first version released, reflecting promotion of MYDOS as the next logical follow-up to Atari DOS 2.0.
- Originally a side project that was created while developing the original firmware for Percom disk drives for the Atari.
- Highly configurable: Full support for floppy disk drives supporting the Percom Configuration Block.
- Menu driven, modeled after Atari DOS 2.
- First DOS for the Atari to allow for dynamic density changes (Percom compatible disk drives).
- First DOS for the Atari to support larger capacity diskettes even in a single drive configuration (Percom compatible disk drives).
- Consists of DOS.SYS and DUP.SYS (as in Atari DOS 2).
- MEM.SAV file can be employed to preserve the contents of memory to disk when DUP.SYS is loaded (as in Atari DOS 2).
- Disk drive types supported:
  1. Atari 810 (& compatible)
  2. SSDD 5.25" Single-Sided, Double Density (Percom compatible)
  3. Atari 1050 (& compatible) (MYDOS 4.x versions)
  4. Configurable (Percom compatible)
     - Floppy disk drives including double-sided, 8", and 80 track disks
     - High-capacity drives (hard disks) (MYDOS 4.x versions)
  5. RAM drive (MYDOS 4.x versions)
     - Up to 1 MiB, using either Port B banked memory or Axlon banked memory
       Default: 64 KiB for 130XE banked memory
- Disk allocation/filesystem: "MYDOS" (Atari DOS 2.0 with extensions)
  - Single or Double Density: 128 or 256 total bytes/sector, with 3 bytes of each sector used to address the next sector.
  - All high-capacity disks are large sector drives (256 bytes/sector)
  - Disk contains sectors numbered
    - 1 to 720 (810 or SSDD Percom drive types - Atari DOS 2.0 compatible)
    - 1 to 1,040 (1050 drive type)
    - 1 to up to 4,015 (configurable floppy drives)
    - 1 to up to 65,535 (high capacity drives, i.e. hard disks) (MYDOS 4.x)
  - Special sectors:

Sector #	Description
1-3	Boot sectors, containing the boot record accessed by the Atari OS at system power-up. 128 bytes/sector.
...360	Volume Table of Contents (sector usage). Uses only sector 360 in Atari DOS 2 compatible mode (810 or SSDD Percom drive types), or expands to previous contiguous sectors as necessary.
361-368	File Directory (up to 64 files/subdirectories) - MYDOS versions after 3.08/3.12 include support for subdirectories, each containing up to 64 files/subdirectories
720	Sector available for use with 810 and SSDD Percom drive types (unlike Atari DOS 2.0)

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- Data capacity per diskette for standard drive types:

810:	708	sectors x	125	bytes/sector =	88,500	bytes/disk
SSDD Percom:	708	sectors x	253	bytes/sector =	179,124	bytes/disk
1050:	1027	sectors x	125	bytes/sector =	128,375	bytes/disk
130XE RAM:	499	sectors x	125	bytes/sector =	62,375	bytes/disk

- Versions 3.x sold commercially by SWP for use with the ATR8000:
  - 3.0x versions are the standard releases
  - 3.1x versions have an integrated R: handler for the ATR8000 serial port
  - Sold by SWP in disk-side or system disk builder pairs. Known version-pairs include: 3.08/3.12, 3.09/3.13, 3.011/3.16, 3.013/3.18, 3.014/3.19
  - 3.2x versions were developed for use with the never-shipped SWP ATR8500
- ROMDOS 3.0 / RDOS 3.0 variants of MYDOS 3.0x
  - Versions: 0.0, 0.1 (1984), 0.11, 0.12, 0.14
    RDOS/OSS(0.0) copyright 1984, WORDMARK
    RDOS/RAM(0.1) copyright 1984,WORDMARK
  - The ROM version of RDOS could be programmed in an EPROM and run from the memory at 49,152-53,247 ($C000-$CFFF) (i.e., Newell Ramrod personality board or CDY Omnimon! board) with or without a disk drive on the system
  - The OSS SuperCartridge version provided most of the same features as the ROM version (taking only 400 bytes of the 48K memory space over that taken by the disk buffers allocated)
  - The third version was loaded into low RAM in the normal location at $0700 but it shared the same boot sectors as the ROM version and the under-the-cartridge version, permitting a disk to be built that would run it if no $C000 ROM were present and no OSS SuperCartridge were present either
  - Version 1.4 added the ability to run under the XL/XE built-in BASIC
  - https://www.mathyvannisselroy.nl/marslett1.htm
- OMNIDOS is Wordmark ROMDOS/RDOS and CDY Omniview on one 8 KiB chip for Newell Ramrod personality board or CDY Omnimon! board
- MYDOS 3.016 shipped with: Astra "Big D" (earlier units)
- Versions 4.x have full read compatibility with the Atari DOS 2.5 format, but will only write to the first 720 sectors of the disk.
- Versions 4.x shipped with RS-232 driver for the ATR8000
- MYDOS 4.x shipped with: SupraDrive, BTL Hard Disk System, TOMS 720 (on ROM), Newell 256KXL
- Version 4.3 adds 'S' command to set the RAM drive number and adds 'V' to turn on and off write-verify.
- Versions 4.5x include:

Program	Description
ATARI850.AUT	for loading the R: handler from the 850 Interface ROM
ATR232.AUT	RS-232 driver for the ATR8000
ATR232HD.AUT	RS-232 driver for ATR8000 with ATR hard disk interface

- Bob Puff/Computer Software Services offers version 4.50 (first freeware release): http://www.nleaudio.com/css/files/MYDOS45M.ARC
- MYDOS 4.50T is TOMS version for running from ROM, offered on the TOMS TurboDOS 2001 cartridge, and on ROM in TOMS 720 and TOMS 360 disk drives
- Charles W. Marslett/Wordmark Systems makes version 4.51 source code available: http://www.wordmark.org/mydos.html

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- MyDOS 4.53 was released by **David R. Eichel** on 1/1/90, making minor changes from the released 4.50 and 4.51 source code.
  - Supports multiple AUTORUNs at boot up (*.AR0 through *.AR9). (Support for the traditional AUTORUN.SYS is removed.)
  - Fixes broken Axlon banked memory RAM drive support
  - Version 4.53/3 gives 3-character file length/free sector count instead of the normal (for MyDOS) 4.
  - Version 4.53/4 is the same as 4.53/3, but uses a minimum of four characters in the sector count just like most versions of MyDOS.
- More recent work on MyDOS by **Lee Barnes** is available, along with many earlier MYDOS versions, from Mathy van Nisselroy's MyDOS page:
  https://www.mathyvannisselroy.nl/mydos.htm

7.3.3.5) DOS-MOD

Release history:
- DOS-MOD (1983)
- TOP-DOS Version 1.0 (March 1984)
- © 1984 **R.K. Bennett** TOP-DOS v1.1
- © 1984 **R.K. Bennett** TOP-DOS v1.20
- TOP-DOS 1.3 (1984)
- TOP-DOS 1.4 (1984)
- TOP-DOS 1.5 © 1985 **R.K. Bennett**
- TOP-DOS 1.5a © 1985 **R.K. Bennett**
- TOP DOS 1.5 Plus (1986)
- TOP DOS Professional (1986)

Features:
- Developed by **R.K. Bennett** for Sunny Software / Eclipse Software
- Sold commercially by Sunny Software (original DOS-MOD release) or Eclipse Software (later DOS-MOD release and all releases of TOP-DOS)
- DOS-MOD: Enhances Atari DOS 2.0S
  - Menu-driven, Full screen use
  - Command files
  - Expanded wildcard capability
  - Fixes 11 bugs in DOS 2.0S
  - Single and Double Density versions for:
    1. Atari 810 (& compatible)
    2. SSDD 5.25" Single-Sided, Double Density (Percom compatible)
  - Disk allocation/filesystems:
    1. Atari DOS 2.0 Single Density
    2. Atari DOS 2.0 Double Density
  - DD version supports HELLO command file option on startup
  - DD version supports cartridge-bypass feature on startup
  - DD version can also run in the SD mode

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- TOP-DOS: Standalone product, includes all the features of DOS-MOD
  - Drive support: works with single density (SD 810 compatible), double density (DD Percom compatible) and double-sided double density (DS/DD Percom compatible) drives. Supports 8" floppy disk drives.
  - Disk allocation/filesystems:
    1. Atari DOS 2.0 Single Density
    2. Atari DOS 2.0 Double Density
    3. "TOP-DOS Single Density"
       Maximum 720 sectors for 5.25" disks, or 944 sectors for 8" disks
    4. "TOP-DOS Double Density"
       Maximum 720 sectors for 5.25" disks or 944 sectors for 8" disks
    5. "TOP-DOS Double-Sided Double Density" (360 KiB DS/DD / "Quad" Density)
       Maximum 1,440 sectors for 5.25" disks or 1,968 sectors for 8" disks
  - TOP-DOS -type disk allows TOP-DOS to alphabetize and compress the File Directory, to handle double-sided double density drives, and to access up to 1,968 sectors on 8" double density drives
  - 1 to 8 disk drives
  - Reformat only the VTOC, on a previously formatted disk
  - RAM drive support: Axlon or Mosaic banked memory
- Version 1.4 was a bug-fix release with no new features
- TOP-DOS 1.5:
  - RAM drive support: Port B banked memory, Axlon, Mosaic
  - 1050 Enhanced Density Support
  - "WISE" Density Control
  - High Speed Data Transfer (Happy Warp Speed)
  - Improved Status Display
  - Hex-Decimal Conversion
  - 90 KiB buffer for one-pass disk duplication
  - Four-level command file nesting
  - Ad: Antic vol. 4 no. 9 Jan-1986 page 44
  - Shipped with: Astra "Big D" (later units), Astra The "One"
  - Also distributed by Happy Computers, Inc., 1986- for use with Happy 810 Enhancement (Rev 7 capable units) or Happy 1050 Enhancement
- TOP DOS 1.5 Plus:
  - Allows multiple RAM drives, SD or DD
  - Accesses Atari DOS 2.5 files
  - New sector number display and tone control
  - Better warp speed and group autorun control
  - BASIC enable/disable for XE/XL with built-in BASIC
- TOP DOS Professional:
  - Up to 16MB disk capacity
  - Sub-directories
  - Sector read, write & compare
  - File compare
- 1.5 Plus / Professional ad: Antic vol. 5 no. 2 Jun-1986 page 27
- Apparently released into the public domain, approximately 2005

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7.3.3.6) DOS 4.0

DOS 4.0 (Copyright 1984 Mike Barall (Michael Barall), released to the PD via Antic in 1986)

- Developed by programmer Mike Barall (Michael Barall) for Atari as QDOS, 1983-1984.
- Existed as early as July 1983. (source code)
- After the release version of Atari DOS 3 was finalized, QDOS was planned for release as Atari DOS 4.
- Rights to QDOS reverted to Mike Barall (Michael Barall) upon the July 1984 sale of Atari assets by Warner Communications.
- Mike Barall (Michael Barall) continued development of QDOS for Atari, Corp. into fall 1984, before Atari ultimately declined to acquire the software
- Released by Mike Barall (Michael Barall) into the public domain as DOS 4.0 through the Antic Catalog, first appearing in the February 1986 issue of Antic magazine.
- Supports 8 physical drives (1-8), and 10 logical drives (D0: - D9:)
- Supports serial bus (SIO) and 1450XLD parallel bus (PBI) Integral Disk Drives.
- Data on the disk is physically organized into sectors:

```
          SD disks:   sector = 128 bytes
   2D or DD disks:   sector = 256 bytes
```

- Data on the disk is logically organized into blocks:

```
                SD disks:     6 sectors/block, or     768   bytes/block
  SS/2D or SS/DD disks:     3 sectors/block, or     768   bytes/block
                DS/DD disks:   12 sectors/block, or   3,072   bytes/block
```

- Five disk drive types supported:
  1. SS/SD 810: 708 sectors

```
     708 sectors / 6 sectors/block =        118   blocks
   118 blocks * 768 bytes/block =       90,624   bytes
```

  2. SS/2D 1050: 513 sectors

```
     513 sectors / 3 sectors/block =        171   blocks
   171 blocks * 768 bytes/block =      131,328   bytes
```

  3. SS/SD Percom (1450XLD: "large" mode): 708 sectors

```
     708 sectors / 6 sectors/block =        118   blocks
   118 blocks * 768 bytes/block =       90,624   bytes
```

  4. SS/DD Percom (1450XLD: "large" mode): 711 sectors

```
     711 sectors / 3 sectors/block =        237   blocks
   237 blocks * 768 bytes/block =      182,016   bytes
```

  5. DS/DD Percom (1450XLD: "large" mode): 708 sectors

```
     708 sectors / 6 sectors/block =        118   blocks
  118 blocks * 3,072 bytes/block =      362,496   bytes
```

- Advanced users can create additional drive types
- Allocation of blocks is controlled by the contents of a sector called the Volume Table of Contents (VTOC). (A large VTOC may occupy two sectors.)
- File directory cannot contain more than 128 entries
- Filesystem could support disks up to 384 KiB (Konrad M. Kokoszkiewicz, AtariAge Forums 2010-07-21)
- DOS 2 to DOS 4 Conversion Program
- DOS 3 to DOS 4 Conversion Program

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7.3.3.7) SmartDOS

Release history:
- SmartDOS Beta Test Version 1.5R © 1984 John Chenoweth & Ron Bieber
- SmartDOS © 1984 John Chenoweth & Ron Bieber distributed by Rana Systems 6.1D
- SmartDOS © 1984 John Chenoweth & Ron Bieber for The Programmer's Workshop 8.2D (affiliate of Astra Systems)

Features:
- Earlier versions were distributed as a utility to modify Atari DOS 2.0S
- Disk drive types supported:
  1. Atari 810 (& compatible)
  2. SSDD 5.25" Single-Sided, Double Density (Percom compatible)
- Disk allocation/filesystems:
  1. Atari DOS 2.0 Single Density
  2. Atari DOS 2.0 Double Density
- First Atari DOS to be "Density Smart" (changing between the disk drive's density settings dynamically, in accordance with the format density of the inserted media, without user-intervention)
- Menu additions that allow sector copying, drive speed checking, bad sector testing, write verify on/off, and drive reconfiguration
- Original Master diskette, shipped with earlier SmartDOS versions, contains: DOS.SYS, DUP.SYS, DEFAULT, ARCREATE.BAS, RS232.ARx, AUTORUN.SYS
  - DOS.SYS is Atari DOS 2.0S version under license from Atari.
  - Disk is used only to create a Working Master diskette.
- Working Master diskette, created using the AUTORUN.SYS file on the Original Master diskette, or shipped with later SmartDOS versions, contains: DOS.SYS, DUP.SYS, DEFAULT, ARCREATE.BAS, RS232.ARx
  - DOS.SYS is proprietary SmartDOS version.
- ARCREATE.BAS is used to create a file that will autorun a BASIC file upon system boot.
- Multiple autoload file support, for files named *.AR1 through *.AR9
- RS232.ARx loads the R: handler from the 850 Interface ROM.
  - Should be renamed RS232.AR1 to be autorun by SmartDOS
  - Supports both warm and cold re-boots of the system
- Shipped with: Rana 1000, Astra 1620 (later units), Astra 2001, Astra 1001

7.3.3.8) MachDOS

Release history:
- Mach DOS v2.1 XL © 1984 stace
- Mach DOS v2.6 XL © 1984 stace
- MachDOS v3.7a © 1985 stace

Features:
- By Hadley V. Stacey
- Pre-release name: MACH 2XH DOS
- Early versions supplied with the NCT 810 Turbo (1984 units); later released directly into the public domain

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- Disk drive types supported:
  1. Atari 810 (& compatible)
  2. SSDD 5.25" Single-Sided, Double Density (Percom compatible)
  3. DSDD 5.25" Double-Sided, Double Density (Percom compatible)
- Disk allocation/filesystems:
  1. Atari DOS 2.0 Single Density
  2. Atari DOS 2.0 Double Density
  3. Double-Sided, Double Density
     - 1,427 free sectors (360 KiB)
     - Compatibility with other Atari DOS 2 based DS/DD formats UNCONFIRMED, DETAILS WANTED
  4. RAM drive for banked memory. (MachDOS v3.7a) Types supported: 130XE (Port B), Axlon, Mosaic, Intec, 800+ (800 Plus 256K), M.A.C.E. ("MACE Mod")
- Intelligent detection and support for double density and double-sided disks
- v.3.7a RAM drive for banked memory. Types supported: Port B, Axlon, Mosaic, Intec boards as well as the 800+ and MACE modifications
- Mach File disk image files
- [SELECT] key toggles menu on-screen
- There is no DOS.SYS or DUP.SYS files. The only file is MACH.SYS.
- MEM.SAV workalike is named: MEMSAV.SYS
- AUTORUN.SYS files are processed just like Atari DOS 2.0.

7.3.3.9) SpartaDOS

Release history:
- SpartaDOS Version 1.1 Copyright © 1984 by ICD, INC.
- SpartaDOS Version 2.3b D Copyright © 1985 by ICD, INC.
- SpartaDOS Version 2.3b C Copyright © 1985 by ICD, INC.
- SpartaDOS Ver 2.3e 1-Nov-85 D Copyright © 1985 by ICD, INC.
- SpartaDOS Ver 2.3e 1-Nov-85 C Copyright © 1985 by ICD, INC.
- SpartaDOS Ver 3.2c 30-Jan-86 Copyright © 1986 by ICD, Inc.
- SpartaDOS Ver 3.2d 17-Feb-86 Copyright © 1986 by ICD, Inc.
- SpartaDOS Ver 3.2f 25-Feb-94 Copyright © 1994 by FTe
- SpartaDOS Ver 3.2g 04-Jun-94 Copyright © 1994 by FTe
- SpartaDOS Ver 3.2gx 04-Jun-94 Copyright © 1994 by FTe

Features:
- Originally developed by **Mike Gustafson** of Spartan Software of Minnesota/ICD, and shipped alongside US Doubler as ICD's first two products in 1984.
- Version 1.1:
  - Supports 5.25" and 8" floppy disk drives, single- or double-sided, single, enhanced, or double density (35, 40, 77, or 80 tracks)
  - Supports 4 disk drives
  - SPCOPY command for single or dual drive transfers between SpartaDOS and/or Atari DOS 2 compatible formats
  - AT_RS232 R: handler for ATR8000

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- Disk allocation/filesystem: SpartaDOS File System (SDFS) version 1.1
  - 128 or 256 bytes/sector
  - Four sector types:
    1. Disk descriptor - Sector 1. Among other data, includes indicator of the number of (consecutive) sectors in the main DOS boot.
    2. Bit map. One or more sectors together containing a list of bits corresponding to all sectors on the disk, indicating whether each sector is currently in use.
    3. Sector map. Lists of sector numbers of the data sectors used by a particular file or directory
    4. Data sectors. One of:
       (i) Directory data. The directory is a special file that contains entries about each file and each subdirectory it contains, including: filename, time/date, length, first sector map number, and status. The first entry in the directory contains: the first sector map of the parent director, the length of the directory, and the directory name.
       (ii) File/User data
  - Up to 128 files per directory/subdirectory
  - Time/date stamping
  - Disks have volume names. Every disk must have a unique name.
  - Up to 16 MiB per drive
- RAM drive support:
  - RDAXLON.COM, supplied with SpartaDOS 2.3, sets up a 112 KiB Axlon banked memory RAM drive

- Several flavors of Version 1.1:
  - STD_HS.DOS (original name) or SPEED.DOS (later name)
    - Full version including UltraSpeed support
  - STD.DOS (original name) or STANDARD.DOS (later name)
    - Full version except without UltraSpeed support
  - RO_HS.DOS (original name) or NOWRITE.DOS (later name)
    - Miniature version; can only read from disk; UltraSpeed supported
  - RO.DOS (early distribution only)
    - Miniature version; can only read from disk; no UltraSpeed support
  - NOCP.DOS (later distribution(s) only)
    - No command processor (but can both read/write); UltraSpeed supported
    - Tries to load an AUTORUN.SYS file before it passes control onto the cartridge
- Changes for Version 2.3, packaged as the SpartaDOS Construction Set, which was supplied with many ICD US Doubler units and also sold separately:
  - Requires a 64 KiB XL/XE
  - An enhanced Atari DOS 2 handler: Can read, write, and run Atari DOS 2 formatted diskettes in both single and double density
  - Supports 8 disk drives
  - UltraSpeed High Speed built in
  - 14 new internal command processor commands
  - 8 new XIO functions
  - Extra 4 KiB program area
  - RAM drives:
    - RDBASIC.COM sets up an 8 KiB RAM drive on any XL/XE computer
    - RD130.COM sets up a 64 KiB RAM drive for 130XE banked memory

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  - Disk allocation/filesystem: SpartaDOS File System (SDFS) version 2.0. Relative to SDFS 1.1:
    - The first three sectors on the disk are boot sectors. They contain the program that loads in the DOS, links it into the system, and enters the command processor. Sector 1 also contains the disk descriptor data as in SDFS 1.1.
      (i) Only the first 128 bytes of each boot sector are used (same whether the disk is formatted in 128 or 256 bytes/sector)
    - Sector 1 disk descriptor data additions:
      (i) Volume sequence number (avoid problems with non-unique volume names)
      (ii) Volume random number (avoid problems with non-unique volume names)
      (iii) Sector number of the first sector map of the file to be loaded when the disk is booted (usually a DOS file)
      (iv) Write lock flag
    - Sector 1 disk descriptor data no longer used:
      (i) Number of buffers reserved for sector storage
      (ii) Number of sectors in the main DOS boot
- Two flavors of 2.3 (2.3b, 2.3e) versions:
  - XD type (XD23B.DOS or XD23E.DOS) is the full powered DOS; recognizes the STARTUP.BAT file when booted and priority is given to DOS (rather than the cartridge).
  - XC version (XC23B.DOS or XC23E.DOS) is the same as XD versions except AUTORUN.SYS is recognized when booted and control priority is given to the cartridge.
- Changes for Version 3.2, which was supplied with the ICD R-Time 8 and also packaged as the SpartaDOS Construction Set, which was supplied with many ICD US Doubler units and also sold separately:
  - Better time and date support (internal TD, TIME, DATE commands)
  - Internal R-Time 8 interface
  - Internal JIFFY clock interface (for non-R-Time 8 users)
  - Internal 32 character keyboard buffer (and KEY command)
  - Automatic mini-buffer system for fast byte PUT and GET functions
  - New vectors added for machine language support
  - Control returned to DOS if DOS was active during RESET
  - Supports both a STARTUP.BAT and an AUTORUN.SYS file
  - Compatible with BASIC XE, 1200XLs and many modified Operating Systems
  - BASIC ON/OFF command operation from within a batch file (not end only)
  - NOISY I/O flag recognized
  - Support for the Supra Hard Disk Interface
  - All command entry in upper or lower case
  - Full read capability for Atari DOS 2.5 type enhanced density format
  - New RAM drives:
    - RD.COM supports the standard 130XE, the 130XE with 64 KiB RAM upgrade (from Ron Boling) and the 256 KiB RAMBO XL upgrade for the 800XL and 1200XL computers. With the RAMBO XL, gives a 192 KiB RAM drive.
    - RD260.COM supports the 800XL RAM upgrade to 256 KiB as published in the September 1985 BYTE magazine by **Claus Buchholz**, giving a 192 KiB RAM drive.

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- Several notable patches to SpartaDOS 3.2d have been developed, such as:
  - **Bob Woolley** created a patch utility program that will modify SpartaDOS 3.2d to support the XF551's high speed I/O
  - "SpartaDOS 3.2z" was the result of a patch developed and distributed by Computer Software Services (CSS, **Bob Puff**) for SpartaDOS 3.2d to allow SpartaDOS to support the CSS Multiplexer (MUX). See: http://nleaudio.com/css/products/Mux_docs.htm
- Rights purchased from ICD by Fine Tooned Engineering (FTe, **Mike Hohman**) in 1993 (November?).
- FTe SpartaDOS 3.2g changes included:
  - Support for a ninth drive, D9:
  - D: means current working drive, instead of D1:
  - Full support for upper/lower case
  - CWD, CREDIR, DELDIR commands changed to CD, MD, RD
  - TDLINE Y2K bug fixed
  - 1200XL function keys work properly
  - SpartaDOS 3.2gx differs only in that it locates the disk buffers under the OS to save RAM. 3.2gx is intended for use in systems that include a parallel device (MIO, Black Box); it is not compatible with BASIC XE nor any other programs using RAM under the OS.
- Many disk-based SpartaDOS versions are available for download from Thunderdome, kept by SysOp Fox-1: http://mixinc.net/atari/a8men.htm
  Direct link: http://mixinc.net/atari/download_a8/sdsys.htm#top

7.3.2.10) XDOS

Release history:

- Happy-Computer DOS II+/D V:4.5M Copyright 1985 by **Stefan Dorndorf**
- DOS II+/D - Version 6.1 Copyright 1987 by **Stefan Dorndorf**
- DOS II+/D - Version 6.4 © '87 by S.D.
- XDOS 2.3 (p) 1990 **Stefan Dorndorf**
- XDOS 2.43 © 2009 by **Stefan Dorndorf**

Features:

- Early versions commonly known as "Happy-DOS"
- First published in issue 3/1986 of Happy Computer magazine
- "Extended Disk Operating System"
- A compact yet more capable alternative to Atari DOS 2.5
- Version 2.3 added DOS 2.5/MYDOS enhanced density compatibility
- Version 2.4 two versions:
  1. XDOS 2.4N supports all standard Atari drives (810, 1050, XF551), and supports XF551 and Hyper-XF Hyper Speed high speed input/output.
  2. XDOS 2.4F adds high speed input/output with: SIO2USB, SIO2SD, Speedy 1050, Happy 1050, 1050 Turbo

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- Disk utilization / filesystems (Version 2.4):
  1. DOS 1 (not append)
  2. DOS 2.0
  3. DOS 2.5
  4. DOS 2.2/2.3 (931 sectors format)
  5. DOS XL
  6. (Happy) DOS II + / D (All versions)
  7. Bibo-DOS (except 360 KiB format)
  8. Turbo-DOS (except 360 KiB format)
  9. MyDOS (except sub-directories, disks with more than 1040 sectors, and append to MyDOS files)
- RAM drive for RAM under XL OS ROM (14 KiB) or for Port B banked memory (64 KiB-256 KiB). Explicitly supported: Atari 130XE, **Claus Buchholz**/ABBUC, ATARI-Mag/Rambo, Compy-Shop/Megaram
- Command driven
- Can use batch files
- D: Disk File Manager supports D1: through D9:
- H: device of Atari800Win emulator is supported
- Available: http://std.gmxhome.de/atari/system.atr
- Documentation: http://std.gmxhome.de/atari/xdos24.pdf

7.3.3.11) SuperDOS

Release history:
- SuperDOS V2.9 © 1986 **Paul Nicholls**
- SuperDOS V2.E © 1986 **Paul Nicholls** (unofficial)
- SuperDOS V4.3 © 1986 **Paul Nicholls**
- SuperDOS V4.3E © 1986 **Paul Nicholls** (unofficial)
- SuperDOS V4.3T © 1986 **Paul Nicholls** (unofficial)
- SuperDOS 3.7T j_b™ 1987 © **Paul Nicholls** (unofficial)
- SuperDOS V4.4 © 1988 **Paul Nicholls** (unofficial)
- SuperDOS V5.0 © 1988 **Paul Nicholls**
- SuperDOS V5.1 © 1988 **Paul Nicholls**
- SuperDOS V5.2 © 1988 **Paul Nicholls**
- SUPERDOS V5.2 © 2012 James Bradford

Features:
- Developed by **Paul Nicholls** for Super Products (Australia), Happy Computers (USA), Technical Support (USA), Antic Arcade Catalog (USA)
- Disk drive types supported:
  1. Atari 810 (& compatible)
  2. Atari 1050 (& compatible)
  3. SSDD 5.25" Single-Sided, Double Density (Percom compatible)
  4. SuperMax high speed (versions 4.x and up)
  5. XF551 high speed (versions 5.x)
  6. US Doubler UltraSpeed (versions 5.x)

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- Disk allocation/filesystems:
  1. Atari DOS 2.0 Single Density
  2. Atari DOS 2.0 Double Density
  3. Atari DOS 2.5
     - Can use sector 720.
       Data capacity per diskette: 1,011 sectors x 125 bytes/sector = 126,375 bytes/disk
  4. "SuperDOS DS/DD" (360 KiB) (versions 5.x)
     - 253 data bytes/sector
     - Disk contains sectors numbered 1 to 1,440
     - 14 Special sectors:

1-3	Boot sectors, containing the boot record accessed by the Atari OS at system power-up. 128 bytes/sector
360	Volume Table of Contents (VTOC) side 1 (sector usage)
361-368	File Directory (up to 64 files/subdirectories)
1,024	VTOC sides 1 & 2
1,040	Unused

     - Data capacity per diskette: 1,426 sectors x 253 bytes/sector = 360,778 bytes/disk
- Menu driven. Density-smart: Automatic density detection.
- Fully RAM-resident. Highly configurable.
- Supports four floppy disk drives and assumes that any drive reference above 4 is a RAM drive.
- RAM drive support is provided for Axlon banked memory (128 KiB or 256 KiB) or Port B banked memory (256 KiB or 320 KiB).
- V5.0 changes:
  1. Full support for the Atari XF551 Floppy Disk Drive, including Double-sided/Double density and high speed transfer.
  2. Complete XF551 compatibility with previous disk drives. Double density drives can read files on Double-sided disks (just as Single density drives can read Enhanced density disks).
  3. High speed transfer and skewed sectors for US Doubler, XF551, and SuperMax.
  4. Full sector count displayed, no more 999+.
  5. Full support for Newell 256 KiB memory upgrade for 800XL.
  6. Hold down [Esc] during boot up to reserve the 130XE memory banks for your program. 256 KiB and 320 KiB computers can use BASIC XE and a RAM drive.
  7. Bug in RAM drive reboot ("coldstart") routine fixed.
  8. The right margin is no longer set to 37.
- Rights and source code purchased by James Bradford (1994?)
- V5.2 (2012) changes:
  - Modded slightly to increase the RAM drive speed
  - Disabled the Axlon banked memory RAM drive support
  - Available:
    http://www.atariage.com/forums/topic/197622-superdos-ramdisk-speed/
- Collection of official versions:
  https://forums.atariage.com/topic/354163-superdos-offical-versions/

7.3.3.12) Bibo-DOS

Release history:

- Bibo-DOS V 5.1N (p) **Erwin Reuss** © 1987 COMPY SHOP
- Bibo-DOS V 5.2F (p) **Erwin Reuss** © 07/1987 Compy-Shop

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- Bibo-DOS 5.4RF (p) **Erwin Reuss** © 06/1988 Compy-Shop
- Bibo-DOS 6.4RF (p) **Erwin Reuss** © 06/1988 Compy-Shop
- Bibo-DOS 5.4AN Turbo-BASIC-Version/R-Disk Jan/89
- Bibo-DOS 7.0 (p) **Erwin Reuss** © 1990 by J.Kruszona

Features:
- XL/XE only
- Densities supported: single, medium, double
- Disk allocation/filesystems:
  1. Atari DOS 2.0 Single Density
  2. Atari DOS 2.5 Enhanced Density ("Medium Density")
  3. Atari DOS 2.0 Double Density
  4. (Versions 6.x only)
     "Bibo-DOS Quad Density" (MYDOS DS/DD 360 KiB format compatible)
     - 256 total bytes/sector, with 3 bytes of each sector used to address the next sector
     - 80 tracks x 18 sectors/track = 1,440 total sectors, with 13 sectors used for software control or unused by the FMS
     - Data capacity per diskette: 1,427 sectors x 253 bytes/sector = 361,031 bytes/disk
  - Extension to above standards: Long/large directories (128 files per disk)
- Maximum 64 files/disk, except quad density supports 128 files/disk
- N versions without high-speed support
- F versions support high speed with the Speedy 1050 and Happy
- R versions support 64 KiB, 128 KiB, or 256 KiB RAM drive for Port B banked memory.
  - 130XE and Compy-Shop memory upgrade types supported by default; can also be customized to support other memory upgrade types

7.3.3.13) Turbo-DOS XL/XE

Release history:
- Turbo-DOS XL/XE 1.5 (1988 February)
- Turbo-DOS XL/XE 1.7 (1988 August)
- Turbo-DOS XL/XE 2.0 (1989)
- Turbo-DOS XL/XE 2.1 (1990)
- Disk Operating System II Vers. XLE (P) 1990 Atari (Germany) ("DOS XLE")

Features:
- Developed by Herbert Barth and Frank Bruchhaeuser
  for Martin Reitershan Computertechnik
- All versions: Atari DOS 2.5 source code used by permission from Atari for portions of DOS.SYS file
- "DOS XLE" is a version of Turbo-DOS XL/XE Version 2.1 supplied with an Atari DOS 2.5 style menu interface. Intended for distribution by Atari Computer GmbH in Germany, as a replacement for Atari DOS XE.
  - Known during development as: XF-DOS

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Version 2.1 features:

- Master-Disk produces 4 different versions:
  1. Normal Version for 810, 1050, or 1050 Turbo
  2. HS: Version for Happy 1050 or Speedy 1050
  3. XF: Version for XF551 high speed
  4. EX: Full version (features of all other versions)
- Disk allocation/filesystems:
  1. Atari DOS 2.0 Single Density
  2. Atari DOS 2.5 Enhanced Density ("Medium Density")
  3. Atari DOS 2.0 Double Density
  4. "Turbo-DOS Quad Density" (360 KiB DSDD)
     - 256 total bytes/sector, with 4 bytes of each sector used to address the next sector.
     - 80 tracks * 18 sectors/track = 1,440 total sectors, with 13 sectors used for software control or unused by the FMS.
     - Data capacity per diskette: 1,427 sectors x 252 bytes/sector = 359,604 bytes/disk
- DOS Converter utility supports access to files, up to 315 sectors long, on disks in the following formats:
  - DOS 2.0S & compatible
  - DOS 2.5 all formats
  - Turbo-DOS XL/XE all formats
  - DOS 3 all formats
  - DOS 4 Single & Enhanced Density
  - DOS 4 Double Density (single sided)
- BIBOEIN.COM utility supports access to files on disks in the Bibo-DOS Quad Density (MYDOS DS/DD 360 KiB compatible) format
- Maximum 64 files/disk, except quad density supports 128 files/disk
- Supports 16 KiB RAM drive on XL/XE with 64 KiB RAM total
- 64 KiB, 128 KiB, or 256 KiB RAM drive for Port B banked memory
- 256 KiB RAM drive for IRATA or ICD Multi-I/O RAM
- Toggle up to four 256 KiB RAM drives for support of up to 1 MiB total system RAM

7.3.3.14) BW-DOS

Release history:

- BW-DOS Ver. 1.00 © BEWESOFT 1994
- BW-DOS Ver. 1.10 © BEWESOFT / ABBUC 1994
- BW-DOS Ver. 1.30 © BEWESOFT 1995
- BW-DOS TC 1.31b BEWESOFT & HJX 2020
- BW-DOS 1.31b BEWESOFT & HJX 2021
- BW-DOS 1.31 BEWESOFT, HJX 24-04-2021
- BW-DOS 1.31 BEWESOFT 18-12-202
- BW-DOS 1.4 BEWESOFT 29-09-2022

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Features:

- Versions 1.00-1.30 by **Jiri Bernasek**; Versions 1.31 and 1.4 by **Holger Janz**
- Disk allocation/filesystem: SpartaDOS File System (SDFS) version 2.0
- Directories may contain up to 1,424 files or directories
- Only SpartaDOS X (version 4.x) is able to use BW-DOS directories in full – other versions will work only with the first 126 files (the rest will be invisible)
- Designed to be compatible with SpartaDOS, and to use as little memory as possible
- Any disk with capacity up to 16 MiB is possible
- Single file may up to 8 MiB long
- Up to 5 files may be open at the same time
- Five disk drives are supported (1, 2, 3, 4 and 8)
- On XL/XE: Does not use the RAM under OS ROM
- 130XE RAM drive - up to 1 MiB
- XL RAM drive - 14 KiB (RAM under OS ROM)
- Menu program also supports the disk allocation/filesystems:
  1. Atari DOS 2.0 Single Density
  2. Atari DOS 2.0 Double Density
  3. Atari DOS 2.5
- XF551 high speed
- Micro-SpartaDOS 2.3 included
- Version 1.00 (June 16, 1994) is the "basic version"
  - For computers with at least 48 KiB RAM
- Version 1.10 (July 14, 1994) is identical to Version 1.00 except for the message after boot
- Update #1 (April 1995; for BW-DOS 1.00 or 1.10)
  - "Thanks to Erhard Puetz"
  - New versions of: MENU, RAMDISK, DIRMAST
  - New commands: MOVE, RTIME8, ARGSRTC
    - Support for ICD R-Time 8 and ARGS RTC/P V2 clock cartridges
  - New driver: ARGSPRN
    - Support for the printer port of the ARGS RTC/P V2 cartridge
  - New program: BWDFUNCT.BAS
- Version 1.20 (May 1995) - not released
- Version 1.21 (July 1995) - not released
- Version 1.30 / Update #2 (December 17, 1995):
  - "Thanks to Erhard Puetz and Olda Rezler"
  - Reading the last byte of a file is now indicated by status 3
  - Installation of new "E:" drivers is now allowed
  - The command "TYPE" is no longer limited to 64 characters per line
  - The method of handling the allocation pointers (positions 18 and 20 in sector 1) was changed. The new method provides much better protection of the directory-area on disk, and so the directories are not mixed between data sectors as often as under older BW-DOS versions or SpartaDOS. This results in faster access to directories. 100% read/write compatibility with every SpartaDOS versions 2.x and later retained
  - New versions of: BACKUP, COPY, UNERASE
  - New commands: DOSDRIVE, NEWED
    - NEWED requires BW-DOS 1.20 or later
  - New driver: RAMBOX (RAM drive for JRC RAMBOX cartridge, 32 KiB – 4,096 KiB)

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- Versions 1.31 by **Holger Janz**, April 2021, three variations:
  - XBW131.DOS version 1.31
    - Version 1.31 always starts command processor after reboot. It does not automatically start an active cartridge after reboot. Use command CAR to run cartridge.
    - Command CWD is renamed CD
    - Command CREDIR is renamed MD
    - Command DELDIR is renamed RD
  - XBW131B.DOS version 1.31
    - Works with 16 KiB but cannot be started from other DOS
  - XBW131TC.DOS version 1.31
    - New driver: TCDRIVER
      For The!Cart using D1: for flash disk F1: and D8: for RAM drive
  - New external commands:
    TCAR, TCDRIVER, TCFORMAT, TCRESTOR, TCSETDRV, TCSTORE
- Version 1.31 by **Holger Janz**, December 2021
  Changes from version 1.30:
  - Needs only 16 KiB RAM
  - Always starts command processor at boot
    (does not automatically start an active cartridge)
  - Sets left margin to 0
  - Command CWD is renamed CD
  - Command CREDIR is renamed MD
  - Command DELDIR is renamed RD
  - New external commands: COLD, MEMCLEAR, MEMX, POKE, SECOPY
- Changes from Version 1.3 to 1.4 (by **Holger Janz**, September 2022)
  - Needs only 16 KiB RAM (full function with 48 KiB)
  - Always starts command processor at boot. It does not automatically start a cartridge. Use command CAR to run cartridge.
  - Sets left margin always to 0
  - Command CREDIR is renamed MD
  - Command CWD is renamed CD
  - Command DELDIR is renamed RD
  - Command ERASE is renamed DEL
  - Command PROTECT is renamed LOCK
  - Command RENAME is renamed REN
  - Command UNPROTECT is renamed UNLOCK
  - New internal command MAN
  - Additional commands and driver by FJC, ICD, and FTe
  - Absolute address COMTAB (see chapter Page 7 and COMTAB)

https://github.com/HolgerJanz/BW-DOS

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7.3.2.15) RealDOS

By Integrated Logic Systems (ILS, **Stephen J. Carden**), 2002-2013

- Disk utilization / filesystem: SpartaDOS File System (SDFS) version 2.0
- XL/XE with 64 KiB RAM required. Also designed to run on APE software and hardware, or with an emulator.
- RealDOS contains both the MUX- and non-MUX SIOV. This DOS will realize how it is being called and will load the proper SIOV handler for your needs. RealDOS will configure itself by detecting your hardware configuration.
- Fully supports: Black Box (all versions), ICD MIO, **Ken Jones** MIO, KPI interface, Supra Interface, IDEa, SIO2PC, APE Registered Version, SIO2SD, SIO2IDE, SIO2USB, S-Drive and The Multiplexer.
- RealDOS was also designed to work with the Atari800Win emulator.
- RealDOS does not support the cartridge version of the MyIDE product.
- RealDOS Ver 1.0a 4-Apr-2011 Copyright © 2011 by ILS, Inc. (Build 0030)
  Available: https://www.realdos.net/downloads.html
- RealDOS Ver 1.0a 5-May-2013 Copyright © 2013 by ILS, Inc. (Build 0031)
  Available: https://www.atariuser.com/downloads/atari-user-volume-2-issue-24/
- Information and downloads: http://www.realdos.net/

7.3.4) What are Micro-SpartaDOS, MyPicoDos, and LiteDOS?

A "miniature DOS" / "gameDOS" / "microDOS" is a DOS version that is designed to provide minimal capabilities. Typically, this type of DOS makes the disk bootable, and supports the launching of files on the disk. This section describes modern miniature DOS versions for the Atari.

7.3.4.1) Micro-SpartaDOS (Micro-SD or MSDOS), 1990-2010

Latest released version: Micro-SpartaDOS 4.6 (MSDOS46.OBX), 2010-09-07

- Disk allocation/filesystem:
  - SpartaDOS File System (SDFS) version 2.0
  - Maximum number of directories entries is only limited by available RAM

Versions by Jiri Bernasek (BEWESOFT):
Micro-SpartaDOS 1.0 - February 1990
Micro-SpartaDOS 1.1 - February 1992
Micro-SpartaDOS 2.0, 2.1 - March-April 1993
Micro-SpartaDOS 2.2 - May 3, 1993

- "Thanks to Erhard Puetz and M.G. & Megasoft"
- Version 2.2 supports also a high speed SIO for Speedy 1050, XF551 and the HDI

Micro-SpartaDOS 2.3 by BEWESOFT 1994

- Version supplied with BW-DOS versions 1.00, 1.10, 1.30

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Versions by Tomasz Pecko ('pecus') and Pawel Kalinowski ('pirx'):
Micro-SpartaDOS 2.3 modified, 2001
- Pecus modified version with multi disc operation
- Keys 1-8 - select working drive and read the main directory

Micro-SpartaDOS 3.0, 2005
- Supports multiple drives
- This version supports XF551 drives with HS, Happy Warp/US-Doubler drives with High Speed, and Speedy HS (only in US-Doubler mode)
- SIO2IDE interface support

Micro-SpartaDOS 3.3, 2007
- Improved operation with KMK IDE
- [SHIFT] permanently disconnects all accelerators during charging MSDOS (communication by standard procedures)
- [SHIFT] + [1-8 DIGIT] selects the drive and temporarily disables the accelerators for this drive (if they have not been turned off earlier)
- Optimized code

Micro-SpartaDOS 4.3, 2010-05-26
- Primarily by Pecus. It uses a novel approach to mapping index sectors
- Supports "quadruple" sectors (512 bytes long); expands the available partition size to 32 MiB
- Contains only the most popular Happy / UltraSpeed routines
- Holding [SHIFT] during booting turns off HS I/O entirely
- This version detects BASIC and QMEG. With QMEG the High Speed I/O is turned off as QMEG handles HS I/O by itself

Micro-SpartaDOS 4.5, 2010-06-12
- Several bug fixes
- Screen colors and TURBO mode configurable per directory
- Supports drives 1-15

Micro-SpartaDOS 4.6, 2010-09-07
- Color change - and a little faster due to fewer screen opens

Micro-SpartaDOS 4.7 (source code available)
- Move through successive "screens" with a list of files using the keys "right" / "left" or "up" / "down"
- Adds "Backspace" as return to directory above

Available: http://pecus.pigwa.net/pliki/Atari/
Sources: https://github.com/pkali/micro-sparta-dos

7.3.4.2) MyPicoDos

MyPicoDos 4.06 © 1992-2017 by Matthias Reichl
A "game-DOS" for DOS 2.x/MyDOS compatible disks with the following features:
- It supports loading of COM/EXE, BIN (boot image) and BAS files.
- It works with single and double density (hard-) disks from 720 up to 65,535 sectors.
- Drives D1: to D8: can be accessed.
- Disk allocation/filesystem: DOS 2.x/MYDOS compatible disks

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    - It supports MYDOS style subdirectories
    - It supports Bibo-DOS style long directories (128 files per disk)
- It supports XF551 format detection.
- Built-in high speed SIO code: compatible with UltraSpeed (Happy, Speedy, AtariSIO/SIO2PC/APE/...), Happy 810 Warp Speed, XF551 and Turbo 1050, up to 126 kbit/sec (Pokey divisor 0)
- It supports displaying long filenames and a disk/directory title.
- On XL/XE-type computers MyPicoDos can automatically switch BASIC on when loading a BASIC program, and switch BASIC off when loading a COM/EXE/BIN file.
- Joystick support: either use arrow keys or a joystick to select the file.
- Optional built-in atariserver (AtariSIO) remote console.
- Separate "barebone" version without high speed SIO support and remote console support (for those who want to save space)
- Separate boot-sector-only version "PicoBoot" supporting a single COM file on a disk
- Separate "SDrive" version which configures the SDrive to use 110 or 126 kbit/s transfer speed.
- Available: http://www.horus.com/~hias/atari/

7.3.4.3) LiteDOS by Mr.Atari (Sijmen Schouten), 2018-2022

- Previously known as TinyDOS
- Uses only 2 KiB RAM, leaving 4 KiB more free memory
  (XL/XE with 64 KiB: 8 KiB more when using Turbo-BASIC XL or U-BASIC)
- 1,016 free sectors on an ED disk or 700 free sectors on a SD disk
- Up to 1,000 files on a disk/partition
- Supports all drives (single / medium / double / XF / 360 KiB / 720 KiB)
- Supports all partitions (0.5 - 16MB)
- Boots in 2-3 seconds
- Disk allocation/filesystem:
    - Reads Atari DOS 2.0 2.5 MyDOS and other DOS 2 clones
- LiteDUP Disk Utility Package
- 19.2 kbit/s Bluetooth support (SIO2BT compatible)
- Available drivers and tools:
    - HSIO (Highspeed I/O) supporting serial devices up to 57.6 kbit/s
    - HDD driver for IDE hardware, like MyIDE / SIDE / XELCF
    - RAM drive for 64 KiB machines and 130XE
    - ROMEmulator loads .ROM files as "soft cartridge"
    - LZ4-SE decompression driver, reads LZ4 binary/executables
    - INIT, formats / clears / updates LiteDOS to any disk or partition

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- XIO 39 loads binary files/executables
- AUTOEXEC up to 10 files during start-up
- Build 2022 February 7:
  - Fixed subdir following on MyDOS disks, upload date now in welcome message and LiteINIT.
  - Fixed some 400/800 bugs and non Atari-OS when entering DOS.
  - Fixed MAC/65 stack usage induced bug, some cosmetic bugs and added conditional BT-support.

Available: http://www.mr-atari.com/Mr.Atari/LiteDOS/

7.3.5) What should I know about filenames and filename extensions?

Atari disk operating systems generally support file specifications in the form of a filename of 1 to 8 characters, with an optional filename extension of zero to 3 characters.

Valid characters for use in filenames/filename extensions:
(varies somewhat by DOS version)
- The letters 'A' to 'Z'
- The digits '0' to '9' (Many DOS versions do not permit filenames to start with a digit.)
- The underscore character ('_') (DOS XE, SpartaDOS, BW-DOS, RealDOS)
- The "at" symbol ('@') (DOS XE)

Spaces and other characters are generally not permitted.

Filenames, including filename extensions, are generally arbitrary, but file naming conventions can be helpful. The most common method is to reserve specific extensions for certain types of files. The following list contains some of the more commonly used extensions and their typical corresponding file types.

Filenames reserved by some DOS versions for files to be automatically run at system startup are listed here as well.

File formats are binary unless described below as "text" where:
- Binary format files are made up of a sequence of bytes of any value from 0-255.
- Text format files (technically, a special case of binary files) are limited to printable/displayable alpha-numeric characters and symbols, organized into lines.

.ACT Action! program source code

.ALF AlfCrunch archive file containing one or more compressed files

.AMP Antic Music Processor file

.AMS Advanced MusicSystem file or Advanced MusicSystem II file

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.ARC Archive file containing one or more compressed files, compatible with the multi-platform SEA ARC format. On the Atari, best supported by SuperARC / SuperUnArc or the SpartaDOS X ARC external command.

.ASM Assembler Editor program source code, LISTed. ATASCII text.

.ASC ASCII text file

.ATA ATASCII text file

.BAS BASIC SAVEd program. Less common: .SAV

.BAT Batch file of DOS commands (DOS XE, SpartaDOS, BW-DOS, RealDOS). ATASCII text.

- AUTOEXEC.BAT batch file runs at system boot (DOS XE, SpartaDOS, RealDOS)
- STARTUP.BAT batch file runs at system boot (BW-DOS)

.BIN

1. File transferred using CompuServe CIS 'A' Protocol. Fully supported on the Atari by TSCOPE/MSCOPE/RSCOPE; also download support by Express! 3.x (file naming convention used on CompuServe before February 1987);
   or
2. A ROM dump file as described in another section of this FAQ list regarding file formats for entire disks/tapes/cartridges.

.BXL BASIC XL SAVEd program

.BXE BASIC XE SAVEd program

.CMD Batch file of DOS Commands (XDOS). ATASCII text.

.COM

1. Executable ('Load and Go') machine language (object code) program;
   or
2. DOS external Command
   (DOS 2.5, DOS XE, SpartaDOS, BW-DOS, RealDOS, XDOS)

.CTB Compiled Turbo-BASIC XL program

.DAT Data file (typically created/used by another program)

.DCM Disk Communicator 3.2 disk image file. Less common: .DSK or .DC3

.DOC Documentation text file (perhaps ASCII or ATASCII)

.DOS DOS system file (SpartaDOS, BW-DOS, RealDOS)

.EXE Executable ('Load and Go') machine language (object code) program

.HLP Help text file (perhaps ASCII or ATASCII)

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.LGO	LOGO SAVEd workspace file. ATASCII text.
.LST	LISTed BASIC program. ATASCII text. Less common: .LIS
.M65	MAC/65 SAVEd program source code
.MIC	Micro-Painter picture file ("uncompressed"; 62 sectors under DOS 2.0S). Format, minus color data, also supported by Illustrator versions using the filename PICTURE and [Insert] to save file or [Clear] to load file.
.MUS	Music Composer file
.OBJ	Object code (machine language) file (not 'Load and Go')
.OBX	Modern naming convention for an object code (machine language) file (not 'Load and Go'). Used to discourage modern computers from thinking that Atari .OBJ files might be MS-DOS/MS-Windows object code files.
.PIC	Micro Illustrator / KoalaPainter / AtariArtist "compressed" picture
.PLT	PILOT SAVEd program. ATASCII text.
.PRN	Text file formatted for copying to Printer (perhaps ASCII)
.SAV	File named MEM.SAV may be employed by DOS to preserve the contents of memory to disk when DUP.SYS (DOS 2.0, DOS 2.5) or KCP.SYS (DOS 3) is loaded into memory.
.SCP	SpartaDOS SCOPY disk image file. Used with SCOPY, an external command distributed with SpartaDOS 3.2.
.SFX	Self-Extracting archive file. Created with the CTH SFX program.
.SYS	DOS System file or driver • AUTO.SYS can be used to automatically poke data in RAM locations on system startup (DOS I) • AUTORUN.SYS binary file is launched on system boot (DOS 2.0, DOS 3, DOS 2.5, RealDOS, XDOS) • AUTORUN.SYS batch file of DOS commands runs at system boot (XDOS)
.TUR	Turbo-BASIC XL SAVEd program. Less common: .TBS
.TXT	Text file (perhaps ATASCII or ASCII)
.UTL	A DOS external utility program (DOS 3)
.XEX	Modern naming convention for an executable ('Load and Go') machine language (object code) program. Used to discourage modern computers from thinking that Atari .EXE files might be MS-DOS/MS-Windows executable programs.

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.XMO Binary file, uploaded/download using XMODEM file transfer protocol (file naming convention used on CompuServe before February 1987)

Additional file extensions associated with Atari picture formats are listed at the website for RECOIL (Retro Computer Image Library), a viewer of pictures in native formats of the Atari 8-bit (and other platforms) for modern computers:
http://recoil.sourceforge.net/

Additional file extensions associated with Atari music formats are listed at the website for ASAP (Another Slight Atari Player), a player of Atari 8-bit music for modern computers:
http://asap.sourceforge.net/

File extensions associated with Atari disk image, cassette image, or cartridge ROM formats normally used with Atari emulators, rather than on the Atari itself, are described elsewhere in this FAQ list.

7.3.6) What Atari programs can use MS-DOS 5.25" or 3.5" diskettes?

Except for recent versions of SpartaDOS X, Disk Operating Systems designed for the Atari are not designed to use MS-DOS format floppy disks directly, in part corresponding to the fact that disk drives designed for the Atari do not normally support such disk formats.

This section highlights software programs designed to run on the Atari that allow the Atari to use an MS-DOS formatted floppy disk in combination with a disk drive also supporting such formats.

Solutions involving modern storage devices with firmware that emulates Atari floppy disks, so that the devices can be used by Atari DOS versions using native Atari DOS filesystems, are described elsewhere in this FAQ list.

IBMXFR IBM Transfer Program, by Happy Computers, Inc.
- For use with the Happy 1050 Enhancement upgrade for the Atari 1050
- Can read/write 5.25" SS-DD MS-DOS format 180 KiB floppy disks

MSDOS, by Marek Bojarski of Navitron, 1989?
- For use with the Tygrys 2000 (2000T) upgrade for the LDW Super 2000 or California Access CA-2001 disk drives
- Can read/write 5.25" SS-DD MS-DOS format 180 KiB floppy disks

IBM DOS and IBM 360, by TOMS
- Available on ROM in TOMS Turbo Drive LDW, TOMS Multi Drive LDW, and TOMS Multi Drive 1050 Floppy Disk Drives upgrades
- Can read/write 5.25" SS-DD MS-DOS format 180 KiB floppy disks

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IBMST, by TOMS

- Available on ROM in TOMS 720/720C/720CR floppy disk drives for the Atari
- Can read/write:
  - 5.25" SS-DD MS-DOS format 180 KiB floppy disks
  - 5.25" DS-DD MS-DOS format 360 KiB floppy disks
  - 5.25" DS-DD Atari ST (MS-DOS like) format 720 KiB floppy disks

IBMREAD.COM IBM/ST Transfer Utility, by Computer Software Services (CSS)

- Supplied on disk with the XF Update, XF Single Drive Upgrade, and XF Dual Drive Upgrade for the Atari XF551
- With XF Update, can read:
  - 5.25" SS-DD MS-DOS format 180 KiB floppy disks
  - 5.25" DS-DD MS-DOS format 360 KiB floppy disks
- With XF Single Drive Upgrade or XF Dual Drive Upgrade, can read:
  - 3.5" SS-DD MS-DOS format 360 KiB floppy disks
  - 3.5" DS-DD MS-DOS format 720 KiB floppy disks
- Supports the increased sector density of the 'twister' ST disk formats (10 sectors/track)
- Supports ASCII->ATASCII text conversion

BBXFER.COM, version 1.9, by Computer Software Services (CSS)

- Available on ROM in CSS Black Box/Floppy Board interface combination
- Can read/write:
  - 5.25" SS-DD MS-DOS format 180 KiB floppy disks
  - 5.25" DS-DD MS-DOS format 360 KiB floppy disks
  - 5.25" DS-HD MS-DOS format 1200 KiB floppy disks
  - 3.5" SS-DD MS-DOS format 360 KiB floppy disks
  - 3.5" DS-DD MS-DOS format 720 KiB floppy disks
  - 3.5" DS-HD MS-DOS format 1,440 KiB floppy disks

SpartaDOS X, by DLT

- Can read MS-DOS FAT12 (as of SDX 4.46) or FAT16 (as of SDX 4.47) format storage media, including floppy disks and hard disks
- Hardware device must support 512-byte sectors
- SDX detailed elsewhere in this FAQ list

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7.4) Are there Graphical User Interfaces (GUIs) for the Atari?

Section started by: Andreas Koch
Other contributors: Mathy van Nisselroy, Kathleen Ferrante

G.O.S. by Total Control Systems (David Sullivan)
- Public domain program released 1986 (written in Action!)

Window XL/XE © 1986, by Joerg Forg / Megamania Soft inc.
- Andreas Koch writes: a Turbo-BASIC XL GUI with some nice add-ons, like calculator, editor and other things.

RAOS (Rat Actuated Operating System) by Zobian Controls, 1987
Includes:
- DOS.SYS – Modified version from Atari DOS 2.0S
- SYNTEL.SYS – Desktop program (earlier: Z-DOS; replaces DUP.SYS of Atari DOS 2.0S)
  - Designed by Bob Dolan and programmed by Brian Ernisse of Syntel
- AUTORUN.SYS – SuperRat (or standard Atari mouse) driver
- ACCU.RAT – Accu-Draw drawing program by Vision software
- AUTORAT.BAS – Demonstrates how to write programs using the SuperRat (or Atari mouse)
- Screens 2.0 – Windowing environment
  - Based on Screens by Joseph J. Wrobel for Soft Cellar (1986), which was itself based on T: A Text Display Device published by Wrobel via APX
- DEMO.BAS – Demonstrates how to write programs using Screens 2.0 windows

XL-TOS by Marc Ebner
- Published in Atari Magazin, 1987/01 Jan/Feb, with supplements published in issues 3/4-87 Mar/Apr and 5/6-87 May/Jun.
- Andreas Koch writes: the BASIC file, which consists of many data lines creates a short object code file); unfortunately, this GUI only looks good, it loads almost nothing...

GOE (cartridge), developed by Total Control Systems (David Sullivan)
- Written in Assembly
- Promoted by Merrill Ward & Assoc. / Shelly Merrill as "ST Jr." early 1988
- Demo version(s?) released by TCS fall 1988
- Full cartridge version never shipped.

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Diamond GOS, developed by Reeve Software / ReeveSoft (Alan Reeve)
(co-marketed by USA Media / Shelly Merrill as "ST Jr." Aug 1988 - Apr 1989)

- Supports: DOS 2.5 and compatible, SpartaDOS, DOS XE
  - Diamond GOS version 1 (1988)
    - Diamond DeskTop 1.0 (disk) DUP.SYS replacement
  - Diamond GOS version 2 (1989) package:
    - Diamond DeskTop 2.0 (cartridge) + Utility Diskette
    - Diamond Programmer's Kit (Programmer's Manual)
    - Diamond Paint (disk)
  - Diamond GOS version 3 (1991) package:
    - Diamond DeskTop 3.0 (cartridge) + utility diskette
    - Diamond Paint (disk)
    - Diamond Write (disk)

Atari Desktop, by Piotr Bieniek © 1992 ABC Software (Poland)

- Andreas Koch writes: includes editors, converters, file copiers, sector copy, tape+turbo tape copy, small games, CMC finder and player and much much more; works with 64 KiB RAM and keyboard input; disk manuals only in Polish language...

Screen Aided Management (SAM) by RaindorfSoft for Power Per Post (Germany)

- It is available in two different versions:
  1. Atari Magazin type-in listings or Lazy Fingers disks (public domain)
  2. Commercial version 2.0 which has many add-ons
- Supports: Atari DOS 2.5
  - V1.25i, 1994 is available from DGS, http://www.dgs.clara.net/
    DGS SAM page: http://www.dgs.clara.net/sam.htm

BOSS-XL by Mirko Sobe (MS Software)

- Requires 64 KiB XL/XE
- Supports: ATARI-DOS, Turbo-DOS
- Current Version: v4.5 Edition 2000 (primary development 1993-1997)
- System Software:
  - File Manager (Desktop was the BOSS-XL V2.0)
  - BOSS-font editor (XE-version)
  - Icon Editor (XL-/XE-Version)
- Written in Turbo-BASIC XL

BOSS-XE by Mirko Sobe (MS Software)

- Requires 64 KiB XL/XE, 128 KiB or more recommended
- Supports: ATARI-DOS, Turbo-DOS
- Current Version: v8.1 Edition 2000 (developed 1997-2000)
- Written in Turbo-BASIC XL

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- System Software:
  - BOSS parameter
  - BOSS-font editor (XE-version)
  - Icon editor (XL / XE version)

BOSS-X by Mirko Sobe (MS Software)
- Requires 128 KiB XL/XE, 256 KiB or more recommended
- Supports: MYDOS 4.50 and above; Atari ST Mouse
- Current Version: 10:33, 2003 (developed 2000-2003)
- Written in Turbo-BASIC XL
- System Software:
  - File Manager
  - BOSS parameter
  - BOSS-font editor (X version)
  - Icon editor (X version for colored symbols)
  - BOSS-X framework
  - Multiple screen savers

ST-TOS
A small BASIC program, that looks like a GUI; it can merely load BASIC files and do a few DOS commands, like lock, unlock, delete and such...

BASIC desktop
A GUI written in BASIC just as a sample, what can be done with an 8-bit computer; this one loads BASIC and text files (maybe also ML files);

DCS
The desktop construction set from Tom Hunt; there are 3 different versions available:
a) for DOS 2.5,
b) for MyDOS,
c) for SpartaDOS;
I have tested the SpartaDOS version, which worked with batch files and could easily load some ML files, text files and BASIC files (which were already on the DCS disk); it also works with high densities and/or hard disk partitions up to 16 MiB and supports subdirs of course; hmm, freeware or shareware ?!?

ATOS - GUI by Tom Hunt/Closer To Home.
- Let you use any demo or intro as a screen saver!!
- Works with all Atari hardware, BB, MIO and Hard drives, SpartaDOS support
- Let you run files like full games and demos and then return back to the desktop. It uses Overlays.

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TRS Desktop by Tristesse (By Epi, Pin, Trub) (2005)

- A graphic user interface for SpartaDOS X to be used with hard drives.
- http://www.atari8.info/trsdesktop.php
- http://trub.atari8.info/sdx_files/TRS_desktop_v09d_alfa.zip

GUI project demo, by Jonathan Halliday (2012)

- A work in progress
- https://atari8.co.uk/gui/

GEOS 2.0 by Berkeley Softworks (Graphic Environment Operating System)

- Originally for Commodore 64 (1986), also released for Commodore 128 (1987) and Apple II (1988)
- Reverse engineered by Maciej Witkowiak and Michael Steil, 2016
  - https://github.com/mist64/geos
  - Ported to 8-bit Atari by Maciej Witkowiak, 2022
    - https://github.com/ytmytm/geos-atari/blob/atari/README-Atari.md

7.5) What should I know about R: and T: modem device handlers?

The Atari computer Operating System does not provide a modem device handler. Modems can be connected to the Atari in several different physical ways: via an 850 Interface or equivalent, via a joystick/controller port, or via the SIO port. For each way a modem can be connected to the Atari, application software code specific to that type of modem must be utilized by the computer to communicate with the modem.

Some Atari programs, especially commercial telecommunications programs, simply support one or several specific modem types, incorporating the necessary modem-specific software routines internally.

Some programs, especially earlier public domain / freeware / shareware programs, were released in several versions, each dedicated to a particular modem or modem type.

Finally, as multiple modem types gained popularity, public domain / freeware / shareware authors started abstracting the modem device handling software routine from the rest of their telecommunication programs, allowing for a single version of the main program to work with one or more separately-distributed modem handler routines. Users were then expected to combine an application with an appropriate modem handler in order to create a complete, working telecommunications software package.

This section attempts to list all Atari modem device handler files that can be used in combination with telecommunications programs requiring such a handler.

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7.5.1) R: modem device handler on 850 Interface ROM

The 850 contains an R: handler, supporting devices R1: through R4:, in its ROM. This R: handler supports the full range of capabilities of the RS-232 serial interface ports provided by the 850, but is typically used with an RS-232 serial interface modem.

With no powered disk drive #1 present, the R: handler loads from the ROM of a powered 850 into computer RAM on system startup. An extended beep is emitted through the computer's audio signal as the handler is loaded.

The R: handler can also be loaded from 850 ROM into computer RAM as part of a system Disk Boot or afterward by running a brief software utility for that purpose. Such utilities include:

- AUTORUN.SYS, distributed with Atari DOS 2.0S (1980)
- RS232.COM, distributed with OS/A+ and DOS XL by OSS (1982-1984)
- RS232FIX.COM, distributed with DOS XL by OSS (1982-1984). Explicitly attempts to correct some of the known bugs in the 850 R: handler.
- HANDLERS.SYS, distributed with Atari DOS 3 (1983)
- RS232.ARx, distributed with SmartDOS by Rana Systems (1984)
  - Should be renamed RS232.AR1 to be autorun by SmartDOS
  - Supports both warm and cold re-boots of the system
- AUTORUN.SYS, as generated by the Atari DOS 2.5 SETUP.COM utility (1984)
- RS232.COM for SpartaDOS, distributed with ICD SpartaDOS and with the ICD P:R: Connection (1986)
- RS232.SYS for Atari DOS 2, distributed with the ICD P:R: Connection (1986)
- BOOT850.COM, distributed with AMODEM 7.4 and 7.5 by Trent Dudley (1987)
- RDRIVER.SYS, distributed with Atari DOS XE (1988)
- ATARI850.AUT, distributed with MYDOS 4.50
- X850.COM, distributed with ANSITERM by Robert Sinclair (1992)
- PR.COM, distributed with ANSITERM by Robert Sinclair (1992)
- RS232.COM, part of RealDOS
- RS232.COM, part of SpartaDOS X

Special to the P:R: Connection (popular 850 workalike):

- PRC.SYS is an R: handler "translator" distributed with the P:R: Connection by ICD (1986). Allows some telecommunications programs (such as HomePak HomeTerm) with integrated support for 850-based modems, but that do not load or use the internal 850 R: handler, to work with the P:R: Connection.

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7.5.2) R: modem device handlers for MPP-1000C, MPP-1000E, Supra 300AT, or Volksmodem VM1 with F Cable

- MPPHAND.AUT, Version 1.0, by John S. DeMar, 1983(?) 'Smartmodem and "R:" Device Emulator, for the MPP-1000C Modem'
- MPP 1000C Modem/850 Emulator by Jordan Chilcott. Three versions:
  - MPP850.DRV – MPP Modem Driver REV. 1.0 © 1984 Jordan L. Chilcott, Standard version tested with: AMODEM, AMIS, FORUM. (alias MDRIVE.XMO)
  - SMARTMPP.DRV – MPP Modem Driver REV. 1.0S © 1984 Jordan L. Chilcott
    Also supports "Smartmodem" features of MPP modems.
    (aliases SMDRV.XMO, AMDM6HD.MPP)
  - HOMEMPP.DRV – MPP Modem Driver REV. 1.0H © 1985 Jordan L. Chilcott
    For use with HomePak HomeTerm. (aliases HMDRVE.XMO, HMDRV.XMO)
    - HTM450.XMO – Version modified for 450 baud
    - MPP450.DOC – Documentation by Charles Johnson
- MPP R: Driver
  - DRIVER.REG – MPP R: Driver © 1985
    - DRIVER.HPK – Modified for use with HomePak HomeTerm
  - DRIVER.SML – MPP R: Short Driver © 1985
- 300AT R: Handlers from Supra Corporation, Version 2.x, by Willie Brown and Mark White
  - RDRVR.30A – SUPRA 300A R: Driver v2.2, c1986
    - Full driver, includes a limited set of HAYES SMARTMODEM commands.
  - SRDRVR.30A – SUPRA 300A R: Short Driver v2.0, c1986
    - For BBS users, written to be short and only include the bare essential SIO calls.
- MPPHNDLR.COM, by Trent Dudley, distributed with AMODEM 7.4 and 7.5, 1987.
  "I have rewritten this MPP R: handler to make its relocation routine compatible with SpartaDOS."
- MPP850.HAN, by James Dillow (author of DeTerm MPP), 1988.
- MPP.COM, by **Bob Puff**, modified version of MPP850.HAN by James Dillow, distributed with BobTerm 1.10 (6/89), 1.20 (4/1990), & 1.21 (4/27/1990)

7.5.3) R: modem device handlers for Supra 1200AT

- RDRVR.12A – SUPRA 1200A Driver v1.0 © 1986
- 1200AT R: Handler from SUPRA Corporation Version 2.x, Willie Brown

7.5.4) T: modem device handler on 1030 Modem ROM

In addition to the ModemLink software program, the 1030 Modem ROM also contains the T: modem device handler that can be loaded and utilized by user programs apart from ModemLink.

The T: device handler does not use the SIO protocol for data transmission with the computer, creating potential conflict with other devices connected via SIO that also don't use the SIO protocol, including the C: cassette handler built into the Atari OS. Consequently, there should be no program recorder attached to the system when using a T: modem device handler.

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The handler supports tone dialing, but is not self-relocating, and thus must be loaded before Atari BASIC is initialized. Extensive T: handler details published by Russ Wetmore: http://www.atarimagazines.com/v4n4/1030modem.html

Utilities to load the T: handler from the 1030 ROM include:

- AUTO1030.SYS, by Russ Wetmore for Antic, August 1985 (alias THANDLR1.030)
- BOOT1030.COM, by Trent Dudley, distributed with AMODEM 7.4 and 7.5, 1987

7.5.5) T: modem device handlers for both 835/1030 (& XM301) and 850-based Modems

- '835/850 Handler' (alias AUTO1030.OBJ) by AMODEM author Jim Steinbrecher, distributed with his Atari MODEM-835/850 Ver. 4.2, 01-15-84
- TSHANDL.OBJ, by Ken Fowkes, is the T: handler code extracted from his DiskLink program (1984).

7.5.6) T: modem device handlers for the 1030/XM301 Modems

- HANDLER.OBJ, by Atari, distributed with the XM301 modem on the XE Term disk. A slight superset of the 1030 ROM T: handler; it too supports tone dialing but is likewise not self-relocating. Shipped fall 1985.

7.5.7) T: modem device handlers for the 835/1030/XM301 Modems

- THANDLER.COM, by Trent Dudley, distributed with AMODEM 7.4 and 7.5, 1987. A self-relocating version of the Atari XE Term T: handler.

7.5.8) R: modem device handlers for both 850-based and 835/1030/XM301 Modems

- R.BIN, by **Joe Miller (Joseph B. Miller III)** and Russ Wetmore for Star Systems Software, 1984/5(?)
  "A combined handler for 850-based and 835/1030 modems...an extensive modification of **Joe Miller (Joseph B. Miller III)** original handler from his...TSCOPE. While TSCOPE uses a "T:" handler (standard for 835/1030 modems), R.BIN is installed as an "R:" device." Self-relocating. Does not support tone dialing on the 1030.
- RHANDLR1.030 is identical to R.BIN but also executes RUN "D:MENU" after loading (perhaps for a disk of the month for an Atari user group).
- 'RHANDLER2' (RHANDLR2 or RHAND2.BIN or RHAND2.AUT or ANO835) is a slightly modified version of R.BIN which also executes the BASIC command
  RUN"D:*.RUN" after loading.

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- RHAN1030.AUT and RHAND3.BIN are two different derivatives of 'RHANDLER2' where the provision to RUN"D:*.RUN" after loading has been removed.
- ATARISRS.232, by JM/RW, is the R.BIN driver code extracted from VT-10-Squared, and then distributed with OmniCom, 1986-1987
- RBIN1030.BIN / RHANDLER.COM / R1030.XMO, by JM/RW/MG, are derivatives of ATARISRS.232, possibly/probably modified for SpartaDOS compatibility by **Mike Gustafson**. Distributed with AMODEM 7.4 and 7.5, 1987

7.5.9) R: modem device handlers for the 1030/XM301 Modems

- SMARTT.COM, V7.14.86 by Joe Hitchens (author of VTERM)
- HANDLER.XM, by James Dillow (author of DeTerm XM301) (1988?)
- XM850.HAN, by James Dillow, based on his HANDLER.XM (1988?)

7.5.10) R: modem device handlers for the 835/1030/XM301 Modems

- XM.COM, by **Bob Puff**, modified version of XM850.HAN by James Dillow, distributed with BobTerm 1.10, 6/1989
- XM.COM (re-written), by **Bob Puff**, distributed with BobTerm 1.20 (4/1990) and 1.21 (4/27/1990)

7.5.11) R: modem device handlers for the R-Verter/SupraVerter Modem Adapter (SIO)

Note that handlers designed for the Atari SX212 Modem via SIO may also work with the R-Verter/SupraVerter.

- The A.I.D. R-Verter was distributed with 4 different R: handler versions, originally written by Royce W. Powell, © April, 1984 by A.I.D.:
  - RHAND1.OBJ - R: handler supporting DSR & RD
    - nearly identical: RVDOSXL.COM (version for DOS XL?)
  - RHAND1C.OBJ - R: handler supporting DSR & CD
  - RHAND2.OBJ - R: handler supporting DSR & RD and translation tables
  - RHAND2C.OBJ - R: handler supporting DSR & CD and translation tables
- RVHAND.XMO or RVHAND.OBJ, by Ron Hodges, for use with HomePak HomeTerm.
  A re-assembly of the file RHAND1C.SRC supplied with the R-Verter, but starting at a lower address ($1D00). (alias RVERTER.HND)
- BOB-Verter 2.4 Fast Handler (RVERTER.COM), by Robert Puff, 10/16/89.
  Explicitly supports both the SX212 Modem (via SIO) and the R-Verter/SupraVerter interface cable. Distributed with BobTerm 1.20 & 1.21

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7.5.12) R: modem device handlers for the SX212 Modem connected via SIO

Note that handlers designed for the Atari SX212 Modem via SIO may also work with the R-Verter/SupraVerter.

- The SX-212 Companion!, by Marc Ingle and Tom Neitzel of S*P*A*C*E, based on the R-Verter R: handler, specifically to bring SX212 support to 850 Express! version 3.00p by Keith Ledbetter. Modifications by Tom Neitzel and Marc Ingle. December, 1987. Two versions:
  - LOADER.LOW (aliases: SX212A or SX212A.COM)
    This version loads at $1D00 and works with most DOSes in their standard configuration (generally 2 or 3 drives, with a LOMEM of $1D00 or lower).
  - LOADER.HI (alias: SX212A.HI)
    This version loads at $2000 and allows more memory for drive buffers but will reduce your terminal buffer by about 750 bytes.
- SX_RHAND.COM, author/distribution unknown
- SX212HND.COM (alias SX212HND.OBJ), SX212 R: Handler V1.0 by Trent Dudley, 1987?
- HANDLER.OBJ, by Paul Swanson, distributed with Atari SX Express!, 1988
- SX212 ATH handler (SX212ATH.COM), by James Dillow (author of DeTerm SX212), 1988. (Distributed with AtariLink BBS.)
  - SX.COM is a modified version by **Bob Puff**, distributed with BobTerm 1.10, 6/1989
- BOB-Verter 2.4 Fast Handler (RVERTER.COM), by Robert Puff, 10/16/89. Explicitly supports both the SX212 Modem (via SIO) and the R-Verter/SupraVerter interface cable. Distributed with BobTerm 1.20 & 1.21
- SX.COM, by Robert Sinclair, distributed with ANSITERM, 1992

7.5.13) R: modem device handler for the U-CALL modem interface

- UCALL.OBJ, by Digital Devices, supplied on disk with the interface

7.5.14) R: modem device handler for the Datatari serial interface cable

- BTDATARI.COM, by ABBUC ev, specifically for use with BobTerm

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7.5.15) R: modem device handlers for the ATR8000 interface by SWP

- MYDOS 3.1x versions have an integrated ATR8000 R: handler
- MYDOS 4.50 includes:
  - ATR232.AUT - RS-232 driver for the ATR8000
  - ATR232HD.AUT - RS-232 driver for ATR8000 with ATR hard disk interface
- SpartaDOS from ICD (disk versions) shipped with an R: handler for the ATR8000 called: AT_RS232

7.5.16) R: modem device handlers for the Multi I/O board (MIO) by ICD

The MIO includes its own 850 R: handler emulator in ROM, which does not need to be loaded into computer RAM in order to function. Depending on the ROM version, this handler may or may not fully support the hardware flow control capability of the MIO hardware.

- HYPERSPD.MIO HyperSpeed RS-232 accelerator Version 1.3a for Multi I/O, Copyright 1995, 1997 by Lenard R. Spencer. Full 19,200 bit/s throughput with hardware flow control.

7.5.17) R: modem device handlers for the Black Box interface by CSS

The Black Box includes its own 850 R: handler emulator in ROM, which does not need to be loaded into computer RAM in order to function. This handler supports the hardware flow control capability of the Black Box.

- HYPERSPD.BB HyperSpeed RS-232 accelerator Version 1.3a for Black Box, Copyright 1995, 1997 by Lenard R. Spencer. Full 19,200 bit/s throughput with hardware flow control.

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7.6) What should I know about using fast modems with the Atari?

When using a modem supporting V.42bis or V.44 data compression, the computer's optimal communication port's speed setting would be 4 times the modem's maximum data transmission bitrate.

Examples:

2,400 bit/s V.22bis	modem with V.42bis compression:	9,600	bit/s
9,600 bit/s V.32	modem with V.42bis compression:	38,400	bit/s
14,400 bit/s V.32bis	modem with V.42bis compression:	57,600	bit/s
V.34 or V.34bis	modem with V.42bis compression:	115,200	bit/s
V.90 or V.92	modem with V.42bis compression:	230,400	bit/s

While Atari never marketed a modem faster than the 1,200 bit/s SX212, the Atari is capable of supporting modem bitrates of up to 19,200 bit/s, depending upon circumstances described here.

Several factors come into play in using modems faster than 2,400 bit/s with the Atari.

Firstly, the top bitrate supported by a given software application on the Atari can be the determinative limiting factor. Many programs on the Atari may not support, or may not be able to keep up with, bitrates greater than 1,200 bit/s or 2,400 bit/s.

Assuming the use of an Atari program that supports higher speeds, it will be useful to have an understanding of data flow control. Here is a definition of flow control from:
http://preview.tinyurl.com/p8muzmp

> Often, one modem in a connection is capable of sending data much faster than the other can receive. Flow control allows the receiving modem to tell the other to pause while it catches up. Flow control exists as either software (XON/XOFF) flow control, or hardware (RTS/CTS) flow control. With software flow control, when a modem needs to tell the other to pause, it sends a certain character, usually Control-S. When it is ready to resume, it sends a different character, such as Control-Q. Software flow control's only advantage is that it can use a serial cable with only three wires. Since software flow control regulates transmissions by sending certain characters, line noise could generate the character commanding a pause, thus hanging the transfer until the proper character (such as Control-Q) is sent. Also, binary files must never be sent using software flow control, as binary files can contain the control characters. Hardware, or RTS/CTS, flow control uses wires in the modem cable or, in the case of internal modems, hardware in the modem. This is faster and much more reliable than software flow control.

Some/later 2,400 bit/s modems, and probably all modems with 9,600 bit/s speed capabilities and up, normally use V.42 standard error correction and V.42bis standard data compression. Subjectively, V.42/V.42bis are nice at 2,400 bit/s, important at 9,600 bit/s, and essential at any speeds beyond 9,600 bit/s.

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V.42bis requires hardware flow control (and V.42 error correction). But with Atari equipment (except the MIO and Black Box) hardware flow control is not supported so V.42bis cannot be used and should be disabled. Standard Hayes modem command to disable V.42bis data compression: AT&C0

While V.42 error correction can technically work with either software or hardware flow control, for reasons described above it is typically only used when hardware flow control is available. Since Atari equipment (except the MIO and Black Box) does not support hardware flow control, V.42 should generally be disabled. Standard Hayes modem command to disable V.42 error correction: AT&K0
Note that disabling V.42 also has the effect of disabling V.42bis.

Finally, hardware ports on the Atari have their inherent top bitrate limits. The serial ports of the Atari 850, for example, support a top bitrate of 9,600 bit/s. Other modem interfaces for the Atari may support bitrates of up to 19,200 bit/s.

Clay Halliwell offers a tip on achieving 9,600 bit/s through the 850 Interface:
On 11 Feb 1996, Marc G. Frank said:

> I'm having problems getting a modem attached to my Atari 850 to communicate at 9,600 baud. When I set my communications program to 2,400 baud, everything works fine. However, when I set it to 9,600 baud, the modem echoes my characters but doesn't act on them.

The problem with the 850 is that some of them (like mine) don't produce a PERFECT 9,600 baud signal. As a result, modems can't train on it, and while they will echo characters back, for some nitpicky reason they won't pick up on the "AT" attention code.

The solution is to do all your dialing at 2,400 baud, but set the S37 register to force the modem to try to connect at 9,600. Then switch your Atari to 9,600 after connecting.

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Chapter 8

Software

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8.1) How may a program behave on NTSC / PAL / SECAM computer versions?

Every Atari computer unit is designed for compatibility with either the NTSC, PAL, or SECAM analog color video encoding standards. Some functional characteristics vary among these versions of the computers, so that software may behave differently depending upon whether the computer it is run on is an NTSC, PAL, or SECAM computer.

PAL B and PAL I Atari computers differ only in the TV channel frequencies used by the RF signal produced. So in terms of software compatibility, all PAL Atari computers are indistinguishable.

The FGTIA found in SECAM Atari computers is designed to be 100% software compatible with the PAL GTIA. This fact, along with the fact that SECAM computer models include a PAL ANTIC, mean that the PAL and SECAM versions of the Atari computers are completely software compatible, but with one practical exception: in GTIA Graphics Mode 1 (BASIC Graphics mode 9), while the GTIA can display 16 distinct luminances, the FGTIA can only display 8 distinct luminances.

Thus the situation essentially simplifies down to just two sets of Atari computers that may have potential software compatibility issues between them: NTSC computers vs. PAL/SECAM computers. What might happen if you run a software program designed with an NTSC Atari on a PAL or SECAM Atari, or a program designed with a PAL or SECAM Atari on an NTSC Atari?

There are a number of possibilities:
1. The program may run faster or slower than intended.
2. The program may exhibit some sort of "screen flickering" effect.
3. The system may crash.
4. The colors displayed by the program are not what was intended.
5. The program may explicitly refuse to run on incorrect hardware.
6. The program may not load correctly at all.
7. The program may run fine on both NTSC and PAL/SECAM machines.

8.1.1) The program may run faster or slower than intended

In order to work with the different timings of the NTSC and PAL/SECAM video signal standards, components of the NTSC versions of the Atari computers run at slightly different speeds than they due on PAL/SECAM Atari computers. Software timing that is based exclusively on the 6502 clock rate would thus run nearly 1% faster/slower on the opposite type of Atari. This effect, while small, can be significant in applications that are computation- or timing-sensitive, such as music players, or in any programs designed to simulate real time.

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The screen refresh rate of the PAL/SECAM Atari computer is considerably slower than that of the NTSC Atari. A software routine that operates as a Vertical Blank Interrupt (VBI), executed during the times between screen frame refreshes, is thus executed at considerably different frequencies on NTSC machines vs. PAL/SECAM machines. Based on this effect alone, a VBI programmed on an NTSC machine would run 16.8% slower on PAL/SECAM machines. Conversely, a VBI programmed on a PAL/SECAM machine would run 20.2% faster on NTSC machines.
59.92 Hz - 49.86 Hz = 10.06 Hz
10.06 Hz / 59.92 Hz = 16.8%
10.06 Hz / 49.86 Hz = 20.2%
These calculations ignore the above-mentioned 6502 clock rate differences, which would also come into play.

8.1.2) The program may exhibit some sort of "screen flickering" effect

The ANTIC display list is the software program responsible for the video display, horizontal scan line by horizontal scan line. There are 262 lines available in the (non-interlaced) NTSC video signal, while there are 312 lines available in the (non-interlaced) PAL/SECAM video signal. If software written on a PAL/SECAM machine sets up an ANTIC display list that is made up of more scan lines than are available in the NTSC video standard, the program will exhibit a "screen flickering" effect if run on the NTSC Atari.

8.1.3) The system may crash

NTSC and PAL/SECAM machines have different numbers of machine cycles available for execution of software routines designed as vertical blank interrupts (VBIs).

An Immediate VBI must complete execution within the number of machine cycles available during the vertical blank time:

NTSC:	2,508 machine cycles (262 NTSC scanlines - 240 Atari scanlines) * 114 cycles/scanline
PAL/SECAM:	8,208 machine cycles (312 PAL/SECAM scanlines - 240 Atari scanlines) * 114 cycles/scanline

8,208 - 2,508 = 5,700
PAL/SECAM machines have a total of 5,700 more machine cycles available for Immediate VBIs than are available on NTSC machines.

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A Deferred VBI must complete execution within the number of machine cycles available from one vertical blank to the next. The number of machine cycles available for a Deferred VBI depends upon the ANTIC Display List in use, but the upper limit may be derived from the total number of machine cycles per frame:

NTSC:	29,859 machine cycles / frame
PAL/SECAM:	35,568 machine cycles / frame

35,568 - 29,859 = 5,709
PAL/SECAM machines could have as many as 5709 more machine cycles available for Deferred VBIs than are available on NTSC machines.

If there are not enough machine cycles available on an NTSC machine to execute a VBI that was developed on a PAL/SECAM machine, the NTSC system will crash.

8.1.4) The colors displayed by the program are not what was intended

When utilizing ANTIC graphics modes 2, 3, or F, NTSC Atari computers exhibit unique color artifacting effects that are not present on PAL/SECAM Atari computers. (Artifacting is discussed elsewhere in this FAQ list.) As a result, software that utilizes one of these high-resolution graphics modes can appear to be using very different colors on NTSC machines in comparison to PAL/SECAM machines.

Also, the additional color frequency generation circuitry present in PAL/SECAM machines produces a color palette that is similar to, though different from, the color palette of NTSC Atari computers. These differences are subtle enough that they are generally not problematic.

8.1.5) The program may explicitly refuse to run on incorrect hardware

Software may be designed to determine whether the Atari is NTSC or PAL/SECAM, and refuse to run if the hardware present does not match what is expected.

8.1.6) The program may not load correctly at all

This would mostly likely result from copy protection techniques based upon precise hardware timing associated with disk drives, cassette recorders, or components of the computer itself, where the timing was not anticipated to vary depending upon NTSC vs. PAL/SECAM hardware.

According to Jindroush (26-Feb-2002), two examples of programs that run on NTSC machines but not PAL/SECAM machines as a result of timing-based copy protection techniques (probably based on vblank timing) are Transylvania and The Quest, both by Penguin Software.

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8.1.7) The program may run fine on both NTSC and PAL/SECAM machines

Either the differences are too slight to matter, or the software may be sophisticated enough to detect NTSC vs. PAL/SECAM hardware, as described above, and act accordingly.

An example of a program that alters its behavior depending upon detection of NTSC versus PAL/SECAM is Ghostbusters by Activision (checks the GTIA type).

8.1.8) Bottom line

Software written for NTSC machines (North America) will (almost) always work on PAL/SECAM machines (Europe), but software designed on PAL/SECAM machines sometimes won't work as intended on NTSC machines.

Replacing the NTSC ANTIC chip in an NTSC Atari with a PAL ANTIC changes the screen refresh rate to 50 Hz, allowing most of the PAL/SECAM-only European software to run on a North American NTSC Atari. However, make sure your display device can support a 50 Hz video refresh rate first!

North American Atari users might also obtain and use real European PAL or SECAM Atari machines, with a similar caveat concerning the display device.

8.2) What programming languages are available for the Atari?

Freddy Offenga has compiled a comprehensive list of programming languages produced for the 8-bit Atari. Please visit:
http://www.ataripreservation.org/websites/freddy.offenga/langlist.txt

[Text retrieved on Sept 29, 2017]

What programming languages are available for the Atari 8-bit computers?
Atari 8-bit computers are: Atari 400, 800, 600XL, 1200XL, 800XL, 130XE, 65XE, 800XE, XEgs.

Current version : 2.3
Last changed at : 2013-4-5

Maintainer: Freddy Offenga
URL: http://www.ataripreservation.org/websites/freddy.offenga/langlist.txt
Email: info at ataripreservation dot org

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The goal is to give information about all available languages for the Atari 8-bit computer. This information includes: title, last version, author, date and a short description. It would also be nice to know how to get it and where to get more information (like reference cards, reviews and such).

There are quite a lot! To get some structure in this section it's divided into the following categories;

1. ASSEMBLER
2. BASIC
3. C
4. PASCAL
5. LISP
6. FORTH
7. PILOT
8. LOGO
9. All the rest

The following format is used:

Language title (medium)	
Version, Year	version, year
Author/Company	author/company
Availability	where/how to get it
Package	programs, documentation
Features	main features
Description	description

The question marks (?) indicate that more information is required about that topic.

Credits

- The Multi-lingual Atari, Analog magazine 45, August 1986
- A bunch of manuals
- Some copy-pasted lines from the Atari 8-bit newsgroup
- umich (University of Michigan Atari archive)
- David Wyn Davies (PL65)
- Kevin Savetz (APX titles)
- Maury Markowitz
- Michael Current
- JT (ValForth)
- Andreas Magenheimer
- Winston Smith
- Carsten Strotmann
- Brad Arnold
- Tomasz Krasuski
- Piotr Fusik
- Charles W. Marslett

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Revision history
2.3 - 2013-4-5
- Updated/checked all BASIC entries

2.2 - 2013-3-23
- Updated/checked all entries in the assembler section

2.1
All these additions and edits by Michael Current:
- 2012.05.20 Advan BASIC availability, author, release year, thanks James
- 2011.02.20 Quick Assembler clarifications from Tomasz Krasuski
- 2009.02 edits: The BASIC Compiler; BASIC XE; Microsoft BASIC; Microsoft BASIC II; CLSN Pascal; Logo; PILOT; Action!, Kyan Pascal, Lightspeed C versions from Atari Explorer magazines
- 2006.01.16 added: Xasm 3.0.0, 2005 from Piotr Fusik

2.0
- Added Atari Pilot info from Brad Arnold

1.9
- X-Assembler updated
- Added "QS FORTH" info from Winston Smith
- Added FORTH section work from Michael Current (thanks to Carsten Strotmann) (see also: http://www.strotmann.de/twiki/bin/view/APG/LangForth)
- Several updates in the assembler section

1.8
Thanks to Adreas Magenheimer for these updates:
- Added "Mesa-Forth"
- Added "130XE Assembler 4.32"
- Updated "SynAssembler"

1.7
Thanks to Maury Markowitz for these updates:
- Updated "A BASIC Compiler"
- Added "Der BASIC Compiler", "MMG BASIC Compiler"
- Added "Frost BASIC", "TT-BASIC XL"

1.6
Synchronized with Atari 8-bit FAQ May-2002 :
- Added "X-Assembler"
- Added "CTH Fast Basic"
- Added availability for "Deep Blue C"
- Added availability for "Atari Pascal"
- Ignored changes "Kyan Pascal" (need more info)
- Updated "ValForth"
- Updated "Extended fig-Forth"
- Updated "fun-Forth"

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- Added "Extended WSFN"
- Removed e-mail addresses
- Added availability for "A65"
- Updated "PL65"

1.0 .. 1.5
Changes not noted.
Old versions are available on request.

8.2.1) ASSEMBLER

130XE Makro Assembler (disk)	
Version, Year	4.32, ?
Author/Company	Torsten Karwoth
Availability	freeware, ABBUC PD #297
Package	assembler, editor, menu, monitor, batch enhancement, linker/packer
Features	macros
Description	Two pass 6502 assembler with integrated menu, editor and monitor shell for 128 KB RAM Ataris. Source format is derived from Atmas Makroassembler.

130XE+ Makro Assembler (disk)	
Version, Year	2.2, 1992
Version, Year	2.1, 1991
Author/Company	Torsten Karwoth
Availability	freeware
Package	assembler, editor, menu, monitor, batch enhancement, linker/packer
Features	macros
Description	New version with 128 KB – 1,088 KB RAM support. Two pass 6502 assembler with integrated menu, editor and monitor shell. Needs extra RAM banks. Source format is derived from Atmas Makroassembler.

A65 (disk)	
Version, Year	1.2, 1989
Version, Year	1.0, 1984 (first version)
Author/Company	Charles W. Marslett, WORDMARK Systems
Availability	abandonware, http://www.wordmark.org/
Package	assembler, manual
Features	source include
Description	Two pass 6502 assembler. Source format is based on the Atari Macro Assembler. Assembler source included.

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Alfasm, Turbo-Assembler/16 (disk)	
Version, Year	1.0, 1990
Author/Company	Jeff Williams, DataQue Software
Availability	http://gury.atari8.info/details_software/1172.htm
Package	assembler, docs
Features	source include
Description	Two pass 6502/65816 assembler.

Assi (download)	
Version, Year	0.0.41, 2000
Author/Company	MacFalkner
Availability	-
Package	assembler, file linker
Features	source include, data include, code relocation
Description	Cross assembler for Win32. Source code is highly compatible with Atmas for the Atari.

Atari Assembler/Editor (cart)	
Version, Year	1.0, 1981
Author/Company	Atari, Shepardson Microsystems (Kathleen O'Brien)
Availability	CXL4003
Package	assembler, editor, monitor, manual
Features	-
Description	Two pass 6502 assembler with integrated editor/monitor http://en.wikipedia.org/wiki/Atari_Assembler_Editor

Atari Macro Assembler (disk)	
Version, Year	1.0C, 1981
Author/Company	Atari, APX
Availability	?
Package	assembler, editor, debugger, manual
Features	macros, source include
Description	Two pass 6502 assembler.

ATasm (disk)	
Version, Year	1.07, 2010
Version, Year	0.90, 1999 (first version)
Author/Company	Mark Schmelzenbach
Availability	http://atari.miribilist.com/atasm/index.html
Package	assembler
Features	macros, source include, optionally target .XFD disk images and machine state files (Atari800 / Atari800Win), conditional assembly.
Description	Two pass 6502 portable cross assembler. Mostly compatible with MAC/65.

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Atmas Makroassembler (disk)	
Version, Year	2, 1985
Author/Company	Peter Finzel, Hofacker
Availability	?
Package	assembler, editor, monitor, manual
Features	macros
Description	Two pass 6502 assembler with integrated editor/monitor.

Bibo Assembler (disk)	
Version, Year	1.0, 13/12/1986
Author/Company	Erwin Reuss, Compy-shop
Availability	http://wiki.strotmann.de/wiki/Wiki.jsp?page=BiboAssembler
Package	assembler, editor, monitor
Features	source include, data include
Description	Two pass 6502/65c02 assembler with integrated editor/monitor.

Datasm/65 assembler (disk)	
Version, Year	2.0, 1981
Author/Company	DataSoft Inc.
Availability	?
Package	assembler, editor, menu, manual
Features	-
Description	Two pass 6502 assembler.

EASMD (disk)	
Version, Year	1.0, 1981
Author/Company	OSS
Availability	?
Package	assembler, editor, monitor
Features	-
Description	Two pass 6502 assembler with integrated editor/monitor. Edit/ASseMble/Debug. Enhanced version of the Atari Assembler Editor.

Fast Assembler (disk)	
Version, Year	1.5, 1995
Author/Company	MMMG Soft (Marek M.M. Goderski)
Availability	?
Package	assembler, editor, disassembler
Features	Compatible with Quick Assembler v1.0.
Description	-

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Kasm65 (disk)	
Version, Year	2.51, 1997
Author/Company	Ken Siders
Availability	http://atari.kensclassics.org/a8programming.html
Package	assembler, editor, linker, docs
Features	macros, relocation, source include, conditional assembly
Description	Two pass 6502 assembler. Relocatable object files are compatible with ra65. Source format is derived from the Atari Macro Assembler.

MA65 Macro Assembler	
Version, Year	1.6, 2000
Author/Company	Jonathan Halliday, RIF
Availability	http://www.atari8.co.uk/ma65/default.html
Package	assembler, documentation and source code
Features	macros, conditional assembly, include directive
Description	http://www.atari8.co.uk/ma65/default.html

MAC/65 Macro Assembler (disk|cart)	
Version, Year	1.02, 1984 (black cart?)
Version, Year	1.01, 1984 (black cart)
Version, Year	1.00, 1984 (orange cart)
Author/Company	Stephen D. Lawrow, Jim Dunion, OSS
Availability	?
Package	assembler, editor, monitor, manual
Features	macros, source include
Description	http://en.wikipedia.org/wiki/MAC/65

MAC/65 Macro Assembler (disk)	
Version, Year	4.20, 1994
Version, Year	4.20 demo version 1982, 1994 ?
Author/Company	Stephen D. Lawrow, Jim Dunion, OSS/Fine Tooned Engineering
Availability	?
Package	?
Features	-
Description	http://en.wikipedia.org/wiki/MAC/65

MAE (disk)	
Version, Year	.96, 1996
Author/Company	John Harris
Availability	http://www.umich.edu/~archive/atari/8bit/Languages/Assembly/
Package	assembler, menu, editor, monitor, docs
Features	macros, source include, data include, conditional assembly
Description	Two pass 6502/65816 assembler with integrated editor/monitor. Extra RAM supported.

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NASM65 (disk)	
Version, Year	?, 1992
Author/Company	Nat!
Availability	?
Package	assembler, linker, librarian
Features	macros, relocation, source include
Description	One pass 6502 portable cross assembler (initially for the ST). Highly compatible with MAC/65.

PC-65 (disk)	
Version, Year	1.0 beta, 1996
Author/Company	Jan Feenstra & Freddy Offenga
Availability	-
Package	assembler
Features	macros, source include, data include, boundary directive
Description	Two pass 6502 cross assembler for PC/DOS. The source format is highly compatible with the ST-65 assembler.

Quick Assembler (disk)	
Version, Year	1.0, 1991
Author/Company	Janusz B. Wisniewski, L.K.Avalon
Availability	https://preview.tinyurl.com/y2tnlb8a
Package	assembler, editor, menu, debugger
Features	source include
Description	Two pass 6502 cross assembler with integrated editor. Very user-friendly menu environment.

Ra65 (disk)	
Version, Year	1.0, 1989
Author/Company	John R. Dunning
Availability	public domain, https://preview.tinyurl.com/yy4z5y56
Package	assembler, linker, librarian part of cc65 (c-compiler)
Features	-
Description	

Synassembler (disk | cart)	
Version, Year	4.0, 1982
Author/Company	Steve Hales, Synapse Soft
Availability	http://idiology.com/8b/bacardi/Synapse/SynAssembler.zip
Package	assembler, editor, monitor, manual
Features	source include
Description	Two pass 6502 assembler. An Adaptation by Steve Hales of the S.C. Assembler II. https://preview.tinyurl.com/yxue5ust

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ST-65 (disk)	
Version, Year	3.1(e), 1991
Author/Company	A. Stauffenberg, F. Offenga
Availability	https://preview.tinyurl.com/y23rnczj
Package	assembler, menu shell, manual
Features	macros, conditional assembly, source include, data include, boundary directive
Description	Two pass 6502/65c02 cross assembler for the Atari ST written in 68000 assembly. https://preview.tinyurl.com/y23rnczj

Xasm	
Version, Year	3.0.2, 2009 (Windows)
Version, Year	2.6.1, 2005 (DOS)
Version, Year	2.0, 1998 (first version)
Author/Company	Piotr Fusik
Availability	http://xasm.atari.org
Package	assembler, docs
Features	conditional assembly, source include, binary include, pseudo commands, pseudo addressing modes
Description	Two pass 6502 cross assembler for DOS/Windows. The source format is backward compatible with Quick Assembler.

8.2.2) BASIC

A BASIC Compiler (disk)	
Version, Year	1.05, 1987
Version, Year	1.03, 1983
Version, Year	1.02, 1983
Author/Company	Monarch Data Systems
Availability	?
Package	BASIC compiler
Features	single-pass compiler translates Atari BASIC into p-code.
Description	-

Advan BASIC (disk)	
Version, Year	N/A, 1985
Author/Company	Advan Language Designs (William Graziano)
Availability	http://advan.atarinet.com/
Package	BASIC compiler
Features	-
Description	Unprotected version released by the author http://advan.atarinet.com/

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Atari BASIC (cart)	
Version, Year	REV. C, 1983
Author/Company	Atari
Availability	CXL4002, standard ROM in Atari XL/XE
Package	BASIC interpreter, manual
Features	pretty plain BASIC implementation
Description	-

Atari Microsoft BASIC (disk)	
Version, Year	1.0, 1981
Author/Company	developed by Microsoft, published by Atari
Availability	CX8126
Package	BASIC interpreter released for the Atari 800
Features	Based on the full language level of Microsoft BASIC
Description	Shows 'Atari 800 BASIC V1.0' at startup.

Atari Microsoft BASIC II (cart + extensions disk)	
Version, Year	2.0, 1983
Author/Company	developed by Microsoft, published by Atari
Availability	AX2025 box contains: • Microsoft BASIC II Programming Language cart. RX8035 • Microsoft BASIC II Extension Diskette DX5046 • [User's Guide] C061251 REV. A (1982) • Reference Manual C061257 REV. A (1983) • Quick Reference Guide C061253 REV. A (1982)
Package	BASIC interpreter
Features	Based on the full language level of Microsoft BASIC
Description	"Programs developed under the diskette-based version of Atari Microsoft BASIC can be run using Atari Microsoft BASIC II."

BASIC A+ (disk)	
Version, Year	3.05, 1983?
Author/Company	OSS
Availability	?
Package	BASIC interpreter, OS/A+, EASMD (Assembler/Editor)
Features	-
Description	http://en.wikipedia.org/wiki/BASIC_A%2B

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BASIC XL (cart)	
Version, Year	?, ?
Author/Company	OSS
Availability	?
Package	BASIC interpreter
Features	-
Description	-

BASIC XE (cart + extensions disk)	
Version, Year	4.1, 1985
Author/Company	OSS
Availability	?
Package	BASIC interpreter
Features	requires XL/XE; supports 130XE extended memory
Description	-

CTH Fast Basic (disk)	
Version, Year	?
Author/Company	Tom Hunt/Closer to Home
Availability	PD, Freeware or Shareware;
Package	language plus several test files and examples; english docs;
Features	faster than Atari Basic, not much slower than TB, does not use Ram under OS;
Description	Available at Tom Hunt's homepage or elsewhere...

Der BASIC Compiler (disk)	
Version, Year	1.4, 1983
Author/Company	Datasoft
Availability	?
Package	BASIC compiler
Features	-
Description	Likely to be a German release of 'The BASIC Compiler'?

Frost BASIC (?)	
Version, Year	1.4, 1985
Author/Company	Frank Ostrowski, Happy Computer (magazine)
Availability	?
Package	BASIC interpreter, compiler
Features	-
Description	Version of Turbo Basic XL that runs on 48k machines (400/800).

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MMG BASIC Compiler 2.0 (disk)	
Version, Year	2.0, 1984
Author/Company	Special Software Systems
Availability	?
Package	BASIC compiler
Features	-
Description	It appears that this is a newer version of Der BASIC Compiler, licensed to MMG Micro Software (needs to be checked).

The BASIC Compiler (disk)	
Version, Year	1.4, 1983
Author/Company	Datasoft
Availability	?
Package	BASIC compiler
Features	four-pass compiler; compiles Atari BASIC programs into 6502 machine language; produces DATASM compatible assembler files
Description	-

TT-BASIC XL (disk)	
Version, Year	2.11, 1985
Author/Company	Frank Ostrowski, Happy Computer (magazine)
Availability	?
Package	BASIC interpreter, compiler
Features	-
Description	Published in the German Happy Computer (magazine). Appears to be a newer version of Turbo Basic XL.

Turbo Basic XL (disk)	
Version, Year	1.5, 1985
Author/Company	Frank Ostrowski, Happy Computer (magazine)
Availability	?
Package	BASIC interpreter, compiler (V1.1)
Features	-
Description	Published in the German Happy Computer (magazine).

8.2.3) C

ACE C (disk)	
Version, Year	?
Author/Company	Jack Palevich (John H. Palevich) & Ralph Walden
Availability	?
Package	?
Features	-
Description	This is a newer version of 'Deep Blue C'.

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C/65 (?)	
Version, Year	?
Author/Company	OSS
Availability	?
Package	?
Features	-
Description	Probably derived from Dr. Dobbs "Small C". Compiles to 6502 code which emulates the 8080 instruction set.

C65 (?)	
Version, Year	?
Author/Company	Keith Ledbetter
Availability	?
Package	?
Features	good macro assembler
Description	This compiler does not support structs.

CC65 (disk)	
Version, Year	1989
Author/Company	John R. Dunning
Availability	umich archive, https://preview.tinyurl.com/y45tskku
Package	compiler, linker, assembler, librarian
Features	-
Description	Public domain compiler. Also used as cross compiler. Relocatable object linkage files, and the most thorough K&R C for the 8-bit. Comes with an relocatable assembler.

CC8 (disk)	
Version, Year	2.3
Author/Company	Jack Palevich (John H. Palevich) & Steve Kennedy
Availability	?
Package	Compiler
Features	-
Description	ACE C with more "real" C support (e.g. arrays of pointers to structs). Requires ACE C runtime libs and linker.

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Deep Blue C (disk)	
Version, Year	1.2, 1982
Author/Company	Jack Palevich (John H. Palevich), APX
Availability	http://www.atariarchives.org/APX/showinfo.php?cat=20166 Source code "Deep Blue Secrets" downloadable at http://www.atariarchives.org/APX/showinfo.php?cat=20179
Package	Compiler, Linker
Features	-
Description	Deep Blue C was originally an independent product, but it then became available from APX. It converts C to pseudo-code and then interprets the pseudo code (8080 instruction set emulation). Drawn from Ron Cain's public domain C-compiler (Small-C).

DVC C (disk)	
Version, Year	1.05, 1985
Author/Company	Ralph E. Walden
Availability	?
Package	Editor, Compiler, Optimizer, Linker
Features	Quite user-friendly program
Description	The compiler generates special object files (.CCC) which can be optimized and linked. The package uses a special DOS called DVC DOS which contains runtime stuff.

LightSpeed C (disk)	
Version, Year	1.08, 1986
Version, Year	3.0, 1988
Author/Company	Clearstar Softechnology
Availability	?
Package	Compiler, Optimizer, Linker
Features	-
Description	Runs under CLI DOS's and MENU DOS's.

Tiny-C	
Version, Year	?
Author/Company	OSS
Availability	?
Package	?
Features	-
Description	First sold C compiler by OSS. This compiler was used to compile itself! First true language "bootstrap" on any 8-bit machine (it was also available for Apple and CP/M machines). Derived from Dr. Dobbs "Small C". Compiles to 6502 code which emulates the 8080 instruction set.

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8.2.4) PASCAL

Atari Pascal (disk)	
Version, Year	1.0, 1982
Author/Company	APX
Availability	APX-20102, Information at http://www.atariarchives.org/APX/showinfo.php?cat=20102
Package	?
Features	-
Description	Requires two drives.

CLSN Pascal (disk)	
Version, Year	1989?
Author/Company	CLSN Software
Availability	?
Package	editor, compiler
Features	generates 6502 machine code
Description	Requires 128K XL/XE

Draper Pascal (disk)	
Version, Year	2.1, 1989
Author/Company	Norm Draper
Availability	?
Package	?
Features	-
Description	-

Kyan Pascal (disk)	
Version, Year	2.02, 1986
Author/Company	Kyan Software
Availability	?
Package	editor, compiler, linker, macro-assembler and manual
Features	-
Description	-

8.2.5) LISP

INTER-LISP/65 (disk)	
Version, Year	2.1, 1981
Version, Year	2.2, 1982
Author/Company	Special Software Systems, DataSoft
Availability	?
Package	?
Features	-
Description	-

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8.2.6) FORTH

ES-FORTH	
Version, Year	1.2, 1984
Author/Company	The English Software Company
Availability	http://www.strotmann.de/twiki/bin/view/APG/LangForthESForth
Package	?
Features	-
Description	Seems to be based on fig-FORTH, but with some unique "Words". Works with normal DOS.

Extended fig-FORTH, (disk)	
Version, Year	11/10/1981
Version, Year	1.1 REV. 2.0, 01/15/1982
Author/Company	Patrick Mullarky, APX
Availability	APX-20029, Information at http://www.atariarchives.org/APX/showinfo.php?cat=20029
Package	?
Features	-
Description	-

fig-FORTH	
Version, Year	1/26/1981 and 4/01/1982 releases
Author/Company	Steve Calfee "Team FORTH"
Availability	http://www.atariarchives.org/APX/showinfo.php?cat=unknown_fig
Package	?
Features	-
Description	-

fig-FORTH	
Version, Year	4/10/1982
Author/Company	Peter Lipson / Robin Ziegler "Team FORTH"
Availability	?
Package	?
Features	-
Description	Based on 4/1/1982 release of fig-FORTH by Steve Calfee

fig-FORTH	
Version, Year	5/5/1982 - 10/16/1982
Author/Company	Harald Striepe "Team FORTH"
Availability	?
Package	?
Features	-
Description	Based on 4/10/82 release of fig-FORTH by Lipson/Ziegler

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fig-FORTH, Antic (disk)	
Version, Year	1.4S REV. H, 18 Jun 1985
Author/Company	John Stanley/Antic Magazine "Team FORTH"
Availability	http://www.strotmann.de/twiki/bin/view/APG/LangForthAntic
Package	?
Features	-
Description	Based on 10/16/82 release of fig-FORTH by Striepe

fun-Forth (disk)	
Version, Year	?
Author/Company	Joel Gluck, APX
Availability	APX-20146, Information at http://www.atariarchives.org/APX/showinfo.php?cat=20146
Package	?
Features	-
Description	-

Grafik-FORTH	
Version, Year	1990
Author/Company	RAI Production
Availability	https://preview.tinyurl.com/yxrz6p3p
Package	?
Features	-
Description	Based on fig-FORTH 1.4S and TURBO-GRAPHICS-SYSTEM 256

MesaForth	
Version, Year	12/03/1981
Author/Company	?
Availability	http://www.strotmann.de/twiki/bin/view/APG/LangForthMesa
Package	language, source code, documents, examples
Features	-
Description	Based on 6502 fig-Forth. The major difference is in the size of the screen on disk (512 bytes instead of 1024 bytes). Runs under ATARI DOS 2.0S.

QS FORTH	
Version, Year	1.0, 3/27/1981
Author/Company	James Abanese / [QS] Quality Software
Availability	http://www.strotmann.de/twiki/bin/view/APG/LangForthQS
Package	Editor, Assembler, I/O routines Single Density 5.25 Floppy and Manual in Binder
Features	Editor, Assembler, I/O Routines
Description	Based on fig-FORTH.

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Turbo-4th	
Version, Year	January 1985
Author/Company	Steve Calfee
Availability	?
Package	?
Features	-
Description	Compatible with fig-FORTH and Team FORTH. It's fast. Not threaded, it is a true compiler

ValForth (disk)	
Version, Year	1.1, 1982
Author/Company	Valpar International
Availability	?
Package	(8) disks in the set including: 1) master disk, 2) display formatter, 3) text compression and auto text formatting, 4) valDOS-I, 5) valDOS-II, 6) player-missile graphics, character editor and sound editor, 7) general utilities and video editor, 8) Turtle & valGraphics and advanced floating-point routines.
Features	-
Description	Based on fig-FORTH

X-FORTH	
Version, Year	26 Jan 2003
Author/Company	Carsten Strotmann
Availability	http://www.strotmann.de/twiki/bin/view/APG/ProjXForth
Package	binary, source, disk image with samples & editor
Features	aims to be compatible with new ANSI standard
Description	Works with normal DOS.

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8.2.7) PILOT

Programming Language Pilot Educators Package, Pilot with "Turtle" Graphics (CX405) (cart, tape)	
Version, Year	1980, 1981, 1982
Author/Company	Atari
Availability	?
Package	• Pilot Cartridge (CXL4018) • Two demonstration program cassettes (CX4113A/B) • Pocket Reference Card C017812 REV. 2 - Program © 1980, Manual © 1981 • Pilot Demonstration Programs Users Guide C017810 REV. 1 – Program © 1980, Manual © 1981 • Pilot Primer: The Pilot Programming Language Instruction Manual C017809 REV. 2 – Program © 1980 Atari, Manual © 1980 Dymax • Student Pilot: Reference Guide C017811 REV. 1 - Program © 1980, Manual © 1981.
Features	-
Description	-

8.2.8) LOGO

Atari LOGO (cart)	
Version, Year	1983
Author/Company	Logo Computer Systems, Inc. of Montreal, Canada & Atari
Availability	?
Package	?
Features	-
Description	-

8.2.9) All the rest

Action! (cart)	
Version, Year	3.6, 1983
Author/Company	Action! Computer Services (Clinton Parker), published by OSS
Availability	?
Package	compiler, editor, monitor and library
Features	fast compiler which generates good code
Description	Needs cartridge for runtime procedures. A PD runtime library is also available. All variables are static, so recursive routine calls are not possible. No floating-point type (though a PD library should make this possible). No arrays of objects (arrays of POINTERS to objects are possible).

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Extended WSFN, WSFN = Which Stands For Nothing	
Version, Year	?
Author/Company	Harry B. Stewart, APX
Availability	APX-20026
Package	?
Features	?
Description	Info at http://www.atariarchives.org/APX/showinfo.php?cat=20026

Quick (disk)	
Version, Year	2.0, 1990
Author/Company	Raindorf Soft
Availability	?
Package	?
Features	-
Description	This is the "poor man's Action!". Same restrictions as Action! apply also to Quick. Further restrictions are: only simple assignment expressions, no records and no pointers.

PL65 (disk)	
Version, Year	1.0, 1987
Author/Company	Noahsoft
Availability	commercial, Extremely rare
Package	compiler, editor, library, sample game
Features	Similar features to Action with same restrictions
Description	Highly flexible language that includes inline assembler features and pointers. Robust and well-engineered editor. Does not require additional runtime library - automatically generated and included in the compiled code during compilation.

Test Computer Language (disk)	
Version, Year	2.2, 1985-1990
Author/Company	D. Firth
Availability	public domain, ?
Package	compiler and editor
Features	?
Description	-

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8.3) What cartridges were released for the Right Slot of the 800?

This should be a complete list of commercial cartridges produced for use in the Right Cartridge slot of the Atari 800.

- ACE-80, programmed by **Claus Buchholz** for Amiable Computer Enhancements (1985) or by Vintage Computer Center (2021) (software-generated 80 column display)
  - Compatible with Atari BASIC, with patches available for: OS/A+, EASMD, Letter Perfect v.6, Data Perfect, Atari Logo
  - Note: There is also ACE-80XL, nearly identical but a standard Left Cartridge for any 8-bit Atari computer (48 KiB RAM), also sold by Amiable Computer Enhancements (1985) or by Vintage Computer Center (2021)
- Adapta-Cartridge B: by Microsota, Inc.
- Austin 80 Console Software by Austin Franklin Associates (for use with the Austin 80 Column Video Processor Board)
- Block (first right cartridge; first "backup" program hardware device)
- Cartridge Maker by Radical Systems (EPROM burner)
- KISS by Eastern House
- Magic Dump by Geminisoft/Eric Wolz for Sar-An Computer Products (SCP)
- Magic Dump II by Geminisoft/Eric Wolz for Sar-An Computer Products (SCP)
- Monkey Wrench by Eastern House
- Monkey Wrench II (original 800 version) by Eastern House
  - Note: There is also a Monkey Wrench II for Atari XL version that works with XL/XE computers except 1200XL
- R-Time 8 by ICD (battery-backed clock, for left or right cartridge slots)
- Real Time Cartridge by Sunmark
- Right Cartridge which boots the Atari from the Corvus disk system. (by ????? Details????)

8.4) What programs use paddle controllers?

Programs that use the Atari CX30 Paddle Controllers:

- Arkanoid (Taito)(Mike Hutchinson for Imagine, 1987; for The Hit Squad, 1987)
- Arkanoid II (Prof Soft Amsterdam, 1987)
- Asteraxis 2k (Waldemar Pawlaszek & Remigiusz Zukowski, 2001)
- Avalanche (Dennis Knoble for APX, 1980)
- Balloon Game (Kelly Jones & Bill Williams, 1984)
- Balloon Pop (White Bag Software, 1986) (paddles support according to Antic)
- Bird-Man-3D demo (AMC-Verlag)
- Blazing Paddles (Baudville, 1986)
- Block Buster (Bradshaw & Griesemer for APX, 1981; Quality Software, 1981)
- Bomber (Lyren Brown, Jose Pereira, Marek Pesout, 2015)
- Breakout / Breakout!!! / brkwall.bas (public domain, author unknown)
- Burgers! (**Douglas Crockford**, 1983)
- Bust Out (Dennis Debro, 1989)

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- Cascade (F. Neil Simms for ANALOG #28, March 1985)
- Castle Crisis (Bryan Edewaard, 2004)
- Checkers (David Slate for Odesta, 1982)
- Chess 7.0 (Larry Atkin for Odesta, 1982)
- Chicken (Mike Potter for Synapse, 1982)
- Chiseler (John Scarborough for Compute!'s First Book of Atari Games, 1983)
- Clowns and Balloons (Frank Cohen for Datasoft, 1982)
- Comment Compter ("Counter" by Al P. Casper for Atari France)
- Computer Quarterback (Dan Bunten for SSI, 1983)
- Counter (Al P. Casper for APX, 1982)
- David's Midnight Magic (David Snider for Broderbund, 1982)
- Descente a Ski ("Downhill" by **Mark Reid** for Atari France)
- Diamond Drop (Matthias M. Giwer for Compute!, 1983)
- Downhill (**Mark Reid** for APX)
- Dragonriders of Pern (Jim W. Connelley for Epyx, 1983)
- Etch-1 (public domain, author unknown)
- Frog (Stan Ockers 5/82 for A.C.E. Newsletter, July 1982)
- Frog (Stan Ockers 6/82 for Antic, Oct/Nov 1982)
- Golden Oldies Volume 1 v2.2 (Mike Fitch for Software Country, 1985)
- Golden Oldies Volume 1 v2.3 (Mike Fitch, The Software Toolworks, 1987, © 1985)
- Hardwaretester/Peripheral Test 2.0 by Florian Dingler, 2008
- Horse of a Different Color V1.0 (**Gus Makreas**, 3/1/81)
- Insomnia (**Bob Fraser** for APX, 1981)
- IQ by David S. Maynard for CRL, 1987
- Kaboom! (**Larry Kaplan** & Paul Willson for Activision, 1983)
- JunkYard Racing (Tim Gearin, 1999)
- Landing Simulator (by Jake Jacobs for Creative Computing magazine, written for Apple II, Atari translation by Bruce Jordan)
- Laser Game (public domain, author unknown)
- Laser Wars (Mike Potter for Crystalware, 1981)
- Lie Detector (Michael Krueger for Antic, 1986)
- Livewire (Tom Hudson - ANALOG #12)
- Livewire 2 (Tom Hudson - ANALOG #12 - Modified by Wolf)
- Lost in Space (Sijmen Schouten, 2015)
- Lunar Lander (Wes Newell)
- Megaoids (Peter J. Meyer and Lance Ringquist for Video 61, 2016)
- Midnight Strip (M. L. Clayton, 1982)
- M.U.L.E. (Ozark Softscape for Electronic Arts, 1983)
- Night Driver (Dudek, Szpilowski, Ziembik, 2008)
- Nineball (Jay M. Ford for ZiMAG, 1982)
- One on One! (Chris York for Compute!, 1983)
- Pad 1.83 by Nelson Ramirez, 2014
- Paratroop Attack (David Plotkin for Compute!'s Second Book of Atari, 1982)
- "Perfected Pong" see: Pong! ("Perfected Pong") below
- Personal Fitness Program (Dave Getreu for APX, 1981)

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- Pinball Construction Set (Electronic Arts)
  - all pinball games created with Pinball Construction Set
- PlatterMania (Michael Farren for Epyx, 1982)
- Pong ("Super Pong")(Gary Domrow/Summit Software Group, ANALOG #39 Feb.1986)
- [Pong] ("Pong 2", pong2.com, public domain, author unknown)
- Pong! ("Perfected Pong") (Bob Ayik for Antic, May 1988)
- Pool 1.5 (Howard De St. Germain for IDSI, 1981)
- Prisonball (John Scarborough for Compute! #77, October 1986)
- Probe One - The Transmitter (Lloyd Ollmann for Synergistic Software, 1982)
- Rain of Terror (Rob Schlortt and Eric Henneke, 2016)
- RealSports Curling (Ryan Witmer for 5200, conversion by Homesoft, 2019)
- Safe Cracker (Mike Starnes)
- Space Arena (Fandal, 2009)
- Space Bombs (John Y. Hsu, 1984)
- Space Eggs (Dan Thompson for Sirius, 1981)
- Speedblaster (Pinball Construction Set Game by MR Datentechnik)
- Spy's Demise (Robert Hardy & Alan Zeldin for Penguin Software, 1983)
- Stardust (MR Datentechnik)
- Starshot (Matthias M. Giwer for Compute!, 1983)
- States and Capitals (David J. Bohlke for SoftSide, 1980)
- Stereo 3-D Graphics Package (Clyde Spencer for APX, 1982)
- Super Ball (Compy-Shop)
- Super Ball 2 (Compy-Shop)
- Super Ball 3 (Compy-Shop)
- Super Ball 4 (Compy-Shop)
- Super Breakout by **Larry Kaplan** for Atari, 1979
- "Super Pong" see: Pong ("Super Pong") above
- Stretch (public domain Gr. 15 pict. stretcher, author unknown)
- Superski (AMC, 1994 - patch for paddles by HOMESOFT)
- Surround'Em (Peter J. Meyer for Video 61, 2017)
- Tempest Elite (Peter J. Meyer for Video 61, 2017)
- Tile Smashers (Peter J. Meyer for Video 61, 2017)
- Tilter (public domain, author unknown)
- Uranium Core (Martin Stiby for Computer & Video Games mag, 1982/11)
- Warlords (The Webbed Sphere BBS)
- Wavy Navy (Rodney McAuley for Sirius, 1983)
- Wayout (Paul Allen Edelstein for Sirius, 1982)
- WildWest (Stan Ockers for ACE Newsletter, 1983)
- Word Radar (Jerry Chaffin & Bill Maxwell & Barbara Thompson for DLM, 1984)
- Worms? by David S. Maynard for Electronic Arts, 1983

See also AtariMania lists of games & utilities that use paddle controllers:
http://preview.tinyurl.com/qxynbh8
http://preview.tinyurl.com/mnyrhsw
See also Fandal site search for games that use paddle controllers:
http://a8.fandal.cz/search.php?search=paddle&butt_details_x=x

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Note that the Atari Touch Tablet, the KoalaPad Touch Tablet, and the Suncom Animation Station are read by the computer in the same way that the computer receives data from paddle controllers, making software designed for graphics tablets at least somewhat usable with paddles as well.

8.5) What programs use Keyboard Controllers?

This should be a complete list of released programs designed to use the Atari Keyboard Controllers, Video Touch Pad, or Kid's Controller (which are all mutually compatible with each other).

- Keypad Controller, by Thomas D. Newton for APX, 1982
- Keypad Controller, REV. 2, by Thomas D. Newton for APX, 1982
  - REV. 2 contains an option for using the program with two-player games
- Preschool Games, by **Bob Polaro** for APX, 1981

See also AtariMania lists of games & utilities using keyboard controllers:
http://preview.tinyurl.com/o4yw6hd
http://preview.tinyurl.com/p7vmxdv

8.6) What programs are designed to use a light pen?

Contributors to this section: Bertrand M. (LEXX), **Andreas Koch**

While the user experiences are quite different, the Atari computer reads the horizontal and vertical positions of a light pen or a light gun in the same way. Consequently, while software programs are usually designed for either one or the other, these two types of controllers can sometimes substitute for each other.

A light pen or light gun requires a cathode ray tube (CRT) television or monitor. Only one light pen or light gun may be used on the Atari at a time.

Also, on the 400, Controller Jacks #1-#3 do not support a light pen / light gun, only controller port #4 can be used. This effectively makes many light pen / light gun programs incompatible with the 400.

Programs designed for a light pen:
- Alien Blast, Richard Gore for DGS, 1993
- Alphabet Construction Set (Playground Software) by Futurehouse
- Alphabet Fun for the Young, by Tech Sketch
- Alphabet Recognition, The Programmer's Institute/Futurehouse, 1982
- Animal Crackers (Playground Software) by Futurehouse
- AtariGraphics by Steve Gibson for Atari, © 1984
  (RX8054, shipped with Atari Light Pen CX75 only)
- Belegost, by Ondrej Cada, Mirek Fidler, Antonin Holik, Rudolf Kudla, 2016
- Blazing Paddles by Baudville, 1986

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- Color For The Non-Reader, The Programmer's Institute/Futurehouse, 1982
- Computer Crayons (Playground Software) by Futurehouse
- Concentration by Stack Computer Services, 1983
- Crossword Twister by Stack Computer Services, 1983
- Demonstration program cassette by Atari, 1980 (CX4124, shipped with CX70)
- Different Shape Identification, The Programmer's Institute/Futurehouse, 1982
- Different Symbol Discrimination, The Programmer's Institute/Futurehouse,1982
- Draughts by Stack Computer Services, 1983
- Go by Stack Computer Services, 1983
- Hardwaretester/Peripheral Test 2.0 by Florian Dingler, 2008
- Hit the Mole, by Carsten Strotmann, 2004
- Kinderware, by Tech Sketch
  - Includes 6 programs: Math Fun, Alphabet Fun, Shapes and Colors, Memory Jogger, Connect-a-Dot, Simon Sez
- KoalaPainter by Koala for Commodore 64/Atari (diskette)
  (Illustrator product by Island Graphics, light pen version)
- Letter Sequence, The Programmer's Institute/Futurehouse, 1982
- Letter Tutor by Edgework for Atari, 1984 prototype
- Life by Stack Computer Services, 1983
- Light Pen Doodle by John and Mary Harrison for Antic, 1984
- Like Shape Identification, The Programmer's Institute/Futurehouse, 1982
- Like Symbol Discrimination, The Programmer's Institute/Futurehouse, 1982
- LiteWriter by Stack Computer Services
- Little Red Riding Hood (Playground Software) by Futurehouse, 1983
- Lost in the Labyrinth by Stack Computer Services, 1983
- Math Fun for the Young - Level I by Tech Sketch, 1983
- Math Fun for the Young - Level II by Tech Sketch, 1983
- Matrix by Dave Oblad, 1985
- Memory Jogger, by Tech Sketch
- Micro Illustrator by Tech Sketch (diskette)
  (Illustrator product by Island Graphics, light pen version)
- Name That Color, The Programmer's Institute/Futurehouse, 1982
- Number Fun for the Young, by Tech Sketch
- Othello by Stack Computer Services, 1983
- Paint-N-Sketch Level I by Tech Sketch, 1983
  (shipped with many Tech Sketch LP-15 and LP-10S Light Pens)
- Paint-N-Sketch Level II by Tech Sketch, 1983
- Peripheral Vision by Futurehouse, 1984
  - Shipped with Edumate Light Pen 1984 package for Atari/Commodore 64
- Seek and Destroy by Stack Computer Services, 1983
- Shape and Color Recognition by Tech Sketch, 1983
- Shuffler by Stack Computer Services, 1983
- Simon by Stack Computer Services, 1983
- Simon Sez, by Tech Sketch
- Word Search, by Tech Sketch

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See also AtariMania lists of games & utilities that use a light pen:
http://preview.tinyurl.com/ps962gx
http://preview.tinyurl.com/pqe5ppu

8.7) What programs include CX85 Numerical Keypad support?

This section started by **Andreas Koch** (entries with ";").
To do: use Zong issues 7/92- for further verification

- Aquanaut (Zong 11/91)
- Ball Harbour (Zong 8/1992);
- The Big Quest (Zong 7/1992);
- Blob (Zong 2/92)
- Bomb Down, by The Roemer/U.N.O.
- The Bookkeeper, by Atari, 1982
- The Brundles, by KE-Soft, 1993 (hold SPACE at boot for configuration)
- Car Race (Zong 12/91)
- Catch (Zong 6/92)
- Click!, by **Chris Martin**, 2008
- Code table (Zong 11+12/1993);
- Cursor Steuerung: Cursor 2 (Zong 1/92)
- CX-85-Driver (Zong 7+8/1994);
- CX-85-Keycode-driver (Zong 7+8/1995);
- CX85 Reeve Key, by Alan Reeve, 1986 (free version of: Super ReeveKey)
- Deepspace (Zong 11/91)
- Donald-Demo (Zong 4/92)
- Donald, by KE-Soft, 1992
- Drag Update Version, by KE-Soft, 1991 (see Zong 9/91 p22)
- Dragon Fire, by Kemal Ezcan for Zong 1/93
- FlickerTerm 80 v.0.51, by LonerSoft (Clay Halliwell), 1995
- Gravitar (Zong 4/92)
- Gulp (Zong 3/92)
- Guzzler (Zong 1/92)
- Hardwaretester/Peripheral Test 2.0, by Florian Dingler, 2008
- Hungry Goblin (Zong 5/92)
- Hurdle Jumper (Zong 10/91)
- Invaders (Zong 5+6/1993);
- Johnny the Ghost, by Harald and Marcus Gitzel (Drachensoft), 1993, for Powersoft, 1994
- Joshi (Zong 3+4/1993);
- Lasermaze-Demo (Zong 8/92)
- Lasermaze, by KE-Soft, 1992
- Lost in the Antarctic (Zong 2/92)
- Lundar Landing (Zong 1/92)
- Magnetix (Zong 9/91)

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- Mampfman (Zong 8/1992);
- Miner 1049er (Zong 4/92)
- Minipac (Zong 3/92)
- Minipac 2 (Zong 6/92)
- Money Raider (Zong 2/92)
- Monster Tracking (Zong 9/1992);
- Numerical Keypad Handler Master Program Diskette CX8139, by Atari, 1982
  - Explicitly promoted by Atari for use with VisiCalc
  - Disk contains two files: KEYPAD.OBJ and KEYPAD.SRC, which states:
  - DEMONSTRATION OF CX-85 KEYPAD INTERRUPT HANDLER, FLORA P. NG, 3/08/82
  - Disk is a boot disk. KEYPAD.OBJ loads and runs on system boot, then prompts the user to: "Insert your program diskette in drive #1 and press RETURN"
  - For keypad plugged into port 2
- Obst (Zong 1/92)
- Pac-Man (Zong 11/1992);
- The Pit (Zong 8/91)
- Schlumpf (Zong 5/92)
- Shoggoth (Zong 3/92)
- Slurp (Zong 3/92)
- Splat (Zong 9/91)
- Super Miner II (Zong 12/91)
- Super ReeveKey, by Reeve Software, 1986
  (Commercial version of: CX85 Reeve Key) (XL/XE only)
- Swop (Zong 10/91)
- Swop-Editor (Zong 11/91)
- Transsylvania (Zong 3+4/1993);
- Viro-Mania (Zong 2/1993);
- VT850, by Curtis Laser, 1991
- Wassergnom II (Zong 1/92)
- Zador Update Version, by KE-Soft, 1991 (see Zong 9/91 p22)
- Zador II, by KE-Soft, 1992

8.8) What programs are designed for a true trackball controller?

The following programs have a trackball mode designed for use with the Atari CX22 or CX80 Trak-Ball controllers in true trackball mode.

- Catch 88 by Simon Trew, 1991
  - Supports Multi-Mouse Trakball Driver by Simon Trew
- Centipede 5200 by Atari with trackball support by Peter Meyer, 2009
  - [CONTROL] + [T] for trackball mode
- Contiki OS package for Atari, by **Oliver Schmidt**
- Final Legacy by Atari, 1984
  (Optionally used in controller port #2 in the game's Sea-to-Air mode)
- Hardwaretester/Peripheral Test 2.0 by Florian Dingler, 2008

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- Knight Quest by Simon Trew, 1991
  - Supports Multi-Mouse Trakball Driver by Simon Trew
- Kriss Kross by Simon Trew, 1992
  - Supports Multi-Mouse Trakball Driver by Simon Trew
- Missile Command by **Rob Zdybel** for Atari, 1981
  - [CONTROL] + [T] for trackball mode – feature undocumented upon the program's release because Atari had not yet introduced a trackball controller.
- Missile Command+ by Paul Lee, 2005
  - [CONTROL] + [T] for trackball mode
- Multi-Mouse Trakball Driver by Simon Trew for New Atari User #42 1990
- Othello by Simon Trew, 1991
  - Supports Multi-Mouse Trakball Driver by Simon Trew
- PLATOTerm by **Thomas Cherryhomes**, 2018
- Slime by Steve Hales for Synapse, 1982 (press [T] for trackball mode)
- Tempest Elite by Peter J. Meyer for Video 61, 2017
- Tile Smashers by Peter J. Meyer for Video 61, 2017
- Toy'Swap by Victor Parada, 2015

See also AtariMania list of games that use CX22/CX80 trackball mode:
http://preview.tinyurl.com/knz2zmf
See also Fandal site search for games that use the CX22/CX80 trackball mode:
http://a8.fandal.cz/search.php?search=trak-ball&butt_details_x=x

8.9) What programs use: Touch Tablet or KoalaPad / Animation Station?

Thanks to **Andreas Koch** for the initial version of this section, and for providing copies of some of the rare programs listed here.

The Atari Touch Tablet and the KoalaPad/Animation Station tablets, while very similar, are slightly incompatible with each other in that y-position values are reversed.

8.9.1) Atari Touch Tablet

The following programs use the Atari Touch Tablet:
- AtariArtist by Atari (cartridge)
  (Illustrator product by Island Graphics, Atari Touch Tablet version)
  - Shipped with the Atari Touch Tablet
- Atari Rechner Simulation mit UPN, © 1985 MTC Mouse Tecnology Corp.
- CardStax 2.1 by David A. Paterson, 1993
- Catch 88 by Simon Trew, 1991
  - Supports Multi-Mouse Touch Tablet Driver by Simon Trew
- Chopin 2010 by Krzysztof Dudek (xxl), 2010 ("mouse cmi08" mode)
- Click! (**Chris Martin**, 2008)
- Colour Enhancer by David Blackshaw, © 1986/1987 Hillside Software

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- Contiki OS package for Atari, by **Oliver Schmidt**
- Desktop Performance Studio (Virtuoso)
- Diamond GOS by Reeve Software
- Diamond Develop by Reeve Software, requires Diamond GOS
- Diamond News Station by Reeve Software, requires Diamond GOS
- Diamond Paint by Reeve Software, requires Diamond GOS
- Diamond Write by Reeve Software, requires Diamond GOS
- DigiPaint 1.0 by Volker Eloesser
- Dye by Christian Krueger, 2016
- ECKN+ by Christian Krueger for Berlin Softworks, 2008
- Hardwaretester/Peripheral Test 2.0 by Florian Dingler, 2008
- Hit the Mole by Carsten Strotmann, 2004
- Knight Quest by Simon Trew, 1991
  - Supports Multi-Mouse Touch Tablet Driver by Simon Trew
- Koala Cursor Demonstration Program by Karl E. Wiegers for Antic, Jan. 1985 (article name: "Touch Tablet Cursor" ; original filename: KOALA.BAS)
- Kriss Kross by Simon Trew, 1992
  - Supports Multi-Mouse Touch Tablet Driver by Simon Trew
- Macro Edit / EDMAC (character set/screen editor) by John Oakley
- Multi-Mouse Touch Tablet Driver by Simon Trew for New Atari User #42 1990
- Musorqa by Ron Torborg for ANALOG #34, Sept. 1985
- Othello by Simon Trew, 1991
  - Supports Multi-Mouse Touch Tablet Driver by Simon Trew
- Pixel Artist Deluxe version 1.3 by Art Horan, 1988
- PLATOTerm by **Thomas Cherryhomes**, 2018
- The Print Shop (Broderbund)
- The Print Shop Companion (Broderbund)
- QUICK Ed Character Editor by PPP
- RAMbrandt by Bard Ermentrout
- Rubber Stamp (XLEnt)
- Smart Art II by Sean Puckett, 1984?
  - includes SMARTTAB.BAS patch for Touch Tablet/Koala support
  - includes TTCALIB.BAS Touch Tablet Calibration utility
- Typesetter (XLEnt)
- Xirius Defect by Martin Simecek, 2013
- Xirius Defect XXL by Martin Simecek, Jason Kendall, Zdenek Eisenhammer, 2014

See also AtariMania lists of games & utilities using the Atari Touch Tablet:
http://preview.tinyurl.com/pst2j96
http://preview.tinyurl.com/q3hvhss

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8.9.2) KoalaPad/Animation Station

The following programs use the KoalaPad or the Animation Station:

- Alphabet Construction Set (Playground Software) by Futurehouse
- Animal Crackers (Playground Software) by Futurehouse
- Blazing Paddles (Baudville, 1986)
- The Brundles by KE-Soft, 1993 (hold SPACE at boot for configuration)
- Click! (**Chris Martin**, 2008)
- Computer Crayons (Playground Software) by Futurehouse
- Desktop Performance Studio (Virtuoso)
- DesignLab
  (Suncom version of Blazing Paddles; Distributed with the Suncom Animation Station)
- Diamond GOS by Reeve Software
- Diamond Develop by Reeve Software, requires Diamond GOS
- Diamond News Station by Reeve Software, requires Diamond GOS
- Diamond Paint by Reeve Software, requires Diamond GOS
- Diamond Write by Reeve Software, requires Diamond GOS
- DigiPaint 1.0 by Volker Eloesser
- Hardwaretester/Peripheral Test 2.0 by Florian Dingler, 2008
- Hong Kong, Kemal Ezcan for Zong 5/93
- Koala Cursor Demonstration Program by Karl E. Wiegers for Antic, Jan. 1985
  (article name: "Touch Tablet Cursor" ; original filename: KOALA.BAS)
- KoalaPainter (cartridge)
  (Illustrator product by Island Graphics, KoalaPad version)
  - Shipped with many KoalaPad units for Atari computers
- Koala Sketch by Charles F. Johnson
- Little Red Riding Hood (Playground Software) by Futurehouse
- Macro Edit / EDMAC (character set/screen editor) by John Oakley
- Micro Illustrator (disk) by Steven Dompier for Koala, © 1983 Island
- Graphics (Illustrator product by Island Graphics, KoalaPad version)
  - Shipped with many KoalaPad units for Atari computers
- News Station (Reeve Software)
- Pixel Artist Deluxe version 1.3 by Art Horan, 1988
- Planetary Defense (Charles Bachand and Tom Hudson for ANALOG #17 March 1984)
- Planetary Defense 2012 (Charles Bachand, Tom Hudson)
- PLATOTerm by **Thomas Cherryhomes**, 2018
- The Print Shop (Broderbund)
- The Print Shop Companion (Broderbund)
- RAMbrandt by Bard Ermentrout
- Reader Rabbit (The Learning Company)
- Rubber Stamp (XLEnt)
- Smart Art II by Sean Puckett, 1984?
  - Includes SMARTTAB patch for Touch Tablet/Koala support
  - Includes TTCALIB.BAS Touch Tablet Calibration utility

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- Trails!
- Typesetter (XLEnt)
- Word Search (original author unknown)
  - Upgrade, screen output and Touch Tablet support by Warren Lieuallen 10/86

See also AtariMania lists of programs using the KoalaPad/Animation Station:
http://preview.tinyurl.com/orbbub4
http://preview.tinyurl.com/osa6bx7

Note that the Atari Touch Tablet, the KoalaPad Touch Tablet, and the Suncom Animation Station are read by the computer in the same way that the computer receives data from paddle controllers, making software designed for paddles at least somewhat usable with graphics tablets as well.

8.10) What programs are designed to use a light gun?

While the user experiences are quite different, the Atari computer reads the horizontal and vertical positions of a light pen or a light gun in the same way. Consequently, while software programs are usually designed for either one or the other, these two types of controllers can sometimes substitute for each other.

A light pen or light gun requires a cathode ray tube (CRT) television or monitor. Only one light pen or light gun may be used on the Atari at a time.

Also, on the 400, Controller Jacks #1-#3 do not support a light pen / light gun, only controller port #4 can be used. This effectively makes many light pen / light gun programs incompatible with the 400.

Programs designed for a light gun:
- Alien Blast, Richard Gore for DGS, 1993
- Barnyard Blaster, James V. Zalewski for Atari, 1987
- Bembel Wo by Thorsten Butschke for Foundation Two, 1998
- Bug Hunt, Alan Murphy and **Rob Zdybel** for Atari, 1987
- Cementerio, Pelusa Software, 1989
- Click!, **Chris Martin**, 2008
- Comparando Figuras, Turbo Software/M.P.M., 1989?
- Crime Buster, Ron Andrzejewski & James Zalewski for Atari, 1988
- Crossbow, Sculptured Software for Atari, 1988
- Disparando a la Vocales, Turbo Software/M.P.M., 1989?
- Emboscada en el Desierto, Turbo Software/M.P.M., 1989?
- Fly Shooting, by Kemal Ezcan for Zong 2/93
- Gangsters by Houra, Pesout, Stefek, Sterba, Svoboda, 2007
- Gangstersville, Emanuele Bergamini for Lindasoft, 1988
- Geisterschloss, KE-Soft, 1992
- Guntris by Richard Gore, 1996

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- Hardwaretester/Peripheral Test 2.0 by Florian Dingler, 2008
- Helocoptero de Combate, Turbo Software/M.P.M., 1989?
- Hit the Mole, by Carsten Strotmann, 2004
- Invasion, Pelusa Soft
- Jezkovy voci, Frantisek Houra, 2016
- Laser Gun, Turbo Software/M.P.M., 1989?
- Laser Math, Turbo Software/M.P.M., 1989?
- Light Gun Blaster, Andre Willey, Atari User Feb. 1988
- Light Gun Blaster (enhanced) by Pedrokko
- Messe Hanau, Kemal Ezcan, 1995
- Operation Blood, P. Kalinowski & P. Bulkowski of Our 5oft for Mirage and ANG, Light Gun Version by The Missing Link (ANG), 1993
- Operacion Comando, Turbo Software/M.P.M., 1989?
- Pajaki II, Arkadiusz Lubaszka for ArSoft, 1996
- Schiessen, L. Franzky (Abbuc magazine)
- Sharp Shooter, Matthew J.W. Ratcliff for Analog #76 9/89
- Simon, Turbo Software/M.P.M., 1989?
- Sniper, Premysl Stefek, Radek Sterba, Petr Svoboda and Fandal, 2007
- Special Forces (Operation Blood II), P. Kalinowski & P. Bulkowski of Our 5oft for Mirage and ANG, light gun conversion by Homesoft
- Tiro al Blanco, Turbo Software/M.P.M., 1989?
- Toy'Swap, Victor Parada, 2015

See also Fandal site search for games that use a light gun:
http://a8.fandal.cz/search.php?search=light+gun&butt_details_x=x
See also AtariMania list of games that use a light gun:
http://preview.tinyurl.com/pffhtwh
See also http://atari.panprase.cz/?action=lg-hry

8.11) What programs use a computer mouse?

8.11.1) Atari STM1/PCM1 Mouse or compatible

Programs that use the Atari STM1/PCM1 Mouse or compatible (which would include the Zobian Controls SuperRAT):

- 8Bit-Mouse (BPAUG)
- Accu-Draw, by Vision software for Zobian Controls, 1987
- Artprog
- Atari Rechner Simulation mit UPN, © 1985 MTC Mouse Tecnology Corp.
- Black Magic Composer by Sven Tegethoff for Ulf Petersen, 1991
- Bomb Down by The Roemer/U.N.O.
- BOSS-X by Mirko Sobe / MS Software, 2003
- The Brundles by KE-Soft, 1993 (hold SPACE at boot for configuration)
- The Brundles Editor by KE-Soft, 1994
- CardStax 2.1 by David A. Paterson, 1993

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- Catch 88 by Simon Trew, 1991
  - Supports Multi-Mouse ST Mouse Driver by Simon Trew
- Celebrity Cookbook by David Sullivan/Total Control Systems for USA Media
- Click! by **Chris Martin**, 2008
- Contiki OS package for Atari, by **Oliver Schmidt**
- Copy F'n'F by Mirko Sobe / MS Software, requires BOSS-X
- Crescent Solitaire, Zdenek Eisenhammer, Frantisek Houra, Marek Pesout, 2018
- Datenbank by Mirko Sobe / MS Software, requires BOSS-X
- Diamond GOS by Reeve Software
- Diamond Develop by Reeve Software, requires Diamond GOS
- Diamond News Station by Reeve Software, requires Diamond GOS
- Diamond Paint by Reeve Software, requires Diamond GOS
- Diamond Write by Reeve Software, requires Diamond GOS
- Enigmatix! by Stephen A. Firth for Page 6, 1993
- EORoid by Daniel Kolakowski for Wolf Software Ltd, 1994
- Facher Patience, by Kemal Ezcan for Zong 1/93
  - With KE-Maus Beispielprogram
- Fig-Forth by Matt Symonds for Pulsar Software, 1988
- FireBall (a Breakout game, requires SAM)
- GOE demo by Total Control Systems/David Sullivan, 1988
- Guntris by Richard Gore, 1996
- Hardwaretester/Peripheral Test 2.0 by Florian Dingler, 2008
- Hong Kong, Kemal Ezcan for Zong 5/93
- Klony 2010 by Arkadiusz Lubaszka for ArSoft, 2010
- Knight Quest by Simon Trew, 1991
  - Supports Multi-Mouse ST Mouse Driver by Simon Trew
- Kriss Kross by Simon Trew, 1992
  - Supports Multi-Mouse ST Mouse Driver by Simon Trew
- Macao, by Alexander Klinner for Zong 5/94
- Mau Mau X by Mirko Sobe / MS Software, requires BOSS-X
- Maus Calculator, by AMC Verlag, © by Peter Eilert
- Maus-DOS, by Volker Matzat for Zong 5/93
- Minesweeper by **Harald Schoenfeld** for PPP, 1992
- Mine Sweeper by Raindorf Soft
- Mine Sweeper 3
- Missile Command by **Rob Zdybel** for Atari, 1981.
  [CONTROL] + [T] for trackball/mouse mode, according to Atari's 1987 documentation supplied with the XE game system (with Missile Command built-in).
  In fact, the game's (originally undocumented) trackball mode inadvertently also supports many, but not all, versions of the Atari STM1/PCM1 and compatible mouse.
- M.O.S. (from Abbuc mag.)
- MS-Copy 1.1 by Mirko Sobe / MS Software, requires BOSS-X
- Multi-Mouse ST Mouse Driver by Simon Trew for New Atari User #42 1990
- Multi-Player by Madteam
- Multi-DOS
- Numblines by Jaroslaw Kucisz & Tomasz Kucisz for Utopia Software, 1997
- Operation Blood, P. Kalinowski & P. Bulkowski of Our 5oft for Mirage and ANG, 1992

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- Othello by Simon Trew, 1991
  - Supports Multi-Mouse ST Mouse Driver by Simon Trew
- P-Graph(s) by ???
- Pad 1.2 (Padnoid) by Nelson Ramirez / New Age, 1995
- Pad 1.83 by Nelson Ramirez, 2014
- PLATOTerm by **Thomas Cherryhomes**, 2018
- QUICK Ed Character Editor by PPP
- RAOS Desktop, by Syntel for Zobian Controls, 1987
- SAM (Screen Aided Management) by Power Per Post & Raindorf Soft (a GUI!)
- SAM Budget (80 column spreadsheet program, requires SAM)
- SAM Convert (text files to/from the SAM Texter format, requires SAM)
- SAM Creator (SAM Painter files to/from Micro-Painter format, requires SAM)
- SAM Designer (drawing and design / desktop publishing, requires SAM)
- SAM Memobox (card filing program, requires SAM)
- SAM Monitor (view and change memory, requires SAM)
- SAM Painter (128 color paint program, requires SAM)
- SAM Texter (80 column word processor, requires SAM)
- Screens 2.0, by Zobian Controls, 1987
- Shanghai by Peter Sabath for Activision, 1987
- Special Forces (Operation Blood II), P. Kalinowski & P. Bulkowski of Our 5oft for Mirage and ANG, 1993
- Sprint XL (from Abbuc)
- Tommingi by Tomek Borygo
- Toy'Swap by Victor Parada, 2015
- TRS Desktop by Tristesse, 2006
- Unriagh II by Uwe Hartwig, 1986
- Vanish, Kemal Ezcan for Zong 7/93
- Vier gewinnt

See also Fandal site search for games that use the Atari mouse:
http://a8.fandal.cz/search.php?search=mouse&butt_details_x=x
See also AtariMania lists of games & utilities using the Atari mouse:
http://preview.tinyurl.com/mcm6wwo
http://preview.tinyurl.com/oa7gklk

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8.11.2) Zobian Controls RAT (which never shipped?)

Programs that could use the original Zobian Controls RAT (which never shipped?):
- Accu-Draw (Rat Trace), by Vision software for Zobian Controls (original version for original RAT; never shipped?)
- Business Manager by Reeve Software, 1986
- Control (Rat Control) by Zobian Controls (never shipped?)
- Master Disk Directory II by Zobian Controls (never shipped?)
  - Based on Master Disk Directory by Jason Leigh, Analog #37 Dec-1985 pages 99-108
- Rich Man's Word Processor, by Mark Rogalski for Computer Software Services
  - Earlier name: Writer80
- Also announced by Zobian Controls in RAT-compatible versions (never shipped): Super 3-D Plotter (Elfin Magic), Rambrandt, Atari-Artist (AtariArtist)

8.11.3) Amiga mouse

Programs that use the Amiga mouse (original "tank" or 1352 models):
- Black Magic Composer by Sven Tegethoff for Ulf Petersen, 1991
- Bomb Down by The Roemer/U.N.O.
- Contiki OS package for Atari, by **Oliver Schmidt**
- Crescent Solitaire, Zdenek Eisenhammer, Frantisek Houra, Marek Pesout, 2018
- Global War by P.M.M. Elfinger & D.J. Garbowski for L.K. Avalon, 1993
- Klony 2010 by Arkadiusz Lubaszka for ArSoft, 2010
- Multi-Player by MadTeam
- Najemnik - Powrot by LK APM for Krysal Software
- Operation Blood, P. Kalinowski & P. Bulkowski of Our 5oft for Mirage and ANG, 1992
- Pad 1.83 by Nelson Ramirez, 2014
- PLATOTerm by **Thomas Cherryhomes**, 2018
- Samurai's Game by Rafaell Soft for Krysal Software, 1992
- Special Forces (Operation Blood II), P. Kalinowski & P. Bulkowski of Our 5oft for Mirage and ANG, 1993
- TRS Desktop by Tristesse, 2006

See also Fandal site search for games that use the Amiga mouse:
http://a8.fandal.cz/search.php?search=amiga+mouse&butt_details_x=x

8.11.4) Commodore 1351 mouse

Programs that use the Commodore 1351 mouse (mouse for Commodore 64/128):
- Klony by ArSoft, 2006

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8.12) What programs use Driving Controllers?

Programs that use the Atari CX20 Driving Controller:

- Megaoids by Peter J. Meyer and Lance Ringquist for Video 61, 2016
- Tempest Elite by Peter J. Meyer for Video 61, 2017
- Tile Smashers by Peter J. Meyer for Video 61, 2017

8.13) What games support 4 or more simultaneous players?

8.13.1) 4 joystick head-to-head play

The following games support 4 joystick head-to-head play on the 400/800:

- 4-Player Volleyball, original for Apple II by Jim Hilger for SoftSide #34 July 1981, Atari translation by Bradley J. Bell
- Ali Baba and the Forty Thieves by Stuart Smith for Quality Software
- Aliens, hack of Jack Palevich's (John H. Palevich) Dandy, programmer unknown
- Asteroids by **Tod Frye** for Atari
- Basketball by **Alan Miller** for Atari
- Battle Room (CIA vs. KGB) by SNACC
- Dandy by John H. Palevich (Jack Palevich) for APX
- Depth Warrior by Jack Chung for ROM magazine #7 Aug/Sep 1984
- Floyd of the Jungle by MicroProse (1982 and 1983 releases)
- GEM by Joel Gluck
- Killa Cycle by Simon Goodwin & David Muncer
- Hockey by Gamma Software, © 1981
- Major League Hockey by Thorn EMI
- Major League Soccer by Thorn EMI
- Maze War by Mark Price for ANALOG #36 Nov 1985
- Mouse Party by Bill Halsall for New Atari User #39 Aug/Sep 1989
- M.U.L.E. by Ozark Softscape for Electronic Arts
- The Return of Heracles by Stuart Smith for Quality Software
- Road Block / Roadblock by Brian Holness for Compute! vol.5 no. 7 #38 Jul-1983
- Silicon Warrior, developed by The Connelley Group for Epyx
- Sky Warrior by Jack Chung for ROM magazine #6 June/July 1984
- Soccer by Gamma Software
- Survivor by Richard Carr for Synapse
- Tank Battle by Fred Pinho for Antic vol. 3 no. 2 June 1984

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8.13.2) 4 paddle head-to-head play

The following games support 4 paddle head-to-head play:
- Castle Crisis by Bryan Edewaard, 2004
- IQ by David S. Maynard for CRL, 1987 (same game as "Worms?")
- JunkYard Racing (Tim Gearin, 1999)
- Space Arena by Fandal, 2009
- Warlords by ?, year? (public domain version, unlicensed)
- Worms? by David S. Maynard for Electronic Arts, 1983

8.13.3) 4 players on all machines, using special 4-button keypad controllers

The following game supports 4 joystick head-to-head play, using special 4-button keypad controllers linked together with RJ-11 jacks (standard phone jacks) to a box with 2 controller jack connectors:
- PQ: The Party Quiz Game by Suncom

8.13.4) Multi-joystick games, using extra hardware called Quadrotron

The following game supports 4 joystick head-to-head play, using extra hardware called Quadrotron (from the German Atari Magazin Feb-1989):
- Quadro-Tron by H. Schoenfeld (4-player Tron-clone)

8.13.5) Multi-joystick games, using extra hardware called Multijoy

The following games support multiple joystick head-to-head play, using extra hardware called Multijoy (multijoy4, multijoy8, or multijoy16 for up to 4, 8, or 16 players, respectively) which was developed by Radek Sterba / Raster & Atariklub Prostejov, see:
http://raster.infos.cz/atari/hw/multijoy.htm or
http://raster.infos.cz/atari/english.htm#MULTIJOY or
https://www.return-magazin.de/ausgaben/return-ausgabe-16/
- Acey-Duecey M4, original from L&S Computerware / Softsmith, patch by Fandal
- Asteroids M4, original from Atari, patch by Matthias Luedtke
- Astro4 Road by Frantisek Houra, Radek Sterba
- Astrowarriors M4, original from Apogee Software, patch by Fandal
- Atari Tennis M4, original from Atari, patch by Matthias Luedtke
- Ate'em All by Frantisek Houra and Christian Krueger, 2016
- Basketball M4, original from Atari, patch by Matthias Luedtke
- Battleroom M4, original by Steven Martin, patch by Fandal
- Boulders and Bombs M4, original by Keith Dreyer for K-Byte, patch by Fandal
- Bounce Ball M4, Jerzy Kasenberg, patch by Fandal

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- Bremspunkt by Thorsten Butschke, Rouven Gehm
- Bugs Fight M4 by Michael Kalous and Petr Postava, 2019
- Card Grabber by Florian Dingler
- Cervi by Radek Sterba
- Cervi 2 by Radek Sterba
- Cubes M8 by BAHA Software, 2019
- Dandy Dungeon M4, original from APX, patch by Matthias Luedtke
- Drutt M4+, original by Wojciech Gorski, Jacek Grad, patch by Fandal
- Dynakillers Unchained, original by Marek Chorvat, Robert Pecnik, and Marian Vybostok, patch by MatoSimi
- Floyd of the Jungle M4, original from MicroProse, patch by Fandal
- Fujiama Run by Matthias Luedtke, Stefan Niestegge
- Gem M4, original by Joel Gluck, patch by Fandal
- Helicops by Nils Feske, Frantisek Houra, Radek Sterba, Adam Wachowski
- Hockey M4, original from Gamma Software, patch by Fandal
- Hockey M8, original from Gamma Software, patch by Fandal
- Ice-Hockey by Florian Dingler
- Impact M4, original from **David Buehler**, patch by Fandal
- Jail Break M4, original by James Stage Jr., patch by Fandal
- Kde domov muj M4 by Michael Kalous and Petr Postava (2017)
- Killa Cycle M4, original by Simon Goodwin and David Muncer, patch by Fandal
- Killer 'Thello M4, original by Mark Price, patch by Fandal
- Major League Hockey M4, original from Thorn EMI, patch by Fandal
- Mashed Turtles by Zdenek Eisenhammer, Frantisek Houra
- Maze War M4, original from ANALOG, patch by Fandal
- Mouse Party M4, original by Bill Halsall, patch by Fandal
- M.U.L.E. M4, original for Electronic Arts, patch by Matthias Luedtke
- Multijoy 17Players Roulette by Marek Pesout and Zdenek Zubr (2021)
- Multiloops by Antonin Holik and Rudolf Kudla (2017)
- Multris by Radek Sterba (2001)
- Multris 2k17 by Radek Sterba, patch by Fandal
- Muxeso by Frantisek Houra and Marek Pesout, 2016
- Proto Basketball M4+, Atari original for 5200, conversion & patch by Fandal
- Quadrotron M4, original by Oliver Redner, Stefan Wiegmann, patch by Radek Sterba
- Rozstrel M4 by Michael Kalous and Petr Postava (2017)
- Rubacka vo kopec, by Zdenek Eisenhammer, Frantisek Houra, Michal Szpilowski
- Sails of Doom by R0ger, 2018
- Sheep-Race by Florian Dingler
- Shootout 2 M4 by BAHA Software, 2019
- Shot'em All by Radek Sterba
- Silicon Warrior M4, original from Epyx, patch by Fandal
- Snakes and Ladders M4, oiginal by C. Harper, Kevin Harper, patch by Fandal
- Soccer M4, original from Gamma Software, patch by Fandal
- Soccer M4, original from Thorn EMI, patch by Fandal
- Space Arena M4, by Frantisek Houra and Marek Pesout, 2014
- Survivor M4, original from Synapse, patch by Fandal

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- Table Football M4+, original by Anthony Wilson, patch by Fandal
- Tag! M4, original by Richard Gore, patch by Fandal 2015
- Tank Battle M4, original by Dan Pinal for the book "Atari Graphics and Arcade Game Design" (1984), patch by Fandal
- Tank M4 Battle, original by Harald Siegmund (1983), patch by Fandal
- Up for Grabs M4, original by Ken Madell for Spinnaker, patch by Fandal
- Wingman M4, original from MicroProse, patch by Fandal
- Yahtzee M4, original by Gary L. Born, patch by Fandal
- Zeppelin M4, original by William Mataga for Synapse, patch by Fandal
- See also Fandal site search for games that use a Multijoy: http://a8.fandal.cz/search.php?search=multijoy&butt_details_x=x

8.14) What programs support Atari computer networking?

This section started by **Andreas Koch**.

There are two different hardware add-ons which provide a "computer-network" (two or more Ataris linked together). Thus, there is software that supports either one or the other hardware (namely GameLink or GameLink-II). The following software supports the networking hardware:

GameLink (by DataQue, 1990):
- Computer Battleship, by John Babson and Bill Cleis, as patched by Rick Detlefsen for GameLink
- Tic-Tac-Two (a tic-tac-toe clone) by DataQue, 1990

GameLink-II (by DataQue, 1993) / Multilink (by Bewesoft):
- Maze of Agdagon (full version, 2-8 players) by The AGDA Group, 1993
- Multi-Dash (2-8 players, XL/XE only) by Bewesoft;
- Multi-Race (2-16 players, XL/XE only) by Bewesoft;
- Multi-Worms (2-8 or 2-16? players, XL/XE only) by Bewesoft;
- "Starter-kit" module to use in your own networking-games by Bewesoft (free use of this module is granted by Bewesoft/**Jiri Bernasek**);
- Speed-Up by Radek Sterba
- Speed-Up Gold by Radek Sterba

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8.15) What non-commercial telecommunications programs are there?

This section lists widely-used or notable non-commercial telecommunications programs for the Atari. These programs could be used for accessing dial-up online service providers, or for connecting to a dial-up bulletin board system (BBS) hosted by another home computer. Such activities were very popular on the Atari computer, especially from the mid-1980s to the mid-1990s.

AMISTERM, by Craig Chamberlain and Jim Steinbrecher, 3/17/82

- Early recommendation for accessing an AMIS BBS
- Upload/download (text only)
- Requires R: handler

JTERM, by Frank C. Jones, 1982-1984

- Originally based on a short BASIC program by Henrique Veludo published in Compute! magazine #9, Feb-1981
- Developed in cooperation with ARMUDIC BBS author Frank Huband
- Upload/download (text only)
- Requires R: handler
- Version 3.1, June 19, 1982
- Version 3.2, July 10, 1982, published in Compute! magazine #32, Jan-1983
- Version 3.8 published in Compute! magazine #56, Jan-1985
  - Added support for 1,200 bps modems

ATERM, by Marshall Abrams, 10/1982

- Simple terminal simulator (no specific terminal emulation)
- Upload/download (text only)
- Requires R: handler

AMODEM, by Jim Steinbrecher, 1982-1984

- Designed for accessing RCP/M and Atari bulletin board systems, and as a replacement for AMISTERM.
- XMODEM file transfers (standard protocol by Ward Christensen)
- Early releases: the major versions <2.0, 3.0, 4.0> were released by the author, while the "sub-versions <3.1, 3.2, 4.1...> were mostly prepared as personal modifications by others. 4.0 was released in 10/82.
- Atari MODEM Ver. 4.2
  - AMODEM4.BAS:VER 4.2; 11-24-82 (AMODEM42.BAS)
  - Requires R: handler

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- Atari MODEM-835/850 Ver. 4.2
  - AMODEM42.835:VER 4.2;01-15-84 (AMOD1030.BAS)
  - Requires T: handler; distributed with the author's 835/850 Handler
  - (alias AUTO1030.OBJ)
  - Unofficial release "SUPERTERM 835/1030 MODEM" distributed with slightly modified version of the Steinbrecher 835/850 Handler (SUPRTERM.AUT)
- "AMODEM Plus" – various versions released by others based on AMODEM 4.2
  - Example: AMODEM Plus Release 1.6, 7/15/83, by Matthew R. Singer

TSCOPE / MSCOPE / RSCOPE, by Joe Miller (Joseph B. Miller III), 1983-1986

- "This (limited-feature) telecom program was designed to be used with the CompuServe Information Service."
- Supported some CompuServe VIDTEX terminal program functions, including:
  - UPL and DOW commands for file transfers using the CIS 'A' Protocol
  - Online color graphics
- TSCOPE original release, 25 Dec 83
  - Integrated T: handler supports both 850-based and 835/1030 Modems
  - Does not work with the P:R: Connection interface
- MSCOPE, 18 May 85
  - Features of TSCOPE, but integrated modem driver is for MPP modems
- RSCOPE, 15 Apr 86
  - Features of TSCOPE without integrated modem driver, requires R: handler

Kermit for the Atari Home Computer, 1983-1984

- Kermit upload/download file transfers, DEC VT52 terminal emulation
- v1.1 by Jack Palevich (John H. Palevich) (1984/01/09)
  - Official port of the Columbia University Kermit Project software
  - Released as Action! source code, compiles into one of two versions:
    - For the Atari 850 and the DC-Hayes Smartmodem, with auto-dial support
    - For the Atari 1030 Modem
  - Requires R: or T: handler as appropriate
  - Available: http://www.columbia.edu/kermit/archive.html#atari
- v1.2 Kermit/1030 release by Jack Palevich (John H. Palevich), 1984 (aliases: KERMIT1030 or KBIN.HEX)
  - Requires T: handler
- v1.3 Atari/850 Kermit release by Jim Dahlberg, 1984
  - Requires R: handler

TERM1030, by Matthew S. Arrington, 1984-1985

- XMODEM upload/download
- Version 2.0 (1984?) requires T: handler
  - Distributed with TERM1030.AUT, a version of Steinbrecher's 835/850 Handler as slightly modified to automatically load and run a file named ".RUN" from disk after the driver is loaded.

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- Version 3.0 (1985) requires T: handler
  - Distributed with "Antic's T-handler for: TERM1030" (THANDLER.OBJ) which is a version of Steinbrecher's 835/850 Handler modified to work as AUTORUN.SYS on a DOS 2 disk with MEM.SAV created, in combination with TERM1030.BAS on that disk.
- Ver. 4.2R by Rich Schmitt, 5/1/85
  - Requires R: handler; R.BIN or 'RHANDLER2' recommended.

DiskLink, by Ken Fowkes, 1984 (alias: Disk 'o Link)

- Supports file transfers between two Atari computers running this program in 2 modes: ASCII text and modified XMODEM protocol.
- Thanks to nonstandard XMODEM implementation, allows two users to type back and forth (in a somewhat halting fashion) DURING file transfer.
- Integrated T: handler supports both 850-based and 835/1030 Modems

VT-10-Squared (VT10^2 or VT10SQ), by Alexander M. Stevens and David L. Bailey

- DEC VT100 terminal emulation, 80-column screen (software handler)
- Version 0.6, 1984? (VT100.OBJ)
  - Both 850-based and 835/1030 Modems supported via integrated handler derived from R.BIN
  - Instructions include a program to remove the integrated R.BIN to create VT10SQ.OBJ, either with an integrated MPP R: handler (distributed as the separate file MYHAND.OBJ), or without integrated R: handler to be used with the A.I.D. RHAND.OBJ R: handler for the R-Verter
- Version 0.7, 1985?
  - VT10SQ.XMO with integrated R.BIN, or VT10NH.XMO without R: handler
  - Adds some VT-100 features and corrects some bugs in order to facilitate operation with UNIX and the vi editor
  - Adds a capability to transmit even or odd parity
- Version 0.7 modified for XL by K. Knutson
  - Earlier releases require 400/800 OS or OS translator
- VT100 Terminal Emulator, modified and revised version by Alec Benson, 1986 (VT100.OBJ or VT100NR.OBJ)
  - Added VT52 emulation
- OmniTerm version modified by CDY Consulting for OmniView

AMODEM 7, by Trent Dudley, 1985-1987

- Rewritten from AMODEM 4.2 and AMODEM Plus releases
- Requires R: or T: handler
- AMODEM 7.0 (5/85) features joystick input, SHIFT-CTRL key macros, adjustable delay rate, XMODEM transfers. Exclusive R: handlers:
  - AMOD70.AUT loads the 850 R: handler
  - AMODMPP.OBJ R: handler for MPP modems. Derived from the DeMar handler.

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- AMODEM 7.1, 8/12/85
  Exclusive modem device handlers:
  - R850.ATR (executable, not a disk image) loads the 850 R: handler
  - MPP.ATR (executable, not a disk image) R: handler for MPP modems. A modified version of the MPP REV. 1.0 MINI R: handler which is compatible with XL/XE computers. (alias: AMD7HND.MPP)
  - T1030.ATR (executable, not a disk image) loads the 1030 T: handler
  - RBIN.ATR (executable, not a disk image) version of R.BIN combined R: handler for 850-based and 835/1030 Modems
- AMODEM 7.2, 12/1/85
  Exclusive modem device handlers:
  - MPPHANDL.A72 R: handler for MPP modems (essentially identical to MPP.ATR)
  - AUTO1030.72 loads the 1030 T: handler
- AMODEM 7.3 XE, requires BASIC XL or BASIC XE, 12/85
- AMODEM 7.2R, for the R-Time 8 cartridge, 2-Feb-86
  Exclusive modem device handler:
  - MPPHANDL.AM7 R: handler for MPP modems (essentially identical to MPP.ATR)
- AMODEM 7.4, 15-Mar-87, features XMODEM/CRC and YMODEM file transfers, word wrapping, an edit window, improved autodial scanning and macros; support for: SpartaDOS, R-Time 8, BASIC XE.
  - Distributed with modem device handlers: BOOT850.COM, MPPHNDLR.COM, BOOT1030.COM, THANDLER.COM, RHANDLER.COM
- AMODEM 7.50, 14-Jun-87 (final release)
  - Distributed with modem device handlers: BOOT850.COM, MPPHNDLR.COM, BOOT1030.COM, THANDLER.COM, RHANDLER.COM

Express!, by Keith Ledbetter, 1985-1986

- Strengths: auto-dialer and reliable XMODEM transfers
- Version 3: XMODEM/CRC, ability to download .BIN files on CompuServe using XMODEM, VIDTEX mode for CompuServe cursor positioning, R-Time 8 support
- Each version includes an integrated modem handler
- Original version: 1030 Express! (September 1985)
  - Integrated T: handler
- 850 Express! 3.0 release date: 9/24/86 (earlier releases include 1.1)
  - Integrated R: handler
- 1030 Express! 3.0 release date: 11/1/86 (earlier releases include 2.0, 2.1)
  - Integrated T: handler
- MPP Express! 3.0 release date: 12/1/86 (earlier releases include 1.1)
  - Integrated R: handler is Chilcott MPP handler
- Also the basis for SX Express! from Atari (1988) and for the Express! cartridge from Orion Micro Systems (1990)

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VTERM V10.4.86, by Joe Hitchens, 1986

- DEC VT52 terminal emulation, 80-column pannable (40-column visible) screen, capture, Upload/download (text only)
- Requires R: handler

OmniCom, by CDY Consulting (David Young), 08/15/1987 (shareware release)

- VT10SQ was used as an early model.
- 80-column screen (software handler), VT100 emulation, XMODEM, Kermit, ASCII send, capture mode, screen dump
- Requires R: handler. Distributed with the ATARISRS.232 variation of R.BIN as extracted from VT-10-Squared.
- While 1986-1987 commercial versions required a CDY Consulting Omniview chip, the 08/15/87 shareware release runs on standard Atari hardware

Kermit-65, by John R. Dunning, 1987-1990

- Kermit file transfers, VT100 or VT52 terminal emulation (or none), Atari standard screen, 80-column pannable (40-column visible) like VTERM, or 80-column graphics like VT10SQ
- Port of Kermit-65 for Commodore 64
- Two versions of each release:
  - K65.COM or KERMIT.COM: Integrated 850 R: autoloader
  - K65NR.COM or KERMITNR.COM : Requires R: handler
- Releases: 3.1 8/6/1987, 3.3 10/20/1987, 3.5 4/1990, 3.6 4/1990, 3.7 5/1990

DeTerm, by Jim Dillow, 1987-1988

- XMODEM file transfer, full Telenet PC Pursuit support, Breakout game playable while uploading, downloading or waiting for a connection
- Several versions: DeTerm XM301 (DTXM) / DeTerm MPP (DTMPP) / DeTerm SX212 (DTSX) each have a built-in modem handler; DeTerm 850 (DT850) is to be appended to an 850 R: autoloader; DeTerm (plain) requires R: handler

PC-Term, by Rick Hunter, 1988

- Designed especially for Telenet PC Pursuit
- XMODEM, XMODEM/CRC, YMODEM, or C-MODEM (C-MODEM protocol by Jerry Horanoff of Carina Software Systems) file transfers
- Dialer, capture, print-screen
- 850-based or SX212 Modem required (integrated SX212 handler by Jim Dillow)
- Version 3.1, 10/14/88

BobTerm 1.2x, 1990-1993, shareware by Bob Puff

- XMODEM, XMODEM/CRC, XMODEM-1k, CIS Fast XMODEM (BobTerm exclusive for use only on CIS), YMODEM, FMODEM (YMODEM but with 4 KiB block size) file transfers
- VT52 terminal emulation (odd or even parities) with CompuServe VIDTEX cursor positioning

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- Floating buffer size (depending on machine and DOS), chat window with recall, online/real-time clock, R-Time 8 support, dialing system
- Modular design: distributed with an XEP80 driver and with a command processor module for SpartaDOS 3.2 or SpartaDOS X
- Integrated 850 R: autoloader; also supports and distributed with separate R: handlers for most possible modem options, most written by **Bob Puff**
- Version 1.21 final full release, 4/27/1990: http://www.nleaudio.com/css/
- Version 1.22 05/1990 executable, final version update for real hardware:
  https://tinyurl.com/4xrcdpsj
  https://tinyurl.com/mrys6nkf
- Version 1.23 03/1993 executable, updated version for use with emulators (not for use with more modern Atari emulators or with real hardware):
  http://www.mixinc.net/atari/download_a8/datacom/bobt123.lzh or
  http://members.chello.nl/becotel/atari/software.html
- Earlier releases: v.1.02 4/1989, v.1.10 6/1989, v.1.20 4/1990

VT850, by Curtis Laser, 1991

- VT100 terminal emulation, with select VT102 features and VT200 series keyboard support. Capture file function.
- Supports the XEP80 (controller jack #1) and the CX85 (controller jack #2)
- Display is either 39 columns in GR.0 with custom character set, or 80/132 columns (authentic VT100 horizontal scrolling for >80 columns) on the XEP80
- Requires R: handler
- Release versions: B0, B1

ANSITerm, by Robert Sinclair, 1991-1992

- IBM terminal emulation program with VT100 mode
  - ATARI, ASCII, or ANSI modes
- XMODEM send/receive, dump, capture, dialer
- Requires R: handler.
  Distributed with handlers for: 850, P:R: Connection, SX212
- Version 1.0 released 24-JUN-92

FlickerTerm 80, by Clay Halliwell, 1993-1995

- High speed ANSI terminal emulator
  - ASCII, IBM PC, or VT100 modes
- 80-column screen uses two alternating Graphics 0 screens
- Print-screen, Joystick/CX85 Keypad, macros
- Requires R: handler
- Releases: v0.37 07/07/94; v0.381 11/04/94; v.0.51 6/27/1995

Ice-T, by Itay Chamiel, 1994-2013

- Complete VT102 and ANSI-BBS emulation, including boldface/blink support
- Supports up to 19,200 baud, with no data loss

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- 80-column screen (GR.8 software handler)
- XMODEM/CRC, XMODEM-1k, YMODEM, YMODEM-g, ZMODEM download protocols
- ASCII upload, 16 KiB capture buffer, 16 KiB scrollback buffer
- Auto-dialer, with a directory of up to 20 numbers
- Text file viewer, Fine scroll, Print screen
- Requires R: handler
- Ice-T 800 v1.1, October 1994:
  - Reduced features, but only requires 48 KiB 400/800
- Ice-T XE 2.72, February, 1997
  - Full feature set, requires an XL/XE with at least 128 KiB RAM
- Ice-T XE 2.73, April 14, 2012
  - Available: http://atariage.com/forums/topic/196599-ice-t-xe-273-released/
- Ice-T XE 2.74, September 24, 2013
  - Available: http://atariage.com/forums/topic/217052-ice-t-xe-274-released/
- Ice-T XE 2.75, October 1, 2013
  - Available: http://atariage.com/forums/topic/217245-ice-t-xe-275-released/
- Ice-T XE 2.76, October 10, 2013
  - Available: http://atariage.com/forums/topic/217539-ice-t-xe-276-released/

Term-80 / Term80, by Tom Hunt, 1995-1996

- (Not to be confused with the unrelated Term 80 by Mark Gamber, 12/1/88)
- Designed for calling IBM ANSI bulletin boards at the highest speeds supported by the MIO and Black Box. Default 14,400 baud.
- Hyperspeed R: handler by Len Spencer recommended for MIO users
- Requires one of:
  1. Modem connected to a Black Box or MIO
  2. Either a hard drive (connected to a Black Box or MIO) or a RAM drive (modem connected to a P:R: Connection, 850, or similar interface)
  3. Both a (hard drive or RAM drive) AND modem connected to a Black Box or MIO
- Requires SpartaDOS (3.2d or 3.2g/gx)
- 80-column screen (GR.8 software handler)
- Dialer, YMODEM receive/send
- Modular design, distributed with modules for:
  XMODEM/CRC and XMODEM-1k receive, capture, change baud rate
- Releases:
  - 8.15.95 Version 1.4 was 1st general release;
  - 8.19.95 Version 1.5;
  - 8.25.95 Version 1.6
- 5.24.96 Version 1.9 BETA was distributed to testers with several modules for use with Internet email and lynx servers via a dial-up telnet service. (Direct access to a telnet server is (was) sometimes provided as part of a dial-up SLIP/PPP account from an Internet service provider.)
  - Available: http://atariage.com/forums/topic/180427-term80/#entry2257913

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8.16) What programs can I use to host a BBS on the Atari?

Contributors to this section include: Winston Smith, Steven Sturza, Chad Hendrickson, Don Fanning, Matt Singer, Pete Davis, Jeff Williams, Rod Roark

"A BBS, plain and simple, is some hobbyist setting up their own computer to answer incoming calls from other hobby computers. The visiting person leaves messages on this computer for other visitors, plays games while visiting, sends and receives files, and all that."
– Greg Goodwin, 2005

The 8-bit Atari was popular for hosting a dial-up Bulletin Board System (BBS). This section attempts to list all BBS programs for the Atari.

For most programs listed, a link is provided to the corresponding section at http://www.bbsdocumentary.com/software/ which is a comprehensive collection of BBS information, screenshots, and downloads collected by Jason Scott.

AMIS (Atari Message & Information System)
AMIS was the first BBS program for the 8-bit Atari, created by lead programmer Tom Giese with other members of the Michigan Atari Computer Enthusiasts (MACE). Development and testing started in late 1981, and the MACE A.M.I.S. became the first 24 hours per day Atari BBS in February 1982 (original hardware: 48 KiB Atari 800, Hayes Smartmodem, 850 Interface, four floppy disk drives, 822 Printer). Written in BASIC.
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/AMIS/

The AMIS BASIC source code proved a popular starting point for a number of popular AMIS variations, including:

- AMIS, by Stan Subeck & Susie Subeck
  According to Antic vol. 3 no. 9 Jan-1985:
  - Built-in modem commands for a Hayes Smartmodem.
  - Requires some modification to run with an MPP, Signalman Mark 7 or Mark 12 modem.
  - Requires a different method of auto-answer than other BBS programs, and demands a different setting of the modem's internal DIP switches.
  - Message files compact automatically.
    http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/FASTAMIS/
- Carnival BBS, by ???????
  - "essentially AMIS with an overlay to allow for private messages and passwords." – Antic vol. 3 no. 9 Jan-1985
  - "demands a large amount of disk space and requires every bit of memory your system has." – Antic vol. 3 no. 9 Jan-1985
    http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/CARNIVAL/
    http://www.atarimagazines.com/v3n4/communications.html
    http://www.atarimagazines.com/v3n9/communications.html
- Reed Audio BBS, by Todd Gordanier, 1986
  - A modified version of Carnival BBS that added multiple forum support & support for the Atari 1030 Modem by way of a hardware ring detector (relay). (Wikipedia)

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- Comet AMIS, by Matt Pritchard and Tom Johnson
  http://bbslist.textfiles.com/704/oldschool.html
  - Home was Comet AMIS of Algonic, MI
  - Originally MPP AMIS by Matt Pritchard, for MPP modems only (John DeMar of New York State wrote the MPP drivers), then modified to be used with other types of standard modems.
  - Some heavy involvement of Trent Condellone in certain features
  - The final version featured many automated tasks, usage logs, passwords, private mail, multiple message bases and support for hard drives and MYDOS, and was on the cutting edge of AMIS/Atari 8-bit BBS technology. (Wikipedia)
- AMIS XM301, by Mike Olin and Mike Mitchell (Catspaw Software Systems)
  - Written in BASIC XE (Wikipedia)
- TODAMIS 1.0, by Trent Dudley, 1986
  - for 1030/XM301

ADCM BBS

- Version 1.00 © 1985 ADCM Systems
- © ADCM Systems Version 1.35 - January 15th, 1986
- For use with the Pocket Modem by BOT Engineering
- Jacobus writes (11/2010):
  - "Features a command driven interface, private mail, public message board, upload and downloads. Handles up to 255 users up to 500 baud."
  - "The author is Julius Oklamcak"
- Info & download: http://www.atariage.com/forums/topic/172034-adcm-bbs/

ARMUDIC, by Frank Huband

http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/ARMUDIC/

From the Downtown Washington Atari Users Group of Washington, D.C. Greg Leslie writes "It was written (in BASIC with machine language subroutines) by Frank Huband, and the name came from the numbers used to dial the original BBS (276-8342).

ATABBS - Atari Bulletin Board System

Rod Roark writes (3/12/03):
This is really straining my memory – don't recall exactly when I wrote the thing (maybe '80 or '81), but as far as I know ATABBS was the world's first BBS for the Atari 400/800.

I ran it out of my condo in Atlanta on a 48 KiB 400 with a 90 KiB floppy drive and a 300 bit/s Hayes Smartmodem. The 48 KiB memory module was a third party add-on, not Atari's.

It was written in Atari BASIC with a few bytes of machine language thrown in.

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AtariLink BBS – program by Paul Sungenis and Darren M. Benfer,
Version 1.43 © 1987-1988 Paul L.A. Sungenis
From his blog at http://atari8programming.blogspot.com/ on 20-Mar-2006:
In 1985-1986 I wrote and eventually released the AtariLink BBS software. This came out of necessity, since most Atari BBS programs at the time (especially FoReM and its bastard children) didn't fully support the 1030 Modem that I used (or the XM301 that followed afterward). I eventually adapted the program to work with Atari's 1,200 bit/s SX212 Modem when that was released, and in the process threw the program open to just about every modem out there. AtariLink floated in the wild, passed from BBS to BBS for a while, before an Atari magazine (I forget which one) distributed the software as its disk of the month.

- Requires Atari BASIC; BASIC XE supported
- Recommended SpartaDOS 2.3b/e or SpartaDOS X due to memory requirements.
- Expandable with Door programs

ATKeep – An Atari 8-bit version of CITADEL BBS, by Brent Barrett
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/ATKEEP/
ATKeep is a Citadel-like BBS system for eight-bit Ataris. ATKeep runs under SpartaDOS and requires BASIC XE and 128 KiB of RAM. Originally "MBBBS (Message Base Bulletin Board System) 1.0, March 24th, 1986" MBBBS was changed to Atari Keep, or, ATKeep for short, around version the time version 4.0 was released (June 15, 1986).

ATKeep 7.0 finally took the aide and cosysop commands out of a menu section and put them into extended commands, where they belonged. It also added a SYSOP level command set. Users were no longer "users" "aides" or "cosysops," they had become level "A" (SYSOP) through level "Z" (READ ONLY). The system had become extremely complex. Public, hidden OR password protected PRIVATE rooms. Each room now had its own access level (thus keeping people of lower level from getting in EVEN if they knew the room name). Each room was assigned a RWRT (or Read WRiTe status), which determined who could enter messages in it, and whether or not public or private messages, or both were to be allowed.

Before version 7.0, ATKeep only worked with the Atari 1030 or XM301 Modems.
ATKeep 7.0 was rewritten to accommodate the 850 or PRC interface allowing use of any Hayes compatible modem.

ATKeep version 7.50 was released (1987), was version 8 released?

BBCS – Bulletin Board Construction Set, by Scott Brause/Antic, 1985
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/ABBCS/
A machine language program, developed as the Jersey Atari Computer Group (JACG) BBS system.

BBCS was known for its great flexibility. The sysop was offered easy customization by the use of menus. Many BBSes before it required that you had to actually change the BASIC code in order to customize your BBS.

Unfortunately, it also suffered from a reputation for stability problems.

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BBS Express! – 1986-1989, Keith Ledbetter/Orion Micro Systems
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/BBSEXPRESS/
Written in compiled Action!. 835/1030/XM301 and 850 versions.

BBS Express! Professional ("Pro!") – 6.0b 1999, Lance Ringquist/Video 61
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/BBSEXPRESSPRO/
Version 1.0 released 5/8/1988 by Keith Ledbetter and Chris King from Orion Micro Systems. bf2k+ wrote (May 2010) that version 2.1a was the last version compiled by Keith Ledbetter before he sold it.

Version 5.0 Copyright 1995 by K-Products (Bob Klaas) credited to: **Stephen J. Carden**, Keith Ledbetter, and Chris King

Currently owned by Lance Ringquist/Video 61: http://www.atarisales.com/

Written in 100% machine language.
Requires XL/XE, SpartaDOS 3.2+, hard drive highly recommended, or at least a large RAM drive. R-Time 8 is fully supported.

SpartaDOS Pro Ver 3.3c 19-Dec-97 (S)hareware 1994 by FTe
- SpartaDOS 3.3, originally derived from a disassembly of ICD SpartaDOS 3.2c, was developed by **Stephen J. Carden** with Ken Ames specifically to be an optimal environment for running BBS Express! Pro.
- SpartaDOS 3.3c was released on cartridge by Video 61 in early 1998.

Carina BBS (Carina I), Carina Software Systems (Jerry Horanoff), 1986
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/CARINA/
- Highly modular, modifiable code written in Atari BASIC
- Features Programmable Modem Operating Environment (MOE)
- Supports XMODEM file transfers

Carina BBS version II (Carina II)
© 1988 Carina Software Systems (Jerry Horanoff)
v2.5 upgrade (4/24/91) © 1990 by Shadow Software (David Hunt)
v2.6 (6/15/93) by Shadow Software (David Hunt)
v2.7 © 1995 by Shadow Software (David Hunt)
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/CARINA/
- Requirements: Atari XL/XE computer, at least 500 KiB of storage capacity (combination of disk drives and/or RAM drive), a modem, and SpartaDOS 2.3 or greater.
- Recommended: 192 KiB RAM drive or greater, R-Time 8
- Explicitly supported: MIO interface and a hard drive
- A complete re-write of Carina BBS
- Highly modular, modifiable code written in Atari BASIC

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- Programmable Modem Operating Environment II (MOE II)
- VT-52 graphics support
- Features proprietary C-Modem file transfer protocol, also supports: XModem, XModem CRC, YModem (1K X-Modem CRC), YModem Batch, ASCII, others

Commonwealth XL BBS – © 1985, 1986 by Smokey Layton
http://atariage.com/forums/topic/226543-commonwealth-xl-bbs/
- Expected to run under MYDOS 3 or higher.
- Requires disk drive (including RAM drive) with 180 KiB capacity or higher
- Written in BASIC; BASIC XL supported
- Has a control structure that is modeled after AMIS BBS programs

ECABBS – Efficient Chips Atari Bulletin Board System
by Matthew Jones, V2.0, 1983
http://www.page6.org/pd_lib/utilities/pd_ecabbs.htm
- Originally a commercial release, then released to the public domain
- Requires R: handler
- Written in Atari BASIC

FoReM BBS – Friends of Rick E. Moose BBS.
Developed/sold by Matthew R. Singer.
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/FOREM/

Versions that operate with the Atari 850, the ATR8000, and other configurations. Written in Atari BASIC.

Matt Singer writes:
FoReM BBS derived from an early AMIS. When multiple message areas were added the name was extended to FoReM 26M. Then, When OSS released BASIC XL the program was rehacked and called FoReM XL... Bill Dorsey wrote most of the Assembler routines (where is he now?).

FoReM MPP BBS – developed by Matt Singer, modifications by Matt Ingram and Ted Rosner, sold by MPP
FoReM BBS version for the MPP direct-connect modems (MPP-1000C).
(source: Micro of Monmouth Volume 3 Issue 10).

FoReM 26M BBS – developed/sold by Matt Singer.
FoReM BBS updated to support multiple message area.

FoReM XL BBS – developed/sold by Matt Singer.
FoReM 26M updated to take advantage of BASIC XL from OSS.

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FoReM XE BBS – developed by Matt Singer
This version of FOREM BBS requires the commercial BASIC XE cartridge in order to run. It is in the public domain and can import and export messages from the Atari PRO! BBS EXPRESS-NET (7-bit text only, control ATASCII graphics are reserved for message data-structure bytes).

FoReM XE Professional BBS / FoReM XEP BBS – by Len Spencer
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/FOREMXE/
A re-write of FoReM XE BBS, last version was 5.4, Jan 5 1993. FXEP requires an XL/XE computer with at least 128 KiB of memory, the BASIC XE cartridge from OSS/ICD, SpartaDOS 3.2 (this program will NOT work with any other version), and at least 500 KiB of storage.

Madrona Marsh BBS – written by Matt Arrington
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/MARSH/
"very structured and very customizable at the same time" - Brian A. Diaz

MBBBS (Message Base Bulletin Board System)
– early name for ATKeep, see above

Nite Lite BBS – Paul S. Swanson
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/NITELITE/
- First online: November 3, 1983. Ran completely in RAM.
- Second version shifted the message base to a disk drive.
- Third version added XMODEM uploads/downloads, support for a second disk drive, menus were shifted to disk, ran the first online text adventure
- Fourth version shifted more of the system to disk, ran on the ATR8000 and double density disk drives.
- Version 5.0, Copyright 1985
  - Integrated support for Nite Lite Systems V:Handler (RAM drive)
  - Supports C-GUL protocol for graphics and sound using the C-GUL terminal program

OASIS (the commercial version) / OASIS Jr. (the public domain version)
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/OASISIV/
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/OASISJR/
The original OASIS BBS System was written by Rich Renner and Ralph Walden with tech support and input from Leo Newman. It was first published by OASIS BBS Systems (Renner/Walden/Newman) in 1986, and distributed by Leo Newman. Later, the rights were transferred to Glenda Stocks/Z INNOVATORS, then later (1991) to Jeff Williams ("Alf").

All machine language. OASIS is very crash-resistant and comes with a "dial out" screen so that the Sysop can use the BBS as a terminal program to call and fetch files without having to bring the BBS down and reload a terminal program. OASIS supports "Door programs" which it refers to as "OASIS PAL modules". An excellent message system, and a complex file system. It consists of "file libraries" with suites of "file types". There is quite a bit of overhead involved in performing a download (which may be a good thing, as it discourages file hogs). OASIS IV

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performs networking. SpartaDOS 3.2x recommended, but any DOS supported. R-Time 8 clock cartridge supported.

Glenda Stocks writes at http://world.std.com/~snet/glenda.htm :
I purchased the source code rights to OASIS and began marketing the BBS software to Atari 8-bit enthusiasts around the world. I felt that I had the superior BBS software because I had programmed in the ability to run external programs, including online games and user surveys. I also had added color prompts for IBM clone users who called Atari boards running my OASIS software. Sometime in 1991...I sold the rights to OASIS to a man in Canada..

Jeff Williams ("Alf") writes: (6-Dec-2002)
OASIS was around prior to either PRO or BBS Express! IIRC. I don't know when exactly it showed up, version 3.09 was the first one I remember seeing. What made it nifty was it was very fast, being all assembler, and having some different features that things like Forem & Carina didn't have. Compared to something like Forem MPP at the time, it was kind of amazing.

Ralph Walden sold it to Glenda Stocks, who chopped it up into modules and sold it as ver 4.7. PRO was out by then, and was a much more complete offering in my humble opinion. Glenda wrote some modules for 4.7, but it never really went anywhere because the architecture was so cramped with her changes.

Eventually she gave up and sold me the source. I looked it over and realized it was a mess and nothing was going to happen with it. I worked on a version 5 for a while, but never made much progress.

Puff BBS – by Robert (Bob) Puff
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/PUFFBBS/
"came with a hardware component to both provide ring detect for the Atari (none existed in the modem) and to serve as a hardware key/dongle associated with the software."

SMART BBS – by Marco Benton
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/SMARTBBS/
This program is written entirely in BASIC. It expects to be running under a SpartaDOS environment. This BBS program uses a "modem clock string" rather than an R-Time 8 cartridge in order to retrieve the current time. It also comes with an Atari BASIC game door called "Sabotage".

TART-BOARD – by Bob Alleger
Early Atari BBS.

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TCPIP Express – by ILS - Integrated Logic Systems - Stephen J. Carden
http://www.realdos.net/prodtcpip.html
This upgrade is to the BBS Express Professional. This version is designed to function on the Internet and Multiplexer, though neither is required. Targeted at the serious, big-system Internet SysOp. Will ONLY run on SpartaDOS 3.2x or greater or RealDOS. TDLINE must be installed, and the R-Time 8 is fully supported. Written in 100% machine language.

Technical Difficulties (or "TD")
https://forums.atariage.com/topic/295670-technical-difficulties-bbs-software/
- Written by a pair of guys in the Miami area.
- Worked with MPP modems.
- Required The Translator disk.
- Later became Technical Difficulties XE ("TDXE") and required BASIC XE.
- From one of the authors: "It started out life as an AMIS system, but we added an account system and message forum to make it look and feel like a FoReM system."

XeBBS+ – by Jonathan Taylor
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/XEBBS/
For the Atari 130XE / Expanded 800XL, required BASIC XE, designed to work with the SupraDrive hard disk.
"Used the Automatic Modem Processor (AMP) code from FoReM XE, but was otherwise written from scratch." - Jonathan Taylor

835 & 1030 & XM301 Modem Bulletin Board
By Gardner Computing (earlier) / Duplicating Technologies (DT) (later)
Auto answer, XMODEM upload/download, sold with ring detector.
Ads: ROM #9 Dec-1984 / Jan-1985 p. 37; Antic vol. 4 no. 10 Feb-1986 page 44

8.17) What games support online action via modem?

- Commbat, by Robert Schilling for Adventure International, 1981
- Computer Battleship, by John Babson and Bill Cleis
- JellyBeans, by Chris Martin, 2004
- MIDI Maze, by Michael Park for Xanth F/X (prototype for Atari, 1989)
  - Supports XM301, SX212, or R1:(850)
- Modem Chess, by Gary Heitz, 1986
- Tele-Chess, by Thomas McNamee and Pete Goodeve for Antic, May 1983

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8.18) What Internet applications are there for the Atari?

This section lists Internet applications supporting the Dragon Cart or Dracarys Ethernet devices, or supporting the N: device provided by SIO2BT (Bluetooth) and FujiNet (Wi-Fi).

The following work with the Dragon Cart or the Dracarys Ethernet devices

Contiki OS package for Atari, by Oliver Schmidt

Program	Description
WEBBROWS.COM	Text-based web browser with mouse support
WGET.COM	Downloads content from a web server and saves it as a file
IRC.COM	Internet Relay Chat client
WEBSERV.COM	Web server for static web pages
TELNETD.COM	Telnet daemon providing access to a simple shell for a Telnet client like PuTTY

https://github.com/oliverschmidt/contiki/wiki/ATARI

IP65 package for Atari

by Oliver Schmidt, Christian Groessler, Jonno Downes

Program	Description
Date65	a Network Time Protocol (NTP) client
Telnet65	a Telnet client with a VT100 terminal emulation. The network part is based on IP65 and the terminal part is based on CaTer.
Tweet65	post a tweet on Twitter

https://github.com/cc65/ip65

8bit-Slicks game by Anthony Beaucamp (8bit-Dude)

http://8bit-slicks.com/

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The following work with SIO2BT (Bluetooth) or FujiNet (Wi-Fi)

Available at https://github.com/FujiNetWIFI/fujinet-apps :

- PLATOTERM – a Version of the PLATO terminal for IRATA.ONLINE, pre-configured to connect to IRATA.ONLINE
- boot-disk-cc65-template – An example project that creates a single density (90 KiB boot disk) that runs a program
- appkey-sample – CC65 sample code to write and read a FujiNet App Key
- Capture_the_Flag – Patched version of Capture the Flag for #FujiNet
- netcat, netcat-action, netcat-asm – Netcat examples in C, Action!, and 6502 assembly
- boot-disk-cc65-template – example CC65 linker file, associated source files, and an example program that when compiled, creates a complete boot loadable program contained in an ATR image, ready to boot in any Atari 8-bit system
- election2020 – US election tracker
- LiteSAM – a handler that can be loaded at boot in any Atari DOS, to redirect the screen editor (E:) device output to also go to #FujiNet's built-in S.A.M. speech synthesizer, essentially giving you a screen reader
- twitter – A Twitter client for #FujiNet
- vt100 – A DEC VT100 emulator that uses N:

Available at https://gitlab.com/bocianu/ from Wojciech Bocianski (bocianu)

- Simple UDP chat server
- UDP shoutbox
- chessNet – freechess.org client
- FujiNet_HSC – Hi Score Cafe client
- weather – openweather.org client
- fujinews client – Fujinet news client
- fujitalk-client – FujiTalk chat client

Available at http://8bit-slicks.com/ :

- 8bit-Slicks, game by Anthony Beaucamp (8bit-Dude), FujiNet version

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Chapter 9

File formats & Copy

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9.1) What file formats for entire disks / tapes / cartridges are there?

It is now common, especially when working on modern computers, to work with Atari software as files or "images" containing the data from an entire disk, data cassette, or cartridge as duplicated from the native media for the Atari.

Here is a list of file formats, arranged by their associated filename extensions. These are all filename extensions used to name files containing entire 8-bit Atari floppy disk images, cassette tape images, or cartridge images.

. A2R Raw flux image format invented by John Keoni Morris for his Applesauce floppy drive controller hardware and software.
Comparable to .SCP SuperCard Pro files and RAW KyroFlux stream files.

.ATR Image format invented by Nick Kennedy, for his SIO2PC project.
Very similar to .XFD but with an added 16 byte header.
Widely used format for images of 8-bit Atari disks for use on other computer platforms. Does not support custom formats as found on disks with copy protection.
http://pages.suddenlink.net/wa5bdu/sio2pc.htm

.ATX Image format invented by Jorge Cwik (ijor), for VAPI project. Goal of VAPI is the preservation of Atari software in its original unmodified form, including custom formats used for copy protection.
.ATX is a superset of .ATR, but .ATX supports images of 90 KiB single density disks only.
http://vapi.fxatari.com/
http://www.whizzosoftware.com/sio2arduino/vapi.html
http://atariage.com/forums/topic/252191-vapi-library-source-code/
https://preview.tinyurl.com/y67nmrcn (format enhancements 2020)

.BIN Same as .ROM, see below.

.BIN A binary file as described in a separate section of this FAQ list regarding filename extensions.

.CAR Cartridge ROM image format invented for the Atari800 emulator (first introduced in Atari800 0.8.0). Format includes information about cartridge type. Contains the 'CART' signature at the beginning of the file.
https://github.com/atari800/atari800/blob/master/DOC/cart.txt

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.CAS Cassette image format invented by Ernest R. Schreurs, for his Digital Cassette Image system (includes CAS2SIO, WAV2CAS, and CAS2WAV MS-DOS utilities).
See: http://home.planet.nl/~ernest/
The .CAS format was extended by Tomasz Krasuski to support non-standard data (copy prevention mechanisms), for his A8CAS shared library, tools, and emulator patch. http://a8cas.sourceforge.net/
More .CAS tools: http://preview.tinyurl.com/y7ah6lgz
Note that the .CAS format, both original and extended, only includes the digital track; it does not include the audio track.

.DCM Image format invented by Bob Puff for his Disk Communicator 3.2 utility. Intended for use on native Atari hardware. A compressed data format. DISKCOMM is at http://www.nleaudio.com/css/files/DISKCOM.ARC
.DCM specs at: http://home.planet.nl/~ernest/diskcomm.zip
Comparable to the less commonly used .SCP SpartaDOS SCOPY format

.DD Early filename extension used with double density disk images for use with the Xformer emulators. Superseded by the .XFD extension.

.DI Image format invented by Kolja Koischwitz & Christian Krueger for 800XL DJ, their 1050/XF551 Floppy Disk Drive emulator for the Atari ST/TT/Falcon.
http://www.umich.edu/~archive/atari/Emulators/800xldj.lzh

.DRAFT Data Recording Archival Flux formaT. Standard in progress by the Software Preservation Society (SPS), intended for archival preservation of flux transition stream information from floppy disks.
http://www.softpres.org/glossary:draft

.PRO Image format invented by Atarimax (Steven J. Tucker) for his APE ProSystem. Supports emulation of custom formats used for copy protection.
http://www.atarimax.com/

.RAW KryoFlux raw stream protocol file, protocol invented by Istvan Fabian for the KyroFlux USB-based floppy disk drive controller. According to the developer, these stream files are not intended for long term preservation; long term storage of disk data should instead be kept in the DRAFT file format, once the DRAFT standard is complete.
https://www.kryoflux.com/?page=download#docs
http://www.softpres.org/kryoflux:stream
Comparable to .SCP SuperCard Pro and .A2R Applesauce flux image files.

.ROM ROM dump file, raw with no header information. Typically a cartridge memory dump, but also used for an operating system memory dump.

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.SCP Image format invented by ICD, for SpartaDOS. Used with the external SpartaDOS command SCOPY, distributed with SpartaDOS 3.2. Intended for use on native Atari hardware. A compressed data format.
Comparable to the more commonly used .DCM format.

.SCP Flux image file format invented by Jim Drew for his SuperCard Pro universal floppy disk copier/imager/converter hardware/software for Windows PC. http://www.cbmstuff.com/proddetail.php?prod=SCP
Comparable to RAW KyroFlux stream and .A2R Applesauce flux image files.

.SD Early filename extension used with single density disk images for use with the Xformer emulators. Superseded by the .XFD format.

.WAV Waveform Audio File Format is an audio file format standard, developed by IBM and Microsoft, for storing an audio bitstream on PCs. Though a WAV file can contain compressed audio, the most common WAV audio format is uncompressed audio in the linear pulse code modulation (LPCM) format.
This format is suitable for archival preservation of information recorded on cassettes used with the Atari.
https://en.wikipedia.org/wiki/WAV

.XFD "Xformer Floppy Disk" image format invented by Emulators, Inc. (Darek Mihocka) for the Xformer emulators (ST, PC). Known earlier, before support for arbitrary disk sizes was added, as .SD or .DD depending on the density of the imaged disk. The format consists simply of a raw sector dump of a disk. http://www.emulators.com/
Essentially superseded by the .ATR format.

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Chapter 10

For other computers

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10.1) How can my PC's internal floppy disk drive use Atari diskettes?

This section lists solutions for accessing an Atari format 5.25" floppy disk using a legacy PC with built-in standard floppy disk drive hardware.

Atari-Link PC (AtariDsk) V1.2 © 95-12-09
by HiassofT (Matthias Reichl)
Ataridsk is a program for MSDOS-PCs that allows you to access Atari floppy disks in double density (180 KiB). All you need is a PC (XT or 286 should be sufficient) and a 5.25" floppy drive. Features of this tool:

- Menu driven user interface
- Read, write and format Atari disks on the PC
- Small size (only 35 KiB)

http://www.horus.com/~hias/atari/

WriteAtr V0.92b
by HiassofT (Matthias Reichl)
With WriteAtr you can write double density ATR-images to Atari floppy disks on your MSDOS-PC. You can also create ATR-images of double density floppy disks! All you need is a PC and a 5.25" and/or a 3.5" floppy drive.
Version 0.92b added experimental support for the enhanced density (1040 sectors/128 bytes per sector) format. Please note: this format doesn't work with a lot of floppy controllers - use it at your own risk!
http://www.horus.com/~hias/atari/

MyUTIL
By Mark K Vallevand
Based on Charles W. Marslett's UTIL.
http://www.umich.edu/~archive/atari/8bit/Diskutils/Transfer/myutil.zip
Includes SpartaDOS disk utility v0.1e to access 180 KiB SpartaDOS disks

ATARIO
By Dave Brandman with Kevin White
Reads SS/DD 180 KiB Atari disks.
http://preview.tinyurl.com/pjvb7be (atario21.arc)

SpartaRead
By Oscar Fowler
Reads SS/DD 180 KiB SpartaDOS disks.
http://www.umich.edu/~archive/atari/8bit/Diskutils/Transfer/sr.arc

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UTIL
By Charles W. Marslett
Reads/Writes SS/DD 180 KiB Atari disks.
http://www.wordmark.org/

Here's some advice on using the above utilities from Hans Breitenlohner:
There are two technical obstacles to interchanging disks between DD Atari drives and PC drives.

1. The Atari drive spins slightly slower (288 RPM instead of 300 RPM). If you format a disk on the Atari, then write sectors on the PC, it is possible that the header of the next physical sector will be overwritten, making that sector unreadable. (The next physical sector is usually the current logical sector+2). The solution to this is to format all disks on the PC.

(Aside: Does anybody know how this problem is handled on the XF551? Is it also slowed down?)

Konrad M. Kokoszkiewicz answers: "The XF551 Floppy Disk Drive is not slowed down - these drives are spinning 300 rotations per minute. To prevent troubles with read/write disks formatted and written on normal Atari drives (288 rot/min), the main crystal frequency for the floppy disk controller is 8.333 MHz (not 8 MHz, as in 1050, for example)."

2. If the PC drive is a 1,200 KiB drive there is the additional problem of the track width.
The following is generally true in the PC world:
- Disks written on 360 KiB drives can be read on either drive
- Blank disk formatted and written on 1,200 KiB drives can be read on either kind
- Disks written on a 360 KiB drive, and overwritten on a 1,200 KiB drive, can be read reliably only on a 1,200 KiB drive.
- Disks previously formatted on a 360 KiB drive, or formatted as 1,200 KiB, and then reformatted on a 1,200 KiB drive to 360 KiB, can be read reliably only on a 1,200 KiB drive.

(All this assumes you are using DD media, not HD.)

Solution: Use a 360 KiB drive if you can. If not, format disks on the Atari for Atari to PC transfers, format truly blank disks on the PC for PC to Atari transfers.

Jon D. Melbo sums it up this way:
So a basic rule of thumb when sharing 360 KiB floppies among 360 KiB & 1,200 KiB drives is: Never do any writes with a 1,200 KiB drive to a disk that has been previously written to in a 360 KiB drive....UNLESS... you only plan on ever using that disk in the 1,200 KiB drive from then on out. Of course a disk can be reformatted in a particular drive any time for use in that drive. As long as you follow that rule, you can utilize the backward compatible 360 KiB modes that most 1,200 KiB drives offer.

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AnaDisk + DeAna
While the above-mentioned utilities work with SS/DD 180 KiB Atari-format disks or SS/DD 180 KiB SpartaDOS disks, the following combination of utilities has been used successfully to read SS/SD 90 KiB Atari-format disks. So if you only have standard Atari 810 and/or Atari 1050 drives, you could look into:

AnaDisk, created by Chuck Guzis at Sydex, Inc. in 1987
"Scan, edit, repair and copy just about any kind of diskette"
Version 2.01, November, 1989
One source for AnaDisk 2.06 (1992):
http://www.retroarchive.org/cpm/cdrom/UTILS/22DISK/ANAD206.ZIP
- Some have reported more luck with this than 2.07

One source for AnaDisk 2.07 26-Aug-92:
http://www.retrocomputing.org/cgi-bin/sitewise.pl?act=det&p=776&id=retroorg
- Last free version, readily available, but sometimes described as buggy

Sold to New Technologies Inc. (NTI) by Sydex in March 2000.
More information: http://www.retrotechnology.com/herbs_stuff/sydex.html

DeAna by Nate Monson
Available: http://preview.tinyurl.com/mo7e9xa
Converts AnaDisk dump files from Atari format

See http://preview.tinyurl.com/kpnqcjp for tips on using this combination of utilities.

OmniFlop (as of 2007)
By Sherlock Consulting (Jason Watton)
- A 'universal' floppy disk reader, writer, and tester for the IBM PC or compatible, with built-in floppy drive hardware, which can handle alien floppy disk formats not normally supported by DOS, Windows and Linux.
- OmniFlop on its own transfers disks between systems. If you want to access files, for example, on these disks then you need more - you will need to use OmniFlop to image the disk, then other software to interpret the filing system. OmniFlop alone only handles whole disks.
- Features include, as of 2nd Sep 2007 v2.01m Release:
  - Read, write, and format Atari 8-bit format (90 KiB). (Charles Doty)
- Available: http://www.shlock.co.uk/

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10.2) How can my PC with USB floppy disk drive use Atari diskettes?

The following hardware/software solutions involve USB-based floppy disk drive controllers that interface a standard floppy disk drive (designed for legacy internal floppy disk drive controller) with a modern computer via USB interface.

KyroFlux (2009)
By KryoFlux Products & Services Limited
- Official hardware developed by The Software Preservation Society (SPS)
- A USB-based floppy controller designed specifically for reliable low-level reads, sampling the magnetic flux transition timing, suitable for software preservation
- Save as raw stream files (.RAW), or export to common sector formats including Atari 8-bit (XFD, both FM and MFM)
- Compatible with USB 2.0 (high-speed)
- Powered by USB interface (approx. 500mA). Drive requires its own power.
- Shugart (with extensions) drive interface. 34-pin dual-row header connector.
- Works with all major 3.5" and 5.25" drives
- Works with selected 3" (e.g. Amstrad FDI-1) drives
- Also works with 8" (e.g. Shugart 851; might require additional adapter) drives
- Host software is currently Windows (XP and up, 32 and 64-bit flavours), Mac OS X and Linux.

http://www.kryoflux.com/

FC5025 USB 5.25" floppy controller (2010)
By Device Side Data
- Connects to any computer's USB 2.0 or USB 1.1 port.
- USB powered. Power from USB runs only the FC5025 itself; you must supply power to the drive mechanism separately.
- Sold as a controller board only without a drive mechanism.
  - Tested to work well with the TEAC FD-55GFR drive and should also work with most other PC-style 5.25" drives.
- The FC5025 is read-only. It cannot write to floppies.
- The FC5025 may be unable to read disks that are damaged or copy-protected.
- The FC5025 is intended for 5.25" disks only, not 3.5" or 8" disks.
- Most PC-style drives can't read the second side of two-sided/flippy disks, unless the disk has a second index hole/timing hole corresponding to the reverse side.
- The included software works on: Linux, Mac OS X, Windows
- The included software supports types of disk including: Atari 810

http://www.deviceside.com/

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SuperCard Pro by Jim Drew (2013)

- USB device for PC.
- Can automatically duplicate any disk that was written with the data starting and ending at the index pulse. "99% of Atari 400/800 commercial disks were created this way."
- Device includes a standard 34 pin (17 x 2, .100" x .100") floppy drive interface.
- Make backup copies of 5.25" or 3.5" floppy disks (including any Atari disk) directly to another disk, or store the data as a flux image file (.scp)

http://www.cbmstuff.com/

Applesauce Floppy Drive Controller, by John Keoni Morris (2018)

- Floppy drive controller for connecting vintage Apple II 5.25" and 3.5" floppy drives up to your modern computer via a USB connection.
- Includes Applesauce Client Software for macOS
- As of Version 1.37 (June 2020), supports FM and MFM encoded disks, and supports 40 track disks. As a result, can work with Atari format disks.
- Fast Disk Imager can image an unprotected floppy disk. Supported formats include Atari DOS 2.0 and DOS 2.5.
- The .A2R format is the raw flux images as recorded by the Applesauce hardware and software.

https://applesaucefdc.com/

Greaseweazle project by Keir Fraser (2019)

- A USB interface and tool for reading and writing floppy disks in any format
- There are two broad categories of Greaseweazle:
  - Greaseweazle F1: Based on the STM32F103 microcontroller and the "Blue Pill" development board.
  - Greaseweazle F7: Based on the STM32F730 microcontroller and a fully custom PCB.
- When dumping disks it produces .SCP flux image files (SuperCard Pro)

Project: https://github.com/keirf/Greaseweazle/wiki
Group: https://www.facebook.com/groups/greaseweazle/

Greaseweazle F7 Plus USB Floppy Interface Flux Tool (2020)

- Designed by Ant Goffart (with help from Keir Fraser, designer of original Greaseweazle F7).
- Added stronger buffers for driving 5.25" drives with higher current pull-up resistors.
- Integrated 5V switching regulator, so only a single 12V supply is required for drives needing both rails.
- Choice of full-size or micro USB connector.

https://github.com/aerobaticant/Greaseweazle-F7-Plus
https://www.sellmyretro.com/offer/details/43881

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Key software for making use of tools like KyroFlux and SuperCard Pro with Atari disks and disk images:

a8rawconv by Avery Lee, 2014-

- Convert from a raw disk image (RAW or SCP) produced by imaging hardware to a decoded Atari disk image (ATR or ATX). Raw images can be produced from physical floppy disks either by KryoFlux or SuperCard Pro imaging hardware.
- Convert between ATR and ATX (either direction).
- Convert from RAW to SCP.
- Use a SuperCard Pro device to directly read from a floppy disk.
- With a SuperCard Pro device, write images to physical disks.

Version 0.94 (August 15, 2020) available: https://preview.tinyurl.com/y5tzscrp

10.3) How can my PC use my Atari disk drive?

This section describes hardware cables/interfaces designed to connect an Atari floppy disk drive to a modern PC, as well as software running on modern computers used with such devices.

10.3.1) Hardware

1050-2-PC, by Nick Kennedy
Hardware design: http://pages.suddenlink.net/wa5bdu/1050.txt
Additional cable/interface designs and sources:

- http://www.asselheim.de/atari/1050-pc.htm (Frank Heuser)
- 10502PC / SIO2PC-USB **Przemyslaw Krawczyk (Lotharek)**
  https://lotharek.pl/productdetail.php?id=157
  https://retrolemon.co.uk/12-atari
- Atari8Warez SIO2PC/10502PC Dual-USB

APE ProSystem, by Steven Tucker
The ProSystem hardware is a cable designed to allow connection of a stock 1050 disk drive directly to a PC's serial port for use by the companion ProSystem software.
Latest version: Atarimax Universal SIO2PC/ProSystem interface, USB or RS-232/Serial versions
http://www.atarimax.com/sio2pc/documentation/

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10.3.2) Software

Software for 1050-2-PC and/or ProSystem cable/interface

1050-2-PC function of SIO2PC 4.x, by Nick Kennedy

- Requires 1050-2-PC cable
- Software allows direct sector I/O with the Atari drive and can be used to create disk images which will emulate copy protection schemes when run on SIO2PC.
- Supports the .ATR disk image format.
- SIO2PC home page: http://pages.suddenlink.net/wa5bdu/sio2pc.htm

APE ProSystem, by Steven Tucker

- The ProSystem software program is used to create (protected or unprotected) .PRO format disk images. These disk images can then be accessed by the Atari using Steven Tucker's Atari Peripheral Emulator (APE) cable/software.
- http://www.atarimax.com/

atarixfer module of AtariSIO package, by Matthias Reichl, 2002-

Used to read/write disk images from/to a Atari drive connected to your Linux box with an 1050-2-PC cable or an APE ProSystem cable. Requires a 2.2, 2.4, 2.6 or 3.x series Linux kernel (with enabled module support) and a serial port with a 16550 or 16C950 compatible chip. Supports the .ATR disk image format.
http://www.horus.com/~hias/atari/

ALibPc, by Ray Ataergin

- Used to make ATR archives from Atari 8-bit computer disks, and to create real Atari 8-bit disks from ATR archives.
- High-speed disk drive upgrades like US Doubler, Speedy and Happy are supported in either regular or high speed.
- Recommended software for Atari8Warez SIO2PC/10502PC Dual-USB interfaces.
  - AspeQt-A8W Edition is not required but highly recommended for full integration of the two applications
  - Other versions/forks of AspeQt are not supported
- 10502PC devices supported at regular speed are:
  - Atari8Warez SIO2PC/10502PC Dual-USB
  - Przemyslaw Krawczyk (Lotharek) 10502PC/SIO2PC-USB
  - AtariMax Universal SIO2PC/ProSystem Interface (RS232 serial version only)
  - Any other 10502PC device based on either RS232 or VCP serial port technology
- Devices supported at high speed are:
  - Atari8Warez SIO2PC/10502PC Dual-USB
  - Przemyslaw Krawczyk (Lotharek) 10502PC/SIO2PC-USB

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Chapter 11

What is the history of Atari's 8-bit computers platform?

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Information presented here is derived as directly as possible from sources published or produced in the original time period. While also consulted extensively, modern historical retrospectives (including books, oral histories, and especially websites) are utilized chiefly as pathways to primary sources.

Key sources for 1977-1978:
https://archive.org/details/JoeDecuirEngineeringNotebook1977
https://archive.org/details/JoeDecuirEngineeringNotebook1978

Credit to Tomasz Krasuski for finding sales figures in Polish periodicals:
http://preview.tinyurl.com/kdydwv8

For a comprehensive Atari history: https://mcurrent.name/atarihistory/

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Vocabulary

Non-US readers will appreciate some clarification of abbreviations that appear in this section. Source of information: indeed.com & zippia.com.

VP - Vice President
The Vice President of a company is usually the second or third in charge after the President or CEO. Vice Presidents are part of a President-led team that establishes the vision, beliefs, mission, strategic goals and values of an organization. Vice Presidents are responsible for leading, guiding, directing and evaluating the work of other top executives, including managers, senior Directors and assistant Vice Presidents.

SVP - Senior Vice President
A Senior Vice President is a key employee within a company that manages other executives, maintains industry knowledge and develops goals and strategies. Depending on the structure of an organization a Senior Vice President may have varying levels of responsibility, although they are generally at the top of the corporate structure next to the President, CEO and EVP.

EVP - Executive Vice President
An Executive Vice President is responsible for monitoring departmental operations, managing customer relationships, developing the company's strategic goals, and identifying business opportunities that would maximize the company's performance, drive revenues, and achieve the business's profitability goals. Executive Vice Presidents contribute to sales innovations, negotiate business contracts, analyze financial reports, and minimize the company's expenses without compromising high-quality operations and customer satisfaction. An Executive Vice President must have excellent leadership and communication skills to support its daily operations to achieve its long-term goals and objectives.

COO - Chief Operating Officer
A Chief Operating Officer works closely with the CEO of a company, and their role is defined by the CEO. In most corporate offices, a Chief Operating Officer is responsible for overseeing the daily operations and keeping the CEO aware of significant changes or events. They may also create policies and operations strategies that they must communicate to employees to ensure employees are aligned with corporate goals. A Chief Operating Officer may oversee or manage human resource management as well.

CEO - Chief Executive Officer
Chief Executive Officers are responsible for overseeing the entire C-level executive team. They also are responsible for making the major decisions, managing the resources and overall operations of a company. A Chief Executive Officer in a large corporation will deal with strategic decision-making that directs a company toward overall growth. Chief Executive Officers in smaller corporations may deal with the day-to-day functions of a company. A Chief Executive Officer is usually chosen by the board of directors and their shareholders. Chief Executive Officers communicate directly with the board and corporate operations. They are the visionaries of a company and often set the tone and corporate culture.

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But how much is that today?

The days of the launch, heyday and decline of Atari 8-bit computers are long gone now.

When you read about the product launches, the price reductions, the bundles, etc... and their associated amounts, it's hard for some readers to figure out how much that amount represents today. A month's salary? The price of 10 Big Macs from McDonalds? The price of a supermarket trolley filled with the week's shopping for 4 people? The table below will give you an idea of whether the amount you are reading is a large sum or not.

First row: year, then amount from that year in USD.
Second row: now (2024), then how much the amount just above represents today in USD.
Third row: now (2024), then how much the amount just above represents today in EUR.

Source of information: in2013dollars.com. All current values are rounded up to the next one.

1977	$10	$25	$100	$500	$1,000
2024	$51	$127	$507	$2,531	$5,062
2024	47 €	118 €	470 €	2,344 €	4,689 €

1978	$10	$25	$100	$500	$1,000
2024	$47	$118	$471	$2,352	$4,705
2024	44 €	109 €	436 €	2,179 €	4,358 €

1979	$10	$25	$100	$500	$1,000
2024	$42	$106	$423	$2,113	$4,225
2024	39 €	98 €	392 €	1,957 €	3,913 €

1980	$10	$25	$100	$500	$1,000
2024	$37	$93	$373	$1,861	$3,723
2024	34 €	86 €	346 €	1,724 €	3,449 €

1981	$10	$25	$100	$500	$1,000
2024	$34	$84	$337	$1,687	$3,375
2024	31 €	78 €	312 €	1,563 €	3,126 €

1982	$10	$25	$100	$500	$1,000
2024	$32	$79	$318	$1,589	$3,179
2024	30 €	73 €	295 €	1,472 €	2,945 €

1983	$10	$25	$100	$500	$1,000
2024	$31	$77	$308	$1,540	$3,080
2024	29 €	71 €	285 €	1,426 €	2,853 €

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1984	$10	$25	$100	$500	$1,000
2024	$30	$74	$295	$1,476	$2,952
2024	28 €	69 €	273 €	1,367 €	2,734 €

1985	$10	$25	$100	$500	$1,000
2024	$29	$71	$285	$1,425	$2,851
2024	27 €	66 €	264 €	1,320 €	2,641 €

1986	$10	$25	$100	$500	$1,000
2024	$28	$70	$280	$1,399	$2,799
2024	26 €	65 €	259 €	1,296 €	2,593 €

1987	$10	$25	$100	$500	$1,000
2024	$27	$68	$270	$1,350	$2,700
2024	25 €	63 €	250 €	1,251 €	2,501 €

1988	$10	$25	$100	$500	$1,000
2024	$26	$65	$259	$1,296	$2,593
2024	24 €	60 €	240 €	1,200 €	2,402 €

1989	$10	$25	$100	$500	$1,000
2024	$25	$62	$247	$1,267	$2,474
2024	23 €	57 €	229 €	1,174 €	2,292 €

1990	$10	$25	$100	$500	$1,000
2024	$23	$59	$235	$1,174	$2,347
2024	21 €	55 €	218 €	1,087 €	2,174 €

1991	$10	$25	$100	$500	$1,000
2024	$23	$56	$225	$1,126	$2,252
2024	21 €	52 €	208 €	1,043 €	2,086 €

1992	$10	$25	$100	$500	$1,000
2024	$22	$55	$219	$1,093	$2,186
2024	20 €	51 €	203 €	1,012 €	2,025 €

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1972

June 27: Incorporation of Atari, Inc.

December: Atari doing business as Syzygy shipped Pong (the coin-operated game; first commercial production units). (Wall Street Journal 18-Mar-1974 for date)

1975

February 16-18: Atari previewed consumer Pong at the American International Toy Fair in New York.

July: MOS Technology announced the MCS6502 microprocessor, samples to ship September 1975, and announced that the 6502 and other MCS6500 family microprocessors would be second sourced by Synertek.

August?: Sears introduced Tele-Games Pong by Atari on page 410 of the Wish Book for the 1975 Christmas Season.

September 16-19: MOS Technology introduced the MCS6502 microprocessor at Western Electronic Show and Convention (WESCON) in San Francisco, California.

October: Atari formally established a Consumer Games division.

December: (after Dec. 25) Engineer **Joe Decuir (Joseph C. Decuir)** – previously a research assistant at the San Francisco Institutes of Medical Sciences – joined Atari and would work with senior engineers **Steven T. Mayer** and **Ron Milner** at Atari's Cyan Engineering to help debug a concept prototype "Programmable video game" project ; later: "Stella" project.

1976

January 7-9: Atari introduced Pong (C-100) during the 4th annual Winter Consumer Electronics Show (CES). (TV Digest 24-Nov-1975, page 8; 12-Jan-1976, page 11).

March: Atari VP Research & Development **Al Alcorn** established an advanced products group chartered to further develop the prototype "Programmable video game" project invented at Atari's Cyan Engineering by **Steven T. Mayer** and **Ron Milner**, comprised of:

- **Jay G. Miner** – Synertek engineer/Atari consultant (MOS/LSI design),
- **Joe Decuir (Joseph C. Decuir)** – Atari engineer (logic design; previously of Atari's Cyan Engineering where he had helped debug the concept prototype),
- **Larry Wagner** – Mathematician/programmer (Software & Systems Architecture; previously of Singer Business Machines).

The project would become known as: "Stella".

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July: MOS Technology announced a series of new chips in the 6500 family, including the MCS6520 PIA.

November: Commodore International acquired controlling interest in MOS Technology, and MOS Technology became a subsidiary of Commodore.

1977

Spring: Synertek engineer/Atari consultant **Jay G. Miner** and Atari engineers **Joe Decuir (Joseph C. Decuir)**, **Steven T. Mayer**, and **Ron Milner**, originators of the Atari "Stella" project – soon to be introduced as: Video Computer System (VCS) – started conversing about a follow-up project. Consensus was that the next logical progression was to build a home computer that would be "a terrific game player."
(**Joe Decuir (Joseph C. Decuir)** in "Stella" at 20 tape 19 00:20)

May:
- **Brad Stewart** joined Atari (Consumer) as a programmer for the Rosemary project – game system based on the Signetics 2650 microprocessor; product never introduced,
- Also joining Atari for the project: engineer/programmer **R. Scott Scheiman**,
- Chip engineering technician **Steve Smith** would join Atari as well, for the "Video Frog" project (same project?); **Steve Smith** had been interviewed by lab supervisor **Craig Hansen**,
- **Bob Brown** remained Atari (Consumer) Director of Microelectronics.

June 5-8: At the 11th annual Consumer Electronics Show (CES) Atari introduced the CX2600 Video Computer System (VCS).

July 25: **John D. Vurich** – previously National Semiconductor product marketing manager – and prior to that, chief engineer at Mirco Games, Inc. – had joined Atari (Consumer) as new product manager (Personal Computer). (TV Digest 25-Jul-1977, page 11)

August 9: Atari "Colleen" computer project broad specifications as proposed by Atari Cyan Engineering senior engineer **Steven T. Mayer** and Atari (Consumer) engineer **Joe Decuir (Joseph C. Decuir)** were accepted by Atari decision makers and contributors:
- **Jay G. Miner** – Synertek engineer/Atari consultant,
- **Bob Brown** – Atari (Consumer) Director of Microelectronics,
- **John Ellis** – Atari (Consumer) Director of Engineering,
- **John D. Vurich** – Atari (Consumer) new product manager (Personal Computer),
- **Al Alcorn** – Atari VP Research & Development.

(**Joe Decuir (Joseph C. Decuir)** 1977 engineering notes, pages 65-74)
Jay G. Miner would be "Colleen" Project Chief Engineer.

Fall?: Engineer **Richard Simone** – previously LSI design manager at National Semiconductor – joined Atari (Consumer) as LSI Design Manager. **Bob Brown** remained Atari (Consumer) Director of Microelectronics. Hires by **Richard Simone** would include (all from National Semiconductor): **Douglas G. Neubauer**, **Steve Stone**, **Mark Shieu**, **Delwin Pearson**.

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Fall?: Atari and Dorsett Educational Systems reached a licensing agreement that would bring Dorsett's Talk & Teach Computer-Assisted Instruction (CAI) System to Atari "Colleen" computer.

November 29: Upon considering updated pricing estimates for the Atari "Colleen" computer project, Atari engineers considered targeting products at three consumer price points:
1. "Colleen" would be the complete computer system,
2. "Candy" would use the "Colleen" chipset but would be a non-expandable game player (no keyboard, no interface, potentially Atari VCS compatible),
3. "Elizabeth" would be the same as "Colleen" but with a 13-inch color monitor.

(Joe Decuir (Joseph C. Decuir) 1977 engineering notes, pages 106-110).

December: "Several other new personal computers, in the PET/TRS-80 price range, are coming soon...Atari (another video game manufacturer), and a European and Japenese [sic] company are also expected to enter the competition."
(Micro #2 Dec-1977, page 18; reprinted from "Northwest Computer Club News" Oct-1977)

December 21: Atari "Colleen" computer project managers conducted design reviews of the 3 chips and system:

- Jay G. Miner remained Project Chief Engineer,
- Joe Decuir (Joseph C. Decuir) would assume responsibility for ANTIC,
- George McLeod would focus on the next generation TIA (later: CTIA),
- Douglas G. Neubauer would focus on POKEY,
- R. Scott Scheiman would focus on the digital system as a whole,
- Alan Miller would be applications programmer and focus on hardware/software interface,
- Howard Bornstein would work on the system monitor/resident firmware.

(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, page 5)

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1978

January 11: Planned Atari "Colleen" features included 4 KiB RAM, 2 ROM cartridge ports, built-in keyboard, audio cassette I/O, serial port, and bus expansion, while "Candy" features would include 4 KiB RAM, 1 ROM cartridge port, plug-in keyboard (joystick ports 3 & 4), audio cassette I/O, no serial port, no bus expansion.

"Colleen"	"Candy"
4 KiB RAM	4 KiB RAM
2 ROM cartridge ports	1 ROM cartridge port
Built-in keyboard	Plug-in keyboard (Joystick ports 3 & 4)
Audio cassette I/O	Audio cassette I/O
Serial port	No serial port
Bus expansion	No bus expansion

Project managers included:
Alan Miller, John Ellis, Jay G. Miner (Project Chief Engineer), John D. Vurich, Joe Decuir (Joseph C. Decuir), Howard Bornstein, Wade B. Tuma, Niles E. Strohl, R. Scott Scheiman
(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, page 3)

January: "Other manufacturers are also looking at TV games as the way to enter the home-computing market. Atari is said to be working on a programmable unit featuring color graphics; it will use either custom chips or a 6502 micro." (ROM vol. 1 no. 7 Jan-1978, page 60)

January 31: Industrial designer John Hayashi – with previous experience as an Atari (Consumer) Project Engineer – had joined Atari (Consumer) as Director of Industrial Design and Graphics, reporting to VP Consumer Engineering John Ellis.
(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, page 7; The Art of Atari, page 306)

Winter: Atari acquired the right to port Microsoft BASIC M6502 8K Version to the upcoming Atari personal computers ("Colleen"/"Candy").
See: http://www.computerhistory.org/collections/catalog/102722318

Winter: At Atari (Consumer):
Bob Brown – previously Atari (Consumer) Director of Microelectronics – would become Director of Research,
John Ellis – previously Atari (Consumer) Director of Engineering – was promoted to VP Engineering, assuming microelectronics from Bob Brown.

February 17: Software suggested by Atari (Consumer) programmer Larry Kaplan for demonstration on "Colleen"/"Candy" for January 1979 included:
- Chess,
- BASIC,
- Resident operating system,
- 2 action games (examples: 4 Player Tank, Super Bug),
- Income tax preparation / personal finance,

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- Menu planning,
- Demonstration cartridge (point of sale),
- Support of: Printer, Floppy disk drive, Cassette, Dorsett system.

(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, page 35)

March: Ray Kassar (Raymond E. Kassar), President of R.E. Kassar Corporation and Warner Communications senior marketing & management consultant for several weeks, was named general manager of Atari's Consumer division, replacing VP Research & Development Al Alcorn in the role. The appointment was on a temporary, 6-month basis, and Ray Kassar (Raymond E. Kassar) was free to return to R.E. Kassar Corp. as needed.
(New York Times 5-Jan-1979, How They Achieved, Merch Jun-1978)

March: Peter N. Rosenthal – previously a molecular biologist and cancer researcher – joined Atari (Consumer) as a marketing research associate (Personal Computers).

March: Atari (Consumer) hired computer programming consultant David Gjerdrum of PRODATA to port Microsoft BASIC M6502 for the Atari "Colleen"/"Candy" computer project.
(Inside Atari DOS, pages iv-v)
Wade B. Tuma remained Atari (Consumer) Engineering Manager;
Consultant Jay G. Miner remained "Colleen"/"Candy" Project Chief Engineer.

April 20: Educational technology consultant Liza Loop of the LO*OP Center ("Learning Options Open Portal") gave an invited presentation to the Atari "Colleen"/"Candy" project engineering team.
(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, page 71)

Atari would proceed to hire Liza Loop to write user manuals for the upcoming Atari personal computer systems. She interviewed with Atari (Consumer) engineering manager Wade B. Tuma.

June?: Peter N. Rosenthal – previously Atari (Consumer) marketing research associate (Personal Computer) – became Atari (Consumer) Manager of Software Planning (Personal Computer).

July 6: "Candy", the reduced feature set version of the Atari "Colleen" computer, was still planned as a console with external plug-in keyboard.
(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, page 84)

July 10: Rather than a dedicated audio cassette I/O interface, Atari now planned the cassette interface on "Colleen" to be incorporated into the computer's 13-pin serial port.
The cassette I/O interface on "Candy" was now planned to use the same form factor as the "Colleen" serial port.
(Joe Decuir (Joseph C. Decuir) 1978 engineering notes, page 88)

August: Carol Shaw joined Atari (Consumer) as Microprocessor Software Engineer (game designer/programmer).

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August: Atari (Consumer) hired Harry B. Stewart of NEOTERIC as a Systems Software consultant for the "Colleen"/"Candy" project. Harry B. Stewart was hired by Director of Software Development George Simcock.
Consultant Jay G. Miner remained "Colleen"/"Candy" Project Chief Engineer.

September: Bob Polaro – previously a Software engineer for Commodore – joined Atari (Consumer) as a Software engineer.

September/October:
- Steve Bristow (Stephen D. Bristow) – previously Atari (Coin-Op) VP Engineering and Plant Manager Pinball Production – became Atari (Consumer) VP engineering, Consumer Game (Electronic Toys & Games) and Home Computer product lines. (Steve Bristow (Stephen D. Bristow) resume)
- John Ellis remained Atari (Consumer) VP Engineering,
- Reports to Steve Bristow (Stephen D. Bristow) would include Niles E. Strohl (Engineering Manager, Home computer line).

The Atari "Candy" console, the reduced-feature version of the "Colleen" computer project, would be redesigned to incorporate a built-in monopanel keyboard, and would be marketed as a personal computer rather than as a game console.

September/October: Atari "Colleen"/"Candy" computer project system monitor/resident firmware and BASIC development efforts were essentially re-started. Veteran Atari (Consumer) programmers assigned to the new effort would include:
- Alan Miller,
- Larry Kaplan,
- David Crane.

Harry B. Stewart remained Systems Software consultant for Atari;
George Simcock remained Atari (Consumer) Director of Software Development;
Consultant Jay G. Miner remained "Colleen"/"Candy" Project Chief Engineer.

October 6: Atari contracted with Shepardson Microsystems, Inc. (SMI, headed by Bob Shepardson) to create both a version of BASIC (would ship as: Atari BASIC) and a File Management Subsystem (FMS) for the upcoming Atari personal computers ("Colleen"/ "Candy"). The contract called for delivery by April 6, 1979.

November 28: Warner Communications Inc. (WCI) announced that its Atari division was entering the personal-home computer industry with:
- The "general purpose" Atari-400 System (Atari 400, Project "Candy"; 57 key mono-panel keyboard, single cartridge slot, cassette recorder capability),

And
- The "specialized" Atari-800 System (Atari 800, Project "Colleen"; dual cartridge capability, user expandable RAM to 48 KiB, optional peripherals including Floppy Disk Drive and 40-column Printer).

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A library of software was to consist of applications such as: personal financial management, income tax preparation, household and office record keeping, and computer aided instruction in over 20 subject areas including math, English, history, literature, economics, psychology, and auto mechanics.

Software was also to include games for one to four players such as: Basketball, Chess, Life, Kingdom, Lemonade stand, Fur trader and Stock market. The computers were to be user-programmable using languages including BASIC.

Michael Shea was Atari Marketing Director; Manny Gerard (Emanuel Gerard) was a member of the Office of the President, Warner Communications Inc. (WCI). (Press Release) Reportedly the Atari 400/800 would retail for $450 / $900; the FORTRAN programming language was also planned. (TV Digest 4-Dec-1978, page 11)

December 14: Atari held a press conference in New York to unveil two personal computer systems, the Atari-400 ($500; 4 KiB RAM) and the Atari-800 ($1,000; with internal 8 KiB OS ROM Module, internal 4 KiB RAM Module, Atari 410 Program Recorder, 4 joystick controllers, Basketball cartridge, Atari BASIC cartridge, Atari 800 Operators Manual, Atari BASIC Programming Guide). Hands-on demonstration: Basketball.

The computers were designed to pass FCC tests for use with home TV, and they were expected to ship August 1, 1979.

Atari said it was studying connecting the computers with the Warner Amex QUBE two-way interactive cable television system in Columbus, Ohio. In addition to the already designed Printer & Floppy disk drive, future peripherals including Chord music module and Drawing pen were planned.
(TV Digest 18-Dec-1978, page 11; on Computing Fall 1979, pages 51-53 with photos; Atari 800 Operators Manual 1978 version)

December: Shepardson Microsystems, Inc. (SMI) delivered working versions of Atari BASIC and a disk File Management System (FMS) to Atari.
Project leader: SMI contract programmer Paul Laughton.
George Simcock remained Atari (Consumer) Director of Software Development.

December 28: Manny Gerard (Emanuel Gerard), Office of the President of Warner Communications with responsibility for Atari, instituted a change of leadership at Atari.

- Nolan Bushnell – previously Atari Chairman & co-CEO – became creative consultant,
- Joe Keenan – previously Atari President & co-CEO – became Atari Chairman, replacing Nolan Bushnell in the role,
- Ray Kassar (Raymond E. Kassar) – previously Atari (Consumer) general manager, temporary basis while remaining President of R.E. Kassar Corporation – joined Atari on a permanent basis as:
  - President, replacing Joe Keenan in the role,
  - CEO, replacing Nolan Bushnell and Joe Keenan in the role.

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1979

January 8: Donald D. Kingsborough of D.K. Associates, Inc. – previously Atari (Consumer) sales representative for Northern California (They Create Worlds; ISBN 978-1-138-38990-8, page 457) – had joined Atari (Consumer) as Director of Sales & Marketing, in part replacing Michael Shea (marketing) who departed the company.
(TV Digest 8-Jan-1979, page 12; Fun, page 381).

January 6-9: At the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada (Las Vegas Convention Center, Hilton hotel, and Jockey Club hotel), Atari previewed the Atari-400 Personal Computer (Atari 400, 8 KiB RAM; approximately $500) and the Atari-800 Personal Computer (Atari 800, 8 KiB RAM; approximately $1,000).

Previewed for the Atari 400/800: Cassette tape drive (Atari 410; to be sold separately for the 400; to be supplied with the 800).

Previewed for the Atari 800: High speed floppy disc drive (Atari 810), 40-column printer (Atari 820).

Software shown or promised included:
- Business & household management applications,
- Over 20 Educational Library subjects including:
  Algebra, Basic Psychology, Counseling Procedures, Economics, Spelling, Vocabulary Builder, Auto Mechanics, Spanish, Great Classics, Sociology, Accounting, Statistics, US History, Carpentry, Basic Electricity, Zoology,
- Thinking games:
  Chess, Backgammon, Business Simulations, Fur Trader, Stock Market Simulation, Space Adventure, Superman,
- Action games:
  Four Player Basketball, Super Bug Driving Game, Game of Life, Fire Truck, Four Player Tank.

Also shown or promised: Atari BASIC (SMI) and Atari Disk BASIC (Port of Microsoft BASIC).

Atari (Consumer) programmer Larry Kaplan and chip engineering technician Steve Smith led the live demonstrations of the Atari 400/800 at the show.

Donald D. Kingsborough was Atari (Consumer) Director of Sales & Marketing. Manny Gerard (Emanuel Gerard) represented the Office of the President, Warner Communications Inc. (WCI).

(Creative Computing Apr-1979, page 16 photo, pages 62-63 Press Release; The Intelligent Machines Journal Issue 2, 17-Jan-1979; Merch Jan-1979)

January: Atari ran an advertisement for the Atari 400/800 on pages 54-55 of Merchandising (magazine), vol. 4, no. 1, Jan-1979.

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January:

- **Donald D. Kingsborough** – previously Atari (Consumer) Director of Sales & Marketing – became VP Sales & Marketing,
- **Peter N. Rosenthal** – previously Atari (Consumer) Manager of Software Planning (Personal Computers) – became Marketing Manager of personal computers (Creative Computing vol. 5, no. 8, Aug-1979, page 58), replacing **John D. Vurich** who departed the company. **Peter N. Rosenthal** would report to **Donald D. Kingsborough**,
- **John D. Vurich** and former Atari Chairman & co-CEO **Nolan Bushnell** would together establish Axlon Incorporated on 26-Mar-1980.

February: Synertek engineer/Atari consultant **Jay G. Miner** departed the companies (Atari Inc.: Business is Fun, page 386) to Custom MOS, Inc., which would change its name to ZyMOS in November 1980.

February: Atari (Consumer) hired UC Berkeley doctoral student **Ted M. Kahn**, who had previously worked with the Learning Research Group at Xerox Palo Alto Research Center (PARC) (under **Alan Kay**), as a personal computers educational marketing consultant – essentially replacing consultant **Liza Loop** in the role. **Ted M. Kahn** would report to Marketing Manager of personal computers **Peter N. Rosenthal**.

March 26: Atari had asked the US FCC to extend the comments deadline on Texas Instruments' February 1979 petition for a waiver of the Class I TV Device rules, in what was widely seen as an attempt to delay market introduction of the TI home computer. The FCC agreed to extend the deadline to March 30. (TV Digest 26-Mar-1979)

Winter/Spring: Atari (Consumer) LSI Design Director **Richard Simone** departed the company to Maruman Integrated Circuits.

Winter/Spring: Atari canceled Atari Disk BASIC (Port of Microsoft BASIC M6502 8K Version to the Atari-800). Atari (Consumer) computer programming consultant **David Gjerdrum** of PRODATA departed the company.

April 9: In joining others including Apple Computer, Interact, Mattel, and Tandy Radio Shack, Atari had registered its opposition to Texas Instruments' RF devices waiver request from the US FCC by submitting a 60-page report accompanied by technical data showing that TI standards could cause massive interference in urban areas, and claiming that:

"TI simply presented the Commission with its self-serving appraisal of what it considered 'reasonable standards' for home computer manufacturers, and asked for authority to produce & market a computer line satisfying its own standards." (TV Digest 9-Apr-1979, page 11)

April: Atari chip engineering technician **Steve Smith** departed the company to Custom MOS, Inc.

April: **Rob Zdybel** joined Atari (Consumer) as a game programmer.
George Simcock remained Atari (Consumer) Director of Software Development.

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April 16-June 30: Direct-mail "refund" promotion to all known (US) Atari VCS owners. Each of "hundreds of thousands" of owners would receive a blank check good for $2 on purchase of any of 28 VCS game programs. In addition, consumers were asked to answer 3 questions about Atari's new personal computers. Winners drawn from correct responses would receive Atari 400 & Atari 800 Computers and $100 computer merchandise certificates.
(TV Digest 12-Mar-1979, page 12; Merch Apr-1979)

Spring: As Atari shifted international consumer sales/marketing from the former Atari International division to the Consumer division, **Anthony Bruehl (Anton Bruehl)** – previously a VP of one of the Burlington Industries' international divisions – would join Atari (Consumer) as VP International Sales/Marketing.

May 11-13: At the 4th West Coast Computer Faire, San Francisco's Civic Auditorium & Brooks Hall, San Francisco, California, Atari showed/again promised the Atari 400 computer (8 KiB RAM; $549.99) and Atari 800 computer (8 KiB RAM with Atari 410 Program Recorder; $999.99).

Again shown/promised:
- For the Atari 400/800: Atari 410 Program Recorder,
- For the Atari 800: Atari 810 Floppy Disk Drive ($749.99), Atari 820 printer.

Business & household management software shown/promised (titles not finalized): Income tax preparation guide, Personal financial management, Record keeping, Charge account management, Personal capital investment management, Mailing list/Address book, Computerized appointment calendar, Inventory management, Accounts payable, Touch-typing trainer, Payroll.

Over 20 Educational Library subjects were again shown/promised including: Algebra, Economics, Auto Mechanics, Sociology, US History, Zoology, Counseling Procedures, Vocabulary Builder, Basic Psychology, Spelling, Spanish, Accounting, Carpentry, Great Classics, Statistics, Basic Electricity, World History.

Entertainment software shown/promised: Chess, Backgammon, Business Simulations, Stock Market Simulation, Space Adventure, Four-Player Basketball, Super Bug Driving Game, Game of Life, Super Breakout.

Programming language: Atari BASIC.

Demonstrations were led by Atari (Consumer) programmer **Larry Kaplan**.

(Apr-1979 Atari 400/800 flyers;
Kilobaud Microcomputing Sep-1979, pages 52-54 includes photo;
Creative Computing Aug-1979, page 66 photo;
Intelligent Machines Journal 11-Jun-1979, page 8)

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May 21: In response to Texas Instruments' technical reply to the US FCC regarding its Class I waiver request, which said its interference standards exceeded Computer & Business Equipment Manufacturers Association (CBEMA) standards, Atari had filed a follow-up noting that CBEMA standards were for commercial computers up to 30 meters from a TV, enclosing photos of broken-up TV pictures reportedly caused by a home computer with TI standards. (TV Digest 21-May-1979, page 13)
May/June: Mike Lorenzen joined Atari (Consumer) as a Game designer/ Programmer. George Simcock remained Atari (Consumer) Director of Software Development.

June 3-6: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, Atari promised that the Atari 400/800 base units would ship fall 1979, and featured a firmed Atari 400/800 product line including suggested retail prices.

400 system (8 KiB RAM) with Atari BASIC cartridge and Atari BASIC book (Wiley Self-Teaching Guide)	$549.99
800 system (8 KiB RAM) with BASIC cartridge, Education System Master Cartridge, Atari BASIC book (Wiley Self-Teaching Guide), 410 Program Recorder, and Guide to BASIC Programming cassette	$999.99
810 Floppy Disc Drive	$749.99
820 Printer	$599.99
410 Program Recorder	$89.99
8 KiB RAM Memory Module	$124.99
16 KiB RAM Memory Module	$249.99
Driving Controller Pair	$19.95
Paddle Controller Pair	$19.95
Joystick Controller Pair	$19.95

ROM cartridges:
- Assembler Debug (would ship as: Assembler Editor)
- Atari BASIC
- Basketball
- Computer Chess
- Educational System Master Cartridge
- Game of Life (would ship as: Video Easel)
- Home Finance (earlier: Checkbook; never shipped)
- Music Composer
- Super Breakout
- Super Bug (never shipped)

Educational System cassette programs:
- Auto Mechanics (never shipped)
- Basic Algebra
- Basic Electricity
- Basic Psychology
- Basic Sociology
- Business Communications
- Counseling Procedures
- Effective Writing
- Great Classics (English)
- Physics
- Principles of Accounting
- Principles of Economics
- Spelling
- Supervisory Skills
- US Government
- US History
- World History (Western)

BASIC game and program cassettes: Guide to BASIC Programming (would ship as: An Invitation to Programming 1: Fundamentals of BASIC Programming), BASIC Game Programs (compilation never shipped);

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Diskettes: Blank Diskettes (would ship as: 5 Diskettes), Disk File Manager (would ship as: Master Diskette).

(Creative Computing Aug-1979, page 26, launch kit)

June 15: Atari announced US Federal Communications Commission (FCC) Type I approval for the Atari 400 and Atari 800 personal computer systems, along with the Atari Program Recorder (410). It was the 29th consecutive Atari product approval by the FCC. (Press Release)

June: Atari microcomputer systems engineer **Joe Decuir (Joseph C. Decuir)** departed the company. (Atari Inc.: Business is Fun, page 387)
Joe Decuir (Joseph C. Decuir) had established Standard Technologies Corporation on 7-Jul-1978.

June: Completion date for the Atari 400/800 Operating System REV. A.

June: Atari (Consumer) programmer **Larry Kaplan** departed the company.
(They Create Worlds; ISBN 978-1-138-38990-8, page 483)
He would help form Activision, which would be established on 1st-Oct-1979, and would join Activision in Dec-1979.

Month?: **Georgia A. Marszalek** joined Atari (Consumer) as Manager of Marketing Communications (Personal Computer), reporting to Marketing Manager of personal computers **Peter N. Rosenthal**.

July 2: The Atari 400/800 were offered for $549.95 / $995.00 on page 774 of the JCPenney Fall And Winter 1979 catalog. (TV Digest 2nd-Jul-1979)

July:
- **Robert A. Hovee** – previously of Questor – joined Atari (Consumer) as personal computers VP Sales & Marketing, in part replacing **Donald D. Kingsborough** who had departed the company to return to his sales representative business, D.K. Associates; **Donald D. Kingsborough** would establish D.K. Marketing, Inc. on 1st-Oct-1979, and S.K.U., Inc. on 11-May-1981,
- **Peter N. Rosenthal** – previously Marketing Manager of personal computers – would be promoted to Director of Marketing for personal computers, reporting to **Robert A. Hovee**.

Summer: Atari determined that the production version of the Atari 400 would feature the full Serial I/O interface as found on the Atari 800.
Previously: the Atari 400 was to feature an audio cassette I/O interface using the same form factor as the full SIO interface on the 800.

Summer: Engineer **Rob Fulop** joined Atari (Consumer) as a game designer/programmer.

August: Atari (Consumer) senior programmers & game designers **Alan Miller** and **David Crane** both departed the company. (They Create Worlds; ISBN 978-1-138-38990-8, page 483)
They would co-found Activision on 1st-Oct-1979.

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August: Atari (Consumer) programmer **Larry Kaplan** departed the company. He would help form Activision, and would join Activision in December 1979.

August:
- **Tod Frye** joined Atari (Consumer) as a Game Designer / Programmer. (**Tod Frye** in Atari 50),
- **John Eckstrom** joined Atari (Consumer) as a Programmer (operating systems, computer line),
- **Harry B. Stewart** remained Systems Software consultant for Atari,
- **George Simcock** remained Atari (Consumer) Director of Software Development.

August: Atari (Consumer) chip design engineer **Douglas G. Neubauer** departed the company to Hewlett-Packard. (Compute! magazine #3, Mar/Apr-1980, page 75)

August?: On pages 654-655 of the Wish Book for the 1979 Holiday Season Sears featured the Atari 400 personal computer system ($549) and accessories.

Summer/Fall: The Atari plant at 1173 Borregas Avenue, Sunnyvale, California – previously home of Atari (Coin-Op) pinball production – was repurposed for Atari 400/800 computer line manufacturing.

Brad C. Saville would be Atari (Consumer) manufacturing manager (Personal Computers).

September 4: **Chris C. Crawford** – previously an instructor with the University of California Extension, and designer of the self-published game Legionnaire for Commodore PET – joined Atari (Consumer) as a game designer/programmer. **Chris C. Crawford** was recommended for hire by Atari (Consumer) programmer **Rob Zdybel**.

September 4: The New York Times reported on page D7, "Atari Inc., the maker of home video games, will introduce two new personal computer systems in the fall. The inaugural ad campaign, created by Doyle Dane Bernbach, will break in October in 12 national publications. TV commercials will also be aired in Los Angeles in November and December."

September: **Ray Kassar (Raymond E. Kassar)** – previously Atari President & CEO – would become Atari Chairman & CEO, replacing Atari Chairman **Joe Keenan** who announced his departure from the company.

September?: **Dennis Koble** – previously Atari (Consumer) Engineering Manager for Consumer Games (Electronic Toys & Games) – became Atari (Consumer) Software Manager. A new position, reporting to Director of Software Development **George Simcock**.

September 18: In response to petitions from Texas Instruments filed February 1979, and in rejection of expressed opposition from several companies including Atari, the US FCC adopted an Order Granting Waiver in Part which granted Texas Instruments authority to apply for and receive certification of and to market its TI-900 RF modulator, to be effective 30 days after publication. (FCC 79-557; 44 FR 62339) TI would be able to market its home computer, the TI-99/4, effective November 23, 1979.

September 24: Shepardson Microsystems, Inc. (Contract programmer **Paul Laughton** for SMI) completed the File Management Subsystem (FMS) for the Atari personal computers.
George Simcock remained Atari (Consumer) Director of Software Development.

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October: Atari shipped the Atari 400 personal computer system (NTSC; 8 KiB RAM) and the Atari 800 personal computer system (NTSC; 8 KiB RAM), each boxed with the BASIC Computing Language cartridge (Atari BASIC by SMI) and the Atari BASIC book (Wiley Self-Teaching Guide).

Also supplied with the Atari 800 and also shipped separately (for Atari 400 owners): the Atari 410 Program Recorder and the Educational System Master Cartridge (Dorsett Educational Systems). (Byte Mar-1980, page 110 for date).

October: "Atari's production lines were stalled for about a week in October due to yield problems at one of its chip suppliers, Synertek. The low yields at the semiconductor manufacturer resulted in significantly reduced delivery of the MPU [the 6502 microprocessor] to Atari, resulting in about a 3-week delay in getting the computers into the marketplace." (Electronic News 10-Dec-1979, page 83)

Fall?: **Stephen N. Davis** and **Carol Abbott** joined Atari (Consumer) as Product Marketing Managers, reporting to Director of Marketing (Personal Computer) **Peter N. Rosenthal**.

November 8: Atari filed a Motion to Stay the effective date (November 23, 1979) of the Order Granting Waiver in Part that the FCC had granted to Texas Instruments on September 18, 1979.

November 9: **Dale Yocum** – previously of Telesensory – had joined Atari (Consumer) to establish and manage an Atari 400/800 programmers' group as Applications Software Manager (Personal Computer).
Dale Yocum had been hired by Software Manager **Dennis Koble**, but he would report directly to Director of Software Development **George Simcock**, while **Dennis Koble** would remain Software Manager for Game Software, still reporting to **George Simcock**.

November: Sears, the US national retailer, began test marketing the Atari 400/800 in its retail stores throughout California and the Atari 400 in its stores in the Chicago area.
(Electronic News, 10-Dec-1979, page 83; Byte Apr-1980, page 115 for date)

In its retail stores, for the Atari 400/800 Sears offered 8 Computer Program Library cassettes, software developed by The Image Producers: Target Chase (7671), Baseball (7672), Stock Challenge (7673), Memory Maze (7674), Roman Checkers (7675), Oil Wells (7676), Frame Up (7677), Bingo Duel (7678). These were likely the first third-party products for the Atari 400/800.

November:
- **Conrad C. Jutson** – previously Texas Instruments marketing manager for personal computers – joined Atari (Consumer) as a personal computers sales manager. (Compute! magazine #5, Jul/Aug-1980, page 16)
- **Craig A. Conway** would also join Atari (Consumer) as a personal computers sales manager.
- **Robert A. Hovee** remained Atari (Consumer) VP Sales & Marketing for personal computers.

November 20: The US FCC denied Atari's Motion to Stay the effective date (November 23, 1979) of the waiver granted to Texas Instruments on September 18, 1979, saying Atari hadn't presented any new evidence. (FCC 79-754; TV Digest 26-Nov-1979)

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November 21: Regarding the FCC's November 20 denial of Atari's Motion to Stay the effective date (November 23, 1979) of the waiver granted to Texas Instruments on September 18, 1979, Atari sought judicial review and a court stay from the US Court of Appeals, D.C. Circuit. (Atari v. FCC, No. 79-2376)

November 23: The waiver granted by the FCC to Texas Instruments on September 18, 1979 to sell an independent RF modulator for home computers & video games (and effectively the TI-99/4 computer system) went into effect, and TI began sales of the TI-99/4. Atari filed a petition with the FCC requesting reconsideration of the TI waiver.

November/December:
Atari shipped:

- Basketball
- Super Breakout
- Computer Chess

Atari shipped the Atari 810 Floppy Disk Drive with 810 Master Diskette (DOS developed by SMI).

Atari shipped the Talk & Teach Educational System cassettes (Dorsett Educational Systems):

- Basic Algebra
- Basic Electricity
- Basic Psychology
- Basic Sociology
- Business Communications
- Counseling Procedures
- Effective Writing
- Great Classics
- Physics
- Principles of Accounting
- Principles of Economics
- Spelling
- Supervisory Skills
- US Government
- US History
- World History (Western)

November/December?: **Lane Winner** – previously of Versatec – joined Atari (Consumer) as an Applications Programmer (Personal Computer). **Lane Winner** would report to Applications Software Manager **Dale Yocum**.

November/December: **Kathy Forte** joined Atari (Consumer) as an Applications Programmer (Personal Computer). **Kathy Forte** would report to Applications Software Manager **Dale Yocum**.

December 6: In Atari v. FCC, No. 79-2376, the US Court of Appeals, D.C. Circuit denied Atari's motion for stay. Atari's November 23 request for reconsideration by the FCC remained active.

December 10: "Atari is funneling large quantities of its 400 and 800 personal computers and software to Sears, Roebuck, while retail computer stores have been faced with late hardware deliveries and received very little, if any, software." (Electronic News, 10-Dec-1979, page 83)

December: **Chris C. Crawford** – previously an Atari (Consumer) Game Designer – transferred to the personal computer application programmers' group, reporting to Applications Software Manager **Dale Yocum**.

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December:

- **Steve Bristow (Stephen D. Bristow)** – previously Atari (Consumer) VP Engineering, Consumer Game (Electronic Toys & Games) and Home Computer product lines – would remain VP Engineering, Consumer Game product line (Electronic Toys & Games), (**Steve Bristow (Stephen D. Bristow)** resume)
- **John Ellis** remained Atari (Consumer) VP Engineering, re-assuming Computer Product Line Engineering from **Steve Bristow (Stephen D. Bristow)**,
- **Niles E. Strohl** remained Engineering Manager, computer line, now reporting to **John Ellis**.

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1980

January 5-8: At the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada, for the Atari 400/800 (now $629.95 / $1,079.95; previously: $549.99 / $999.99) Atari introduced:
- Atari 825 Printer
- Atari 830 Modem
- Atari 850 Interface (each due summer 1980)

Atari again promised the Atari 820 Printer.

Atari introduced:
- 3-D Tic-Tac-Toe
- Assembler Editor (previously: Assembler Debug; April)
- Music Composer (March)
- Personal Finance (previously: Home Finance; July; never shipped)
- Star Raiders
- Video Easel (previously: Game of Life)

Atari featured:
- Basketball
- The Talk & Teach Educational System

Atari again promised:
- Introduction to Programming (previously: Guide to BASIC Programming)

Atari announced:
- Biorhythm
- Blackjack
- Hangman
- Kingdom

(Interface Age Feb-1980, page 49; InfoWorld 18-Feb-1980, page 17 with photos; Merch; C015700 REV. 1; Touch the Future flyers; Dec-1979 Atari 400/800 flyers; Price list)

Atari announced a license agreement to market 8 personal capital investment management application programs designed by Control Data Corporation (CDC) from CDC's Cyberware library, including:
- Bond Yield, Bond Price and Interest, Bond Switch,
- Stock Rate of Return, Stock Dividend Analysis, Stock Charting,
- Mortgage Analysis,
- Portfolio Analysis.

(Wall Street Journal 8-Jan-1980, page 37; TV Digest 14-Jan-1980, page 13)

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Atari would ship the four titles:
- Mortgage & Loan Analysis,
- Bond Analysis,
- Stock Analysis,
- Stock Charting.

January?: Atari shipped 3-D Tic-Tac-Toe.

January:
- **Conrad C. Jutson** – previously an Atari (Consumer) Sales Manager for personal computers – was promoted to VP Sales & Marketing, Personal Computers, replacing **Robert A. Hovee** who departed the company. (TV Digest 21-Jan-1980, page 14),
- **Craig A. Conway** – previously also an Atari (Consumer) Sales Manager for personal computers, reporting to **Robert A. Hovee** – would become National Sales Manager for personal computers, reporting to **Conrad C. Jutson**.

January 21: Atari and Control Data Corporation (CDC) announced an agreement for the repair of Atari personal computers through the nationwide network of Control Data Service Centers.

Under terms of the agreement, CDC would furnish a variety of repair services to owners and distributors of the Atari 400 and Atari 800 personal computer systems, including warranty repair, safety and engineering changes, equipment upgrades and annual service contracts. Repair centers for Atari computers were being established in CDC's existing nationwide network of field service locations.

Approximately 20 centers were open in California, Colorado, Florida, Georgia, Illinois, Maryland, Massachusetts, Minnesota, New Jersey, Ohio, Texas and Washington, with more scheduled. (Dr. Dobb's Journal).

Winter:
- **Bob Smith (Robert G. Smith)** joined Atari (Consumer) as a programmer. He was hired by, and would report to, Game Software Manager **Dennis Koble**,
- **Dave Johnson** – previously of Interact Electronics – joined Atari (Consumer) as a programmer. He was hired by Director of Software Development **George Simcock** and reporting to Applications Software Manager **Dale Yocum**.

Winter: At IBM, the company's recently-created Entry Level Systems unit proposed a quick entry into the personal computer market by presenting to the IBM executive board a prototype "Personal Computer" based on the Atari 800, along with a proposal to acquire the necessary technology by acquiring Atari.

The presentation was actually a ploy by the group to win support for developing a personal computer independent of the rest of the company's standard lengthy and elaborate product development process. The ploy was successful, ultimately leading to the August 12, 1981 introduction of the IBM 5150 Personal Computer (IBM PC). (see: Delete: A Design History of Computer Vapourware, by Paul Atkinson, 2013, pages 86-91)

February 11: The Sears spring-summer catalog featured the Atari 400 at $549, and the Atari 800 at $999. (TV Digest 11-Feb-1980, page 10)

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February?: Atari shipped Video Easel and Star Raiders.

March 14-16: Atari did not attend the 5th West Coast Computer Faire in San Francisco, California, although Atari retail training staff and support personnel were present assisting several Atari 400/800 dealers. (Compute! magazine #4, May/Jun-1980, page 6)

March?: Atari shipped: Music Composer.

March: Science Research Associates (SRA, the subsidiary of IBM) and Atari announced that SRA would develop educational computer courseware in reading, language arts, mathematics, science, and social studies, intended for Atari personal computers used in the home; Atari would have the right to market this software.

Additionally, SRA would have primary responsibility for the sale of Atari personal computers and services to the educational community (public and private, pre-school through university level). (Compute! magazine #4, May/Jun-1980, page 76; InfoWorld 31-Mar-1980, page 2)

March/April: **Tandy Trower** – previously of WICAT (World Institute for Computer-Assisted Teaching) – joined Atari (Consumer) as an evaluator of 3rd party software titles (Personal Computer). He was hired by Atari (Consumer) Director of Marketing (Personal Computer) **Peter N. Rosenthal**.

April 9: Atari's November 23, 1979 petition to the US FCC to rescind the waiver of Class I TV rules granted to Texas Instruments was rejected by the commission. (TV Digest 7-Apr-1980, page 11; 14-Apr-1980, page 12)

Atari and the National Association of Broadcasters (NAB) would appeal the FCC's decision to the United States District of Columbia Court of Appeals (Byte Apr-1980, page 115), which would reject the appeal. (Byte May-1980, page 146)

April 23: **George Simcock** remained Atari (Consumer) Director of Software Development.

For the Atari 400/800 product line:

- **Dale Yocum** remained Applications Software Manager, reporting to **George Simcock**,
- **Tandy Trower** remained an Evaluator of 3rd party software titles, reporting to Director of Marketing **Peter N. Rosenthal**,
- **Carol Abbott** remained a Software Product Manager, reporting to **Peter N. Rosenthal**,
- **Keith Ball** was a Systems Software Programmer, reporting to **George Simcock**,
- **Georgia A. Marszalek** – previously Manager of Marketing Communications, personal computers – had become a Software Product Manager, reporting to **Peter N. Rosenthal**,
- **Brian Johnston** – previously an Atari (Consumer) Game Developer (Electronic Toys & Games) – was serving as a Systems Software Programmer on an interim basis, reporting to **George Simcock**.
  https://archive.org/details/AtariDiagnosticCartridgeEvaluationMemo
- **Sally Bowman** – previously a school psychologist for the Scottsdale Unified School District (Arizona) – had joined Atari (Consumer) as Manager of Marketing Communications, personal computers, replacing **Georgia A. Marszalek** in the role.

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Spring: For the Atari 400/800 Atari shipped: An Invitation to Programming 1: Fundamentals of BASIC Programming (Program Design, Inc. – PDI; previously: Introduction to Programming), Kingdom, Blackjack, Biorhythm, Hangman (1st-Jun-1980 Price list)

May 12: Atari (Consumer) senior layout engineer **Steve Stone** had departed the company and established Macro Dienamics, Inc. (MDI)

May?:
- **Dennis Koble** – previously Atari (Consumer) Game Software Manager – was promoted to Director of Software Development, replacing **George Simcock** who had departed the company (retired),
- **Brian Johnston** – previously Atari (Consumer) Game Developer (Electronic Toys & Games) – would become Systems Software Supervisor, computer line (new position). He would be reporting to **Dennis Koble**,
- Systems Software consultant **Harry B. Stewart** would now report to **Brian Johnston**. He was previously reporting to **George Simcock**,
- **Dale Yocum** remained Applications Software Manager, computer line, now reporting to **Dennis Koble**.

May 19: **Steve Bristow (Stephen D. Bristow)** – previously Atari (Consumer) VP Engineering, Consumer Games (Electronic Toys & Games) – would become Atari (Consumer) VP Engineering, assuming the role from **John Ellis** who had departed the company.
Niles E. Strohl remained engineering manager, computer line, now reporting to **Steve Bristow (Stephen D. Bristow)**.

May 20-22: Atari featured the Atari 400/800 personal computer systems at the 1980 National Computer Conference's (NCC) Personal Computing Festival at the Disneyland Hotel, Anaheim, California. Also at the show, Personal Software introduced the Atari 800 version – and the Commodore PET/CBM version – of VisiCalc by Software Arts. The original Apple II version had shipped Oct. 1979. (Byte May-1980, pages 280-281; The Boston Globe 27-May-1980)

June 15-18: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, for the Atari 400/800 ($630 / $1,080) Atari introduced:
- 815 Dual Floppy Disk Drive with DOS 2.0D ($1,499.95; fall; never shipped),
- 822 Printer ($449.95; summer),
- Light Pen (CX70; $74.95; summer).

Atari again promised:
- 820 Printer ($599.95; summer),
- 825 Printer ($999.95; summer),
- 830 Modem ($199.95; summer),
- 850 Interface ($219.95; summer).

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Atari introduced:

- Mortgage & Loan Analysis (Control Data Corporation (CDC))
- Bond Analysis (CDC)
- Stock Analysis (CDC)
- Stock Charting (CDC)
- An Invitation to Programming 2: Writing Programs One and Two (Program Design, Inc. – PDI)
- An Invitation to Programming 3: Introduction to Sound and Graphics (PDI)
- Astrology (never shipped)
- Conversational French (EMI / Longman)
- Conversational German (EMI / Longman)
- Conversational Spanish (EMI / Longman)
- Mailing List
- Touch Typing
- Calculator
- Graph It
- Statistics I
- Energy Czar
- States & Capitals
- European Countries & Capitals
- TeleLink I
- Space Invaders (by Taito)

Atari again promised: Assembler Editor
No longer promised: Personal Finance.

Atari also previewed The Atari Accountant series (by BPI; would consist of: General Accounting System; Accounts Receivable System; Inventory Control System; each package in the series would require the Atari 815 Dual Floppy Disk Drive; series never shipped).

Also, Atari had modified the Atari 800 personal computer system package. The Atari 800 would now ship with one CX853 16 KiB RAM module installed (previously: one CX852 8 KiB RAM module); the Atari 410 Program Recorder and Educational System Master Cartridge were removed from the package; the BASIC Reference Manual was added to the package.
(Creative Computing Sep-1980, page 30; Compute! magazine #5, Jul/Aug-1980, pages 4-5; TV Digest 2nd-Jun-1980, page 11; 1st-Jun-1980 Price list)

Months?:

- **Jeff Burton** joined Atari (Consumer) as International Market Manager,
- **Nancy Garrison** – previously of Revlon – joined Atari (Consumer) as International Marketing Manager for Computer Software,
- **Anthony Bruehl (Anton Bruehl)** remained Atari (Consumer) VP International Sales/Marketing.

July 1: Date of the internal Atari document: "Atari PCS Applications Software Standards" REV 1.0 by **Dale Yocum**, application programmers' group manager.
https://preview.tinyurl.com/y6kc333y

July: Date of Atari Lease Agreement for 1196 Borregas Avenue, Sunnyvale, California, future home of the future Atari Computer division.

July 29: Warner Amex Cable Communications announced a fall 1980 project in collaboration with Atari, Inc. and CompuServe that would provide a minimum of 100 subscribers to the Warner Amex two-way interactive QUBE service in Columbus, Ohio, with access to data from CompuServe through the use of provided Atari computers. (Warner Amex Cable Communications Press Release)

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Summer?: Atari shipped the 820 Printer.

Summer?: Atari (Consumer) game designer **Carol Shaw** departed the company to Tandem Computers.

Summer:
- **Dennis Koble** – previously Atari (Consumer) Director of Software Development – would remain Director of Game Software Development,
- **John R. Powers, III** – previously of The Authorship Resource, Inc. (ARI) (established by **John R. Powers, III** and **Joe Miller (Joseph B. Miller III)** on 1st-Apr-1977 to develop the OS and software for the CyberVision home computer) – joined Atari (Consumer) as Director of Applications and Systems software development,
- Reports to **John R. Powers, III** would include Applications Manager **Dale Yocum** and Systems Software Supervisor **Brian Johnston**,
- **Steve Bristow (Stephen D. Bristow)** remained Atari (Consumer) VP Engineering.

Summer: Atari donated 18 Atari 800 Computers and Atari 810 Floppy Disk Drives to the Lawrence Hall of Science, Berkeley, California, for their Math and Computer Project. The donation was arranged by Atari Educational Marketing consultant **Ted M. Kahn**. (Atari Connection Fall 1981, pages 12-15)

August 19: Shepardson Microsystems, Inc. (Contract Programmer **Paul Laughton** for SMI) completed the File Management Subsystem (FMS) for Atari DOS II.
Brian Johnston remained Atari (Consumer) systems software supervisor.

September:
- **Roger H. Badertscher** joined Atari to be President of the new Personal Computer division, which would be spun off from the Consumer division. **Roger H. Badertscher** was previously VP and General Manager of the microprocessor division of Signetics, an electronics semiconductor manufacturer, and he had developed the business plan for the new division. (InfoWorld 26-Jul-1982, page 29 for date),
- **Bruce W. Irvine** – previously of Control Data Corporation (CDC) – would join Atari (Personal Computer) as VP Software (Software Engineering). He would be reporting to **Roger H. Badertscher**,
- Reports to **Bruce W. Irvine** would include Director of Applications and Systems Software Development **John R. Powers, III**,
- **Bill Kaiser** – previously of Atari (Consumer) – would be Atari (Personal Computer) Director of Finance,
- **Niles E. Strohl** – previously Atari (Consumer) Engineering Manager, computer line – would be Atari (Personal Computer) Director of Engineering,
- **Kevin P. McKinsey** – previously Atari (Consumer) Industrial Designer – would be Atari (Personal Computer) Manager of Industrial Design and Graphics,
- **Brad C. Saville** – previously Atari (Consumer) Manufacturing Manager (Personal Computers) – would be Atari (Personal Computer) Operations Manager,

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- The 2nd floor at 1272 Borregas Ave, Sunnyvale, California would remain home of both Atari (Consumer) and Atari (Computer) engineering departments, with Atari (Coin-Op) engineering remaining on the first floor. (Once Upon Atari, page 25)
- David Staugas – previously of Exidy – joined Atari (Personal Computer) as a Systems Software Programmer, reporting to Systems Software Supervisor Brian Johnston.

September: The Atari Customer Service Department, located at 1346 Bordeaux Dr, Sunnyvale, California, would expand to also occupy 1340 Bordeaux Dr, Sunnyvale, California. (see winter 1981 Atari 400/800 software manuals)

Also, the unit began offering Customer Software Support for Atari 400/800 users. (Atari Connection vol. 1 no. 1, page 24)

Jerry Jessop – previously Manufacturing Technician (Atari 400/800 line) – would be Customer Service supervisor (Atari 400/800).

September 15-December 31: Atari-sponsored dealer promotion: Free 410 plus Educational System Master Cartridge and choice of one Talk & Teach series title with purchase of an Atari 400 computer. Or, free CX852 8 KiB RAM module with purchase of an Atari 800 computer – which shipped with one CX853 16 KiB RAM module installed.

September 16-18: Western Electronic Show and Convention (WESCON/80), Anaheim, California, featured speakers including Peter N. Rosenthal, Atari (Personal Computer) Director of Marketing.

September 29: Atari had appointed SSC & B Inc. to handle its Personal Computer Division. (New York Times 29-Sep-1980)

October:
- Chris C. Crawford – previously an Atari (Computer) Applications Programmer, having completed Energy Czar and SCRAM; he was reporting to Applications Software Manager Dale Yocum – was promoted to Supervisor of a new Software Development Support Group (technical support to outside programmers). He would be reporting to Director of Applications & Systems Software Development John R. Powers, III,
- The group would eventually include: Lane Winner, Jim Cox, Mike Ekberg, John Eckstrom (previously: Operating Systems Programmer), Kathleen Armstrong (Kathleen Pitta), Gus Makreas, Amy Chen (Amy Liu) (Y. M. Chen), Bob Fraser, Jim Dunion,
- Ken (Charles) Balthaser – previously Designer and Programmer at The Authorship Resource, Inc. (ARI) – was hired as a Consultant Programmer by Atari (Personal Computer) (for the speech synthesis peripheral project; never introduced),
- Niles E. Strohl remained Atari (Personal Computer) Director of Engineering.

Fall?: Atari shipped: 822 Printer, 825 Printer, 830 Modem, 850 Interface, CX70 Light Pen.

Also shipped: Assembler Editor (SMI), TeleLink I (original "small box" release with 1 hour of access to CompuServe), Space Invaders (original cassette, "small box" release), States & Capitals, European Countries & Capitals, Mortgage & Loan Analysis, Energy Czar.

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Fall: New production Atari 810 Floppy Disk Drives would ship with the newly-completed Disk Operating System Reference Manual. (Analog #1, page 23)

Fall:
At Atari (Personal Computer):

- **Conrad C. Jutson** – previously Atari (Consumer) VP Sales & Marketing, Personal Computers – was VP Sales & Marketing,
- **Craig A. Conway** – previously Atari (Consumer) National Sales Manager for personal computers, reporting to **Conrad C. Jutson** – would be National Account Manager, still reporting to **Conrad C. Jutson**,
- **Keith E. Schaefer** joined Atari (Personal Computer) as National Sales Manager (replacing **Craig A. Conway** in the role),
- **Chris Bowman (Christopher P. Bowman)** – previously Director of Media services at the Harvard University Graduate School of Education – joined the company as National Manager of Educational marketing,
- **Robert A. Kahn** – previously an Educational Computer Applications Consultant and prior to that, Director of the Computer Education Project at the University of California, Berkeley – joined the company as Manager, Educational Software Products,
- **Brenda K. Laurel** – previously Manager, Educational Product Design at The Authorship Resource, Inc. (ARI) – joined the company as a Software Specialist for Educational applications,
- **Tandy Trower** – previously Atari (Consumer) Evaluator of 3rd party software titles (Personal Computers) – became a Software Product Manager,
- **Peter N. Rosenthal** remained Director of Marketing, reporting to VP Sales & Marketing **Conrad C. Jutson**.

Fall: Shepardson Microsystems, Inc. (SMI) Contract Programmer **Paul Laughton** joined Atari (Personal Computer) as a Systems Software Programmer.
Brian Johnston remained Atari (Personal Computer) Systems Software Supervisor.

November/December?: Atari (Personal Computer) applications programmer **Kathy Forte** departed the company.

Atari reportedly lost $10 million on sales of computer equipment of $13 million in 1980 (InfoWorld 14-Sep-1981)

Atari had sold 35,000 Atari 400/800 computers through 1980. (source?)

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1981

January 6: Warner Amex Cable Communications, Atari, and CompuServe jointly announced the availability of the CompuServe Information Service to Columbus, Ohio subscribers of the Warner Amex QUBE two-way interactive cable television system. An Atari 800 personal computer was lent to the subscriber as part of the service.

January 8-11: At the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada, Atari announced that the Atari 400 would now ship in two versions:
- Original 8 KiB RAM version at the new list price of $499.95 (previously: $630),
- New 16 KiB RAM version for $630.

For the Atari 400/800 Atari introduced:
- Asteroids,
- Atari PILOT,
- Atari Word Processor,
- Conversational Spanish,
- Missile Command,
- SCRAM (A Nuclear Power Plant Simulation).

Atari also introduced:
- Atari Accountant: Accounts Receivable System (BPI; never shipped),
- Atari Accountant: General Accounting System (BPI; with Business Manager's Companion Guide by Arthur Young & Company; package never shipped),
- Atari Accountant: Inventory Control System (BPI; never shipped).

Atari also announced: Personal Fitness Program (ultimately released via APX), Personal Financial Management System.

Atari again promised:
- An Invitation to Programming 2,
- An Invitation to Programming 3,
- Astrology (never shipped),
- Conversational French,
- Conversational German.

(Creative Computing Mar-1981, page 54; Analog #1; 1981 Software Catalog)

January:
- Niles E. Strohl – previously Atari (Computer) Director of Engineering – would be Atari Engineering Manager, advanced technology,
- Gene B. Rosen would join Atari (Computer) as VP Engineering, replacing Niles E. Strohl in the role (ComputerWorld 16-Mar-1981 page 74).

January: Atari (Computer) marketing established a Users' Group Support Program; Earl Rice would be Manager, Users' Group Support.

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January 27: Engineer **Larry Plummer** – previously of Heath Zenith where he had been Director of Advanced Development, Zenith computer business group and before that, Director of Computer Products, Heath computer engineering group – would join Atari (Computer) as Director, Electrical Engineering, reporting to VP Engineering **Gene B. Rosen**.

January/February: First issue of A.N.A.L.O.G. 400/800 Magazine, published by **Lee Pappas** and **Mike DesChenes**. 4,000 copies printed.

Winter: Atari shipped:
- Bond Analysis,
- Graph It,
- Mailing List,
- Statistics I,
- Stock Analysis,
- Stock Charting,
- Touch Typing.

(Analog #2, page 47)

Winter: Atari Customer Support released:
- Technical User Notes (C016555),
- Atari 400/800 Operating System (OS) listing (with binder; CA016557),
- Atari 400/800 Disk Operating System (DOS) listing (without binder; C016558).

(Atari Connection Spring-1981, page 21, Compute! magazine #12, May-1981, page 80)

Winter?:
- **Brenda K. Laurel** – previously Software Specialist for Educational Applications – would remain a Software Product Manager,
- **Mark O. McCrackin** would join the company as a Product manager for Educational Marketing – replacing **Brenda K. Laurel** in the role,
- **Robert A. Kahn** remained Manager, Educational Software Products,
- **Tandy Trower** remained a Software Product Manager,
- **Peter N. Rosenthal** remained Director of Marketing.

Winter: Onflo International Limited would become Atari's 400/800 line distributor in Hong Kong.

February 2:
Atari had announced that:
- **Conrad C. Jutson** – previously Atari (Computer) VP Sales & Marketing – was promoted to (Corporate) VP Consumer Market Planning (TV Digest),
- **Peter N. Rosenthal** – previously Atari (Computer) Director of Marketing, reporting to **Conrad C. Jutson** – would be Atari (Computer) VP Business Planning (new position),
- **Rigdon Currie** – previously of Xerox subsidiary Diablo – had joined the company as VP Marketing for the Computer division (Compute! magazine #11, Apr-1981, page 168; TV Digest), replacing **Conrad C. Jutson** in the role,
- **Mark A. Lutvak** – previously Product Program General Manager at Memorex – would join Atari (Computer) as Director of Product Marketing. He would replace **Peter N. Rosenthal** in the role and report to **Rigdon Currie**,

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- Product marketing manager **Stephen N. Davis** would depart the company to Corvus Systems Inc.,
- Software Product Manager **Carol Abbott** would depart the company,
- **Tandy Trower** – previously a Software Product Manager, reporting to **Peter N. Rosenthal** – would be promoted to Software Marketing Manager. He would replace **Peter N. Rosenthal** in the role and report to **Rigdon Currie**.

February:
- **J. Fred Thorlin** had joined Atari (Computer) as Director of Software Product Acquisition (new position). He would be reporting to VP Software **Bruce W. Irvine**.
  J. Fred Thorlin's first charge: to finalize a contract with Microsoft to bring Microsoft BASIC to the Atari product line,
- **Dale Yocum** – previously Atari (Computer) Applications Software Manager, where he reported to Director of Applications & Systems Software Development **John R. Powers, III** – established and would serve as Manager of the new Atari Program Exchange (new position). We would be reporting to **J. Fred Thorlin**,
- **Ken (Charles) Balthaser** – previously an Atari (Computer) Consultant Programmer in engineering (for the speech synthesis peripheral project) – joined Atari (Computer) as Applications Software Manager. He would be replacing **Dale Yocum** in the role. He would be reporting to **John R. Powers, III**,
- **Andrew Soderberg** – previously a partner at a computer retailer called Computer Connection – joined Atari (Computer) as an Assistant Software Product Manager. He would be reporting to Software Marketing Manager **Tandy Trower**,
- Atari (Computer) Systems Software Programmer **David Staugas** departed the company and returned to Exidy,
- **Brian Johnston** remained Systems Software Supervisor.

February 25: The source code to:
- Atari BASIC – including Atari OS Floating-Point Package (FPP),
- The FMS component of Atari DOS 2.0S (DOS.SYS),
- The Atari Assembler Editor

were purchased from Shepardson Microsystems, Inc. (SMI) by Optimized Systems Software (OSS) – recently established by **Bill Wilkinson**, **Mike Peters**, **Kathleen O'Brien**, and Atari (Computer) systems software programmer **Paul Laughton**.
https://tinyurl.com/axuredhz

March?: Atari VP Research & Development **Al Alcorn** departed the company. **Al Alcorn** would establish Cumma Research, Inc. on 2nd-Feb-1983.

March: **Doug Chorey (Douglas A. Chorey)** – previously a Senior Analyst at Control Data Corporation (CDC) – joined Atari (Computer) as System Project Leader.
Bruce W. Irvine remained VP Software.

March?: Atari (Computer) published the premier (Spring 1981) issue of The Atari Connection, a glossy magazine started/headed by Atari (Computer) Marketing Communications Manager **Sally Bowman** in support of the Atari 400/800 computers.

March: **Bill Bartlett** – previously of Electronic Data Systems (EDS) – joined Atari (Computer) in marketing as a product manager (The Atari Accountant).

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Winter/Spring: Atari (Computer) established division headquarters operations (including engineering, previously on the 2nd floor at 1272 Borregas Avenue, Sunnyvale, California) in a new building at 1196 Borregas Avenue, Sunnyvale, California. (Atari Explorer vol. 1 no. 1 Spring 1981)

March/April: Atari Customer Service (home consumers) established a Regional Service Center at 43 Belmont Dr., Somerset, New Jersey. 1346 Bordeaux Dr., Sunnyvale, California, the existing home of Customer Service, would also serve as a Regional Service Center.

April 2-30: Atari-sponsored dealer promotion: Free $100 subscription to The Source with purchase of Atari Communicator System: choice of Atari 400 or Atari 800 computer with 850, 830, and TeleLink I.

April 3: Adjacent to the 6th West Coast Computer Faire (April 3-5, San Francisco Civic Auditorium and Brooks Hall, San Francisco, California), at a private hospitality suite for Atari computer Users' Group officers and their guests, Atari announced:

- The Atari Software Acquisition Program (ASAP), involving the creation of regional software-acquisition centers where freelance programmers would be supported by Atari in developing software for Atari computers.
  The first ASAP Center was expected to open in the Sunnyvale, California area in mid-May – it would open in October,
- The Atari Program Exchange (APX), a free quarterly mail-order catalog of user-written software – first/Summer Edition due for publication June 1),
- The ASAP Contest, where programs accepted for the APX catalog would qualify for $100,000 in prizes to be awarded over the coming year, including a grand prize of $25,000 cash.

About 20 persons attended the event, on behalf of about 30 total groups registered with Atari Users' Group Support.

Bruce W. Irvine was Atari (Computer) VP Software. (Compute! magazine #12, May-1981, page 8 & page 150; Computer Business News 18-May-1981, page 22)

April 3-5: Also at the West Coast Computer Faire, Optimized Systems Software (OSS) introduced BASIC A+, CP/A (would shortly be renamed to: OS/A+), and EASMD – enhanced, disk-based versions of Atari BASIC, Atari DOS 2.0S and Atari Assembler Editor, respectively.

April: **Paul V. Cubbage** – previously of The Wollongong Group – joined Atari (Computer) as Acquisition Manager (new position). He would be reporting to Director of Software Product Acquisition **J. Fred Thorlin**.

April: Opening of Future Center at the Capital Children's Museum, featuring "tomorrow's classroom" of 20 Atari 800 computer systems donated by Atari. With further support from Atari, the project would additionally include the "Communications" hands-on exhibit (November 1981), the SuperBoots educational software development effort, and computer enhancements of other exhibits. (Atari Connection vol. 1 no. 4, pages 9-10; Atari Connection vol. 2 no. 1, pages 7-8) The project was facilitated by Atari educational marketing consultant **Ted M. Kahn**.

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April 23-24: An Atari Seminar for developers.
The Atari Software Development Support Group (technical support to outside programmers) included:

- Chris C. Crawford – graphics,
- Lane Winner – BASIC, cassette,
- Mike Ekberg – OS, DOS,
- Kathleen Armstrong (Kathleen Pitta) – Forth,
- Jim Cox – graphics & utilities,
- Gus Makreas – assembly language,
- John Eckstrom – Pascal.

April 25-28: At Greenfield Community College, Massachusetts, the year-long TEME (Totally Enclosed Modular Environment) project in human ecology culminated in an elaborate 72-hour simulated space flight mission.

Led by instructors Gregg Vouros and Dan LaRose, the team of students had built a full-size flight deck mock-up, habitation module, and observation lab, incorporating an Atari 800 computer system that was donated by Atari, running software designed by student Mike Tepper who had received 3 days of free training at Atari in California. (Atari Connection Summer 1981, pages 8-9; Florida Today (Cocoa, Florida) 25-Apr-1981, page 10A)

Spring: 6-week pilot of the IEC-Atari Mobile Computer Van Project, a collaboration between the Industry-Education Council (IEC) of Santa Clara County, California and new IEC member Atari, serving one community college and 14 schools in 6 school districts.

Atari had supplied 18 complete Atari 800 computer systems (van capacity: 15 systems), and the Atari Advanced Products group had designed and produced portable carrying cases for the systems, and also handled the interior and exterior design of the van.

Curriculum was developed by Computer-Using Educators (CUE). During fall 1981 the van would serve 49 separate schools, 165 separate classes, and 4,950 students.
The project was facilitated by Atari educational marketing consultant Ted M. Kahn. (Atari Connection vol. 2 no. 1, pages 14-16)

May 1: Atari's suggested retail price for the Atari 400 with 16 KiB RAM, now to be marketed as The Basic Computer, was reduced to $399 (previously: $630). The 8 KiB RAM version of the Atari 400 would no longer be offered.
The Atari 800 Personal Computer System (with 16 KiB RAM) retail price remained $1,080.

May 1-August 31: Atari offered a free CX853 16 KiB RAM Module ($99.95) with purchase of an Atari 800 personal computer; offered the 825 Printer at $800 instead of $1,000; and offered the 850 Interface at $170 instead of $220

May 4-7: At the National Computer Conference in Chicago, Illinois, Atari announced that the 8 KiB Atari 400 was being discontinued and that the price on the 16 KiB version was being reduced to $399 (was $630); also, the Atari BASIC cartridge and Atari BASIC book (Wiley Self-Teaching Guide) would no longer be included with the now "mass market packaged" Atari 400.

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Other price reductions:
- CX852 8 KiB RAM module now $49.95 (was $124.95),
- CX853 16 KiB RAM module now $99.95 (was $199.95),
- 820 Printer now $299.95 (was $449.95).

Atari also introduced:
- Personal Financial Management System (PFMS; $74.95),
- Dow Jones Investment Evaluator ($99.95; never shipped),
- Atari Microsoft BASIC ($89.95),
- Program-Text Editor (would ship as a standalone title via APX),
- Sorcim Macro Assembler (the latter two titles would ship together as: Macro Assembler and Program-Text Editor),
- Conversational Italian (EMI / Longman).

Additionally, new production units of TeleLink I would include one hour of time on each of: Dow Jones Information Service, The Source, CompuServe (previously: CompuServe only). (Compute! magazine #13, Jun-1981, page 158)

May?: Atari (Computer) software development support group Manager, Compilers (Pascal) **John Eckstrom** departed the company.

May:
- **Bill Carris (William Carris)** – previously Director of Atari Technical Services (Customer Service) – became Atari (Computer) National Sales Training Manager,
- **Jon D. Ebbs** joined Atari as Director of Customer Service, replacing **Bill Carris (William Carris)** in the role, reporting to Atari EVP **Dennis Groth**?

Atari would phase out its partnership with Control Data Corporation (CDC) for Atari 400/800 service at Control Data Service Centers and would launch a new nation-wide network of Authorized Atari Computer Service Centers.

The Atari Regional Service Centers at 1346 Bordeaux Dr, Sunnyvale, California and at 43 Belmont Dr, Somerset, New Jersey would continue to operate as support for the service network. (Atari Connection vol. 1 no. 3, page 21; Analog #4, page 9; Compute! magazine #16, Sep-1981, page 145)

- **James W. Prather** would join Atari Customer Service as Manager of field service,
- **David S. Wilson** would join Atari Customer Service as Manager of Customer Support,
- **John H. Hahn** would join Atari Customer Service as Manager of Technical Support,
- **Jerry Jessop** – previously Supervisor, Customer Service home computers group – would join Atari (Consumer) engineering as a Senior Technical Associate.

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June 1?: Atari released the Atari Program Exchange (APX) Software Catalog Summer Edition 1981, introducing:

- Alien Egg
- Anthill
- Avalanche
- BASIC Cross-Reference Utility (XREF)
- BASIC Program Compressor (MASHER)
- BASIC Renumber Utility (RENUM)
- Castle
- Centurion
- Character Set Editor
- Chinese Puzzle
- Comedy Diskette
- Disk Fixer (FIX)
- Extended WSFN
- FIG FORTH (also known as "Coin-Op Forth" or "Colleen Forth"; never shipped)
- Graphics/Sound Demonstration
- Lemonade
- Mugwump
- Newspaper Route Management Program
- Outlaw/Howitzer
- Preschool Games
- Roman Checkers
- Sleazy Adventure
- Sound Editor
- Space Trek
- Sultan's Palace
- Supersort
- Tact Trek
- Text Formatter (FORMS)
- The Computerized Card File
- Variable Changer
- Wizard's Gold

APX also introduced several hardware products:

- DE-9S with DE51218 Shell (controller plug),
- 5-pin DIN connector,
- 13-pin I/O plug,
- 13-pin I/O socket,
- DA-15P with DA110963-2 Shell (850 printer plug),
- DE-9P with DE110963-1 Shell (850 serial plug),
- 2716 EPROM cartridge.

APX location: 155 Moffett Park Dr., Sunnyvale, California.

June: Atari (Corporate) established the Atari Institute for Educational Action Research, which would award grants of Atari home computer products, cash stipends, and/or consulting services to selected individuals and non-profit institutions or organizations interested in developing new educational uses for computers in schools, community programs, or in the home.

Ted M. Kahn – previously Atari (Computer) educational marketing consultant, who had written the business plan for the Institute at the request of Atari EVP Dennis Groth – joined Atari as the Institute's Executive Director; Dennis Groth would serve as the Institute's Chairman.

The Executive Committee would eventually include:

- Dennis Groth,
- Ray Kassar (Raymond E. Kassar) – Atari Chairman & CEO,
- Alan Kay – Atari VP & Chief Scientist,
- Roger H. Badertscher – Atari (Home Computer) President,
- Steven T. Mayer – Atari (Home Computer) VP Research & Development,
- Peter N. Rosenthal – Atari (Home Computer) VP Business Planning,
- Roger Smith – Warner Communications VP Corporate Affairs.

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The Board of Advisors would include:

- Dean Brown,
- Judy Collins,
- Hugh Downs,
- Marian Wright Edelman,
- Roger C. Faxon,
- W. Tim Gallwey,
- Sam Gibbon
  (Consultant, Children's Television Workshop and Bank Street College of Education),
- Herbert Kohl,
- Paul Trachtman,
- Heinz von Foerster,
- William S. Wagner (founder of Computer-Using Educators),
- Karl Zinn.

(Atari Action vol. 1 no. 1 Fall 1982; Compute! magazine #17, Oct-1981, page 174)

June: Leslie Wolf joined Atari (Computer) in marketing as a data processing specialist.

June 21: Atari was establishing an Advanced Development Laboratory in New York City, to pursue "advanced consumer products for the education, entertainment and professional markets." Projects were anticipated in areas including computer graphics, system architecture, telecommunications, and computer languages. (New York Times 21-Jun-1981, page F41)

June/July:

- Atari Software Manager, advanced technology, Bob Smith (Robert G. Smith) departed the company to Imagic,
- Atari (Consumer) Game Designer/Programmer Rob Fulop departed the company to Imagic,
- Programmer Mike Lorenzen transferred from Atari (Consumer) to the Atari (Personal Computer) operating systems software group,
- Brian Johnston remained Systems Software Supervisor.

Month?:

- Engineer Tim McGuinness – previously of MDS Quantel – joined Atari (Computer) where he would be a Senior electronics test and design engineer,
- Jeffrey Sarnoff joined Atari (Computer) as a software architect.

Month?: In West Germany, Steve Molyneux – previously of American Express Military Banking – joined Atari Elektronikvertriebs GmbH as Computer Software Development Manager. He was recruited by Atari (Consumer) International Marketing Manager for Computer Software Nancy Garrison.

Month?: Dave Menconi joined Atari Customer Service as a technical support specialist, reporting to manager of technical support John H. Hahn. (Atari Explorer Fall 1981, page 21 for title)

Month?: The Atari Software Development Support Group released "De Re Atari". Atari made the book available to registered developers.

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Summer?: J. Peter Nelson joined Atari (Computer) as public relations manager.

Summer?: Stanford MBA student Ken Wirt (Kenneth R. Wirt) began working for Atari (Computer) in sales. (Marquis)

Summer: Atari sold the rights to their Talk & Teach series of educational software titles, plus the Educational System Master Cartridge, back to the developer, Dorsett Educational Systems.

Summer: By mid-1981 Atari had sold over 50,000 Atari 400/800 computers to date. (InfoWorld 14-Sep-1981)

Summer: Atari shipped:
- Atari 810 Master Diskette II (DOS II version 2.0S developed by SMI/Atari),
- Atari Word Processor,
- An Invitation to Programming 2,
- An Invitation to Programming 3,
- Asteroids,
- Conversational French,
- Conversational German,
- Conversational Spanish,
- Missile Command,
- SCRAM (A Nuclear Power Plant Simulation),
- TeleLink I – new "large box" version – with one hour of time on each of:
  Dow Jones Information Service, The Source, CompuServe

August 1: In the UK, Atari distributor Ingersoll Electronics shipped the Atari 400/800 Computers (new PAL version for UK, PAL I; £345 / £645 incl. VAT; both with 16 KiB RAM).

August: Jamie Cook (James Alan Cook) joined Atari (Computer) as VP & Counsel.

August: Atari (Computer) launched project "Z800" (later: "Sweet-16"; would lead to: 1200XL Computer).

August 26: Date of the internal Atari document "Z800 Product Specification, Revision 1" reflecting early work that would lead to the release of the Atari 1200XL Computer.
See: https://tinyurl.com/2p95ja8n

Summer/Fall: Atari (Consumer) international sales & marketing operations were spun off into a new division of Atari, Atari International.
- Anthony Bruehl (Anton Bruehl) – previously Atari (Consumer) VP International Sales/Marketing – would be President of Atari International,
- Gerd Stoecker joined Atari International – as Director of International Finance?
- Claude Nahum joined Atari International as Manager of financial planning & analysis, reporting to Gerd Stoecker,
- Jeff Burton remained Market Manager,
- Nancy Garrison remained Marketing Manager for Computer Software.

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September 1?: Atari released the Atari Program Exchange (APX) Software Catalog Fall Edition 1981, introducing:

- 747 Landing Simulator
- BASIC Utility Diskette
- BASIC Utility for Renumbering Programs (BURP)
- BLIS
- Babel
- Banner Generator
- Blackjack Tutor
- Bumper Pool
- Chameleon CRT Terminal Emulator
- CodeCracker
- Data Management System
- Decision Maker
- Developer's Diskette
- Dice Poker
- Disk Fixer (FIX) REV. 2
- Diskette Librarian
- Domination
- Eastern Front (1941)
- Financial Asset Management System
- Load 'n Go
- Lookahead
- Mapware
- Minotaur
- Personal Fitness Program (previously announced for Atari's main 400/800 product line)
- Reversi
- Screen Dump Utility
- Terry
- Video Math Flashcards
- Wizard's Revenge

APX also announced their full software product line for sale via download from CompuServe MicroNET.

One hardware product was modified: DE-9S with DE110963-1 Shell (controller plug).

September 1: New production Atari 810 Floppy Disk Drives would contain an External Data Separator Board. (Atari 810 Field Service Manual, pages 1-9)

September 1-October 31: Atari offered a free Atari Word Processor with the purchase of an Atari 800 Computer, Atari 810 Floppy Disk Drive and two additional 16 KiB RAM Modules.

September 3-7: Atari computer distributor Adveico launched the Atari 400/800 (new PAL versions for PAL B/G; 985.000 ITL / 1.990.000 ITL) at SIM-Hi.Fi in Milan, Italy. (MC microcomputer #1 back page; #2, pages 19-20 for prices)

September 10-12: Atari distributor Ingersoll Electronics introduced the Atari 400/800 at The 4th Personal Computer World (PCW) show at the Cunard Hotel, Hammersmith, London, UK.

September 14: **Barry Berghorn** – previously of Memorex – joined Atari (Computer) as Sales & Marketing VP, replacing **Rigdon Currie** who had departed the company. (ComputerWorld 14-Sep-1981, page 84; TV Digest 1981, page dxxx/530)

September: Atari opened their Advanced Development Laboratory at: 300 E. 42nd St., New York, New York.

Steven T. Mayer – previously Atari Cyan Engineering Senior Engineer – became Atari VP Research & Development, replacement for the departed **Al Alcorn**, and had transferred from Cyan Engineering to establish and head the new Atari NY Lab. (Warner Communications Inc. (WCI) Press Release 13-Jul-1984 except year)

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Advanced Development Group personnel involved with 8-bit Atari projects would eventually include:

- Gregg Squires – manager of hardware engineering, previously of Racal Vikonics,
- Bob Card (Robert Card) – hardware engineer, previously of Racal Vikonics,
- Steven Ray previously of Racal Vikonics,
- Joel Moskowitz,
- Philippe des Rioux,
- Glenn Boles.

September: Atari (Consumer) Programmer Brad Stewart had departed the company and joined Imagic.

September 18-23: At SMAU (Salone Macchine e Attrezzature per l'Ufficio, or Office Machinery and Equipment Exhibition) in Milan, Italy, Atari computer distributor Adveico continued the launch of the Atari 400/800 in Italy. (MC microcomputer #1 back page)

September/October?: At Atari (Computer) in software:

- John R. Powers, III – previously Director of Applications and Systems Software Development – would remain Director of Applications & Development Systems. He would still be reporting to VP Software Bruce W. Irvine,
- Lou R. Tarnay – formerly of GTE Sylvania – joined Atari (Computer) as Systems Development Manager (Operating Systems and Telecommunications). He would assume the role from John R. Powers, III,
- Brian Johnston – previously Systems Software Supervisor, reporting to John R. Powers, III, became a Product Coordinator. He would be reporting to Product Coordination Manager Paul E. Liniak,
- Paul Laughton – previously a Systems Software Programmer, reporting to Brian Johnston – would be promoted to Operating Systems Supervisor, replacing Brian Johnston in the role. He would be reporting to Lou R. Tarnay,
- J. Fred Thorlin – previously Director of Software Product Acquisition (including ASAP and APX) – became Director of Product Review and Research (new position; still including APX),
- Tom Gracon (T. J. Gracon) – formerly of Control Data Corporation (CDC) – joined Atari (Computer) as Director of Software Product Acquisition, replacing J. Fred Thorlin in the role,
- Paul V. Cubbage – previously Acquisition Manager, reporting to J. Fred Thorlin – would be Product Review Manager, still reporting to J. Fred Thorlin,
- Bruce W. Irvine remained Atari (Computer) VP Software.

October: Dr. Alan Kay – previously a Xerox Fellow at the Xerox Palo Alto Research Center (PARC) – joined Atari as VP/Chief Scientist. (InfoWorld 21-May-1984 for date)

October: Atari announced that the promised Atari Accountant small business accounting system and Atari 815 Dual Floppy Disk Drive – which was to be required for the accounting system – were both cancelled.

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A new home accounting system for the Atari 800 – would ship as: The Bookkeeper – would be designed expressly for the home market. It would work with the Atari 810 Floppy Disk Drive, and was to be ready for delivery in the first quarter of 1982. (InfoWorld 19-Oct-1981, page 37; Compute! magazine #18, Nov-1981, page 167)

October:
- Atari (Computer) Software Marketing Manager **Tandy Trower** departed the company to Microsoft, to manage the Microsoft's range of BASIC products,
- **Brenda K. Laurel** – previously an Atari (Computer) Software Product Manager, reporting to **Tandy Trower** – would be promoted to Manager, software strategy and marketing – essentially replacing **Tandy Trower** in the role, but reporting directly to division president **Roger H. Badertscher**.

October 15-18: The 3rd annual Northeast Computer Show (NCS) at the Hynes Auditorium, Boston, Massachusetts was attended by 50,000.

For the Atari 400/800 Atari featured:
- Asteroids,
- (The) Atari Word Processor,
- Conversational French,
- Conversational Italian,
- Conversational Spanish,
- Missile Command,
- Personal Financial Management System,
- States & Capitals.

"The Future of Personal Computers" forum on Oct. 15, sponsored by the Boston Computer Society, featured panelists including:
- **Peter N. Rosenthal** – Atari (Computer) VP Business Planning, standing in for Atari (Computer) President **Roger H. Badertscher**,
- **Bill Gates (William H. Gates)** – Microsoft President,
- **H.E. James Finke** – Commodore President,
- **Jon Shirley** – Tandy Radio Shack VP,
- **Philip Estridge** – IBM Personal Computers Director,
- **Mike Markkula (Armas Clifford 'Mike' Markkula Jr.)** – Apple Computer President.

(InfoWorld 9-Nov-1981, pages 1,6; Boston Computer Society Press Release 6-Oct-1981, 13-Oct-1981)

October 20:
At Atari (Computer), direct reports to VP Software **Bruce W. Irvine** included:
- **Tom Gracon (T. J. Gracon)** – Software Product Acquisition,
- **Paul E. Liniak** – Product coordination,
- **J. Fred Thorlin** – Product review and research – APX,
- **Jim P. Romanos** – Product test,
- **John R. Powers, III** – Applications & Development systems,
- **Lou R. Tarnay** – Systems development,
- (Vacant) – International,
- **Leslie Wolf** – Word processing specialist.

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- Reports to **J. Fred Thorlin** included product review manager **Paul V. Cubbage** and APX manager **Dale Yocum**,
- Reports to **John R. Powers, III** included **Ken (Charles) Balthaser** (applications) and **Chris C. Crawford** (development support for outside programmers),
- Reports to **Lou R. Tarnay** included **Paul Laughton** (Acting Supervisor, operating systems).

https://archive.org/details/AtariHarryStewart

October 20: Atari, Inc. was awarded US patent 4,296,476 for 18 claims by inventors **Steven T. Mayer**, **Jay G. Miner**, **Douglas G. Neubauer**, and **Joe Decuir (Joseph C. Decuir)** regarding their "Data processing system with programmable graphics generator" (the Atari 400/800 hardware platform).

October 26: Atari had opened its first regional software-acquisition center (earlier: ASAP Center). (InfoWorld 26-Oct-1981, page 1; Computer Business News 19-Oct-1971, page 8)
The center was managed by **Steven H. Gerber**, and was located in the 4,000 square feet (372 m^2) location that also housed the Atari Program Exchange (APX): 155 Moffett Park Dr., Sunnyvale, California.
Bruce W. Irvine remained Atari (Computer) VP Software.

Fall:
At Atari (Computer):
- **Keith E. Schaefer** was promoted from National Sales Manager to VP Sales (TV Digest 1981, page dcclxv),
- **Don Kurtz** of the Kurtz & Tarlow agency would be hired as Director of Marketing Services (Atari Connection Summer 1982),
- **Keith E. Schaefer** & **Don Kurtz** would together be replacing VP Sales & Marketing **Barry Berghorn** who had departed the company to Via Video, Inc.

Fall:
- **Gary Furr** – previously of GTE Sylvania – joined Atari (Computer) as a Software Product Manager,
- **Mark Cator** joined Atari (Computer) as a Marketing specialist, Users' Group support,
- **Earl Rice** remained Manager, Users' Group Support,
- **Sally Bowman** – previously Atari (Computer) Manager, Marketing Communications – would become Manager, Direct Marketing and would remain responsible for The Atari Connection magazine,
- **Ted Richards** joined Atari (Computer) as Editor of The Atari Connection (new position, reporting to **Sally Bowman**).

Fall: K-Byte, division of Kay Enterprises Co., released K-Razy Shoot-Out, the first third-party ROM cartridge for the Atari 400/800. (SoftSide Mar-1982, page 71)

Fall: In West Germany, Atari Elektronikvertriebs GmbH shipped the Atari 400/800 (PAL versions for PAL B/G).

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November 1: New production Atari 810 Floppy Disk Drives would ship with the Revision C ROM and with DOS II version 2.0S (replacing the original Atari DOS I). (Antic Oct-1982; Atari Connection vol. 2 no. 2, pages 1-2).
Many existing units would be serviced with this ROM upgrade.

November: Chemical Bank began testing their prototype Pronto electronic home banking system in about 200 homes in the New York area. Homes were provided Atari computers with prototype client software developed with Atari as part of the project.

November: The Atari 400/800 NTSC versions would now ship with the GTIA chip rather than the earlier CTIA. (Antic Oct-1982)
Many existing units would be serviced with this upgrade.
PAL versions for PAL B/G & PAL I Atari 400/800 units had only shipped with GTIA.

November: The Atari 400/800 began shipping with the 400/800 OS REV. B, improving peripheral I/O control routines. (Antic Oct-1982; Atari Connection vol. 2 no. 2, pages 1-2)
Many existing units would be serviced with this upgrade.

November 17-20: Atari distributor Ingersoll Electronics featured the Atari 400/800 Computers at COMPEC'81 (Computer Peripheral and Small Computer Systems Exhibition), Grand Hall, Olympia, London, UK.

November/December: For the Atari 400/800 Atari shipped the Starter Kits:
- The Communicator,
- The Entertainer,
- The Programmer,
- The Educator.

Atari also shipped:
- Conversational Italian,
- Calculator,
- Atari PILOT (Educators' Package and Home Package),
- Space Invaders – previously released on cassette – was now re-released on cartridge ("large box" version).

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December 1?: Atari released the Atari Program Exchange (APX) Software Catalog Winter Edition 1981, introducing:

- Atari Program-Text Editor (also released in Atari's main product line in package with Macro Assembler)
- Atlas of Canada
- Attank!
- Blackjack Casino
- Block 'Em
- Bowler's Database
- Caverns of Mars
- Dog Daze
- Downhill
- Dsembler
- Enhancements to Graph It
- Extended fig-FORTH
- Family Cash Flow
- Hickory Dickory
- Hydraulic Program (HYSYS)
- Insomnia (A Sound Editor)
- Instedit
- Keyboard Organ
- Letterman
- Mathematic-Tac-Toe
- Memory Match
- Morse Code Tutor
- My First Alphabet
- Number Blast
- Player Piano
- Presidents of the United States
- Pro Bowling
- Quiz Master
- Reversi II
- Solitaire
- Source Code for Eastern Front (1941)
- Space Chase
- Stereo 3-D Graphics Package
- Supersort REV. 3
- T: A Text Display Device
- Ultimate Renumber Utility
- Weekly Planner
- Word Processing Diskette (Text Formatter (FORMS) + Atari Program-Text Editor)

APX sales via CompuServe MicroNET had been discontinued.

Dale Yocum was APX Manager.

December 14: **Bill Carris (William Carris)** was Atari (Computer) national sales training manager. (InfoWorld)

December?: **Steven H. Gerber** – previously Manager of Atari's lone Regional Software-Acquisition Center (located at APX headquarters, Sunnyvale, California) – was promoted to Atari (Computer) Director of Software Product Acquisition.
He would be reporting to VP Software **Bruce W. Irvine**.
He would replace **Tom Gracon (T. J. Gracon)** who departed the company to co-manage the entertainment and learning center, Computer Capers, with **Helen Gracon**.

December:

- Atari Corporate Research, headed by Atari VP/Chief Scientist **Alan Kay**, established a Games Design Research Group,
- **Chris C. Crawford** – previously Atari (Computer) Software Development Support Group Supervisor (development support for outside programmers) – became Manager, Games Design Research Group,
- **John R. Powers, III** remained Atari (Computer) Director, Applications & Development Systems, reporting to VP Software **Bruce W. Irvine**.

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December?: **Linda S. Gordon** – previously of Hellman, Jordan Management Company – joined Atari (Corporate) as VP Special Projects, assistant to the President, reporting to Atari Chairman & CEO **Ray Kassar (Raymond E. Kassar)**.

December: **Steven T. Mayer** was VP Research & Development at Atari (New York Times 24-Dec-1981, page D2; New York Times 31-Dec-1981, page D2)

December 30: Atari said that it would cut the retail price for the Atari 800 Home Computer (with 16 KiB RAM and newly "mass market packaged") to $899 from $1,080. Other prices were increased: The Entertainer to $110 and The Educator to $166.

Atari claimed to have sold 300,000 Atari 400 & Atari 800 Computers in 1981. (InfoWord 14-Jun-1982, page 57)

The installed base of Atari 400 & Atari 800 Computers was estimated by Future Computing, Inc. to be just over 100,000. (Jan-1983)

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1982

January 1?: The Atari Computer division would now be known as the Atari Home Computer division (HCD), and it adopted the advertising slogan, "We've brought the computer age home."

January 5: In advance of the opening of the Winter Consumer Electronics Show (CES) on January 7, for the Atari 400/800 Atari (Home Computer) announced:
- Caverns of Mars (originally developed for APX; 1st quarter 1982),
- Centipede (2nd quarter 1982),
- Pac-Man (by Namco; 2nd quarter 1982),
- The Bookkeeper,
- The Home Filing Manager.

J. Peter Nelson was Atari (Home Computer) spokesperson. (Press Release)

January 6: Atari announced the publication, Atari Special Editions, a catalog of more than 400 products for the Atari computers from 117 vendors.

January 7-10: At the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada, for the Atari 400 ($399 / 16 KiB RAM) and Atari 800 ($899 / 16 KiB RAM) Atari introduced:
- Caverns of Mars (which had only just been added to the APX product line as of December 1981; it would be the first APX title to be transferred into Atari's main product line),
- Centipede (June – Analog #6, page 13),
- Pac-Man (by Namco; to ship in May – Analog #6, page 13).

Atari announced:
- CX85 Numerical Keypad (price tba),
- The Bookkeeper Kit (price tba),
- The Bookkeeper,
- The Home Filing Manager,
- The Home Manager Kit (price tba).

Atari again promised:
- Atari Macro Assembler and Program-Text Editor,
- Atari Microsoft BASIC,
- Dow Jones Investment Evaluator (never shipped),
- Personal Financial Management System.

Following the Atari 400 packaging theme introduced in 1981, the Atari 800, 810, and 410 would now ship in silver/full color packaging.

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January?: Atari Consumer Product Service (CPS) – previously: Customer Service – still headed by **Jon D. Ebbs**, had opened two new Regional Service Centers at 5400 Newport Dr Ste 1, Rolling Meadows, Illinois and at 2109 E division St, Arlington, Texas.

Operations at 1340/1346 Bordeaux Dr, Sunnyvale, California – home of Customer Support and a Regional Service Center – would move to 1312 Crossman Ave, Sunnyvale, California.
A fourth Regional Service Center remained at 43 Belmont Dr, Somerset, New Jersey.

- **David S. Wilson** – previously: Manager of Customer Support – would be manager of Customer Relations – representatives and specialists – still reporting to **Jon D. Ebbs**,
- **Bill Bartlett** – previously an Atari (Home Computer) product marketing manager – would be supervisor of customer relations specialists, reporting to **David S. Wilson**,
- **Dave Menconi** – previously a Customer Service technical support specialist – reporting to manager of technical support **John H. Hahn** – became a Software Analyst, Atari (Home Computer) Users' Group Support, reporting to group manager **Earl Rice**.

January 16: Atari held its first annual Star Award ceremony at San Francisco's Maxwell's Plum restaurant in Ghiradelli Square, San Francisco, California.
The Star Award and ASAP Contest $25,000 grand prize went to **Fernando Herrera** for his APX title, My First Alphabet.
Star Award of Merit winners: **Ronald Marcuse** & **Lynn Marcuse**, **Sheldon Leemon**, **Greg Christensen**
(Atari Connection Spring 1982, page 12)

January 19-22: Atari distributor Ingersoll Electronics featured the Atari 400/800 Computers at the third annual Which Computer? Show, National Exhibition Centre, Birmingham, UK.

January 25: Internal Atari memo by Systems Software consultant **Harry B. Stewart** reflected that the project previously known as "Z800" was now known as: "Sweet-16".
See: https://tinyurl.com/msa9hryp

Winter?: Atari shipped Atari Microsoft BASIC (programmer at Microsoft: **Ric Weiland**) and the software development package, Macro Assembler and Program-Text Editor. Macro Assembler developed for Atari by Sorcim; Program-Text Editor also released via APX.

February: Atari VP/Chief Scientist **Alan Kay**, with manager of Administration for Corporate Research **W. Chris Jeffers**, founded the Atari Sunnyvale Research Laboratory, which would serve as the primary home of Atari Corporate Research.

Systems Research Group research scientists would eventually include:
- **Jim Dunion**,
- **Brenda K. Laurel** – previously: Atari (Home Computer) Manager, Software Strategy and Marketing,
- **Jeffrey Sarnoff** – previously: Atari (Home Computer) Software Architect.

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The recently-established Games Design Research Group would be housed in the new lab, and would eventually include:

- Chris C. Crawford – Group Manager,
- Valerie Atkinson,
- Douglas Crockford,
- Bob Fraser,
- Randall Smith,
- Larry Summers,
- Kim Whitmore,
- Aric Wilmunder.

The Research Engineering Group (projects including Amy digital audio chip) would eventually include:

- Dale Yocum – Director of Research Engineering, 1982-83; previously: APX Manager,
- Douglas Crockford,
- Gary Sikorski – Digital Audio group manager; Director of Research Engineering, 1983-84,
- Jack Palevich (John H. Palevich) – digital audio,
- Jim Leiterman,
- Sam Nicolino – digital audio,
- Scott H. Foster – digital audio,
- Thomas G. Zimmerman – digital audio,
- Tim McGuinness.

Additionally, Atari (Home Computer) Director of Product Review and Research (including APX) J. Fred Thorlin would additionally become APX General Manager, replacing Dale Yocum in the role.

February: New production Atari 810 Floppy Disk Drives would ship in the significantly-revised "810 Analog" design. (Happy Computers ads for date, e.g., Analog #18, page 14)

February 18: Atari established the subsidiary, Atari International (UK) Inc., to assume the Atari consumer products business from distributor Ingersoll Electronics. Anthony Jones, previously of Ingersoll Electronics – where he had headed the 400/800 marketing group since its inception – would be the founding Managing Director. Operations would launch in April.

March 1: Atari had completed remastering and replacing inventory of all cassette-based products to reduce background noise on the cassettes, improving compatibility with the newer Transtek/Hong Kong version of the Atari 410 Program Recorder. (Tech Tip 5)

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March 1?: Atari released the Atari Program Exchange (APX) Software Catalog Spring Edition 1982, introducing:

- Advanced Music System
- Atari Pascal Language System (by MT MicroSYSTEMS for Atari)
- Block Buster
- Cubbyholes
- Diskette Mailing List
- Extended fig-FORTH REV. 2
- Family Budget
- GTIA Demonstration Diskette
- Instedit (Microsoft BASIC version)
- Isopleth Map-Making Package
- Keypad Controller
- Musical Computer – The Music Tutor
- RPN Calculator Simulator
- Sketchpad
- Speed-O-Disk
- Starware
- Wordmaker

APX also introduced the book, "De Re Atari".

Dale Yocum had still been APX Manager at printing date.

March 12: At Atari (Home Computer) in software, **Lou R. Tarnay** remained systems development manager. Reports to **Lou R. Tarnay** included telecommunication supervisor (acting) **John Curran**, operating systems supervisor **Paul Laughton**, and Software Architecture consultant **Harry B. Stewart**.

The telecommunication group included **Joe Miller (Joseph B. Miller III)** – previously of The Authorship Resource, Inc. (ARI), **Vincent H. Wu**, and **Gin Pao Lu**.
https://archive.org/details/AtariHarryStewart

March 15: Atari had announced Atari Computer Camps, "the first effort by a major home computer manufacturer to fully sponsor summer camps for 10 to 18-year-olds interested in computers."

Atari was to conduct eight camp sessions during summer 1982, two in each of four locations:
1. Pennsylvania (East Stroudsburg State College),
2. North Carolina (Asheville School),
3. Wisconsin (Lakeland College),
4. Southern California (University of San Diego).

Each session would last four weeks. While Atari would provide the computer expertise and have ultimate oversight over the camps, day-to-day operation would be handled for Atari by Specialty Camps, Inc., an organization which had run both theme (Weight Watchers) and traditional camps for 25 years.

- **Linda S. Gordon** was Atari (Corporate) VP Special Projects,
- Atari (Home Computer) Educational Software Products Manager **Robert A. Kahn** was Atari Computer Camps Curriculum Director,
- **Ray Kassar (Raymond E. Kassar)** remained Atari Chairman & CEO,
- **J. Peter Nelson** was Manager of Public Relations for Atari's Home Computer division.

(Atari Age May/Jun-1982, page 6; Dr. Dobb's Journal May 1982, page 14; InfoWorld 15-Mar-1982, page 43; Interface Age Jun-1982, page 26)

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March: Steven T. Mayer – previously Atari VP Research & Development – became VP Research & Product Development.

March:
Atari (Home Computer) formed a special projects engineering group.
- Engineer Ajay Chopra – previously of Burroughs Corporation, would join Atari (Home Computer) as a Special Projects Engineer,
- Jim Tittsler – previously director of software development at International Remote Imaging Systems and before that, a software engineer at Heath Company, where he had reported to Larry Plummer – joined Atari (Home Computer) as a Special Projects Engineer,
- Larry Plummer remained Atari (Home Computer) Director, Electrical Engineering.

March: Atari Star Raiders for the Atari 400/800 was awarded Computer Game of the Year by Electronic Games magazine. (Electronic Games Mar-1982, page 49)

March 19-21: At the 7th West Coast Computer Faire in San Francisco, California, Atari held their second annual invitational hospitality suite for Atari computer Users' Group officers and their guests, where Atari introduced APX Atari Pascal Language System. About 80 persons attended, on behalf of 15 of the 200 total groups registered with Atari Users' Group Support.

At Atari (Home Computer):
- Don Kurtz was Director of Marketing Services,
- Earl Rice was Manager of the Users' Group support program,
- Bonnie A. Umphreys was Pascal's Product Manager.

(Atari Connection vol. 2 no. 2, page 1)

Also at the Faire, Percom introduced the first alternative to the Atari 810, the Percom RFD40-S1 (with matching slave drive RFD-40A1). (Analog #6, page 8).

March 26: Atari established the subsidiary, Atari Special Projects, Inc. – joint ventures with Club Mediterranee SA and/or with Specialty Camps Corp., with offices at 1196 Borregas Avenue, Sunnyvale, California – also home to the Home Computer division and Corporate Research.

Atari (Corporate) VP Special Projects Linda S. Gordon would additionally be President of Atari Special Projects, Inc.

April 7: Date of first draft of the Atari "Sweet-16" Home Computer Product Specifications document. Specific computer models planned: "1000" (16 KiB; later: "1200"; never shipped) and "1000X" (64 KiB; later: "1200X"; would ship as: 1200XL)
See: http://www.landley.net/history/mirror/atari/museum/sweet16.html

April: Atari shipped Caverns of Mars (cartridge). (Video Take-Out Apr-1982)

April:
- Bob Fournier was Atari (Home Computer) Entertainment Product Manager,
- Brenda K. Laurel remained Manager, Software Strategy & Marketing.

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April: Thomas M. McDonough joined Atari as VP Marketing in Atari's Home Computer division (New York Times 19-Dec-1982 for date), replacing Director of Marketing Services Don Kurtz who had departed the company – remaining with the Kurtz & Tarlow agency.

April: Atari launched the subsidiary, Atari International (UK) Inc., taking over the Atari consumer products business from distributor Ingersoll Electronics.
The unit had been set up by Financial Controller John Constantine and founding Managing Director Anthony Jones.
Graham Daubney would be Product Manager; Product Support would be headed by Jon Norledge.

April 16: "The Electronic and Computer Technician Vocational Education Incentive Grants Act" hearing before the Subcommittee on Elementary, Secondary, and Vocational Education of the Committee on Education and Labor, US House of Representatives, included testimony by Steven T. Mayer, Atari VP Research & Product Development.

April: First issue of Antic (magazine), The Atari Resource magazine, published by James Capparell.

April/May: Atari shipped, then promptly pulled from the market for further development, Personal Financial Management System. (Analog #9, page 118, plus C017535 REV. C)

Spring?:
- Atari (Home Computer) Applications Programmer Dave Johnson departed the company to Axlon,
- Atari (Home Computer) Software Product Coordinator Brian Johnston departed the company to Fox Video Games,
- Paul E. Liniak remained Manager of Product coordination/Software conversion.

May 1: Through Atari Special Projects, Inc., Atari began supplying both equipment and instructor training for the Club Mediterranee computer classroom at Club Med Ixtapa in Mexico – replacing Computer Camp of Santa Barbara, California, which had the role since the classroom opened in November 1981.

Atari did not take on the other existing Club Med computer classroom at Club Med Kamarina, Sicily, which had opened in May 1981.

A second Atari computer classroom was planned for Club Med Eleuthera, the Bahamas. (InfoWorld 12-Jul-1982, pages 14-16)

May 12-13: Initial meetings between Atari Chairman Ray Kassar (Raymond E. Kassar) and Rick Trow of Rick Trow Productions (RTP) would lead to "Computers: Expressway to Tomorrow" traveling multimedia assembly program for schools, under a contract covering the 1982-1983 (including fall 1982 focus group / touring unit and winter 1983 national launch) and 1983-1984 school years, with an option for the 1984-1985 school year.

May: For the Atari 400/800 Atari shipped Pac-Man (Roklan).

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May: Atari opened its second regional software-acquisition center, managed by **Jerry Connelly**, at: 57 John F. Kennedy St., Cambridge, Massachusetts.

Bruce W. Irvine remained Atari (Home Computer) VP Software.

While plans for additional centers were not announced, Atari was considering opening a "satellite facility" in New York City in the near future. (InfoWorld 24-May-1982, page 9)

May: The Atari (Home Computer) Special Projects Group – engineers **Ajay Chopra** and **Jim Tittsler** – would engage in a project to develop a combination Atari 800/SUN workstation. **Larry Plummer** remained Atari (Home Computer) Director, Electrical Engineering.

May?:

- **Robert A. Kahn** – previously Atari (Home Computer) Educational Software Product Manager – became Atari Director of Special Projects (Atari Computer Camps and Club Med initiatives), reporting to Atari (Corporate) VP Special Projects **Linda S. Gordon**,
- Dr. **Sueann Ambron**, Ed.D – previously assistant professor of educational psychology at Stanford University – joined Atari (Home Computer) as Manager of Educational Software Products replacing **Robert A. Kahn** in the role,
- **Brenda K. Laurel** remained Manager, Software Strategy & Marketing.

May: **Ken Wirt (Kenneth R. Wirt)** – previously of PBS – and more recently working full time for Atari on an internship while a second-year Stanford MBA student – joined Atari (Home Computer) as a Sales Manager. (Sales & Marketing Management 3rd-Dec, page 56)
Keith E. Schaefer remained VP Sales.

May: Engineer **Richard C. Pasco** – previously a researcher at Xerox Palo Alto Research Center (PARC) – joined Atari (Home Computer) as Manager of VLSI Development.

May 17: Atari Consumer Product Service (CPS) would fold Atari's nationwide network of Authorized Atari Computer Service Centers, Independent Service Centers (VCS service), and four Regional Service Centers together under the new Atari Service Factory Authorized Network branding.

May 25: **Paul V. Cubbage** remained Atari (Home Computer) Manager, Product Review.

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June 1?: Atari released the Atari Program Exchange (APX) Product Catalog Summer Edition 1982, introducing:

- Algicalc
- Astrology
- BLIS REV. 1.1
- Blackjack Tutor REV. 1.1
- Block 'Em REV. 2
- Bowler's Database REV. 2
- Calculator
  (moved from Atari's main product line)
- Castle REV. 1.1
- Checker King
- Cosmatic Atari Development Package
- Data Base/Report System
- Elementary Biology (by MECC)
- Family Vehicle Expense
- Frogmaster
- Galahad and the Holy Grail
- Going to the Dogs
- Insomnia (A Sound Editor) REV. 1.1
- Instedit REV. 1.1
- Instructional Computing Demonstration (by MECC)
- Jax-O
- Jukebox #1
- Metric and Problem Solving (by MECC)
- Microsoft BASIC Cross-Reference Utility
- Music I – Terms & Notation (by MECC)
- Player Generator
- Polycalc
- Pushover
- Rabbotz
- Recipe Search 'n Save
- Salmon Run
- Seven Card Stud
- The Midas Touch
- Three R Math System
- Utility Diskette II

J. Fred Thorlin was APX general manager; product review: Paul V. Cubbage.

June 6-9: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, for the Atari 400 ($349 / 16 KiB RAM; previously: $399) and Atari 800 ($899 / 16 KiB RAM),
Atari announced:

- Music Tutor I (would ship as: AtariMusic I),
- Juggles' Rainbow (by The Learning Co.),
- Juggles' House (by The Learning Co.),
- TeleLink II (never shipped as a standalone release; would ship as part of The Communicator II kit only).

Atari introduced:

- Atari Speed Reading (by Otto & Kamm),
- The Bookkeeper Kit ($249.95; Bookkeeper program plus CX85 Numerical Keypad),
- The Communicator II kit (price tba; new 835 modem with TeleLink II),
- The Home Manager Kit (price tba; Personal Financial Management System + The Home Filing Manager).

The APX title, My First Alphabet would be re-released as part of Atari's standard product line.

Atari again promised:

- The Bookkeeper (standalone program),
- The Home Filing Manager,
- Personal Financial Management System (PFMS now to ship winter 1983),
- Centipede.

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Atari also introduced the ERIC: Electronic Retail Information Center, one of several models of point of purchase merchandising displayers for retailers. ERIC is an Atari 800 Home Computer linked to a videodisc player; inventor: Larry Nicholson of Atari Cyan Engineering; Project Manager: Engineering technician Dan Corona.

Keith E. Schaefer was VP Sales for Atari's Home Computer division.

June:

- Steven T. Mayer, Atari VP Research & Product Development, would additionally serve as Atari (Home Computer) VP Research & Development – acting head of the division,
- Steven T. Mayer replaced Atari president Home Computer division Roger H. Badertscher who had departed the company (New York Times 25-Aug-1982) as would VP Software (software engineering) Bruce W. Irvine,
  - Roger H. Badertscher and Bruce W. Irvine would co-found Mindset Corporation on 27-Sep-1982,
- John Hagel III – previously of The Sequoia Group, founder and CEO – would join Atari (Home Computer) as VP Strategic Planning, reporting to Steven T. Mayer,
- Chris J. Horseman – previously of Thorn EMI, and independent developer as Centaursoft – would join Atari (Home Computer) as VP Software Engineering, replacing Bruce W. Irvine in the role (Antic Jul-1983 for title),
- Lou R. Tarnay – previously Director of Systems Development, reporting to Bruce W. Irvine – would become Director of Software Development, reporting to Chris J. Horseman. He would be assuming applications development from John R. Powers, III who would depart the company to Convergent Technologies,
- Doug Chorey (Douglas A. Chorey) – previously Executive Assistant to the VP of Software – would be Software Support Supervisor (new sound engineering and video graphics group). He would be reporting to Chris J. Horseman,
  - Reports to Doug Chorey (Douglas A. Chorey) would include sound engineer Brad Fuller,
- Thomas M. McDonough – previously Atari (Home Computer) VP Marketing – would become SVP Sales & Marketing, assuming responsibilities for Sales & Software Marketing,
- Brenda K. Laurel – previously Atari (Home Computer) Manager, Software Strategy & Marketing, reporting to Roger H. Badertscher – would join Atari Corporate Research in Systems Research,
- Bill Carris (William Carris) – previously Atari (Home Computer) Director of Sales Training – would become Atari (Home Computer) Director of Software Marketing, replacing Brenda K. Laurel in the role; reporting to Thomas M. McDonough. Bill Carris (William Carris) would assume responsibility for the Atari (Home Computer) Software Development Support Group (development support for outside programmers). He was previously reporting to John R. Powers, III,
- VP Sales Keith E. Schaefer would now report to Thomas M. McDonough.

June:

- Stephen M. Race – previously a consultant for Arthur D. Little Inc. – would join Atari International as Hardware Product Manager (computers and accessories), in part replacing Jeff Burton who had departed the company to Electronic Arts.
- Nancy Garrison remained marketing manager for computer software.

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June 28: Engineer John Skruch joined Atari (Home Computer) in Software Product Engineering (manufacturing).

June/July: Dave Stubben (David R. Stubben) – previously Atari (Coin-Op) Director, Electrical Engineering, reporting to VP Engineering Lyle Rains – became Atari (Home Computer) VP Engineering, replacing Gene B. Rosen who departed the company.
(Dave Stubben (David R. Stubben) resume)

June/July?:
At Atari (Home Computer),

- Kevin P. McKinsey – previously Manager of Industrial Design and Graphics – would remain Manager of Industrial Design, reporting to VP Engineering Dave Stubben (David R. Stubben).
- John Fox Haag would become Manager of Publications and Packaging Design (source), assuming the role from Kevin P. McKinsey, reporting to SVP Sales and Marketing Thomas M. McDonough.

Month?: Steve Arnold (Stephen D. Arnold) joined Atari (Home Computer) as a Software Product Manager, reporting to Director of Software Marketing Bill Carris (William Carris).

July 9: Release of the Walt Disney feature film TRON, with sound effects design and synthesis by Frank Serafine, Serafine FX Studios, who derived some of the sound effects from sounds generated by an Atari 800.
(Atari Connection vol. 2 no. 2, Summer 1982, pages 9-10
; Compute! magazine #28, Sep-1982, pages 18-22)

July 14: In what was believed to be the largest single order for home computers by a school system, Dade County (Florida) had placed an order for 426 Atari 800 Home Computers and peripherals. "This order brings the total number of Atari Home Computers in use in Dade County schools to approximately 650," said Thomas M. McDonough, SVP Sales & Marketing for Atari's Home Computer division.

July: Atari Corporate Research established the Atari Cambridge Research Laboratory at Five Cambridge Center, 8th floor, Cambridge, Massachusetts (Kendall Square district; adjacent to the Massachusetts Institute of Technology – the MIT).

The lab's Director would be Cynthia Solomon – previously VP, Research & Development/Co-Founder of Logo Computer Systems, Inc.

Administrative manager: James Russell Davis;
Business manager: Greg Gargarian.

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Researchers at the 35-person lab would eventually include:

- Annette Dula
- Bill St. Clair (Jan-Mar 1984)
- Dan Melnechuk
- David Levitt
- Edward F. Hardebeck
- Gary Drescher
- Henry Minsky
- Jaron Lanier
- Jay Jones
- Jim Davis (James Raymond Davis)
- Julie Minsky
- Ken Haase
- Lauren Young
- Lisa Delpit
- Margaret R. Minsky
- Mark Gross
- Max Behensky
- Michael Grandfield
- Nancy Smith
- Peter Cann
- Stephen Hain
- Susan Cotten
- Susan Kroon
- Tom Trobaugh

Chief consultant: Marvin Minsky

July:

- Graham Daubney – previously Atari International (UK) Inc. Product Manager – would remain Software Manager. (source),
- Les Player – previously of Digital Microsystems – joined Atari International (UK) Inc. as Technical Services Manager (service, repair, and technical training), assuming the role from Graham Daubney,
- Les Player would establish a network of Atari Independent Service Centres across the UK, plus an Atari Service Centre – incorporating national Customer Support/Product Support – which would be managed by George West and located at the subsidiary's headquarters in Slough, Berkshire, UK.

July: Atari shipped Centipede. (Video Take-Out Apr-1982)

July?: Industrial designer Regan L. Cheng transferred from Atari (Consumer) to the Home Computer division, where he would report to manager Kevin P. McKinsey.

July 26: In the US Atari had cut the retail price for the Atari 400 (16 KiB RAM) to $299 (previously: $349). (InfoWorld 26-Jul-1982, page 22; Changing Times Sep-1982, page 26; Compute! magazine #28, Sep-1982, page 6)

July 26: InfoWorld estimated between 250,000 and 300,000 Atari 400 & Atari 800 Computers had been sold to date.

Summer: First year of Atari Computer Camps, held at 3 locations:
1. "Camp Atari – San Diego" at the University of San Diego, California,
2. "Camp Atari – Ashville" at the Asheville School (Asheville, North Carolina),
3. "Camp Atari – East Stroudsburg" at East Stroudsburg State College, Pennsylvania.

Camp was canceled at the fourth announced site, "Camp Atari – Sheboygan" at Lakeland College in Sheboygan, Wisconsin.
Pricing: $1,590 for 4 weeks or $2,790 for 8 weeks.

Summer: At Atari (Home Computer): Jeff Schwamberger – previously of The Authorship Resource, Inc. (ARI) was Manager of the Software Standards Group. (Atari Connection Summer 1982, page 13)

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Summer:

- **Jim Paige** was Atari (Home Computer) national education sales manager (Atari Connection Summer 1982, page 23) as Atari had taken the sale of Atari personal computers and services to the educational community in-house. It was previously outsourced to Science Research Associates (SRA),
- **Keith E. Schaefer** remained Atari (Home Computer) VP Sales.

Summer: The Atari (Home Computer) Software Development Support Group (development support for outside programmers) had been renamed, the "Atari I/O Seminar Services Group". (Atari Connection Summer 1982, page 2)
Bill Carris (William Carris) remained Director of Software Marketing.

Summer: Atari Consumer Product Service (CPS) Technical Support operations (**John H. Hahn**, manager) were moved from 1312 Crossman Ave, Sunnyvale, California – which would remain home to Customer Relations and a Regional Service Center – to: 845 W Maude Ave, Sunnyvale, California.

August 11: Approximately 1,370 Atari Home Computers and peripherals, valued at more than $3 million, had been ordered by the US Department of Defense Dependents Schools (DoDDS) under a competitive Request for Proposal.
Thomas M. McDonough was Atari (Home Computer) SVP Sales & Marketing. (Press Release).

August: Industrial designer **Tom Palecki** – previously of Xerox – joined Atari (Home Computer). He would be reporting to industrial design manager **Kevin P. McKinsey**.

August 15-October 15: "Taste The Thrill Of Atari At McDonald's" promotion. 50 grand prize deluxe packages would each include a 5200, an Atari 800 with peripherals, and a Centipede coin-operated game.

August 18: Atari, Inc. and Merchandising Corp. of America announced an agreement under which Atari was granted worldwide exclusive rights to market coin-operated and home video games based on E.T. the Extra-Terrestrial, the film directed by Steven Spielberg. (Press Release)

August 24: **John C. Cavalier** was named Atari Home Computer division President, replacing the departed **Roger H. Badertscher** (New York Times 25-Aug). **John C. Cavalier** was previously VP & General Manager of American Can's Dixie and Dixie/Marathon unit, makers of consumer paper products.
The new Home Computer division headquarters would be located at 30 E. Plumeria Dr. – Previous division headquarters: 1196 Borregas Avenue, Sunnyvale, California.

August 29-December 31: "Atari Announces Discount Fares to the Computer Age. Save up to $60" promotion. In the US, for the purchase of an Atari 400 ($299 / 16 KiB), Atari offered a rebate of $10 for each purchase of up to six additional Atari computer products.

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August 30: Atari had announced their Advanced Development Laboratory in New York City. Dedicated to the exploration of microprocessor-based products in electronic publishing and transactional services for home computers, the lab would be responsible for development of advanced products for Atari, and also function as a focus for joint research projects with other subsidiaries of Warner Communications Inc. (WCI).

Opened in September 1981, the Atari NY Lab, home of the Atari Advanced Development Group, had been established and was headed by **Steven T. Mayer**, Atari VP Research & Product Development. Atari employed 30 at the site.

Summer/Fall?: The Warner Communications L.A. Lab Research & Development unit (QUBE cable television system development), located at 3701 Oak St., Burbank, California ("Fantasy Trailer" on the Warner Bros. Ranch), was shifted to Atari Corporate Research.

Engineer **Steven J. Davis** would remain Director of the Atari L.A. Lab, now as Atari Director of Advanced Research, reporting to VP/Chief Scientist **Alan Kay**.

Others at the L.A. Lab would eventually include: **Todor Fay**, **Rob Newman (H. Robert Newman)**, **Jim Wiefel**.

Summer/Fall: Atari shipped The Bookkeeper Kit and My First Alphabet.

August/September: The Atari Consumer Product Service (CPS) Regional Service Center previously at 43 Belmont Dr, Somerset, New Jersey was moved to: 12 B World's Fair Dr., Somerset, New Jersey.

August/September:
At Atari (Home Computer),

- Engineer **Ajay Chopra** would be reassigned from the Special Projects Group to the "Sweet-16" project with Engineer **David Owen Sovey** and Director, Electrical Engineering **Larry Plummer**,
- Engineer **Carl Goy** – previously of Heath Zenith where he had been manager of Heathkit & printer engineering, Zenith computer business group and before that, engineering hardware manager, Heath computer engineering group, reporting to Director of Computer Products **Larry Plummer** – joined Atari (Home Computer) as a Special Projects Engineer, replacing **Ajay Chopra** in the role,
- The special projects unit – **Carl Goy** and **Jim Tittsler** – would abandon efforts to develop a combination Atari 800/SUN workstation to instead launch an effort to develop a combination Atari 800/IBM PC compatible computer – project "Shakti"/"25601", later: 1600; would become a joint venture with Toshiba.
- **Larry Plummer** remained Atari (Home Computer) Director, Electrical Engineering.

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September 1?: Atari released the Atari Program Exchange (APX) Software Catalog Fall Edition 1982, introducing:

- Calculus Demon
- Counter
- Cribbage
- Dog Daze REV. 1.1
- Dunion's Debugging Tool (DDT)
- Easygrader
- FORTH Turtle Graphics Plus
- Family Cash Flow REV. 2
- Flags of Europe
- fun-FORTH
- Keypad Controller REV. 2
- Mankala
- Mantis Boot Tape Development System
- Mapmaker
- Math*UFO
- Message Display Program
- Snark Hunt
- Spelling Genie
- Stock Management
- Text Analyst
- Word Search Generator

J. Fred Thorlin was APX general manager; product review: Paul V. Cubbage.

September 3-5: Atari exhibited in the Technology Fair at the US Festival held at Glen Helen Regional Park, San Bernardino County, California. (SoftSide #36, pages 14-16; Unuson Press Release 10-Sep, 17-Sep, 23-Sep & 31-Sep)

September 8: Chemical Bank announced it would provide the first major home banking and information system commercially available in the country, called Pronto. Pronto would initially require an Atari Home Computer system, but programs would be developed for most major personal computers on the market.

September 10-12: Atari featured the Atari 400/800 Computers at the 5th Personal Computer World (PCW) show at the Barbican, London, UK.

September: At Stevens Institute of Technology in Hoboken, New Jersey, the 80 freshmen in Science and in Systems Planning were required to purchase an Atari 800. (SoftSide #43, page 26)

September: Unimport Ibérica, S.A. was established to launch and serve as distributor of the Atari 400/800 in Spain. https://tinyurl.com/fy6xc2pk

September 17: Date of the internal Atari document, "Atari 600 Home Computer Liz: Low Cost Computer Specification"
https://archive.org/details/AtariA600XLProductStatusMeetingHandout

September 22-October 1: At the SICOB (Salon international d'Informatique, télématique, Communication, Organisation du bureau et Bureautique) show (stand 162-163) at the CNIT (Centre des Nouvelles Industries et Technologies) in Paris – La Defense, France, P.E.C.F. Atari launched the Atari 800 (6,500 FRF / 16 KiB; 7,500 FRF / 48 KiB; PAL version modified for Peritel) and introduced the Atari 400 (3,800 FRF; PAL version modified for Peritel) in France. (L'Ordinateur Individuel #40, page 6, #42, page 80, #46 for prices).

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September 29: Date of a late draft of the internal Atari document, "Sweet-16" Product Specification. Specific computer models indicated: "1200" (16 KiB; earlier: "1000"; never shipped) and "1200X" (64 KiB; earlier: "1000X"; would ship as: 1200XL), with both models now sharing the same case design.
Plans now called for manufacture of only the "1200X".
https://tinyurl.com/2p95ja8n

October 1: Florida National Banks of Florida, Inc. announced that it would test Pronto, the in-home banking and information system, licensed from Chemical Bank of New York, in selected markets beginning in the first quarter of 1983. Atari home computers had been utilized for initial Pronto testing, though eventually the software would be adaptable to most of the personal computers on the market. (Press Release)

October 11: Atari had announced plans to produce home computers in Hong Kong and Taiwan, beginning January 1983. Production would take place at facilities already producing games for Atari. Employment at Atari's plant in Hong Kong would grow from 700 to 1,000. Atari said computers produced in the Far East would be marketed there, while the US market would be served from its home facilities in Silicon Valley. (Electronics News 11-Oct-1982)

October?:
- **Anthony Jones** – previously Atari International (UK) Managing Director – would become a Group Product Manager for Atari Inc., Sunnyvale, California headquarters,
- **Graham Clark** – previously of Rank Xerox – would join Atari International (UK) as Managing Director, replacing **Anthony Jones** in the role,
- **Eric Salamon** – previously of Mars Confectionery – would join the company as Marketing Director.

October:
- Atari established a Software Development Centre at Atari International (UK) Inc,
- **Graham Daubney** remained Software Manager for Atari International (UK),
- **Jon Norledge** – previously Product Support Manager, reporting to Atari Service Centre head **George West** – would be Development Manager, reporting to **Graham Daubney**. (I/O #4 page 4)
- **Shamus Kelly** would become Product Support Manager, replacing **Jon Norledge** in the role and reporting to **George West**.

October 22-December 31: In the US, Atari offered two 16 KiB RAM modules free with the purchase of an Atari 800 computer system ($899 / 16 KiB standard; 48 KiB RAM total with the additional modules). (InfoWorld 8-Nov-1982, page 15; Video Game Update Nov-1982)

October 30: Atari had announced that its Hong Kong distributor, Onflo International, had been awarded a contract to supply 300 Atari 800 computer systems to Hong Kong secondary schools. (New York Times 30-Oct)

November 4: Dry Dock Savings Bank of New York and Atari jointly announced that Dry Dock would offer depositors the opportunity to receive Atari 800 computer systems in place of cash interest or to purchase the computer systems at specially reduced prices. The offer would begin Nov. 8th and run through the end of the year. (Press Release)

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November 10: Date of the internal Atari (Home Computer) document, "Atari LOGO: A Proposed Plan" by **Bonnie A. Umphreys**, Software Product Manager.

November: Atari began producing new Atari 810 Floppy Disk Drives with the "center flip door" drive mechanism by Tandon, instead of the "push button, sliding door" mechanism by MPI used in the original design. (Antic May-1983) Technical documentation would refer to the new design as the "810T Analog".

November 15: Atari announced they had obtained an exclusive worldwide license for the development, manufacture and distribution of Nintendo's "Donkey Kong" and "Donkey Kong, Jr." video games for Atari's Home Computer.

- **John C. Cavalier** remained Atari Home Computer division President,
- **Keith E. Schaefer** remained Atari Home Computer division VP Sales,
- **Helen Gray** remained Atari VP Corporate Communications.

(Press Release)

November 16-19: Atari featured the Atari 400/800 Computers at COMPEC'82, Olympia hall, London, UK.

November 18-20: At the Amusement & Music Operators Association (AMOA) show in Chicago, Illinois, Atari introduced the Atari Coin Executive coin accounting system (ACE; never shipped), which incorporated an Atari 800.

November?: Atari (Home Computer) Programmer **Mike Lorenzen** departed the company to Activision.

November/December?: Atari Computer Camps literature for 1983 (© 1982) mentioned:

- Atari VP/Chief Scientist – **Alan Kay**,
- Atari Computer Camps Executive Director and (Corporate) VP Special Projects – **Linda S. Gordon**,
- Atari Software Consultant – **Wayne Harvey**,
- Atari Educational Consultant – **Patricia Tubbs**,
- Atari Computer Camps Executive Director – **Dan Schliftman**,
- Atari Computer Camps Camp Administration Coordinator – **Illeen Berg**,
- Atari Computer Camps Executive Director – **Mike Sparber**,
- Atari Business Manager – **Robin Bernheim**,
- Special Projects Director – **Robert A. Kahn**,
- Atari Computer Camps Personnel and Camper Records Director – **Flip Shulman**,
- Computer Camps Site Selection and Facility Director – **Tony Sparber (Tony 'Big T' Sparber)**.

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December 1?: Atari released the Atari Program Exchange (APX) Product Catalog Winter Edition 1982-83, introducing:

- Air-Raid!
- Astrology REV. 1.1
- BASIC/XA
- Deep Blue C Compiler
- Deep Blue Secrets
- Disk Fixer/Load 'n Go
- Diskmenu
- Earth Science (by MECC)
- Easygrader REV. 1.1
- FOG Index
- Game Show
- Geography (by MECC)
- Gridiron Glory
- I'm Different!
- Melt-Down
- Monkey Up a Tree
- Music II – Rhythm & Pitch (by MECC)
- Music III – Scales & Chords (by MECC)
- Music Player
- Phobos
- Prefixes (by MECC)
- Pushky
- Quarxon
- Rabbotz REV. 1.1
- Real Estate Cash Flow Analysis
- Text Analyst REV. 2
- The Magic Melody Box
- The Market Place (by MECC)
- Typo Attack
- Yahtman

Product review: **Paul V. Cubbage**.

J. Fred Thorlin – previously Atari (Home Computer) Director of Product Review & Research, reporting to VP Software Engineering **Chris J. Horseman** – was now APX Director (previously: APX General Manager; still reporting to **Chris J. Horseman**).

APX operations had been moved from 155 Moffett Park Dr., Sunnyvale, California to 3281 Scott Blvd, Santa Clara, California.

December 1?: **Sherwin Gooch** – previously Associate Director, Center for Music Research, Florida State University – joined the Atari (Home Computer) communications products group, reporting to manager **John Curran**.

December 2:
At Atari (Home Computer):

- **Lou R. Tarnay** was Director of Software Development, and was reporting to VP Software Engineering **Chris J. Horseman**.
  Direct reports to **Lou R. Tarnay** included:
  - **Paul Laughton** – Systems products,
  - **John Curran** – Communications products,
  - **Ken (Charles) Balthaser** – Entertainment and Education products,
  - **Joe Miller (Joseph B. Miller III)** – Advanced development.
- Reports to **Paul Laughton** included:
  - **R. Scott Scheiman** – Operating Systems Development,
  - **Jim Cox** – Advanced Consumer Product Development.
- Reports to **Ken (Charles) Balthaser** included:
  - **Clyde Grossman** – Entertainment Product Development,
  - **Vincent H. Wu** – Amusement Product Development.

https://archive.org/details/AtariHarryStewart

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December 6: Atari announced that Parisian, Inc., a chain of nine stores in Alabama with headquarters in Birmingham, was substituting an "electronic catalog" for its Christmas catalog to promote its holiday selection as well as to help make the public more familiar with home computers. Approximately 1,700 gift suggestions had been programmed into Atari 800 computers. Store employees would help customers key in responses to four questions asked by the electronic catalog about the person the customer is shopping for, and the catalog would suggest three Christmas gifts and a stocking stuffer, each tailored to suit the tastes of the gift recipient. Two to four of the systems had been installed in each of Parisian's nine stores. (Press Release)

December 13: At the Plaza Hotel in New York City Atari introduced the:
- 1200XL Home Computer ("Well under $1,000"),
- 1010 Program Recorder ($99; winter 1983),
- 1020 Printer/Plotter ($299; winter 1983),
- 1025 Printer ($549; spring 1983).

Atari promised:
- (again) The Communicator II kit,
- The 835 modem apart from The Communicator II kit (spring 1983),
- (again) The CX85 Numerical Keypad (spring 1983),
- (again) The Home Manager kit (The Home Filing Manager + Family Finances; winter 1983).

The Programmer kit was updated to include the new Inside Atari BASIC book – instead of Atari BASIC book (Wiley Self-Teaching Guide) –, and the Entertainer kit was updated to include Pac-Man – instead of Missile Command.

The Atari 800 would now ship with 48 KiB RAM standard. The Atari 400 Computer, 410 Program Recorder, 810 Floppy Disk Drive, 830 Modem, and 850 Interface Module were to remain available as well.

For Atari 400/800/1200XL Atari introduced:
- Defender (by Williams Electronics),
- Galaxian (by Namco),
- VisiCalc (by Software Arts for VisiCorp; previously released by Personal Software, the earlier name for VisiCorp).

For Atari 400/800/1200XL Atari again promised:
- Atari Speed Reading (to ship imminently),
- Juggles' House (January),
- Juggles' Rainbow (January),
- TeleLink II (again promised apart from The Communicator II kit).

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For Atari 400/800/1200XL Atari announced:
- E.T. Phone Home! (March),
- Qix (by Taito; February),
- Dig Dug (by Namco; April),
- AtariWriter (earlier: Word-Wise, see ANALOG #9p17; March),
- Family Finances (enhanced combination of the two APX titles, Family Cash Flow and Family Budget; replacement for the canceled Personal Financial Management System; March),
- Timewise (RLM Micro Systems for Atari; based on Weekly Planner from APX; March),
- Eastern Front (1941) (updated version on cartridge; previous version released by APX),
- Star Trux (never shipped),
- Superman III (never shipped),
- AtariMusic I (previously: Music Tutor I),
- Microsoft BASIC II.

Atari also announced the Disney Education Series, to consist of 5 programs developed & published by Disney, and distributed by Atari, featuring Mickey Mouse, Peter Pan, and the Cheshire Cat.

Keith E. Schaefer was VP Sales and **John C. Cavalier** was Atari Home Computer division President.

(Analog #9, page 17, pages 117-118; Video Game Update Jan-1983; Press Release)

December 14: Date of internal memo from Atari Software Architecture consultant **Harry B. Stewart** titled "6402 Floppy Disk Controller Protocol" regarding the built-in floppy disk drive for the "6402" computer under development (would be introduced as: Atari 1450XLD).
See: https://archive.org/details/AtariHarryStewart

December: Atari shipped: Galaxian, Defender, Atari Speed Reading (Learning Multi-Systems, Inc.).

December: Atari International (UK) Inc. had established a network of Independent Service Centres, supported by the Atari Service Centre at company headquarters in Slough, Berkshire, UK, using the Atari Service Factory Authorised Network branding.

December 19:
At Atari (Home Computer):
- SVP Sales & Marketing **Thomas M. McDonough** had departed the company to Kenyon & Eckhardt. (New York Times 19-Dec-1982),
- **Keith E. Schaefer** – previously Atari (Home Computer) VP Sales – would be promoted to SVP Sales, replacing **Thomas M. McDonough** in part.

December/January: First issue of Page 6 magazine, the UK's first Atari computer magazine. Published by Les Ellingham.

Winter 1982/1983: First issue of I/O, later known as Input/Output, the magazine of the Atari Home Computer Club (Atari International, UK).

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Atari sold 400,000 of its Atari 400 & Atari 800 Computers in 1982, according to The Yankee Group, a Boston-based computer consulting firm, accounting for 17 percent of all home computer sales. (Washington Post 24-May-1983, page D7)

The worldwide installed base of Atari 400 & Atari 800 Computers was estimated by Future Computing, Inc. to be about 500,000, with about 425,000 in the US (Jan-1983).

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1983

January 6-9: At the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada, for the:
- Atari 400 ($299 / 16 KiB RAM),
- Atari 800 ($679 / 48 KiB RAM / no longer with Atari BASIC cartridge and books; previously: $899 / 16 KiB RAM / standard with Atari BASIC cartridge and books),
- Atari 1200XL ($899; not yet shipped),

Atari introduced:
- Mickey in the Great Outdoors by Walt Disney Productions,
- Paint (SuperBoots Software from Capital Children's Museum via Reston),
- Donkey Kong (by Nintendo).

Atari featured or again promised:
- 1010 Program Recorder,
- 1020 Printer/Plotter,
- 1025 Printer,
- Juggles' House (to ship imminently),
- Juggles' Rainbow (to ship imminently),
- AtariMusic I,
- AtariWriter,
- Family Finances,
- Timewise,
- VisiCalc,
- Dig Dug,
- Eastern Front (1941) (cartridge),
- E.T. Phone Home!,
- Qix,
- Star Trux (never shipped),
- Superman III (never shipped),
- Microsoft BASIC II,
- The Home Manager kit,
- The Communicator II kit.

(1st-Feb-1983 Price list)

Atari hired two teenagers, **Robert Allbritton** and **John Dickerson** – via family connections with Atari CEO **Ray Kassar (Raymond E. Kassar)** – to help pitch Atari computers at the show.

January 7: Date of the internal Atari document, "Atari 600 Home Computer Liz: Low Cost Computer Specification, Revision Two". The Atari 600 was projected to be available with either 16 KiB RAM or 64 KiB RAM. (Would ship as: Atari 600XL and Atari 800XL).
https://archive.org/details/AtariA600XLProductStatusMeetingHandout

January 15: At the 2nd annual Atari Star Award banquet, held at St. Francis Hotel, San Francisco, California, Atari awarded the Atari Star Award and $25,000 Grand Prize to **David Buehler** for his APX title, Typo Attack.

Star Special Award of Merit winners: **Douglas Crockford**, **Harry Koons** & **Art Prag**, **Lee Actor**.

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Paul V. Cubbage, head of the APX Software Review team, represented APX, and Atari (Home Computer) SVP Sales Keith E. Schaefer made the announcement and presented the award. (Atari Connection Spring 1983, page 10)

January: John Hagel III – previously Atari (Home Computer) VP Strategic planning – became Atari (Corporate) VP Strategic planning.

January:

- Jeffrey A. Heimbuck – previously SVP Marketing for wine operations at Joseph E. Seagram & Sons – joined Atari (Home Computer) as SVP Marketing & Software Engineering – replacement for the departed Thomas M. McDonough, in part. (Los Angeles Times 11-Oct-1983 for date),
- VP Software Engineering Chris J. Horseman would now report to Jeffrey A. Heimbuck,
- Peter N. Rosenthal – previously Atari (Home Computer) VP Business Planning – would become Atari (Home Computer) VP Product Development and Business Planning, reporting to Jeffrey A. Heimbuck,
- Paul Laughton – previously Atari (Home Computer) Systems Products Manager – would be promoted to Director of Software Development, reporting to Chris J. Horseman, replacing Lou R. Tarnay who departed the company to Fox Video Games.

January: Atari Consumer Product Service (CPS) management included:

- Jon D. Ebbs – Atari VP for CPS,
- James W. Prather – Manager, field service operations,
- David S. Wilson – Manager, customer relations,
- Ronald R. Elliot – Manager, materials & parts distribution,
- Julie B. Naughton – Controller, CPS,
- John H. Hahn – Manager, technical support & publications,
- William B. McPhetridge – Manager, international & special markets services,
- Janis H. Pepper – Manager, service marketing.

January: Through Atari Sales Corp., Atari began offering US consumers Atari Service Contracts on all Atari hardware (video game and home computer systems).

January: Atari published the Atari Computer Educational Software Directory (first edition). (page 48 for date) The back page of the catalog announced Atari LOGO, being developed by Logo Computer Systems, Inc. of Montreal, Canada, to be exclusively manufactured for and distributed by Atari and to be available fall 1983.

January: In France, P.E.C.F. Atari shipped the Atari 400 (PAL version modified for Peritel). (L'Ordinateur Individuel #51 Sep-1983, page 160)

January?: In West Germany, David Evans joined Atari Elektronikvertriebs GmbH as Product Director. Software development manager Steve Molyneux would now report to David Evans.

January: Atari shipped Juggles' House and Juggles' Rainbow.

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January: Atari commenced production of the Atari 1200XL Computer at its plant at 1215 Borregas Avenue, Sunnyvale, California. Additionally, Atari 400 (and 800?) production commenced at Atari's plant in Hong Kong, while Atari 400 & Atari 800 production would continue at 1173 Borregas Avenue, Sunnyvale, California.

Brad C. Saville remained Atari (Home Computer) operations manager.

January?: Some Atari Consumer Product Service (CPS) operations (headquarters, materials & parts distribution) would move into 1272 Borregas Avenue, Sunnyvale, California.

January 18: At the Volvo Masters' tennis championship in New York's Madison Square Garden, Atari's Home Computer division and the Association of Tennis Professionals unveiled the Atari-ATP Computer Ranking System. Also, the Atari 800 was now the official computer of the ATP.

January 18-21: Atari featured the Atari 400/800 Computers at the Which Computer? show at the Birmingham National Exhibition Centre, UK.

January 19: Atari was working on two new computer models to complement the Atari 1200XL: "Liz" (would ship as: Atari 600XL) would be less expensive than the 400; "6402" (would be introduced as: Atari 1450XLD) would include built-in floppy disk drive, modem, and voice synthesizer and would be more expensive than the 1200XL.
See: https://archive.org/details/AtariHarryStewart

January 20: Logo Computer Systems, Inc. (LCSI) and Atari jointly announced Atari LOGO for the Atari 400/800/1200XL

January 28: Atari would commence development work on the "1201" ("6402" feature set except floppy disk drive; would be introduced as: Atari 1400XL).
See: http://atariage.com/forums/topic/98872-atari-vaxs-being-moved/

January 31: **Steven T. Mayer** – previously Atari VP Research & Product Development – would be Atari SVP Engineering, remaining head of the Atari NY Lab, still reporting to Atari Chairman & CEO **Ray Kassar (Raymond E. Kassar)**.

February 7: Atari had announced that they were now shipping VisiCalc.

February 9: **Andy Sekel (A. J. Sekel)** – previously of Pizza Hut – had joined Atari (Home Computer) as Manager of Press Relations (New York Times), having replaced **J. Peter Nelson** who had departed the company.

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February: Atari launched the "Computers: Expressway to Tomorrow" traveling multimedia assembly program, produced by **Rick Trow** Productions (RTP), offered free of charge to junior and senior high schools in the US Using two 16-millimeter screens – **Chuck Sterin (J. Charles Sterin)**, filmmaker – and a live actor, the program featured an exploration of the past, present and future of computers in society.

The show would be presented to 1.2 million students at nearly 1,400 public and private schools through June 1983, with plans to reach 4,000 schools and 3.8 million students by December 1984. RTP had dedicated 9 of its 15-20 touring units to the Atari program.

Chris Bowman (Christopher P. Bowman) was Atari (Home Computer) national manager of educational marketing.

February?: Atari shipped the Numerical Keypad (CX85; $124.95)

February: Atari shipped: Qix (Video Game Update).

February 22: Atari announced that manufacturing for its Home Computer division would be consolidated mainly in Hong Kong and Taiwan, where Atari already manufactured consumer electronics products, and announced 1,700 layoffs.

Atari said that 600 workers in its home video game operation were laid off effective immediately, and that another 1,100 in the Home Computer division would lose their jobs over the next four months.

"Manufacturing for home computers and video games will come to a virtual halt here in the United States by July," Atari said.

March 1?: Atari released the Atari Program Exchange (APX) Product Catalog Spring Edition 1983, introducing:

- Atspeller
- Catterpiggle
- Chameleon CRT Terminal Emulator (New Version)
- Diggerbonk
- Escape to Equatus
- Fingerspelling
- Getaway!
- Hex-A-Bug
- Impact
- Math Mission
- Microsailing
- My Spelling Easel
- Teasers by Tobbs
- Three R Math Classroom Kit
- Typit

J. Fred Thorlin was APX Director; Product Review Manager: **Paul V. Cubbage**.

March 7:

- **Jim P. Romanos** – previously Atari (Home Computer) Software Product Test Manager – had been promoted to Director of Software Development. **Jim P. Romanos** would be reporting to VP Software Engineering **Chris J. Horseman**, replacing **Paul Laughton** who had departed the company to Fox Video Games,
  - Direct reports to **Jim P. Romanos**:
    - **Ken (Charles) Balthaser** – Applications,
    - **John Curran** – System and Telecommunications,
    - **Doug Chorey (Douglas A. Chorey)** – Software support: sound and video graphics.

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- Reports to **Ken (Charles) Balthaser**:
  - **Clyde Grossman** – Entertainment applications,
  - **Jim Cox** – Advanced home applications.
- Reports to **John Curran**:
  - **R. Scott Scheiman** – Systems,
  - **Sherwin Gooch** – Telecommunications, replacing **John Curran** in the role.
- Technical staff reporting to **Jim P. Romanos**:
  - **Joe Miller (Joseph B. Miller III)**,
  - **Greg Riker**,
  - **Lane Winner**.

https://archive.org/details/AtariHarryStewart

March 8:

- **Kamalu Bruns** was Atari (Home Computer) Software Support Group Manager (internal support section and test department).
  - Direct reports to **Kamalu Bruns**:
    - **Fred A. Terzian** – Support section manager,
    - **Jack Quinn** – Test department manager.
- Reports to **Jack Quinn**: test supervisors **Carla Furr**, **Lisa Reinbold**

https://archive.org/details/AtariHarryStewart

March 8: Penril Corp., a Rockville-based electronics firm, had won a $4 million contract to provide low-cost communications modems to Atari. Penril was expected to ship roughly 100,000 modems (Atari 1030) by the middle of 1984, with delivery beginning July 1983. (Washington Post 8-Mar-1983)

March 8-April 4: Atari featured the Atari 400/800 Computers at the Daily Mail Ideal Home Exhibition, Earls Court, London, UK.

March 10:

Direct reports to Atari (Home Computer) VP Software Engineering **Chris J. Horseman** included:

- **Jim P. Romanos** – Director Internal Development,
- **Paul E. Liniak** – Director Software Conversion,
  - Reports to **Paul E. Liniak** included **Vincent H. Wu** – Development Manager.
- **Kamalu Bruns** – Manager, support group: internal support section and test department.

https://archive.org/details/AtariHarryStewart

March 15: **John Peeke-Vout** would join Atari International (UK) Inc. as Software Manager, replacing **Graham Daubney** who had departed the company to CentreSoft.
(Home Computing Weekly #2, page 6)

March: Atari (Home Computer) Director of Finance **Bill Kaiser** departed the company to Electronic Arts.

March: Atari shipped the Atari 1200XL Computer, suggested retail price $899. (**Ray Kassar (Raymond E. Kassar)** in Across The Board, Jun-1983, page 26 for month), and shipped the Atari 1010 Program Recorder ($99.95).

March?: Atari shipped Timewise.

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March 18-20: At the 8th West Coast Computer Faire at the Brooks Convention Hall and Civic Center in San Francisco, California, Atari introduced the Atari 1050 Floppy Disk Drive (with DOS 2.0S; spring 1983).

Atari again promised the:
- 1020 Printer/Plotter (spring 1983),
- 1025 Printer (spring 1983),
- 835 Modem,
- The Communicator II kit.

Atari featured the:
- 1010 Program Recorder (1200XL sales flyer),
- Dig Dug,
- E.T. Phone Home!,
- Qix,
- AtariWriter.

Atari introduced Atari Logo (Brian Silverman of LCSI for Atari).

Atari announced a $50 rebate, starting April 15th, for the purchase of an Atari 400 computer, and hinted that the 400 was soon to be replaced by a new model ("Liz"; presumptive name: Atari 600XL).

March 25-27: Atari featured the Atari Coin Executive (ACE) at the Amusement Operators Expo '83 (AOE '83) at the O'Hare Exposition Center in Chicago, Illinois.

March 26: **Jack Perron** had become Acting Manager, Product Review, APX, replacing **Paul V. Cubbage** who had departed the company to Mindset.

March 31: **Larry Plummer** remained Atari (Home Computer) Director, Electrical Engineering.

Winter/Spring?: **Peter R. Ateshian** – previously of Reticon – joined Atari (Home Computer) in engineering (digital circuit design).

April 1?:
- **Mark Davis** – previously Atari (Consumer) Director, Electrical Engineering – became Atari (Home Computer) Director, Electrical Engineering, replacing **Larry Plummer** who departed the company to Convergent Technologies.
- **Dave Stubben (David R. Stubben)** remained Atari (Home Computer) VP Engineering.

April 11: **Bill Carris (William Carris)** was Atari (Home Computer) Director of Software Marketing. (InfoWorld 11-Apr-1983, page 64)

April: Atari commenced Atari 1200XL production by Atari Taiwan Manufacturing Corp. Atari 1200XL production would also continue at the 1215 Borregas Avenue plant in Sunnyvale, California.

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April: Atari (Home Computer) Software Product Manager – including AtariWriter – **Gary Furr** departed the company to Datasoft, developers of AtariWriter.

April?: In the Netherlands at Atari International (Benelux) B.V., **Han Van Egdom** joined the company as product manager home computers.

April 15: Start date for several Atari computer rebate offers: $50 for the purchase of an Atari 400, or $100 for the purchase of an Atari 800 or Atari 1200XL. (Newspaper ads)

April 26: Atari was expected to announce shortly that it would lay off between 500 and 800 employees in consolidating its Home Computer division with the Consumer Electronics division. (Washington Post 26-Apr-1983)

Spring: Atari shipped:
- AtariWriter (Datasoft),
- Eastern Front (1941) (cartridge),
- Family Finances,
- Mickey in the Great Outdoors
  (Walt Disney Telecommunication & Non-Theatrical Company),
- Microsoft BASIC II,
- Paint,
- The Home Manager kit.

Spring: There were now eight Atari computer classrooms in Club Med villages:
1. Eleuthera in the Bahamas,
2. La Caravelle in French Guadeloupe,
3. Ixtapa in Mexico,
4. Copper Mountain in the Colorado Rockies near Denver, Colorado,
5. Dom Miguel in Marbella, Spain,
6. Chateau Royal in Noumea, New Caledonia,
7. Les Almadies, Senegal,
8. Cherating, Malaysia.

Linda S. Gordon was Atari (Corporate) VP Special Projects.
(Atari Connection Spring 1983, pages 40-41)

May 4: Warner Communications Inc. (WCI) established the subsidiary, WCI Labs Inc. The Atari Advanced Development Laboratory (Atari NY Lab) at 300 East 42nd Street. Fl 6/10, New York NY, home of the Atari Advanced Development Group, would become the facility of WCI Labs, which would serve Atari as well as other units of WCI.

Steven T. Mayer – previously Atari SVP Engineering, reporting to Atari chairman & CEO **Ray Kassar (Raymond E. Kassar)** – would be President of WCI Labs and Senior Executive Consultant to the office of the president of WCI.

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May 8:

- Dr. **Alfred L. Moye** – previously the US Dept. of Higher Education's Deputy Assistant Secretary during the Carter administration – would join Atari (Home Computer) as national educational sales manager, responsible for sales programs targeted at elementary, high school and college educators (Arcade Express vol. 1 no. 20), replacing **Jim Paige** who departed the company. Educational sales would adopt the branding: AtariEd,
- **Keith E. Schaefer** remained Atari (Home Computer) SVP Sales.

May?:

At Atari Consumer Product Service (CPS):

- **David S. Wilson** – previously Manager of Customer Relations – was promoted to Director of Customer Relations, still reporting to VP for CPS **Jon D. Ebbs**,
- **Bill Bartlett** – previously Supervisor of Customer Relations Specialists – was promoted to Manager of Product Support for Customer Relations, still reporting to **David S. Wilson**,
- Users' Group Support Manager **Earl Rice** – previously of the Atari Home Computer division in marketing – would now report to **Bill Bartlett** in CPS,
- **Robert H. Levrini** would be promoted to Supervisor, product specialist group, replacing **Bill Bartlett** in the role, reporting to **Bill Bartlett**.

May?:

- Atari (Corporate) VP Special Projects **Linda S. Gordon** assumed responsibility for educational marketing of Atari computers (InfoWorld 27-Feb-1984, page 105), which would adopt the branding: Atari Instructional Material Service (AIMS).
- **Mike Knoblauh (Michael T. Knoblauh)** would join Atari (Corporate) as Manager, AIMS (head of educational software acquisition and development) (Atari Connection Winter 1984, page 29). He would be reporting to **Linda S. Gordon** and replacing both:
  - Atari (Home Computer) Manager of Educational Software Products **Sueann Ambron** who had departed the company to Human Engineered Software (HesWare)
  - Atari (Home Computer) National Manager of Educational Marketing **Chris Bowman (Christopher P. Bowman)** who had departed the company to Apple Computer.

May?:

- Marketing consultant **Don Thorson** – formerly of Atari (Consumer) from 1977-1981 – would return to the company as Atari (Home Computer) Director of Hardware Marketing, reporting to SVP Marketing and Software Engineering **Jeffrey A. Heimbuck**. **Don Thorson** would replace **Mark A. Lutvak** who departed the company to Durango Systems,
- **Andrew Soderberg** – formerly a Software Product Manager – would become Product Manager for Atari XL computers, reporting to **Don Thorson**.

May?:

- **Steven H. Gerber** – previously Atari (Home Computer) Director of Software Product Acquisition – joined Atari International (UK) Inc. as Director of the Software Development Centre. He would assume the role from Software Manager **John Peeke-Vout** who would join Atari (Home Computer) as Director of External Software Development, replacing **Steven H. Gerber** in the role,
- Atari's two regional software-acquisition centers (at the APX headquarters at 155 Moffett Park Dr., Sunnyvale, California and at 57 John F. Kennedy St., Cambridge, Massachusetts) would be shut down.

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May?: Robert D. Cory – previously of the Boston Consulting Group and before that, the Standard Research Institute – would join Atari (Home Computer) as Director of Computer Business Development, in part replacing VP Product Development and Business Planning Peter N. Rosenthal who departed the company to DesignWare, Inc.

May?:

- Atari (Home Computer) group product manager – until recently, Manager, direct marketing, including Atari Connection magazine – Sally Bowman departed the company to DesignWare, Inc.,
- Ted Richards remained Editor of Atari Connection magazine.

May: Atari discontinued production of the Atari 400 – both at 1173 Borregas Avenue, Sunnyvale, California and at Atari's plant in Hong Kong.
Atari also discontinued domestic production of the Atari 800, and Atari's plant at 1173 Borregas Avenue would be repurposed. Atari 800 production would commence (continue?) at the Hong Kong plant, for the short-term.

May: Atari discontinued domestic production of the Atari 1200XL (1215 Borregas Avenue, Sunnyvale, California).
Atari 1200XL production would continue by Atari Taiwan Manufacturing Corp. (ATMC).

May?: Production of the Atari 1050 Floppy Disk Drive commenced in Singapore by Atari-PCI Enterprises Pte. Ltd.

May: Atari shipped: E.T. Phone Home! (Video Game Update)

May 15-20: At the 24th Annual Conference of the Australian College of Education held in Sydney, Australia, Atari International marketing manager for computer software Nancy Garrison revealed that the Atari 1200XL would not be released in Australia. Rather, a new range of more powerful machines was to debut at the upcoming (June) Consumer Electronics Show (CES) in the US. (Sydney Morning Herald 30-May-1983)

May 18-September 12: In Paris, France, at the Forum of the Pompidou Centre, the "Au temps de l'espace" (In Space Time) exhibit by the "Centre de Creation Industrielle" (CCI; Industrial Creation Center) included components (including Atari 800 and software) from the ongoing TEME (Totally Enclosed Modular Environment) project in human ecology at Greenfield Community College, Massachusetts, with financial support from Atari via the Atari Institute for Educational Action Research.

485,270 would visit the exhibit over 85 days. (Antic vol. 2 no. 6)

May 20: Atari launched Atari International (Italy) Inc. with a press conference held at the Hotel Principe di Savoia in Milan, Italy. The new subsidiary would replace Italian Atari computer distributor Adveico.

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June 1?: Atari released the Atari Program Exchange (APX) Product Catalog Summer Edition 1983, introducing:

- Bootleg
- Can't Quit
- Circuit Lab
- Dandy
- Drawit
- Ennumereight
- Home Inventory
- Home Loan Analysis
- Morsecode Master
- Piano Tuner
- Punctuation Put-on
- Smasher
- Strategic Financial Ratio Analysis
- The Bean Machine
- Three R Math Home System
- Video Kaleidoscope
- Wordgo

APX also introduced the 48 KiB RAM Expansion Kit (for the Atari 400 computer, 8 KiB or 16 KiB versions).

J. Fred Thorlin was APX Director; Product Review Manager: Jack Perron.

June 1: Atari announced the consolidation of its Consumer Products Group (Consumer and Atari International divisions) and Home Computer division into three new business units:
1. Atari Products Co. – domestic and international marketing and engineering,
2. Atari Sales & Distribution Co.,
3. Atari Manufacturing Co.

Three new business units to be managed by:

- John C. Cavalier – previously Home Computer division president – would be President of Atari Products Co.,
- Donald D. Kingsborough – previously Consumer division EVP Sales & Marketing – would be President of Atari Sales & Distribution Co.,
- Paul Malloy – previously Consumer division SVP Operations – would be President of Atari Manufacturing Co.

John C. Cavalier, Donald D. Kingsborough, and Paul Malloy would each report to Atari chairman and CEO Ray Kassar (Raymond E. Kassar).
(New York Times 2nd-Jun-1983, page D5, Wall Street Journal 2nd-Jun-1983, page 20)

Reports to John C. Cavalier would include:

- Jeffrey A. Heimbuck – SVP Domestic & International Marketing and Engineering, except Entertainment Software Marketing,
- Dave Ruckert – SVP Entertainment Software Marketing.

Reports to Jeffrey A. Heimbuck would include:

- Don Thorson – Director of Computer Hardware Marketing,
- Fred Simon – VP Software: Marketing and Engineering of home applications and children's software for Atari home computers and game systems, previously: VP of the Software division of Walt Disney Telecommunications and Non-Theatrical Company,
- John Constantine – VP International Marketing,
- Michel Ebertin – VP Engineering,
- Dave Stubben (David R. Stubben) – VP Advanced Engineering.

Reports to Dave Ruckert would include:

- West Shell III – Director of Computer Game Marketing – previously: a Product Director at Johnson & Johnson. (The Art of Atari, page 313 for date)

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Reports to **Fred Simon** would include:
- **Colette Weil** – Director, Marketing, Home Applications and Children's Software – previously: Director, Corporate Market and Consumer Research,
- **J. Fred Thorlin** – Director, APX,
- **John Peeke-Vout** – Director, External Software Development.

The new Advanced Engineering unit would inherit the "Shakti" / "25601"/ Atari 1600 Computer Project.

Reports to **Donald D. Kingsborough** would include:
- **Keith E. Schaefer** – SVP Computer Sales,
- **Anthony Bruehl (Anton Bruehl)** – EVP International Sales,
- **Conrad C. Jutson** – VP Planning.

Also, to be noted:
- **Alfred L. Moye** remained National Educational Sales Manager (head of AtariEd),
- **Craig A. Conway** – previously Atari (Home Computer) National Account Manager – departed the company to Digital Research.

Atari would establish an Advanced Games Group, game development for coin arcades, home computers, and home video game systems), to be directed by **Chris J. Horseman** – previously: Home Computer division VP Software Engineering.

Bill Carris (William Carris) – previously Atari (Home Computer) Director of Software Marketing, reporting to **Jeffrey A. Heimbuck** – transferred to Atari (Coin-Op) in Marketing / Special Projects (Atari Adventure concept?).

June 5-8: At the Summer Consumer Electronics Show (CES) held at McCormick Place in Chicago, Illinois.

On Sunday night, June 5, Atari hosted a nearby reception for customers at The First Chicago Center, One First National Plaza.

During the show, Atari introduced the following Home Computers:
- 600XL ($199; to ship in July),
- 800XL (price to be announced; August),
- 1400XL (price to be announced; September; never shipped),
- 1450XLD (price to be announced; October; never shipped) with DOS III (later: DOS 3).

The Atari 1050 Floppy Disk Drive, currently shipping with DOS 2.0S, was to ship with DOS III by the end of summer.

Atari also introduced:
- 1027 Printer,
- 1030 Modem (fall) with ModemLink.

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Three computer expansion devices were introduced (each due in the fall):
1. CP/M Module with CP/M 2.2 (never shipped),
2. Atari Expansion Box (later: Atari 1090 XL Expansion System; never shipped),
3. 64K Memory Module (for the 600XL; would ship as: Atari 64K Memory Module (1064)).
(Press Release)

Atari also featured:
- 1020 Printer/Plotter,
- 1025 Printer.

Accessories introduced:
- Touch Tablet (CX77; fall) with graphics tablet cassette program
  (would ship as: AtariArtist on cartridge),
- Trak-Ball (CX80; fall),
- Light Pen (CX75).

Atari announced for future introduction:
- Superjoystick / Ultimate Joystick (CX60; never introduced).

The 2600 Remote Control Wireless Joysticks (CX42) package was to be updated for marketing for Atari Home Computers (package never updated).

Atari also featured:
- Numerical Keypad (CX85).

Atari announced three All-In-One-Pak kits (each due in the fall):
1. The Writing System (would ship as: AtariWriter System),
2. The Programming System (never shipped),
3. The Entertainment System (never shipped).

Five Add-A-Pak kits were featured or announced:
1. The Communicator II (July; the 835 Modem was no longer promised to ship separately),
2. The Atari Accountant – new name for The Bookkeeper kit
   (never shipped under the new name),
3. The Home Manager,
4. The Arcade Champ (August),
5. The BASIC Tutor I (August).

Software introduced:
- Tennis,
- Soccer (never shipped),
- Football,
- Pole Position (by Namco),
- Joust (by Williams Electronics),

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- Donkey Kong Jr. (by Nintendo),
- Ms. Pac-Man (by Namco),
- Pengo (by Sega Enterprises),
- Robotron: 2084 (by Williams Electronics),
- AtariMusic II: Major Scales and Keys.

Atari announced/previewed:
- The Mysteries of Wonderland (Disney; never shipped),
- Peter Pan's Daring Escape (Roklan for Walt Disney Productions; never shipped).

Software announced/simulated:
- Battlezone (title would be shipped by Atari Corporation in 1988),
- Tempest (never shipped),
- Xevious (by Namco; never shipped).

Atari again promised:
- AtariMusic I,
- TeleLink II (again promised apart from The Communicator II kit),
- Superman III,
- Atari Logo.

No longer promised: Star Trux.

Atari also introduced **Alan Alda** as spokesperson for Atari computers, in an arrangement to extend for the next 5 years.
(hear: https://archive.org/details/alan-alda-atari-ces-1983)
(Current Notes Jul-1983, pages 3-7; Analog #13)

Atari Instructional Material Service (AIMS) courseware titles to be released fourth quarter 1983 included:
- A multi-program Trigonometry and Algebra course from CONDUIT (University of Iowa),
- Atari Sentences,
- Math Arcademics (Arcademic Skill Builders by DLM).

Previewed at the show: AtariLab (previously: ScienceLab) series (by Dickinson College), including AtariLab Starter Set with Temperature Module (September); Future modules:
- Biofeedback,
- Lie Detector,
- Light,
- Mechanics,
- Timekeeper.

(Analog #13, page 36; see also InfoWorld 4-Jul-1983, page 13)

June 6-8: Atari demonstrated the AtariLab series at NECC/5, the National Educational Computing Conference 1983, held at Towson State University, Baltimore, Maryland. (InfoWorld 10-Oct-1983, page 28)

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June 9-14: At the 17th International Exhibition of Music, High Fidelity, Video and Consumer Electronics (SIM-Hi.Fi - IVES '83) in Milan, Italy, Atari International (Italy) Inc. introduced the Atari 600XL, 800XL, and 1450XLD to Italy. Estimated pricing: 500.000 ITL, 750.000 - 1 million ITL, and 2.9 - 3 million ITL, respectively.

Also featured/promised: 1010, 1050, 1020, 1027, CP/M Module, Touch Tablet (CX77), Light Pen (CX75), Remote Control Wireless Joysticks (CX42), Track-Ball, Expansion Box, and much software. (MC microcomputer #21, pages 14-16)

June 11-Sept 10: Expanding upon the Atari computer classroom concept already offered in at least eight other Club Med locations, "Club Med-Atari Village" was featured at Club Med Punta Cana, Dominican Republic. (Les Villages Apr-1983 vol. 3 no. 1)
The Atari Village included custom hardware and software developed at the Atari L.A. Lab.

June: The total installed base of Atari 400, Atari 800 & Atari 1200XL Computers was estimated by Future Computing, Inc. to be about 950,000.

June?: Atari discontinued production of the Atari 800 (late production units made at Atari's plant in Hong Kong).

June?: Atari shipped:
- 1020 Printer/Plotter ($299),
- 1025 Printer ($549),
- 1050 Floppy Disk Drive (with DOS 2.0S)

June: Atari shipped: Dig Dug, Donkey Kong (Video Game Update)

June 27: Opening of the first Atari Center, a retail computer training center concept, at The Oaks Shopping Center in Cupertino, California, with **Sara Armstrong** – Director of the Terra Nuova Montessori School in Hayward, California – hired as the location's manager.

For the Atari Center program: operations were the responsibility of the Picodyne Corporation (**Dean Brown**, President; **Alan O'Neill**, contract manager, Atari Center program) with funding and advertising by Atari. (InfoWorld 5-Sep-1983, pages 14-15)

June 30: Opening of the Atari Adventure Center at Caesars Palace in Las Vegas, Nevada, featuring 60 coin videogames from Atari and other manufacturers, as well as displays of Atari Home Computers, peripherals and software. (Hollywood Reporter 1st-Jul-1983, page 7)

July 2: An Atari Center – the second location; the first had opened 27-Jun-1983 in Cupertino, California – was opened at the corner of Fifth Ave. and 48th St. in Manhattan, New York, New York. Educator **Seth Greenberg** would be the location's manager.
(InfoWorld 5-Sep-1983, pages 14-15)

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July 7:

- Warner Communications Inc. (WCI) announced that **Ray Kassar (Raymond E. Kassar)** had resigned as Atari Chairman and CEO, and that his replacement would be **James J. Morgan**, currently EVP Marketing for US cigarette operations at Philip Morris Inc. **James J. Morgan** was expected to begin at Atari on September 6.
- **Manny Gerard (Emanuel Gerard)**, Warner Communications Inc. (WCI) office of the President and co-COO, a Director, and responsible for Atari, would serve as Atari interim CEO until **James J. Morgan**'s arrival.
- **Ray Kassar (Raymond E. Kassar)** was to remain a consultant to Warner Communications Inc. (WCI).

July: Production of the Atari 1200XL computer ended (later units made by Atari Taiwan Manufacturing Corp.).

July: **Peter H. Friedman** joined Atari Products Co. as product marketing manager for the "Shakti" or "25601" project. The new computer would be planned for introduction as the Atari 1600 (never introduced).

July 20: **Linda S. Gordon** remained Atari VP Special Projects. (Wall Street Journal)

Summer?: Atari planned to release 11 new peripherals for Atari XL Home Computers by the end of the year (including the Expansion Box).

Summer: Second year of Atari Computer Camps, held at 7 locations:

1. Camp Atari – New England
   (**Jerome Singer**, Director) at the Stoneleigh-Burnham School in Greenfield, Massachusetts,
2. Camp Atari – Poconos
   (**Robert Werner**, Director; **Cyndi Heller**, Computer Director; **Steve Mandl**, Assistant Director) at East Stroudsburg State College in Pennsylvania,
3. Camp Atari – Chesapeake
   (**Leonard Fagen**, Director) at the Oldfields School in Glencoe, Maryland,
4. Camp Atari – Smokey Mountains
   (**Jeffrey Wolfe**, Director) at the University of North Carolina at Asheville, North Carolina,
5. Camp Atari – Midwest
   (**William Merriman**, Director; **Laurie D. Edwards**, Computer Director) at the Shattuck School in Faribault, Minnesota,
6. Camp Atari – Old West
   (**Marlene Applebaum** & **Don Applebaum**, Directors) at the Athenian School in Danville California,
7. Camp Atari – Pacific
   (**Marianne Kravitz** & **William Kravitz**, Directors) at the University of San Diego in California.

Summer: At Atari International (UK) Inc., **Jon Dean** had been promoted to Head of the Product Support group, reporting to Atari Service Centre head **George West**, replacing **Shamus Kelly** who had departed the company.

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August 3: In the UK, Atari was donating more than 100 Atari 800 systems for 40 one-week day camps held in Kentish Town, Greenwich, Edmonton, Westminster, Haringey, Leytonstone, and the docklands. The original idea came from the national charity Inter-Action Trust. (Personal Computer News 3rd-Aug-1983, page 5)

August 5: Date of revision of the internal Atari document, "Atari 25601 Hardware Technical Specifications" – project also known as "Shakti" or "25601" and planned for introduction as the Atari 1600 (never introduced).

August: Atari launched the Atari 600XL PAL version (for Europe, except France) in West Germany.

Also promoted:
- 1010,
- 1020,
- 1025,
- 1027 (Nov),
- 1050 (Oct; DOS III due winter 1984),
- 1060 CP/M Module,
- 1064 Memory Module (Oct),
- Joysticks (CX40),
- Numerical Keypad (CX85),
- Super Controller (CX24; Oct),
- Touch Tablet (CX77; Nov),
- Trak-Ball (CX80; Dec).

New software promised:
- Donkey Kong Jr. (Oct),
- Fussball (Soccer; Nov; never shipped),
- Pengo (Oct),
- Pole Position (Oct),
- Robotron (Oct),
- Superman III (Oct; never shipped).

August: Atari shipped Atari Logo. (Logo Computer Systems, Inc. of Montreal Press Release 12-Dec-1983)

August:
- Atari Products Co. Product Marketing Manager for XL Computers **Andrew Soderberg** departed the company to ViMart,
- **Don Thorson** remained Director of Computer Hardware Marketing,
- **Sherwin Gooch** – previously Atari Products Co. manager, Telecommunications Products Group – was promoted to Atari Products Co. manager, Applications Software and Telecommunications Products Group, assuming the role of **Ken (Charles) Balthaser** who had departed the company to Mindset,
- **Fred Simon** remained VP Software,
- **Keith E. Schaefer** – previously Atari Sales & Distribution Co. SVP Computer Sales – was promoted to EVP Sales,

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- Donald D. Kingsborough remained president of Atari Sales & Distribution Co,
- Stephen M. Race – previously Atari Products Co. International Hardware Product Manager (computers and accessories) – would be promoted to Director of Marketing,
- John Constantine remained Atari Products Co. VP International Marketing.

August 17: Atari announced it had been named the official Home Computer of the 1984 Olympic Games.

August/September?: Atari released an updated Atari Computer Educational Software Directory (reprint of the Jan-1983 edition with updated cover pages). New titles available through AtariEd (Atari educational sales) were to include:

- Alien Addition (Arcademic Skill Builders by DLM),
- Atari LOGO in the Classroom: A Teacher's Manual (book by Donna Bearden, would be published by Reston in 1984),
- Atari Sentences (never shipped?),
- Atari/PLATO (would be shipped by Atari, Corp. in 1986 as: The Learning Phone),
- AtariLab Curriculum Modules (never shipped),
- AtariLab Light Module (would be shipped by Atari, Corp. in 1985),
- AtariLab Starter Set,
- CONDUIT Algebra Part I & II (never shipped?),
- CONDUIT Trig Part I & II (never shipped?),
- Concentration,
- Demolition Division (Arcademic Skill Builders by DLM),
- Denver Pascal (never shipped),
- Department of Defense Dependent Schools Student Scheduling Program (never shipped),
- Division Drill (School and Home CourseWare),
- Geoterms Part I & II (Marc Ed, Inc.; never shipped?),
- Green Globs & Other Trig Diversions (never shipped?),
- Math Facts and Games (never shipped?),
- Math Mysteries (never shipped?),
- Meteor Multiplication (Arcademic Skill Builders by DLM; never shipped?),
- Peter and the Wolf (never shipped?).

September 1?: Atari released the Atari Program Exchange (APX) Product Catalog Fall Edition 1983, introducing:

- Advanced Fingerspelling
- AtariWriter Printer Drivers
- Atspeller REV. 2
- Cartoonist
- Color Alignment Generator
- Eastern Front (1941) Scenario Editor
- Eastern Front Scenarios 1942/1943/1944
- Excalibur
- Ion Roadway
- Kangaroo (GCC; by Sun Electronics)
- Mathlib for Deep Blue C
- Moon Marauder
- Musical Pilot
- Puzzler
- Ringmaster
- Saratoga
- Space War
- Spelling Genie REV. 2.0

J. Fred Thorlin was APX Director; Product Review Manager: Jack Perron.

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September 6: James J. Morgan arrived at Atari as Chairman & CEO, replacing the departed Ray Kassar (Raymond E. Kassar). (InfoWorld 1st-Aug-1983, page 3)

September 12: Atari had re-established a separate division, Atari Products International, to assume international sales and marketing of consumer products from the Atari Sales & Distribution Co. and Atari Products Co. business units.

- Jeffrey A. Heimbuck – previously Atari Products Co. SVP Domestic and International Marketing and Engineering – would remain Atari Products Co. SVP Marketing and Engineering,
- Anthony Bruehl (Anton Bruehl) – previously Atari Sales & Distribution Co. EVP International Sales – would be president of Atari Products International,
- John Constantine – previously Atari Products Co. VP International Marketing, reporting to Jeffrey A. Heimbuck – would be Atari Products International VP Sales Administration and Distribution, based in New York, reporting to Anthony Bruehl (Anton Bruehl).

Atari Products International had named:

- Christopher P. Deering – previously of Gillette Europe, based in London (see RCA/Columbia Press release 5-Apr-1985) – as VP Marketing (Marketing and Product Management), essentially replacing John Constantine in the role,
- Jack Beuttell (John C. Beuttell) as VP sales for Canada, Africa, Central/South America, the Middle East and parts of Europe,
- Steven T. Henick as VP Sales for Asia and the Pacific region,
- Dumas Simeus (Dumarsais M. Simeus) as VP New Business Development – previously: division VP strategic planning.

(Wall Street Journal, 12-Sep-1983, page 48)

September:

- Linda S. Gordon – previously Atari (Corporate) VP Special Projects – would be (Corporate) SVP Education (Education Group), remaining responsible for educational software acquisition and development (Atari Instructional Material Service, AIMS), Atari Computer Camps, and the Atari Club Med project, while additionally assuming responsibility for educational sales (AtariEd) and the Atari Institute for Educational Action Research,
- AIMS and AtariEd would be combined as Atari Learning Systems, with operations at 1399 Moffett Park Dr, Sunnyvale, California,
- Alfred L. Moye – previously National Educational Sales Manager – would become Director of the Atari Institute for Education Research, replacing Ted M. Kahn who had departed the company to Picodyne,
- Bob Hall (Robert D. Hall) would become Director of Educational division Sales, replacing Alfred L. Moye in the role. (Scientific American Jan-1984, page C6),
- Mike Knoblauh (Michael T. Knoblauh) – previously manager of AIMS – would be Director of Educational division Marketing.

September: Atari Consumer Product Service (CPS) shut down the Regional Service Centers at 2109 E Division, Arlington, Texas and at 5400 Newport Dr Ste 1, Rolling Meadows, Illinois, leaving two remaining: 1312 Crossman Ave, Sunnyvale, California (also home to Customer Relations) and 12 B World's Fair Dr, Somerset, New Jersey.

September: In the Netherlands, Wilfried de Graaf (W. L. de Graaf) joined Atari International (Benelux) B.V. as sales manager (Home Computers).

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September 17-25: Atari International (UK) Inc. launched the XL Home Computer product line (Atari 600XL, 800XL, 1010, 1050, 1025, 1020, 1027, Touch Tablet (CX77), Trak-Ball (CX80), Super Controller (CX24), Atari 64K Memory Module (1064); previewed: CP/M Module, Expansion Box) and software line in the UK, and introduced The Lone Raider, at the Great Home Entertainment Spectacular, Olympia, London, UK.

September 22: Atari, Inc. and General Foods announced a multi-million-dollar promotion called Catch-On-To-Computers. Computer tutorials would run in 10 cities nationwide during October, November and December, starting in Washington D.C. and San Francisco, California on Oct. 5th with a 10-day Catch-On-To-Computers Learning Festival.

On subsequent days similar programs would be conducted in Los Angeles, Denver, Chicago, Houston, New Orleans, Atlanta, St. Louis, and Newark – New Jersey.

At each stop on the tour computer training experts would present 80 hours of free tutorials especially designed for Catch-On-To-Computers by the People's Computer Co., a non-profit company.

In addition, weekend open houses were scheduled to provide family members and any interested individuals the opportunity to operate the computers under supervision. Aside from the classes, Atari and Post Cereals would offer schools and other membership organizations the opportunity to exchange a specified number of Post Cereals proof-of-purchase box tops for a wide range of Atari equipment, expansion devices and a wide selection of educational software.

The year-long national program would kick off Sept. 30th with a mailing of catalogs to more than 91,000 schools. A simultaneous direct mailing to 41 million homes – approximately half of all US households – would announce the promotion to consumers and identify the participating Post brands and Atari products.

Linda S. Gordon was SVP Atari education group. (Press Release).

September 23: The two Atari Center locations (Cupertino, California and New York, New York) both closed at the end of the 90-day trial period for the program. (InfoWorld 24-Oct-1983, page 16).

September 28-October 2: Atari featured the XL range of Home Computers (Atari 600XL / Atari 800XL) and products, including the new Touch Tablet (CX77) and Light Pen (CX75), at the 6th Personal Computer World (PCW) show, Barbican Centre, London, UK.

October 3-7: At the first ever VidCom-MIJID held at the Palais de la Croisette in Cannes, France, P.E.C.F. Atari previewed the 600XL. (L'Atarien #1)

October 7:

- **John C. Cavalier**, President of Atari Products Co. – Consumer products Marketing and Engineering – departed the company to Apple Computer. (New York Times 11-Oct-1983),

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October 10:

- Atari Products Co. SVP Marketing and Engineering **Jeffrey A. Heimbuck** had departed the company to Koala Technologies Corp.,
- Atari (Coin-Op) President **John Farrand** would additionally assume responsibility for all consumer products engineering,
- **Michel Ebertin** – previously Atari Products Co. VP Engineering – and **Dave Stubben (David R. Stubben)** – previously Atari Products Co. VP Advanced Engineering – would both now report to **John Farrand**.
- Atari announced the appointment of **Dave Ruckert**, previously Atari Products Co. SVP Entertainment Software Marketing – reporting to departed division president **John C. Cavalier**, as SVP (probable actual title: EVP) of Atari Products Management, the marketing arm for home computers and video games (head of the division). He would be reporting directly to Atari chairman and CEO **James J. Morgan**,
- **Fred Simon** – previously: VP Software, reporting to **Jeffrey A. Heimbuck** – was named SVP Computer Marketing, responsible for the marketing of computer hardware and software,
- **Philip C. Restaino** – previously: Director of Game Hardware Marketing – was named VP of Games Marketing, in charge of marketing game hardware and game software used on Atari hardware,
- **Fred Simon**, **Philip C. Restaino**, and **Linda S. Gordon** – who remained SVP Education – would each report to **Dave Ruckert**.

(Press Release)

John Peeke-Vout – previously Director of External Software Development, reporting to **Fred Simon** – had become VP Software Marketing (home applications and children's software), still reporting to **Fred Simon**. He would replace **Colette Weil** who had departed the company to CompuFill Corporation, the subsidiary of McKesson Corporation.

Other reports to **Fred Simon** included:

- **J. Fred Thorlin** – APX,
- **Don Thorson** – Hardware,
- **Martin H. Hummel III** – Computer Advertising; previously Doyle Dane Bernbach VP and Account Supervisor with clients including Atari.

Reports to **Philip C. Restaino** included **West Shell III** – Games for Atari computers.

Steve Calfee – previously Atari (Coin-Op) Director, Electrical Engineering and Software – would be Atari Vice President, Game design (both Coin-Op and Consumer), assuming Atari Computer Game Engineering from **Fred Simon**; reporting to **John Farrand**.

Atari Products Co. manager, Applications Software and Telecommunications Products Group **Sherwin Gooch** would now report to **Michel Ebertin**; previously: to **Fred Simon**.

October 12: The Washington Post reported (12-Oct-1983, page D11) on Atari's plans to introduce an IBM-compatible personal computer at the January 1984 CES. The new computer nearing introduction would be both IBM PC and Atari XL compatible, was known inside Atari as "Shakti" or "25601", and was expected to be introduced as the Atari 1600 (never introduced).

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October: Atari published Review: A Catalog of Atari Learning Systems.
New titles were to include:

- Alligator Mix (Arcademic Skill Builders by DLM),
- Atari Pascal (Version 2.0) (previously: Denver Pascal; to ship Jan. '84; never shipped),
- Atari Super PILOT (previously: PILOT II; to ship April '84; never shipped),
- Basic Arithmetic (by MECC),
- Counting (by MECC),
- Create a Rondo (never shipped),
- Dragon Mix (Arcademic Skill Builders by DLM),
- Earth Science (by MECC; previously released by APX),
- Elementary Biology (by MECC; previously released by APX),
- Expeditions (by MECC),
- Geography (by MECC; previously released by APX),
- Graphing (by MECC),
- Instructional Computing Demonstration (previously released by APX),
- Metric & Problem Solving (by MECC; previously released by APX),
- Minus Mission (Arcademic Skill Builders by DLM),
- Music I (Terms & Notations) (by MECC; previously released by APX),
- Music II (Rhythm & Pitch) (by MECC; previously released by APX),
- Music III (Scales & Chords) (by MECC; previously released by APX),
- Name Rondo (never shipped),
- Phone Home (never shipped),
- Player Maker,
- Pre-Reading (by MECC),
- Prefixes (by MECC; previously released by APX),
- Screen Maker,
- Secret Formula advanced (by Mind Movers),
- Secret Formula elementary (by Mind Movers),
- Secret Formula intermediate (by Mind Movers),
- Spelling Bee (by MECC),
- Spelling in Context 1 to 8,
- The Market Place (by MECC; previously released by APX),
- US Geography check marc (by Marc Ed, Inc.),
- US Geography high marc (by Marc Ed, Inc.),
- Word Games (by MECC).

Atari announced:

- AtariLab Biofeedback, Timekeeper, Lie Detector, and Mechanics modules (all never shipped),
- AtariWriter Curriculum Guide (never shipped),
- Swarthmore Trig (never shipped).

Atari again promised for future release: AtariLab Curriculum Modules: Temperature and Light, CONDUIT Algebra, Green Globs and Other Trig Diversions.

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October: Atari re-released the Pro-Line Trak-Ball Controller (CX22; final version including trackball mode) (Video Game Update Nov-1983), supplanting the unshipped CX80 for Atari's domestic computer product line.

October?: Internationally (not domestically), Atari shipped the Super Controller (CX24).

October: The Atari Consumer Product Service (CPS) Regional Service Center at 12 B World's Fair Dr, Somerset, New Jersey would transition to using the new address: 22 B World's Fair Dr, Somerset, New Jersey.

October: Atari Consumer Product Service (CPS) Technical Support (**John H. Hahn**, Director) operations were moved from 845 W Maude Ave, Sunnyvale, California to 1272 Borregas Avenue, Sunnyvale, California, which would also remain home to CPS headquarters and CPS materials & parts distribution.

October?: Atari's Advanced Engineering group – **Dave Stubben (David R. Stubben)**, VP Advanced Engineering – discontinued the Atari 1600 Computer Project (formerly: "Shakti" or "25601").

October: Premier issue #0 of L'Atarien magazine, the official magazine of the Atari Club in France, published by Rive Ouest - Cato Johnson France on behalf of P.E.C.F. Atari.

October: "Atari still had not brought out any of its new XL line by mid-October." (Compute! magazine #43, Dec-1983, page 32)

October 21: Atari said that it was delaying the making and marketing of its two higher-priced computer models, the Atari 1400XL and 1450XLD. The machines would not ship until late December, after the Christmas selling season, and then only in limited quantities. (Wall Street Journal 24-Oct-1983, page 5)

October 21-23: TariCon '83, "The world's first Atari-only computer convention," was scheduled by MACE, Michigan Atari Computer Enthusiasts, at the Southfield Civic Center Pavillion, Southfield, Michigan. The even did not come together as planned, but TariCon '84 was successfully held August 1984.

October 24: Report that plans at Atari to introduced a new computer model, the Atari 1600, had recently been canceled by Atari CEO **James J. Morgan**. (Wall Street Journal 24-Oct-1983, page 5)

October/November: Atari shipped the Atari 600XL NTSC version for North America ($199) (The Globe and Mail, Canada, 23-Dec-1983) and the Atari 600XL UK version (£159.99) (Page 6 #7, page 6).

Fall: Atari shipped The Communicator II kit – with the new 835 modem – for $279.95 and the 1027 printer.

Fall: An Atari TV ad promoted the Atari 400 (16 KiB RAM) for $69.95 after $50 Atari rebate, indicating a new/final list price of $119.95 (previously: $299).
http://www.atarimania.com/videos/atari-400-commercial-50-usd-rebate.flv

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November 2: Report that Atari announced that because of production snags in Hong Kong, it would be able to fill only 60% of its Christmas orders for the Atari 600XL and the Atari 800XL.

Atari also reiterated that it would ship the Atari 1400XL and 1450XLD in limited quantities in late December and more widely after the first of the year. (Wall Street Journal 2nd-Nov-1983, page 2)

November 4: Premiere of the Warner Bros. feature film, "Deal of the Century", which included a fighter plane cockpit monitor where the display was driven by a real (off-screen) Atari 800, software by Atari's Los Angeles Lab (L.A. Lab, Atari Corporate Research).

November 9: Atari said it would raise the prices of its home computers and video game consoles by between 17 percent and 29 percent, effective Jan. 1, 1984.
The increases would raise the dealer price on the Atari 600XL to $180, from $140.
The dealer price of the Atari 800XL would rise to $280, from $240.
Atari also said it would raise prices of its Atari 1027 Printer and 1050 Floppy Disk Drive by about $15 each.

November: Atari Engineering Manager of VLSI Development **Richard C. Pasco** departed the company to IBM Research – Almaden.

November 19: Grand opening of the first Atari (Coin-Op) Atari Adventure family entertainment center at the Northwest Plaza shopping center located in St. Ann (suburban St. Louis), Missouri. The concept combined a video game room (65 games), a new video game technology display area, and a hands-on computer learning center featuring 8 Atari XL computer stations (publicity photos: Atari 1200XLs; media reports: Atari 800XLs) staffed by a full-time instructor – **Kent Wilke** – to provide regular computer literacy classes.
(Creative Computing vol. 7 no. 11; Press Release 1st page see Fun!, page 757; Cash Box 12-Nov-1983, page 32; Cash Box 19-Nov-1983, page 32; Cash Box 26-Nov-1983, page 32; Play Meter 1st-Feb-1984, pages 32-33)

November 22: **John J. Cardozo** had become Acting Manager, Product Review, APX, replacing **Jack Perron** who departed the company.

November/December:

- **Michel Ebertin** – previously Atari VP Consumer Engineering – would remain VP Enginering Consumer Division, still reporting to Atari (Coin-Op) president **John Farrand**,
- **Steve Bristow (Stephen D. Bristow)** – previously VP Engineering, AtariTel Division – became Atari VP Engineering Computer Division, assuming the role from **Michel Ebertin** and reporting to **John Farrand**,
- **Steve Bristow (Stephen D. Bristow)** would launch efforts to develop a portable/notebook XL computer, project "Eskimo",
- Atari Products Management Director of Computer Business Development **Robert D. Cory** departed the company to Apple Computer,
- **Ken Wirt (Kenneth R. Wirt)** – previously an Atari Sales Manager – became Atari Products Management VP Computer Marketing, replacing Director of Computer Marketing **Don Thorson** who had departed the company. **Don Thorson** would join Apple Computer in 1984,
- **Fred Simon** remained SVP Computer Marketing,

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- John H. Hahn – previously Director of Technical Support & Publications, Atari Consumer Product Service (CPS) – would become Atari 600XL / Atari 800XL product marketing manager, replacing the departed Andrew Soderberg; reporting to Ken Wirt (Kenneth R. Wirt),
- Bill Carris (William Carris) – previously of Atari (Coin-Op) in marketing/special projects (Atari Adventure concept?) – would become Director of Consumer Engineering Documentation Control, essentially replacing John H. Hahn in the role,
- Joe Miller (Joseph B. Miller III) became Atari Manager, operating systems software, replacing R. Scott Scheiman who had departed the company to The Braegen Corporation.

December 1?: Atari released the Atari Program Exchange (APX) Product Catalog Winter Edition 1983-84, introducing:

- Atspeller for AtariWriter
- Bellum
- Burgers!
- Chambers of Zorp
- Character Fun
- Dog Daze Deluxe
- Dragon Quest or A Twist in the Tail
- Equestrian
- Mastermatch
- National Flags
- Numberland Nightwatch
- Raid on Graviton
- Rush Hour
- Weakon

December 12: Atari LOGO, developed in Quebec by Logo Computer Systems, Inc. of Montreal, Canada (LCSI), had been awarded the Best Microcomputer Software of the Year Award by the Learning Periodicals Group. (Logo Computer Systems, Inc. of Montreal, Canada Press Release)

December 13: In an open letter posted to the Atari SIG on CompuServe addressed to Atari users, Atari Chairman and CEO James J. Morgan described the Atari he had inherited as being "in way over its head with a computer product line as inclusive as the Atari 600XL, 800XL, 1400XL, 1450XLD, and 1600."

December: Atari shipped initial small quantities of the Atari 800XL NTSC version for North America ($299) (newspaper ads and Current Notes Jan-1984, page 6 for timing). Atari 800XL production would ramp up dramatically in Winter 1984.

December?: Internationally (not domestically), Atari shipped the Trak-Ball controller (CX80).

December: For Atari Home Computers Atari shipped: Jungle Hunt, Robotron: 2084 (original "large box" version with dual cartridge holder) (Video Game Update; 1st-Jan-1984 Price list)

December?:

- Dorothy K. Deringer – previously a program officer at the US National Science Foundation (NSF) – joined Atari Learning Systems as VP Product Development, assuming the role from Mike Knoblauh (Michael T. Knoblauh), who would remain Director of Marketing,
- Vincent H. Wu – previously in software development – would be in education software development, reporting to Dorothy K. Deringer,
- Leslie Wolf – previously in software development – would become an educational software product marketing manager, reporting to Mike Knoblauh (Michael T. Knoblauh),
- Mark O. McCrackin remained an educational software product marketing manager, reporting to Mike Knoblauh (Michael T. Knoblauh) as well,
- Linda S. Gordon remained Atari Products Management SVP Education.

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December 20: An Atari budget meeting projected future Atari computer introductions including an Atari 800XLD (Atari 800XL with built-in floppy disk drive, using the Atari 1450XLD case design; probable late 1984).
Source: https://tinyurl.com/ycydwudj

"Atari sold about 400,000 units [computers] in December." – Creative Strategies International as quoted in InfoWorld, 6-Feb-1984.

"Atari sold roughly 250,000 of its 800 series computers last year" – Time magazine, 16-Jul-1984

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1984

January 1: In the US, the suggested retail price for the Atari 600XL became $249 (previously: $199); the suggested retail price for the Atari 800XL became $399 (previously: $299).

January 7-10: At the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada, for the Atari 600XL ($249), 800XL ($399), and 1450XLD (unshipped but again shown), Atari introduced the Light Pen (CX75) with AtariGraphics and the Atari 64K Memory Module (1064) for the Atari 600XL.

Again promised:
- The AtariWriter System kit (previously: Writing System),
- The BASIC Tutor I kit,
- The Programming System kit,
- Touch Tablet (CX77).

Atari announced that DOS 3 (previously: DOS III) would be made available for free via Atari Customer Relations, and would also ship with new production Atari 1050 Floppy Disk Drives.

Software introduced:
- Captain Hook's Revenge (previously: Peter Pan's Daring Escape; never shipped),
- Jungle Hunt (by Taito; shipped Dec. 1983),
- Mario Bros. (by Nintendo; April; would be shipped by Atari Corporation in 1988),
- Millipede (March; would be shipped by Atari, Corp. in 1985),
- Moon Patrol (by Williams Electronics; February; would be shipped by Atari, Corp. in 1985),
- The Atari Translator (to ship via APX or Atari Customer Relations),
- Typo Attack (previously released by APX).

Software again promised:
- AtariMusic I,
- AtariMusic II,
- Donkey Kong Jr.,
- Joust,
- Ms. Pac-Man,
- Pengo (February),
- Pole Position,
- RealSports Football,
- TeleLink II (again promised apart from Communicator II kit),
- Tennis,
- The Mysteries of Wonderland.

Atari announced:
- Pop'R Spell (previously released by Milliken; never shipped by Atari),
- Sky Writer (previously released by Milliken; would be shipped by Atari, Corp. in 1985),
- SynCalc by Synapse,
- SynFile+ by Synapse,
- SynTrend by Synapse (consisting of SynGraph and SynStat).

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Atari previewed:
- Crystal Castle (Crystal Castles would be shipped by Atari Corporation in 1989),
- The Legacy (Atari Advanced Games Group; later: Final Legacy; would be shipped by Atari, Corp.).

The Bookkeeper kit was to be renamed The Accountant effective 1st-Apr-1984 (never shipped under the new name).

Finally, Atari Learning Systems promoted:
- Atari Pascal (Version 2.0),
- Atari Super PILOT,
- AtariLab Light Module,
- AtariLab Starter Set with Temperature Module ("ready to ship now"),
- Player Maker,
- Screen Maker.

(1st-Jan-1984 Price list; Analog #17, page 13)

January 14: At the Annual Atari Star Awards Banquet held at 12:30pm at The Westin St. Francis Hotel, Union Square, San Francisco, California, in the City Club located on the 12th floor on the main building, Atari awarded the third annual Atari Star Award and $25,000 to **Mark Reid** for his APX title, Getaway!.
Other Finalists: **James Burton**, **R. Stanley Kistler**, **Gregor Novak**.

Atari Products Management SVP **Fred Simon** announced the winner and APX Director **J. Fred Thorlin** presented the award. (Atari Connection Spring 1984, page 14)

January: Atari Engineering Computer Division engineer **Ajay Chopra** departed the company to Mindset.

January: Atari shipped:
- Tennis,
- Ms. Pac-Man,
- Pole Position,
- Joust.

(Video Game Update; 1st-Jan-1984 Price list)

January: Atari (Coin-Op) opened a second Atari Adventure family entertainment center, at Crestwood Plaza in Crestwood (suburban St. Louis), Missouri, using the same concept as the area's Northwest Plaza Atari Adventure location that had opened 19-Nov-1983.

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January 23:

- James J. Morgan, chairman and CEO Atari, Inc., announced an organizational realignment of the company,
- John Farrand – previously Atari (Coin-Op) President – was named President of Atari, Inc. and President and COO of Atari Products Co. – both newly created positions – and would report to James J. Morgan.
- Steve Calfee was named Atari Products Co. SVP Entertainment Software (Consumer Game Engineering; still reporting to John Farrand). (Press Release)

Atari Products Co. was a new operating division of Atari, comprised of Sales & Marketing, Research & Development, Software Development, Product Engineering and Manufacturing, plus the coin-operated Games unit.

Alan Kay – previously, VP Chief Scientist – and Steve Bristow (Stephen D. Bristow) – previously, Atari Products VP Engineering Computer Division – were named to the newly created, highest ranking technical position in the company: "Atari Fellow".

Dave Stubben (David R. Stubben) – previously, VP Advanced Engineering – would be VP Engineering Computer Division, replacing Steve Bristow (Stephen D. Bristow) in the role.

In addition to John Farrand, reports to James J. Morgan would also include Anthony Bruehl (Anton Bruehl) – President of Atari International, newly renamed from: Atari Products International.

Winter: Atari shipped the Touch Tablet (CX77; with AtariArtist), AtariMusic I, AtariMusic II (1st-Jan-1984 Price list)

January/February:
At Atari Products Co.:

- John H. Hahn – previously Atari 600XL / Atari 800XL Product Marketing Manager – was promoted to Director of Computer Marketing, reporting to SVP Computer Marketing Fred Simon, replacing Ken Wirt (Kenneth R. Wirt) who had departed the company to Cognitive Systems,
- Sherri L. Horowitz was promoted to Atari 600XL / Atari 800XL product marketing manager, replacing the promoted John H. Hahn in the role,
- Thea Cain was promoted to Atari 1450XLD product marketing manager.

February 7: Atari's unannounced plans for introducing an Atari 800XLD later in 1984 had been dropped, while development of the previously-canceled Atari 1450XLD had been resumed.
Phil Suen was Atari 1450XLD project manager.
https://tinyurl.com/4khhvcx7

February?: Atari Learning Systems marketing manager Mark O. McCrackin departed the company.

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February: James R. Evans – previously of Atari operations/product engineering – would become Atari VP Consumer Product Service (CPS), replacing Jon D. Ebbs who had departed the company to Apple Computer. (Business Marketing Mar-1984, page 111)
The CPS Customer Relations unit would transition to being known (again) as Customer Service.

February:
- Atari Fellow Steve Bristow (Stephen D. Bristow) departed the company to Technicom Advanced Design Center (Steve Bristow (Stephen D. Bristow) resume),
- Dave Stubben (David R. Stubben) – previously Atari Products Co. VP Engineering Computer Division – became an Atari Fellow, replacing Steve Bristow (Stephen D. Bristow) in the role. (Dave Stubben (David R. Stubben) resume; Warner Communications Inc. (WCI) Annual Report 1983),
- Michel Ebertin – previously Atari Products VP engineering Consumer Division – would be VP Product Engineering, assuming Computer Division Engineering from Dave Stubben (David R. Stubben).

February: Atari Products Co. Manager, operating systems software Joe Miller (Joseph B. Miller III) departed the company to Koala Technologies Corp.

February: Atari Products Co. software support supervisor (sound and video graphics for internal software development) Doug Chorey (Douglas A. Chorey) departed the company to Tandem Computers.

February: Brad C. Saville – previously Atari Operations Manager for computer products – would become El Paso Plant Manager.

February 16: Phil Suen was Atari Products Co. Atari 1450XLD project manager; Thea Cain (marketing) was product manager. (https://tinyurl.com/4khhvcx7)

March 6: Atari, Inc. was awarded US patent 4,435,779 for 13 claims by inventors Steven T. Mayer, Jay G. Miner, Douglas G. Neubauer, and Joe Decuir (Joseph C. Decuir) regarding their "Data processing system with programmable graphics generator" (the Atari 400 & Atari 800 hardware platform).

March 11-18: At the Festival International du Son et de l'Image, held at the CNIT (Centre des Nouvelles Industries et Technologies) in Paris – La Defense, France, P.E.C.F. Atari launched the Atari 600XL and Atari 800XL in France.

PAL versions were available immediately (Atari 600XL 2,200 FRF / Atari 800XL 3,200 FRF); Atari 600XL SECAM version (2,500 FRF; never shipped) and Atari 800XL SECAM version (3,500 FRF; would be shipped by Atari, Corp. Nov-1984) were due to ship in June 1984.
(L'Atarien #2; L'Ordinateur Individuel #58 Apr-1984, page 81; L'Atarien #4, page 18 for prices)

March?: Atari shipped the Atari 800XL PAL version for UK (£249.99) and Atari 800XL PAL version for Europe.

March: Atari released: Football, Donkey Kong Jr., Pengo (Video Game Update Mar-1984, Apr-1984)

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March: Atari Products Co. applications software and telecommunications products group manager **Sherwin Gooch** was Atari 1450XLD project manager, having recently replaced engineer **Phil Suen** in the role (Creative Computing Jul-1984, page 206).

March 22: **Martin H. Hummel III** – previously Atari Products Co. Director of Computer Advertising – would be promoted to Atari (Corporate) Director of Advertising and Marketing. (Ad Day)

March 22-25: At the 9th West Coast Computer Faire, San Francisco Civic Auditorium and Brooks Hall, San Francisco, California, Atari showed/again promised the Light Pen (CX75), the Plato System cartridge, and many games.

Atari introduced APX Bumpomov's Dogs, while confirming that APX was being discontinued, with the top 20 APX titles to be absorbed into the "main line" of products, and APX Director **J. Fred Thorlin** would depart the company.

A new, final production run of 15,000 Atari 850 Interfaces had just been manufactured.

At Atari:
- **Thea Cain** was Atari 1450XLD Product Manager,
- **David S. Wilson** was Director of Customer Service,
- **Earl Rice** remained Manager, Users' Group Support,
- **Bill Bartlett** remained Manager of Product Support.

March 31: **James J. Morgan**, CEO of Atari, said shipments of his company's home computers in the first three months of this year were 35% lower than in the first quarter of 1983. (The Globe and Mail, Canada, 1st-Jun-1984)

April 2: Programmer **Mike Barall (Michael Barall)** (QDOS developer) joined Atari, where he would direct advanced operating systems development. (Antic Jan-1986, page AC14; source for date?)

April 5: **John Peeke-Vout** was Atari Products Co. VP Software Marketing.
(https://archive.org/details/APX_Programmer_Correspondence)

April 5: Atari Fellow **Alan Kay** departed the company to Apple Computer in the wake of widespread layoffs in the company's research department, including the closing of the Atari Cambridge Research Laboratory – where **Cynthia Solomon** had been Director. (Washington Post 6-Apr-1984; New York Times 3rd-May-1984; InfoWorld 11-Jun-1984)

April?: **Kenneth Ashton** was promoted to Atari Products Co. VP Product Engineering, replacing **Michel Ebertin** who departed the company to Zilog.

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April:
- **Fred Simon** – previously Atari Products Co. SVP of Computer Marketing – would remain VP Computer Hardware and Software Marketing (Electronic News 4-Jun-1984). He would still be reporting to EVP marketing **Dave Ruckert**,
- **West Shell III** – previously Director of Games Marketing for Atari computers, reporting to VP Games Marketing **Philip C. Restaino** – would become Director of Software Marketing (all software for Atari computers). He would be reporting to **Fred Simon**. He would assume home applications and children's software from **John Peeke-Vout** who departed the company to the Electric Power Research Institute (EPRI).

April:
- Director of the Atari Institute for Education Research **Alfred L. Moye** had departed the company to Hewlett-Packard,
- **Linda S. Gordon** remained Atari Products Co. SVP Education, head of the Atari Learning Systems Group.

April 26: Atari Home Computer distributors in Asia – supported regionally by Atari International (Hong Kong) Limited – included:
- Hong Kong: Wong's Kong King Ltd.,
- Singapore: Hin Seng (Pte) Ltd.,
- Malaysia: Perangsang International Sdn Bhd,
- Thailand: Nite Spot Computer System Co Ltd.,
- Indonesia: PT Multipolar Corp.,
- Taiwan: Taipoly-Grerich.

Spring: I/O Issue Five turned out to be the final issue of Input/Output, the magazine of the Atari Home Computer Club (Atari International, UK).

Spring: Atari shipped:
- CX75 Light Pen with AtariGraphics,
- AtariLab Starter Set with Temperature Module,
- SynCalc,
- SynFile+,
- SynTrend,
- Typo Attack.

Spring: Atari released DOS 3, offered through Atari Customer Service, free to those who had purchased Atari 1050 Floppy Disk Drives with DOS 2.0S. (Atari Connection Spring 1984, pages 9, 73).

Spring: Atari shut down the "Computers: Expressway to Tomorrow" traveling multimedia assembly program.

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Spring:
- Jon Dean – previously Head of Product Support, Atari International (UK), reporting to Atari Service Centre head George West – had become an Assistant Software Development Manager. He would be reporting to Development Manager Jon Norledge,
- Steven H. Gerber remained Director,
- Robert Katz had become head of Product Support, Atari International (UK), replacing Jon Dean in the role; reporting to George West.

May 1: "Hearing on Computer Education" held before the Subcommittee on Elementary, Secondary, and Vocational Education of the Committee on Education and Labor, US House of Representatives, included testimony by Atari Learning Systems VP Dorothy K. Deringer.

May 8: At 10:30am, at the Lucasfilm Ranch in Marin County California, as Atari/Lucasfilm, Lucasfilm Ltd. and Atari Inc. introduced Ballblazer and Rescue on Fractalus!, both developed by the Games Group at Lucasfilm's Computer division and to be marketed by Atari, to be available 3rd quarter (summer) 1984 on cartridge in versions for Atari Home Computers.
(Atari Press Release; Lucasfilm Press Release)

For Atari: Joel Oberman was Director of Games Marketing; Dave Ruckert was EVP Marketing. (InfoWorld 4-Jun-1984, page 12; United Press International 8-May-1984 and 9-May-1984; Wall Street Journal 9-May-1984)

Both titles would be released (on disk) for Atari Home Computers in 1985 by Epyx (North America) and Activision (Europe).

May 14-19: At the special SICOB (Salon international d'Informatique, télématique, Communication, Organisation du bureau et Bureautique) show held at the CNIT (Centre des Nouvelles Industries et Technologies) in Paris – La Defense, France, Atari featured the Atari 600XL / Atari 800XL product line. (L'Atarien #4, page 21)

May:
- Atari Products Co. Applications Software and Telecommunications Products Group manager Sherwin Gooch departed the company,
- Earl Rice – previously Manager, Users' Group Support, Consumer Product Service (CPS) – became Atari 1450XLD Project Manager, replacing Sherwin Gooch in the role,
- Mark Cator was promoted to Manager, Users' Group Support, replacing Earl Rice in the role. He would be reporting to manager of Product Support Bill Bartlett.

May 22: Publication date of the Atari Learning Systems New Products Bulletin, introducing:
- AtariLab Starter Set (versions for Apple II, C-64; never shipped),
- Escape ("Interpreting graphs the fun way"; platform(s) unspecified; never shipped),
- Find It! (Atari XL, C-64, Apple II, IBM PC; never shipped),
- First Aid... The ABC of CPR (Edunetics; Atari XL; never shipped),
- Green Globs (Atari XL, Apple II; never shipped),
- LabMate Home Edition Ages 14-15 (book for AtariLab Starter Set; never shipped),
- LabMate Home Edition Ages 9-13 (book for AtariLab Starter Set; never shipped),
- LabMate School Edition Elementary (books for AtariLab Starter Set; never shipped),
- LabMate School Edition High School (books for AtariLab Starter Set; never shipped),

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- LabMate School Edition Jr. High (books for AtariLab Starter Set; never shipped),
- Simulated Computer II (Atari XL, C-64; never shipped),
- Telly Turtle (Atari XL, C-64, Apple II, IBM PC/PCjr; never shipped),
- The Learning Phone (previously: Atari PLATO; would be shipped by Atari, Corp. in 1986),
- Wheeler Dealer (Atari XL, C-64, Apple II, IBM PC/PCjr; never shipped),
- Yaacov Agam's Interactive Painting (Atari XL, IBM PC; never shipped).

May 22: Atari EVP **Dennis Groth** would additionally be President of the Atari International division, assuming the additional role from **Anthony Bruehl (Anton Bruehl)** who had departed the company. (Wall Street Journal 22-May-1984)

May 24-25: At MIDISoft '84, the first annual event sponsored by IMA (the International MIDI Association) held at the Mark Hopkins Hotel in San Francisco, California, Hybrid Arts introduced MIDIMate for the Atari 800 or 800XL computer.

May 28: Media report that Atari was shuttering its manufacturing plant in Hong Kong – producer of almost all Atari Home Computers sold in the international market over the last year – and terminating a purchasing accord there with its primary supplier of Home Computers – for the domestic market –, Chelco Sound.

Production of the Atari 600XL was currently suspended. Production of the Atari 800XL would continue exclusively at Atari Taiwan Manufacturing Corp. (ATMC).

The dealer price for the Atari 800XL had been cut to $217 (previous dealer price: $280, corresponding with the previous retail price of $399).
(Electronic News 28-May-1984, 4-Jun-1984)

June 3-6: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, Atari introduced the MindLink System (KX7117 package for Atari home Home Computers; never shipped), comprised of: headband, cartridge, and infrared transmitter and receiver. (We Love Atari Vol. 2, page 14).

Atari introduced or again promised (due Summer/Fall 1984):
- Ballblazer (would be shipped by Epyx in 1985),
- Crystal Castles (would be shipped by Atari Corporation in 1989),
- Final Legacy (previously: The Legacy; would be shipped by Atari, Corp. in 1985),
- Hobgoblin (Atari Advanced Games Group; later: Habitats; never shipped),
- Jr. Pac-Man (by Bally-Midway; never shipped),
- The Last Starfighter (would be shipped by Atari, Corp. in 1986 as: Star Raiders II),
- Millipede (would be shipped by Atari, Corp. in 1985),
- Moon Patrol (would be shipped by Atari, Corp. in 1985),
- Rescue on Fractalus! (would be shipped by Epyx in 1985),
- Track & Field (with Arcade Controller; by Konami;
  would be shipped by Atari, Corp. in 1985),
- Elevator Action (by Taito; never shipped),
- Stargate (by Williams Electronics; never shipped),

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- Crime Lab (never shipped - Video Game Update Jul-1984, page 64 sole source),
- This Is Ground Control (Futuremakers series; due Sept. 1984; never shipped),
- Through the Star Bridge (Futuremakers series; due Sept. 1984; never shipped).

(Video Game Update Jul-1984, page 64).

Also announced/previewed/again promised (due in 1985):
- Captain Hook's Revenge (never shipped),
- Letter Tutor (never shipped),
- Mario Bros. (would be shipped by Atari Corporation in 1988),
- Pole Position II (by Namco; never shipped),
- Proofreader (previously released via APX as: Atspeller for AtariWriter; would be shipped by Atari, Corp. in 1986),
- Sky Writer (would be shipped by Atari, Corp. in 1985),
- Word Tutor (never shipped).

Also announced/previewed: Garfield on the Run (Atari Advanced Games Group; never shipped).

Atari Learning Systems introduced or again promised (due summer/fall 1984):
- AtariLab Light Module (would be shipped by Atari, Corp. in 1985),
- Escape (never shipped),
- Green Globs (never shipped).

(Video Game Update Jul-1984, page 64)

Atari Learning Systems also previewed (due in 1985):
- Find It! (never shipped),
- First Aid... The ABC of CPR (Edunetics; never shipped),
- Simulated Computer II (never shipped),
- Telly Turtle (never shipped),
- Wheeler Dealer (never shipped).

(Analog #22, page 49)

Privately previewed: the (revised) 1090 XL Expansion System (previously: Expansion Box; to ship with one XL 64 KiB RAM Card).

Atari also announced they had "begun developing ties with independent firms to create software for a new high-end computer for introduction in the second half of 1984." The new machine (unnamed; previously: Atari 1450XLD), previewed privately to software developers, was to include "a built-in, double-sided, dual density floppy disk drive that stores 352 KiB of RAM... (that) operates five times faster than a floppy disk drive previously planned in a computer announced a year ago (the old 1400 series)."
Also to be built-in: a 300 baud modem, telecommunications software and a mini-database called The Grapevine, an enhanced speech synthesis chip (upgrade from the old 1400 series), and 64 KiB RAM. While the larger-capacity built-in floppy disk drive would not be supported by DOS 3, it would be supported by the new "QDOS".

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At Atari Products Co.:

- At Atari Products Co., **Dave Ruckert** remained Head (EVP) of Marketing (Wall Street Journal 4-Jun-1984),
- Atari had just laid off 700 to 800 of the employees at its headquarters, with another 200 to 300 expected to be let go soon,
- **West Shell III** – previously Director of Computer Software Marketing – would be promoted to Director of Computer Marketing. He would replace VP Computer Hardware and Software Marketing **Fred Simon** who had departed the company along with his Director of Computer Marketing **John H. Hahn**. (Electronic News 4-Jun-1984; AdWeek 9-Jul-1984)
- **David S. Wilson** and **Bill Bartlett** of Customer Service, Consumer Product Service (CPS) had departed the company. (San Leandro Computer Club (SLCC) Jun-1984)

June: Atari 1450XLD product manager (marketing) **Thea Cain** had departed the company. (San Leandro Computer Club (SLCC) Jul-1984)

June: Atari released the Atari BASIC REV. C cartridge, offered through Atari Customer Service, free to Atari 600XL / Atari 800XL owners still within warranty. (San Leandro Computer Club (SLCC) Jul-1984, page 3)

Month?: Exidy released the Max-A-Flex coin-operated arcade conversion system, along with four games for the system, all developed by First Star Software: Astro Chase, Boulder Dash, Bristles, Flip and Flop. The Exidy Max-A-Flex utilized an embedded Atari 600XL system. (My Atari Magazine, January 2003.)

Month?: In West Germany, Atari Elektronikvertriebs GmbH released Karriere in versions for both Atari Home Computers and for Commodore 64.

Month?: The Swedish synth-pop band, Adolphson Falk, released an LP (Long Play vinyl record album) called Over Tid Och Rum which contained a track with a BASIC program for Atari 8-bit computers. https://tinyurl.com/yjexmzx5

July 1-August 25: Third and final year of Atari Computer Camps. Camps were scheduled and held at 2 locations:

1. "Camp Atari – New England"
   at the Stoneleigh-Burnham School in Greenfield, Massachusetts,
2. "Camp Atari – Poconos"
   at East Stroudsburg State College in Pennsylvania.

July 2: Warner Communications Inc. and Tramel Technology, Ltd. (statement by Chairman **Jack Tramiel**) jointly announced the acquisition by Tramel Technology of the Atari, Inc. home video game and computer businesses.

The transaction included an inventory of 100,000 XL computers.
(Current Notes Sep-1984, page 10)

July 5-6: Tramel Technology hired approximately 300 of the existing Atari, Inc. domestic Consumer and Home Computer division employees. (InfoWorld 30-Jul-1984)

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West Shell III would be Director of Marketing.
Systems engineer Phil Suen would be Director of Engineering - XL family computers.

Additional engineers and technicians included:

- Dan H. Kramer
- David Owen Sovey
- Gary Rubio
- George Kulcher
- George Nishiura
- Jim Tittsler
- John Hinman
- John Honig
- Jose A. Valdes
- Lane Winner
- Michael Wooding
- Mike Barall (Michael Barall)
- Peter R. Ateshian
- Randy Hoopai
- Songly Mu
- Vincent H. Wu

John Skruch would be a Software Product Manager.

July 11: Tramel Technology, Ltd. filed a Certificate of Amendment to its Articles of Incorporation changing the corporate name to: Atari, Corp.

July 23: Business week reported, "In just two weeks [Jack Tramiel] has fired 700 people at Atari's Sunnyvale offices and has axed several of Atari's current products, including the 7800 video game system and the $150 Atari 600XL Home Computer."

July/August?: In the UK Atari shipped: The Pay-Off.

July/August?: In West Germany, Atari released Die Story der Final Legacy (audio cassette).

August 7: Tandon Corp. announced it had reached agreement in principle for the sale of up to $130.5 million in floppy disk drive and subsystem products to Atari Corp. Deliveries, which were subject to definitive purchase orders from Atari, had begun and were scheduled to continue through the first half of calendar 1985.

August 13: Date of internal Atari memo detailing plans for 5 new XL computers:
1. "XL": The 64 KiB 800XL with 3.5" floppy disk drive support and new DOS.
2. "XL/Writer": A 64 KiB computer with integral 80 column monochrome monitor, 3.5" floppy disk drive, letter quality printer, and word processing software.
3. "XL/CMOS": A portable 64 KiB computer with built-in word processor, 3.5" floppy disk drive support, new DOS and 40/80 column optional LCD.
4. "XL/M": An XL with AMY built-in. The music machine.
5. "XL/P": A 128 KiB RAM version of the XL.

In addition, a 3.5" floppy disk drive and a color monitor were planned.

- Phil Suen was Director of XL Computer Engineering,
- Thomas B. Brightman was VP Engineering.

https://tinyurl.com/5n7yk987

August: Atari Marketing Director West Shell III departed the company to The Cooper Companies.

August 25-26: TariCon '84, the first Atari-only computer fair, was held at Southfield Civic Centre near Detroit, Michigan. Sponsored and organized by two User Groups - CHAOS (Ike

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Hudson of the Capitol Hill Atari Owners Society) and MACE (Mike Lechkun of the Michigan Atari Computer Enthusiasts). About 1,800 attended. (Atari did not attend.)

August 27: Atari, Corp. stated, "Atari plans to manufacture and supply the Atari 800XL family computer, satisfying the overwhelming and increased demand for that product with aggressive, competitive pricing through the end of 1984." Atari said that it had already lowered the wholesale price for the Atari 800XL (without providing specifics).

Summer/Fall?: The Atari Adventure at the Northwest Plaza in St. Ann (suburban St. Louis), Missouri, was closed.

September 1: The new US retail price for the Atari 800XL was $179. (Associated Press 13-Nov-1984; Washington Post 13-Nov-1984)

September 1: In the UK, Atari cut all prices, including:
- The Atari 600XL by £60, from £159.99 to £99.99,
- The Atari 800XL by £50, from £249.99 to £199.99.

(Popular Computing Weekly 16-Aug-1984; The Times 21-Aug-1984, page 17;
The Guardian (London) 6-Sep-1984;
Personal Computer News 25-Aug-1984, page 3 and 1st-Sep-1984, page 3)

In France, Atari would reduce the Atari 800XL by 1,000 FRF to 2,199 FRF.

September 6-8: UK Media reports that the Atari 600XL (PAL/UK) would remain available while supplies last. (Popular Computing Weekly 6-12-Sep-1984 page 1; Popular Computing Weekly 8-Sep-1984 page 3)
New Atari 600XL units had not been manufactured since April 1984.

September 9: Date of internal Atari memo detailing plans for 3 new XL computers, with each new machine representing a step forward in cost reduction:
1. "800XLF" incorporating FREDDIE
   - SECAM version due Oct-1984; NTSC/PAL versions due Nov-1984
2. "900XLF" incorporating a new keyboard and housing design
   - NTSC/PAL versions due Dec-1984; SECAM version due Feb-1985 (would ship as: 65XE)
3. "900XLKF" incorporating KERI (function of ANTIC+GTIA+POKEY)
   - NTSC/PAL versions due Jan-1985 (SECAM version not planned)

A new cost-reduced Atari 1050-compatible Floppy Disk Drive was also planned:
- Either 3.5" or 5.25"; 163 KiB capacity; 38.4 kbit/s transfer rate

https://tinyurl.com/yftb5a7w

September 11: Atari Games, Inc. (the former Atari, Inc.) was awarded US patent 4,471,463 for 6 claims by inventors **Steven T. Mayer**, **Jay G. Miner**, **Douglas G. Neubauer**, and **Joe Decuir (Joseph C. Decuir)** regarding their "Data processing system with programmable graphics generator" (the Atari 400 & Atari 800 hardware platform).

September 11: Atari Games, Inc. (the former Atari, Inc.) was awarded US patent 4,471,464 for 15 claims by inventors **Steven T. Mayer**, **Jay G. Miner**, **Douglas G. Neubauer**, and **Joe Decuir (Joseph C. Decuir)** regarding their "Data processing system with programmable graphics generator" (the Atari 400 & Atari 800 hardware platform).

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September 20: Neil Harris – previously of Commodore International (software division) – joined Atari as Director of Communications, manager of publications and user group support. With Atari Director of Creative Services Mel Stevens, Neil Harris would be responsible for launching a replacement for the former Atari, Inc. magazine, Atari Connection, to be called: Atari Explorer.

September 25: Rather than halt production of Atari's 800XL Home Computer and its 2600 video-game player, as many had expected, Atari has significantly expanded production of the two products, Sam Tramiel said (interviewed in Taipei by the Dow Jones Service). "In January, Atari will introduce a second low-priced computer that will run games and software made for the predecessor product." (The Globe and Mail, Canada)

October 9: Date of Atari internal draft specification document for a "900XLA" computer (earlier: "XL/M"; later: 65XEM). The document contrasted the "900XLA" with the forthcoming "900XL" computer (which would ship as: 65XE).
https://atariage.com/forums/topic/78378-atari-900xla-product-spec/

October 15: Atari began shipping products – existing inventories and new production – in quantity. (Jack Tramiel in Los Angeles Times 8-Jan-1985) In the UK and Europe, in addition to new production Atari 800XL computers and 1050 Floppy Disk Drives, Atari would ship the new 1029 Printer. In the US and Canada Atari would supply Atari 600XL / Atari 800XL systems and software largely from existing inventories.

October 22: Atari software engineer (XL operating systems, including XL floppy disk drive controller) Mike Barall (Michael Barall) had departed the company and established Invisible Software, Inc.

October 26: In the UK Atari now offered the Atari 800XL for £169.
(The Times 26-Oct-1984, page 9).

November 1: In Canada, Irwin Toy ended its role as exclusive distributor of Atari computers, having been supplanted in the role by the newly-established Atari (Canada) Corp.
The price of the Atari 800XL was being cut to below C$200 (previously: C$400)
The Atari 600XL was to be priced at under C$100 (previously: C$250-C$300).
(Winnipeg Free Press 16-Nov-1984)

November 13: Atari held a press conference proclaiming "The New Atari Corp." at company headquarters in Sunnyvale, California. The company currently offered the Atari 800XL computer, price now reduced from $179 to $119. Two new 8-bit computers, compatible with the Atari 800XL, were to be introduced at the January 1985 CES.

November: In France, P.E.C.F. Atari shipped the Atari 800XL SECAM version (2,499 FRF). Also remaining available: Atari 800XL PAL version (2,199 FRF), Atari 600XL PAL version (1,599 FRF). (L'Atarien #5, page 19; L'Atarien #7, page 33 for date)

November 19: In the US, Atari had launched a print campaign in major market newspapers to support holiday price cuts on the Atari 800XL. Full-page ads carried the theme, "The powerful personal computer so affordable even Scrooge would have given it." (AdWeek)

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November/December: Ongoing production of the Atari 1050 Floppy Disk Drive was shifted from Atari-PCI Enterprises Pte. Ltd. in Singapore to Atari's plant in Hong Kong.

December 6: Atari had held an early December press conference in Frankfurt, West Germany proclaiming "The New Atari Corp." to the UK and Europe. Atari announced the price of its Atari 800XL Home Computer in West Germany was reduced from 648 DEM to 499 DEM, with similar cuts in the UK (from £169 to £129) and across Europe.

The new Atari product line was to include four 8-bit models:
1. A 65XE (to be equivalent to the Atari 800XL),
2. A 128 KiB version of the 65XE (would ship as: Atari 130XE),
3. A "strong music" version of the 65XE (Atari 65XEM; never introduced),
4. A version of the 65XE with built-in floppy disk drive and monitor (Atari 65XEP; never shipped).

December 8: Atari participated in the Children's Holiday Celebration, a fund-raising event for the Scholarship Fund of the Children's Health Council (CHC). Atari loaned 24 Atari 800XL computers to the event's coordinators. The systems were then rented to participants, proceeds to the Scholarship Fund. Two of the Atari 800XLs and 1,000 T-shirts were donated by Atari to the organization.

"The Atari 800XL has sold almost 500,000 units through 1984" – Atari's **Sigmund Hartmann**, Atari Explorer, Summer 1985, page 33.

"By the end of 1984, the Atari 800XL will have sold more than 600,000 units since its introduction more than a year ago, according to **Kenneth Lim** of Dataquest, a market research firm in San Jose." InfoWorld 7/14-Jan-1985.

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1985

January 5-8: At the International Winter Consumer Electronics Show (CES) in Las Vegas, Nevada, under the banner "Power Without the Price" Atari introduced new personal computers including:
- Atari 65XE ("under $120"),
- Atari 130XE ("well under $200").

Atari previewed:
- Atari 65XEP ("under $400"; never shipped). A 65XEM computer was not introduced as promised in advance of the show.

The XE computers would run the Atari OS as found in the Atari 800XL which would be phased out.

Atari introduced:
- XM128 80-column Monitor/Adapter (some literature: "XM148"; "about $150" or "under $100"; monitor never shipped; adapter would ship as: XEP80 Interface),
- XC1411 Color Monitor (some literature: "XC141"; "under $300"; never shipped),
- XTM201 Printer ("under $100"; never shipped),
- XTC201 Printer ("under $100"; never shipped),
- XMM801 Printer ("under $200"),
- XDM121 Printer ("under $200"),
- XM301 Modem ("under $50").

Atari featured the Atari 1025 and 1027 Printers, 1010 Program Recorder, and the 1050 Floppy Disk Drive with DOS 2.5.

Atari previewed: XF521 5.25" Floppy Disk Drive (130 KiB), expected to eventually replace the 1050; never shipped.

Software introduced:
- AtariLab Light Module (previously introduced by Atari, Inc.),
- AtariWriter Plus,
- Infinity (by Matrix Software; never shipped),
- Music Painter (by Atari/Carousel Software),
- Proofreader (previously introduced by Atari, Inc.),
- Silent Butler (by Atari/Silent Butler Software),
- The Learning Phone (access software for the PLATO Homelink Service; previously introduced by Atari, Inc.).

Announced (but not shown): Shopkeeper (6 module series by CodeWriter; never shipped), Atari Tutorial (never shipped), and two games previously introduced by Atari, Inc.: Crystal Castles, Mario Bros.

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Several games previously introduced by Atari, Inc. were featured:
- Final Legacy,
- Millipede,
- Moon Patrol,
- Sky Writer,
- Track & Field.

(Happy Computer Apr-1985; Antic Online 2nd-Jan-1985 Pre-CES Preview; Compute! magazine #59, Apr-1985, page 25; SPACE Jan-1985; Analog #28; Analog #29; InfoWorld 28-Jan-1985; Antic Apr-1985; We Love Atari Vol. 2, page 61; Antic Online CES Final Wrap-Up)

Winter: In France, P.E.C.F. Atari released La Chasse aux Fautes (et La Course aux Hapax) and Calcul Algebrique.

Winter: Atari VLSI design engineer **Peter R. Ateshian** departed the company to Silicon Design Labs.

February 1: In the US, the suggested retail price for the Atari 800XL was reduced to $99 (previously: $119). (Wall Street Journal 19-Feb-1985)

February?: Conclusion of a production run of the Atari 1050 Floppy Disk Drive at the Atari plant in Hong Kong.

February: First issue of Atari Explorer, published by Atari manager of publications **Neil Harris**.

February: Retail prices from Atari France: Atari 800XL SECAM: 1,700 FRF; 1050: 2,600 FRF; 1027: 2,600 FRF.

March 5: At the San Leandro Computer Club (SLCC), Atari pledged the XE would ship in April. Regarding the 65XEP, Atari had "postponed plans to produce an 8-bit portable computer, due to lack of interest."

Regarding the 65XEM, "plans for an XEM 8-bit music computer have been postponed indefinitely due to problems with finalizing the AMY sound chip."
(SPACE Apr-1985; Current Notes, Apr-1985, page 19)

March 30: At the first meeting of the Atari Worldwide User Network (WUN), held at the office of Antic (magazine) in San Francisco, California, Atari announced that:
- The Atari 130XE had just shipped in the US ($149),
- The Atari 65XE was currently being shipped in Canada,
- DOS 2.5 (OSS) was now shipping with Atari 1050 Floppy Disk Drives (replacing DOS 3) and would be also be distributed as freeware.

John Skruch was Atari XE Software Development Director.

March 30-April 2: At the 10th West Coast Computer Faire at the Moscone Convention Center in San Francisco, California, The San Leandro Computer Club (SLCC) and the Atari Bay Area User's Computer Society (ABACUS) both displayed Atari 130XE units supplied by Atari, their first showing to the general public.

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Winter/Spring: Atari released:
- AtariLab Light Module,
- Final Legacy,
- Millipede,
- Moon Patrol,
- Sky Writer,
- Track & Field (with Arcade Controller).

(Atari Explorer Summer 1985, page 41)

April: Atari released DOS 2.5 as freeware via the CompuServe Atari SIG.

April: Atari discontinued production of the Atari 800XL computer. (There would be one more production run in winter 1987.)

April: John Skruch was Atari Software Product Manager, XL/XE line. (Atari Explorer Summer 1985, pages 32-33)

April 17-24: Atari introduced the Atari 130XE to West Germany and featured the Atari 800XL at the Hannover Messe (Hanover Trade Fair). (No 65XE or 65XEM were shown.)
Atari also introduced the Atari XMM801 and XDM121 Printers to West Germany (220V AC versions for Europe; never shipped) and featured the Atari 1050 Floppy Disk Drive, 1027 Printer, and 1029 Printer.

April 19: Atari Holdings, Inc. (the former Atari, Inc.) transferred ownership of the four US Patents 4,296,476 & 4,435,779 & 4,471,463 & 4,471,464 (collectively, the Atari 400 & Atari 800 hardware platform) to Atari, Corp.

April 22: Atari shipped the Atari 130XE in the UK (£169.90).
(News Bytes for date; Popular Computing Weekly 25-Apr-1985)

Spring: In France, using the AtariSoft label, Atari released: Nostradamus, L'Enigme du Triangle.

May 6-9: At the Spring Computer Dealers Exposition (COMDEX) show at the Georgia World Congress Center in Atlanta, Georgia, Atari said the Atari 800XL and Atari 130XE were available for mass retailers and that they expected the Atari 800XL to sell widely through toy retailers for Christmas 1985.

May: First issue of the UK's Atari User magazine, published by Database Publications.

May: In the UK Atari had released:
- The 800XL 64K Personal Computer Pack
  800XL + 1010 + An Invitation to Programming 1 cassette + Pole Position/Atari Demo cassette; £129.99,
- And also offered a £249.99 (earlier/Atari's own ad: £269.99) system bundle consisting of:
  800XL + 1050 + DX1002 Diskette Pack (Home Filing Manager + The Pay-Off/Atari Demonstration).

(Personal Computer News 16-Feb-1985, page 2; Atari User #1 May-1985, pages 2-3 ad, page 19 article)

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May 30: In Italy, Atari Italia S.p.A. launched the Atari 130XE (380.000 ITL), and also offered the Atari 600XL (149.000 ITL) and Atari 800XL (299.000 ITL). (MC microcomputer #42, page 105)

June 2-5: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, Atari featured the XM301 Modem, introduced The Professional (VIP Software; never shipped), GEM Desktop (VIP Software; never shipped), and Home Astronomer (by Atari/Deltron; would ship as: Atari Planetarium), and featured AtariWriter Plus and Silent Butler.

June: Atari France retail price for the Atari 130XE SECAM: 1,990 FRF.

July 11/17: Atari's XE computer range included the Atari 130XE, available in the UK, Europe, and North America, and the Atari 65XE, available in Canada. (Popular Computing Weekly, page 5).

Summer: In place of the canceled 6-module Shopkeeper series, Atari had acquired distribution rights from CodeWriter for:
- FileWriter,
- ReportWriter,
- MenuWriter,
- CodeWriter (FileWriter + ReportWriter + MenuWriter),
- Accounts Receivable System / Accounts Payable System (two packages in one),
- AdventureWriter,
- Home Integrator,
- Retail Invoice,
- Salesmans Expense,
- Small Business Inventory,
- Star Voyage Series: Star Voyage 1 - Star Voyage 2.

(Atari Explorer Summer 1985, page 41).

Summer: In France, using the AtariSoft label, Atari released: Cameleon, Promoteur.

September 4-8: Atari featured the 130XE at the 8th Personal Computer World (PCW) show at London's Olympia Hall, London, UK.

October: In the UK Atari had launched four new XL/XE system bundles:
1. 800XL + joystick + Qix cartridge for £70;
2. 800XL + 1010 + joystick + software pack (ACC1001 cassette: Computer Chess + European Countries and Capitals) for £99;
3. 130XE + 1050 + four pieces of software: DOS 3 + DOS 2.5 + DX1002 Diskette Pack (Home Filing Manager + The Pay-Off/Atari Demonstration) for £231;
4. 130XE + 1027 + AtariWriter Plus (disk) + three other pieces of software: DOS 2.5 + DX1002 Diskette Pack (Home Filing Manager + The Pay-Off/Atari Demonstration) for £305.

(Atari User vol. 1 no. 6 Oct-1985, page 7)

October?: A new production run of the Atari 1050 Floppy Disk Drive commenced in Singapore by Atari-PCI Enterprises Pte. Ltd. This instead of Atari producing the announced XF521.

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October 28-November 1: At Systems '85 in Munich, West Germany (which was attended by about 126,000 people) Atari featured the Atari 800XL / Atari 130XE and the Atari 1010, 1050, 1027, 1029, and Touch Tablet (CX77).

November: Atari shipped AtariWriter Plus, which was designed and programmed from scratch by **William Robinson** (the core word processor), **Ron Rosen** (Mail Merge module), and **R. Stanley Kistler** (Proofreader module) for Micro Fantasy, for Atari. Manual by **Jeffrey D. Bass**. Package included a version for 48 KiB/64 KiB Atari computers as well as a version supporting the 128 KiB RAM of the Atari 130XE.

November 20-24: At the 7th annual Fall Computer Dealers Exposition (COMDEX) in Las Vegas, Nevada, Atari exhibited the Atari 130XE. Notably, Atari presented a display consisting of an Atari 520ST, a Commodore Amiga, an Apple Macintosh, and an Atari 130XE, all running versions of the famous Amiga Boing Ball demo program.
Atari promoted: the XM301 Modem, The Learning Phone, AtariWriter Plus, Proofreader, Silent Butler, Music Painter (previously: Song Painter)

November/December: **John Skruch** – previously Atari Software Product Manager, XL/XE line – would be Manager of in-house Software Development.

December: Atari shipped the XM301 Modem.

December: In the UK, Atari had sold their entire remaining stock of Atari 800XL computers (PAL I units; approximately 100,000 units) to Dixons (including Currys), who offered two exclusive Atari-sponsored Atari 800XL system bundles for the holiday season:

1. 800XL + 1010 + joystick + 5 cassettes (new re-releases by Atari): The Lone Raider, Chess (Computer Chess), Eastern Front (1941), European Countries and Capitals, An Invitation to Programming (An Invitation to Programming 1) for £99.99 (reported) / £79.99 (advertised);
2. 800XL + 1050 + DX1003 Software Pack (The Home Filing Manager disk + The Pay-Off/Paint disk) for £169.99

(Atari User #8 Dec-1985, page 9)

Atari's 8-bit user base in the UK has now reached 400,000 ... close to 100,000 of the [discontinued Atari 800XL] are believed to have been sold during the run up to Christmas alone. (Atari User Feb-1986, page 9)

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1986

January 9: At the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada, Atari featured the Atari 130XE ($149) and again promised the Atari 65XE ("under $100"), announced (but did not show) the XC11 Program Recorder, previewed Star Raiders II (disk), and featured: Silent Butler, Music Painter, Home Astronomer (to ship as: Atari Planetarium), AtariWriter Plus.

Atari also announced a $399 Atari 130XE bundle to include: printer (1027), floppy disk drive (1050) and five software titles: Silent Butler, Star Raiders, Music Painter, Paint, AtariWriter; there was to be a similar Atari 65XE bundle ("$300-$350") as well.

January?: Production of the Atari 1050 Floppy Disk Drive – late units by Atari-PCI Enterprises Pte. Ltd. in Singapore – ended.

Winter: Atari shipped The Learning Phone – Access Software cartridge for the PLATO Homelink Service from Control Data Corporation (CDC) – designed at Atari by **Vincent H. Wu**. The Atari PLATO project had been in development at Atari, Inc. since 1981.

Winter: In the UK Atari shipped the XC11 Program Recorder. (Atari User Mar-1986, page 7)

February: Cover date of Issue #10, the final issue of L'Atarien magazine from Atari France.

February: Atari France retail prices: Atari 130XE SECAM: 1,490 FRF; 1010: 490 FRF; 1050: 1,490 FRF; 1029: 1,490 FRF.

March 7-9: At the (first) Atari Computer Show (ACS) sponsored by Atari User magazine at the Novotel, Hammersmith, London, UK (the first Atari-specific exhibition to be held anywhere in the world), Atari previewed an "80-column adapter" (previously: video adapter component of the XM128 monitor/adapter; would ship as: XEP80 Interface) and introduced the XC11 Program Recorder.

March 12-19: At CeBIT '86 in Hannover, West Germany – this was the first year that CeBIT was held separately from the Hannover Messe (Hanover Trade Fair) – Atari again previewed an 80-column card (XEP80 Interface), previewed a 3.5" Floppy Disk Drive (XF351; never shipped), and previewed a new DOS (later: ADOS; would ship as: DOS XE).

March: Atari shipped the Atari 65XE (US release; $99.95) and shipped: Proofreader, Silent Butler (**Ted A. Goldstone**; shipped with order form for Silent Butler Checkholder from Silent Butler Software), Music Painter.

April 28-May 1: At the Spring Computer Dealers Exposition (COMDEX) show in Atlanta, Georgia, Atari featured the Atari 130XE and software including Atari Planetarium and Star Raiders II. (Analog Aug-1986, pages 113-114; Current Notes Jun-1986, page 26).

Spring: Atari shipped the XMM801 Printer and Atari Planetarium.

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May 30: Atari had hired David H. Ahl and Betsy Staples (Elizabeth B. Staples) – both previously of Creative Computing – to take over publication of Atari Explorer magazine. The first issue from the new team was expected in July. The last issue from Atari's in-house team, including Director of Publications Neil Harris and editor David Duberman, had been dated Winter 1986.

June 1-4: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, Atari introduced the XEP80 Interface, introduced Star Raiders II, and also featured the XMM801 Printer, Atari Planetarium, and Silent Butler.

Atari also announced/showed a Hayes-compatible 1,200 bit/s modem for ST/PC/XE ("XM 1200"?; would ship as: SX212) to ship by late summer 1986. (Info World 16-Jun-1986, page 22)

July: Atari shipped Star Raiders II.

July: Atari and Hybrid Arts placed a full-page advertisement featuring the Atari 1040ST, 520ST, and 130XE computer systems in the July issues of Keyboard and Musician magazines.

Summer: Atari shipped the XC12 Program Recorder (UK/Europe).

August: Hi Tech Expressions announced that they and Atari were teaming up to provide computers and software in pediatric wards of hospitals in 10 US cities for Christmas 1986. Atari would donate 28 Atari 130XE computers, along with printers and joysticks, while Hi Tech Expressions would provide its complete line of greeting-card and novelty software, including PartyWare, HeartWare, and Jingle Disks. (News Bytes)

September 3-7: At the 9th Personal Computer World (PCW) show in London, UK, Atari introduced the XEP80 Interface and Star Raiders II to the UK.

September 12: Atari, Corp. filed a certificate of amendment to its articles of incorporation changing the corporate name to: Atari Corporation

September/October: First issue of Atari Explorer magazine produced by Atari Explorer Publications, Corp.

- Publisher: David H. Ahl,
- Editor: Betsy Staples (Elizabeth B. Staples),
- Senior Technical Editor: John B. Jainschigg.

November 10-14: At the Fall Computer Dealers Exposition (COMDEX) in Las Vegas, Nevada, Atari introduced the SX212 Modem (ST/XE/PC) and featured the XEP80 Interface.

November 24: Atari was testing a 30-second TV commercial in Boston and Philadelphia for its lower-price XE line of computers, using the new theme: "Technology so advanced, it's affordable" (Advertising Age)

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November 28-30: At the Atari Christmas Show at the Royal Horticultural Hall, London, UK, Atari featured the XEP80 Interface.

German Atari Chairman **Alwin Stumpf** reported at CeBit 1987 in Hannover that Atari was surprised to sell 92,000 Atari XL computers in West Germany in 1986. (Happy Computer (magazine) - 2. Atari XL/XE Sonderheft, page 3, as quoted/translated by **Andreas Koch**)

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1987

January 8-11: At the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada, Atari previewed the Atari XE game system (XEgs), again previewed a 3.5" Floppy Disk Drive (XF351) and showed the XC11 Program Recorder.

January: **Alex Leavens** joined Atari as Technical Support Manager (online support). His assignments would specifically include support for the 8-bit computers.

Winter: Atari carried out a final production run of the Atari 800XL computer (PAL units for West Germany).

February: Atari committed to releasing the Atari XE game system (XEgs).
John Skruch, Associate Director for Computer Software, would additionally be Product Manager, XE games. (Current Notes Dec-1987/Jan-1988, page 17)

February 15-18: Atari introduced the Atari XEgs at the American International Toy Fair in New York. The system would include Console, Keyboard, Joystick (CX40), and Video Gun (would ship as: XG-1 Light Gun), and would be bundled with "a sophisticated computer game requiring keyboard interaction" (Flight Simulator II), "a fast-action arcade-style game" (Missile Command), and "a new shooting game for the video gun" (Troubleshooter; later: Blast 'Em; would ship as: Bug Hunt).

March 4-7: At CeBIT '87 in Hannover, West Germany, Atari introduced the Atari XEgs to Europe, announced BattleZone XE (previously announced/previewed by Atari, Inc. in 1983), and also announced a new XE-styled direct replacement for the Atari 800XL (would ship as: Atari 800XE).

March?: Atari introduced the Atari XEgs to the UK at the London Toy Show, London, UK. The system would include Console (with Missile Command) and Joystick (CX40) for £89.99.
(We Love Atari Vol. 2, page 95 sole source)

March 24: Atari announced that Technical Support Manager **Alex Leavens** was no longer with the company.

April 24-26: At the Atari Computer Show (ACS), Champagne Suite & Exhibition Centre, Novotel, Hammersmith, London, UK, Atari featured/again promised the Atari XEgs (Console: £80; Keyboard: £40).

May: According to Atari, AtariWriter 80 (80-column XEP80 Interface version of AtariWriter Plus) was to ship in June 1987 along with the XEP80 itself, and a new 80-column XEP80 version of Silent Butler (Silent Butler 80; never shipped) was to ship soon after that.

May 29: Atari announced the appointment of **Clifford Slobod** as Director of National Sales for its entertainment division. **Clifford Slobod**'s experience included 13 years with Mattel. **Clifford Slobod** would be responsible for domestic sales of video game systems and software, and would manage the introduction of the new Atari XEgs.

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May 30-June 2: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, Atari again promised the Atari XEgs, now to be bundled with Keyboard, Video Gun (Light Gun), Joystick, Flight Simulator II (previously released by SubLOGIC), Missile Command (previously released on cartridge), and Blast 'Em (shooting game; would ship as: Bug Hunt).

Atari introduced 14 XE cartridges:
- Archon (by Free Fall Associates; previously released by Electronic Arts),
- Ballblazer (by Lucasfilm; previously released by Epyx),
- BattleZone (by Atari),
- Blue Max (by Broderbund; previously released by Synapse),
- Crossbow (by Exidy),
- David's Midnight Magic (previously released by Broderbund),
- Fight Night (previously released by Accolade),
- Food Fight (by Atari),
- Hardball! (previously released by Accolade),
- Lode Runner (previously released by Broderbund),
- One-on-One Basketball (previously released by Electronic Arts),
- Rescue on Fractalus! (by Lucasfilm; previously released by Epyx),
- Star Raiders II (by Atari; previously released on disk),
- Touchdown Football (previously released by Electronic Arts; XE cartridge never shipped).

Atari said they were additionally developing "two new shooting games" as well (would ship as: Barnyard Blaster, Crime Buster).

Further titles announced for later release:
- Choplifter! (previously released by Broderbund),
- Commando (by Capcom; never shipped),
- Desert Falcon,
- GATO (by Spectrum Holobyte).

Also, Atari introduced the XF551 Floppy Disk Drive with ADOS (would ship as: DOS XE), featured the SX212 Modem and introduced/announced SX Express!, featured the XEP80 Interface (and again promised but did not show AtariWriter 80 and Silent Butler 80), and featured Atari Planetarium. (Current Notes Jul/Aug-1987, pages 13-14) Again previewed: XC1411 Monitor.

July: In West Germany Atari shipped the Atari 800XE, and also promoted the Atari 130XE, XC12 Program Recorder, and 1029 Printer.

Summer: Atari shipped the XDM121 Printer.

September: Atari shipped the SX212 Modem.

September 16-21: At SMAU '87 (Salone Macchine e Attrezzature per l'Ufficio, or Office Machinery and Equipment Exhibition) in Milan, Italy, Atari featured the Atari 130XE (259.000 ITL) and XE 4002 (XE System/XC12 package) (320.000 ITL). The XE 4002 package never shipped: the XE 4001 package would ship in Italy instead.

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September 18-20: (First) Atari Messe Duesseldorf, Messehalle 1, Messegelaende, Duesseldorf, West Germany, organized by Atari Corp. (Deutschland) GmbH. Atari showed their entire product range, including the Atari 800XE.

September/October: Atari shipped the XEP80 Interface.

September/October: Atari shipped the Atari XEgs in late September, and it reached most dealer shelves by mid-October, retail price $150. XES4001 package included: Missile Command and Atari BASIC on ROM, Keyboard, Joystick (CX40), Light Gun (XG-1), Bug Hunt (previously: Blast 'Em) cartridge, Flight Simulator II cartridge.

October 23: Nintendo of America Inc. requested a preliminary injunction against Atari Corporation in US District Court, protesting that two Atari television commercials were false and misleading. The first commercial claimed the XE played hundreds of games while Nintendo's NES played only 80. Nintendo said the Atari claim was inflated because it was based in part on older games now hard to find. The second commercial stated the XE played both disk and cartridge games while the Nintendo played only cartridge games. While the commercial acknowledged the floppy disk drive for the XE must be purchased separately, Nintendo said the claim was misleading because the floppy disk drive was expensive and hard to find.

October 24-25: Atarifest '87 at Fairfax High School, Vairfax, Virginia. (Current Notes Dec-1987, pages 14-17)

Fall: In the UK, Atari shipped the 130XE Starter Pack (130XE + XC12 + CX40 Joystick + TX9043 Compilation Tape: Typo Attack, Missile Command, Centipede, Tennis, Star Raiders) for £139.95 (Atari User vol. 3 no. 8 Dec-1987, page 33), and also re-released separately on cassette (for bundling with the XC12?): Star Raiders (Sep-1987 printing date).

Also in the UK for the holiday season:

- Dixons released an exclusive Atari-sponsored Atari 65XE Home Computer Outfit (Atari 65XE + XC12 + CX40 Joystick + Atari TXP7100 Compilation A cassette (four titles by Atari: Star Raiders, Asteroids, Missile Command, Centipede; plus Airstrike 2 by English Software) + Atari TXP7100 Compilation C cassette (all titles by Bug-Byte: Savage Pong, Up Up and Away, Cloak of Death, Leaper, Quest For Eternity),
- Currys released an exclusive Atari-sponsored Atari 65XE Home Computer Outfit (Atari 65XE + XC12 + CX40 Joystick + Atari TXP7100 Compilation A cassette + Atari TXP7101 Compilation B cassette (Tennis by Atari; Chop Suey by English Software; Football, Basketball, and Chess (Computer Chess) by Atari).

Fall: Atari Corp. (UK) Limited shipped Twilight World (Matthew Trimby).

December 15: The Honorable **Robert P. Aguilar**, United States District Judge, Northern District of California, denied the October 23, 1987 request by Nintendo of America for a preliminary injunction against the Atari television ads comparing Atari's XE game system with the Nintendo Entertainment System. The court ruled that the advertisements did not violate the Lanham Act.

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December: Atari shipped:
- Ballblazer,
- Barnyard Blaster (by K-Byte),
- Blue Max (by Sculptured Software),
- David's Midnight Magic,
- Hardball! (by Sculptured Software),
- Rescue on Fractalus!,
- Star Raiders II.

(Computer Entertainer Jan-1988, page 14)

December?: Atari shipped the XF551 Floppy Disk Drive (with DOS 2.5).

December 31: From the Atari Annual Report: "In Czechoslovakia, the German Democratic Republic, and Poland the Atari 800XE and Atari 65XE computers have gained brand dominance and are among the most popular systems being sold in these countries."

Atari sold 100,000 Atari XEgs in the US at Christmas and did not meet demand (Antic May-1988, page 39)

Atari "claims more than 2 million Atari XEgs sold in 1987." (Compute! magazine #96, May-1988)

In 1987 Atari sold 4,600 8-bit computers to East Germany and 10,500 to Czechoslovakia. (Reuters 14-Mar-1988)

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1988

January: Atari shipped: BattleZone (by Ken Rose) (Computer Entertainer Jan-1988, page 14)

January: Optimized Systems Software (OSS) was merged into ICD.

Winter: Atari Corp. (UK) Limited shipped Thunderfox (by Aztec Design), an original cassette release (see Atari User #35 Mar-1988, page 5 and #36 Apr-1988, pages 22-23)

February 8-17: Atari featured the Atari 2600, 7800 and XEgs system at the 85th American International Toy Fair in New York.

March: Atari shipped: Fight Night (by Sculptured Software), One-on-One Basketball (by Sculptured Software) (Computer Entertainer May-1988, page 9).

Winter/Spring: Atari shipped: Lode Runner (by Chuck Peavey), Archon (see manual printing dates).

April: Atari shipped: GATO (by Xanth F/X) (Computer Entertainer May-1988, page 9).

Spring: Atari shipped the SX Express! disk software package for use with the SX212 Modem.

June: John Skruch, previously Atari Director of Software Development, as well as Product Manager, XE games, would become Director, Entertainment Software.

June 4-7: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, (booth 9405) Atari featured the Atari XEgs ($149.95).

New XE titles ("more than 19") would include:
- Ace of Aces (previously released by Accolade),
- Airball (by MicroDeal),
- Choplifter!,
- Commando (never released),
- Crime Buster,
- Crossbow,
- Crystal Castles,
- Dark Chambers (by John Palevich),
- Desert Falcon,
- F-16 Fighting Falcon (by Nexa; never shipped),
- Food Fight,
- Into the Eagle's Nest (by Pandora),
- Jinks (by Softgold/Rainbow Arts; never released by Atari; would be released by AMC-Verlag in 1991),
- Karateka (previously released by Broderbund),
- Mario Bros.,
- Mean 18 Ultimate Golf (by Accolade; never released),
- Nebulus (Hewson; never released),

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- Necromancer (by Bill Williams; previously released by Synapse),
- Summer Games (previously released by Epyx),
- Ultimate Driving (later: Fatal Run; never shipped).

Atari featured no computers at the show.

June 21: Date of "Specification for Super XE Game Machine" document by Atari and Ricoh. VP Advanced Technology **Shiraz M. Shivji** signed for Atari.
(http://atariage.com/forums/topic/287546-super-xe-game-machine/)
This project did not lead to any product announcement.

October 1, 1988 through September 30, 1989: "Atari Advantage" promotion program by Atari (US) for the 2600, 7800, and XE. Collect 5 cartridges for a free Atari T-shirt; 15 cartridges for a free cartridge; or 25 cartridges for an Atari 7800 for $25 or for an Atari XEgs or XE floppy disk drive for $50, and "enter an essay writing contest to win an expense-paid 7-day/6-night trip for you and a guest to California. Visit some of California's top tourist attractions including a day at Atari headquarters (near San Francisco) to see how video games are designed."

October?: Atari published the XE "Atari Advantage" catalog/poster. "Coming Soon": Crystal Castles, Thunderfox, Crossbow, Into the Eagle's Nest.

November: Final issue of the UK's Atari User magazine. The name would be sold to rival UK magazine publisher Page 6.

November: Atari announced the US availability of the XES2001 XG-1 Light Gun + Bug Hunt package.

November/December: In the US, through Dec. 31, Atari offered a $50 rebate for the purchase of an Atari XEgs.

December 31: From the Atari Annual Report: "Our XE line of 8-bit computer systems is extremely popular throughout Eastern Europe, and most recently, has begun to appear on retail shelves in the Soviet Union."

Atari sold 500,000 Atari 800XL units in West Germany in 1988. (Bajtek Feb-1989, page 7; thanks Tomasz Krasuski)

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1989

January 7-10: Atari's Entertainment division exhibited in a suite of rooms at the Dunes Hotel near the Winter Consumer Electronics Show (CES) in Las Vegas, Nevada. (ST World Feb-1989) Atari announced 6 new titles planned, including: Commando (never shipped), Into the Eagle's Nest, Airball. This would bring the total library to 41 "active" game cartridge titles. (Current Notes Mar-1989, page 13)

January: Atari shipped DOS XE (earlier name: ADOS). New production XF551 Floppy Disk Drives would also ship with DOS XE (replacing DOS 2.5).

February/March: New name for Page 6 magazine: Page 6 Atari User

February-March: In the US Atari offered the Atari XEgs for $99 (normal: $149). (Current Notes Mar-1989, page 13).

March 8-15: At CeBIT '89 in Hannover, West Germany, Atari announced that the Atari 7800 would ship in West Germany in June 1989 (to replace the Atari XEgs).

March: Atari shipped: Ace of Aces, Food Fight (by The Softworks Factory), Necromancer (Computer Entertainer Mar-1989, page 14)

April 3: Date of Atari US 1989 Distributor Price List, in which Atari announced or again promised:
- Commando (Sept.; never shipped),
- Deflektor (August; never shipped),
- MIDI Maze (by Xanth F/X) (Sept.; never shipped),
- Super Football (Sept.; never shipped),
- Tower Toppler (previously: Nebulus; by US Gold) (Sept.; never shipped),
- Xenophobe (by Bally Midway) (Sept.; never shipped).

April: Atari shipped: Crossbow (by Sculptured Software), Dark Chambers (by Sculptured Software) (Computer Entertainer May-1989).

April: Atari Explorer Publications, Corp. released the May/June Premier issue of Atarian magazine (Publisher/Editor: David H. Ahl) in support of the Atari 2600, 7800, and XEgs.

April 22-23: At the World of Atari show, sponsored by ST World, Disneyland Hotel, Anaheim, California, Atari featured/again promised MIDI Maze and AtariWriter 80. (Atari Interface magazine Jul-1989, page 4)

Spring?: Atari shipped:
- Airball (by The Softworks Factory),
- Choplifter! (by Sculptured Software),
- Crime Buster,
- Crystal Castles (by The Softworks Factory),
- Desert Falcon (by Ken Rose),

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- Karateka (by Sculptured Software),
- Mario Bros. (by Sculptured Software),
- Summer Games,
- Thunderfox.

Spring: Atari Corp. (UK) Limited shipped Nucleus (by **Paul Marshall**) and Tiger Attack (by Arena Developments). (Page 6 #37 Apr/May-1989, page 6; New Atari User #38 Jun-1989, page 37)

May: Atari shipped: Into the Eagle's Nest. (Computer Entertainer Jun-1989)

May: Atari shipped AtariWriter 80, programmed by **William Robinson** and **Ron Rosen** for Micro Fantasy. The package included Proofreader (programmed by **R. Stanley Kistler**) and Mail Merge modules, and required the XEP80 Interface. Like AtariWriter Plus, the package included a version for 48 KiB/64 KiB Atari computers as well as a version supporting the 128 KiB RAM of the Atari 130XE.

This would be the last US release by Atari for the XE.

June 3-6: At the Summer Consumer Electronics Show (CES) in Chicago, Illinois, Atari introduced/again promised:
- Commando (never shipped),
- Deflektor (never shipped),
- MIDI Maze (never shipped),
- Super Football (never shipped),
- Tower Toppler (never shipped),
- Xenophobe (never shipped).

(Computer Entertainer Jun-1989, page 13)

June/July: New name for Page 6 Atari User magazine: New Atari User.

Summer: Atari Corp. (UK) Limited released: Black Lamp (Telecomsoft), Cygnus X1 (Anco), Slingshot (by Matthew Trimby) (New Atari User #40 Oct/Nov-1989, pages 38-40; New Atari User #42 Feb/Mar-1990, page 7) and had also announced Super Soccer (due Nov 1989; never shipped).

Summer/Fall: Atari Corp. (UK) Limited released Speed Hawk (Arena Developments). (New Atari User #40 Oct/Nov-1989, pages 38-40; New Atari User #42 Feb/Mar-1990, page 7)

September/October: Third and final issue of Atarian magazine from Atari Explorer Publications, Corp. (Publisher/Editor: **David H. Ahl**).

December: Final issue of ANALOG Computing magazine.

December 31: From the Atari Annual Report: "sales of games products such as the 2600 and 7800 game systems and the range of older XE 8-bit computers decreased by 35% to $101.6 million, or 24% of total net sales for the year ended December 31, 1989, from $155.5 million, or 34%, of total net sales in 1988."

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From the Atari 10-K: "The Company's traditional video game offerings include the Atari 2600 VCS, the Atari 7800 ProSystem, and the Atari XEgs."

1990

Winter: Atari Corp. (UK) Limited released Heartache (in-game title: Heart Break). (New Atari User #42 Feb/Mar-1990, page 7; New Atari User #43 Apr/May-1990, page 42)

This would be the last release by Atari for the XE.

May 15: At the Atari shareholders meeting, Atari stated that last year, 250,000 XE computers were sold. In Poland, the XE sold 70,000 units, making it the most popular computer in Poland. (Atari Interface, Jun/Jul-1990, page 6)

Also, the Spring issue of Atari Explorer would be the last produced by Atari Explorer Publications, Corp. (Publisher: David H. Ahl; Editor: Betsy Staples (Elizabeth B. Staples); Senior Technical Editor: John B. Jainschigg), and the subsidiary was being shut down.

Atari would continue to publish the magazine, but there would no longer be coverage of the 8-bit Atari computers.

June/July: Final issue of Antic (magazine), The Atari Resource magazine. Antic would continue as a section of the publisher's STart magazine.

1991

March/April: LDW had imported about 250-270 thousand Atari 8-bit computers into Poland to date (since 1985). Currently about 20% of the global production of 8-bit Atari computers is sent to Poland (Moje Atari Apr-1991, pages 8-9; thanks Tomasz Krasuski).

April/May: Final issue of STart magazine – which had incorporated Antic magazine.

May: "Atari Canada's General Manager Geoff Earle announces a new trade up program for owners of Atari 8-bit computers to a Atari 520STFM for $250. The 8-bit computer line is admitted to be discontinued." (Atari User Jan-1992, page 20)

May 14: At the Atari shareholders meeting, Atari stated that the XE was still in production, being sold in South America, Eastern Europe and the Middle East. (Atari Interface magazine, Jun-1991, page 10).

November 23-24: Chicago Computerfest by Atari, held at the Ramada Hotal O'Hare, Rosemont, Illinois, was the first show sponsored by Atari in the US, locally hosted by the Lake County Atari Computer Enthusiasts (LCACE). The show drew 8-bit Atari computer developers and users, as Atari brought substantially all of their remaining inventory of 8-bit computer products for clearance sale.

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December: "[...] as of Christmas 1991, Atari decided to discontinue the Atari XEgs, 2600, and 7800 systems." – Tim Duarte, Atari User magazine, Jul-1992, page 22.

December 28: From the Atari 10-K SEC filing: "Atari's XE series computers are targeted for the price conscious markets. The Atari 65XE and Atari 130XE have 64 KiB and 128 KiB of internal RAM, and generally retail for less than $100 and $150, respectively. Both are supported by a variety of peripheral equipment and a variety of software titles including entertainment software. This computer line retains compatibility with the Company's previous generation 8-bit computer systems, i.e., the Atari 400 and Atari 800XL computers."

1992

Atari announced that support for all 8-bit products was discontinued as of the beginning of this year, according to Atari Classics magazine. (Dec-1992, page 4).

June 2: At the Atari stockholders meeting, Atari stated that the XE line of computers was still being made. Though not available in the US market, XE systems were being made for sale in Mexico, South America, Eastern Europe and Germany. (Atari Interface magazine, Fall 1992, page 19).

Fall?: The Atari Adventure center at Crestwood Plaza in Crestwood (suburban St. Louis), Missouri, which had featured Atari 800XL computers until at least 1991, was shut down.

December: First issue of Atari Classics magazine, published by Unicorn Publications, Ben Poehland (Benjamin L. Poehland) managing editor.

December 31: For the first time, the XE was not mentioned in Atari's Annual Report to Shareholders.

1993

Jan/Feb: Final issue of Atari Explorer magazine.

November?: Rights to ICD (including OSS) products for the 8-bit Atari were purchased by Fine Tooned Engineering (FTe / Mike Hohman).

1994

January 1: From the Atari Annual Report: "The Company also has some inventory of its older 16-bit computer products and 8-bit game products, namely ST and TT series of computers, 2600 and 7800 video games systems and XE computer and Portfolio products. As a result of these inventories being technologically obsolete and noncompetitive, the Company has written off these inventories. The Company is expecting minimal sales from these products in the future."

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1996

July 30: Atari Corporation was merged with and into JTS Corporation. The prior business of Atari would now be conducted through the Atari division of JTS; however, "the Atari division was not expected to represent a significant portion of JTS business," JTS said.

1997

July: Final issue of Atari Classics magazine.

1998

February 23: JTS sold substantially all of the assets of its Atari division, consisting primarily of the Atari intellectual property rights and license agreements, to HIAC XI, Corp., a wholly-owned subsidiary of Hasbro Interactive, Inc. (which was established in 1995 as a subsidiary of toy company Hasbro, Inc.), for $5 million.

May 7: The name of HIAC XI, Corp. was changed to: Atari Interactive, Inc.

Fall: Final issue of Page 6 Publishing's New Atari User magazine.

2001

January 29: Infogrames Entertainment S.A. (Lyon, France) announced completion of its acquisition of Hasbro Interactive, Inc. from Hasbro, Inc., renaming the subsidiary Infogrames Interactive, Inc.

Atari Interactive, Inc. remained a wholly-owned subsidiary of the newly-renamed Infogrames Interactive, Inc.

2003

May 6: Atari Interactive, Inc. (established 12-Feb-1998 as HIAC XI, Corp.) was merged with and into Infogrames Interactive, Inc. (established 8-Dec-1995 as Hasbro Interactive, Inc.), which was renamed to: Atari Interactive, Inc.

2009

May 29: Infogrames Entertainment S.A. announced that the company would now be known as Atari S.A. – Atari name licensed from the wholly owned Atari S.A. subsidiary, Atari Interactive, Inc.

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Today

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