Atari

Atari 8 bit computers

Frequently Asked Questions

Michael Current

2017
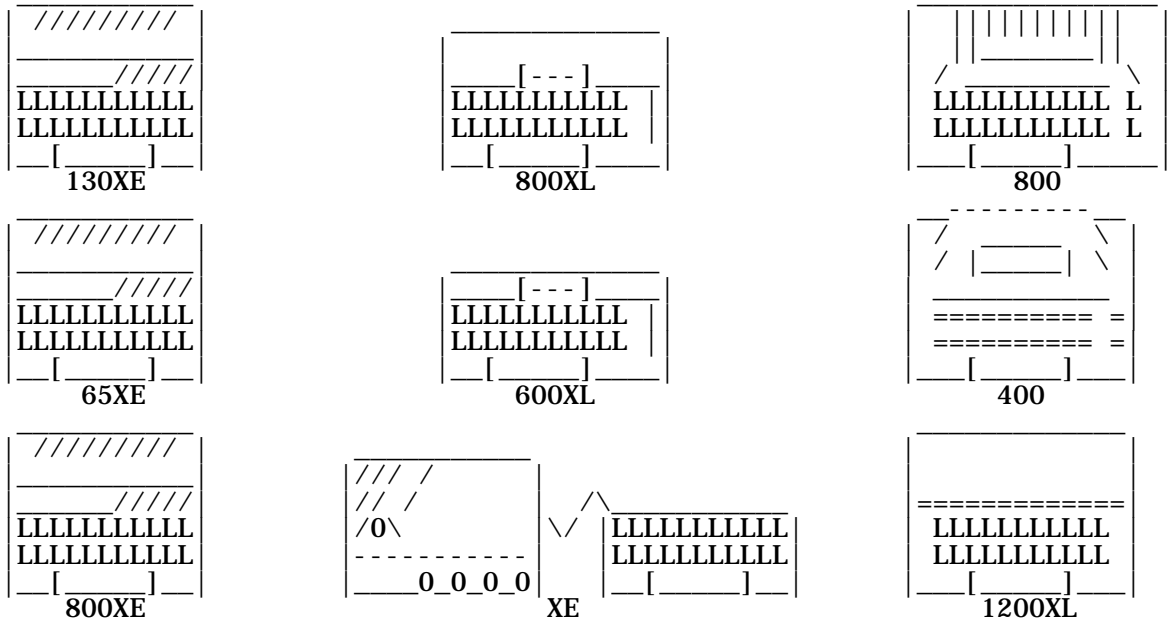
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Welcome to the comp.sys.atari.8bit newsgroup!

Atari 8-Bit Computers

Frequently Asked Questions List

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|__[_____]__     |        |__[_____]__     |        |___[_____]_____|
     130XE                     800XL                      800

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      65XE                     600XL                      400

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|__[_____]__     |        |            |  XE |            |    |__[_____]__     |
      800XE                                                        1200XL
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Additions/suggestions/comments/corrections are needed! Please send to:

Michael Current, michael@mcurrent.name
Library Department, University of Wisconsin-La Crosse

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!

The latest version of this document is posted to the following Usenet newsgroups every 59 days:
    comp.sys.atari.8bit, comp.answers, news.answers

More locations for the latest version of this document:
    ftp://rtfm.mit.edu/pub/faqs/atari-8-bit/faq
    http://www-ftp.lip6.fr/pub/doc/faqs/atari-8-bit/faq
    Enhanced versions (Text, A4 PDF, US Letter PDF): http://www.atari800xl.eu/

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

UPDATES SINCE PREVIOUS POSTING:

```
2017.08.22 11.1 https://archive.org/details/AtariHarryStewart GOLD MINE!
2017.08.19 11.1 ASAP director T.J. Gracon
2017.08.19 7.3.1 DOS 3 contributor Harry Stewart
2017.08.17 1.11 11.1 1400XL/1450XLD early names
2017.08.15 7.1.1 credit Harry Stewart for OS Manual
2017.08.15 7.1.1 credit Scott Scheiman for ATASCII
2017.08.15 3.2.2 Turbo DOS ver 2.5
2017.08.08 11.1 a lot more cleanup in 1983-1984
2017.08.07 11.1 Plummer, Goy, Suen
2017.08.05 11.1 Michael Barall
2017.08.05 11.1 Chris Bowman, Jim Paige
2017.08.05 5.1 1030 team credits
2017.08.03 8.6 8.8 Tempest Elite
2017.08.03 5.2 Pocket Modem uses SIO Motor Control
2017.08.03 6.1.4 MIDIMate uses SIO Motor Control
2017.08.03 1.14 remove SIO bus info
2017.08.03 3.1.1 5.1 only one Motor Control SIO device at a time
2017.08.02 5.1 1.12  1030 tone dialing tones are generated by the computer
2017.08.01 1.12 1.14 POKEY two-tone mode
2017.08.01 3.1.1 intro much more precise regarding DA/AD conversions
2017.08.01 5.1 6.1.1 7.1.4 adopt Atari's use of "bootstrap" throughout
2017.08.01 3.2.1 explaining 2 sided floppy disks
2017.08.01 3.2.1 track 1 is outermost, 40 the innermost, thx Laurent Delsarte
2017.07.31 6.11 48K boards contain 64KiB in chips
2017.07.31 6.11 Calisto Computers 32K and 48K boards
2017.07.30 6.11 added Maplin/Mapsoft 48K RAM card
2017.07.30 11.1 APX Calculator was the same as the main product line version
2017.07.30 1.2 - 1.10 and 1.12 ANTIC versions
2017.07.29 11.1 6502 and 6520 introductions
2017.07.29 1.12 6502 and PIA discussions revisited
```

TO DO? LIST

- Finish building complete parallel interface list
 - Build complete RS232 interface list
        THIS INFO TO MOVE TO NEW RS-232 INTERFACE SECTION:
        (Datatari / Multi-Viewterm by Miracle Technology, later by
        Gralin International, used to access Prestel online service in the UK;
        DATARI will open up the full world of VIEWDATA systems including PRESTEL,
        TELECOM GOLD and others.
        Datatari RS232 interface, software by Matthew Jones
        hardware also supported by the Communications module of Mini Office II
         by Database Software (1987)
        Digital Devices U-Call Model A
- SIO bus - move info from 1.17 to its own section
- Atari Cartridge
   - Diagnostic cartridges, eg Star Raiders, Basketball
   - In his Antic Podcast interview, Crane calls bit 7 of the option byte
     the "Al Miller bit"
- Boot cartridge/disk/cassette formats
- DOS 2 binary file format
- Commercial telecommunications programs
- Remove unwanted sections - pruning
- re-standardize $ vs US$
- rough memory map, including Axlon, Mosaic, 130XE banking
- programs supporting Axlon or Mosaic banked memory
   Axlon list: OmniWriter,
   Mosaic list: RAMbrandt
- How can I run CP/M on the Atari?
   Note: SDX 4.46+ can read Indus CP/M disks
- Mass Storage: Re-Writable Cartridges
- "ramdisk" standardization

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1) Computers & Custom chipsets

1.1) What is an Atari 8-bit computer?

Based in Silicon Valley in the USA, the company known as Atari produced a line of home 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 included the 400, 800, 1200XL, 600XL, 800XL, 65XE, 130XE, 800XE, and the XE game system.

For basic marketplace context, here are the release years of the 8-bit Atari computers alongside release years of significant competing home/personal computers. Note: Market dynamics varied substantially around the world.
1977: Apple II, Commodore PET, Radio Shack TRS-80
1978: ARI Cybervision 2001
1979: Atari 400/800, Apple II Plus, Texas Instruments TI-99/4
1980: Radio Shack TRS-80 Model III, TRS-80 Color Computer, Sinclair ZX80
1981: Acorn BBC Micro, Commodore VIC-20, IBM PC, Osborne 1, Sinclair ZX81,
      Texas Instruments TI-99/4A
1982: Commodore 64, Kaypro II, Sinclair ZX Spectrum
1983: Atari 1200XL/600XL/800XL, Acorn Electron, Apple IIe, Coleco Adam, MSX,
      IBM PC XT, Radio Shack TRS-80 Model 4, TRS-80 Color Computer 2
1984: Amstrad CPC, Apple IIc, Apple Macintosh, IBM PCjr, IBM PC AT
1985: Atari 65XE/130XE, Atari 520ST, Commodore 128, Commodore Amiga
1986: Atari 1040ST, Apple Macintosh Plus, Tandy Color Computer 3
1987: Atari 800XE, Acorn Archimedes, Atari Mega ST, Apple Macintosh II,
      Apple Macintosh SE, Commodore Amiga 500, IBM PS/2

1987 also saw the release of the Atari XE game system, competing alongside Atari's own 7800 (released in 1986) and legacy 2600 (available since 1977) systems, and competing directly against the leading home gaming consoles of the time, the Nintendo Entertainment System and the Sega Master System.

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 in the worlds of home and business personal computing, 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. All of these but the 5200, however, do share (essentially) the same joystick/ controller hardware port.

While the 5200 controller ports are different, the 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 16KiB of RAM, fixed 32KiB ROM cartridge size, a physically different cartridge port, and a much smaller 2KiB operating system.

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

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

```
CPU CLOCK RATE:
      1.7897725MHz (NTSC machines)
      1.7734470MHz (PAL/SECAM machines)

FRAME REFRESH RATE:
      59.94Hz (NTSC machines)
      49.86Hz (PAL/SECAM machines)

MACHINE CYCLES per FRAME:
      29859 (NTSC machines) (1.7897725MHz / 59.94Hz)
      35568 (PAL/SECAM machines) (1.7734470MHz / 49.86Hz)

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

MACHINE CYCLES per SCAN LINE
      114          (NTSC machines: 29859 cycles/frame / 262 lines/frame;
                   PAL/SECAM machines: 35568 cycles/frame / 312 lines/frame)

COLOR CLOCKS per MACHINE CYCLE
      2

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

MAXIMUM SCAN LINE WIDTH = "WIDE PLAYFIELD"
      176 color clocks

MAXIMUM RESOLUTION = GRAPHICS PIXEL
      0.5 color clock

MAXIMUM HORIZONTAL FRAME RESOLUTION
      352 pixels (176 color clocks / 0.5 color clock)

MAXIMUM VERTICAL FRAME RESOLUTION
      240 pixels (240 scan lines per frame)

GRAPHICS MODES:
ANTIC    GTIA    Atari OS    Display    Resolution       Colors
Mode #   Mode #  Mode #      Type       (full screen)    (Color Registers)
------------------------------------------------------------------------
  2                 0         Char       40 x 24          3 *
  3                 -         Char       40 x 19          3 *
  4                12 ++      Char       40 x 24          5
  5                13 ++      Char       40 x 12          5
  6                 1         Char       20 x 24          5
  7                 2         Char       20 x 12          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 ++      Map        160 x 192        2
  D                 7         Map        160 x 96         4
  E                15 ++      Map        160 x 192        4
  F                 8         Map        320 x 192        3 *
  F        1 +      9         Map        80 x 192         16 or 8 **
  F        2 +     10         Map        80 x 192         9
  F        3 +     11         Map        80 x 192         16 ***
  + GTIA Modes require GTIA chip or FGTIA chip
    (With CTIA these modes are considered valid by the OS but do not work.)
 ++ Supported by the XL OS (not supported by the 400/800 OS)
  * 2 of the 3 available color registers share the same color/hue in this mode
 ** GTIA: 16 luminances of one color/hue
    FGTIA: 8 luminances of one color/hue
*** 16 colors/hues all sharing the same luminance
```

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 except 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 independendly 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.

    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.

1.2) What is the Atari 400?

Introduced in January 1979 alongside the Atari 800 and shipped that 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 8KiB RAM, but most were sold with 16KiB 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:
 - 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)

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:
 o Domestic version for NTSC M television (North America)
    - 1979-1981 systems shipped with:
      - 8KiB of RAM
      - Atari BASIC Programming Language cartridge CXL4002
      - Atari BASIC (Wiley Self-Teaching Guide) book C014385
      - Atari 400 Operator's Manual C014768 (C014768)
    - 1981-1983 systems shipped with:
      - 16KiB of RAM
      - The Basic Computer Owner's Guide C017711
    - Most units: 6502 MPU (MOS Technology MCS6502A or equivalent), C014377

Late units: 6502 MPU (Atari SALLY), C014806
          - ANTIC NTSC version, C012296
          - Early units: CTIA, C012295
            Most units: GTIA NTSC version, C014805
          - 10KiB 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
      o PAL versions for PAL B/G television (Europe) or PAL I television (UK)
          - Shipped 1981-1983
          - 16KiB RAM
          - 6502 MPU (Atari SALLY), C014806
          - ANTIC PAL 'A' version, C014887
          - GTIA PAL version, C014889
          - 10KiB 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
          - "Peritel" PAL version for France has a second built-in TV connecting
            cable for Peritel TV input. (limited-palette RGB video)
              - http://www.atariage.com/forums/index.php?showtopic=62346&st=25
              - http://preview.tinyurl.com/ngsxhd8
              - Rare! See L'Atarien #7 p33 for further reference
          - The Atari 400 Computer Owner's Guide C060200 (C060200)

Additional Manuals:
 - Atari 400/800 Personal Computer System Service Manual
      - August 1980
      - 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: Used with an external 9 volt AC transformer power supply rated for at
least 19 watts: Atari CA014748 or equivalent.

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, Sunnyvale CA from
November 1979 to May 1983, and was also made by Atari-Wong Co. 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 in January 1979 alongside the Atari 400 and shipped that 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 8KiB RAM, many were sold with 16KiB, and
later on 48KiB 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 8KiB, 16KiB, 24KiB, 32KiB, 40KiB, or 48KiB were thus supported by Atari.

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

System initialization types supported:
 - Memo Pad: Turn on computer with no cartridge(s) inserted and no powered
   disk drive #1.
 - Cartridge: Turn on computer with cartridge(s) inserted.
 - Cassette boot: (boot cassette may or may not require cartridge(s) 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(s) inserted)
     Turn on computer with boot disk inserted in powered disk drive #1.

Versions of the Atari 800:
  o Domestic version for NTSC M television (North America)
     - 1979-1980 systems shipped with:
        - 8KiB of RAM as one CX852 Memory Module
        - 410 Program Recorder
        - Educational System Master Cartridge CXL4001
        - Atari BASIC Programming Language cartridge CXL4002
        - Atari BASIC (Wiley Self-Teaching Guide) book C014385
        - Atari 800 Operator's Manual C014769 (C014769)
     - 1980-1982 systems shipped with:
        - 16KiB of RAM as one CX853 Memory Module
        - Atari BASIC Programming Language cartridge CXL4002
        - Atari BASIC (Wiley Self-Teaching Guide) book C014385
        - BASIC Reference Manual C015307
        - The Atari 800 Home Computer Owner's Guide C060057 (C060057) REV.1
          (17 pages)
     - 1982-1983 systems shipped with:
        - 48KiB of RAM as 3 CX853 Memory Modules (slot compartment screwed
          shut)
        - The Atari 800 Home Computer Owner's Guide C060057 (C060057) REV.A
          (13 pages)
     - Most units: 6502 MPU (MOS Technology MCS6502A or equivalent), C014377
       Late units: 6502 MPU (Atari SALLY), C014806
     - ANTIC NTSC version, C012296
     - Early units: CTIA, C012295
       Most units: GTIA NTSC version, C014805
     - CX801 10K ROM Personality Module
     - 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
  o PAL versions for PAL B/G television (Europe) or PAL I television (UK)
     - Shipped 1981-1983
     - 16KiB RAM (earlier units) or 48KiB RAM (later units)
     - 6502 MPU (Atari SALLY), C014806
     - ANTIC PAL 'A' version, C014887
     - GTIA PAL version, C014889
     - CX801-P 10K ROM Personality Module
     - 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)
     - "Peritel" PAL version for France has an added internal Peritel Adaptor
       board CA061034, and added "Peritel" monitor port on the left side of
       the unit toward the rear. (limited-palette RGB video)
     - Discussions:

  - Pictures: http://msx.fab.free.fr/mpc2/atari/patari80.htm
  - Rare! See L'Atarien #7 p33 for further reference
  - The Atari 800 Home Computer Owner's Guide C060497 (C060497)

4 different types of 800 keyboards were nicely documented by ACML here:
http://www.atariage.com/forums/index.php?showtopic=105170

Additional Manuals:
 - Atari 400/800 Personal Computer System Service Manual
    - August 1980
    - 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: Used with an external 9 volt AC transformer power supply rated for at
least 19 watts: Atari CA014748 or equivalent.

The 800 was manufactured at Atari's plant at 1173 Borregas, Sunnyvale CA from
December 1979 to May 1983 (most units), and late units were made by
Atari-Wong Co. in Hong Kong in May-June 1983 (rare). Serial numbers:
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
intended to eventually replace the Atari 800 while maintaining compatibility
with the earlier model.

Innovations relative to the 400/800 include a full 64KiB of RAM and a
significantly revised XL Operating System (ROM expanded from 10KiB to 14KiB).

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]). 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

    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:
 - Self Test program
 - Text screen fine scrolling is available
 - The Resident Diskette Handler can read/write disk sectors having variable

length from 1 to 65536 bytes.
          Default = 128 bytes (matching the 400/800 static value)
    - The Resident Diskette Handler can write a sector to the disk without a
      read-verify operation always following it.
    - Universal OS for both NTSC and PAL systems (including independent values
      for cassette timings and for keyboard auto-repeat functions)

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:
    - The 1200XL lacks +12V on SIO pin 12, as was available on the 400/800.
    - On the 1200XL the +5V/Ready line (pin 10) on the SIO port supplies enough
      current for the Ready ("Computer On") function but not enough current for
      peripherals designed to use the line as their power source.
      ("FIX": Replace 100 Ohm resistor R63 with a 0 Ohm to 1 Ohm resistor, or a
      jumper wire.)

The labels on several of the 1200XL keyboard keys differ slightly from those
of the 400/800:   400/800   1200XL
                         [CTRL]   --> [CONTROL]
                         [SYSTEM RESET]   --> [RESET]
                         [CAPS LOWR]   --> [CAPS]
                         [DELETE BACK S]   --> [DELETE BACK SPACE]
                         "Atari logo" key --> "Inverse video" key

System initialization types supported:
    - "ATARI" rainbow logo/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:
    o Domestic version for NTSC M television (North America)
        - 6502 MPU (Atari SALLY), C014806
        - ANTIC NTSC version, C012296
        - GTIA NTSC version, C014805
        - 14KiB Operating System ROM, C060616 + C060617
            - Floating Point Package (FPP) included, identical to the 400/800 FPP
            - Most units: XL OS Rev. A
            - Rare units: XL OS Rev. B
        - Monitor port is Atari 5-pin
            - Lacks the chrominance video signal on pin 5
        - 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

Power: Used with an external 9 volt AC transformer power supply, input power
31 VA; shipped with Atari CA017964.

Manuals:
    - The Atari 1200XL Home Computer Owner's Guide C061418
    - Atari 1200XL Home Computer Field Service Manual FD100217

1200XL visual tour:
http://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.

The 1200XL was manufactured at Atari's plant at 1215 Borregas, Sunnyvale CA 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 the low-end machine that would replace the Atari 400 while maintaining compatibility with the earlier model.

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.

Available current on the +5V/Ready line (pin 10) on the SIO port of the 600XL/800XL matches that on the 400/800, restoring compatibility with SIO peripherals designed to draw power from that line which would not work on the 1200XL.

The 600XL contains 16KiB RAM. The Atari 1064 Memory Module expands the 600XL from 16KiB to 64KiB RAM.

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:
   o Domestic version for NTSC M television (North America)
       - 6502 MPU (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
       - 14KiB Operating System ROM: XL OS Rev.1, C062024
       - Atari BASIC Rev. B (8KiB ROM), C060302
       - 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
   o PAL versions for PAL B/G television (Europe) or PAL I television (UK)
       - 6502 MPU (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
            - 14KiB Operating System ROM: XL OS Rev.1, C062024
            - Atari BASIC Rev. B (8KiB ROM), C060302
            - Monitor port is Atari 5-pin
               - Lacks the luminance video signal on pin 1
               - Lacks the chrominance video signal on pin 5
            - 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).
               - Rare variant: RF channel 3 (PAL B Finland version)
            - RF Cable for TV connection supplied with computer
         o  SECAM version (France)  ("Pauline")
            - Announced by Atari, Inc. but never shipped
```

Rare variations of the 600XL:
   o Some late-model 600XLs were sold with 64KiB RAM. These may have only
appeared in Canada. The box had a round gold foil sticker reading:
"64k Memory -- Now with a full 64k of memory built-in."

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

Manuals:
 - The Atari 600XL Home Computer Owner's Guide C061530 (21 pages)
 - Atari Computer 600XL C061946 (international; 61 pages)
 - Atari Computer 600XL and Atari Computer 800XL Connection Instructions for
   PAL TV Systems C061947 (international)
 - Atari Computer 600XL Connection Instructions for NTSC TV Systems C062228
   (international)
 - Atari 600XL Computer Field Service Manual FD100610 REV.1 October 1983

The 600XL was made by Chelco Sound (Hong Kong) Limited from July to November
1983 (early NTSC units with 7YJ serial numbers), by Atari-Wong Co. in Hong
Kong from September 1983 to April 1984 (most NTSC/PAL units), and by Atari
Taiwan Manufacturing Corp. in July 1984 (rare late PAL units).

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).
(See MyAtari Magazine, January 2003.)

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
would replace the Atari 800 while maintaining compatibility with the earlier
model. Small quantities of 800XL computers shipped in the U.S. late in 1983,
before mass shipments commenced worldwide late winter/early spring, 1984.

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.

Available current on the +5V/Ready line (pin 10) on the SIO port of the
600XL/800XL matches that on the 400/800, restoring compatibility with SIO
peripherals designed to draw power from that line which would not work on the
1200XL.

The 800XL contains 64KiB RAM.

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:
    o Domestic version for NTSC M television (North America)
       - 6502 MPU (Atari SALLY), C014806
       - ANTIC NTSC 'E' version, C021697
         - Substituted in earlier units: ANTIC NTSC version, C012296
       - GTIA NTSC version, C014805
       - Monitor port is Atari 5-pin
         - Lacks the chrominance video signal on pin 5
       - 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
       - 14KiB Operating System ROM
         - Early units: XL OS Rev.1, C062024
         - Most units: XL OS Rev.2, C061598
       - Atari BASIC (8KiB ROM)
         - Most units: Atari BASIC Rev. B, C060302
         - Late units: Atari BASIC Rev. C, C024947
       - Some internal pics:
         http://atarinside.dyndns.org/gallery2/main.php?g2_itemId=74
    o PAL versions for PAL B/G television (Europe) or PAL I television (UK)
       - Late unit motherboards (9/84 revision): "800XLF"
       - 6502 MPU (Atari SALLY), C014806
       - ANTIC PAL 'B' version, C021698
         - Substituted in earlier units: ANTIC PAL 'A' version, C014887
       - GTIA PAL version, C014889
       - Monitor port is Atari 5-pin
         - Earlier units: Lacks the chrominance video signal on pin 5
         - Later units: Pin 5 is connected 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
       - 14KiB Operating System ROM
         - Early units: XL OS Rev.1, C062024
         - Most units: XL OS Rev.2, C061598
       - Atari BASIC (8KiB ROM)
         - Most units: Atari BASIC Rev. B, C060302
         - Late units: Atari BASIC Rev. C, C024947
       - Visual tour:
         http://www.atari800xl.eu/hardware/computers/pal-atari-800xl.html
       - More internal pics:
         http://atarinside.dyndns.org/gallery2/main.php?g2_itemId=73
    o SECAM version (France)
       - Motherboard: "SECAM ROSE"
       - 6502 MPU (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
- 14KiB Operating System ROM: XL OS Rev.2, C061598
- Atari BASIC Rev. C (8KiB ROM), C024947
- Visual tour:
  http://www.atari800xl.eu/hardware/computers/secam-atari-800xl.html
- More internal pics:
  http://atarinside.dyndns.org/gallery2/main.php?g2_itemId=15

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

Manuals:
- The Atari 800XL Home Computer Owner's Guide C061859 (22 pages)
- Atari Computer 800XL C024450 (international; 64 pages)
- Atari Computer 600XL and Atari Computer 800XL Connection Instructions for PAL TV Systems C061947 (international)
- Atari Home Computers Connection Instructions for SECAM Television Systems C025342 (EN, FR) (1984)
- Atari 800XL Computer Field Service Manual FD100740
  - REV. 01 February 1984
  - REV. 02 June 1985

The 800XL was made by Atari-Wong Co. in Hong Kong from November 1983 to April 1984 (NTSC/PAL units), by Chelco Sound (Hong Kong) Limited from January to May 1984 (NTSC units with 7YJ serial numbers), and by Atari Taiwan Manufacturing Corp. from March 1984 to April 1985 (NTSC/PAL/SECAM units). 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, 65XEP (never shipped), and 65XEM (announced but not shown; never shipped), 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 64KiB RAM, and has the Atari XL OS and Atari BASIC on ROM.

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 labeled [Delete Bk Sp] on the 65XE/130XE.

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:
   o  Domestic version for NTSC M television (North America)
      - Most units: No ECI
        Late units: NTSC 130XE motherboard (including ECI, but only 64KiB RAM)
      - 6502 MPU (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
      - 14KiB Operating System ROM
         - Most units: XL OS Rev.2, C061598
         - Late units: XL OS Rev.3, C300717
      - Atari BASIC Rev. C (8KiB ROM), C024947
   o  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 64KiB RAM)
      - 6502 MPU (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
      - 14KiB Operating System ROM
         - Most units: XL OS Rev.2, C061598
         - Late units: XL OS Rev.3, C300717
      - Atari BASIC Rev. C (8KiB ROM), C024947
      - UK version also shipped in: Atari 65XE Home Computer Outfit
   o  Arabic Atari 65XE Najm for PAL television in Arabia
      - Reportedly widely sold in Saudi Arabia and Egypt
      - "65XEN" motherboard
      - ECI port
      - 6502 MPU (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
      - 14KiB Operating System ROM: XL OS Rev.3B (Arabic localized OS), C101700
      - Atari BASIC Rev. C (8KiB ROM), C024947
      - Visual tour:
        http://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/

Manuals:
 - Atari 65XE Personal Computer Owner's Manual C072018

The 65XE was made in Taiwan (common) and China (late production).
```

1.8) What is the Atari 130XE?

Introduced in January 1985 alongside the 65XE, 65XEP (never shipped), and
65XEM (announced but not shown; never shipped), 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 does not include the PBI port as on the 600XL/800XL, but it does
include the similar (though physically incompatible) Enhanced Cartridge
Interface (ECI).

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 labeled
[Delete Bk Sp] on the 65XE/130XE.

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

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:
  o Domestic version for NTSC M television (North America)
      - 6502 MPU (Atari SALLY), C014806
      - ANTIC NTSC 'E' version, C021697
      - GTIA NTSC version, C014805
      - 14KiB Operating System ROM
         - Most units: XL OS Rev.2, C061598
         - Late units: XL OS Rev.3, C300717
      - Atari BASIC Rev. C (8KiB 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
  o PAL versions for PAL B/G television (Europe) or PAL I television (UK)
      - 6502 MPU (Atari SALLY), C014806
      - ANTIC PAL 'B' version, C021698
      - GTIA PAL version, C014889
      - 14KiB Operating System ROM
         - Most units: XL OS Rev.2, C061598
         - Late units: XL OS Rev.3, C300717
      - Atari BASIC Rev. C (8KiB 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
  o SECAM version (France)
      - 6502 MPU (Atari SALLY), C014806

- ANTIC PAL 'B' version, C021698
    - FGTIA, C020120
    - 14KiB Operating System ROM
        - Most units: XL OS Rev.2, C061598
        - Late units: XL OS Rev.3, C300717
    - Atari BASIC Rev. C (8KiB 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

Manuals:
  - Atari 130XE Personal Computer Owner's Manual C025951
  - Atari 130XE Reference Manual (field service manual)

The 130XE was made in Taiwan (common) and China (late production).

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/800XE but without a keyboard. A companion XE System Keyboard
was produced and often sold with the Console.

The XE System Console offers 64KiB RAM, and has the Atari XL OS Rev.4 (14KiB),
Atari BASIC Rev. C (8KiB), and Missile Command (8KiB) all built-in on ROM (all
on a single 32KiB ROM chip; 2KiB is unused), C101687.

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/800XE 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)

```
Keyboard    Held down while pressing [Power]:
Attached    [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/MC 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/MC disabled
    Y           Y       Y      N      Disk #1 boot if present, BASIC enabled
    Y           Y       Y      Y      Cassette boot, BASIC enabled
     (table adapted from AtariAge post by Tomasz Krasuski, May 2014)
- 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:
  o Domestic version for NTSC M television (North America)
    - 6502 MPU (Atari SALLY), C014806
    - ANTIC NTSC 'E' version, C021697
    - GTIA NTSC version, C014805
    - 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
  o PAL versions for PAL B/G television (Europe) or PAL I television (UK)
    - 6502 MPU (Atari SALLY), C014806
    - ANTIC PAL 'B' version, C021698
    - GTIA PAL version, C014889
    - 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
  o SECAM version (France)
    - 6502 MPU (Atari SALLY), C014806
    - ANTIC PAL 'B' version, C021698
    - FGTIA, C020120
    - 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

The components of the XEgs were sold by Atari in several different packages,
which are listed in the broader "kits" listing in this FAQ list.
(see Atari User v3n9 p.28 for a partial list of packages)

Manuals:
 - Atari XE System Owner's Manual C100608 / C033514 (26 pages)
 - Atari XE System Keyboard Owner's Manual C100609 / C033513 (99 pages)

The XE System Console was made in Taiwan.

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 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 U.S.)

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 64KiB RAM, and has the Atari XL OS and Atari BASIC on ROM.

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 800XE:
   o PAL versions for PAL B/G television (Europe)
       - PAL 130XE motherboard (including ECI, but only 64KiB RAM)
       - 6502 MPU (Atari SALLY), C014806
       - ANTIC PAL 'B' version, C021698
       - GTIA PAL version, C014889
       - 14KiB Operating System ROM: XL OS Rev.3, C300717
       - Atari BASIC Rev. C (8KiB 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

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

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

The 800XE was made in Taiwan (common) and China (late production).

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 1400XL was introduced by Atari, Inc. alongside the 600XL, 800XL, and 1450XLD at the June 1983 Summer Consumer Electronics Show in Chicago, and 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".
Prototype units exist, but the 1400XL never shipped.
http://www.atarimuseum.com/computers/8BITS/XL/1400xl/1400.html

The 1450XLD was introduced by Atari, Inc. alongside the 600XL, 800XL, and 1400XL at the June 1983 Summer Consumer Electronics Show in Chicago, and originally promised to ship in October 1983. The 1450XLD was to provide the features of the 1400XL plus a built-in double sided, dual/enhanced density 260KiB 5.25" floppy disk drive, with expansion space for a second disk drive. Atari continued to promote the 1450XLD through June 1984. Earlier internal names at Atari for the 1450XLD: "6402", "1250", "1251", "1200XLD", "1250XLD", "1450XL". Prototype units exist, but the 1450XLD never shipped.
http://www.atarimuseum.com/computers/8BITS/XL/1450xld/1450xld.html

The 65XEP was introduced by Atari, Corp. alongside the 65XE and 130XE at the January 1985 Winter Consumer Electronics Show in Las Vegas. The portable 65XEP was to provide the features of the 65XE, plus built-in 5" monochrome CRT display and 360KiB 3.5" disk drive. The 65XEP never shipped, and possibly only the single original mockup display prototype unit ever existed.
http://www.cyberroach.com/cyromag/14/DSCN3934.jpg

The 65XEM was announced (but not shown) by Atari, Corp. at the January 1985 Winter Consumer Electronics Show in Las Vegas. 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 85)
 - Digital sample rate in excess of 30kHz. Over 60dB dynamic range.
 - Fundamental Frequency Range of 4.8Hz to 7.8kHz -10 2/3 octaves.
 - Fundamental Frequency Resolution of 1/64 semitones.
 - Precise control of harmonic amplitudes. 64 harmonics.
The 65XEM never shipped, and no more than a handful of prototype units may exist.
http://www.atarimuseum.com/computers/8bits/xe/xe_protos/65xem.html

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.

6502 MPU -- 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 2MHz) microprocessor unit (MPU). 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.

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 4MHz 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
 - Exidy Max-A-Flex coin-operated arcade conversion system
   (embedded Atari 600XL): Astro Chase, Boulder Dash, Bristles, Flip and Flop
 - Atari 7800

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


```
ANTIC  --   ANTIC NTSC (pre-'E'):C012296       ANTIC PAL 'A':C014887
=====            ANTIC NTSC 'E':C021697       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 p.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 a 7 bit refresh address counter for up to 128 row addresses, while the C021697/C021698 ANTIC use an 8 bit counter for up to 256 row addresses, thereby supporting a wider variety of DRAM chip types. Atari used DRAM types requiring the C021697/C021698 ANTIC in the 600XL and in some later production XE computers.
 - NMI (Non-Maskable Interrupt) control. 3 types of NMIs on the Atari are:
     1) Display List Interrupt (DLI)
     2) System Reset (key)
     3) Vertical Blank Interrupt (VBI)
 - Vertical and Horizontal fine scrolling
 - Light pen / light gun horizontal and vertical position registers
    - Updated upon pulse of any of the Joystick Trigger lines
       - Exception: 400 Controller Jacks 1-3 Trigger lines are not connected
         to ANTIC.
 - Vertical line counter
 - WSYNC (wait for horizontal sync) command -- allows the microprocessor to
   synchronize itself to the TV horizontal line rate

Other systems utilizing the Atari ANTIC chip:
 - Atari 5200
 - Exidy Max-A-Flex coin-operated arcade conversion system
   (embedded Atari 600XL): Astro Chase, Boulder Dash, Bristles, Flip and Flop

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


```
CTIA/GTIA/FGTIA  --   CTIA(NTSC):C012295       GTIA,PAL:C014889
===============       GTIA,NTSC:C014805    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 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 presense 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 3/15/82 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!, 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

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

Other systems utilizing the Atari GTIA chip:
 - Atari 5200
 - Exidy Max-A-Flex coin-operated arcade conversion system
   (embedded Atari 600XL): Astro Chase, Boulder Dash, Bristles, Flip and Flop

Technical documentation by Atari:
GTIA(NTSC) C014805: http://www.retromicro.com/files/atari/8bit/gtia.pdf
FGTIA:
ftp://ftp.pigwa.net/stuff/collections/nir_dary_cds/Tech%20Info/FGTIA.PDF

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 and controls selected maskable
interrupt (IRQ) requests from peripherals (other IRQs are handled by the PIA).

- 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
 - Exidy Max-A-Flex coin-operated arcade conversion system
    (embedded Atari 600XL): Astro Chase, Boulder Dash, Bristles, Flip and Flop
 - Atari Ballblazer and Commando cartridges for the Atari 7800

POKEY Technical documentation by Atari:
http://www.retromicro.com/files/atari/8bit/pokey.pdf

FREDDIE -- 800XL("800XLF" and SECAM),XE(all):C061922/C061991
=======
According to Atari's design specification (C061922), the "Freddie RAM" Memory
Control Unit (MCU) 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.

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: http://preview.tinyurl.com/z6xmjpj

6520 PIA -- MOS Technology MCS6520A or equivalent: C012298/C014795/C014812
========
The 8-bit Atari uses the MOS Technology MCS6520A (6520 rated for 2MHz) 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 2Mhz 6520 equivalent (replaced the C012298 part number)
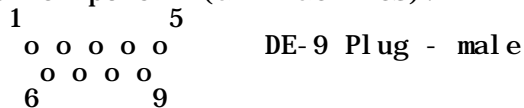   C014812 = 68B21 (Motorola MC6821 rated for 2 MHz) or equivalent.

```
Hardware manuals from Atari:
 - Hardware Manual
    - (c)1980 edition, 10/80
       - BLUE title page (printings with line-printed title page include
         date imprint; printing with Atari logo on title page lacks date)
       - Section VI.C. Schematics is published single-sided.
       - Pages B-10 and B-11 (Memory Configurations) are hand-drawn.
       - Included in earlier printings of C016555 Atari Personal Computer
         System Operating System User's Manual and Hardware Manual (official
         nickname: "Technical User's Notes"), including printings dated:
         November 1980 (orange cover page), August 1981 (cover page??),
         January 1982 (yellow cover page)
    - (c)1982 edition.  Identical to the 10/80 edition except:
       - BEIGE title page (with Atari logo)
       - Section VI.C. Schematics is published double-sided.
       - Pages B-10 and B-11 (Memory Configurations) are machine-produced.
       - Included in C016555 Rev. A (1982) Technical Reference Notes
 - De Re Atari: A Guide to Effective Programming
    - C060070, (c)1981 editions (early versions for registered developers)
      https://archive.org/details/DeReAtari_early_version
      https://archive.org/details/DeReAtari_Alternate_Early_Version
    - APX-90008, (c)1982 edition (common version sold via APX)
      http://www.atariarchives.org/dere/
    - Also published in German and French language editions
```

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

```
+---------+   +-+       +---------+
|  6502   |   |p|       |  ANTIC  +-<--- Controller Ports: Light Pen/Light Gun
|  MPU    +---+ +-----+ |         |
+---------+   |r|       +-+------+ +- Controller Ports: Triggers
              | |        +->-+ +---<-+   (Joystick/Driving/Trackball Triggers)
+---------+   |o|       +-----+-+-+-<--- Console Switches (Start/Select/Option)
|  RAM    +---+ |       |CTIA/GTIA+--->- Picture Output (to TV/Monitor)
|---------|   |c+-----+ /FGTIA   +--->- Sound Output (to TV/Monitor)
| 8-48KiB |   | |       +-----+---+--->- Console Speaker / to Sound Output
| /64KiB  |   |e|        +->-+
| /128KiB |   | |       +-+------+
+---------+   |s|       |  POKEY  +-<--- Keyboard
              | +-----+       +-<--- Controller Ports: Potentiometers
+---------+   |s|       +------+-+                 (Paddles, Touch Tablet)
|  ROM    +->-+ |            +-<SIO>+ Program Recorder
|---------|   |o|       +------+-+ | + Disk Drives
|  OS     |   | |       |  6520  | | + Printers
|10/14KiB |   |r+-----+ |  PIA   | | + Modem
|---------|   | |       +------+-+ | + 850 Interface
| BASIC   |   | |            +->- to Sound Output
|  8KiB   |   |b|
|---------|   | |       +------+ Controller Ports: Data Bits (Joysticks,
| Missile |   |u|              Paddle Triggers, Light Pen Button,
| Command |   | |              Driving, Touch Tablet Buttons,
|  8KiB   |   |s|              Trackballs, Light Gun Trigger, XEP80)
|---------|   +-+----------<PBI/ECI>+ 1064 Memory Module (600XL) (48KiB RAM)
|cartridge+---------------------<--- Left Cartridge (8KiB/16KiB ROM)
|0/8/16KiB+---------------------<--- Right Cartridge (8KiB ROM)
+---------+
```

```
NOTES
 *  6502 MPU: Most NTSC 400/800: MOS Technology MCS6502A or equivalent
              Late NTSC 400/800, all PAL 400/800, and all XL/XE: Atari SALLY
 *  ROM: 400/800: 10KiB 400/800 OS
         1200XL: 14KiB XL OS
         600XL/800XL/65XE/130XE/800XE: 22KiB (14KiB XL OS + 8KiB BASIC)
         XEgs: 30KiB (14KiB XL OS + 8KiB BASIC + 8KiB Missile Command)
 *  RAM: 400: 8KiB or 16KiB, or 48KiB with 48K RAM Expansion Kit
         800: 8KiB-48KiB using 1-3 CX852 8K RAM or CX853 16K RAM Memory Modules
         600XL: 16KiB, or 64KiB with 1064 Memory Module
         1200XL/800XL/65XE/800XE/XEgs: 64KiB
         130XE: 128KiB
 *   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 are the pinouts for the various connectors on the Atari?

```
Controller port 1 (all machines):
        1         5
         o o o o o          DE-9 Plug - male
          o o o o
        6         9
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 Scan 1 (POKEY) (returns values from 228 to 1)
    - Paddle #2 Position
    - Touch Tablet #1 Vertical Position
6. Trigger 0
    - Joystick #1 Trigger (CTIA/GTIA/FGTIA)
    - Driving Controller #1 Trigger (CTIA/GTIA/FGTIA)
    - Trackball #1 Triggers/Buttons (CTIA/GTIA/FGTIA)
    - 800/XL/XE (not 400): Light Pen/Light Gun Read (ANTIC)
7. +5V
8. Ground
9. Potentiometer Scan 0 (POKEY) (returns values from 228 to 1)
    - Paddle #1 Position
    - Touch Tablet #1 Horizontal Position
```
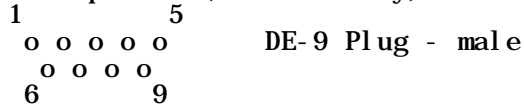
```
Controller port 2 (all machines):
        1       5
        o o o o o       DE-9 Plug - male
         o o o o
        6       9
1. PIA Port A Input/Output Bit 4
    - Joystick #2 Forward/Up
    - Driving Controller #2 Bit 0 (of 2-bit Gray code)
    - Trackball #2 X Direction (high=right low=left)
    - 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 Scan 3 (POKEY) (returns values from 228 to 1)
    - Paddle #4 Position
    - Touch Tablet #2 Vertical Position
6. Trigger 1
    - Joystick #2 Trigger (CTIA/GTIA/FGTIA)
    - Driving Controller #2 Trigger (CTIA/GTIA/FGTIA)
    - Trackball #2 Triggers/Buttons (CTIA/GTIA/FGTIA)
    - 800/XL/XE (not 400): Light Pen/Light Gun Read (ANTIC)
7. +5V
8. Ground
9. Potentiometer Scan 2 (POKEY) (returns values from 228 to 1)
    - Paddle #3 Position
    - Touch Tablet #2 Horizontal Position
```

```
Controller port 3 (400/800 only):
      1        5
      o o o o o       DE-9 Plug - male
       o o o o
      6        9
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 Scan 5 (POKEY) (returns values from 228 to 1)
    - Paddle #6 Position
    - Touch Tablet #3 Vertical Position
6. Trigger 2
    - Joystick #3 Trigger (CTIA/GTIA)
    - Driving Controller #3 Trigger (CTIA/GTIA)
    - Trackball #3 Triggers/Buttons (CTIA/GTIA)
    - 800 (not 400): Light Pen/Light Gun Read (ANTIC)
7. +5V
8. Ground
9. Potentiometer Scan 4 (POKEY) (returns values from 228 to 1)
    - Paddle #5 Position
    - Touch Tablet #3 Horizontal Position
```

```
Controller port 4 (400/800 only):
       1        5
        o o o o o        DE-9 Plug - male
          o o o o
        6        9
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 Scan 7 (POKEY) (returns values from 228 to 1)
     - Paddle #8 Position
     - Touch Tablet #4 Vertical Position
6. Trigger 3
     - Joystick #4 Trigger (CTIA/GTIA)
     - Driving Controller #4 Trigger (CTIA/GTIA)
     - Trackball #4 Triggers/Buttons (CTIA/GTIA)
     - Light Pen/Light Gun Read (ANTIC)
7. +5V
8. Ground
9. Potentiometer Scan 6 (POKEY) (returns values from 228 to 1)
     - Paddle #7 Position
     - Touch Tablet #4 Horizontal Position

Serial I/O (SIO) / Peripheral port (all machines, also peripherals):
       2            12
        o o o o o o        Atari proprietary plug - male
         o o o o o o o
        1              13
1. Computer Clock Input (POKEY)    8. Motor Control (PIA)
2. Computer Clock Output (POKEY)   9. /Proceed (PIA)
3. Computer Data Input (POKEY)    10. +5V/Ready,
                                      50mA current rating except 1mA on 1200XL
4. Ground                         11. Audio Input (175mV)
5. Computer Data Output (POKEY)   12. 400/800: +12V, 300mA current rating
   (normally digital, but can also     XL/XE: Not Connected
   be two-tone audio for cassette data)
6. Ground                         13. /Interrupt (PIA)
7. /Command (PIA)
```
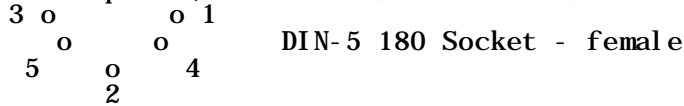
```
Monitor port (all but 400, NTSC 600XL, SECAM 800XL/130XE/XEgs):
    3 o      o 1
      o      o          DIN-5 180 Socket - female
    5    o    4
         2
1. Composite Luminance ("Y") (PAL 600XL: Not Connected)
2. Ground
3. Audio Output
4. Composite Video (NTSC or PAL standard)
5. Composite Chrominance ("C"; NTSC or PAL standard) (1200XL: Not Connected;
        PAL 600XL: Ground; all but very late-production 800XL: Not Connected)

Monitor port, Peritel (PAL 800 Peritel only):
  - Thanks Laurent Delsarte for cable verification
  - Socket picture:
      http://msx.fab.free.fr/mpc2/atari/photo8b/atari800/atari800palcote2.jpg
       7      6
        o 8 o
    3 o  o  o 1          DIN-8 270 Socket - female
        o    o
       5   o   4
           2
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):
      5          1
       o  6  o
          o              DIN-6 240 Socket - female
       o      o
      4    o    2
            3
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):
       7      6
        o   o
    3 o      o 1          DIN-7 270 Socket - female
        o   o
       5  o   4
          2
1. +5V          5. Ground
2. Shield       6. +5V
3. Ground       7. Ground
4. +5V
```
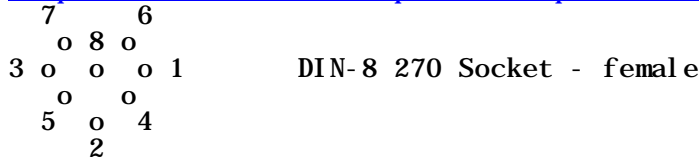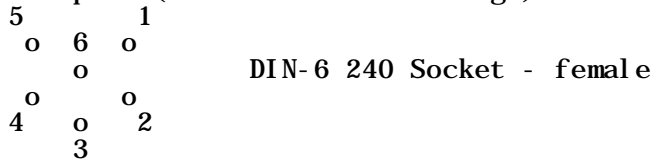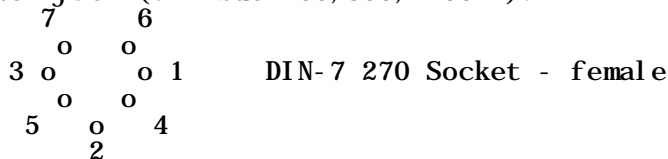
```
Cartridge slot (present on all machines; Left Cartridge/Cartridge A on 800):
      A  B  C  D  E  F  H  J  K  L  M  N  P  R  S
      -  -  -  -  -  -  -  -  -  -  -  -  -  -  -        Edge Connector 15/30
      -  -  -  -  -  -  -  -  -  -  -  -  -  -  -        .100 Centers
      1                                      15
  1.  /S4 Select $8000-$9FFF          A.  RD4 RAM Deselect $8000-$9FFF
                                           except 400: 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    R.  400/800/1200XL: R/W Early
      except 400: Not Connected            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
      -  -  -  -  -  -  -  -  -  -  -  -  -  -  -        .100 Centers
      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
```

```
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

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
```

```
RAM Module Slot 2 (middle RAM slot; 800 only):
    A   B   C   D   E   F   H   J   K   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

RAM Module Slot 3 (rear RAM slot; 800 only):
    A   B   C   D   E   F   H   J   K   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. Not connected
 13. R/W Late 2,3                              P. D6XX /CS Chip Select $D6xx
 14. Phi2 Phase 2 clock                        R. Not connected
 15. RASTIME Row Address Strobe Time           S. Not connected
 16. R/W Early                                 T. 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
```

```
Parallel Bus Interface (PBI) (600XL and 800XL only):
 1                                                               49
 - - - - - - - - - - - - - - - - - - - - - - - - -
 - - - - - - - - - - - - - - - - - - - - - - - - -
 2                                                               50
                    Edge Connector 25/50
   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                     48. 600XL: +5V
      800XL: Reserved                    800XL: Reserved
  49. AUDIO Audio In (Input)         50. GND Ground

Enhanced Cartridge Interface (ECI)/Expansion port (130XE, 800XE, & many 65XE)
      A  B  C  D  E  F  H          Edge
      -  -  -  -  -  -  -          Connector
      -  -  -  -  -  -  -          7/14
      1                 7
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

Keyboard port (XE System Console only):
      8        1
      o o o o o o o o      DA-15 Plug - male
       o o o o o o o        - pin numbering reverse of standard
      15       9
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)
```

1.15) 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/

```
Atari 400/800 hardware designers:
Steven T. Mayer       - Chief system inventor/architect
Jay G. Miner          - Project manager, system architecture
Douglas G. Neubauer   - POKEY designer (also wrote Star Raiders)
Joseph C. Decuir      - System co-inventor/co-architect; ANTIC designer
George McLeod         - CTIA/GTIA logic designer
R. Scott Scheiman     - Digital circuit designer; serial bus protocol
Francois Michel       - ANTIC logic co-designer
M. John Ellis         - Vice president (VP) of engineering
Wade B. Tuma          - Director of engineering
Niles E. Strohl       - Project engineering
John Vurich           - Product planning manager
Kevin P. McKinsey     - 800 industrial designer (case)
Hugh M. Lee           - 800 industrial designer (case)
Jeffery O. Nelson     - 400 industrial designer (case)
Douglas A. Hardy      - 400 industrial designer (case)
 - Other notable contributors:
    - VP research and development Al Alcorn
    - Director of microelectronics Robert J. Brown
    - Programmers Al Miller, Larry Kaplan, Bob Whitehead
    - Coin-Op Division engineers Dave Stubben, Mike Albaugh
    - Cyan Engineering unit engineers including Ron Milner
 - Chipset development technicians: Jim Luby (ANTIC), Steve Smith (CTIA),
   Mark Shieu (POKEY), Steve Stone (POKEY), Delwin Pearson (POKEY)

Atari 1200XL hardware designers:
Steven T. Mayer       - VP Research & product development
Gene B. Rosen         - VP engineering
David R. Stubben      - VP engineering
Larry Plummer         - Director of Engineering, production specification
David Owen Sovey      - Project engineering, production specification
Ajay Chopra           - System architect, production specification
Mark Lutvak           - Product manager, Director of Product Management
Regan L. Cheng        - Industrial designer (case)

Atari 600XL/800XL hardware designers:
Steven T. Mayer       - Atari SVP engineering, WCI Labs president
Gregg Squires         - Project Manager
Robert (Bob) Card     - Principal Engineer
Steven Ray            - Critical Electronics Layout Designer
Joel Moskowitz        - Mechanical Engineer
Philippe des Rioux    - Project engineer
Glenn Boles           - Project engineer
Ajay Chopra           - Parallel Bus Interface specification
Andrew Soderberg      - Product marketing manager
Regan L. Cheng        - Industrial designer (cases)

Atari 800XL("800XLF","SECAM ROSE")/65XE/130XE hardware designers:
Phil Suen             - Director of engineering, XL/XE line
Vincent H. Wu         - Project manager
David Owen Sovey      - Project engineer
Richard C. Pasco      - FREDDIE logic design
Bryan Kerr            - Product marketing manager
Ira Velinsky          - Industrial designer (XE cases)

XEgs/800XE hardware designers:
Jose A. Valdes        - Development engineer
Ira Velinsky          - Industrial designer (cases)
```

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

2) Monitors & Video

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

    Systems BGIL: o 625 scan lines per frame
              o 576 scan lines of video per frame including overscan
              o 312 scan lines per field (frame = two interlaced fields)
              o 288 scan lines of video per field including overscan
              o 50 fields per second = 50Hz
                 (refresh rate corresponds to household electricity standard)
              o Complete frame refresh rate = 25 fps
              o 4:3 aspect ratio
              o While G and I used the same UHF channel frequencies for
                 video carriers, they each used different audio carrier
                 frequencies for the same channels.
              o B was used with VHF channels, while G was used with UHF
                 channels. B/G were used together in most of western Europe.
              o System I was used in the UK over UHF channels only.
                 (The UK used System A over VHF channels until 1985.)
              o System L was used in France over UHF only until 1984, with
                 VHF switching from System E to System L in 1984.

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 or 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.

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: 60Hz (System M compatible) or 50Hz (Systems B/G/I/L compatible).

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

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

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

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

    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 (Germany, Finland) use:
 - 55.25MHz video/60.75MHz audio - TV Channel 3 standard (400, some 600XL)
 - 62.25MHz video/67.75MHz audio - TV Channel 4 standard

(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; 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).

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.

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: 60Hz on
NTSC computer versions or 50Hz on PAL computer versions. Any computer
monitor, television, or video receiver that accepts a standard 60Hz or 50Hz
(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
programs.

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 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.

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 Peritel version has a built-in TV connecting cable that terminates
with a Peritel connector. The 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                            _20_____2_
     8.  Slow Switching (+12V = AV Mode 4:3) \ o o o o o o o o o o |
    11.  RGB Green                        (21)\ o o o o o o o o o o|
    15.  RGB Red                             19-----------------1
    16.  Fast Switching (High / +1-3V = RGB)
    17.  Video Ground              Not connected: pins 1-5, 9-10, 12-14, 18-19
    20.  RGB Sync
```
  see: http://atariage.com/forums/topic/252426-400pal-with-rf-and-scartperitel/

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:
```
     4.  Audio Ground
     6.  Audio (mono)
     7.  RGB Blue                            _20_____2_
     8.  Slow Switching (+12V = AV Mode 4:3) \ o o o o o o o o o o |
    11.  RGB Green                        (21)\ o o o o o o o o o o|
    15.  RGB Red                             19-----------------1
    16.  Fast Switching (High / +1-3V = RGB)
    17.  Video Ground                  Ground: 4, 5, 9, 13, 17, 18
    20.  RGB Sync                      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)                    _20_____2_
 4. Audio Ground (tied to pin 17)            \ o o o o o o o o o o o
 6. Audio (tied to pin 2)               (21)\ o o o o o o o o o o o |
 8. Slow Switching (+12V = AV Mode 4:3)       19------------------1
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
```

2.4) What were the Atari XC1411 and XM128 monitors?

The Atari XC1411 monitor was shown at the January 1985 Winter Consumer Electronics Show in Las Vegas. It 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.

The Atari XM128 monitor was shown at the January 1985 Winter Consumer Electronics Show in Las Vegas. It was a 12" green monochrome composite monitor, styled to match the Atari XE computers, suitable for high-resolution 80-column text display. The XM128 never shipped, and no more than a handful of prototype units may exist.

2.5) What is artifacting?

The term TV artifacts refers to a spot or "pixel" on the screen that displays a different color than the one assigned to it. --De Re Atari, page D-1

There are two different types of artifacting associated with the Atari.

The first type is considerably more intuitive. Color cathode ray tube (CRT) televisions and computer displays generate color by exciting red, green, and blue phosphors arranged in either an aperture grille pattern (vertical wires) or a shadow mask pattern (triads of dots).
    http://en.wikipedia.org/wiki/Aperture_grille
    http://en.wikipedia.org/wiki/Shadow_mask
The density of the phosphors defines the "dot pitch" of the display device. If a video signal source defines a spot or pixel that is smaller than the dot pitch of the display device, then accurate color cannot be reproduced by that display device in that precise spot on the screen. This type of artifacting is relatively minor with the Atari because of the relatively low resolution of Atari graphics modes in comparison to the dot pitch of CRT display devices.

NTSC Atari computers exhibit a considerably more profound type of artifacting than the above. The following is 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.
=-=-=-=-=-=
This section discusses how to get multiple colors out of a single color graphics mode through the use of television artifacts.

The ANTIC modes with which this can be accomplished are 2, 3, and 15. ANTIC mode 2 corresponds to BASIC mode 0, ANTIC mode 15 is BASIC mode 8, and ANTIC mode 3 has no corresponding BASIC mode. 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.

A simple example of artifacts using the Atari computer is shown by entering the following lines:
```
GRAPHICS 8
COLOR 1
POKE 710,0
PLOT 60,60
PLOT 63,60
```

These statements will plot two points on a black background; however each pixel will have a different color.

To understand the cause of these differing colors one must first understand that all the display information for the television display is contained in a modulated television 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 phaseshifted 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.

The color signal oscillates at a constant rate of about 3.579MHz, thus defining the highest horizontal color resolution of a television set. This appears on the screen in the form of 160 visible color cycles across one scan line. (There are actually 228 color cycles including the horizontal blank and sync, and any overscan.)

The 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 graphics mode 7 is an example of one color clock resolution, where each color clock pixel can be a different color. (There are microprocessor limitations though.)

Atari also offers a "high resolution" mode (GRAPHICS 8) that displays 320 pixels across one line. This is generated by varying the amplitude of the luminance signal at about 7.16MHz, which is twice the color frequency.

Since the two signals are theoretically independent, one should be able to assign a "background" color to be displayed and then merely vary the luminance on a pixel-by-pixel basis. This in fact is the way mode 8 works, the "background" color coming from playfield register 2, and the luminances coming from both playfield registers 1 and 2.

The problem is that in practice the color and luminance signals are not independent. They are part of a modulated signal that must be demodulated to be used. Since the luminance is the primary 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. Moreover, that color cannot be altered from the transmitting end of the signal (the Atari computer).

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 pixel->│        │        │         │
                  │           │        │        │         │

   Luminance          0         1        0        0    1/2 cc pixel color A
   (0=off,            1         0        0        0    1/2 cc pixel color B
    1=on)             1         1        0        0      1 cc pixel color C
                      0         1        1        0      1 cc pixel color D
```
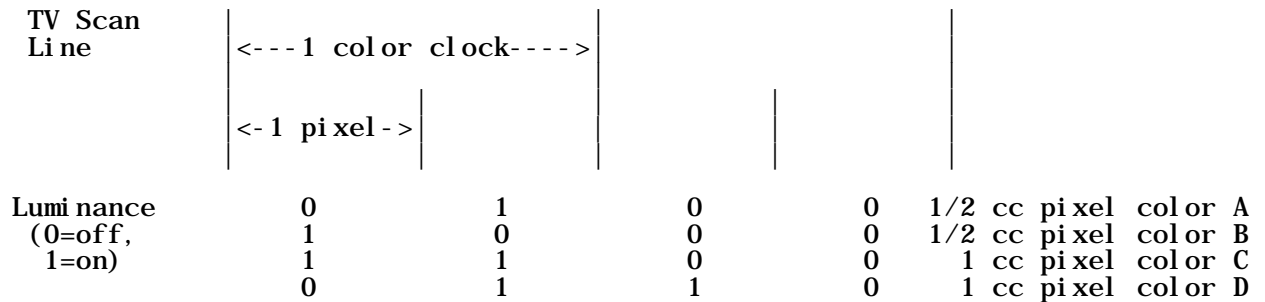
Note that each of these pixels requires one color clock of distance and
therefore has a horizontal resolution of 160.

The colors A through D are different for each television set, usually because
the tint knob settings vary. Thus they cannot be described as absolute colors,
for example, red; but they are definitely distinct from each other, and
programs have been written that utilize these colors.

=-=-=-=-=-=
The actual colors seen depends upon the tint setting of the NTSC display
device, and also upon the version of the NTSC Atari computer used, as pointed
out by Bryan on Oct 7, 08:

   It's well known that different models produce different artifact colors.
   The 800 produces Blue/Green, the 1200XL produces Green/Purple, and the other
   XLs produce Blue/Red. The reason for this doesn't lie with GTIA, but
   rather with the delays inherent in the different video buffer circuits.
   When you start modifying the video circuits, you slightly alter the time
   alignment between chroma and luma and the artifact colors change. The TV's
   decoder will be synched to the colorburst supplied by the chroma signal, but
   artifact colors are produced by changing the luma level at the 3.579 color
   frequency which the NTSC Atari models are inherently set up to do.

A classic example of a game that utilizes color artifacting on the NTSC Atari
is the Broderbund game, Choplifter!. 2nd example: Drol, also by Broderbund.

More information about artifacting on the Atari 8-bit computers:

"Atari Artifacting" by Judson Pewther, Compute! #38, July 1983, p. 221:
    http://www.atarimagazines.com/compute/issue38/096_1_ATARI_ARTIFACTING.php
    or from Compute!'s Second Book of Atari Graphics:
    http://www.atariarchives.org/c2bag/page193.php

"GRAPHICS 8 In Four Colors Using Artifacts" by David Diamond, Compute!'s First
    Book of Atari Graphics:
    http://www.atariarchives.org/c1bag/page203.php

A posting on AtariAge by phaeron, Posted Fri Jan 28, 2011:
    http://preview.tinyurl.com/qhyr6pg

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

3) Mass storage

3.1) Tape 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 (100KiB). 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" = 5327 Hz ; "space" = 3995 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-brand CX4100 blank cassette tapes 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.
  - 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
- Shipped with the earliest (1979-1980) 800 computer systems
- Was also included in the kit: CX482 The Educator
- Built-in SIO cable - must end SIO daisy chain
- Produced 1979-1983. Replaced by the 1010.
- Manuals:
    - Atari 410 Program Recorder Operator's Manual C014810 (C014810)
      (shipped with earlier units)
    - Atari 410 Program Recorder Owner's Guide C060055 (C060055)
      (shipped with later units; USA or International (Holland) printings)
    - Atari 410 Program Cassette Recorder Field Service Manual FD100004
    - Atari 410 Program Cassette Recorder Field Service Manual PAL-UK FD100005
- 3 main versions, each with two different variations:
    1) Unreleased prototype 410 version
        - Small/narrow profile
        - Chrome carrying handle
        - "Atari 410" label between cassette bay door and buttons
        - 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 unreleased prototype version variations:
            1a) Buttons are black, except red REC button
                See: http://mcurrent.name/atariads/intro400.htm
                and: http://mcurrent.name/atariads/intro800.htm
            2a) Buttons are white with black borders
                See: http://www.rhod.fr/images_periph/410/410proto.jpg
    2) Made in Japan by Bigston (initial production version)
        - 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
        - Two Japan 410 version variations:
            2a) 120V Made in Japan version
                Power: plugs directly into wall (120V AC, 6W)
            2b) 220V/240V (Direct Current) Made in Japan version
                Power jack on the RIGHT side of the unit. Center positive.
                Power: Used with an external DC power supply rated for 6.0V DC
                and 300mA, such as the Tadmod 6498 or Atari AC/DC Adapter Type
                FW3199 (both detailed elsewhere in the FAQ list) or equivalent.
    3) Made in Hong Kong by Transtek or by Chelco Sound (Hong Kong) Limited
        - 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
        - Two Hong Kong 410 version variations:
            3a) 120V 60Hz 7 watts Made in Hong Kong version
                Power: plugs directly into wall (120V AC, 6W)
            3b) 220V/240V (Direct Current) Made in Hong Kong version
                Power jack on the BACK of the unit. Center positive.
                Power: Used with an external DC power supply rated for 6.0V DC
                and 300mA, such as the Tadmod 6498 or Atari AC/DC Adapter Type
                FW3199 (both detailed elsewhere in the FAQ list) or equivalent.
- 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.

1010 Program Recorder
- Produced from 1983-1985. Replaced the 410; replaced by the XC11.
- Also included in the kit: KX7114 Programming System All-In-One-Pak
- 2 Atari SIO ports for direct connection to Atari computers
- Included: Owner's guide, Atari SIO cable, power adapter
- Manuals:
    - The Atari 1010 Program Recorder Owner's Guide C061133

```
                - Atari 1010 Cassette Recorder Field Service Manual FD100223
                   - Rev. 02 April 1983
                   - Rev. 02 September 1983
          - Two slightly different versions were manufactured:
               - 1010S.  FCC ID: BPA99H1010
                  - Made in Japan by Sanyo
                  - 6 Buttons, left to right:
                    Record, Play, Rewind, Advnce, 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, Advnce, Stop/Ej, Pause
                  - Silver sticker inside cassette bay
          - Power: Used with an external 8.5 to 9 volt AC transformer power supply
            rated for at least 8 watts.  Shipped with Atari C061515 or C061516;
            CA017964 recommended (each detailed elsewhere in this FAQ list).
          - 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.

     XC11 Program Recorder
          - Announced at the Jan. 1986 CES.  Replaced the 1010; replaced by the XC12
          - Advertised in the UK from late fall 1985 through summer 1986 (Atari User)
          - "Not released in the U.S." --Best Electronics Rev.10 catalog p. 140
          - Has a built-in SIO cable and one free SIO port
          - Power: Drawn from SIO pin 10 (+5V/Ready)

     XC12 Program Recorder
          - Shipped in mid-1986, replacing the short-lived XC11
          - Introduced to the U.S. at the January 1987 CES (reported as the XC11)
          - "had a very limited release in the U.S., mainly shipped to the European
            market place" --Best Electronics Rev.10 catalog p.140
          - Also included in the kits:
             - Atari 65XE Home Computer Outfit (Dixons/Currys special offer)
             - 130XE Starter Pack (UK)
             - XE 2012 (France)
          - "Round" window
          - Based on the Phonemark PM-4401A
             - Printed circuit board is marked "PM4401-4"
          - Built-in SIO cable - must end SIO daisy chain
          - Power: Drawn from SIO pin 10 (+5V/Ready)
```

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

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Important contributor to this section: Tomasz Krasuski

Unlike other microcomputer systems of the time period, only Atari-specific
cassette tape recorders could be used with Atari 8-bit computers.  Several
such peripherals were produced by companies other then 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
    - 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 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 CA12 (once Atari parts supply
        ran dry)
- CA12 [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

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 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.

Taihaho Computer Cassette
- Photos in this AtariAge Forums thread: http://preview.tinyurl.com/nxfabz9

LINKS
http://computers.mcbx.netne.net/8bit/aptaperec/index.htm

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.

- CASA Turbo Tape, by CASA (Dutch) (1985)
  o Purely software
- Rambit TurboCharger (1986?)
  o From the UK
  o For: 410, 1010, XC11, Phonemark, XC12
  o Circuit board + conversion utility program on cassette.
    The software is used to convert standard Atari data cassettes to Rambit format cassettes.
  o 3300-3600 bit/s achieved
  o Review (Nov/Dec86): http://www.page6.org/archive/issue_24/page_30.htm
- Turbo 2000, by Jiri Richter (RICO or JRC; Czechoslovakia)
  o Project published in Zpravodaj Atari Klubu -- priloha 11/1987
    See: http://blog.3b2.sk/igi/file.axd?file=2013%2f12%2fTurbo+2000.pdf
  o Software + modification project for XC12
  o Transfer rates flexible; later standardized to 2270 baud
  o Software: Super Turbo cartridge software by RICO (1988)
  o Released later: TT-DOS, a DOS 2.5 clone with high speed tape handler, B:
    o TT-DOS 1.1 (c) 1989 JR Computing (JRC)
    o TT-DOS 1.2 (c) 1989 JR Computing
    o TT-DOS 1.5 (c) 1991 JR Computing
  o Released separately (West Germany): B-TAPE high speed system by Jiri Bernasek (BEWESOFT) for use with BW-DOS or SpartaDOS
  o Released separately (Poland): K.S.O. 2T06 ("KSO Turbo 2000")
    - "Cassette Operating System" (L1, L2, WIELOBLOK) software by Wojciech Zabolotny
    - Published in the magazine IKS 11/1988 pages 4-6, with followup

information published in the next issue 12/1988 page 14 and in
           01/1989 pages 28 and 31.
        - Reviewed in Bajtek 8/89 (compared with AST)
        - Separately: K.S.O. Turbo 2000 cartridge project for self assembly
     o Turbo 2000 format extensions (all from Poland):
        - Turbo 2000F+ or "New format"
        - Speedy 2007 or "*AJEK" (translates to "*Thanksgiving")
        - Turbo 2000F, by MUEL (1989)
           o 6700 baud. Advertisement: Bajtek 8/1989 p26
        - Turbo 2001 (TOMS)
        - Turbo 2002
        - Turbo 2000 Plus
- Atari Super Turbo (AST) (late 1987)
     o Designed by Slawomir Nienaltowski (designer of the SN-360 disk drive),
       sold to Atari Studio (AS; later: Mirage)
     o The first Polish Turbo system
     o Programs stored with AST can be read by Turbo 2000.
     o Originally for the 1010, later released for XC12 and clones.
     o Reviewed in Bajtek 4/89
     o Later version(s) sold with software on cartridge: AST Turbo Cartridge
- Turbo 6000 / Schleife '88 (Loop'88)
     o From East Germany, for XC12
     o Chaos System: Turbo 6000 interface + software: Chaos Loader, Chaos Copy
     o 6000 baud
- 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.
     - 4000 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
- SITRE/S.I.T.R.E./"Sistema Inteligente Turbo con Recuperacion de Errores"
     o From Chile by Victor Parada G. (++Vitoco)
     o Purely software. Primarily a copying tool, but also turbo speed.
     o Version 1.01 March 1989 via SYFCOM, then VCC (Video Compu Club) for 800XL
     o Version 2.01 April 1989 for 130XE
     o Version 1.11 June 1989 (800XL, attempted support for longer programs)
     o Version 3.02 (2015, full support for XL/XE 64KiB to 320KiB)
     o Available: http://www.vitoco.cl/atari/sitre/
- Turbo 2600, by Zaklad Elektroniczny SZOK (Poland)
- 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
- Turbo ROM, jointly developed by PLUS and MAPASOFT (Poland) (1991?)
     o Special software cartridge loader required to read such cassettes
     o Reviewed in Tajemnice_Atari 5/91
- Hard Turbo (Poland)
Most of the above upgrades are described in detail at:
http://atariki.krap.pl/index.php/Systemy_turbo

3.2) Disk drives

3.2.1) What is the Atari 810 Disk Drive?

Portions of this section developed by Laurent Delsarte from the 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
90KiB. The 810 Disk Drive is used with a single Atari 8-bit computer with a
minimum of 16KiB of RAM installed. Up to four 810 disk drives may be attached
and used with an Atari computer at the same time.

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:
                    Black & White left: Drive 1
                Black right, White left: Drive 2
                   Black & White right: Drive 3
                Black left, White right: 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 (90KiB)
- Average Data Transfer Rate: 6000 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%
- 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: FM (frequency modulation / "single density")
- Drive heads: One (accesses the disk from below)
- Media used is Atari CX8100 Blank Diskette or equivalent:
  - 5.25" micro-diskette / minidiskette / mini-disk / minifloppy diskette /
    mini-floppy diskette / floppy disk
  - Soft-sectored (no sector holes; one index hole, which the 810 ignores)
  - 48 TPI, either single density or double density
  - 40 tracks (avoid rare early 35 track disks from the 1970s)
  - Single-sided or Double-sided
    - The 810 is a single-sided drive. A disk is inserted into the drive
      with label side up and, from below, the drive head accesses the back
      (non-label) side disk surface via the media/head access hole on the
      back side of the disk.
    - All disk media is actually two-sided, and all disks have a media/head
      access hole on the front (label side) disk surface as well. "Single-
      sided" disks are certified for use on only one side, while "double-
      sided" disks are certified for use on either side.

- The reverse side of a disk (the front, label side disk surface) may be
           accessed by re-inserting the disk into the 810 upside-down, label side
           down. The 810 thus sees the reverse side of the disk as another,
           entirely different, single-sided disk.
      - Media first used by the Wangco Model 82 Micro-Floppy Disk Drive (1977)
       NOTES:
         - 96 TPI 80-track High Density (HD) 1200KiB 5.25" floppy diskettes,
           which are very common, can NOT be used with Atari 810 and compatible
           drives. The media is physically different from 48 TPI diskettes.
         - 96 TPI 80-track double density / "quad density" 720KiB 5.25" floppy
           diskettes, which are rare, MAY be used with Atari 810 and compatibles.
           The media in these is actually identical to that of 48 TPI diskettes.
- 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 MPU (MOS Technology MCS6507 or equivalent) @ 500KHz, C010745
- ROM, C011299
- 6810 128 x 8 bit static RAM (1KiB) (Motorola MCM6810), C014328
- 6532 PIA (MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent), C010750
- Western Digital FD1771 Floppy Disk Controller (FDC) @ 1MHz, C014329
- Read/Write Head Gap: .013 inches
- Guard Band: .008 inches
- Pad Pressure: 17 grams

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

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

Original 810 Disk Drive (1980-1981, 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 Input: 9 volts AC, 1.7 amperes
- Power Usage: 20-21 watts
- Power: Used with an external 9 volt AC transformer power supply:
  Atari CA014748 or equivalent (earlier 20W C014319 units only; later 18.5W
  C014319 units are inadequate)

810 drives manufactured after September 1, 1981 ("DS" sticker) shipped with an
External Data Separator Board, which enhances the ability of the FD1771 FDC to
process data. It is installed in the Side Board where the FDC chip would
otherwise be installed. (810 FSM p. 1-9) The Side Board stepper motor circuit
voltage was increased to regulated 12 volts DC as well, leading to greater
power requirements for the drive:
  - Power Input: 9 volts AC, 3 amperes
  - Power Usage: 30 watts
  - Power: Used with an external 9 volt AC transformer power supply:
    Atari C016804 or equivalent
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 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.

810 drives produced from February 1982 used the new "810 Analog"
("810M Analog") design, further improving reliability: (see 810 FSM p. 8B-1)
  1. A Power Supply Board now bolts onto the common base plate where the Rear
     Board used to be. The Power Supply Board contains:

a) A redesigned Power Supply.
          b) A Tachometer/Speed Switch I.C. (frequency to voltage converter)
             added as the Tach circuit to stabilize the motor speed.
   2. 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:
          a) Operational amplifiers ("op-amps") and discrete transistors in place
             of transistor arrays.
          b) A multiplexor chip for switching the Read/Write amplifiers.
   3. A 10 pin flat cable connects the Analog Board to the Power Supply Board.
810 Analog power: Used with an external 9 volt AC transformer power supply
   rated for at least 30 watts; shipped with Atari CA017964.
The 3 new 810 Analog components were also offered together as an upgrade:
   - CB101128 "Grass Valley Analog Board Set" for Pre-Analog 810 drives.

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

810 manuals by Atari:
 - Atari 810 Disk Drive Operator's Manual C014760 (C014760) (earlier units)
 - Atari 810 Disk Drive Owner's Guide C060056 (C060056) (later units)
 - Atari 810 Disk Drive Field Service Manual
      - Preliminary (~190 pages)
      - FS015854 Rev. 1 July 1980 (~138p)
      - FD100003
         - July 1982 [Rev. 02]
         - Rev. 03 May,1983

From winter 1980 to fall 1981 the 810 shipped with CX8101 Master Diskette
(boxed; DOS I). From fall 1981 to May 1983 the 810 shipped with CX8104 Master
Diskette II (boxed; DOS II version 2.0S or DOS 2.0S). Box contents for both
are detailed elsewhere in this FAQ list.

810 accessories from Atari:
CX8100 5 Diskettes. Box contains five CX8100 Atari 810 Blank Diskettes
CX8202 5 Blank Diskettes. Box contains five CX8202 Atari 810/815 Blank
        Diskettes (certified for double density use).
        Minimal production, see: http://www.myatari.com/ebay/815dt.html

810 accessory from Atari, announced but never shipped:
CX8111 Atari 810 Formatted Diskettes II (5 per box)

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)
                   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 and diagnostic program
 - Software sold separately, 1982-1983:
   - Multiple Drive Happy Backup Program
   - Happy Compactor Program
 - Warp Speed Software disk included (1983-), contains Warp Speed DOS
   (modified Atari DOS 2.0S), Diagnostic, Sector Copier, Happy Backup, Happy
   Compactor, Multi Drive Happy Backup, Tracer
 - Software sold separately, 1982- :
   - Happy Customizer Program (create non-standard disks track-by-track)
 - 810 Version 7 Upgrade, hardware upgrade by Happy Computers, required for
   1982-1985 units to run Happy Warp Speed Software Rev 7, as well as other
   software sold separately by Happy Computers:
   - Warp Speed DOS XL, including under cartridge, under ROM and Axlon RAM
     versions (modified DOS XL by Optimized Systems Software (OSS))
   - TOP DOS version 1.5, by Eclipse Software
 - Software sold separately:
   - Happy Version Archiver/Editor, by Spartan Software of Minnesota, 1984
     - Also marketed by B&C ComputerVisions as: Scan-It!/810 Happy, 1987
   - Fuzzy/Phantom Sector Maker, by CSS, 1986 (Antic 9/86p48)
   - Archiver Enhancement, by Computer Software Services (CSS), 1987
     - Super Archiver/Editor 3.0, The Archiver Tracer

The Chip, by Spartan Software of Minnesota, 1983-1984
The Chip with Archiver I, by ICD, 1984
Scan-It!/Chip, from B&C ComputerVisions, 1987
 - Popularly: "Archiver chip", "810 Archiver", "Archiver/810", "Archiver"
 - Navigate/edit/create nonstandard format disks
 - Shipped with Archiver/Editor program
    - Disassembler, sector editor, custom formatter and mapper
 - Software sold separately:
   - Archiver Enhancement, by Computer Software Services (CSS), 1987
     - Super Archiver/Editor 3.0, The Archiver Tracer

Right-Write, by Gardner Computing, 1983
 - Write to side 2 of any disk without notching out a hole in the disk
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 Serices (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 backup some protected disks
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 Disk Drive?

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

The Atari 1050 disk drive was introduced in June 1983 as a replacement for
the 810 disk drive. The 1050 is fully backward compatible with the 810, with
the addition of a new "double density" mode of operation offering 130KiB of
data storage 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 180KiB 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 1050 drive has only one drive head, so it can only read/
write to one side of the disk. The reverse side of a 2-sided "flippy" disk
may be used by inserting the disk into the drive upside-down.

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:
                    Black & White left: Drive 1
                Black right, White left: Drive 2
                    Black & White right: Drive 3
                Black left, White right: Drive 4

More features/specifications of the 1050 disk drive:
- 6507 MPU (MOS Technology MCS6507 or equivalent) @ 1MHz, C010745
- ROM, Custom 2732 FC100541
- 6810 128 x 8 bit static RAM (1KiB) (Motorola MCM6810), C014328
- 6532 PIA (MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent), C010750
- Western Digital WD2793 Floppy Disk Controller (FDC) @ 1MHz, 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.

	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
- Read/Write head	1	1
- Write protect sensor	Yes	Yes
- Track 00 sensor	Yes	Yes
- Rotational speed	288 RPM	288 RPM
- Rotational speed accuracy	+/-3%	+/-3%
- Average latency	110 milliseconds	110 milliseconds
- Access time		
o Track to track (max)	40 milliseconds	40 milliseconds
o Head settling (max)	30 milliseconds	30 milliseconds
o Motor start (max)	1000 milliseconds	1000 milliseconds
- Power Consumption		

    Standby: 1.5 watts (maximum)
    Operating: 30 watts (maximum)
    Start Up: 50 watts (maximum)

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

The 1050 disk drive is used with an external 9 volt AC transformer power supply rated for at least 50 watts; shipped with Atari CA017964.

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

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 Tandon units shipped with Rev K, 1984-1985 Hong Kong units shipped with an alternate version of Rev K, and 1985 Tandon 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
 - 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 Enhancement, by Happy Computers, Inc. (Richard Adams), 1984
 - Board includes a 6502 microprocessor and a RAM buffer:
   Up to 36 sectors (SD mode: 2 tracks / 4608 bytes)
 - Adds single-sided, double density (180KiB) operation (Percom compatible)
 - "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 nonstandard format disks
 - Warp Speed Software disk included (1983-), contains Warp Speed DOS
   (modified Atari DOS 2.0S), Diagnostic, Sector Copier, Happy Backup, Happy
   Compactor, Multi Drive Happy Backup, Tracer
 - (Rev 2 ROM) ICD US Doubler emulation for UltraSpeed software compatibility
 - IBMXFR IBM Transfer Program included, 1988- (Warp Speed Software v. 7.10)
 - Software sold separately by Happy Computers:
    - Happy Customizer Program (create non-standard disks track-by-track)
    - Warp Speed DOS XL, including under cartridge, under ROM and Axlon RAM
      versions (modified DOS XL by Optimized Systems Software (OSS))
    - TOP DOS version 1.5, by Eclipse Software
 - Software sold separately:
    - Happy Version Archiver/Editor, by Spartan Software of Minnesota, 1984
       - Also marketed by B&C ComputerVisions as: Scan-It!/1050 Happy, 1987
    - Fuzzy/Phantom Sector Maker, by CSS, 1986 (Antic 9/86p48)
    - Archiver Enhancement, by Computer Software Services (CSS), 1987
       - Super Archiver/Editor 3.0 and The Archiver Tracer
    - Happy Doubler, by Innovative Concepts, 1989
       - US Doubler compatible/UltraSpeed capable (software solution)
       - Ability to configure drives as D5: through D8:
 - Hardware upgrades for Happy 1050 Enhancement:
    o Happy 1050 Controller, by Happy Computers, Inc., 1986
       - Hardware switch to select Happy Fast or Slow mode
       - Hardware switch to control write protection, with LED indicator
       - Write to flip side of disks without punching holes
    o 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
    o IC Chip, by Innovative Concepts, 1988-11-11
       - US Doubler compatible/UltraSpeed capable (replacement Happy ROM)
Happy 1050 Maximizer, by Happy Computers, Inc.
 - Adds single-sided, double density (180KiB) operation (Percom compatible)
 - Happy 1050 Controller upgrade compatible
 - Maximizer to Enhancement Upgrade available from Happy Computers
High Speed Board 1050, by Irata Verlag, 1985 (West Germany)
 - Happy 1050 Enhancement clone
1050 Lazer Enhancement, from Utility House (1986) (UK)
 - Happy 1050 Enhancement clone
 - Shipped with The Lazer Drive Supercharger software from Utility House
1050 IS Plate, by Innovated Software (Robert Perry), 1986
 - Add-on board includes 6502 and 16KiB RAM buffer. Plugs into 6507 socket.
 - Happy 1050 Enhancement compatible/near-clone
 - Emulation of: IS Doubler, US Doubler, standard 1050, Archiver/810
   (UltraSpeed and Archiver software compatible)
 - System supports up to 16 drives
 - Shipped with 2-sided 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
 - Happy Warp Speed Software (pre-7.0) included
Klone II, by Computer Software Services (CSS), 1987 (USA)
 - Happy 1050 Enhancement clone
 - Happy Warp Speed Software (7.0) included

Copy Card 7.0, by ????, year ???? (Europe)
 - Happy 1050 Enhancement compatible/near-clone
Hyper Drive, by Chaos! Computers (UK), 1994
 - Happy 1050 Enhancement clone
 - Shipped with software package (Ver. II): Hyper Fast DOS, Hyper Sector
   Copier, Hyper Back-Up Sytem, US Doubler Emulation, HyperCompaction,
   Diagnostic Tester, Archiver/810 Emulation, Multi Drive Back-Up
 - See review & ad, Page 6's New Atari User #75 pp. 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 (180KiB) operation (Percom compatible)
 - "UltraSpeed" standard high speed "54K baud" via sector skewing; supporting
   software required for high speed (initially: SpartaDOS)
 - Many units shipped with ICD SpartaDOS
SuperMax, by Super Products
 - US Doubler compatible/UltraSpeed capable
 - Add-on board, switch between standard and replacement drive ROM
IS Doubler, by Innovated Software (Robert Perry), 1985?
 - US Doubler clone

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 (180KiB) operation (Percom compatible)
 - Shipped with public domain backup software, double density Menu Maker
 - Archiver/810 compatible (Rev 2 and up)
Super Archiver, by Computer Software Services (CSS), 1987
 - Add-on board, known as: "Super Archiver Mod", "1050 Super Archiver Chip"
 - Adds single-sided, double density (180KiB) operation (Percom compatible)
 - Archiver/810 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
 - Also sold without software (B&C ComputerVisions)
 - Bit-Writer upgrade sold separately by CSS (1988):
    - Writes bits rather than sectors, for increased copy capabilities
Super Archiver II, by CSS, 1988
 - Enhanced density version of CSS Super Archiver
 - Sold complete or as a software-only upgrade for CSS Super Archiver
 - Software: Super Archiver/Editor 3.03 (enhanced density), Super Archiver
   Fuzzy Sector Maker (enhanced density), The Archiver Tracer, Super Archiver
   Diagnostic

Reproducer, by Gardner Computing, 1984
 - Navigate/edit/create nonstandard format disks
 - Software included
Density Doubler 1050, by Duplicating Technologies (DT), 1986
 - Adds single-sided, double density (180KiB) operation (Percom compatible)
 - Whole track buffering (18 sectors / 8KiB) "up to three times faster"
1050 Duplicator, by Duplicating Technologies (DT), 1986
 - Adds single-sided, double density (180KiB) operation (Percom compatible)
 - Whole track buffering (18 sectors / 8KiB) "up to three times faster"
 - Navigate/edit/create nonstandard format disks (including enhanced density)
 - Includes copying software
 - Sources (Jim Patchell):
   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, 1985-1988
 - Hardware includes replacement ROM (no microprocessor; no RAM buffer)
 - Adds single-sided, double density (180KiB) operation (Percom compatible)
 - "Turbodrive" standard high speed 68200 bit/s ("70000 baud") via sector
   skewing; 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 of LDW)
  - Software: TURBO DOS ("TUR-DOS") disk or cartridge. Known versions:
    - TURBO DOS (c) 1989 ver 2.5 (disk?)
    - TUR DOS - (c) 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

Speedy 1050 (Mini-Speedy), by Compy-Shop, 1986
  - Includes 65C02 microprocessor, 8KiB RAM buffer, 8KiB program ROM space
  - Adds single-sided, double density (180KiB) 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 S: Internal add-on with 8KiB Sector Copy program in ROM
  - Mini-Speedy D: Internal add-on with 8KiB mini-Bibo-DOS 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 192KiB 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; 24KiB ROM space total
Mega Speedy (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)
  - Version 1.0: US Doubler clone?
  - Version 2.0: US Doubler and 1050 Turbo compatibility?

TOMS Multi Drive 1050 (1990)
  - Adds single-sided, double density (180KiB) operation (Percom compatible)
  - Adds SS-DD "IBM format": 40 tracks, 9 sectors of 512 bytes = 180KiB
  - 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

Other:

Protector, by Computer Software Serices (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, by Duplicating Technologies, 1986
  - Write to both sides of any disk without notching disks
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, and 3) Will write to any disk
- Two-color LED for write-protect status

3.2.3) What is the Atari XF551 Disk Drive?

The Atari XF551 disk drive was introduced in June 1987 as a replacement for
the 1050 disk drive. The XF551 is fully backward compatible with the 1050,
with the addition of two new modes of operation: a true "double density" mode
offering 180KiB of data storage per (single-sided) diskette (fully compatible
with 3rd party double density drives for the Atari), and a "double-sided
double density" mode offering 360KiB of data storage per (2-sided) diskette.

Unlike the 810 or 1050, the XF551 drive has two drive heads, so it can
read/write to both sides of a 2-sided floppy disk (in double-sided double
density 360KiB disk mode). The 360KiB mode of the XF551 writes "backwards" to
the second side of the disk in comparison to the way data would be stored on
the reverse side of a two-sided "flippy" disk in single-sided double density
180KiB mode.

When working with double-sided double density 360KiB disks, the XF551 is also
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.

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: Drive 1
                    Left down, Right up: Drive 2
                    Left up, Right down: Drive 3
                    Left & Right up: Drive 4

More features/specifications of the XF551 disk drive:
- 8040/8050 MPU. One of:
    - Intel 8050 microcontroller (MCU) @ 8.3333MHz, C070235
    - Intel 8040 microcontroller (MCU) @ 8.3333MHz, CB101393
  - The 8050 has internal ROM space that is not used in the XF551.
  - (Initial Atari and media reports incorrectly indicated a 6507 MPU.)
  - (The DOS XE: XF551 manual incorrectly indicates 18.3333MHz.)
- 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 360KiB mode operation only
- Rotation rate: 300 RPM
  Virtually all other Atari-specific drives spin at 288 RPM. This results in
  rare compatibility issues. Specifically, these commercial disks do not load
  in, and can possibly be damaged (!) by the XF551:
    - Flight Simulator II (subLOGIC)
    - Blue Max (Synapse) (I have personally destroyed multiple Blue Max
      disks with the XF551 drive! -mc)
    - Bank Street Writer (Broderbund). Conflicting reports about this one.
    - Boulder Dash II (Databyte release?)
    - Inside (Spektra, 1990?--original Polish version?)
- Media used is the same as for the Atari 810.

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	128	128	256	256	(total capacity)
Total Bytes	92,160	133,120	184,320	368,640	(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.
- Mitsumi XF551 (earlier/common production)
    - Disk Busy light is rectangular, and is located below the drive latch.
    - "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 index hole of
      a soft-sectored diskette when reading/writing, so the Mitsumi XF551 CAN
      read from, and write to, the flip side of a 2-sided disk in single-sided
      (90KiB, 130KiB, or 180KiB) mode if the disk lacks a 2nd jacket index hole
      corresponding to the reverse side of the disk.
- Chinon XF551 (later/uncommon production)
    - Disk Busy light is round, and is located directly to the left of the
      drive latch.
    - "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 index hole
      of a soft-sectored diskette when reading/writing, so the Chinon XF551
      CANNOT read from, nor write to, the flip side of a 2-sided disk in
      single-sided (90KiB, 130KiB, or 180KiB) mode if the disk lacks a 2nd
      jacket index hole corresponding to the reverse side of the disk.

Unlike the Atari 810 and 1050, the XF551 (both Mitsumi and Chinon) utilizes
the index hole of a soft-sectored diskette when formatting the disk. As a
result, the XF551 CANNOT format the flip side of a 2-sided disk in single-
sided (90KiB, 130KiB, or 180KiB) mode if the disk lacks a 2nd jacket index
hole corresponding to the reverse side of the disk.

The XF551 disk drive is used with an external 9 volt AC transformer power
supply rated for at least 50 watts; shipped with Atari CA017964.

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

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 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" 720KiB 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
  -- 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.
  - Shipped with ST/IBM Disk Reader disk, containing IBMREAD.COM
http://www.nleaudio.com/css/products/XFdualdrup.htm

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 jacket index 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.
  - 60Hz version for North America or 50Hz 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
  - Shipped with IBM/ST Transfer Utility disk, containing IBMREAD.COM
http://www.nleaudio.com/css/products/XFupdate.htm

XF Speedy
  - (c) 1994 Klaus Peters Elektronik + Software
  - Converts drive to a Speedy 1050 clone with a DSDD 360KiB mode
  - Replaces the 8040 MPU with a 65C02 + ROM + Memory

Hyper-XF (or HyperXF)
  - (c) 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 360KiB (5.25") / 720KiB (3.5")
  - Can theoretically read/write ST/PC 720KiB disks (software is missing!)
  - Improved double density detection
http://atariage.com/forums/topic/84017-xf551/#entry1023935

Reimaged XF551 Disk Drive Controler
  - 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 Disk Drives?

The 815 Dual Disk Drive was introduced by Atari in June 1980 at the Summer
Consumer Electronics Show (CES) in Chicago. The unit would feature two

single-sided, double density (MFM encoding) disk drives. The 815 would not have a single density (810-compatible) operation mode (a shortcoming that would inspire Percom to invent the "Percom configuration block" as a standard for density-configurable Atari disk drives).
- Total storage capacity per diskette:
    40 tracks x 18 sectors/track = 720 sectors/disk
    720 sectors x 256 bytes/sector = 184,320 bytes/disk (180KiB)
- 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).
- Manual: Atari 815 Operator's Manual C016377 (C016377)
- The 815 disk drive has a built-in power supply (plugs directly into the wall, 120V AC).
- 815 accessories from Atari:
    o CX8201 Master Diskette II
       (DOS II version 2.0D, or DOS 2.0D; version of DOS II supporting both 815 and 810 disk drives; prototype box exists, but never shipped)
    o CX8202 5 Blank Diskettes
       Box contains five CX8202 Atari 810/815 Blank Diskettes (certified for double density use).
       Minimal production, see: http://www.myatari.com/ebay/815dt.html
- Software titles announced by Atari to require the 815:
    o CX401 The Atari Accountant: General Accounting System (prototypes exist)
    o CX402 The Atari Accountant: Accounts Receivable System (never shipped)
    o CX403 The Atari Accountant: Inventory Control System (never shipped)
       The Atari Accountant flyer at AtariMania:
       http://www.atarimania.com/catalog-atari-atari-usa-_138_8.html
    o CX408 Atari Word Processor (Atari 815 Version; never shipped)
- Atari continued to promote the 815 through the summer of 1981 (see Company Store price list for 8-24-81 for a late reference); it was dropped from the product line by October 1981. Prototype units exist (according to Atarimuseum.com: 60 units were produced), but the 815 never shipped.
    http://www.atarimuseum.com/computers/8BITS/400800/815/815.html

The XF521 5.25" disk drive was previewed by Atari in January 1985 at the Winter CES in Las Vegas. The XF521 was to be a 130KiB, 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 XF351 3.5" single-sided double density disk drive was first previewed by Atari in March 1986 at CeBIT in Hanover, West Germany. The XF351 was subsequently previewed at the 1986 Spring COMDEX show in Atlanta and at the January 1987 Winter CES in Las Vegas. With ADOS (would ship as: DOS XE), the XF351 was reported to provide 325KiB (6/1986 report) or 320KiB (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, 90KiB/side, 810 compatible
    ED = Enhanced Density, 5.25" floppy disks, 130KiB/side, 1050 compatible
    DD = Double Density, 5.25" floppy disks, 180KiB/side, Percom compatible
    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 2-sided "flippy" disk may be used
         by inserting the disk upside-down.
    DS = Double-Sided
         The following information is mostly taken from the documentation for
         HiassofT's WriteAtr program,  http://www.horus.com/~hias/atari/
         Double-Sided drives for the Atari may use one of three different
         drive-mapping possibilities.
          * Most double-sided Atari disk drives:
            First fill tracks 0-39 (or 0-79) on the first side, then switch
            over to side 2 and again fill tracks 0-39 (0-79 for 3.5" disks).
          * The XF551 first fills track 0 on the first side.  Then it
            fills track 1, then track 2, ... up to track 39 (on a 5.25" disk)
            or 79 (on a 3.5" disk).  Then it switches to side 2 and fills
            the disk in reverse order (starting at track 39/79, then 38/78,
            ... til it has reached the end of the disk at track 0).
          * The third possibility is the standard in the PC world, but on the
            Atari it's possibly unique to drives connected via the Karin Maxi
            interface.
            If your Atari disk drive uses this mapping, it first fills
            track 0 on side 1, then track 0 on side 2, then seeks to track 1,
            again first fills track 1 / side 1, then track 1 / side 2,
            and so on, until it finishes with track 39 (79) / side 2.
            The drive switches the heads (sides) first before switching
            the track.
          * The TRAK AT-D4 (uniquely?) functions as two logical drives, where
            the second "drive" (side) is read/written in reverse order.


Amdek AMDC-II          SS SD/ED/DD dual drives.  Media is "flippy" 3" (not 3.5")
                       Compact Floppy (CF) standard (Amdisk III, Maxell CF2),
                       180KiB/side, 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.  Shipped with OS/A+ Version 2
                       (earlier units) or SmartDOS (later units).
Astra 2001            SS SD/DD dual drives.  Shipped with SmartDOS.
Astra "Big D"         DS SD/DD dual drives.  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)
California Access CA-2001 (or "CA2001")
                       SS SD/ED/DD.  1988 replacement for LDW Super 2000,
                       Indus GT compatible/Synchromesh capable
                       Sold with DOS XL 2.35I1 (manual: "DOS XL 2.35L")
                       Upgrades:
                        - TOMS Turbo Drive LDW (1989)
                          - SS SS/ED/DD/IBM formats
                          - IBM format: 40 tracks * 9 sectors * 512bytes=180KiB
                          - 1050 Turbo compatible/Turbodrive capable,
                          - Indus GT 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 SS/ED/DD, plus two additional formats:
```

```
                        - 40tracks * 9sectors * 512bytes = 180KiB (IBM S-9)
                        - 40tracks * 6sectors * 1024bytes = 240KiB
                        - "Flash Turbo" high speed 127 kbit/s
                        - Supplied with FlashDOS
                        - SRAMCharger by trub, http://trub.atari8.info/
SBG D.8002 HS           DS SD/ED/DD ICD US Doubler compatible/UltraSpeed capable
                        see: http://atariki.krap.pl/index.php/D.8002_HS
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 360KiB mode,
                        Copy 2000 program in ROM
Indus GT                SS SD/ED/DD, Z-80A MPU, features "Synchromesh" standard
                        high speed, 38400 bit/s or 68200 bit/s
                        sold with one of: OSS DOS XL 2.20, 2.30, 2.35I1, 2.35I2
                        sold with "GT DrivingSystem" software titles:
                        - GT Estate Wordprocessor, (c) 1983 Elcomp Publishing
                          author: H. C. Wagner for IJG, Inc.
                        - GT Albert E. Spreadsheet by SIM Computer Products Inc.
                          (c) 1982-1983 by David H. Hewit
                        - GT Data Manager, (c) 1984 Vervan Software
                          authors: Carl M. Evans and Richard M. Leonard
                        replaced by LDW Super 2000 (1987)
                        upgrades:
                        - CSS Protector: Bad sector generator
                        - Indus RAM-Charger: 64KiB RAM + CP/M 2.2 + software
                        - SRAMCharger by trub, http://trub.atari8.info/
LDW Super 2000          SS SD/ED/DD, replaced Indus GT; replaced by CA-2001,
                        Indus GT compatible/Synchromesh capable, shipped 12/1987.
                        Sold with DOS XL 3.25I1 (manual: "DOS XL 2.35L")
                        Upgrades:
                        - 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 by trub, http://trub.atari8.info/
Micro MainFrame MF-1682 SS SD/DD dual drives, SS/DD operation software or
                        hardware selectable (no DD DOS needed), Z-80 MPU.
                        (Planned MMF Expansion Box never shipped)
Percom RFD40-S1         SS SD/DD, introduced March 1982; 1st 810 alternative.
                        Early units shipped with "BLD" utility to build Percom
                        DOS 2.0P (double density support) from a copy of Atari
                        DOS 2.0S; later/most units shipped with OS/A+ Version 2.
Percom RFD44-S1         DS SD/DD, shipped with OS/A+ Version 4.
Percom RFD40-S2         SS SD/DD dual drives, shipped with OS/A+ Version 2.
Percom RFD44-S2         DS SD/DD dual drives, shipped with OS/A+ Version 4.
Percom AT88-S1          SS SD, shipped with OS/A+ Version 2.
                        Introduced Nov 1982 marketed as: "AT-88"
                        Upgrade: AT88-DDA Doubler ("Double Density Adapter")
Percom AT88-S2          SS SD dual drives, shipped with OS/A+ Version 2.
Percom AT88-S1PD        SS SD/DD, shipped with DOS XL.
                        Announced summer 1983.  Sales flyer: "AT-88S1PD"
Percom AT88-SPD         SS SD/DD, shipped with DOS XL.  Manual cover page:
                        "AT88SPD".  Announced summer 1984. (IW 9/3/84)
Rana 1000               SS SD/DD, stand alone disk formatting,
                        shipped with SmartDOS
RCP 810                 SS SD (Computer Palace house version of Atari 810)
Special Edition         SS SD (San Jose Computer house version of Atari 810)
Spider                  SS SS/ED/DD.  XF551 clone, 70 units made.  See:
                        http://www.atariage.com/forums/index.php?showtopic=99716
TOMS 720                DS SD/ED/DD/ID/QD/ST.  1991.
                        DS-DD 360KiB format is XF551 compatible.  Other formats:
                        SS-iD IBM - 40 tracks of  9 sectors of 512 bytes = 180KiB
                        DS-QD      80 tracks of 18 sectors of 256 bytes = 720KiB
                        DS-ID IBM - 40 tracks of  9 sectors of 512 bytes = 360KiB
                        DS-CD IBM/ST - 80 tracks, 9 sectors of 512 bytes = 720KiB
                        Intel 8085 microprocessor, US Doubler compatible/
                        UltraSpeed capable, 1050 Turbo compatible/Turbodrive
                        capable; MYDOS 4.50, IBMST, and other utilities on ROM
```

```
                         - 720KiB "IBM" format requires rare 96 TPI 80-track
                           double density/"quad density" 720KiB 5.25" diskettes
TOMS 720C            Same as TOMS 720 but with printer port
TOMS 720CR          Same as TOMS 720 but with printer port and RS-232 port
TOMS 710            DS SD/ED/DD/QD.  1994.
                    DS-DD 360KiB format is XF551 compatible.  Other format:
                    DS-QD 80 tracks of 18 sectors of 256 bytes = 720KiB
                    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.  1996.
                    DS-DD 360KiB format is XF551 compatible.
                    US Doubler compatible/UltraSpeed capable,
                    1050 Turbo compatible/Turbodrive capable;
                    TOMS Navigator and other utilities on ROM
Trak AT-1           SS SD/DD, shipped with "DDINIT" utility to modify Atari
                    DOS 2.0S for double density.
Trak AT-D1          SS SD.  Upgrade: Double density.
Trak AT-D2          SS SD/DD, shipped with "DDINIT" utility to modify Atari
                    DOS 2.0S for double density.
Trak AT-D4          DS SD/DD, shipped with "DDINIT" utility to modify Atari
                    DOS 2.0S for double density.  Double-sided operation: side
                    1 is accessed as D1: and side 2 is accessed as D2:.
Viatronic VD 40     DS SS/ED/DD XF551 compatible including high speed, 8085
                    MPU, 8KiB RAM, 8KiB 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
                    http://atariki.krap.pl/index.php/XFD601
XFD602 (Jacek Zuk)  DS SD/ED/DD dual drives, each same as XFD601
                    http://atariki.krap.pl/index.php/XFD602
```

3.2.6) What is the Percom configuration block?

The following is largely verbatim from Bill Wilkinson's "Insight: Atari"
column, Compute! magazine #65, October 1985, page 110-111. See:
http://www.atarimagazines.com/compute/issue65/insight_atari.php

As defined by the Percom standard (Percom was the first manufacturer of disk
drives for the Atari other than Atari), a config block is a set of 12 bytes
within the memory of the disk control microprocessor--which is inside your
disk drive(s). You read a drive's config block by passing "N" to it as an SIO
command. You can write a new config block to a drive via an "O" 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 in the block are shown in the table:

```
   Byte #   # of    Description
            Bytes
     0       1      Number of Tracks
     1       1      Step Rate (values have no universal meaning)
    2-3      2      Sectors per Track (byte 2 is high byte; byte 3 is low byte)
     4       1      Number of Sides or Heads (0=one head, 1=two heads)
     5       1      Density (0=FM/Single, 4=MFM/Double)
    6-7      2      Bytes per Sector (byte 6 is high byte; byte 7 is low byte)
     8       1      Drive Selected?
     9       1      Serial Rate Control (values have no universal meaning)
   10-11     2      Miscellaneous (reserved)
```

The successful establishment of the Percom standard allowed 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 interchangeably. However, the extent of support for the full standard
varies widely among particular disk drives. Atari's own 810 and 1050 drives

do not support the Percom config block at all, but the Atari XF551 and most
3rd party disk drives designed for the Atari support at least portions of the
Percom standard. For example, the Indus GT supports Percom config block bytes
5-7 (Density and Bytes/Sector) only.

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

The standard interface between floppy disk drive (FDD) and controller was
established by the Shugart Associates SA400 minifloppy Disk Drive (1976). The
interface normally consists of a 34 conductor ribbon cable, using 34 pin PCB
edge connectors (5.25" drive convention) and/or 34 pin header (2x17)
connectors (3.5" drive convention).

(Earlier 8" floppy disk drives normally used a 50 conductor ribbon cable and
corresponding pin header or PCB edge connectors.)

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 5.25" or 3.5" floppy disk drives.

Unless stated otherwise, these FDD interfaces support single or double density
drives, but not high density 1440KiB 3.5" or 1200KiB 5.25" drives.

```
Atari disk drives that also add a standard FDD interface
--------------------------------------------------------
- Amdek: AMDC-II                            (34 pin header)
- Micro MainFrame MF-1682                   (PCB edge)
    - 'Supports both 5.25" and 8" drives'
- Percom: RFD40-S1, AT88-S1PD, AT88-SPD    (34 pin header)
          RFD40-S2, AT88-S1               (34 pin PCB edge)
          RFD44-S1, RFD44-S2, AT88-S2
    - Matching add-on drives:
          Percom RFD40-A1        SS SD/DD
          Percom RFD44-A1        DS SD/DD (released?)
          Percom AT88-A1         SS SD
- Trak: AT-1, AT-D1, AT-D2, AT-D4          (34 pin PCB edge)
    - Matching add-on drive:
          Trak AT-S1             SS SD/DD
```

```
Other Atari FDD Interfaces
--------------------------
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
 - Orginally 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 v1n3 Aug82 p43 and v1n5 Dec/Jan83 p94

ATR8000, by Software Publishers / SWP Microcomputer Products (1982-1986)
 - 16KiB or 64KiB RAM versions
 - Connects to the Atari via SIO (includes 2nd SIO port)
 - 4MHz Z-80A MPU
 - RS-232 port (26 pin PCB edge) for modem or serial printer (or standard
   RS-232 terminal in place of an Atari computer)
    - Does not use standard Atari 850 R: device handlers
```

- 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
- Unit RAM can be used as a disk buffer
- Double Density CP/M 2.2 included with 64KiB version
  - 16KiB version: Double density CP/M 2.2 available with 64KiB Upgrade
  - Included Autoterm terminal emulator for the Atari (80 column display
    with 40 column movable window; Bit 3 Full-View 80 also supported) is
    used to access software running on the ATR8000.
- Sold separately by SWP for 16KiB or 64KiB units:
  - OSS OS/A+ Version 4 (1982-1983) or MYDOS 3 (1983-1986)
  - Autoterm-80 (version of Autoterm with 80 column display for any Atari)
- Sold separately by SWP for 64KiB units:
  - CO-POWER-88 (internal upgrade): 5.33MHz 8088 MPU, 128KiB or 256KiB,
    MS-DOS 2.11
  - CO-POWER-Plus (internal upgrade): 5.33MHz 8088 MPU, 256KiB (expandable
    in increments of 256KiB to 1MiB) or 1MiB, MS-DOS 2.11
  - CP/M-86 for CO-POWER-88 or CO-POWER-Plus

HDI High-density Disk Interface, by Erhard Puetz (1990/1991?)
- A printed circuit board, includes 65C02 MPU and WD37C65C controller
- Connect up to 4 standard PC floppy drives
- Drive types: 5.25" 360KiB, 3.5" 720KiB, 3.5" 1440KiB (any combination)
- Drive connector: 34 pin header
- Drives must support the Disk Change signal at pin 34 of the Shugart bus
- Connects to the Atari via SIO (must be at end of SIO chain)
- Happy compatible/Warp Speed capable
- Maximum transfer rate: 500 kbit/s (1440KiB 3.5" disks)
- 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
- Drive types: 5.25" 360KiB, 3.5" 720KiB, 5.25" 1200KiB, 3.5" 1440KiB
- 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

Karin Maxi Disk Drive by Mariusz Geisler for Karin (1995?)
- XL OS Rev.1+ New Device, connects to Cartridge+ECI
  - Design errors result in conflicts with other New Device peripherals
- Drive connector: 34 pin PCB edge
- FDC: WD1770 or WD1772
- Usual drive types: 5.25" or 3.5", each either 40 tracks or 80 tracks
- Double-sided formats use PC-standard 'head-first' mapping
- 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/drac030/candle
- Original Karin Maxi design with original design errors fixed
- See: http://karinmaxidrive.pigwa.net/

3.3) Hard disks & other storage

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) 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 and 4
  - Attaches to Processor port on Corvus drive (34 pin Corvus-IMI bus)
- Two different "AT Utilities" diskettes (v.1 and v.2)
- 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 48KiB RAM, and 810 or equivalent floppy disk drive.
- SYSGEN utility divides the drive into any combination of 90KiB and 180KiB "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 (4/25/81)
  - 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)

3.3.2) How can I use an ST506 interface hard disk (MFM or RLL)?

The 5MB ST-506 MicroWinchester was the first 5.25" hard disk drive, introduced
in 1980 as the first product from Shugart Technology (shortly to be renamed,
Seagate Technology). The market success of the ST-506 (along with the
subsequent 10MB ST-412 and 20MB ST-225) led to the ST506 interface between
disk controller and drive (an incremental derivation from the interface for
the 8" 10MB Shugart Associates SA1000 hard disk from 1979) being established
as an industry standard for hard disk drives.

Note that with ST506 type hard disks, the disk itself is attached to a
separate disk controller unit, which in turn attaches to a host computer
interface.

At the time of the Atari, hard disks paired with ST506 type controllers were
popularly characterized not by the interface (ST506), but by the recording
method used by the controller: either modified frequency modulation (MFM) or
run-length limited (RLL).

Sold by SWP for 64KiB ATR8000 units (with CP/M) for the Atari (1986):
5MB, 10MB, or 20MB hard disk packages with SWP host adapter (40 pin header
connector to controller), WD1002-HD0 MFM controller (ST506 interface: 34 pin
header drive control + 20 pin header data connectors), and "a new CP/M" with
ZCPR3 option. Can be partitioned for MYDOS & CP/M, plus MS-DOS for CO-POWER.
The SWP ATR8000 hard disk interface supports up to 32MB of hard disk storage.

Also, some hard disk "bridge" controllers allow a ST506 type hard disk to be
attached to a computer's SASI/SCSI interface. Such controllers were popular
for use with the Atari SASI/SCSI interfaces that require a controller
supporting 256-byte sectors. Suitable ST506 controllers for this purpose
include: Adaptec ACB-4000A (SCSI), Adaptec ACB-4070 (SCSI), Western Digital
WD1002-SHD (SASI), Xebec S1410 (SASI), Xebec S1410A (SASI)

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

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.

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 Atari SASI/SCSI interfaces. Suitable SCSI drives meeting
this requirement include: Seagate ST-225N (20MB), Rodime RO650 (10MB) and
RO652 (20MB), Iomega Alpha 10H (10MB) and Beta removable cartridge drives

Also, some hard disk "bridge" controllers allow a ST506 type hard disk to be

attached to a computer's SASI/SCSI interface. Such controllers were popular
for use with the Atari SASI/SCSI interfaces that require a controller
supporting 256-byte sectors. Suitable ST506 controllers meeting this
requirement 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.

==> Z-Tec 1000
- SASI host adapter for 64KiB SWP ATR8000
- Attaches to the ATR8000 internally
- SASI Connector: 50 pin Micro-Ribbon
    - Compatibility limited to controllers supporting 256-byte sectors

==> BTL 2004 SASI Hard Disk Adapter, by William Lurie & Associates, 1986
- XL OS Rev.1+ New 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
- XL OS Rev.1+ New 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
    - 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
        http://preview.tinyurl.com/nsroe4u

==> Multi I/O board (MIO), by ICD, 1987
- XL OS Rev.1+ New Device, connects to PBI
    - ICD adapter for Cartridge+ECI provides two pass-through cartridge ports
- 256KiB or 1MiB RAM versions
- RamDisk: Use any amount of unit RAM as a RAMdisk
    - 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
- RS-232 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)
- Menu program on firmware ROM
  - Accessed by holding down the SELECT key while booting or by holding down SELECT and pressing RESET
    - Menu loads into the computer's main memory (RAM)
  - Allows booting booting from RamDisk or Hard Drive
  - Allows partitioning of hard drives and RAM for RamDisks (up to 8 total drives)

==> Black Box, by Computer Software Services (CSS), 1989
- XL OS Rev.1+ New 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-C 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
- 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
- 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
- Mathy van Nisselroy's Black Box page: http://www.mathyvannisselroy.nl/blackbox.htm

==> Multi I/O board (MIO) "new series" by Ken Jones / MEtalGuy66, 2006
Equivalent to the original ICD MIO, 1MiB RAM version, with improvements:
- RS-232 port: DE-9P (IBM PC standard)
- Hard Disk (SCSI) port:
  - Compatibility includes controllers supporting 512-byte sectors
- Available: http://www.rasterline.com/

3.3.4) How can I use an IDE interface hard disk or CompactFlash card?

(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 with the 8-bit Atari:

==> KMK/JZ IDE (1996) and KMK/JZ/IDEa (2004)

- 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
  - XL OS Rev.1+ New Device, connects to Cartridge+ECI
  - Available: http://8bit.yarek.pl/interface/atari.kmk/
- KMK/JZ IDEa Interface
  - Hardware design by Jacek Zuk (Simius) and Michal 'Pasiu' Pasiecznik,
    2005-2006
  - XL OS Rev.1+ New Device, connects to Cartridge+ECI
    - Can also be mounted inside any XL/XE
  - Available: http://atarifanstore.info/idea.htm
- Software by Konrad 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
- Utilities, tools and the system software: http://drac030.krap.pl/

==> SmartIDE, project by Bob Woolley (1996)
- Project for the 1200XL
- Published as a series of articles in Atari Classics magazine;
  Web pages by Clarence Dyson
- "SmartOS" Sept/Oct 1995, pp. 25-29
  http://www.wolfpup.net/atarimods/smartos-1.html
- "Dallas 'ROMs'" Fall 1996, p. 16
  http://www.wolfpup.net/atarimods/smartos-2.html
- "Smart IDE" Fall 1996, pp. 17-19
  http://www.wolfpup.net/atarimods/smartide-1.html
- "The IDEal Hard Drive" Fall 1996, pp. 20-22
  http://www.wolfpup.net/atarimods/smartide-2.html
- "IDE Driver Software" Fall 1996, pp. 23-27
  http://www.wolfpup.net/atarimods/smartide-3.html
  Software (IDE38.ASM) download: http://www.wolfpup.net/atarimods/idecode.zip
- IDE (IDE_NKH.ASM 12/09/00; based on IDE38.ASM by Bob Woolley) by Nathan
  Hartwell adds the SIO command GET_CONFIG to the IDE Driver Software
  http://www.magelair.com/atari_8bit_stuff.html
- Extensions of the SmartIDE project:
  ==> 16-bit IDE, project by Nathan Hartwell (MageX)(2000)
    - Based on the schematic for SmartIDE by Bob Woolley
    - SmartIDE Code (IDE_NKH.ASM 12/19/00) is based on IDE38.ASM by Bob
      Woolley
    - Project home: http://www.magelair.com/atari_8bit_stuff.html
  ==> PBI 16-bit IDE, project by Nathan Hartwell (MageX)(2000?)
    - Heavily modified from the SmartIDE schematic by Bob Woolley
    - Like SmartIDE, this is still an internal design that plugs into the MPU
      socket for most of the signals needed.
    - No PAL/GAL logic is used.
    - No code has yet been developed.
    - Project home: http://www.magelair.com/atari_8bit_stuff.html

==> msc IDE, by Stefan Birmanns and Matthias Belitz (1996)
- XL OS Rev.1+ New 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 SPARTA-DOS 3.2 gx (reading)
- Transfer rate > 10 kB/s file access with SPARTA-DOS 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:
  https://web.archive.org/web/20111117071126/http://www.birmanns.de/atari/

==> 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)
- Project home: http://www.alma.demon.co.uk/Atari/AtariHwSw.html

==> 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 19200 baud
- Works with Atari High Speed SIO (US and Happy) at a speed of 52000 baud
- 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
- 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 16MiB)
- Supports directory change (multiconfig)
- 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
Available, latest version: http://afs.atari.org/sio2ide.htm
- Options: USB controller, SIO plug
SIO2IDE project home: http://www.atariarea.krap.pl/sio2ide/

==> MyIDE, by Mr.Atari (Sijmen Schouten)(2002) / Atarimax (Steven Tucker)
- Originally released as plans, as a cartridge, or as a kit that could either
  be installed into a cartridge case or inside the computer.
  Software also included: MyBIOS, the IDE based OS by Mr.Atari
- Version 3.1 is an internal or external IDE interface for all Atari
  8-bit XL/XE computers (2006)
- Atarimax implementations by Steven Tucker:
  - MyIDE+Flash Cartridge Interface (XL/XE)
  - MyIDE Internal Interface (XL/XE)
- MyIDE project home: http://www.mr-atari.com/myidehome.htm

==> IDE Plus 2.0 (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), 1995-2011
  - XL OS Rev.1+ New 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 96KiB ISP Flash ROM and 32KiB RAM available to the internal PBI BIOS and flashable from the Atari
  - Contains 512KiB or 1024KiB 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 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, by Sebastian Bartkowicz (Candle), 2011
- Allows the use of a CF card on the Atari, via the cartridge port
- Features:
  - SpartaDOS X cartridge (SDX)
  - On Board Real Time Clock with appropriate driver inside SDX
  - CF Card slot capable of handling 3.3V CF cards (that excludes microdrives, but everything else, regardless of capacity should work)
- Developer web page: http://spiflash.org/block/16.html

==> SIDE 2, by Przemyslaw Krawczyk (Lotharek), 2012
- Builds on the original SIDE concept by adding CF card hot-swap functionality and enhanced ROM banking capabilities.
- Available: http://lotharek.pl/product.php?pid=68

==> MyIDE-II, by Atarimax (Steven Tucker) / Mr.Atari (Sijmen Schouten), 2012
MyIDE-II CompactFlash Cartridge for Atari XL/XE computers includes:
- Compact Flash Hardware Interface (by Atarimax)
  - Full Software Power Control
  - Hardware Media Change Detection
  - Upgradable Hardware Core via Card Edge JTAG Interface
- 512KiB On-Board User Customizable Flash Memory
  - Atarimax Maxflash Studio & USB Programmer Integration
  - Menu Customizability using Maxflash Studio Workbooks
- 512KiB On-Board Application SRAM
  - Develop advanced applications without requiring internal RAM upgrades
- Mr-Atari's MyBIOS Included
  - New MyIDE-II MyBIOS with Full "Hot Swap" Media Change Support
  - Upgrade/Change MyBIOS by updating your Maxflash Studio Workbook
More features:
- Available Atarimax MyIDE-II FAT32 Loader, to access *.XEX and *.COM files directly from FAT32 partitions
- Disk mode, to load .ATR files inside MyIDE mode
- MyIDE mode, works the same as earlier MyIDE Interface
- LED access, and card on/off
- Compatible with SD cards with adaptors
http://www.atarimax.com/myide/documentation/

==> Incognito, by Sebastian Bartkowicz (Candle'O'Sin), 2012
- 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
- Device detailed elsewhere in this FAQ list (800 personality boards)

3.3.5) How can I use a Secure Digital (SD) card with my Atari?

(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, by Jakub Kruszona-Zawadzki, Pajero/MadTeam, Jakub Husak
Load games/applications into 8-bit Atari computers via SIO interface from
SD/MMC cards. Device features:
 - 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 16MiB 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 writting 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.).
 - Builtin very simple TURBO loader (for 7th bit mode - turbo mode similar to
   one used in XF551)
 - Available: http://www.mega-hz.de/Angebote/angebote.html (v.1,v.2)
 - Available: http://afs.atari.org/ (v.2)
 - SIO2SD project home: http://sio2sd.gucio.pl/

==> SDrive, by C.P.U. (Radek Sterba (Raster) & Robert Petruzela (Bob!k))
http://raster.infos.cz/atari/hw/sdrive/sdrive.htm
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 mamory card.
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 16MiB, 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 MCU, 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 8MiB 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: 80KiB file size limit applies to standard DOSes, 8MiB to Q-MEG and MyDOS)

==> SDrive NUXX, by Steve Vigneau / cOnsumer
http://nuxx.net/wiki/SDrive_NUXX
Based on SDrive by C.P.U. Changes from the original SDrive:
- 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.

==> SDrive Standard, by Rick L. Detlefsen / Rix / More Than Games
(based on SDrive by C.P.U.)
http://morethangames.a8maestro.com/proda8/adv-eh0130.htm

==> SDrive Bay Mount version, by Rick L. Detlefsen / Rix / More Than Games
(based on SDrive by C.P.U.)
http://morethangames.a8maestro.com/proda8/adv-eh0140.htm

==> SIO2MicroSD, by Don Peruski
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 *
- Load/Unload/Swap with 4 buttons and 16x2 LCD Display
- Optional "Game/Simple Mode" configuration to limit menu choices for easier use
- LCD detail mode to view access commands and use
- XEX Boot-Loader **
- Ability to save current configuration of all settings
- S-Drive main functions compatible ***
- 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
  * Limited to mode 9 (about 56 kbit/s) due to 16Mhz crystal used with the stock
    Arduino.
 ** XEX Bootloader code used from S-Drive source
*** Only main portions of S-Drive were implemented based on documentation
http://diskwiz.wordpress.com/sio2microsd/

3.3.6) How can I use a USB flash drive with my Atari?

USB flash drives are NAND-type flash memory data storage devices integrated with a USB (universal serial bus) interface. They are typically small, lightweight, removable and rewritable.

==> SIO2USB, by ABBUC Regional Group Frankfurt / Main (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-Imagefiles (ATR or XFD) on a standard FAT filesystem.
Features:
 o Can boot an Atari 8-bit Computer without physical Floppy Drive
 o Emulation of up to 3 (virtual) Disk drives simultaneously
 o Simple device, attached to SIO-Port, no modification of computer necessary
 o Mixed operation of real Floppy and SIO2USB possible
 o Fully compatible with all Atari DOS and OS and all Atari compatible extensions
 o Storage of Atari-Imagefiles on standard USB FLASH Drives
 o Configuration of the device by built-in keys and LC-Display or configuration program on the Atari
 o Built-in Real Time Clock (RTC)
 o Power supply for the device and USB FLASH Drive from SIO-Bus
 o Updated SIO2USB Firmware can be applied from within the Atari (no additional device or computer required)
 o Updates available via Internet (USB FLASH Drive) or direct from the Atari (real Disk Drive)
Information: http://preview.tinyurl.com/m6akpr8

3.4) How can my Atari utilize my other computer's storage devices?

==> 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. Features (disk emulation):
 - Provides up to four pseudo-drives to the ATARI. To Atari DOS they appear as devices D1: through D4:. What they actually are is 90KiB 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), 1983/1984
A hardware interface and CP/M software package that links an Atari computer to CP/M compatible computers. Features (disk emulation):
 - Utilize an entire CP/M disk as an emulated 600KiB Atari disk drive
 - Utilize 92KiB CP/M disk files as emulated Atari 90KiB 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, 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.

Software features (disk emulation):
 - 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
 - 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.wolfpup.net/atarimods/ (Clarence Dyson)
 - 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/ (Steven Tucker)
 - http://www.mega-hz.de/Angebote/SIO2PC/SIO2PC.html (Wolfram Fischer)
 - http://www.asselheim.de/atari/sio-pc.htm (Frank Heuser)

SIO2PC cable/interface designs and sources, USB interface:
 - Atarimax Universal SIO2PC/ProSystem interface, USB versions
   http://www.atarimax.com/sio2pc/documentation/ (Steven Tucker)
 - SIO2PC-USB (Ray Ataergin)
   http://www.atari8warez.com/
 - SIO2PC/1050ZPC Dual-USB (Ray Ataergin)
   http://www.atari8warez.com/
 - Sio2PC-USB (Lotharek)
   http://lotharek.pl/product.php?pid=98

==> 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 Steven Tucker, 1995/2007
Hardware component: APE Interface Cable (or SIO2PC cable)
Versions for DOS or Windows PC, software features (disk emulation):
 - Up-To 8 Hard Drives & Floppy Drives
 - Single, Double, "Quad", or 1050 Enhanced Density for any floppy drive
 - Disk images of up to 16MiB 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
 - Supports the .ATR and .PRO Atari disk image file formats on the PC
 - Full cooperation with real SIO devices
http://www.atarimax.com/

==> Floppy EMULator, by Pavel Machek, 1997
Turn your Linux machine into the Atari computer's floppy drive.
- Need to use an 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 EMULater by Pavel Machek
- Need to use an 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/

==> 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: SIO2PC (except
early two-chip design), 1050-2-PC, or APE ProSystem cable.
atariserver software features (disk emulation):
- Supports several SIO speeds:
  - Standard 19200 bit/s
  - 38400 bit/s in XF551 compatibility mode
  - 57600 bit/s
  - 57600 bit/s with short pauses between bytes
- Can be fully controlled from the Atari
- Virtual drive support (somewhat similar to the "PC mirror" feature of APE).
  Directly access files on your harddisk (without first creating an ATR image)
  and also store new files on your harddisk 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: SIO2PC.
http://vapi.fxatari.com

==> Multi-platform Distributive Operating System Professional for Atari,
    by Krishna Software (Krishnasoft), 2005/2006
MPDOS Professional for Atari Features (disk emulation):
 o Simulates up to 4 Atari disk drives (D1:, D2:, D3:, D4:)
 o Simulates Atari cassette player (C:)
 o Includes easy to use parallel port cable (plug and play)
 o Hardware level simulation (no drivers required, except for keyboard)
 o Supports PC video overlay window
 o KDOS4-- a fast binary file uploader
 o Multimedia CDROM included (runs on PC and Atari using distributive
   programming)
 o Simple GUI interface for simulating peripherals, compiling, and uploading
 o On-line 100+ page manual with technical and general information
http://www.krishnasoft.com/sps.htm

==> SIO2BSD, by Konrad Kokoszkiewicz, 2005/2012
A program that handles the SIO2PC cable under: FreeBSD, Linux, MacOS X
(preferably FreeBSD).
- Supported baudrates: 19200 bit/s, 38400 bit/s, 57600 bit/s
- Configurable POKEY clock frequency

- Attach up to 15 disk images
- Supports the .ATR disk image file format
- PCLink feature - mounted directory is served by processing only high-level
  DOS requests from the Atari. Requires corresponding software on the Atari,
  such as the available PCLINK.SYS which installs the PCL: device under
  SpartaDOS X.
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
- SIO2PC cable required
- USB serial adapter with complete RS232 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 Serial Peripheral Emulator for QT
- Original AspeQt code up to version 0.6.0 Copyright 2009 by Fatih Ayguen
- Updates to AspeQt since v0.6.0 Copyright 2012- by Ray Ataergin
- MS Windows and Ubuntu versions
- Sold with the developer's SIO2PC/10502PC Dual-USB or SIO2PC-USB cables
http://www.atari8warez.com/

==> SIO2BT, by Marcin Sochacki (Montezuma), 2014/2015
A set of hardware and software solutions related to the wireless Bluetooth
communication between the 8-bit Atari computers and Bluetooth (BT) enabled
Serial Input Output (SIO) devices.
- Requires modified Atari OS (SIO communications timing issues)
- Compatible with SIO2BSD
- Modified version of AspeQt available
- Android software available: SIO2BT App
- Hardware design prohibits use with other, real SIO devices
http://www.abbuc.de/community/forum/viewtopic.php?f=15&t=8132
https://play.google.com/store/apps/details?id=org.atari.montezuma.sio2bt
http://atariage.com/forums/topic/228860-sio2bt/
https://drive.google.com/file/d/0B3-191R-U_S1blpUTFBsRW1iRUE

==> RespeQt, Atari Serial Peripheral Emulator for Qt, 2015- by Joseph Zatarski
Based on AspeQt 1.0.0-preview7 by Fatih Ayguen and Ray Ataergin.
Emulates various Atari 8-bit peripherals like disk drives and printers via a
SIO2PC cable.
- Supports .ATR, .XFD, .ATX (still in development), and .PRO formats
- Cross-platform GUI with drag and drop support
    - Runs under Windows, Linux and Mac OS X
- AspeCl client software for the Atari
    - Runs only under SpartaDos (v2.5 and up) and SpartaDos X versions
- 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 (With
  compatible 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
- Printer emulation with preview and ATASCII support
- .CAS Cassette image playback with custom baud rate
- Ability to save and restore RespeQt sessions with its UI settings.
- Normal and mini UI modes
https://github.com/jzatarski

4) Printers

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.

Atari 820 Printer
- Sold by Atari in the USA only
- 40-column dot matrix impact printer
- 5x7 dot matrix
- 40 characters per line, upper & lower case alpha
- Horizontal and vertical alphanumeric characters
- 6507 MPU (MOS Technology MCS6507 or equivalent), C010745
- 6532 PIA (MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent), C010750
- 2KiB ROM
- 40 characters per second
- 400/800 OS: Responds to P: and ignores any device number
    XL OS: Responds to P: and P1:
- 2 Atari SIO ports for direct connection to Atari computers
- Included:
  - Atari SIO cable CA14122 (3 ft.)
  - Ribbon
  - Standard Roll Paper (one roll)
  - Atari 820 Printer Operator's Manual C014762 (C014762)
- Power supply is built-in (plugs directly into the wall, 120V AC, 18W)
  - (There is no 220V/240V version of the 820.)
- Uses Standard Roll Paper/adding machine paper
- Print mechanism: LRC 7000 / Eaton 7000
- Made in ????????
- Industrial design (case): Roy Nishi and Russell W. Farnell
- Sold separately:
  - Atari 820 Printer Paper (Roll Paper) C014062
  - Atari 820 Printer Ribbon C014854
- Technical manuals:
  - Atari 820 40 Column Printer Service Manual
    - FS015893 REV. 1 January, 1980
  - Atari 820 40 Column Printer Field Fervice Manual
    - FD100048 July, 1981 (c)1982

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:
- 2 Atari SIO ports for direct connection to Atari computers
- Included:
  - AC Power Adapter
  - I/O Data Cord
  - One roll of white thermal paper installed
  - Atari 822 Thermal Printer Operator's Manual C015954 (C015954)
- Power: Used with an external 9 volt AC transformer power supply rated for at least 18 watts: Atari CA014748 or equivalent
- Print mechanism: Trendcom 100
- Made in USA by Trendcom for Atari
- Sold separately:

- Atari 822 Thermal Printer Paper (2 rolls) C016345

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: 1200 dot columns
- Controls along bottom of front of printer, left to right:
    - Online/Local
    - Paper Rev<->Fwd
    - Power Off On
- Paper: roll, fanfold, or cut sheets
- Connectivity: 40 pin PCB edge. Pinout:
  40   2
   -
   -
  39   1
         1. Data Strobe   2. Ground
         3. Data Bit 1   4. Ground
         5. Data Bit 2   6. Ground
         7. Data Bit 3   8. Ground
         9. Data Bit 4   10. Ground
        11. Data Bit 5   12. Ground
        13. Data Bit 6   14. Ground
        15. Data Bit 7   16. Ground
        17. Data Bit 8   18. Ground
        19. Acknowledge   20. Ground
        21. Busy   22. Ground
        23. Always Logic 0 (Ground) 24. Ground
        25. On-Line   26. Not Used
        27. Signal Ground   28. Always Logic 1
        29. Not Used   30. Ground
        31. Signal Ground   32. +-+ Pin 32 connected to
        33. Chassis Ground   34. +-+ Pin 34 in Printer
        35. +5V Signal (Power Supply On) 36. Demand
        37. +17V   38. Not Used
        39. +17V   40. Not Used
- Requires Atari 850 Interface Module or equivalent to connect to the
  Atari computer. As such:
  400/800 OS: Responds to P: and ignores any device number
    XL OS: Responds to P:, P1:, and P2:
- Included:
    - Ribbon
    - Atari CX86 Printer Cable (825 to 850 parallel)
    - Atari 825 80-Column Printer Operator's Manual C015506 (C015506)
- Power supply is built-in (plugs directly into the wall, 120V AC, 100W)
    - (There is no 220V/240V version of the 825.)
- Print mechanism: Centronics 737
- Made in ????????
- Sold separately:
    - Atari 825 Printer Ribbon (3 per box) CA016087
    - Atari 825 Printer Paper (Roll Paper) C016233
    - Atari 825 Paper Mandrel C016229
    - Atari 825 Paper Roll Support C016230
    - Atari 825 Paper Deflector C016231
- Technical manual: 825 Printer Field Service Manual

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.

```
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:
- 2 Atari SIO ports for direct connection to Atari computers
- Included:
   - Atari SIO cable
   - 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 (C061368)
   - Joystick Sketchpad Instruction Guide C061578
   - Atari 1020 Color Printer Field Service Manual FD100288
- Power: Used with an external 9 volt AC transformer power supply rated for at
   least 15 watts; shipped with Atari CA017964.
- 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)

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 chrs at 16.7 cpi, 80 chrs 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:
- 2 Atari SIO ports for direct connection to Atari computers
- Included: Printer ribbon, SIO cable, Power adapter (220V version)
- CPU: Intel 8051 microcontroller (MCU), FC100387
- 8155 RAM I/O: Intel 8155 2048 bit static MOS RAM with I/O ports and timer, FC100389
- Manuals:
    - The Atari 1025 Printer Owner's Guide C060505
    - Atari 1025 Printer Field Service Manual FD100290
- Power, 120V version: Plugs directly into wall (120V AC, 100W)
- Power, 220V version: Used with an external AC power adapter with two outputs, one rated for 29VAC/600mA and the other rated for 8.6VAC/1A. Atari#14750, one such supply, is detailed elsewhere in this FAQ list.
- Print mechanism: Okidata ML80 / Microline 80
- Made in Japan
- Sold separately: Atari 1025 80-Column Printer Ribbon C061419 / BX4202

Atari 1027 Letter Quality Printer
- Type: Letter quality (fully formed characters Prestige Elite 12)
- Format: 12 pitch = 12 cpi (80 columns)
- Printing speed: 20 characters per second
- Paper type: Single sheets or Roll paper
- 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:
- 2 Atari SIO ports for direct connection to Atari computers
- Included: Ink roller, Atari SIO cable, power adapter
- Manuals:
    - The Atari 1027 Letter Quality Printer Owner's Guide C061387
    - Atari 1027 Printer Field Service Manual FD100670 REV. 01 October 1983
- Power, 120V version: Used with an external 9.5V AC power supply rated for 4.2A or 40VA, such as Atari#C061636 or equivalent
- Power, 220V version: Used with an external 9V AC power supply rated for 4.2A, such as Atari#C061605-11 or equivalent
- 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

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
- 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:
- 2 Atari SIO ports for direct connection to Atari computers
- Power
    - 220V-240V 50Hz-60Hz 0.15A version: Plugs directly into wall
    - 120V version: plugs directly into wall
      (released in Canada but not the USA)
- Print mechanism: Seikosha GP-500 ; clone of Seikosha GP-500AT
- Made in Japan for Atari, Corp. in 1984, following conception by Atari, Inc.
- 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.

Atari XMM801 Dot Matrix Graphics Printer
- Dot matrix impact printer
- 80 columns
- Pica 10 characters per inch (cpi), double width pica 5 cpi, elite 12 cpi, double width elite 6 cpi, condensed 16.5 cpi, double width condensed 8.25 cpi
- 96 ASCII character set and 36 International Characters.
- 400/800 OS: Responds to P: and ignores any device number
    XL OS: Responds to P:, P1:, and P7:
- Included:
    - Direct connect 3 ft Atari SIO Cable,
    - Wire paper feed Rack,
    - Multi Strike black Ribbon Cassette
- Manuals:
    - Atari XMM801 Dot-Matrix Graphics Printer Owner's Manual C025959
    - Atari XMM801 Field Service Manual C070435 (1985)
- Power supply is built-in (plugs directly into the wall, 120V AC)
- 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

Atari XDM121 Letter-Quality Daisy-Wheel Printer
- Daisy wheel impact printer
- 80 columns
- Underlining, subscripts, superscripts
- Courier 10 Print Wheel (10 pitch = 10 cpi)
- International Character Set
- 400/800 OS: Responds to P: and ignores any device number
    XL OS: Responds to P:, P1:, and P8:
- Included:
    - 3 foot Direct connect Atari SIO cable
    - Atari XDM121 Letter-Quality Daisy-Wheel Printer Owner's Manual C026323
      (C026323)
    - Multi Strike Black Ribbon Cassette
- Power supply is built-in (plugs directly into the wall, 120V AC)
- Friction feed paper
- Ribbon: Silver Reed CF130, Olivetti ET201, ET221, Nu-Kote NK136
- Made in ??????

4.4) What were the Atari XTM201 and XTC201 Printers?

The XTM201 printer was introduced by Atari in January 1985 at the Winter Consumer Electronics Show in Las Vegas. A monochrome thermal printer, the XTM201 would accept single sheets of thermal paper or plain paper (Xerox 4024 or equivalent), and would also have both ribbon-end and paper-out sensors.

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.

The XTC201 printer was introduced by Atari in January 1985 at the Winter Consumer Electronics Show in Las Vegas. A color thermal printer with support for monochrome (black) printing as well, the XTC201 would accept single sheets of thermal paper or plain paper (Xerox 4024 or equivalent), and would also have both ribbon-end and paper-out sensors. 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

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
- 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

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 U.S. 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 U.S. 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 U.S. by Axiom
- Built-in Atari interface, cable and connector; 2nd SIO port for daisy chain
- Dot matrix impact printer
- 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.

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.

1050 Turbo (for Atari 1050), by Bernhard Engl for Gerald Engl Computertechnik
 - Optional Centronics parallel printer interface cable (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
Atari 850 Interface Module - DA-15S
 - Detailed elsewhere in this FAQ list
Atari XEP80 Interface Module - DB-25S
 - Detailed elsewhere in this FAQ list
 - Supplied with replacement P: device handler
ATR8000 by SWP
 - 16KiB or 64KiB RAM versions
 - Printer port: 34 pin PCB edge
 - Unit RAM can be used as a printer buffer
 - 2nd SIO port for daisy chain
Black Box, by Computer Software Services (CSS)
 - XL OS Rev.1+ New 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:
     - 64KiB 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
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 (?)
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 36 contact miniature-ribbon plug
 - Prints Atari graphics characters
ICEPIC, by ICECo - joystick cable to 36 contact miniature-ribbon plug
 - Supplied with 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)
 - XL OS Rev.1+ New Device, connects to PBI
 - Printer port: 40 pin PCB edge
     - Supplied with printer port software utilities
Macrotronics Parallel Printer Interface (see Analog#2p29)
 - Connects to controller jacks 3&4. Six versions:
     - Trendcom 100 / 200   A4P-1 for 400, or A8P-1 for 800
     - Centronics 730 / 737 A4P-2 for 400, or A8P-2 for 800
     - Centronics 36 Pin   A4P-3 for 400, or A8P-3 for 800
 - Does not use standard Atari OS P: device handler
Mega Speedy (for the Atari 1050), by Guus Assmann & Matthias Reichl, 2014
 - Optional centronics interface, connector type same as 1050 Turbo
Micro MainFrame MF-1682 dual disk drives - printer port, 4KiB print buffer
 - 2nd SIO port for daisy chain
 - Option: printer buffer to 38KiB
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 joystick port #3, NTSC 400/800 only, supplied with required
   replacement OS ROM chip for Atari OS Rev.A/NTSC chip C012499
 - Acknowledged software incompatibilities:
     - Monkey Wrench II from Eastern House Software
     - Zaxxon from DataSoft (early release versions)
 - Sold separately:
     - MPP-1102 Adapter Cable (40-pin 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
  - XL OS Rev.1+ New Device, connects to PBI
       - ICD adapter for Cartridge+ECI provides two pass-through cartridge ports
  - 256KiB or 1MiB 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
           - Pause/Resume, Repeat Copies, Clear
Multi I/O board (MIO) "new series" by Ken Jones / MEtalGuy66
  - XL OS Rev.1+ New Device, connects to PBI
  - 1MiB 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 AT88-S1PD disk drive - 34 pin header (2x17)
  - 2nd SIO port for daisy chain
Percom AT88-SPD disk drive - 34 pin header (2x17)
  - 2nd SIO port for daisy chain
Portprint, by Computer Support
  - Connects to joystick ports of any XL/XE computer
  - Replacement P: handler required
P:R: Connection, by ICD - DA-15S
  - SIO port for daisy chain
Printer Connection, by ICD - SIO cable to 36 contact miniature-ribbon plug
Printerface, by W.E. Electronics
  - Connects to 1 joystick port on the Atari
  - Shipped with P: driver on cassette
Rambit PPP - Parallel Printer Port - 36 contact miniature-ribbon plug
  - Connects to the Atari via PBI (600XL/800XL)
Spider disk drive - DA-15S and DB-25S dual printer ports
  - 2nd SIO port for daisy chain
Supra Hard Disk Interface, by Supra
  - XL OS Rev.1+ New 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 720C disk drive - DB-25S
  - 2nd SIO port for daisy chain
TOMS 720CR disk drive - DB-25S
  - 2nd SIO port for daisy chain
Trak AT-1 disk drive
  - 2nd SIO port for daisy chain
  - Upgrade: 34 pin PCB edge printer port with 4KiB buffer
       - Upgradable to 16KiB
Trak AT-D1 disk drive - 34 pin PCB edge, 4KiB print buffer
  - 2nd SIO port for daisy chain
  - Upgrade: 16KiB print buffer
Trak AT-D2 disk drive - 34 pin PCB edge, 4KiB print buffer
  - 2nd SIO port for daisy chain
  - Upgrade: 16KiB print buffer
Trak AT-D4 disk drive - 34 pin PCB edge, 4KiB print buffer
  - 2nd SIO port for daisy chain
  - Upgrade: 16KiB print buffer
TurboPrint/A, by Telesys - 36 contact miniature-ribbon plug
  - Page formatting independent of software
TurboPrint/GTA, by Telesys - 36 contact miniature-ribbon plug
  - Page formatting independent of software
  - Prints Atari graphics characters
  - Options: B16 16KiB TurboBuffer or B32 32KiB TurboBuffer

U-Print Model A, by Digial Devices - 36 contact miniature-ribbon plug
 - SIO port for daisy chain
 - Upgrade: 16KiB buffer
U-Print Model A16, by Digial Devices - 36 contact miniature-ribbon plug
 - SIO port for daisy chain
 - 16KiB buffer, Copy button, Reset (cancel) button
 - Upgrade: to 32KiB
U-Print Model A64, by Digial Devices - 36 contact miniature-ribbon plug
 - SIO port for daisy chain
 - 64KiB buffer, Copy button, Reset (cancel) button
WW Interface 72000 - 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.

4.7) How can my Atari utilize my other computer's printer?

==> ATARIBUS project by Dave Warker, 1982/1983
A hardware interface design and CP/M software package that links an Atari
computer to a CP/M compatible computer. Features (printing):
 - 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. Features (printing):
 - 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.
Software features (printing):
 - Print-Thru captures Atari print-out and routes to PC's printer
http://pages.suddenlink.net/wa5bdu/sio2pc.htm

See another section of this FAQ list for a list of additional SIO2PC cable
and interface designs and sources.

==> Atari Peripheral Emulator (APE), by Steven Tucker, 1995/2007
Hardware component: APE Interface Cable (or SIO2PC cable)
Versions for DOS or Windows PC, software features (printing):
 - Full emulation of the Atari 850 interface, allowing you to use your PC
   printer from any Atari application that can use the 850 interface.
 - Can also print to a file on the PC.
 - Print data conversion options:
   EOL conversion, ATASCII TAB conversion, strip from 8-bit to 7-bit data
 - Full cooperation with real SIO devices
http://www.atarimax.com/

==> 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: SIO2PC (except
early two-chip design), 1050-2-PC, or APE ProSystem cable.

atariserver software features (printing):
- Can be fully controlled from the Atari
- 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
- SIO2PC cable required
- USB serial adapter with complete RS232 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 Serial Peripheral Emulator for QT
- Original AspeQt code up to version 0.6.0 Copyright 2009 by Fatih Ayguen
- Updates to AspeQt since v0.6.0 Copyright 2012- by Ray Ataergin
- MS Windows and Ubuntu versions
- Sold with the developer's SIO2PC/10502PC Dual-USB or SIO2PC-USB cables
http://www.atari8warez.com/

==> RespeQt, Atari Serial Peripheral Emulator for Qt, 2015- by Joseph Zatarski
Based on AspeQt 1.0.0-preview7 by Fatih Ayguen and Ray Ataergin.
Emulates various Atari 8-bit peripherals like disk drives and printers via a
SIO2PC cable.
- Printer emulation with preview and ATASCII support

5) Modems & Networking

5.1) What are the Atari 830, 835, 1030, XM301, and SX212 Modems?

Thanks to Laurent Delsarte for some of the research and writing for 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.

The first commercially successful modem was the Bell 103 from AT&T. While the AT&T Bell System maintained monopolistic control over the direct connection to its phone lines in the USA, third-party manufacturers could only offer "acoustic" modem configurations. Acoustic modems featured a cradle designed to fit snugly around the microphone and earpiece of a standard (of the time) Bell telephone handset. A standard Bell telephone was utilized for it's microphone, speaker, and dialing capabilities. Such modems were designed to be interoperable with the Bell 103, which maintained its role as the effective industry standard.

Later "direct-connect" modems, led by the Hayes Smartmodem, instead connected directly to the phone line. These modems contained their own microphones, speakers, and dialing capabilities controlled via software. The "Hayes command set" successfully established the industry standard for controlling modem features via computer software.

Most voice band modems have a pass-through line allowing a standard telephone to be physically connected to the line while the modem is also connected. However, voice and data cannot be transmitted at the same time over the same phone line (as is possible with newer telecommunication technologies such as ISDN and DSL). When online using a dial-up modem, before telephone services like voice mail were common, incoming callers would experience a "busy signal" as if someone was already talking on the line. This limitation was finally addressed in 2001 with the V.92 modem standard. V.92 includes a "Modem On Hold" capability, especially useful in combination with the phone company's "call waiting" and "caller ID on call waiting" features.

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. Major modem modulation standards:

```
Standard    (Year appeared)  Top Bitrate  Baud(symbols per second)
  Bell 103 modem  (1962)      300 bit/s    300 (V.21 precursor)
  Bell 212A modem (1977)     1200 bit/s    600 (V.22 precursor)
  V.22bis         (1982)     2400 bit/s    600
  V.32            (1986)     9600 bit/s    2400
  V.32bis         (1991)    14400 bit/s    2400
  AT&T V.32ter    (1993)    19200 bit/s    3200 ("terbo"; V.34 precursor)
  Rockwell V.FC   (1993)    28800 bit/s    3200 ("Fast Class"; V.34 precursor)
  V.34            (1994)    28800 bit/s    3200
  V.34            (1996)    33600 bit/s    3429 ("V.34 Plus" or "V.34bis")
  US Robotics X2  (1997)    56000 bit/s    8000 (V.90 precursor)
  Rockwell K56flex(1997)    56000 bit/s    8000 (V.90 precursor)
  V.90            (1998)    56000 bit/s    8000
  V.92            (2001)    56000 bit/s    8000
```

At the time, it was very common for modem speed bit rates to be incorrectly referred to as "baud" rates. Other than the early 300 bit/s / 300 baud modulation standard this was never correct usage of the term. Baud always meant "symbols per second" rather than "bits per second."

Two additional important modem standards emerged in 1990: V.42 error control and V.42bis data compression. V.42 and V.42bis were implemented in some later V.22bis and V.32 modems, and probably in all modems supporting V.32bis and up. V.92 modems, which appeared in 2001, support V.44 data compression, an improvement over V.42bis compression.

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. 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.

Atari produced several modems for use with the 8-bit Atari computers. Each Atari brand modem supports U.S. modulation communication standards only; Atari did not market their modems in Europe.

Atari 830 Acoustic Modem
- Sold separately or as part of the Communicator kit CX484
- Type: Acoustic, frequency shift keying (FSK)
- Speed: Up to 300 baud
- Compatibility: Bell 103/113 modem compatible (U.S. industry standard)
- Additional hardware requirement: Atari 850 Interface Module or equivalent
- Connectivity: RS-232-C serial. 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)
- 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
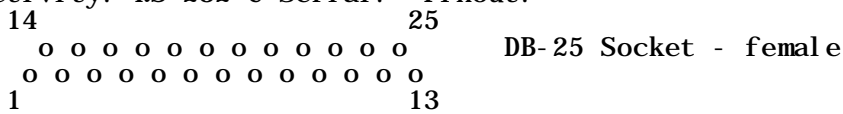
- Originate: mark, 1270Hz; space 1070Hz
        - Answer: mark, 2225Hz; space 2025Hz
- Receive frequencies
        - Originate: mark, 2225Hz; space 2025Hz
        - Answer: mark, 1270Hz; space 1070Hz
- Receive sensitivity: -45dBm
- Power: Uses an external power supply that delivers 20V AC @ 400mA, such as
  the Atari #CA016751-01 / Novation 901017 or equivalent.
        NOTE: Atari product catalogs variously list the minimum power rating for
              the 830 at 7 watts or 18 watts)
        NOTE: Both the 830 box and the 850 Interface Technical Manual indicate
              that the 830 requires:
                  Input: 117V AC (4 watts)
                  Output: 24V AC @ 150mA
              Is there an Atari-branded supply like this?????
- Shipped with an Atari CX87 Modem Cable (830 to 850 serial)
- 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

Atari 835 Direct-Connect Modem
- Sold only as part of the Communicator II kit CX488
- Type: Direct-connect modem
- Speed: up to 300 baud
- Compatibility: Bell 103/113 modem compatible (U.S. industry standard)
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers
- MPU: Intel 8048 microcontroller (MCU), C060549
- Texas Instruments TMS99532 frequency-shift keying (FSK) modem chip, FC100279
- 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: external power supply that delivers 20V AC @ 330mA, such as the
  Atari #C060479 or equivalent
        NOTE: Atari product catalogs list the minimum power rating for the 835 at
              18 watts, but Atari's own power supply is only rated for 9 watts)
- Manuals:
    - The Communicator II User's Guide C024438
    - Atari 835 Direct Connect Modem Field Service Manual FD100268

Atari 1030 Direct-Connect Modem
- Speed: up to 300 baud
- Compatibility: Bell 103/113 modem compatible (U.S. industry standard)
- Connectivity: 2 Atari SIO ports for direct connection to Atari computers.
    - Uses SIO Motor Control; only one such device can be attached to the
      system at a time.
- 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;
      many alternatives to the 1030 ROM T: handler exist as well. Please see a
      separate section of this FAQ list regarding R: and T: modem device
      handlers for the 1030 for more details.
- 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
- Included: Owner's guide, Atari SIO cable, Telephone extension cable with
  RJ-11 clip connectors, Power adapter
- Power: external power supply that delivers 9V AC @ 5.4mA, such as Atari
  #C062195 or equivalent
- User's documentation: C061798 (C061798) The Atari 1030 modem with ModemLink
  telecommunications program owner's guide (1983)
- Field service manual: ?????
- 1030 Designers: John Curran, Ken Fowkes, Sherwin Gooch (project director),
  Joe Miller, Songly Mu, Bernie Poggi, Mark Rustad, Phil Schug, Dennis Smith,
  Jose Valdes, Vince Wu
    - Tone Dialer: * Original version by: J. W. Tittsler, Feb. 1983
                   * Final version by: M. D. Rustad, May, 1983
                   * Modified by: J. B. Miller, August, 1983

Atari XM301 Modem
- Type: Direct-connect modem
- Speed: up to 300 baud
- Compatibility: Bell 103/113 modem compatible (U.S. industry standard)
- 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: Permanent SIO cable, must be at end of SIO chain
- Key engineer/designer: Jose 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 1270Hz +/- 0.5%; Space 1070Hz +/- 0.5%
    - Answer: Mark 2225Hz +/- 0.5%; Space 2025Hz +/- 0.5%
- Transmit level: -9.0dBm to -16dBm
- Receiver frequency
    - Originate: Mark 2225Hz +/- 30Hz; Space 2025Hz +/- 30Hz
    - Answer: Mark 1270Hz +/- 20Hz; Space 1070Hz +/- 20Hz
- Sensitivity: -13dBm to -46dBm
- Carrier detect threshold
    - On: -44dBm
    - Off: -45dBm
- Bit error rate: No more than 1 in 10E5 bits
- Power: 5V @ 60mA, drawn from SIO pin 10 (+5V/Ready)
- User's documentation: C026119 (1985) Atari XM301 Modem
- Field service manual: ?????

Atari SX212 Modem
- Type: Direct-connect modem
- Speed: 75-300 and up to 1200 bit/s
- Compatibility: Bell 103/113/212A modem compatible (U.S. industry standards)
- Compatibility: Hayes command set compatible
- Incompatibilities: With an 800XL, cannot be used with a tape recorder
  (reason unknown?????). The manual reads "If you are connecting your SX212
  modem to an Atari 800XL computer, you cannot operate the modem and a
  cassette recorder at the same time. Remove the recorder before using the
  modem."
- Additional hardware requirement: (none)
- Connectivity: - Atari SIO (must be at end of of SIO chain)
                - Uses SIO Motor Control; only one such device can be

```
                        attached to the system at a time.
                       - DB-25S RS-232 serial
- Key engineer/designer: Jose 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
- Dialing capabilities: Tone and pulse (rotary) dialing
- Carrier frequencies
    - 1200 bit/s; Originate; Transmit 1200Hz, Receive 2400Hz
    - 1200 bit/s; Answer; Transmit 2400Hz, Receive 1200Hz
    - 75-300 baud; Originate; Mark 1270Hz, Space 1070Hz
    - 75-300 baud; Answer; Mark 2225Hz, Space 2025Hz
- Receive signal frequency tolerance: +/- 7Hz
- Bit error rate: Less than 1 in 10E5 bits for signal-to-noise ratio of 8dB
  with 300Hz to 3400Hz 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, and SIO cable
    - SX Express! Program Disk (DX5089) includes:
        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   DOS 2.5 130XE RAMdisk utility
        HANDLER.OBJ   R: device handler (by Paul Swanson)
        HANDLER.DOC   SX212 Modem Handler Technical Description
- Power: External 500mA 9V DC (center positive).  Shipped with Atari C016353.
- User's documentation: (1987) C070878 (C070878) C033506 (C033506)
  Atari SX212 Modem - Owner's manual
- Field service manual: ?????
```

5.2) What other modems can I use with my Atari?

Some third-party modems were marketed for use with the Atari 8-bit computers.
All of these are direct-connect modems (plug directly into the phone line)
unless stated otherwise.

```
==> Microconnection A1, by The Microperipheral Corp. (1981)
- 300 bit/s, Bell 103 compatible
- (No Auto-Dial, no Auto-Answer)
- Requires 850 interface, Atari cable included (Atari CX87 equivalent)
- Software included: Tariterm (both cassette and disk, version 1.1, 9/15/81)
- Sold separately: TSMART (cassette)

==> 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, 9/15/81)
- Sold separately: TSMART (cassette)

==> Microconnection A2, by The Microperipheral Corp. (1981)
- 300 bit/s, Bell 103 compatible
- (No Auto-Dial, no Auto-Answer)
- RS-232 serial printer port included
- Connects via SIO, must be at end of SIO chain.  Not a smart SIO device.
- No software included(?).  Sold separately:
    - Typer-A (M: serial printer device handler on cassette)
    - TSMART (cassette)
```

==> Microconnection A2A, by The Microperipheral Corp. (1981)
- 300 bit/s, Bell 103 compatible
- Auto-Dial (pulse dialing, not touch tone) / (No Auto-Answer)
- RS-232 serial printer port included
- Connects via SIO, must be at end of SIO chain. Not a smart SIO device.
- No software included(?). Sold separately:
   - Typer-A (M: serial printer device handler on cassette)
   - TSMART (cassette)

==> AutoPrint Microconnection, by The Microperipheral Corp. (1983)
- For Atari or Commodore computers
- 300 bit/s, Bell 103 compatible
- Auto-dial / auto-answer
- Printer port - "Centronics" parallel output interface
- Hardware ability to route incoming modem text directly to printer port
- Connects via SIO, must be at end of SIO chain.
- Terminal software listings provided in the user manual. Sold separately:
   - TSMART (cassette)

==> 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)
- 300 bit/s, Bell 103 compatible
- Auto-dial / auto-answer
- Requires 850 interface, Atari cable included (Atari CX87 equivalent)

==> Volksmodem, by Anchor Automation (1983)
- 300 bit/s, Bell 103 compatible
- (no auto-dial, no auto-answer)
- Voice/data 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 joystick port #2
      - Shipped with cassette based terminal software (what software????)

==> Pocket Modem, by BOT Engineering
- 300 baud
- Auto-answer
- Connects directly to SIO
   - Uses SIO Motor Control; only one such device can be attached to the
     system at a time.
- Pocket Modem cartridge, "Intelligent Terminal Software (c) 1984" contains:
   - Pocket Modem Software Ver 2.08 By ADCM Systems (C) Copyright 1984

==> MPP-1000, by Microbits Peripheral Products (1982)
- 300 bit/s, Bell 103 compatible
- Connects to joystick port #4 (400/800 only)
- Smart Terminal tape/disk

==> MPP-1000C, by Microbits Peripheral Products (1983)
- 300 bit/s, Bell 103 compatible
- Auto answer / Auto dial
- Connects to joystick port
- Smart Terminal cartridge
- CompuServe DemoPak

==> 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 joystick port
- Smart Terminal cartridge (by MPP) or disk (by Supra)

- 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 joystick port
- 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: 1200 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 via included SupraVerter interface
- Smart Terminal disk
- CompuServe DemoPak and Delphi membership

==> SupraModem 2400AT, by Supra (1988)
- Asynchronous operation at 300, 1200, or 2400 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

Beyond the above modem models, most any industry standard (of the time)
external RS-232-C serial modem can work well with the Atari. These were
commonly sold for PCs for many years. The Hayes Smartmodem more or less
defined the market for these, initially. Normally modems featured a DB-25S
connector for interfacing to the computer.

The original, most common, and most trouble-free way to use such a modem with
the Atari is to attach it to the #1 RS-232-C serial port (DE-9S) of the Atari
850 Interface Module or equivalent, using an Atari CX87 Modem Cable or
equivalent (DE-9P to DB-25P). Note that the standard "modem cable" used with
PCs of the era was DE-9S to DB-25P. Such a cable combined with a simple DE-9
P-P gender converter creates the equivalent of the Atari CX87 Modem Cable.

A less common way to connect a standard external modem with DB-25S connector
to the Atari is to connect it to the Atari SIO port via an R-Verter Serial Bus
Modem Adapter (Atari SIO to DB-25P) by Advanced Interface Devices (A.I.D.),
later sold as the SupraVerter by Supra, or equivalent.
 - The R-verter uses SIO Motor Control; only one such device can be attached
   to the system at a time.

Note that the top modem bitrate that can be utilized by the Atari, under ideal
circumstances, is 19200 bit/s. Modems capable of faster bitrates work fine,
they just can't be operated at their full speeds.

Later external modems designed for newer PCs connected to a USB port on the PC
instead of the standard DE-9P serial port found on earlier PCs.

5.3) What should I know about using fast modems with the Atari?

While Atari never marketed a modem faster than the 1200 bit/s SX212, the Atari is capable of supporting modem bitrates of up to 19200 bit/s, depending upon circumstances described here.

Several factors come into play in using modems faster than 2400 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 1200 bit/s or 2400 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 2400 bit/s modems, and probably all modems with 9600 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 2400 bit/s, important at 9600 bit/s, and essential at any speeds beyond 9600 bit/s.

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 9600 bit/s. Other modem interfaces for the Atari may support bitrates of up to 19200 bit/s.

Clay Halliwell offers a tip on achieving 9600 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 9600 baud. When I set my communications program to 2400
 > baud, everything works fine. However, when I set it to 9600 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 9600 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 2400 baud, but set the S37
register to force the modem to try to connect at 9600. Then switch your
Atari to 9600 after connecting.

5.4) What networking hardware is there for the Atari?

==> CSS Deluxe Quintopus
Share SIO devices between 2 computers. The Deluxe Quintopus consists of a box
with two switched SIO ports and 4 unswitched SIO ports.

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

==> Supra MicroNet
Supports the connection of one SIO chain of peripherals to 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.

A printer/data buffer can make the MicroNet more practical.

Supra also provided a modified Atari DOS 2.5 that would re-try disk accesses
repeatedly in response to SIO timeouts.

http://www.atarimagazines.com/v4n10/productreviews.html

==> CSS Multiplexer ("MUX")
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.

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)

a) GameLink: This hardware was developed in 1989/90. It links two
   computers together via the joystick ports. 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.

b) 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)

==> 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 flatcable with 33 leads, alternating ground and
a dataline across the width to minimise crossover disruption of data. Also
for this link system, I made drivers both in relocatable code, as well as a
device driver.

5.5) How can I connect my Atari to a high speed/Ethernet network?

Two options are presented here:
  - Option #1 is a generic LAN/RS-232 interface from Lantronix
  - Option #2 is a native ethernet interface for the Atari

Option #1
=-=-=-=-=
Marius Diepenhorst pioneered the use of Lantronix devices. He writes (2004):

   "Try to get a Lantronix UDS-10 device. It acts like a modem but it is a LAN
   -> RS-232 converter. So with that device you can have incoming and outgoing
   'calls' like modem ones via the Internet.

I ran my Atari 8-bit BBS with such a thing. The Lantronix UDS-10 or MSS100 will do too. But in that case you have to make a custom RS-232 cable (easy job)."

Lantronix UDS-10 official:
http://www.lantronix.com/device-networking/external-device-servers/uds-10.html

Other, similar serial-to-Ethernet interfaces from Lantronix have been successfully utilized, including the discontinued MSS100
(http://www.lantronix.com/support/discontinued/mss100.html) and MSS1-T.

Lantronix UDS1100, successor to the earlier UDS-10 and MSS100:
http://preview.tinyurl.com/yo3qmz

Option #2
=-=-=-=-=
The Atari 8-Bit Ethernet Project is developing a hardware/software solution that will be able to connect to the internet via an Atari 8-bit Ethernet Cartridge.

The hardware and software was originally developed by Chris Martin and tested by Mark Dusko. The software is based on the work already done in the Commodore 64 community, this adapter will allow you to take advantage of telnet, e-mail, web browsing and a web server via the Contiki Operating System and a Ciris Logic CS8900A ethernet controller chip.

The main component is called the IP Dragon II; the official cartridge name is the Dragon Cart.

Project website: http://www.atari8ethernet.com/

5.6) How can my Atari utilize my other computer's modem/network?

These solutions provide effective means of connecting the 8-bit Atari (indirectly) to the Internet.

==> Atari Peripheral Emulator (APE), by Steven Tucker, 1995/2007
Hardware component: APE Interface Cable (or SIO2PC cable)
Versions for DOS or Windows PC, software features (modem or network):
 - Full emulation of the Atari 850 interface, allowing you to use your PC
   modem or network (Internet) from any Atari application that can use the
   850 interface.
 - Allowing loading of the Atari R: handler from any communications program
 - Hardware flow control for the PC modem using the R: device.
 - Full cooperation with real SIO devices
http://www.atarimax.com/

==> Sio2OSX, by Mark Grebe, 2006/2009
Allows the Atari computer to use an OSX based Macintosh as an Internet modem.
- Requires OS X 10.3.9 or higher, and a G4 or Intel processor or higher
- SIO2PC cable required
- USB serial adapter with complete RS232 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

6) Interfaces & Other hardware

6.1) Interfaces

6.1.1) 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.

```
RS-232-C Serial Interface
-------------------------
```
The Electronic Industries Association (EIA) introduced the RS-232 standard,
entitled "Interface Between Data Terminal Equipment (DTE) and Data Circuit-
Terminating Equipment (DCE) Employing Serial Binary Data Interchange," in 1960
in an effort to standardize the interface between DTE (usually a terminal or a
computer emulating a terminal) and DCE (usually a modem). Although emphasis
then was placed on interfacing between a modem unit and DTE, other
applications for the standard gained popularity. Early versions of the EIA
232 standard included RS-232 (1960), RS-232-A (1963), and RS-232-B (1965).
From 1969-1987, including most of the time of the 8-bit Atari, the standard
was formally known as EIA RS-232-C. Revisions since then have included EIA-
232-D (1987), EIA/TIA-232-E (1991), and the current version from the
Telecommunications Industry Association, EIA/TIA-232-F (1997), known as of
2011 as TIA-232-F. Especially in the 1980s, 232 was widely adopted for low-
cost serial connections between the DTE and peripherals such as an external
modem, mouse, plotter, printer, scanner, digitizer, track ball, and myriad
others. In more recent years TIA-232-F has essentially been supplanted by
USB. In keeping with the context of the time period, this FAQ will normally
refer to the 232 standard as RS-232-C.

The Atari 850 interface connects to the SIO port on the Atari computer and
provides the system with:

- Four serial interface ports (RS-232-C)
- One 8-bit parallel output interface port (Centronics)

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*, 50 bit/s*, 56.875 bit/s*, 75 bit/s**, 110 bit/s, 134.5 bit/s,
    150 bit/s, 300 bit/s, 600 bit/s, 1200 bit/s, 1800 bit/s, 2400 bit/s,
    4800 bit/s, 9600 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.
 ** 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.

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.
Many alternatives to the 850 ROM R: handler have been developed. Please see a
separate section of this FAQ list regarding R: and T: device handlers for the
850 for more details.

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)
    5   1   3. XMT Send Data   (Out)
     o o o o o   4. RCV Receive Data   (In)
      o o o o   5. Signal Ground
    9   6   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):
    5   1   1. DTR Data Terminal Ready (Out)
     o o o o o   3. XMT Send Data   (Out)
      o o o o   4. RCV Receive Data   (In)
    9   6   5. Signal Ground
                   6. DSR Data Set Ready   (In)

Serial Interface Port 3 (DE-9 Socket - female):
    5   1   1. DTR Data Terminal Ready (Out)
     o o o o o   3. XMT Send Data   (Out)
      o o o o   4. RCV Receive Data   (In)
    9   6   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 +
    5   1   3. XMT / TXD- Send Data - (Out)
     o o o o o   4. RCV   Receive Data   (In) --+ A 20 mA current loop
      o o o o   5. Ground | device must tie together
    9   6   7. +10V / RXD+ Receive Data + --+ pins 4 and 7.
                   9. -8V / RXD- Receive Data -

```
Parallel Interface Port (DA-15 Socket - female):
                        1.  /Data Strobe
                        2.  Data bit 0
                        3.  Data bit 1
  8                 1   4.  Data bit 2
    o o o o o o o o     5.  Data bit 3
     o o o o o o        6.  Data bit 4
    15          9       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
```

Prototype 850 units are in an all-black brushed steel case, but production
units are in a beige plastic case matching the 400/800 computers.

```
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 MPU (MOS Technology MCS6507 or equivalent), C010745
 - 6532 PIA.   Two of:
    - MOS Technology 6532 RAM-I/O-Timer (RIOT) or equivalent, C010750
 - 4KiB X 8 Bit ROM, C012099

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)
- Atari 850 Interface Module Field Service Manual
    - CS 400/800-S004-B 4/81
    - FD100036 April, 1981
```

Power: Used with an external 9 volt AC transformer power supply rated for at
least 17 watts: Atari CA014748 or equivalent.

The 850 was designed by R. Scott Scheiman at Atari, according to:
http://www.atarimuseum.com/computers/8bits/400800/atari850.html

The 850 was manufactured by Atari in the USA.

6.1.2) What is the Atari XEP80 Interface Module?

The Atari XEP80 interface connects to joystick port 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 60Hz (NTSC compatible)
  or 50Hz (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 60Hz signal compared to the NTSC standard of 243, or 300 scan
lines of video for the 50Hz 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.

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 joystick
port, so a substitute P: handler must be installed in RAM in order for Atari
software to recognize the XEP80 parallel port for printing.
```
    13                            1
      o 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
    25                        14
           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)
```
  DOS.SYS         DOS 2.5 File Management Subsystem (FMS)
  DUP.SYS         DOS 2.5 Disk Utility Package (DUP)
  AUTORUN.SYS     XEP80 Handler and Relocator.
                  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:
  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
```

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 Valdes at Atari.
Lane Winner was software developer for the XEP80 at Atari.
The XEP80 was made in Taiwan.

The XEP80 draws 400mA of current from an external power supply. Use a power
supply that delivers 500mA 9V DC (center positive). Shipped with Atari
C016353 or C018084.

6.1.3) What were the 1060 CP/M Module and 1090 XL Expansion System?

The Atari CP/M Module was shown at the June 1983 Consumer Electronics Show in
Chicago. Later dubbed the 1060, housed in a case greatly resembling the 1050
disk drive, features were to include: Z-80A microprocessor, 4.0MHz processing
speed, 64KiB RAM, CP/M 2.2 Operating System, 40/80-column video output
(switchable), Serial input/output port (Atari SIO), Monitor output. CP/M
software in Atari diskette format was to be supplied 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 1060 in January 1984. No more than a handful
of prototype units may exist.
http://www.atarimuseum.com/computers/8BITS/XL/xlperipherals/1060/1060.html

The Atari Expansion Box was first shown at the June 1983 Consumer Electronics
Show in Chicago. Later dubbed the 1090 XL Expansion System, and intended to
replace the 850 interface, the 1090 would plug into the PBI on
600XL/800XL/1400XL/1450XLD computers to provide: two RS-232-C serial
input/output ports, one Centronics-type parallel output port, and five
internal 8-bit PBI card slots. Three prototype XL Expansion Cards for the
1090 have been identified: the 1066 CP/M card (1090 card version of the
prototype 1060 CP/M Module), an 80-column video card (perhaps necessary for
the 1066 CP/M card to be usable), and a 64KiB RAM card that by June 1984 was
promoted to ship with the 1090. Atari continued to promote the 1090 through
June 1984. A handful of prototypes exist, but the 1090 was never shipped.
Few if any working prototype XL Expansion Cards for the 1090 exist.
http://www.atarimuseum.com/computers/8BITS/XL/xlperipherals/1090xl.html

6.1.4) What MIDI interfaces are there for the Atari?

From Wikipedia (10.28.2012):
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; 128KiB XL/XE)
- Sold separately or distributed by Hybrid Arts for the MIDIMate:
    - MIDITrack III (1985; 128KiB 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)
    - Oasis (visual editing system for the Ensoniq Mirage & 128KiB 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 (64KiB 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 ABBUC HardWareDoc (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 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);

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
  joystick ports 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
```

6.1.5) How can I use an ISA device with my Atari?

```
(Background derived from Wikipedia)
Industry Standard Architecture (ISA) is a computer bus standard for IBM PC
compatible computers introduced with the IBM Personal Computer (1981) to
support its Intel 8088 microprocessor's 8-bit external data bus, and extended
to 16 bits in 1984 for the IBM Personal Computer/AT with Intel 80286.  The ISA
bus was further extended for use with 32-bit processors as Extended Industry
Standard Architecture (EISA) in 1988.

RoBue (Roland Buehler) of the Stuttgart ABBUC Regional Group has produced
project plans for an ISA-Bus Interface for Atari 800XL/130XE Computer.
https://atariwiki.strotmann.de/wiki/Wiki.jsp?page=ARGS%20ISA%20PC%20Interface

Carsten Strotmann has released source code showing how to access a Hercules
video card with the ISA-Bus Interface: http://preview.tinyurl.com/po6yyys
```

6.1.6) How can I use a USB device with my 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 following project aims to provide USB compatibility to the Atari:

MicroUSB.org - Microprocessor USB Project, http://microusb.org/
Project USB Cartridge
    * Project Name : USB Cartridge with two USB Slots
    * Project Start : Summer 2002
    * Project Member: Marc Brings, Thomas Grasel, Harry Reminder,
                      Guus Assmann, Carsten Strotmann

https://atariwiki.strotmann.de/wiki/Wiki.jsp?page=MicroUSB

Atarimax(Steven Tucker)/ABBUC USB Cartridge:
http://www.atarimax.com/usbcart/documentation/

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)

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 120V/60Hz power.
In some of the rest of the world, the mains is now standardizing to 230V/50Hz.
However, other combinations of voltages of 100V-127V or 220V-240V paired with
frequencies of either 50Hz or 60Hz remain standard. Here is the Wikipedia
article listing current household power outlet standards in use throughout the
world: http://en.wikipedia.org/wiki/Mains_electricity_by_country

In the time of 8-bit Atari computers and peripherals, North America still used
120V/60Hz, most of continental Europe used 220V/50Hz, and the UK used
240V/50Hz.

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:

 o 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.

 o 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.

 o 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 N.Am., 220V Euro, 240V UK)
   2) Input frequency in units of hertz (60Hz for N.Am., 50Hz Euro)
   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)

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)
   cosine(phase) is known as the "power factor"

N O R T H   A M E R I C A   INPUT = 117V-120V AC 60Hz
===
AC supplies (external transformers)

Atari#: C061515
    "For Use With Atari 1010 Program Recorder" (top)
    "Plug-In Power Supply" (bottom)
    UL Listed: 18J5, Made in Japan
    Input: 120V 60Hz 8 W
    Output: 9V AC 5 VA
    Shipped with: 1010
    http://mcurrent.name/powersupplies/61515-bottom.jpg
    http://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
    http://mcurrent.name/powersupplies/61516-bottom-187Z.jpg
    http://mcurrent.name/powersupplies/61516-bottom-34J2.jpg
    http://mcurrent.name/powersupplies/61516-top.jpg

Atari#: C062195
    "Power Adaptor" "For Use With 1030 Modem Only"
    UL Listed: 967Z, Made in Taiwan
    Type: DV-9750
    Input: 120VAC 60Hz 12VA
    Output: 9VAC 5.4VA
    Shipped with: 1030
    http://mcurrent.name/powersupplies/62195-top.jpg
    http://mcurrent.name/powersupplies/62195-bottom.jpg

Atari#: C014319 (unit & some boxes) / CA014748 (box, USA)
    "Power Supply" (unit) / "Power Adaptor" (boxes)
    "Use with ATARI 400/800 Computer Systems (C014319 box)
    "For Use With Atari 400/800 Personal Computer System" (top, early units)
    UL Listed: 205E, Made in Sunnyvale CA
    Input (1979-1981): 120 VAC 60 Hz 20W   (unit) (OK for early 810 drives)

```
     Input (1981-1982): 120 VAC  60 Hz  18.5W (unit) (NOT for 810 drives)
     Input, according to the boxes: 105-125 V.A.C.   60 Hz
     Output: 9 VAC  15.3 VA (unit) / 9.5 V.A.C.  1.7 A (boxes)
     Shipped with (1979-1981 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
     http://mcurrent.name/powersupplies/14319-bottom.jpg
     http://mcurrent.name/powersupplies/14319-top.jpg
     http://mcurrent.name/powersupplies/14319-alt-bottom.jpg
     http://mcurrent.name/powersupplies/14319-alt-top.jpg
     http://mcurrent.name/powersupplies/14319-box.jpg
     http://mcurrent.name/powersupplies/14748-usa.jpg

Atari#: C016804
     "Class 2 Transformer"
     UL Listed: 622T, Made in Taiwan.  Known manufacture date range: 6/81-11/81
     Input: 120V  60Hz
     Output: 9V AC  31 VA
     Shipped with (1981-1982): 810(Pre-Analog units with Data Separator)
     Use for: 400,800,810,822,850,1200XL,1010,1020,1050,XF551,PCF554
     1982-1983: Sometimes shipped by Atari in place of C014319/CA014748
     http://mcurrent.name/powersupplies/16804-bottom.jpg
     http://mcurrent.name/powersupplies/16804-top.jpg

Atari#: C017945 (unit) / CA017964 (box, USA)
     "Power Supply" (unit) / "Power Adaptor" (box)
     "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
     Input: 120V  60Hz  50W (unit) / 105-125 V.A.C.  (box)
     Output: 9V AC  31 VA (unit) / 9 V.A.C.  3.4A (box)
     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
     Recommended for: 400,800,810,822,850,1200XL,1010,1020,1050,XF551,PCF554
     1982-1983: Shipped by Atari in place of C014319/CA014748
     http://mcurrent.name/powersupplies/17945-bottom.jpg
     http://mcurrent.name/powersupplies/17945-top.jpg
     http://mcurrent.name/powersupplies/17945-top-trak.jpg
     http://mcurrent.name/powersupplies/17945-566T-bottom-japan.jpg
     http://mcurrent.name/powersupplies/17945-566T-bottom.jpg
     http://mcurrent.name/powersupplies/17945-566T-top.jpg
     http://mcurrent.name/powersupplies/17964-usa.jpg

Atari#: C061636 (C061636) (unit)
     "Power Supply" (unit) / "Power Adaptor" (box)
     UL Listed: 566T, Made in Japan
     Input: 120V  60Hz  60W
     Output: 9.5V AC  40VA
     Shipped with: 1027
     http://mcurrent.name/powersupplies/61636-alt-bottom.jpg
     http://mcurrent.name/powersupplies/61636-alt-top+box.jpg

Atari#: C061636 (C061636) (unit/box)
     "Power Supply" (unit) / "Power Adaptor" (box)
     UL Listed: 771K, Made in Taiwan
     Input: 120V  60Hz  53W  (unit/box)
     Output: 9.5V AC  4.2A (unit/box)
     Use with: 1027
     http://mcurrent.name/powersupplies/61636-bottom.jpg
     http://mcurrent.name/powersupplies/61636-top+box.jpg

Atari#: C060479 (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 U.S.A.
     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
http://mcurrent.name/powersupplies/60479-bottom.jpg
http://mcurrent.name/powersupplies/60479-top.jpg
http://mcurrent.name/powersupplies/60535.jpg

Atari#: CA016751-01 / Novation 901017 (unit)
Top: "Use with 830 Modem Only"
Bottom: "Novation AC Adaptor"
UL Listed: 883K, Made in Taiwan
Type: DV 2040
Input: 117V AC 60Hz 15W
Output: 20V AC 400 mA
Shipped with: 830
http://mcurrent.name/powersupplies/901017-bottom.jpg
http://mcurrent.name/powersupplies/901017-top.jpg

DC power supplies (external adapters)

Atari#: C070042-01 (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
Input: 117V 60HZ 22VA
Output: 5VDC 1A
Shipped with: 65XE(most),XEgs(later)
Recommended for: 65XE,XEgs (stock 64KiB RAM and no ECI devices)
http://mcurrent.name/powersupplies/70042-01-bottom.jpg
http://mcurrent.name/powersupplies/70042-01-top.jpg

Atari#: C070042-011 (nickname: "Mini")
"Power Supply"
UL Listed: 94H6, Made in Taiwan
Type: DV-51AAT
Input: 120V AC 60Hz 17W
Output: +5V DC 1A
Shipped with: XEgs(most)
Works with: 65XE,XEgs (stock 64KiB RAM and no ECI devices)
Considered not as rugged as the C070042-01 "Logo" unit.
http://mcurrent.name/powersupplies/70042-011.jpg

Atari#: C061982 (nicknames: "White Brick" or "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 60Hz 30W
Output: 5V DC 1.5AMP
Shipped with: 600XL(early),800XL(early). Rare!
Recommended for: 600XL, 800XL, 65XE, 130XE, XEgs
http://mcurrent.name/powersupplies/61982-White_Brick-bottom.jpg
http://mcurrent.name/powersupplies/61982-White_Brick-top.jpg

Atari#: C061982 (nicknames: "Ingot" or "Ugly Klunker")
"Power Supply"
UL Listed: 94H6, Made in Taiwan
Type: DV-512CM
Input: 120V AC 60Hz 40W
Output: +5V DC 1.5A
Shipped with: 600XL(most),800XL(most),65XE(some),130XE(some)
Works with/NOT recommended for: 600XL,800XL,65XE,130XE,XEgs
NOTE: This unit is known for its ability to fail in such a way that it can
      damage your computer. While the 600XL/800XL are somewhat immune,
      the XE computers are particularly vulnerable to such damage.
http://mcurrent.name/powersupplies/61982-Ingot.jpg

Atari#: C061982 (nicknames: "Black Brick" or "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 60Hz 40W
        Output: +5V DC 1.5A
        Shipped with: 600XL(later),800XL(later).  Rare!
        Recommended for: 600XL,800XL,65XE,130XE,XEgs
        http://mcurrent.name/powersupplies/61982-Black_Brick-bottom.jpg
        http://mcurrent.name/powersupplies/61982-Black_Brick-bottom-label.jpg
        http://mcurrent.name/powersupplies/61982-Black_Brick-top.jpg
        http://mcurrent.name/powersupplies/61982-Black_Brick-top-alt.jpg

Atari#: C061982  (nicknames: "Box" or "Peanut")
        "Power Supply"
        UL Listed: 771K, Made in Taiwan
        Type: SA R05-18
        Input: 120V~60Hz 25W
        Output: 5V-1.5A 7.5VA
        Shipped with: 130XE(most)
        Recommended for: 600XL,800XL,65XE,130XE,XEgs
        http://mcurrent.name/powersupplies/61982-Box.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 U.S.A. (examples: 377, 387, 497)
        Input: 120V  60Hz  9W
        Output: 9VDC  500MA (center positive)
        Use with: Atari  C-380,SC-450,2600,XEP80,SX212
                  Sears 99713,99729,99473/75001/75005
        http://mcurrent.name/powersupplies/10472-205E.jpg

Atari#: C010472 (unit/box, 1977-1978)
        Black with white lettering; slightly curved shape
        "Sunnyvale CA. U.S.A."  "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  C-380,SC-450,2600,XEP80,SX212
                  Sears 99713,99729,99473/75001/75005
        http://mcurrent.name/powersupplies/10472-118D-bottom.jpg
        http://mcurrent.name/powersupplies/10472-118D-top.jpg

Atari#: C010472 (unit/box) / CA014034 (box)
        "Sunnyvale, CA. U.S.A."  "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  C-380,SC-450,2600,XEP80,SX212
                  Sears 99713,99729,99473/75001/75005
        http://mcurrent.name/powersupplies/10472-B-355-beige-bottom.jpg
        http://mcurrent.name/powersupplies/10472-B-355-beige-top.jpg
        http://mcurrent.name/powersupplies/10472-B-355-black-bottom.jpg
        http://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  60Hz  8W
        Input, DC-950B: AC  120V  60Hz  12W
        Output: DC  9V  500mA (center positive)
        Use with: Atari  C-380,SC-450,2600,XEP80,SX212
                  Sears 99713,99729,99473/75001/75005
        http://mcurrent.name/powersupplies/10472-DC-950-bottom.jpg
        http://mcurrent.name/powersupplies/10472-DC-950-top.jpg
        http://mcurrent.name/powersupplies/10472-DC-950B-bottom.jpg
        http://mcurrent.name/powersupplies/10472-DC-950B-top.jpg

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 60Hz 11W
        Output: 9V DC 500mA (center positive)
        Use with: Atari C-380, SC-450, 2600, XEP80, SX212
                  Sears 99713, 99729, 99473/75001/75005
        http://mcurrent.name/powersupplies/10472-883K.jpg
        http://mcurrent.name/powersupplies/16353-883K.jpg
        http://mcurrent.name/powersupplies/16353-967Z.jpg
        http://mcurrent.name/powersupplies/16353-81J1.jpg

Atari#: C010472 (earliest) / C016353 / C016353-101 (later) / CX261 (box)
        UL Listed, earlier units: 771K, Made in Taiwan (examples: 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 60Hz 9W
        Output: 9V DC 500mA (center positive)
        Use with: Atari C-380, SC-450, 2600, XEP80, SX212
                  Sears 99713, 99729, 99473/75001/75005
        http://mcurrent.name/powersupplies/10472-771K.jpg
        http://mcurrent.name/powersupplies/16353-771K.jpg
        http://mcurrent.name/powersupplies/16353-20J8.jpg
        http://mcurrent.name/powersupplies/16353-101-20J8.jpg

Atari#: C016353 (unit) / CX261 (box)
        "AC/DC Adaptor"
        UL Listed: 903K
        Input: 120V 60Hz 10W
        Output: 9VDC  500mA (center positive)
        Use with: Atari C-380, SC-450, 2600, XEP80, SX212
                  Sears 99713, 99729, 99473/75001/75005
        http://mcurrent.name/powersupplies/16353-903K.jpg

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 60Hz 12W
        Input, C016353-101/17J2 units: 120V 60Hz 12W
        Output: 9V DC 500mA (center positive)
        Use with: Atari C-380, SC-450, 2600, XEP80, SX212
                  Sears 99713, 99729, 99473/75001/75005
        http://mcurrent.name/powersupplies/16353-689T.jpg
        http://mcurrent.name/powersupplies/16353-17J2.jpg
        http://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 60Hz 9W
        Output: DC 9V 500mA (center positive)
        Use with: Atari C-380, SC-450, 2600, XEP80, SX212
                  Sears 99713, 99729, 99473/75001/75005
        http://mcurrent.name/powersupplies/16353-101-LIIIIA9.jpg
```

```
I N T E R N A T I O N A L   INPUT = 216~264V 50Hz
================================================
AC supplies (external transformers)

Atari#: C061516-34
     "A.C. Mains Adaptor"
     "For Use Only With Atari 1010 Program Recorder"
     "Disconnect The Mains Plug From The Supply Socket When Not In Use"
     Made in the U.K.
     Input: 240v~ 50Hz 5VA
     Output: 8.5v~ 4.25VA
     Shipped with: 1010 (UK)
     http://mcurrent.name/powersupplies/61516-34.jpg

Atari#: C061516 (C061516) or C061516-11
     "AC/AC Adapter"
     Type: FW6399
     Input: 220V~/50Hz/7VA
     Output: 9V~/0.5A
     Shipped with: 1010 (Europe)
     http://mcurrent.name/powersupplies/61516-6399-bottom.jpg
     http://mcurrent.name/powersupplies/61516-6399-top.jpg
     http://mcurrent.name/powersupplies/61516-11-bottom.jpg
     http://mcurrent.name/powersupplies/61516-11-top.jpg

Atari#: C061516-13
     Input: (220v 50Hz)
     Output: 8.52vac 4.26VA
     Shipped with: 1010 (New Zealand)
     PICTURE OF THIS UNIT STILL NEEDED!

Tadmod TM4498 (supplied for Atari# CA014748)
     "Power Supply"
     Type M 5496
     Input: 240V ~50Hz
     Output: 9.5V - 1.5 AMP
     Shipped with: 400,800,822,850
     http://mcurrent.name/powersupplies/tm4498-box.jpg (box)
     PICTURE OF THIS UNIT STILL NEEDED!

Atari#: CA014748 (box, Europe)
     9.3V AC  15.44VA  (1,66A)  Max:?  FW 6799
     Shipped with: 400,800,822,850
     PICTURE OF THIS UNIT STILL NEEDED!

Atari#: C060592-34 (unit) / CA017964 (box, UK)
     Type: TM 7498, Made in United Kingdom
     Input: 240V ~ 50Hz 0.037Kw (unit) / 216~264V 50Hz (box)
     Output: 9V - 50Hz 27VA (unit) / 9V.A.C. 3.4A (box)
     Use with: 400,800,810,822,850,1010,1020,1050,XF551,PCF554
     http://mcurrent.name/powersupplies/60592-34.jpg (unit)
     http://mcurrent.name/powersupplies/17964-uk.jpg (box)

Atari#: C060592 / CA017964 (box, Europe)
     "AC/AC Adapter"
     Type: FW6699
     Input, earlier units: 220V~/50Hz/42VA
     Input, later units:   220V~/50Hz/50VA
     Output: 9V~/3A
     Early units have misprinted part number: C060529
     Later units: "For Atari 1020/1050"
     Use with: 400,800,810,822,850,1010,1020,1050,XF551,PCF554
     http://mcurrent.name/powersupplies/60529.jpg
     http://mcurrent.name/powersupplies/60592-bottom.jpg
     http://mcurrent.name/powersupplies/60592-bottom-10201050.jpg
     http://mcurrent.name/powersupplies/60592-top.jpg

Atari#: C060592-11 / CA017964 (box, Europe)
```

```
        "AC Power Supply"
        Type: PL028, Made in U.K.
        Input: 220v~37W 50Hz
        Output: 9v~27VA
        Use with: 400, 800, 810, 822, 850, 1010, 1020, 1050, XF551, PCF554
        http://mcurrent.name/powersupplies/60592-11-PL028.jpg

Atari#: C060592-11 / CA017964 (box, Europe)
        "Power Supply"
        Made in Taiwan (sample: 1987-12)
        Input: 220V~  50Hz  50W
        Output: 9V~  30.6VA
        Use with: 400, 800, 810, 822, 850, 1010, 1020, 1050, XF551, PCF554
        http://mcurrent.name/powersupplies/60592-11-alt-bottom.jpg
        http://mcurrent.name/powersupplies/60592-11-alt-top.jpg

Atari#: C060592-11 / CA017964 (box, Europe)
        "Power Supply"
        Type: DV-9034A  UP, Made in Taiwan (sample: 04-1988)
        Input: 220V~ 50Hz 35W
        Output: 9V~ 3A 27VA
        Use with: 400, 800, 810, 822, 850, 1010, 1020, 1050, XF551, PCF554
        http://mcurrent.name/powersupplies/60592-11-DV-9034A.jpg

Atari#: C061605-11
        "AC/AC Adapter"
        Type: FW6699
        Input: 220V~50Hz/50VA
        Output: 9V~/4,2A
        Use with: 1027
        http://mcurrent.name/powersupplies/61605-11-bottom.jpg
        http://mcurrent.name/powersupplies/61605-11-top.jpg

Atari#: 14750 "AC/AC Adapter"
        Type: 102501
        Input: 220V~/50Hz/38VA
        Output: I 29V~/600mA
               II 8,6V~/1A
        Use with: 1025(220V version in Europe)
        http://mcurrent.name/powersupplies/14750-bottom.jpg
        http://mcurrent.name/powersupplies/14750-top.jpg

DC power supplies (external adapters)

Atari#: C061763-34 (C061763-34)
        Type: T40/E, Made in U.K.
        Input: 240V~50Hz 24W
        Output: 5V-7.5VA
        Use with: 600XL, 800XL, 65XE, 130XE, XEgs
        http://mcurrent.name/powersupplies/61763-34-alt-top.jpg
        http://mcurrent.name/powersupplies/61763-34-alt-bottom.jpg

Atari#: C061763-34
        Type: DV-515UK, Made in Taiwan
        Input: 240V~50Hz 0.11A
        Output: +5V - 1.5A
        Use with: 600XL, 800XL, 65XE, 130XE, XEgs
        http://mcurrent.name/powersupplies/61763-34.jpg

Atari#: C061763-24
        "Power Supply"
        Type: DV-515SAA, Made in Taiwan
        Input: 240V ~ 50Hz
        Output: 5V - 1.5A, 7.5VA
        Use with: 600XL, 800XL, 65XE, 130XE, XEgs
        http://mcurrent.name/powersupplies/61763-24-top.jpg
        http://mcurrent.name/powersupplies/61763-24-bottom.jpg

Atari#: C061763-11 (C061763-11)
```

```
     Type: DV-515UP, Made in Taiwan
     Input: 220V~50Hz
     Output: 5V=/1.5A   7.5VA
     Use with: 600XL,800XL,65XE,130XE,XEgs,800XE
     http://mcurrent.name/powersupplies/61763-11-DV-515UP.jpg
     http://mcurrent.name/powersupplies/61763-11-DV-515UP-top.jpg

Atari#: C061763-11
     "AC/DC Adapter"
     Type: FW1599
     Input: 220V~/50Hz/26VA
     Output: 5V-/1.5A
     Use with: 600XL,800XL,65XE,130XE,XEgs,800XE
     http://mcurrent.name/powersupplies/61763-11-FW1599-bottom.jpg
     http://mcurrent.name/powersupplies/61763-11-FW1599-top.jpg

Atari#: C061763-11/T
     "Stromversorgungsgeraet"
     Type: PS40, Made in Singapore by Magpower Manufacturers Pte Ltd
     Input: 220V~, 50Hz 32VA
     Output: 5V - 2A
     Use with: 600XL,800XL,65XE,130XE,XEgs,800XE
     http://mcurrent.name/powersupplies/61763-11-T-bottom.jpg
     http://mcurrent.name/powersupplies/61763-11-T-top.jpg

  5V DC  1.8A  (9.0W)  Atari#: C061763-107  (Poland)
     Use with: 600XL,800XL,65XE,130XE,XEgs,800XE
     PICTURE OF THIS UNIT STILL NEEDED!

Atari#: C070045-01
     "Power Supply"
     Type: DV-51AUP, Made in China
     Input: 220V~50Hz 19VA
     Output: 5V - 1A   5VA
     Shipped with: 800XE
     Works with: 65XE,XEgs,800XE (stock 64KiB RAM and no ECI devices)
     http://mcurrent.name/powersupplies/70045-01-bottom.jpg
     http://mcurrent.name/powersupplies/70045-01-top.jpg

Atari#: C070045-01/T
     "Stromversorgungsgeraet"
     Type: PS35, Made in Singapore by Magpower Manufacturers Pte Ltd
     Input: 220V~, 50Hz, 18VA
     Output: 5V-, 1A
     Works with: 65XE,XEgs,800XE (stock 64KiB RAM and no ECI devices)
     http://mcurrent.name/powersupplies/70045-01-T-bottom.jpg
     http://mcurrent.name/powersupplies/70045-01-T-top.jpg

Atari#: n/a
     "Tadmod Mains Adaptor Model 6498"
     "For Use Only With Model 410 Tape Recorder"
     Made in England
     Input: 240v ~ 50Hz
     Output: 6v - 1.8VA
     Shipped with: 410(220V/240V version in UK)
     http://mcurrent.name/powersupplies/6498.jpg

Atari#: n/a
     "AC/DC Adapter"
     Type: FW3199
     Input: 220V~/50Hz/5,5VA
     Output: 6V-/300mA
     Shipped with: 410(220V/240V version in Europe)
     http://mcurrent.name/powersupplies/3199-top.jpg
     http://mcurrent.name/powersupplies/3199-bottom.jpg

Atari#: C018084-309 (CA0 18084-309)
     "Adaptor" "Use only with Models CX 2000/2600"
     REF. 28399, Made in England
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```
        Input: 240V. 50Hz. 8.2W
        Output: 9V. - 500mA. (center positive)
        Use with: 2600(all but 2600S),XEP80
        http://mcurrent.name/powersupplies/18084-309.jpg
        http://mcurrent.name/powersupplies/18084-309-side.jpg

Atari#: n/a
        Atari / Futuretronics Australia Pty. Ltd.
        "A.C. Adaptor"
        App. No V/79309/PS580
        Input: 240 V   50 Hz
        Output: 9VDC   500 mA
        Use with: 2600(all but 2600S),XEP80
        http://mcurrent.name/powersupplies/futuretronics.jpg

Atari#: n/a
        "AC/DC Adapter"
        Top: "Atari" in white
        Type: FW3399
        Input: 220V~/50Hz/7,9VA
        Output: 9V-/400mA      (center positive)
        Use with: 2600(all but 2600S),XEP80
        http://mcurrent.name/powersupplies/3399-bottom.jpg
        http://mcurrent.name/powersupplies/3399-top.jpg

Atari#: C018084-107
        "AC/DC Adapter"
        Top: "Atari" logo in black
        Top: "Use only with model CX 2000 / 2600"
        Type: FW3299
        Input: 220V~/50Hz/9VA
        Output: 9V-/500mA    (center positive)
        Use with: 2600(all but 2600S),XEP80
        http://mcurrent.name/powersupplies/18084-107-bottom.jpg
        http://mcurrent.name/powersupplies/18084-107-top.jpg

Atari#: C018084-107
        "AC/DC Adaptor"
        "Indoor use only with models:CX-2600"
        Type: SA 9500E, Made in Taiwan.   Example: 1987
        Input: 220V~50Hz
        Output: 9V-500mA
        Use with: 2600(all but 2600S),XEP80
        http://mcurrent.name/powersupplies/18084-107-SA9500E.jpg

Atari#: C018084-117 (C018084-117)
        Square, black label
        "AC/DC Adaptor"
        "For use with models CX2600 XEP80 or SX212"
        Input: AC 220V 50Hz 9W
        Output: DC 9V 500mA (center positive)
        Use with: 2600(all but 2600S),XEP80
        http://mcurrent.name/powersupplies/18084-117.jpg
        http://mcurrent.name/powersupplies/18084-117-side.jpg

Atari#: C018084-117/A (C018084-117/A)
        Rounded, black label
        "AC/DC Adaptor"
        "For use with models CX2600 XEP80 or SX212"
        Input: AC220V 50Hz 9W
        Output: DC9V 500mA (center positive)
        Use with: 2600(all but 2600S),XEP80
        http://mcurrent.name/powersupplies/18084-117-a.jpg
        http://mcurrent.name/powersupplies/18084-117-a-altview.jpg

Atari#: C018084-117A
        Square, silver label
        "AC/DC Adaptor"
        "For use with model 2600"
```

```
        Input: AC 220V~50Hz 9W
        Output: DC 9V-500mA 4.5VA (center positive)
        Shipped with: 2600 (latest production, including 1990-1991)
        Use with: 2600(all but 2600S),XEP80
        http://mcurrent.name/powersupplies/18084-117a.jpg

Atari#: C016507 (unit) / CA017087 (box from U.S.) / CA019055 (box from H.K.)
        "AC Adaptor"
        Some units: "Use Only With Models CX-2600"
        Input: 220V 50Hz 15W
        Output: 9.5VDC 650mA (center positive)
        Use with: 2600S (original SECAM VCS version for France, shipped in 1982)
        http://mcurrent.name/powersupplies/16507--19055.jpg (unit with H.K. box)
        http://mcurrent.name/powersupplies/16507-alt.jpg


M O R E   I N F O
================
Devices by Atari that draw their power from SIO pin 10 (+5V/Ready):
XM301(60mA), XC11, XC12

Device by Atari that draws its power from the 600XL PBI: 1064

Devices by Atari that have built-in power supplies (the device plugs directly
into the wall for power):
410(120V versions),820,825,1025(120V version),1029,XMM801,XDM121

Section References:
 - "Secrets of XL/XE Power Supplies" by Benjamin L. Poehland, Current Notes,
   Vol. 10, No. 9, pp. 42-49.
   http://mcurrent.name/powersupplies/poehland.pdf
 - http://www.best-electronics-ca.com/power%20guide.htm
 - B&C ComputerVisions http://stores.ebay.com/Atari-Sales-and-Service
```

6.3) What accessories/kits did Atari make for their 8-bit computers?

```
(Thanks Laurent Delsarte for pics of: CX404, CX481, KX7097, CX484)

This should be a complete list of Atari "CX" or "KX" accessories or kits
intended or usable with 8-bit Atari computers.

Controllers/Accessories
========================
Controllers marketed by Atari for the 2600 VCS and/or the 7800 also work on
the 8-bit computers.
CX10 / CA010973 Joystick Controller (X-Y Controller)
        - 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 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 Joystick PCB replacement (for the CX40; Europe only)
CX11 Joystick plastic insert replacements (for the CX40; Europe only)
CX12 Joystick cable replacement (for the CX40; Europe only)
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 (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
- 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

CX22 Trak-Ball controller
- Introduced January 1983 (marketed primarily for the Atari 2600)
- Shipped domestically only
- Identified by round buttons
- Two versions:
1) Single mode version (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
2) Dual mode version (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 (CO24237)
   - Unit/box/Owner's Manual do not carry the "Pro-Line" brand
   - Box/Owner's Manual both mention Atari Home Computers
   - Made in Mexico
- Available: Atari CX22 Trakball Field Service Manual FD100660

CX23 Kid's Controller
- Introduced January 1983 (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
- Introduced January 1983 as CX60 Pro-Line Joystick (marketed domestically for the 2600)
- Introduced June 1983 as CX60 Super Controller (for home computers and international markets)
- One or two units shipped with 1984-1985 European 2600 systems
- Two units shipped with all NTSC 7800 systems (1984, 1986-1991)
- Also sold separately
  - Marketed as Pro-Line Joystick until 1989
  - Marketed as Deluxe Joystick beginning 1989

CX30 / CA010949 / CA012760 Paddle Controller (set of 2)
- Introduced June 1977 (for the Atari VCS)
- 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 Sears version of early units 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 / CA012994 Joystick Controller / Standard Joystick (X-Y Controller)
       - 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
       - For the CX40 Joystick
       - Includes: 1 Printed Circuit Board, 3 Springs, 1 Insert, 1 Boot,
         1 Retaining Ring, Joystick Repair instructions C020484 (C020484)
CX42 Remote Control Wireless Joysticks
       - Introduced June 1983
       - Package contains:
          - Remote Control Receiver
          - Two Remote Control Joysticks (Left Controller, Right Controller)
          - Installation Instructions C021059 (C021059)
       - Receiver requires the 2600 VCS AC power adapter (Atari#C010472
         specified; not included) for its power, and in turn supplies the power
         to the 2600 VCS.
       - 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
       - Not marketed internationally by Atari
CX43 Space Age Joystick
       - Introduced June 1983 (marketed for the Atari 2600)
       - Marketing/packaging also carry the "Pro-Line" brand
       - Designed for Atari by Milton Bradley
CX50 / CA012758 Keyboard Controllers: One Set
       - 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
       - Introduced June 1980
       - RARE - Only offered by Atari for a few months in 1981
         (InfoWorld 12/26/83-1/2/84)
       - Shipped with CX4124 demonstration program cassette
       - Manual: Atari Light Pen Operator's Manual Model CX70 C016367 (C016367)
CX75 Light Pen
       - Previewed June 1983, introduced with AtariGraphics January 1984
       - Shipped with RX8054 AtariGraphics cartridge
       - Developed by Gibson Laboratories / Steve Gibson for Atari
CX77 Touch Tablet
       - Previewed June 1983, introduced with AtariArtist January 1984
       - Shipped with RX8053 AtariArtist cartridge and CX8104 DOS 2.0S disk

(Illustrator product by Island Graphics, Atari Touch Tablet version)
            - The Atari Touch Tablet With AtariArtist Software Owner's Guide C061794
            - Industrial design: Tom Palecki
CX78 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
CX80 Trak-Ball controller
            - Introduced June 1983 (for home computers and international markets)
            - Shipped internationally only
            - Identified by large triangular buttons
            - 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
            - 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.)
CX82 B & W Monitor Cable. Package includes (thanks Laurent Delsarte):
            - Connection instructions
            - Phono (RCA-type) adapter, part no. C016828
            - BNC adapter, part no. C016829
            - UHF adapter, part no. C016830
CX85 Numerical Keypad
            - Introduced June 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 (C060488)
                - Technical Reference Notes C061037 (C061037)
            - Available: Atari CX85 Numeric Keypad Field Service Manual FD100176
                         November, 1982
            - Made in Hong Kong
CX86 Printer Cable (included with 825 printer)
CX87 Modem Cable (included with 830 modem)
CX88 Terminal Cable (null modem cable)
CX89 Color Monitor Cable
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 cannot be read by Atari 8-bit computers
            - Shipped with Atari ST/Mega/STe/Falcon desktop computers
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/ATW/TT matching white
            - Right mouse button cannot be read by Atari 8-bit computers
            - Shipped with Atari PC/ATW/TT computers (except laptops)
XG-1 Light Gun
            - Previewed January 1987, introduced February 1987
            - Shipped with various XEgs packages

In-Store Demonstration Video Tapes
==================================

```
CX302 Atari 400 Demonstration Video Tape - VHS (Repeats for 2 hours)
CX303 Atari 400 Demonstration Video Tape - Beta (Repeats for 2 hours)

Kits (actually marketed as kits: CX418,CX419,CX481,CX482,CX483,CX484,CX488)
====
CX404 Atari Word Processor (Atari 810 Version)
        * Easel-Back Notebook CA017717
        * Training Manual
        * Reference Manual
        * Program Master Diskette CX8119 (2 duplicate disks)
        * Training Data Diskette CX8120
        * Audio Master Cassette CX4122
        * Reference Card
CX405 PILOT (Educators' Package)
        * PILOT Programming Language cartridge CXL4018
        * PILOT Primer: The PILOT Programming Language Instruction Manual
          C017809 (C017809) ((c)1980 DYMAX)
        * Student PILOT: Reference Guide C017811 (C017811)
        * Pocket Reference Card C017812
        * 2 Demonstration Program Cassettes
          - CX4113A Side 1: PILOT Programs for Children
                   Side 2: A PILOT Teaching Program
          - CX4113B Side 1: PILOT "Turtle Graphics" Demonstration
                   Side 2: PILOT Do-It-Yourself Slide Show
        * PILOT Demonstration Programs: Users Guide C017810
        * Binder CA017805
CX414 The Bookkeeper
        * Data Entry Diskette CX8131
        * Reporting Diskette CX8133
        * Sample Data Base Diskette (Benson) CX8134
        * Data Base Diskette CX8132
        * The Bookkeeper User's Guide
        * Simplified Guide
CX415 The Home Filing Manager
        * The Home Filing Manager Program Diskette CX8129
        * Formatted Diskette II CX8111
        * Users Guide C060153
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
CX421 Family Finances
        * Family Finances I (Cash Flow) Program/Data Diskette CX8141
        * Family Finances II (Budget) Program/Data Diskette CX8142
        * Family Finances User's Guide C061029
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
      v.1: * Atari BASIC CXL4002
           * BASIC Reference Manual C015307
```

```
                    * Atari BASIC (Wiley Self-Teaching Guide) book C014385
                    * The Programmer Owner's Guide C017996
              v.2:  * Atari BASIC CXL4002
                    * BASIC Reference Manual C015307
                    * Inside Atari BASIC book C060992
                    * The Programmer Owner's Guide C017996
                    * $5 rebate coupon for An Invitation to Programming 1, 2, or 3
CX484 The Communicator
              * 850 Interface Module unit
              * 850 Power Supply unit C014319, boxed (CA014748)
              * SIO cable (for the 850)
              * 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
CX488 The Communicator II
              * 835 Direct Connect Modem
              * 835 Power Adaptor unit C060479, boxed (CA060535)
              * SIO cable and phone cable (for the 835)
              * The Communicator II User's Guide C024438
              * TeleLink II cartridge CXL4016
                - On-board 1KiB (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 only


Kits, including Add-A-Pak and All-In-One-Pak kits
=================================================
KX7097 Logo ("Full Pac" / consumer package) "16K Cartridge And User Manuals"
         Consists of two boxes plastic-wrapped together
         (both were also sold separately):
         - Programming Language Cartridge (RX8032) "Economy Pac" box contains:
             * Atari Logo Computer Program cartridge RX8032
             * Atari Logo: Quick Reference Guide C061583
         - Atari Logo User Manuals (BX4208) "Manual Pac" box contains:
             * Atari Logo: Introduction to Programming Through Turtle Graphics
               C061590
             * Atari Logo: Reference Manual C061589
KX7099 BASIC Tutor I Add-A-Pak (An Invitation to Programming 2: Writing
         Programs One and Two + An Invitation to Programming 3: Introduction to
         Sound and Graphics + Inside Atari BASIC book + 101 Programming Tips &
         Tricks book/cassette)
         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
KX7110 AtariWriter System All-In-One-Pak (pre-release: The Writing System)
         600XL + 1027 + AtariWriter + paper stock + One Way to Write Anything
         book.
         http://www.rhod.fr/ataripics/hardwarewriterpackkompleet.jpg
KX7114 Programming System All-In-One-Pak
         600XL + 1010 + An Invitation to Programming 1 + An Invitation to
         Programming 2 + An Invitation to Programming 3 + Inside Atari BASIC
         book + 101 Programming Tips & Tricks book
         http://www.rhod.fr/ataripics/8001010.JPG
KX7400 Game Kit (Donkey Kong cartridge + two CX40 Joysticks)
Atari 65XE Home Computer Outfit (Dixons/Currys special offer)
         65XE + XC12 + CX40 Joystick + 10 games on two cassettes
```

```
                (Compilations A & C)
                http://www.rhod.fr/ataripics/65xehomeoutfit.jpg
                http://www.binarydinosaurs.co.uk/Museum/atari/65xe.php
                http://www.rhod.fr/ataripics/currys.JPG
130XE Starter Pack (UK)
                130XE + XC12 + CX40 Joystick + software
                http://www.rhod.fr/ataripics/130xestarter.JPG
130XE + 1050 disk drive
                http://www.rhod.fr/images_recherches/frenchpack.jpg

XE game system kits:

XES 2001 / XES2001 / XE 2001
                XG-1 Light Gun + Bug Hunt
                http://www.mr-atari.com/afbeeldingen/hardwarediv/xesystemgun2.jpg
                Some packages (Chile) 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:
                http://www.mr-atari.com/afbeeldingen/hardwarediv/hardwarelightgun.jpg
                (The actual G1 never shipped.  It was to be the same as the XG-1 but
                orange instead of gray, and to be marketed for use with the 2600/7800.)
XES 2002 (?????) (Europe)
                XE System Keyboard + Flight Simulator II
                http://www.mr-atari.com/afbeeldingen/hardwarediv/xesystem3toetsenbord.jpg
                http://www.rhod.fr/ataripics/xesystem3.jpg
XE 2012 (France)
                XE System Keyboard + XC12 + Flight Simulator II
XES 3001 (Europe)
                XE System Console + CX40 Joystick
                http://www.mr-atari.com/afbeeldingen/hardwarediv/xesystem1.jpg
                http://www.rhod.fr/ataripics/xesystem1.jpg
XES 4001 / XE4001
                XE System Console + XE System Keyboard + XG-1 Light Gun + CX40 Joystick
                + Flight Simulator II + Bug Hunt
                http://www.mr-atari.com/afbeeldingen/systems/xegamesystem.jpg
                http://www.rhod.fr/ataripics/xegamesystem.jpg
XE 4002 (Italy) (shipped???)
                XE System Console + XE System Keyboard + XC12 + 2 CX40 Joysticks
                + 3 games
XE 5001 (France)
                XE System Console + XG-1 Light Gun + Bug Hunt + CX40 Joystick
65XE + XG-1 Light Gun + CX40 Joystick (Mexico?)
                http://www.rhod.fr/ataripics/65xepack.JPG
```

6.4) 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:

o 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.

o Atari Touch Tablet CX77

```
          - Shipped with AtariArtist cartridge RX8053
            (Illustrator product by Island Graphics, Atari Touch Tablet version)
          - Also shipped with CX8104 Atari 810/1050 Master Diskette II disk (DOS 2.0S)
          - 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.

      o 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, (c)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.

      o 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:
            o Road Map Distance Analysis
            o Length
            o Area - Calculation of areas (any shape)
            o Sound - display pen location by means of sound
            o Drawing
            o Graphics
          - See ANALOG #1 for a review (p. 16) and an ad (p. 17)

      o 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)

      o 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.
          - 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)

      o 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
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6.5) 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 by Symtec (1982)
- The Light Pen by Programmer's Institute / Futurehouse (1983)
- Tech-Sketch LP-10 Light Pen (ad: Compute Aug83p117)
   - sold with Demo Cassette
- Tech-Sketch LP-15 Light Pen (ad: Compute Aug83p117)
   - sold with Demo Cassette
- Tech-Sketch LP-10S Light Pen (ad:CC Jan84p.230).   Shipped with one of:
   - Paint-N-Sketch Level I
   - Micro Illustrator diskette
     (Illustrator product by Island Graphics, light pen version)
- Computapix PixStik (ad: YourComputer Feb84p12-13)
   - Atari version shipped with PaintBox (by Eamonn Walsh) and "3 free games"
- Atari Light Pen CX75 (1983, shipped 1984)
   - Shipped with AtariGraphics cartridge RX8054 by Gibson Laboratories /
     Steve Gibson for Atari
- Stack Light Pen by Stack Computer Services (1984)
- Edumate Light Pen by Futurehouse (1984)
   - Improved version of The Light Pen by Programmer's Institute / Futurehouse
   - Sold with 5 or 6 programs for the Atari
   - Some later units sold with Peripheral Vision program by Futurehouse
- 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) 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

6.6) 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.

6.7) What voice/speech synthesis hardware is there for the Atari?

```
Type 'n Talk (TNT) by Votrax  (see CreativeComputing9/81p148-151)
 - RS-232-C 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-C 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 joystick ports 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 joystick ports
 - Software: Machine Language Driver, Word Editor, Sentence Builder,
   Dictionary, Word Blaster

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 joystick ports 1+2, or ports 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/Feb86
 - Connects to joystick ports 1+2, or ports 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 Jan87
 - Connects to joystick ports 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
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6.8) What sound digitizers/samplers were produced for the Atari?

This section started by Andreas Koch.

- Talk is Cheap project by Ed Stewart, Antic Volume 2 Number 4, July 1983,
  pages 64-66; hardware schematics only (a test/demo program is
  mentioned in the text, but not printed in the magazine!);
- Parrot (2-Bit) by Alpha Systems, Anthony Ramos;
  - Plugs into joystick port 2, includes mini-plug jack
- Parrot-2 (2-Bit or 4-Bit?) by Alpha Systems, Anthony Ramos;
- Replay cartridge (4-Bit) by 2 Bit Systems
  - Related software by 2 Bit Systems: Digidrum, Digisynth
- Replay Sound Sampling System, by Gralin International
  - Same as Replay cartridge by 2 Bit Systems
  - Supplied with DigiDrum and DigiSynth
  - Sample resolution
    - Record- 8 bit
    - Playback- 4 bit (via POKEY) - 8 bit via Percussion Master
- Sound N'Sampler (2-Bit) by Ralf David;
- Sound Digitiser (2-Bit) by Ralf David;
- Sound-Meister (2-Bit) by Irata;
- Sound-Digitizer (2-Bit) by Irata;
- Digitales Mikrofon (2-Bit) by Compy-Shop;
- Voice Master Speech and Music Processor, by Covox (1985) (2-Bit)
  - Plugs into Joystick port 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
- Voice Master Junior, by Covox (1988?)
  - Plugs into Joystick port
  - Built-in microphone
  - 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
- Analog-Sample-Processor (2-Bit) by Steven Lashower (ANALOG Magazine);
- Atari-Sound-Sampler (4-Bit) by Andreas Binner and Harald Schoenfeld of PPP
  (German Atari magazin 1/1989, pages 44-49, complete with schematics,
  documentation, sample-program and assembler-source);
  - Also 5/1989
- Alphasys Sample Cartridge (8-Bit) by ANG/Mirage;
  Accompanied software, made by Solarsystems, only used the upper 4 bits;
  Cartridge also has a "Replay Cartridge compatibility mode" so people could
    use it with the software by 2 Bit Systems.

6.9) What sound upgrades (stereo or 8-bit PCM) 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.

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 C. Steinman, 12/16/1989 ("GUMBY upgrade")
- Original filename: STEREOXL.TXT
- Achieves stereo output through the addition of a second POKEY chip. (The second POKEY chip is referred to as Gumby.)
- GUMBY upgrade compatibles include:
    - StereoPlus by Gralin International, 1994?
    - Atari 8-Bit in Stereo, by Frankenstein, in Megazine #2, #3, #5:
      http://preview.tinyurl.com/pbgf829
      http://preview.tinyurl.com/of2kk5x
      http://preview.tinyurl.com/pqwh7hq
    - Stereo in the "little" Atari, by Rysowal Monsoft, 2002?
      http://ftp.pigwa.net/stuff/mirror/www.atari.cuprum.com.pl/stereo.htm
    - Stereo by Pasiu/SSG, 2004?
      http://hardware.atari8.info/stereo.php
    - Dual-POKEY Stereo Sound Board, by MetalGuy66, 2006
      http://preview.tinyurl.com/jphxurn
      http://www.rasterline.com/
    - Atari 8 bit stereo upgrade FINAL ("Simple Stereo"), by Lotharek, 2006
      http://www.lotharek.pl/product.php?pid=45
    - STEREO by C.P.U., 2006
      http://raster.atariportal.cz/hw/stereo/stereo.htm
        - PCB version by Pajero / MadTeam, 2007
          http://madteam.atari8.info/index.php?prod=stereo
    - SimpleStereo by Candle, 2003-2008
      http://www.spiflash.org/block/9.html
    - Stereo Expansion rev.2.1 by Mega-Hz, 2010
      http://www.mega-hz.de/Angebote/Stereo/Stereo_small.html
        - Includes bass boost and GTIA sound amplifier
        - Earlier prototype: Stereo Expansion rev.1.2, 2008
          http://www.mega-hz.de/Angebote/Stereo/Stereo_big.html
- POKEY stereo / Gumby supporting software:
  http://a8.fandal.cz/search.php?search=stereo&butt_details_x=x

Stereo Blaster Pro (Programmable), by Portronic/AMC-Verlag (1995?)
    Andreas Koch writes: This add-on had only 1 small paddle, to amplify the sound volume; the stereo-sound could be generated via two simple POKE statements; a demo disk was included.
    See: http://www.strotmann.de/~highland/amc/amcprogs.html

"Covox" project, original by Psychol/MadTeam
- 4 channel, 8-bit sound playback (8-bit PCM)
- Digital to analog (DAC) converter based on the Covox Speech Thing for PC
- http://atariki.krap.pl/index.php/Covox
- Covox compatible projects:
    - Easy 4 channels * 8 bits Covox C/A, by: Gumi/Tight
      http://ftp.pigwa.net/stuff/mirror/www.atari.cuprum.com.pl/covox.htm
        - Covox upgrade by Gumi, re-written by Pigula/Shpoon
          http://ftp.pigwa.net/stuff/mirror/www.atari.cuprum.com.pl/covox_2.htm
    - SimpleStereo by Candle, 2003-2008
      http://www.spiflash.org/block/9.html

- 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

6.10) What 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 10MHz
 - 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

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 10MHz
 - 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

XEP80 Interface Module, by Atari (1986)
 - Plugs into joystick port 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)
 - 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 1024 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
 - Blitter with 7 modes of operations capable of zooming displayed data,
   transparency, collision detection and many other features
 - Fully downward compatible with GTIA chip
 - Developer website: http://spiflash.org/block/15.html
 - 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

6.11) What types of memory upgrades are there for the Atari?

Thanks to Andreas Koch for his earlier extensive work on RAMdisk 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.

The 8-bit 6502 and ANTIC processors can directly address 64KiB distinct memory locations, addressed 0-65535 or $0-$FFFF. Any upgrade providing more total system RAM than 64KiB must use a bank-selection scheme to allow a range of logical memory addresses to refer to more than one range of physical memory locations.

400/800 Memory Upgrades

As designed by Atari, RAM management in the 400/800 is accomplished in hardware via the presence of up to three RAM Module boards in the 800, or a single internal RAM board in the 400. The 400 was designed to support up to 32KiB RAM; the 800 up to 48KiB RAM. Of the remaining 16KiB of the total 64KiB of 8-bit address space available to use with the 6502 and ANTIC, 8KiB is taken up by the Operating System, 2KiB is occupied by the Math Pack, 2KiB is occupied by hardware registers, and 4KiB was unused/reserved for future use. Use of an 8KiB ROM cartridge limits the total available system RAM to 40KiB; use of a 16KiB cartridge, or two 8KiB cartridges in an 800, limits the total available system RAM to 32KiB.

800 Memory Module industrial design (case): Kevin P. McKinsey, James C. Asher

- 4KiB boards
  These make an additional 4KiB available to the computer in the 4KiB of memory address space (49152-53247 or $C000-$CFFF), unused by the 400/800 hardware or Operating System, directly beyond the normal 48KiB RAM address space as intended for use by Atari. These can be used with standard 8KiB, 16KiB, 24KiB, 32KiB, 40KiB, or 48KiB RAM systems. See also: 52KiB 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
- 8KiB 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)
- 16KiB 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 Peripherals Corp./MPC Peripherals AT-16
    - Intec 16K
    - Tiny Tek 16K
    - Bontek 16K
    - Mosaic 8K to 16K RAM Expansion Kit (400)
- 32KiB boards/upgrades
  A 32KiB board, "properly" designed, may be used in 3 places: in the 400 internal RAM slot, or in either of the first two RAM slots in the 800. In the 800 a 32KiB board must be installed in combination with an 8KiB or 16KiB board also in slot 1 or 2, or utilize another solution that taps both slots for the necessary chip select lines.
    - Axlon RamCram / RamPower 32 (400 or 800 middle RAM slot)
    - Mosaic 32K RAM Board (400 or 800 first two RAM slots)

- Optional Companion Board for use in the 800 without another RAM board
              - Mosaic Expander is the same but shipped with 16KiB and sockets for
                16KiB RAM chips taken from a 16KiB board
              - Mosaic Adapter is the same but shipped with no memory but sockets for
                32KiB in RAM chips taken from two 16KiB boards.
        - Microtek Peripherals Corp./MPC Peripherals AT-32
          (400 or 800 middle RAM slot)
        - Intec 32K (400 or 800 first two RAM slots)(early release: 800 only)
        - Tiny Tek 32K (400 or 800)
        - Bit 3 32K Memory Plus (400 or 800 middle RAM slot)
        - Tech-Data (TD) 32K (400 or 800)
        - Calisto Computers 32K (400)
        - Austin Franklin 32K Austin Board (400 or 800 first two RAM slots)
              - Optional 32K Loopback for use without another RAM board
        - Bontek 32K (400 or 800)
        - High Country MicroSystems (HCMS) Ram-Page 32K (400 or 800)
        - Tara Computer Products Atari 32K RAM
        - HardStuff 32K RAM Board (400 or 800)
  - 48KiB boards/upgrades
    If designed for the 400, these must modify the computer 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 designed for the
    800, these boards are used with no other RAM boards installed. Also, these
    physically used 64KiB in DRAM chips because such designs were much simpler
    and less expensive than a design using chips actually totaling 48KiB.
        - Intec 48K (400)
        - Dynamic Technologies 48K Memory Expansion Kit (400)
        - Axlon RamCram Plus / RamPower 48 (400). Two installation options:
              - 40KiB available, or 48KiB with supplied board in cartridge slot
                 - No computer modification required
              - 48KiB 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)
        - Austin Franklin 48K Austin Board (400 or 800)
              - Optional 48K Loopback card required for use in the 800
        - Mosaic 48K Ram Kit (400)
        - Maplin/Mapsoft 48K RAM card (400)
        - Calisto Computers 48K (400)
        - Essence Peripheral 48K
        - Polly Products 48400 (400)
        - Xtra HardWare XTRA48 (400 or 800)
        - Tara Computer Products 48K RAM for the Atari 400
        - A 48K Upgrade For Your 400, project by Claus Buchholz, MACE Newsletter,
          (Michigan Atari Computer Enthusiasts), 9/82
        - Atari 400 48K Memory Modification Instructions, by Gary A. Crowell with
          Steven P. Davies, (c)1983
        - Atari 48K RAM Expansion Kit (400) (June 1983)
  - 52KiB boards/upgrades
    These have the same features/capabilities as 48KiB boards/upgrades but make
    an additional 4KiB available to the computer in the 4KiB of memory address
    space (49152-53247 or $C000-$CFFF), unused by the 400/800 hardware or
    Operating System, directly beyond the normal 48KiB RAM address range. The
    result is 52KiB of continuous, non-banked RAM available while still running
    the standard 400/800 OS in memory as well.
        - Tiny Tek 48K/52K (400)
        - Newell 48/52K Ram Board (400 or 800)
        - Xtra HardWare XTRA52 (400 or 800)
  - 64KiB and up boards/upgrades
    Surpassing the limit of 52KiB 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 52KiB
    RAM address range. Atari never offered such a solution, but several
    different third-party schemes emerged.
   > "Axlon" bank-selection type
    Banks are 16KiB, 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 4080KiB of banked RAM (255 banks of
16KiB each) for a total system RAM potential of 4128KiB (4080KiB + 48KiB).
- Axlon RamDisk / RamPower 128 (800 middle RAM slot)(1981)
  Provides 8 16KiB banks of memory, one of which is available to the
  computer at a time as part of the normal RAM of up to 48KiB. With a
  total of 32KiB installed in the other two RAM slots, the total system
  potential is 160KiB.
    - Toggle switch supports configuration as 128KiB or 16KiB for added
      software compatibility
    - Shipped with CREATE utility that modifies Atari DOS 2.0S into:
      Axlon RAMDisk MMS V1.0 (Memory Management System) (D4: RAMdisk)
    - 1st 3rd-party Axlon RAMdisk: 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 16KiB banks of memory, one of which is available to the
  computer at a time as part of the normal RAM of up to 48KiB. With a
  total of 32KiB installed in the other two RAM slots, the total system
  potential is 160KiB.
- Crystal Computer Products (CCP) 256 K RAMCard (800 middle RAM slot)(1986)
  Provides 16 16KiB banks of memory, one of which is available to the
  computer at a time as part of the normal RAM of up to 48KiB. With a
  total of 32KiB installed in the other two RAM slots, the total system
  potential is 288KiB.
    - Can be configured as 256KiB or 16KiB for added software compatibility,
      either via jumper pins or via optional hardware switch.
- Super Products SuperRAM
  (256KiB piggyback board for 16KiB board in middle RAM slot)
  Provides 16 16KiB banks of memory, one of which is available to the
  computer at a time as part of the normal RAM of up to 48KiB. With a
  total of 48KiB installed in the three RAM slots, the total system
  potential is 304KiB.
- Magna Systems Ramcharger 256K (800 middle RAM slot)(1986)
  Provides 16 16KiB banks of memory, one of which is available to the
  computer at a time as part of the normal RAM of up to 48KiB. With a
  total of 32KiB installed in the other two RAM slots, the total system
  potential is 288KiB.
- Magna Systems Ramcharger 512K (800 middle RAM slot)(1986)
  Provides 32 16KiB banks of memory, one of which is available to the
  computer at a time as part of the normal RAM of up to 48KiB. With a
  total of 32KiB installed in the other two RAM slots, the total system
  potential is 544KiB.
- Magna Systems Ramcharger 1Mb (800 middle RAM slot)(1986)
  Provides 64 16KiB banks of memory, one of which is available to the
  computer at a time as part of the normal RAM of up to 48KiB. With a
  total of 32KiB installed in the other two RAM slots, the total system
  potential is 1056KiB.
- Incognito, by Sebastian Bartkowicz (Candle'0'Sin), 2012
    - 1MiB Axlon compatible memory expansion for Colleen mode
    - Device detailed elsewhere in this FAQ list (800 personality boards)
> "Mosaic" bank-selection type
  Banks are 4KiB, 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 192KiB (48KiB + 36 banks of 4KiB).
  - Mosaic 64K Ram Select (400 or 800 any RAM slot) (400/800 version or early
    400-only version) (1982)
      - Single board provides 48KiB "hard-wired" plus 4 banks of 4KiB
        addressed directly beyond the normal 48KiB limit, for 52KiB of
        continuous memory available to the computer.
      - In the 800, may be used in combinations including two 16KiB boards,
        one 32KiB board, one 16KiB board and one 32KiB board, or with one or
        two additional Mosaic 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
        4KiB addressed directly beyond the normal 48KiB limit. Total system

potential with three 64K Ram Select boards is 192KiB (48KiB + 36 banks
              of 4KiB).
         - Cable Kit/Cable Connectors #1 required in 400 or with first 64K Ram
           Select in 800; Cable Kit/Cable Connectors #2 required with 2nd or 3rd
           64K Ram Select in 800; use of one 64K Ram board with one 32KiB board
           requires Companion Board in middle RAM slot in 800
         - 48K Boot Fix program included for compatibility with software written
           to treat more than 48KiB available as not enough memory available.
         - Software sold separately by Mosaic:
             - Handyman by Holiday Software (software utility package; routines
               reside in bank select RAM; useable with BASIC and Assembler Editor)
             - SuperDrive by Starship Enterprises (c)1983 H.V. Stacey (Stace)
                 - GENVDOS installation program modifies Atari DOS 2.0S to support
                   a Mosaic RAMdisk, and to support DUP.SYS and/or MEM.SAV residing
                   on the RAMdisk.
                 - Included with later 64K Ram Select units
   > Neither Axlon nor Mosaic bank-selection type (but very similar to Axlon)
       - A 48K Upgrade For Your 400, project by Claus Buchholz, MACE Newsletter
         (Michigan Atari Computer Enthusiasts), 9/82, including "Suggestions for a
         64K Modification" ("MACE Mod")
         Provides one 16KiB bank of memory, bank-switched with the "middle" 16KiB
         of the 48KiB RAM, visible at 16384-32767 or $4000-$7FFF, for a system
         total of 64KiB RAM. Write a 1 to a memory location between $D700 and
         $D7FF (55040 to 55295 decimal; byte 55295 ($D7FF) used by popular
         convention) to enable the banked memory; write a 0 to the same location
         to disable banked memory.
       - Atari 800 Plus 256K, project by David G. Byrd
         48KiB of normal user memory and 240KiB of "extended memory". Uses the
         $4000-$7FFF banked region, with bank selection at $D7xx (byte 55295
         ($D7FF) used by popular convention). Versions:
          - 1983 original (WHERE????)
          - July 1985 S.N.A.C.C. Newsletter (Southern Nevada Atari Computer Club)
          - Revision A - Oct 1985.
          - Computer Shopper magazine, Feb 1987
          - Rev: D, Ver. 1.6 (maybe this is the Computer Shopper version?)
         Used with GENEMDE by H.V. Stacey, to extend DOS 2.0S to produce EMDE/OS
         with 240KiB RAMdisk support.
       - Intec 64K (400)
          - Explicitly supported by later versions of MachDOS.
          - Seems rather likely this is a commericalized 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, a (1985?) clone of the 48K/64K MACE Mod by Claus Buchholz
       - The Windhover Project memory upgrades for the 800, by Jay Torres.
         96KiB/160KiB/288KiB 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 batter backup
          - http://www.bobhays.com/atari512k.html
   > Others, bank-selection type unknown (WHO CAN VERIFY?????)
       - High Country MicroSystems (HCMS) Ram-Page 64K (400 or 800)
          - "For the 800 provides up to 96KiB".
       - Xtra HardWare XTRA64 (400 or 800).
       - HardStuff 64K RAM Board (400 or 800)

XL/XE Memory Upgrades

In Atari XL/XE computers, the available 64KiB of memory address space includes
48KiB of "main" RAM addresses (analogous to the 400/800 design maximum,
including 8KiB or 16KiB of address space occupied by any ROM cartridge
present), and there is an additional 14KiB RAM available in the same 14KiB of
address space as the 12KiB XL OS and the 2KiB Math Pack. In the 130XE, there
are four "extra" 16KiB RAM banks that can be accessed using the "middle" 16KiB
of main memory address space (analogous to the middle RAM slot in the 800).
Memory location 54017 ($D301), known as PIA Port B or PORTB, is used by the
programmer to manage access to portions of built-in ROM and RAM that share
ranges of memory addresses:

```
    Bit  Meaning if value set to 1
    ---  -----------------------
    #0   OS ROM enabled / RAM disabled (16KiB, 49152-65535 or $C000-$FFFF,
         except 2KiB range of hardware addresses, 53248-55295 or $D000-$D7FF)
    #1   BASIC ROM disabled / RAM enabled (8KiB, 40960-49151 or $A000-$BFFF)
    #2   1200XL LED 1 off; 130XE bank selection least significant bit (LSB)
    #3   1200XL LED 2 off; 130XE bank selection most significant bit (MSB)
    #4   130XE CPU Bank /Enable (CBE) (1=disabled, 0=enabled)
         (16KiB, 16384-32767 or $4000-$7FFF)
    #5   130XE Video Bank /Enable (VBE) (1=disabled, 0=enabled)
         (16KiB, 16384-32767 or $4000-$7FFF)
    #6   XE System Console Missile Command disabled / RAM enabled
         (8KiB, 40960-49151 or $A000-$BFFF)
    #7   Self Test ROM disabled / RAM enabled (2KiB, 20480-22527 or $5000-$57FF)
```

XL/XE memory upgrades to more than 128KiB RAM use additional PORTB bits as
bank-selection bits, beyond the two (bits 2-3) used in the 130XE.   "True ANTIC
banking" describes the ability, as in the 130XE, for the 6502, ANTIC, both, or
neither, to access the currently-selected bank of "extra" memory, based on the
settings of PORTB bits 4-5 (CBE and VBE).

```
32KiB system total, for the 600XL
    - RC Systems AM2, plugs into the PBI, 1984
    - W.E.Electronics 16KiB, plugs into the PBI, 1985
        - Card could be upgraded from 16KiB to 32KiB
48KiB 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 32KiB, plugs into the PBI, 1985
64KiB system total, for the 600XL
    - Atari 1064, plugs into the PBI, 1984
    - MPP MicroRam 64K Memory Board, plugs into the PBI, 1984
    - RC Systems AM64, plugs into the PBI, 1984
    - FirstWare (Mosaic) 64K Expander (internal), 1984
    - W.E.Electronics 48KiB, 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 (16KiB to 64KiB internal), 1987
    - 64K Upgrade for 600XL project by Don Neff, February 1988 issue of
      Michigan Atari Magazine
128KiB system total (Atari 130XE standard)
  PIA Port B bank-selection bits used: 2,3
  2 bank-selection bits allows selection of 2^2 = 4 16KiB memory banks.
    - Innovative Concepts Ramdrive + 128K (65XE 64KiB to 128KiB)
        - True ANTIC banking
    - Innovative Concepts Ramdrive + XE-GM1 (XEgs 64KiB to 128KiB) (1988)
        - True ANTIC banking
    - Innovative Concepts Ramdrive + XL to XE (800XL/600XL 64KiB to 128KiB)
        - True ANTIC banking ("including Extended Antic modes") (1989)
192KiB system total
  PIA Port B bank-selection bits used: 2,3,6
  3 bank-selection bits allows selection of 2^3 = 8 16KiB memory banks.
    - Compy-Shop 128K for 600XL
        - No separate ANTIC banking.  (Question: Is 6502/ANTIC banking
          simultaneous, or does ANTIC have no access to banked memory?????)
    - Innovative Concepts Ramdrive + 192K (130XE 128KiB to 192KiB), 1988-11-11
        - True ANTIC banking (?)
    - Innovative Concepts Ramdrive + XE-GM2 (XEgs 128KiB to 192KiB).  Upgrade
      for XEgs with IC's XE-GM1 128KiB upgrade already installed.
        - True ANTIC banking
256KiB system total
  4 bank-selection bits allows selection of 2^4 = 16 16KiB memory banks, but
  there are only 12 "extra" banks available because these REPLACE the
  computer's main 64KiB RAM.
 > "Newell" bank-selection type
```

```
       PIA Port B bank-selection bits used: 2,3,5,6 (only 12 banks available)
       PORTB Bit 5 use is inverted relative to the later "Rambo" type.
       - Newell Industries 256KXL for 800XL/1200XL, ANTIC 'E' required, 1985
         - ANTIC has no access to banked memory
         - Main memory is protected from bank-selection.
         - Shipped with MYDOS 4.x
         - SCXM Sector Copier (1985) sold separately
         - 256KXL Mods published by Newell
           1. Allow 6502/ANTIC simultaneous banked memory access via PORTB bit 4
           2. Main memory can be bank-selected.
         - NOTE: After the RAMBO XL gained strong marketplace acceptance, the
           Newell 256KXL was replaced with the Newell 256KXLE, see below.
   > "Rambo" bank-selection type
       PIA Port B bank-selection bits used: 2,3,5,6 (only 12 banks available)
       PORTB bit 5 use is inverted relative to the earlier "Newell" type.
       - 130XE-Compatible 800XL 256K Upgrade, project by Claus Buchholz
         - Revision of his "Quarter-Meg Atari 800XL" project, Byte 9/85, (which
           used 32KiB banks and was not 130XE-compatible)
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
         - Main memory can be bank-selected.
       - Ramaster, by ABC Consulting, for 800XL
         - Commercialized version of the Buchholz 130XE-Compatible 800XL 256K
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
         - Main memory can be bank-selected.
       - 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 Buchholz 130XE-Compatible 800XL 256K Upgrade.
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
         - Main memory can be bank-selected.
       - 800XE PLUS, by Triple "C" Computer, for 800XL or 1200XL, 1986
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
           "It's entirely compatible with the 130XE"
       - 256k RAM for 800XL, by Computer Support, 1986 (may be "Newell" type????)
         - "Includes Ramdisc software for all DOS systems"
         - "Full 130XE compatibility"
       - Magna Systems Ramcharger 256K for 800XL or 1200XL, 1987
         - ANTIC has no access to banked memory.
       - Innovative Concepts Ramdrive + XL (800XL 64KiB to 256KiB), 1987
         - True ANTIC banking (???? mc doubts it)
       - Yorky, design by Dave Malham for York Computer Centre (1987), then
         Richard Gore (1993), for 800XL or 64KiB 600XL
         - Plugs into the PBI
         - Uses the 600XL/800XL power supply; supplies power for the computer
         - 3-way switch: Off, 64K, or 256K
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
       - Wizztronics 256K for 800XL, c1990 (by Steve Cohen)
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
       - 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, 800XL or 65XE installation
         - True ANTIC banking
       - Atarimax 256k Memory Upgrade for 800XL and 1200XL
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
       - Reimaged Rambo XL 256k Memory Upgrade, by Bits of the Past, (2011?)
         - For 800XL or 1200XL
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
       - Reimaged Wizztronics 256k Memory Upgrade, by Bits of the Past, (2011?)
         - For 800XL
         - Separate versions for ANTIC CO12296 or ANTIC CO21697
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
       - SuperRAM, by Super Products, for 600XL/800XL
         - No soldering required
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
 320KiB system total
     4 bank-selection bits allows selection of 2^4 = 16 16KiB memory banks.
     These ADD to the computer's main 64KiB RAM.
```

```
    > "Atari magazin" bank-selection type
      Bank-selection is the same as the "Rambo" type but with 16 banks available.
      PIA Port B bank-selection bits used: 2,3,5,6
        - The 130XE/320K upgrade by Scott Peterson, 1985
            - ANTIC has no access to banked memory.
            - Credits the 800/288K upgrade (D.G.Byrd) and the 800XL/256K upgrade
              (C.Buchholz) for inspiration
        - 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
            - ANTIC has no access to banked memory.
        - The 65XE 130XE/320K Upgrade! by Scott Peterson (for the 65XE), 1986
            - 100% compatible with the previous 130XE/320K upgrade by Scott Peterson
            - ANTIC has no access to banked memory.
        - Magna Systems Ramcharger 320K for 130XE, 1987
            - ANTIC has no access to banked memory.
        - Innovative Concepts Ramdrive + XE (130XE 128KiB to 320KiB), 1987
            - True ANTIC banking (?)
        - Atari magazin "320 KByte im Eigenbau" for 800XL, by Rolf Schmidtke,
          issue 1987n2p56; bugfixes/updates 1987n3p54, 1988n4p62, 1988n5p86
            - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
        - Innovative Concepts Ramdrive + 320K (65XE 64KiB to 320KiB)
            - True ANTIC banking
        - CSS Power Plus, 130XE installation
            - True ANTIC banking
        - RAM 320XL, by ctirad, for 600XL/800XL, 2010
            - Plugs into the PBI
            - Standard mode ADDS 256KiB of expansion memory.  This gives a 16KiB
              600XL 272KiB system total, while a 64KiB 800XL has 320KiB system
              total.
            - Remapped base RAM mode DISABLES internal RAM, makes 64KiB main memory
              available from the RAM 320XL device, for 320KiB total
            - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
            - http://atariage.com/forums/topic/162420-ram-320xl/
        - SuperRAM, by Super Products, for 130XE
            - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
    > "Compy-Shop" bank-selection type
      PIA Port B bank-selection bits used: 2,3,6,7
        - Compy-Shop 256K, versions for 800XL or 130XE (versions for any others?)
            - True ANTIC banking
        - Megaram XL/XE (Version 1, Version 2, or Version 3 256KiB installation),
          by Klaus Peters, for 800XL, 800XE, 65XE, 130XE, or XE System Console.
            - ANTIC has no access to banked memory.
            - Fixes for refresh errors:
              http://www.b-pahl.de/atari8bit/RAM-Disk/doku/BugFix/bugfix.html
    > 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
        - RAM-Erweiterung 256kB fur 130XE, by Heuser Family (2005).  Two modes:
            - Rambo/Atari magazin mode with 6502/ANTIC simultaneous banking
            - Compy-Shop mode with true ANTIC banking
            - http://www.asselheim.de
512KiB system total
   5 bank-selection bits allows selection of 2^5 = 32 16KiB memory banks, but
   there are only 28 "extra" banks available because the computer's main 64KiB
   RAM has been REPLACED.
     - 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!
         - PIA Port B bank-selection bits used: 2,3,5,6,7
         - 6502/ANTIC banking is simultaneous only, controlled by PORTB bit 4
576KiB system total
```

```
  5 bank-selection bits allows selection of 2^5 = 32 16KiB memory banks.
  These ADD to the computer's main 64KiB RAM.
    - Irata Verlag 512K RAM 800XL RAMFloppy plugs into the 800XL PBI (1986)
      - PIA Port B bank-selection bits used: 2,3,5,6,???
      - ANTIC has no access to banked memory.
      - Sold separately: 512K RAM BetriebsSystem Chip for 800XL + RAMFloppy
    - The 130XE/576K upgrade, by Scott Peterson. (1986)  Two modes:
      - 576KiB mode: PIA Port B bank-selection bits used: 1,2,3,5,6
        - Internal BASIC is lost via software control (PIA Port B bit 1)
        - ANTIC has no access to banked memory.
      - 130XE mode: 192KiB RAM, PIA Port B bank-selection bits used: 2,3,6
        - "100% compatible 130XE"
    - Magna Systems Ramcharger 576K for 130XE (1987)
      - PIA Port B bank-selection bits used: 2,3,5,6,7
      - Self Test is lost via software control (PIA Port B bit 7)
      - ANTIC has no access to banked memory.
    - Innovative Concepts Ramdrive + 576K (130XE 320KiB to 576KiB), 1987
      - Upgrade for 130XE with IC's 130XE 320KiB upgrade already installed.
      - PIA Port B bank-selection bits used: 2,3,5,6,???
      - True ANTIC banking (?)
    - 512 kByte im 800XL / 800XE project by Bernhard Pahl
      - Two modes: Atari magazin and Compy-Shop
      - http://www.b-pahl.de/atari8bit/RAM-Disk/800xl_2/800xl_2.html
    - 512 kByte im 130XE project by Bernhard Pahl
      - Two modes: Atari magazin and Compy-Shop
      - http://www.b-pahl.de/atari8bit/RAM-Disk/130xe_2/130xe_2.html
    - 512k SRam Extended Memory for XL/XE, project by Bernd Herale (BigBen) and
      Wolfram Fischer.  (2007?)  Internal upgrade with four modes:
      - 512KiB using PORTB bits 2,3,5,6,7; 6502/ANTIC simultaneous banking
      - 256KiB Compy-Shop mode with true ANTIC banking
      - 256KiB Rambo (Atari magazin) and 6502/ANTIC simultaneous banking
      - Extended RAM off
      - http://www.abbuc.de/~bernd/selfmade-hardware/512k-memory-extension/
    - 512k SRAM extension for Atari XL/XE, project by Matthias Reichl, v1.3,
      (2006-2010), and Wolfram Fischer.  Internal upgrade with four modes:
      - 0KiB / off
      - 256KiB Compy-Shop with true ANTIC banking
      - 256KiB Rambo/Atari magazin with 6502/ANTIC simultaneous banking
      - 512KiB using PORTB bits 2,3,5,6,7; 6502/ANTIC simultaneous banking
      - http://www.horus.com/~hias/atari/#sram512k
      - http://www.mega-hz.de/Angebote/512K/512k.html
    - 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:
        - 128KiB 130XE, 320KiB Rambo, 320KiB Compy-Shop, 576KiB Rambo
      - 130XE and 320KiB Compy-Shop modes with true ANTIC banking
      - http://atariage.com/forums/topic/232856-ram320xe576-order-thread/
1088KiB system total
  6 bank-selection bits allows selection of 2^6 = 64 16KiB memory banks.
  These ADD to the computer's main 64KiB RAM.
    - Scott Peterson 1088XE project for the 130XE
      - April 1986 (initial release); Version 2.0(This one works!) June 1986
      - PIA Port B bank-selection bits used: 1,2,3,5,6,7
      - Self Test is lost via software control (PIA Port B bit 7)
      - Internal BASIC is lost via software control (PIA Port B bit 1)
      - ANTIC has no access to banked memory.
    - Magna Systems Ramcharger 1088K for 130XE. (1987)
      - PIA Port B bank-selection bits used: 1,2,3,5,6,7
      - Self Test is lost via software control (PIA Port B bit 7)
      - Internal BASIC is lost via software control (PIA Port B bit 1)
      - ANTIC has no access to banked memory.
    - Newell 1 Meg XL for 800XL/1200XL (1990)
      - Installation Method 1: (1088KiB accessible RAM)
        - PIA Port B bank-selection bits used: 1,2,3,5,6,7
        - Self Test is lost via software control (PIA Port B bit 7)
        - Internal BASIC is lost via software control (PIA Port B bit 1)
        - True ANTIC banking
```

- Installation Method 2: (1072KiB accessible RAM)
  - PIA Port B bank-selection bits used: 2,3,4,5,6,7
  - Self Test is lost via software control (PIA Port B bit 7)
  - 6502/ANTIC simultaneous banked memory access is ALWAYS enabled; 16KiB of main memory is not accessible
- Installation Method 3: (1072KiB accessible RAM)
  - PIA Port B bank-selection bits used: 0,1,2,3,5,6
  - Internal BASIC is lost via software control (PIA Port B bit 1)
  - True ANTIC banking
  - 16KiB 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), 1MiB installations
  - PIA Port B bank-selection bits used: 1,2,3,5,6,7
  - Self Test is lost via software control (PIA Port B bit 7)
  - Internal BASIC is lost via software control (PIA Port B 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 (Version 3 1024KiB installation, Super-Megaram), by Klaus Peters, for 800XL, 800XE, 65XE, 130XE, or XE System Console
  - Bank-selection bits: PIA Port B bits 2,3,6,7 and memory location 54784 ($D600) bits 0,1
  - ANTIC has no access to banked memory.
  - Fixes for refresh errors: http://www.b-pahl.de/atari8bit/RAM-Disk/doku/BugFix/bugfix.html
- Satantronic 1MB SIMM RAM expansion project for 800XL, 800XE, 130XE, XEgs, by Dodo (Jozef Friedmansky). (2002) Internal upgrade, with or without switches, with or without GAL chip.
  - 1MiB mode uses PORTB bits 1,2,3,5,6,7
  - 256KiB Compy-Shop mode
  - 256KiB Rambo/Atari magazin mode
  - 64KiB 130XE mode
  - http://satantronic.atari.sk/?str=xe_1mbram
- 1024 kByte im 800XL project by Bernhard Pahl
  - PORTB bits: 1,2,3,5,6,7
  - Two modes: 1024KiB without BASIC, or 512KiB with BASIC
- 1MiB SIMM project for 800XL, 65XE, 130XE, 800XE, by Pasiu/SSG. (2004?) Internal upgrade works in two modes:
  - 512KiB Compy-Shop with true ANTIC banking
  - 1024KiB with 6502/ANTIC simultaneous banking
  - http://hardware.atari8.info/simm.php
- mega-mem 1024KB for 800XL, 800XE/65XE, 130XE, 1200XL, by Matthias Reichl and Wolfram Fischer, 2009. Internal upgrade with 8 modes:
  - 0KiB (off)
  - 64KiB 130XE compatible (true ANTIC banking?)
  - 128KiB (true ANTIC banking?)
  - 256KiB Compy-Shop compatible (true ANTIC banking?)
  - 256KiB Rambo or Atari magazin and 6502/ANTIC simultaneous banking
  - 512KiB with ANTIC access (simultaneous only?)
  - 512KiB without ANTIC access
  - 1024KiB (built-in BASIC not available) (no ANTIC banking?)
  - http://www.mega-hz.de/Angebote/1024K/1mb.html
- Ultimate1MB, by Sebastian Bartkowicz (Candle'O'Sin), for 65XE/130XE or 800XL/600XL/1200XL, 2011. Internal upgrade with 4 modes:
  - disabled
  - 320KiB "Rambo" (Atari magazin) with 6502/ANTIC simultaneous banking
  - 578KiB "Compy-Shop" with true ANTIC banking
  - 1088KiB "Rambo" with 6502/ANTIC simultaneous banking
  - Also includes 4 flashable OS ROM slots
  - http://spiflash.org/block/19.html

4MiB system total
8 bank-selection bits allows selection of 2^8 = 256 16KiB memory banks. These ADD to the computer's main 64KiB RAM.
- Newell Meg XL for 800XL/1200XL (1991), Meg 65 for 65XE (1991), or Meg 130 for 130XE (1991), 4MiB installations (4064KiB accessible RAM)
  - PIA Port B bank-selection bits used: 0,1,2,3,4,5,6,7
  - Self Test is lost via software control (PIA Port B bit 7)

- Internal BASIC is lost via software control (PIA Port B bit 1)
            - Installation option: Toggle switch to select internal BASIC
    - 6502/ANTIC simultaneous banked memory access is ALWAYS enabled;
      16KiB of main memory is not accessible
    - 16KiB 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

6.12) 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)

Ramrod MMOS Custom Operating System Board, by Newell Industries (1982)
- Five ROM chip sockets for up to two operating systems (one or two chips
  each), and one optional Floating Point Package (FPP) chip
    - One OS can be the standard 400/800 OS chips moved from a CX801.
    - Shipped with the Newell OSN OS. (except "Ramrod 3" shipped without)
        - OSN supplied on 2 4KiB chips or on one 8KiB chip.
- Addresses the 4KiB byte block of memory at $C000.
    - May be used for 4KiB RAM or up to 16KiB of ROM via banking.
    - Shipped with CDY Consulting Omnimon! machine language monitor.
      (except "Ramrod 2" and "Ramrod 3" shipped without)
    - Ramrod board must be modified to add a toggle switch to select
      either Omnimon! or Omniview, if both are to be installed.

Integrater, with built-in smallDOS, by ADS (1983)
- For Corvus hard disk drive and/or Axlon-compatible RAMdisk users
- Software & hardware design by D.S.S.A. (David & Sandy Small and
  Associates); sales support by Adams Computer Systems, Inc. (Allan Adams)
- RAMdisk runs about 2 times faster than original Axlon MMS RAMdisk
- RAMdisk 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 (replacement for Corvus "Mount" program) with
  Corvus, Axlon RAMdisk, and standard floppy disk drive support

MEM/EX, by Prairie Physics (1983)
- Requires 400/800 OS chips moved from a CX801
- Adds 4KiB 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'0'Sin), 2012
- 4 slots for OS separate for Colleen and XL/XE mode
- 64KiB 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
- 1MiB Axlon compatible memory expansion for Colleen mode
- 64KiB/320KiB/576KiB/1088KiB total memory available in XL/XE mode
- Up to 52KiB of memory in Colleen mode (configurable)
- Developer site: http://spiflash.org/index.php/block/29.html
```

7) OS, BASIC, DOS, GUIs, Modem handlers

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 [System 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 NonMaskable 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.

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 Rev.	Rev. 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 http://mcurrent.name/os255/410insert-os255.htm and
http://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 shipped:

```
        XL OS  (Dec.)  Hex   Rev. Date     Shipped in
        Rev.A   (10)   $0A   1982-10-26    1200XL (most)
        Rev.B   (11)   $0B   1982-12-23    1200XL (rare--via service centers only?)
        Rev.1    (1)   $01   1983-03-11    600XL(all)/800XL(early)
        Rev.2    (2)   $02   1983-05-10    800XL(most)/65XE(most)/130XE(most)
        Rev.3    (3)   $03   1985-03-01    65XE(later)/130XE(later)/800XE(all)
        Rev.4    (4)   $04   1987-05-07    XE System Console (all)
        Rev.3B  (59)   $3B   1987-07-21    Arabic Atari 65XE Najm (all)
```

OS MANUALS FROM ATARI (FPP coverage included)
 - Operating System User's Manual
   - Author: Harry B. Stewart, NEOTERIC for Atari
   - (c)1980 edition
     - GREEN title page (printings with line-printed title page include
       printing date imprint; printing with Atari logo on title page lacks
       printing date)
     - 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)
     - Included in earlier printings of C016555 Atari Personal Computer
       System Operating System User's Manual and Hardware Manual (official
       nickname: "Technical User's Notes"), including printings dated:
       November 1980 (orange cover page), August 1981 (cover page??)
   - (c)1980 Rev. 0.2 edition
     - GREEN title page (line-printed)
     - 261 numbered pages
     - Identical to the earlier (c)1980 edition through page number 191
       - Confusingly, this includes the portion of the superceded 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.
          - Included in January 1982 printing of C016555 Atari Personal Computer
            System Operating System User's Manual and Hardware Manual (official
            nickname: "Technical User's Notes") (yellow cover page)
       - (c)1982 edition
          - GRAY title page (with Atari logo)
          - 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)
          - Included in C016555 Rev. A (1982) Technical Reference Notes
  - De Re Atari: A Guide to Effective Programming
     - C060070, (c)1981 edition (early version for registered developers)
       https://archive.org/details/DeReAtari_early_version
     - APX-90008, (c)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
    Notes C024515 (ii+38 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"

OS SOURCE CODE PUBLISHED BY ATARI
(excluding the FPP; see "What is Atari BASIC" FAQ section for FPP source code)
 - Operating System Source Listing CA016557 with binder
     - Should exist.   February 1981?
     - Complete 400/800 OS Rev.A source code
 - Operating System Source Listing C017893, August 1981, (c)1981
     - Complete 400/800 OS Rev.A source code
 - Operating System Source Listing, (c)1982, 129 numbered+24 un-numbered pages
     - BLUE title page (with Atari logo)
     - Complete 400/800 OS Rev.B source code (numbered pages)
     - Cross Reference section (un-numbered pages)
     - Included in C016555 Rev. A (1982) Technical Reference Notes
 - According to Mapping the Atari, 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."

OS DEVELOPER CREDITS AT ATARI
(see "What is Atari BASIC" FAQ section for FPP credits)

400/800 OS
    Rev.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   - Design (as Neoteric consultant to Atari)
                            (also wrote: APX Extended WSFN, Atari PILOT)
      Gary Palmer   - Worked on the I/O portion (as consultant to Atari)
      Ian Shepard   - Developed the disk drive functions
      R. Scott Scheiman   - ATASCII

    Rev.B
      Michael P. Mahar   - Fix several problems
      R. Scott Scheiman   - Fix several problems

```
XL OS
    Rev. A
        Harry B. Stewart          - External Reference Specification
                                    (Neoteric consultant to Atari)
        Lane Winner               - ?
        R. Scott Scheiman         - Handler Loader
        Y. M. (Amy) Chen          - Relocating Loader; International Character Set
        Mike W. Colburn           - Self Test
        Richard K. (Hud) Nordin   - ?

    Rev. B
        R. Scott Scheiman     - Fix several problems

    Rev. 1
        R. Scott Scheiman         - Support for PBI and on-board BASIC
        Richard K. (Hud) Nordin   - Support for PBI and on-board BASIC
        Y. M. (Amy) Chen          - Support for PBI and on-board BASIC

    Rev. 2
        R. Scott Scheiman     - Fix several problems

    Rev. 3
        ?                     - Self Test updated; Fix one problem

    Rev. 4
        ?                     - Support for detachable keyboard and on-board game

    Rev. 3B
        ?                     - 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 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.

```
For the 400/800
---------------
Fastchip (or: Fast Chip), by Newell Industries, 1981
- Faster replacement for the Floating Point Package (FPP) ROM chip
- Routines by Charles W. Marslett

Omnimon!, by CDY Consulting (David Young), 1982, 1983
- Resident machine language monitor
- ROM chip shipped with piggyback board (hardware by Bill Williams) for
  400/800, or shipped with Newell Industries Ramrod personality board (800),
  or as an add-on chip for "Ramrod 2" or "Ramrod 3".
- Installs into the 4KiB byte block of memory at $C000.
- Standard Version: Has a HELP command (not present in other versions)
- OmnimonA!: Several utilities replace the HELP command, plus adds support
  for Happy 810 Enhancement
- Advanced Version A: Same as OmnimonA! plus support for Bit 3 Full-View 80
- Ramdisk Version R: Same as Advanced Version A but adds Axlon RAMdisk handler
- Banked Version L: Same as RAMdisk Version R with additional disk I/O
```

facilities, but without debugging commands of Standard Version
         - Banked Version U: Add-on for Banked Version L adds the Standard Version
           debugging commands plus a mini-assembler and a relocate command.
- 8K Omnimon: L & U (complete Omnimon feature set)
         - Comes in a special 8KiB chip with hardware toggle switch to select
           between lower 4KiB (OmnimonL) and upper 4KiB (OmnimonU). All characters
           on the screen are inverted to prompt user to flip the switch when needed.

OSN OS (O.S.'N'), by CDY Consulting for Newell Industries, 1982
- Shipped with Newell Ramrod 800 personality board (except "Ramrod 3")
- 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, 1982
- 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.
- Axlon RAMdisk handler (up to 1MiB) included
- ROM Chip will plug onto either the CDY Consulting Omnimon! board (400/800)
  or onto the Newell Industries Ramrod personality board (800)
         - On the Omnimon! board, the Omniview chip replaces the Omnimon! chip
         - Both Omnimon! and Omniview can be installed on a Ramrod board if a
           hardware toggle switch is utilized
- 4KiB version installs into the 4KiB byte block of memory at $C000.
- 8KiB version also includes many features of Omnicom!.
- Many units supplied with OmniWriter, OmniTerm, and patches for LJK
  Letter Perfect and LJK Data Perfect
- Sold separately by CDY: Patched AtariWriter Plus, patched LJK Letter
  Perfect, patched LJK Data Perfect, OmniCom (pre-shareware versions)

Impossible!, by Computer Software Services (CSS), 1984
- 4K Static RAM-Pac board plugs in place of the C012499 OS ROM chip
- Adds 4KiB RAM at $C000, hardware switch selectable
- Shipped with disk containing copying software

Ultimon, by Computer Support, 1986
- Machine code monitor/disassembler, mini-DOS, disk sector editor

80 Column Pack, by Computer Support, 1986
- 80 column text mode using a Graphics 8 screen

Superchip / Super-Chip, by Computer Support, 1986
- Fast floating point math routines ?????

For the 800 only

Super800, by Super Products, for 800
- 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 16KiB RAM
- Can use Super Products SuperRAM as Axlon or XL/XE compatible RAM

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
   - Access to 4KiB RAM at $C000
- Available for 1200XL or for 600XL/800XL
- Board includes socket for standard XL OS ROM chip, and includes switch
  for selecting XL OS or 400/800 OS.

XL Boss, by Allen Macroware, 1984
- 400/800 OS translator in ROM

- Access to 4KiB RAM at $C000
- OS ROM chip for 800XL/600XL, or chip with adapter for 1200XL
- Beginning 1985 shipped with dual operating system board
- Shipped with (disk):
  MacroMon XL (machine language monitor), MacroDOS (miniature DOS)

OmnimonXL, by CDY Consulting, 1984
- Single OS ROM chip includes:
   - OSNXL (OSN XL/XE) operating system
   - Fastchip XL floating point routines
   - OmnimonXL (Omnimon XL) resident machine language monitor
- Compatible with the 400/800 OS, but has a programmable cassette baud rate,
  increased keyboard speed, and all the graphic modes of the XL/XE's
- Shipped with Newell Industries Ramrod XL (Ramrod XL/XE)(except "Ramrod XL2")
  (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 (OSN XL/XE) operating system
   - Fastchip XL floating point routines
   - OmniviewXL (Omniview XL/XE)
- Compatible with the 400/800 OS, but has a programmable cassette baud rate,
  increased keyboard speed, and all the graphic modes of the XL/XE's
- 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. Compatible with Omniview 400/800.
- Built-in ATRMON terminal emulator for use with the ATR8000
- Later versions (Omniview XL/XE) include 64KiB RAMdisk handler for 130XE
- Supplied with OmniWriter, OmniTerm, and patches for LJK Letter Perfect and
  LJK Data Perfect
- Sold separately by CDY: Patched AtariWriter Plus, patched LJK Letter
  Perfect, patched LJK Data Perfect, OmniCom (pre-shareware versions)

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

512K RAM BetriebsSystem Chip, by Irata Verlag, 1985?
- XL OS with added RAMdisk 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 RAMdisk for the 130XE

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 screendump
- Also included with Super Products Super800

XOS/80 Column Pack!, by Computer Support, 1985
- 600XL/800XL and 130XE separate versions
- XL OS modified to be highly compatible with the 400/800 OS, plus 820 baud
  cassette saves
- 80 column text mode using a Graphics 8 screen

XOS/Ultimon!, by Computer Support, 1985
- 600XL/800XL and 130XE separate versions
- XL OS modified to be highly compatible with the 400/800 OS, plus 820 baud
  cassette saves
- Machine code monitor/disassembler, mini-DOS, disk sector editor
http://ultimon.com/

XOS/Fix, by Computer Support, 1985
- 400/800 OS translator in ROM

Superchip / Super-Chip, by Computer Support, 1986
- 600XL/800XL and 130XE separate versions
- XL OS with fast floating point math routines ?????

Ultra Speed OS, 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 OS and standard Atari XL OS

Omniview 256, by CDY Consulting, 1986
- Omniview XL/XE (see OmniviewXL above) with added 192KiB RAMdisk
- Marketed for use with 800XL with Newell Industries 256KXL upgrade

16K-Bibomon, by Erwin Reuss for Compy-Shop, 1986
- Add on board includes:
  - Bibomon 16K machine language monitor ROM
    (occupies 4KiB 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
  - 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

Qmeg-OS, by Stefan Dorndorf, 1987
- "Quarter-Mega OS" - intended for machines with minimum 256KiB RAM
- Highly compatible with standard XL OS
  - Removed: PBI/ECI support, Self Test, International character set
- Adds monitor OS, mini DOS, machine language monitor with disassembler
- 130XE-type RAMdisks, configured as two standard single density disks,
  two enhanced density disks, or one standard double density disk
- Universal high speed SIO support for Happy 1050, Speedy 1050, 1050 Turbo
- P2: and P3: Epson printer drivers
- Internal Centronics parallel printer interface support (at $D6xx)
  - Must be attached directly to PIA

Expander, by Syngery Concepts, 1987
- XL OS with added Executive Program for managing up to four RAMdisks of up to
  512KiB; boot from any RAMdisk or any floppy disk drive; built-in mini-DOS

Ultra Speed Plus! Operating System Package, CSS, 1988
- Module replaces OS ROM chip, with several lines soldered to points on
  the motherboard as well. Three operating systems, switch-selectable:
  - Standard Atari XL OS
  - XL-Fix Plus
    - 400/800 OS translator, with enhancements
    - Mach-Ten binary file loader, with Mach Menu writer
  - Ultra Speed Plus (US+)
    - Universal support for high speed read/write with upgraded disk drives
      including Super Archiver, Happy, US Doubler, Duplicator, Klone, Density
      Doubler, and XF551
    - RAMdisk handler can emulate single or double density floppy disks, and
      supports 128KiB to 2MiB XE-type upgrades. Can boot from RAMdisk.
    - Fastchip floating point routines
    - Comprehensive memory test routine pinpoints defective RAM chips

Turbo-OS, by DataQue Software (Chuck Steinman), 1989
- Shipped with DataQue Software Turbo-816 65C816 board (both 600XL/800XL/65XE/
  130XE and 1200XL versions)
- Compatible with software that uses the published, legal entry points into

the Atari XL OS and legal RAM locations
- Recommended to install both the Atari XL OS and the Turbo-OS ROMs, and a
  toggle switch used to select which is active ("Dual Prom" Option).

TurBoss, by Integrated Logic Systems (ILS), 1990
- Enhances the screen display list speed in Graphics Mode 0
- Charles Marslett's high speed math routine (Fastchip)
- 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 XL/XE 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

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, by Stefan Dorndorf, 1997
- "Quarter-Mega Plus OS" - intended for machines with minimum 256KiB RAM
- Can be installed in 64KiB or 128KiB computers (no RAMdisks supported)
- Highly compatible with standard XL OS
    - Removed: Self Test, International character set, full cassette support
- Adds monitor OS, mini DOS, machine language monitor with disassembler and
  disk sector editor, Freezer
- Full support for large Bibo-DOS, Turbo-DOS, and MYDOS floppy disks, and
  MYDOS subdirectories
- RAMdisk for 130XE, Atari magazine 256KiB, Copy-Shop 256KiB, and Newell 1MiB;
  RAMdisks configured as two standard single density disks, two enhanced
  density disks, or one standard double density disk
- Universal high speed SIO support for Happy 1050, Speedy 1050, 1050 Turbo,
  XF551. Drive types automatically detected.

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 Atari ASCII, or ATASCII text?

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.

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" 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.
 - 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
Device-specific communication. 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.
 - Diskette Handler, Resident
      - Not a full device handler; not CIO-compatible
      - Except for Atari DOS I, normally only used to load a full File
        Management System from disk
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.
 - XL OS Rev.1+: Loaded from a New Device attached via PBI or Cartridge+ECI

DEVICE CONTROL BLOCK (DCB)
Carries communications between higher-level device handlers and lower-level
Serial I/O (SIO). There is a single DCB only.
 - Also used by the OS-resident Diskette Handler

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
 - 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"

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 = 5327Hz (audible sound frequency)
 - Space = 3995Hz (audible sound frequency)
 - Bit = space(0) or mark(1)
 - Byte = 10 bits:
    - 1 start bit (space)
    - 8 data bits
    - 1 stop bit (mark)
 - Record = 132 bytes:
    - 1st Marker byte for tape speed measurement = $55 (hex)
    - 2nd Marker byte for tape speed measurement = $55 (hex)
    - 1 Control byte
    - 128 Data bytes
    - 1 Checksum byte. One of three values:
       1) $FC = record is a full data record (128 bytes)
       2) $FA = record is a partial data record, and the next record should

be an end-of-file record. The actual number of data bytes
            (1-127) is stored in the last (128th) data byte.
        3) $FE = record is an end-of-file record. This is followed by 128
            zero bytes
 - 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 record frames
   3) End-Of-File record frame

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:
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:

1) 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. 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.

2) Similar to the above, writes to $3F8. This OS equate defines
whether on a warm start, 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 8KiB 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.

3) Some games use a four-joystick setup, or at least initialize
PIA itself. If this happens inadequately, PIA Port B, 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.

4) 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 (4KiB) or $D800-$FFFF (10KiB). In other
   words, it requires 64KiB RAM.
2) It uses RAM expansions at $4000-$7FFF controlled by PORTB $D301. In other
   words, it requires at least 128KiB total RAM, 130XE compatible.
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.

7.1.9) How 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 sold the Atari Translator on disk.

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 COLD START in the new, RAM-based 400/800 OS environment.

The Translator disk is a two-sided disk, providing two slightly different
versions of the Translator. 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. 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 83-03-20
  - Joe Miller: Added graphics and code for [RESET] 83-09-15

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), 1983 (ad Antic Apr84p102)
      - Commercial program released (originally) in disk and cassette versions
      - Also released in ROM version
  - 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
      - Also released in ROM version as: XOS/Fix
  - Ultrafix/XL, 400/800 OS Rev.B or Rev.A choice, v.2.2 1986, by Tim Patrick

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:

1) 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.

2) 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!)

3) 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).

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 System) 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 transcendental routines
```

While SMI developed Atari BASIC to occupy 10KiB of ROM, including a 2KiB 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 8KiB. 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:

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, Oct. 1981:
http://www.atarimagazines.com/compute/issue17/171_1_DOCUMENTED_ATARI_BUGS.php

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

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 June 1985 issue of Compute!, 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 revision 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. Rev. C was first
shipped on cartridge (CXL4002) by Atari, Inc. in June 1984 according to Antic
(http://www.atarimagazines.com/v4n5/revisioncconverter.html).   The silver
label on the first Rev. C cartridges reads "(c)1982 Atari, Inc." and "Made in
U.S.A." Atari, Corp. also produced Rev. C on cartridge, using two different
silver labels designs, both of which read "(c)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.

Determining Revision version

When running Atari BASIC, memory location 43234 ($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 (Wiley Self-Teaching Guide) C014385 by Albrecht/Finkel/Brown
   (c)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, (c)1980, 120 pages
     - Authors: Carol Shaw and Keith Brewster
     - Shipped with the 800 computer systems from 1980-1982
 - Inside Atari BASIC, C060992, Carris for Reston, (c)1983, 183 pages
 - Atari BASIC Reference Manual Update, C061038, (c)1982, 6 pages
 - BASIC Reference Manual (400/800/1200XL ed.), C061456 / BX4211, (c)1983,
   126 pages
 - Atari BASIC Reference Guide For Experience Programmers, C061570, (c)1983,
   14 pages
 - Atari BASIC Reference Guide, C061948, (c)1983 (international; 61 pages)

7.2.2) How do I load/run or save an Atari BASIC program on cassette?

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.
   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.
7. You may press STOP on the recorder once the program is loaded, unless the
   program is designed to control further tape motion start/stop.
8. If the loaded program is not running yet (you did not enter RUN "C:"
   above), now enter the command: RUN

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)
   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.

7.3) DOS

7.3.1) What is Atari DOS, and what versions did Atari release?

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, DOS XLE

On the Atari, a complete Disk Operating System (DOS) consists of a complex,
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
       - Component of the Atari OS
       - Generalized low level communications with SIO bus devices, including
         disk drives
       - Utilized by the Resident Diskette Handler
       - Normally utilized by the FMS
   2) Resident Diskette Handler
       - Component of the Atari OS
       - Utilizes SIO for communications with disk drives
       - Supports just five functions (four on the 400/800):
         1.  GET SECTOR
             - Read a specified sector
         2.  PUT SECTOR WITH VERIFY
```

```
                        - Write sector; check sector to see if written
                3.  STATUS REQUEST
                        - Ask the disk controller for its status
                4.  FORMAT
                        - Issue a format command to the disk controller
                5.  PUT SECTOR WITHOUT VERIFY
                        - Write sector (don't check sector to see if written)
                        - Available on XL/XE; not available on 400/800
            - 400/800: Uses 128 byte sectors
              XL/XE: Can read/write disk sectors having variable length from 1 to
                     65536 bytes.  Default=128 bytes
            - Normally only used to load the FMS from disk.  Exception: Atari DOS I
              uses the OS-resident Diskette Handler for all disk communications.
        3) FMS (File Management Subsystem)
            - Must be loaded from disk (using the Resident Diskette Handler)
            - Normally utilizes SIO for disk drive communications
            - Does not utilize the Resident Diskette Handler.  Exception: Atari
              DOS I uses the OS-resident Diskette Handler for all disk
              communications.
            - Normally provides a D: Disk File Manager device handler that is
              compatible with CIO
        4) CIO (Central Input/Output Utility) routine
            - Component of the Atari OS
            - Generalized high level, device independent access to device handlers,
              including any disk drive device handler provided by a FMS
        5) DUP (Disk Utility Package) or equivalent software program(s)
            - Optionally provided with a FMS
            - Must be loaded from disk using the FMS
            - Typically a DOS menu program, but could take any form of software
              that provides a user interface to FMS management functions
            - Normally utilizes CIO for carrying out disk management operations

In practice, those DOS components loaded into memory from disk, that is, a FMS
and any additional programs distributed with that FMS (such as a DUP), are
normally collectively described as a "DOS" on the Atari.


DOS I
-----
DISK OPERATING SYSTEM  9/24/79  COPYRIGHT 1979 ATARI
 - Contains two main parts:
    - A File Managememt Subsystem (FMS)
       - Developed by Paul Laughton (also wrote: Atari BASIC) for Shepardson
         Microsystems, Inc. (SMI) for Atari
    - A Disk Utility Package (DUP)
 - Shipped with 810 disk drives manufactured from 1980-1981.
 - Disk Utility Package (DOS menu) is loaded into memory with the FMS
 - Uses the OS-resident Diskette Handler for all disk communications via SIO
 - 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:
            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
          720 unused by the FMS (FMS interprets the VTOC sector bit map as
              sectors numbered 0-719, ignoring nonexistant 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
 - D: Disk File Manager supports up to four 810 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 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,
              loaded by OS-resident Diskette Handler on system startup
  - Manual: Disk Operating System Reference Manual C015200

DOS 2.0S

DISK OPERATING SYSTEM II VERSION 2.0S COPYRIGHT 1980 ATARI
  - Shipped with 810 and 1050 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"
  - 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"
  - Does not use the OS-resident Diskette Handler once the FMS is loaded.
  - 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)
  - 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
     - Requires a 3 sector boot (provision for double density version DOS 2.0D)
     - 13 special sectors:
           1-3 Boot sectors, containing the boot record accessed by the Atari
               OS at system power-up
           360 Volume Table of Contents (sector usage)
       361-368 File Directory
           720 unused by the FMS (same as DOS I)
     - Maximum of 64 files per diskette (8-sector File Directory)
     - Difference in boot record lengths means DOS I and DOS II disks cannot be
       interchanged.
  - 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 810
    disk drives, D1: and D2:
     - To configure DOS 2.0S for the number of 810 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 1802,1   (D1:)
             - POKE 1802,3   (D1: and D2: -- DOS 2.0S default value)
             - POKE 1802,7   (D1:, D2:, D3:)
             - POKE 1802,15   (D1:, D2:, D3:, D4:)
             - POKE 1802,31   (D1:, D2:, D3:, D4:, D5:)
             - POKE 1802,63   (D1:, D2:, D3:, D4:, D5:, D6:)
             - POKE 1802,127   (D1:, D2:, D3:, D4:, D5:, D6:, D7:)
             - POKE 1802,255   (D1:, D2:, D3:, D4:, D5:, D6:, D7:, 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
  - 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 resdisplay menu after a command
  - Can write DOS files to any drive
  - NOTE/POINT are available for random file access
  - Atari 810 Master Diskette II or Atari 810/1050 Master Diskette II (CX8104)
    disk contains:
       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 CX8111 Formatted Diskette II
  - Manuals:
    - Disk Operating System II Reference Manual C016347
    - 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")
    - Atari 810 Disk Drive: An Introduction to the Disk Operating System
      C060054 (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/
  - 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 support) from a copy of DOS 2.0S.

DOS 3

Atari DOS 3 Copyright 1983
  - Shipped with 1050 disk drives manufactured from 1984 through early 1985.
  - Developed by 3-person team at Atari, led by Richard K. (Hud) Nordin
    - Project started at Atari by early 1981 under systems software manager
      Brian Johnston. Contributor: NEOTERIC consultant Harry B. Stewart
  - Disk drive types supported:
    1) Atari 810 (& compatible)
    2) Atari 1050 (& compatible)
    3) Atari 1450XLD built-in (double-sided, enhanced/dual density)
       Minimal support only: A single 1450XLD disk drive appears to DOS 3 as
       two Atari 1050 drives. That is, side 1 is accessed as D1: and side 2
       is accessed as D2:.
  - Disk utilization/filesystems:

1) "DOS 3 Single Density"
        - Sector = 128 bytes
        - Block = 8 sectors = 1024 bytes
        - Track = 18 sectors = 2304 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 1024 bytes/block = 89,088 bytes/disk
        - Blocks 1-3 are used by the system as 24 special sectors:
              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)
    2) "DOS 3 Double Density" (enhanced/dual density)
        - Sector = 128 bytes
        - Block = 8 sectors = 1024 bytes
        - Track = 26 sectors = 3328 bytes
        - Disk contains 40 tracks, or 1040 sectors, or 130 blocks, with 3
          blocks used for software control.
        - Data capacity per diskette:
          127 blocks x 1024 bytes/block = 130,048 bytes/disk
        - Blocks 1-3 are used by the system as 24 special sectors:
              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.
- Master Diskette 3 (DX5052) contains:
  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 a DOS 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)

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           (makes no mention of the 1450XLD built-in disk drive(s))
      - An Introduction to the Atari Disk Operating System C062288 (29 p)
        (makes extensive mention of the 1450XLD built-in disk drive(s))
      - 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)


DOS 2.5
-------
DISK OPERATING SYSTEM II VERSION 2.5  COPYRIGHT 1984 ATARI CORP.
 - Shipped with 1050 disk drives manufactured in fall 1985, and with XF551
   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 RAMdisk (65,408 bytes)
 - 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 = 1040 total sectors, with 30 sectors
         used for software control or unused by the FMS.
       - Data capacity per diskette:
         1010 sectors  x  125 bytes/sector  =  126,250 bytes/disk
       - 30 special sectors:
               1-3 Boot sectors, containing the boot record accessed by the
                   Atari OS at system power-up
               360 Volume Table of Contents (sectors 1-719 usage)
           361-368 File Directory
               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 RAMdisk"
       - 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:
             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 RAMdisk is enabled, the default value for SABYTE is
      131, enabling D1:, D2:, and D8:, where D8: is the RAMdisk.
 - DOS 2.5 (DX5075) disk contains:
    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 on an XL/XE with 128KiB RAM or
                  more:
                   1) Displays a message that it is initializing the RAMdisk
                   2) Sets up a 64KiB RAMdisk as D8:
                   3) 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:
                       - Load the R: handler from an Atari 850 Interface Module
                       - 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.OS 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


DOS XE
------
DOS XE DISK OPERATING SYSTEM  COPYRIGHT 1988 ATARI CORP.   VERSION 01.00
 - Shipped with late production XF551 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 supported:
   1) Atari 810 (& compatible)
   2) Atari 1050 (& compatible)
   3) Atari XF551 -- XF551 high speed supported
   4) Atari 130XE RAMdisk (64KiB)
   5) SSDD 5.25" Single-Sided, Double Density
 - Disk utilization/filesystems:
   1) "DOS XE" via the native D: Disk File Manager:
      - Supports disk drive sizes up to 16MiB.
      - Files can be up to 8MiB long.
      - All disks are addressed in 256 byte sectors.  Simulates 256 byte
        sectors on 810 and 1050 disk drives, which have 128 byte sectors,
        by reading and writing sector pairs.
      - Up to 65536 sectors can exist on a single disk.
        (65536 sectors x 256 bytes/sector = 16MiB)
      - 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. (OS reads 128 bytes/sector)
           - Contains a 32 byte Drive Table describing the physical and
             logical layout of the disk.
           - The DOS XE 130XE RAMdisk 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.
        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.
       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:).
  - A directory or subdirectory can hold up to 1250 files or subdirectories.
  - File pathnames are limited to 80 characters.
  - Hybrid interface is both menu driven and command driven, including stacked
    command entry.
  - 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:
    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 RAMdisk
                   - 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

DOS XLE

DOS II Version XLE ("DOS XLE") (P) 1990 Atari (Germany)
  Andreas Koch writes (January 2010):
    "programmed by Reitershan in 1990 (as requested by Atari Deutschland then
    for the XF551 drive), it is not only similar, but fully compatible to
    Turbo-DOS XL/XE (also by Reitershan). It uses the well-familiar DOS 2.5
    DUP-menu, with a few enhancements, like e.g. 1-8 for Dir. of drive 1-8,
    formats 90KiB-360KiB and RAMdisks up to 256KiB; there is even an option (P)
    to switch back to standard DOS 2.5; this DOS has been written with the
    source-code of DOS 2.5 (made available for Reitershan by Atari
    Deutschland), so it is as compatible as possible to DOS 2.5 but still
    offers some enhancements; luckily all Turbo-DOS XL/XE utilities can be used
    with this DOS (e.g. the RAMdisk-driver from Turbo-DOS!);

7.3.2) What are RealDOS, SpartaDOS X, and XDOS?

The continuing development of various modern mass storage options for the
8-bit Atari computers has necessitated ongoing development of supporting
disk operating systems. This section describes full-featured disk operating
systems (DOS) for the Atari that remain actively developed today.

RealDOS
=======
RealDOS v1.0a Build 0031 (November 2012)
- Shareware from Integrated Logic Systems (ILS, Stephen J. Carden)
- Disk utilization/filesystem: SpartaDOS File System (SDFS) version 2.0
- XL/XE with 64KiB 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 at this time the cartridge version of the MyIDE product.

Old version/Release history:
  RealDOS (or Real.DOS) shares its development heritage with disk-based SpartaDOS version 3.2c from ICD (which is described elsewhere in this FAQ list). The features and capabilities of RealDOS may thus be further described in terms of changes and improvements made since ICD SpartaDOS 3.2c...
  (NOTE: Prior to Real.Dos Build 0026, distribution of RealDOS was private. Exception: the Video 61 SpartaDOS 3.3C cartridge described below.)
-- SpartaDOS Ver 3.2p "30-Jan-86 Copyright (C) 1986 by ICD, Inc."
    o Support for the CSS Multiplexer ("MUX") in the form of a MUX-specific SIOV
    o Being based on SpartaDOS 3.2c, does not have the open file/directory bug/error found in later official SpartaDOS versions (3.2d, 3.2f, 3.2g, 3.2gx), a problem known to be capable of trashing a hard drive
    o What was privately distributed as SpartaDOS 3.2p was initially developed from SpartaDOS 3.2c source code that was privately shared by ICD. During the development process all new/modified sources were lost, so new sources were then reverse-engineered (by Ken Ames for Steve Carden) from surviving working executables and from memory, leading finally to SpartaDOS 3.2p.
    o Date of distribution unknown -- unreflected in the Version info
-- SpartaDOS Pro Ver 3.3a 3-Nov-94 "Copyright (C) 1994 by FTe"
    o Support for a Drive 9
    o MS-DOS work-alike command set
-- SpartaDOS Pro Ver 3.3b 25-Dec-95 "(S)hareware 1995 by IFYB, Inc."
    o Same as 3.3a but includes the Sparta High Speed SIOV (for US Doubler & compatible) instead of the MUX SIOV as in 3.3a.
-- SpartaDOS Pro Ver 3.3c 19-Dec-97 "(S)hareware 1997 by IFYB, Inc."
    o Same as 3.3a or 3.3b, but includes both SIOV versions, auto-selected based on hardware detected
-- Sparta DOS 3.3C "(c) 1998 Video 61"
    o Same as Ver 3.3c 19-Dec-97 but modified by Video 61 to operate from a 16KiB ROM cartridge. Available: http://www.atarisales.com/
    o According to Lance Ringquist of Video 61:
      K-Products (Bob Klaas) contracted with FTe (Mike Hohman) to develop SpartaDOS Pro 3.3 for exclusive use and distribution with K-Products' BBS Express! Pro. When Video 61 purchased all rights associated with BBS Express! Pro from K-Products, the rights to SpartaDOS Pro 3.3 were included.
    o According to Stephen Carden:
      The SpartaDOS Pro 3.3 versions were developed privately as hacks to ICD SpartaDOS 3.2c, the rights to which remain with FTe to this day.
-- SpartaDOS Ver 3.3d 1-Jan-98 "(S)hareware 1998 by IFYB, Inc."
    o Same as 3.3c, but further debugged for use with the ICD MIO
-- Real.dos Builds 0003 through 0031, 2002-2012
Available: http://www.realdos.net/

SpartaDOS X
==========
SpartaDOS X 4.48 with Toolkit (23 Jul. 2016), by DLT Ltd.
- Often abbreviated: SDX
- No source code in common with disk-based SpartaDOS, nor with RealDOS
- 48KiB RAM required; more recommended
- A 128KiB ROM cartridge (v.4.40+ ; earlier versions 64KiB)
- Can run on the following platforms: intSDX128 and intSDX128 "flash", Altirra and Atari800 emulators, IDE Plus 2.0 interface, Ultimate1MB, Incognito board, SIDE HDD cartridge, SIC! Cartridge, Turbo Freezer 2005, Maxflash 1Mb, Maxflash 8Mb, Maxflash MyIDE+Flash, MyIDE II, an upgraded SpartaDOS X cartridge from ICD, SDX 128 "flash" cartridge, AtraX SDX 128 cartridge
- 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:

1) SpartaDOS File System (SDFS) version 2.1 (SDX native filesystem)
       (v.4.40+ ; SDFS 2.0 in prior versions)
        - Supports sector sizes larger than 256 bytes
        - "All DOS using SDFS 2.0 work with SDFS 2.1 and vice versa."
    2) Atari DOS 2
        - Supports subdirectories in MYDOS up to a size of ~16MiB
          (65535 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
    3) CP/M (as of SDX 4.46)
        - Read Indus CP/M 2.2 disks on Indus GT/LDW Super 2000/CA-2001)
    4) MS-DOS FAT12 (as of SDX 4.46) or FAT16 (as of SDX 4.47)
        - Read-only; hardware device must support 512-byte sectors
- 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 65535
- Disk size: up to 32MiB (16MiB in versions before v.4.40)
- Directory size: up to 32KiB
- Number of directories: unlimited
- Number of entries per directory: up to 1423
- File size: up to 16MiB
- Number of files open at a time: up to 16
- Path length: up to 64 characters
- Extended memory: up to 1024KiB with Port B type; 4032KiB with Axlon type
- High speed support: Happy/Warp Speed, US Doubler/UltraSpeed,
  Indus GT/Synchromesh, XF551, 1050 Speedy
- RS232.COM provided for loading the R: handler from the 850 interface ROM
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 Ltd. (Draco, Lizard, Trub) chose to carry the development of SDX forward.
   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)
Developer's website:
   http://sdx.atari8.info/ or http://spartados.com or http://spartadosx.com
Manufacturers:
    - Atarimax http://www.atarimax.com/
    - Candle http://spiflash.org/
    - Lotharek http://lotharek.pl/

XDOS
====
XDOS 2.43 (c) 2009 by Stefan Dorndorf
 - "Extended Disk Operating System"
 - A compact yet more capable alternative to Atari DOS 2.5
 - 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
 - Disk utilization/filesystems:
    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 360KiB "Quad" format)
      8) Turbo-DOS (except 360KiB "Quad format)
      9) MyDOS (except sub-directories, disks with more than 1040 sectors, and
         append to MyDOS files)
   - RAM disks: 14KiB-256KiB
   - Command driven
   - Can use batch files
   - D: Disk File Manager supports D1: through D9:
   - H: device of Atari800Win emulator is supported
Old versions:
   - Happy-Computer DOS II+/D V:4.5M  Copyright 1985 by Stefan Dorndorf
      - Commonly known as "Happy-DOS"
      - Published in issue 3/1986 of Happy Computer magazine
   - DOS II+/D - Version 6.1  Copyright 1987 by Stefan Dorndorf
   - DOS II+/D - Version 6.4 (c) '87 by S.D.
   - XDOS 2.3 (p) 1990 S.Dorndorf
      - Adds DOS 2.5/MYDOS enhanced density compatibility
Available: http://std.gmxhome.de/atari/system.atr
Documentation: http://std.gmxhome.de/atari/xdos24.pdf
```

7.3.3) What are MyPicoDOS and Micro-SpartaDOS?

```
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 current miniature DOS versions for the Atari.

MyPicoDos
=========
MyPicoDos 4.05 (C) 1992-2010 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 65535 sectors.
      - Drives D1: to D8: can be accessed.
      - 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 builtin 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/

Micro-SpartaDOS (Micro-SD)
===============
Micro-SpartaDOS 4.6 (MSDOS.COM), 2010-09-07
Micro-SpartaDOS 4.5 (MSDOS.COM), 2010-06-12
   - Versions through 2.2: by Jiri Bernasek (BEWESOFT)
     Versions 2.3+ by Tomasz Pecko ('pecus') and Pawel Kalinowski ('pirx')
```

```
      - Disk allocation/filesystem:
          - SpartaDOS File System (SDFS) version 2.0
          - Maximum number of directories entries is only limited by available RAM
Old versions/Changelog:
    MSDOS22.COM - original BEWESOFT version
          - by Jiri Bernasek - BEWESOFT (Prague, 93-05-03)
          - Version 2.2 supports also a high speed SIO for Speedy 1050, XF551 and
            the HDI.
Pecus & Pirx modifications:
    MSINI2.COM  - Pecus & Pirx variation on the menu editor.
    MSDOS23.COM - Pecus modified version with multi disc operation.
                  - Keys 1-8 - select working drive and read the main directory.
    MSDOS30.COM - This version supports XF551 drives with HS, Happy Warp/
                    US-Doubler drives with High Speed, and Speedy HS (only in
                    US-Doubler mode).
                  - Version 3.x+ are compatible with the SIO2IDE interface -
    MSDOS43.COM - Warsaw, 2010-05-26
                  - Version 4.3 of MSDOS is a serious rewrite, done primarily by
                    Pecus.  It uses a novel approach to mapping index sectors.
                  - Version 4.3 supports "quadruple" sectors (512 bytes long);
                    expands the available partition size to 32MiB.
                  - Version 4.3 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.
    MSDOS45.COM - Warsaw, 2010-06-12
                  - Several bug fixes
                  - Screen colors and TURBO mode configurable per directory.
                  - Supports drives 1-15.
Available: http://pecus.pigwa.net/pliki/Atari/
```

7.3.4) 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 RealDOS, SpartaDOS X, and XDOS (which are described in
another section of this FAQ list).

This list is presented in chronological order by date of first (known)
release.

OSS OS/A+ -   ATARI version 1.2  Copyright (C) 1981    OSS
OSS OS/A+ -   ATARI version 1.2e Copyright (C) 1981    OSS
OSS OS/A+ -   ATARI version 2.00 Copyright (C) 1982    OSS, Inc.
OS/A+ version 2.1 (1982 - MC is still looking for a copy of this version)
OSS DOS XL -  ATARI version 2.20 Copyright (C) 1983    OSS, Inc.
OSS DOS XL -  ATARI version 2.30 Copyright (C) 1983    OSS, Inc.
OSS DOS XL -  ATARI version 2.30C Copyright (C) 1983   OSS, Inc.
OSS DOS XL -  ATARI version 2.30X Copyright (C) 1983   OSS, Inc.
OSS DOS XL Atari v2.30  Axlon RamDisk   Copyright (C) 1984   OSS, Inc.
OSS DOS XL Atari v2.30C Axlon RamDisk   Copyright (C) 1984   OSS, Inc.
OSS DOS XL Atari v2.30  Mosaic RamDisk  Copyright (C) 1984   OSS, Inc.
OSS DOS XL Atari v2.30C Mosaic RamDisk  Copyright (C) 1984   OSS, Inc.
FTe DOS XL -  ATARI version 2.30  Copyright (C) 1994 by FTe
FTe DOS XL -  ATARI version 2.30C Copyright (C) 1994 by FTe
FTe DOS XL -  ATARI version 2.30X Copyright (C) 1994  by FTe
--------------------------------
  - 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.
  - Introduced April 3-5, 1981 at the West Coast Computer Faire as: "CP/A"
  - Original version of the Console Processor and the original version
    ("version 2") of the File Management Subsystem (FMS; identical with that of
```

Atari DOS 2.OS) were written by Paul Laughton. Other portions primarily by
    Mark Rose, with collaboration of Bill Wilkinson and Mike Peters.
- Command line driven, with optional menu available
- Version 1
    - Disk drive type supported: Atari 810 (& compatible)
    - Disk allocation/filesystem: Atari DOS 2.0 Single Density
- Version 2
    - Disk drive types supported:
        1) Atari 810 (& compatible)
        2) SSDD 5.25" Single-Sided, Double Density
    - Disk allocation/filesystems:
        1) Atari DOS 2.0 Single Density
        2) "Atari DOS 2.0 Double Density"
            - Format developed with Atari for the Atari 815
            - 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:
                1-3 Boot sectors, containing the boot record accessed by the
                    Atari OS at system power-up. (OS reads 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.OS)
            - 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
    - 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 5KiB 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 5KiB 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 3KiB of user RAM by occupying memory available under the Atari OS
      (requires an XL/XE computer with at least 64KiB RAM).
    - BitWedge (BIT3.COM) Version 1.1 - 20DEC83
      Copyright (c) 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.
        - Version 2.30 with RAMdisk support with the Axlon 128K Ramdisk on an
          Atari 800. 883 single density sectors.
    - v2.30C Axlon RamDisk. Version by Harald E. Striepe and OSS.
        - v2.30 Axlon RamDisk with DOSXL.SUP enabled as DOSXL.SYS, which
          saves 5KiB 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.
        - Version 2.30 with RAMdisk support with Mosaic 64K RAM Select boards
          installed on an Atari 800. From 371 sectors (64KiB plus 32KiB of
          standard RAM) to 896 sectors (two 64KiB boards plus a 32KiB board).
    - v2.30C Mosaic RamDisk. Version by Harald E. Striepe and OSS.
        - v2.30 Mosaic RamDisk with DOSXL.SUP enabled as DOSXL.SYS, which
          saves 5KiB 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
          - OSS/Indus DOS XL 2.35 is OSS DOS XL 2.30 plus GTSYNC.COM, the
            Indus GT Synchromesh Engager. Copyright (C)(P) 1984, Indus Systems.
            Two versions of DOS XL 2.35 were released by Indus:
                  - OSS DOS XL - ATARI version 2.35I1 Copyright (C) 1983   OSS,Inc.
                    - GTSYNC.COM VID: 01.02\01.01\01.01\01.21\01.21.
                    - Supports Synchromesh 38.4 kbit/s on:
                        Indus GT, LDW Super 2000, CA-2001
                  - OSS DOS XL - ATARI version 2.35I2 Copyright (C) 1983   OSS,Inc.
                    - GTSYNC.COM VID: 01.10\01.01\01.10\01.30\01.30.
                    - Supports Synchromesh 68.2 kbit/s on:
                        Indus GT, LDW Super 2000, XFD601, XFD602
                  - DOS XL 2.35I1 and DOS 2.35I2 were often (always?) distributed with
                    RAM130.COM, written by Joseph Segura in 1985: a 64KiB RAMdisk for
                    the 130XE. Synchromesh (GTSYNC.COM) must be disabled in order to
                    use RAM130 -- effectively, RAM130 is for DOS XL 2.30.
          - "DOS XL 2.35L" is described in the manuals for the LDW Super 2000 and
            CA-2001 disk drives. However, original disks shipped with these drives
            are reported to be identical to DOS XL 2.35I1 (including RAM130.COM).
          - Warp Speed DOS XL, including under cartridge, under ROM and Axlon RAM
            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,
            Indus GT, LDW Super 2000, Percom RFD40-S1, Percom RFD40-S2,
            Percom AT88-S1, Percom AT88-S2, Percom AT88-S1PD, Percom AT88-SPD
    - 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.

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

OS/A+ version 4.0 (1982 - MC is still looking for a copy of this version)
OSS OS/A+ - ATARI version 4.10 Copyright (C) 1982   OSS

- Port of Apple DOS for the Apple II (which was developed by Paul Laughton for
  Shepardson Microsystems, Inc. (SMI), predecessor to OSS)
- Requires minimum of 32KiB RAM to run
- Disk allocation/filesystem:
    - Random access to data files
    - Disks with 128, 256, or 512 bytes per sector
    - Drives ranging in storage size from 128KiB to 32MiB
- Shipped with: Percom RFD44-S1, Percom RFD44-S2
- Also sold by Software Publishers/SWP for use with ATR8000, 1982-1983

DOS-MOD (1983)
(c) 1984 R.K.Bennett TOP-DOS v1.1
(c) 1984 R.K.Bennett TOP-DOS v1.20
TOP-DOS 1.4 (1984)
TOP-DOS 1.5 (c) 1985 R.K.Bennett
TOP-DOS 1.5a (c) 1985 R.K.Bennett
TOP DOS 1.5 Plus (1986)
TOP DOS Professional (1986)

    - 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
        o Menu-driven, Full screen use
        o Command files
        o Expanded wildcard capability
        o Fixes 11 bugs in DOS 2.0S
        o Single and Double Density versions
        o DD version supports HELLO command file option on startup
        o DD version supports cartridge-bypass feature on startup
        o DD version can also run in the SD mode
    - TOP-DOS: Standalone product, includes all the features of DOS-MOD
        o Uses Atari DOS 2 single and double density filesystems, or
          proprietary variations on the DOS 2 filesystem. The TOP-DOS unique
          filesystem is not supported by any other DOS for the Atari.
        o 1 to 8 disk drives
        o Alphabetization and compression of the disk directory
        o Drive support: 5.25": SD, DD, DSDD. 8": DD
        o Specify the number of sectors desired, up to 944 per side in single
          density and up to 1968 in double density
        o Reformat only the VTOC, on a previously formatted disk
        o RAMdisk support: Axlon and Mosaic
    - TOP-DOS 1.5:
        o RAMdisk support: 130XE Extended
        o 1050 Enhanced Density Support
        o "WISE" Density Control
        o High Speed Data Transfer (Happy Warp Speed)
        o Improved Status Display
        o Hex-Decimal Conversion
        o 90KiB buffer for one-pass disk duplication
        o Four-level command file nesting
        o Ad: Antic v4n9 Jan86 p.44
        o Shipped with: Astra "Big D" (later units), Astra The "One"
        o 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:
        o Allows multiple RAM disks, SD or DD
        o Accesses Atari DOS 2.5 files
        o Supports other RAM boards
        o New sector number display and tone control
        o Better warp speed and group autorun control
        o BASIC enable/disable for XE/XL with built-in BASIC
    - TOP DOS Professional:
        o Up to 16MiB disk capacity
        o Sub-directories
        o Sector read, write & compare
        o File compare
    - 1.5 Plus / Professional ad: Antic v5n2 Jun86 p.27
    - Apparently released into the public domain, approximately 2005

MYDOS

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 C. Marslett
MYDOS 3.09 [reported to exist]
    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
    MYDOS 3.18 -- copyright 1984,WORDMARK ATR8000 RS232 Version, by C. Marslett
MYDOS 3.014 - copyright 1985,WORDMARK (February 18, 1985)
    MYDOS 3.19 -- copyright 1985,WORDMARK ATR8000 RS232 Version, by C. Marslett
MYDOS 3.016 - copyright 1985,WORDMARK
    MYDOS 3.016AX copyright 1985,WORDMARK Axlon RAMdisk version
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 (11/28/88 freeware, from Bob Puff)
MYDOS 4.50T - Copyright 1988,WORDMARK
MYDOS 4.51 -- copyright 1989,WORDMARK (6/14/89)
MyDOS 4.53/3 and 4.53/4 (David R. Eichel rel.ver.1/1/90)
MyDOS 4.55 Beta (Lee Barnes March 17, 2003)

 - Primarily developed by Charles W. Marslett
 - Menu driven, modeled after Atari DOS 2
 - Uses Atari DOS 2 single and double density file systems, extended with
   support for larger capacity diskettes
 - First Atari DOS to support dynamic density changes (user-initiated, but
   without rebooting the system).
 - Earlier versions were sold commercially; 4.5x versions shareware/freeware
 - Versions 3.x sold 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 also exist, for use with the ATR8500 which never shipped
 - Versions after 3.08/3.12 include support for subdirectories
 - RDOS 800 (early name ROMDOS) is MYDOS 3.0 but can occupy less user RAM.
    - Revisions: 0.0, 0.1 (1984), 0.11, 0.12, 0.14. Versions:
       - Can reside in the 4KiB unused memory address space in the 400/800
         (49152-53247 or $C000-$CFFF) for permanent availability on ROM
         (i.e., Newell Ramrod personality board or CDY Omnimon! board)
       - Can reside in OSS supercartridge banked RAM address space
       - Can reside in standard RAM
       - 0.14 additionally can reside under XL/XE built-in BASIC
 - MYDOS 3.016 shipped with: Astra "Big D" (earlier units)
 - Versions 4.x include support for high capacity drives (hard drives), up
   to 16MiB per partition.
 - 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. (MYDOS has its
   own format for enhanced density disks that allows full access.)
 - 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 RAMdisk drive number and adds 'V'
   to turn on and off write-verify.
 - Version 4.50, first freeware release, includes:
    - 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:
   http://www.nleaudio.com/css/files/MYDOS45M.ARC
 - Charles Marslett/Wordmark Systems makes version 4.51 source code available:
   http://www.wordmark.org/mydos.html
 - 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 RAMdisk 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:
   http://www.mathyvannisselroy.nl/mydos.htm

DOS 4.0 (1984)

 - Developed at Atari. Known before its release as "QDOS"
 - Copyright 1984 Atari, published 1984 by Antic Magazine
 - Copyright 1984 Michael Barall, published 1984 by Antic Magazine
 - Supports "a variety of different disk drives, single density or double
   density, and single-sided or double-sided"
 - Disk drive types supported, by bus connection:
    1) internal (1450XLD)

```
     2) external (parallel bus)
     3) external (serial bus)
  - Filesystem could support disks up to 384KiB (drac030, AA Forums 2010.07.21)
  - Filesystem uses logical sector size of 1.5KiB
    (drac030, AA Forums 2010.07.21)
  - Supports 8 physical drives (1-8), and 10 logical drives (D0:-D9:)
  - DOS 2 to DOS 4 Conversion Program
  - DOS 3 to DOS 4 Conversion Program

SmartDOS  Beta Test Version 1.5R  (C)1984 John Chenoweth & Ron Bieber
SmartDOS  (C)1984  John Chenoweth & Ron Bieber
          distributed by Rana Systems  6.1D
SmartDOS  (C)1984  John Chenoweth & Ron Bieber
          for The Programmer's Workshop  8.2D
-------------------
  - Disk drive types supported:
    1) Atari 810 (& compatible)
    2) SSDD 5.25" Single-Sided, Double Density
  - 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

Mach DOS v2.1 XL (c) 1984 stace
Mach DOS v2.6 XL (c) 1984 stace
MachDOS v3.7a (c) 1985 stace
-------------------
  - Released directly into the public domain by H. V. Stacey (stace)
  - Disk drive types supported:
    1) Atari 810 (& compatible)
    2) SSDD 5.25" Single-Sided, Double Density
    3) DSDD 5.25" Double-Sided, Double Density
  - Disk allocation/filesystems:
    1) Atari DOS 2.0 Single Density
    2) Atari DOS 2.0 Double Density
    3) DOS 2.0 Double-Sided, Double density
  - Intelligent detection and support for double density and double-sided disks
  - v.3.7a RAMdisk types supported: 130XE, Axlon, Mosaic, Intec boards as well
    as the 800+ and MACE modifications
    - RAMdisk is D4:
  - Mach File disk image files
  - [SELECT] key toggles menu on-screen

SpartaDOS  Version 1.1 Copyright (C) 1984  by ICD, INC.
SpartaDOS  Version 2.3b  D  Copyright (C) 1985 by ICD, INC.
SpartaDOS  Version 2.3b  C  Copyright (C) 1985 by ICD, INC.
SpartaDOS Ver 2.3e 1-Nov-85  D  Copyright (C) 1985 by ICD, INC.
SpartaDOS Ver 2.3e 1-Nov-85  C  Copyright (C) 1985 by ICD, INC.
SpartaDOS Ver 3.2c 30-Jan-86  Copyright (C) 1986 by ICD, Inc.
SpartaDOS Ver 3.2d 17-Feb-86  Copyright (C) 1986 by ICD, Inc.
```

```
SpartaDOS Ver 3.2f 25-Feb-94  Copyright (C) 1994 by FTe
SpartaDOS Ver 3.2g 04-Jun-94  Copyright (C) 1994 by FTe
SpartaDOS Ver 3.2gx 04-Jun-94  Copyright (C) 1994 by FTe
---------------------------------------------------------------
 - Originally developed by Mike Gustafson of Spartan Software of Minnesota/
   ICD, and shipped alongside US Doubler as ICD's first two products in 1984.
 - Often included with US Doubler
 - Version 1.1:
     o Requires 24KiB RAM 400/800/XL/XE
     o Supports 5.25" and 8" floppy disk drives, single or double sided, single
       or double density (35, 40, 77, or 80 tracks)
     o Supports 4 disk drives
     o SPCOPY command for single or dual drive transfers between SpartaDOS
       and/or Atari DOS 2 compatible formats
     o Available AT_RS232 R: handler for ATR8000 support
     o Available RDAXLON command sets up a 112KiB Axlon RAMdisk
     o Disk allocation/filesystem: SpartaDOS File System (SDFS) version 1.1
         o 128 or 256 bytes/sector
         o Four sector types:
             - Bit maps.  Contain a list of bits corresponding to all sectors on
               the disk, indicating whether each sector is currently in use.
             - Sectors 1-3 are boot sectors, containing the boot record accessed
               by the Atari OS at system power-up. (OS reads 128 bytes/sector)
             - Sector maps.  Contain a list of data sectors making up a file,
               plus links to previous and next sector maps.
             - Directory data sectors.  Contain a directory file, consisting of
               information about each file in the director, and information about
               any subdirectories
             - User data sectors
         o Subdirectories supported, up to 128 files per directory
         o Time/date stamping
         o Disks have volume names
         o Up to 16MiB per drive
 - Several flavors of Version 1.1:
     o SPEED.DOS - RAM resident full powered DOS; UltraSpeed supported
     o STANDARD.DOS - RAM resident full DOS; no UltraSpeed support
     o NOCP.DOS - No command processor; tries to load an AUTORUN.SYS file
                  before it passes control onto the cartridge; UltraSpeed
                  supported
     o NOWRITE.DOS - Can only read from disk, very low memory usage,
                  UltraSpeed supported; useful as a game loader
 - Changes for Version 2.3, packaged as the SpartaDOS Construction Set:
     o Requires a 64KiB XL/XE
     o An enhanced Atari DOS 2 handler: Can read, write, and run Atari DOS 2
       formatted diskettes in both single and double density
     o Supports 8 disk drives
     o UltraSpeed High Speed built in
     o 14 new internal command processor commands
     o 8 new XIO functions
     o Extra 4KiB program area
     o RDBASIC sets up an 8KiB RAMdisk on any XL/XE computer
     o RD130 sets up a 64KiB RAMdisk on a 128K XL/XE computer
     o Disk allocation/filesystem: SpartaDOS File System (SDFS) version 2.0
         - Generally compatible with SDFS version 1.1, but some changes to data
           contained in boot sectors mean that SDFS 1.1 disks should be used
           with DOS versions supporting SDFS 2.0 only with caution.
 - Two flavors of 2.3 (2.3b, 2.3e) versions:
     o 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).
     o 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, packaged as the SpartaDOS Construction Set:
     o Better time and date support (internal TD, TIME, DATE commands)
     o Internal R-Time 8 interface
     o Internal JIFFY clock interface (for non-R-Time 8 users)
     o Internal 32 character keyboard buffer (and KEY command)
     o Automatic mini-buffer system for fast byte PUT and GET functions
```

o New vectors added for machine language support
        o Control returned to DOS if DOS was active during RESET
        o Supports both a STARTUP.BAT and an AUTORUN.SYS file
        o Compatible with BASIC XE, 1200XLs and many modified Operating Systems
        o BASIC ON/OFF command operation from within a batch file (not end only)
        o NOISY I/O flag recognized
        o Support for the Supra Hard Disk Interface
        o All command entry in upper or lower case
        o Full read capability for Atari DOS 2.5 type enhanced density format
    - Several notable patches to SpartaDOS 3.2d have been developed, such as:
        o Bob Woolley created a patch utility program that will modify SpartaDOS
          3.2d to support the XF551's high speed I/O
        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:
        o Support for a ninth drive, D9:
        o D: means current working drive, instead of D1:
        o Full support for upper/lower case
        o CWD, CREDIR, DELDIR commands changed to CD, MD, RD
        o TDLINE Y2K bug fixed
        o 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 PBI
      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

SuperDOS V2.9 (C) 1986 Paul Nicholls
SuperDOS V4.3E(C) 1986 Paul Nicholls
SuperDOS V4.3T(C) 1986 Paul Nicholls
SuperDOS V4.4 (C) 1988 Paul Nicholls
SuperDOS V5.0 (C) 1988 Paul Nicholls
SuperDOS V5.1 (C) 1988 Paul Nicholls
SUPERDOS V5.2 (C)2012 JAMES BRADFORD

  - 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
    4) Supermax high speed (versions 4.x and up)
    5) XF551 high speed (versions 5.x)
    6) US Doubler UltraSpeed (versions 5.x)
  - Disk allocation/filesystems:
    1) Atari DOS 2.0 Single Density
    2) Atari DOS 2.0 Double Density
    3) Atari DOS 2.5
    4) "Atari DOS 2 Skewed Sectors" for Supermax drives
       Antic: "Skewed sector disks read and write much faster than standard
       format disks (while Atari DOS 2.0 and 2.5 can still read and write
       them)."
  - 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 RAMdisk.
  - RAMdisk support is provided for the Atari 130XE and upgrade formats
    including 128KiB and 256KiB Axlon, 256KiB XL and 320KiB XE.
  - V5.0 changes:
      1. Full support for the Atari XF551 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 256KiB memory upgrade for 800XL.
              6. Hold down [Esc] during boot up to reserve the 130XE memory banks
                 for your program.   256KiB and 320KiB computers can use BASIC XE and a
                 RAMdisk.
              7. Bug in RAMdisk 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 changes:
            - Modded slightly to increase the RAMdisk speed
            - Disabled the Axlon banking access
            - Available:
              http://www.atariage.com/forums/topic/197622-superdos-ramdisk-speed/

BiboDOS V 5.1N (p) E.Reuss (c) 1987 COMPY SHOP
BiboDOS V 5.2F (p) E.Reuss (c) 07/1987 Compy-Shop
BiboDOS 5.4RF (p) E.Reuss (c) 06/1988 Compy-Shop
BiboDOS 6.4RF (p) E.Reuss (c) 06/1988 Compy-Shop
BiboDOS 5.4AN Turbo-BASIC-Version/R-Disk Jan/89
Bibo-DOS 7.0 (p) E.Reuss (c) 1990 by J.Kruszona

    - 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) "Atari DOS 2.0 Quad Density" (XF551 DSDD 360KiB)
            - Version 6 and up only
        - Extension to above standards:
            Long/large directories (128 files per disk)
    - N versions without high speed support
    - F versions support high speed with the Speedy 1050 and Happy
    - R versions support 64KiB, 128KiB, or 256KiB RAMdisk
        - 130XE and Compy-Shop memory upgrade types supported by default;
          can also be customized to support other memory upgrade types

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)

    - Developed by Martin Reitershan, Herbert Barth, and Frank Bruchhaeuser
      for Martin Reitershan Computertechnik
    - Supports a wide range of relatively advanced hardware while maintaining a
      very high degree of compatibility with Atari DOS 2.5.
    - Master-Disk produces 4 different versions:
        1) Normal Version
        2) HS: Version for 1050 with Happy or Speedy 1050
        3) XF: Version for XF551 high speed
        4) EX: Full version (all three versions)
    - Andreas Koch contributes:
supports 256KiB Xtra RAM / RD and supports use of batchfiles; has converter
for DOS 3 and DOS 4; supports 4 formats, up to "quad" 360KiB; does not use RAM
under OS ROM; DUP uses a Command Processor; all commands are available via
HELP key; works with XL/XE computers only, does not load/boot on Atari
400/800.
    - Atari DOS XLE (1990), developed by Reitershan, was built upon Turbo-DOS.

BW-DOS Ver. 1.00 (C) BEWESOFT 1994 (Jiri Bernasek)(94-06-16)
BW-DOS Ver. 1.10 (C) BEWESOFT / ABBUC 1994 (94-07-14)
    - Update #1 Released: 4/95
BW-DOS Ver. 1.30 (C) BEWESOFT 1995 (Jiri Bernasek)(95-12-17)
    - Update #2 Released (with Ver. 1.30): 95-12-17

Another popular, powerful DOS is BW-DOS (it is pronounced "Bay Vay Dos"),

freeware by Jiri Bernasek - BEWESOFT.
Disk allocation/filesystem: SpartaDOS File System (SDFS) version 2.0
Andreas Koch writes: "SpartaDOS compatible. Does not use any speeder
internally, but comes with external XF551 speeder. Supports 4 drives and
RAMdisk, comes with RAMdisk driver for XE compatible RAMdisks up to 1MiB;
supports 4 densities: a) Single (90KiB), b) Enhanced/Medium (130KiB), c)
Double (180KiB) and d) DSDD (360KiB); does not use any RAM under OS ROM (so it
works on an Atari 800 and with Turbo-BASIC XL); unlike SpartaDOS most commands
are external, thus the DOS is only 5KiB short; supports a PAL clock (made by
ABBUC regional group "ARGS"); comes with many great utilities (which can also
be used with SpartaDOS)."
 - Ver. 1.10 distributed by ABBUC as the "Jahresgabe" 1994
 - BW-DOS Update #1 Released: 4/95
    - New versions of: MENU, RAMDISK, DIRMAST.
    - New commands: MOVE, RTIME8, ARGSRTC
    - New driver: ARGSPRN
    - New program: BWDFUNCT.BAS
 - New in BW-DOS 1.30:
    - 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 more 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.
 - BW-DOS Update #2 Release: 12/95 with BW-DOS 2.30
    - New versions of: BACKUP, COPY, UNERASE
    - New commands: DOSDRIVE, NEWED
    - New driver: RAMBOX
Available:
http://wiki.strotmann.de/wiki/Wiki.jsp?page=BEWE%20DOS%201.30%20Manual

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, RealDOS)
 - The "at" symbol ('@') (DOS XE)
Spaces and other characters are generally not permitted.

Filenames and 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 Atari DOS, SpartaDOS, RealDOS, or XDOS are listed 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
.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
.BAT  Batch file of DOS commands (DOS XE, SpartaDOS, RealDOS).  ATASCII text.
       - AUTOEXEC.BAT batch file runs at system boot
         (DOS XE, SpartaDOS, RealDOS)
.BIN  File transferred using CompuServe CIS 'A' Protocol.  Fully supported on
      the Atari by TSCOPE/MSCOPE/RSCOPE; also download support by Express! 3.x
      (filenaming convention used on CompuServe before February 1987)
.BXL  BASIC XL SAVEd program
.BXE  BASIC XE SAVEd program
.CMD  Batch file of DOS Commands (XDOS).  ATASCII text.
.COM  DOS external Command (DOS 2.5, DOS XE, SpartaDOS, 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, RealDOS)
.EXE  Executable ('Load and Go') machine language (object code) program
.HLP  Help text file (perhaps ASCII or ATASCII)
.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 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.  More common: .XEX
.PIC  Micro Illustrator/KoalaPainter/AtariArtist "compressed" picture
.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.  Less common: .OBX
.XMO  Binary file, uploaded/download using XMODEM file transfer protocol
      (filenaming 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.

7.4) 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 (c)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
- Marketed 1986/1987 for use with the company's SuperRAT or earlier RAT
  mouse controllers (neither of which shipped)
- Was to include Z-DOS desktop (DUP.SYS replacement)
- Never shipped

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.

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
  o Diamond GOS version 1 (1988)
     - Diamond DeskTop 1.0 (disk) DUP.SYS replacement
  o Diamond GOS version 2 (1989) package:
     - Diamond DeskTop 2.0 (cartridge) + Utility Diskette
     - Diamond Programmer's Kit (Programmer's Manual)
     - Diamond Paint (disk)
  o Diamond GOS version 3 (1991) package:
     - Diamond DeskTop 3.0 (cartridge) + utility diskette
     - Diamond Paint (disk)
     - Diamond Write (disk)

Atari Desktop, by Piotr Bieniek (c) 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 64KiB 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:
  a) Atari magazin type-in listings or Lazy Fingers disks (public domain)

b) 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 64KiB 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 64KiB XL/XE, 128KiB or more recommended
- Supports: ATARI-DOS, Turbo-DOS
- Current Version: v8.1 Edition 2000 (developed 1997-2000)
- Written in Turbo-BASIC XL
- System Software:
    - BOSS parameter
    - BOSS-font editor (XE-version)
    - Icon editor (XL / XE version)

BOSS-X by Mirko Sobe (MS Software)
- Requires 128KiB XL/XE, 256KiB 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 and c) for Sparta-DOS; I have
tested the Sparta DOS version, which worked with batchfiles 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
16MiB and supports subdirs of course; hmm, freeware or shareware ?!?

ATOS - GUI by Tom Hunt/Closer To Home.
 1) Lets you use any demo or intro as a screen saver!!
 2) Works with all Atari hardware, BB, MIO and Hard drives, SpartaDOS support
 3) Lets you run files like full games and demos and then
    return back to the desktop. It uses Overlays.

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

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.

==> 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-C serial interface ports provided by the 850, but is typically used with an RS-232-C 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.

==> R: modem device handlers for MPP-1000/1000C/1000E and Supra 300AT modems
- 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 (c) 1984 Jordan L. Chilcott,
    Standard version tested with: AMODEM, AMIS, FORUM. (alias MDRIVE.XMO)
  - SMARTMPP.DRV -- MPP Modem Driver Rev. 1.0S (c) 1984 Jordan L. Chilcott
    Also supports "Smartmodem" features of MPP modems. (alias SMDRV.XMO)
  - HOMEMPP.DRV -- MPP Modem Driver Rev. 1.0H (c) 1985 Jordan L. Chilcott
    For use with HomePak HomeTerm. (aliases HMDRVE.XMO, HMDRV.XMO)
- 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)

==> 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.

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

==> 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).

==> T: modem device handlers for the 835/1030/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.
- 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.

==> R: modem device handlers for both 850-based and 835/1030/XM301 modems

- R.BIN, by Joe Miller 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's 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) is a slightly modified
  version of R.BIN which also executes the BASIC command RUN"D:*.RUN" after

loading.
- 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

==> R: modem device handlers for the 835/1030/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?)
- 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)

==> 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, (c) 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).
- 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

==> R: modem device handlers for the Datatari interface cable

- BTDATARI.COM, by ABBUC ev, specifically for use with BobTerm

==> 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

==> 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

==> 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 19200-bit throughput
  with hardware flow control.

==> 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 19200-bit throughput with
  hardware flow control.

8) Software

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.

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.

The CPU clock rate of the PAL/SECAM Atari computer is slightly slower than that of the NTSC Atari:
```
      NTSC machines: 1.7897725MHz
PAL/SECAM machines: 1.7734470MHz
```
Software timing that is based exclusively on the CPU 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.

The screen refresh rate of the PAL/SECAM Atari computer is considerably slower than that of the NTSC Atari:
```
      NTSC machines: 59.94Hz
PAL/SECAM machines: 49.86Hz
```
Software that operates as a Vertical Blank Interrupt (VBI), that is, software that is repeatedly 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. (59.94Hz-49.86Hz=10.08Hz ; 10.08Hz/59.94Hz=16.8% ; 10.08Hz/49.86Hz=20.2%) These calculations ignore the above-mentioned CPU clock rate differences, which would also come into play.

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.

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: 2508 machine cycles
    (262 NTSC scanlines - 240 Atari scanlines) * 114 cycles/scanline
  PAL/SECAM: 8208 machine cycles
    (312 PAL/SECAM scanlines - 240 Atari scanlines) * 114 cycles/scanline

  8208 - 2508 = 5700
  PAL/SECAM machines have a total of 5700 more machine cycles available for
  Immediate VBIs than are available on NTSC machines.
```

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: 29859 machine cycles / frame
  PAL/SECAM: 35568 machine cycles / frame

  35568 - 29859 = 5709
  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.

4) The colors displayed by the program are not what was intended.

When utilizing ANTIC graphics modes 2, 3, or 15, 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.

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.

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 (2/26/02), 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.

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).

=-=-=-=-=-=-=
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 50Hz, 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 50Hz 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

==
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;

        a) ASSEMBLER
        b) BASIC

```
                c) C
                d) PASCAL
                e) LISP
                f) FORTH
                g) PILOT
                h) LOGO
                i) All the rest
```

The following format is used:

```
        - Language titel (medium)
          version, year  : version, year
          author/company : author/company
          available..... : where/how to get it
          package....... : programs, documentation
          features...... : main features
          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

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 mags
- 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"
- 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.

a) ASSEMBLER

    - 130XE Makro Assembler (disk)
      version, year : 4.32, ?
      author/company : Torsten Karwoth
      available..... : freeware, ABBUC PD #297
      package....... : assembler, editor, menu, monitor,
                       batch enhancement, linker/packer
      features...... : macros
      Two pass 6502 assembler with integrated menu, editor
      and monitor shell for 128KB 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
      available..... : freeware,
      package....... : assembler, editor, menu, monitor,
                       batch enhancement, linker/packer
      features...... : macros
      New version with 128KB - 1088KB 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 Marslett, WORDMARK Systems
      available..... : abandonware, http://www.wordmark.org/
      package....... : assembler, manual
      features...... : source include
      Two pass 6502 assembler. Source format is based on the
      Atari Macro Assembler. Assembler source included.

    - Alfasm, Turbo-Assembler/16 (disk)
      version, year : 1.0, 1990

```
            author/company : Jeff Williams, DataQue Software
            available..... : http://gury.atari8.info/details_software/1172.htm
            package....... : assembler, docs
            features...... : source include
            Two pass 6502/65816 assembler.

        -  Assi (download)
            version, year  : 0.0.41, 2000
            author/company : MacFalkner
            available..... : -
            package....... : assembler, file linker
            features...... : source include, data include, code relocation
            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)
            available..... : CXL4003
            package....... : assembler, editor, monitor, manual
            features...... : -
            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
            available..... : ?
            package....... : assembler, editor, debugger, manual
            features...... : macros, source include
            Two pass 6502 assembler.

        -  ATasm (disk)
            version, year  : 1.07, 2010
            version, year  : 0.90, 1999 (first version)
            author/company : Mark Schmelzenbach
            available..... : 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. Two pass 6502 portable cross assembler.
            Mostly compatible with MAC/65.

        -  Atmas Makroassembler (disk)
            version, year  : 2, 1985
            author/company : Peter Finzel, Hofacker
            available..... : ?
            package....... : assembler, editor, monitor, manual
            features...... : macros
            Two pass 6502 assembler with integrated editor/monitor.

        -  Bibo Assembler (disk)
            version, year  : 1.0, 13/12/1986
            author/company : E.Reuss, Compy-shop
            available..... :
http://wiki.strotmann.de/wiki/Wiki.jsp?page=BiboAssembler
            package....... : assembler, editor, monitor
            features...... : source include, data include
            Two pass 6502/65c02 assembler with integrated editor/
            monitor.

        -  Datasm/65 assembler (disk)
            version, year  : 2.0, 1981
            author/company : DataSoft Inc.
            available..... : ?
            package....... : assembler, editor, menu, manual
            features...... : -
            Two pass 6502 assembler.
```

```
    - EASMD (disk)
      version, year  : 1.0, 1981
      author/company : OSS
      available..... : ?
      package....... : assembler, editor, monitor
      features...... : -
      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)
      available..... : ?
      package....... : assembler, editor, disassembler
      features...... : Compatible with Quick Assembler v1.0.

    - Kasm65 (disk)
      version, year  : 2.51, 1997
      author/company : Ken Siders
      available..... : http://atari.kensclassics.org/a8programming.html
      package....... : assembler, editor, linker, docs
      features...... : macros, relocation, source include,
                       conditional assembly
      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
      available..... : http://www.atari8.co.uk/ma65/default.html
      package....... : assembler, documentation and source code
      features...... : macros, conditional assembly, include directive.
      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
      available..... : ?
      package....... : assembler, editor, monitor, manual
      features...... : macros, source include
      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
      available..... : ?
      package....... : ?
      features...... : -
      http://en.wikipedia.org/wiki/MAC/65

    - MAE (disk)
      version, year  : .96, 1996
      author/company : John Harris
      available..... :
http://www.umich.edu/~archive/atari/8bit/Languages/Assembly/
      package....... : assembler, menu, editor, monitor, docs
      features...... : macros, source include, data include,
                       conditional assembly
      Two pass 6502/65816 assembler with integrated editor/
      monitor. Extra RAM supported.

    - NASM65 (disk)
      version, year  : ?, 1992
      author/company : Nat!
```

```
        available..... : ?
        package....... : assembler, linker, librarian
        features...... : macros, relocation, source include
        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
        available..... : -
        package....... : assembler
        features...... : macros, source include, data include,
                         boundary directive
        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
        available..... :
http://ftp.pigwa.net/stuff/collections/atari_forever/Tools%20-
%20atr/Quick%20Assembler/
        package....... : assembler, editor, menu, debugger
        features...... : source include
        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
        available..... : public domain,
http://www.umich.edu/~archive/atari/8bit/Languages/Cc65/ra65-etc.arc
        package....... : assembler, linker, librarian
                         part of cc65 (c-compiler)
        features...... : -

    - Synassembler (disk|cart)
        version, year  : 4.0, 1982
        author/company : Steve Hales, Synapse Soft
        available..... : http://idiology.com/8b/bacardi/Synapse/SynAssembler.zip
        package....... : assembler, editor, monitor, manual
        features...... : source include
        Two pass 6502 assembler.
        An Adaptation by Steve Hales of the S.C. Assembler II.
        http://wiki.strotmann.de/wiki/Wiki.jsp?page=Synapse%20Assembler%20Manual

    - ST-65 (disk)
        version, year  : 3.1(e), 1991
        author/company : A. Stauffenberg, F. Offenga
        available..... :
http://www.ataripreservation.org/websites/freddy.offenga/ST65_2003.zip
        package....... : assembler, menu shell, manual
        features...... : macros, conditional assembly,
                         source include, data include,
                         boundary directive
        Two pass 6502/65c02 cross assembler for the Atari ST written in 68000
assembly.
        http://www.ataripreservation.org/websites/freddy.offenga/ST65_2003.htm

    - 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
        available..... : http://xasm.atari.org
        package....... : assembler, docs
        features...... : conditional assembly, source include,
                         binary include, pseudo commands,
                         pseudo addressing modes
```

```
        Two pass 6502 cross assembler for DOS/Windows. The source
        format is backward compatible with Quick Assembler.

b) 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
      available..... : ?
      package....... : BASIC compiler
      features...... : single-pass compiler translates Atari BASIC into p-code.

    - Advan BASIC (disk)
      version, year  : N/A, 1985
      author/company : Advan Language Designs (William Graziano)
      available..... : http://advan.atarinet.com/
      package....... : BASIC compiler
      features...... :
        unprotected version released by the author
        http://advan.atarinet.com/

    - Atari BASIC (cart)
      version, year  : Rev.C, 1983
      author/company : Atari
      available..... : standard ROM in Atari XL/XE
      package....... : BASIC interpreter, manual
      features...... : pretty plain BASIC implementation

    - Atari Microsoft BASIC (disk)
      version, year  : 1.0, 1981
      author/company : developed by Microsoft, published by Atari
      available..... : CX8126
      package....... : BASIC interpreter released for the Atari 800
      features...... : Based on the full language level of Microsoft BASIC
        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
      available..... : 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
                        "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
      available..... : ?
      package....... : BASIC interpreter, OS/A+, EASMD (Assembler/Editor)
      features...... :
        http://en.wikipedia.org/wiki/BASIC_A%2B

    - BASIC XL (cart)
      version, year  : ?, ?
      author/company : OSS
      available..... : ?
      package....... : BASIC interpreter
      features...... : -

    - BASIC XE (cart + extensions disk)
```

```
          version, year  : 4.1, 1985
          author/company : OSS
          available..... : ?
          package....... : BASIC interpreter
          features...... : requires XL/XE; supports 130XE extended memory

     - CTH Fast Basic (disk)
          version/year   : ?
          author/company : Tom Hunt/Closer to Home
          available.......: 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;
          available at Tom Hunt's homepage or elsewhere...

     - Der BASIC Compiler (disk)
          version, year  : 1.4, 1983
          author/company : Datasoft
          available..... : ?
          package....... : BASIC compiler
          features...... : -
          Likely to be a German release of 'The BASIC Compiler'?

     - Frost BASIC (?)
          version, year  : 1.4, 1985
          author/company : Frank Ostrowski, Happy Computer
          available..... : ?
          package....... : BASIC interpreter, compiler
          features...... : -
          Version of Turbo Basic XL that runs on 48k machines (400/800).

     - MMG BASIC Compiler 2.0 (disk)
          version, year  : 2.0, 1984
          author/company : Special Software Systems
          available..... : ?
          package....... : BASIC compiler
          features...... : -
          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
          available..... : ?
          package....... : BASIC compiler
          features...... : four-pass compiler; compiles Atari BASIC programs into
                           6502 machine language; produces DATASM compatible
                           assembler files

     - TT-BASIC XL (disk)
          version, year  : 2.11, 1985
          author/company : Frank Ostrowski, Happy Computer
          available..... : ?
          package....... : BASIC interpreter, compiler
          features...... : -
          Published in the German magazine "Happy Computer".
          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
          available..... : ?
          package....... : BASIC interpreter, compiler (V1.1)
          features...... : -
          Published in the German magazine "Happy Computer".


  c) C
```

```
-  ACE C (disk)
   version, year  : ?
   author/company : John Palevich & Ralph Walden
   available..... : ?
   package....... : ?
   features...... : -
   This is a newer version of 'Deep Blue C'.

-  C/65 (?)
   version, year  : ?
   author/company : OSS
   available..... : ?
   package....... : ?
   features...... : -
   Probably derived from Dr.Dobbs "Small C". Compiles to 6502
   code which emulates the 8080 instruction set.

-  C65 (?)
   version, year  : ?
   author/company : Keith Ledbetter
   available..... : ?
   package....... : ?
   features...... : good macro assembler
   This compiler does not support structs.

-  CC65 (disk)
   version, year  : 1989
   author/company : John R. Dunning
   available..... : umich archive,
   http://www.umich.edu/~archive/atari/8bit/Languages/Cc65/
   package....... : compiler, linker, assembler, librarian
   features...... : -
   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 : John Palevich & Steve Kennedy
   available..... : ?
   package....... : Compiler
   features...... : -
   ACE C with more "real" C support (e.g. arrays of pointers
   to structs). Requires ACE C runtime libs and linker.

-  Deep Blue C (disk)
   version, year  : 1.2, 1982
   author/company : John Palevich, APX
   available..... : 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...... : -
   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
   available..... : ?
   package....... : Editor, Compiler, Optimizer, Linker
   features...... : Quite user friendly program
   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
      author/company : Clearstar Softechnology
      available..... : ?
      package....... : Compiler, Optimizer, Linker
      features...... : -
      Runs under CLI DOS's and MENU DOS's.

    - Lightspeed C (disk)
      version, year  : 3.0, 1988
      author/company : Clearstar Softechnologies
      available..... : ?
      package....... : Compiler, Optimizer, Linker
      features...... : -
      Runs under CLI DOSes and MENU DOSes.

    - Tiny-C
      version, year  : ?
      author/company : OSS
      available..... : ?
      package....... : ?
      features...... : -
      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.


  d) PASCAL

    - Atari Pascal (disk)
      version, year  : 1.0, 1982
      author/company : APX
      available..... : APX-20102
      Information at http://www.atariarchives.org/APX/showinfo.php?cat=20102
      package....... : ?
      features...... : -
      Needs two drives.

    - CLSN Pascal (disk)
      version, year  : 1989?
      author/company : CLSN Software
      available..... : ?
      package....... : editor, compiler
      features...... : generates 6502 machine code;
                       requires 128K XL/XE

    - Draper Pascal (disk)
      version, year  : 2.1, 1989
      author/company : Norm Draper
      available..... : ?
      package....... : ?
      features...... : -

    - Kyan Pascal (disk)
      version, year  : 2.02, 1986
      author/company : Kyan Software
      available..... : ?
      package....... : editor, compiler, linker, macro-assembler
                       and manual
      features...... : -


  e) LISP

    - INTER-LISP/65 (disk)
      version, year  : 2.1, 1981
```

```
                author/company : Special Software Systems, DataSoft
                available..... : ?
                package....... : ?
                features...... : -

          - INTER-LISP/65 (disk)
                version, year  : 2.2, 1982
                author/company : Special Software Systems, DataSoft
                available..... : ?
                package....... : ?
                features...... : -


   f) FORTH

          - ES-FORTH
                version, year  : 1.2, 1984
                author/company : The English Software Company
                available..... :
http://www.strotmann.de/twiki/bin/view/APG/LangForthESForth
                package....... : ?
                features...... : -
                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
                author/company : Patrick Mullarky, APX
                available..... : APX-20029
                                 http://www.atariarchives.org/APX/showinfo.php?cat=20029
                package....... : ?
                features...... : -

          - Extended fig-Forth (disk)
                version, year  : 1.1 Rev. 2.0, 01/15/82
                author/company : Patrick Mullarky, APX
                available..... : APX-20029
                                 http://www.atariarchives.org/APX/showinfo.php?cat=20029
                package....... : ?
                features...... : -

          - fig-FORTH
                version, year  : 1/26/81 and 4/01/82 releases
                author/company : Steven R. Calfee  "Team FORTH"
                available..... :
http://www.atariarchives.org/APX/showinfo.php?cat=unknown_fig
                package....... : ?
                features...... : -

          - fig-FORTH
                version, year  : 4/10/82
                author/company : Peter Lipson / Robin Ziegler "Team FORTH"
                available..... : ?
                package....... : ?
                features...... : -
                based on 4/1/82 release of fig-FORTH by Steve Calfee

          - fig-FORTH
                version, year  : 5/5/82 - 10/16/82
                author/company : Harald Striepe "Team FORTH"
                available..... : ?
                package....... : ?
                features...... : -
                based on 4/10/82 release of fig-FORTH by Lipson/Ziegler

          - fig-FORTH, Antic (disk)
                version, year  : 1.4S REV.H, 18Jun85
                author/company : John Stanley/Antic Magazine "Team FORTH"
```

```
        available..... :
http://www.strotmann.de/twiki/bin/view/APG/LangForthAntic
        package....... : ?
        features...... : -
        based on 10/16/82 release of fig-FORTH by Striepe

     - fun-Forth (disk)
        version, year  : ?
        author/company : Joel Gluck, APX
        available..... : APX-20146
                         http://www.atariarchives.org/APX/showinfo.php?cat=20146
        package....... : ?
        features...... : -

     - Grafik-FORTH
        version, year  : 1990
        author/company : RAI Production
        available..... :
http://www.strotmann.de/twiki/bin/view/APG/LangForthGraphicForth
        package....... : ?
        features...... : -
        based on fig-FORTH 1.4S and TURBO-GRAPHICS-SYSTEM 256

     - MesaForth
        version, year  : 12/03/81
        author/company : ?
        available..... : http://www.strotmann.de/twiki/bin/view/APG/LangForthMesa
        package....... : language, source code, documents, examples
        features...... : -
        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, 3/27/81
        author/company : James Abanese / [QS] Quality Software
        available..... : 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.
        based on fig-FORTH.

     - Turbo-4th
        version, year  : January 1985
        author/company : Steven R. Calfee
        available..... : ?
        package....... : ?
        features...... : -
        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
        available..... : ?
        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...... : -
        based on fig-FORTH

     - X-FORTH
        version, year  : 26 Jan 2003
        author/company : Carsten Strotmann
        available..... : 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.
```

works with normal DOS.

g) PILOT

    - Programming Language Pilot Educators Package,
      Pilot with "Turtle" Graphics (CX405) (cart, tape)
      version, year : 1980, 1981, 1982
      author/company : Atari
      available..... : ?
      package....... :
      * Pilot Cartridge (CXL4018)
      * Two demonstration program cassettes (CX4113A/B)
      * Pocket Reference Card C017812 Rev2 - Program (c)1980, Manual (c)1981
      * Pilot Demonstration Programs Users Guide C017810 Rev1 - Program
        (c)1980, Manual (c)1981
      * Pilot Primer: The Pilot Programming Language Instruction Manual
        C017809 Rev2 - Program(c)1980 Atari, Manual (c)1980 Dymax
      * Student Pilot: Reference Guide C017811 Rev1 - Program (c)1980,
        Manual (c)1981.
      features...... : -

    - Programming Language Pilot Educators Package,
      Pilot with "Turtle" Graphics (CX405) (cart, tape)
      version, year : 1980, 1981, 1982
      author/company : Atari
      available..... : ?
      package....... :
      * Pilot Cartridge (CXL4018)
      * Two demonstration program cassettes (CX4113A/B)
      * Pocket Reference Card C017812 Rev2 - Program (c)1980, Manual (c)1981
      * Pilot Demonstration Programs Users Guide C017810 Rev1 - Program
        (c)1980, Manual (c)1981
      * Pilot Primer: The Pilot Programming Language Instruction Manual
        C017809 Rev2 - Program(c)1980 Atari, Manual (c)1980 Dymax
      * Student Pilot: Reference Guide C017811 Rev1 - Program (c)1980,
        Manual (c)1981.
      features...... : -

h) LOGO

    - Atari LOGO (cart)
      version, year : 1983
      author/company : LCSI, Atari
      available..... : ?
      package....... : ?
      features...... : -

i) All the rest

    - Action! (cart)
      version, year : 3.6, 1983
      author/company : Action! Computer Services (Clinton Parker), published by
OSS
      available..... : ?
      package....... : compiler, editor, monitor and library
      features...... : fast compiler which generates good code
      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).

    - Extended WSFN, WSFN = Which Stands For Nothing
      version, year : ?
      author/company : Harry Stewart, APX
      available..... : APX-20026

```
        package...... : ?
        features..... : -
        Info at http://www.atariarchives.org/APX/showinfo.php?cat=20026

    - Quick (disk)
      version, year  : 2.0, 1990
      author/company : Raindorf Soft
      available..... : ?
      package...... : ?
      features..... : -
      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
      available..... : commercial, Extremely rare.
      package...... : compiler, editor, library, sample game
      features..... : Similar features to Action with same restrictions.
      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
      available..... : public domain, ?
      package...... : compiler and editor
      features..... : -
```

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 by Claus Buchholz for Amiable Computer Enhancements / TNT Computing
  (80 column editor, compatible with Atari BASIC, and patches available for:
  OS/A+, EASMD, Letter Perfect v.6, Data Perfect, Atari Logo)
    - Based on DT-80, the Atari/ATR8000 80-Column Dumb Terminal Emulator
      cartridge by Claus Buchholz for Amiable Computer Enhancements, 1984
- 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 by Eastern House
- 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 games support 4 or more simultaneous players?

a) The following games support 4 joystick head-to-head play:
   (Only possible on the 400/800 since only these computer models have
    4 controller ports)

- Ali Baba and the Forty Thieves by Stuart Smith for Quality Software
- Aliens a public domain game by ??? using an altered Dandy program
  (the Dandy font and thus the graphics were changed, however,
   the levels remain the same and can be used in both games)
- Asteroids by Tod Frye for Atari
- Basketball by Alan Miller for Atari
- Battle Room (CIA vs. KGB) a public domain game by SNACC
- Dandy disk by John H. Palevich (Jack Palevich) for APX
- Depth Warrior by ??? for ROM magazine (Canada) v1n7 ***
- 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, (c)1981
- Major League Hockey by Thorn EMI
- Major League Soccer by Thorn EMI
- Maze War by ???
- 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! v5n7 #38 July 1983
- Silicon Warrior, developed by The Connelley Group for Epyx
- Sky Warrior by Jack Chung for ROM magazine (Canada) v1n6
- Soccer by Gamma Software
- Survivor by Richard Carr for Synapse
- Tank Battle by Fred Pinho from Antic magazine:
  http://www.atarimagazines.com/v3n2/animate.html
- Volleyball by ??? (public domain game written in Atari BASIC)
- Yellow-Brick-Road by ??? for ROM magazine (Canada) v1n2 ***

*** these programs are reported to be 4-player programs, I'm
    not sure if they are meant to be 4-players simultaneously
    or 4-players - one after another (try to find out!);

b) 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

c) The following game supports 4 players on all machines, using special
4-button keypad controllers linked together with RJ-11 jacks (standard
phone jacks) to a box with 2 joystick port connectors:

- PQ: The Party Quiz Game by Suncom

d) The following programs support multi-joystick games, using extra
   hardware called Quadrotron (from the German Atari magazin 2/1989):

- test program for 4 joysticks (and assembler source);
- Quadro-Tron by H.Schoenfeld (4-player Tron-clone);

e) The following programs support multi-joystick games, 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/
- 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
- Bremspunkt by Thorsten Butschke, Rouven Gehm
- Card Grabber by Florian Dingler
- Cervi by Radek Sterba
- Cervi 2 by Radek Sterba
- 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
- Hardwaretester/Peripheral Test 2.0 by Florian Dingler (2008)
- 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
- 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
- Multiloops by Antonin Holik and Rudolf Kudla (2017)
- Multris by Radek Sterba
- 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
- Sheep-Race by Florian Dingler
- 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
- 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

8.5) What programs use a light pen or a light gun?

Contributor to this section: Bertrand M. (LEXX), Andreas Koch

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 may be intended for one or the other, these two types of controllers may often 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. Controller Jacks 1-3 on the 400 do not support a light pen / light gun.

Programs designed for a light gun:

Alien Blast, Richard Gore for DGS, 1993
Alien Invaders (TB-XL or CTB) disk by R.Gore (available from DGS);
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?
Flyshoot 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
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, 1993
Operacion Comando, Turbo Software/M.P.M., 1989?
Pajaki II, Arkadiusz Lubaszka for ArSoft, 1996
Schiessen, L. Franzky (Abbuc magazine)
Sharp Shooter, Matthew Ratcliff, 1989
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

Programs designed for a light pen:

- Alien Blast, Richard Gore for DGS, 1993

- Alphabet Construction Set (Playground Software) by Futurehouse
- Animal Crackers (Playground Software) by Futurehouse
- AtariGraphics by Steve Gibson for Atari, (c)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
- 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)
- 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
- KoalaPainter by Koala for Commodore 64/Atari (diskette)
  (Illustrator product by Island Graphics, light pen version)
- Language Skills - Alphabet Recognition by Futurehouse, 1982
- Language Skills - Different Symbol Discrimination by Futurehouse, 1982
- Language Skills - Letter Sequences by Futurehouse, 1982
- Language Skills - Like Symbol Discrimination by 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
- 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
- Micro Illustrator by Tech-Sketch (diskette)
  (Illustrator product by Island Graphics, light pen version)
- Othello by Stack Computer Services, 1983
- Paint-N-Sketch Level I by Tech-Sketch, 1983
- Paint-N-Sketch Level II by Tech-Sketch, 1983
- Peripheral Vision by Futurehouse, 1984
- 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
- See also AtariMania lists of games and utilities that use a light pen:
  http://preview.tinyurl.com/ps962gx
  http://preview.tinyurl.com/pqe5ppu

8.6) What programs are designed for a true trackball controller?

The following programs have a trackball mode designed for use with the
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 trak-ball support by Peter Meyer, 2009
  ([CTRL+T] for trackball mode)
- 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
- 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 Atari ([CTRL+T] for trackball mode)
- Missile Command+ by Paul Lee, 2005 ([CTRL+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
-  Slime by Steve Hales for Synapse, 1982 (press [T] for trackball mode)
-  Tempest Elite 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
```

8.7) What programs are designed to work with a mouse?

```
Programs that use the Atari STM1 Mouse or compatible:
-  8Bit-Mouse (BPAUG)
-  Artprog
-  Atari Rechner Simulation mit UPN, (c)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
-  Catch 88 by Simon Trew, 1991
       - Supports Multi-Mouse ST Mouse Driver by Simon Trew
-  Celebrity Cookbook by David Sullivan/Total Control Systems for U.S.A. Media
-  Click! by Chris Martin, 2008
-  Copy F'n'F by Mirko Sobe / MS Software, requires BOSS-X
-  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
-  Faecher Patience by Kemal Ezcan for Zong mag, 1993
-  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 by KE-Soft / Kemal Ezcan (ZONG mag.), 1993
-  KE-Mouse drivers by KE-Soft
-  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 XL by KE-Soft (ZONG mag.)
-  Mau Mau X by Mirko Sobe / MS Software, requires BOSS-X
-  Maus Calculator, by AMC Verlag, (c) by Peter Eilert
-  Minesweeper by Harald Schoenfeld for PPP, 1992
-  Mine Sweeper by Raindorf Soft
-  Mine Sweeper 3
-  M.O.S. (from Abbuc mag.)
-  Mouse-DOS by KE-Soft (ZONG 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
```

- Othello by Simon Trew, 1991
  - Supports Multi-Mouse ST Mouse Driver by Simon Trew
- Pad 1.2 (Padnoid) by Nelson Ramirez / New Age, 1995
- Pad 1.83 by Nelson Ramirez, 2014
- Patience by Kemal Ezcan for KE-Soft, 1993
- P-Graph(s) by ???
- QUICK Ed Character Editor by PPP
- 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)
- 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 by Kemal Ezcan for KE-Soft, 1993
- 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 programs using the Atari mouse:
  http://preview.tinyurl.com/mcm6wwo
  http://preview.tinyurl.com/oa7gklk

Programs that use the Zobian Controls RAT (which never shipped):
- Business Manager by Reeve Software, 1986
- Rich Man's Word Processor, by Mark Rogalski for Computer Software Services
- The RAT was equivalent to the Radio Shack TRS-80 Color Mouse #26-3025;
  programs designed for the Atari Touch Tablet or for paddles would have also
  been at least somewhat usable with the RAT.

Programs that use the Zobian Controls SuperRAT (which never shipped):
 - No released programs. The SuperRAT as depicted in marketing was either the
   Amiga mouse or the Commodore 1351 (which?????); see below for lists of
   compatible programs. (Some customers who ordered a SuperRAT actually
   received "The Best" mouse by Best Electronics, a mouse fully compatible
   with the Atari STM1.)

Programs that use the Amiga mouse:
- Black Magic Composer by Sven Tegethoff for Ulf Petersen, 1991
- Bomb Down by The Roemer/U.N.O.
- 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
- 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

Programs that use the Commodore 1351 mouse (mouse for Commodore 64/128):
- Klony by ArSoft, 2006

8.8) 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)
- 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,
  (c)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, 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)
- 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)
- 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)
- 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)
- Tempest Elite (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

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 these
graphics tablets at least somewhat usable with paddles as well.

8.9) 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 (Zong 1/1993);
- 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);
- 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)
- 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);
- Wassergnom II (Zong 1/92)
- Zador Update Version, by KE-Soft, 1991 (see Zong 9/91 p22)
- Zador II, by KE-Soft, 1992

8.10) 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.

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, (c)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, (c) 1986/1987 Hillside Software
- 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
- 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)
- See also AtariMania lists of games & utilities using the Atari Touch Tablet:
     http://preview.tinyurl.com/pst2j96
     http://preview.tinyurl.com/q3hvhss

The following programs use the KoalaPad or the Animation Station:
- Alphabet Contruction Set (Playground Software) by Futurehouse
- Animal Crackers (Playground Software) by Futurehouse
- Blazing Paddles (Baudville)
- 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 by KE-Soft / Kemal Ezcan (ZONG mag.), 1993
- 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, (c)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)
- 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
- 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 these graphics tablets as well.

8.11) 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

8.12) 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

8.13) 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 programs using keyboard controllers:
  http://preview.tinyurl.com/o4yw6hd
  http://preview.tinyurl.com/p7vmxdv

9) File formats & Copy

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.

.ATP - Atari Protected Disk Image Format. An open disk format suitable for storing copy protected disks (similar to the APE .PRO format). Version 1.6, 2004-4-11, by the ATP Working Group:
http://www.ataripreservation.org/websites/freddy.offenga/ATP16.htm

.ATR - Image format invented by Nick Kennedy, for his SIO2PC project. Very similar to .XFD but with an added 16 byte header. This is the most common image format, used with most 8-bit Atari emulators running on other computer platforms. SIO2PC is at 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 format or copy protection. .ATX is a superset of .ATR for single density; does not support other Atari disk densities. .ATX is comparable to .IPF or .SCP (SuperCard Pro) file formats.
http://vapi.fxatari.com/
http://www.whizzosoftware.com/sio2arduino/vapi.html
http://atariage.com/forums/topic/252191-vapi-library-source-code/

.BIN - Same as .ROM, see below.

.CAR - Cartridge ROM image format invented for the Atari800 emulator. Format includes information about cartridge type. Contains the 'CART' signature at the beginning of the file. See:
http://sourceforge.net/p/atari800/source/ci/master/tree/DOC/cart.txt

.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

.DD - Early filename extension used with double density disk images for use with the Xformer emulators. Replaced by the .XFD extension.

```
.DI  -Image format invented by Kolja Koischwitz & Christian Krueger for
      800XL DJ, their 1050/XF551 disk drive emulator for the Atari
      ST/TT/Falcon.
      800XL Deejay:  http://www.umich.edu/~archive/atari/Emulators/800xldj.lzh

.IPF -Interchangeable Preservation Format invented by the Software
      Preservation Society (SPS), http://www.softpres.org/.  A platform
      agnostic format that is extremely low-level, representing the
      information as it would have been read by a drive head.  Comparable to
      .SCP (SuperCard Pro) or the Atari-specific .ATX format.  Images are
      created on a modern computer using the KryoFlux USB-based floppy
      controller:  http://www.kryoflux.com/

.PRO -Proprietary image format invented by Steven Tucker, for his
      APE ProSystem.   http://www.atarimax.com/

.ROM  ROM dump file, raw with no header information.  Typically a cartridge
      memory dump, but also used for an operating system memory dump.

.SCP -Image format invented by ICD, for SpartaDOS.  Used with the external
      SpartaDOS command SCOPY, distributed with SpartaDOS 3.2.  Used when
      working with native Atari hardware.  A compressed data format.

.SCP -"Flux image file" format (platform agnostic) invented by Jim Drew for
      his SuperCard Pro universal floppy disk copier/imager/converter
      hardware/software for Windows PC.  Comparable to .IPF or the Atari-
      specific .ATX format.   http://www.cbmstuff.com/proddetail.php?prod=SCP

.SD  -Early filename extension used with single density disk images for use
      with the Xformer emulators.  Replaced by the .XFD extension.

.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.  Used with ST Xformer, PC Xformer, and
      Xformer 2000 emulators.
      Xformer emulators are at http://www.emulators.com/

See also:
Atari Disk Image FAQ  (Steve Tucker)
http://www.atarimax.com/ape/docs/DiskImageFAQ/
```

10) Miscellaneous

10.1) What non-commercial telecommunications programs are there?

This section lists widely-used or notable noncommercial 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! #9, Feb81
- 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! #32, Jan83
- Version 3.8 published in Compute! #56, Jan85
   - Added support for 1200 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
- 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

TSCOPE / MSCOPE / RSCOPE, by Joe Miller, 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 John Howard Palevich (Jack 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 John Howard Palevich (Jack 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.
- 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

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.
- 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
        - 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)

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 the 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 espeically 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 4KiB block size) file transfers
- VT52 terminal emulation (odd or even parities) with CompuServe VIDTEX cursor positioning
- 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:
    http://preview.tinyurl.com/navwxj3
    http://preview.tinyurl.com/o52parp
- Version 1.23 03/1993 executable, updated version for use with emulators:
    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 (joystick port 1) and the CX85 (joystick port 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
- 80-column screen (GR.8 software handler)
- XMODEM/CRC, XMODEM-1k, YMODEM, YMODEM-g, ZMODEM download protocols
- ASCII upload, 16KiB capture buffer, 16KiB 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 48KiB 400/800
- Ice-T XE 2.72, February, 1997

- Full feature set, requires an XL/XE with at least 128KiB 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 RAMdisk
       (modem connected to a P:R: Connection, 850, or similar interface)
    3- Both a (hard drive or RAMdisk) 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

10.2) 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.

    o 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: 48KiB 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:
    * Fast AMIS, by Stan Subeck & Susie Subeck
       According to Antic v3n9Jan85:

- 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 v3n9Jan85
             - "demands a large amount of disk space and requires every bit of
               memory your system has." --Antic v3n9Jan85
             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)
          * 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 involvment 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

   o ADCM BBS
- Version 1.00   (C) 1985 ADCM Systems
- (C) 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/

   o 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).

   o 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 48KiB 400 with a
                    90KiB floppy drive and a 300 bit/s Hayes Smartmodem. The
                    48KiB 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.

   o AtariLink BBS -- program by Paul Sungenis and Darren M. Benfer,
                    Version 1.43 (c) 1987-1988 Paul L.A. Sungenis
From his blog at http://atari8programming.blogspot.com/ on 3/20/06:

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 1200 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

  o 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 128KiB 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?

  o 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.

  o 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.

  o BBS Express! Professional ("Pro!")--6.0b 1999, Lance Ringquist/Video 61
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/BBSEXPRESSPRO/
Originally released in 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.

Written in 100% machine language.
Requires XL/XE, SpartaDOS 3.2+, hard drive highly recommended, or at least a large RAMdisk. R-Time 8 is fully supported.

  o 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

   o Carina BBS version II (Carina II)
     (c)1988 Carina Software Systems (Jerry Horanoff)
     v2.5 upgrade (4/24/91) (c)1990 by Shadow Software (David Hunt)
     v2.6 (6/15/93) by Shadow Software (David Hunt)
     v2.7 (c)1995 by Shadow Software (David Hunt)
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/CARINA/
- Requirements: Atari XL/XE computer, at least 500KiB of storage capacity
  (combination of disk drives and/or RAMdisk), a modem, and SpartaDOS 2.3 or
  greater.
- Recommended: 192KiB RAMdisk 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
- 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

   o Commonwealth XL BBS -- (c)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 RAMdisk) with 180KiB capacity or higher
- Written in BASIC; BASIC XL supported
- Has a control structure that is modeled after AMIS BBS programs

   o 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 ATR 8000 CP/M interface, 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?).

   o FoReM MPP BBS -- developed by Matt Singer, sold by MPP
FoReM BBS version for the MPP direct-connect modems.

   o FoReM 26M BBS -- developed/sold by Matt Singer.
FoReM BBS updated to support multiple message area.

   o FoReM XL BBS -- developed/sold by Matt Singer.
FoReM 26M updated to take advantage of BASIC XL from OSS.

   o 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).

   o 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 128KiB of memory, the BASIC XE
cartridge from OSS/ICD, SpartaDOS 3.2 (this program will NOT work with any
other version), and at least 500KiB of storage.

FXEP is available at: http://www.lenardspencer.com/Lenspencer/fxep.html

   o Marsh BBS -- written by Matt Arrington
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/MARSH/

Primarily written in machine language.
"very structured and very customizable at the same time" - Brian A. Diaz

   o MBBBS (Message Base Bulletin Board System)
      -- early name for ATKeep, see above

   o NITE-LITE BBS -- Paul Swanson's BBS with RAMdisk.
http://www.bbsdocumentary.com/software/ATARI/EIGHTBIT/NITELITE/
Paul Swanson was a programmer from the Boston, Massachusetts, USA, area.

"1983: Nite-Lite B.B.S. goes on the air. (Was it running A.M.I.S. ?) It is
called "Nite-Lite" because the computer monitor casts an eerie glow about the
room.   1984: Paul Swanson writes his own BBS hosting software for the Atari
8-bit computer. He names it "Nite-Lite". The Nite-Lite BBS hosting
software goes on to be the most successful commercial BBS software ever
written for the Atari 8-bit computer. 1989: Nite-Lite BBS puts in a
second line. (MichTron boards eventually take the place of all of the Atari
Nite-Lite boards.)" - Winston Smith

This BBS was the first to support a RAMdisk, which Paul Swanson called a "V:"
device for "virtual disk". This BBS was written in Atari BASIC and required a
joystick hardware "dongle" device. This was notable as being one of the first
Atari 8-BIT BBSs that could actually go for a week without having to be
rebooted. Pointers to the message base were kept in an Atari "very long
string" (for which Atari BASIC is famous). The BBS would only have problems
(for the most part) if this string became corrupted.

   o 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 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: (12/6/02)
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
imo. 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.

o 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."

o 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".

o TART-BOARD -- by Bob Alleger
Early Atari BBS.

o 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.

o 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

o 835 & 1030 Modem Bulletin Board
-- by Gardner Computing (earlier) / Duplicating Technologies (DT)(later)
Auto answer, XMODEM upload/download, sold with ring detector.
Ads: ROM #9 Dec84/Jan85 p. 37; Antic v4n10 Feb 86 p. 44

10.3) How can I read/write Atari diskettes with my other computer?

There are several programs that allow an MS-DOS system to work with an
Atari-format 5.25" diskette. Most of these work with the Atari SS/DD 180KiB
format.

There is also a device, detailed below, that allows an external 5.25" floppy
disk drive to be connected to a modern PC via a USB port, and which supports
reading Atari DOS 2 SS/DD 90KiB floppy disks.

Atari-Link PC (AtariDsk) V1.2 (c) 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 (180KiB). 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 35KiB)
  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 Marslett's UTIL.
 - http://www.umich.edu/~archive/atari/8bit/Diskutils/Transfer/myutil.zip
 - Includes SpartaDOS disk utility v0.1e to access 180KiB SpartaDOS disks

ATARIO
======
 - By Dave Brandman with Kevin White
 - Reads SS/DD 180KiB Atari disks.
 - http://preview.tinyurl.com/pjvb7be (atario21.arc)

SpartaRead
==========
 - By Oscar Fowler
 - Reads SS/DD 180KiB SpartaDOS disks.
 - http://www.umich.edu/~archive/atari/8bit/Diskutils/Transfer/sr.arc

UTIL
====
 - By Charles Marslett
 - Reads/Writes SS/DD 180KiB 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 Kokoszkiewicz answers:
     "The XF551 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 8.333MHz
     (not 8MHz, as in 1050, for example)."

2. If the PC drive is a 1200KiB drive there is the additional problem of the
   track width.
   The following is generally true in the PC world:
    - disks written on 360KiB drives can be read on either drive
    - blank disk formatted and written on 1200KiB drives can be read on
      either kind
    - disks written on a 360KiB drive, and overwritten on a 1200KiB drive,
      can be read reliably only on a 1200KiB drive.
    - disks previously formatted on a 360KiB drive, or formatted as 1200KiB,
      and then reformatted on a 1200KiB drive to 360KiB, can be read reliably
      only on a 1200KiB drive.
   (All this assumes you are using DD media, not HD.)

   Solution: Use a 360KiB 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 360KiB floppies among 360KiB &
    1200KiB drives is: Never do any writes with a 1200KiB drive to a disk that
    has been previously written to in a 360KiB drive....UNLESS... you only
    plan on ever using that disk in the 1200KiB 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 360KiB modes that most 1200KiB drives offer.

AnaDisk + DeAna
===============
While the above mentioned utilities work with SS/DD 180KiB Atari-format disks
or SS/DD 180KiB SpartaDOS disks, the following combination of utilities has
been used successfully to read SS/SD 90KiB 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.

Preston Crow writes:
    "As best as I can figure it out, if your PC drive happens to read
    FM disks (I'm not sure what the criteria for that is), then you
    can read single density disks on your PC by dumping the contents
    to a file with AnaDisk, and then using Deana.com to convert the
    dump file into a usable format.

    For enhanced density disks, AnaDisk generally only reads the first
    portion of each sector, but it demonstrates that it is possible for
    a PC drive to read enhanced density disks."

FC5025 USB 5.25" floppy controller
==================================
 - By Device Side Data
 - Plugs into any computer's USB port and enables you to read data
   from an external 5.25" floppy drive.
 - Sold as a controller board only without a drive mechanism.
   It has been tested to work well with the TEAC FD-55GFR drive and should
   also work with most other 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.
 - The FC5025 may be unable to read the second side of "flippy" disks,
   depending on the drive it is attached to.
 - The included software works on: Linux, Mac OS X, Windows
 - The included software supports types of disk including: Atari 810
 - Available: http://www.deviceside.com/

OmniFlop
========
 - By Sherlock Consulting (Jason Watton)
 - A 'universal' floppy disk reader, writer, and tester for the IBM PC or
   compatible 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:
  - Read, write, and format Atari 8-bit format (90KiB). (Charles Doty)
- First released in December 2004.
- Runs under Windows 2000, Windows XP, Windows Vista and Windows 7;
- Earlier title OmniDisk runs under DOS and Windows 95 through to Windows Me
- Available: http://www.shlock.co.uk/

10.4) 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 180KiB floppy disks
  (40 tracks, 9 sectors/track, 512 bytes/sector)

IBM DOS and IBM 360, by TOMS
- Available on ROM in TOMS Turbo Drive LDW, TOMS Multi Drive LDW, and TOMS Multi Drive 1050 disk drive upgrades
- Can read/write 5.25" SS-DD MS-DOS format 180KiB floppy disks

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 180KiB floppy disks
  - 5.25" DS-DD MS-DOS format 360KiB floppy disks
    (40 tracks, 9 sectors/track, 512 bytes/sector)
  - 5.25" DS-DD 720KiB floppy disks ("quad density")
    (80 tracks, 9 sectors/track, 512 bytes/sector)
      - Note that the 720KiB 5.25" disk is not an MS-DOS standard format

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 180KiB floppy disks
  - 5.25" DS-DD MS-DOS format 360KiB floppy disks
- With XF Single Drive Upgrade or XF Dual Drive Upgrade, can read:
  - 3.5" SS-DD MS-DOS format 360KiB floppy disks
    (40 tracks, 9 sectors/track, 512 bytes/sector)
  - 3.5" DS-DD MS-DOS format 720KiB floppy disks
    (80 tracks, 9 sectors/track, 512 bytes/sector)
- 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 180KiB floppy disks
    - 5.25" DS-DD MS-DOS format 360KiB floppy disks
    - 5.25" DS-HD MS-DOS format 1200KiB floppy disks
      (80 tracks, 15 sectors/track, 512 bytes/sector)
    - 3.5" SS-DD MS-DOS format 360KiB floppy disks
    - 3.5" DS-DD MS-DOS format 720KiB floppy disks
    - 3.5" DS-HD MS-DOS format 1440KiB floppy disks
      (80 tracks, 18 sectors/track, 512 bytes/sector)

SpartaDOS X, by DLT Ltd.
 - 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

10.5) How do I transfer files using a null modem cable?

This section by Russ Gilbert.

Q: How do I connect two computers using a null modem cable?

A: You need a term program and RS-232 ports on both
     computers. The RS-232 ports need to be connected
     together using a 'null modem cable'.

     For up to 4800 baud, no flow control lines need be
     connected. Just cross the transmit and receive lines
     and join the grounds together. Transmit is pin #2,
     receive is pin #3 and ground is pin #7 on the 25 pin
     port. 25 pin #2 goes to Atari #4 (XMT to RCV), 25 pin
     #3 goes to #3 on Atari (RCV to XMT) and #5 of 850 goes
     to #7 of 25 pin (GND to GND).

     The right hand pin on the 'long' side of a female 'D'
     connector is #1. There are 13 holes on this 'long'
     side, 12 holes on the 'short' side. The numbers go
     to the left 1 to 13 then #14 is under #1 and left again
     so that #25 is under #13.

     Most term programs allow a null connection, without a
     carrier detect. Notably, '850 Express!' does not. I have
     only used 'Procomm 2.4.3' (the last shareware version of
     Procomm) on the PC and BobTerm on the Atari, but other
     term programs may work.

     To check your null modem connection, start both PC and
     Atari term programs, set baud to 2400 or 4800 on both
     computers. No parity, 8 data bits, 1 stop bit on the PC.
     Be sure to use the correct COM port on the PC. Go to
     'terminal' mode and you should now be able to type on
     either computer and see it on the other screen. To
     accomplish a file transfer, use Y-modem probably from
     BobTerm, rather than X-modem. X-modem will often append
     bytes to a file transfer, an undesirable event. There is
     also a very nice Z-modem receive program for the Atari,
     called ATAR-Z-MODEM by Larry Black for the Atari.

     A convenient way to make a null modem cable, up to about
     30 feet long, is to use two DB-25S connectors

(Radio Shack) some three or more conductor cable. Using
the two DB-25S connectors allows unplugging your
modems and plugging in the null modem cable into the two
modem cables. This also avoids the confusion of
variations in the computer ports. Most computers connect
into the modem end via a standard RS-232 DB25 connection.
With this both ends 25 pin cable, you would cross pins 2
and 3 and connect the #7s together to make a null modem
cable.

The SIO port on the Atari cannot be used directly. An
850, P:R: Connection, MIO, Black Box or similar device
that provides an RS-232 port must be used.

Following are pin assignments for a DB25 pin RS-232-C
port.

1.	Protective Ground	12.	Select Alternate Rate
2.	Transmit Data	15.	Transmit Clock (sync)
3.	Receive Data	17.	Receive clock (sync)
4.	RTS (Request to Send)	20.	Data Terminal Ready
5.	CTS (Clear to Send)	22.	Ring indicator
6.	Data Set Ready	23.	Select Alternate Rate
7.	Signal Ground	24.	Transmit Clock
8.	Carrier Detect		

For higher speed connections, above 4800 or 9600, you
need the flow control lines and Atari term software that
has flow control built in. You also need an MIO or Black
Box, which uses the PBI (parallel bus). A high speed
cable would need not only XMT, RCV, and GND, but also
flow control lines. I suggest a commercial null modem
from computer store to ensure correct lines. A null
modem is a small adapter with the correct lines already
crossed. I don't know how to correctly connect the CTS,
RTS, DTR, DSR, CRX lines for a high speed null modem.
With a null modem, you just plug it into the 25 pin
connectors of the two modem cables you might already
have connected to your Atari and PC or Mac. You may need
a straight thru 25 pin gender changer also.

Following is in this FAQ elsewhere, but I summarize here:
(Figure out or look for pin numbers on the ports.) Note
that these are pin assignments, and NOT null modem
connections with the XMT, RCV crossed and GND straight
thru.

```
Atari 8-bit  PC AT 25   PC AT 9 pin
---------------------------------------
 1.  DTR          20          4*
 2.  CRX           8          1*
 3.  XMT           2          3
 4.  RCV           3          2*
 5.  GND           7          5
 6.  DSR           6          6
 7.  RTS           4          7
 8.  CTS           5          8
 9.  No connect?  shield      RI
             22 RI
```

Note: * above indicates the difference between an AT 9 pin
and a Atari 8-bit 9 pin cable connector, e.g., if you check
continuity from pin 3 of 25 pin end and it goes to pin
4 of nine pin end, you have an Atari serial cable. If pin
3 of 25 pin goes to pin 2 of 9 pin end, you have a PC
serial cable.
(updated 3/1/99)
    (DTE = Data Terminal Equipment, i.e., your computer.
     DCE = Data Communications Equipment, i.e., your modem.)

10.6) How can my other computer utilize my Atari disk drive?

```
==> 1050-2-PC function of SIO2PC 4.x, by Nick Kennedy
Allows a PC to communicate directly with an Atari disk drive.  Requires
"1050-2-PC" cable which is very similar to the SIO2PC cable but configured
differently.  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.
```
More 1050-2-PC information: http://pages.suddenlink.net/wa5bdu/1050.txt
SIO2PC home page: http://pages.suddenlink.net/wa5bdu/sio2pc.htm

```
Additional cable/interface designs and sources:
 - http://www.asselheim.de/atari/1050-pc.htm (Frank Heuser)
 - SIO2PC/10502PC Dual-USB (Ray Ataergin)
   http://www.atari8warez.com/
```

```
==> 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/
- 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/

11) What is the history of Atari's 8-bit computers platform?

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 broader Atari history: http://mcurrent.name/atarihistory/

1975

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.

September 16-19: MOS Technology introduced the MCS6502 MPU at WESCON (Western Electronic Show and Convention) in San Francisco.

1976

July: MOS Technology announced a series of new chips in the 6500 family, including the MCS6520 PIA.

1977

April 16: The introduction of the Apple II by Apple Computer would spur Atari to ramp up nascent efforts to develop new machines based upon the Atari Stella project platform. (Antic podcast interview 65 with Steve Mayer)

June 5-8: At the 11th annual Consumer Electronics Show (CES) Atari introduced the Video Computer System (VCS; previously: Stella project).

July?: John Vurich, previously National Semiconductor product marketing manager, joined Atari (Consumer) as product planning manager (personal computers).

August 9: As the followup project to the Atari VCS, Atari "Colleen" broad

specifications as proposed by Cyan Engineering senior engineer Steven T. Mayer and Atari (Consumer) microelectronics engineer Joseph C. Decuir were accepted by Atari decision makers including Synertek/Atari LSI chip designer Jay G. Miner, Atari (Consumer) director of microelectronics Bob Brown, Atari VP Consumer engineering M. John Ellis, Atari (Consumer) product planning manager (personal computers) John Vurich, and Atari VP research and development Al Alcorn (head of the Consumer Division). (Decuir 1977 engineering notes p65-74) Synertek/Atari LSI chip designer Jay Miner would be Colleen project manager.

October?: Steve Smith joined Atari (Consumer) as a chip engineering technician. He had been interviewed by Craig Hansen. (mc suspects the interviewer's correct name to be Craig Nelson)

Fall: Douglas G. Neubauer joined Atari (Consumer) as a chip design engineer.

Fall: At Atari (Consumer), John Hayashi would be promoted to director of Consumer graphics (industrial design/design services), replacing Frederick W. Thompson who departed the company. Doug Hardy, previously VCS project manager, would now serve as an industrial designer (reporting to Hayashi). Engineer Wade Tuma would be promoted to Director of Consumer Engineering (replacing Hardy in the role). (Tuma and Hayashi would both report to VP Consumer engineering John Ellis.)

Fall?: Engineer Richard Simone joined Atari as LSI Design Manager. He was previously with National Semiconductor. Simone was to head large-scale integration chip design for Atari dedicated game consoles, while Synertek's Jay Miner was to head Atari's LSI chip design for cartridge-based game consoles (and computers). (Atari User #4)

Fall?: Electronics technician Steve Wright, with prior experience at IBM, joined Atari (Consumer) as Manager of LSI Test.

Fall?: Atari and Dorsett Educational Systems reached a licensing agreement that would bring Dorsett's Talk & Teach Computer-Assisted Instruction (CAI) System to Atari personal computer systems.

November 29: Upon considering updated pricing estimates for the Atari Colleen system, Atari engineers considered targeting products at three consumer price points: Colleen would be the complete computer system, "Candy" would use the Colleen chipset but would be a non-expandable game player (no keyboard, no interface, potentially Atari VCS compatible), and "Elizabeth" would be the same as Colleen but with a 13-inch color monitor. (Decuir 1977 engineering notes p106-110)

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 Dec77 p18; reprinted from "Northwest Computer Club News" Oct77)

December 21: Design reviews of the Colleen system and ANTIC/CTIA/POKEY chips were held, fixing most of the specifications of the three chips that Atari was gearing to develop. (Decuir 1978 engineering notes p5)

1978

January 6: Howard Bornstein would be the first person to work on the Colleen system monitor/resident firmware. (Decuir 1978 engineering notes p5)

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 v1n7 Jan78 p60)

Winter: Atari acquired the right to port Microsoft BASIC M6502 8K Version to the upcoming Atari personal computers. See: http://www.computerhistory.org/collections/catalog/102722318

February?: David Gjerdrum joined Atari (Consumer) as a software engineer. He would be assigned to the project to port Microsoft BASIC M6502 for the Atari Colleen project.

February 17: Internally-suggested demo software for Colleen for the system's intended January 1979 debut included: chess, BASIC, resident operating system, 2 action games (examples: 4 Player Tank, Super Bug), income tax preparation / personal finance, menu planning, demonstration cartridge (point of sale), support of: printer, floppy disk, cassette, Dorsett system (Larry Kaplan memo summary in Decuir 1978 engineering notes p39)

April 20: Educational technology consultant Liza Loop of the LO*OP Center ("Learning Options Open Portal") gave an invited presentation to the Atari Colleen project engineering team. (Decuir 1978 engineering notes p71) Atari would proceed to hire Loop to write user manuals for the upcoming Atari personal computer systems. She interviewed with Atari director of consumer engineering Wade Tuma.

Month?: Atari (Consumer) hired Peter N. Rosenthal as a market research associate (personal computers).

Summer?: Atari pre-announced that the Atari computer would debut at the January 1979 Consumer Electronics Show.

August: Carol Shaw joined Atari (Consumer) as a game designer.

August: Atari (Consumer) hired NEOTERIC consultant Harry B. Stewart to oversee and document "Colleen" project systems software development. Stewart was hired by director of software development George Simcock.

September: At Atari (Consumer), "Colleen" project systems software development efforts were essentially re-started, reassigned to several of the division's top VCS game programmers (and replacing Howard Bornstein in the role).

October 6: Atari contracted with Shepardson Microsystems, Inc. (SMI, headed by Bob Shepardson) to create both a version of BASIC and a File Management Subsystem (FMS) for the upcoming Atari personal computers. The contract called for delivery by April 6, 1979.

November: The Atari "Colleen" computer was named the 800 and the "Candy" machine was named the 400, named after their target price points of $800 and $400. The 400, which did not yet have a final case design, would not have a keyboard, but would support an external keyboard connected through controller ports 3-4. (Atari Inc.: Business is Fun, p. 460)

November/December: As reflected in the preliminary Atari 800 Operators Manual printed for the January 1979 CES, Atari expected to ship the 800 with: internal 8KiB OS ROM Module, internal 4KiB RAM Module, TV Switch Box, AC power adapter, 410 program recorder, 4 joystick controllers, Basketball cartridge, Atari BASIC cartridge, Atari 800 Operators Manual, Atari BASIC Programming Guide

December 6: "Last week Atari...disclosed that it was on the verge of introducing its first home computers." (NYT p.D4)

December: SMI delivered working versions of BASIC and a disk FMS to Atari.

1979

January 6-9: At the MGM Grand Hotel in Las Vegas, during the Winter Consumer Electronics Show (which was held at the Las Vegas Convention Center, Hilton hotel, and Jockey Club hotel), Atari and Warner Communications Inc. displayed the new Atari-400 Personal Computer and the Atari-800 Personal Computer. The 400 would come with 8KiB of RAM and was expected to retail for approximately $500. The 800 would ship with 8KiB of RAM, expandable to 48KiB, and would sell for approximately $1,000. Peripherals announced/previewed: custom tape cassette recorder (410), high speed floppy disc (810), 40-column printer (820). Software applications promised: "personal financial management, income tax preparation, household and office record keeping, computer aided instruction in over 20 subject areas including math, English, history, literature, economics, psychology, auto mechanics, and many others." Games promised: Basketball, Chess (would ship as: Computer Chess), Life (would ship as: Video Easel), Kingdom, Lemonade Stand (would ship from APX as: Lemonade), Fur Trader (never shipped), Stock Market (never shipped). Programming language promised: BASIC. Availability dates were not announced. Atari (Consumer) software manager Larry Kaplan and chip engineering technician Steve Smith led the live demonstrations of the 400/800 at the show. Don Kingsborough was Atari (Consumer) Director of Sales & Marketing. Emanuel Gerard represented the Office of the President, WCI. Coverage of the introduction of the Atari 400/800 from Creative Computing magazine: http://mcurrent.name/atari1979/ (see also The Intelligent Machines Journal Issue 2, 79 Jan 17)

January: Atari ran an advertisement for the 400/800 on pp. 54-55 of Merchandising, vol. 4, no. 1, January 1979. See: http://mcurrent.name/atariads/gallery.htm for these and other early Atari computer print ads from 1979-1981.

January: Stephen N. Davis would join Atari (Consumer) as Product Marketing Manager (personal computers), replacing John Vurich who departed the company. Peter Rosenthal, previously hired by Atari (Consumer) as a marketing research associate (personal computers), would join the company as Atari (Consumer) Manager of Software Planning (personal computers).

Winter?: Atari committed to shipping the 400/800 with the BASIC developed for Atari by SMI, abandoned efforts to port Microsoft BASIC to the 400/800, and Atari (Consumer) senior software engineer (personal computers) David Gjerdrum departed the company.

February: Synertek/Atari engineer Jay Miner departed the companies (Atari Inc.: Business is Fun, p. 386) (to Custom MOS, Inc.).

February: Atari (Consumer) hired Ted M. Kahn, previously member of the Learning Research Group at Xerox PARC, as a personal computers educational marketing strategy consultant, essentially replacing consultant Liza Loop who would depart the company.

March 26: Atari had asked the US FCC to extend the comments deadline on Texas Instruments' petition for a waiver of Class I rules on RF modulators, in what was seen as an attempt to delay market introduction of the TI home computer. (TVDigest 3/26/79)

April 9: In joining others including Apple, Interact, Mattel, and Radio Shack, Atari formally opposed 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 manufactureres, and asked for authority to produce & market a computer line satisfying its own standards." (TVDigest 4/9/79 p11)

April: Atari chip engineering technician Steve Smith departed the company (to Custom MOS, Inc.).

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 & 800 computers and $100 computer merchandise certificates. (TVDigest 3/12/79p12)

May 11-13: At the 4th West Coast Computer Faire, held in San Francisco's Civic Auditorium & Brooks Hall, in a booth as elaborate as those seen at Consumer Electronics Shows, Atari demonstrated its new 400 and 800 series computers. This was Atari's first public display of their new computer product lines. (Intelligent Machines Journal 79 Jun 11 p8) In addition to business & household management software, educational applications promised: Algebra (would ship as: Basic Algebra), Economics (would ship as: Principles of Economics), Auto Mechanics (never shipped), Sociology (would ship as: Basic Sociology), U.S. History, Zoology (never shipped), Counseling Procedures, Vocabulary Builder (never shipped), Basic Psychology, Spelling, Spanish (never shipped), Accounting (would ship as: Principles of Accounting), Carpentry (never shipped), Great Classics, Statistics (never shipped), Basic Electricity, World History. Entertainment applications promised: Chess (would ship as: Computer Chess), Backgammon (never shipped), business simulations, Stock Market Simulation (never shipped), space adventure, strategy games, Four-Player Basketball (would ship as: Basketball), Superbug Driving Game (never shipped), Game of Life (would ship as: Video Easel), Super Breakout. Also promised: Atari BASIC

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 Equipent Manufacturers Association (CBEMA) standards, Atari had filed a followup noting that CBEMA standards were for commercial computers up to 30 meters from a TV, enclsing photos of broken-up TV pictures reportedly caused by a home computer with TI standards. (TVDigest 5/21/79 p13)

June 3-6: At the Summer CES in Chicago Atari promised that the 400/800 base units would ship fall 1979, and featured a firmed 400/800 product line including suggested retail prices. 400 system with BASIC cartridge and Atari BASIC (Wiley Self-Teaching Guide): $549.99; 800 system with BASIC cartridge, Education System Master Cartridge, Atari BASIC (Wiley Self-Teaching Guide), 410 Program Recorder, and Guide to BASIC Programming cassette: $999.99; 810 Disc Drive: $749.99; 820 Printer: $599.99; 410 Program Recorder: $89.99; 8K RAM Memory Module: $124.99; 16K RAM Memory Module: $249.99; Driving Controller Pair: $19.95; Paddle Controller Pair: $19.95; Joystick Controller Pair: $19.95; ROM cartridges: Education System Master Cartridge (would ship as: Educational System Master Cartridge), Basketball, Life (would ship as: Video Easel), Super Breakout, Super Bug (never shipped), Atari BASIC, Assembler Debug (would ship as: Assembler Editor), Music Composer, Computer Chess, Home Finance (earlier: Checkbook; later: Personal Finance; never shipped); Educational System cassette programs: U.S. History, U.S. Government, Supervisory Skills, World History (Western), Basic Sociology, Counseling Procedures, Principles of Accounting, Physics, Great Classics (English), Business Communications, Basic Psychology, Effective Writing, Auto Mechanics (never shipped), Principles of Economics, Spelling, Basic Electricity, Basic Algebra; BASIC game and program cassettes: Guide to BASIC Programming (would ship as: An Invitation to Programming 1: Fundamentals of BASIC Programming), BASIC Game Programs (never shipped); diskettes: Blank Diskettes (would ship as: 5 Diskettes), Disk File Manager (would ship as: Master Diskette). Don Kingsborough remained director of sales and marketing for Atari (Consumer).

June 15: Atari announced U.S. Federal Communications Commission (FCC) Type I approval for the Atari 400 and Atari 800 personal computer systems, along with the Atari Program Recorder (410).

June: Atari microcomputer systems engineer Joe Decuir departed the company. (Fun p387)

June: Completion date for the Atari 400/800 Operating System Rev.A.

Month?: Bill Carris joined Atari (Consumer) as manager of technical services (personal computers).

Month?: Steve Wright, previously Atari manager of LSI test, would become an Atari (Consumer) training manager. Carl J. Nielsen would join Atari as director of LSI design and test, replacing Wright as well as LSI design manager Richard Simone who departed the company to Maruman Integrated Circuits.

July 2: Atari personal computers were in the Penny fall-winter catalog at $550 & $995. (TVDigest 7/2/79)

July: Robert A. Hovee, previously of Questor, joined Atari (Consumer) as personal computers sales & marketing VP, in part replacing Donald Kingsborough who departed the company (to rejoin D.K. Marketing).

August: Atari (Consumer) programmer / game designer Larry Kaplan departed the company.

August: Atari (Consumer) chip design engineer Doug Neubauer departed the company (to Hewlett-Packard). (Compute! #3 Mar/Apr 80 p75)

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 Ave., Sunnyvale CA, previously Atari's pinball manufacturing plant, was repurposed for 400/800 computer line manufacturing.

September 4: The New York Times reported on p. 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: Atari (Consumer) programmers / game designers David Crane, Alan Miller and Bob Whitehead all departed the company. (Together the three would establish Activision, Inc. on 10/1/79.)

September: An Atari computer running Star Raiders was shown by Ludwig Braun at an "education-and-computers" conference. (cc 6/80 p34)   WHAT CONFERENCE????

September 19: The U.S. Federal Communications Commission (FCC) adopted a new set of "Technical Standards for Computing Equipment" (FCC 79-555, 79 FCC 2d. 28). The new Class A (commercial) and Class B (residential) digital device standards were both less stringent than the earlier Type I standard which, among home computers released and announced to date, only the Atari 400/800 had succeeded in complying with. Atari, among others, would formally protest the new standards.

September 24: Shepardson Microsystems, Inc. (staff engineer Paul Laughton for SMI) completed the File Management System (FMS) for the Atari personal computers.

October: Steve Bristow, previously Atari VP Engineering and Plant Manager Pinball Production, became Atari VP Engineering, Consumer and Home Computer Division, replacing John Ellis who departed the company. Niles Strohl would be promoted to director of Consumer engineering, replacing Wade Tuma who departed the company. (Ellis and Tuma would together establish Compower Corp. on 5/19/80).

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 to Atari, resulting in about a 3-week delay in getting the computers into the marketplace." Electronic News, December 10, 1979, p. 83.

November: Conrad C. Jutson, previously of Texas Instruments, joined Atari (Consumer) as VP Sales & Marketing, Personal Computers, replacing Robert Hovee who departed the company. (TVDigest 1/21/80p14; Compute!s 1st Book p2 for date)

November?: Dale Yocum, previously of Telesensory, joined Atari (Consumer) to head a new application programmers group (non-game, non-systems software) as Applications Software Manager (personal computers). Yocum would report to director of software development George Simcock.

November: Atari shipped the 400 personal computer system (NTSC; 8KiB RAM) and, shortly thereafter, the 800 personal computer system (NTSC; 8KiB RAM), each boxed with the BASIC Computing Language cartridge (Atari BASIC by SMI) and the Atari BASIC (Wiley Self-Teaching Guide) book; the 800 additionally shipped with the 410 program recorder and the Educational System Master Cartridge (Dorsett Educational Systems), which each also shipped separately.
  "The first "real" consumer units were shipped in Nov. of '79 and were 400s
  to Sears followed very shortly by 800s." --Jerry Jessop

November 26: The US FCC had denied Atari's motion for a stay of the waiver given to Texas Instruments to sell an independent RF modulator for home comptuers & video games, saying Atari hadn't presented any new evidence. (TVDigest 11/26/79)

November/December?: Programmer Lane Winner, previously of Versatec, joined Atari (Consumer) as an applications programmer (personal computers). Winner would report to application programmers group manager Dale Yocum.

November/December?: For the 400/800 Atari shipped: Basketball, Video Easel (previously: Life), Super Breakout, and the Talk and Teach Courseware cassettes: U.S. History, U.S. Government, Supervisory Skills, World History (Western), Basic Sociology, Counseling Procedures, Principles of Accounting, Physics, Great Classics, Business Communications, Basic Psychology, Effective Writing, Principles of Economics, Spelling, Basic Electricity, Basic Algebra

December: "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. Sears is offering the Atari 400, priced at $549, through its catalog [1979 Wish Book pages 654-655], and is spot-marketing the machine in its retail stores throughout California and the Chicago area. In addition, the firm is selling the Atari 800, priced at $999.99, in its California stores, but not through the catalog, a Sears spokesman said." Electronic News, December 10, 1979, p. 83.

1980

January 5-8: At the Winter CES in Las Vegas, for the 400/800, Atari introduced the 825 printer, 830 modem, and 850 interface, introduced 3-D Tic-Tac-Toe, Star Raiders, and Calculator, and again promised Music Composer, Assembler Editor (previously: Assembler Debug), and Personal Finance (previously: Home Finance; never shipped). Atari announced a license agreement to market 8 investment-application programs designed by Control Data Corp. 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. (WSJ Jan8p37; TVDigest 1/14/80p13) Also, list prices for the 400 and 800 packages increased to US$630 and US$1,080 (up from US$550 and US$1,000).

January?: Atari shipped: Computer Chess, 3-D Tic-Tac-Toe, Star Raiders

January: Chris Crawford, previously an Atari (Consumer) game designer, transferred to the personal computer application programmers group (reporting

to group manager Dale Yocum).

January 21: Atari and Control Data announced an agreement whereby Atari computer systems could be repaired through the nationwide network of Control Data repair centers. Approximately 20 centers throughout the country were open; more were scheduled. (Dr. Dobb's Journal)

Winter: Atari shipped the 810 disk drive with Master Diskette (DOS I developed by SMI), and shipped the 820 printer. (US$449.95).

February 11: The Sears spring-summer catalog featured the Atari 400 at $549, and the Atari 800 at $999. (TVDigest 2/11/80p10)

March?: Atari shipped Music Composer.

March: Science Research Associates (SRA) 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).

April?: Tandy Trower, previously of WICAT, joined Atari (Consumer) as an evaluator of 3rd party software titles (personal computers). He was hired by Atari (Consumer) Manager of Software Planning (personal computers) Peter Rosenthal.

Spring: For the 400/800 Atari had shipped: An Invitation to Programming 1 (PDI; previously: Guide to BASIC Programming), Biorhythm, Hangman, Kingdom, Blackjack (6/1/80 price list)

May 19-22: Atari featured the 400/800 personal computer systems at the 1980 National Computer Conference at the Anaheim Convention Center, Anaheim CA. 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 version had shipped Oct. 1979.)

May/June?: John R. Powers, III, co-founder and previously of The Authorship Resource, Inc. (ARI; developers of software for the CyberVision home computer), joined Atari (Consumer) as director of software development (personal computers), in-part replacing George Simcock who departed the company (retired). (Powers was hired by VP engineering Steve Bristow.) Brian Johnston, previously Atari (Consumer) game developer (electronic toys & games), became Atari (Consumer) systems software manager (personal computers). Johnston and application programmers group manager Dale Yocum would both report to Powers.

June 15-18: At the Summer CES in Chicago, for the 400/800 Atari introduced: 815 dual disk drive with DOS 2.0D ($1499.95; never shipped), 822 printer ($449.95), and Light Pen (CX70; $74.95), and again promised the 825 printer ($999.95), 830 modem ($199.95), and 850 interface ($219.95). (CC Sep80p30; 6/1/80 price list) 400/800 software Atari announced or again promised (6/1/80 price list): Mortgage & Loan Analysis (Control Data), Bond Analysis (Control Data), Stock Analysis (Control Data), Stock Charting (Control Data), An Invitation to Programming 2: Writing Programs One and Two (PDI), An Invitation to Programming 3: Introduction to Sound and Graphics (PDI), Astrology (never shipped), Conversational French (Thorn EMI), Conversational German (Thorn EMI), Conversational Spanish (Thorn EMI), Mailing List, Touch Typing, Calculator, Graph It, Statistics I, Energy Czar, States & Capitals, European Countries & Capitals, TeleLink I (previously: Terminal Emulator), Space Invaders (title by Taito), Assembler Editor. Atari also previewed The Atari Accountant series (by BPI; would consist of: General Accounting System; Accounts Receivable System; Inventory Control Program; series never shipped).

Also, Atari modified the 800 computer package. The computer would now ship with one CX853 16KiB RAM module installed (previously: one CX852 8KiB RAM module); the 410 program recorder and Educational System Master Cartridge were removed from the package; the BASIC Reference Manual was added to the package.

The retail price remained US$1,080. The unchanged 400 computer package remained $630.

July: Engineer Larry Plummer, previously General Manager, Computer Products at Heathkit, joined Atari (Consumer) as personal computer systems director of engineering (replacing Atari (Consumer) director of engineering Niles Strohl in the role). Engineer Carl Goy would join Plummer in moving from Heath to Atari.

July: Electronics engineer and programmer Tim McGuinness, previously of Plantronics / Zehntel, joined Atari (Consumer) as a personal computer systems engineer.

Summer?: Atari (Consumer) game designer Carol Shaw departed the company.

August 19: Shepardson Microsystems, Inc. (staff engineer Paul Laughton for SMI) completed the File Management System (FMS) for Atari DOS II.

Summer/Fall: For the 400/800 Atari shipped: 822 printer, 825 printer, 830 modem, 850 interface, CX70 Light Pen, Assembler Editor (SMI), TeleLink I (original "small box" release with 1 hour of access to CompuServe), Space Invaders (original cassette release), States & Capitals, European Countries & Capitals, Mortgage & Loan Analysis, Energy Czar

September: Roger H. Badertscher joined Atari to be president of the new Personal Computer Division. Badertscher was previously VP and general manager of the microprocessor division of Signetics, an electronics semiconductor manufacturer. (InfoWorld 7/26/82p29 for date) Bruce W. Irvine would join Atari (Personal Computer) as VP software.

September: The Atari (Consumer) Software Support Group began offering telephone Customer Software Support for Atari 400/800 users. (AtariConnection v1n1p24)

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 400 computer. Or, free CX852 8KiB RAM module with purchase of 800 computer (which shipped with one CX853 16KiB RAM module installed).

October: Atari spun off a new Personal Computer Division from the Consumer Division. (BusWk 6/15/81 for date) Conrad Jutson, previously Atari (Consumer) VP Sales & Marketing for Personal Computers, became Warner Communications VP corporate planning. Peter Rosenthal, previously Atari (Consumer) manager of software planning (personal computers), became Atari (Personal Computer) director of marketing (replacing Jutson in the role, in part). Keith E. Schaefer joined Atari (Personal Computer) as National Sales Manager (replacing Juston in the role, in part). Brenda K. Laurel, previously Manager, Educational Product Design at The Authorship Resource, Inc. (ARI), joined Atari (Personal Computer) as Manager, Software Strategy and Marketing (replacing Rosenthal in the role). Tandy Trower, previously an evaluator of 3rd party software titles (personal computers), became an Atari (Personal Computer) product manager. Kevin McKinsey, previously Atari (Consumer) industrial desginer, would be Atari (Personal Computer) manager of industrial design and graphics.

October: Atari (Personal Computer) hired Ken (Charles) Balthaser, previously designer and programmer at The Authorship Resource, Inc. (ARI), as a consultant.

Fall?: Bill Kaiser, previously of Xerox, joined Atari (Personal Computer) as director of finance.

Fall: 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 Atari (Personal Computer) as Manager, Educational Software Products. He was hired by Atari (Personal Computer) director of marketing Peter Rosenthal. Chris Bowman, previously director of media services at the Harvard University Graduate School of

Education, would join Atari (Personal Computer) as national manager of educational sales, as Atari would take the sale of Atari personal computers and services to the educational community in-house (previously: outsourced to Science Research Associates (SRA)).

December: Gene B. Rosen joined Atari as VP of engineering for the Atari Computer Division (replacing Bristow in the role). (ComputerWorld 3/16/81p74)

December: Atari (Personal Computer) software consultant Ken (Charles) Balthaser joined the company as an applications programmer (reporting to applications softare supervisor Dale Yocum).

December: At Atari (Personal Computer), Applications group programmer Chris Crawford (having completed Energy Czar and SCRAM) was promoted to supervisor of the Software Development Support Group.

Atari reportedly lost $10 million on sales of computer equipment of $13 million in 1980 (InfoWorld 9/14/1981)

Atari had sold 35,000 400/800 computers through 1980. (source?)

1981

January 1?: The Atari Personal Computer Division would now be known as the Atari Computer Division.

January/February: First issue of A.N.A.L.O.G. 400/800 Magazine, published by Lee Pappas and Mike DesChenes. 4000 copies printed.

January 6: Warner Amex Cable Communications, Atari, and CompuServe jointly announced the availability of the CompuServe information service to Columbus OH 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 CES in Las Vegas Atari announced that the 400 would now ship in two versions: original 8KiB RAM version at the new list price of US$499.95 (previously: US$630), or new 16KiB RAM version for US$630. Atari introduced/featured (CC Mar81p54; Analog#1): Asteroids, Missile Command, SCRAM (A Nuclear Power Plant Simulation), Atari PILOT, Conversational Spanish (Thorn EMI), Personal Fitness Program (ultimately released via APX), Atari Accountant: General Accounting System (BPI; "Accounting Primer Manual" by Arthur Young & Company; never shipped), Atari Accountant: Accounts Receivable System (BPI; never shipped), Atari Accountant: Inventory Control Program (BPI; never shipped), Atari Word Processor. Also announced or again promised (1981 Software Catalog): An Invitation to Programming 2, An Invitation to Programming 3, Astrology (never shipped), Personal Financial Management System (replacement for the canceled Personal Finance). Again promised (Analog #1): Conversational German, Conversational French. Privately announced (Analog#1): Conversational Italian

January: Atari (Computer) marketing established a Users' Group Support Program; Earl Rice would be Marketing Manager, Users' Group Support Program.

Winter: Atari released Master Diskette II (DOS II version 2.0S developed by SMI/Atari).

Winter: Atari shipped: Bond Analysis, Stock Analysis, Stock Charting, Mailing List, Touch Typing, Graph It, Statistics I (Analog#2p47)

February 2: Atari announced that Rigdon Currie, previously of Xerox subsidiary Diablo, had joined Atari as VP marketing for the Computer Division. Roger Badertscher remained president of the Computer Division. (Compute!#11p166). Peter Rosenthal, previously Atari (Computer) director of marketing, became

Atari (Computer) VP business planning (new position).

February: Fred Thorlin joined Atari (Computer) as director of software acquisitions (new position, hired by Atari (Computer) VP software Bruce Irvine).

February: Mark A. Lutvak, previously product program general manager at Memorex, joined Atari (Computer) as director of product management, replacing Stephen Davis who departed the company.

February: Andrew Soderberg, previously a partner at a computer retailer called Computer Connection, joined Atari (Computer) as an assistant product manager. He had been hired by product manager Tandy Trower.

February?: Paul Laughton, previously Shepardson Microsystems, Inc. (SMI) staff engineer, joined Atari (Computer) as a systems software programmer (hired by manager of systems software Brian Johnston).

February 25: The source code to Atari BASIC (including Atari OS FPP), the FMS component of Atari DOS 2.0S (DOS.SYS), and the Atari Assembler Editor were purchased from Shepardson Microsystems, Inc. (SMI) by Optimized Systems Software (OSS), headed by former SMI employees Bill Wilkinson and Mike Peters.

March: Jim Tittsler, previously Director of Software Development at International Remote Imaging Systems (and before that a Software Engineer at Heath Zenith (Heathkit)), joined Atari (Computer).

April 2-30: Atari-sponsored dealer promotion: Free $100 subscription to The Source with purchase of Atari Communicator System: choice of 400 or 800 computer with 850, 830, and TeleLink I.

April 3-5: At the 6th West Coast Computer Faire, San Francisco Civic Auditorium and Brooks Hall, Atari (Computer) announced the Atari Software Acquisition Program (ASAP), which would involve the creation of ASAP regional centers where qualified developrs could work with Atari equipment and receive technical assistance (the first ASAP center was expected to open in the Sunnyvale CA area in mid-May), and Atari Program Exchange (APX), a free quarterly mail-order catalog of user-written software (first edition due for publication in May). 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. Bruce W. Irvine was Atari (Computer) VP software; Fred Thorlin was Atari director of software acquisitions (ASAP and APX) (see Compute! #12 5/81 p150). The event also featured Atari's "first annual" invitational hospitality suite for Atari computer users' group officers and their guests. About 20 persons attended, on behalf of about 30 total groups registered with Atari Users' Group Support.

April 3?: Dale Yocum, previously Atari (Computer) applications software supervisor, had become APX manager, software acquisition department (ASAP and APX). Paul V. Cubbage, previously of The Wollongong Group, joined Atari (Computer) as Manager, Software Review, Software Acquisition Department (ASAP and APX). Fred Thorlin remained Atari (Computer) director of software acquisitions (ASAP and APX). Ken Balthaser, previously an Atari (Computer) applications programmer, had been promoted to manager of applications software development (replacing Yocum in the role).

April 3-5: Also at the West Coast Computer Faire, Optimized Systems Software (OSS) introduced BASIC A+, CP/A (would ship as: OS/A+), and EASMD (enhanced, disk-based versions of Atari BASIC, Atari DOS 2.0S and Atari Assembler Editor, respectively).

April 23-24: An Atari Seminar for developers. The Atari Software Development Support Group included: Chris Crawford (graphics), Lane Winner (BASIC, cassette), Mike Ekberg (OS, DOS), Kathleen Armstrong (Kathleen Pitta), Jim Cox (graphics & utilities), Gus Makreas (assembly language), John Eckstrom (pascal)

Spring: First issue of The Atari Connection, the glossy magazine published by Atari (Computer) in support of the 400/800.

May 1-August 31: Atari offered a free CX853 16K RAM Module ($99.95) with purchase of an Atari 800 personal computer; offered the 825 printer at $800 instead of $1000; and offered the 850 interface at $170 instead of $220

May 4-7: At the National Computer Conference in Chicago, Atari announced that the 8KiB Atari 400 was being discontinued and that the price on the 16KiB version was being reduced to US$399 (was US$630); also, the Atari BASIC cartridge and Atari BASIC (Wiley Self-Teaching Guide) book would no longer be included with the now "mass market packaged" 400. Other price reductions: CX852 8KiB RAM module now US$49.95 (was US$124.95), CX853 16KiB RAM module now US$99.95 (was US$199.95), 820 printer now US$299.95 (was US$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). Also introduced: Conversational Italian (by Thorn EMI). 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).

May: Jon D. Ebbs joined Atari, where we would be VP of Consumer Product Service. By January 1982, in support of both Atari Consumer and Atari Computer division products, the unit would establish a new national network of Atari Factory Authorized Service Centers ("Atari Service Factory Authorized Network"). The new network would replace Control Data Service Centers for Atari computer repairs.

Month?: The Atari Software Development Support Group released De Re Atari. Atari made the book available to registered developers.

Summer?: Atari created the Atari Institute for Educational Action Research, which began awarding major 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. Founded and directed by Dr. Ted M. Kahn, Ph.D. More than US$250,000 would be awarded in the program's first year.

Summer?: Barry Berghorn, previously of Memorex, joined Atari (Computer) as sales & marketing VP, replacing Rigdon Currie who departed the company. (WeeklyDigest 1981p.dxxx/530)

Summer?: J. Peter Nelson joined Atari (Computer) as public relations manager.

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 50,000 400/800 computers to date. (InfoWorld 9/14/1981)

Summer: Atari shipped: Conversational Spanish, Conversational French, Conversational German, An Invitation to Programming 2, An Invitation to Programming 3, SCRAM (A Nuclear Power Plant Simulation), Missile Command, Asteroids, Atari Word Processor, plus TeleLink I new "large box" version with one hour of time on each of: Dow Jones Information Service, The Source, CompuServe

Summer: First edition of the Atari Program Exchange (APX) catalog, a component of the Atari Software Acquisition Program (ASAP). See http://www.atariarchives.org/APX/. Listings for the 400/800: Newspaper Route Management Program, The Computerized Card File, Text Formatter (FORMS), Lemonade, Mugwump, Avalanche, Outlaw/Howitzer, Preschool Games, Roman Checkers, Space Trek, Castle, Wizard's Gold, Sleazy Adventure, Alien Egg, Chinese Puzzle, Sultan's Palace, Anthill, Centurion, Tact Trek, Comedy Diskette, Graphics/Sound Demonstration, FIG FORTH (this version never shipped), Sound Editor, BASIC Program Compressor (MASHER), BASIC Cross-Reference Utility (XREF), BASIC Renumber Utility (RENUM), Disk Fixer (FIX),

Variable Changer, Character Set Editor, Extended WSFN, Supersort. 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 CA

August 1: In the UK, Atari consumer products distributor Ingersoll Electronics shipped the Atari 400/800 computers (new UK versions for PAL-I; 345 pounds / 645 pounds incl. VAT; both with 16KiB RAM).

August: James Alan Cook (Jamie Cook) joined Atari as VP and Counsel of Atari's Computer division.

August 26: Date of the internal Atari document "Z800 Product Specification, Revision 1" reflecting early work that would lead to the release of the 1200XL computer.
See: http://www.atarimuseum.com/computers/8BITS/1200xl/1200xl.html

September 1: New production Atari 810 disk drives would contain an External Data Separator Board. (810 FSM p.1-9)

September 1-October 31: Atari offered a free Atari Word Processor with the purchase of an Atari 800, 810 disk drive and two additional 16K RAM Memory Modules.

September 10-12: Atari distributor Ingersoll Electronics introduced the Atari 400/800 at The 4th Personal Computer World Show at the Cunard Hotel, Hammersmith, London.

October: Dr. Alan Kay, previously a Xerox Fellow at the Xerox Palo Alto Research Center (PARC), joined Atari (Corporate) in the new position of VP/Chief Scientist. (InfoWorld 5/21/84 for date) Kay would be responsible for the new Atari Corporate Research division, which would include the existing Atari research & development unit, Cyan Engineering, as well as the existing Warner Communications L.A. Lab research & development unit located at 3701 Oak Street, Burbank, CA (on the campus of Warner Bros. Studios), which would now be known as the Atari L.A. Lab. Engineer Steven J. Davis would remain director of the L.A. Lab, now as Atari director of advanced research.

October: As part of the Atari Software Acquisition Program (ASAP), Atari opened its first Regional Software Acquisition Center, managed by Steven H. Gerber, in the 4,000 square-foot location that also housed the Atari Program Exchange (APX): 155 Moffett Park Dr, Sunnyvale CA

October: Atari (Computer) software product manager Tandy Trower departed the company. (for Microsoft)

October 15-18: The Northeast Computer Show (NCS) at the Hynes Auditorium, Boston MA was attended by 50,000. For the 400/800 Atari featured Missile Command, Asteroids, the Atari Word Processor, Personal Financial Management System, States & Capitals, Conversational Italian, Conversational French, Conversational Spanish. Atari director of business planning and development Peter Rosenthal was a featured panelist at the show, alongside Microsoft president William H. Gates, Commodore president H.E. James Finke, Radio Shack VP Jon Shirley, IBM Personal Computers director Philip Estridge, and Apple Computer president A.C. (Mike) Markkula.

October 19: InfoWorld reported that a new 400/800 home accounting system (would ship as: The Bookkeeper) would replace the unshipped Atari Accountant (which would have required the unshipped and recently canceled 815 disk drive). (p37)

October 20: At Atari (Computer), Brian Johnston, previously manager of systems software, had become a product coordinator. Lou R. Tarnay, previously of GTE Sylvania, had joined the company as systems development manager (replacing Johnston in the role). Direct reports to VP software Bruce Irvine now included: T.J. Gracon (software product acquisition (ASAP)), P.E. Liniak (product coordination), Fred Thorlin (product review and research (APX)), J.P. Romanos (product test), John Powers (applications & development systems),

Tarnay (systems development), vacant (international). Reports to Thorlin still included product review manager Paul Cubbage and APX manager Dale Yocum. Reports to Powers still included Ken Balthaser (applications) and Chris Crawford (development support). Reports to Tarnay included Paul Laughton (operating systems supervisor).
https://archive.org/details/AtariHarryStewart

October 20: Steven T. Mayer, Jay G. Miner, Douglas G. Neubauer, and Joesph C. Decuir were awared U.S. patent 4,296,476 for a "Data processing system with programmable graphics generator" (the Atari 400/800 hardware platform).

Fall: APX Catalog introduced: Data Management System, Financial Asset Management System, Decision Maker, Banner Generator, Personal Fitness Program (previously announced for Atari's main 400/800 product line), Blackjack Tutor, Mapware, Video Math Flashcards, Dice Poker, 747 Landing Simulator, Eastern Front (1941), CodeCracker, Domination, Terry, Bumper Pool, Reversi, Minotaur, Lookahead, Babel, Wizard's Revenge, Chameleon CRT Terminal Emulator, Diskette Librarian, Disk Fixer (FIX) Rev. 2, BASIC Utility for Renumbering Programs (BURP), BASIC Utility Diskette, Screen Dump Utility, Load 'n Go, BLIS, Developer's Diskette. 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).

Fall: At Atari (Computer): Keith Schaefer was promoted from National Sales Manager to sales VP (WeeklyTVDigest 1981p.dcclxv) and Ken Wirt, previously Associate Director of Research at the Public Broadcasting Service (PBS), joined the company as VP marketing, together replacing VP sales & marketing Barry Berghorn who departed the company.

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 Mar82p71)

Fall: For the 400/800 Atari shipped the Starter Kits The Communicator, The Entertainer, The Programmer, and The Educator, and shipped: Conversational Italian, Calculator, Atari PILOT (Educators' Package and Home Package). Space Invaders, previously released on cassette, was now re-released on cartridge.

Fall: In West Germany, Atari Elektronik Vertriebsgesellschaft mbH shipped the Atari 400/800 (new PAL versions for PAL B).

November 1: New production Atari 810 disk drives would ship with the Revision C ROM and with DOS II version 2.0S (replacing the original Atari DOS I). (Antic Oct.82;ConnectionV2n2p1-2)

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.82) (PAL and UK 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.82;ConnectionV2n2p1-2)

November 17-20: Atari consumer products distributor Ingersoll Electronics featured the Atari 400/800 at Compec '81 (Computer Peripheral and Small Computer Systems Exhibition), Grand Hall, Olympia, London.

November 25: Speciality Camps Corp. was established by Herbert Resnick in New York. (mc suspects this was established specifically for a joint summer computer camp venture with Atari. Linda S. Gordon may have already joined Atari as VP special projects (assistant to the president).)

December: Chris Crawford, previously Atari (Computer) Software Development Support Group supervisor, became Atari (Corporate) Manager, Games Design Research Group, Atari Corporate Research.

December: Bill Carris, previously manager of technical services, was now Atari (Computer) national sales training manager. (InfoWorld)

December 30: Atari said that it would cut the retail price for the 800 home computer (with 16KiB RAM and newly "mass market packaged") to US$899 from US$1,080. Other prices were increased: The Entertainer to US$110 and The Educator to US$166.

Atari claimed to have sold 300,000 400/800 computers in 1981. (InfoWord 6/14/82 p. 57)

The installed base of Atari 400/800 computers was estimated by Future Computing, Inc. to be just over 100,000. (January 1983)

1982

January 1?: The Atari Computer Division would now be known as the Atari Home Computer Division, and it adopted the advertising slogan, "We've brought the computer age home."

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 CES in Las Vegas Atari introduced Pac-Man (title by Namco), Centipede, Caverns of Mars (which had only just been added to the APX product line as of winter 1982; it would be the first APX title to be transferred into Atari's main product line), The Bookkeeper, and The Home Filing Manager. Now promised for mid-1982: Personal Financial Management System. Following the 400 packaging theme introduced in 1981, the 800, 810, and 410 would now ship in silver/full color packaging. Previewed at the show: the Atari Supergame System / Video System "X" (would ship as the 5200). Dale Yocum was APX Manager.

January 16: At the first Atari Star Awards banquet, held at San Francisco's Maxwell's Plum restaurant in Ghiradelli Square, the Atari Software Acquisition Program (ASAP) awarded the Star Award Grand Prize and US$25,000 to Fernando Herrera for his APX title, My First Alphabet. Star Award of Merit winners: Ronald Marcuse & Lynn Marcuse, Sheldon Leemon, Greg Christensen

January 19-22: Atari featured the 400/800 at the third annual Which Computer? Show, National Exhibition Centre, Birmingham, England.

January 25: Internal Atari memo by Harry Stewart reflected that the project previously known as "Z800" was now known as: "Sweet-16"
See: https://archive.org/details/AtariHarryStewart

Winter: APX Catalog introduced: Bowler's Database, Family Cash Flow, Weekly Planner, Enhancements to Graph It, Hydraulic Program (HYSYS), Keyboard Organ, Morse Code Tutor, Player Piano, Atlas of Canada, Hickory Dickory, Letterman, Mathematic-Tac-Toe, My First Alphabet, Number Blast, Presidents of the United States, Quiz Master, Stereo 3-D Graphics Package, Attank!, Blackjack Casino, Block 'Em, Caverns of Mars (would be available from APX only briefly before moving to Atari's main product line), Dog Daze, Downhill, Memory Match, Pro Bowling, Reversi II, Solitaire, Source Code for Eastern Front (1941), Space Chase, Atari Program-Text Editor (also released in Atari's main product line in package with Macro Assembler), Dsembler, Extended fig-FORTH, Insomnia (A Sound Editor), Instedit, Supersort Rev. 3, T: A Text Display Device, Ultimate Renumber Utility, Word Processing Diskette (Text Formatter (FORMS) + Atari Program-Text Editor). APX sales via CompuServe MicroNET had been discontinued. Dale Yocum was APX Manager.

Winter?: Atari shipped Atari Microsoft BASIC 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)

Winter: Ted Richards' name first appeared as editor of The Atari Connection magazine (replacing Atari (Home Computer) marketing communications manager Sally Bowman in the role).

February: New production Atari 810 disk drives would ship in the significantly-revised "810 Analog" design. (Happy Computers ads for date, e.g., Analog#18p14)

February 18: The new Atari International (U.K.) would replace Ingersoll Electronics as Atari 400/800 distributor in the UK.

March 12: At Atari (Home Computer) in software, Lou Tarnay remained systems development manager and had two direct reports: operating systems supervisor Paul Laughton and telecommunication supervisor John Curran.
https://archive.org/details/AtariHarryStewart

March: Bill Carris, previously Atari (Home Computer) training director, would become Atari (Home Computer) director of software marketing (replacing Brenda Laurel who transferred to the new Atari Sunnyvale Research Lab).

March: Atari announced that it would be sponsoring summer Atari Computer Camps for students, 10 to 18 years old, who were interested in computers. The camps were "the first such effort by a major computer manufacturer." Eight camp sessions were planned, two in each of four locations. Linda Gordon was Atari VP of special projects; Atari (Home Computer) Educational Software Products Manager Robert A. Kahn was named Atari Computer Camps Curriculum Director. Ray Kassar remained Atari chairman and CEO. (InfoWorld 3/15/82p43; Interface Age)

March 19-21: At the 7th West Coast Computer Faire in San Francisco, Atari's held their second annual invitational hospitality suite for Atari computer users' group officers and their guests. About 80 persons attended, on behalf of 15 of the 200 total groups registered with Atari Users' Group Support. (AtariConnection v2n2p1) Also at the Faire, Percom introduced the RFD40-S1 and RFD40-A1 floppy disk drives (the first alternatives to the Atari 810), announced the RFD44-S1 and RFD44-A1, and promised four higher-capacity (80 track) drives (never introduced).

March 26: Atari established the subsidiary, Atari Special Projects, Inc., for their Atari Computer Camps venture with Speciality Camps Corp.

Spring: APX Catalog introduced: Family Budget, Diskette Mailing List, Isopleth Map-Making Package, RPN Calculator Simulator, Advanced MusicSystem, Sketchpad, Cubbyholes, Musical Computer--The Music Tutor, Starware, Wordmaker, Block Buster, Atari Pascal Language System, Extended fig-FORTH Rev. 2, GTIA Demonstration Diskette, Instedit (Microsoft BASIC version), Keypad Controller, Speed-O-Disk. APX also introduced the book, De Re Atari, written by staff in the Atari Software Development Support Group: Chris Crawford wrote Sections 1-6 and Appendices A & B; Lane Winner wrote Section 10 and Appendix D with assistance from Jim Cox; Amy Chen wrote Appendix C; Jim Dunion wrote Sections 8-9; Kathleen Pitta (Kathleen Armstrong) wrote Appendex E; Bob Fraser wrote Section 7; Gus Makreas prepared the Glossary. Dale Yocum was APX manager.

Spring?: Dale Yocum, previously APX Manager, became Atari (Corporate) research engineering manager. Atari (Home Computer) director of product review and research (including APX) Fred Thorlin would additionally become APX general manager (replacing Yocum in the role).

April 7: Date of first draft of the Atari Sweet-16 Home Computer Product Specifications document. Specific computer models planned: "1000" (16KiB; later: "1200"; never shipped) and "1000X" (64KiB; later: "1200X"; would ship as: 1200XL)
See: http://www.landley.net/history/mirror/atari/museum/sweet16.html

April?: Atari shipped Caverns of Mars (on disk).

April: Thomas M. McDonough joined Atari as SVP of sales and marketing in Atari's home computer division. (NYT 12/19/82 for date) (new position; Keith

Schaefer remained VP sales and Ken Wirt remained VP marketing)

April: First issue of Antic, The Atari Resource magazine, published by James Capparell.

April/May: For the 400/800 Atari shipped, then promptly pulled from the market for further development, Personal Financial Management System. (see Analog #9p118, plus C017535revC)

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 CA, 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 7/12/82 p14-16)

May: Atari shipped Pac-Man (Roklan). (Analog#6p13)

May: Ken Wirt remained Atari (Home Computer) VP marketing.

May: As part of the Atari Software Acquisition Program (ASAP), Atari opened its second Regional Software Acquisition Center, managed by Jerry Connelly, at: 57 John F Kennedy St, Cambridge MA. Bruce Irvine remained Atari (Home Computer) VP software. While plans for additional ASAP centers were not announced, Atari was considering opening a "satellite facility" in New York City in the near future. (InfoWorld 5/24/82 p9)

May 25: Paul Cubbage remained Atari (Home Computer) Manager, Product Review.

May/June?: Robert A. Kahn, previously Atari (Home Computer) Educational Software Product Manager, became Atari Director of Special Projects (Atari Computer Camps and Club Med initiatives) (Linda Gordon remained Atari VP special projects). Dr. Sueann Ambron, Ed.D, previously assistant professor of educational psychology at Stanford University, joined Atari (Home Computer) as Manager of Software Products for education products (replacing Kahn in the role).

June 6-9: At the Summer CES in Chicago Atari introduced Atari Speed Reading (by Learning Multi-Systems; US$74.95), announced Music Tutor I (would ship as: AtariMusic I), Juggles' Rainbow (by The Learning Co.), Juggles' House (by The Learning Co.), and TeleLink II (US$79.95; never shipped as a standalone release; would ship as part of Communicator II kit only), and introduced three new kits: Bookkeeper (including new CX85 Numerical Keypad), Communicator II (new 835 modem with TeleLink II) (US$279.95), Home Manager. The APX title, My First Alphabet would be re-released as part of Atari's standard product line. Again promised, now to ship winter 1983: Personal Financial Management System. Atari also twice announced new suggested retail prices for the 400 (previously: US$399) at the show: first US$349 (CC Oct82 p180; InfoWorld 6/28), then US$299 (Merch Jul82 p43; InfoWorld 7/26p21). Atari also introduced the Electronic Retail Information Center (ERIC; an Atari 800 home computer linked to a videodisc player) for retailers. Keith Schaefer was VP of sales for Atari's Home Computer division.

June 8: At the Summer CES in Chicago, Atari introduced the 5200 Home Entertainment System (later dubbed the SuperSystem). While the 5200 required unique game cartridges and controllers, the internal hardware was very closely related to that of the 400/800 computers.

June: Atari shipped Centipede. (Analog#6p13)

June: Atari president Home Computer Division Roger Badertscher resigned from company. (NYT 8/25/82) Atari VP research and product development Steve Mayer would serve as acting president of the division.

June 28: John Skruch joined Atari (Home Computer) as a software product engineer.

Month?: Atari (Home Computer) director of software development John Powers departed the company (to Convergent Technologies).

July 14: In what was believed to be the largest single order for home computers by a school system, Dade County, Fla., 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 McDonough, SVP of sales and marketing for Atari's Home Computer Division.

July: The Atari Corporate Research unit established the Atari Cambridge Research Laboratory at Five Cambridge Center, 8th floor, Cambridge MA. The lab's Director would be Cynthia Solomon, previously VP, Research & Development/Founder of Logo Computer Systems, Inc.

July: Chris Horseman, previously of Centaursoft (and before that, Thorn EMI), joined Atari (Home Computer) as VP software engineering, replacing Bruce Irvine who departed the company. Irvine and fomer Atari president Home Computer Division Roger Badertscher would co-found Mindset Corporation on 9/27/82.) John Powers, previously applications & development systems manager, would (again) become director of software development.

July 26: InfoWorld estimated between 250,000 and 300,000 Atari 400/800 computers had been sold to date.

Summer: APX Catalog introduced: Bowler's Database Rev. 2, Data Base/Report System, Family Vehicle Expense, Recipe Search 'n Save, Calculator (moved from Atari's main product line), Astrology, Blackjack Tutor Rev. 1.1, Going to the Dogs, Algicalc, Elementary Biology (by MECC), Frogmaster, Instructional Computing Demonstration (by MECC), Metric and Problem Solving (by MECC), Music I--Terms & Notation (by MECC), Polycalc, Three R Math System, Block 'Em Rev. 2, Castle Rev. 1.1, Checker King, Galahad and the Holy Grail, Jax-0, Jukebox #1, The Midas Touch, Pushover, Rabbotz, Salmon Run, Seven Card Stud, BLIS Rev. 1.1, Cosmatic Atari Development Package, Insomnia (A Sound Editor) Rev. 1.1, Instedit Rev. 1.1, Microsoft BASIC Cross-Reference Utility, Player Generator, Utility Diskette II. Fred Thorlin was APX general manager; product review: Paul Cubbage.

Summer: First year of Atari Computer Camps, held at 3 locations: "Camp Atari-- San Diego" at the University of San Diego (CA), "Camp Atari--Ashville" at the Asheville School (Asheville, NC), and "Camp Atari--East Stroudsburg" at East Stroudsburg State College (PA). (Camp was canceled at the fourth announced site, "Camp Atari--Sheboygan" at Lakeland College in Sheboygan WI.) The camps were managed for Atari Special Projects, Inc. by Specialty Camps, Inc.

Summer: Dave Stubben, previously Atari (Coin-Op) director of engineering, became Atari (Home Computer) VP engineering, replacing Gene Rosen who departed the company.

Summer: Chris Bowman, previously Atari (Home Computer) national manager of educational sales, had become Atari (Home Computer) education marketing manager. Jim Paige was Atari (Home Computer) national education sales manager (Atari Connection Summer82 p23) (having replaced Bowman in the role).

Summer: The Atari Home Computer Division's Software Development Support Group had been renamed to: Atari I/O. (AtariConnection Sum82p2)

August 11: Approximately 1,370 Atari Home Computers and peripherals, valued at more than $3 million, had been ordered by the Department of Defense Dependents Schools (DoDDS) under a competitive Request for Proposal, it was announced by Thomas M. McDonough, SVP of sales and marketing for Atari's Home Computer Division.

August: Industrial designer Tom Palecki, previously of Xerox, joined Atari (Home Computer). (He would report to industrial design manager Kevin 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 800 with

peripherals, and a Centipede coin-operated game.

August 24: John C. Cavalier was named Atari president Home Computer Division (replacing the departed Roger Badertscher). Cavalier was previously VP and general manager of American Can's Dixie and Dixie/Marathon unit, makers of consumer paper products.

August/September?: Atari (Home Computer) public relations manager J. Peter Nelson departed the company.

August 29-December 31: "Atari Announces Discount Fares to the Computer Age. Save up to $60" promotion. For the purchase of an Atari 400, Atari offered a rebate of $10 for each purchase of up to six additional Atari computer products.

September 3-5: Atari exhibited in the Technology Exposition at the 'US' Festival held at Glen Helen Regional Park, CA. (SoftSide #36p14-16)

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 400/800 at the 5th Personal Computer World (PCW) show at the Barbican, London.

September: At Stevens Institute of Technology in Hoboken, NJ, the 80 freshmen in Science and in Systems Planning were required to purchase an Atari 800. (SoftSide #43p26)

September: Atari Corporate Research established a New York City Research Laboratory, headed by Atari VP research and product development Steven T. Mayer, and located in office space at: 300 E 42nd St, New York NY. Dedicated to the exploration of microprocessor-based products in electronic publishing and transactional services for home computers, the Atari NY 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. Lab personnel would eventually include: manager of hardware engineering Gregg Squires (previously of Racal Vikonics), Robert (Bob) Card, Steven Ray, Joel Moskowitz, Philippe des Rioux, Glenn Boles, Risa Rosenberg

September 22-October 1: At the SICOB (Salon international d'Informatique, telematique, Communication, Organisation du bureau et Bureautique) show in Paris, P.E.C.F. Atari launched the 400 and 800 in France.

September 29: Date of a late draft of the internal Atari document, "Sweet-16 Product Specification". Specific computer models indicated: "1200" (16KiB; earlier: "1000"; never shipped) and "1200X" (64KiB; earlier: "1000X"; would ship as: 1200XL), with both models now sharing the same case design. Plans now called for manufacture of only the "1200X".
http://www.atarimuseum.com/computers/8BITS/1200xl/1200xl.html

September 29: Atari had announced it had formed Atari Semiconductor Group (ASG), to be responsible for all the company's semiconductor design, development and test operations. (NYT) Gary J. Summers, most recently an independent consultant for several firms including Atari since 1981, and before that head of Commodore Semiconductor Group (CSG, the former MOS Technology) had written the business plan for the new division, and had joined Atari as VP and General Manager ASG. Carl Nielsen would remain director of LSI design and test, ASG.

October 11: Atari had annouced plans to produce home computers in Hong Kong and Taiwan, beginning January 1983. Production would take place at facilities already producing games for Atari. Atari-Wong, the company's joint venture in Hong Kong, would enlarge employment from 700 to 1000. Atari said computers produced in the Far East would be marketed there, while the U.S. market would be served from its home facilities in Silicon Valley. (Electronics News 11-Oct-82)

October: Atari shipped the 5200 SuperSystem.

October: Atari announced that as of October 22, new 800 computer systems would be sold with two "free" 16KiB RAM modules for a total of 48KiB, for the unchanged list price of $899. The new 800 systems would no longer ship with Atari BASIC, the BASIC Reference Manual, nor the Atari BASIC (Wiley Self-Teaching Guide) book. Keith Schaefer remained VP sales for the home computer division.

October: At Atari International (U.K.) Inc., Atari established a Software Development Centre for a new Software Development Group. Steve Gerber, previously manager of the Atari Regional Software Acquisition Center in Sunnyvale CA, became director of the Atari Software Development Group in the UK. Gerber would be supported by development manager John Norledge and the group's administrator, Frances Conolly. (I/O #4 p4) APX operations were moved from 155 Moffett Park Dr, Sunnyvale CA to 3281 Scott Blvd, Santa Clara CA. The two Atari Software Acquisition Program (ASAP) Regional Software Acquisition Centers (at the former APX headquarters and at 57 John F Kennedy St, Cambridge MA) were shut down, and Atari (Home Computer) director of software product acquisition T.J. Gracon departed the company. Fred Thorlin, previously Atari (Home Computer) director of product review & research and APX general manager, became APX director.

Fall: APX Catalog introduced: Family Cash Flow Rev. 2, Message Display Program, Stock Management, Text Analyst, Calculus Demon, Counter, Easygrader, Flags of Europe, Math*UFO, Spelling Genie, Word Search Generator, Cribbage, Dog Daze Rev. 1.1, Mankala, Snark Hunt, Dunion's Debugging Tool (DDT), FORTH Turtle Graphics Plus, fun-FORTH, Keypad Controller Rev. 2, Mantis Boot Tape Development System, Mapmaker. Fred Thorlin was APX general manager; product review: Paul Cubbage.

Fall: For the 400/800 Atari announced (see Analog#9p117-118): Galaxian (title by Namco), Defender (title by Williams), Qix (title by Taito), Dig Dug (title by Namco), E.T. Phone Home!, Eastern Front (1941) (updated version on cartridge; previous version released by APX), Star Trux (never shipped), Superman III (never shipped), Family Finances (enhanced combination of the two APX titles, Family Cash Flow and Family Budget; replacement for the canceled Personal Financial Management System), Timewise (RLM Micro Systems for Atari; based on Weekly Planner from APX), AtariWriter, AtariMusic I (previously: Music Tutor I), Microsoft BASIC II. New hardware announced: 1020 printer/plotter, 1025 printer, trakball controller (CX80?), 1010 program recorder. Again promised: Atari Speed Reading (to ship imminently), Juggles' Rainbow, Juggles' House

November: Atari began producing new 810 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 83) Technical documentation would refer to the new design as the "810T Analog".

November: Engineer Rich Pasco, previously a researcher at Xerox Palo Alto Research Center (PARC), joined Atari (Home Computer) as Manager, VLSI Development.

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 Junior" video games for Atari's Home Computer. John Cavalier remained Atari president Home Computer Division; Keith Schaefer remained Atari Home Computer Division VP sales.

November 16-19: Atari featured the 400/800 at Compec '82, Olympia hall, London.

November 18-20: At the Amusement & Music Operators Association (AMOA) show in Chicago, Atari introduced the Atari Coin Executive coin accounting system (ACE; never shipped), which incorporated an Atari 800.

November/December?: Atari Computer Camps literature for 1983 ((c)1982) mentioned: Atari VP/Chief Scientist Alan Kay, Atari Computer Camps Executive

Director and VP Special Projects Linda 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 Kahn, Atari Computer Camps Personnel and Camper Records Director Flip Shulman, and Computer Camps Site Selection and Facility Director Tony "Big T" Sparber.

December 1: Fred Thorlin was APX Director (previously: APX General Manager).

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 Tarnay was director of software development (reporting to VP software engineering Chris Horseman). Direct reports to Tarnay included Paul Laughton (systems products), John Curran (communications products), Ken Balthaser (entertainment and education products), Joseph B. Miller (advanced development). Reports to Laughton included Scott Scheiman (operating systems development) and Jim Cox (advanced consumer product development). Reports to Balthaser included Clyde Grossman (entertainment product development) and Vincent H. Wu (amusement product development).
https://archive.org/details/AtariHarryStewart

December 13: Atari introduced the 1200XL home computer at a press conference at the Plaza Hotel in New York City. The list price for the 1200XL would be "well under $1,000." 400/800/1200XL peripherals introduced: 1010 program recorder, 1020 printer/plotter, 1025 printer. The Programmer kit was updated to include the new Inside Atari BASIC book (instead of Atari BASIC (Wiley Self-Teaching Guide)); the Communicator II kit was again promised; the Entertainer kit was updated to include Pac-Man (instead of Missile Command), and the Home Manager kit was again promised, now to include Family Finances (instead of the canceled Personal Financial Management System). In 400/800/1200XL software Atari introduced Galaxian and Defender (both to ship imminently) and again promised: E.T. Phone Home!, Dig Dug, Qix, Donkey Kong, Donkey Kong Junior, Family Finances, Timewise, AtariWriter, AtariMusic I, Juggles' Rainbow, and Juggles' House. Keith Schaefer was VP of sales and John Cavalier was Atari president Home Computer Division.

December 14: Date of internal memo from Atari consultant Harry Stewart titled "6402 Floppy Disk Controller Protocol" regarding the built-in disk drive for the "6402" computer under development (would be introduced as: 1450XLD). See: https://archive.org/details/AtariHarryStewart

December: Atari shipped Galaxian and Defender in time for holiday shoppers.

December: Atari (Home Computer) SVP of sales and marketing Thomas M. McDonough had departed the company. (NYT 12/19/82) Jeffrey A. Heimbuck, previously SVP marketing for wine operations at Joseph E. Seagram & Sons, would join Atari (Home Computer) as SVP marketing and software engineering (replacing McDonough and the departed Bruce Irvine in the two roles). Keith Schaefer, previously Atari (Home Computer) VP sales, would become Atari (Home Computer) SVP sales (replacing McDonough in the role).

December/January: First issue of Page 6 magazine, the U.K.'s first Atari computer magazine. Published by Les Ellingham.

Winter 82/83: First issue of I/O, later known as Input/Output, the magazine of the Atari Home Computer Club (Atari International (U.K.)).

Atari sold 400,000 of its 400 and 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 5/24/1983 pD7)

The worldwide installed base of Atari 400/800 was estimated by Future Computing, Inc. to be about 500,000, with about 425,000 in the U.S. (January 1983).

January 6-9: At the Winter CES in Las Vegas Atari introduced VisiCalc (by Software Arts for VisiCorp; previously released by Personal Software, the earlier name for VisiCorp) and previewed Donkey Kong. 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. The retail price for the 1200XL was announced at $899; the new retail price for the 800 would be $679 (previously: $899); the retail price for the 400 remained $299. Also featured: the 1010, 1020, and 1025, and: Qix, E.T. Phone Home!, Dig Dug, Family Finances, Timewise, AtariWriter, Juggles' Rainbow, Juggles' House, AtariMusic I. Keith Schaefer was Atari (Home Computer) SVP sales. (Leisure Time Electronics Feb83p47 for prices)

For the 2600 Atari introduced the Pro-Line Trak-Ball Controller (CX22), the Pro-Line Joystick (CX60; would ship as CX24), and the Kid's Controller (CX23; earlier: Action Control Base).

January 13: Date of internal memo from Atari consultant Harry Stewart titled "6402 Operating System Tasks" regarding the "6402" computer under development (would be introduced as: 1450XLD). See: https://archive.org/details/AtariHarryStewart

January 15: At the 2nd Atari Star Awards banquet, held at San Francisco's St. Francis Hotel, Atari awarded the Star Award Grand Prize and US$25,000 to David Buehler for his APX title, Typo Attack. Star Special Award of Merit winners: Douglas Crockford, Harry Koons & Art Prag, Lee Actor. Keith Schaefer remained Atari (Home Computer) SVP sales.

January: Jeffrey A. Heimbuck, previously SVP marketing for wine operations at Joseph E. Seagram & Sons, joined Atari (Home Computer) as SVP marketing (replacing the departed Thomas M. McDonough). (LATimes 10/11/83 for date)

January: Atari published the Atari Computer Educational Software Directory (first edition).

Janaury: Atari commenced production of the 1200XL at its plant at 1215 Borregas, Sunnyvale CA. Additionally, 400 (and 800?) production commenced at Atari-Wong Co. in Hong Kong, while 400/800 production would also continue at 1173 Borregas, Sunnyvale CA.

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 400/800 at the Which Computer? show at the Birmingham National Exhibition Centre, England.

January 19: Atari was working on two new computer models to complement the 400/800/1200XL: "LIZ" (would ship as: 600XL) would be less expensive than the 400; "6402" (would be introduced as: 1450XLD) would include built-in disk drive, modem, and voice synthesizer and would be more expensive than the 1200XL. See: https://archive.org/details/AtariHarryStewart

January 28: Atari would commence development work on the "1201" ("6402" feature set except disk drive; would be introduced as: 1400XL). See: http://atariage.com/forums/topic/98872-atari-vaxs-being-moved/

January 20: Logo Computer Systems, Inc. (LCSI) and Atari jointly announced Atari Logo for the 400/800/1200XL. (It would ship fall 1983.)

January 31: Steve Mayer, previously Atari VP research and product development, would become Atari SVP engineering (and would remain head of the Atari NY Lab). Atari announced the appointment of Dr. Marcian E. Hoff, Jr. (Ted Hoff), with Intel since 1968 and previously Intel manager of applications research, as VP of research and development (replacing Mayer in the role). Hoff was "to

spearhead development of new home video games and coin-operated arcade games, the company said." (NYT 2/1/83).

Winter: APX Catalog introduced: FOG Index, Real Estate Cash Flow Analysis, Text Analyst Rev. 2, Astrology Rev. 1.1, Earth Science (by MECC), Easygrader Rev. 1.1, Geography (by MECC), I'm Different!, The Magic Melody Box, The Market Place (by MECC), Monkey Up a Tree, Music II--Rhythm & Pitch (by MECC), Music III--Scales & Chords (by MECC), Prefixes (by MECC), Typo Attack, Air-Raid!, Game Show, Gridiron Glory, Melt-Down, Phobos, Pushky, Quarxon, Rabbotz Rev. 1.1, Yahtman, BASIC/XA, Deep Blue C Compiler, Deep Blue Secrets, Disk Fixer/Load 'n Go, Diskmenu, Music Player.   Fred Thorlin was APX director; product review: Paul Cubbage.

Winter: Atari shipped the AtariWriter cartridge. AtariWriter was programmed by William V. Robinson (author of DataSoft's Text Wizard) with Mark Rieley for DataSoft, in fulfillment of the 300-page "AtariWriter Internal Design Specification" developed by Gary Furr, a product manager at Atari.

Winter?: At Atari (Home Computer), Leslie Wolf, with the company since June 1981, was promoted to Product Manager (Educational Hardware and Software products), replacing Sueann Ambron who departed the company to Human Engineered Software (HesWare).

February 1: Atari assumed exclusive distribution rights to the Cynex Game Mate 2 cordless joystick controller, to be available from Atari as the Atari Remote Control Wireless Joysticks (CX42) package beginning March 1.

February 13: Keith Schaefer, previously Atari (Home Computer) VP sales, had been promoted to Atari (Home Computer) SVP sales. (ArcExp v1n14 2/13/83)

February: Atari announced that they were now shipping VisiCalc.

February 22: Atari announced that manufacturing for its Home Computer Division and its Consumer Products Group 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.

Winter/Spring: "Computers: Expressway to Tomorrow" was an Atari-produced assembly program for junior and senior high schools in the U.S., offering both entertainment and computer education using films, slides, music, and a live host to explore the role of computers in society. (MC's note: I remember that this came to my school!)

March 7: Atari (Home Computer) software development director Lou Tarnay, systems products manager Paul Laughton, and product coordinator Brian Johnston had departed the company to Fox Video Games. Jim Romanos was now internal development director (replacing the departed Tarnay). Direct reports to Romanos: Ken Balthaser (applications), John Curran (system and telecommunications), Douglas A. Chorey (software support). Reports to Balthaser: Clyde Grossman (entertainment applications), Jim Cox (advanced home applications). Reports to Curran: Scott Scheiman (systems), Sherwin Gooch (telecommunications, replacing Curran in the role). Technical staff reporting to Romanos: Joe Miller, G. Riker, Lane Winner.
https://archive.org/details/AtariHarryStewart

March 8: Kamalu Bruns was At Atari (Home Computer) software support group manager. Direct reports to Bruns: Fred A. Terzian (support section manager), Jack Quinn (test department manager). Reports to 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 3/8)

March 8-April 4: Atari featured the 400/800 at the Daily Mail Ideal Home Exhibition, Earls Court, London.

March 10: Direct reports to Atari (Home Computer) VP software engineering Chris Horseman included Jim Romanos (director internal development), P. Liniak (director software conversion), Kamalu Bruns (manager support group). Reports to Liniak included Vincent Wu (development manager).
https://archive.org/details/AtariHarryStewart

March: Atari (Home Computer) director of engineering Larry Plummer departed the company.

March: Atari shipped the 1200XL, suggested retail price US$899. (Kassar in Across The Board, 6/83 p26 for month)

March: Atari shipped Donkey Kong.

March 18-20: At the 8th Annual West Coast Computer Faire at the Brooks Convention Hall and Civic Center in San Francisco, Atari featured Dig Dug, E.T. Phone Home!, Qix, and AtariWriter, and introduced Atari Logo (Brian Silverman of LCSI for Atari). Atari announced a $50 rebate, starting April 15, for the purchase of a 400 computer, and hinted that the 400 was soon to be replaced by a new model ("LIZ"; presumptive name: 600XL).

March?: Atari featured the Atari Coin Executive (ACE) at the Amusement Operators Expo '83 (AOE '83) at the O'Hare Expo Center in Chicago.

March 26: Jack Perron had become Acting Manager, Product Review, APX, replacing Paul Cubbage who departed the company (to Mindset).

Spring: Atari Special Projects, Inc. and Club Med operated eight Atari computer classrooms in Club Med villages at: Eleuthera in the Bahamas, La Caravelle in French Guadeloupe, Ixtapa in Mexico, Copper Mountain in the Coloado Rockies near Denver, Dom Miguel in Marbella Spain, Chateau Royal in Noumea New Caledonia, Les Almadies in Senegal, and Cherating Malaysia. (Atari Connection p40-41) Linda Gordon was Atari VP Special Projects; Robert A. Kahn was Director, Special Projects.

Spring: APX Catalog introduced: Atspeller, Typit, Fingerspelling, Escape to Equatus, Math Mission, My Spelling Easel, Teasers by Tobbs, Three R Math Classroom Kit, Catterpiggle, Diggerbonk, Getaway!, Impact, Microsailing, Chameleon CRT Terminal Emulator (New Version), Hex-A-Bug. Fred Thorlin was APX director; product review manager: Paul Cubbage.

Spring?: Atari shipped the 1010 program recorder, 1020 printer/plotter (US$299), and 1025 printer (US$549).

April 11: Bill Carris was Atari (Home Computer) director of software marketing.

April: Atari commenced 1200XL production by Atari Taiwan Manufacturing Corp. 1200XL production would also continue at the 1215 Borregas plant in Sunnyvale.

April?: In the Netherlands at Atari International (Benelux) B.V., Han Van Egdom joined the company as product manager home computers

April: Atari established an Advanced Games Group (games for coin arcades, home computers, and home video game systems), to be headed by VP advanced games Chris Horseman (previously: Home Computer Division VP software engineering). The unit would eventually include: Jim Morris, Robert Weatherby, Michael Gurganus, Jack Ritter, Dave Menconi, Steve Englehart, Aric Wilmunder, Dan Oliver, Rita Pless. Jeffrey Heimbuck, previously Atari (Home Computer) SVP marketing, became SVP marketing and software engineering (replacing Horseman in the latter role).

April 15: Start date for several Atari computer rebate offers: $50 for the purchase of a 400, or $100 for the purchase of an 800 or 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 4/26)

May 4: Warner Communications Inc. (WCI) established the subsidiary, WCI Labs Inc. The former Atari NY Lab would become the facility of WCI Labs. Steve Mayer, previously Atari SVP engineering and head of the Atari NY Lab, would become president of WCI Labs, as well as senior executive consultant to the office of the president of WCI. Most Atari NY Lab staff (including manager of hardware engineering Gregg Squires) would remain with WCI Labs.

May 8: Atari had announced that Dr. Alfred L. Moye, formerly the U.S. Dept. of Higher Education's Deputy Assistant Secretary during the Carter administration, had joined the company as national educational sales manager (ArcadeExpress v1n20), replacing Jim Paige who departed the company.

May: Atari consolidated its Consumer and Home Computer divisions into three new divisions: Atari Products Co., Atari Sales & Distribution Co., and Atari Manufacturing Co. (NYT 6/2pD5, WSJ 6/2p20)

Within the new Atari Products Co.: Dave Stubben (previously: Home Computer division VP engineering) would be SVP engineering (replacing the departed Steve Mayer). Don Teiser (previously: Consumer division director of product development) would be director of advanced engineering (strategic product development). Jeffrey Heimbuck (previously: Home Computer division SVP marketing and software engineering) would be SVP marketing (hardware for video games and computers). Fred Simon, previously VP of the software division of Walt Disney Telecommunications, joined the company as VP software engineering (replacing Heimbuck in the role).

Departures from Atari (Home Computer) would include director of finance Bill Kaiser.

May: Atari discontinued production of the 400 (both at 1173 Borregas, Sunnyvale CA and at Atari-Wong Co. in Hong Kong). Atari also discontinued domestic production of the 800, and Atari's plant at 1173 Borregas, Sunnyvale CA was idled. 800 production would commence (continue?) at Atari-Wong Co. (for the short-term).

May: Atari discontinued domestic production of the 1200XL, and Atari's plant at 1215 Borregas, Sunnyvale CA was idled. 1200XL production would continue by Atari Taiwan Manufacturing Corp.

May: Production of the 1050 disk drive for Atari commenced in Singapore by Tandon (S) Pte. Ltd.

May 15-20: At the Twenty-Fourth Annual Conference of the Australian College of Education held in Sydney Australia, Atari international marketing manager Nancy Garrison revealed that the 1200XL would not be released in Australia. Rather, a new range of more power machines was to be debut at the CES in the US the following month. (SydneyMorningHerald 5/30/83)

June 5-8: At the Summer CES in Chicago Atari introduced the 600XL home computer ($199; to ship in July; to replace the 400), the 800XL home computer (price to be announced; to ship in August; to replace the 800), the 1400XL home computer (price to be announced; to ship in September; never shipped), and the 1450XLD home computer (price to be announced; to ship in October; never shipped). Atari introduced: 1050 disk drive with DOS III (later: DOS 3), 1027 printer, 1030 modem with ModemLink, Touch Tablet (CX77) with graphics tablet cassette program (would ship as: AtariArtist on cartridge), Trak-Ball controller (CX80), Remote Control Wireless Joysticks (Cynex; CX42), and previewed/announced: CP/M Module with CP/M 2.2 (or: CP/M Add-On module; later: 1060; never shipped), Expansion Box (later: 1090 XL Expansion System; never shipped), Light Pen (CX75), Super Controller (home computer and international name for CX60 Pro-Line Joystick; would ship as CX24). All-In-One-Pak kits introduced/previewed: Programming System, Entertainment System, Writing System. Add-A-Pak kits introduced/previewed: Atari Accountant (never shipped), Home Manager (never shipped), Arcade Champ, BASIC Tutor I. Software

introduced/featured: Mickey in the Great Outdoors (Disney Education Series; Roklan for Walt Disney Productions), Paint (SuperBoots Software from Capital Children's Museum via Reston), AtariWriter, Family Finances, Timewise, Microsoft BASIC II, Atari Logo, Qix, Dig Dug, Donkey Kong, E.T. Phone Home!, Caverns of Mars (now on cartridge), Eastern Front (1941) (now on cartridge). Introduced: Tennis, Soccer (never shipped), Football, Pole Position (title by Namco), Joust (title by Williams), Donkey Kong Junior (title by Nintendo), Ms. Pac-Man (title by Namco), Pengo (title by Sega), AtariMusic II: Major Scales and Keys. Again promised: AtariMusic I: Notes and Steps. Announced: Starter AtariLab (would ship as: AtariLab Starter Set with Temperature Module; AtariLab (previously: ScienceLab) series by Dickinson College; planned additional modules for 1984 to include: Light, Timekeeper, Lie Detector, Reaction Time, Heartbeat). Previewed (simulated): Battlezone (title would be shipped by Atari Corporation in 1988), Tempest (never shipped), Xevious (title by Namco; never shipped). Disney Education Series further titles were to include: Peter Pan's Daring Journey (alternate: Peter Pan's Daring Escape; later: Captain Hook's Revenge; Roklan for Walt Disney Productions; never shipped), Mysteries of Wonderland (never shipped). Atari also introduced Alan Alda as spokesperson for Atari computers, in an arrangement to extend for the next 5 years.

June 6-8: Atari exhibited at NECC/5, the National Educational Computing Conference 1983, held at Towson State University, Baltimore MD. For Atari home computers, Atari introduced and demonstrated Starter AtariLab (would ship as: AtariLab Starter Set with Temperature Module) at the event. Atari also announced AIMS (Atari Instructional Material Service). AIMS titles were to include Math Arcademics (Arcademic Skill Builders by DLM), Atari Sentences (never shipped?), the AtariLab (previously: ScienceLab) series (by Dickinson College), and a multi-program trigonometry and Algebra course from CONDUIT (University of Iowa) (never shipped?).

June 11-Sept 10: Club Med Punta Cana in the Dominican Republic, expanding on the Atari computer classroom concept established at other Club Med locations, featured an "Atari Village" (including custom hardware and software by the Atari L.A. Lab).

June: The total installed base of Atari 400/800/1200XL computers was estimated by Future Computing, Inc. to be about 950,000.

June?: Atari discontinued production of the 800 (late production units made at Atari-Wong Co. in Hong Kong).

June 27: Atari opened their first Atari Center, an educational computing concept, at The Oaks Shopping Center in Cupertino, CA. Atari Centers were operated by the Picodyne Corporation (Dean Brown, president) with Atari providing funding and advertising. Alan O'Neill was the contract manager of Atari Centers. Sara Armstrong, director of the Terra Nuova Montessori School in Hayward CA, would be director of the Cupertino Atari Center.

Summer: APX Catalog introduced: Home Inventory, Home Loan Analysis, Strategic Financial Ratio Analysis, Drawit, Piano Tuner, Video Kaleidoscope, Circuit Lab, Morsecode Master, Punctuation Put-on, Three R Math Home System, Wordgo, The Bean Machine, Bootleg, Can't Quit, Dandy, Ennumereight, Smasher. APX also introduced the 48K RAM Expansion Kit (for the 400 computer, 8KiB or 16KiB versions; $134.95, or $154.95 installed at Atari Regional Service Centers. Fred Thorlin was APX director; product review manager: Jack Perron.

Summer: Second year of Atari Computer Camps, held at 7 locations: Camp Atari-New England (Jerome Singer, director) at the Stoneleigh-Burnham School in Greenfield MA; Camp Atari-Poconos (Robert Werner, director) at East Stroudsburg State College in PA; Camp Atari-Chesapeake (Leonard Fagen, director) at the Oldfields School in Glencoe MD; Camp Atari-Smokey Mountains (Jeffrey Wolfe, director) at the University of North Carolina at Asheville; Camp Atari-Midwest (William Merriman, director) at the Shattuck School in Faribault MN; Camp Atari-Old West (Marlene and Don Applebaum, directors) at the Athenian School in Danville CA; Camp Atari-Pacific (Marianne and William Kravitz, directors) at the University of San Diego in CA.

July 2: The second Atari Center opened at the corner of Fifth Ave. and 48th

St. in Manhattan. Educator Seth Greenberg would be manager of the Manhattan Atari Center.

July?: AtariEd (previously: AIMS (Atari Instructional Material Service)) published an updated Atari Computer Educational Software Directory. New Atari home computers education titles from Atari were to include: Alien Addition (Arcademic Skill Builders by DLM), AtariLab Starter Set (previously: Starter AtariLab), AtariLab Curriculum Modules (never shipped), AtariLab Light Module, Atari Logo in the Classroom: A Teacher's Manual (book by Donna Bearden, would be published by Reston in 1984), Atari/PLATO (would be shipped by Atari, Corp. in 1986 as: The Learning Phone), Atari Sentences (never shipped?), 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?).

July: Production of the Atari 1200XL computer ended (later units made by Atari Taiwan Manufacturing Corp.).

July: Atari released the Pro-Line Trak-Ball Controller (CX22).

August 8: Linda Gordon remained Atari VP special projects. (InfoWorld 8/8/83)

August: Atari shipped the 1050 disk drive, with DOS II version 2.0S. (Page 6 #6 p5)

August: Sherwin Gooch, previously Atari Products Co. manager, Telecommunications Products Group, became Atari Products Co. manager, Applications Software and Telecommunications Products Group, assuming the role of Ken Balthaser who departed the company (to Mindset).

August: Don Thorson would return to Atari as Atari Products Co. director of product management (computers), replacing Mark Lutvak who departed the company (to Durango Systems). XL computer line product manager Andrew Soderberg departed the company (to ViMart).

August: Atari Products Co. product manager (educational computer software) Leslie Wolf departed the company (to Inmac).

September: Atari National Educational Sales Manager Alfred Moye would additionally become director of the Atari Institute for Education Research, replacing Ted Kahn who departed the company.

September?: John Hagel, previously Atari VP strategic planning, would be promoted to Atari SVP strategic planning, assuming the role of VP computer business planning Peter Rosenthal who departed the company.

September: In the Netherlands, W.L. (Wilfried) de Graaf joined Atari International (Benelux) B.V. as sales manager (home computers).

September 17-25: Atari launched the XL range of home computer products in the UK, and introduced The Lone Raider, at the Great Home Entertainment Spectacular, Olympia, London.

September 23: The two Atari Center locations both closed at the end of the 90-day trial period for the program.

September 28-October 2: Atari featured the XL range of home computer products at the Sixth Personal Computer World Show (PCW), Barbican Centre, London.

September 30: Launch date for one phase of the two-phase "Catch on to Computers" computer literacy program by Atari and General Foods' Post Cereals, where Atari computers, equipment, and educational software would be provided to schools in exchange for proof-of-purchase seals collected from Post cereal boxes over the 1983-1984 school year.

Fall: APX Catalog introduced: Atspeller Rev. 2, AtariWriter Printer Drivers, Color Alignment Generator, Advanced Fingerspelling, Excalibur, Musical Pilot, Puzzler, Ringmaster, Spelling Genie Rev. 2.0, Ion Roadway, Kangaroo (GCC; title by Sun Electronics), Moon Marauder, Saratoga, Space War, Cartoonist, Eastern Front (1941) Scenario Editor, Eastern Front Scenarios 1942/1943/1944, Mathlib for Deep Blue C. Fred Thorlin was APX director; product review manager: Jack Perron.

Fall: Atari shipped the Communicator II kit (with the new 835 modem) ($279.95), the 1027 printer, and the Remote Control Wireless Joysticks ($59).

Fall: An Atari TV ad promoted the 400 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)

October 3: Linda Gordon, previously Atari VP special projects, had become Atari Products Co. SVP education, replacing Chris Bowman who had departed the company (to Apple Computer). (InfoWorld 10/3/83 p20)

October 3-7: At the first ever VidCom-MIJID held at the Palais Croisette in Cannes, P.E.C.F. Atari previewed the 600XL. (L'Atarien #1)

October 5: As one phase of the two-phase computer literacy program sponsored by General Foods' Post Cereals and Atari called "Catch on to Computers" a 10-day learning festival opened in New York City, and a similar event opened in San Francisco. Further events in the program were planned in Los Angeles, Milwaukee, Denver, Chicago, Washington D.C., Houston, New Orleans, and Atlanta through December 1983.

October 10: Atari announced the appointment of David Ruckert, previously Atari SVP of entertainment software marketing, as SVP of Atari Products Management [sic], replacing John Cavalier who departed the company (to Apple Computer). Fred Simon was named SVP of computer marketing, responsible for the marketing of computer hardware and software (assuming computer software marketing from Bill Carris who transferred to the Atari Coin-Op division). Simon and SVP of education Linda Gordon would report to Ruckert. Jeffrey Heimbuck, formerly responsible for the marketing of hardware for video games and computers, had departed the company.

October 12: The Washington Post reported (p.D11) on Atari's plans to introduce an IBM-compatible personal computer at the January 1984 CES, incorrectly calling the unannounced computer the Sierra. The project was real, but was actually called Shakti, was a project of the Atari Advanced Engineering Division Special Projects Group, and was projected to be announced as the Atari 1600. Sierra was also real, but was an unrelated concept computer project of Atari Corporate Research.

October: The Atari Learning Systems division (previously: AtariEd) published Review: A Catalog of Atari Learning Systems. New Atari home computers education titles from Atari were to include: Spelling in Context 1, Spelling in Context 2, Spelling in Context 3, Spelling in Context 4, Spelling in Context 5, Spelling in Context 6, Spelling in Context 7, Spelling in Context 8, U.S. Geography check marc (by Marc Ed, Inc.), U.S. Geography high marc (by Marc Ed, Inc.), Atari Pascal (Version 2.0) (previously: Denver Pascal; to ship Jan. '84; never shipped), Secret Formula elementary (by Mind Movers), Secret Formula intermediate (by Mind Movers), Secret Formula advanced (by Mind Movers), Screen Maker, Player Maker, Alligator Mix (Arcademic Skill Builders by DLM), Minus Mission (Arcademic Skill Builders by DLM), Dragon Mix (Arcademic Skill Builders by DLM), Atari Super PILOT (previously: PILOT II; to ship April '84; never shipped), Phone Home (never shipped), Name Rondo (never shipped), Create a Rondo (never shipped), Instructional Computing Demonstration (previously released by APX), 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), Elementary Biology (by MECC; previously released by APX), Earth Science (by MECC; previously released by APX), Geography (by MECC; previously released by APX), Prefixes (by MECC; previously released by APX), Metric & Problem Solving (by MECC; previously released by APX), The Market

Place (by MECC; previously released by APX), Basic Arithmetic (by MECC), Graphing (by MECC), Pre-Reading (by MECC), Counting (by MECC), Expeditions (by MECC), Spelling Bee (by MECC), Word Games (by MECC). Announced: AtariLab Biofeedback, Timekeeper, Lie Detector, and Mechanics modules (all never shipped), AtariWriter Curriculum Guide (never shipped), Swarthmore Trig (never shipped). Again promised for future release: AtariLab Curriculum Modules: Temperature and Light, CONDUIT Algebra, Green Globs and Other Trig Diversions. Linda Gordon was Atari Products Co. SVP Education.

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! #43 Dec83 p32)

October 21: Atari said that it was delaying the making and marketing of its two higher-priced computer models, the 1400XL and the 1450XLD. The machines would not ship until late December, after the Christmas selling season, and then only in limited quantities. (WSJ 10/24/1983 p. 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 Morgan. (WSJ 10/24/1983 p. 5)

October/November: Atari shipped the 600XL NTSC version for North America (US$199) (The Globe and Mail (Canada) 12/23/83), 600XL UK version (159.99 pounds) (Page 6 #7 p6), and 600XL PAL version for Europe (except France).

November 2: Report that Atari announced that because of production snags in Hong Kong (Atari-Wong and contract manufacturer Chelco Sound), it would be able to fill only 60 per cent of its Christmas orders for the 600XL and the 800XL. Atari also reiterated that it would ship the 1400XL and the 1450XLD in limited quantities in late December and more widely after the first of the year. (WSJ 11/2/1983 p.2)

November 4: Premier of the Warner Bros. 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 (Corporate Research Division L.A. Lab).

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 600XL to $180, from $140. The dealer price of the 800XL would rise to $280, from $240. Atari also said it would raise prices of its 1027 printer and 1050 disk drive by about $15 each.

November 19: Atari opened their third "Adventure" location, the first Atari Adventure family entertainment center at the Northwest Plaza shopping center located in St. Ann MO (suburban St. Louis MO). The 8,000 square foot location was planned as the corporate prototype for a nationwide roll-out of 12-15 facilities. Store design by Bill Poon & Company Architects. The location combined a traditional video game arcade (65 games), a new video game technology display area, and a Computer Learning Center: a hands-on public computer classroom/lab featuring 8 Atari 1200XL computer stations and a full-time instructor. Barry Sullivan was VP of Atari Adventure (having replaced the departed Jim Ginsberg). (CCv7n11)

November 22: John J. Cardozo had become Acting Manager, Product Review, APX, replacing Jack Perron who departed the company.

November/December?: Dorothy K. Deringer, previously a program officer at the U.S. National Science Foundation (NSF), joined Atari Learning Systems as VP

product development (replacing the departed Leslie Wolf). Deringer was hired by Atari Products Co. SVP Education Linda Gordon.

November/December?: Peter R. Ateshian was promoted to Atari Manager of VLSI Development, replacing Rich Pasco who departed the company.

December 13: In an open letter posted to the Atari SIG on CompuServe, addressed to Atari users from Atari Chairman and CEO Jim Morgan, Morgan described the Atari he had inherited as being "in way over its head with a computer product line as inclusive as the 600XL, 800XL, 1400XL, 1450XLD, and 1600." Morgan announced the formation of "a group led by Ted Hoff and Alan Kay which is chartered to define our next generation of computers...In the meantime, we will have to keep our product line rather restricted to broadly saleable products." (M.A.C.E. Journal v4n2/3 Feb/Mar 1984 p.2; see also CC May84p193)

December: Atari shipped initial small quantities of the 800XL NTSC version for North America (US$299) (see newspaper ads and Current Notes Jan84p6 for timing). (800XL production would ramp up dramatically in Winter 1984.)

December 20: Ken Wirt remained Atari VP marketing - home computers.

"Atari sold about 400,000 units [computers] in December." - Creative Strategies International as quoted in InfoWorld, Feb 6, 1984.

"Atari sold roughly 250,000 of its 800 series computers last year" - Time magazine, July 16, 1984

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 1?: Atari VP marketing - home computers Ken Wirt departed the company. (Fred Simon remained Atari Products Co. SVP of computer hardware and software marketing.)

January 7-10: At the Winter CES in Las Vegas Atari featured the Touch Tablet with AtariArtist ($79.95), featured the Light Pen (CX75) with AtariGraphics, and introduced the 1064 memory module ($199) for the 600XL. The unshipped 1450XLD computer and the 1090 XL Expansion System were again shown, but Atari confirmed that the unshipped 1400XL computer and 1060 CP/M Module were both canceled. Entertainment titles introduced/featured: Millipede (would be shipped by Atari, Corp.), Joust, Dig Dug, Jungle Hunt (title by Taito), Pole Position, Moon Patrol (title by Irem; would be shipped by Atari, Corp.), Pengo, Crystal Castles (would be shipped by Atari Corporation in 1988), Donkey Kong Junior, Mario Bros. (title by Nintendo; would be shipped by Atari Corporation in 1988), Robotron: 2084 (title by Williams). Other software introduced or announced: DOS 3 (for the 1050 disk drive; previously: DOS III), Atari Translator, Sky Writer (would be shipped by Atari, Corp.), SynFile+ (by Synapse; introduced by Synapse June 1983; never shipped by Atari; would be shipped by Synapse fall 1984), SynCalc (by Synapse; introduced by Synapse June 1983; never shipped by Atari; would be shipped by Synapse fall 1984), SynTrend (by Synapse; consisting of SynGraph and SynStat; introduced by Synapse June 1983; never shipped by Atari; would be shipped by Synapse fall 1984), Legacy (Atari Advanced Games Group; later: Final Legacy; would be shipped by Atari, Corp.), Typo Attack (previously released by APX), Captain Hook's Revenge (by Disney; never shipped), Berzerk (title by Stern; never shipped), Pop'R Spell (never shipped), and in the Atari Music Learning Series: AtariMusic I, AtariMusic II. The AtariLab Starter Set with Temperature Module ("ready to ship now") and the Atari Lab Light Module were featured, and Atari Learning Systems announced: AtariLab Robotics Module (proposed; never shipped), AtariLab Nuclear Radiation Module (proposed; never shipped)

January 14: At San Francisco's St. Francis Hotel, Atari awarded the third annual Atari Star Award and US$25,000 to Mark Reid for his APX title, Getaway!. Other Finalists: James Burton, R. Stanley Kistler, Gregor Novak. Fred Simon remained Atari Products Co. SVP of computer hardware and software marketing.

January: Atari opened their fourth "Adventure" location, the second Atari Adventure family entertainment center, at Crestwood Plaza in Crestwood MO (suburban St. Louis MO). A 2-story location, using the same concept as the area's Northwest Plaza Atari Adventure location.

January: Steve Bristow, previously Atari VP engineering AtariTel Division, became Atari Products Co. VP Engineering Computer Division (replacing SVP engineering Dave Stubben in the role) and would head the Atari Advanced Computer Technologies Design Center. Director of advanced engineering Donald Teiser departed the company.

January: Atari recognized three of the highest ranking technical positions in the company with the new additional title of "Atari Fellow": Atari VP/chief scientist Alan Kay, Atari Products Co. VP Engineering Computer Division Steve Bristow, and Atari (Coin-Op) VP of creative development Lyle Rains.

Winter: APX Catalog introduced: Equestrian, Mastermatch, Atspeller (for AtariWriter), Bellum, Burgers!, Chambers of Zorp, Character Fun, Dragon Quest or A Twist in the Tail, Numberland Nightwatch, Raid on Graviton, Rush Hour, Weakon, National Flags, Dog Daze Deluxe

Winter: Atari shipped the Touch Tablet (with AtariArtist and DOS 2.0S), and began shipping the 1050 disk drive with DOS 3 (replacing DOS 2.0S).

Winter?: Mark Cator was promoted to Atari Manager, Users' Group Support (replacing Earl Rice in the role).

February 7: Atari had re-launched 1450XLD development; Phil Suen was project manager. (http://TinyURL.com/y8zep9e7)

February: Atari 5200 production ended.

February: Atari Products Co. manager, operating systems software Joe Miller departed the company (to Koala technologies).

February: Atari Products Co. VP engineering computer division and Atari Fellow Steve Bristow departed the company. An Atari Fellow recognition would be given to Atari Products Co. SVP engineering Dave Stubben. (Fun p792 for Stubben business card)

March 11-18: At the Festival International du Son et de l'Image, held at the CNIT (Center of New Industries and Technologies) in La Defense in Paris, France, P.E.C.F. Atari launched the 600XL and 800XL in France. PAL versions were available immediately (2 200 F / 3 200 F); 600XL SECAM version (2 500 F; never shipped) and 800XL SECAM version (3 500 F; would be shipped by Atari, Corp. 11/84) were due to ship in June 1984. (L'Atarien #2; L'Ordinateur Individuel #58 Apr84 p81; L'Atarien #4 p18 for prices)

March?: Atari shipped the 800XL UK version (249.99 pounds) and 800XL PAL version for Europe.

March: APX director Fred Thorlin departed the company.

March 22-25: At the 9th West Coast Computer Faire in San Francisco, Atari's exhibit included the APX title, Equestrian. (ROM #6) APX also introduced what turned out to be their last release, Bumpomov's Dogs.

March 24: Atari said it had decided to cease its direct-mail software sales operations (APX).

March 31: James Morgan, CEO of Atari, said shipments of his company's home computers in the first three months of this year were 35 per cent lower than

in the first quarter of 1983. (The Globe and Mail (Canada) 6/1/84)

April 2: Internally, Atari Products Co. EVP Ted Hoff announced the promotion of Jan Dekema to manager, Research Administration (assistant to Hoff in the administration of the entire Atari R&D and Product Development organization) (Dekema was previously administrative manager for the Atari Sunnyvale Research Laboratory, and would also retain that role). Hoff also announced the promotion of Chris Jeffers (previously: manager of administration for Corporate Research) to Atari Products Co. VP Product Development, also reporting directly to Hoff (Update).

April 2: Programmer Michael Barall joined Atari (hired to develop DOS IV).

April: Atari National Educational Sales Manager and director of the Atari Institute for Education Research Alfred Moye had departed the company (to Hewlett-Packard).

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 (U.K.)).

Spring: Atari shipped the CX75 Light Pen with AtariGraphics ($99) and shipped the AtariLab Starter Set with Temperature Module ($89.95).

May 1: "Hearing on Computer Education" held before the Subcommittee on Elementary, Secondary, and Vocational Education of the Committee on Education and Labor, U.S. House of Representatives, included testimony by Atari Learning Systems VP product development Dorothy Deringer.

May 8: In an elaborate press event, Atari/Lucasfilm introduced Ballblazer and Rescue on Fractalus!, both developed by Lucasfilm Games, to be published by Atari for the 5200 and on cartridge for Atari XL computers. (Atari/Commodore computer disk versions would be shipped by Epyx (U.S.) and Activision (UK) in 1985; 5200 versions would be shipped by Atari Corporation in 1986; XE cartridge versions would be shipped by Atari Corporation in 1988) At Lucasfilm Games: Peter Langston was Games Group Leader, David Levine was Ballblazer project leader, David Fox was Rescue on Fractalus! project leader. Fred Simon remained Atari SVP of computer hardware and software marketing.

May 14-19: At the special SICOB show held at CNIT in France, Atari featured the 600XL/800XL product line. (L'Atarien #4 p21)

May: Atari Products Co. manager, Applications Software and Telecommunications Products Group Sherwin Gooch departed the company.

May 21: Atari disclosed that the 5200 was no longer in production. More than 1 million 5200s had been sold to date. (Washington Post, May 22, 1984, C3)

May 30: Atari confirmed plans to withdraw from its joint venture with Wong's Electronics Co. and close the Atari-Wong Co. consumer products manufacturing plant in Hong Kong. Production was to be moved to Atari's wholly owned plant in Taiwan.

June 3-6: At the Summer CES in Chicago Atari introduced the MindLink System; packages would include: headband, two infrared sensors, and a software package. 3 initial software packages for the unit were planned: an adventure game, a new version of Breakout, and a relaxation biofeedback program.

Atari introduced/featured: Ballblazer, Rescue on Fractalus!, Mario Bros., Millipede, Jr. Pac-Man (title by Bally-Midway; never shipped), Crystal Castles, Donkey Kong Junior, Elevator Action (title by Taito; never shipped), Garfield on the Run (Atari Advanced Games Group; never shipped), Track & Field (with Track & Field Arcade Controller; title by Konami; would be shipped by Atari, Corp.), Final Legacy (previously: Legacy), This Is Ground Control (Futuremakers series; never shipped), Through the Star Bridge (Futuremakers series; never shipped), Word Tutor (never shipped), Letter Tutor (never shipped), Sky Writer, SynCalc, SynFile+, SynTrend, AtariWriter, Proofreader (for AtariWriter; would be shipped by Atari, Corp. in 1985). Hardware featured: Touch Tablet with AtariArtist, Light Pen with AtariGraphics, 1050 disk drive with DOS 3. Also announced/again promised: Captain Hook's Revenge,

Pole Position II (title by Namco; never shipped), Moon Patrol, Hobgoblin (Atari Advanced Games Group; never shipped), Gremlins (never shipped), The Last Starfighter (never shipped)

Atari Learning Systems published a New Products Bulletin, and introduced: Find It! (never shipped), Green Globs (never shipped), Yaacov Agam's Interactive Painting (never shipped), First Aid... The ABC of CPR (never shipped), Simulated Computer II (never shipped), Telly Turtle (never shipped), Wheeler Dealer (never shipped), LabMate Home Edition Ages 9-13 (book for AtariLab Starter Set; never shipped), LabMate Home Edition Ages 14-15 (book for AtariLab Starter Set; never shipped), LabMate School Edition Elementary (books for AtariLab Starter Set; never shipped), LabMate School Edition Jr. High (books for AtariLab Starter Set; never shipped), LabMate School Edition High School (books for AtariLab Starter Set; never shipped), The Learning Phone (previously: Atari PLATO; would be shipped by Atari, Corp. in 1986), Escape ("interpreting graphs the fun way"; never shipped). Also featured: Atari Logo.

Atari announced that they would introduce a new, un-named, high-end computer ("1650XLD" project; never shipped), reportedly for under $1000, to ship fall 1984. The machine would resemble the canceled 1450XLD; it would have 64KiB RAM, modem, speech synthesis chip, and built-in double-sided, double density 352KiB disk drive; it would be fully compatible with the Atari 600XL/800XL, and would also be "70 to 80 percent compatible" with the IBM PC; telecommunications software and a mini-database called The Grapevine would be built in. Also again featured: the 1090 XL Expansion System.

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. (MyAtari Magazine, January 2003.)

July 1-August 25: Third and final year of Atari Computer Camps. Camps were held at 2 locations: "Camp Atari--New England" at the Stoneleigh-Burnham School in Greenfield MA, and "Camp Atari--Poconos" at East Stroudsburg State College in PA. Patricia Tubbs was Project Manager at Atari.

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 Sept84p10)

July 5-6: Tramel Technology hired approximately 300 of the existing Atari, Inc. domestic consumer and home computer division employees. Among key marketing and advertising executives, the lone holdovers were expected to be West Shell, director of marketing (computers), and Bryan Kerr, group product manager (videogames) (AdWeek, July 9, 1984; InfoWorld July 30) Engineers and technicians included Jim Tittsler, Lane Winner, and Jose Valdes, plus: Phil Suen, Vincent Wu, George Nishiura, Mike Barall, David Owen Sovey, Peter R. Atesian, John Hinman, George Kulcher, John Honig, Michael Wooding, Songly Mu, Randy Hoopai, Gary Rubio. Software product management: Richard C. Frick, John Skruch. Programmers: Rob Zdybel, Landon Dyer, David Getreu.

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 [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 600XL home computer."

Summer: Coinciding with the 1984 Summer Olympics (held July 28 to August 12 in Los Angeles), Atari shipped (limited release, US only): Track & Field for Atari home computers (with Track & Field Controller)

August 3: Atari engineers had commenced work on both an "800XL CR" (cost-reduced primarily via fewer custom chips, using new KERI and MUFFY chip) and a

new "900XL" computer as well as a 3.5" Microdisk Drive for Atari XL computers.

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 (mid-month): In the US, Atari cut the price of the 800XL from $250 to $179. (AP 11/13)

August 21: In the UK, Atari was to cut its prices from September: the 600XL by 60 pounds, from 159.99 pounds to 99.99 pounds, and the 800XL by 50 pounds, from 249.99 pounds to 199.99 pounds. (TheTimes 8/21p17; The Guardian (London) 9/6) In France, Atari would reduce the 800XL by 1000 F to 2199 F.

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 (Capitol Hill Atari Owners Society) and MACE (Michigan Atari Computer Enthusiasts).

August 27: In its first official statement, Atari, Corp. stated the intention to be full line manufacturer of products in the video game, family computers and small business computers categories. Atari planned to manufacture and supply the Atari 800XL family computer with aggressive, competitive pricing through the end of 1984.

Summer/Fall?: The Atari Adventure at the Northwest Plaza in St. Ann MO was closed.

September 6: UK Media report that Atari 600XL was discontinued. (PopularComputingWeekly 9/6)

September: Atari engineers completed the "800XLF" motherboard design, to be used in new-production 800XL computers (PAL version). The new 800XL machines would include the new FREDDIE memory management chip (previously developed at Atari, Inc.), the new Revision C of Atari BASIC, and a reinstated chrominance video signal on the Monitor port (missing on the 1200XL/600XL/800XL produced by Atari, Inc.). ("800XLF" = "800XL CR" without KERI and MUFFY chips) http://ataricomputers.altervista.org/Foto/800XL_AT84224114_05_FULL.jpg

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 (would be announced as: 65XEM). The document contrasted the "900XLA" with the forthcoming "900XL" computer (would be introduced as: 65XE).

October: In the new AtariSoft software management/development division, John Skruch was software product manager, 8-bit computers.

October 26: In the UK Atari now offered the 800XL for 169 pounds. (TheTimes 10/26p9)

Fall: Atari shipped: AtariLab Light Module, Sky Writer, Millipede, Moon Patrol, Final Legacy. In Europe Atari shipped the 1029 printer, and in the UK, the Atari Software Products Division shipped: The Pay-Off

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 800XL was being cut to below $200 (previously: $400; the 600XL was to be priced at under $100 (previously: $250-$300). (Winnipeg Free Press November 16, 1984)

November 13: Atari held a press conference proclaiming "The New Atari Corp."

at company headquarters in Sunnyvale, CA. The current price of the 800XL, $179, would be reduced to "under $120." Two new 8-bit computers, compatible with the 800XL, were to be introduced at the January 1985 CES.

November?: In Hong Kong, the Atari-Wong Co. consumer products manufacturing plant, idled since May 1984, resumed operations with new production of the Atari 1050 disk drive. Ongoing 1050 production in Singapore by Tandon (S) Pte. Ltd. would be discontinued.

November: In France, P.E.C.F. Atari shipped the 800XL SECAM version (2 499 F). Also remaining available: 800XL PAL version (2 199 F), 600XL PAL version (1 599). (L'Atarien #5 p19; L'Atarien #7 p33 for date)

November 19: In the US, Atari had launched a print campaign in major market newspapers to support holiday price cuts on the 800XL. Full-page ads carried the theme, "The powerful personal computer so affordable even Scrooge would have given it." (AdWeek 11/19/84)

December 6: In the UK, Atari now offered the 800XL for 129 pounds (previously: 169 pounds).

December 6: It was reported that Atari would make an immediate 23 per cent reduction to DM 499 (US$160) in the price of its 800XL home computer in West Germany and similar cuts in the UK and Italy. Atari estimated the company's share of the West German home computer market at 8%, compared with 2% in 1983. In the UK, the 800XL price cut was from 169 to 129 pounds.

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 800XL computers to the event's coordinators. The systems were then rented to participants, proceeds to the Scholarship Fund. Two of the 800XLs and 1,000 T-shirts were donated by Atari to the organization.

December: Atari engineers completed the prototype "900XLF" motherboard design, to be used in the forthcoming "900XL" computer. (would be introduced as: 65XE)

"The 800XL has sold almost 500,000 units through 1984" --Atari's Sigmund Hartmann, Atari Explorer magazine, Summer 1985, p. 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 January 7/14, 1985

1985

January 5-8: At the Winter CES in Las Vegas Atari introduced the 130XE computer ($149), the 65XE computer ($99), and the 65XEP computer ($399; never shipped), and announced the 65XEM computer ($149; never shipped). Atari previewed/announced: XC1411 monitor (never shipped), XM128 monitor (never shipped), XF521 5.25" disk drive (130KiB; never shipped) with DOS 2.5, XTM201 printer (never shipped), XTC201 printer (never shipped), XMM801 printer, XDM121 printer, XM301 modem. The 130XE/65XE/65XEP/65XEM would run the Atari OS as found in the Atari 800XL which would now be phased out. New software by Atari would include: Infinity (by Matrix Software; never shipped), Silent Butler (by Atari/Silent Butler Software), Shopkeeper (never shipped), AtariWriter Plus, Song Painter (by Atari/Carousel Software; would ship as: Music Painter), Atari Tutorial (never shipped), and several titles previously introduced by Atari, Inc.: The Learning Phone (access software for the PLATO Homelink Service), Proofreader, Crystal Castles, Mario Bros. Also featured: AtariLab Light Module, Sky Writer, Millipede, Moon Patrol, Track & Field, Final Legacy

Winter: In France, P.E.C.F. Atari released La Chasse aux Fautes et La Course aux Hapax, and released Calcul Algebrique.

February?: Atari discontinued manufacturing operations at the Atari-Wong Co. (AWC) plant in Hong Kong (most recently, 1050 disk drive production), and would withdraw from the joint venture originally established between Atari, Inc. and Wong's Electronics Co. (WEC) in 1980.

February: Retail prices from Atari France: 800XL SECAM: 1700 FRF ; 1050: 2600 FRF ; 1027: 2600 FRF

March 5: At the San Leandro Computer Club, 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." (CN, Apr85, p. 19; SPACE Apr85)

March 30: At the first meeting of the Atari Worldwide User Network (WUN), held at the office of Antic magazine in San Francisco, Atari announced that the 130XE had just shipped in the U.S. ($149), the 65XE was currently being shipped in Canada, and that DOS 2.5 (OSS) was now shipping with 1050 disk drives (replacing DOS 3) and would be also be distributed as freeware.

March 30-April 2: At the 10th West Coast Computer Faire at the Moscone Convention Center in San Francisco, The San Leandro Computer Club (SLCC) and the Atari Bay Area User's Computer Society (ABACUS) both displayed 130XE units supplied by Atari, their first showing to the general public.

April: Atari featured the 130XE at the Hannover Messe (Hanover Trade Fair), West Germany. For the XE Atari featured the XMM801 and XDM121 printers. Also, Atari did not plan to attend June's Consumer Electronics Show in Chicago (they would change their minds in time to attend). (PopularComputingWeelky 4/25)

April: Atari released DOS 2.5 as freeware via the CompuServe Atari SIG.

April: Atari discontinued production of the 800XL computer.

April 22: Atari shipped the 130XE in the UK (169.90 pounds). (NewsBytes for date; PopularComputingWeekly 4/25 for price)

Spring: In France, using the Atarisoft label, Atari released: Nostradamus, L'Enigme du Triangle

May 6-9: At the Spring COMDEX show at the Georgia World Congress Center in Atlanta GA, Atari said the 800XL and 130XE were available for mass retailers and that they expected the 800XL to sell widely through toy retailers for Christmas 1985.

May: First issue of the U.K.'s Atari User magazine, published by Database Publications.

June 2-5: At the Summer CES in Chicago, 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.

Also at the CES, DataSoft re-introduced 3 titles previously shipped by Atari: Pole Position, Pac-Man, Dig Dug

June: Atari France retail price for the 130XE SECAM: 1990 FRF

Months?: In the UK, using the Atarisoft label, the Atari Software Products Division released on diskette: Software Pack (The Home Filing Manager + The Pay-Off / Paint), and re-released on cassette: The Lone Raider, Chess, Eastern Front (1941), European Countries and Capitals, An Invitation to Programming

Summer: In France, using the Atarisoft label, Atari released: Cameleon, Promoteur

September 4: Atari introduced the 130XE to the UK at the Personal Computer World (PCW) show in London.

Fall: Rather than produce the announced XF521 disk drive, Atari turned (back) to Tandon (S) Pte. Ltd. for a new production run of the Atari 1050.

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 48KiB/64KiB Atari computers as well as a version supporting the 128KiB RAM of the 130XE.

November 20-24: At the 7th annual Computer Dealers Exposition (COMDEX/Fall) in Las Vegas, Atari exhibited the 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)

December: Atari shipped the XM301 modem.

December: Bill Carris, previously of Atari, passed away at 34.

Atari's 8-bit user base in the UK has now reached 400,000...close to 100,000 of the [discontinued 800XL] are believed to have been sold during the run up to Christmas alone. (Atari User Feb 1986 p.9)

1986

January 9: At the Winter CES in Las Vegas Atari announced the XC11 program recorder, previewed Star Raiders II (disk), and featured: Silent Butler, Music Painter, Home Astronomer (to ship as: Atari Planetarium), AtariWriter Plus. Also, both the 130XE and 65XE were to be marketed in the U.S. in bundles; the $399 130XE bundle would include: mouse (STM1), printer (1027), disk drive (1050) and five software titles: Silent Butler, Star Raiders, Music Painter, Paint, AtariWriter.

January/February: Atari shipped The Learning Phone (Access Software cartridge for the PLATO Homelink Service from Control Data Corporation), designed at Atari by Vincent Wu. The Atari PLATO project had been in development at Atari, Inc. since 1981.

February: Cover date of Issue #10, the final issue of L'Atarien magazine from Atari France.

February: Atari France retail prices: 130XE SECAM: 1490 FRF ; 1010: 490 FRF ; 1050: 1490 FRF ; 1029: 1490 FRF

March 7-9: At the (first) Atari Computer Show (ACE) sponsored by Atari User magazine at the Novotel, Hammersmith, London (the first Atari-specific exhibition to be held anywhere in the world), Atari previewed an "80-column adapter" (would ship as: XEP80) and introduced the XC11 program recorder.

March 12-19: At CeBIT '86 in Hanover, 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), 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 65XE (U.S. 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 COMDEX show in Atlanta Atari showed the XMM801 printer, again previewed an 80 column card (XEP80), again previewed a 3.5"

floppy disk drive (XF351), and showed software including Star Raiders II. Atari also previewed a 1200 bit/s modem for XE or ST (would ship as: SX212).

Spring: Atari shipped the XMM801 printer and Atari Planetarium.

June 1: Atari announced that David H. Ahl was the new editor of Atari Explorer magazine.

June 1-4: At the Summer CES in Chicago 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 1200 bit/s modem for ST/PC/XE ("XM 1200"?; would ship as: SX212) to ship by late summer 1986. (InfoWorld June 16 p.22)

July: Atari shipped Star Raiders II.

Summer: Atari shipped the XC12 program recorder (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. (NewsBytes)

September 3-7: At the 9th Personal Computer World Show in London, Atari introduced the XEP80 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

Sept/Oct: First issue of Atari Explorer magazine produced by the new subsidiary, Atari Explorer Publications Corp. of Mendham, NJ, headed by David H. Ahl, founder and former editor of Creative Computing magazine.

October: Atari Associate Director for Computer Software (XE line) John Skruch would additionally be responsible for ST line software development.

November 10-14: At the Fall COMDEX in Las Vegas Atari introduced the SX212 modem (ST/XE/PC) and featured the XEP80.

November 28-30: At the Atari Christmas Show at the Royal Horticultural Hall, London, Atari featured the XEP80.

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 - 2. Atari XL/XE Sonderheft, p. 3, as quoted/translated by Andreas Koch)

1987

January 8-11: At the Winter CES in Las Vegas Atari previewed the XE game system and a 3.5" disk drive (XF351; never shipped), introduced the XC12 program recorder to the U.S. (never shipped in the U.S.), featured the XEP80, and announced 80-column XEP80 versions of Silent Butler (later: Silent Butler 80; upgrade for Silent Butler; never shipped) and AtariWriter Plus (would ship as: AtariWriter 80), and also featured the SX212.

January: Alex Leavens joined Atari as Technical Support Manager (online support). His assignments would specifically include support for the 8-bit computers.

February 15-18: Atari introduced the XE game system at the American International TOY FAIR in New York. The system would include console, keyboard, joystick (CX40), and video gun (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 Hanover, West Germany, Atari introduced the XE video game system to Europe, announced BattleZone XE (previously announced/previewed by Atari, Inc. in 1983), and also announced a new XE-styled replacement for the recently fast-selling-out 800XL (would ship as: 800XE).

March 24: Atari announced that technical support manager Alex Leavens was no longer with the company.

April 3: John Skruch, previously Atari associate director for computer software (ST and XE lines), would become Atari Director of Software Development (non ST lines).

April 24-26: At the Atari Computer Show, Champagne Suite & Exhibition Centre, Novotel, Hammersmith, London, Atari introduced the XE game system to the UK (console: 80 pounds; keyboard: 40 pounds).

May 29: Atari announced the appointment of Clifford Slobod as director of national sales for its entertainment division. Slobod's experience included 13 years with Mattel. Slobod would be responsible for domestic sales of video game systems and software, and would manage the introduction of the new Atari XE game system.

May 30-June 2: At the Summer CES in Chicago Atari announced that, in addition to keyboard, joystick, and video gun (light gun), the XE game system would be bundled with Flight Simulator II (previously released by SubLOGIC), Missile Command (previously released on cartridge), and Blast 'Em (previously: Troubleshooter; would ship as: Bug Hunt). Atari introduced 14 XE cartridges: Hardball! (previously released by Accolade), Fight Night (previously released by Accolade), Touchdown Football (previously released by Electronic arts; XE cartridge never shipped), One-on-One Basketball (previously released by Electronic Arts), Archon (by Free Fall Associates; previously released by Electronic Arts), Ballblazer (by Lucasfilm; previously released by Epyx), Rescue on Fractalus! (by Lucasfilm; previously released by Epyx), Lode Runner (previously released by Broderbund), Blue Max (by Broderbund; previously released by Synapse), David's Midnight Magic (previously released by Broderbund), Crossbow (title by Exidy), plus Atari's own Food Fight, BattleZone, and Star Raiders II (previously released on disk). Atari said they were additionally developing "two new shooting games" as well (would ship as: Barnyard Blaster, Crime Buster). Also, Atari introduced the XF551 disk drive with ADOS (would ship as: DOS XE), featured the SX212 and introduced/announced SX Express!, featured the XEP80, and featured Atari Planetarium.

Summer: Atari shipped the XDM121 printer.

August: Newspaper wire story on Las Vegas attractions: Atari Adventure Center, Caesars Palace and Riviera Hotels. Designed for the hotels by Atari and featuring more than 50 games...charge for most games. Atari 800 computers may be played at no charge for those who want to test geography and spelling skills. Open 24 hours daily.

September: Atari shipped the SX212 modem.

September/October: Atari shipped the XEP80 interface.

September/October: Atari shipped the XE game system in late September, and it reached most dealer shelves by mid-October, retail price US$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

Fall: Atari shipped: Rescue on Fractalus!, Ballblazer, Star Raiders II, Blue Max (Sculptured Software), Lode Runner (Chuck Peavey), David's Midnight Magic, Hardball! (Sculptured Software), Fight Night (Sculptured Software), Barnyard Blaster (K-Byte), Archon, One-on-One Basketball (Sculptured Software)

Fall: Atari announced (via a new 2600/7800/XE Video Game Catalog): Desert Falcon, Choplifter! (previously released by Broderbund), Commando (title by Capcom via Data East; never shipped), GATO (title by Spectrum Holobyte)

October 23: Nintendo of America Inc. requested a preliminary injunction against Atari Corporation in U.S. 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 disk drive for the XE must be purchased separately, Nintendo said the claim was misleading because the disk drive was expensive and hard to find.

December 15: The Honorable Robert P. Aguilar, United States District Judge, Northern District of California, denied the October 23, 1988 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.

December?: Atari shipped the XF551 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 65XE computers have gained brand dominance and are among the most popular systems being sold in these countries."

Atari sold 100,000 XE Game Systems in the U.S. at Christmas and did not meet demand (Antic magazine, May 1988, p. 39)

Atari "claims more than 2 million XE game systems sold in 1987." (Compute! magazine, May 1988)

1988

January 7-10: Atari did not exhibit at the Winter CES in Las Vegas, but instead occupied a suite away from the show floor and sponsored ads in the daily show magazines for its Atari game systems. (Compute! Mar88p4)

January: Optimized Systems Software (OSS) was merged into ICD.

February 8-17: Atari featured the 2600, 7800 and XE video game systems at the 85th American International Toy Fair in New York City.

Winter: Atari shipped BattleZone (Ken Rose).

Spring: Atari shipped the SX Express! disk software package for use with the SX212.

June 4-7: At the Summer CES in Chicago (booth 9405) Atari featured the XE ($149.95) game system. 20 XE titles for 1988 would include Battlezone (released early 1988) and 19 new titles (for a total of 52 XE titles), available 2nd Qtr: Ace of Aces (previously released by Accolade), Desert Falcon, GATO, Necromancer (by Bill Williams; previously released by Synapse); 3rd Qtr: Choplifter!, Commando (never released), Crime Buster, Crossbow, Crystal Castles, Into the Eagle's Nest (by Pandora), Karateka (previously released by Broderbund), Mario Bros., Mean 18 Ultimate Golf (title by

Accolade; never released), Summer Games (previously released by Epyx), Thunderfox (by Aztec Design); 4th Qtr: Airball (by MicroDeal), Dark Chambers, Jinks (by Softgold; never released), Nebulus (Hewson; later: Tower Toppler; never released). (The 65XE/130XE were not shown.)

June/July: Atari shipped GATO (Xanth F/X)

August/September: Atari shipped: Desert Falcon (Ken Rose), Ace of Aces, Mario Bros. (Sculptured Software)

October 1, 1988 through September 30, 1989: "Atari Advantage" promotion program by Atari (U.S.) 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 a 7800 for $25 or for an XE game system or XE 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 Next

October?: Atari shipped: Food Fight (The Softworks Factory), Necromancer

November: Final issue of the U.K.'s Atari User magazine. The name would be sold to rival U.K. magazine publisher Page 6.

November: Atari (U.S.) announced the availability of the XES2001 Light Gun + Bug Hunt package.

November/December: Atari (U.S.) offered a $50 consumer rebate on the purchase of the XE game system.

December: Atari shipped: Crystal Castles (The Softworks Factory), Into the Eagle's Nest

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 2/1989, p.7; thanks Tomasz Krasuski)

1989

January 7-10: Atari's Entertainment division exhibited in a suite of rooms at the Dunes Hotel near the Winter CES in Las Vegas. (ST World Feb89) 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. (CN Mar89p13)

January: Atari shipped DOS XE (earlier name: ADOS). New production XF551 disk drives would also ship with DOS XE (replacing DOS 2.5).

February/March: New name for Page 6 magazine: Page 6 Atari User

March: Atari shipped: Choplifter! (Sculptured Software), Dark Chambers (Sculptured Software), Crime Buster

April 3: Date of Atari (U.S.) 1989 Distributor Price List, in which Atari announced or again promised: Deflektor (August; never shipped), MIDI Maze (by Xanth F/X) (Sept.; never shipped), Commando (Sept.; never shipped), Super Football (Sept.; never shipped), Tower Toppler (previously: Nebulus; title by U.S. Gold) (Sept.; never shipped), Xenophobe (title by Bally Midway) (Sept.;

never shipped)

April?: Atari shipped: Crossbow (Sculptured Software), Karateka (Sculptured Software), Summer Games, Airball (The Softworks Factory), Thunderfox. These would be the last game cartridges released by Atari for the XE.

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 48KiB/64KiB Atari computers as well as a version supporting the 128KiB RAM of the 130XE. This would be the last release by Atari for the XE.

May/June: Premier issue of Atarian magazine, "the official magazine of the Atarian Video Game Club sponsored by Atari (U.S.) Corp." Published by Atari Explorer Publications, David H. Ahl, Publisher/Editor, in support of the 2600, 7800, and XE game systems.

June 3-6: At the Summer CES in Chicago, upcoming titles were promised by Atari: Commando (never shipped), Tower Toppler (previously: Nebulus; never shipped), Deflektor (never shipped), Xenophobe (never shipped), MIDI Maze (never shipped), Super Football (never shipped)

June/July: New name for Page 6 Atari User magazine: New Atari User.

October: Third and final issue of Atarian magazine.

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." From the Atari 10-K: "The Company's traditional video game offerings include the 2600 VCS, the 7800 ProSystem, and the XE Game System."

1990

March 15: Atari Explorer Publications was shut down, and Atari Explorer magazine went on hiatus.

May?: 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, June/July 1990, p. 6)

June/July: Final issue of Antic, The Atari Resource magazine. Antic would continue as a section of the publisher's STart magazine.

1991

Jan/Feb: Return of Atari Explorer magazine, now headed by John Jainschigg and published in-house at Atari.

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 4/1991, pp. 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 520STFM for $250. The 8-bit computer line is admitted to be discontinued." (AtariUser Jan'92, p. 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, June 1991, p. 10)

November 23-24: Chicago Computerfest by Atari / Lake County Atari Computer Enthusiasts (LCACE), Ramada Hotel O'Hare, Rosemont, Illinois. Atari (U.S.) brought substantially all of their remaining inventory of 8-bit computer products for clearance sales.

December: "..as of Christmas 1991, Atari decided to discontinue the XEgs, 2600, and 7800 systems." --Tim Duarte, AtariUser magazine, July 1992, p. 22.

December 28: From the Atari 10-K SEC filing: "Atari's XE series computers are targeted for the price conscious markets. The 65XE and 130XE have 64k and 128k 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 400 and 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, p.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 U.S. market, XE systems were being made for sale in Mexico, South America, Eastern Europe and Germany. (Atari Interface magazine, Fall 1992, p. 19)

Fall?: The Atari Adventure center at Crestwood Plaza in Crestwood MO, which had featured 800XL computers until at least 1991, was shut down.

December: First issue of Atari Classics magazine, published by Unicorn Publications, Ben 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."

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 (which was established in 1995 as a subsidiary of toy company Hasbro, Inc.), for US$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 from Hasbro, renaming the subsidiary Infogrames Interactive, Inc. Atari Interactive remained a wholly-owned subsidiary of the newly-renamed Infogrames Interactive, Inc.

2003

May 6: Atari Interactive, Inc. (established Feb. 12, 1998 as HIAC XI, Corp.)

was merged with and into Infogrames Interactive, Inc. (established Dec. 8, 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.

TODAY

The Atari copyrights/trademarks/patents associated with the 400/800/XL/XE 8-bit Atari computer line are owned by Atari Interactive, Inc., a subsidiary of Atari S.A. of Paris, France.   http://www.atari.com/