Atari 1090XL Expansion Card Instruction Manual

Version 0.4

By Brian E. Reifsnyder

General Information

Memory Card Installation

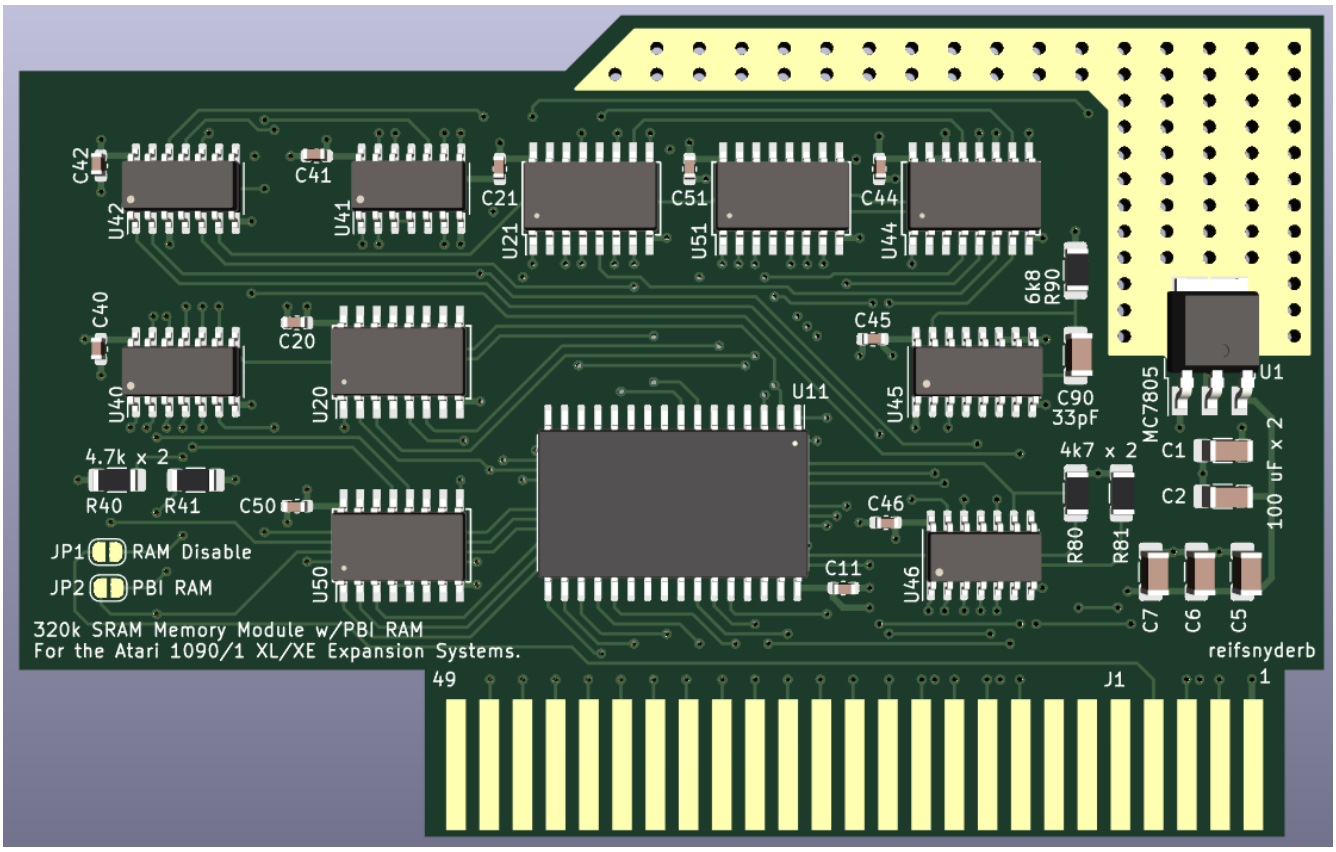
An observation has been made that memory cards, and cards with memory, are more stable when installed in the three card slots farthest from the side of the power switch. The reason for this issue is presently unknown.

Device IDs

Some, but not all, cards require that a Device ID be set. Some Atari documentation listed the Device ID range as being 0 to 7 and other Atari documentation listed the Device ID range as being from 1 to 8. Because of this discrepancy, cards may be marked with either range. In the event a card's Device ID starts with a 0, add one to the card's Device ID for the purposes of comparing it's Device ID to that of other cards. (i.e. If a card has a Device ID range that starts with 0, and the card is set to 3, consider it's effective Device ID to be 4.) It is important to ensure that each card has a unique Device ID. In addition, the Atari computer will initialize the 1090XL Cards starting with the card that has the lowest Device ID. For most cards, the exact Device ID doesn't matter. The most important concern is that each relevant card has a unique Device ID on the 1090XL.

Modern Cards

320k SRAM



Description:

Provides or upgrades the main memory to 64k. 256k of extended memory is provided and is accessible via RAMBO compatible banking. 512 bytes of PBI memory can optionally be supplied as per Atari's PBI memory specifications.

Since this card supplies extended memory, as per RAMBO compatible banking, many applications, games, operating systems, and utilities will find and use this memory automatically. Examples include Prince of Persia and SpartaDOS X.

Setting(s):

a. PBI RAM solder jumper

Solder jumper to set card to provide PBI RAM in the region of $D600-$D7FF.

Note: This jumper must be cleared to use this card with some devices, such as the VBXE.

b. RAM Disable solder jumper

Solder jumper to permit other 1090XL to disable memory if so desired.

Note: This capability is only available on the modern remake of the 1090XL. This jumper must be cleared to use this card with an original 1090XL.

Register(s):

a. $D301 (PORTB)

Bit 2	Write	RAM Bank
Bit 3	Write	RAM Bank
Bit 4	Write	Enable (0) or Disable (1) banking
Bit 5	Write	RAM Bank
Bit 6	Write	RAM Bank

80 Column HDMI Video

Description:

Provides an 80 column text only video display when connected to an HDMI monitor. This video display is compatible with software that utilizes Atari's CIO access to the Editor and Screen via the E: and S: device handlers. No additional software is required to use this card as this card has an onboard ROM with the device handlers. This card can be disabled by booting the computer with a Shift key held down.

Setting(s):

a. Device ID jumper

Set to a unique Device ID. No two installed cards can have the same Device ID.

Register(s):

a. $D1F8 I/O

CX-85 Numeric Keypad Interface

Description:

Provides an interface for the CX-85 Numeric Keypad. No additional software is required to use this card as it has the firmware installed on it's ROM.

Setting(s):

a. Device ID

Set to a unique Device ID. No two installed cards can have the same Device ID.

MIDIcar

Description:

Provides audio and MIDI interfaces with a DreamBlaster daughter board.

Note: Not known if this card was tested when this document was released.

Setting(s):

a. Base

Sets the base address range to either $D1xx or $D5xx

b. Address

Sets the low address byte. Options include $0x20, $0x40, $0x60, $0x80, $0xA0, or $0xE0.

c. Serial TTL

d. Ext MIDI

Note: If the address (Base/Address) is set with the PBI range ($D1xx), the address of $D1C0 is preferred.

OS Extension

Description:

Provides the following extensions and changes to the Atari operating system:

a. HIAS High Speed SIO that works with compatible devices. (i.e. Happy Enhancement)
b. Fast Math F+ floating point math pack that, on the average, doubles the speed of floating point calculations that use the built-in floating point routines.
c. Left screen margin set to 0
d. Reduced key repeat delay
e. Reduced key repeat rate
f. Option key function is inverted, at boot time, on even Device ID numbers.
g. With PBI RAM installed, has the following additional features when Device ID is set to any number except 1 and 4.
    i. Attract mode is turned off
    ii. CONTROL/SHIFT/DELETE cold starts the computer
    iii. SHIFT/HELP toggles international character set
    iv. CONTROL/HELP sets left screen margin to 0
    v. CONTROL/SHIFT/INVERSE starts WozMon (Device ID must be set on 2 or 3.)
    vi. Atari Fuji Screen on entry to self test mode. (Press HELP to continue.) (Not available with Device ID 1 or 4.)

This card can be disabled by booting the computer with a Select key held down.

Setting(s):

a. Device ID

Set to a unique Device ID. No two installed cards can have the same Device ID. The features provided vary depending upon the Device ID as follows:

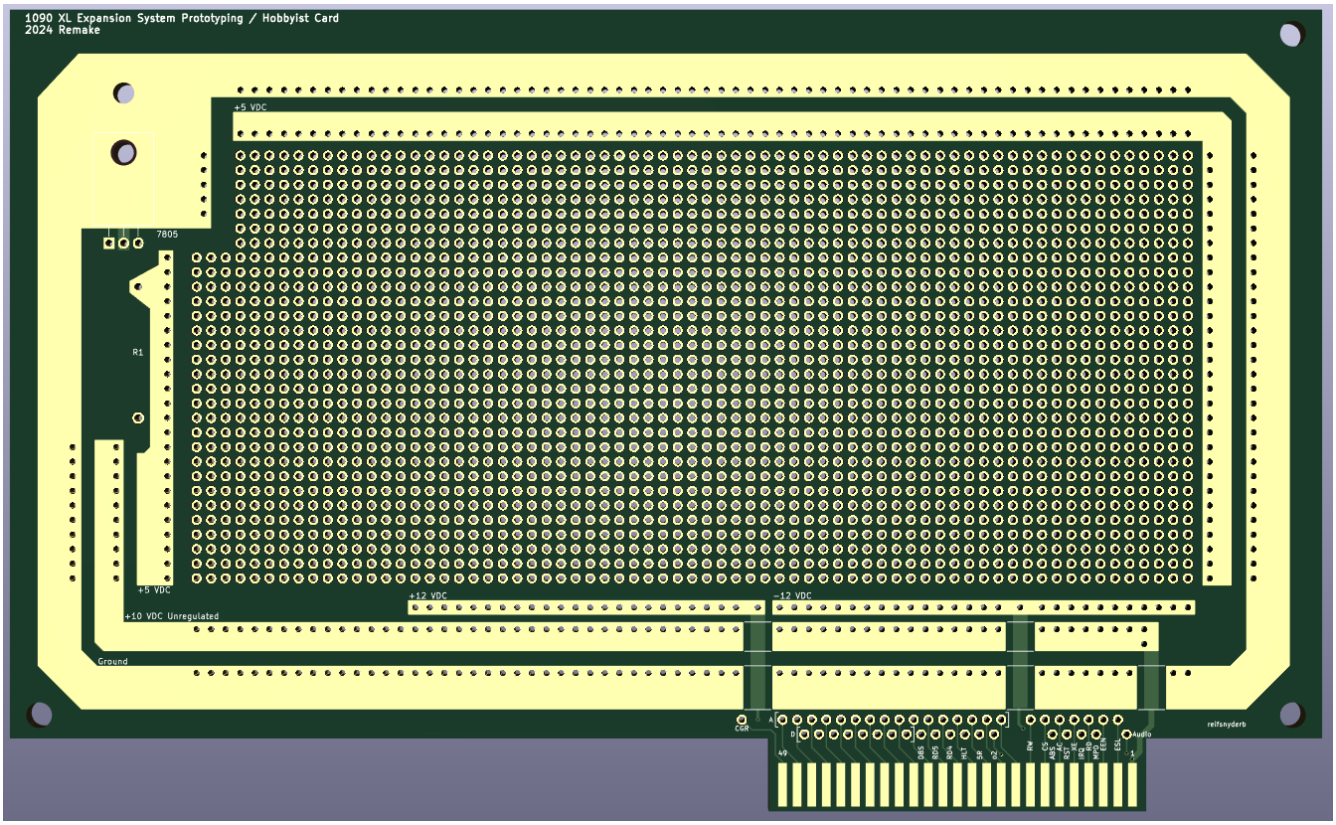
Feature:	Device ID:
PBI RAM Feature WozMon	23
Invert Option Key	2468
PBI RAM Features Attract mode off Control/Shift/Delete to cold start computer Shift/Help to set left screen margin to 0 Atari Fuji Screen	235678

HIAS High Speed SIO	12345678
Fast Math F+ (When enabled)	12345678

b. Fast Math F+

On the left side of the card, a jumper is available to enable or disable the Fast Math F+ math pack feature.

Prototyping / Hobbyist Card



Description:

A blank card that permits prototyping of new 1090XL interface card designs.

This card includes the following power rails:

+ 5 VDC – This requires the installation of a 7805 voltage regulator.

+ 10 VDC Unregulated – This voltage can vary from over 14 VDC to under 8 VDC.
+ 12 VDC – 30 milliamps, max.
- 12 VDC – 30 milliamps, max.
Ground

Signal Lines:

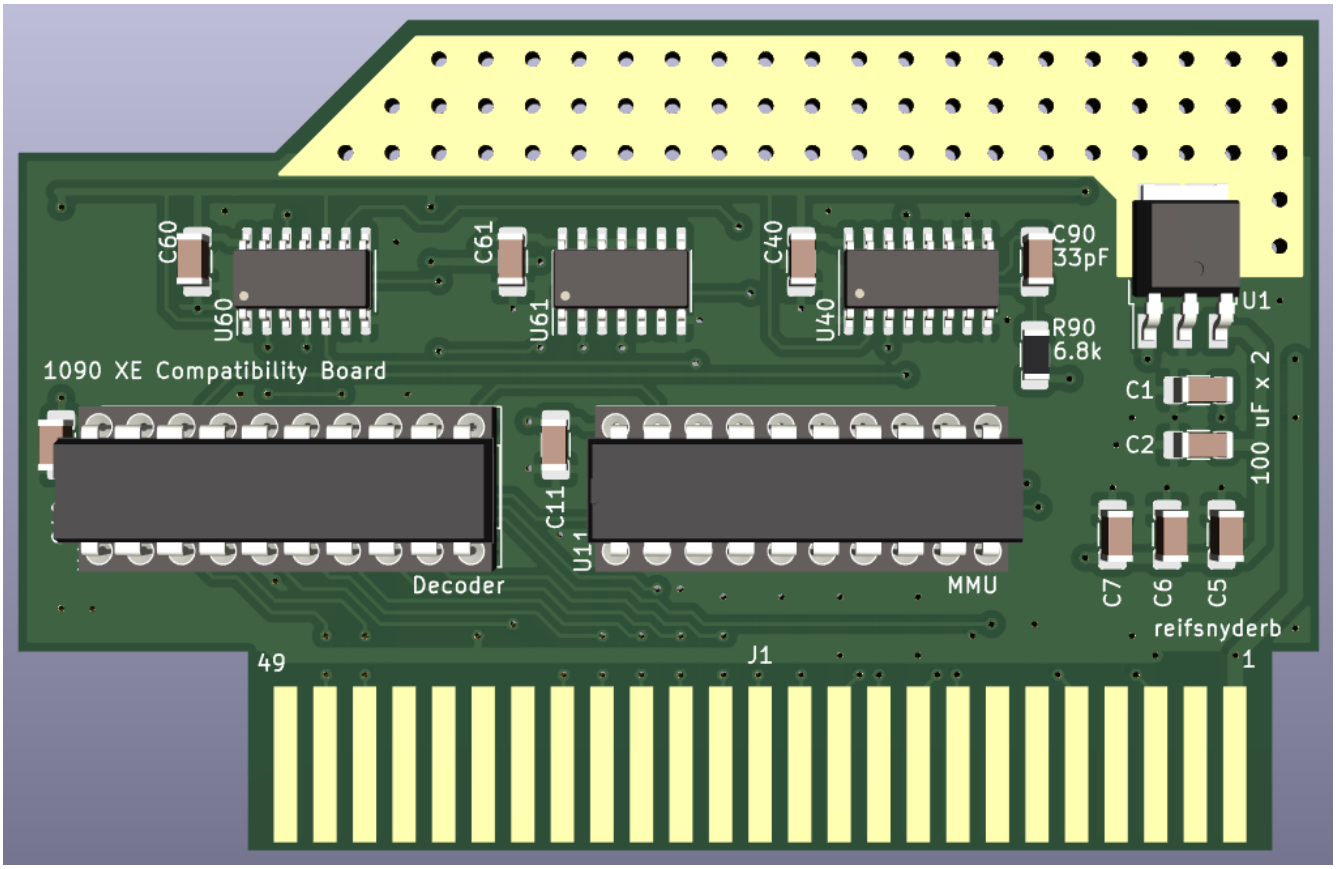
On the front of the board, the Address and Data lines (marked by an “A” or “D”) are surrounded by brackets and increment from left to right. The other signal lines are labeled as per their modernized equivalents.

The less obvious abbreviations are as follows:

DBS	/Data Buffer Select
HLT	/Halt
5R	+5 VDC Reference
o2	Phi 2
RW	Read / Write
CS	/Card Select
ABS	/Address Buffer Select
AC	AC Reference
RST	/Buffered Reset
MPD	/Math Pack Disable
EEN	External Enable
ESL	/External Select

See “The Comprehensive Guide To The Atari Parallel Bus” for more information.

XE Compatibility Card



Description:

This card will only function on a modern remake of the 1090XL and may be required to use memory cards when the 1090XL is connected to an Atari 130XE. This card provides an MMU, on the 1090XL, that provides the missing EXTENB signal not available on a stock Atari 130XE ECI.

Note: On the Atari 130XE ECI, Pin A is not connected and designated as “reserved”. This card is not required if Pin A is connected it to pin 16 of the MMU (U3 / CO61608) so as to provide the missing EXTENB signal.

Setting(s):

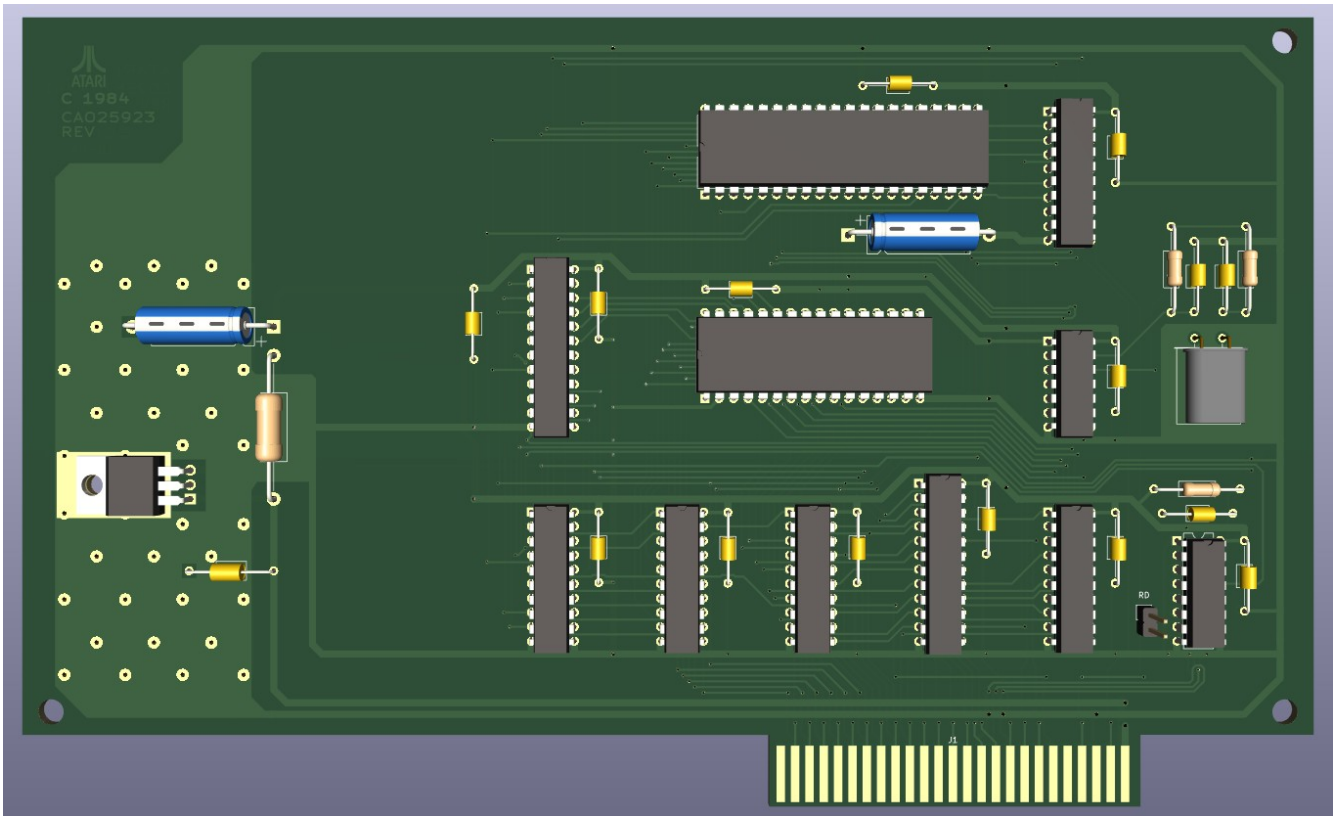
None

Register(s):

a. $D301 (PORTB)

Bit 0	Write	OS Enable (1) or Disable (0) shadow
Bit 1	Write	BASIC Enable (0) or Disable (1) shadow
Bit 7	Write	Self Test Enable (0) or Disable (1) shadow

Z-80 CP/M Card



Description:

Provides a Z-80 CPU and 64k of RAM for use by the Z-80 CPU. This provides an environment for the CP/M operating system. Requires a CP/M boot disk that contains software to utilize the Atari's I/O devices as well as the CP/M operating system. This card will remain dormant without a CP/M boot disk.

Setting(s):

a. RAM Disable jumper

Jumper for this card to disable the memory on other modern 1090XL memory cards. This jumper is located on the lower right-hand corner of the card and may not be marked.

Note: This capability is only used with the modern remake of the 1090XL. This jumper must be removed to use this card with an original 1090XL.

Register(s):

a. $D1F0

Bit 0	Write	Z80 RESET (Inverted and low on boot.)
Bit 1	Write	Z80 /INT
Bit 2	Write	Z80 /BUSRQ
Bit 3	Write	Z80 /RAM Enable
Bit 6	Read	Z80 /BUSAK
Bit 7	Read	Z80 /D7 (Service Request)

b. $D1F1 Banking for DMA to Z-80 RAM by 6502 processor.

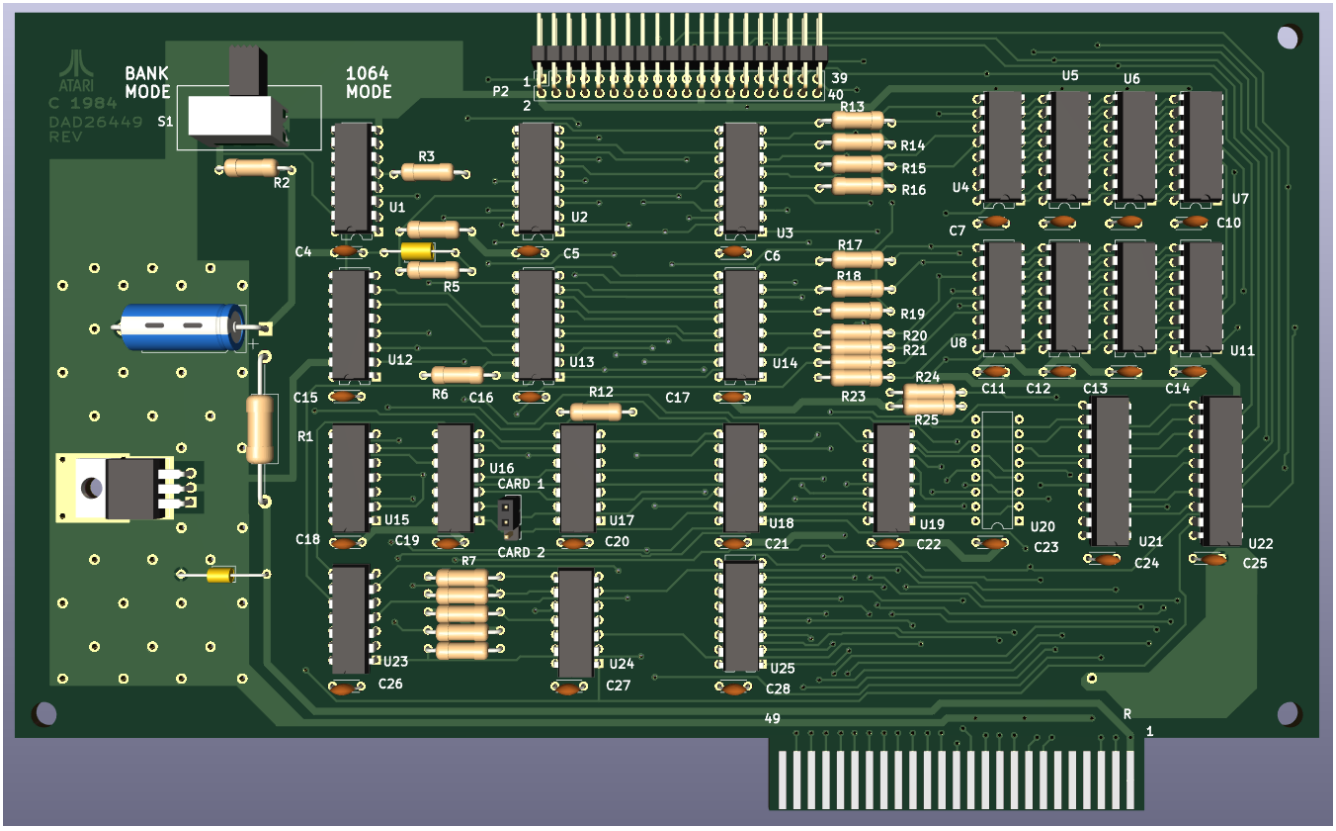
Bit 0	Write	RAM bank
Bit 1	Write	RAM bank 00 = bank 0 ($0000 - $3FFF) 01 = bank 1 ($4000 - $7FFF) 10 = bank 2 ($8000 - $BFFF) 11 = bank 3 ($C000 - $FFFF)
Bit 7	Write	Enable (1) or Disable (0) RAM banking. Disabled on boot. RAM is banked at $8000 - $BFFF

Additional Notes:

1. The Z-80 CPU must be rated for at least 8 MHz.

Reproduction Cards

64k RAM



Description:

Provides RAM that can either upgrade a 600XL to 64k or be set to bank in 64k of RAM via the $D1FE register. Can provide 256k of RAM with an optional modification. Up to 2 cards can be installed to provide banked memory. A 40 pin connector is also provided so as to utilize this card to supply memory for an optional Z-80 CPU card.

Setting(s):

a. Mode switch

1064 Mode: Provides 48k of memory to upgrade a 600XL to 64k of RAM.
Bank Mode: Sets card to bank memory in at the $4000 - $7FFF address range.

b. Card jumper

If this card is in Bank Mode, this jumper sets the register range used to select it's banks. See the section on "Registers", below.

Register(s):

$D1FE

Memory Bank Address:	$4000-$7FFF	(16384-32767)
Select Bank:	$D1FE, BN*	(53758, BN*)
Deselect Bank:	$D1FE, $80	(53758, 128)

* BN is the Bank Number as follows:

First RAM Card:	$0 - $3	(0 - 3)
Second RAM Card:	$10 - $13	(16 - 19)

Note: Claus Buckholz has determined that a 1066 64k RAM card can handle 256k DRAM chips by connecting pin 1, of U20, to ground and by installing a 74LS153 in the empty U20 socket. With this change, bits 2 and 3, of $D1FE, will become bank select bits resulting in the following bank select table:

First RAM Card:	$0 - $F	(0 -15)
Second RAM Card:	$10 - $1F	(16 - 31)

Additional Notes:

1. In 1064 Mode, this card has discovered to be incompatible with other 1090XL cards.

2. This card, in 1064 Mode, will not work with an identical card set to Bank Switch mode.

3. This card does not function exactly as described in Atari's documentation. Both due to available pictures and this difference in function, it is believed there was another 64k card created for the 1090XL.

80 Column Video

Description:

Provides an 80 column text only video display when connected to a composite. This video display is compatible with software that utilizes Atari's CIO access to the Editor and Screen via the E: and S: device handlers. No additional software is required to use this card as this card has an onboard ROM with the device handlers.

Setting(s):

a. Device ID

Set switch to a unique Device ID. No two installed cards can have the same Device ID.

Register(s):

a.	$D1FA	Write	CRTC register address
b.	$D1FB	Read/Write	CRTC register data
c.	$D1FC	Write	VRAM aperture base
d.	$D1FD	Write	VRAM aperture base