Parallel Interface Card

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Contents

Preface

This manual will tell you everything you need to know about your Parallel Interface Card. The card allows you to attach more than one parallel device to your Lisa, giving you wide flexibility in total system configuration.

Chapter 1 is an introduction to the card, telling you its major features and uses. Chapter 2 details the installation of the card. This is the only procedure you need to perform in order to use the Parallel Interface Card.

The appendix contains technical information about the card. This appendix is designed only for reference by programmers, and need never be used for normal operation of the card.

You can insert this manual into the peripherals binder that is in the Lisa accessories box.

Chapter 1
Introduction

Your Lisa can be connected to "peripheral" devices that do things like store information (such as the ProFile hard disk) or print information (such as the Apple Dot Matrix Printer).

All such peripheral devices are either "serial" or "parallel." Information travels to and from serial devices one bit at a time, like beads on string. On parallel devices, information travels several bits at a time, along parallel wires.

Once the information is in your Lisa, it doesn't matter how it got there, but in order to connect peripheral devices to your Lisa, you need to know whether they use the serial or parallel method of communicating.

The Parallel Interface Card connects parallel peripherals to the Lisa. The Lisa contains one built-in connector for a parallel peripheral; each Parallel Interface Card provides two additional connectors, enabling your Lisa to support two more parallel peripherals. The card can be easily installed into one of the three Lisa expansion slots.

Since the Lisa contains a built-in parallel interface, a Parallel Interface Card is only required when you have more than one parallel device.

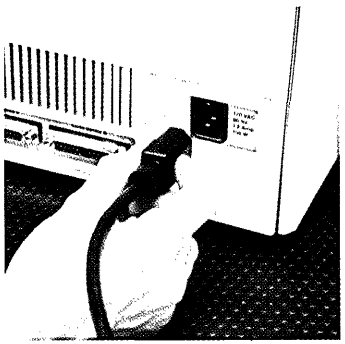
The card has these general features:

- Any device that uses Apple's standard parallel interface can be connected to the card. This includes: ProFile hard disk and the Apple Dot Matrix Printer, and two ProFile hard disks.
- Installation of the card is simple, even for beginners. Just slip the card into any one of the Lisa's three expansion slots.
- The card transfers data at a maximum rate of 625K bytes/second.
- The card's connectors use the same software command format as the Lisa's built-in parallel interface.

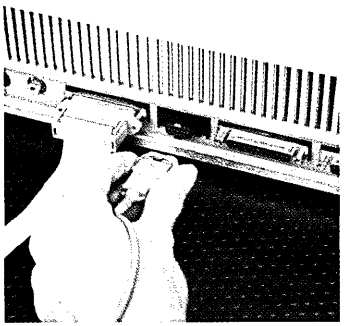
Chapter 2
Installing the Parallel Interface Card

Installing the board is a simple process. Follow these instructions:

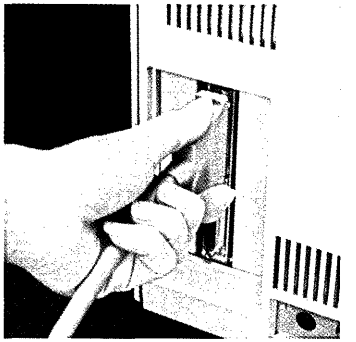
1. If the Lisa is on, turn it off by pressing the on-off button. Wait until all diskettes are released and the power light is off.
2. Turn off all peripheral devices.
3. Disconnect the power cord from the back of the Lisa. Turn the Lisa so that the back panel is facing you.



If they are in the way, remove any cables that are attached to the connectors along the bottom edge of the back panel.



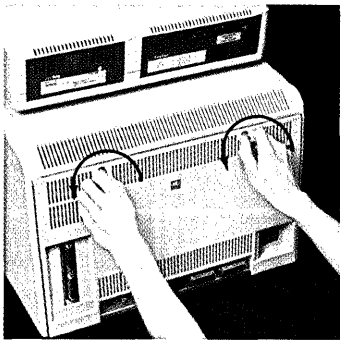
4. Remove any cables extending from the expansion cards on the left side of the back panel.



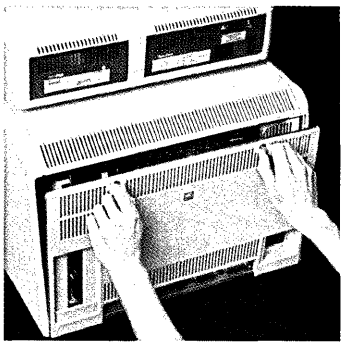
5. Remove the back panel, following this procedure:

   a. Turn the two thumbscrews along the upper edge counterclockwise until they won't turn any further.

      These screws loosen but do not come free from the back panel.

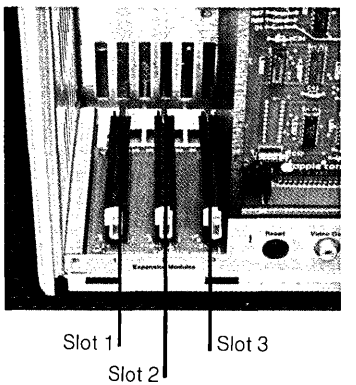


   b. Pull the panel toward you slightly and up.

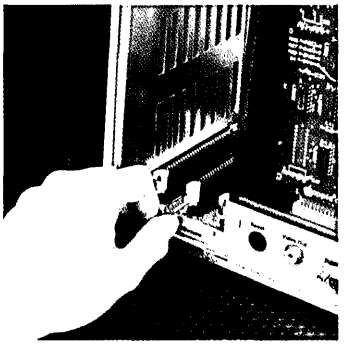


6. Determine which of the three expansion slots on the lower left of the card cage will hold the card.

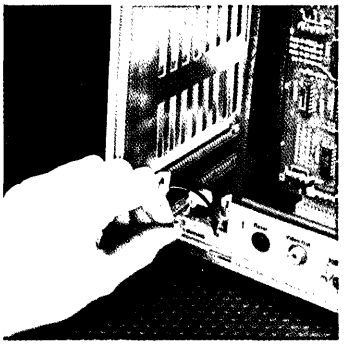
   In general, parallel interface cards should be installed in slot 2 or 3.



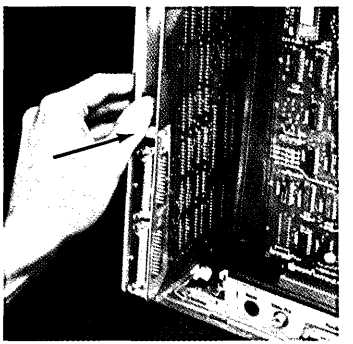
7. Pull out the metal lever extending from the plastic cap in front of the card slot.



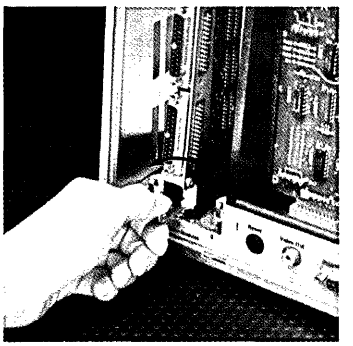
8. Turn the lever clockwise 90 degrees, to the 3 o'clock position.



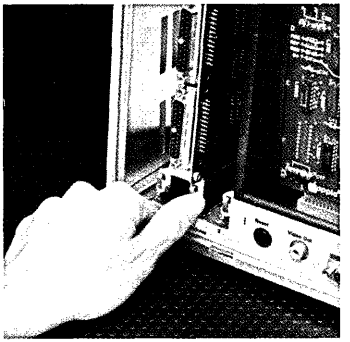
9. Hold the expansion card by the metal edge, with the green plastic facing right and the white cover facing left. Insert the bottom of the green card into the connector slot and the top of the green card into the plastic slot above the connector. Slide the card evenly into the cage as far as it will go.



10. Turn the metal lever counterclockwise 90 degrees, back to the 12 o'clock position.



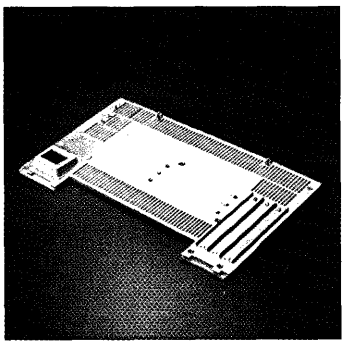
11. Push the lever back into the plastic cap.



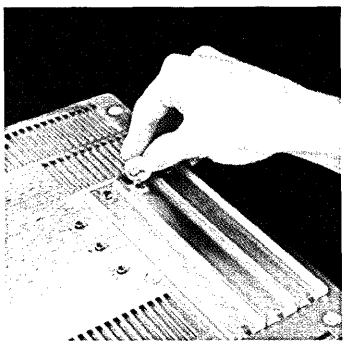
12. A set of slot covers on the Lisa's back panel blocks the electromagnetic emissions from inside the cabinet. If you have just installed a card into a slot that did not previously contain a card, follow steps a through e for removing the cover that protects that slot.

    Otherwise, skip the lettered instructions and go to step 13.

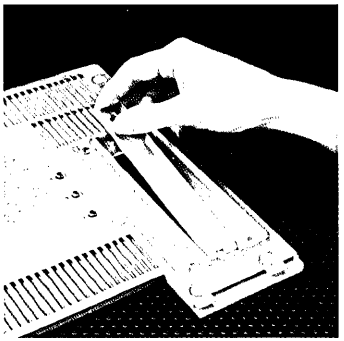
    a. On the back panel, locate the slot cover for the slot in which you just installed a card.



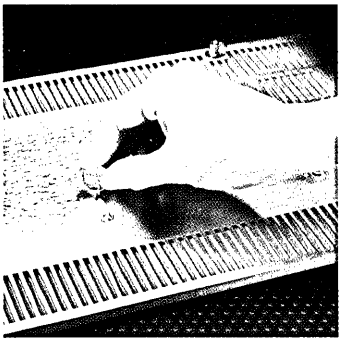
    b. Loosen the screw at the top of the metal plate. (If you don't have a screwdriver, a coin will work nicely.)



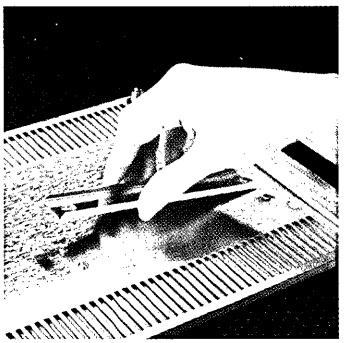
c. Pull the plate over the screw head and out from behind the retaining notch.



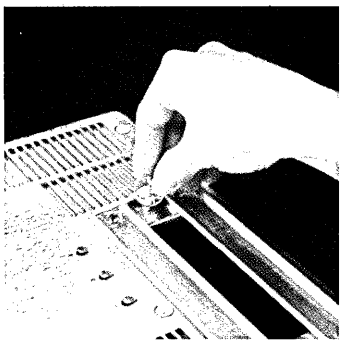
d. Loosen one of the three screws in the middle of the back panel.



e. Slide the metal plate behind the retaining tab and over the screw head.

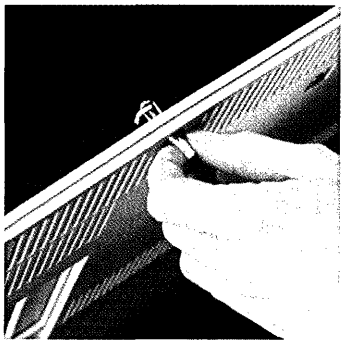


f. Tighten both screws.

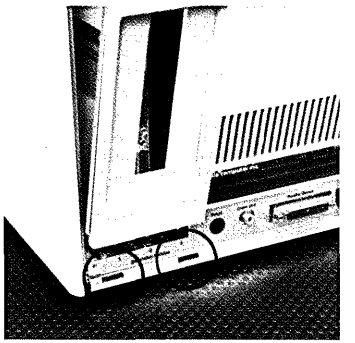


13. Replace the back panel, following this procedure:

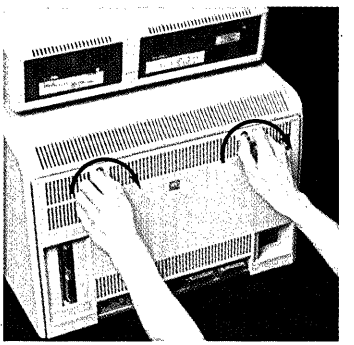
    a. Make sure the metal prongs attached to the two screws on the panel are pointed to the left.



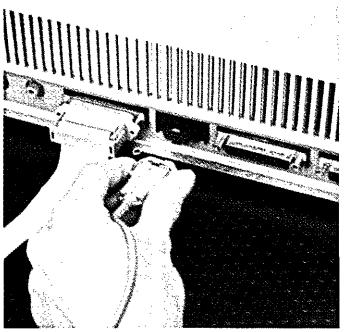
    b. Insert the four tabs along the lower edge of the back panel into the slots at the base of the cabinet.



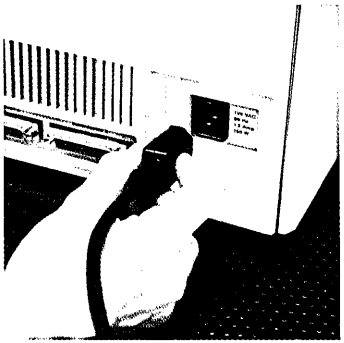
    c. Push the panel flat against the back of the cabinet. Turn the two thumbscrews clockwise until they are snug.



14. Reattach any cables that you removed from the expansion cards or from the bottom edge of the back panel.



15. Connect the power cord to the back of the Lisa.



After you install your Parallel Interface Card, you need to specify in the Lisa Preferences where you have installed the card. See the *Lisa Owner's Guide*, Section D, Desktop Manager Reference Guide, under Set Device Connections.

Appendix
Technical Appendix

Overview

The two connectors on the Parallel Interface Card are electronically similar to the parallel connector built into the Lisa system, so software driving the internal connector can also drive the external parallel connectors with little modification. There is also a ROM on the card which contains self-test diagnosic software, as well as a program that allows Lisa to boot from peripherals attached to the connectors.

Technical Specifications

- Two parallel interface connectors
- Standard Apple parallel interface protocol
- 2K Bytes on-board ROM
- Allows system startup from ProFile hard disk attached to connector
- Self-test diagnostics
- 625K bytes/second maximum data transfer rate
- Connector control based on 6522 Versatile Interface Adapters
- Supports several read/write handshake modes
- 4 programmable timers
- Interrupt capability
- Parity check on data lines
- Dimensions: 9.3″ high x 5″ wide x 0.7″ deep (236mm x 127mm x 18mm)
- Power consumption: 1 Amp @ 5 Volts

Electrical Description

The parallel connector electronics consist basically of two 6522A Versatile Interface Adapter (VIA) chips. Each VIA contains two 8-bit parallel connectors, associated handshake signals, a programmable timer/counter, and a shift register. See the 6522A data sheet for more information. One 6522A is dedicated to each parallel connector.

The pin functions are as follows:

DD0-DD7	Eight bidirectional data lines. DD7 is the most significant bit.
RW	Read/write. The Lisa drives this line high to indicate that it expects data to be input on the data lines. The Lisa drives this line low when there is data to output.
PARITY	Bidirectional line which must be configured on the basis of data currently on the data lines to give odd parity.
PSTRB/	Processor strobe line used by the Lisa to indicate valid data being output.
CMD/	The Lisa asserts this line to indicate that a command has been placed on the data lines.
BSY/	The attached periperhal asserts this line to indicate that it is busy and unable to process commands on the interface.
OCD	Open cable detect. If this line is high, Lisa assumes no device is connected to the connector.
CRES/	Controller reset. Lisa asserts this line to reset the peripheral to its power-on state.
CHK/	This signal may be used to interrupt the CPU in the event that a fault condition has occurred in the device connected to the connector.

Table 1 shows the signals on the parallel connector DB-25 connector and their respective connections to a 6522A chip. PBx corresponds to connector B, bit x on a 6522A chip, and CAx and CBx are control input/output bits. See the 6522A data sheet for more information.

Table 1. Parallel Connector Pin Assignments and Connections

Signal	Pin	Connector Connection
PSTRB	15	CA2
R/W	3	PB3
CMD	17	PB4
CHK	25	CB1
BSY	16	PB1,CA1
OCD	19	PBO
CRES (out)	21	PB7
CRES (in)	21	PB6
Reset Parity	—	PB5
Parity Latch	—	CB2

Software Considerations

See the 6522A data sheet for information regarding programming the 6522A chip registers and I/O connectors. Basic connector addresses are shown in Table 2; add 2000H, 6000H, or A000H to these addresses depending on whether the Parallel Interface Card is in slot 1, 2, or 3 respectively. Note that these addresses are in system I/O space, as defined in the Lisa Hardware Reference Manual.

The built-in 2K byte ROM starts at 0, 4000H, or 8000H, depending on which slot is being used. The byte-wide ROM appears in the low (D0-D7) byte of each word.

Table 2. 6522A Register Addresses

Register	Reg #	Connector A Address (Hex)	Connector B Address (Hex)
ORB/IRB	0	0	800
ORA/IRA (w/hndshk)	1	09	809
DDRB	2	11	811
DDRA	3	19	819
T1C-L	4	21	821
T1C-H	5	29	829
T1L-L	6	31	831
T1L-H	7	39	839
T2C-L	8	41	841
T2C-H	9	49	849
SR	10	51	851
ACR	11	59	859
PCR	12	61	861
IFR	13	69	869
IER	14	71	871
ORA/IRA (no hndshk)	15	79	879

Differences from Lisa Internal Connector

As mentioned above, both the Lisa and the Parallel Interface Card use 6522A VIAs to drive the parallel connectors. However, there are a few minor differences that the programmer should note.

1. Timing. The Lisa parallel connector is driven by a 500 kHz clock. The Parallel Interface Card supports a faster clock operating at 1.25 MHz. This affects software using 6522A internal timers.

2. Connector Configuration. Software driving the Lisa internal connector references signals through two 6522A chips (see the Lisa Hardware Reference Manual for more information). The Parallel Interface Card devotes a single 6522A to each connector.

Schematic

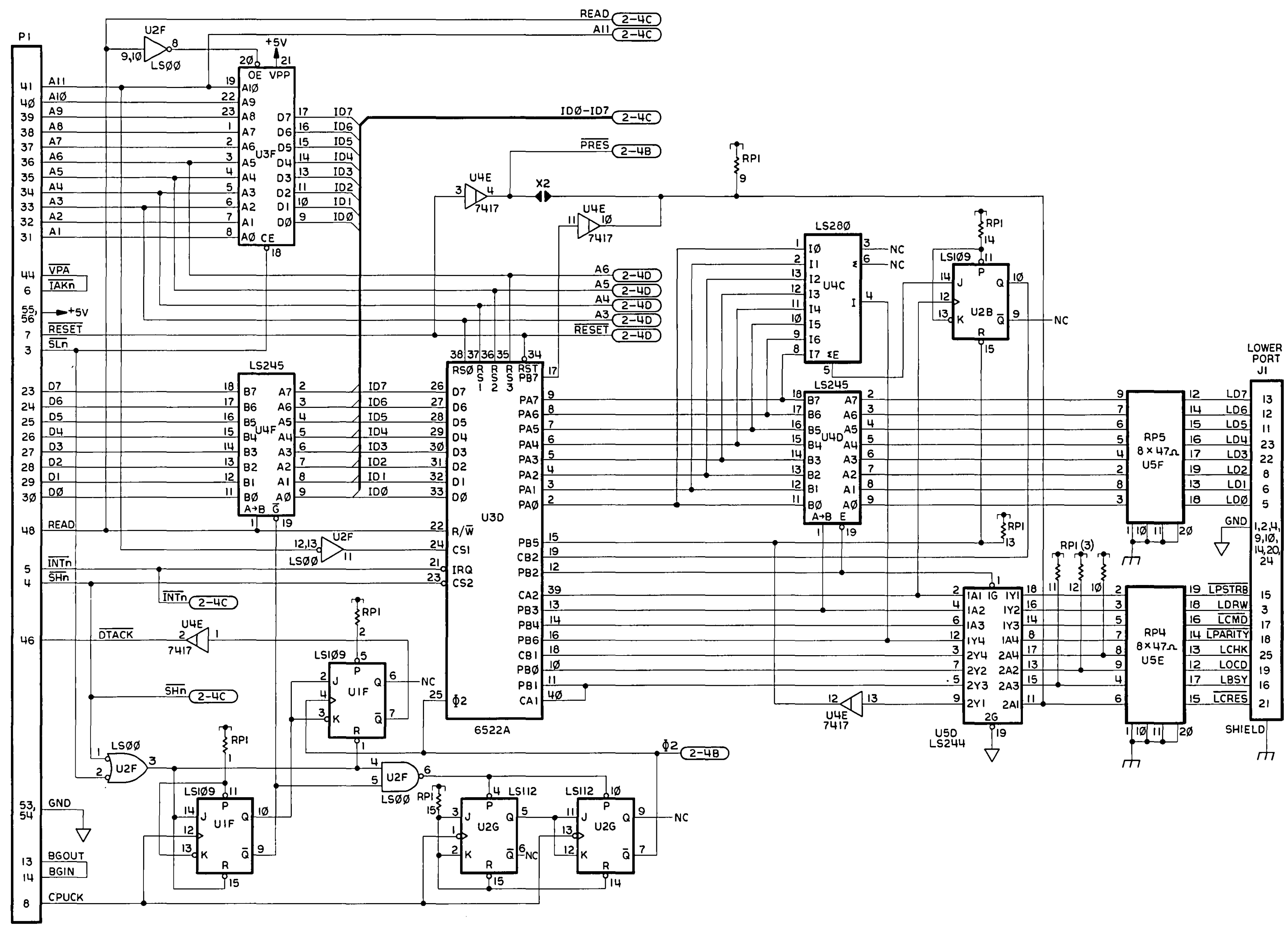
The electronic schematic of the card is shown on the following pages.

Schematic of Parallel Interface Card

Schematic drawing, 1 of 2.

NOTE: UNLESS OTHERWISE SPECIFIED
1. P1 IS COMPATIBLE IN ALL EXPANSION SLOTS.

REV	ZONE	ECO #	REVISION	APPD
A	—	B178	INITIAL RELEASE	—



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METRIC

TITLE: SCHEMATIC, PARALLEL I/F LISA

ORIG DIV: POS

DESIGNER: MARTEN

SIZE: D

DRAWING NUMBER: 050-4027-A

SHT 1/2

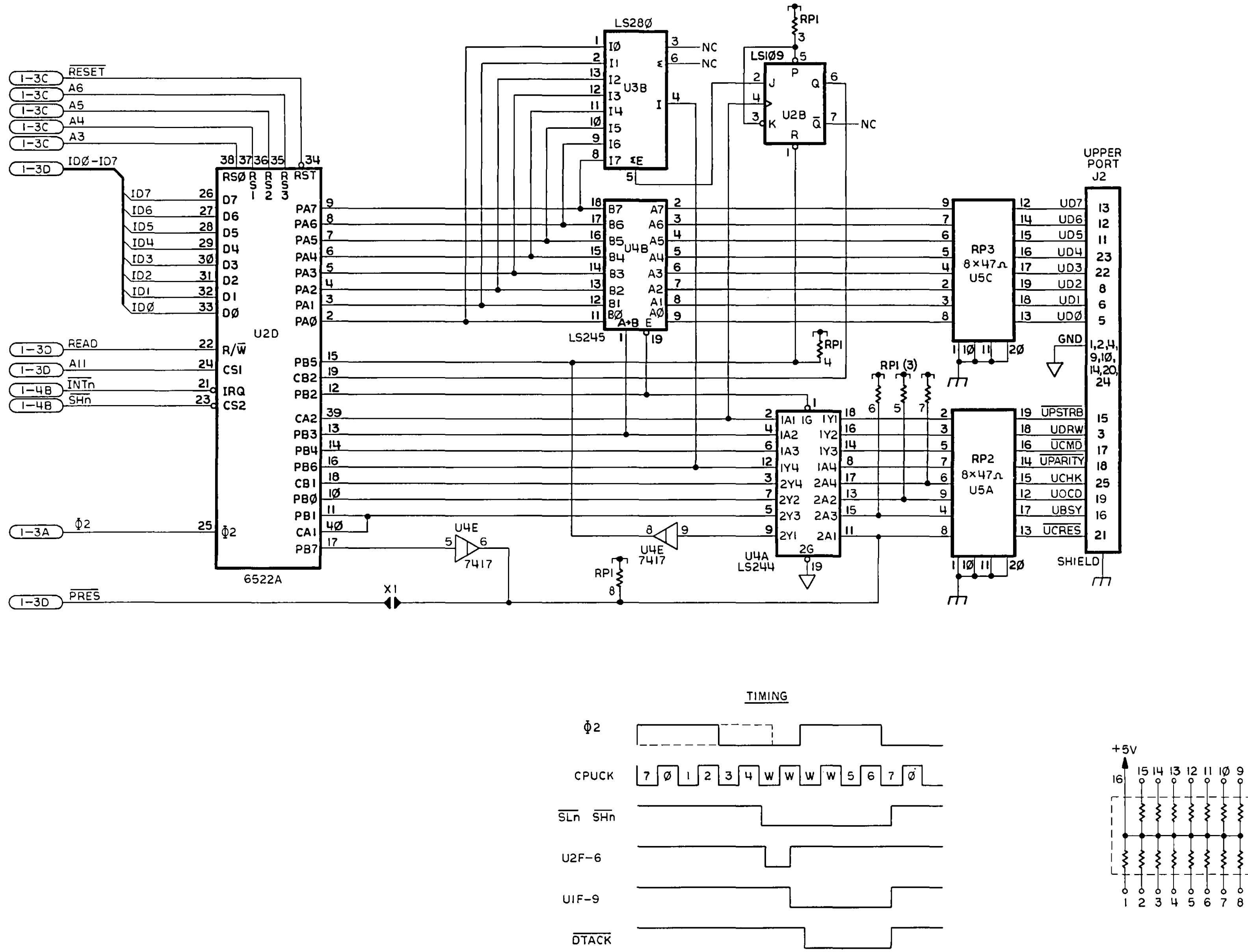
050-4027-A 1/2

Schematic of Parallel Interface Card

Schematic drawing, 2 of 2.

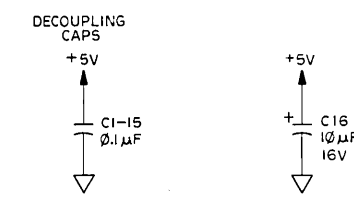
NOTE: UNLESS OTHERWISE SPECIFIED
SEE SH 1

REV.	ZONE	ECO #	REVISION	APPD
			SEE SH 1	



REF DESIG	DEVICE	+5V PIN#	GND PIN#
U1F,2B	LS1Ø9	16	8
U2D,3D	6522A	2Ø	1
U2F	LSØØ	14	7
U2G	LS112	16	8
U3B,4C	LS28Ø	14	7
U3F	2716	24	12
U4A,5D	LS244	2Ø	1Ø
U4B,4D,4F	LS245	2Ø	1Ø
U4E	7417	14	7

REFERENCE DESIGNATIONS		
	LAST USED	NOT USED
RP	RP5	———
C	C16	———
J	J2	———
X	X2	———
P	P1	———



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