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04/03/86

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DATE: September 21, 1979

REVISION DATE: March 7, 1983

BULLETIN NO: II:1

PRODUCT: 26-4001/2 Model II

SUBASSEMBLY: AXX-0505 FDC Board Early Design (All Revisions)
AX-9033 FDC Board Late Design (All Revisions)

PURPOSE: To correct problem of disk not booting or not restoring to track 00. May also cause several different intermittent errors.

DISCUSSION: There are two types of FDC boards. An AXX-0505 (early design) and an AX-9033 (late design) used in the Model II. The AXX-0505 FDC requires that 4 wire jumpers be installed on the Drive 0 logic board if Drive 0 is a Shugart, and 2 jumpers installed on the Drive 0 logic board if Drive 0 is a TPI. Also, if the Model II is not using an expansion bay an external terminator (AJ-6800) **MUST** be plugged into the expansion bay connector on the back of the Model II. When using an AX-9033 FDC, these jumpers are not used on the Drive 0 logic board and the external terminator is not used.

PROCEDURE: The wire jumpers for the Shugart drive are:

J1-4 to T6 (on row farthest from connector)
J1-6 to T5 (on row farthest from connector)
J1-8 to T4 (on row farthest from connector)
J1-10 to T3 (on row farthest from connector)

It is very easy for the terminator to inadvertently be plugged in one row to the right or left of the proper row of pins, so be sure the terminator matches the correct pin locations. Also check for bent or damaged connector pins. A pre-made 4 wire jumper is available from National Parts with part number AW-2706. If the drive is a TPI refer to Technical Bulletin II:30 for proper drive jumpering.

DATE: November 1, 1979
REVISION DATE: March 8, 1983
BULLETIN NO: II:2
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0502 32K Ram Memory Board (All Revisions)
AXX-0503 64K Ram Memory Board (All Revisions)

PURPOSE: To correctly identify proper jumper configurations for the Model II Memory Boards.

DISCUSSION: There are three possible memory board configurations for the Model II. A 32K Ram board, a second 32K Ram board to upgrade from 32K to 64K Ram, and a single 64K Ram board. Jumper configurations are different for each board.

PROCEDURE: The correct jumper configurations are:

First 32K Memory board:

- 16-17 Selects the first 16K of the base page
- 15-18 Selects the second 16K of the base page

Second 32K Memory board:

- 26-27 Enables the next jumpers on page 1 of the memory map
- 9-11 Selects the first 16K of page 1
- 10-12 Selects the second 16K of page 1

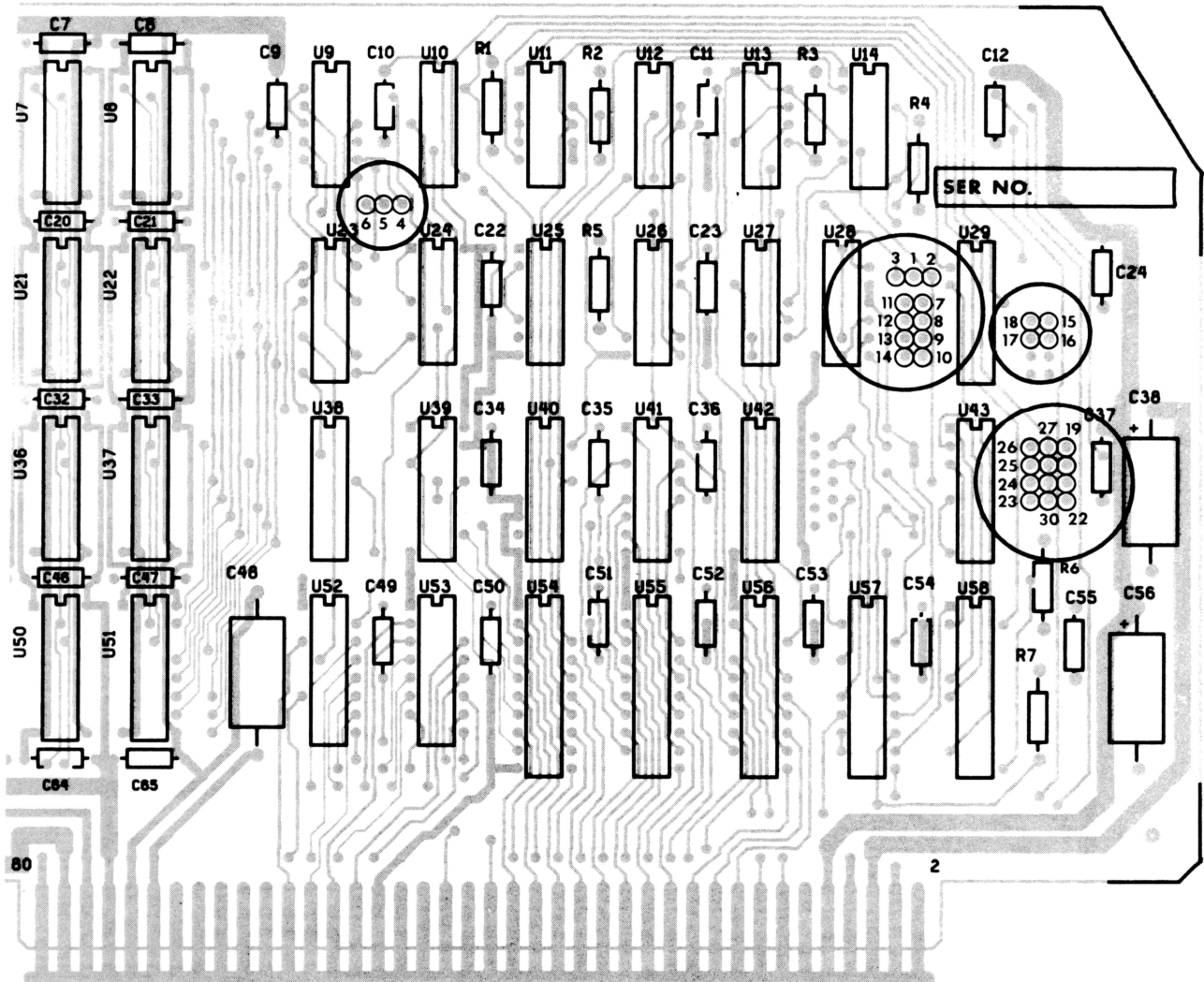
64K Memory board:

- 16-17 Selects the first 16K of the base page
- 15-18 Selects the second 16K of the base page
- 26-27 Enables the next jumpers on page 1 of the memory map
- 9-13 Selects the first 16K of page 1
- 10-14 Selects the second 16K of page 1

The following jumpers are required to be installed on all memory boards.

- 1-2 Pulls up an input to U27 that was floating
- 5-6 Pulls up an input to U9 that was floating

Use MEMII Diagnostic to check each memory board for correct jumpering and proper operation.



JUMPER LOCATION-
COMPONENT SIDE

Figure 1

DATE: January 22, 1980
REVISION DATE: April 28, 1983
BULLETIN NO: II:3
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: General Video Theory

PURPOSE: To discuss general video theory used in the Model II.

DISCUSSION/PROCEDURE: In general, video theory is the same whether old or new technology is used. All video used in the Model II whether it is a Motorola or RCA board and tube is basically the same. This also holds true with the host of other computers we market with the exception of the Color Computer. The material in this bulletin therefore will deal in general theory to aid the technician in troubleshooting ANY video related computer failure.

SAFETY:

The first concern of the technician when troubleshooting and replacing video circuitry is to be safety conscious.

HIGH VOLTAGE: The leads going to and from the Video Board and CRT may have as great as 12,000 volts potential so this is an obvious place to be careful.

CRT IMPLSION: The Cathode Ray Tube (CRT) itself is a vacuum tube with an effective atmospheric pressure of 14.7 pounds per square inch, creating an implosion potential. Always be sure to unplug the connector from the back of the CRT before trying to remove the power supply/video board assembly, as failure to do so will result in an imploded CRT and physical harm to the technician. When the need arises to replace the CRT itself precautions must be taken in handling the old and new tube. Obviously, always handle the tube with care to avoid dropping it. The old tube should be set in an out of the way place to avoid inadvertent damage, and disposed of properly as soon as possible.

TROUBLESHOOTING WITH POWER APPLIED:

REMOVE all jewelry, be very aware of where your hands are, and remain alert. High voltages can harm the technician, and low voltages can harm circuits when unintentional shorting of components, wires, or subassemblies occurs.

DISCHARGING OF THE CRT:

When it is determined that the CRT or the monitor board needs to be replaced the High Voltage lead will have to be taken loose from the CRT tube. **NEVER** attempt to remove the High Voltage lead without first discharging the CRT according to the following procedure. As a further safety note the AC power cord should be disconnected from the back of the computer. Also, remove all jewelry and try to use only one hand whenever possible keeping the other hand away from the computer.

1. Attach one lead of an alligator clip to the a flat blade screwdriver.
2. Attach the other lead of the alligator clip to chassis ground.
3. Be sure to hold the screwdriver by the handle and do not let your hand come in connect with the blade.
4. Insert the blade of the screwdriver under the rubber anode cup and short across the two high leads. Leave the screwdriver in place for a few seconds then remove. It is not a bad procedure to repeat this step a second time to insure the CRT is discharged completely.
5. Remove the high voltage leads from the CRT.

REMEMBER safety should never be taken lightly or compromised, to avoid harm to the technician and/or to the computer.

GENERAL THEORY:

There are basically five subassemblies that may cause the loss, distortion or non-adjustment of video.

1. System Power Supply
2. Video Generator PCB (VDG)
3. Video Driver PCB
4. Cathode Ray Tube(CRT)
5. CRT deflection coil(YOKE)

In addition, the interconnecting wiring between these assemblies, the brightness control pot, and the contrast control pot should not be overlooked as possible causes of video failure. Refer to Section 7-D page 92 of the Model II Technical Reference Manual for the troubleshooting guide.

Figure 1 shows the inputs to the video driver PCB. The system power supply furnishes +12V DC to the monitor. This is the source for Horizontal circuits and gets the horizontal oscillator started to produce the scan derive voltages required by the rest of the circuits in the monitor. The video generator board sends the Vertical Sync, Horizontal Sync, and Video signals to the video driver for video control. Vertical sync determines the vertical position of the display, horizontal sync determines the horizontal position of the display and the video signal supplies the dot information to be displayed.

Figure 2 shows a block diagram of the video monitor board, the yoke, and the CRT. The video output circuit takes the video signal (dot

information) from the VDG and amplifies it. This signal is then applied to the cathode of the CRT for proper dot display. The horizontal circuit takes the horizontal sync signal from the VDG and produces the scan currents necessary to move the CRT electron beam from left to right across the screen. The vertical circuit takes the vertical sync signal from the VDG and produces the scan currents necessary to move the CRT electron beam from top to bottom of the screen. The yoke is located on the neck of the CRT. It has both horizontal and vertical deflection coils. The magnetic fields produced by these coils will influence the electron beam of the CRT. This influence will cause the electron beam to move horizontally across the screen and vertically up and down the screen. The CRT consists of an electron gun and a phosphor screen inside an evacuated glass envelope. The glass neck of the CRT contains the electron gun assembly which produces a beam of electrons accelerated to the screen by the high voltage on the anode.

The flyback transformer located on the monitor board is used to produce (after rectification) the DC voltages used by the various circuits of the monitor. These voltages are:

- +80V Boost
- +19V Source
- +18V Source
- 12KV Source

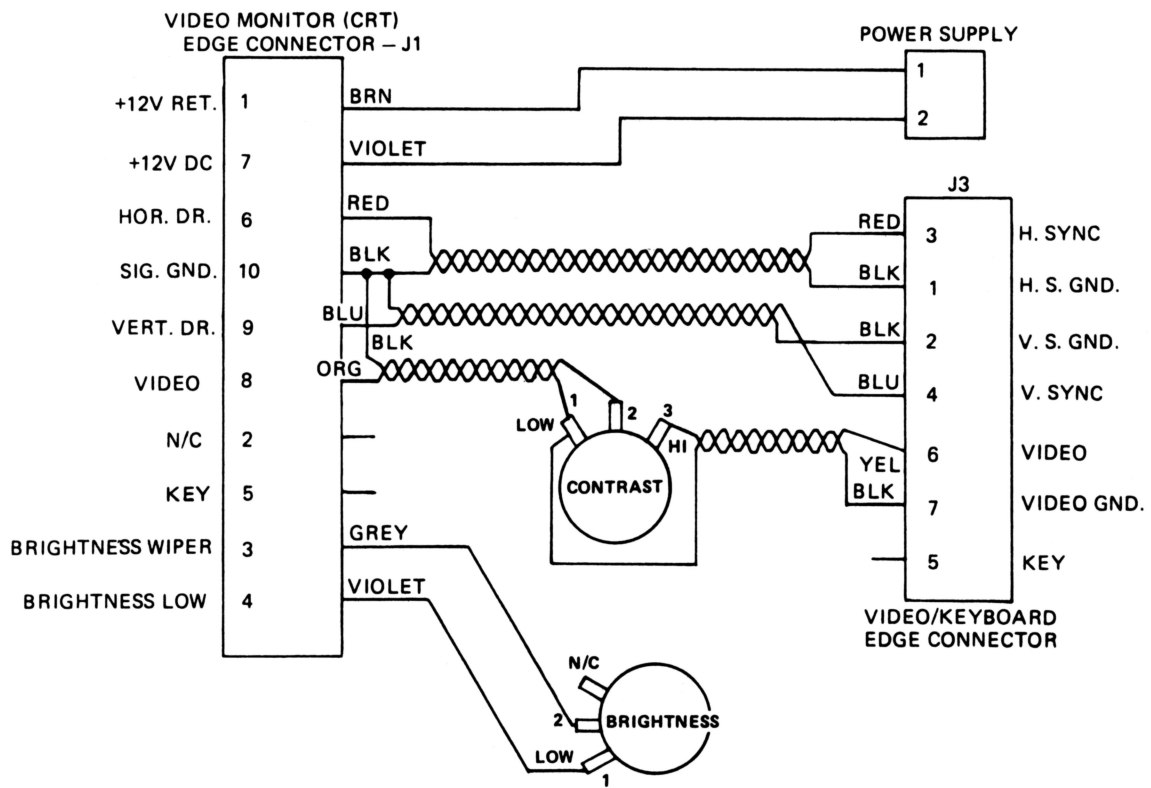


Figure 1

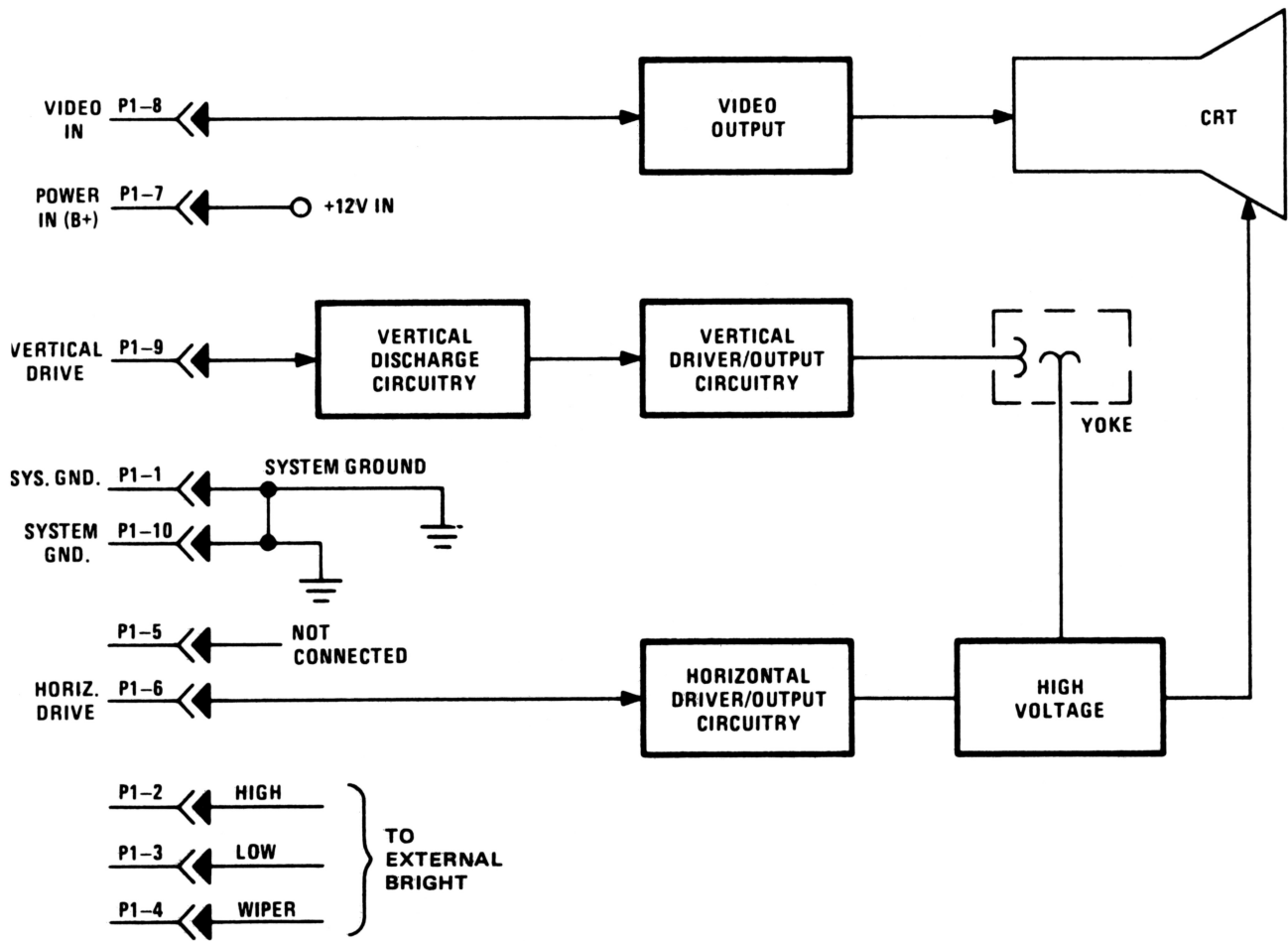


Figure 2

DATE: February 21, 1980
REVISION DATE: March 9, 1983
BULLETIN NO: II:4
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0505 FDC Board Early Design (Rev A, B, and C)

PURPOSE: To correct thermal failure of FDC IC (U6) causing Read/Write errors, and other intermittent disk I/O failures.

DISCUSSION: Early FDC chips developed thermal failures causing disk I/O failures and Read/Write errors. To correct this problem a 2.7V Zener diode **MUST** be installed from U6 Pin 1 to U5 Pin 7. On new and factory repaired assemblies this change will already have been installed.

PROCEDURE: Check to see if this modification has been done, if not, install diode as per Figure 1. Be sure to use sleeving for insulation of leads to prevent shorts. This diode can be ordered from National Parts using part number ADX-1382 and catalog number 26-4001.

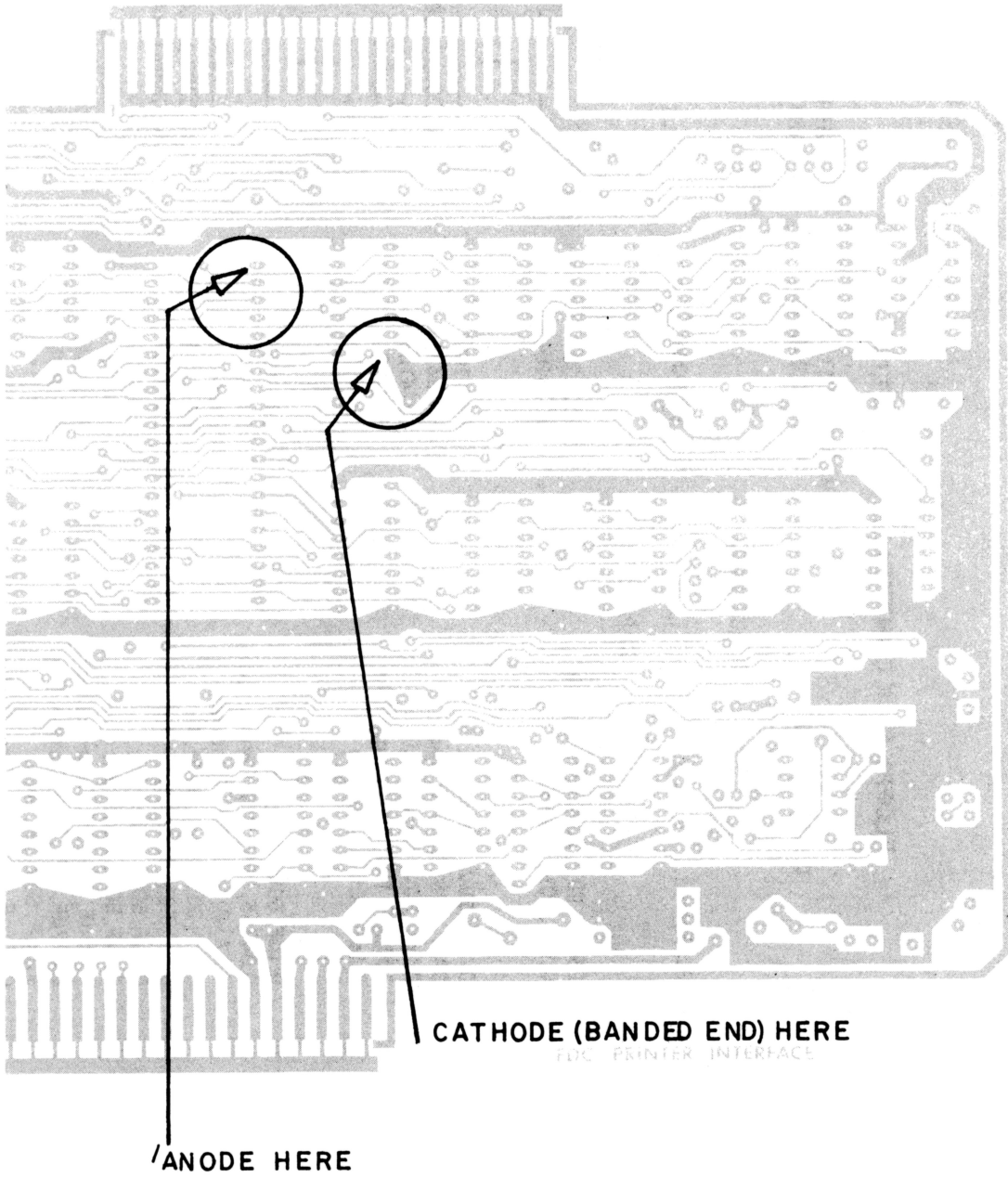


Figure 1

DATE: March 20, 1980
REVISION DATE: March 9, 1983
BULLETIN NO: II:5
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0312 Motorola Video Board

PURPOSE: To correct problem of a failing Motorola Video Board causing the Video Generator Board to fail.

DISCUSSION: A failing Motorola Video Board can cause the Video Generator Board (AXX-0504) to fail also. To correct this problem the Motorola Video Board (AXX-0312) must be modified to allow for better circuit isolation between the Video Board and the Video Generator Board. All new and factory repaired boards will have this modification already installed.

PROCEDURE:

1. Remove R1
2. Remove R6, R7, and R8 and replace with the following valued resistors:
 - R6 to 470 ohms 1/4 watt (AN-0169EEB)
 - R7 to 10K ohms 1/4 watt (AN-0281EEB)
 - R8 to 1.5K ohms 1/4 watt (AN-0206EEC)

Note: The only way to verify this modification has been done is to check R6, R7, and R8 for correct values. This modification is required for all units.

DATE: March 27, 1980
REVISION DATE: March 9, 1983
BULLETIN NO.: II:6
PRODUCT: 26-4160/1/2/3 Model II Expansion Bay
SUBASSEMBLY: AXX-0309/AXX-0310 CDC Logic Boards

PURPOSE: To correct Read/Write errors and other intermittent failures with one or more CDC Drives in the expansion bay.

DISCUSSION: Early CDC Discrete(A level) and LSI(B level) Boards have a problem with the stepper motor always being enabled. This may overload the 24V power supply causing intermittent problems with all drives in the expansion bay. A one drive bay with this problem may not show any errors but should still be checked. The problem with the discrete board was corrected with an engineering change. The LSI board was corrected with the addition of a power saver pack (satellite board).

PROCEDURE:

Electrical check of both Discrete and LSI boards:

1. Power up Model II and expansion bay and make sure drive 0 is selected. Insert diskette message should be present on screen and drive 0 LED lit.
2. Physically attempt to rotate the stepper motor shaft on all the drives in the expansion bay. All of the stepper shafts should rotate easily as none of the drives are selected.
3. If any of the stepper shafts do not rotate easily the problem lies with that drive. Replace defective logic board.
4. Do not attempt to repair or modify any of these boards. They are considered defective and should be changed out with a new board from National Parts.

DATE: April 17, 1980
REVISION DATE: March 10, 1983
BULLETIN NO: II:7
PRODUCT: 26-4160/1/2/3 Model II Expansion Bay
SUBASSEMBLY: AXX-5003 CDC Drive Mechanism

PURPOSE: To correct diskette binding and intermittent drive not ready errors.

DISCUSSION: Problems have occurred causing the diskette to bind when the head is loaded, and intermittent drive not ready errors when the drive is accessed. These problems can be corrected by proper adjustment of the push-rod travel, door interlock switch, and the disk load bail. These problems can also occur if the tip of the push rod is worn or if the foam pad on the disk-load bail is either worn or missing.

PROCEDURE: Perform visual inspection of the following:

1. Check tip of push rod (teflon) for wear, if worn excessively replace rod (ART-2332).
2. Check foam pad on disk load bail to insure it is there and is firmly attached to the full length of the bail. Part number for the foam pad is ART-2331.
3. Some early type set screws for the Push Rod and microswitch are NOT self locking. You can adjust them but they will not stay adjusted. Check to see if the set screws for the Push Rod and microswitch are the self locking set screws. If not, and the customer has had a continuing problem with drive not ready errors replace the set screws (Part number AHD-0044).

Perform mechanical adjustments:

1. Push Rod Travel Adjustment (Ref. 6.6.4 CDC Maintenance Manual)
2. Door-Interlock Switch Adjustment (Ref. 6.6.5 CDC Maintenance Manual)
3. Disk-Load Bail Adjustment (Ref. 6.6.6 CDC Maintenance Manual)

NOTE: The CDC Maintenance Manual is included in your Model II Technical Reference Handbook.

DATE: April 24, 1980
REVISION DATE: March 11, 1983
BULLETIN NO: II:8
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0312 Motorola Video Monitor Board

PURPOSE: Proper heat sinking of Q4/Q7 when replaced.

DISCUSSION/PROCEDURE: When replacing Q4/Q7 on the video board, be sure to apply heat sinking grease to the transistor and heat sink. Use of a white paste type grease (GC type Z9) is preferable to silicon (GC type Z5), as the Z5 paste tends to run in this application.

DATE: May 1, 1983
REVISION DATE: April 13, 1983
BULLETIN NO: II:9
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0505 FDC Board Early Design (Rev A and B)

PURPOSE: Identification and modification of FDC boards needing satellite boards.

DISCUSSION: Early Design Rev A and B FDC boards require a modification to stretch the write pulse for proper operation with CDC LSI Logic Boards. This is accomplished by adding a satellite board (AXX-0506) to the existing circuitry. Rev C FDC boards have this modification incorporated on them so the modification is not required. To double check the Rev level of the board locate R49. On Rev B boards R49 is located next to the PIO chip (U22) and on Rev C boards R49 is located between U34 and U35.

Figure 1 is a Rev B FDC Board with the satellite board modification.

PROCEDURE: Before performing this modification check the FDC Board in a single drive system to assure it will boot up and format correctly. Be careful not to turn any of the pots R32, R36, and R37 on the FDC board while performing the modification and during installation.

Perform the modification according to the following procedure:

1. Cut trace on foil side of the board running from U3 Pin 1 to U16 Pin 3.
2. Dress red, black, and white wires coming from the satellite board to follow the routing shown in Figure 1.
3. Remove solder from the PCB pad that is to receive the stake pin. This is the pad connected to U16 pin 3.
4. Invert satellite module, insert stake pin, and solder the stake pin into place.
5. Reflow solder in unused PCB pads while inserting tinned satellite module leads as shown in Figure 1.
6. Align the FDC board as outlined in the FDCALG diagnostic alignment procedures. Alignment is **MANDATORY** after performing this modification.

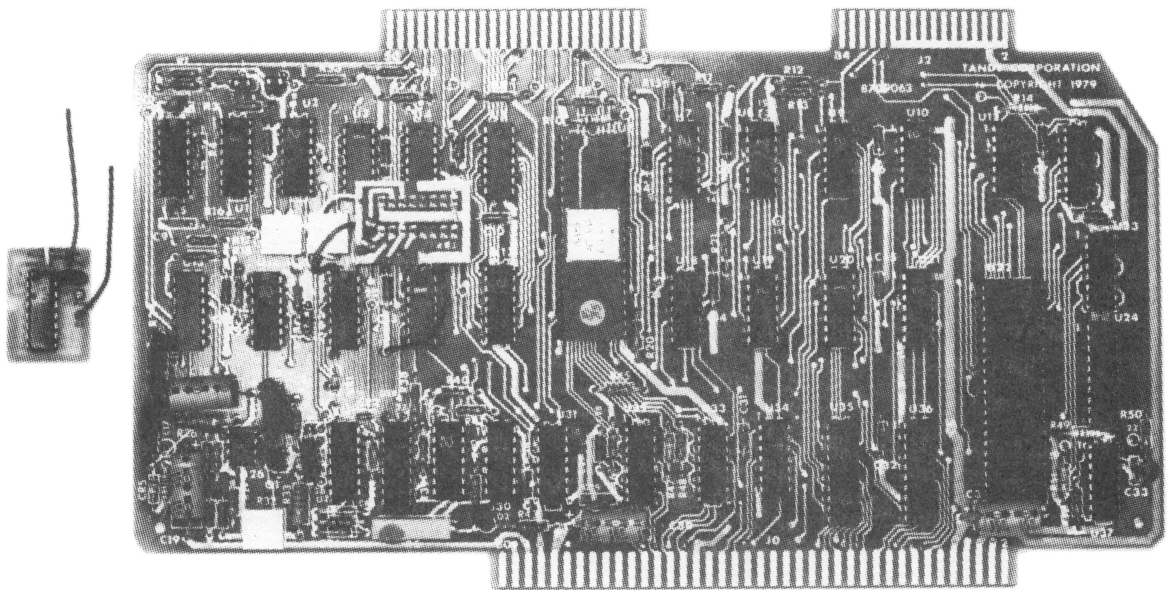


Figure 1

DATE: February 17, 1983
REVISION DATE: February 18, 1985
BULLETIN NO: II:10
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0505 FDC Board (Early design)

PURPOSE: To prevent Xenix from thinking there is a double sided disk in drive 0 when a terminator is used.

DISCUSSION: The terminator that is used with the Model II ties pin 10 of the disk drive card edge to pin 34. This takes the direction line (pin 34) and connects it to a previously unused line (pin 10) which has a pullup resistor R21 installed on it. Xenix looks at pin 10 to determine if the diskette in the current drive is single or double sided. With the terminator installed this signal will change depending on the direction the drive was last stepped. To correct this problem the trace connected to pin 10 of the FDC board should be cut. This will prevent the customer from being able to use double sided drives, which Radio Shack does not support in the Model II. This modification should only be done to Model IIs that have the 26-6010 enhancement kit installed and an old style FDC board.

PROCEDURE: Locate and cut the trace connected to pin 10 of the disk drive connector on the FDC board (Refer to Figure 1).

NOTE: This modification will cause the PIO SYSTEM test to fail. In cutting this trace you are removing a signal path connected to PIO channel A pin 14 through an inverter IC U18. This signal is A1 from the PIO. The PIO SYSTEM test will output a write out of channel B and then read the data back in channel A. With this trace cut, channel A will have bit A1 stuck high and thus the incorrect data read back in will produce an error in the SYSTEM test. The fact that this error will occur after this modification needs to be noted by the technician and therefore the SYSTEM test should be run before the modification is done.

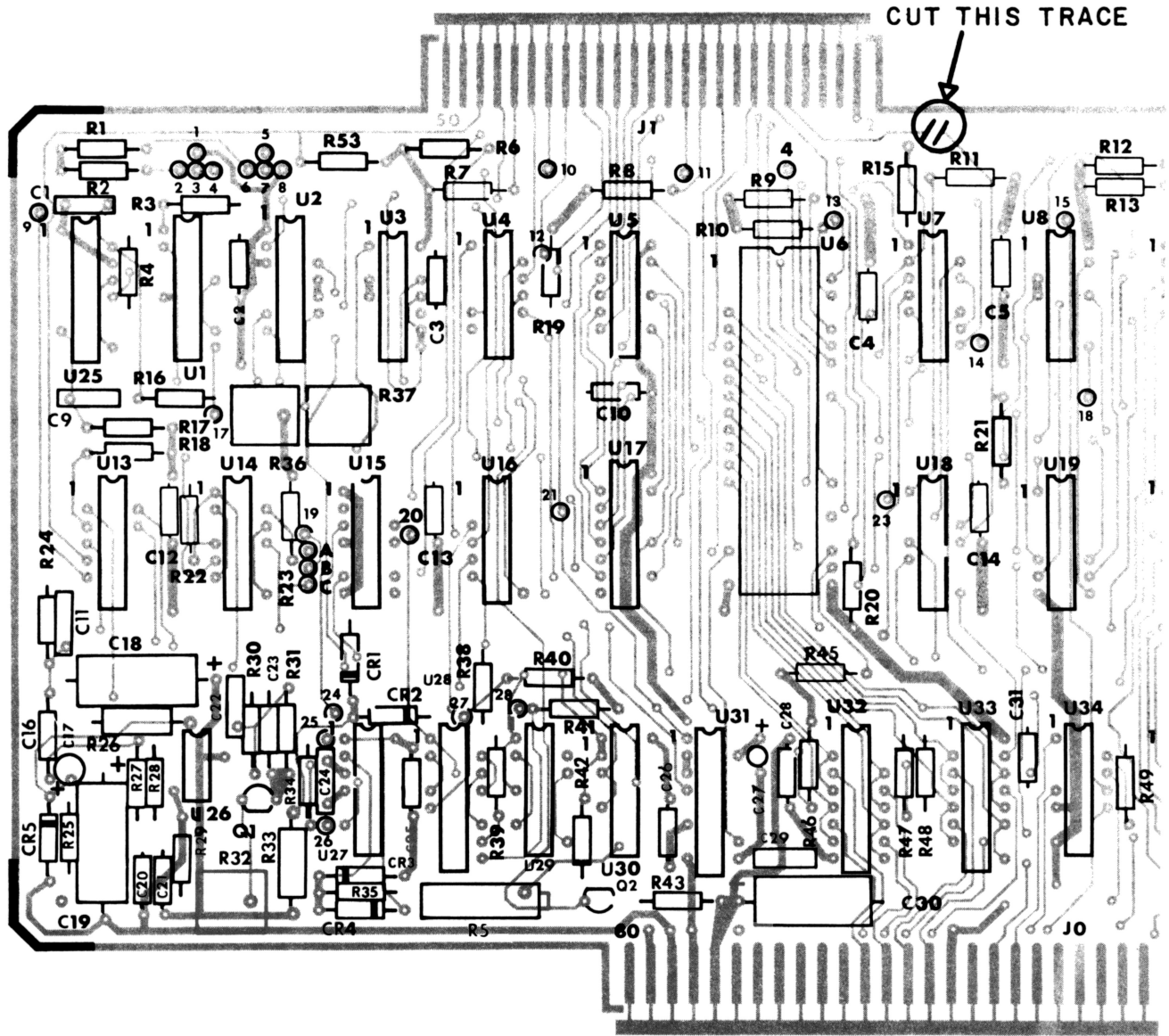


Figure 1

DATE: May 22, 1980
REVISION DATE: March 11, 1983
BULLETIN NO: II:11
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0500 Motherboard Assembly

PURPOSE: Aid in troubleshooting apparent Power Supply and/or disk drive failures.

DISCUSSION/PROCEDURE: If after extensive troubleshooting, diagnostics testing, and alignments the computer still has problems do not overlook the possibility of a defective motherboard or FDC to disk drive cable. These failures could be consistent or intermittent in nature.

DATE: July 8, 1980
REVISION DATE: April 4, 1983
BULLETIN NO: II:12
PRODUCT: 26-4160/1/2 Model II Expansion Bay
SUBASSEMBLY: AXX-6007 Power Supply Open Frame

PURPOSE: To discuss wiring differences between early power supply (closed case) and later power supply (open case) in expansion bay.

DISCUSSION: The later style (open case) power supply is labeled differently than the early style (closed case) power supply used in the Model II expansion bay. The wires in the expansion bay are rated as follows:

Yellow	(heavy gauge)	+24 VDC
Black	(light gauge)	Power supply common
Green	(heavy gauge)	AC Ground
White	(heavy gauge)	AC Neutral
Black	(heavy gauge)	AC Load (HOT)
Red	(heavy gauge)	+5 VDC
Red	(light gauge)	+5 VDC (for LED)

PROCEDURE: Refer to Figure 1 for the early version power supply (closed case) wiring diagram. Refer to Figure 2 for the later version power supply (open case) wiring diagram.

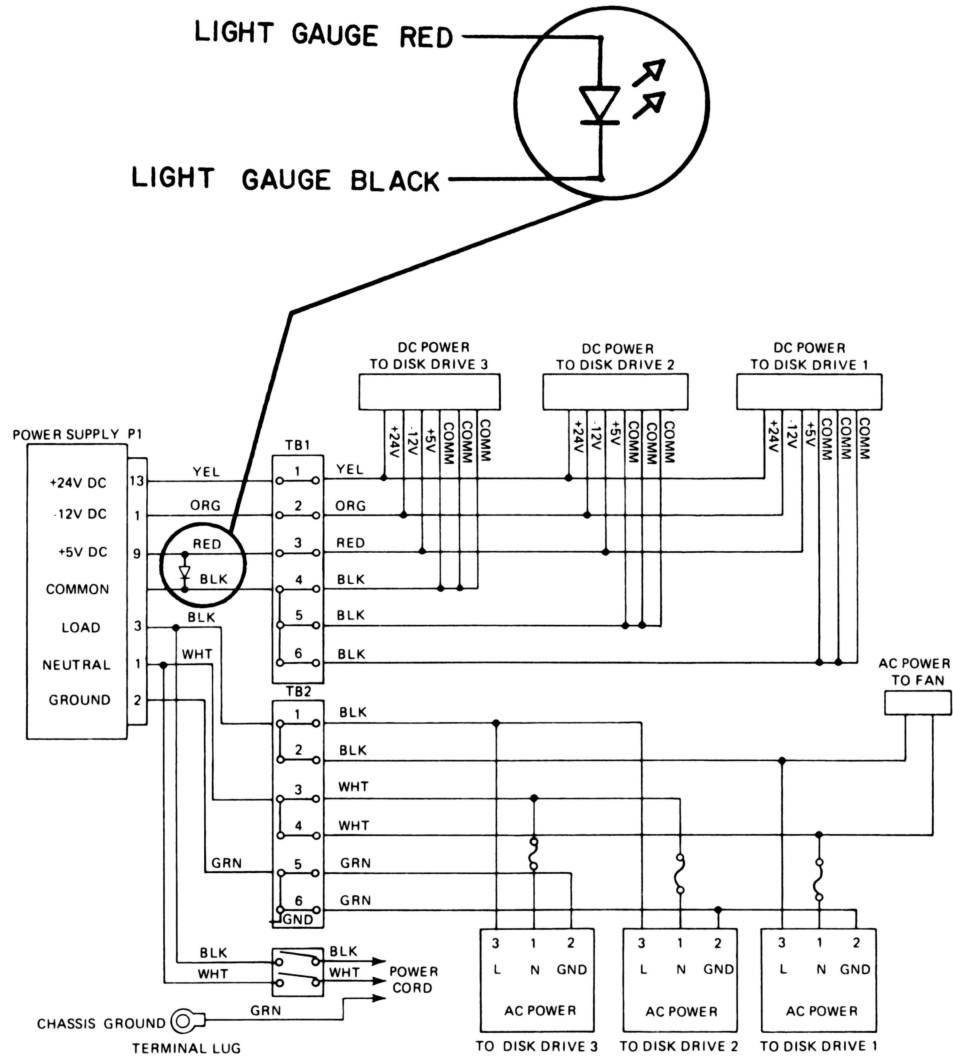


FIG 1 OLD PSU WIRING

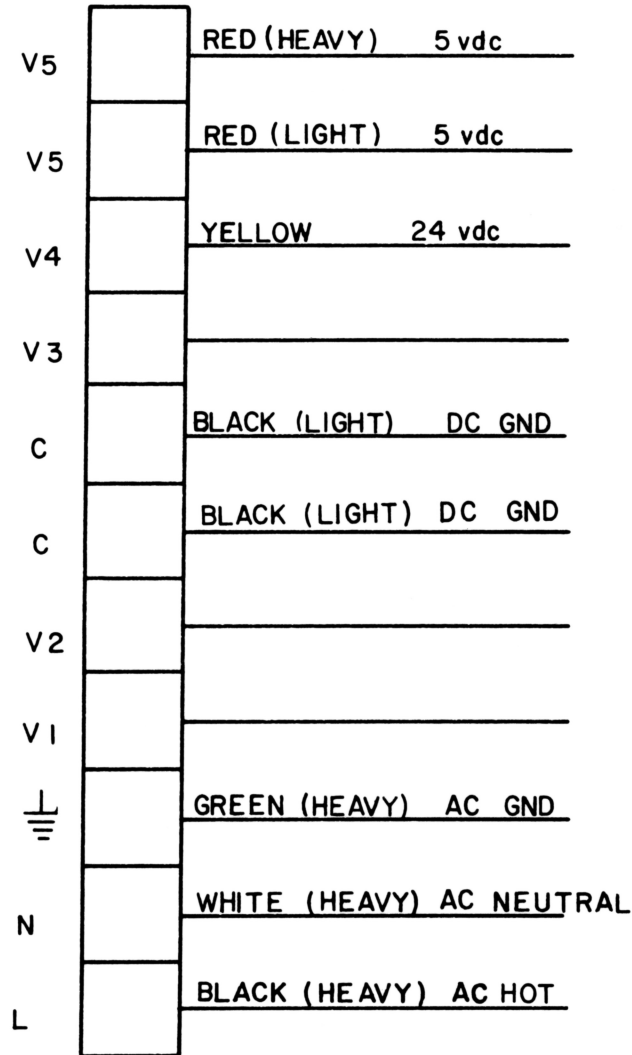


FIG 2 NEW PSU WIRING

DATE: September 11, 1980
REVISION DATE: March 11, 1983
BULLETIN NO: II:13
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0505 FDC Board Early Design (All Revisions)

PURPOSE: To correct FDC Boards which have C17 installed backwards.

DISCUSSION: Early FDC boards had a problem with C17 installed backwards. Rev A boards were not marked with polarity. Rev B boards and early Rev C boards were marked with the polarity backwards. This problem was corrected on later Rev C boards. C17 is a .47 ufd tantalum capacitor with a 33V rating. Installed backwards it will eventually break down due to approximately -6V across the capacitor. Note that CR5 is referenced to -12V. This capacitor installed backwards can cause intermittent problems and will eventually cause circuit failure. Over a period of time the capacitor will smoke causing CR5 and possibly Q1 to be damaged.

PROCEDURE: Check C17 on all units in for service to insure the positive(+) lead is going to ground. The most accurate method of checking this is by actually checking with an ohm meter continuity between the positive lead of C17 to ground. If capacitor is installed backwards replace with a new .47ufd tantalum capacitor(ACC-474MGTP). Do not just turn the old capacitor around as it has started degrading and life expectancy shortened.

If the capacitor actually smoked then you must replace it and the diode CR5 (ADX-1279). Also check Q1, a 2N2222A transistor (AMX-4263), because it may have been damaged also, replace if necessary.

If any parts are replaced check the alignment and full operation of the FDC Board.

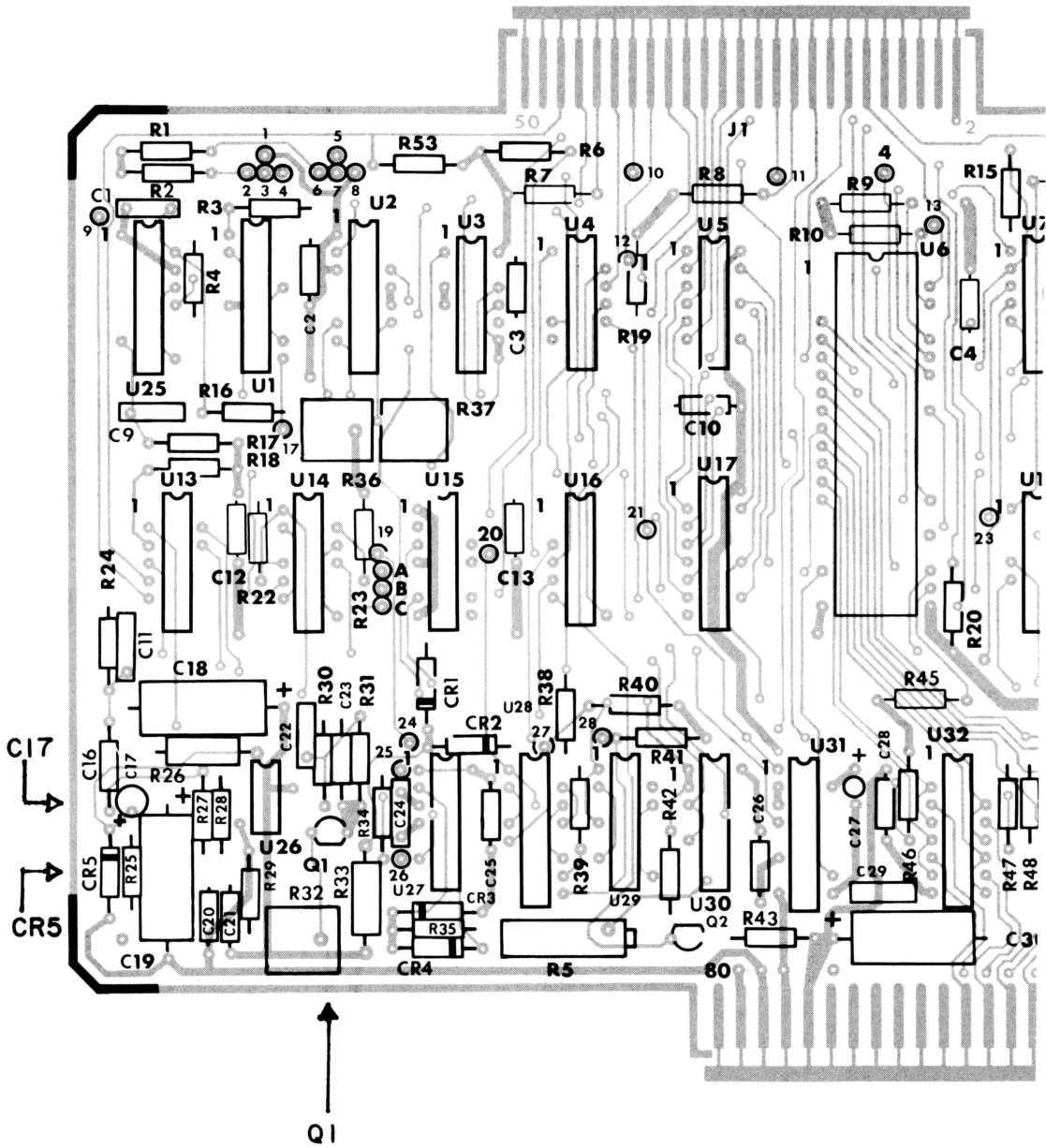


Figure 1

DATE: October 9, 1980
REVISION DATE: March 11, 1983
BULLETIN NO: II:14
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0342 RCA Video Board

PURPOSE: To correct video displaying horizontal retrace lines which cannot be eliminated by turning down the brightness control.

DISCUSSION: A defective voltage divider network consisting of R516 and R518 can cause horizontal retrace lines which cannot be eliminated by adjusting the brightness control. A defective damper diode CR504 can also cause this problem.

PROCEDURE: Check voltage at E801 for 150V to 200V DC. If voltage is higher measure resistance of R516 (1 Meg) and R518(470K). Usually R516 will decrease in value and R518 will increase in value. Replace faulty resistor. If both resistors ohm out all right replace CR504 with a fast recovery diode. This diode can be ordered through National Parts using Part Number ADX-1070 and Catalog Number 26-4001.

DATE: February 12, 1981
REVISION DATE: March 11, 1983
BULLETIN NO: II:15
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-5002 Shugart Drive Mechanism

PURPOSE: Explain proper tightening of stepper motor bracket screws after Head Radial Alignment.

DISCUSSION: After aligning Head Radial DO NOT OVERTIGHTEN bracket screws when securing the stepper motor. Excessive tightening will cause bracket and screws to bend and eventually damage the screw holes in the stepper motor plate, making proper alignment almost impossible.

PROCEDURE: After Head Radial Alignment tighten bracket screws only enough to secure stepper motor. If the stepper motor cannot be secured without excessively bending the bracket (Refer to Figure 1), or if the screw holes in the plate are damaged, replace the drive chassis.

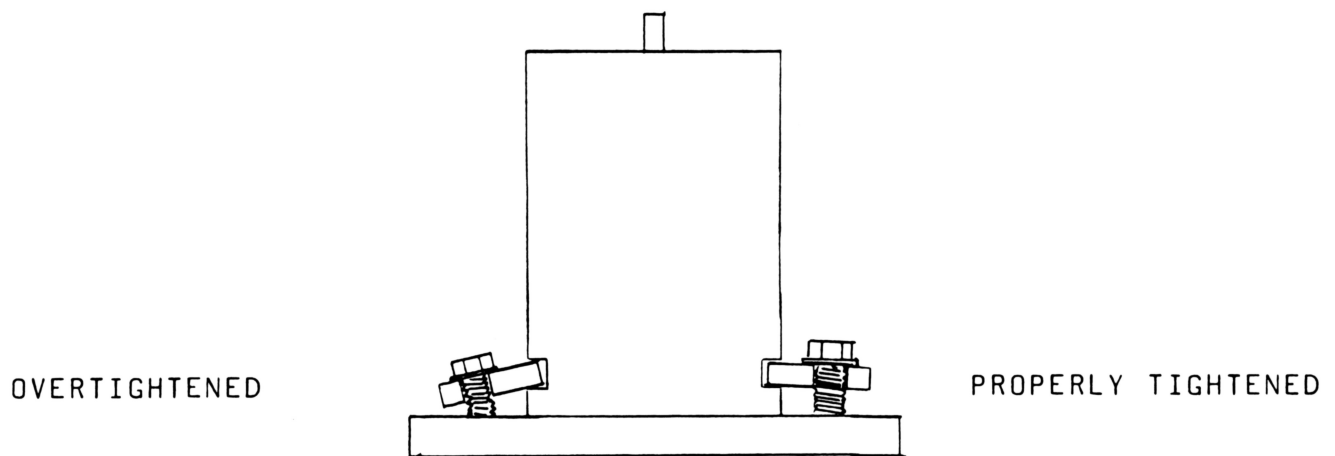


FIG. 1

DATE: February 27, 1981
REVISION DATE: March 11, 1983
BULLETIN NO: II:16
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0308 Shugart LSI Board

PURPOSE: To correct problem of getting Boot Error DC usually after running Scripsit.

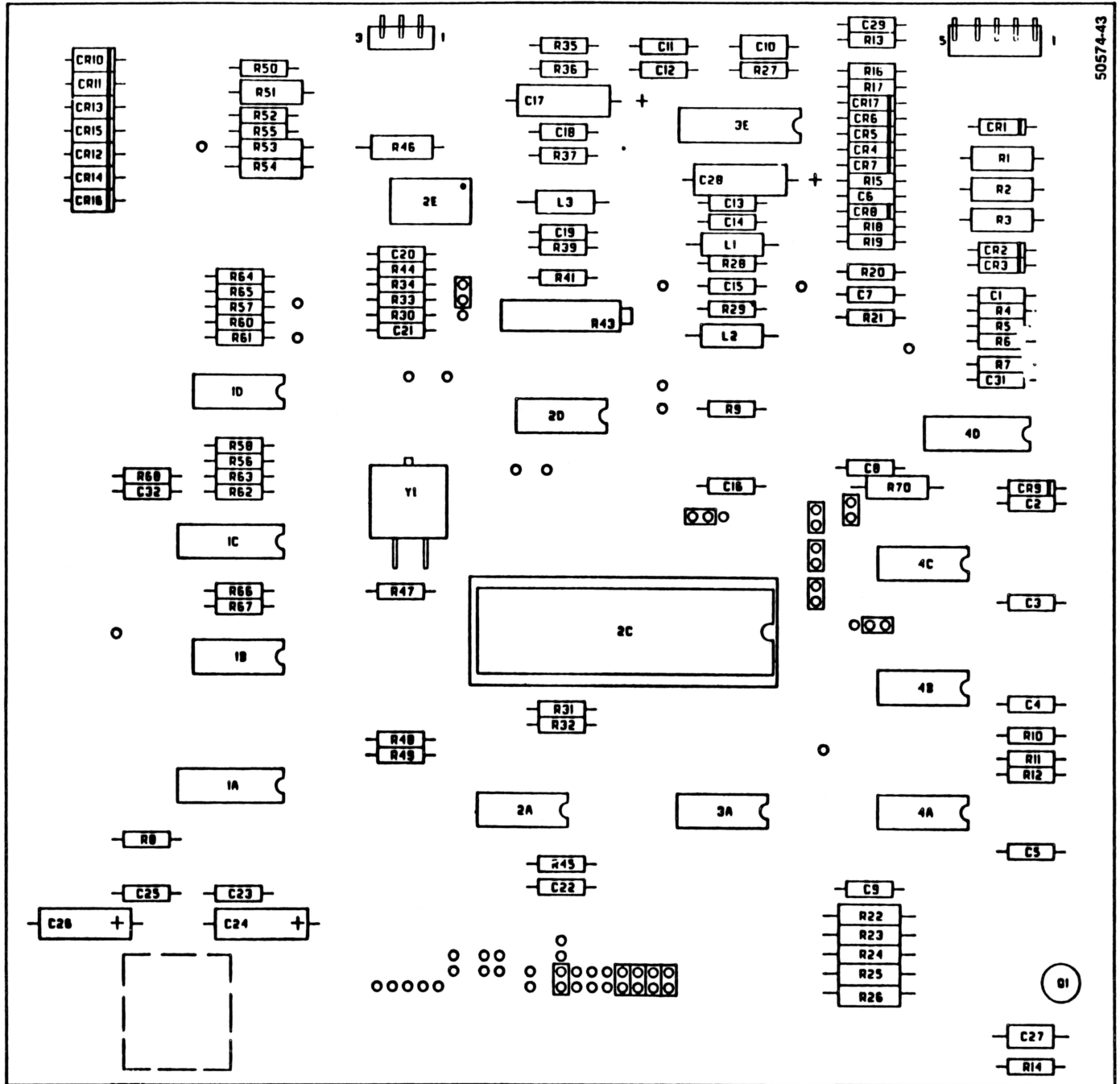
DISCUSSION: This problem will occur only on a small percentage of Model IIs and the solutions should be used to resolve specific customer complaints. There are two solutions to fix this problem:

1. Addition of a .47 ufd 35V tantalum cap across C21 in the power-on-reset circuitry. This will insure power-up in a valid phase of the stepper circuitry.
2. Proper adjustment of the track 00 stop.

PROCEDURE: SOLUTION 1: Check board to insure .47 ufd capacitor is installed across C21 (Refer to Figure 1). This capacitor should be on all LSI boards, if not present, install capacitor with negative lead going to ground. Any value from .47ufd to .68ufd is acceptable. ACC-474MGTP is the National Parts Number for a .47ufd 35V capacitor. Later boards had the capacitor value at C21 changed.

SOLUTION 2: Adjust Track 00 Stop (Reference 4.11.7 of the Shugart Maintenance Manual). This manual is included in your Model II Technical Reference Handbook.

1. Delete steps c,d, and e. The gap is not the limiting factor, it could be correct and the stop could still be out of adjustment.
2. In step g, insure that the collar moves freely, so the shaft does not turn in step i.
3. In step i, the important step is to make sure the tang on the back of the collar is against the head carriage assembly. In tightening the setscrew, make sure that you maintain contact between the carriage and the tang.



50574-43

FIG 1

DATE: September 7, 1982

REVISION DATE: March 14, 1983

BULLETIN NO: II:17

PRODUCT: 26-4001/2 Model II
26-6001/2 Model 16

SUBASSEMBLY: AXX-0501 Z-80 CPU Board (REV A/B/C)
AX-9242 Z-80 CPU Board (REV D)

PURPOSE: Modification of the Z-80 CPU Board for customers who request BISYNC operation and testing using Cat# 26-4716.

DISCUSSION: The Bisync modification is to allow the TRS-80 to communicate with other computers that use the Bisync communications format. This modification affects Channel A only and does not affect Channel B and its operation with a printer or other software. Both in async (normal) and Bisync modes a terminator is still required for the unused channel.

Refer to Figure 1 for schematic changes affected by this modification. The signal Local Interrupt Pending is now ANDed with EIOUT, and not with INTRQL. Previously, if the SIO programming was changed with interrupts disabled, a local interrupt could set flip-flop U13 without being serviced. Later, when an off board interrupt occurred, the bus steering logic would mistakenly interpret this as an on-board interrupt and would not turn the external data receive buffers. By ANDing the EIOUT signal with INTAK signal this problem is eliminated.

Refer to Figure 2 and notice the two different jumper configurations. The reason for the two different configurations is that the transmit clock on channel A can cause noise problems when it is connected to the RS232 cable and affect modem operation. This way only the modem clock is connected to this line which reduces noise. The hardware configuration connects the internal clock from the SIO to this line and must be connected when a loopback connector is used for testing or two computers are wired directly together without modems.

Channel A can be made to function as it did before the modification so it can be used with a modem I or II if the transmit clock is fed back to the SIO chip. A cable can be made for use with non-Bisync modems by shorting pins 15,17, and 24 together on the end connecting to the computer.

The new jumper positions on the loopback connector take the transmit clock for channel A and connects it to pin 24 of the DB25 for channel A. This breaks the connection between the transmit clock and the SIO chip. The transmit clock will now be provided by the modem through pin 15 of the D25 connector (I/O XMIT S.E.T.). The clock for the receive section of SIO channel A now comes from pin 17 of the DB25. This leaves the first channel of the CTC (zc/t0) unused. It also means that we are now using two sections of U10 and one section of U7 that have been previously unused.

PROCEDURE: Before doing any modifications run a full test of the serial channels using SYSTEM diagnostics. A modified loopback connector will be required for testing.

After verifying proper operation of the SIO and CTC chips, change the jumpers next to the SIO IC(U18) as shown in Figure 2. You will need an additional jumper, which can be ordered through National Parts using part number AJ-6769. If these are not in stock wire wrap can be used instead.

If the CPU board is a Rev A/B/C or no Rev letter, cut the trace on the back of the board between U13 pin 6 and U21 pin 1 and add a jumper wire between U21 pin 1 and U24 pin 8. Rev D, later Rev boards, and boards that have been modified for hard disk require NO cuts or jumper wires. However, the push on jumpers must be changed on all boards.

Due to the fact that previously unused gates are now being used, it is strongly recommended that a modified and tested CPU board be taken along on any field service conversions.

Run SYSTEM diagnostics on the modified computer to verify the hardware and jumpers. If the Radio Shack Bisync package (26-4716) is available it should also be run to test out the SIO chip. A modified loopback connector must be used. This package is not to be transferred into a shop. Use a customer or store copy of the package for the test using the following procedure.

Most modems for Bisync have an AL test (Analog Loopback test) switch on them. The 3780 Bisync package (26-4716) has an ALTEST command to test modem operations.

If no modem is available, it is possible to fool the computer into thinking there is a modem attached in the AL test position by making a DB25 connector with the following pins shorted:

2-3 4-5 6-20 15-17-24

Install this connector on the Port A jack and execute BIS3780 from TRSDOS. After the prompt appears, type ALTEST and press <ENTER>. All errors will be displayed. If no error messages appear then the system is working properly. This connector should be used to test the modification because the customers modem may not be configured correctly.

ONCE THE BOARD HAS BEEN TESTED.

You will need to ask the customer if the computer is going to be used with a modem or with another computer to determine how the board should be jumpered (Refer to Figure 2).

Whenever a board needs to be tested using SYSTEM diagnostics a loopback connector is required and the jumpers MUST be in the hardwire configuration. It is recommended that the customer use a 12 conductor cable on their serial channel instead of a 25 conductor cable to help reduce noise.

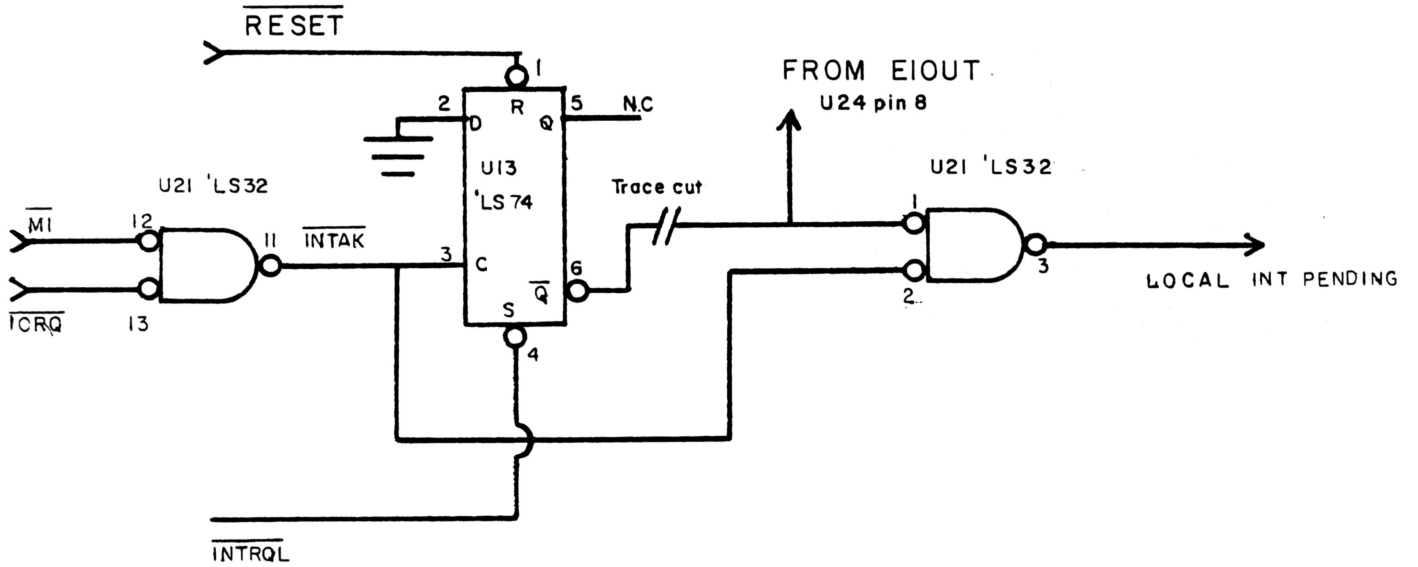
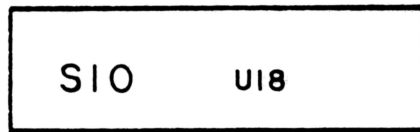


Figure 1

JUMPER POSITION FOR MODEM USE



JUMPER POSITION FOR HARDWIRE

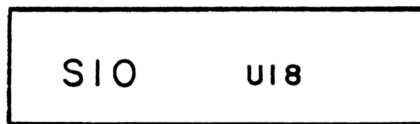


Figure 2

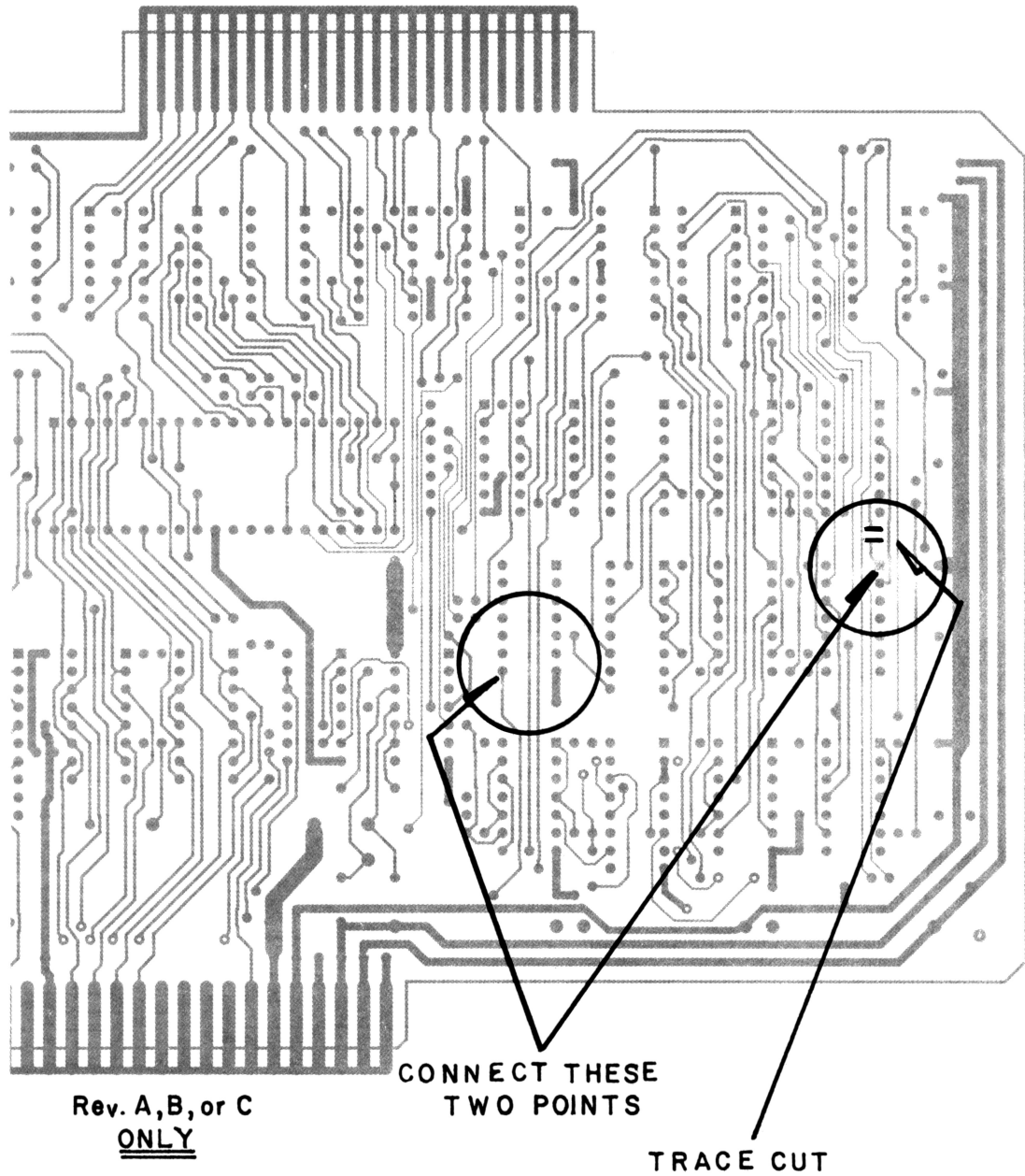


Figure 3

DATE: April 28, 1981
REVISION DATE: March 14, 1983
BULLETIN NO: II:18
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0504 Video/Keyboard Interface (Rev A and B)

PURPOSE: To correct dual addressing on Video/Keyboard Interface boards (Rev A/B).

DISCUSSION: Rev A and B VDG boards have a problem with dual addressing. Addresses FC through FF are decoded on the VDG board for use by the Model II. There is an image of these addresses from 7C through 7F. Most systems will not have hardware port mapped at these addresses so no problem will appear. The only time a problem may arise is if a system has hardware installed that is port mapped in the range of 7C through 7F. This problem was corrected on Rev C VDG boards.

PROCEDURE: Whenever a Rev C VDG board is replaced with a Rev A or B VDG board jumper pin 1 to pin 10 of U27 on the Rev A or B board to insure no addressing conflict of the VDG board (Refer to Figure 1).

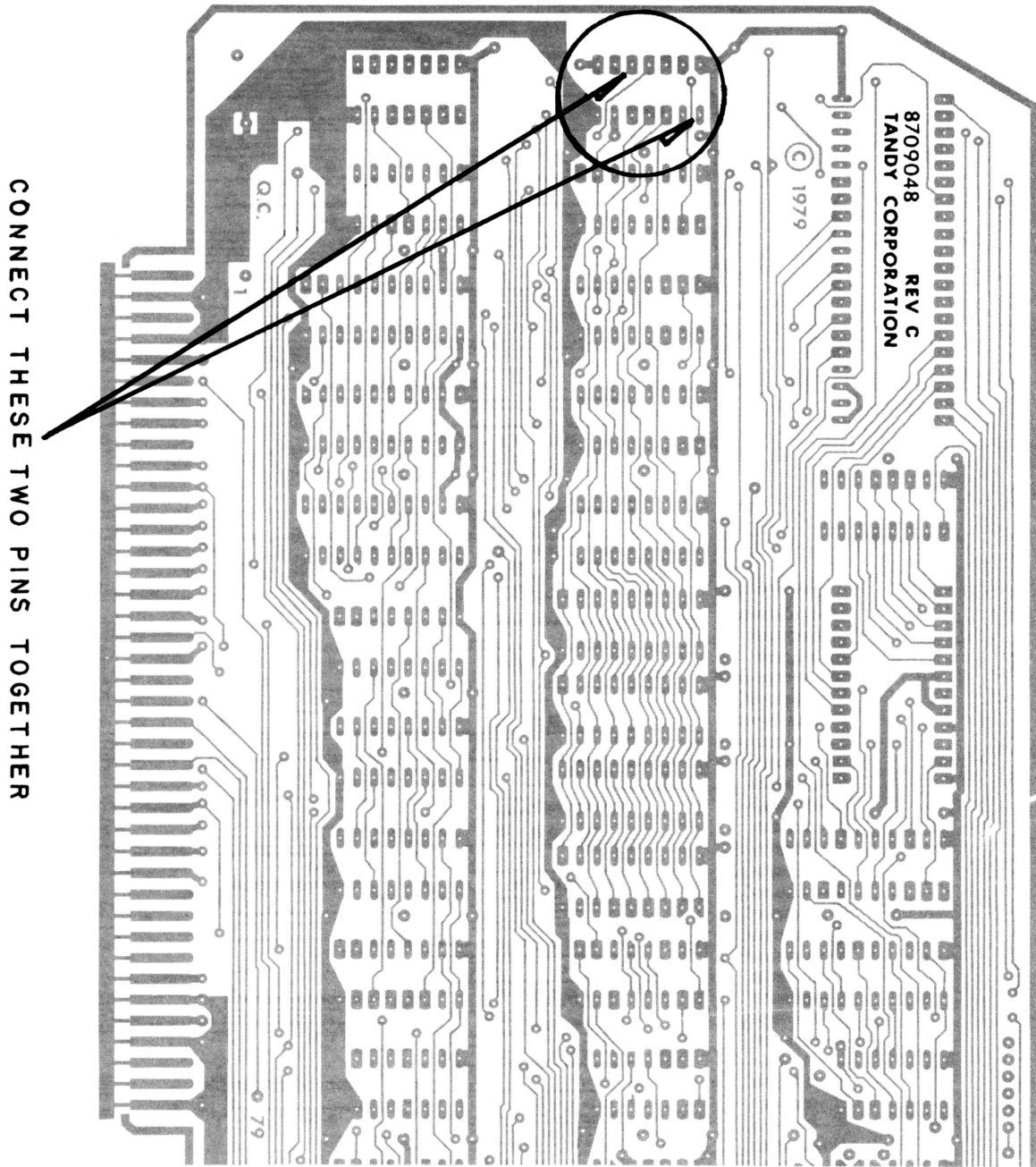


Figure 1

DATE: July 8, 1981
REVISION DATE: March 15, 1983
BULLETIN NO: II:19
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AX-9033 FDC Board Late Design (Rev Blank and Rev A)

PURPOSE: Discussion of Late Design FDC Board for Model II.

DISCUSSION/PROCEDURE: The Late Design FDC board is very different from the early style FDC board. It incorporates the Western Digital 1691 Floppy Support Logic and the 2143 four phase clock chips. Variable precompensation and a software reset are also used. Jumper options are available for different modes of operation. When this board is installed the external terminator plug is not used. Also, if an expansion bay is in the system it does not have to be powered up to use the computer. Refer to Technical Bulletins II:1 and II:30 for proper drive jumpering. To align the FDC board use FDCALG diagnostics with the "L" option.

The correct jumpers for use with a Model II are:

L-M Selects a positive XFERRQ
P-Q Divides 4 MHZ CPU clock by 2 for 1791 FDC chip
B-C Selects 8" drive ready signal
T-U Drive 0 is the only internal drive
J-K FDC board will use ports E0 through EF
Y-X Enables head load delay
Unlabeled boards do not have a W-X-Y jumper, Rev. A and later will

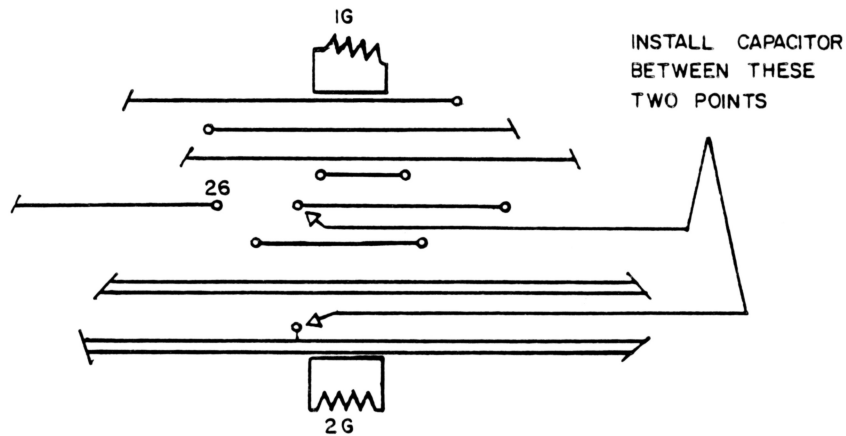
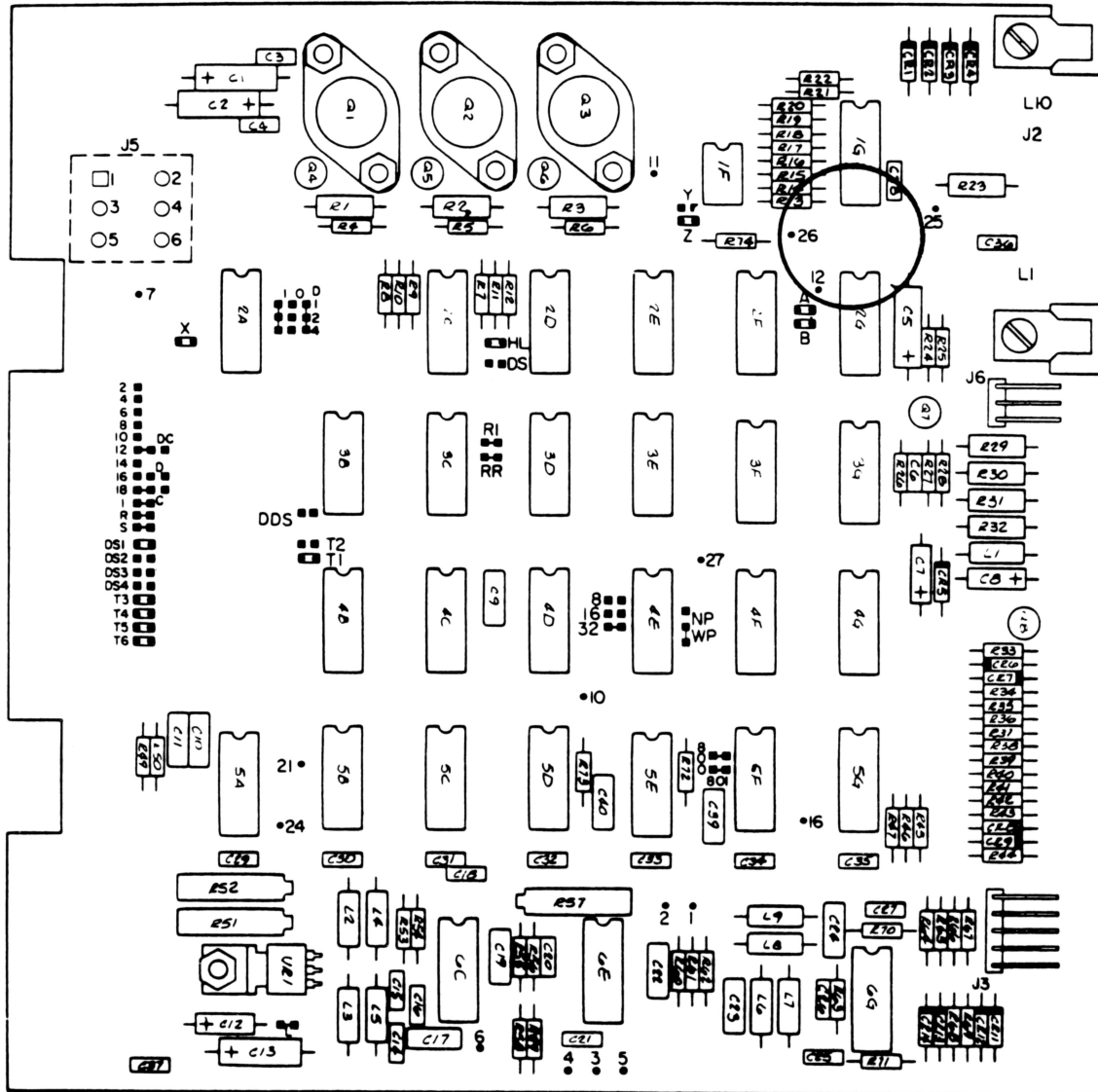
NOTE: An early style FDC board cannot be changed with a redesigned FDC board without changing internal cabling.

DATE: August 18, 1981
REVISION DATE: March 16, 1983
BULLETIN NO: II:20
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0308 Shugart Drive Board(Discrete)

PURPOSE: To correct boot errors on systems with Shugart discrete logic boards installed.

DISCUSSION: To correct booting errors the Ready line on the Shugart discrete logic board should be bypassed to ground with a .01ufd disc capacitor. All discrete boards should have this capacitor installed as a preventive measure. Any system that exhibits an unexplained booting problem not related to a hardware fault should be checked for this capacitor. This is now being done at the factory to new discrete boards. This capacitor is NOT to be added to Shugart LSI logic boards.

PROCEDURE: Check Ready line for .01ufd installed to ground. If capacitor is not present install .01ufd disk capacitor to ground (Refer to Figure 1).



DATE: August 19, 1981
REVISION DATE: March 16, 1983
BULLETIN NO: II:21
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0505 FDC Board (Early design)

PURPOSE: To correct problem of not being able to format past Track 43.

DISCUSSION: Some early FDC boards may not be able to format past Track 43 with precomp set at the required specification of 250 nsec. This problem will occur ONLY with the SY1791-02 FDC chip (not the FD1791-02 FDC chip) because the EARLY pulse ends slightly sooner on the SY1791-02. This could lead to a double pulse being picked off the shift register. To correct this problem the data out is tied to the RESET of the shift register. As soon as the data triggers the one-shot, it then clears the shift register, preventing double data pulses (Refer to Figure 1).

PROCEDURE: On unmarked, Rev A, or Rev B boards make sure the "one shot" modification has been installed (Refer to Technical Bulletin II:9), or that long jumpers are installed on the back of the board running to U37. Disregard this step on Rev C and D boards as they have this modification incorporated into their circuitry. On ALL revisions of the current board with a SY1791-02 FDC chip installed, add a jumper wire on the back side of the board from U1 pin 1 to the trace connected to TP10 (Refer to Figure 2).

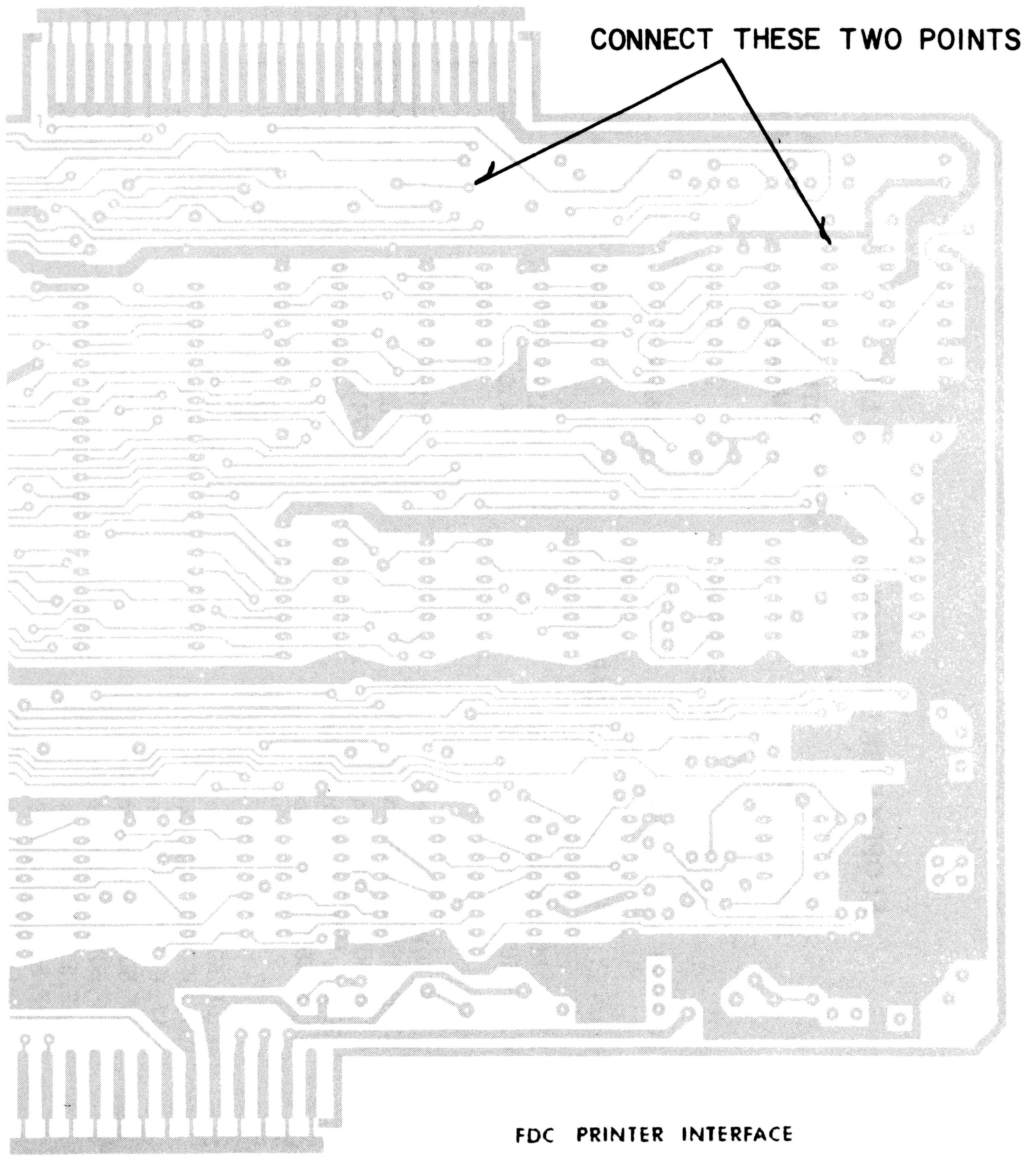


FIG 2

DATE: September 17, 1981
REVISION DATE: March 17, 1983
BULLETIN NO: II:22
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-5002 Shugart Drive

PURPOSE: Discuss proper adjustment of the pot on the sector sensor.

DISCUSSION: Whenever a logic board is changed on a Shugart Drive mechanism this adjustment should be done (Ref 4.7.2 SA800 Maintenance Manual which is included in the Model II Technical Reference Handbook). Index sector timing WILL require adjustment after this procedure (Ref TDC on Model II Diagnostic Diskette).

PROCEDURE: With a diskette inserted in the drive, monitor TP-12 on the logic board with an oscilloscope and check for a pulse width of 1.7 msec +/- .3 msec. Adjust the pot on the sector sensor for proper pulse width. Be careful not to adjust the pot to either end of travel or you may damage the sensor.

DATE: October 8, 1981
REVISION DATE: March 18, 1983
BULLETIN NO: II:23
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0504 Video/Keyboard Interface (VDG)

PURPOSE: To correct unexplained keyboard entries and/or machine lockup.

DISCUSSION: On Rev C VDG boards made by Lika there is a trace missing to the clear line on the latch (U17) that generates KBIRQ*. This can generate random interrupts that may or may not be fatal. To correct this problem a jumper is added to correct the missing trace which is a pullup to the clear line of U17. To identify the board as being manufactured by Lika, look for the Rev C marking on the solder side of the board under the 6845 chip and by LEI etched also on the solder side the crystal. This is the ONLY board to which this fix applies.

PROCEDURE: On the solder side of the board there is a feedthru located beneath the middle of U17 that is not connected to anything. Run a short piece of wire from that feedthru to U17 Pin 10 (Refer to Figure 1).

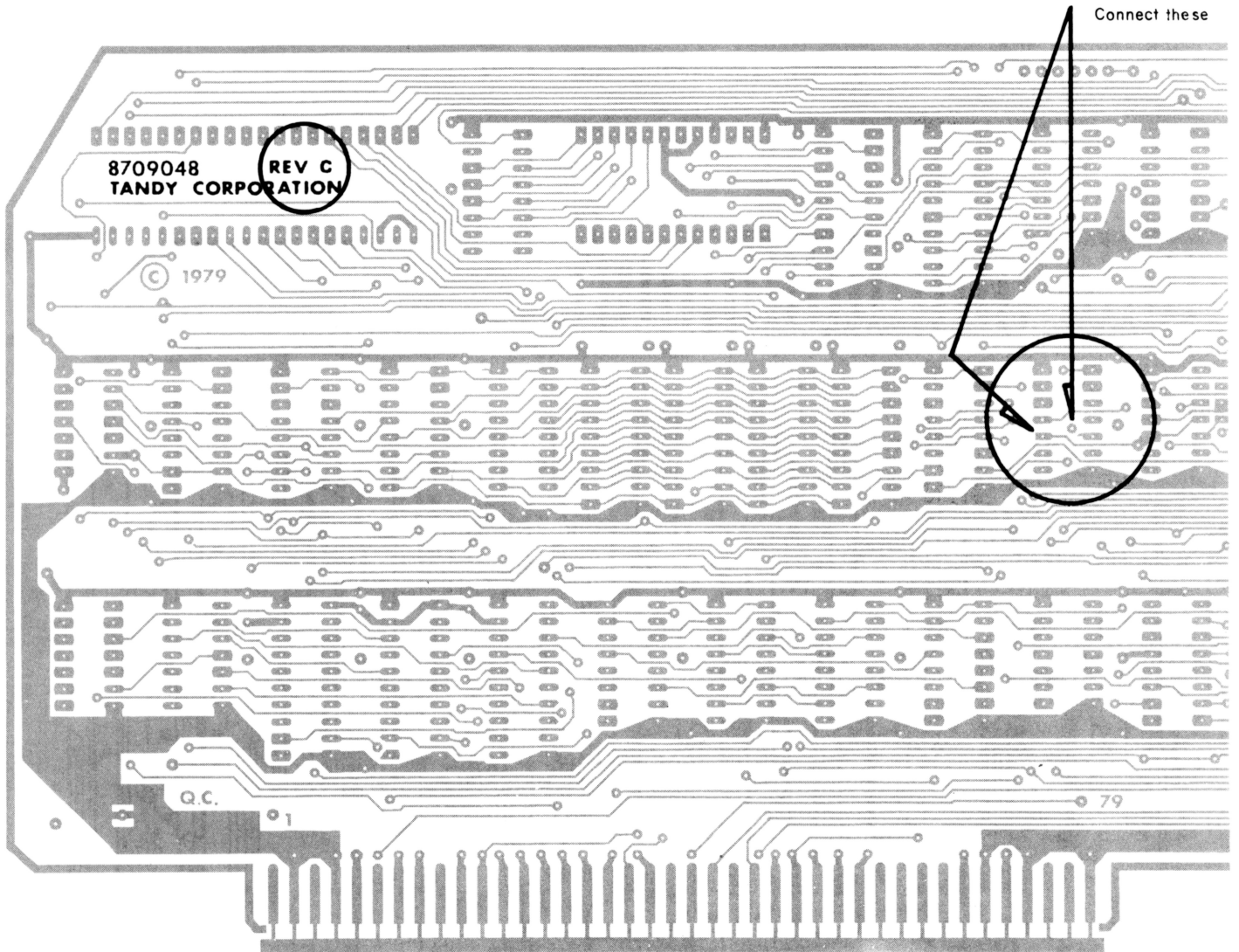


Figure 1

DATE: October 12, 1981
REVISION DATE: March 21, 1983
BULLETIN NO: II:24
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0504 Video/Keyboard Interface (VDG)

PURPOSE: To correct unexplained characters intermittently appearing on the video after scrolling or characters duplicated in a vertical column after scrolling.

DISCUSSION: This problem can be caused by U23, U24, and U25 multiplexer chips being too fast or the Video Ram being too slow.

PROCEDURE: There are two solutions to this problem:

Solution 1: If U23, U24, and U25 are Signetics 74LS157's switch to a slightly slower multiplexer chip, such as Motorola 74LS157. **DO NOT** use 74L157 or 74157 chips.

Solution 2: If the video RAM chips are 300 nsec devices, switch to faster ram chips, such as 200 nsec access rams.

You should not have to do both as the problem usually occurs only with Signetics 74LS157 and 300 nsec ram. However, on rare occasions the problem has occurred with the Motorola 74LS157 and 300 nsec ram. In this instance the video ram **MUST** be changed to 200 nsec access rams.

DATE: November 18, 1981
REVISION DATE: March 22, 1983
BULLETIN NO: II:25
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0501 Z-80 CPU board

PURPOSE: To correct machine not initializing properly after adding more than the original 4 boards. The front panel RESET may or may not function.

DISCUSSION: With more load on the power supply, the 5 volt line will come up slower. As its ramp lengthens, the difference between the 5 volts and Reset line becomes less. This can lead to the processor trying to start execution before the full 5 volts is applied and stable to the entire machine. This problem usually manifests itself as improper initialization of the video. On Motorola videos, there may be none or a ragged edge display. On RCA monitors the sync frequencies may be incorrect. RESET on the front panel may or may not work, due to the fact that you may not have M1 after improper power up. Reference Technical Bulletin II:5 before doing this modification to any Model II. The resistor changes in Technical Bulletin II:5 are **MANDATORY**, or you will destroy the monitor board.

PROCEDURE: After insuring the monitor board has been modified in accordance with Technical Bulletin II:5, change the power-on-reset timing resistor (R21) from 10K ohms to 51K ohms. This resistor can be ordered from National Parts with Part Number N-0344EEC using the 26-9999R Catalog Number.

DATE: January 6, 1982
REVISION DATE: March 22, 1983
BULLETIN NO: II:26
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0501 Z-80 CPU board (REV A/B/C)

PURPOSE: To outline enhanced DMA modification procedure.

DISCUSSION: This modification is the same as the Hard Disk modification except it does not include anything unique to the Hard Disk such as the Boot ROM. Rev A,B, and C boards are the ONLY CPU boards to which this modification applies. DO NOT perform this modification on Rev D and later boards as they have this modification incorporated into their design. Refer to Figures 1 and 2 for schematic changes affected by this modification.

PROCEDURE: After determining that the Revision level of the board is a Rev A, B, or C perform the following procedure with all cuts and jumpers on the SOLDER SIDE of the board for consistency. Remember, DO NOT perform this modification on Rev D boards or later.

2 CUTS:

U4 pin 12 (cut right at the chip)
U13 pin 6 to U21 pin 1

7 JUMPERS:

U21 pin 1 to U24 pin 8
U4 pin 12 to U21 pin 6
U21 pin 4 to WAIT* (the first feedthru after the cut at U4 pin 12)
U21 pin 5 to U15 pin 11
U15 pin 12 to U20 pin 13
U15 pin 13 to U24 pin 4
U24 pin 3 to U20 pin 14

Existing circuit

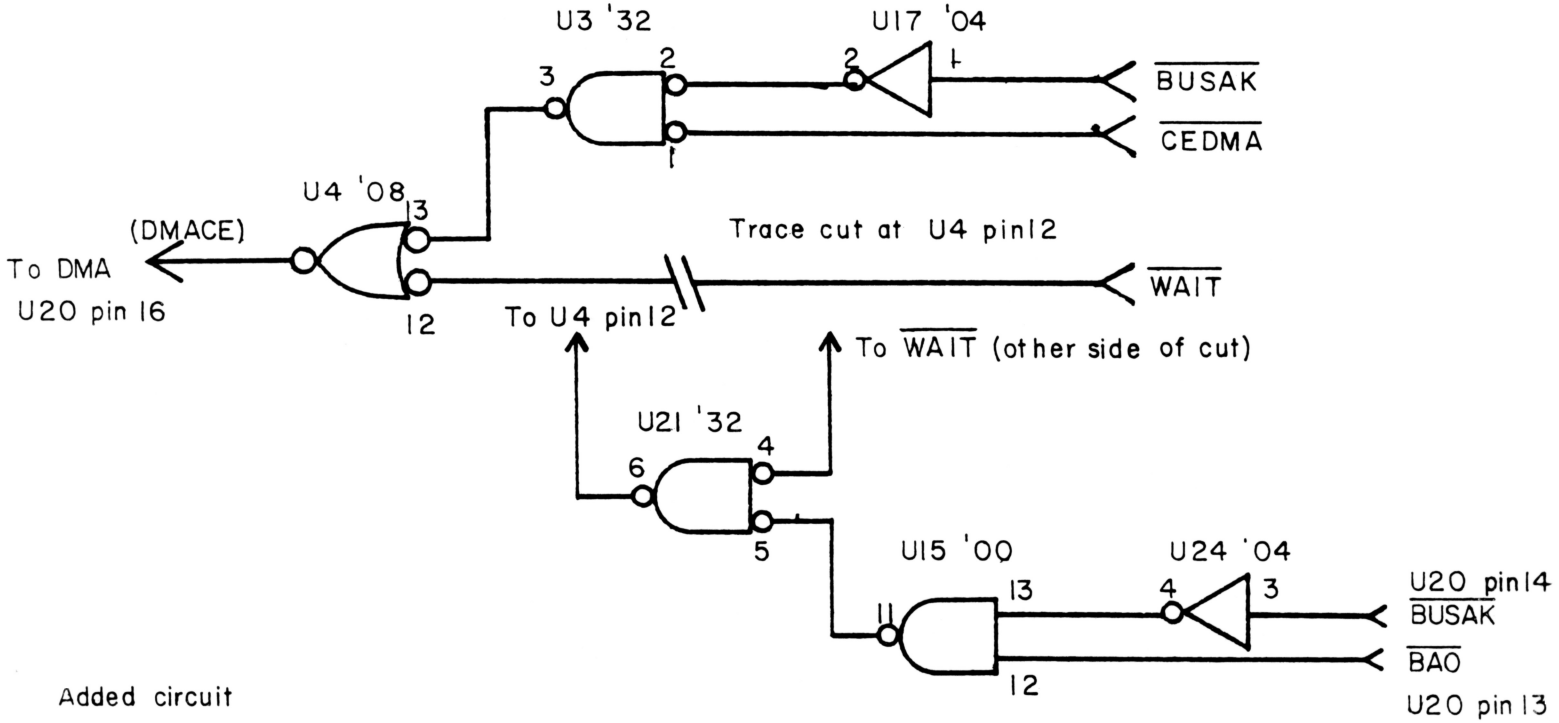


Figure 1

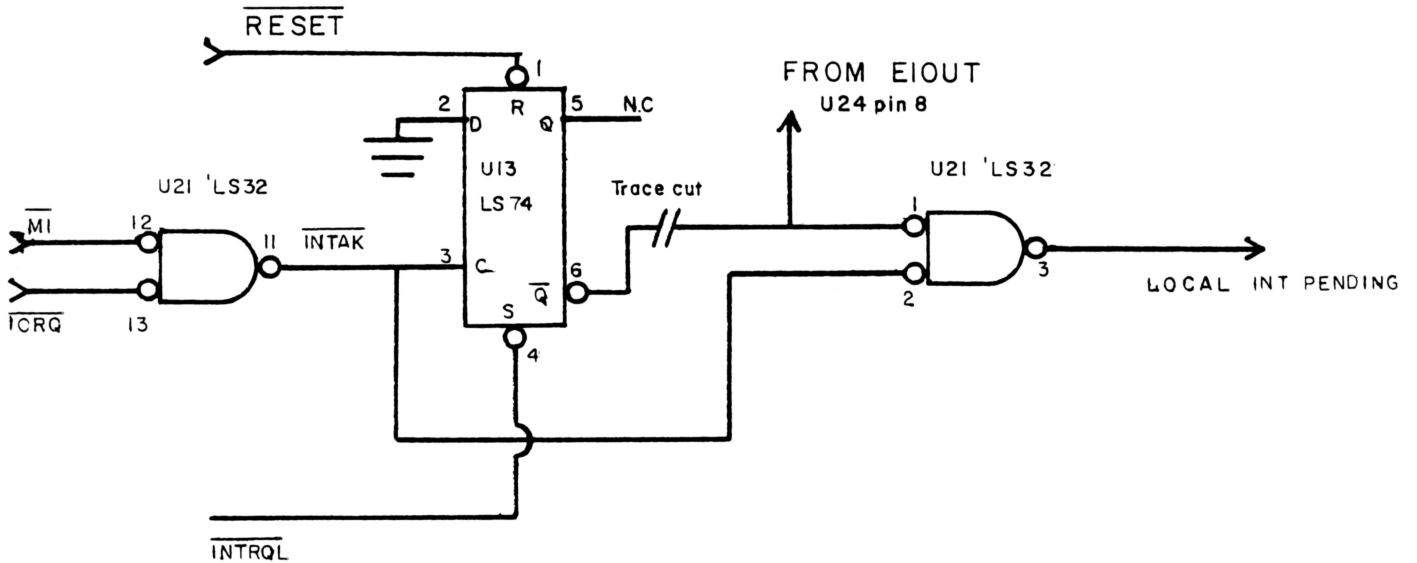


Figure 2

DATE: January 14, 1982
REVISION DATE: March 22, 1983
BULLETIN NO: II:27
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AX-9033 FDC Board Late Design (Rev Blank)

PURPOSE: To check for side select signals going to and from the external drive connector.

DISCUSSION: The trace that supplies the side select signal to the external drive connector on the Late Design FDC board (Rev Blank) is missing. Also, on some boards the trace that supplies the TWOSIDE* signal from the external drives to the FDC board is not present. Without these traces double sided drives cannot be used externally with the computer and will cause a problem with some diagnostics.

PROCEDURE: Refer to Figure 1 for the location of these traces. Run a jumper from pin 14 of connector P1 to the feedthru on the PCB that is directly in from the connector. Also run a jumper from pin 10 of connector P1 to the feedthru that is directly in from the connector.

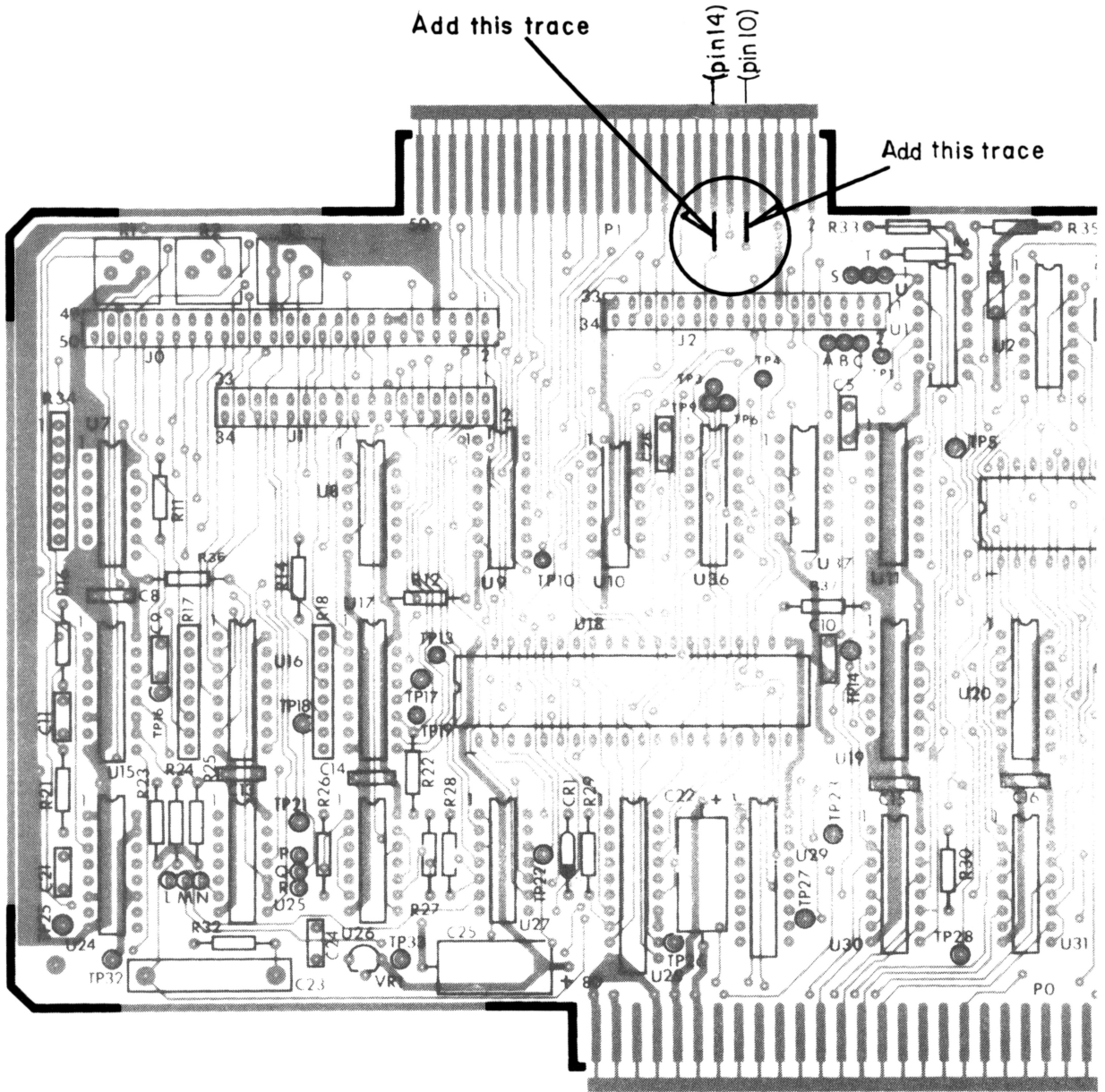


Figure 1

DATE: February 2, 1982
REVISION DATE: March 23, 1983
BULLETIN NO: II:28
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AX-9033 FDC Board Late Design (Rev Blank)

PURPOSE: To correct Head Load termination on FDC board (Late design/Rev Blank).

DISCUSSION: On the redesigned FDC board (Rev Blank) there is a pullup resistor on the Head Load signal for internal drives, but there is none for external drives. With the Model II the internal drive has Head Load termination on the board but the bay does not. With the FDC board (Redesign) this means that the internal drive has double Head Load termination while the external Head Load signal has no pullup. To correct this problem we eliminate the internal Head Load signal on the FDC board and use its pullup for the external Head Load signal (Refer to Figure 1).

PROCEDURE: Perform the following steps:

1. On the componet side, cut the trace that goes to pin 18 of J0 (the 50 position pin header connector) RIGHT AT the connector so that the feedthru can still be used on the reverse side to go to the external head load signal (Refer to Figure 2).
2. Turn the board over to the solder side and solder a jumper from the feedthru referenced in step 1 (this is the pullup resistor line) to the feedthru between U8 and U9 that is closest to pin 8 and 9 of U8. This feedthru is the Head Load external signal external signal and goes over to U10 on the solder side of the board (Refer to Figure 3).

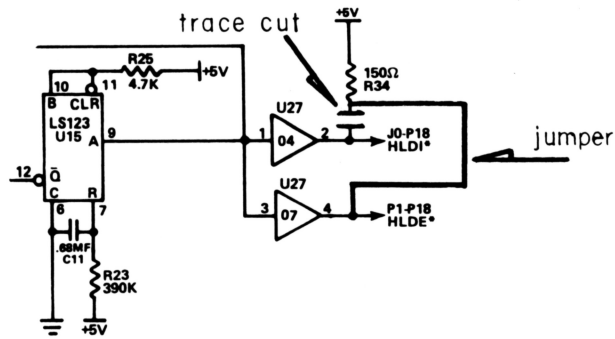


Figure 1

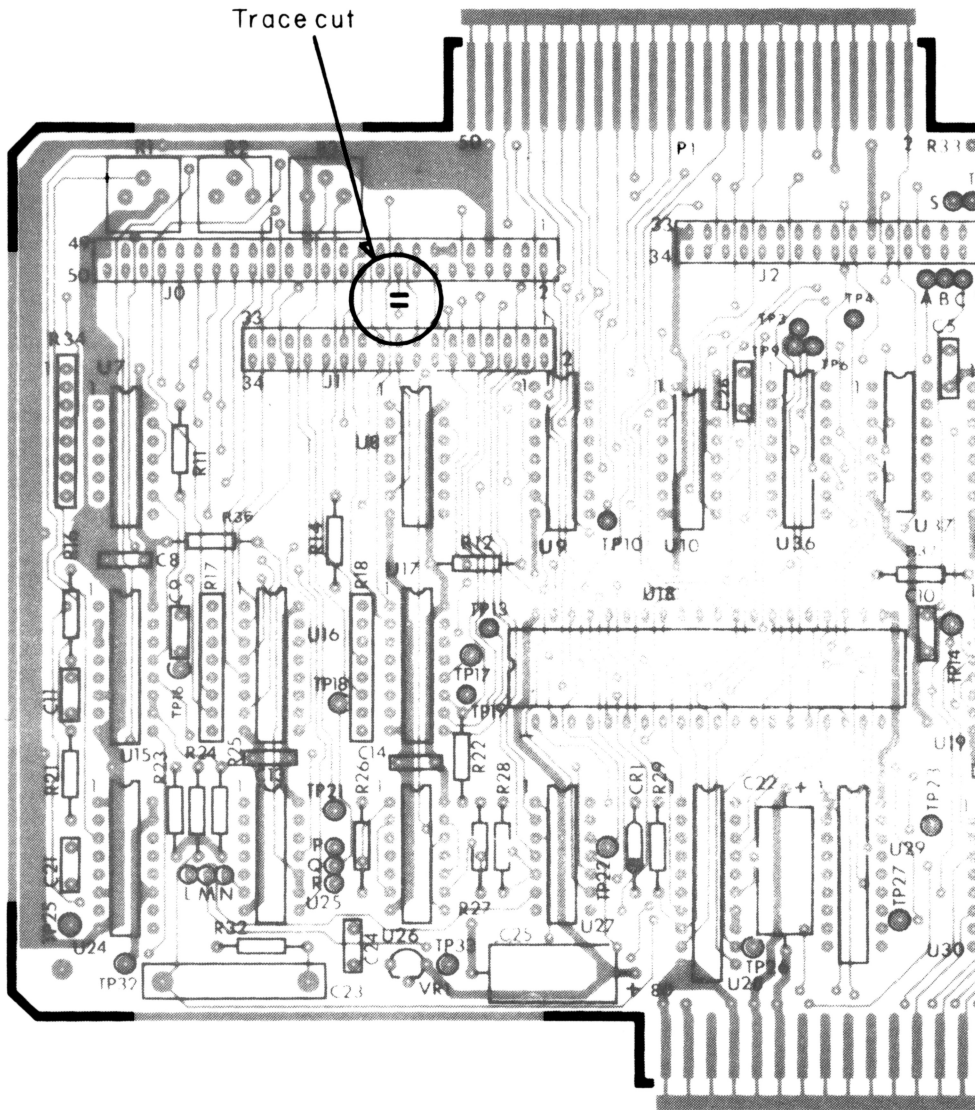


Figure 2

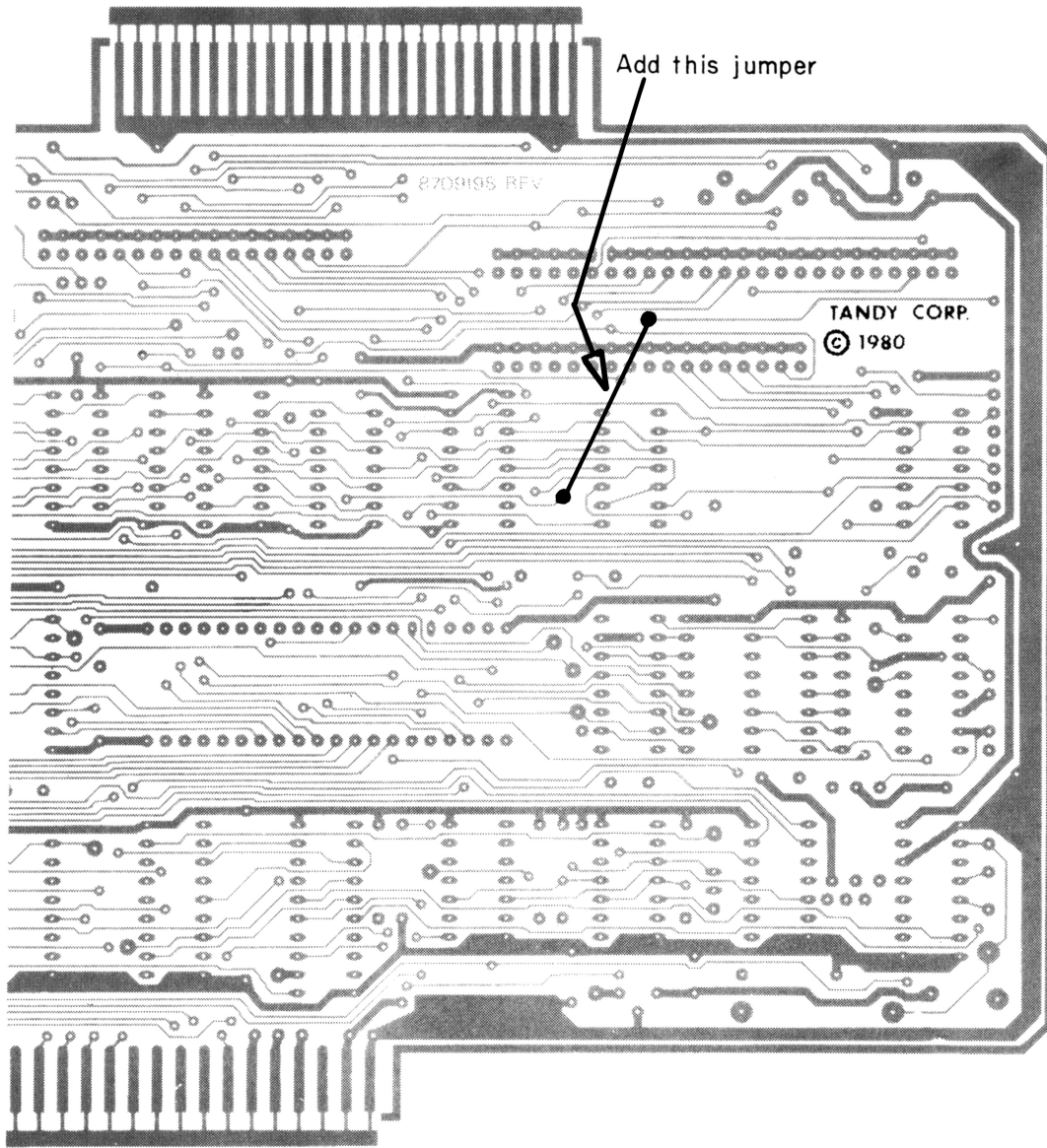


Figure 3

DATE: March 15, 1982
REVISION DATE: April 1, 1983
BULLETIN NO: II:29
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-6008 Modified Power Supply

PURPOSE: To explain correct procedure and safety precautions for adjusting the AAll081 power supply.

DISCUSSION: When six or more boards are installed into the card cage of a Model II a modified power supply AAll081 (AXX-6008) must also be installed and adjusted to match the machine. Also refer to Technical Bulletins II:5 and II:37 for possible modifications needed with a Motorola video board.

PROCEDURE: The following procedure should be followed to accomplish correct voltage adjustment:

1. Remove the old power supply.
2. Replace the +5 volt supply wire to the mother board (Red wire) with the 16 gage wire supplied with the Model 16 upgrade kit. This wire can also be ordered through National Parts using part number AW-2841.
3. Plug the new power supply into the mother board. Position the supply so that trimpot R39 is accessible with a small flathead screwdriver.
4. Remove the CPU card from the mother board and reinstall it on the extender card.
5. Power the system on, insert a diskette, and boot the system up. Wait until the drive deselects and then proceed.
6. Measure the +5 volt line at the positive end of C41 on the CPU card. Adjust R39 on the power supply for +5 volts +/- 0.05 volts.
7. Measure the +12 volt line at the positive end of C32 on the CPU card. Verify that this line is between +11.40 and +12.60 volts. If the voltage is low readjust R39 until the line measures +11.40 volts. If the voltage is high readjust R39 until the line measures +12.60 volts.

8. If readjustment was made in step 7 then recheck the +5 volt line and verify that it is between +4.85 and +5.15 volts. If the voltage is not within these specifications replace the power supply.
9. Measure the -12 volt line at the negative side of C36. Verify that the voltage is between -11.40 and -12.60 volts. If the voltage is not within specs replace the power supply.
10. Remove the diskette and power down the unit. Remove the extender card and reinstall the CPU. Power the unit back on and measure the +24 volt line at pin 1 of the disk drive DC connector for +21.20 to +25.40 volts. If the voltage is not within specs replace the power supply.
11. Complete the installation of the power supply.

SAFETY NOTICE ----- SHOCK HAZARD EXISTS

Safety should **NEVER** be compromised while performing this procedure both for the technician and the computer. All personnel performing this installation should be aware of the shock hazard which exists and take the following precautions.

1. The power supply should not be moved with the power on. The large heat sink for Q1 has a potential of +160 volts and should not be touched with power applied to the unit.
2. Place a 6" strip of electrical tape over the edge of the CRT support nearest the power supply with the bottom edge of the tape approximately 2" from the bottom of the support. This is to prevent inadvertent shorting of the power supply or Q1 heat sink to the support.
3. Place a styrofoam or wood block (non-conductive) under the power supply to elevate it enough to make the trimpot adjustment. A 1" to 2" high, 6" long by 2" wide should be sufficient.
4. Before applying power to the unit, **VERIFY**, that the heat sink on Q1 is not touching any metal and that the power supply is in a stable position. Grounding Q1 to the chassis **WILL** result in catastrophic damage to the power supply.

DATE: July 24, 1982

REVISION DATE: August 29, 1986

BULLETIN NO: II:30

PRODUCT: 26-4001/2 Model II

SUBASSEMBLY: AXX-0308 Shugart 8" Drive Logic Board
AXX-0309 CDC 8" Discrete Board
AXX-0310 CDC 8" LSI Board
AX-8859 TPI 8" Drive Logic board

SUBASSEMBLY REVISION: All

PURPOSE: To discuss proper termination and jumpering for Shugart, CDC, and TPI drives. Also to provide test points for all drives for alignments.

DISCUSSION: Termination and jumpering may not be correct on boards received from National Parts. This can cause intermittent and/or hard failures when these boards are installed. Refer to Page 3 for correct test points and specifications when performing alignment procedures.

PROCEDURE: All boards from National Parts should be checked for the following jumper and termination configurations before being installed into a unit:

All Shugart 8" Drive Logic Boards.

Push on jumpers:

A, B, C, DC, DS, DS1, T1, T2, Z, 800

L should be vertical (LSI boards do not have an L jumper)

For proper termination the jumpers below should be installed on Shugart drive logic boards **ONLY** with the early style FDC board (AXX-0505). These jumpers **SHOULD NOT** be used with the late style FDC board (AX-9033). With the discrete and early LSI boards a 4 jumper-wire assembly (AW-2706) can be used, however, late LSI boards must be wire wrapped.

FROM:	TO:
J1-4	T6 (row opposite connector)
J1-6	T5 (row opposite connector)
J1-8	T4 (row opposite connector)
J1-10	T3 (row opposite connector)

TPI Drive Logic Boards.**Drive 0 only:**

Rev. A: For use with late FDC (AX-9033):
E1-E2, E3-E4, DS1

For use with early FDC (AX-0505):

Due to the complexity of the jumpering needed, it is not recommended that the Rev. A board be used with the early FDC. Should it be necessary, however, the following jumpers should be present:

T1, T8, E1-E2, E3-E4, DS1, 1S (the center staking pins in the bank of 4 pins labeled "2S, 1S, 2SA"). Additionally, there should be wire-wrap jumpers soldered between the following points: (1) the feedthrough connected to J1 pin 6 and the feedthrough connected to pin 1 of jumper position T5 (this is the staking pin closest to J1), (2) the feedthrough connected to J1 pin 8 and the feedthrough connected to Z13, pin 2, (3) the feedthrough located between the J1, pin 6 and J1, pin 8 feedthroughs and the feedthrough connected to pin 2 of jumper position T6 (the staking pin farthest from J1).

Rev. B: For use with late FDC (AX-9033):
E1-E2, E3-E4, DS1

For use with early FDC (AX-0505):

T1, T8, E1-E2, E3-E4, DS1, wire jumpers across pads at 1S, SYS4, SYS5, SYS6.

Drive 1 only: T3, T4, T5, T6, T7, T8, DS2 (note T1 is removed)

Drive 2 only: E1-E2, E3-E4, DS3

Drive 3 only: E1-E2, E3-E4, DS4

CDC 8"Drive Logic Boards.**Drive 1 only:**

LSI "B" version: Pin 9 of resistor pack should be lifted.

Discrete: Pin 14 of resistor pack should be lifted.

All Drives:

LSI Drives: Dip shunt installed with the appropriate lead shorted for the drive position it occupies in the system.

W2 shorted-Drive 1 All other positions open.

W3 shorted-Drive 2 All other positions open.

W4 shorted-Drive 3 All other positions open.

Discrete Drives:

Dip Switch 1 (8 position):

Position 1-4 Drive Select (only one should be on)

Position 5 Ready (always on)

Position 6-8 Spares (always off)

Dip Switch 3 (7 position):

Position 1-3 Off

Position 4 On

Position 5-7 Off

Dip Switch 3 may not be installed. If not, position 4 should have a jumper wire installed.

TEST POINTS

	Shugart	TPI	CDC LSI	CDC DISC
Read Amp Data	TP1, TP2	TP1, TP2	TPA, TPB	TP3, TP4
Index	TP12	TP3	J1 PIN 2Ø U4 PIN 26	TP14
Head Load	TP11	TP6	U1 PIN 1	U13 PIN 6
Raw Data	TP16	TP7	U6 PIN 3 J1 pin 46	TP8
Track Zero	TP26	TP5	J3 PIN 2	J3 PIN 2

SPECIFICATIONS

	Shugart	TPI	CDC
Read Amp.	>11Ø mv	>2ØØ mv	>2ØØ mv
Index/Burst	2ØØ usec +/- 1ØØ	2ØØ-usec +/- 5Ø	45Ø usec +/- 1ØØ
Head Load	<35 msec	<35 msec	<6Ø msec
Radial Alignment	>7Ø%	>8Ø%	>8Ø%

NOTE: These are the "worst case" minimal specifications. Units should exceed these specs for proper operation in hostile environments.

DATE: July 24, 1982

REVISION DATE: September 16, 1986

BULLETIN NO: II:30

PRODUCT: 26-4001/2 Model II

SUBASSEMBLY: AXX-0308 Shugart 8" Drive Logic Board
AXX-0309 CDC 8" Discrete Board
AXX-0310 CDC 8" LSI Board
AX-8859 TPI 8" Drive Logic board

SUBASSEMBLY REVISION: All

PURPOSE: To discuss proper termination and jumpering for Shugart, CDC, and TPI drives. Also to provide test points for all drives for alignments.

DISCUSSION: Termination and jumpering may not be correct on boards received from National Parts. This can cause intermittent and/or hard failures when these boards are installed. Refer to Page 3 for correct test points and specifications when performing alignment procedures.

PROCEDURE: All boards from National Parts should be checked for the following jumper and termination configurations before being installed into a unit:

All Shugart 8" Drive Logic Boards.

Push on jumpers:

A, B, C, DC, DS, DS1, T1, T2, Z, 800

L should be vertical (LSI boards do not have an L jumper)

For proper termination the jumpers below should be installed on Shugart drive logic boards **ONLY** with the early style FDC board (AXX-0505). These jumpers **SHOULD NOT** be used with the late style FDC board (AX-9033). With the discrete and early LSI boards a 4 jumper-wire assembly (AW-2706) can be used, however, late LSI boards must be wire wrapped.

FROM:	TO:
J1-4	T6 (row opposite connector)
J1-6	T5 (row opposite connector)
J1-8	T4 (row opposite connector)
J1-10	T3 (row opposite connector)

TPI Drive Logic Boards.**Drive 0 only:**

Rev. A: For use with late FDC (AX-9033):
E1-E2, E3-E4, DS1

For use with early FDC (AX-0505):

Due to the complexity of the jumpering needed, it is not recommended that the Rev. A board be used with the early FDC. Should it be necessary, however, the following jumpers should be present:

T1, T8, E1-E2, E3-E4, DS1, 1S (the center staking pins in the bank of 4 pins labeled "2S, 1S, 2SA"). Additionally, there should be wire-wrap jumpers soldered between the following points: (1) the feedthrough connected to J1 pin 6 and the feedthrough connected to pin 1 of jumper position T5 (this is the staking pin closest to J1), (2) the feedthrough connected to J1 pin 8 and the feedthrough connected to Z13, pin 2, (3) the feedthrough located between the J1, pin 6 and J1, pin 8 feedthroughs and the feedthrough connected to pin 2 of jumper position T6 (the staking pin farthest from J1).

Rev. B: For use with late FDC (AX-9033):
E1-E2, E3-E4, DS1

For use with early FDC (AX-0505):

T1, T8, E1-E2, E3-E4, DS1, wire jumpers across pads at 1S, SYS4, SYS5, SYS6.

Drive 1 only: E1-E2, E3-E4, T3, T4, T5, T6, T7, T8, DS2 (note T1 is removed)

Drive 2 only: E1-E2, E3-E4, DS3

Drive 3 only: E1-E2, E3-E4, DS4

CDC 8"Drive Logic Boards.**Drive 1 only:**

LSI "B" version: Pin 9 of resistor pack should be lifted.

Discrete: Pin 14 of resistor pack should be lifted.

All Drives:

LSI Drives: Dip shunt installed with the appropriate lead shorted for the drive position it occupies in the system.

W2 shorted-Drive 1 All other positions open.

W3 shorted-Drive 2 All other positions open.

W4 shorted-Drive 3 All other positions open.

Discrete Drives:

Dip Switch 1 (8 position):

Position 1-4 Drive Select (only one should be on)

Position 5 Ready (always on)

Position 6-8 Spares (always off)

Dip Switch 3 (7 position):

Position 1-3 Off

Position 4 On

Position 5-7 Off

Dip Switch 3 may not be installed. If not, position 4 should have a jumper wire installed.

TEST POINTS

	Shugart	TPI	CDC LSI	CDC DISC
Read Amp Data	TP1, TP2	TP1, TP2	TPA, TPB	TP3, TP4
Index	TP12	TP3	J1 PIN 20 U4 PIN 26	TP14
Head Load	TP11	TP6	U1 PIN 1	U13 PIN 6
Raw Data	TP16	TP7	U6 PIN 3 J1 pin 46	TP8
Track Zero	TP26	TP5	J3 PIN 2	J3 PIN 2

SPECIFICATIONS

	Shugart	TPI	CDC
Read Amp.	>110 mv	>200 mv	>200 mv
Index/Burst	200 usec +/- 100	200-usec +/- 50	450 usec +/- 100
Head Load	<35 msec	<35 msec	<60 msec
Radial Alignment	>70%	>80%	>80%

NOTE: These are the "worst case" minimal specifications. Units should exceed these specs for proper operation in hostile environments.

DATE: March 15, 1982
REVISION DATE: March 23, 1983
BULLETIN NO: II:31
PRODUCT: 26-4001/2 Model II
26-4150 8 Meg Hard Drive
SUBASSEMBLY: AXX-0502/AXX-0503 Memory boards
AXX-9035 8 Meg Hard Disk Interface

PURPOSE: To prevent intermittent errors for any Model II board with memory.

DISCUSSION: Pullups are needed on memory boards for inputs to gates. Intermittent problems can occur without these pullups installed. Some of the Model II memory boards may be missing staking pins for push on connectors and appropriate markings. In this case, use wirewrap to jumper the pads and refer to Figure 1 for pad locations.

PROCEDURE: Check boards for proper jumpering and install jumpers if they are missing. For physical locations of jumpering positions refer to Figure 1 for the memory board and Figure 2 for the Interface board.

Hard Disk Interface:
Jumper A-B and W-V

Model II Memory boards:
Jumper 1-2 and 5-6

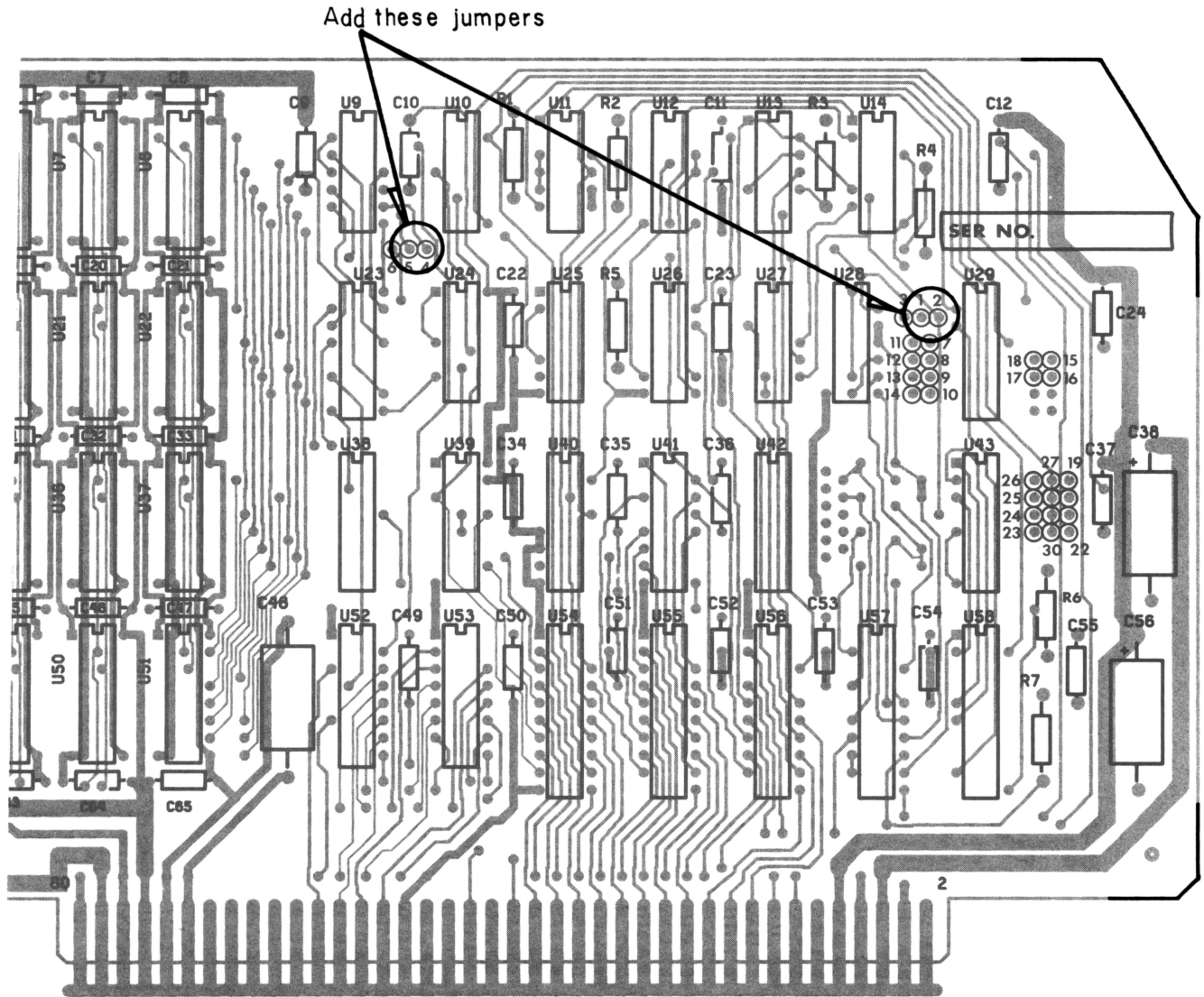


Figure 1

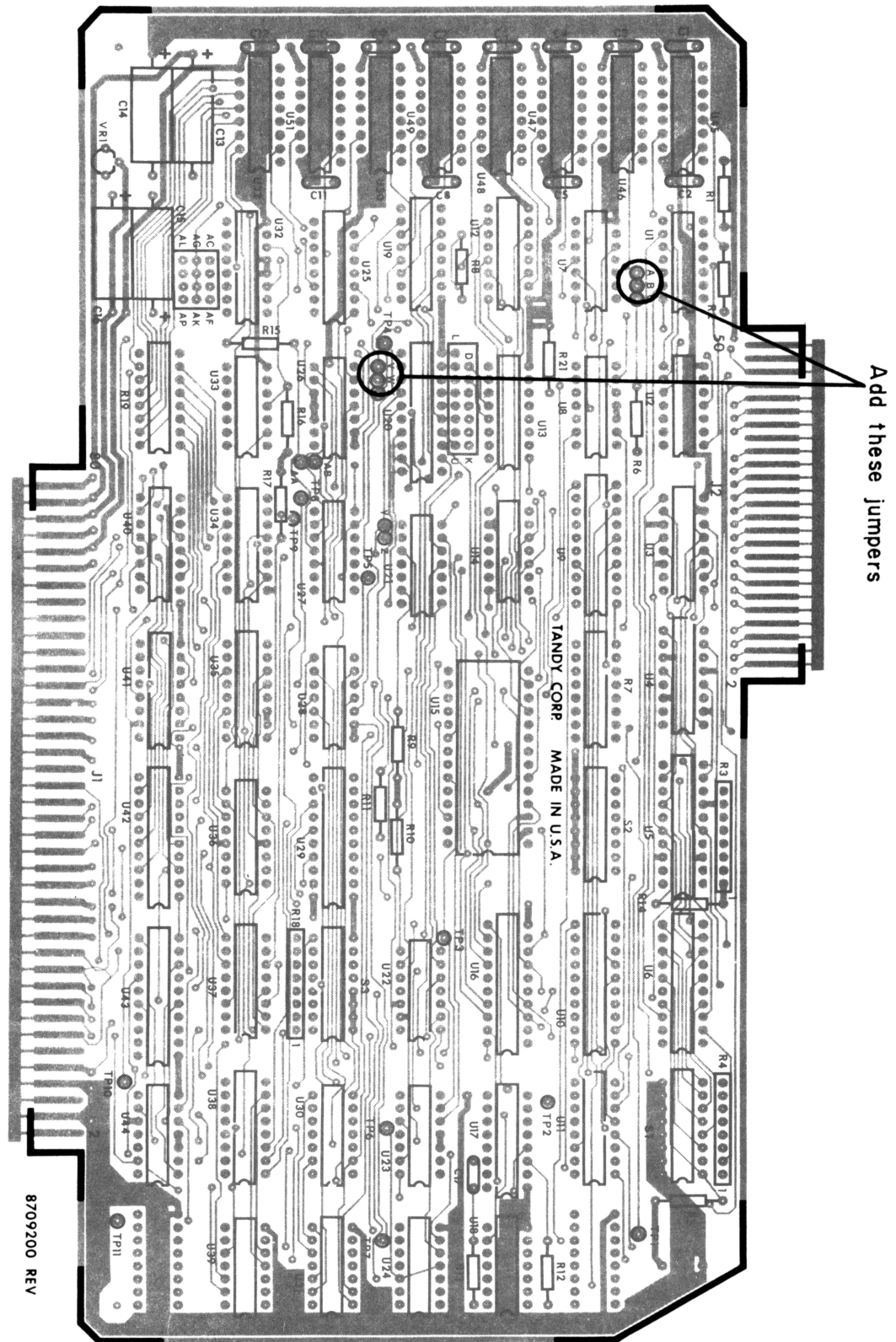


Figure 2

Radio Shack®

DATE: April 29, 1982
REVISION DATE: March 23, 1983
BULLETIN NO: II:32
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0501 Z-80 CPU (Rev A/B/C)
AX-9242 Z-80 CPU (Rev D)

PURPOSE: To insure problems using wait states and software timing loops are not caused by possible missing jumpers on the Z-80 CPU.

DISCUSSION: Problems using wait states and software timing loops may be caused by two missing jumpers on the CPU board. The jumper locations are physically the same on all revision boards, but may be marked differently or not marked at all.

PROCEDURE: Check all CPU boards for jumpers and install if missing.

Rev A, B, and early Rev C

Not marked on board Refer to Figure 1.

Late Rev C

S-T and N-P

Rev D

E3-E4 and E0-E1

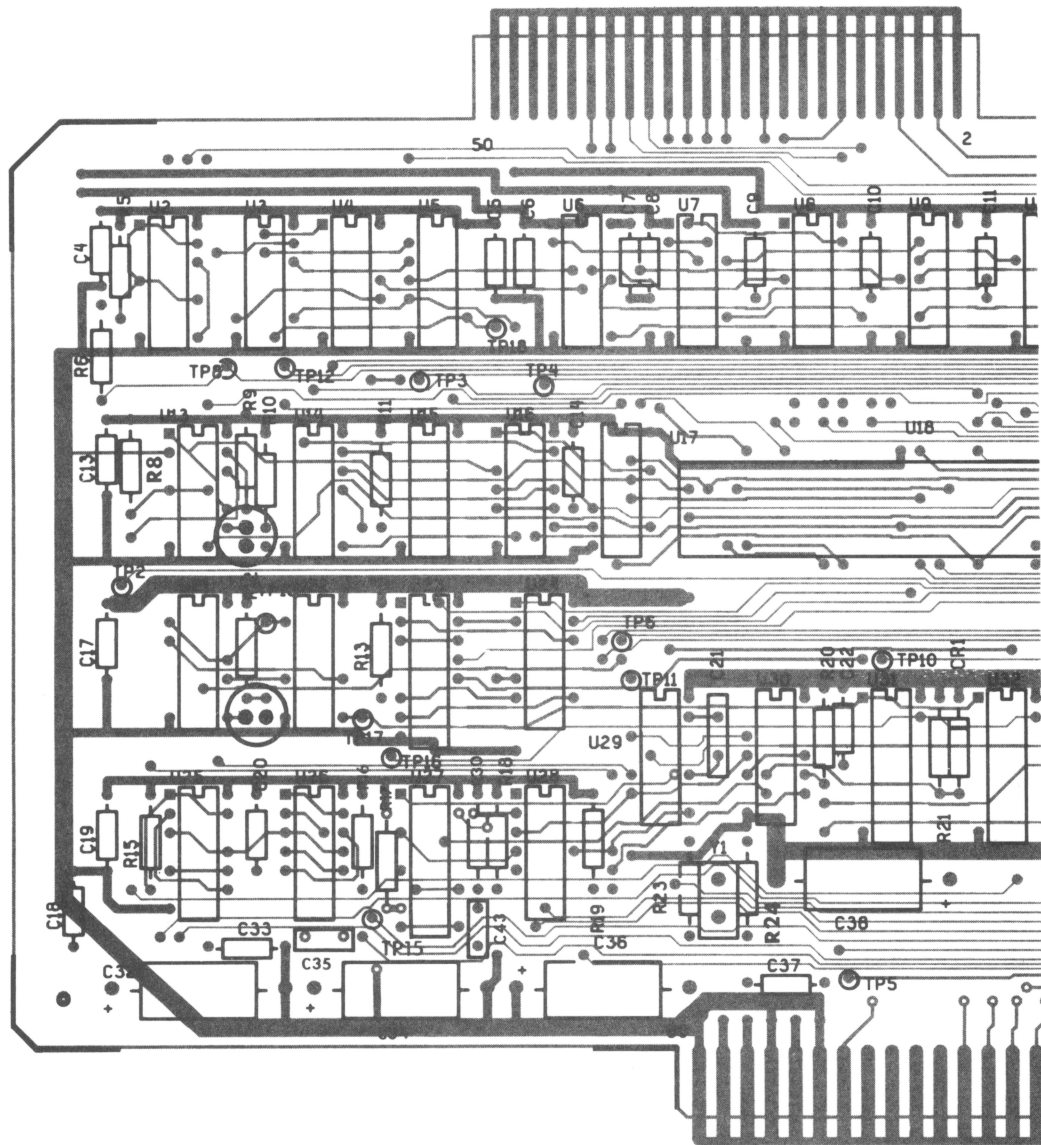


Figure 1

DATE: July 29, 1982

REVISION DATE: September 8, 1986

BULLETIN NO: II:33

PRODUCT: 26-4001/2 Model II
26-6001/2 Model 16

SUBASSEMBLY: AXX-0501 Z-80 CPU
AX-9242 Z-80 CPU

SUBASSEMBLY REVISION: All Revisions (Rev. A,B,C,&D)

PURPOSE: Checksums for Model II/16 Boot ROM's.

DISCUSSION: The following checksum values are for the boot ROM (U11) on the Z-80 CPU board in both the Model II and Model 16 using MEMII.

1. 432F Boots floppy drives only. (Early Model II's only)
2. 0A79 Boots floppy drives only.
3. 4A6A Hard drive boot ROM. (Installed with hard drive upgrade)
4. 88E2 or F42A
Also Hard drive boot ROM. These two ROM's have a slightly different boot sequence. The ROM checks for track 00 indication, if the head is on track 00 it will be stepped out and then back in before reading the boot track. This is because the Tandon drive does not have a track 00 stop, and it is possible for the head to fall out beyond track 00 and still give a track 00 indication.
5. C9AC or E996

These checksums will be found in Model 12/16B/6000's normally, but will also be found in newer Hard Drive Upgrade kits. These checksums are compatible with Western Digital hard drive controllers The E996 checksum will usually only be found in machines with internal Hard Drives. Both checksums are backward compatible which means they will work with all current Hard Drives.

Hard drive boot ROM's may be installed in non Hard Drive machines. With these boot ROM's installed, if the Hard Drive interface board is not present, the system will boot as a floppy system.

PROCEDURE: Before performing the Hard Drive upgrade check the checksum of the boot ROM using MEMII. When upgrading Model II's, the boot ROM that comes with the upgrade kit will need to be installed. This ROM should also be changed to allow the customer to use Hard Drives that contain a Western Digital controller.

DATE: June 30, 1982
REVISION DATE: March 29, 1983
BULLETIN NO: II:34
PRODUCT: 26-4160/1/2/3 Model II Expansion Bay
SUBASSEMBLY: AXX-0310 CDC LSI Board

PURPOSE: To outline adjustment procedure for read symmetry (Raw Data) on the CDC Drive LSI version board.

DISCUSSION: The LSI board has three adjustments R22, R23, and R32 (Refer to Figure 1). R22 and R33 are for adjusting the oscillator and write current to the head. These adjustments **ARE NOT** to be done in the field. The reason for this is because a test jig is needed, excessive time is required to complete the adjustments, and there is a high probability of damaging the head or the LSI chip. Once these adjustments have been done by the factory there is no reason for them to change unless the LSI chip fails. R32 controls the read symmetry (raw data) adjustment and it should be adjusted in the field.

PROCEDURE: Whenever doing drive alignment raw data should be checked with a blank BULK ERASED diskette. Connect scope to U6 pin 3 and proceed to step 8 of the TDC diagnostic. Adjust R32 so that the jitter of the first data pulse is less than 200nsec.

DO NOT Adjust these

Adjust for raw data

Connect scope here
pin3 U6

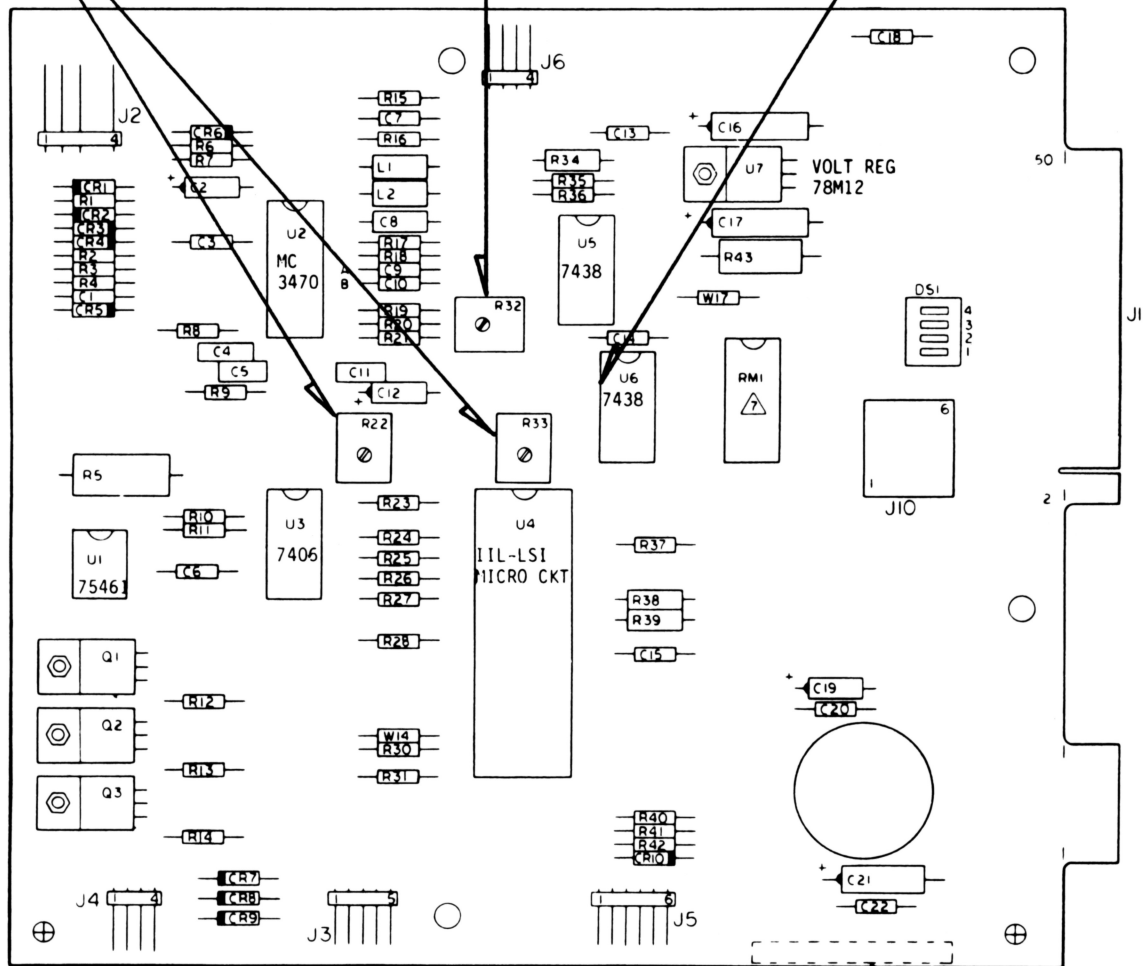


Figure 1

DATE: August 8, 1982
REVISION DATE: March 31, 1983
BULLETIN NO: II:35
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0308 Shugart 8" Drive Logic Board

PURPOSE: To correct intermittent connections and errors caused by the wire wrap jumpers near the rear edge of the drive logic board.

DISCUSSION/PROCEDURE: When installing proper termination, late LSI boards must use wire wrap. However, for discrete and early LSI boards a wiring assembly should be used. These assemblies can be obtained from National Parts using Part Number AW-2706. Most new boards from parts do not have these jumpers installed so it would be a good idea to keep a few in stock. Reference Technical Bulletins II:1 and II:30 for correct jumper configurations and locations.

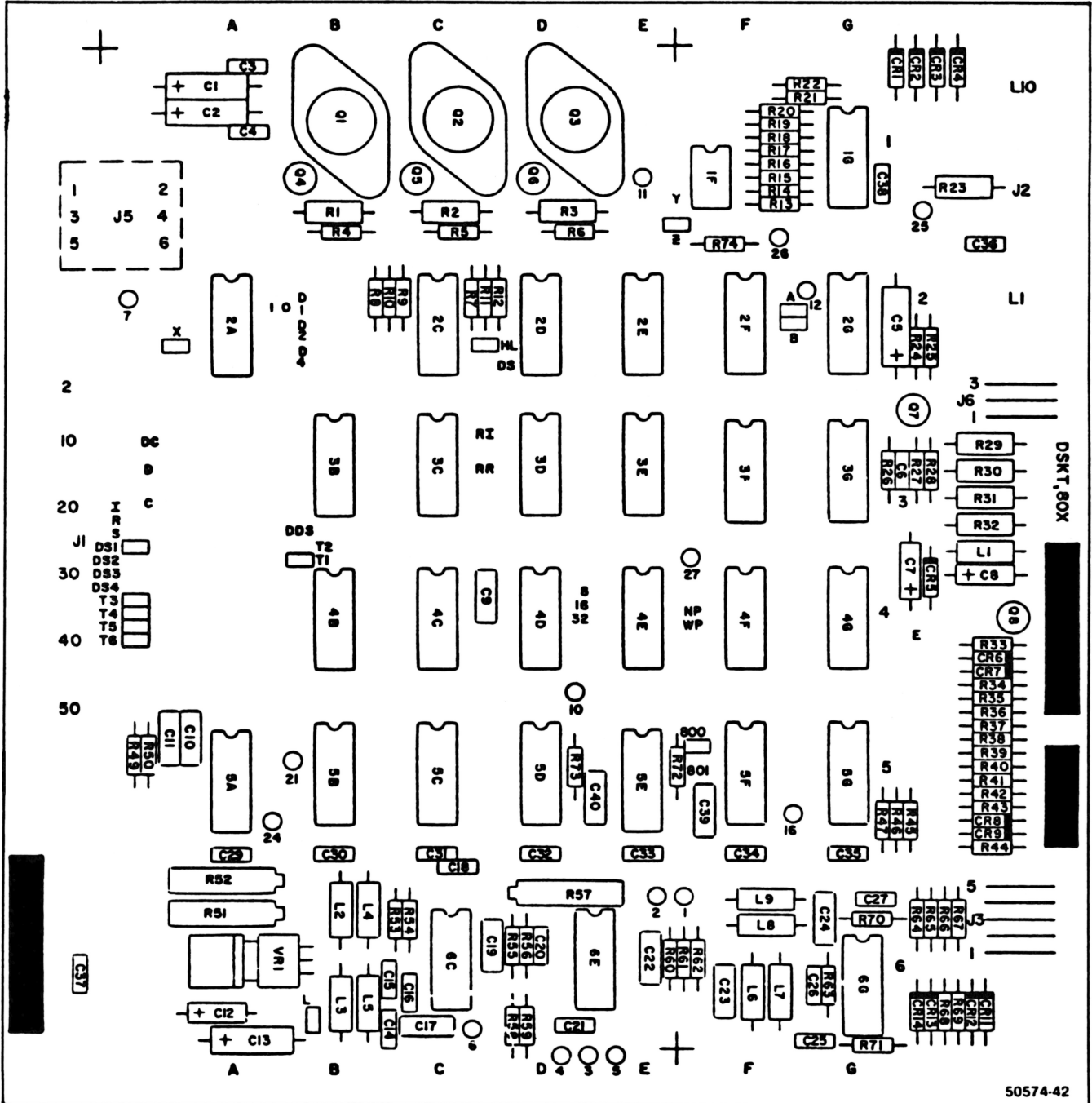
DATE: August 25, 1982
REVISION DATE: March 31, 1983
BULLETIN NO: II:36
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0308 Shugart 8" Drive Logic Board

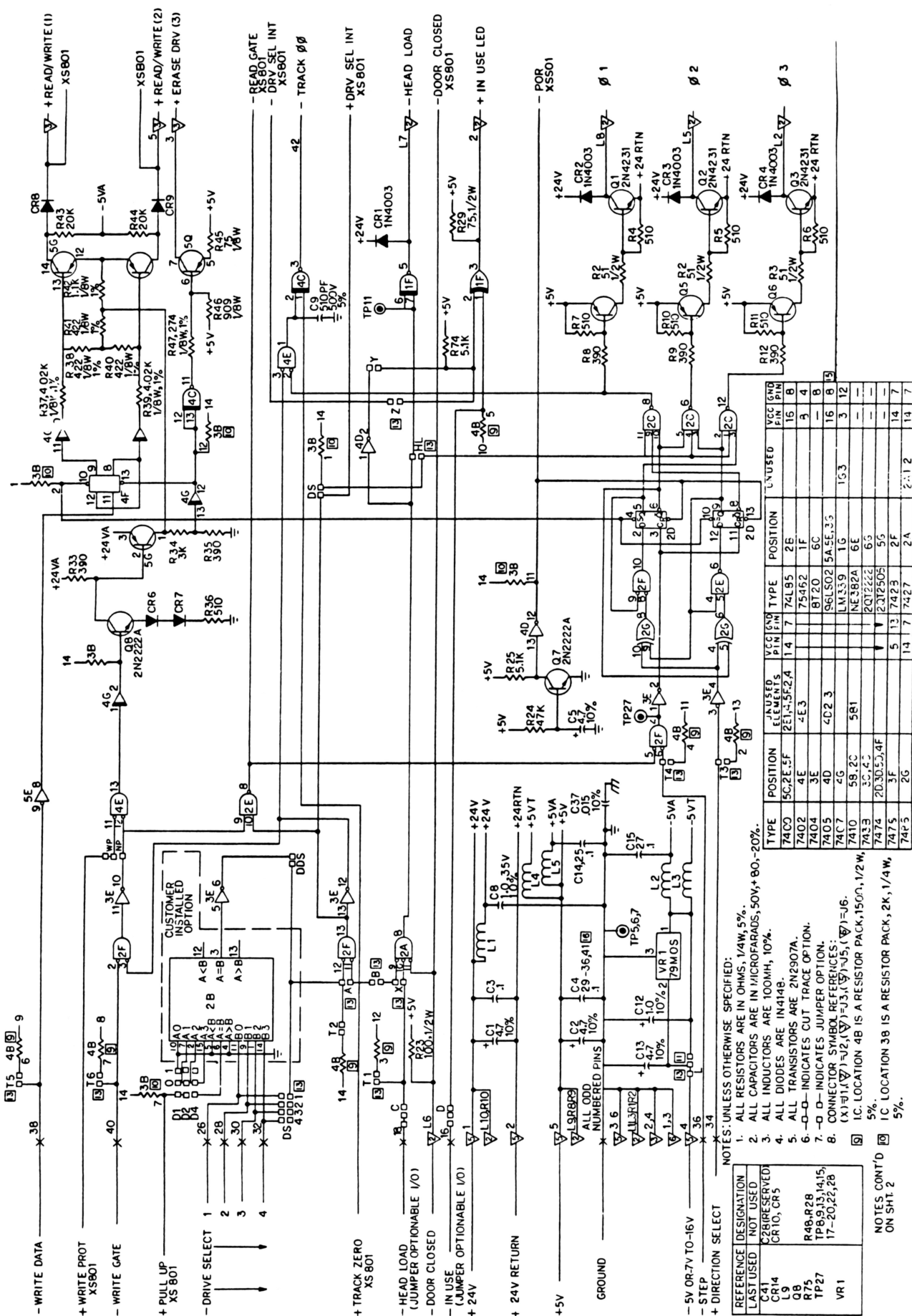
PURPOSE: To provide schematics and component layouts for all Shugart drive logic boards.

DISCUSSION/PROCEDURE: There are 4 different types of Shugart drive logic boards. Attached are the schematics and component layouts for all 4 boards.

Table of Contents:

Page	Board	Description
2-13	2510X	Component Layout
3-13	2510X	Schematic Diagram Sheet 1
4-13	2510X	Schematic Diagram Sheet 2
5-13	2517X	Component Layout
6-13	2517X	Schematic Diagram Sheet 1
7-13	2517X	Schematic Diagram Sheet 2
8-13	25136	Component Layout
9-13	25136	Schematic Diagram Sheet 1
10-13	25136	Schematic Diagram Sheet 2
11-13	25229	Component Layout
12-13	25229	Schematic Diagram Sheet 1
13-13	25229	Schematic Diagram Sheet 2

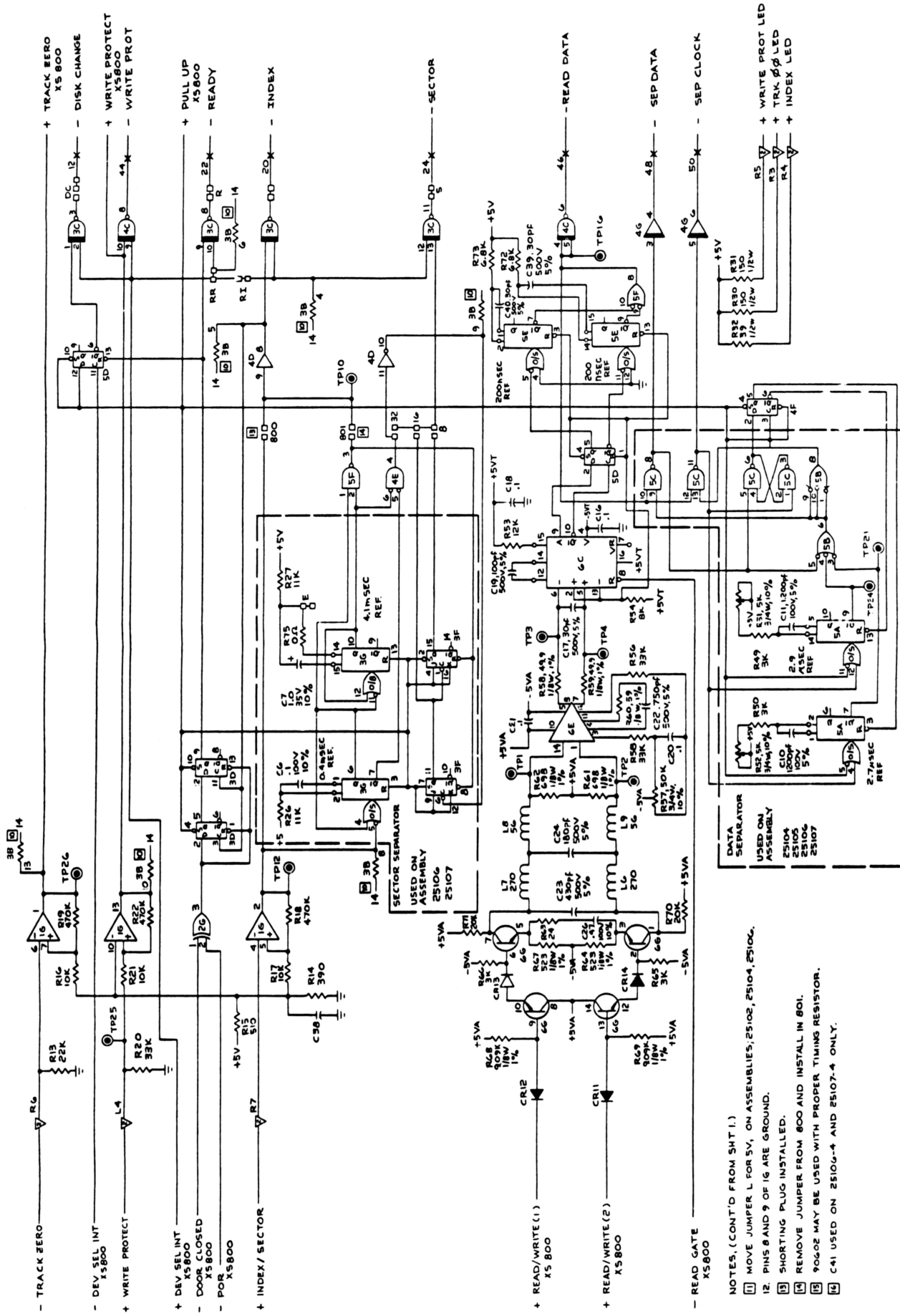




POSITION	USED	TYPE	POSITION	UNUSED
5C2E5F	2E1-5F-24	14	74L95	2E
4E	4E3	7	75462	3
3E	3E3	10	8T20	6C
4D	4D23	4	86LS02	5A, 5E, 3, 5
2G	2G	16	LM339	1G
58, 2C	581	3	NE382A	6E
20, 30, 5, 4F	20, 30, 5, 4F	5	2012262	65
3F	3F	1	2312505	55
2F	2F	14	7423	2A
2A	2A	7	7427	2A

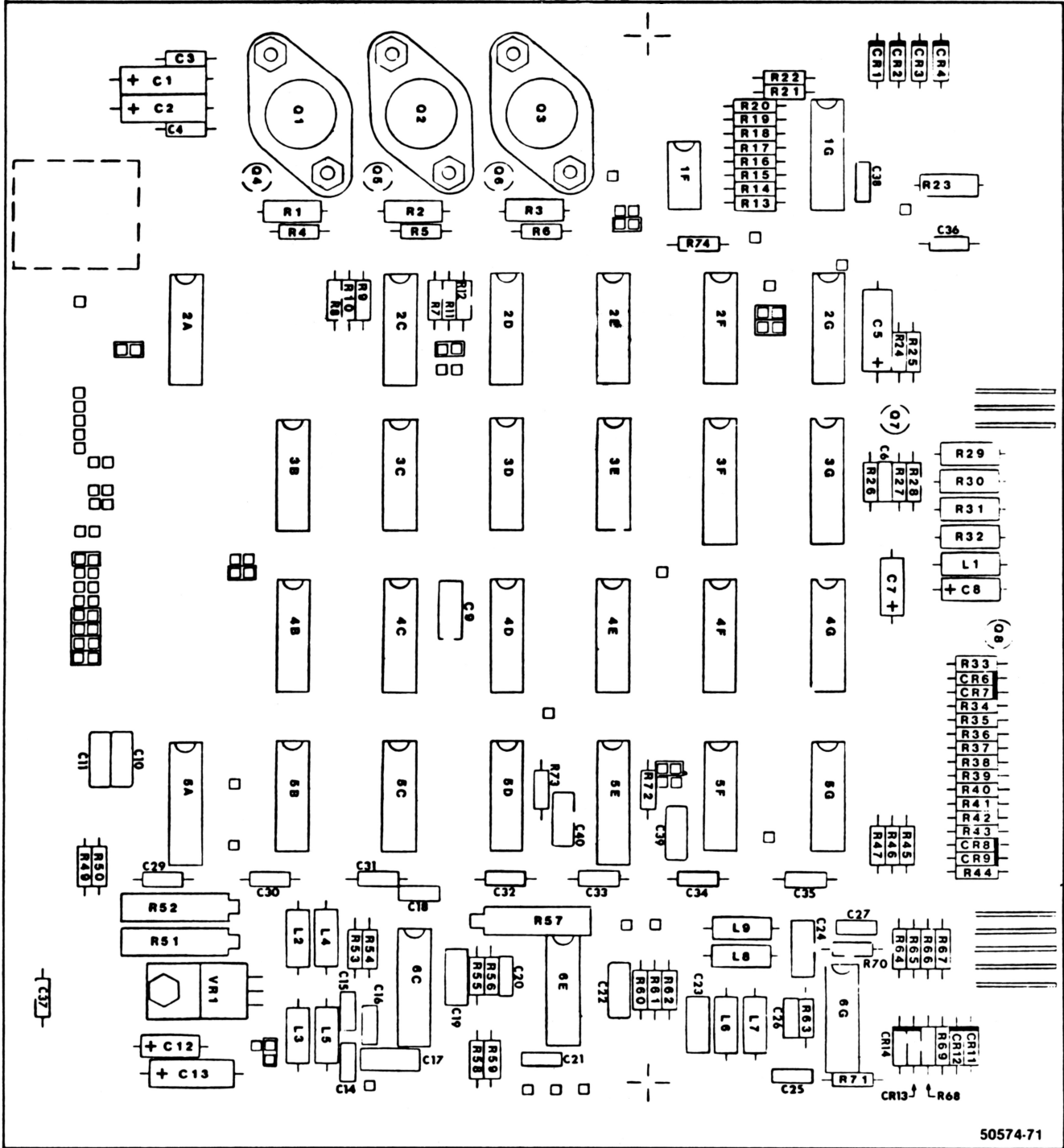
- NOTES: UNLESS OTHERWISE SPECIFIED:
1. ALL RESISTORS ARE IN OHMS, 1/4W, 5%.
 2. ALL CAPACITORS ARE IN MICROFARADS, 50V, +80, -20%.
 3. ALL INDUCTORS ARE 100MH, 10%.
 4. ALL DIODES ARE IN4148.
 5. ALL TRANSISTORS ARE 2N2907A.
 6. -D- INDICATES CUT TRACE OPTION.
 7. -D- INDICATES JUMPER OPTION.
 8. CONNECTOR SYMBOL REFERENCES:
 - (X) 1X11, (V) 1-2, (W) 1-3, (Y) 1-5, (Z) 1-6.
 - (Q) 1C LOCATION 4B IS A RESISTOR PACK, 150Ω, 1/2 W, 5%.
 - (R) 1C LOCATION 3B IS A RESISTOR PACK, 2K, 1/4 W, 5%.

REFERENCE DESIGNATION	DESIGNATION
LAST USED	NOT USED
CR14	RESERVED
L9	CR10, CR5
O8	
R75	R48, R28
TP27	TP8, 9, 13, 14, 15, 17-20, 22, 28
VR1	

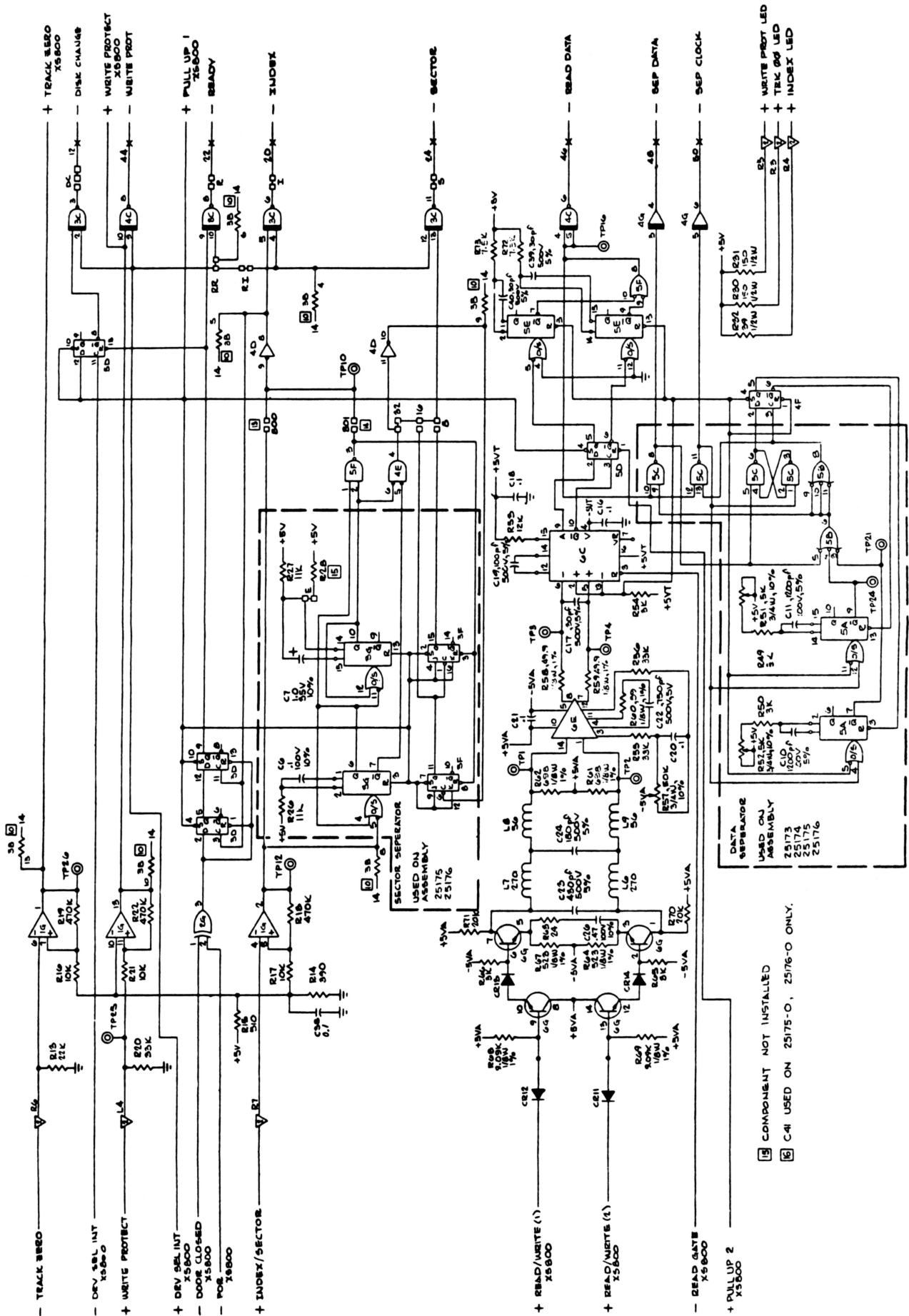


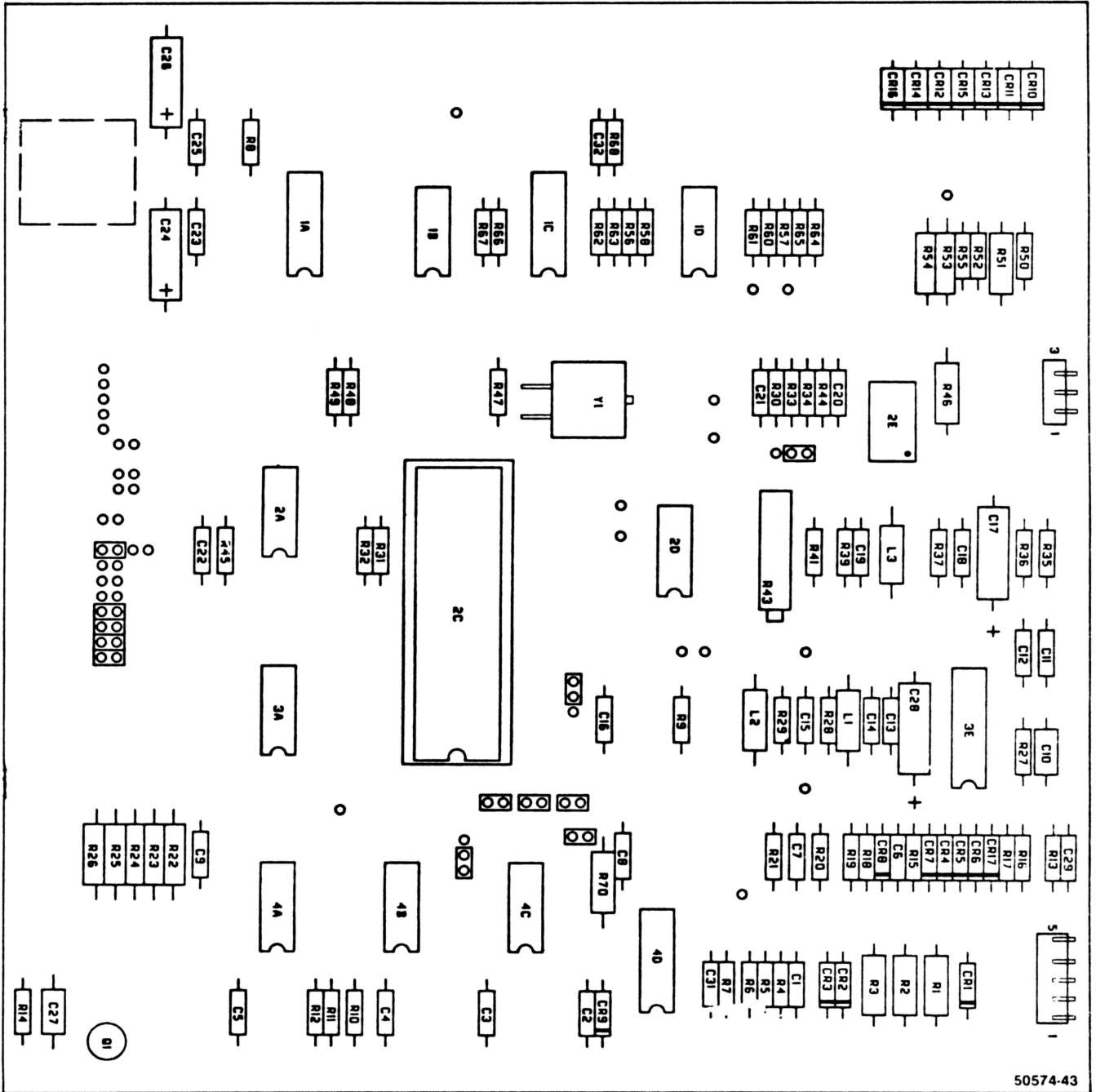
NOTES, (CONT'D FROM SHT 1.)

- 1 MOVE JUMPER L FOR 5V, ON ASSEMBLIES, 25102, 25104, 25106.
- 2 PINS 8 AND 9 OF 16 ARE GROUND.
- 3 SHORTING PLUG INSTALLED.
- 4 REMOVE JUMPER FROM 800 AND INSTALL IN 801.
- 5 90602 MAY BE USED WITH PROPER TIMING RESISTOR.
- 6 C41 USED ON 25106-4 AND 25107-4 ONLY.

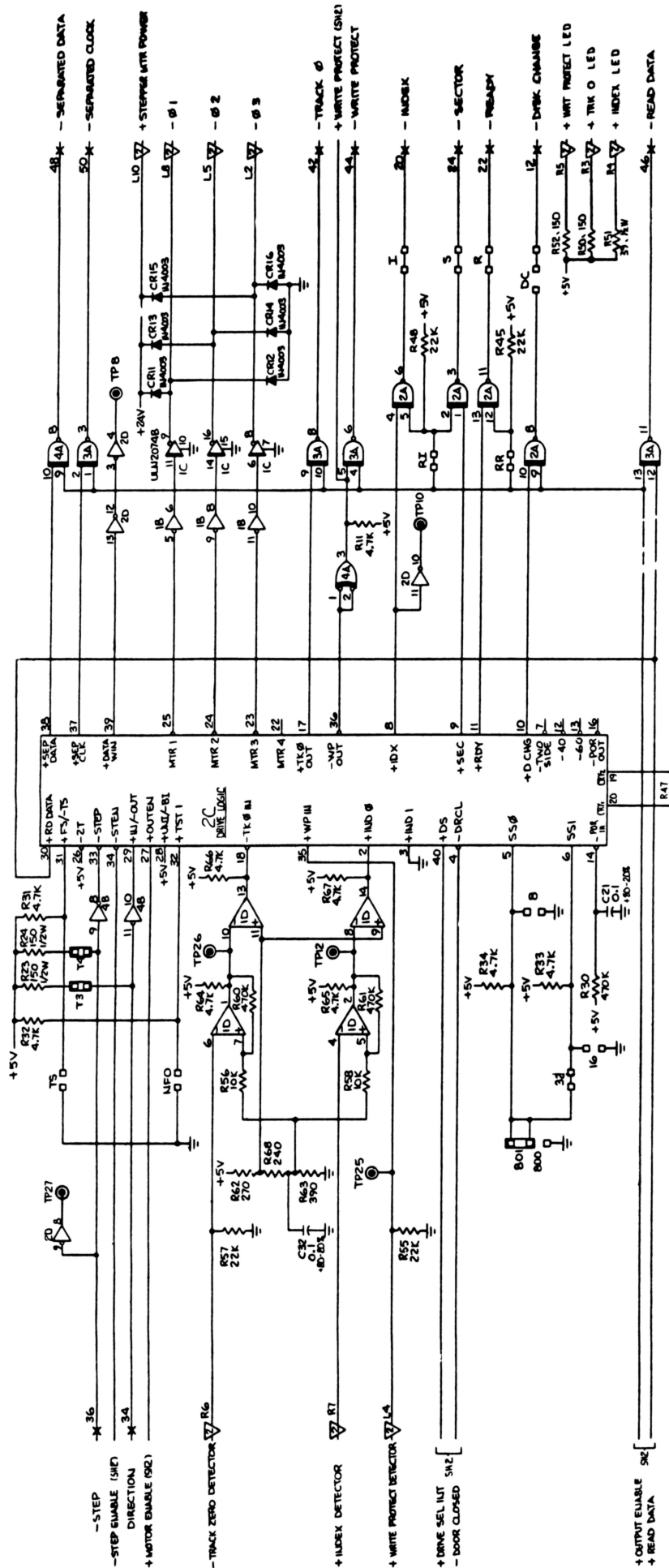


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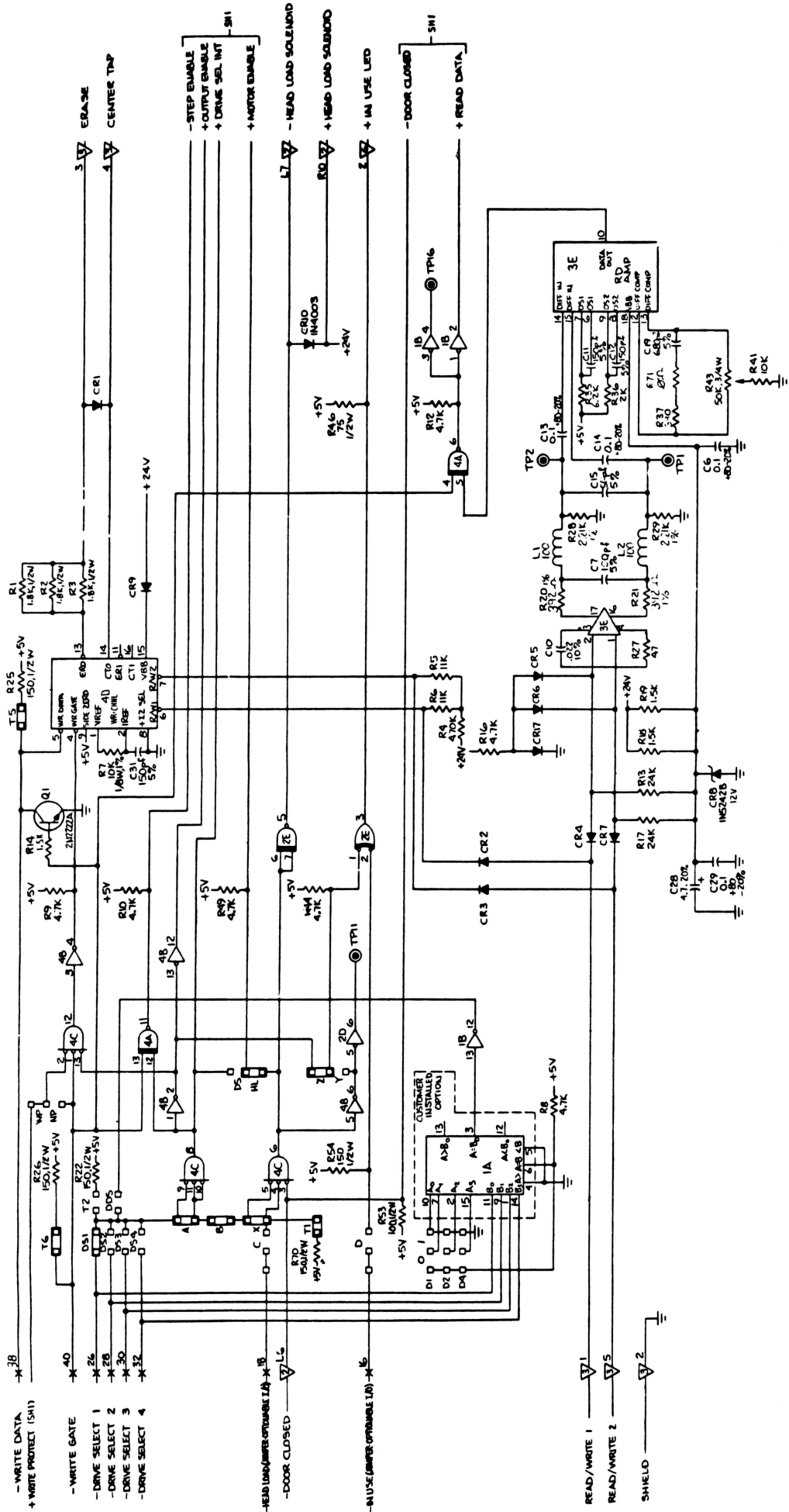
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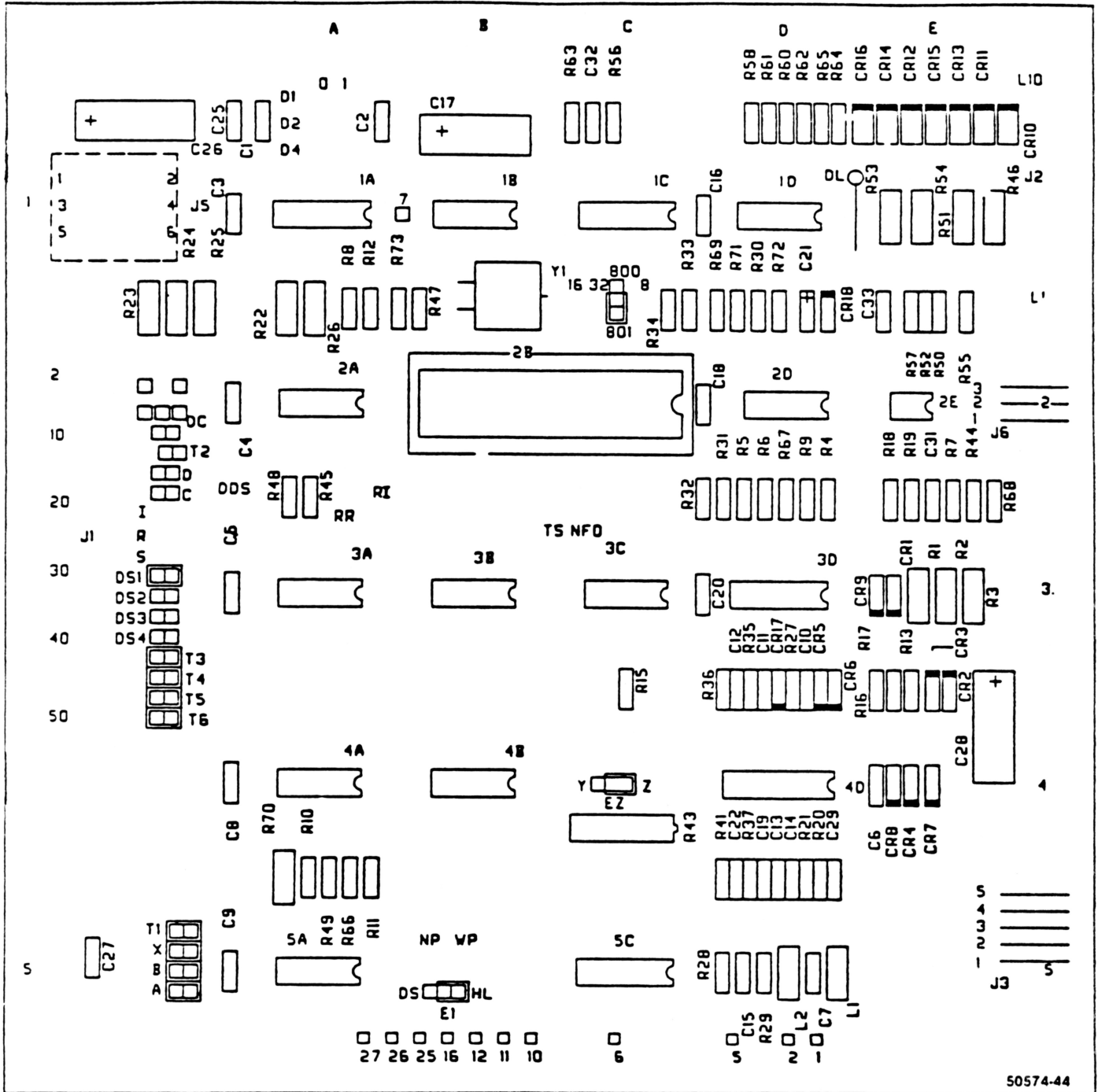


- NOTES
- UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE MICROMATS, 50V.
 - ALL DIODES ARE 1N4148
 - ALL INDUCTORS ARE IN MICROHENRS, 10⁻³.
 - ALL RESISTORS ARE IN OHMS, 1/4W, 5%. UNLESS OTHERWISE SPECIFIED.
 - CONNECTOR REFERENCE SYMBOLS: * - J1, J2, J3, J4, J5, J6.
 - ∇ - INDICATES CUT-TRACE OPTION.
 - ∇ - INDICATES JUMPER OPTION.
 - ⊠ - SHORTING PADS INSTALLED.

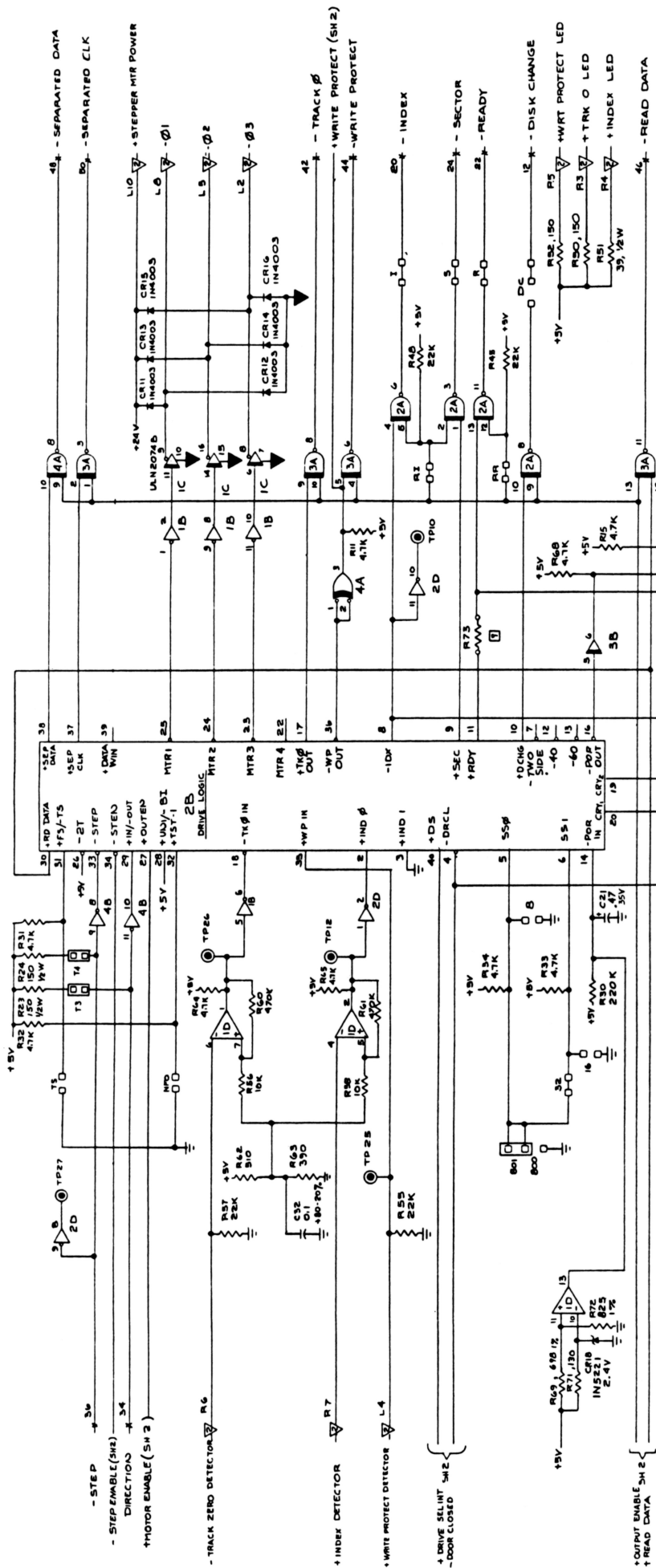
REFERENCE DESIGNATIONS	
LAST USED	NOT USED
C32	C30
CR17	-
L2	L3
G1	-
R71	R15 R74 R75 R76 R77 R78
TP27	TP30 TP31 TP32

TYPE	POSITION	UNUSED ELEMENTS	12V 14V GND
7404	18-48-2D	2D1	- 14 7
7427	4C	-	- 14 7
7438	2A-3A-4A	-	- 14 7
74LS05	1A	-	- 16 5
7545-2	2E	-	- 8 4
MS272-1	*+2	-	- 1 2 12
16-278-0	1	-	- 1 2 1
16-278-0	2	-	- 1 2 1
16-278-0	3	-	- 1 2 1
16-278-0	4	-	- 1 2 1
16-278-0	5	-	- 1 2 1
16-278-0	6	-	- 1 2 1
16-278-0	7	-	- 1 2 1
16-278-0	8	-	- 1 2 1
16-278-0	9	-	- 1 2 1
16-278-0	10	-	- 1 2 1
16-278-0	11	-	- 1 2 1
16-278-0	12	-	- 1 2 1
16-278-0	13	-	- 1 2 1
16-278-0	14	-	- 1 2 1
16-278-0	15	-	- 1 2 1
16-278-0	16	-	- 1 2 1
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16-278-0	99	-	- 1 2 1
16-278-0	100	-	- 1 2 1





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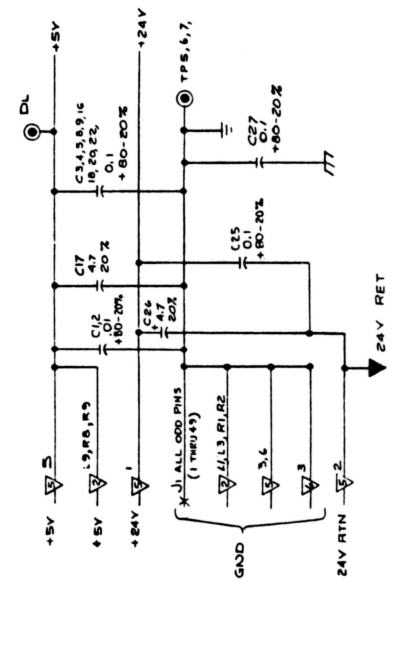


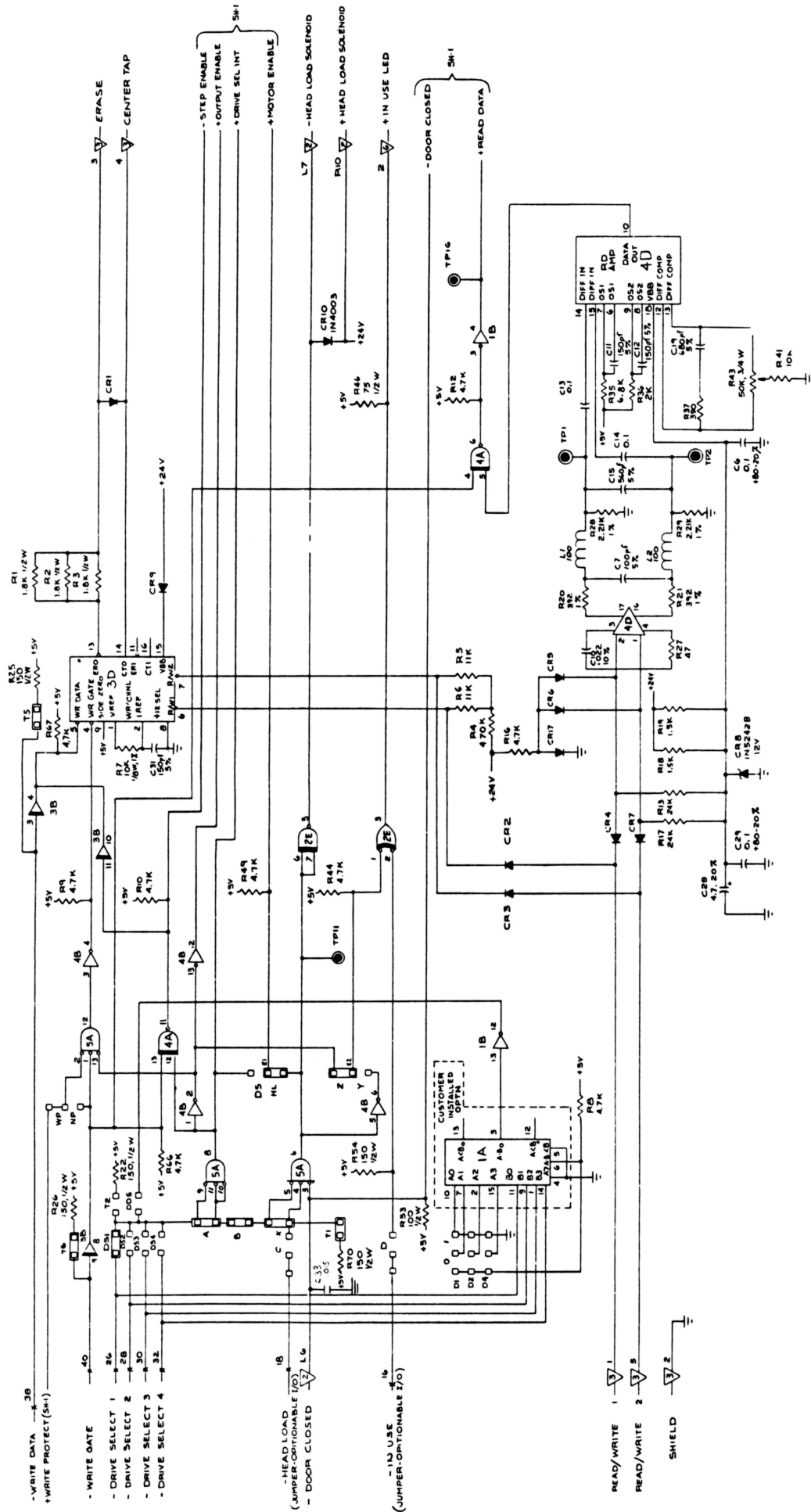
- NOTES: 1 UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MICROMETERS, 50V/10%
 2 ALL DIODES ARE IN MICROFARADS, 50V/10%
 3 ALL INDUCTORS ARE IN MICRONHENRYS, 10%
 4 ALL RESISTORS ARE IN OHMS, 1/4W, 5%
 5 CONNECTOR REFERENCE SYMBOLS ARE IN PARENTHESES
 6 J1 INDICATES JUMPER OPTION
 7 J2 INDICATES SHORTING PLUG OPTION
 8 J3 INDICATES SHORTING PLUG INSTALLED
 9 R73 NOT INSTALLED

REFERENCE DESIGNATIONS

DESIGNATION	VALUE
C33	C30, C23
CR18	-
R78	R73, R14
L2	-
TP27	TP14, TP24
J4	J4

TYPE	POSITION	USED ELEMENTS	12V PIN	15V PIN	2ND PIN
7404	15, 45, 20	20, 2, 6	-	14	7
7427	5A	-	14	7	-
7435	2A, 3A, 9A	-	14	7	-
74LS11A	1A	-	16	8	-
7546	2E	-	8	4	-
16270-1	3D	-	-	10	3, 12
16271-0	2B	-	-	1	21
16270-0	4D	-	18	11	5
1M319	1D	1D, 1	-	3	12
1M20746	1C	1C, 1	-	-	15, 17
7407	3B	2, 5, 1	14	7	-
7474	3C	-	14	7	-





DATE: September 16, 1982
REVISION DATE: March 31, 1983
BULLETIN NO: II:37
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-6008 Modified Power Supply
AXX-0312 Motorola Video Board

PURPOSE: To check for modification to Motorola Video Board (if installed) when installing Model 16 Enhancement option and Modified Power Supply into Model II.

DISCUSSION: When installing the Model 16 enhancement option into a Model II the power supply needs to be changed as per instructions in the installation guide. However, before doing this check to see if the Model II has a Motorola video board installed. If it does it needs to be checked for the modification discussed in Technical Bulletin II:5. Without this modification the video board can short the +12 volt supply, blow F3, and short the two diodes wired in series at the bottom of the power supply. This same procedure holds true whenever you upgrade a Model II with 6 or more boards installed.

PROCEDURE: If the Motorola Video board is installed in the Model II, refer to Tech Tip II:5 and insure that this modification has been done. If the modification is not present it **MUST** be done before an AXX-6008 power supply is installed into the Model II to prevent power supply failure. Also check the power supply to insure that the 2 diodes have the banded ends pointed in the same direction.

DATE: February 28, 1983
REVISION DATE: April 1, 1983
BULLETIN NO: II:38
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AXX-0204 Keytronics Keyboards

PURPOSE: Replacement Keytronics keyboards may cause 5 volt supply failure or may function abnormally.

DISCUSSION: Currently, replacement Model II Keytronics keyboards are being shipped from National Parts with Z4 shorted to prevent static damage during storage and/or shipment. The IC is shorted by foil on the solder side of the PCB, and is held in place with masking tape. Failure to remove this tape prior to installation and operation may cause a 5 volt supply failure and possibly damage Z4.

PROCEDURE: Prior to installation check all replacement keyboards from National Parts, Cherry or Keytronics, for any anti-static protection.

DATE: June 16, 1983
REVISION DATE: June 16, 1983
BULLETIN NO: II:39
PRODUCT: 26-4001/2 Model 2
26-4160/1/2 Expansion Bay
SUBASSEMBLY: AX-8859 TPI 8" Logic Board (Rev A)

PURPOSE: To correct intermittent errors with TPI Drive as Drive 0 and failure to operate when installed in the expansion bay.

DISCUSSION: On Rev A 8" TPI logic boards the DC power connector J5 has no land connecting logic ground Pins 3 and 6 to chassis ground Pin 2. This can cause intermittent errors and intermittent loss of data on the diskette when installed as Drive 0. When installed in the expansion bay the Drive cannot be accessed. A land was added connecting J5 pin 2 to J5 pin 3 on Rev B and C boards correcting this problem.

PROCEDURE: Check all Rev A 8" TPI Drive logic boards for jumper from J5 pin 2 to J5 pin 3. Install jumper between these two points if missing.

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DATE: April 26, 1984

REVISION DATE: April 26, 1984

BULLETIN NO.: II:40

PRODUCT: 26-4001/2, 26-6001/2 Model II, 16

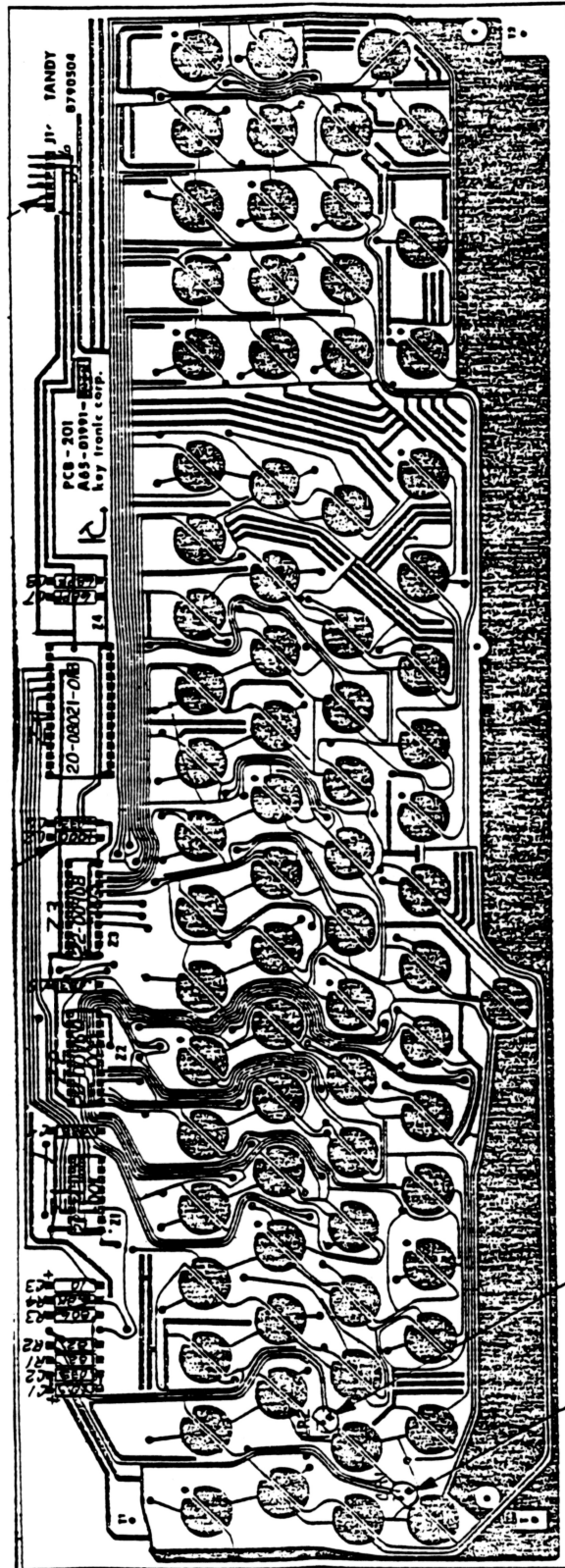
SUBASSEMBLY: AXX-7071, AXX-0208 Key Tronic Keyboard

PURPOSE: Correct, and clarify the schematics on the model II/16 Key Tronic keyboards.

DISCUSSION: The Schematics for the Model II/16 keyboards in the Model II Technical Reference Manual are incorrect. Attached is the correct schematic and component location diagram.

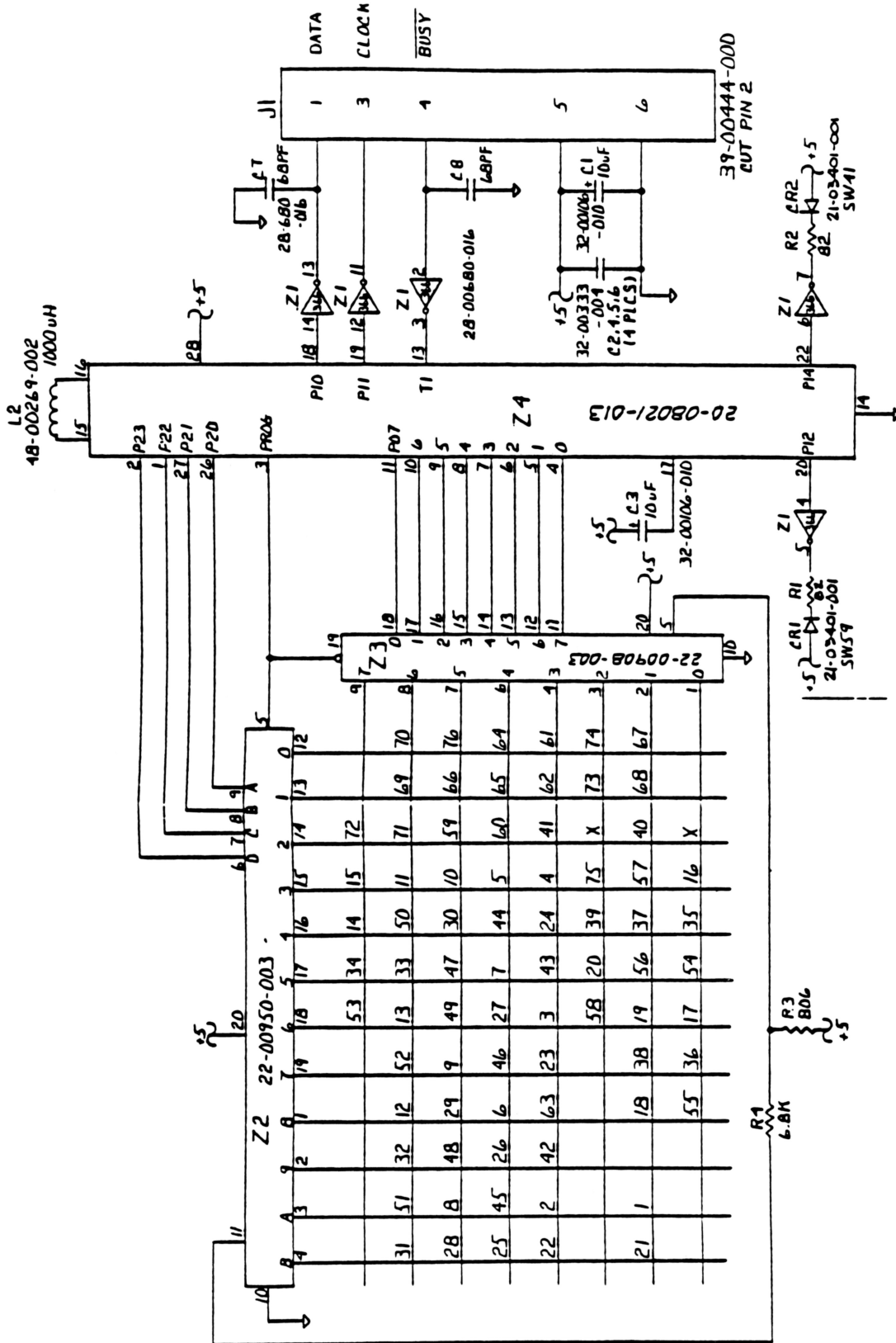
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DATE: May 17, 1984
REVISION DATE: May 17, 1984
BULLETIN NO.: II:41
PRODUCT: 26-4001 Model II
SUBASSEMBLY: AX-0204 Keytronics Keyboard

PURPOSE: To correct keyboard power on reset problems.

DISCUSSION: Some Keytronics keyboards with an 8021H microprocessor (Z4) will exhibit a power on reset problem when used with a Model II. The keyboard will intermittently lockup on power up, but once powered up correctly it will work fine. To correct this problem the power on reset pulse to the microprocessor needs to be lengthened.

PROCEDURE: Change the 10ufd capacitor on the reset line (pin 17 of Z4) to a 33ufd capacitor.

This capacitor can be ordered through National Parts with part number CC-336MFAA under catalog number 26-9999C.

DATE: April 15,1985
REVISION DATE: May 28,1985
BULLETIN NO.: II:42
PRODUCT: 26-4001/2 Model II
SUBASSEMBLY: AX-7981 Multi-terminal Interface

PURPOSE: To explain the installation procedure for the Multi-terminal Interface in a Model II.

DISCUSSION: To install Multi-terminal Interface in the Model II you will have to modify the case bottom to allow external connection of the cables. Install the Multi-terminal Interface board in the #4 slot of the card cage so that the board will not interfere with any other boards or cables. If there is any other board in this slot move it to next available slot.

PROCEDURE:

TOOLS AND MATERIALS REQUIRED: (1) Multi-terminal Board (AX-7981)

- (3) 8" Flat Extender Cables (26-1497)
- (1) Hack Saw or Nibbler Tool (64-823)
- (1) File

1. Remove case top to allow access to the case bottom.
2. (Refer to figure 1.) Measure 8" inches from left side (drive side) make a 3/8" inch deep cut, then measure 2" inches from first cut, and make another 3/8" inch deep cut. Cut away the two inches of plastic between the cuts. Clean the notch and make it smooth as possible.
3. Install Multi-terminal Interface board in #4 slot of card cage (count from the Z-80 CPU board to the left.) The proper slot positions should be filled as follows: (1) Z-80 CPU Board (2) FDC Board (3) Hard Drive Interface Board (4) Multi-terminal Interface Board (5) Video Board (6) 64K Memory Board (7) 68000 CPU Board (8) 16-Bit Memory Board, reading from right to left as you are facing the rear of unit looking at the card cage. If there is a board in #4 slot move all boards to the left leaving the #4 slot open for the multi-terminal board.

4. Fasten the extender cables to each port with the screws provided with each cable, to insure the cables do not become disconnected from inside the unit. Place the cables neatly on top of each other in the notch made in step 2.

CAUTION: Watch for plastic hold tabs on back of case top, make sure you do not puncture cables with these hold tabs.

5. Reinstall top case and check for proper operation.

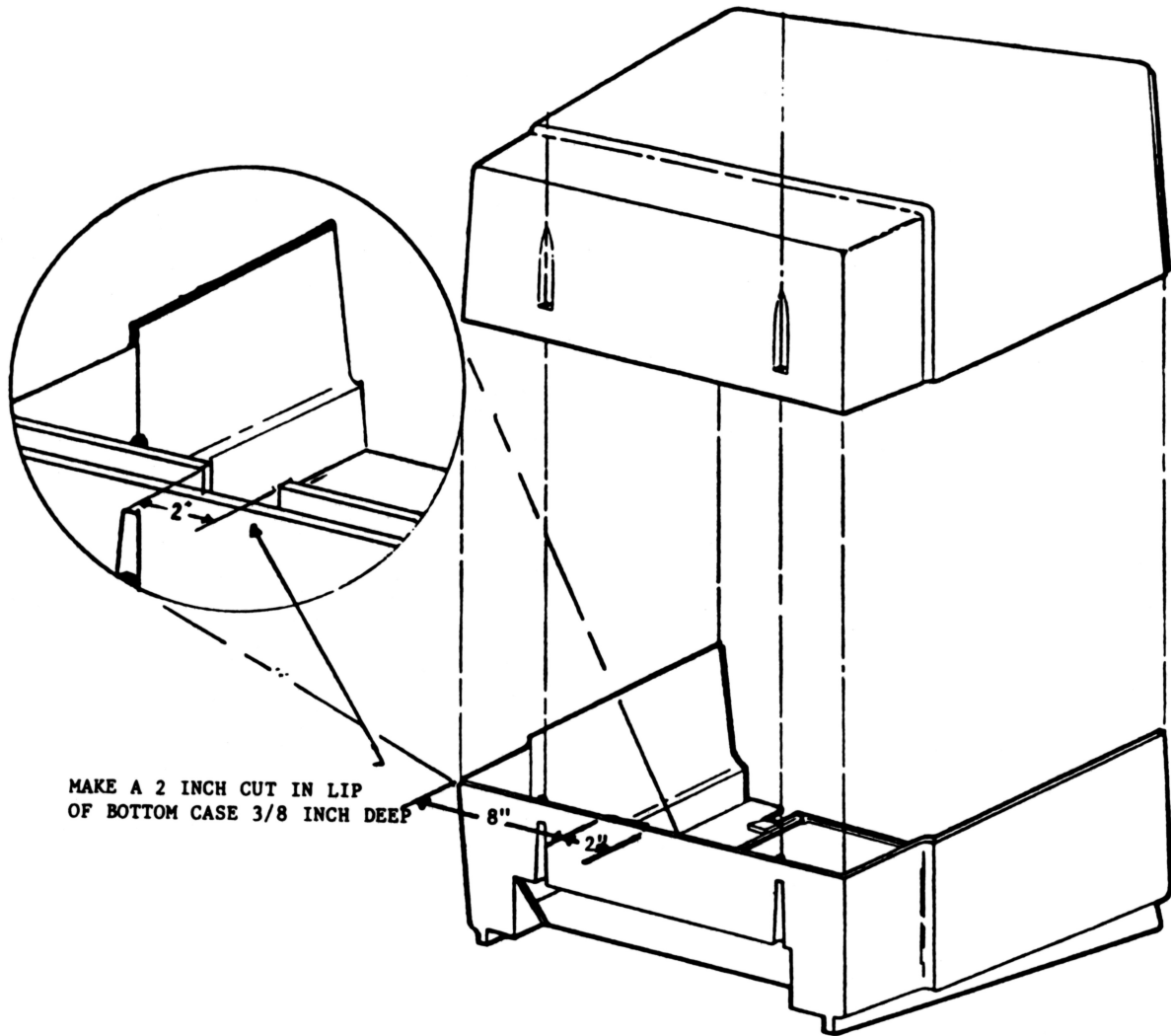


Figure 1.

