II.
INSTALLATION

CAUTION!

Unless your Lt. Kernal hard disk system is specifically labeled otherwise, your system has been factory wired for:

115 volts A.C. 60 hertz only

Do not plug the power cord into any other voltage or frequency outlet.

For domestic American systems, the correct outlet type is the three prong grounded variety. Use of a three prong adapter in a two prong ungrounded outlet is strongly discouraged since such use presents a high shock hazard and may damage your system.

CAUTION!

Always handle your hard disk/power supply assembly with the utmost care. Mechanical bumps and shocks to the drive could irrepairably damage it.

Never move or ship the drive without first conditioning it for shipping via the "ship" system command, described later in this manual.

Never move the drive unless power has been off for at least 30 seconds.

Never ship the drive in any container except it's original carton.

INSTALLING THE LT. KERNAL

Installation of the Lt. Kernal hardware takes only a few moments, but MUST be done carefully to avoid damage. For a typical system setup refer to FIG 1. Be gentle, and work slowly and deliberately, referring to the text frequently as you go.
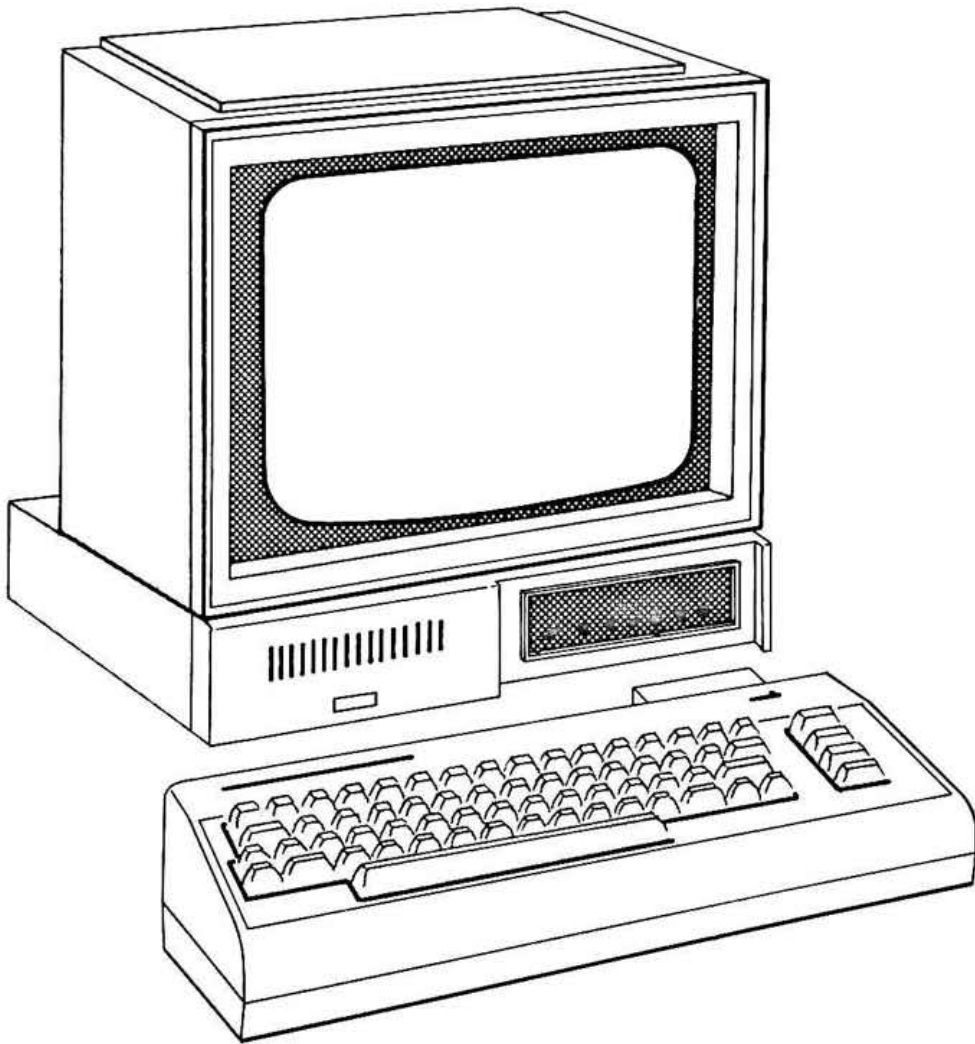
FIG. 1

FIRST
Make sure power is completely turned off to all components of your computer and the Lt. Kernal!!

SECOND
NEVER, NEVER, plug or unplug any interconnection of the system with power applied!!

THIRD
Always remember the second rule or you will eventually destroy some component of your system.

> **BEFORE BEGINNING YOUR INSTALLATION OF THE LT. KERNAL, CAREFULLY CHECK YOUR COMPUTER FOR PROPER OPERATION WITHOUT THE LT. KERNAL INSTALLED. THIS WILL PREVENT FALSE INDICATIONS OF TROUBLE LATER.**

There are two possible installations of the Lt. Kernal. One is for the C-64 computer, and the other for the C-128. To utilize the 128 mode in the C-128, the C-128 adaptor board must be installed. Both installations will void your computer's warranty, as you will be required to open the computer case to install clips and/or an adaptor board. If you do not feel competent to do this installation properly, seek the assistance of a qualified computer technician. **CAUTION: Read each step thoroughly first before proceeding.**

TOOLS REQUIRED: A #1 phillips screwdriver and possibly a T-10 TORX driver plus needle nose pliers for the 64C inner shield and a small flat blade screwdriver.

C-64 or C-64C INSTALLATION

Step 1 - Remove screws on the bottom of the computer case, un-snap the upper keyboard section and carefully unplug the keyboard and indicator LED cables. Place this section aside for now.

Step 2 - Locate the HIRAM and CAEC cable assemblies. Refer to FIGS 2 and 3 to find your model and attach the HIRAM clip to the lead indicated of resistor R44 and attach the CAEC clip to PIN 6 of chip U27. Be sure that the clip is not shorting to any of the adjacent pins of either chip. Secure both leads with small pieces of scotch tape and dress each end out the opening for the expansion slot on rear of computer. NOTE: On some models, the metal shield must first be lifted by removing the TORX screws as needed, and then un-twist the small metal tabs around the perimeter of the shield. Replace this shield after the above clips are installed.

Step 3 - Install the keyboard section by first connecting the keyboard and LED cables and their lower section into place, snap case shut and install bottom screws into case.

Step 4 - Locate the HOST ADAPTOR and push the HIRAM connector onto the leftmost pair of pins of plug P1 as shown in FIGS 2 and 3. Push the CAEC connector onto the 4th set of pins from the left on plug P1 again as shown in FIGS 2 and 3. The jumpers on the 3rd and 5th sets of pins must also be in position as shown. The Host adaptor may now be inserted into the EXPANSION connector on the rear of the computer.

FIG. 2

FIG. 3

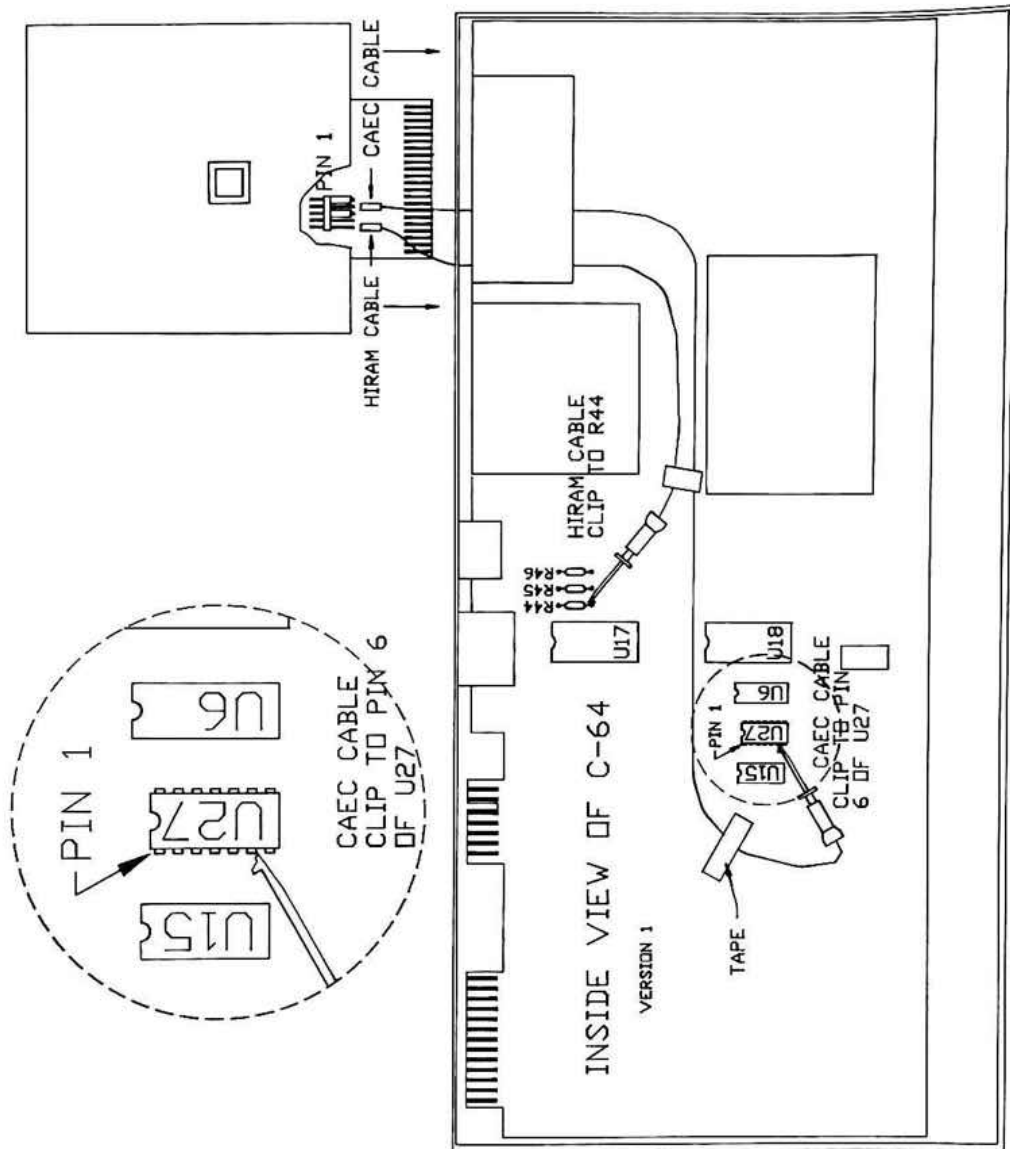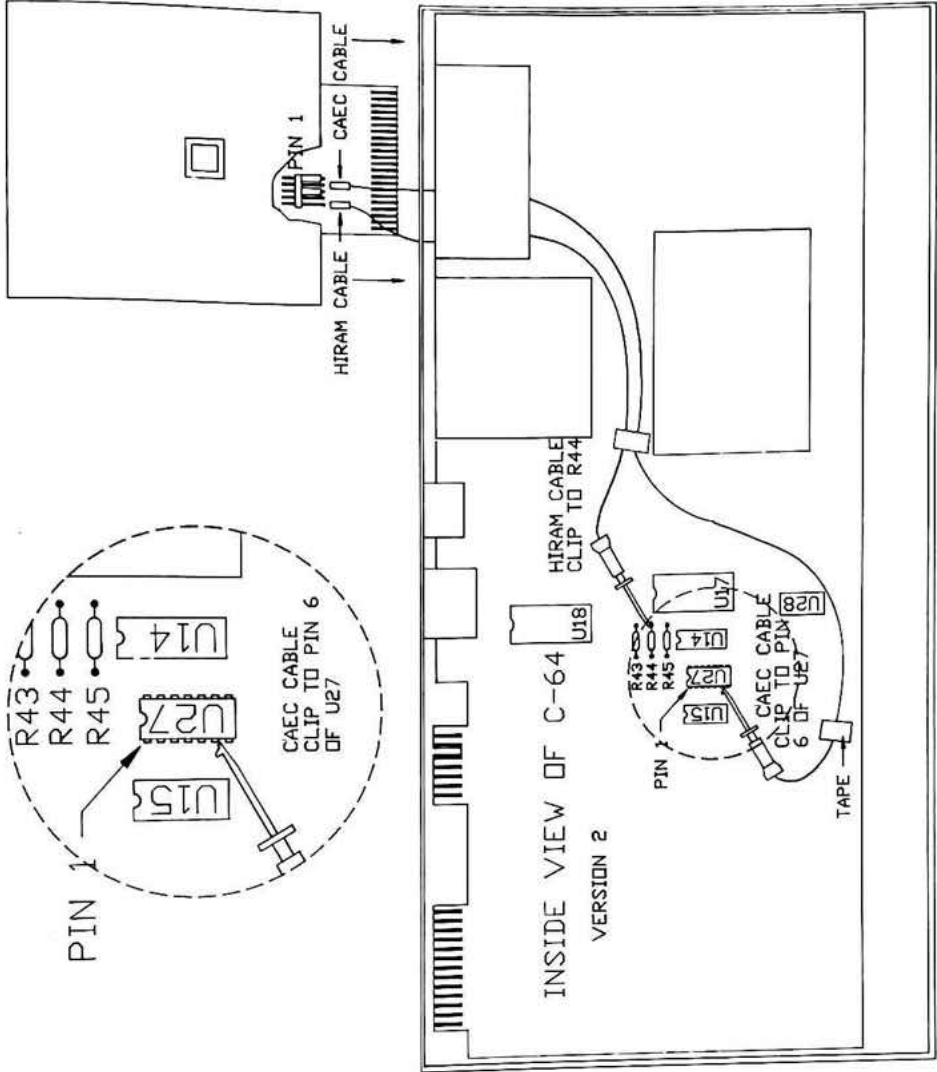You may have a newer version of the C64 computer board that is smaller at about 5'' wide. Use the information below to make your HIRAM and CAEC connections.

HIRAM cable to pin 28 of U6 (MPU) or to pin 6 of U8 (PLA)

CAEC cable to pin 5 of U6 (MPU) or to pin6 of U3.

Step 5 - Locate the 25 pin SIGNAL cable, plug one end into the connector on the rear of the Host Adaptor and secure the cable with the attached screws. Refer to FIG 4.
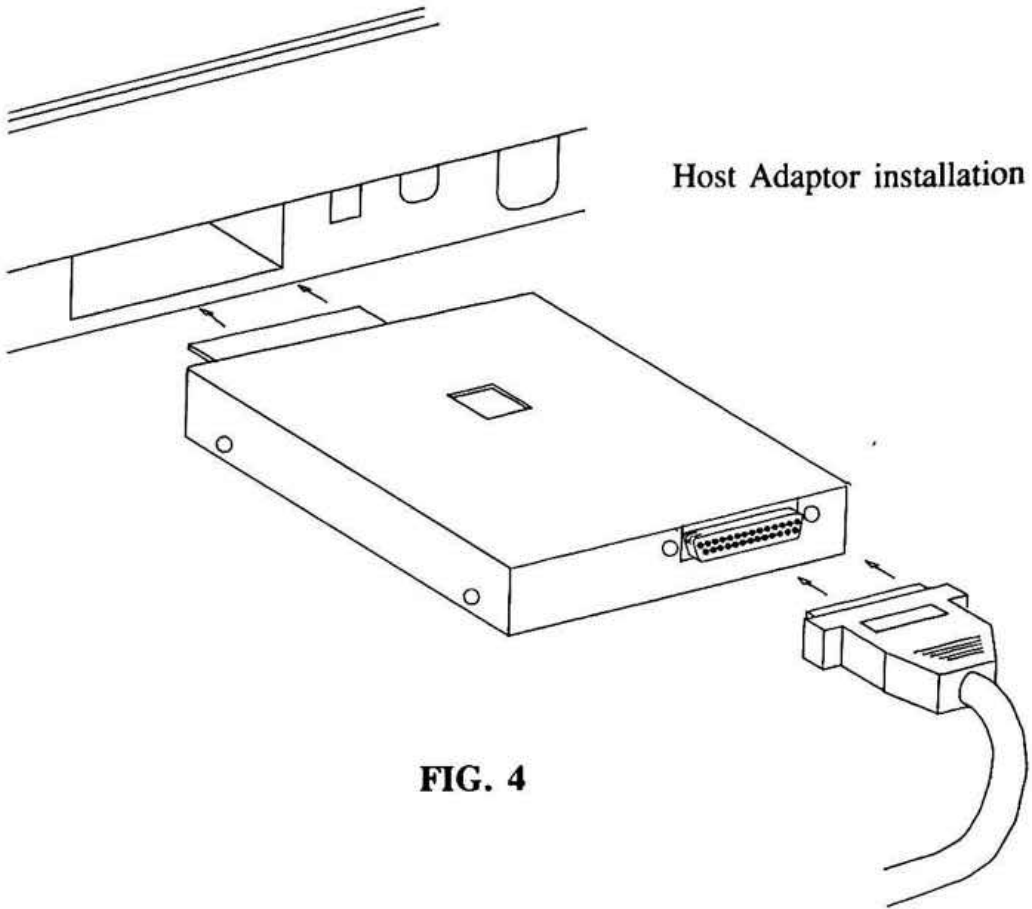
Host Adaptor installation

FIG. 4

Step 6 - Attach remaining end of the 25 PIN SIGNAL cable to the HOST ADAPTOR INPUT connector of the HARD DISK enclosure. Again, secure the cable with the attached screws. Refer to FIG 5.

Step 7 - Locate the AC POWER CABLE and plug female end into the AC POWER receptable of the HARD DISK enclosure. Make sure the Power Switch is in the OFF position and plug the male end into a properly grounded 115 volt AC, 60 Hz outlet. Refer to FIG 5.

Step 8 - Re-connect any other components to your system such as printers, floppy disk and other accessories.

Step 9 - Refer to Power Application Sequence page 2-20.

Rear view of Lt. Kernal hard disk enclosure
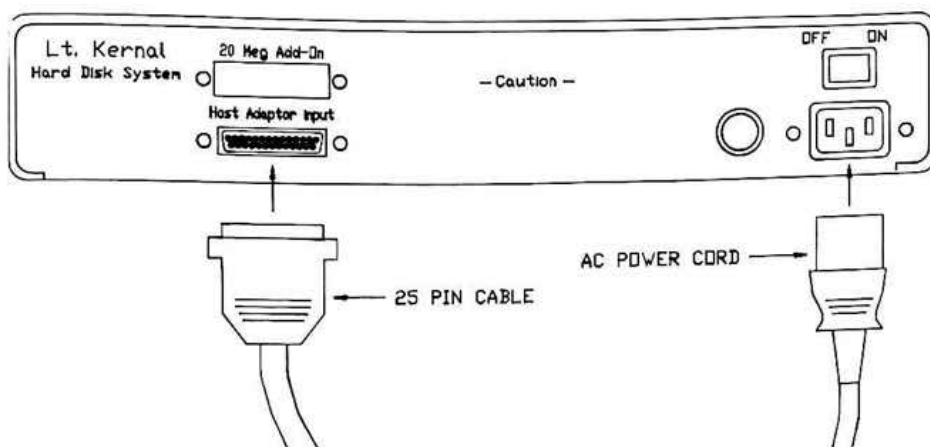
C-128 INSTALLATION

Step 1 - Remove screws on the bottom of the computer case, un-snap the upper keyboard section and carefully unplug the keyboard and indicator LED cables. Place this section aside for now.

Step 2 - Lift the metal shield by removing the TORX screws and un-twisting the metal tabs around the perimeter of the circuit board shield. Lay this shield aside for now.

Step 3 - Locate the C-128 ADAPTOR and lay on top of the SHIELD as shown in FIG 7. CAUTION: Discharge yourself from potential static electricity by touching the metal SHIELD before proceeding to the next step.

Step 4 - Locate chip U7 in FIG 6. Gently remove this chip from its socket by inserting a small flat blade screwdriver as shown and then carefully rotate or twist the blade left and right. DO NOT USE A PRYING ACTION! Once removed, check all pins for straightness, and proceed to next step.

Step 5 - Carefully insert chip U7 into the socket provided on the C-128 ADAPTOR. CAUTION: Be sure PIN 1 of chip matches PIN 1 of socket or indented end of chip matches indented end of socket. Refer to FIG 7.
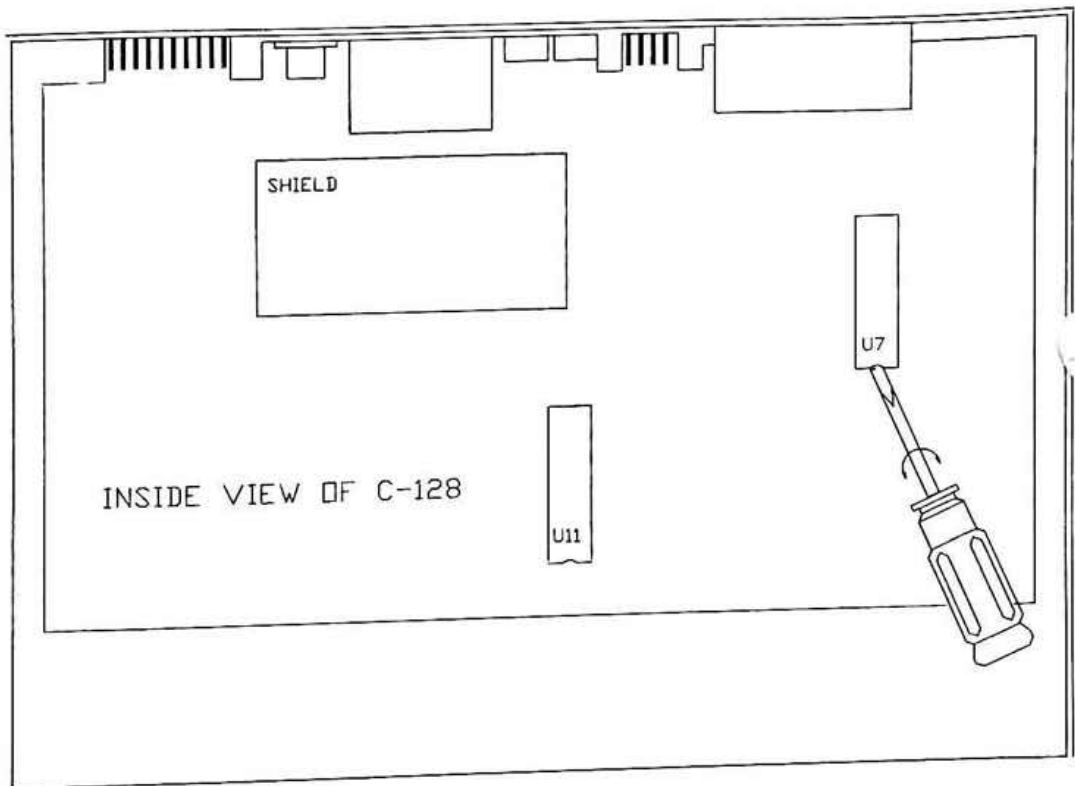
Removal of chip U7 in C-128

SHIELD

INSIDE VIEW OF C-128

U7

U11
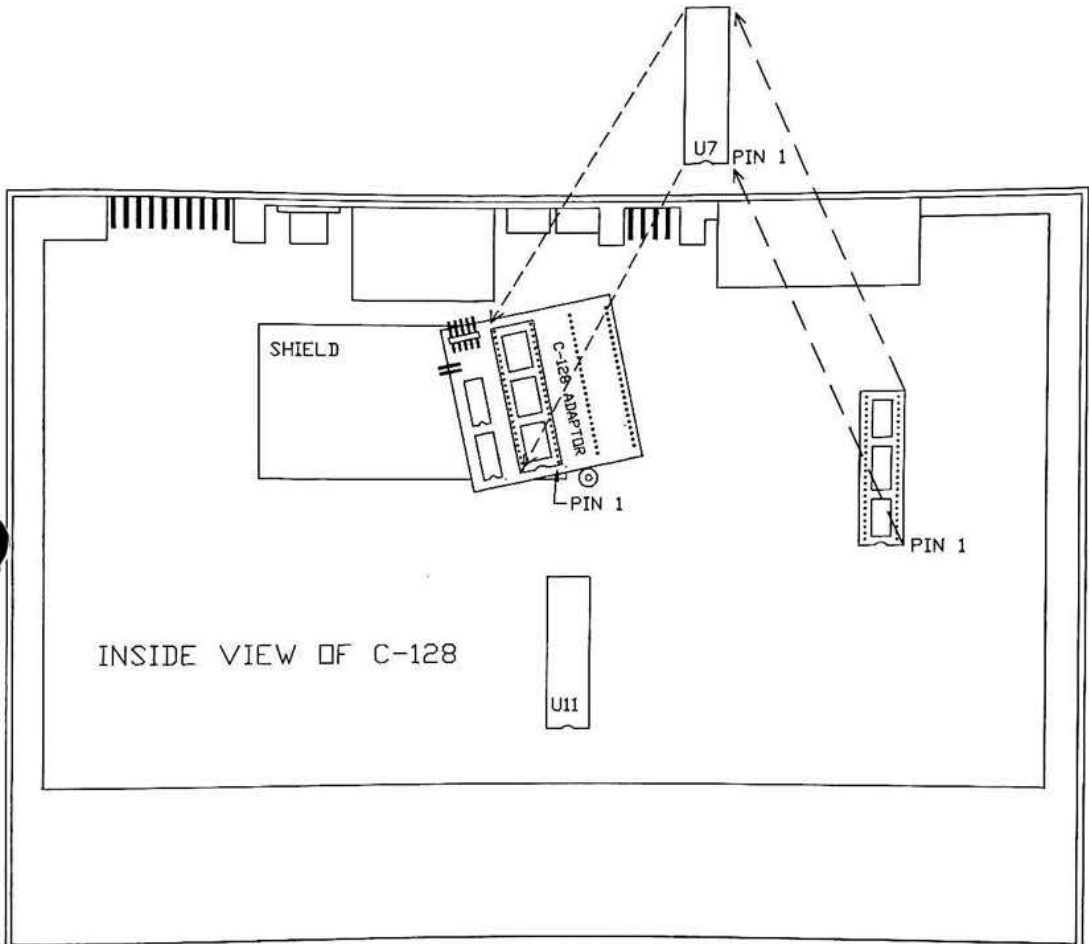
FIG. 6

C-128 adaptor board installation

FIG. 7

C-128 cable connections with Rev C adaptor board

SHIELD

U7 PIN 1

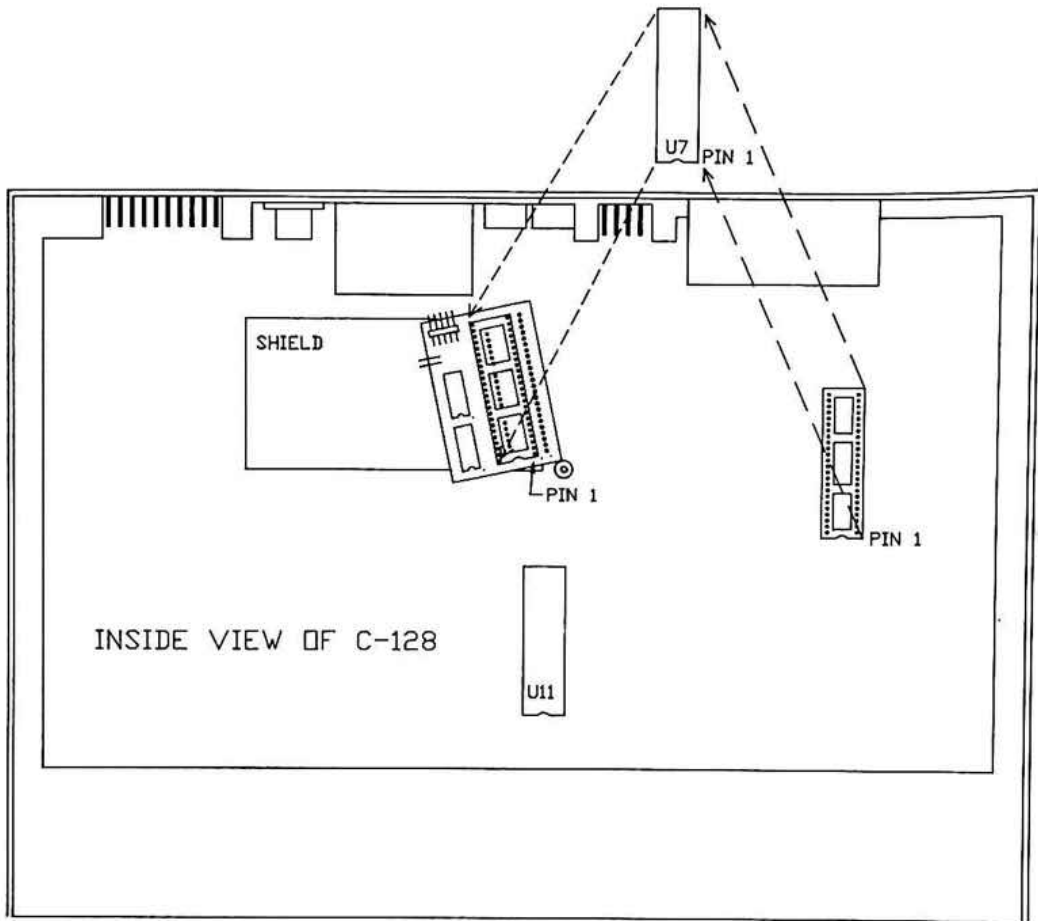PIN 1

PIN 1

INSIDE VIEW OF C-128

U11

FIG 7A

The Rev B and Rev C adaptor boards are functionally identical. They vary only in size. Your Lt. Kernal 128 system may contain either Rev board.

Step 6 - Install the C-128 ADAPTOR into the socket vacated in Step 4 as shown in FIG 8. CAUTION: Make sure pins on the bottom of adaptor board are in their proper positions before firmly seating into place. Press down firmly in the area shown to firmly seat the ADAPTOR board in place.
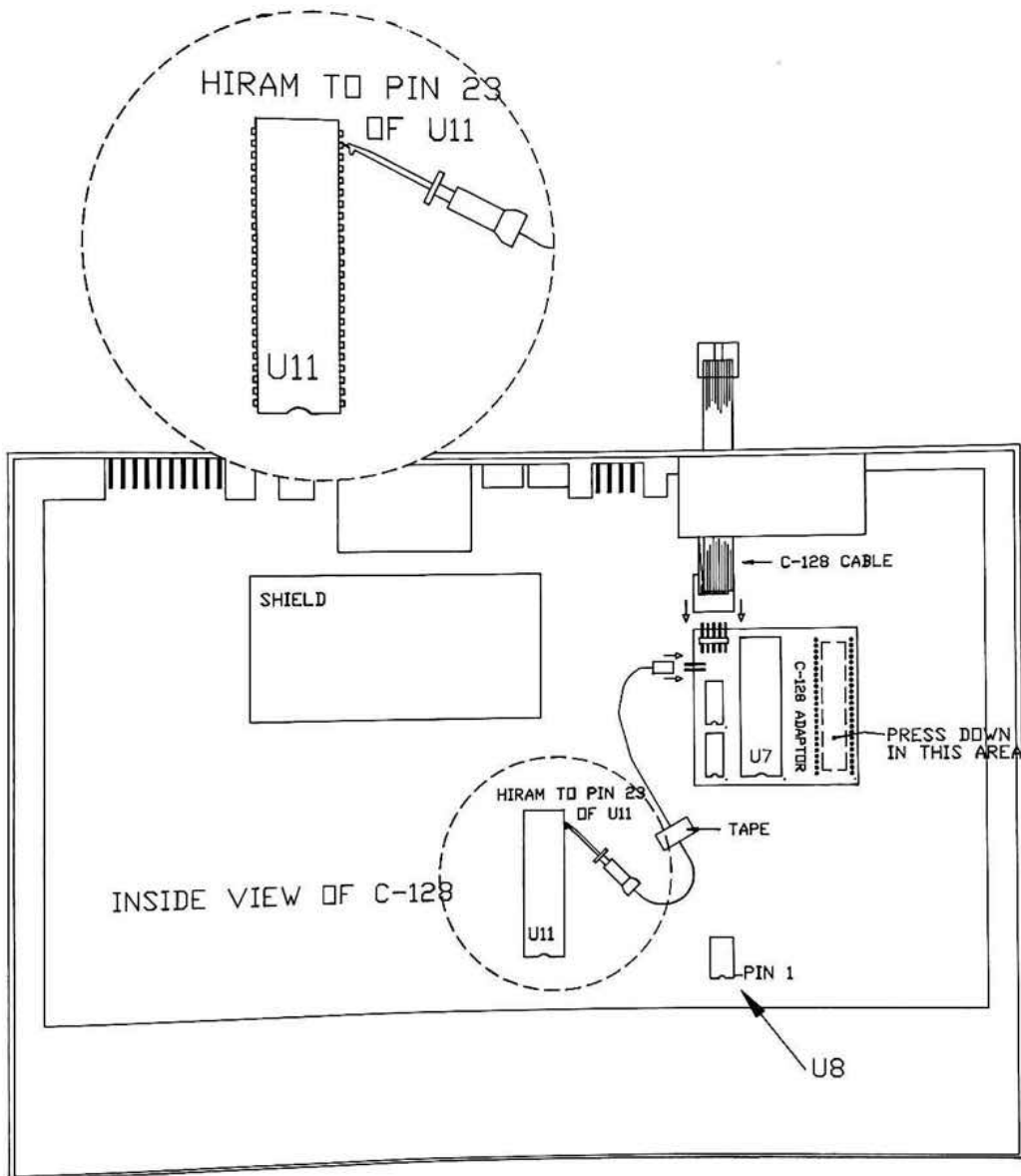
C-128 cable connections

FIG. 8

HIRAM TO PIN 29
OF U11

U11

SHIELD

C-128 CABLE

U7

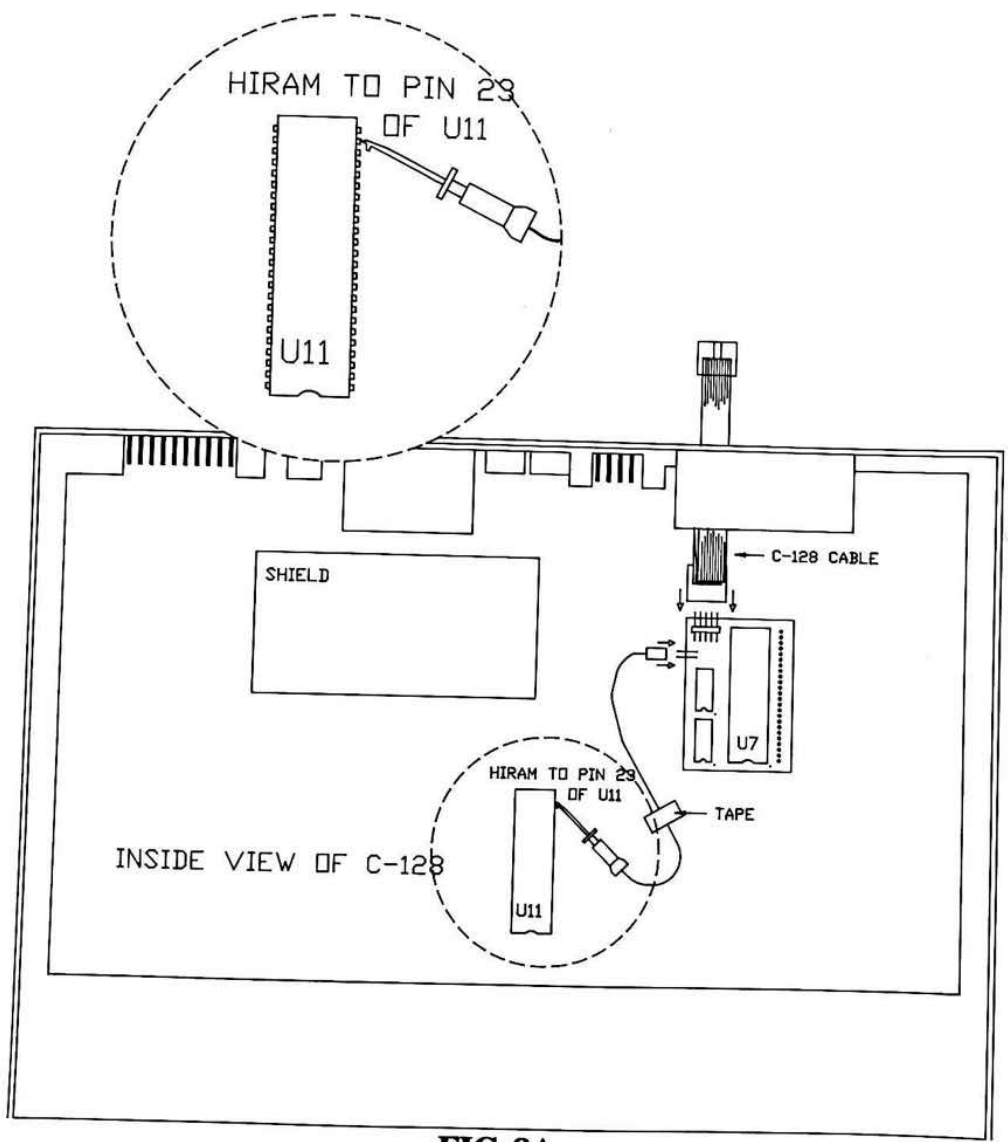HIRAM TO PIN 29
OF U11

TAPE

INSIDE VIEW OF C-128

U11

FIG 8A

Step 7 - Refer to FIG 8 and locate HIRAM CABLE. Clip this cable to PIN 23 of U11 as shown and secure with a piece of scotch tape. Be sure that the clip is not shorting to any of the adjacent pins of Chip U11. Plug the remaining end onto plug P2 of the C-128 ADAPTOR board as shown. (NOTE: The CAEC CABLE is not used in the C-128 installation)

Step 8 - Again refer to FIG 8 and locate the C-128 cable and take either one of the ends and position it so the flat ribbon is coming out of the top side of the connector. Now push this connector onto plug P1 of the C-128 ADAPTOR board as shown making sure all ten pins are properly entering each hole on the socket.

Step 9 - Locate the HOST ADAPTOR and remove the two jumpers on plug P1 as they will not be used in your C-128 installation. Push the remaining end of the C-128 CABLE onto plug P1 again with the flat ribbon coming out on the top side of the connector. The HOST ADAPTOR may now be inserted into the EXPANSION connector on the rear of your C-128. Dress or position the flat cable so it will allow you enough slack to remove your HOST ADAPTOR if necessary. Refer to FIG 9.
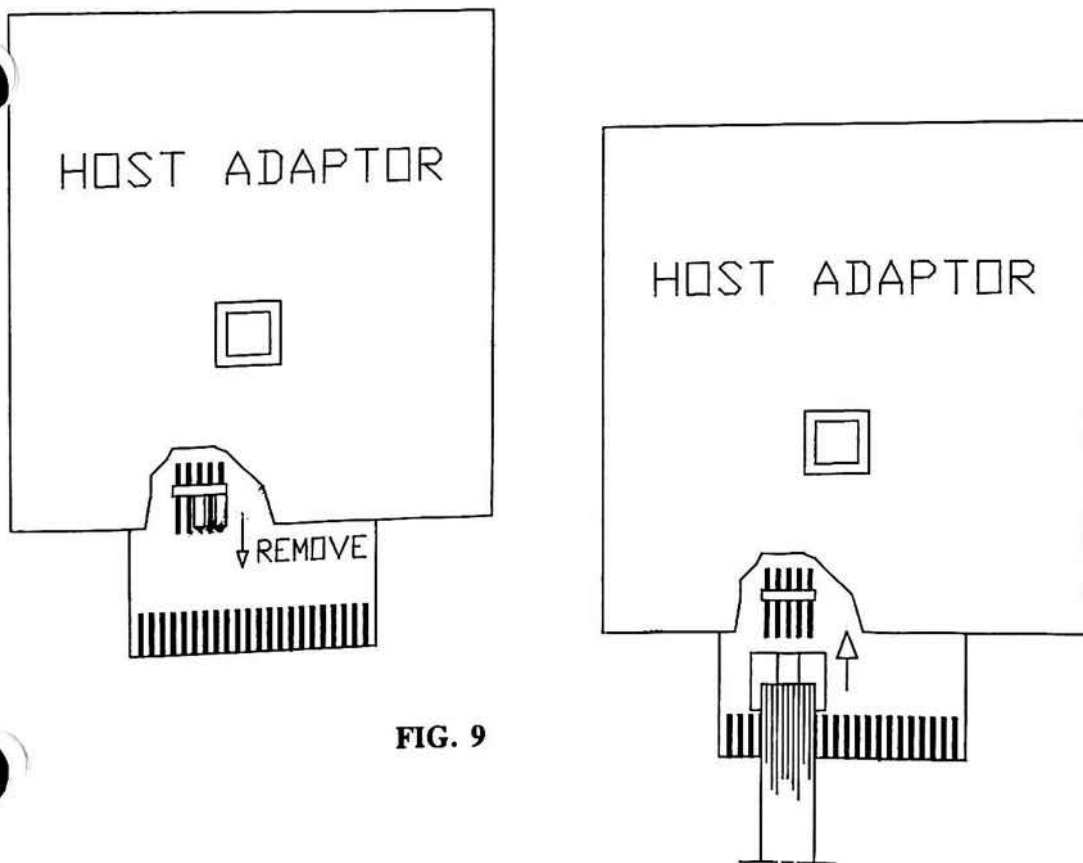
Host Adaptor cable connections for C-128

FIG. 9

Step 10 - Replace the metal shield on the C-128 main board being careful not to pinch or bind the C-128 CABLE.

Step 11 - Install the keyboard sections by re-connecting the cables, snap case halves together, and install bottom screws in case.

Step 12 - Locate the 25 pin SIGNAL cable, plug one end into the connector on the rear of the Host Adaptor and secure the cable with the attached screws. Refer to FIG 4.

Step 13 - Attach remaining end of the 25 PIN SIGNAL cable to the HOST ADAPTOR INPUT connector of the HARD DISK enclosure. Again, secure the cable with the attached screws. Refer to FIG 5.

Step 14 - Locate the AC POWER CABLE and plug female end into the AC POWER receptable of the HARD DISK enclosure. Make sure the Power Switch is in the OFF position and plug the male end into a properly grounded 115 volt AC, 60 Hz outlet. Refer to FIG 5.

Step 15 - Re-connect any other components to your system such as printers, floppy disk and other accessories.

Step 16 - Refer to Power Application Sequence page 2-20.

128D INSTALLATION

Step 1 - Unplug power, keyboard, and all other connections from the 128D computer.

Step 2 - Remove the 2 screws on the bottom and the 3 screws on the back of the computer case. Slide top back and lift up to remove. Place this aside for now.

Step 3 - Locate the 128D Adaptor Board and place it on a firm, flat surface. CAUTION: Discharge yourself from potential static electricity by touching the metal case of the computer before proceeding to the next step.

Step 4 - Locate U7 on the mother computer board. Refer to FIG 10. Gently remove this chip from its socket by inserting a small flat blade screwdriver as shown and then carefully rotate or twist the blade left and right. DO NOT USE A PRYING ACTION! Once removed. check all pins for straightness, and proceed to the next step.

Step 5 - Carefully insert chip U7 into the socket provided on the 128D Adaptor Board. CAUTION: Be sure pin 1 of chip matches pin 1 of socket or indented end of chip matches indented end of socket. Refer to FIG 11.

Step 6 - Install the 128D Adaptor Board into the socket vacated in Step 4 as shown in FIG 12. CAUTION: Make sure pins on bottom of adaptor board are in their proper positions before firmly seating into place.
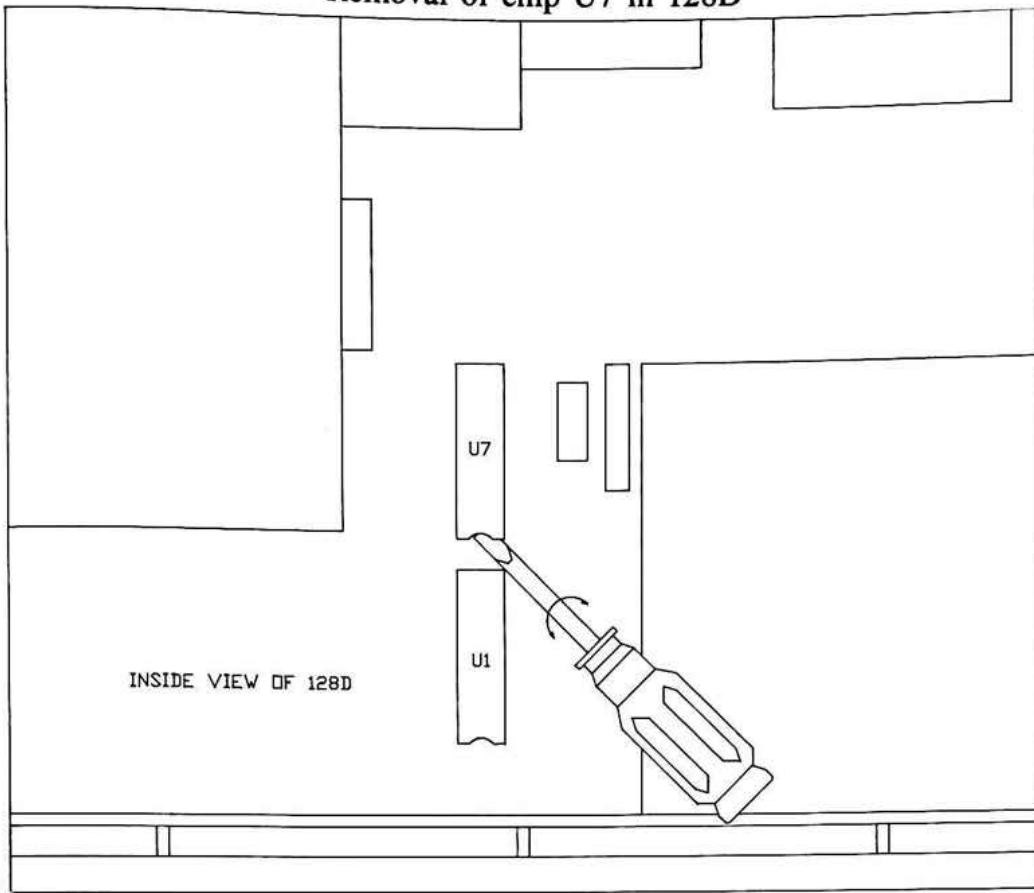
Removal of chip U7 in 128D

U7

U1

INSIDE VIEW OF 128D

FIG 10

128D adaptor board installation

U7

PIN 1
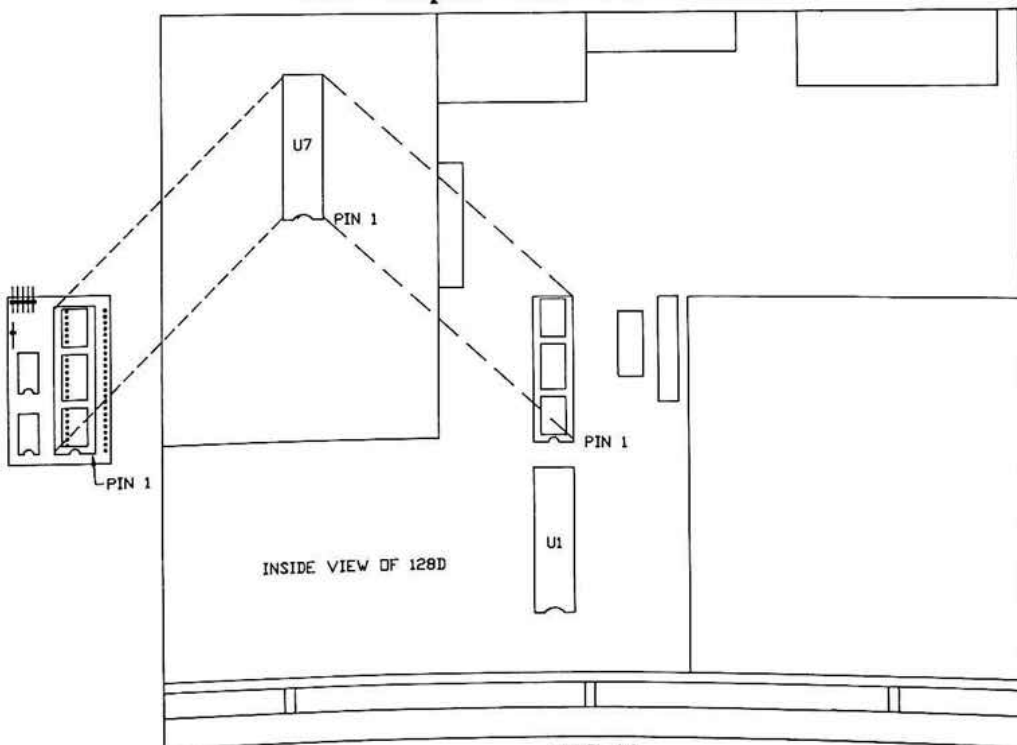
PIN 1

PIN 1

U1

INSIDE VIEW OF 128D

FIG 11

2-13

FIG 12

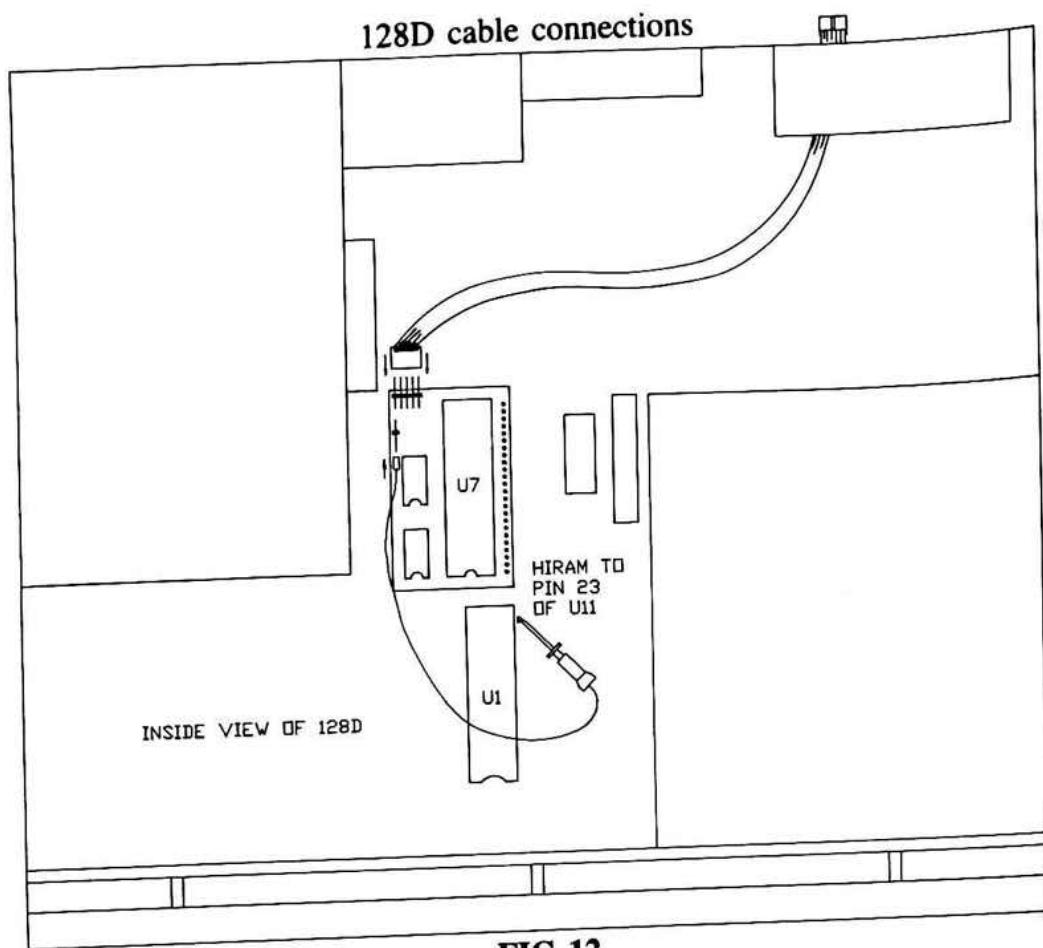**Step 7** - Refer to FIG 12 again and locate HIRAM Cable. Clip this cable to Pin 23 of U11 as shown. Be sure that the clip is not shorting to any adjacent pins of chip U11. Plug the remaining end onto plug P2 of the 128D Adaptor Board as shown. (Note: The CAEC Cable is not used in the 128D installation)

Step 8 - Again refer to FIG 12 and locate the 128 cable. Take either one of the ends and position it so the flat ribbon is coming out of the top side of the connector. Now push this connector onto the plug P1 of the 128D Adaptor Board as shown making sure all ten pins are properly entering each hole on the connector.

Step 9 - Repeat the applicable steps 9 through 16 of the C-128 Installation starting at page 2-11.

Burst Mode Modification

The Lt. Kernal does not support the "FAST" modes of the 1571 drive. If using a 1571 with a 128 computer, you must use the serial cable included with the Lt. Kernal, or else directory listings, programs, etc. will not load without being scrambled. With this cable, your 1571 will operate at the speed of a 1541.

The following steps instruct how to modify your 128 computer to take advantage of the burst mode. If you do not have a need for the burst mode, we suggest that you do not perform this modification. It will VIOLATE your Commodore warranty. If you do not have any technical skills and yet would like to make this modification, we suggest you have a qualified person perform it.

Step 1 - Remove screws on the bottom of the computer case, unsnap the upper keyboard section and carefully unplug the keyboard and indicator LED cables. Place this section aside for now.

Step 2 - Lift the metal shield by removing the TORX screws and untwisting the metal tabs around the perimeter of the circuit board shield. Lay this shield aside for now.

Step 3 - Locate chip U8 on the circuit board. Refer to FIG 13 for the C-128 computer and FIG 14 for the 128D computer. For the C-128, cut pin 9 of U8 and for the 128D, cut pin 13 of U8 as close as possible to the circuit board and CAREFULLY bend the pin upward so that it is parallel to the circuit board. Refer to FIG 15.
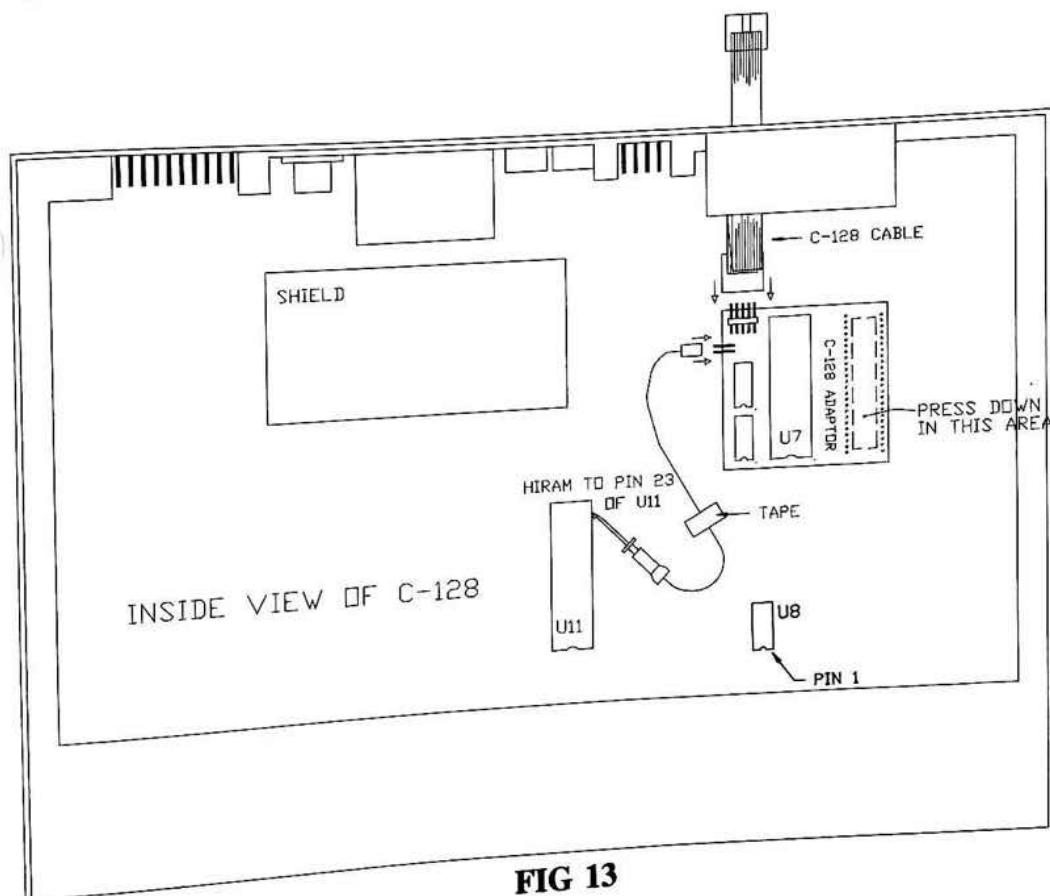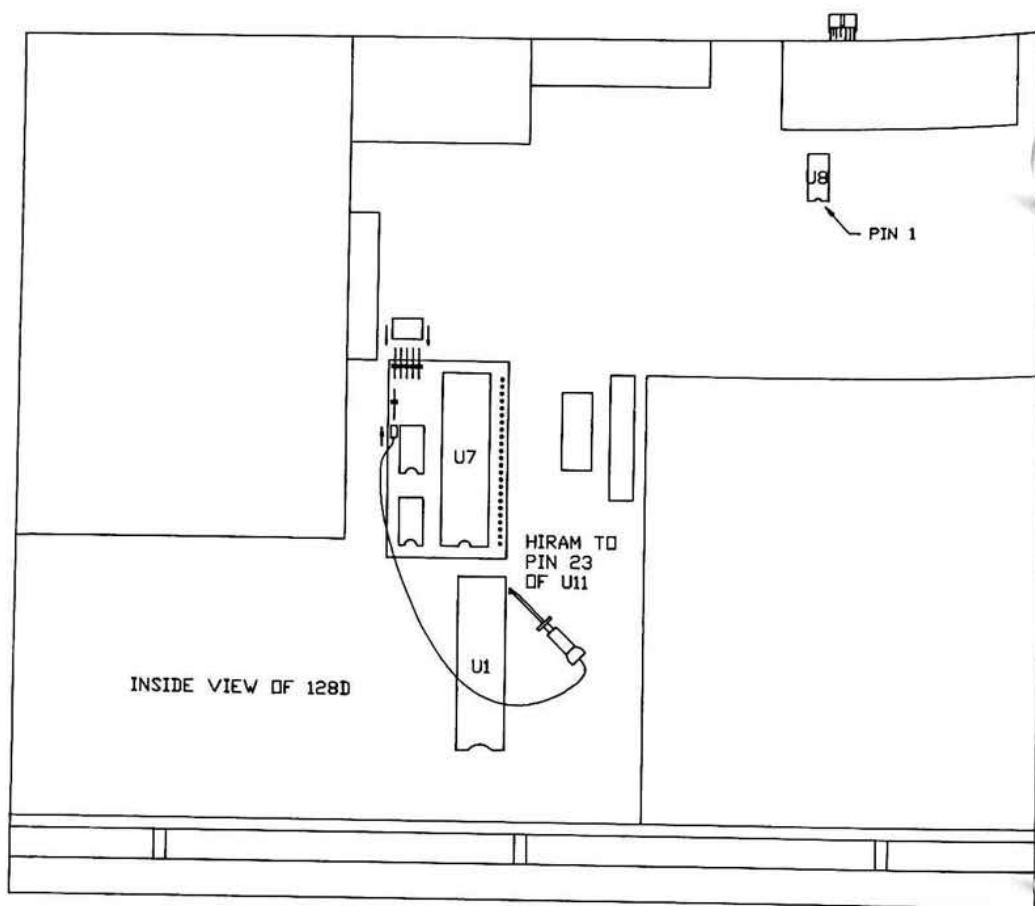

FIG 13

FIG 14

Step 4 - Solder one end of an insulated wire to the pin of U8 modified in step 3. Refer to FIG 16. Be careful NOT to solder bridge adjacent pins of U8.

Step 5 - Locate and unplug the Adaptor Board from the computer circuit board. Carefully remove U7 from the adaptor board. Solder the other end of the wire to the bottom of the Adaptor Board at pin 47 of the U7 socket being careful NOT to solder bridge pin 47 to pin 46 or 48. Refer to FIG 17.

Step 6 - Re-install U7 into the socket. CAUTION: Be sure pin 1 of chip matches pin 1 of socket. Re-Install the Adaptor Board into the computer circuit board making sure pins on the bottom of the adaptor board are in their proper positions before firmly seating into place. Refer to C-128 and 128D INSTALLATION—pages 2-7 through 2-14.

Step 7 - Re-assemble the computer as previously outlined refering to pages 2-7 through 2-14.
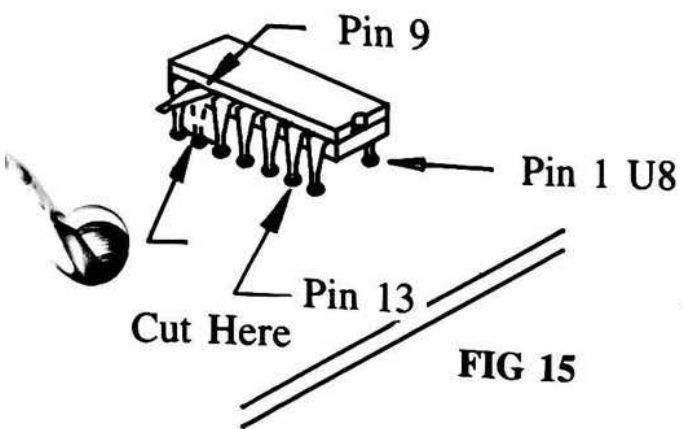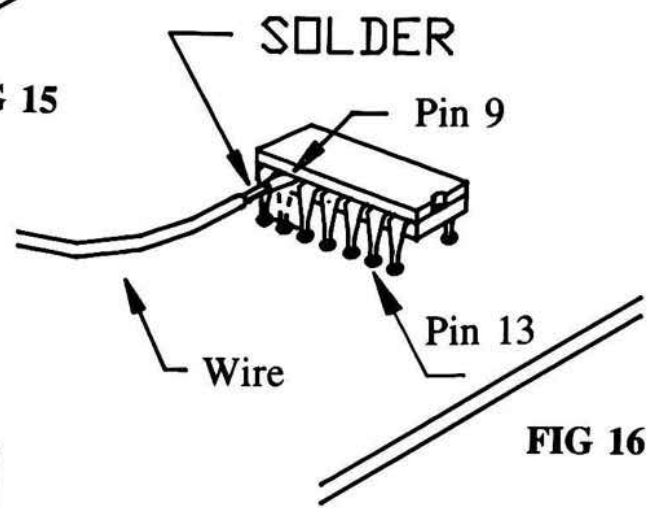
Pin 9

Pin 1 U8

Pin 13

Cut Here

FIG 15

SOLDER

Pin 9

Pin 13

Wire

FIG 16

Socket of U7

Solder

Pin 47

Pin 1

128 Rev. C Adaptor Board
Bottom View

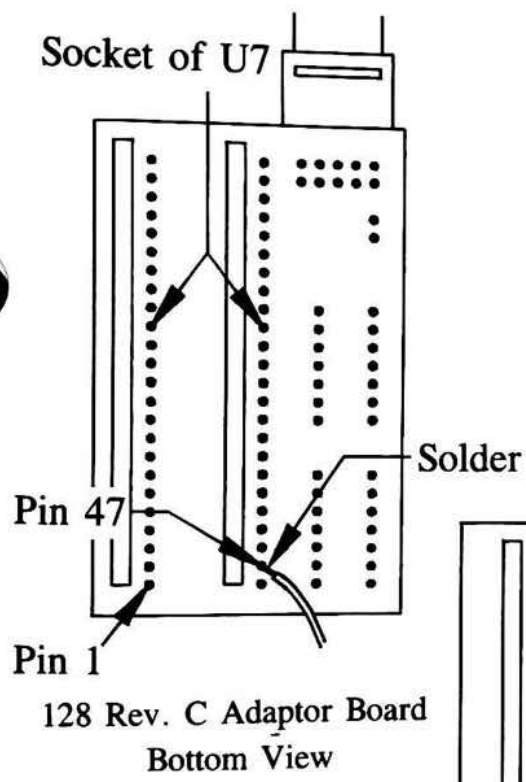**FIG 17**
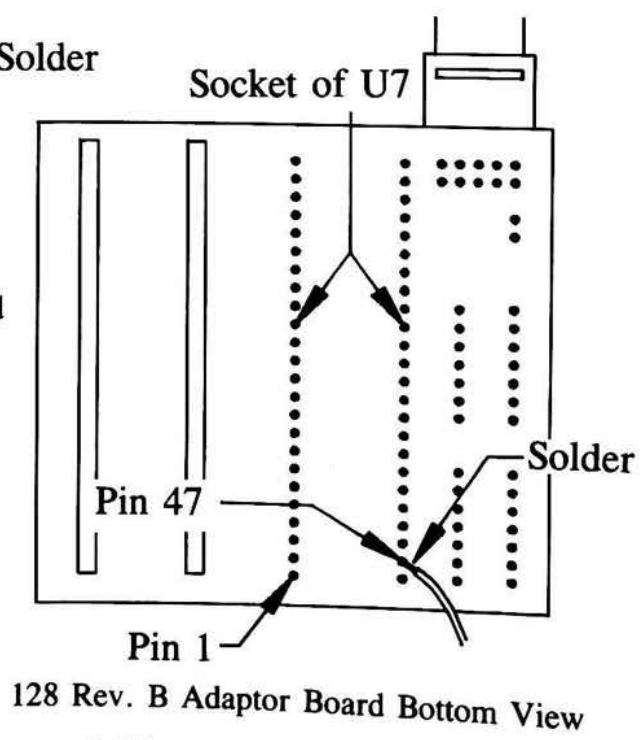
Socket of U7

Solder

Pin 47

Pin 1

128 Rev. B Adaptor Board Bottom View

I/O Modification for CP/M

CP/M operation requires the Host Adaptor to be set for I/O-1. The current version of the Lt. Kernal should already be set for I/O-1. Refer to FIG 18. The current version Host Adaptor (Rev. C) is the only one that has the I/O selectable pins. If you have an older version system, you will have to do a slight modification to the Host Adaptor. Refer to FIGs 19 and 20.
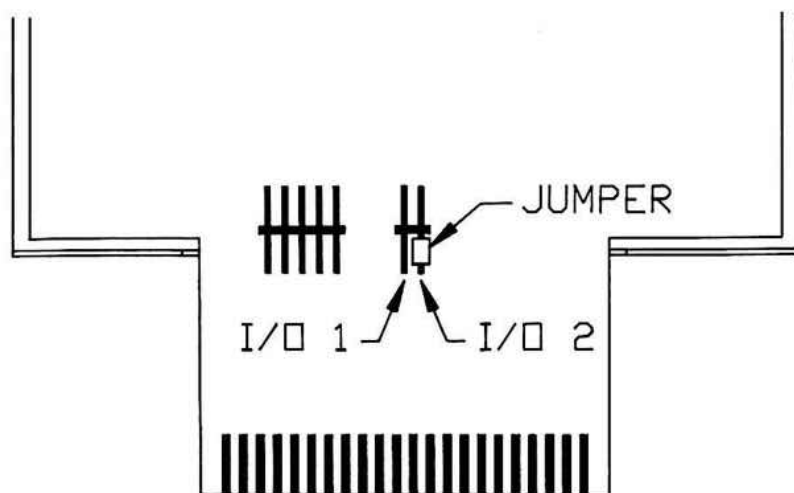

FIG 18
Host Adaptor Rev. C

To select I/O-1, remove the jumper from I/O-2 pins and slide on I/O-1 pins.

The Rev. B Host Adaptor is manufactured to operate in I/O-2 mode. To convert to I/O-1 follow the steps below. If you do not have technical skills, we suggest you have a qualified person perform this modification.

Step 1 - Cut trace on component side of Host Adaptor as shown that connects gold pad 10 with feed through hole.

Step 2 - Solder an insulated wire (approx. 22 ga.) as shown from feed through hole to gold pad 7. Be careful not to solder 'bridge' the wire to any other surrounding pads.
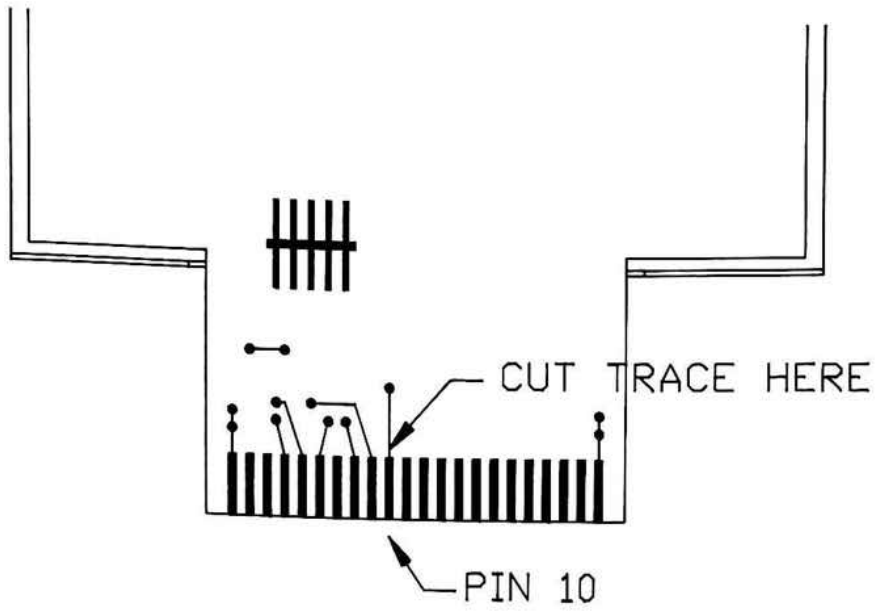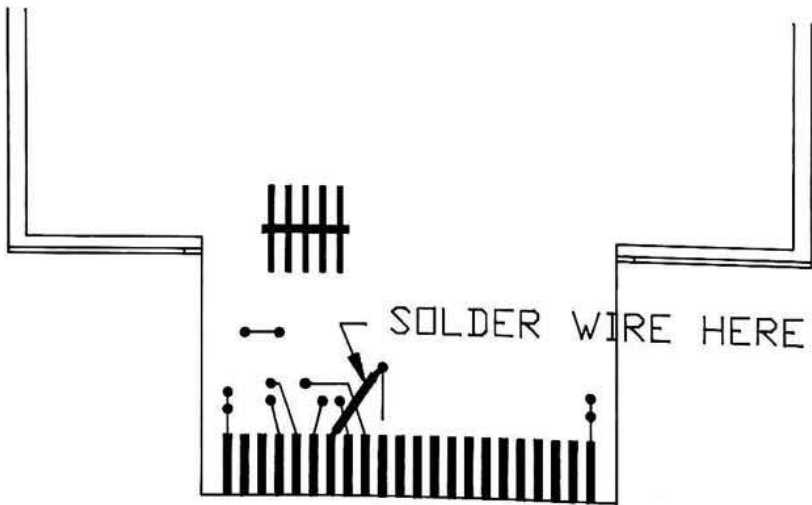
FIG 19
Host Adaptor Rev. B

FIG 20
Host Adaptor Rev. B

POWER APPLICATION SEQUENCE

Power should be applied to your Lt. Kernal/Commodore combination in a specific manner.

Before you do power up your system, please remember that things are going to act a little differently than what you accustomed to seeing, so read this whole section before actually applying power. We want you to know what to expect BEFORE it happens.

Follow the steps in this order:

1. Monitor or television set.
2. Printers, floppy disks, and any other accessories EXCEPT the Lt. Kernel hard-disk.
3. The Lt. Kernal hard disk system.
4. Finally, the Commodore computer itself.

POWER REMOVAL SEQUENCE

1. The Lt. Kernal hard disk system
2. Printers, floppy disks, and any other still powered accessories, including your monitor or TV set.
3. The computer.

Read Section IX before continuing.

A demo program called PXE is located on LU0, USER00, and may be run in the C-64 mode by simply typing PXE and then press the "RETURN" key. Ignore the message "HIT ANY KEY WITHIN 5 SECONDS" or it will take you to an un-documented editor of the demo program. ENJOY!