HEWLETT PACKARD

SERIES 6900 MULTIPROGRAMMERS

HP MODEL 6954A
and
HP MODEL 6944A

USING HP 9000 SERIES 200/300 COMPUTERS

GETTING STARTED GUIDE

for

MODEL 6954A SERIAL 2742A-00101 and UP*
and
MODEL 6944A SERIAL 2726A-01141 and UP*

* For serials above those listed,
a change page may be included.

HP Part No. 06954-90003
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Printing History

New editions of this manual will incorporate all material since the previous edition. Update packages, which may be issued between editions, contain replacement and any additional pages to be merged into the manual by the user.

The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.)

Not all changes to the hardware or software product require manual changes and conversely, manual corrections may be done without any accompanying product changes. Therefore, do not expect a one-to-one correspondence between hardware/software changes and manual updates. With the software revision letters below, the prefix number indicate the versions of each disc that were available at time of issure.

Edition 1 ..... October 1987

For Model HP 6944A Serial 2726A-01141 and up* with Model HP 98633A Serial 2643A-01016 and up*

&

Model HP 6954A Serial 2742A-00101 and up* with Software 06954-60001 Rev. A.01 and up*

* For serial numbers or software revisions above those listed, a change page may be included.

Notice

Safety Symbols

WARNING

The WARNING sign calls attention to a procedure, practice, or the like, which if not correctly performed or adhered to could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION

The CAUTION sign calls attention to an operating procedure, or the like, which, if not correctly performed or adhered to could result in damage to or destruction of part or all of the product or any equipment connected to it. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

MANUAL CHANGES
HP MODELS: 6954A
MANUAL HP P/N 06954-90003
4-4-88

e all corrections in the manual according to ERRATA below, then check the following le for your equipment serial number and enter any listed changes in the manual.

Serial Number		MAKE
REFIX	NUMBER	CHANGES
ALL		ERRATA
742A	00101-00175	1
747A	00176-up	2

ERRATA:

e 1-6. Under "Controller Cards" cification, note that the HP 98633A is luded with the mainframe only.

e 2-3. At bottom of page, add the lowing:

sc Address Switch. The factory default the hard disc HP-IB address is 0. If you t change this for any reason, use the R switch to the left of the cable connec- (see Figure 2-4)."

e A-3. Under "CSUB Kermit", the sentence uld read "This is a null routine that can used to detect if the KERMIT_5 library is rently in memory."

Step 1 of Table A-4, change quirements" to "Configuration".

e A-4. Under "Configuration", after ftware" change the text to read as fol- s: "BASIC 5.0/5.1 and REMCON at HP 6954A; DOS personal computer with KERMIT and HP ANCELINK software as the remote".

CHANGE 1:

the following NOTE on the bottom of page :

NOTE:

"If it is necessary to transport the HP6954A, be sure to park the drive

heads to minimize the possibility of damage to the hard disk. To do this, load and run "PARKHEADS" from the root directory. When the program requests the HP-IB address, enter just the address or the select code + address (e.g., "01", or "701"). Then, wait for the program to finish and follow the instructions on the screen. The heads are automatically unparked whenever the hard disc is accessed.

In Figure 2-12, on page 2-12. add the file "PARKHEADS" next to "lost + found/" in the root directory.

On page one of the index (INDEX-1), under the heading "Hard disc (HP6954)", add "parking the heads.....3-7" as the third subheading.

CHANGE 2:

Your system is now being shipped with Version 5.1 of HP 9000 Series 200/300 BASIC. This does not affect the operation of your HP 6954A or the programs supplied with it (consult your BASIC documentation for the differences between 5.1 and 5.0). Wherever 5.0 is mentioned in this manual, 5.1 also applies.

Page 1-2. change the BASIC documentation list as follows:

Change "Installing, Using, & Maintaining the BASIC 5.0 System" to "Installing & Maintaining the BASIC 5.0/5.1 System"

Add "Using the BASIC 5.0/5.1 System" HP Part No. 98613-90000

Page A-3. Change the first sentence of paragraph A.4.2 to read:

"This file contains three Kermit CSUBs: CSUB KERMIT, CSUB

Ksend (Local_file$, OPTIONAL Remote_file$), and CSUB Kreceive (Local_file$,Sectors)."

. Change the heading "CSUB Ksend (Filenames$)" to "CSUB Ksend (Local_file$, OPTIONAL Remote_File$), and CSUB Kreceive (Local_file$,Sectors)."

. Change the heading "CSUB Ksend (Filename$)" to "CSUB Ksend (Local_file$, OPTIONAL Remote_file$)" and replace the text under it with the following:

"Local_file$ is a variable specifying the name of an ASCII file local to the HP 6954A. If the optional Remote_file$ parameter is not specified, then the remote computer will store the file under the name specified for Local_file$. The optional Remote_file$ is used if a filename other that the default local filename is to be sent to the remote computer. Because the entire Remote_file$ variable is sent, a complete pathname can be used, if desired".

. Change the heading "CSUB Kreceive (Filename$, Sectors)" to "CSUB Kreceive (Local_file$, Sectors)". Replace the heading "Filename$" with "Local_file$" and change the text as follows:

"Local_file$ is a variable that specifies the filename to be used when storing the received file. If the remote computer is to specify the file name, then use a null ("") string for Local_file$.

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Section 1
INTRODUCTION

1.1 WHAT'S IN THIS GUIDE

The purpose of this guide is to help you install and start up the HP 6954A or HP 6944A Multiprogrammer, which are both members of the HP 6900 Series of Multiprogrammer Systems. The HP Model 6954A Multiprogrammer has a built-in HP Model 9000 Series 310 CPU Board with optional keyboard and monitor. The system may be operated from an external remote console or host computer, or may run by itself in a stand-alone configuration. When used as a mainframe the HP Model 6944A requires an external HP Series 200/300 computer as controller. Without the controller, a HP 6944A may be used as an extender with either the HP 6954A or HP 6944A mainframe.

Table 1-1 shows the general procedure that you will follow to install and start up each Multiprogrammer system. Some steps may differ for your specific system, depending on your system configuration. When you have successfully completed the installation, you will go to your *HP 14753A Programming Reference Manual* for details of setting up applications programs. Both the HP 6954A and the HP 6944A require use of the HP 14753A CAT (Computer Aided Test) Programming Package to produce applications software.

1.2 DOCUMENTATION

1.2.1 System Documentation

Table 1-2 lists the documentation that was shipped with your system. You will be refered to these documents as they are needed. The table also lists other documentation that is available (contact you local Hewlett-Packard Sales & Service office).

Table 1-1. General Installation Procedure

HP 6954A MULTIPROGRAMMER	HP 6944A MULTIPROGRAMMER
Hardware	**Hardware**
Install HP 6954A Mainframe	Install HP 98633A Card in Computer
Install Monitor and Keyboard (Optional)	Install RAM in Computer (if required)
Connect Remote Console or Host Computer (Optional)	Install HP 6944A Mainframe
Install HP 6944A Extenders (Optional)	Install HP 6944A Extenders (Optional)
Install I/O Cards	Install I/O Cards
Software	**Software**
Boot BASIC Language System	Load BASIC Language System
Configure the BASIC Language System	Load HP 14753A CAT Software
Start Application Development	Configure the BASIC Language System
	Start Application Development

Table 1-2. Documentation List

Description	HP Part No.
DOCUMENTATION INCLUDED WITH THE SYSTEM	
Multiprogrammer Mainframe:	
Model 6954A/6944A Getting Started Guide (this document)	06954-90003
Model 6954A/6944A Assembly Level Service Manual	06954-90001
Multiprogrammer I/O Card Manuals:	
1 Operating Manual is supplied with each card	
BASIC Documentation (Included with HP 6954A Only):	
Installing, Using, & Maintaining the BASIC 5.0 System	98613-90042
BASIC 5.0 Interfacing Techniques	98613-90022
BASIC 5.0 Programming Techniques (2 Volumes)	98613-90012
BASIC 5.0 Language Reference (2 Volumes)	98613-90052
BASIC 5.0 Graphics Techniques	98613-90032
BASIC 5.0 Condensed Reference	98613-90062
BASIC 5.0 Documentation Guide & Master Index	98613-90072
Computer Documentation (Included with HP 6954A Only):	
HP 9000 Series 200/300 Peripheral Installation Guide (2 Volumes)	97005-90000
Application Software Documentation:	
HP 14753A Programming Reference Manual	14753-90001
HP 14753A Quick Reference Guide	14753-90003
Multiprogrammer Documentation Binder	9282-0972
OTHER AVAILABLE DOCUMENTATION	
Multiprogrammer Applications Notes:	
Data Capture (Note 316-5)	5952-4116
* Introduction to Computer-Aided Test (Note 316-0)	5952-4102
* This note was not written specifically for the HP 6954A/44A systems, but has useful information about measurement techniques and Multiprogammer I/O cards.	
BASIC Documentation:	
BASIC 5.0 CSUB Utility	98613-90095
Computer Documentation:	
HP 9000 Series 300 Computers Configuration Reference Manual	98561-90020

1.2.2 Documentation Reading Path.

You will require other documents besides this guide to get your system up and running. How much other information you need depends on the complexity of your system and your experience with similar systems. Figure 1-1 gives a recommended documentation reading path for a typical a HP 6954A system. Figure 1-2 is the same for a typical HP 6944A system.

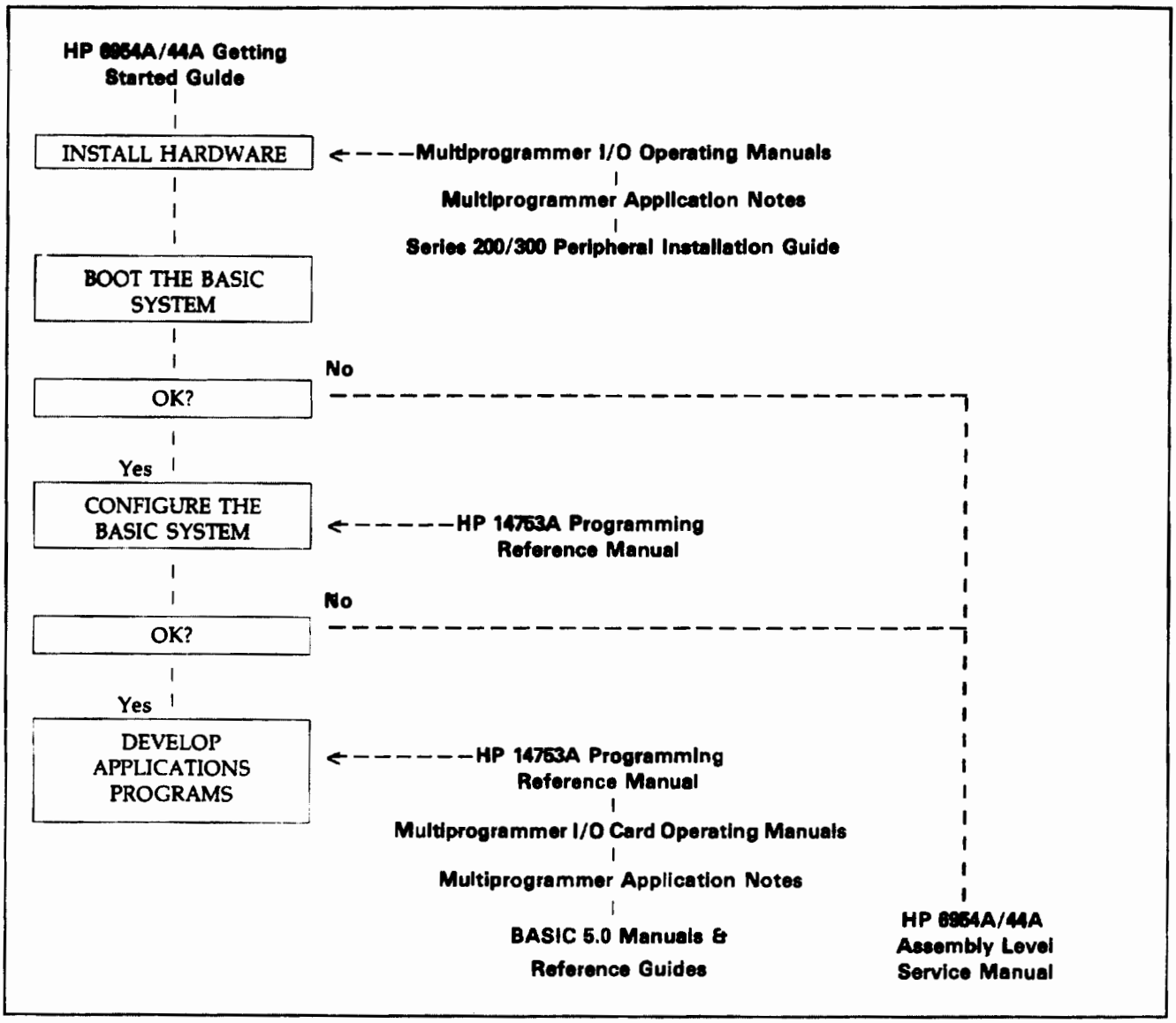


Figure 1-1. Suggested HP 6954A Reader Path

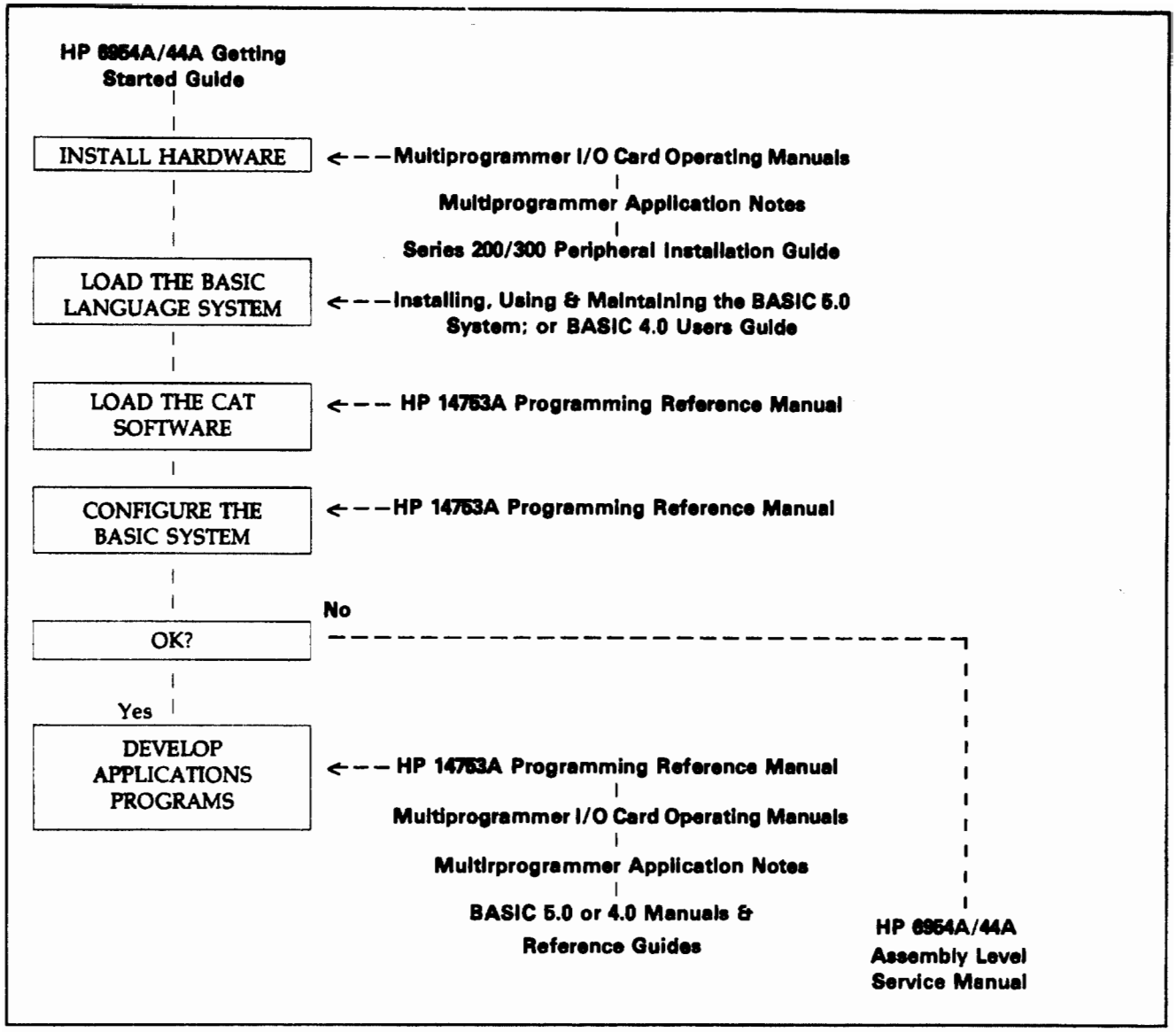


Figure 1-2. Suggested HP 6944A Documentation Path

1.3 SPECIFICATIONS

Table 1-3 lists the specifications for the HP Model 6954A and 6944A Multiprogrammer mainframes, extenders, and their associated controllers. Please note that the performance specifications for a Multiprogrammer I/O card are given in the Operating Manual supplied with the card.

Table 1-3. HP 6954A System Specifications

SYSTEM MAINFRAME

Number of I/O Card Slots: 8

I/O Cards Supported: (Refer to Section 4)

Data Transfer Rate: (With HP 98620B DMA Card)

I/O cards to CPU: up to 220,000 readings/second

I/O cards to external disc: up to 200,000 words/second

I/O cards to internal hard disc: up to 54,000 words/second

Controller: Built-in HP Model 9000 Series 310 CPU Board with 1 Mbyte RAM, HP-IB interface, HP-HIL interface, RS-232-C interface, 520 x 400 bit-mapped monochrome display interface, audio interface, battery-backed clock/calendar, memory management unit.

Controller Cards: 1 HP 98620B DMA Card included. 3 empty DIO card slots for optional Series 200/300 cards.

Hard Disc: Formatted capacity 17.9 Mbytes (less approx. 2.8 Mbytes for installed software), HP-IB interface.

Hard Disc Controller: Disc Controller Board with ON LINE and FAULT LED indicators and volume switch set for single volume configuration.

Controller-CPU Cable: HP-IB cable, HP 10833A (included)

Multiprogrammer Interface: IOFC/BT Board with Select Code switch and frame address jumpers.

Power Supplies: All necessary power supplies for built-in Model 310 CPU Board, HP-HIL keyboard, dedicated Multiprogrammer backplane, up to 4 HP Series 200/300 DIO cards*, and up to 8 Multiprogrammer I/O cards*.

* Number and types of cards depend on their total power consumption. (Refer to Section 4).

Input Power:

100/120/220/240 Vac (switch selectable), +5%, −10%, 47 to 63 Hz, 630 VA (refer to Table 1-5 for line cords)

Operating Temperature Range: 0°C to +55°C

Cooling: Built-in forced air

Dimensions:

177 mm (7 in.) high x 425.5 mm (16.75 in.) wide x 597 mm (23.5 in.) deep

Weight (less I/O Cards):

Net:	26.4 kg (58 lb)
Shipping:	33.6 kg (74 lb)

Software: The following software is supplied on 3-1/2 inch single-sided media and installed on the hard disc.

HP 6954A Remote Console Driver & HP-IB File Transfer Utilities

HP 14753A CAT Software with HP 6954A/44A Diagnostic Utilities

BASIC 5.0 Language System

LOCAL CONTROL KIT (Option 001)

Keyboard: Model: HP 46021A with HP-HIL connecting cable HP 46020-60001

Monitor: Model: HP 35731B 12-inch Monochrome with two RCA type cables HP 45741A

REMOTE CONSOLE (Optional)

Type: Any HP model or HP emulator supported by HP 9000 Series 200/300 BASIC 5.0 Language System

Link: HP 6954A CPU RS-232-C interface. Recommended maximum distance 15 metres (50 ft) unless modem is used

REMOTE HOST COMPUTER (Optional)

Type: Any, from HP Vectra PC to HP 1000

Link: HP 6954A CPU RS-232-C interface or HP-IB port

RS-232-C Cables:

HP Vectra PC – 9-pin interface: HP 24542G (3 metres/9.9 ft)

25-pin interface: HP 13242-60010 (5 metres/16.7 ft)

HP PORTABLE – HP 92221M (1.5 metres/5 ft)

HP Touchscreen PC – HP 13242-60010 (5 metres/16.7 ft)

EXTENDER UNITS (Optional)

Type: Model HP 6944A (refer to Table 1-4 for specifications)

Number: 7, maximum

Link: HP Model 14704X cables (refer to Table 1-4). Maximum total length 9 metres (29.5 ft.)

Table 1-4. HP 6944A System Specifications

SYSTEM MAINFRAME

Number of I/O Card Slots: 16

I/O Cards Supported: (Refer to Section 4)

Data Transfer Rate: (Controller with HP 98620B DMA Card and at least 1 Mbyte RAM)

I/O cards to Controller: up to 220,000 readings/second

I/O cards to disc: up to 200,000 words/second

Controller: Controllers supported depends on version of BASIC Language System as follows:

Language System Controllers Supported

BASIC 5.0 HP 216/217/220/226/236/237/-310/320/330/350

BASIC 4.0 HP 216/217/220/226/236/237

Controller Cards: HP 98633A Multiprogrammer Interface Card included;

HP 98620B DMA Card (optional)

Power Supplies: All necessary power supplies for up to 16 I/O cards.*

* Number and types of cards depend on power consumption. (Refer to Section 4).

Input Power:

100/120/220/240 Vac (switch selectable), +5 %, −10%, 47 to 63 Hz, 650 VA (refer to Table 1-5 for line cords)

Operating Temperature Range: 0°C to +55°C

Cooling: Built-in forced air

Dimensions:

177 cm (7 in.) high x 425.5 mm (16.75 in.) wide x 597 mm (23.5 in.) deep

Weight (less I/O Cards):

Net:	20.9 kg	(46 lb.)
Shipping:	28.6 kg	(62.9 lb.)

Software: The following software is supplied on 3-1/2 inch or 5-1/4 inch single-sided media:

HP 14753A Computer Aided Test (CAT) Programming Package:

The following software is required but not supplied:

HP 9000 Series 200/300 BASIC (5.0 or 4.0) Programming Language System

EXTENDER UNITS (Optional)

Type: The HP 6944A Mainframe can also serve as an Extender Unit.

Number: 7, maximum

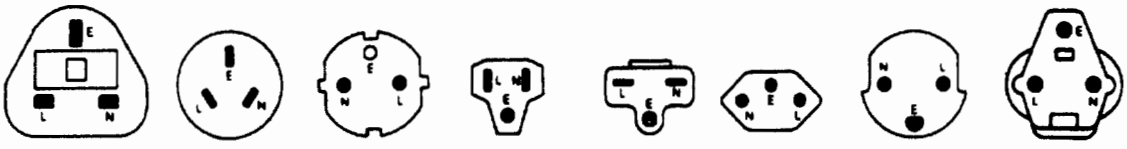
Link: HP Model 14704X cables (refer to Table 1-5). Maximum total length 9 metres (29.5 ft.)

Table 1-5. HP 6945A/44A Common System Components and Options

Mainframe and Extender Line Cords: The following specifications apply to the configurations shown:

Option	Power	HP Part Number
900	250 V, 6 A	8120-1351
901	250 V, 6 A	8120-1369
902	250 V, 6 A	8120-1689
903	120 V, 10 A	8120-1378
904	240 V, 10 A	8120-0698
906	250 V, 6 A	8120-2104
912	250 V, 6 A	8120-2956
917	250 V, 10 A	8120-4211

These drawings represent the wall connector end of the cord.



900 901 902 903 904 906 912 917

Power cords supplied by HP have polarities matched to the power-input socket of the device.

- L = Line or Active Conductor (also called "live" or "hot")
- N = Neutral or identified Conductor
- E = Earth or Safety Ground

Plugs are viewed from connector end. Shape of molded plug may vary.

Extender Interface Cables:

1 metre (3.3 feet)	HP 14704A
2 metres (6.6 feet)	HP 14704B
4 metres (13.2 feet)	HP 14704C

Options: Rack Mount Kit, Option 908
Extra set of system documentation, Option 910

Section 2
ASSEMBLING THE HP 6954A SYSTEM

2.1. INTRODUCTION

This section covers installation and startup of the HP Series 6954A Mutiprogrammer system. Because of the versatility of this computer-based system, there is no single installation sequence valid for all systems. Please read the following paragraphs concerning configurations before going on to the detailed hardware installation procedures.

2.1.1 Typical System Configurations

Figure 2-1 shows the most common system configurations. Use these as a guide for understanding the terminology and procedural steps in this section.

2.1.2 System Assembly Guide

Table 2-1 lists what you must do to assemble the most common system configurations. If your system does not exactly match those in the table, ignore steps that are not applicable.

Table 2-1. Assembly Requirements for Typical Equipment

	HP 6954A Mainframe	HP 6944A Extenders
All Systems		
Connect Disc Controller Board	x	
Install optional DIO cards	x	
Check line voltage switch	x	x
Check line fuse	x	x
Set Frame Address switch		x
Set Logic Ground switch		x
Connect Extender Units	x	
Connect optional peripherals	x	
Install Multiprogrammer I/O cards	x	x
Option 001		
Connect keyboard	x	
Connect video monitor	x	
RS-232-C Console Options		
Check CPU Board switches	x	
Connect console or host computer	x	
HP-IB File Transfer Options		
Check CPU Board switches	x	
Install HP 98624A card	x	
Connect console	x	

2.2 INSTALLING THE MAINFRAME

2.2.1 System Configuration Switches

There are configuration switches on the mainframe and on the cards and boards within the mainframe. Unless instructed otherwise, leave these switches at their factory default setting. If you are instructed to change a switch on a board or card, you will have to pull the board or card out of the Controller Assembly (see Figure 2-2). If needed, refer to your *HP 6954A/44A Assembly Level Service Manual* for disassembly instructions.

CAUTION

All Controller Assembly circuit boards have parts that can be damaged by electrostatic voltages. Use standard anti-static grounding practices when handling these boards.

In order to have an accurate record of your system configuration, please go over the following information and record your final switch settings in Table 2-2. If a switch setting corresponds to the factory setting, put a check mark in the "Actual" column of the table.

CPU Board Switches. These are on a four-section rocker switch located as shown in Figure 2-3 and control the following CPU Board functions:

SC System Controller switch. Determines if board is the HP-IB system controller (address 21) or not the controller. If not the controller, the nominal address is 20, but may be set by software to another value (other than 21).

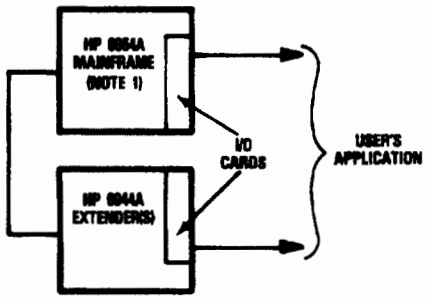
DSP Display switch. Enables or disables board's video display output.

REM Remote switch. Enables or disables board's RS-232-C remote console functions. When remote is enabled, local HP-HIL keyboard input is not disabled.

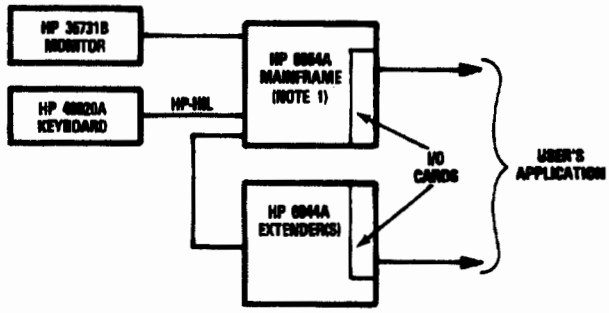
EM Enable Modem switch. Enables or disables board's RS-232-C modem control lines.

NOTE

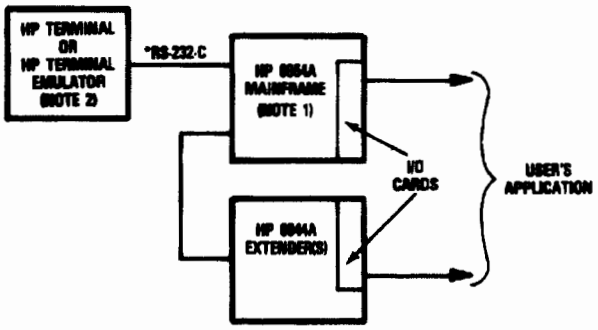
The ROM software boots up the RS-232-C section to the CPU Board at Select Code 9 with an interrupt level at 5. These two parameters are fixed and cannot be changed. The HP-IB section of the CPU Board boots up at Select Code 7 and interrupt level 3, both of which are fixed.



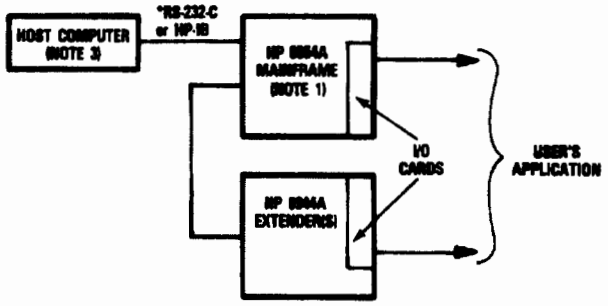
a) Run-Only Mode



b) Local Control Mode (Option 001)



c) Remote Console Mode



d) Remote Host Mode

NOTES:

* Direct line or via modem

1. Vacant RS-232-C and/or HP-IB ports in any configuration are programmable under BASIC and may serve for user I/O functions.
2. Must be a terminal that is supported by Series 200/300 software.
3. Interaction between host computer and HP 6954A will be defined by user's application program.

Figure 2-1. Typical HP 6954A System Configurations

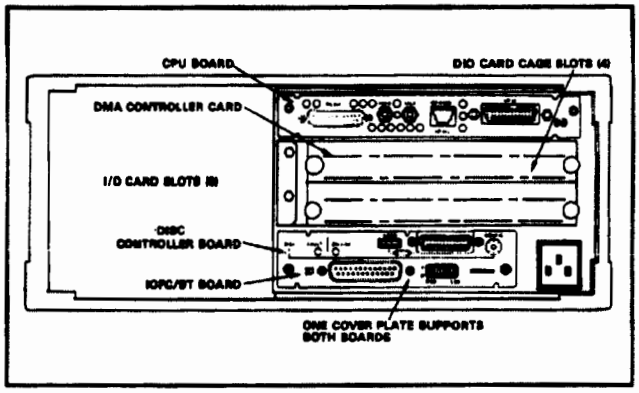


Figure 2-2. Location of Controller Assembly Components

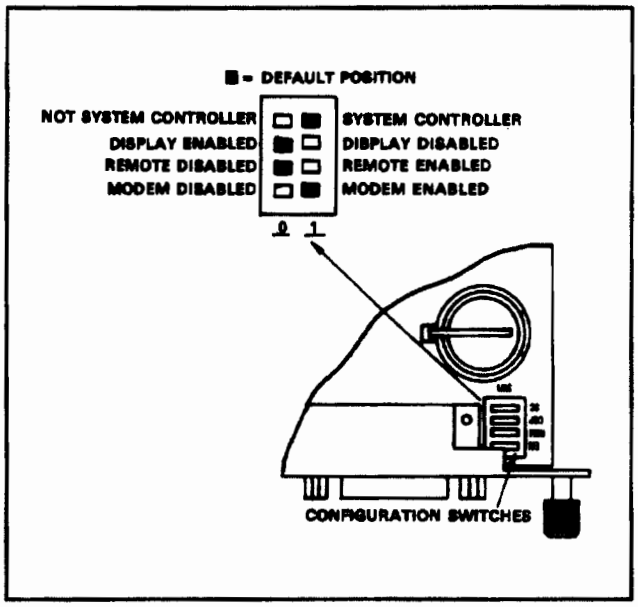


Figure 2-3. CPU Board Configuration Switches.

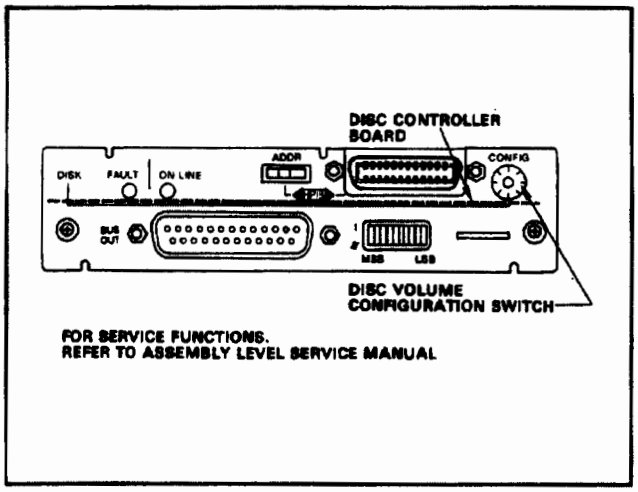


Figure 2-4. Disc Controller Board, Configuration Switch

Table 2-2. Settings of HP 9954A Configuration Switches

Location	Function	Setting	
		Factory	Actual
Chassis	Line Voltage Selection	*	
Chassis	Data Common (not changeable)	Grounded	Grounded
CPU Board	Processor Switches		
	System Controller (SC)	Controller	
	Display	Enabled	
	Remote (REM)	Disabled	
	Enable Modem (EM)	Enabled	
Disc Controller Board	Volume CONFIG	9	
	(Refer to the *HP 9954A/44A Assembly Level Service Manual* for remaining switches on this board)		
IOFC/BT Board	Frame Address	0**	
	Interface Select Code	29	
	Interrupt Priority Level	3	

* Set at factory according to country of destination.
** Not a switch but hard wired (with jumpers) for 0. See the *HP 9954A/44A Assembly Level Service Manual.*

Disc Controller CONFIG. Switch. There is a Disc Volume Configuration switch on the front panel of the Disc Controller Board (see Figure 2-4). This rotary switch defines the hard disc partitioning as listed in Table 2-3. In order to protect the software already installed on the hard disc, the system is shipped with the switch set to 9. If you want to reformat the disc, change the switch to the appropriate setting.

CAUTION

If you reformat the disc, then you must reinstall all the software from your master discs (refer to "Disc Configuration Problems").

Table 2-3. Hard Disc Volume CONFIG.

Switch Setting	No. of Volumes	Volume Sizes (MBytes/Volume)					
0	Permits reformatting the volumes that presently exist on the disc.						
1	1	20.12					
2	2	10.06			10.06		
3	3	3.01		3.01		14.1	
4	4	5.03	5.03		5.03	5.03	
5	2	5.03			15.09		
6	6	3.35	3.35	3.35	3.35	3.35	3.35
7	2	3.01	17.11				
8	Write protects Volume 1 and prevents formatting the disc						
*9	Prevents formatting the disc						

* Factory setting.

IOFC/BT Board Switches. The board has two configuration switches (see Figure 2-5) that are explained here. The mainframe address does not have a switch but is jumper wired for 0. In the unusual case of a system that cannot operate with the HP 6954A at 0, the frame address can be changed via the address jumpers (refer to the *HP 6954A/44A Assembly Level Service Manual).*

a. **Select Code Switch** sets the Multiprogrammer interface Select Code. Use this switch to change the code if 29 is not available for this interface. To access this switch, pull the Disc Controller—IOFC/BT boards subassembly slightly out of the Controller and reach in from the left side of the IOFC/BT Board.

NOTE

The IOFC/BT Board occupies twice the I/O memory space normally alloted to a Select Code address. This means you cannot use the next higher Select Code for another card. For example, if you leave the card at Select Code 29, you cannot assign any other card to Select Code 30.

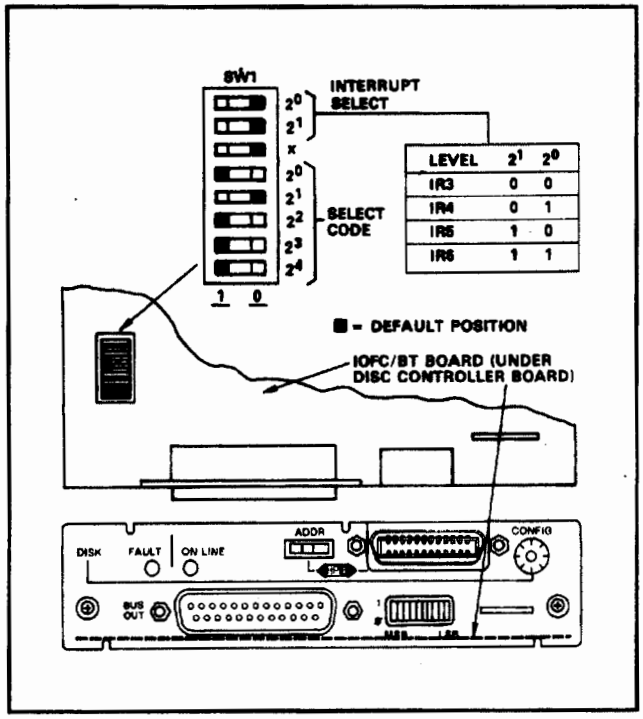


Figure 2-5. IOFC/BT Board, Configuration Switches

b. **Interrupt Select** sets the Multiprogrammer interrupt priority level. Default is the lowest level (3). These switches are on the same switch assembly as the Select Code switches.

Logic Ground Switch. The mainframe chassis has a switch that corresponds to the one used in the HP 6944A mainframe for isolating data common from ground. However, in the HP 6954A *this switch is inoperative* and data common is permanently connected to chassis ground. You cannot isolate data common from chassis ground in the HP 6954A mainframe.

A-C Line Voltage Selection. The mainframe is designed to accomodate mains voltages from 100 to 240 Vac. There are labels located adjacent to the a-c input socket (see Figure 2-6). Make certain that the label with the factory check mark corresponds to your nominal line voltage. *Skip this procedure if* the label agrees with your line voltage.

a. Open the Multiprogrammer front panel by completely loosening the two captive screws and then pulling on them until the panel opens slightly. Next, pull on the right side of the panel until it swings open on its hinge (which is on the left side).

b. Two line voltage select switches are located on the rear of the panel, just to the right of the fan (see Figure 2-6). A Line Selector chart next to the switches shows how to set them for 100 V, 120 V, 220 V, or 240 V nominal input. Set the switches to the proper voltage.

c. Close the front panel and tighten the two captive screws. Go on to the next procedure.

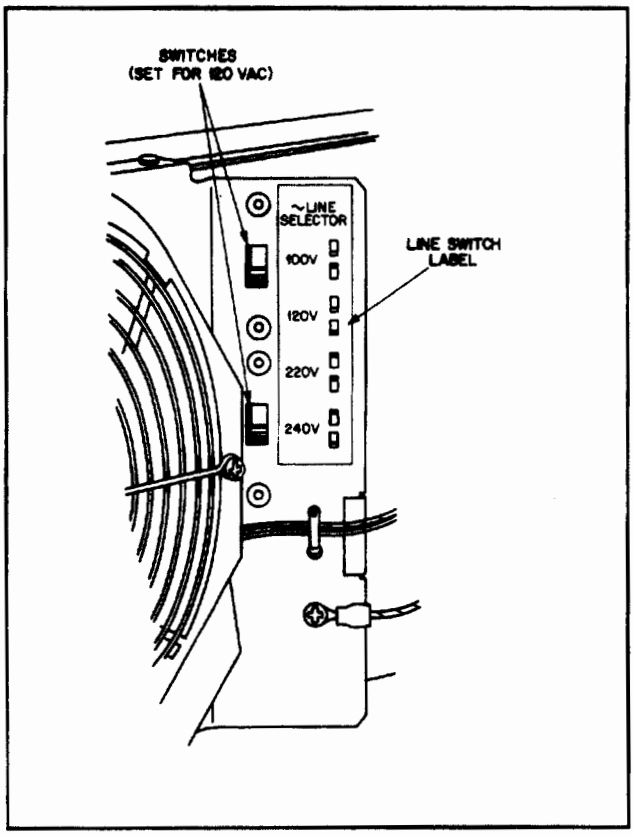


Figure 2-6. Line Voltage Selector Switch.

2.2.2 Installing DIO Cards

The HP 6954A Controller Assembly has a HP 98620B DMA card installed in slot 1 of the DIO card frame. If you have a remote station using HP-IB file transfers, then you must also install a HP-IB card (HP 98624A) in the card cage. The remaining DIO slots may contain any Series 200/300 compatible card. Cards with cover plates must be installed in slot 2 or 4, while those without plates may be installed in any available slot.

NOTE

Use the "Final" columns in Table 2-4 to keep track of the Select Codes and HP-IB addresses in the system.

Observe the following restrictions concerning DIO cards:

a. The optional HP-IB cards are set at the factory for Select Code 8 and Interrupt Level 3 (HP 98624A) or Select Code 14 and Interrupt Level 6 (HP 98625B).

b. Select code 29 is reserved for the Multiprogrammer interface. If you are installing a card that must use code 29, then you must change the select code on the IOFC/BT Board (see Figure 2-5).

c. Any DIO cards installed, together with Multiprogrammer cards installed, must remain within the capabilities of the mainframe power supplies. In general, you are limited to a maximum of 5 watts per slot. For help in making a power budget analysis, refer to Section 4 "Installing Multiprogrammer I/O Cards".

Table 2-4. System Component Select Codes & Addresses

Board or Card	Select Code		HP-IB Address	
	Factory	Final	Factory	Final
* Multiprogrammer Interface	29			
** Hard Disc Interface			0	
CPU Board RS-232-C Port	9	9		
CPU Board HP-IB Interface	7	7	21	
*** HP 9122D Microfloppy Disc Drive			0	
*** HP 98624A HP-IB Card	8		21	
*** HP 98625B HP-IB Card	14		30	30

* IOFC/BT Board
** Disc Controller Board
*** Optional hardware not included with system

2.2.3 Checking Power Connections

CAUTION

Do not apply power to the mainframe until you reach the paragraph "Starting Up the HP 6954A System".

Before plugging the line cord into the a-c mains, be sure that you have checked that the Line Voltage Selector switch setting corresponds to your nominal line voltage. Then, do the following checks:

a. **A-C Line Fuse.** The line fuse is in a fuseholder located just below the a-c input socket (see Figure 2-7). Use a screwdriver to extract the fuseholder from underneath the a-c socket. Check that the fuse (and the spare inside the fuseholder cover) has the following value:

100/120 Vac Input	6.3 Amperes
220V/240 Vac Input	3.15 Amperes

If the value is correct, replace the fuse and fuseholder. If the fuse value is wrong, refer to the *HP 6954A/44A Assembly Level Service manual* for the part number of the correct fuse.

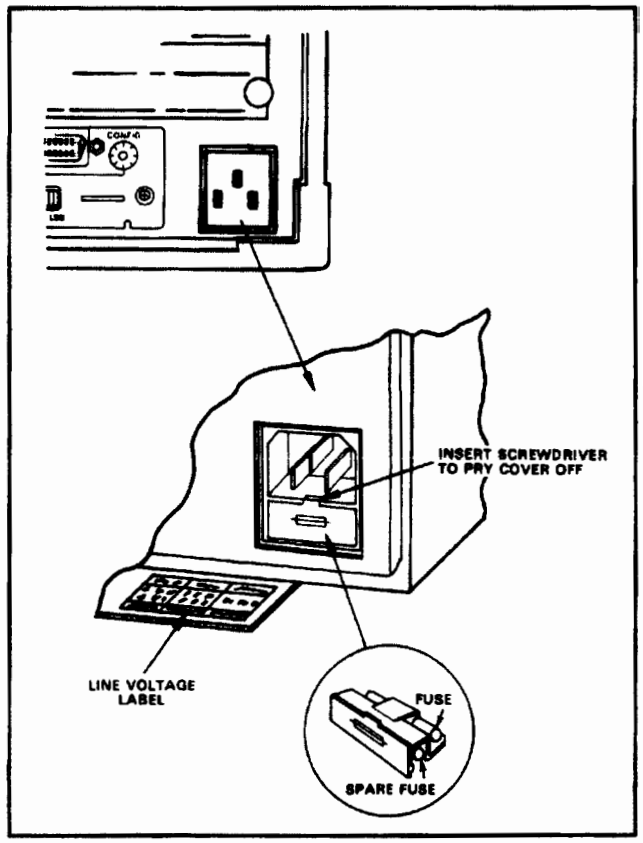
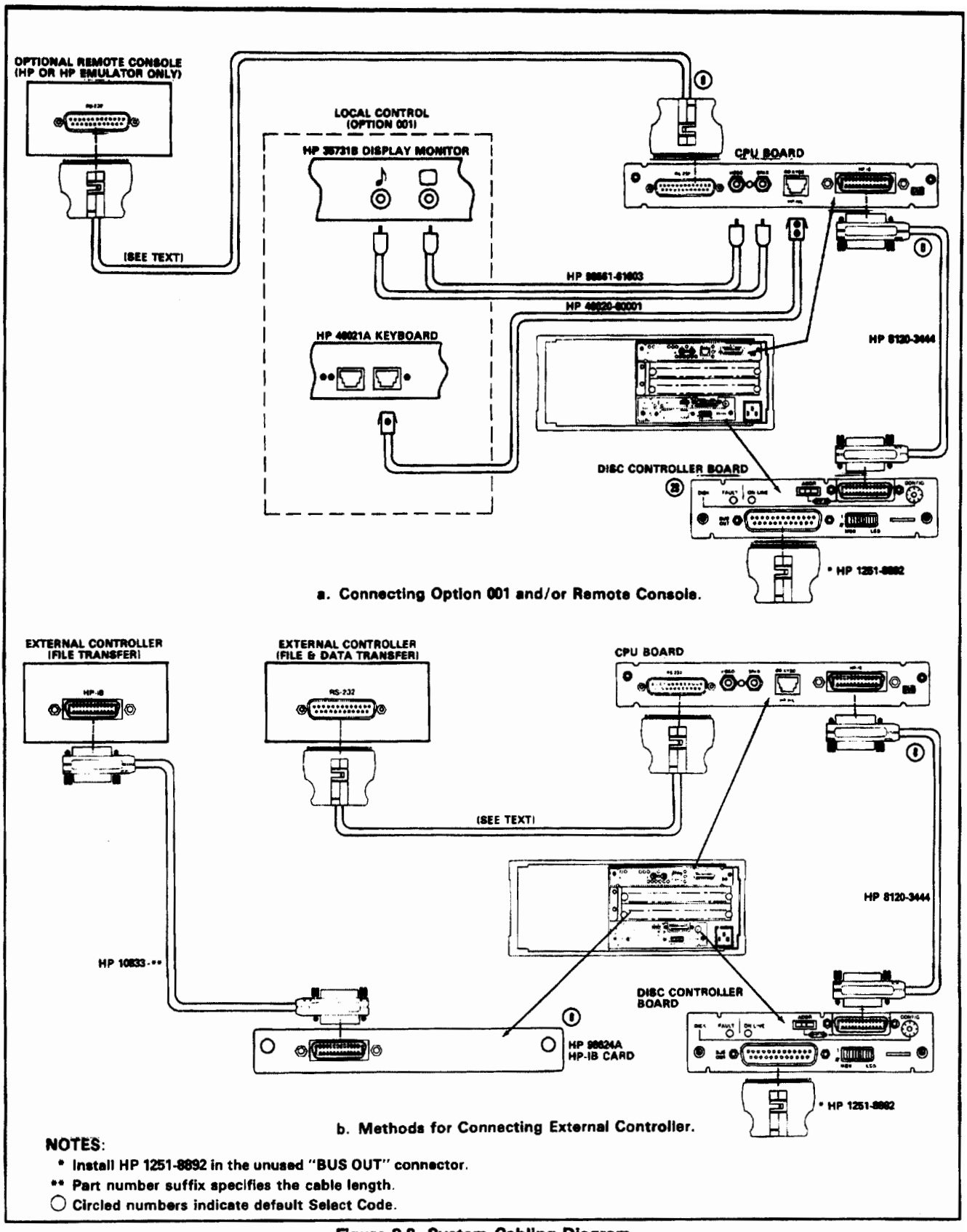


Figure 2-7. Removing the Line Fuse.

b. **A-C Power Cord.** Your mainframe was shipped with a power cord designed for the type of outlet used at your location (see Table 1-5). The table includes the HP part number and order option for each type of cord. If the appropriate power cord was not shipped with your mainframe, contact your nearest HP Sales and Service office to obtain the correct cord.



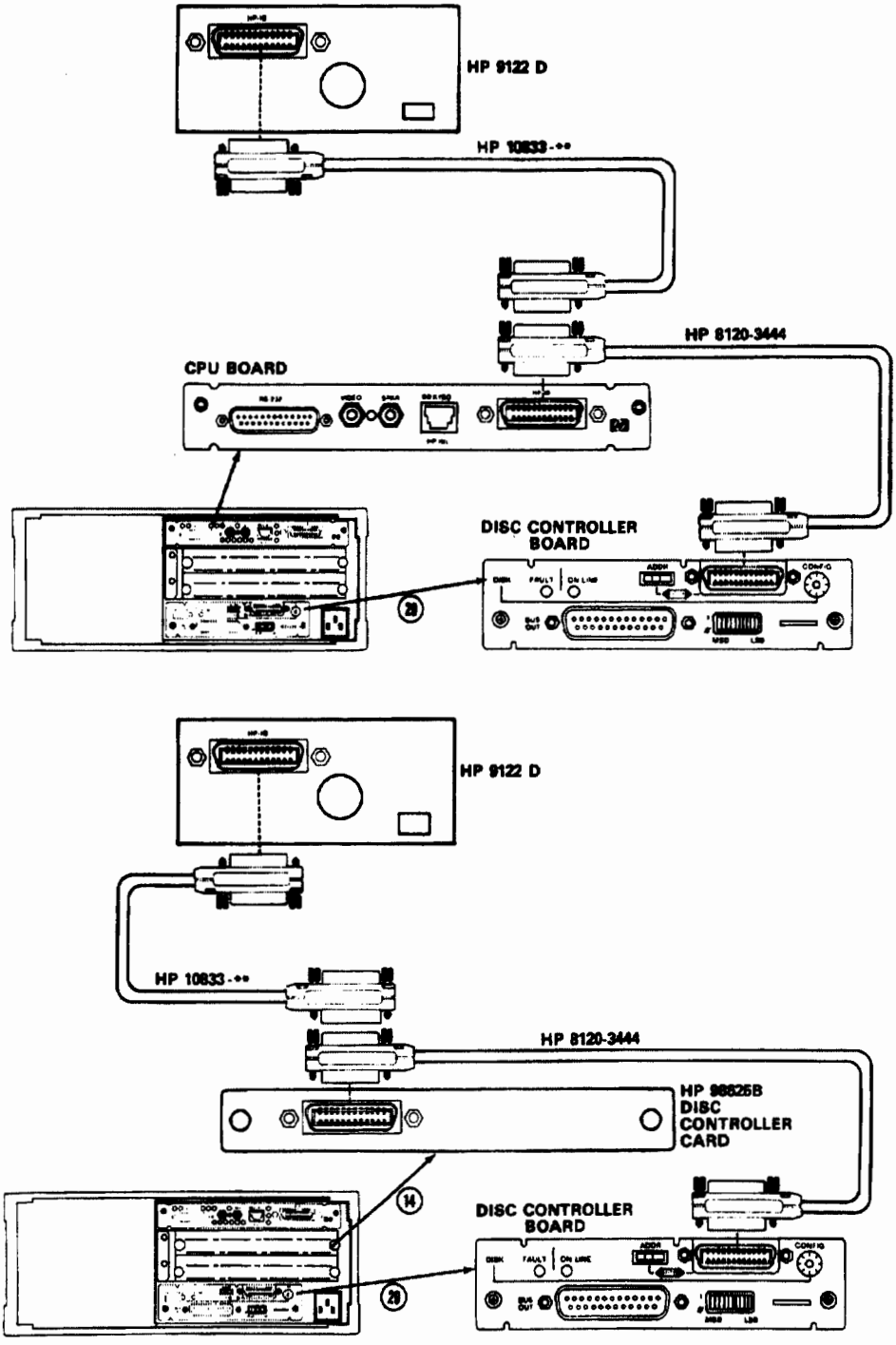
NOTES:

* Install HP 1251-8892 in the unused "BUS OUT" connector.

** Part number suffix specifies the cable length.

○ Circled numbers indicate default Select Code.

Figure 2-8. System Cabling Diagram



c. Methods for Connecting Flexible Disc Drive.

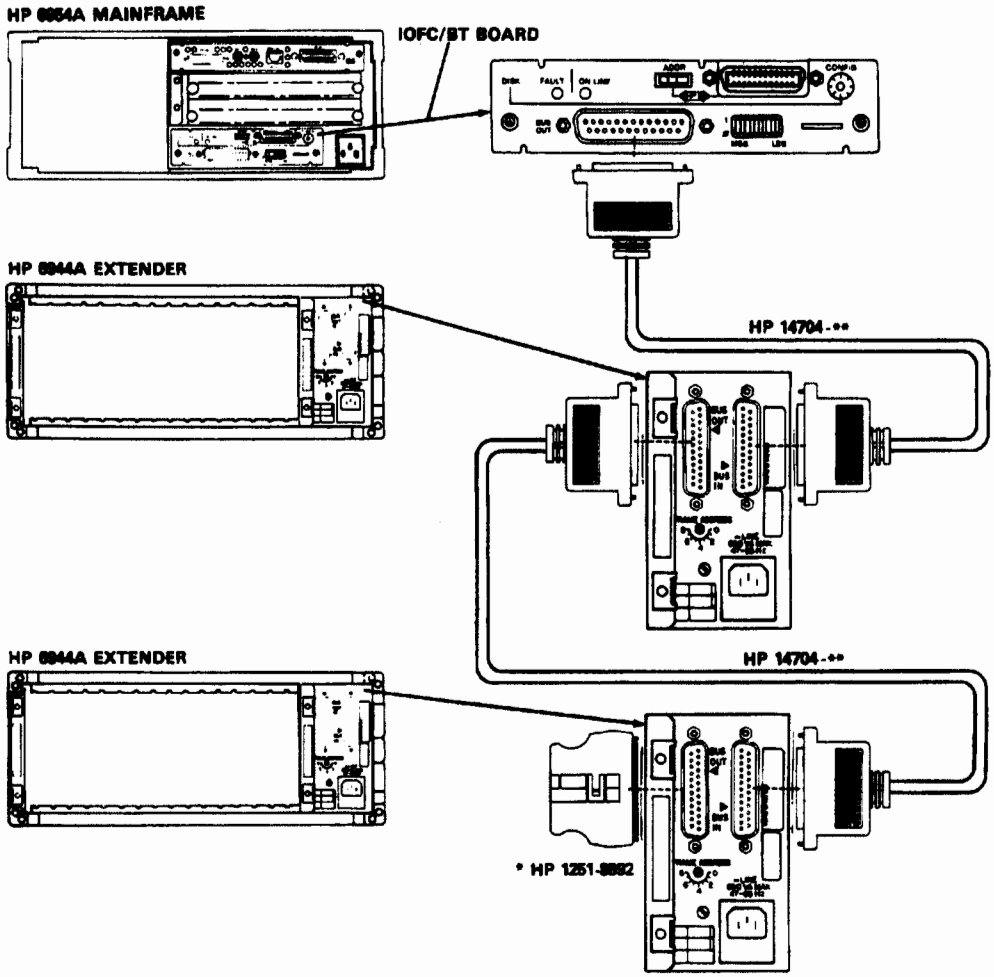
NOTES:

* Install HP 1251-8892 in the unused "BUS OUT" connector.

** Part number suffix specifies the cable length.

○ Circled numbers indicate default Select Code.

Figure 2-8. System Cabling Diagram (Cont'd.)



d. Connecting Extender Units.

NOTES:

* Install HP 1251-8892 in the unused "BUS OUT" connector.

** Part number suffix specifies the cable length.

○ Circled numbers indicate default Select Code.

Figure 2-8. System Cabling Diagram (Cont'd.)

WARNING

The cord was designed to supply a chassis ground through a third conductor. Be certain that your power outlet is of the three—conductor type with the appropriate receptacle pin connected to earth ground.

2.2.4 Connecting the Disc Controller Board

If you are using the HP 98625B Disc Controller Card, skip this step. Otherwise, use the HP-IB cable shipped with the system (see Table 1-3) to connect the HP-IB ports of the Disc Controller and the CPU Board (see Figure 2-8a).

2.3 CONNECTING EXTERNAL DEVICES TO THE COMPUTER

There are numerous external devices that may be used with the Model 310 computer. These include microfloppy disc drives, printers, plotters, consoles, and even host computers (consult your *Series 200/300 Peripheral Installation Guide* for more details).

2.3.1 HP 46021A Keyboard (Option 001)

This is an HP-HIL device that is supplied with a connecting cable. No address is required. Connect the keyboard as shown in Figure 2-8a.

CAUTION

The HP-HIL device plugs and sockets are not all the same. You can damage the equipment by forcing a plug into the wrong socket. Follow the installation diagram carefully.

2.3.2 HP 35731B Display Monitor (Option 001)

The display monitor has a line voltage select switch and two cables for connection to the CPU Board. Refer to Figure 2-8a and proceed as follows:

a. Check that the voltage select switch is set to the same line voltage as that of the Multiprogrammer mainframe.

b. Connect the CPU Board video and audio outputs to the monitor with the cables provided.

CAUTION

The cable ends are not marked. Be careful not to cross the audio and video connections.

2.3.3 HP 9122D Dual Microfloppy Disc Drive

If you want to load your own software to the hard disc, you will need an external microfloppy disc drive. You may use any supported microfloppy, such as the HP 9122D or HP 9122S. To connect the drive, proceed as follows:

a. Check that the drive's voltage switch setting and fuse value are correct (refer to the documentation packed with the drive).

b. Refer to your *Series 200/300 Peripheral Installation Guide* and reset the drive Primary Address switch from 0 to an unused number.

c. If you are using a dedicated HP 98625B disc Controller card, check that its default configuration settings (see Figure 2-9) do not conflict with the rest of your system. In most installations you can leave the card in its default configuration. Using the HP-IB cable supplied with the drive, connect the drive to the card's HP-IB port, as shown in the example of Figure 2-8c.

d. Using the HP-IB cable supplied with the drive, connect the drive piggyback fashion to the HP-IB port of the CPU or Disc Controller Boards, as shown in Figure 2-8c.

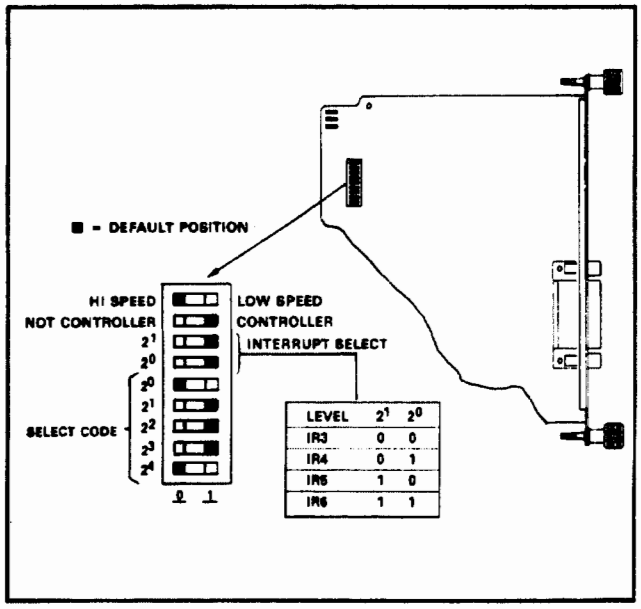


Figure 2-9. HP 98625B Configuration Switch

2.3.4 Remote Console or Host Computer

You may install a remote terminal to replace or supplement the standard local control Option 001. The remote terminal may be a standard HP terminal, a HP 150 PC, or a HP Vectra PC or IBM PC running HP emulation software. Connection to the remote terminal is made via the HP 6954A CPU Board's RS-232-C port with a 3-wire direct wired or 9-wire modem/telephone link (see Figure 2-10). Make certain to change the CPU Board remote (REM) switch to the Enabled position (see Figure 2-3).

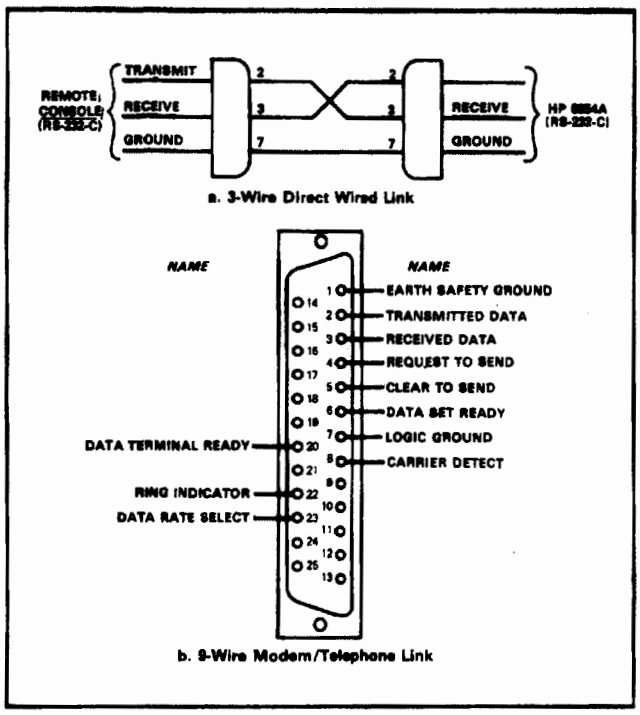


Figure 2-10. Connections for RS-232-C Link

Or, you may install a remote host computer to distribute processing, from the host to the HP 6954A and/or to analyse the data acquired by the HP 6954A. The remote host may be any computer from a HP 1000 to a PC.

The link may be via the HP 6954A RS-232-C port or via its HP-IB port. (Refer to the documentation supplied with the computer for link wiring information.)

If you are using an HP-IB link for transferring files only (data and/or programs), then you cannot use the CPU Board's HP-IB port but must link via a HP 98624A HP-IB card installed in the HP 6954A DIO card cage. Connect the host computer to the HP-IB card and connect the HP 6954A Disc Controller Board cable to the CPU Board's HP-IB port (see Figure 2-8b). Note the following about this type of installation:

a. Change the HP 98624A card's HP-IB address from its default value (21) to 20 (move the 2^0 switch to the 0 position).

b. Make sure that the HP 98624A card's SYS CTL (System Controller) switch is in the NOT CONTROLLER position.

c. The HP 98624A card's default Select Code is 8. If this creates a conflict, try to change the Select Code of some other device. If you must change the card's select code (see Figure 2-11), then you will have to *make a corresponding change to the Shell program in the HP-IB File Transfer Utility*. This is explained in Appendix B.

If required, you may also change the HP 98624A card's interrupt priority level (default is 3). See Figure 2-11.

d. You may run the link up to a maximum distance of approximately 50 feet (15 meters).

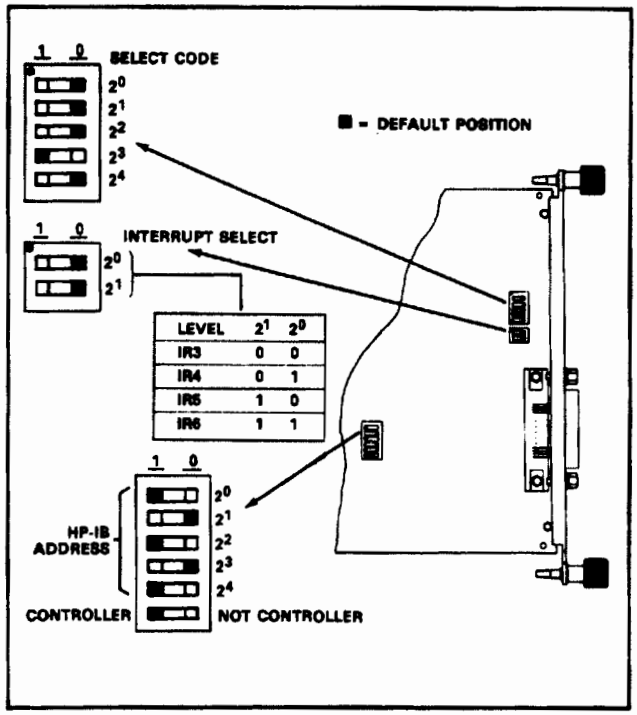


Figure 2-11. HP 98624A Configuration Switches

2.3.5 Printers and Plotters

You may connect any Series 310 supported printer or plotter as an HP-IB device. Table 2-7 lists some acceptable devices.

Table 2-7. Some Supported Printers and Plotters

HP Model and Type	HP Model and Type
Printers	**Printers**
2225A Inkjet	82906A Impact
2227B Inkjet	
2563B Line Impact Dot Matrix	**Plotters**
2564B Line Impact Dot Matrix	
2566B Line Impact Dot Matrix	7440A 8-pen
2567B Impact Line	7470A 2-pen
2603A Daisy Wheel	7475A 6-pen
2671A Thermal	7550A 8-pen
2673G Thermal	7580B 8-pen
2684A Laser	7585A 8-pen
2686A Laser	7586A 8-pen
2932A Dot matrix Impact	
2934B Dot matrix Impact	

2.4 TERMINATING THE MULTI-PROGRAMMER LINK

Skip this step if you are installing one or more HP 6944A Extender Units. Otherwise, install the HP 1251-8892 Termination Plug (packed with the HP 6954A Mainframe) in the BUS OUT connector of the IOFC/BT Board (see Figure 2-8a).

2.5 CONNECTING HP 6944A EXTENDER

You may connect from 1 to 7 HP 6944A Extender Units to your HP 6954A Multiprogrammer (see Figure 2-8c). The maximum length permitted from the HP 6954A to the last extender unit is approximately 30 feet (9 metres).

NOTE

For details of the following steps, refer to the installation portion of Section 3 ("Assembling the HP 6944A System").

a. **Frame Address.** Set each extender unit to a unique frame address. Since address 0 is reserved for the HP 6954A, the extenders may have addresses 1 through 7. It is customary to set the first (closest to the HP 6954A) extender to address 1, the next to address 2, etc.

NOTE

The interrupt priorities of the extenders will be determined by their position in the daisy chain with respect to the HP 6954A and not by the order of their frame addresses.

b. **Logic Ground Switch.** The extender chassis has a switch that determines whether data common is isolated from or connected to chassis ground. The extenders are shipped with the switch connecting data common to ground. For maximum noise immunity, change all switches to the isolated position so that the data common has a single ground at the HP 6954A chassis.

c. **Interface Cables.** Connect the extender units to each other and to the HP 6954A with interface cables. Three lengths of cable are available (refer to Table 1-5). Remember to install the termination plug in the BUS OUT connector of the last extender unit.

2.6 INSTALLING I/O CARDS

The last step is to install the I/O cards in the HP 6954A and any HP 6944A Extender Units. Go now to Section 4 ("Installing Multiprogrammer I/O Cards"). After you have installed all the I/O cards, return here to the next paragraph ("Starting Up the HP 6954A System").

2.7 STARTING UP THE HP 6954A SYSTEM

CAUTION

Do not format the hard disc! The disc is shipped with all the software already installed and ready to boot. If you must reformat the disc, go to "In Case of Trouble".

2.7.1 Check List

Before going any further, be sure that you have:

- Checked that your mainframe line voltage switch is properly set for your power source.
- For all configurations except stand-alone operation, connected your console to the HP 6954A CPU Board. This means connecting the local monitor and keyboard (Option 001) to the video and audio ports of the CPU Board. If you are using the board's RS-232-C port, be sure that the Remote switch is in the REMOTE position. If you are using a HP 98624A HP-IB card in the DIO card cage, make sure the card's Select Code does not conflict with other devices in your system.
- Connected the proper HP-IB cable between the Disc Controller Board and the CPU Board (or HP 98625B Disc Controller card).
- Connected the HP 6954A Mainframe to any HP 6944A Extender Units and set each extender unit to a unique frame address.
- Terminated the unused BUS OUT connector on the mainframe or on the last extender unit with the HP 1251-8892 Termination Plug.
- Properly installed all the required Multiprogrammer I/O cards in the HP 6954A mainframe and extender units.
- Connected each I/O card to your application, *except those that should remain disconnected until the system is known to be operating properly.* This means any application that could be hazardous to personnel or cause damage to this system or to other equipment.

2.7.2 Hard Disc Configuration

Figure 2-12 shows how the software is set up on a typical HP 6954A hard disc. Note that the BASIC 5.0 directories are organized with the same files as the corresponding microfloppy discs supplied with the system. Therefore, your hard disc organization could differ slightly from Figure 2-12, depending on revisions subsequently made to the master discs.

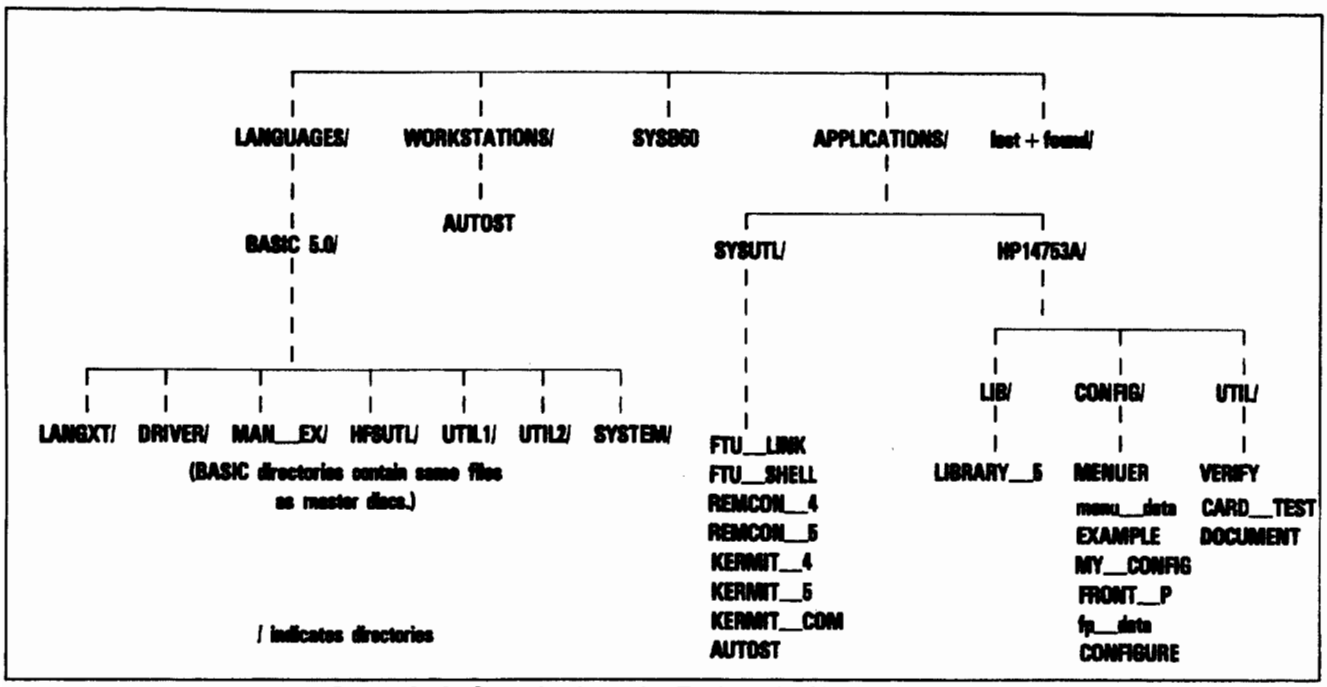


Figure 2-12. Organization of a Typical HP 6954A Hard Disc.

```
Copyright 1985,                              :HP9154, 700, 0, 0
Hewlett-Packard Company.                       1B SYSB50
All Rights Reserved.

BOOTROM Rev. A
Bit Mapped Display
68010 Processor
Keyboard
HP-IB
HP98620B
HP98644 at 9
HP98633 at 29



SEARCHING FOR A SYSTEM (RETURN To Pause)
RESET To Power-Up
```

Figure 2-13. Typical System Startup Display.

2.7.3 Loading BASIC

NOTE

In the following procedures, it is assumed that you are familiar with the use of Series 200/300 BASIC. If you are not, consult your "Installing, Using & Maintaining the BASIC 5.0 System" manual (or the equivalent beginning manual for your version of BASIC).

You are now ready to turn on the power switches for the HP 6954A, HP 6944A extenders, and peripheral devices. When you turn on the HP 6954A, the CPU Board will boot up from the boot ROM, which will run the CPU Board through its self tests. You then will see a monitor display similar to Figure 2-13. The hard disc includes an AUTOST program that automatically loads numerous Language Extension and Driver binaries. If desired, you may modify AUTOST to delete unwanted binaries, or to add any missing ones that are needed for your specific applications. Be sure to leave the following, which are needed for Multiprogrammer operations:

KBD, EDIT, and ERR (In LANGST/)
CS80, HPIB, and HFS (In DRIVER/)

NOTE

If you are controlling your system from a remote console or host computer, refer to Appendix A. If you want to transfer files from a remote site via HP-IB, refer to Appendix B. If you are operating the system in a run-only mode (see Figure 2-1), you will need a suitable AUTOST program, together with your own application program, on the hard disc.

2.7.4 Loading and Running the CAT Software

With BASIC and the required binaries loaded, you are ready to load the HP 14753A CAT software and run the "EXAMPLE" program. Details for doing this are provided in the "Getting Started" section of your *HP 14753A Programming Reference Guide.*

Referring to Figure 2-12, note that the "EXAMPLE" program that you will be running is in the HP 14753A/ subdirectory of the APPLICATIONS directory on the hard disc. In order to access the program, you will have to type:

```
MSI "/APPLICATIONS/HP14753A/CONFIG/"
<Return>
```

NOTE

Before leaving this guide, remember to connect any Multiprogrammer cards that you previously left unwired for safety reasons.

2.8 IN CASE OF TROUBLE

NOTE

The following paragraphs describe some steps that you can take with respect to specific problems. If you still cannot identify the source of the trouble, or if the trouble requires further troubleshooting, refer to your HP 6954A/6944A Assembly Level Service Manual.

2.8.1 Failure to Boot BASIC

a. Monitor Display

If you have a functioning monitor, the CPU Board will attempt to test its interface and then to use it for displaying error messages. If the system fails during self test, the number of the test that failed will be displayed on the screen. Refer to the *HP 6944A/54A Assembly Level Service Manual.*

b. Self-Test Beeper

If only the audio portion of your monitor is functioning, the self-test will send a pattern of beeps that identify the error code. Refer to the *HP 6954A/44A Assembly Level Servicing Manual.*

c. CPU Board LED Display

If the monitor totally fails or your system does not have a monitor, you can use the CPU LED display for some indication of what happened.

Power up the mainframe and observe the LEDs through the cutout in the CPU panel (see Figure 2-14). You will not be able to read the individual LEDs, but a normally functioning system will give the following pattern:

- Maximum brightness as all LEDs go on once.
- Medium brightness as the LEDs flicker. As each test is completed, some will go on and some will go off.
- No brightness as all LEDs go off at the end of the test.

If the LEDs never come on, or if they all stay on, then there has been a total failure of the CPU Board's self test.

If only some LEDs stay on, then a specific test has failed. (Refer to the *HP 6954A/44A Assembly Level Service Manual).*

d. Disc Controller Indicators

While the CPU Board is doing its self test, the Disc Controller Board is doing its own test which takes about 30 seconds. You can get an indication of these tests by observing the two LEDs on the Disc Controller Board (see Figure 2-14).

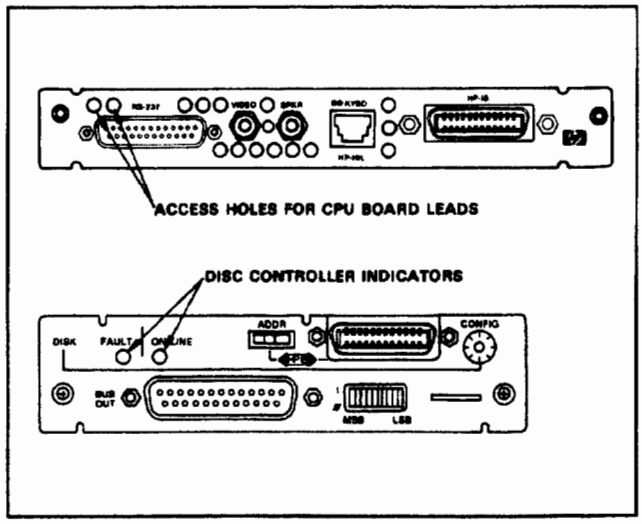


Figure 2-14. Test LED's on CPU and Disc Controller Boards

- As the system powers up, the FAULT LED turns on and the ON LINE LED turns off and then ON. Both LEDs then stay on for about 30 seconds until the self test is completed.

- If the FAULT indicator remains on or if the ON LINE indicator fails to go on, the disc system is not functioning properly.

2.8.2 HP 6954A Diagnostic Tests

Mainframe and card verification tests for the HP 6954A are located in the UTIL/ subdirectory of the HP 14753A/ subdirectory on the hard disc (see Figure 2-12). For further information, refer to the *HP 6954A/44A Assembly Level Service Manual.*

2.8.3 Disc Configuration Problems

Your system may not have any failures, but be unsuitable for your application because you require a different volume configuration of the hard disc. In order to change the configuration, you must first reformat the disc and then reinstall all the software to the disc.

NOTE

You will need to connect an external microfloppy drive to your system. For one method of doing this, refer to "HP 9122D Dual Microfloppy Disc Drive" earlier in this section.

2.8.3.1 Reformatting the Hard Disc

a. Back up all files that are not already on your master discs. If you are backing up to another hard disc, it may be easier to copy the entire disc.

b. On the Disc Controller Board (see Figure 2-4), move the CONFIG switch to the setting corresponding to the desired volume format (refer to Table 2-3).

c. Turn the CPU (HP 6954A mainframe) off and then on. You must do this for the system to recognize the new volume configuration setting.

d. Insert the BASIC 5.0 system master disc in the default drive of the external microfloppy drive and reboot the HP 6954A from that drive.

CAUTION

The following step destroys all files on hard disc.

e. Using the HFS utilities disc supplied with BASIC 5.0, run the DISC_UTIL program. Format the disc by following the prompts in the menu.

f. You now have a properly formatted disc with nothing on it.

2.8.3.2 Reinstalling the Software

The following procedure sets up the hard disc exactly as shown in Figure 2-12. If you do not wish to follow this organization, you may modify the following steps according to your own disc layout.

a. Figure 2-12 shows the intended organization for the hard disc. Note that each of the lowest-level subdirectories (LANGXT/,SYSTEM/,SYSTUTL/,CONFIG/,etc.) is dedicated to the files from a specific microfloppy master. There are 11 subdirectories to accommodate 11 master diskettes.

b. Operating from the microfloppy BASIC 5.0, use the CREATE DIR command to create all the directories and subdirectories shown in Figure 2-12. You can create a directory first, then MSI to that directory and create the next subdirectory, etc. Or, you can create everything from the root directory by specifiying a complete path, such as:

```
CREATE DIR "APPLICATIONS/
HP14753A/CONFIG:,700"
```

c. Copy all the files from each microfloppy disc to the appropriate hard disc subdirectory. Do a CAT on the microfloppy dive to list all the files that you need to copy. Since the HFS system does not have a batch copy command, you will have to copy the files one by one. For example:

```
COPY "VERIFY" TO "APPLICATIONS/
HP14753A/UTIL/VERIFY:,700"
```

By making repeated use of the system's RECALL softkey, you can copy the files more quickly.

d. Copy the AUTOST program from the SYSUTIL/ directory to the WORKSTATIONS/ directory.

e. MSI to the floppy drive, if it is not the current directory.

f. Execute a SCRATCH BIN command.

g. Using the appropriate master diskettes, reload the following binary files:

```
CS80    HFS    HPIB
```

h. Execute `STORE SYSTEM "SYSB60:,700"`

NOTE

You now have a system file in the root directory that duplicates the one that was originally on the hard disc.

i. Turn off the HP 6954A and reset the Disc Controller Board volume CONFIG switch to "9".

j. Turn on the HP 6954A. It will now reboot from the AUTOST program on the hard disc.

k. You now have restored the hard disc to the condition it was in when shipped from the factory.

Section 3
ASSEMBLING THE HP 6944A SYSTEM

3.1. INTRODUCTION

This section covers installation and startup of the HP Series 6944A Multiprogrammer System. The minimum hardware required for using the Multiprogrammer with the HP 14753A Computer Aided Test (CAT) system is specified in Section 1 of this guide. Figure 3-1 is a block diagram of a typical system.

Installation consists of the following steps:

a. Configure the computer hardware by installing the required interface and accessory cards.*

b. Configure the HP 6944A mainframe and extenders switches and install the required Multiprogrammer I/O cards.*

*** NOTE**

Use Table 3-2, near the end of this section, to record your switch settings.

c. Connect all system components together.

3.2 CONFIGURING THE COMPUTER HARDWARE

The following paragraphs show how to set up the various computers for CAT operation with the Multiprogrammer. The hardware covered is:

- Types of computers and number of accessory slots available for each type.
- Installing the HP 98633A Multiprogrammer Interface Card (required for all computers).
- Installing extra memory (for those computers that do not already have at least 1 Mbyte of RAM).

3.2.1 Hardware for Series 200/300 Computers

Table 3-1 lists the computers that may be used as controllers for the HP 6944A and the number of accessory slots available in each computer. In most cases, if you have at least 1 Mbyte of RAM, you will be able to use the minimum backplane configuration. Otherwise, you will have to install an expander. Refer to your computer Installation Guide for details.

Table 3-1. Supported Controllers

Series 200		Series 300	
Model	**Slots***	**Model**	**Slots***
HP 216	2	HP 310	4
HP 217	6	HP 320	4
HP 220	8	HP 330	2
HP 226	8	HP 350	1
HP 236	8		
HP 237	16		

* Total number, but not necessarily available for Multiprogrammer use.

3.2.2 Installing the HP 98633A Multiprogrammer Interface Card

Regardless of your computer model, you must install a HP 98633A Multiprogrammer Interface Card in one of it accessory slots. The card is shipped with Select Code set at 29 and Interrupt Level set at 3. Normally, you should not have to change these default parameters. If you do, refer to Figure 3-2. If you should change the Select Code, do not use codes 0 through 7, which are reserved for the computer's internal use. You will also have to reconfigure the CAT software, as explained under "System Startup".

NOTE

The HP 98633A card occupies twice the I/O memory space normally alloted to a Select Code address. This means you cannot use the next higher Select Code for another card. For example, if you leave the card at Select Code 29, you cannot assign any other card to Select Codes 29 and 30.

3.2.3 Installing Memory Cards

At least 1 Mbyte of RAM is recommended for operating the HP 14753A software. This can be any combination of cards within your available accessory slots that make up the total. (The Model 216 computer has internal RAM that is configured as an address space for one HP 98256A 256-KByte RAM card.) Adding or changing RAM cards may require you to remove factory-installed memory cards to reset their address switches. Refer to your Series 200/300 "Peripheral Installation Guide" for details.

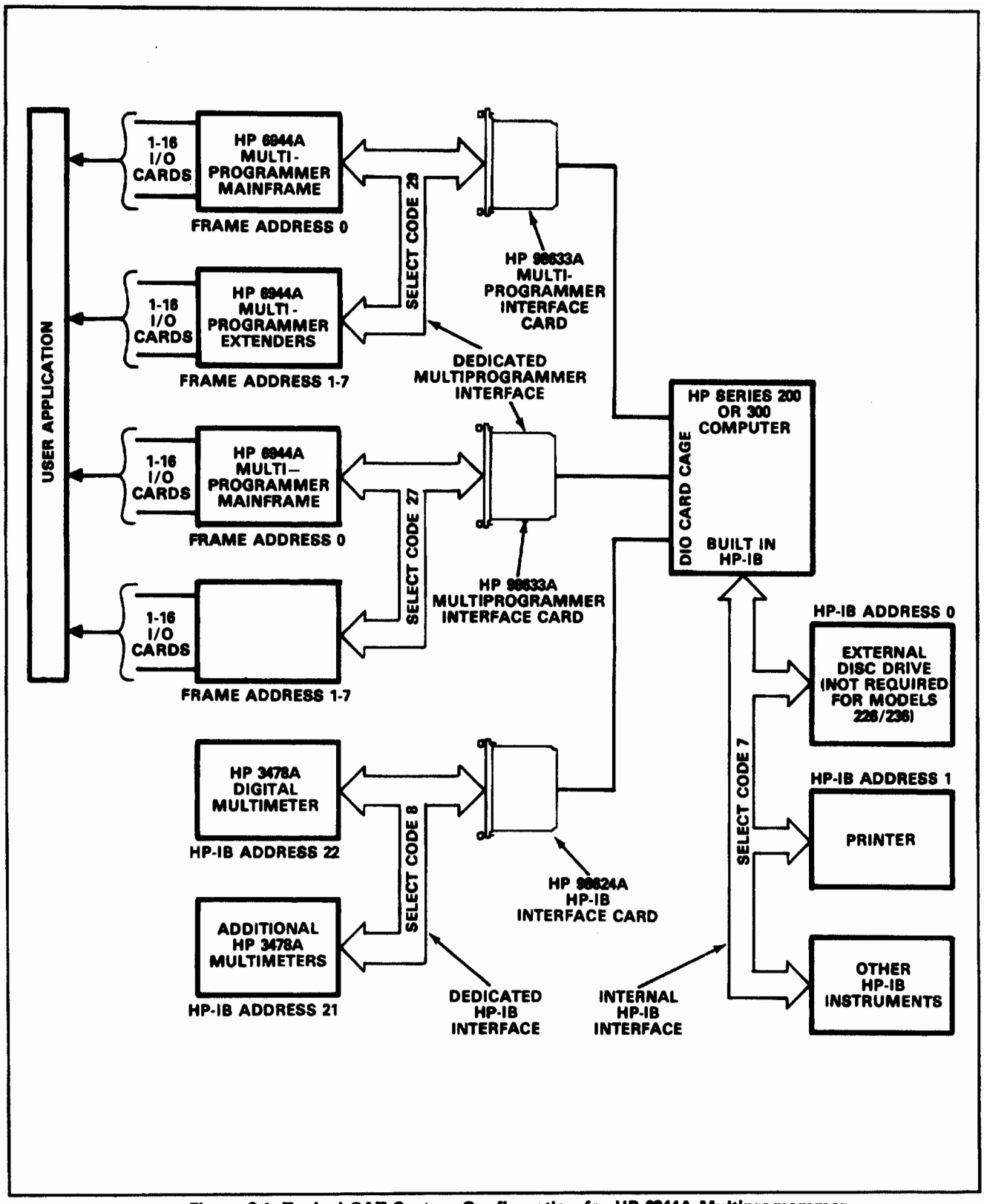


Figure 3-1. Typical CAT System Configuration for HP 6944A Multiprogrammer

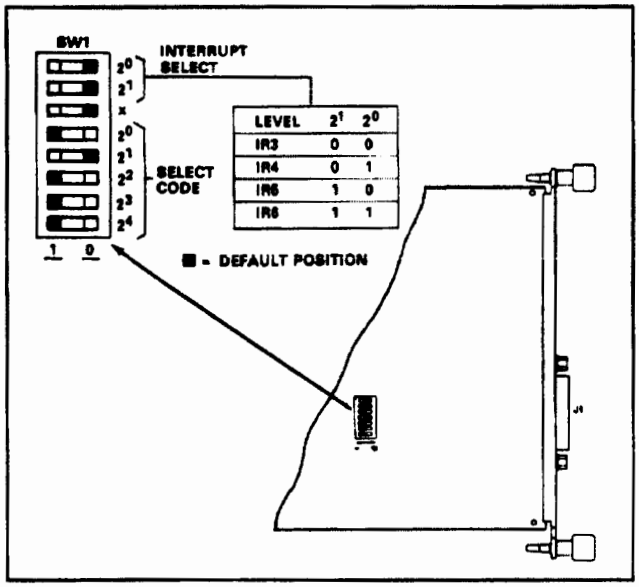


Figure 3-2. HP 98633A Configuration Switches

3.3 SETTING UP THE HP 6944A MAINFRAME

The following paragraphs show how to setup the HP 6944A mainframe and connect it to your Series 200/300 computer. Record all switch settings in Table 3-2, near the end of this section.

3.3.1 Mainframe Switches

A-C Line Voltage Selection. The mainframe is designed to accommodate mains voltages from 100 to 240 Vac. There are labels located adjacent to the a-c input socket (see Figure 3-3). Make certain that the label which is marked corresponds to your nominal line voltage. *Skip this procedure if* the label agrees with your line voltage.

a. Open the Multiprogrammer front panel by completely loosening the two captive screws and then pulling on them until the panel opens slightly. Next, pull on the right side of the panel until it swings open on its hinge (which is on the left side).

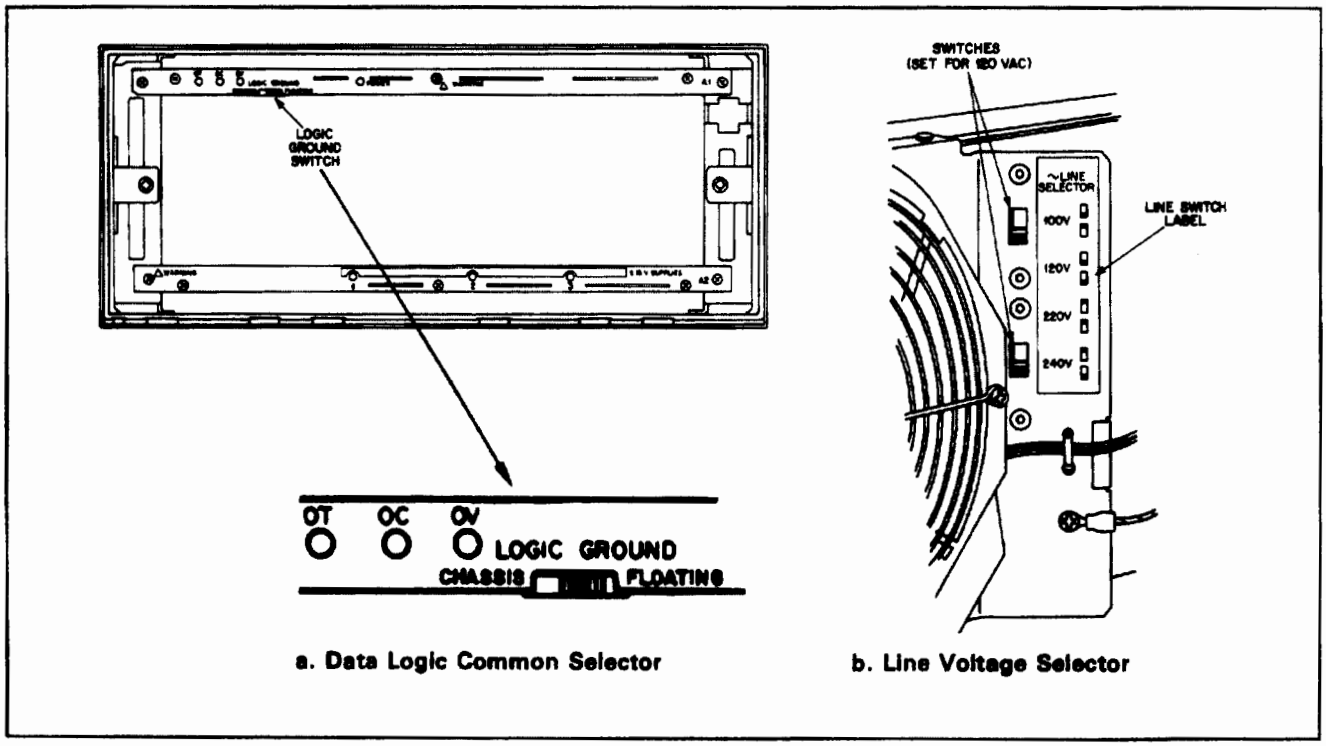
b. Two line voltage select switches are located on the rear of the panel, just to the right of the fan (see Figure 3-3). A Line Selector chart next to the switches shows how to set them for 100 V, 120 V, 220 V, or 240 V nominal input. Set the switches to the proper voltage.

c. Close the front panel but do not fasten the captive screws until you have checked the position of the Logic Ground Switch.

Logic Ground Switch. The mainframe chassis has a switch that determines whether data common is isolated from or connected to chassis ground. For maximum safety and noise immunity, your mainframe is shipped with the switch connecting data common to chassis ground. *Skip this procedure if* you do not have to change the position of the switch.

a. Open the Multiprogrammer front panel as described under "AC Line Voltage Selection."

b. The Logic Ground Switch is located at the upper-left side of the chassis (see Figure 3-3). Slide the switch to the desired position.



a. Data Logic Common Selector

b. Line Voltage Selector

Figure 3-3. Location of Logic Ground and Line Voltage Switches.

c. Close the front panel and tighten the two captive screws. Go on to the next procedure.

Frame Address Switch. A frame address switch is located on the rear of the mainframe (see Figure 3-4). Check that the switch is set to 0 (zero), which should be the factory default setting.

3.3.2 Checking Power Connections

CAUTION

Do not apply power to the mainframe until you are instructed to do so.

Before plugging the line cord into the a-c mains, be sure that you have checked that the Line Voltage Selection switch setting corresponds to your nominal line voltage. Then, do the following checks:

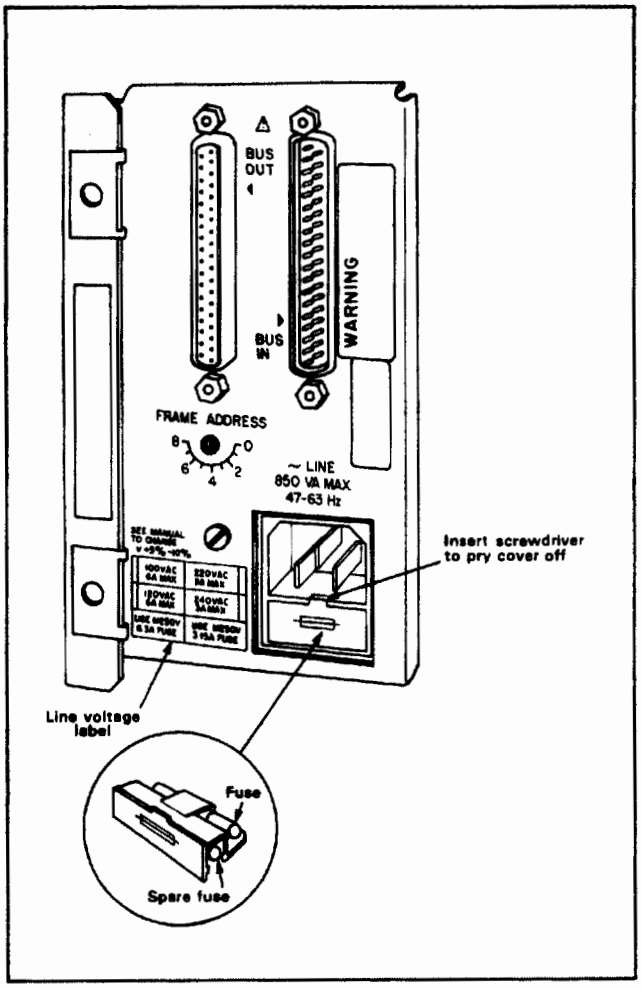


Figure 3-4. Location of Frame Address Switch & Line Fuse.

a. **A-C Line Fuse.** The line fuse is in a fuseholder located just below the a-c input socket (see Figure 3-4). Use a screwdriver to extract the fuseholder from underneath the a-c socket. Check that the fuse (and the spare inside the fuseholder cover) has the following value:

100/120 Vac Input	6.3 Amperes
220V/240 Vac Input	3.15 Amperes

If the value is correct, replace the fuse and fuseholder. If the fuse value is wrong, refer to the *HP 6954A/44A Assembly Level Service manual* for the part number of the correct fuse.

b. **A-C Power Cord.** Your mainframe was shipped with a power cord designed for the type of outlet used at your location (see Table 1-5). The table includes the HP part number and order option for each type of cord. If the appropriate power cord was not shipped with your mainframe, contact your nearest HP Sales and Service office to obtain the correct cord.

WARNING

The cord was designed to supply a chassis ground through a third conductor. Be certain that your power outlet is of the three-conductor type with the appropriate receptacle pin connected to earth ground.

3.3.3 Connecting the Multiprogrammer Mainframe to the Computer

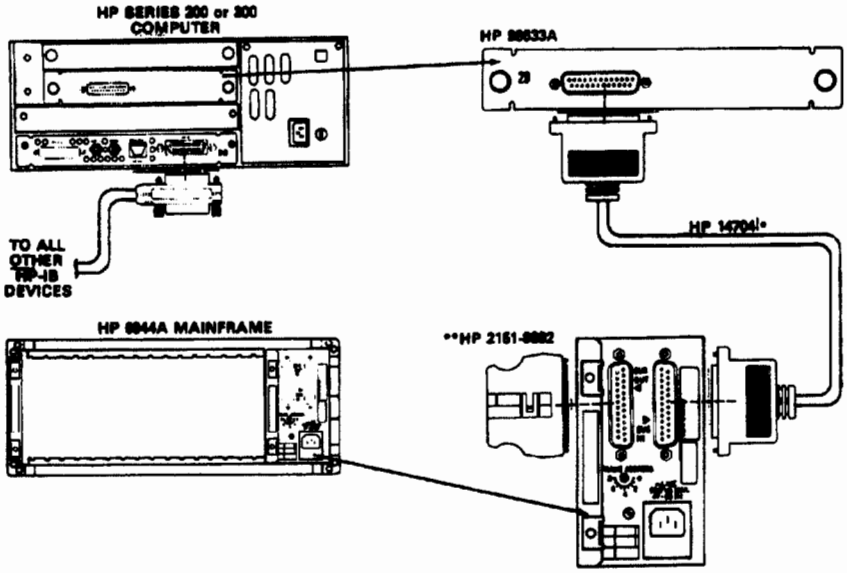
The HP 14704 Interface Cable comes in three lengths (refer to Table 1-5). Connect one end of the cable to the HP 98633A Multiprogrammer Interface card in the computer (see Figure 3-5a). Connect the other cable end to the BUS IN connector on the rear of the Multiprogrammer mainframe. Make sure the connector plugs are pushed securely into the equipment sockets.

3.3.4 Terminating the Multiprogrammer Link

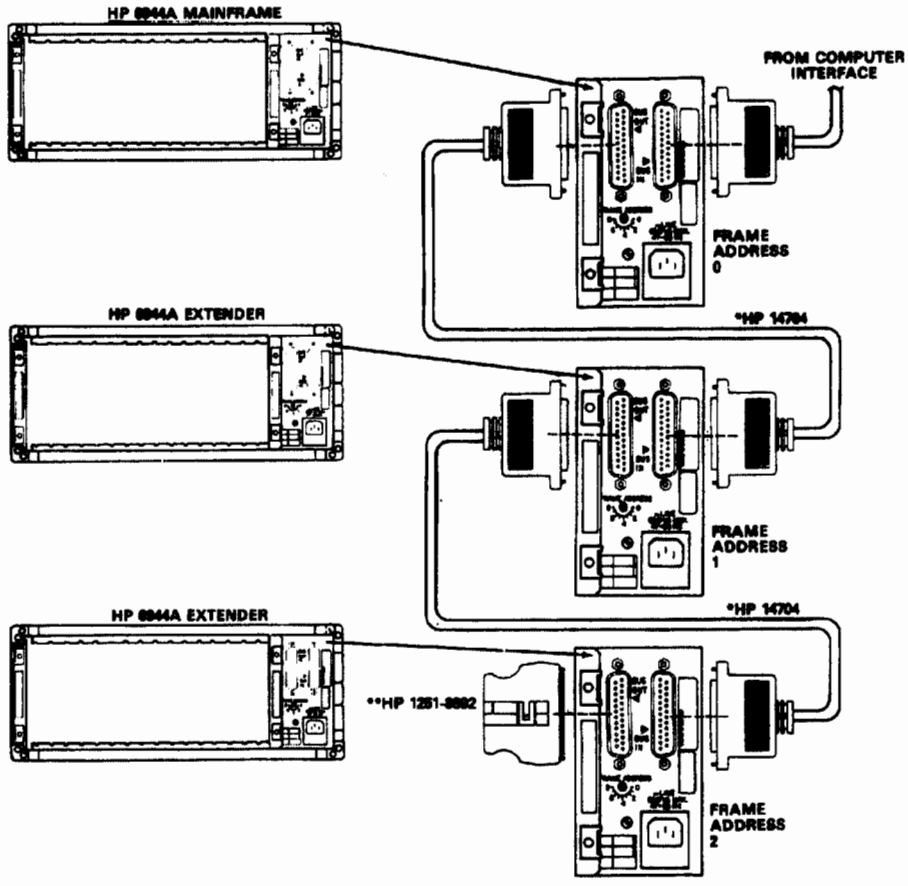
Skip this step if you are installing one or more Extender Units. Otherwise, install the HP 1251-8892 Termination Plug (packed with the HP 6944A mainframe) in the BUS OUT connector (see Figure 3-5a).

3.4 CONNECTING EXTENDER UNITS

You may connect from 1 to 7 HP 6944A extender units to your HP 6944A Multiprogrammer mainframe (see Figure 3-5). The maximum length permitted from the controller interface to the last extender unit is approximately 30 feet (9 metres).



a. Connecting Multiprogrammer to the Computer



b. Connecting Extender Units to Multiprogrammer

NOTES

* Part number suffix specifies cable length.
** Install HP 1251-8882 termination in unused "BUS OUT" connector.

Figure 3-5. System Cabling Diagram

a. **Frame Address.** Set each extender unit to a unique frame address. Since address 0 is reserved for the mainframe, the extenders may have addresses 1 through 7. Insert a small screwdriver into the switch slot and set the pointer to the desired number. It is customary to set the first (closest to the mainframe) extender to address 1, the next to address 2, etc.

NOTE

The interrupt priorities of the extenders will be determined by their position in the daisy chain with respect to the mainframe and not by the order of their frame addresses.

b. **Logic Ground Switch.** Each extender unit is shipped with its Logic Ground switch set to the CHASSIS position. To help eliminate ground loops, it is highly recommended that your system have a single ground at the mainframe unit. Therefore, change the Logic Ground switch on each extender unit to the FLOATING position (see Figure 3-3).

c. **Interface Cables.** Connect the extender units to each other and to the mainframe with interface cables. Three lengths of cable are available (refer to Table 1-5). Remember to install the termination plug in the BUS OUT connector of the last extender unit.

Table 3-2. Settings of System Configuration Switches

Location	Function	Setting	
		Factory	Actual
HP 98633A Card	Select Code	29	_____
	Interrupt Level	3	_____
Memory Card(s)	Address	*	_____
Mainframe	Line Voltage	**	_____
	Logic Ground	Grounded	_____
	Frame Address	0	_____
Extender(s)	Line Voltage	**	_____
Extender(s)	Logic Ground	Grounded	_____
Extender No. 1	Frame Address	*** 0	_____
Extender No. 2	"	0	_____
Extender No. 3	"	0	_____
Extender No. 4	"	0	_____
Extender No. 5	"	0	_____
Extender No. 6	"	0	_____
Extender No. 7	"	0	_____

* Refer to the 'Peripheral Installation Guide' and its accompanying Memory Configuration Wheels for information on specific RAM cards.

** Set according to country of destination.

*** You must set each extender unit to a unique frame address.

3.5 INSTALLING I/O CARDS

The last step is to install the I/O cards in the HP 6944A mainframe and any HP 6944A extender units. Go now to Section 4 ("Installing Multiprogrammer I/O Cards"). After you have installed all the I/O cards, return here to "Starting Up the System".

3.6 STARTING UP THE SYSTEM

3.6.1 Check List

Before going any further, be sure that you have:

- Installed the HP 98633A Multiprogrammer Interface card in your Series 200/300 computer and connected the card to the HP 6944A mainframe. Be sure that the card's Select Code is valid for your system.
- Installed at least 1 MByte of RAM in your Series 200/300 computer.
- Installed a HP 98620 A/B DMA Controller card in a DIO slot of your Series 200/300 computer (this card is not mandatory but highly recommended for high-speed data acquistion).
- Connected the HP 6944A mainframe to any additional HP 6944A extender units and set each extender unit to a unique frame address.
- Terminated the unused BUS OUT connector on the mainframe or on the last extender unit with the HP 12-51-8892 Termination Plug.
- Properly installed all the required Multiprogrammer I/O cards in the HP 6944A mainframe and extender units.
- Connected each I/O card to your application, *except those that should remain disconnected until the system is known to be operating properly.* This means any application that could be hazardous to personnel or cause damage to this system or to other equipment.

3.6.2 Loading BASIC

Table 3-3 lists the Series 200/300 computers supported by each BASIC Language System. A copy of you specific version, in either the 3-1/2 or 5-1/4 inch format, has been supplied with your system If you are not familiar with loading BASIC, refer to the beginning manual in your BASIC documentation package ("Installing, Using, and Maintaining" for BASIC 5.0 or "User's Guide" for earlier versions). After BASIC is loaded, your screen will display the BASIC message. You must now add the required binary files.

Table 3-3. BASIC Language System & Computer Compatibility

Language System	Computer Models Supported
BASIC 4.0	HP 216/217/220/226/236/237
BASIC 5.0	HP 216/217/220/226/236/237/310/320/330/350

3.6.3 Adding Required Binaries

You *must* load the following language extension binary files:

CLOCK GRAPH IO KBD MAT

For your convenience, you may also want to load:

ERR PDEV EDIT (for BASIC 5.0)

Consult your beginning BASIC document for any other language binaries or any driver binaries that may be needed for your specific applications.

NOTE

The HP 98633A Multiprogrammer Interface card and the HP 14753A CAT software do not require any driver binaries.

3.6.4 Loading and Running the CAT Software

With BASIC and the required binaries loaded, you are ready to load the HP 14753A CAT software and run the "EXAMPLE" program. This program is on the Library Disc Supplied with your HP 14753A software. For details, go now to the "Getting Started" section of your *HP 14753A Programming Reference*.

3.7 IN CASE OF TROUBLE

NOTE

The following paragraphs describe some steps you can take with respect to specific problems. If the problem is not specified here, or if you cannot identify the source of the problem or it requires further trouble-shooting refer to your HP 6954A/6944A Assembly Level Service Manual.

3.7.1 Failure to Boot BASIC

a. Console Display.
If you have a functioning console, the CPU Board will attempt to test its interface and then to use it for displaying error messages. If the system fails during self test, the number of the test that failed will be displayed on the screen. Reboot the system. If the same error number occurs again, refer to the *HP 6954A/6944A Assembly Level Service Manual* for the meaning of the error.

b. Self-Test Beeper.
If only the audio portion of your monitor is functioning, the self-test will send a pattern of beeps that identify the error code. Refer to the *HP 6954A/44A Assembly Level Service Manual* for the meaning of the error.

3.7.2 HP 14753A Diagnostic Tests

The CAT software has a verification test that you can use to isolate problems within the Multiprogrammer system. Refer to your *HP 6954A/44A Assembly Level Service Manual.*

Section 4
INSTALLING MULTIPROGRAMMER I/O CARDS

4.1 INTRODUCTION

This section outlines the general procedure normally required when installing Multiprogrammer I/O cards. The sequence of steps is:

a. Perform a power budget analysis for each frame to ensure that the cards will not overload the mainframe power supply.

b. Check that the I/O card is properly configured for your application.

c. Install the I/O card into the mainframe.

d. Wire the card edge connector to your application.

NOTE

To do this step, you must understand how to wire a given I/O card to your application and how to properly interconnect I/O cards. This section includes some guidance on these topics.

e. Install all edge connectors and secure the rear cover.

4.2 SYSTEM POWER BUDGET

4.2.1 General Considerations

In general, the I/O cards are designed to permit you to fill a mainframe with any combination of cards without overloading the power supply. However, you need to be aware of the power consumption in each mainframe in order to avoid those exceptional combinations that could overload the supply. This is particularly important with the HP 6954A mainframe, which has fewer I/O card slots but must also supply the power requirements of the Controller Assembly.

Table 4-1 shows the maximum current available from the HP 6944A mainframe supply, while Table 4-2 shows the minimum and typical current available from the HP 6954A mainframe supply. Note that each mainframe has three separate isolated +18V and -18V supplies.

Table 4-3 lists the worst-case power requirements of the I/O cards. A few cards require more power than can be drawn from a single +18 V or -18 V supply. These cards have internal strapping options to permit them to draw from two or more supplies. Instructions for connecting the straps are included in the I/O card operating manual.

4.2.2 HP 6944A Multiprogrammers and Extenders

Table 4-1 shows the maximum outputs of the mainframe supplies. The majority of I/O cards require only +5 volts dc. With 16 I/O slots, the mainframe can supply at least 5 watts, or 1 ampere, per slot. This is well over the requirements of most I/O cards (see Table 4-2). If you have one or more cards that draw over 1 ampere, add up the drain for all the slots to be sure that the total drain is within the capacity of the supply.

Table 4-1. HP 6944A Mainframe Supply, Maximum Current Available

Mainframe Power Supply	Maximum Output (Amperes)
+5 Volts	16.0
+12 Volts	2.0
-12 Volts	2.0
+18 Volts (3 @ 0.85	2.55
-18 Volts (3 @ 0.40)	1.2

4.2.3 HP 6954A Mainframe Power Distribution.

Table 4-2 shows the minimum and typical outputs of the mainframe supplies. Because it must support the Controller Assembly, the HP 6954A mainframe has less power available for I/O cards. This usually is not a problem because the mainframe has only 8 I/O card slots. Table 4-3 lists the minimum current available to the Multiprogrammer I/O cards and any optional DIO cards. The power drain of the HP 98620B DMA Controller card has been factored into the available current. Add the current drawn by all other DIO cards to that drawn by the Multiprogrammer I/O cards to determine if the total drain is within the capacity of the mainframe supply.

Table 4-2. HP 6954A Mainframe Supply, Minimum Current Available

Mainframe Power Supply	* Output Minimum	(Amperes) Typical
+5 Volts	10.1	10.9
+12 Volts	1.15	1.4
-12 Volts	1.67	1.7
+18 Volts (3 @ 0.85)	2.55	2.55
-18 Volts (3 @ 0.40)	1.2	1.2

* Allows for hard disc and HP 46021A keyboard. Subtract the required current from +12 V supply for any additional HP-HIL devices.

NOTE

The +5 V current consumptions given in Table 4-3 represent absolute worst-case conditions. For practical applications, you may reduce these currents by 15% when calculating the total current drain.

Table 4-3. I/O Card Power Supply Consumption From Mainframe Power Supplies

HP No.	Card	DC Supply and Drain (In Milliamperes)				
		+5	+12	-12	+18	-18
69700A	Resistance Programming	650	-	-	-	-
69709A	Power Supply Programming	500	-	-	-	-
69720A	D/A Voltage Converter	400	-	-	80	40
69721A	D/A Current Converter	400	-	-	110	65
69730A	Relay Output	650	-	-	-	-
69731B	Digital Output	750	-	-	-	-
69734A	Time Base	1250	-	-	-	-
69735A	Pulse Train Out/ Stepping Motor	750	-	-	-	-
69736A	Timer/Pacer	750	-	-	-	-
69750A	Scan Control/Pacer	1600	-	-	-	-
69751A	A/D Converter	400	-	-	150	80
69752A	64 Channel FET Scanner	425	-	-	60	40
69753A	Temperature Scanner	200	-	-	100	-
69754A	32 Channel Relay Scanner	700	-	-	-	-
69755A	16 Channel FET Scanner	400	-	-	45	20
69759A	500 kHz A/D Converter	700	-	-	400	100
69761A	Interprating Digital Multimeter	850	-	-	250	75
69770A	Isolated Digital Input	350	-	-	-	-
69771A	Digital In./Analog Comparator	350	20	40	-	-
69774A	Counter	1000	-	-	105	10
69775A	Counter Totalizer	750	-	-	120	15
69776A	Interrupt	400	-	-	-	-
69790B	Memory (both cards)	1200	-	-	-	-
69791A	64 K Memory	4800	-	-	-	-
69792A	Memory Expansion	1400	-	-	-	-

4.3 CONFIGURING MULTIPROGRAMMER I/O CARDS

4.3.1 Using an I/O Card in an Application

Before installing an I/O card in the mainframe, you must be certain that it is configured properly for your application. Because of the versatility of the Multiprogrammer system, there is no single source for all possible card applications. The appendices in the *HP 14753A Programming Reference Manual* show some common applications. Further information may be found in the various Application Notes (refer to Table 1-2) and I/O card operating manuals.

4.3.2 Configuring an I/O Card for an Application

In order to configure a card, you must understand which card parameters can be configured in hardware (with switches and/or jumpers). The operating manual provided with the card specifies:

a. the card paramenters that can be configured in hardware, and

b. the factory default values for these parameters

If you have two or more cards that use the isolated power supplies, you may have to change the card jumpers to connect the cards to separate supplies (refer to "System Power Budget"). As you do each card, keep a record of how it is configured for future reference (see Table 4-4).

4.4 INSTALLING I/O CARDS IN THE MAINFRAME

WARNING

Be certain that there is no a-c power to the mainframe.

Proceed as follows for each I/O card that you wish to install:

a. Loosen the captive fasteners securing the Multiprogrammer rear cover and remove the cover (see Figure 4-1).

STOP

Is the card that you are about to install properly configured? If not, you will have to remove the card at a later time. If you need more information, return to "Configuring Multiprogrammer I/O Cards."

b. Position the card with the extractor handle down and the PC board component side to the right.

c. Rotate the card extractor handle down and slide the card into the desired mainframe slot. Push the card until it firmly engages the backplane connector.

NOTE

A notch in each card edge connector and a corresponding key in the backplane connector prevent the card from being installed upside down.

d. Press the card firmly until it seats into the backplane connector. Rotate the extractor handle to the Up position.

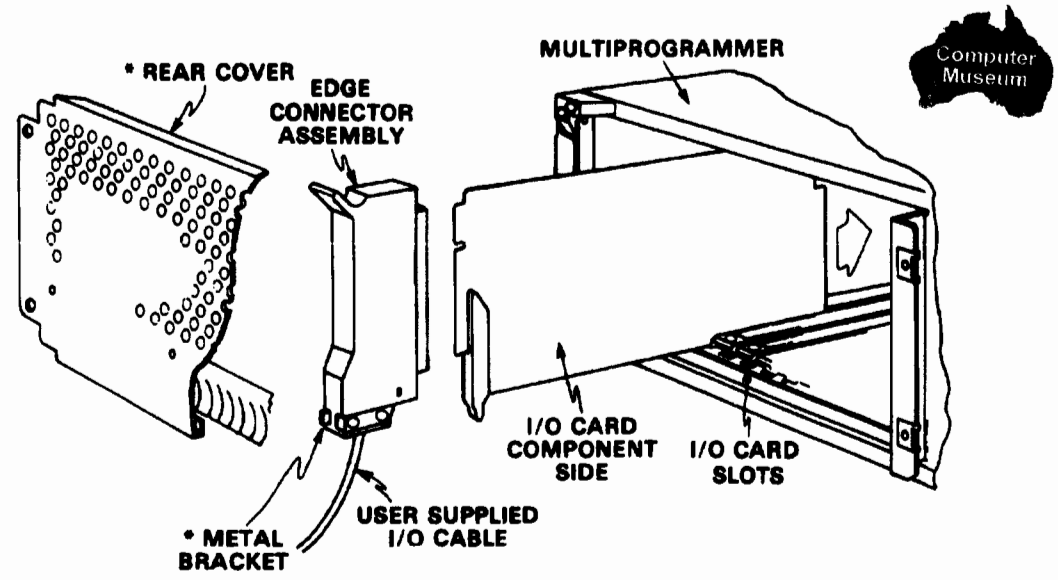


Figure 4-1. Installing I/O Cards in the Mainframe

4.5 CARD EDGE CONNECTIONS

4.5.1 Determining Edge Connector Wiring

The operating manual for an I/O card has a pinout diagram of the card's edge connector and explains every input and output signal. For a further explanation of the function of various card signals, refer to " Advanced Programming Concepts", in the *HP 14753A CAT Programming Reference Manual.*

4.5.2 Wiring the Edge Connector

WARNING

Some I/O cards can accept input potentials 250 volts above or below ground. Once you wire these inputs to the edge connector, it can have hazardous potentials even when the Multiprogrammer is turned off.

Every I/O card is shipped with an external edge connector assembly to provide the interface for external wiring. In order to wire this connector, you must consult the "Installation" section in the particular I/O card operating manual. If you have never assembled an external edge connector, you will also need the *Assembly Procedure for the Model HP 14703A Multiprogrammer I/O Card Connector Assembly,* which is packed with each connector assembly. If you have had previous experience, then Figure 4-2 may be sufficient to refresh your memory.

IMPORTANT

While following the wiring instructions in the I/O card operating manual, pay particular attention to recommendations concerning shielding and grounding.

4.5.3 Securing the Mainframe.

When all cards have been installed in the mainframe, replace its rear cover and firmly secure it with the captive fasteners.

CAUTION

Do not leave the rear cover off the mainframe. The cover must be in place to ensure reliable connections at the I/O card edge connectors and to keep system EMI at a minimum.

If you are assembling a system, go now to "Starting Up the System" in Section 2 (HP 6954A) or Section 3 (HP 6944A).

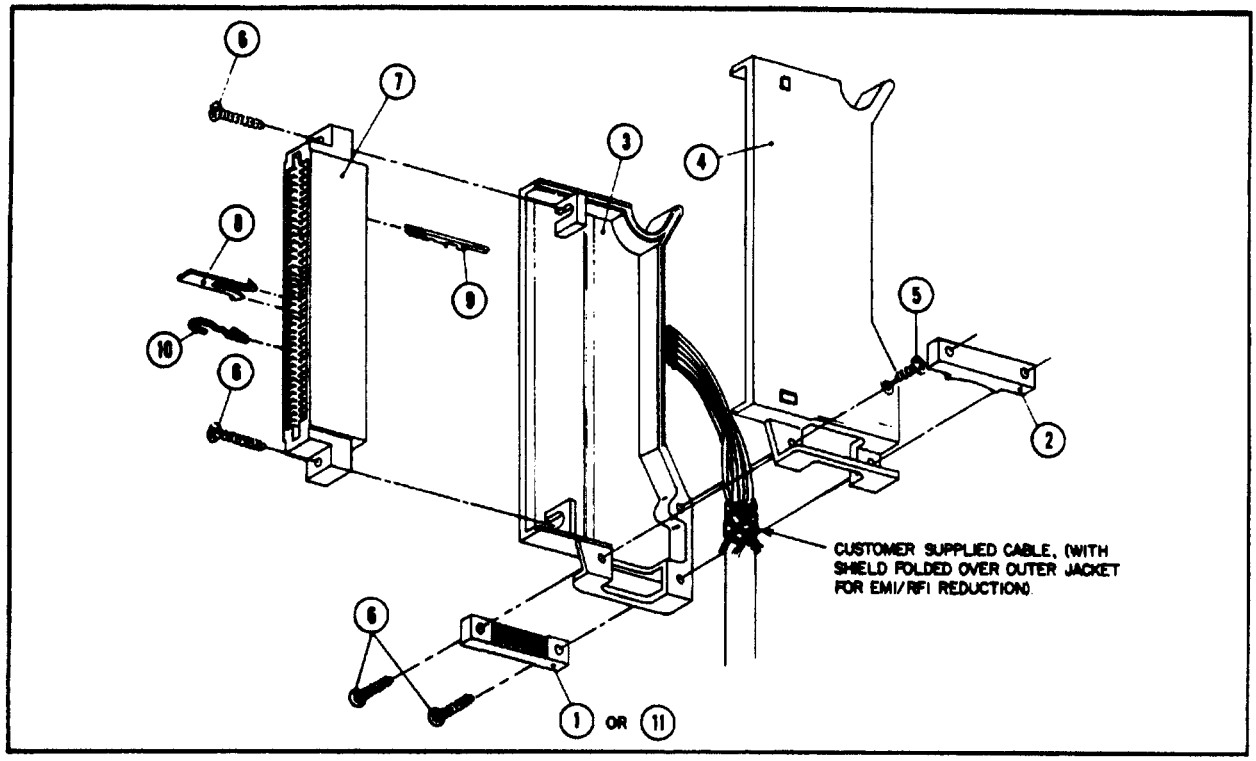


Figure 1. I/O Card Connector Assembly

ASSEMBLY PROCEDURE (Figures 1 and 2)

a. Insert the required number of solder pins (9) to be wired into connector pin housing (7). Pins are inserted into the applicable pin slots from the rear of the connector pin housing. Figure 2 illustrates a sample pin configuration for a digital output card.
b. Solder each cable wire to the appropriate solder pin.
c. To balance the connector, insert extra solder pins (9) in the slots next to the wired solder pins (see Figure 2).
d. Insert springs (10) into the connector pin housing. Springs are inserted from front of the connector pin housing to insure a tight connection to the card's edge (see Figure 1). A pair of springs is inserted into adjacent connector slots in three places on the connector (see Figure 2).
e. Install key (8) (Figure 1) is applicable slot. Connector key is installed from front of the connector pin.
f. Place the hood assemblies (3) and (4) around the connector pin housing (7). Ensure that the bottom (high numbered pin slots) of the housing is at the bottom (cable entrance) of the hood assemblies.
g. Route cable wires through cable entrance and then fasten the left and right hood assemblies together by inserting and tightening screw (5).
h. Fasten connector pin housing (6) to the assembled hoods (3) and (4) using two screws (6).
i. Insert connector bracket (1) or (11) (see EMI/RFI Reduction Considerations) and proper sized cable clamp (2) in the cable entrance and fasten with two screws (6).

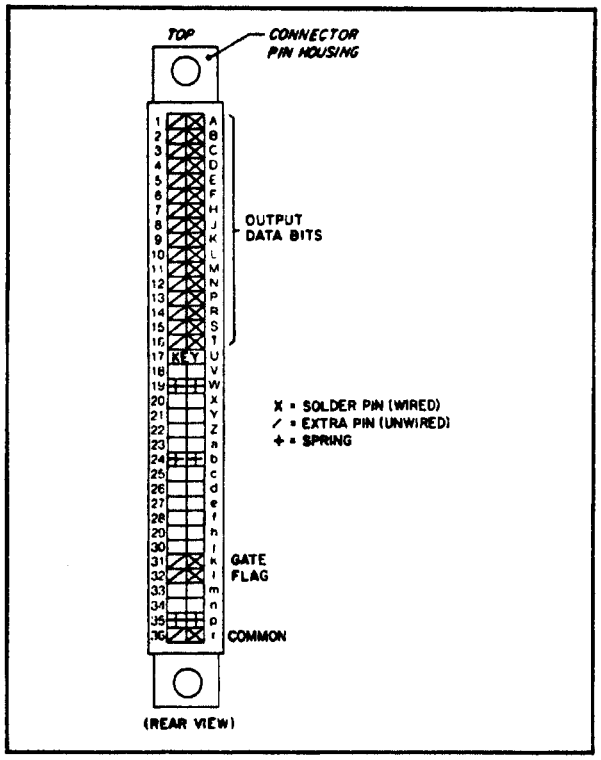


Figure 2. Sample Pin Configuration for a Digital Output Card

Figure 4-2 Assembling External Edge Connector (Refer to HP 14703-90001

Table 4-4. I/O Card Configuration Record

HP Card Model #	Card Function	Address		Configuration of Jumpers/Switches
		Frame	Slot	

Appendix A
USING THE REMOTE CONSOLE REMCON OPTION

A.1 DESCRIPTION

This option allows you to use an RS-232-C terminal, a software terminal emulator, or a modem, in place of the HP-HIL keyboard and video monitor, for developing, executing, monitoring, and controlling programs in the HP 6954A. Remote terminal support is made possible by the REMCON (Remote Console Driver) binary located on the HP 6954 utilities disc and the HP 6954A hard disc. REMCON can be loaded from the hard disc to cause the HP 9000 BASIC 5.0 (or 4.0) to direct its alpha text I/O operations to the remote terminal.

A.2 REQUIREMENTS

These are the requirements for the remote console driver:

Hardware (Refer to Section 2 of this guide for installation diagrams)

a. Any RS-232-C device that uses HP 2623 terminal (or HP terminal emulator) escape sequences may be used as the remote console.

b. The Model 310 CPU Board remote configuration switch *must* be set to the Remote Enabled position. Refer to Section 2 of this guide.

c. Either 3 or 9-wire connections may be used (see Section 2). The handshake protocol is determined by the CF (Data Carrier Detect) line as follows:

- If CF is high, then 9-wire transmission with hardware handshake is used.
- If CF is low (or not connected), then 3-wire transmission with software XON/XOFF (ASCII DC1/DC3) handshake is used.

Software

a. The remote console capability requires the REMCON binary option. REMCON is not on your BASIC discs, it is part of the HP 6954A software and is installed on the hard disc. Files are included to support both BASIC 5.0 and BASIC 4.0.

b. REMCON also requires the binary SERIAL in order to operate. SERIAL is included in BASIC 4.0 and 5.0 and is also installed on the HP 6954A hard disc.

NOTE

The HP 14753A CAT "MENUER" function is not presently supported by REMCON. Configure the CAT system from a local terminal.

A.3 REMCON OPERATION

You must have a HP 2623 terminal or have HP terminal emulation software loaded at your remote console. When the HP 6954A boots up from the factory installed AUTOST program the REMCON binary is automatically loaded and you can communicate with the HP 6954A.

Communication is subject to the following restrictions:

- Because the BASIC GRAPHICS command is not sent to REMCON, you cannot display graphics at the remote console.

Table A-1. Remapping of Standard Keys

Function	HP 2623 Terminal Key Sequence	BASIC Keycodes
up arrow	<esc>A	<255>∧
down arrow	<esc>B	<255>V
right arrow	<esc>C	<255>>
left arrow	<esc>D	<255><
home down	<esc>F	<255>T
go to left margin	<esc>G	<255>H
home up	<esc>H	<255>W
horizontal tab	<esc>I	<255>)
clear display	<esc>J	<255>K
clear line	<esc>K	<255>%
insert line	<esc>L	<255>*
delete line	<esc>M	<255>/
insert character	<esc>N or <esc>Q	<255>+
delete character	<esc>O or <esc>P	<255>–
insert char off	<esc>R	<255>+
roll up (top)	<esc>S	<255>W
roll down (bot)	<esc>T	<255>T
next page	<esc>U	<255>,
previous page	<esc>V	<255>'
backspace	∧H	<255>B
line feed	∧J	<255>E
carriage return	∧M	<255>E
reset	∧C	no keycode
clear I/O	∧Z	<255>I
pause	∧P	<255>P
stop (terminate)	∧T	<255>!
recall	∧R	<255>?
down recall	∧D	<255>@
escape	<esc><esc>	<255>

- Because many terminals do not have the same keys as Series 200/300 keyboards, certain keys on your console will be interpreted as indicated in Tables A-1 and A-2.
- When you are editing via REMCON, the BASIC control character sequence cannot be used. Instead, use CHR$ (255)& x, where "x" is the character you wish to enter.
- Special function keys are assigned as shown in Table A-3.
- Be careful with the SAVE SYSTEM statement when working with REMCON. Make sure that your saved system still includes both the SERIAL and REMCON binaries. Failure to observe this rule will disable your remote console function (refer to "Recovering the Remote Console Function").
- You can use the RS-232-C interface for another purpose if you disable REMCON. Alternate uses are mutually exclusive - you can use the your device as a remote console or for something else, but not both (refer to "Disabling the Remote Console Function").

Table A-2. Remapping of Function Keys

Key	Escape Sequence	System Functions	
		Function	BASIC Keycode
f1	<esc>p or <esc>1	STEP	<255>S
f2	<esc>q or <esc>2	CONT	<255>C
f3	<esc>r or <esc>3	RUN	<255>R
f4	<esc>s or <esc>4	PRT ALL	<255>A
f5	<esc>t or <esc>5	* PAUSE	<255>P
f6	<esc>u or <esc>6	* CLR I/O	<255>I
f7	<esc>v or <esc>7	* STOP	<255>!
f8	<esc>w or <esc>8	RECALL	<255>?

* For easier Keyboard access, these keys are remapped as follows:

PAUSE = Disp Fctns
CLR I/O = Clr/Set Tab
STOP = Any Char

Table A-3. Software Control Function Keys

Control Function	Escape Sequence
Display system softkeys	<esc> '0'
Toggle softkey menu on and off	<esc>'9'
Turn on user software	<esc>')'
Scroll through user softkey levels	<esc>'('
Generate the BASIC keycode (<255>)	<esc> <esc>

A.3.1 Recovering the Remote Console Function

If you should accidently change your system to remove REMCON and/or SERIAL from the configuration, you can recover in one of the following ways:

a. Connect a standard HP-HIL keyboard to the HP 6954A CPU keyboard port and load the missing files from the hard disc.

b. Connect an external disc drive to the CPU HP-IB interface. Insert a disc containing a BASIC system file that includes SERIAL and REMCON. Apply power, interrupt the boot ROM, and boot from the external disc drive.

A.3.2 Removing the Remote Console Function

If you wish to use your RS-232-C device for another function, then you can remove the remote console function in any of the following ways:

a. Disable the HP 6954A RS-232-C interrupts by executing:

```
DISABLE INTR 9
```

Note that this is a temporary change that only disables the remote console function while your program is running. When your program terminates, your remote console function is automatically restored.

b. To permanently disable the console function, change the remote configuration switch, on the HP 6954A CPU Board, to the Remote Disabled position (refer to Section 2).

c. If you have a local keyboard and monitor available, you can disable the remote console function through software. To do this, execute a SCRATCH BIN command and then use LOAD BIN to load only those binaries necessary for your function.

A.4 FILE TRANSFER OPERATION

A.4.1 Functional Description

The HP 6954A software package includes a program that implements a subset of the Kermit file transfer protocol under BASIC. The Kermit file transfer protocol is in the public domain and versions of Kermit are available for various types of computers. With the Kermit program on the HP 6954A hard disc, you can transfer files over an RS-232-C link to and from a host computer that is running on its own Kermit program.

The Kermit program is in the HP 6954A SYSUTIL/ directory. The program has two files, called KERMIT_COM and KERMIT_5.

A.4.2 Description of KERMIT_5

This file contains three Kermit CSUBs: CSUB KERMIT, CSUB Ksend(Filename$), and CSUB Kreceive(Filename$,Sectors).

CSUB Kermit.
This is a null routine that can be used to detect if the KERMIT_5 library is memory resident.

CSUB Ksend (Filename$).
This routine sends the ASCII file from the HP 6954A to the remote computer. If the file cannot be opened, a "File Not Found" error is generated. If the transfer is aborted for any other reason, a data link error is generated. A timeout function prevents the system from hanging up by aborting any transfer that does not start within 60 seconds after the routine is called.

Filename$ specifies the name of the ASCII file at the HP 6954A. This filename is sent to the remote computer and becomes the filename at that computer. The filename must be legal at both the HP 6954A and the remote computer.

CSUB Kreceive (Filename$, Sectors).
This routine receives an ASCII file at the HP 6954A from a remote computer. A timeout function prevents the system from hanging up by aborting any transfer that does not start within 60 seconds of the calling routine.

Filename$ is a dummy parameter that is required because of the way Kermit has been implemented in the HP 6954A software. This parameter always must be specified. The filename to be created is sent by the remote computer to the HP 6954A. Because the file overwrite operation is not supported, an error message is generated if the filename exists. A data link error occurs if the transfer is aborted for any other reason.

Sectors specifies the number of 256-byte sectors required to save the ASCII file on media having the LIF format. If the media has the HF format, then this parameter may be set equal to "1".

A.4.3. Description of KERMIT_COM

This file contains the Common block statements required in an application program if the Kermit CSUBSs are to be loaded at run time.

Table A-4. Procedure Chart for "EXAMPLE" Program

STEP	Procedure
1.	On the HP 6954A, boot up BASIC 5.0 with the REMCON binary (Refer to "Requirements", earlier in this appendix).
2.	Use the MSI command to change default directory to where KERMIT_5 is stored on the HP 6954A hard disc.
3.	Create the "EXAMPLE" program at the HP 6954A (see Table A-5).
4.	SAVE the "EXAMPLE" program (in ASCII format).
5.	Run "EXAMPLE". This executes Ksend (to send "EXAMPLE" to the remote) followed by Kreceive to prepare for the return of an ASCII file from the remote.
6.	EXIT from Advance Link and execute the remote computer's Kermit program.
7.	At the Kermit prompt, type **Receive.** When the function is executed, a status display will appear.
8.	When the file is received, execute a directory command to verify that "EXAMPLE" is stored on the remote disc.
9.	You are now ready to finish the "EXAMPLE" program by returning a file to the HP 6954A (see line 60). Do this by returning "EXAMPLE" as "NEWFILE". At the Kermit prompt, type **send EXAMPLE NEWFILE.**
10.	When the function is executed, a status display will appear. When line 60 of the program is executed, the "EXAMPLE" program is terminated and REMCON enabled.
11.	Using the QUIT command, exit Kermit and rerun Advance Link to return to remote console control and verify that NEWFILE is stored in the HP 6954A. Also, examine the "EXAMPLE" program in memory and note that the remote has appended the Kermit CSUB library to it.

A.4.4 Example of Kermit Operation

This example illustrates the transfer of files between the HP 6954A and a DOS compatible remote computer. The transfer is done by executing the desired CSUB at the HP 6954A and invoking the appropriat Kermit function at the remote computer. Since the remote console configuration is being used, the example program will also be entered from the remote console.

Configuration. The following configurations are assumed:

Link Wiring — Remote computer wired to HP 6954A RS-232-C port (refer to Section 2 of this guide).

Port configured at Select Code 9. Remote computer configured as follows:

Baud rate = 9600; Word length = 7 bits
Receive pacing = off; Transmit pacing = off
Parity = 0's; Parity check = none

Software — BASIC 5.0 and REMCON at the HP 6954A HP Advance Link 2392 and appropriate Kermit program at the remote.

To run the example program, proceed as outlined in Table A-4.

NOTE

Whenever Kermit is executing, the REMCON function is temporarily disabled.

Table A-5. "EXAMPLE" Program Listing

```
 10 COM/Kermit/INTEGER Global (1:22)
 20 ON ERROR GOSUB Load_Kermit
 30 Kermit
 40 OFF ERROR
 50 Ksend ("EXAMPLE")
 60 Kreceive ("DUMMYNAME",1)
 70 STOP
 80 Load_kermit;! OFF ERROR
 90 LOADSUB ALL FROM "KERMIT_5"
100 RETURN
110 END
```

Appendix B
USING THE HP-IB FILE TRANSFER UTILITY

B.1 DESCRIPTION

This utility allows a remote Series 200/300 computer to control the following functions at a HP 6954A:

- Transfer files to the HP 6954A.
- Command the HP 6954A to return a catalog of its disc files.
- Command the HP 6954A to load and run certain BASIC programs.
- Request the status of the remotely initiated BASIC programs.

The transfer utility is made up of two programs:

- "FTU_SHELL" runs on the HP 6954A. This BASIC program waits for a command from the remote computer and then executes it.
- "FTU_LINK" runs on the remote Series 200/300 computer. This BASIC program accepts the user input and sends the appropriate commands to the HP 6954A.

B.2 REQUIREMENTS

These are the requirements for using the HP-IB Transfer Utility:

Hardware (Refer to Section 2 for installation instructions)

a. A HP Model 9000 Series 200/300 remote computer.

b. A HP 98624A HP-IB Interface card installed in the DIO card cage of the HP 6954A. The card must have its address set to 20 and its controller switch set to NOT CONTROLLER. Its default Select Code is 8.

c. An HP-IB cable connection between the remote computer and the HP 98624A card.

Software

a. HP 9000 Series 200/300 BASIC 4.0 (or later) operating system in both computers. Be sure that both the MS and TRANS binaries are loaded with BASIC.

b. If you will use this utility to execute programs having HP 14753A CAT statements, then observe the following concerning COM statements.

1. All programs must include COM/ISSSCOM/-INTEGER X(1:1096).

NOTE

The number "1096" may not be correct for later versions of the CAT software. If your program generates a run time error, check your HP 15753A Programming Reference Manual to verify the value of this number.

2. *All program COM statements must be included in "FTU_SHELL".*

3. If you have changed the Select Code or the HP 98624A HP-IB card (refer back to "Remote Console or Host Computer"), then you must also change it in the "FTU_SHELL" program. Edit the program line that specifies "Hpib = 8 to show the correct Select Code.

B.3 OPERATION

B.3.1 Utility Menu

The "FTU_SHELL" program, together with BASIC and the HP 14753A CAT software, is installed on the remote HP 6954A hard disc. You must install the "FTU_LINK" program in the remote Series 200/300 computer.

"FTU_SHELL" must be running in order for the utility to operate (you might want to LOAD it by modifying the BASIC AUTOST program in the HP 6954A). Then, when you run "FTU_LINK", the menu shown in Table B-1 appears. You send a command by entering the corresponding menu selection. Appropriate prompts will be given (see Table B-2).

B.3.2 Transferring Files

Both BDAT and ACCII files may be transferred. ASCII files are a standard format that can be exchanged between all types of computers. When you select a file transfer, here is what happens:

- The program prompts you to enter the SOURCE filename, followed by the DESTINATION filename (see Table B-2). If you are transferring *to* the HP 6954A then the "Local" filename is the SOURCE and the "HP 6954A" filename is the DESTINATION. The reverse is true when you transfer *from* the HP 6954A.
- You may specify MSIs or pathnames for the SOURCE and/or DESTINATION files.

Table B-1. Entry Menu for "FTU_LINK"

```
(1) Transfer an ASCII file from the HP 6954A
(2) Transfer a BDAT file from the HP 6954A
(3) Transfer an ASCII file to the HP 6954A
(4) Transfer a BDAT file to the HP 6954A
(5) Display a Catalog of the HP 6954A Disc
(6) Execute an ASCII program
(7) Return the status of the HP 6954A
(8) Reset the HP 6954A
(9) Exit BASIC
-------------------------------------------------------------
Enter selection:
```

Table B-2. Utility Prompt Messages

"Enter the HP 6954A filename"
"Enter the local filename"*
"Enter the HP 6954A directory name"
"Press any key for more"
"Press any key to return to the menu"
"File "<filename>"already exists. Do you wish to overwrite it (Y/N)?"

* The filename at your computer.

- As the transfer takes place, you will receive status messages such as "Transfer in progress" and "Transfer completed" (see Table B-3).
- If the DESTINATION file already exists, it is not automatically overwritten. You will be asked for permission to overwrite.
- If a problem occurs during transfer, an error message is displayed (see Table B-3). During transfers, error messages can occur because:
  - the SOURCE file cannot be found
  - a filename is invalid
  - a pathname or MSI is invalid

  If the transfer problem causes the HP 6954A program ("FTU_SHELL") to time out, the program will reset itself and display a corresponding error message. This may require you to reset the "FTU_LINK" program.

B.3.3 Displaying the Disc Catalog

You can perform a CAT command on the HP 6954A hard disc with this function. You have the option of entering the MSI designation and, if you are using BASIC 5.0, you may include directories as part of a directory path name.

B.3.4 Executing an ASCII Program

When you select item 6 from the utility menu, you can execute a program stored on the HP 6954A hard disc and transfer the results back to your computer. (If your program is not on the HP 6954A hard disc, then first select item 1 to transfer the program). Your ASCII program must have the following charactaristics:

- Start at line 1000.
- When finshed, return to the Shell Program (FTU_SHELL) with the statement "GOTO SHELL_START" on the next to last line.
- Have an END statement for the last program line.
- If required by your application, make use of the interrupt lines to reset the HP 6954A or to check its status.
- If required by your application, make use of the Return Status option to obtain the error number of any BASIC errors that occur.
- If interrupts or error checking is *not* required, comment out the appropriate lines in "FTU_SHELL".

B.3.5 Returning the HP 6954A Status

Item 7 of the Entry Menu will return any of the following three status items (see Table B-3):

- The HP 6954A is busy
- The HP 6954A is ready for a command
- BASIC error # ____ has occurred in the HP 6954A.

B.3.6 Resetting the HP 6954A

If you select Item 8 of the Entry Menu, you will reset the HP 6954A. This is useful in many situations, such as:

- You wish to halt your ASCII program and restart the shell program.
- An I/O or interrupt problem has locked up the HP 6954A.

When you successfully reset the HP 6954A, its Shell Program will restart and you will get the status message "The HP 6954A has been reset."

NOTE

If your ASCII program crashes BASIC or locks up the HP 6954A, the Reset command will fail and you will see the message "The HP 6954A is not resonding". In this case, you must reset the system from the HP 6954A.

Table B-3. Utility Error and Status Messages

"Invalid entry"
"File "<filename>" not found"
"Transfer in progress"
"Transfer completed"
"Problem opening "<filename>"
"Error opening "<filename>"
"File "<filename>" is not ASCII"
"File "<filename>" is not BDAT
"Directory "<filename>" not found"
"Catalog complete"
"Program execution started"
"The HP 6954A has been reset"
"The HP 6954A is not responding"
"Transfer cancelled"
"The HP 6954A is ready"
"The HP 6954A is busy"
"BASIC error # "< >" has occured on the HP 6954A"

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