WANG

6107

VS-65 Computer System

COMPANY PROPRIETARY STATEMENT

Customer Engineering
Product Maintenance Manual

741-1617-A

COMPANY CONFIDENTIAL

PREFACE

This document is the Product Maintenance Manual (PMM) for the Wang VS-65 Computer System. The manual is organized in accordance with Customer Engineering Technical Documentation's approved PMM outline. The scope of this manual reflects the type of maintenance philosophy selected for this product.

The purpose of this manual is to provide the Wang-trained Customer Engineer (CE) with sufficient instructions to operate, troubleshoot, and repair the VS-65 Computer System. The manual will be updated on a regular schedule or as necessary. Such updates will be published either as Publication Update Bulletins (PUBs) or as full revisions.

Second Edition (April, 1987)

This edition of the VS-65 Computer System PMM manual obsoletes documents 741-1617, 741-1617-1, 741-1617-2, 741-1617-3, 741-1617-4, 741-1617-5. Use of the material in this document is authorized only for the purpose stated in the Preface, above.

WARNING

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**********************************************************************
*                                                                    *
*           DO NOT ATTEMPT TO REPAIR THE SWITCHING                   *
*           POWER SUPPLY; IT IS FIELD REPLACEABLE ONLY.              *
*                                                                    *
*   DO NOT OPEN THE SWITCHING POWER SUPPLY UNDER ANY                 *
*   CIRCUMSTANCE. EXTREMELY DANGEROUS VOLTAGE AND                    *
*   CURRENT LEVELS ( IN EXCESS OF 300 VOLTS DC AND UNLIMITED         *
*   CURRENT ) ARE PRESENT WITHIN THE POWER SUPPLY.                   *
*                                                                    *
*   AFTER POWERING THE UNIT DOWN AND DISCONNECTING THE AC            *
*   POWER CONNECTOR FROM THE POWER SOURCE RECEPTACLE,                *
*   ALLOW ONE MINUTE BEFORE REMOVING THE POWER SUPPLY                *
*   TO PROVIDE ADEQUATE TIME FOR ANY RESIDUAL VOLTAGE                *
*   TO DRAIN THROUGH THE BLEEDER RESISTORS.                          *
*                                                                    *
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WARNING

****
*   *
*   THIS COMPUTER EQUIPMENT HAS BEEN VERIFIED AS FCC CLASS A.   *
*   *
****

IN ORDER TO MAINTAIN COMPLIANCE WITH FCC CLASS A VERIFICATION, THE FOLLOWING CONDITIONS MUST BE ADHERED TO DURING NORMAL OPERATION OF THE EQUIPMENT.

- ALL OF THE COVERS MUST BE ON THE SYSTEM AND SECURED IN THE PROPER MANNER.
- ALL INTERNAL CABLES MUST BE ROUTED IN THE ORIGINAL MANNER WITHIN THE CABLE CLAMPS PROVIDED FOR THAT PURPOSE.
- THE MAINTENANCE PANEL DOOR MUST BE KEPT CLOSED.
- ALL EXTERNAL CABLING MUST BE SECURED AND THE PROPER CABLE USED TO ENSURE THAT CABLE SHIELDING IS PROPERLY GROUNDED TO THE CABLE CLAMPS PROVIDED.
- ALL HARDWARE MUST BE PROPERLY SECURED.

The last page before the back cover is a comment sheet.
Please take the time to fill out the comment sheet and return it,
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M/S 8237
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CHAPTER 1

INTRODUCTION

Chapter 1 information is not provided as part of the VS-65 First Customer Shipment (FCS) Manual, but will appear in the Illustrated Maintenance Manual (IMM).

CHAPTER 2

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CHAPTER 2

THEORY OF OPERATION

CHAPTER 2

THEORY OF OPERATION

Chapter 2 information is not provided as part of the VS-65 First Customer Shipment (FCS) Manual, but will appear in the Illustrated Maintenance Manual (IMM).

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CHAPTER 3

OPERATION

3.1 GENERAL

This chapter provides the CE with tables listing all VS-65 mainframe controls and indicators, daily turn-on, and normal and emergency shut-down procedures. Included in this chapter are the procedures for using these controls and a brief statement on the purpose of each control and indicator.

3.2 OPERATOR CONTROLS

Table 3-1 lists the operator controls found on the VS-65. The locations of the operator available controls are shown in figures 3-1, 3-2, and 3-3. (Locations of the service controls are referenced in the applicable paragraphs noted in table 3-5.)

Table 3-1. Operator Controls

CONTROL NAME/TYPE	LOCATION	PURPOSE
AC POWER ON/OFF Rocker Switch	Lower Front Cover (on SPS)	Applies ac & dc power to the CPU mainframe when in the one '1' position.
INITIALIZE Red Pushbutton	Front Panel	Causes system to IPL from selected disk drive and system clock to be reset.
CONTROL MODE Green Pushbutton	Front Panel	Forces system into Control Mode if Control Mode Microcode is loaded.
		Allows verification of HEX displays and BP diagnostic switch settings during power-up. (Refer to paragraph 8.5.1.)
BOOT DEVICE Toggle Switch	Front Panel	Selects Diskette, Internal Fixed, or External disk drive as Boot Device.
LOCAL CONTROL, REMOTE DIAGNOSTIC, REMOTE CONTROL Key Switch	Front Panel	Allows normal local operations. Selects Remote Diagnostic TC Mode. Allows Remote Administration using remote diagnostic connector to Wang PC.
DISCONNECT Pushbutton Switch	TC Front Panel	Clear Data Terminal Ready signal for Telecommunication Device Adapter.
CLEAR Pushbutton Switch	TC Front Panel	Generates a power-up reset state for Telecommunication Device Adapter.
DISKETTE DRIVE Latch Control	Diskette Drive Front Panel	Generates interrupts and engages Drive when latch control is turned right 90°.

3.2.1 POWER-ON/OFF

The ac power On/Off switch is mounted on a bracket on the front of the Switching Power Supply (SPS) and protrudes through the front cover of the VS-65. (See figure 3-1.) Ac power is applied to the switching power supply directly from the input source. The system is turned on by depressing the ac power switch to the one '1' position. Ac power is supplied to the switching power supply and the fans. The switching power supply in turn provides dc power to the Motherboard, the Diskette Drive and the Internal Disk Drive.

The Power-On and Not-Ready LEDs, and the four HEX displays on the Front Panel light. If the LEDs do not light, or the HEX displays go on and then off within two seconds, a system power supply problem exists. (See paragraph 4.7.2 and 5.7.2.)

The Diskette Drive Activity LED will light, fluctuate in intensity, and remain dimly lit. The Telecommunication Panel LEDs (if so equipped) will light, with LED-8 blinking, and then turn off (except LED-8 which will remain on). Any other condition indicates a failure in the corresponding TC port.

The system is turned off by depressing the ac power switch to the zero '0' position.

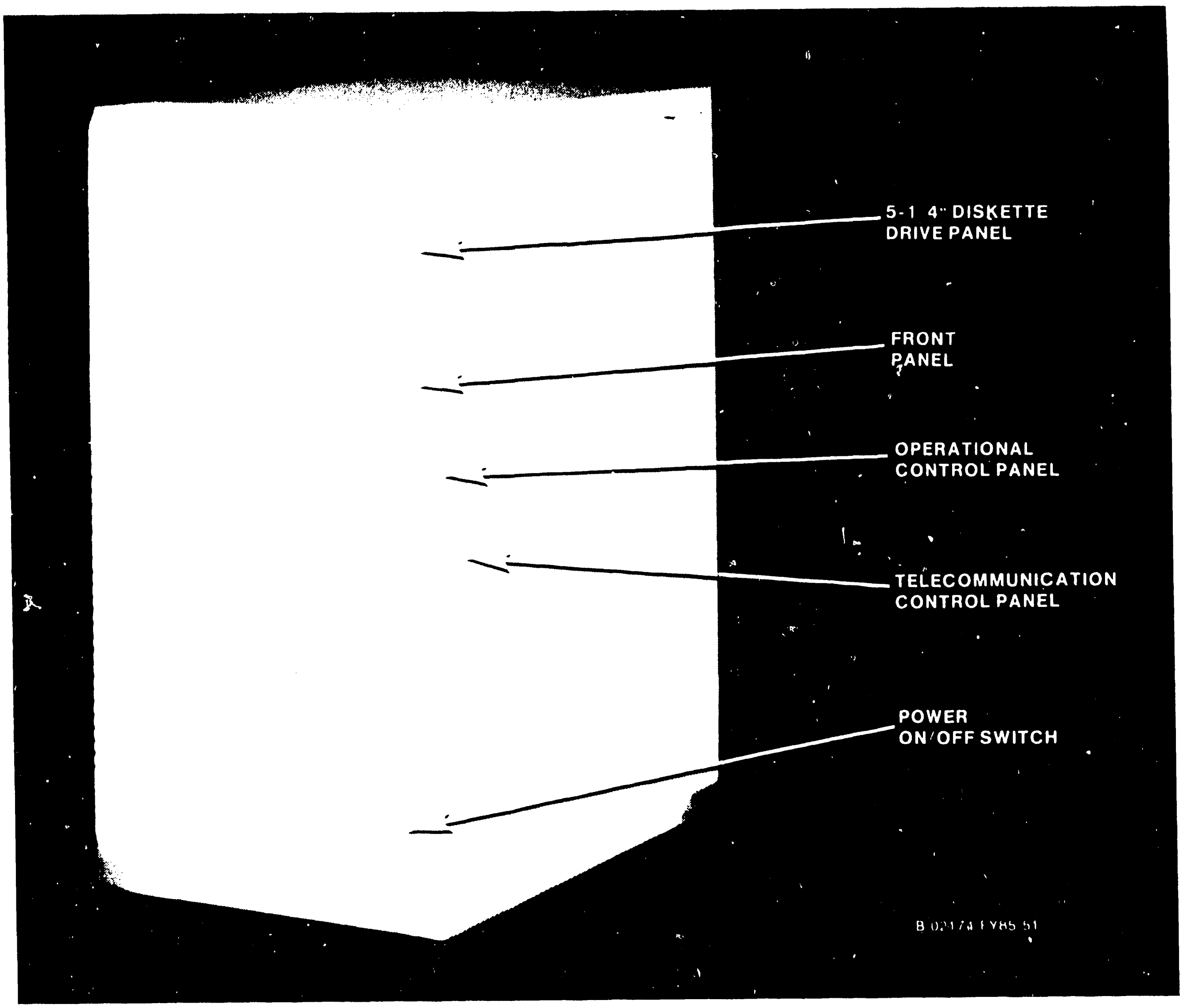

Figure 3-1. Operator Controls and Indicators

3.2.2 DISKETTE DRIVE LATCH

The half-height 5-1/4" Diskette Drive Latch (see figure 3-2) engages the drive when a diskette is in the drive and activates a switch. When the Latch is horizontal, the drive is 'CLOSED' and contains a diskette. When the Latch is vertical, the drive is 'OPEN' and will allow diskette access. When the Latch (switch) position is changed, an interrupt is sent to the Bus Processor.

CAUTION

The Latch control can NOT be rotated unless a diskette is in the drive.

3.2.3 FRONT PANEL CONTROLS

The Front Panel (see figure 3-2.), located at the right front of the mainframe, contains two pushbuttons, and several indicators. These allow the operator to initialize the system, verify the system HEX display and BP diagnostic mode, display system error status, and force the system into Control Mode.

3.2.3.1 Control Mode Pushbutton Switch

The green Control Mode pushbutton serves two functions. At power-up, it allows the verification of the HEX displays by looping on decrementing mode, displaying the settings of the Bus Processor's diagnostic switches, and then beginning the BP's power-up diagnostics.

Pressing the green Control Mode pushbutton during the loading of system microcode (or at any time thereafter), sets the Control Mode bit to one, forcing the CP into the Control Mode. The VS-65 Control Mode function is identical in operation to that of other Small VS Systems.

3.2.3.2 Initialize Pushbutton Switch

Pressing the red Initialize pushbutton forces the system into the Initialized state. In this state, the system is in the following condition:

1. Main Memory (MM), Segment Control Registers (SCRs), and the CP7 Reference and Change Table (now located in MM) are all set to zero.

2. Page Table for Segment Zero (Operating System) is loaded into the TRAM for access by the CP. Remaining TRAM entries are faulted.

3. The System Clock is reset to zero and Comparator bits are set to one. As a result, the operator must enter the date and time into the system whenever the system is initialized using the Initialize pushbutton. (The Time-Of-Day chip is not maintained by the Operating System.)

4. The Bus Processor Power-Up PROM receives control and starts the power-up bootstrap process.

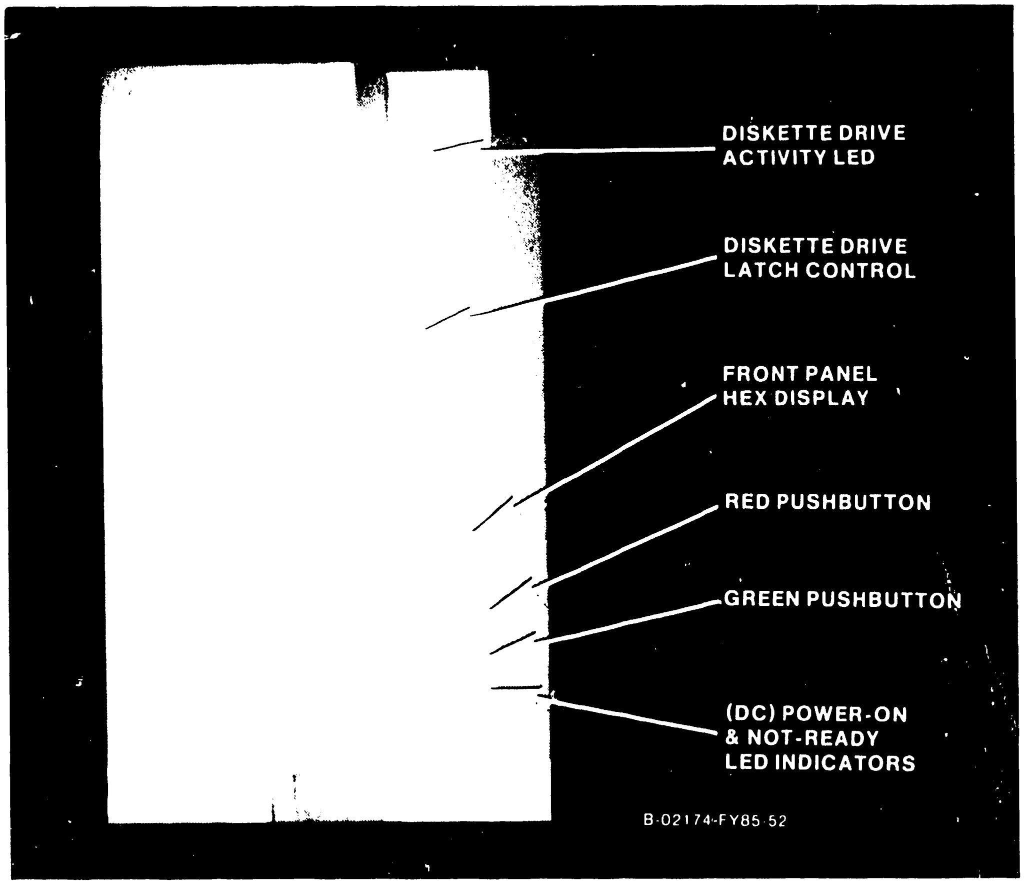

Figure 3-2. Diskette Drive and Front Panel Controls and Indicators

5. The BP checks the BP Code RAM, BP Data RAM, and IPL disk drive interface. The BP then loads microcode into the Data RAM, moves the microcode to Code RAM, and branches to execute the microcode.

3.2.4 BOOT DEVICE AND KEYLOCK ASSEMBLY PANEL

Using the Boot Device and Keylock switch assembly (see figure 3-3.), located behind a small door in the Front Cover, the operator selects the system's operational mode. Depending on the disk drive selected, diagnostic and/or system microcode will be loaded, and the system will attempt to IPL.

3.2.4.1 Boot Device Switch

The three-position Boot Device selection switch enables the operator to select the disk drive required to use Stand-Alone Utilities or to IPL the system. These three positions are:

1. UP - Selects the model 2270V-5 diskette drive (see 8.5.1, note 3).

2. CENTER - Selects the system's internal media tolerant disk drive.

3. DOWN - Selects the system's external disk drive, Drive 1 (Port-0).

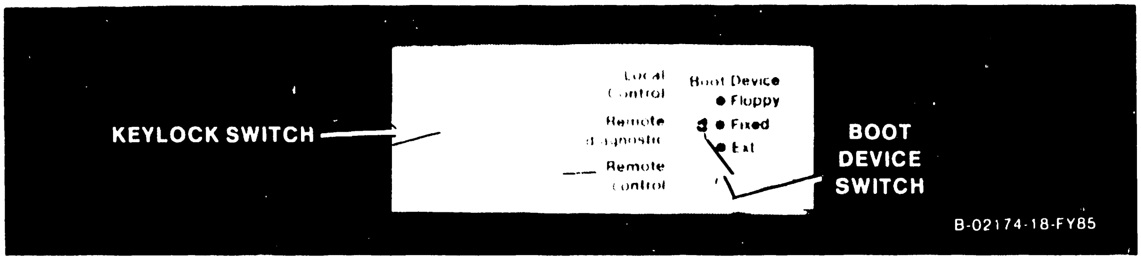

Figure 3-3. Boot Device Switch and Keylock Assembly Panel

3.2.4.2 Local Control/Remote Diagnostic/Remote Control Switch

When in Local Control, the three-position, key operated control switch will allow normal system operation. Turn the switch to the Local Control position, remove the key from the lock, and give the key to the System Administrator.

When in Remote Diagnostic control, it allows connection of the system to the Remote Maintenance Center (RMC), for remote diagnostic operation, via the RS-232 Remote Diagnostics Connector, a modem, and a telephone line. The RMC will be able to read the Nonvolatile RAM or down-line run diagnostic packages already loaded on the system.

The Remote Control position allows Remote Administration through the Remote Diagnostic Connector when connected to a Wang Professional Computer. If the switch is in the Remote position, the PC controls the system's IPL device, and the Initialize and Control Modes.

Because of its function as a diagnostic tool, a detailed description of the Local Control/Remote Diagnostic/Remote Control switch and its function is included in Chapter 8 of this document.

3.2.5 TELECOMMUNICATION DEVICE ADAPTER CONTROL AND INDICATOR PANEL

The Telecommunication Device Adapter Control and Indicator Panels are mounted in the space provided immediately below the Boot Device and Keylock Assembly (figures 3-1 and 3-4). Space is provided for four TC DA Control and Indicator Panels. Each panel contains eight LED indicators and two pushbutton switches. The pushbutton switches are described in table 3-1. The TC Device Adapter status, as indicated by the LEDs, is described in tables 3-2 and 3-4.

Table 3-2. Telecommunication Device Adapter LED Indicators
(Power-Up and/or IPL)

LEDS 1-7 CONDITIONS	LED 8 CONDITIONS	TC DA STATUS
All on	Blinking	Test running
All off	On	Test passed
Some on/some off	Blinking	Test failed

3.3 OPERATOR INDICATORS

Tables 3-2, 3-3, and 3-4 lists the operator indicators found on the VS-65. Locations of the indicators are shown in figures 3-1, 3-2, and 3-4.

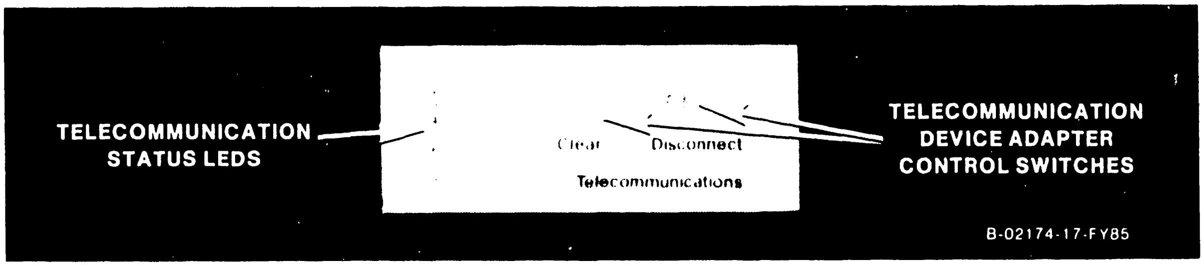

Figure 3-4. Telecommunication Control and Indicator Panel(s)

Table 3-3. Operator Indicators

INDICATOR NAME/TYPE	LOCATION	PURPOSE
Diskette Drive ACTIVITY LED	Upper Left Drive Panel	DIM indicates Ready; ON for Read/Write OFF during Seek (briefly) or Failure.
HEX ERROR CODE Display	Front Panel	Four hexadecimal displays indicate Self-Test Monitor error codes. (See 8.3.4.1)
POWER-ON LED	Front Panel	Indicates dc power is available. (Note)
NOT-READY LED	Front Panel	ON during power-up diagnostics mode. OFF during IPL (or failure, see 8.5.2).
TC Display LEDs	TC Panel	Refer to tables 3-2 and 3-4.

NOTE

Since the Power-On LED's normal status is ON, an error condition exists when the LED is OFF. However, the LED only indicates that the voltages are present at the power supply. It does not indicate that actual voltages on the Motherboard are within the correct limits.

3.3.1 DISKETTE DRIVE ACTIVITY INDICATOR LED

The 5-1/4" half-height diskette drive LED has three modes of operation: Off (or not-ready), Ready, and Seek. When the system is powered-up the LED lights brightly during power-up diagnostics. After a brief period of time, the LED (which may flicker in intensity) will dim, and the drive motor will halt. When the drive is Ready, but inactive, the LED will dim noticeably and remain is this state. During a Read/Write operation, the LED will light brightly, and intermittently dim or go out briefly (during a Seek operation).

If the light remains out, the drive is signaling a Not-Ready (or Failed) condition. In this case, refer to the appropriate paragraphs of Chapters 4, 5, and 8, and Appendix B as required.

3.3.2 FRONT PANEL INDICATORS

The Front Panel monitors system error status and provides the operator with information concerning the error condition of all I/O devices connected to the mainframe as well as error status of the BP, CP, and MM. The Front Panel has one row of four HEX displays and two LED indicators. Because of its function as a diagnostic tool, a detailed description of the Front Panel is included in Chapter 8 of this document. (Refer to table 3-3 above.)

3.3.3 TELECOMMUNICATION DEVICE ADAPTER PANEL LED INDICATORS

The LED indicators as defined in table 3-4 are only valid when running VSCOPY and TCCOPY using RS-232-C (or RS-422, RS-423, or RS-449) and X.21 (International) protocols. On VS systems, the LED indicators may change for WSN, X.25 and other networking applications. For more information refer to the applicable Customer Engineering documents found under Class Code 7300.

Table 3-4. Telecommunication Device Adapter LED Indicators (Normal TC Operation)

INDICATOR	TC SIGNAL	PURPOSE
LED1	(RXD)	Received Data
LED2	(TXD)	Transmitted Data
LED3	(CTS)	Clear-to-Send
LED4	(RTS)	Request-to-Send
LED5	(CXR)	Carrier Detect
LED6	(DTR)	Data Terminal Ready
LED7	(DSR)	Data Set Ready
LED8	-	Power is ON

3.4 SERVICE CONTROLS

Table 3-5 lists the service controls found on the VS-65. Locations of the service available controls (switches) are referenced in the applicable paragraphs noted in the table and are shown in Chapters 4 and 5.

3.4.1 MEMORY SIZE SWITCH AND JUMPER POSITIONS

The VS-65 Main Memory printed circuit board is available in three configurations: One megabyte (1024K-bytes) using 64K-byte RAMs, two megabytes (a half-loaded PCB using 256K-byte RAMs), and four megabytes (a fully loaded PCB). Each is equipped with Error Correction Circuity (ECC), and 16K-bytes of fast static RAM Cache Memory. A 32-bit dedicated Read path between Cache and Main Memory achieves a 90% plus hit ratio. A four-bank DIP switch (SW1), and five jumpers are used to determine the memory size and hardware configuration of the Main Memory PCB. In addition to the standard Motherboard connections, three jumper cables are used to connect the Main Memory to the CP7 Central Processor.

Figures 5-5 and 5-6 show the locations of switch (SW1) and the five jumpers (JP1-JP5). Tables 5-1 and 5-2 give the switch and jumper settings for each of the three Main Memory boards. Incorrectly altering the switch settings and/or jumper positions can result in the system failing the Self-Test Monitor's (STM) Main Memory Test, or being unable to IPL correctly.

The settings of the memory size switch on the Main Memory board are compared with the high-order memory address bits (MA18-21) in the comparator chip. During the STM MM test, the switches and jumpers are read and compared. The only deviation allowed is when the switch settings limit the available physical memory to a logical value less than the actual physical memory available. All other combinations of switch settings and/or jumper positions will return an error code of 4E90.

Table 3-5. Service Controls

CONTROL NAME/TYPE	LOCATION	PURPOSE
AC LINE VOLTAGE Slide Switch	Top of Power Supply Cover	Select ac input voltage, 115Vac, 60 Hz. or 220V ac/50 Hz. (See figure 5-34.)
DC VOLTAGE Potentiometers	Power Supply PC Boards	Four potentiometers used to adjust dc voltages on SPS. (See figures 4-4 & 5)
MEMORY SIZE DIP Switches	Main Memory board	Bank of four switches user to select Main Memory size. (See para. 3.4.1.)
Bus Processor CRAM MEMORY CONTROLLER DIP Switches (1&2)	Bus Processor board	Select BP Code RAM Controller bits determining BP CRAM memory size, timing and operating mode, and CRAM/DRAM DMA.
Bus Processor DIAGNOSTIC DIP Switches (SW3)	Bus Processor board	Determines diagnostics mode or normal system operation. Read by the BP 80286 microprocessor. (See paragraph 3.4.2.)
Internal/External Disk Drive TYPE SELECTION Switches	Int. and/or Ext. Disk Drive DA board	Selects disk drive type using SW1 (and SW2) DIP switch banks for one internal and up to four external drives.(5.5.2)
Internal Disk Drive PCB MODE SELECTION Switches	Disk Drive Internal PC Board	One toggle and three DIP switches used to select operational modes of internal disk drive. (See para. 3.4.3 & 5.7.3)
Telecommunication MODE SELECTION DIP Switch(s)	TC-1 or TC-2 Device Adapter PC Board	Bank of eight switches used to select diagnostic or operational mode(s) for 1-port or 2-port TC DAs. (See 5.2.4)

3.4.2 BUS PROCESSOR SWITCH SETTINGS

The VS-65 Bus Processor functions much the same as the VS-15's BP. In fact, however, it is considerably more powerful since it uses the 80286 microprocessor, has an advanced Code RAM memory controller, and high speed memory. It also has the ability to control either a 5-1/4" or 8" diskette drive. (At the present, the 8" drive capability will not be used.) Two DIP switches of eight banks each (SW1 & SW2), located on the BP board, are used to program the Bus Processor's Code RAM memory controller. The CRAM memory dual port controller allows synchronous operation with the 80286, and asynchronous operation during DMA to the Data RAM. An eight-bank DIP switch (SW3), also located on the BP board, is used by the BP's 80286 microprocessor to determine the diagnostic mode of operation (as was the case for other Small VS Systems).

Figure 5-12 shows the location of the BP switches. Tables 5-4 and 5-5 show the switch settings for the CRAM controller and table 5-3 provides the switch settings which determine the available diagnostic functions.

3.4.3 INTERNAL FIXED DISK DRIVE CONTROLS AND SWITCHES

The Internal Fixed Disk Drive has three (8-bank) DIP switches, a Write Protect toggle switch and Lock Control Assembly. The three DIP switches set the Control and Installation modes, and the Number of Sectors per track.

The Lock Control Assembly secures the Spindle and Actuator Positioner with a lock device to prevent movement during shipping or removal of the drive. This device must be released prior to operating the drive. (Refer to paragraphs 4.5.1 and 5.7.3.)

CAUTION

The Lock Control Lever of the internal disk drive Lock Control Assembly must be in the FREE (UP) position before Power-Up to allow the disk drive to function.

3.5 SERVICE INDICATORS

The VS-65 has several LED indicators located on various printed circuit boards. Refer to table 3-6 for the location and function of each, and the following paragraphs for additional information.

Table 3-6. Service Indicators

INDICATOR NAME/TYPE	LOCATION	PURPOSE
Switching Power Supply VOLTAGE LEDs	Power Supply PC Boards	Indicators for dc voltages supplied throughout mainframe (see figs 4-4&5).
Internal Fixed Disk Drive STATUS LEDs	Internal PC Board	Three colored LEDs indicate status of disk: Ready, Fault, or Seek Error.

3.5.1 SWITCHING POWER SUPPLY DC VOLTAGE LEDS

The Switching Power Supply has six internal LEDs located on two boards. The LEDs indicate that a specific voltage is present at the power supply, but DO NOT indicate that the voltage is within tolerance. The voltages must be measured at the required test points and adjusted as necessary.

3.5.2 INTERNAL FIXED DISK DRIVE STATUS LEDS

The status of the Internal Disk Drive is determined by three LEDs. The READY LED (Green) indicates that the drive is up to speed and the heads are on the cylinder, however a FAULT can still exist. The FAULT LED (Red) will light when a fault is detected and the drive is immediately WRITE PROTECTED. When a SEEK ERROR occurs, the ORANGE LED lights and the drive is also WRITE PROTECTED.

3.6 SUPPORT MATERIALS

No special support materials are necessary for the VS-65 mainframe.

3.7 OPERATIONAL PROCEDURES

This section is included to assist the Customer Engineer during initial installation and during system turn-over to the customer's operator or system administrator. After all peripherals are connected to the VS-65 mainframe, perform the following system procedures, and (if required) demonstrate them to all applicable customer personnel.

3.7.1 DAILY POWER-UP PROCEDURES

1. Make sure that the mainframe power connector is plugged into the power source receptacle.

2. Power-up Workstation Zero (WS-0) and any external drives.

3. Depress the mainframe ac power On/Off switch to the one '1' position.

4. After the PROM-based power-up diagnostics have completed (in about 45 seconds), position the cursor of WS-0 next to the IPL volume name (if different from the default IPL volume) and press ENTER. The Self-Test Monitor (STM) diagnostics will begin running.

   If the NOT-READY LED goes out, the STM halts and displays an error code on the Front Panel HEX Displays, or the system halts for longer than 30 seconds, refer to figures 3-5A through 3-5D, Operator (Customer) Level Troubleshooting Flowcharts. (Also see table 8-2 for additional diagnostic error code information.)

5. After the Self-Test Monitor diagnostics have completed (in about two minutes), the system will begin loading the necessary microcode. The NOT-READY LED will go out and the initialization process will begin. In about 10 seconds, WS-0 will respond with a request for the information required to set the date and time.

6. Enter the date and time and press ENTER.

7. The default configuration file screen will appear immediately. Press ENTER and System Initial Program Load (IPL) screen will appear.

8. The IPL screen displayed on WS-0 shows the version of the VS Operating System Nucleus being used for system generation, the size of physical memory available, and the time at which each IPL level is completed.

9. When System Initialization has completed, the VS Operator's Console screen will appear, and after the Queue Verification Routine has completed, the system will be ready for normal operation.

3.7.2 DAILY VERIFICATION PROCEDURES

1. Perform an IPL from the system disk.

2. Log on to any workstation and and run the WSDKTEST diagnostic located in @SYSTST@ library on the system disk.

3. If there are no errors cancel the diagnostic, log off the system, and let (or assist) the customer resume normal daily operations.

3.7.3 DAILY POWER-DOWN PROCEDURES

Demonstrate to the customer (if required) the following power-down procedures.

CAUTION

POWERING THE SYSTEM AND/OR ANY EXTERNAL DISK DRIVE DOWN IMPROPERLY MAY RESULT IN DAMAGE TO THE VOLUME TABLE OF CONTENTS (VTOC) OF THE DISK DRIVE(S).

1. Verify that all operators have logged off of the system. Press PF key 13 (WORKSTATIONs) on an operator's console to check that all operators have logged off of the system.

2. Press PF key 7 (NONINTERACTIVE Tasks) on an operator's console to check the background tasks on the system. Look under the USER column to identify any user running a background task and advise the user to suspend or terminate the task.

3. Press the green Control Mode button. This prevents any disk I/O command in process from being halted prior to completion.

4. Power down all peripheral devices according to the procedures in the applicable Customer Engineering documents found under Class Code 3000.

5. Depress the mainframe ac power On/Off switch to the zero '0' position.

3.7.4 EMERGENCY SHUT-DOWN PROCEDURES

In case of an emergency situation when the normal daily power-down procedure can not be used, discuss the following procedures with the customer:

1. Press the green Control Mode button, if possible. This prevents any disk I/O command in process from being halted prior to completion and prevents possible damage to any disk VTOC.

2. If time permits, unload any external disk drives.

3. Depress the power On/Off switch to the zero '0' position and power-down any external drives.

4. Disconnect the mainframe power connector from the power source receptacle.

3.8 OPERATOR PREVENTIVE MAINTENANCE

No operator preventive maintenance is necessary on the VS-65 mainframe.

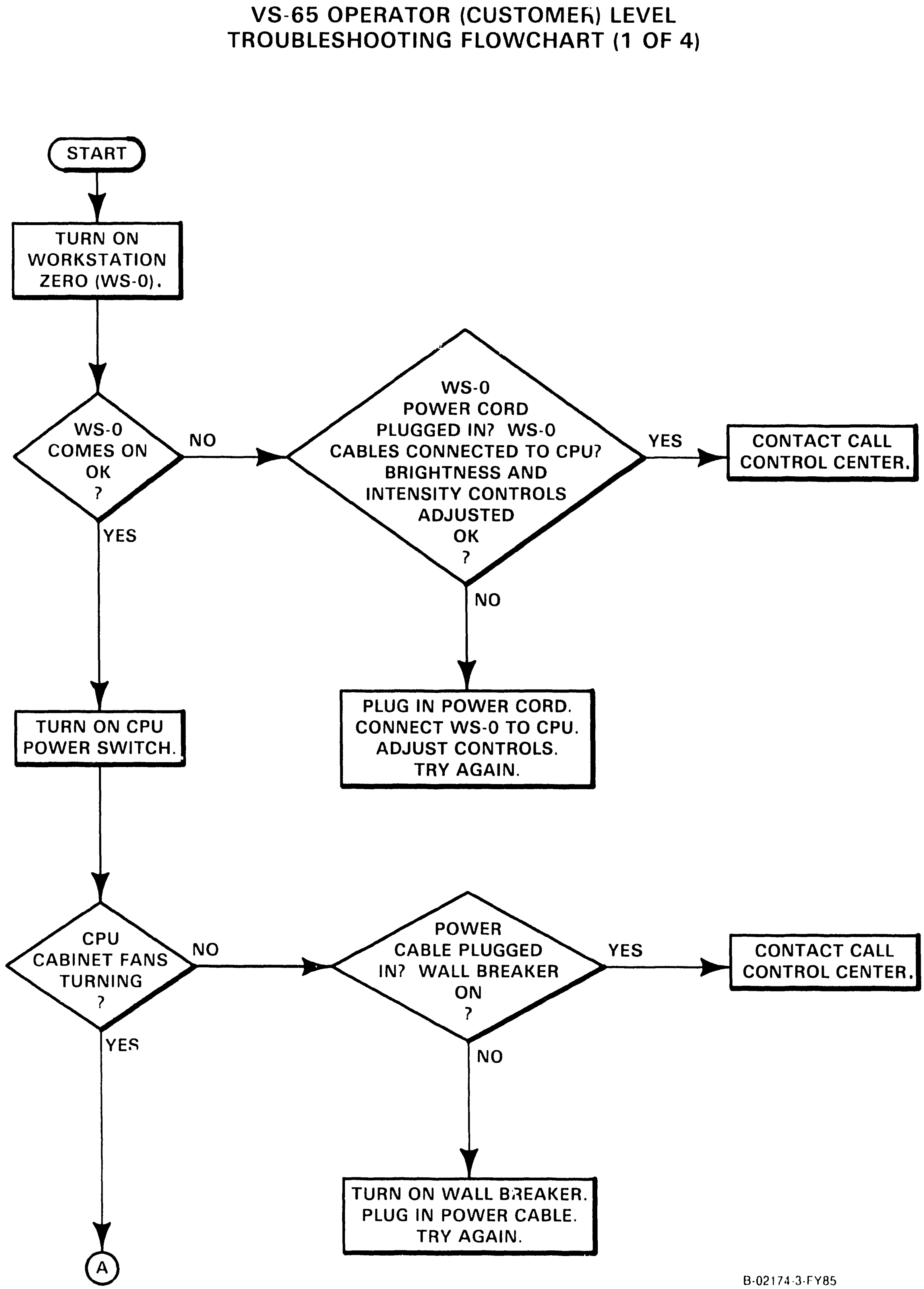

Figure 3-5A. Operator (Customer) Level Troubleshooting Flowchart

VS-65 OPERATOR (CUSTOMER) LEVEL
TROUBLESHOOTING FLOWCHART (2 OF 4)

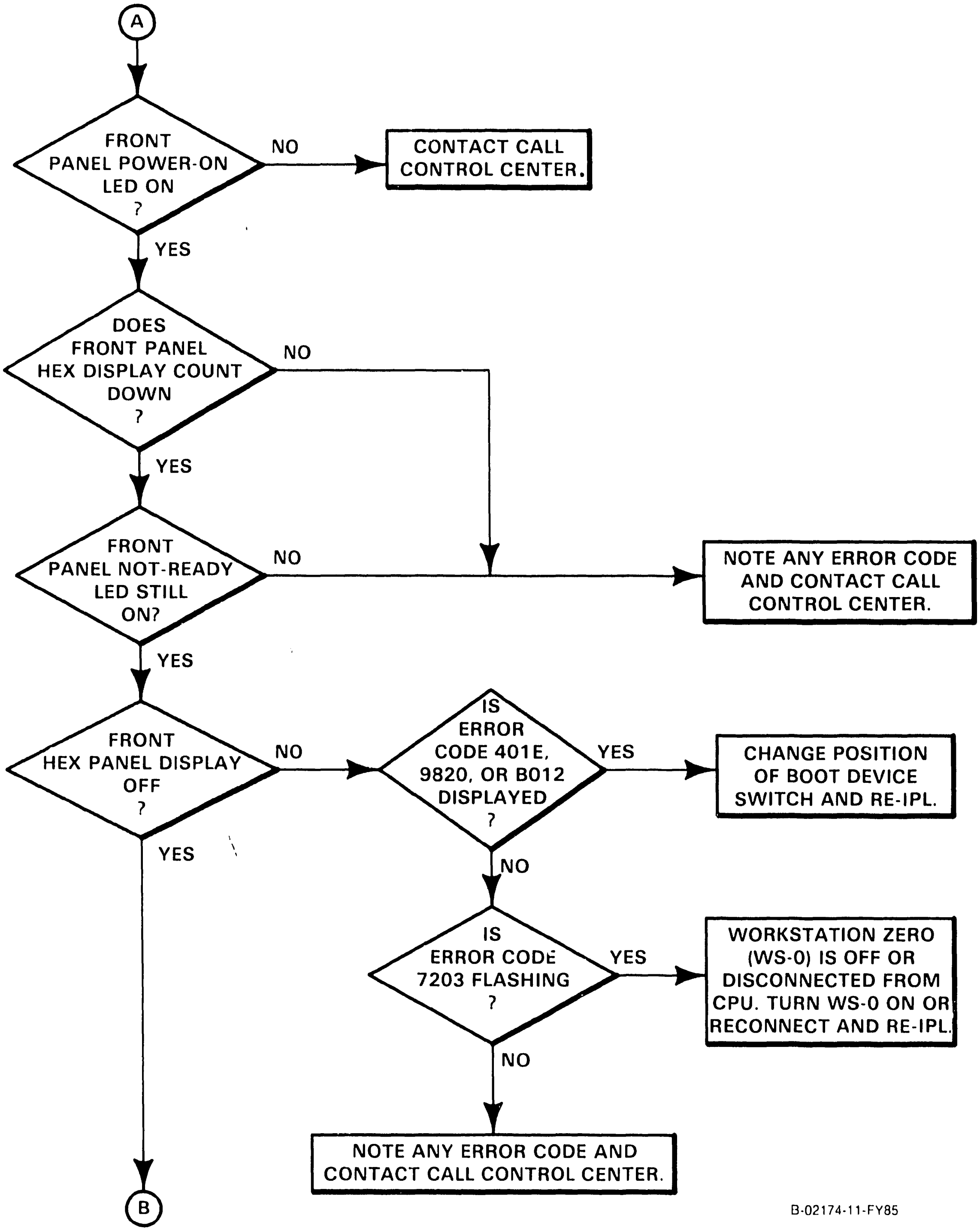

Figure 3-5B. Operator (Customer) Level Troubleshooting Flowchart

VS-65 OPERATOR (CUSTOMER) LEVEL TROUBLESHOOTING FLOWCHART (3 OF 4)

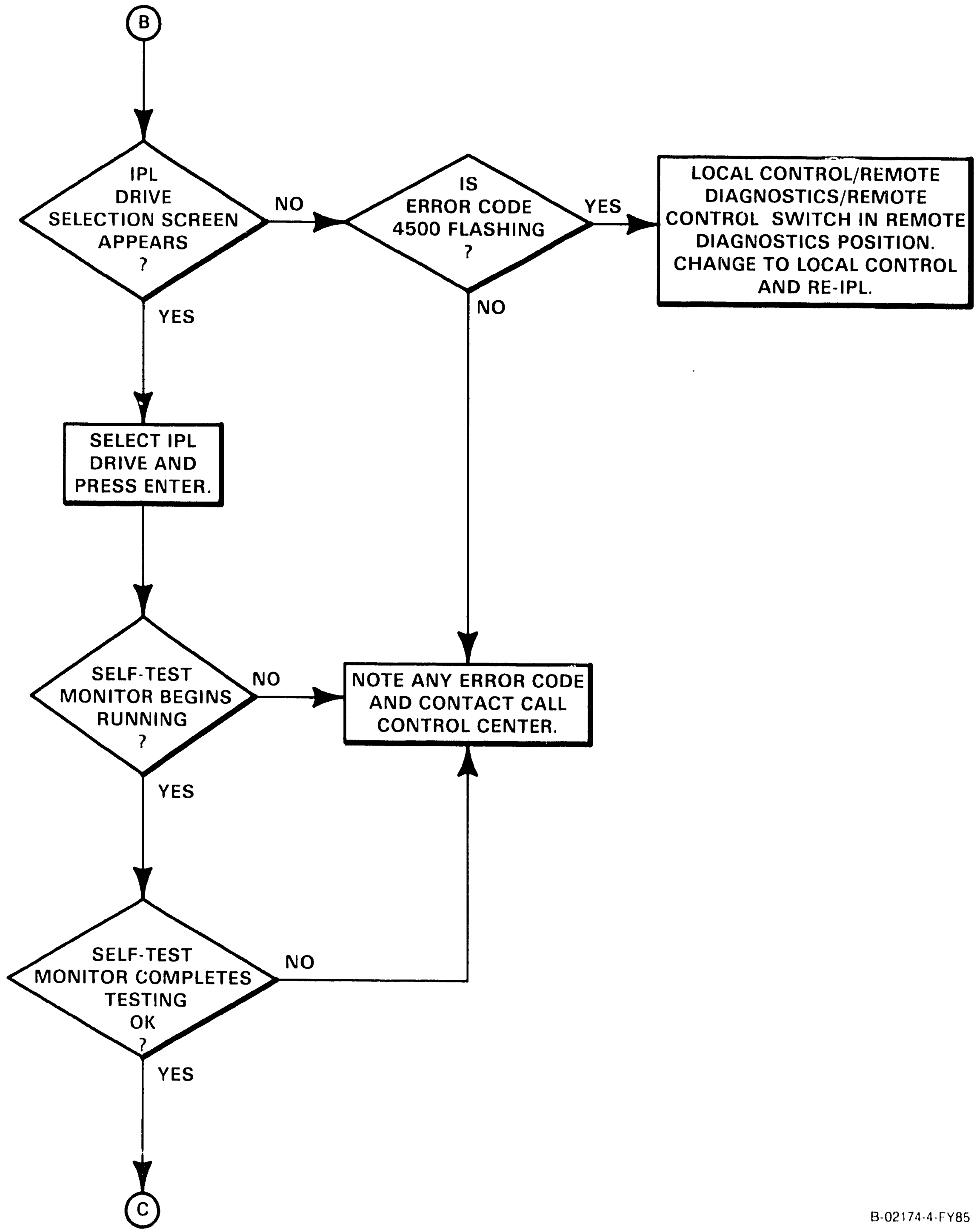

Figure 3-5C. Operator (Customer) Level Troubleshooting Flowchart

VS-65 OPERATOR (CUSTOMER) LEVEL TROUBLESHOOTING FLOWCHART (4 OF 4)

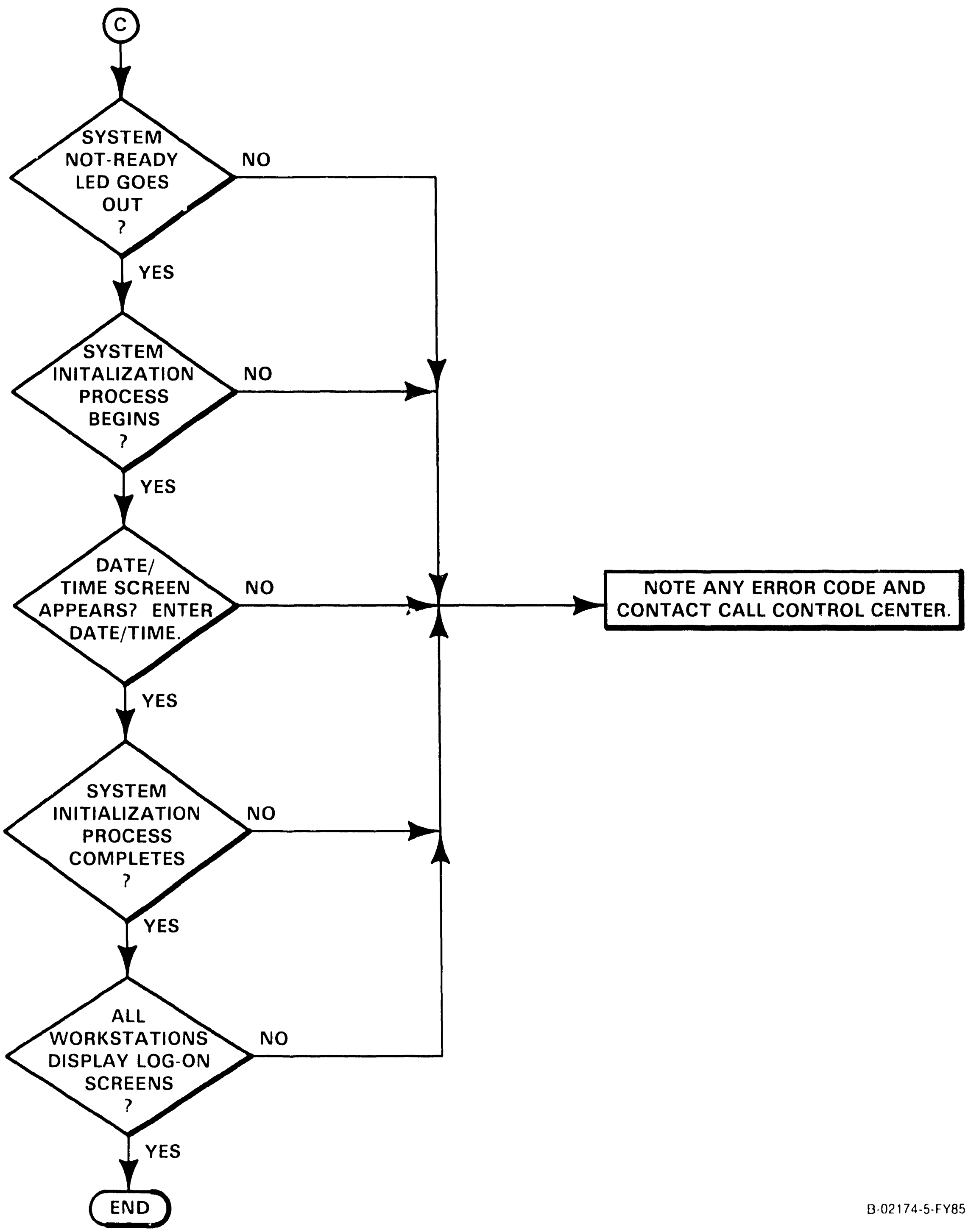

Figure 3-5D. Operator (Customer) Level Troubleshooting Flowchart

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INSTALLATION

4.1 GENERAL

This chapter describes the procedures for unpacking, inspecting, and installing the VS-65 mainframe. Included in this chapter are instructions for system interconnection and initial power-up. Refer to Chapter 3, Operation, Chapter 5, Corrective Maintenance (Removal/Replacement) and Chapter 8, Troubleshooting, of this manual for more information needed to complete the installation. Actual installation should not begin until the site requirements detailed in the following publications have been demonstrated.

DOCUMENT TITLE	WLI P/N
Customer Site Planning Guide	700-5978
Systems Installation Guide for VS, 2200, and WP/OIS Systems	729-0907
VS Customer Planning and Resource Guide	700-6727

Plus any other pertinent documents in Class Code 1106.

4.2 INSTALLATION SITE CHECK

Prior to installation, the following conditions must be met:

1. All site plans have been approved by both the customer and a Wang service representative.

2. All building alterations have been completed and inspected.

3. All electrical wiring, air conditioning, and telecommunication modifications have been installed and tested.

4. If the installation is an upgrade only (CPU replacement), the salesperson has verified that all parallel peripheral devices have been replaced by serial peripheral devices.

NOTE

It is the responsibility of the salesperson to make sure that an upgrade site meets all necessary VS-65 specifications.

5. The CE will perform a preinstallation inspection two weeks prior to delivery. At this time, the CE will check the site for compliance with VS site specifications. The CE will bring any unsatisfactory conditions noted to the attention of the customer for correction.

NOTES

1. Before installation of a VS-65 can take place, the minimum specifications as described in the previously listed publications must be met.

2. Failure to meet these requirements may require the installing Customer Engineer to deem the site unsuitable for the proper functioning of the VS-65 Computer System.

4.2.1 REMOTE DIAGNOSTIC TELECOMMUNICATION REQUIREMENTS

The following information is provided to ensure proper installation of the telecommunication equipment required for remote diagnostic support.

4.2.1.1 Site Preparation for Remote Maintenance

At the preinstallation site check, verify that the customer has:

1. Ordered the following telephone equipment for connection to a switched line telephone network:

   a. A Modular Telephone (either rotary or tone generating is acceptable) for Remote Diagnostic sessions.

   b. The appropriate Modular Connecting Block for one of two telephone types:

      1. RJ11C voice jack for desk top telephones
      2. RJ11W voice jack for flush wall telephones.

2. Scheduled the telephone equipment installation prior to the VS-65 installation to ensure an efficient Remote Diagnostic Certification procedure.

4.2.1.2 Configuration Guidelines

Ensure that the site facilities allow the placement of the:

1. Command Console (WS-0) = within 25 feet of VS-65 Computer System.
2. Remote Diagnostic Modem = within 10 feet of VS-65 Computer System.
3. Modular Telephone = adjacent to Remote Diagnostic Modem.

4.2.1.3 Wang Remote Diagnostic Modem Specifications

Domestically, the Wang model WA3451 modem is supplied with the VS-65 system. A 6-pin modular plug (T-connector), WLI P/N 726-8089, is also supplied to connect the modem to the switched line telephone network. Additional specifications follow.

MODEM DIMENSIONS	INCHES	CENTIMETERS
Width	7.0	18
Height	2.5	6
Depth	12.0	30

MODEM POWER REQUIREMENTS	
Line Voltage	105-129 Vac
Frequency	47-63 Hertz
Power	12 Watts

4.2.1.4 FCC Requirements For Switched Line Connection

Federal Communications Commission (FCC) regulations specify that prior to connecting a device such as the WA3451 modem to the switched telephone network, a user must provide the local telephone company with the name of the manufacturer, the model number, FCC registration number, and the ringer equivalence number of the device to be connected. For the WA3451, the information is listed on the bottom of the modem, and is also shown below.

Model Number	Wang WA3451
FCC registration number	AJ 496M-67213-DM-N
Ringer equivalence number	0.9B
Manufacturer (for Wang Labs)	Racal-Vadic, Inc.

NOTE

The WLI WA3451 modem is registered with the FCC as a permissive device for direct connection to a switched telephone line. A Data Access Arrangement (DAA) is not needed.

4.2.1.5 International Site Preparation and Installation

It is the customer's responsibility to provide:

1. A telephone line for both voice and data communication, and a telephone within 10 feet of the VS-65 system.

2. A 1200 BPS asynchronous modem conforming to CCITT V.22 recommendations. Modem type, availability, and substitutions follow:

   a. Racal-Milgo MPS1222 modem is recommended.

   b. In those countries where the MPS1222 modem is not available, the Postal Telephone/Telegraph (PTT) supplied equivalent is acceptable.

c. The availability of MPS1222 modem, and the approved usage of the V.22 modem in Europe is as follows:

Austria	■	PTT monopoly, can supply MPS1222
France	■	MPS1222 approved
Ireland	■	PTT monopoly, can supply MPS1222
Italy	■	PTT monopoly, can supply MPS1222
Luxembourg	■	MPS1222 approved
Netherlands	■	MPS1222 approved
Sweden	■	PTT monopoly, can supply MPS1222
Switzerland	■	PTT monopoly, can supply V.22
United Kingdom	■	PTT monopoly, can supply MPS1222
West Germany	■	PTT monopoly, can supply MPS1222

3. Connection of the modem to a switched line telephone network will be performed by the PTT.

4.3 TOOLS AND TEST EQUIPMENT

Only standard tools and equipment are required for installation of a VS-65 Computer System as noted below.

DESCRIPTION	WLI P/N
Standard CE Tool Kit	726-9401
Digital Voltmeter (DVM) John Fluke Model No. 8022A	727-0119
Portable CE Vacuum Cleaner	726-9518
CE Cartridge Tape Archiver	190-0751

4.4 UNPACKING

Before unpacking the VS-65, check all packing slips to make sure that the proper equipment has been delivered. Refer to the Customer End Item (CEI) information given in table 4-1. After checking packing slips, inspect all shipping containers for damage (crushed corners, punctures, etc.).

4.4.1 CLAIMS INFORMATION

If damage is discovered during inspection, file an appropriate claim promptly with the carrier involved, and notify:

WLI Distribution Center
Department 90
Quality Assurance Department
Tewksbury, MA. 01876.

State the nature and extent of damage and make arrangements for replacement equipment, if necessary. Make sure to include this information:

WORK ORDER NO.: ________________
CUSTOMER NAME : ________________
CUSTOMER NO. : ________________
MODEL NUMBER : ________________
SERIAL NUMBER : ________________

Table 4-1. VS-65 Computer System Models

MODEL NO.	CEI TAG NO.	MEMORY SIZE	MEMORY PCB P/N	FIXED DISK
VS65-1X	157/177-7349	1024K BYTE	210-8599-1A	NONE
VS65-2X	157/177-7352	2048K BYTE	210-8599-2A	NONE
VS65-4X	157/177-7355	4096K BYTE	210-8599-4A	NONE
VS65-1AN	157/177-7350	1024K BYTE	210-8599-1A	76M BYTE
VS65-2AN	157/177-7353	2048K BYTE	210-8599-2A	76M BYTE
VS65-4AN	157/177-7356	4096K BYTE	210-8599-4A	76M BYTE
VS65-1BN	157/177-7351	1024K BYTE	210-8599-1A	147M BYTE
VS65-2BN	157/177-7354	2048K BYTE	210-8599-2A	147M BYTE
VS65-4AN	157/177-7357	4096K BYTE	210-8599-4A	147M BYTE

Part number prefix 157 = 50 Hz ac line frequency machines.
Part number prefix 177 = 60 Hz ac line frequency machines.

4.4.2 UNPACKING THE MAINFRAME

1. Cut the plastic strapping that secures the top cover and carton tube to the pallet. (See figure 4-1.)

2. Remove the top cover, top cushion, and carton tube.

3. Remove the two cushion blocks at the base of the mainframe cabinet.

4. Remove the plastic bag covering the mainframe cabinet.

5. Remove the two shipping bolts (one front and one rear) securing the mainframe cabinet to the pallet.

WARNING

The mainframe cabinet weighs approximately 140 pounds (64 Kilograms). Be careful when perform ing the following steps.

6. While firmly grasping the cabinet, carefully roll (and slide) the mainframe cabinet off the pallet.

7. Move the mainframe to its permanent location and remove the top, front, and left side covers (see figure 4-2 on page 4-8). (Refer to paragraphs 5.4.1, 5.4.2, and 5.4.3 for disassembly procedures.)

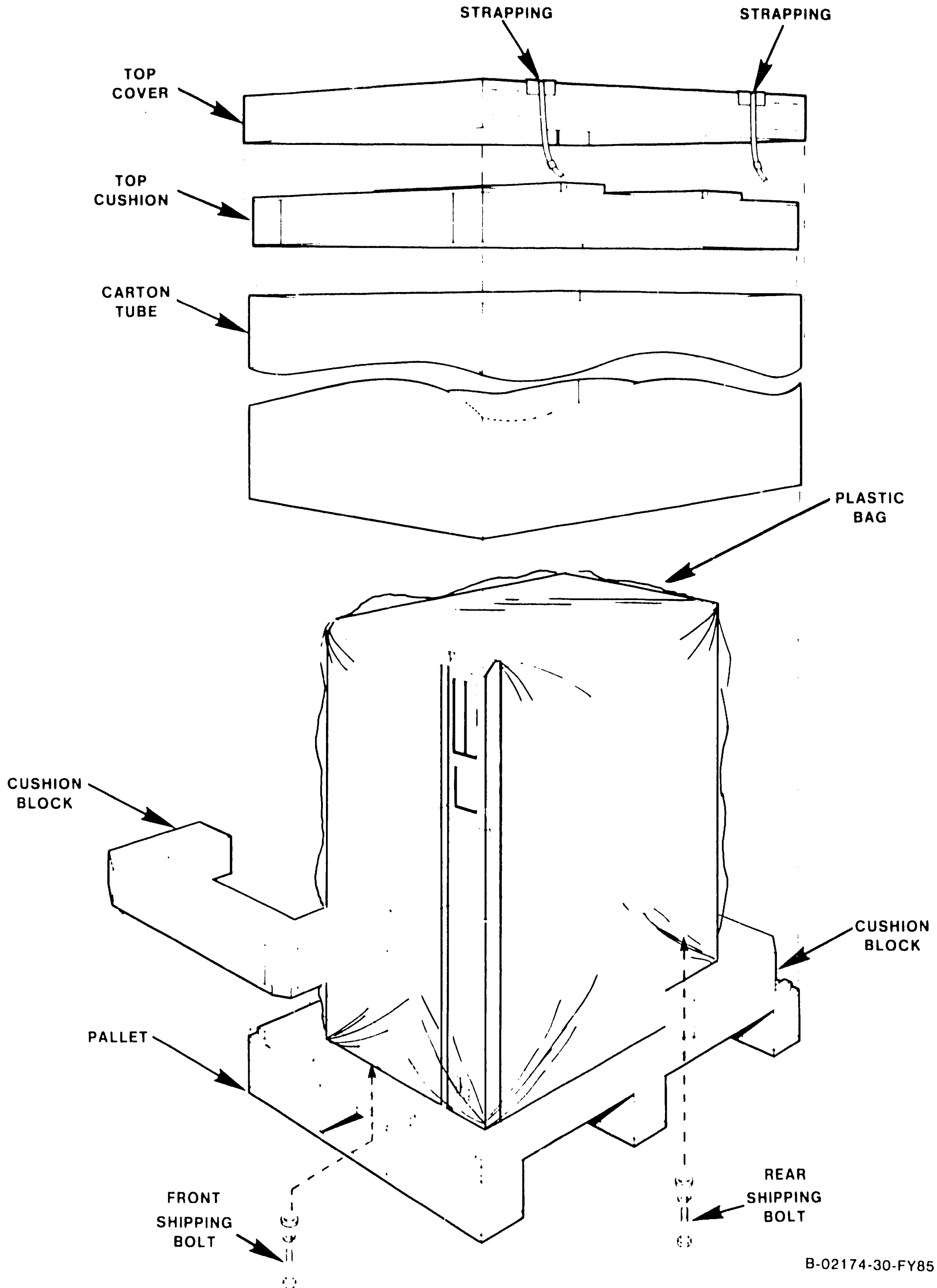


Figure 4-1. Shipping Carton Disassembly and Removal

8. Turn the front stabilizing pedestal down until it just supports the cabinet. Adjust the pedestal to ensure that the mainframe cabinet is reasonably level and firmly in place with no detectable rocking motion.

9. Once the cabinet is in place, check the service clearances as listed in table 4-2.

10. Unlock the spindle and actuator positioner of the internal fixed disk drive by moving the RED Lock Control Lever (from the LOCK position) at the rear of the drive (left rear of mainframe) toward the left side of the mainframe. Push it up as far as it will go, and then move it toward the right side of the mainframe into the FREE position. (Refer to figures 4-2, 5-39 and 5-40.)

Table 4-2. System Service Clearances

SERVICE CLEARANCES	INCHES	CENTIMETERS
Front	36	91.5
Rear	30	76.2
Left	24	61.0
Right	24	61.0
Top	38	96.5

4.4.3 UNPACKING THE PERIPHERALS

Before proceeding, carefully unpack all peripherals according to procedures outlined in applicable Customer Engineering documents found under Class Code 3000. As each unit is unpacked, check it for any obvious shipping damage.

4.5 INSPECTION

To make sure of the integrity of the equipment, a detailed internal inspection must be performed before final installation of the system. The inspection and installation procedures for all VS products are as follows.

4.5.1 MAINFRAME INSPECTION

Recent quality assurance procedures and tests have shown that VS mainframes arriving at the customer's premises require only visual inspection, voltage checks, software verification and/or loading, and cabling. Perform an internal inspection of the VS-65 mainframe, as follows (refer to figure 4-2.):

CAUTION

Do NOT remove printed circuit boards for inspection. Do NOT clean printed circuit board contacts with an eraser. Inspect mainframe visually only. Report installation problems on the installation report and state specific causes of failure before proceeding with troubleshooting.

1. Inspect throughly the interior of the mainframe for packing material, foreign matter, or shipping damage such as broken connectors and loose fastening hardware.

2. Refer to the shipping list to make sure that the correct circuit boards

have been shipped. Do NOT remove any PCBs at this time to verify part numbers; use physical appearance, cable connections, placement, etc..

3. Carefully inspect the motherboard (with all PCBs installed) and fans for obvious damage, loose connections, or foreign matter.

4. Inspect the power supply assembly for damage and loose connections. At this time, make sure that all power supply connections are tight.

5. If necessary, vacuum clean the unit. (If this is required, it must be reported as per paragraph 4.4.1.)

6. Do not reinstall the mainframe covers at this time.

7. If damage is discovered at any time during the inspection, follow the reporting procedure in paragraph 4.4.1.

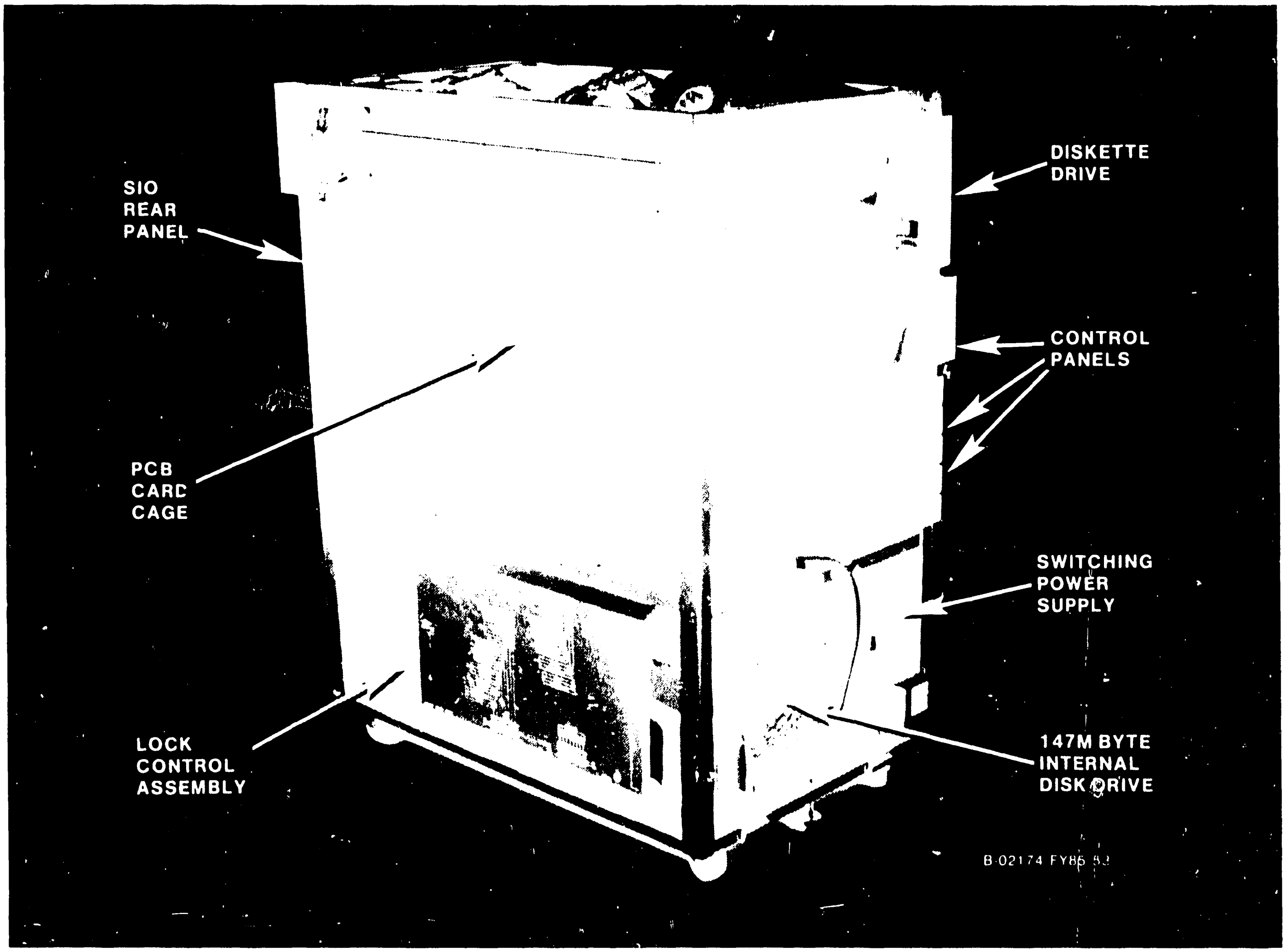


Figure 4-2. VS-65 System with 147 Megabyte Disk Drive

4.5.2 PERIPHERAL INSPECTION

After inspecting the mainframe, carefully inspect each peripheral according to procedures outlined in the applicable Customer Engineering manuals under Class Code 3000. If damage is discovered at any time during the peripheral inspection, follow the reporting procedure in paragraph 4.4.1.

4.6 SYSTEM REQUIREMENTS

The following requirements for system installation include system and diagnostic hardware and software.

4.6.1 MAINFRAME HARDWARE

A minimum system hardware configuration for the VS-65 FCS plus related or optional hardware that may be substitute are listed in tables 4-3 & 4-4 below:

Table 4-3. Minimum Mainframe Hardware

WLI PART NUMBER	BOARD DESCRIPTION	MINIMUM E. REV. LEVEL
210-8599-1A	1024K bytes Main Memory PCB	3
210-8699	CP7 Central Processor PCB	2
210-8465	Bus Processor (80286) PCB	3
210-7906-1A	16-Port SIO Device Adapter PCB	2
210-8312-A	1-Port Internal Disk Drive DA PCB	4
210-8607	Mainframe Motherboard	0
210-8613	Front Panel Printed Circuit Board	0
278-4033	5-1/4" Diskette Drive	
278-4032	76M byte Internal Disk Drive	-
279-0608	Switching Power Supply (SPS476E)	4

Table 4-4. Optional Mainframe Hardware

WLI PART NUMBER	BOARD DESCRIPTION	MINIMUM E. REV. LEVEL
210-8599-2A	2048K bytes Main Memory PCB	5
210-8599-4A	4096K bytes Main Memory PCB	4
210-8312-A	1-Port External Disk Drive DA	4
210-8313-A	2-Port External Disk Drive DA	4
210-8314-A	3-Port External Disk Drive DA	4
210-8315-A	4-Port External Disk Drive DA	4
210-8337-A	1-Port Telecommunication DA	3
210-8637	2-Port Telecommunication DA	4
278-4041	147M byte Internal Disk Drive	-

4.6.2 MAINFRAME SOFTWARE PACKAGE

The minimum system software required to install the system is included on the system disk and is also available in either diskette or cartridge tape versions (version depends on the configuration ordered). Optional system software such as BASIC, COBOL, or RPG II are included, along with off-line and on-line diagnostics, and other utilities. The column titled 'Version' is the minimum version or earliest release level which will allow the system to complete the IPL process.

4.6.2.1 Minimum Operating System Software

Table 4-5 list the files (and respective libraries) required by the system in order to accomplish a minimum configuration IPL (WS-0 only), it represents an unbundled nucleus and is not supported:

Table 4-5. Minimum Operating System Software

LIBRARY	FILE	VERSION	LIBRARY	FILE	VERSION
@SYSTEM@	@CONFIG@	xx.xx.xx	@SYSTEM@	@SYSTSK@	06.39.54
	@MC2246S	xx.xx.xx		@TSKMGR@	06.39.50
	@MCBOOT@	xx.xx.xx		DEVLIST	06.40.15
	@MCBPX@	07.03.00		USERLIST	06.xx.xx
	@MCCP@	07.04.00	@SYSPAGE	@S202EC8	06.xx.xx
	@MCIPL@	xx.xx.xx		@S206890	06.xx.xx
	@OPER@	06.39.53		@S208BD0	06.xx.xx
	@PRTTSK@	06.39.30		@S208DC0	06.xx.xx
	@SHARER@	06.39.55		@S22B9C0	06.xx.xx
	@SYS000@	06.39.57		@S22BCC8	06.xx.xx
	@SYSCPR@	06.39.38	@SYSWORK	@IPLNAME	06.xx.xx
	@SYSGEN@	06.39.49		@SYSLOG	06.xx.xx
	@SYSSVC@	06.39.58		QUEUE	06.xx.xx

4.6.2.2 Minimum System Diagnostic Software

In order to accomplish full configuration Off-Line and On-Line diagnostic testing of the VS-65 system, three additional libraries, included on the system disk are required. For a complete discussion of system diagnostics see Troubleshooting paragraphs 8.1 through 8.4.

Table 4-6. System Diagnostic Software

LIBRARY	DESCRIPTION	OPERATION	VERSION
@DIAGMN@	Small System VS Diagnostic Monitor	Off-Line	Rxxxx
@DIAGST@	Small System VS Self-Test Monitor	Off-Line	R2510
@SYSTST@	VS On-Line System Diagnostics	On-Line	Rxxxx

4.6.2.3 Optional System Software and Utilities

The total number of VS system software files (operating, diagnostic, application, and utility) has exceeded 500 and are too numerous to list. Additional information on customer/system related software may be obtained by referencing the Wang Technical Documentation Catalog/Index (P/N 741-0000), and the Wang Customer Resource Catalog (P/N 700-7647).

4.6.3 SYSTEM DIAGNOSTICS

The installation of a new system requires thorough testing of all system components by the Customer Engineer. Using an integrated set of off-line (stand-alone) hardware diagnostics running on the Bus Processor, the CE assures the integrity of system architecture and disk drive(s). In addition, a limited number of on-line diagnostics are available for peripheral evaluation. A complete discussion of each diagnostic process from power-up through peripheral diagnostics may be found in Chapter 8.

Table 4-7. Peripheral Diagnostics and Utilities

DIAGNOSTIC NAME	VERSION	WLI P/N
FTUA Off-Line (@DIAGSA@)	6xxx	195-2626-9
FTU On-Line (@SYSTST@)	6xxx	195-2652-9
VS On-Line DTOS Device 2 Package	2430	195-2615-9
VS On-Line DTOS Device 3 Package	2344	195-2604-9
VS On-Line DTOS Printer 2 Package	2330	195-2535-9
VS On-Line DTOS Printer 3 Package	2260	195-2899-9
VS On-line Printer Monitor, Part I	2242	195-xxxx-9
VS On-line Printer Monitor, Part II	2211	195-xxxx-9

4.6.4 STAND-ALONE SYSTEM SOFTWARE

Stand-alone system software is available on portable archiving media (diskette and/or cartridge tape) for minimum configuration systems. In the event that software supplied on the system disk is damaged, the CE can delete and replace files (and libraries) as required, or rebuild the entire VS operating system.

4.6.4.1 Stand-Alone Utility Package

Formerly known as the Coldstart package, the Stand-Alone Utility (SAU) package contains the minimum VS system software required to boot, load, and initiate a system IPL process. The SAU is only available on diskette and allows bootstrapping the VS Operating System from either diskettes or cartridge tape media. The SAU is an unbundled and unsupported utility which is not available through Software Distribution. The VS-65 SAU (on two diskettes) is supplied by Product Support along with the VSOS 06.39.58 (on cartridge tape) as an auto-enclosed package WLI P/N 291-0332-12.

Table 4-8. Stand-Alone Utility Package
(Auto-Enclosed and Unsupported - WLI P/N 291-0332-12)

DISKETTE NAME	VERSION	WLI P/N
SAUDK1	1.01.55	735-8237
SAUDK2	1.01.55	735-8238

4.6.4.2 VS Operating System Software - Diskette Media

Table 4-9 is an approximate listing of the system diskettes which are not part of the SAU package, but constitute a complete VS Operating System (VSOS) which will allow system generation, initialization, and operation when used with the SAU. Part numbers and specific diskette requirements will be available in a later update to this manual.

Table 4-9. VS Operating System Package - Diskette Media
(Bundled diskette media - WLI P/N 195-xxxx-9)

DISKETTE	VERSION	WLI P/N	DISKETTE	VERSION	WLI P/N
SYST01	6.39.xx	735-xxx0	SYST08	6.39.xx	735-xxx7
SYST02	6.39.xx	735-xxx1	SYST09	6.39.xx	735-xxx8
SYST03	6.39.xx	735-xxx2	SYST10	6.39.xx	735-xxx9
SYST04	6.39.xx	735-xxx3	SYST11	6.39.xx	735-xx10
SYST05	6.39.xx	735-xxx4	SYST12	6.39.xx	735-xx11
SYST06	6.39.xx	735-xxx5	SYST13	6.39.xx	735-xx12
SYST07	6.39.xx	735-xxx6	SYST14	6.39.xx	735-xx13

Included with the VSOS package, will be another twenty plus additional diskettes, listed in table 4-10, which are used to complete the VS system installation procedure.

Table 4-10. VS Operating System Utilities Package - Diskette Media

DISKETTE	VERSION	WLI P/N	DISKETTE	VERSION	WLI P/N
UTLTY1	6.39.xx	735-xx14	UTLTYB	6.39.xx	735-xx24
UTLTY2	6.39.xx	735-xx15	UTLTYC	6.39.xx	735-xx25
UTLTY3	6.39.xx	735-xx16	UTLTYD	6.39.xx	735-xx26
UTLTY4	6.39.xx	735-xx17	UTLTYE	6.39.xx	735-xx27
UTLTY5	6.39.xx	735-xx18	MACLIB1	6.39.xx	735-xxx1
UTLTY6	6.39.xx	735-xx19	MACLIB2	6.39.xx	735-xxx2
UTLTY7	6.39.xx	735-xx20	MACLIB3	6.39.xx	735-xxx3
UTLTY8	6.39.xx	735-xx21	MACLIB4	6.39.xx	735-xxx4
UTLTY9	6.39.xx	735-xx22	WSCODE	6.39.xx	735-xxx5
UTLTYA	6.39.xx	735-xx23	PRCODE	6.39.xx	735-xxx6

4.6.4.3 Stand-Alone Small System VS Diagnostic Monitor - Diskette Media

The Small System VS Diagnostic Monitor is available on four diskettes which may be ordered separately from the complete package. (Documentation now fills four binders.) The content of each diskette, including program number and file name, will be given in table 8-6 in Chapter 8, Troubleshooting when available.

Table 4-11. Stand-Alone Small System VS Diagnostic Monitor Package
(Bundled Diskette Media - WLI P/N 195-2461-0)

DISKETTE NAME	VERSION	WANG P/N
(DIAG61)	Rxxxx	732-xxxx
(DIAG62)	Rxxxx	732-xxxx
R04A03 (DIAG63)	R04A0	732-xxxx
(DIAG64)	Rxxxx	732-xxxx

NOTE

DIAG61, 62, and 64 are NOT fully operational at FCS time and generate incorrect error messages.

4.6.4.4 NVRAM Utilities Package - Diskette Media

The NVRAM Utilities Package, WLI P/N 195-2452-0, includes the documentation necessary for the CE to implement the installation, modification, or updating of the NVRAM and/or its image file.

4.6.4.5 VS Operating System Software - Archiving Cartridge Tape Media

The Archiving Cartridge Tape version of the VSOS package includes the contents of the 14 System diskettes on a single cartridge tape. The cartridge tape also includes some of the additional files listed in paragraphs 4.6.4.2 through 4.6.4.4 above.

VS Operating System Software Package - Archiving Cartridge Tape Media
(Bundled Media - WLI P/N 195-2456-12)

CARTRIDGE TAPE NAME	VERSION	WLI P/N
VS6202	6.39.58	705-0715

4.7 MAINFRAME POWER-UP PROCEDURE

Prior to replacing the covers on the mainframe and before completing peripheral equipment installation, certain operating conditions need to be considered and specific operational requirements must be met.

4.7.1 MAINFRAME OPERATING PARAMETERS

To ensure the reliability of the VS-65 Computer System, the customer must provide facilities for meeting the power and environmental requirements which follow.

OPERATIONAL REQUIREMENT	SPECIFICATION
Input Voltage Range	102-132 Volts ac @ 60 Hz 180-260 Volts ac @ 50 Hz
Input Current	5.25 Amperes @ 60 Hz 2.7 Amperes @ 50 Hz
Input Power	440 Watts (610 VA)
Power Factor	0.72 (Lagging)
Leakage Current (Nominal)	0.0031 Amperes

NOTE

The VS-65 requires a dedicated branch circuit with an isolated receptacle.

ENVIRONMENTAL REQUIREMENT	TEMPERATURE RANGE	HUMIDITY RANGE
Operating Environment	+60°F to +90°F (+15°C to +32°C)	20% to 80% (See note)
Storage Environment	0°F to +120°F (-18°C to +49°C)	10% to 90%
Transit Environment	-40°F to +140°F (-40°C to +60°C)	15% to 90%

NOTE

Noncondensing humidity with a maximum wet bulb temperature of 75°F (24°C).

ADDITIONAL REQUIREMENTS	ADDITIONAL SPECIFICATIONS
Maximum Rate of Temperature Change	12°F per Hour (6.7°C per Hour)
Rate of Heat Dissipation	1500 BTU per Hour (680 Watts)
Altitude Range	0 to 10,000 Feet (0 to 3000 Meters)

4.7.2 MAINFRAME POWER SOURCE CHECK

The following procedures must be performed to ensure successful installation of the VS-65 Computer System. Check the mainframe power source receptacle and installation for proper wiring and service. Refer to figure 4-3 and table 4-12 for 115 Vac, 60 Hz, USA installations only. Installations outside of the USA, requiring other configurations and voltages, must be dealt with on a site by site basis. The inspection and electrical checks are required to make sure that the power source and receptacle meet all specified requirements before proceeding with the mainframe (and subsequent peripheral) installation.

CAUTION

Failure to perform the following checks properly can result in serious damage to mainframe circuits and to connected peripherals.

NOTE

The matching connector for the NEMA configuration receptacle body 5-15IG is 5-15IP and is limited to a six (6) foot cord.

Table 4-12. NEMA Receptacle Voltage Measurements

TEST POINT LOCATIONS	VOLTAGE MEASUREMENTS (DIGITAL VOLTMETER)
H TO N	102 to 132 Vac
H TO G	102 to 132 Vac
G TO N	-0.5 to +0.5 Vac (Note)

NOTE

If a difference in potential of more than 0.5 Vac exists between neutral and ground, notify the responsible electrician that the power source is NOT ACCEPTABLE.

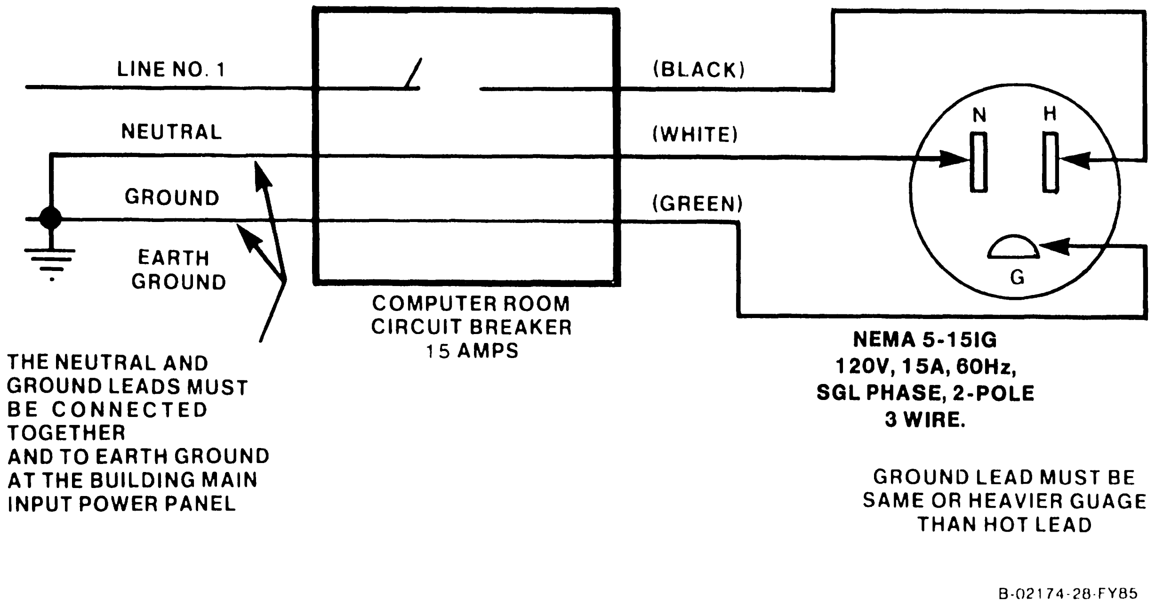


Figure 4-3. USA Power Service Requirement (NEMA) for VS-65 Mainframe

4.7.3 INITIAL MAINFRAME POWER-UP

Perform the following steps in the sequence given below. Refer to Figures 4-2, 3-2 and 3-3, and 4-4 through 4-12 as required.

CAUTION

If an installation requires a voltage other than 115 Vac, verify that the 115/220V switch is in the correct position by performing the removal and replacement procedures in paragraphs 5.7.2. Refer to figure 5-34 for the switch location.

1. Make sure that the ac power On/Off switch on the power supply (figure 4-2) is in the zero '0' position and then plug the mainframe power connector into the power source receptacle.

CAUTION

The Lock Control Lever of the internal disk drive Lock Control Assembly must be in the FREE position before Power-Up to prevent damaging the disk drive.

2. Select the diskette drive by setting the Boot Device switch to the UP position (figure 3-3). No diskette should be in the drive.

3. Depress the ac power On/Off switch to the one '1' position.

4. Make sure the Power-On and the Not-Ready LEDs on the Front Panel are lit, and the mainframe cooling fans are turning. The diskette drive Activity LED will light and the motor will run briefly (it will stop shortly), and the internal disk drive motor should be running. The four HEX Displays should also be lit. (Refer to figure 3-2 for the above indicators.)

NOTE

If the HEX display goes out after 2 seconds, there is a problem with the dc voltage compare circuit in the power supply. Check the power supply LEDs for low voltage indiction using figures 4-4 and 4-5 and proceed with steps 7 through 10 below. If successful, press the red Initialize pushbutton and continue with step 5. If not, see paragraph 5.7.2 and verify the 115/220 switch position. If the switch is correct, replace the power supply.

5. The Front Panel HEX display will flash 0000 and then begin decrementing from FFFF to 0000 and then count up from 00FB through a series of diagnostic routines (starting at 10, 11, 12, 13, 14, 15, and 16) and stop at 9820, Diskette drive not ready. If any number (except 9820) is displayed for more than 20 seconds, the system has failed one of the diagnostics. Refer to 8.5.1 for a complete power-up discussion.

6. At the same time the HEX display on the Front Panel is counting, the Telecommunication Device Adapter PROM-based power-up diagnostics will be running as shown on the TC DA Control/Indicator Panel. (Refer to Table 3-2.) The diagnostics should complete successfully in about 12 seconds.

NOTE

If the diagnostics failed and the voltages listed below are correct, refer to Chapter 8, Troubleshooting, and Appendix B, Self-Test Monitor Diagnostic Error Codes.

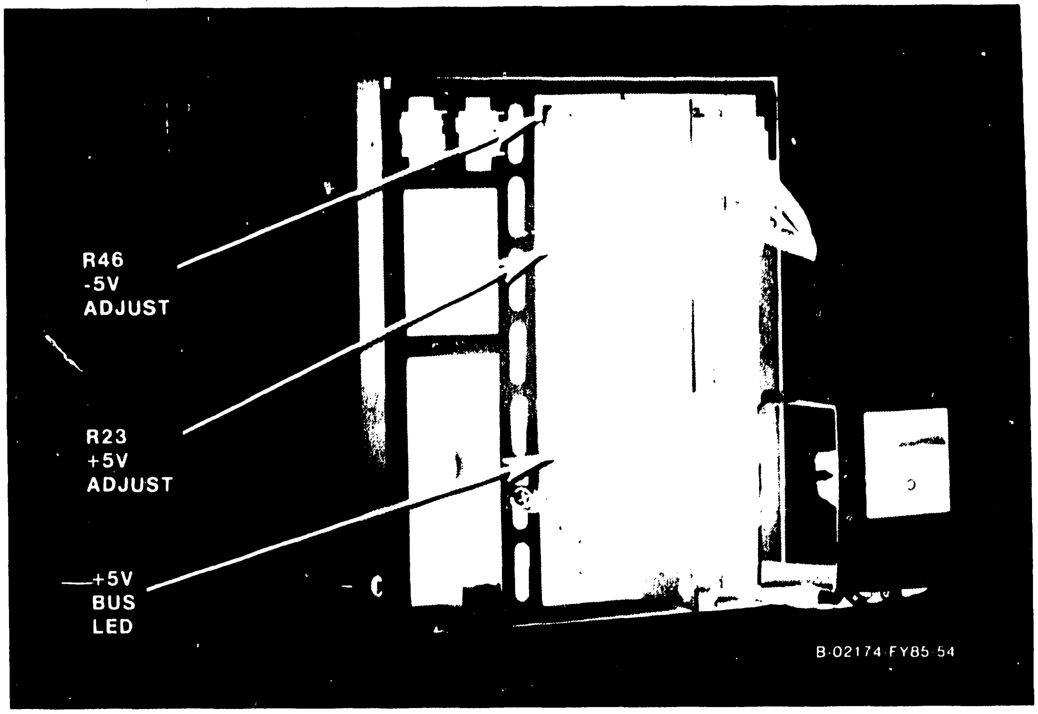


Figure 4-4. Switching Power Supply Adjustments and Indicators (Left Side View)

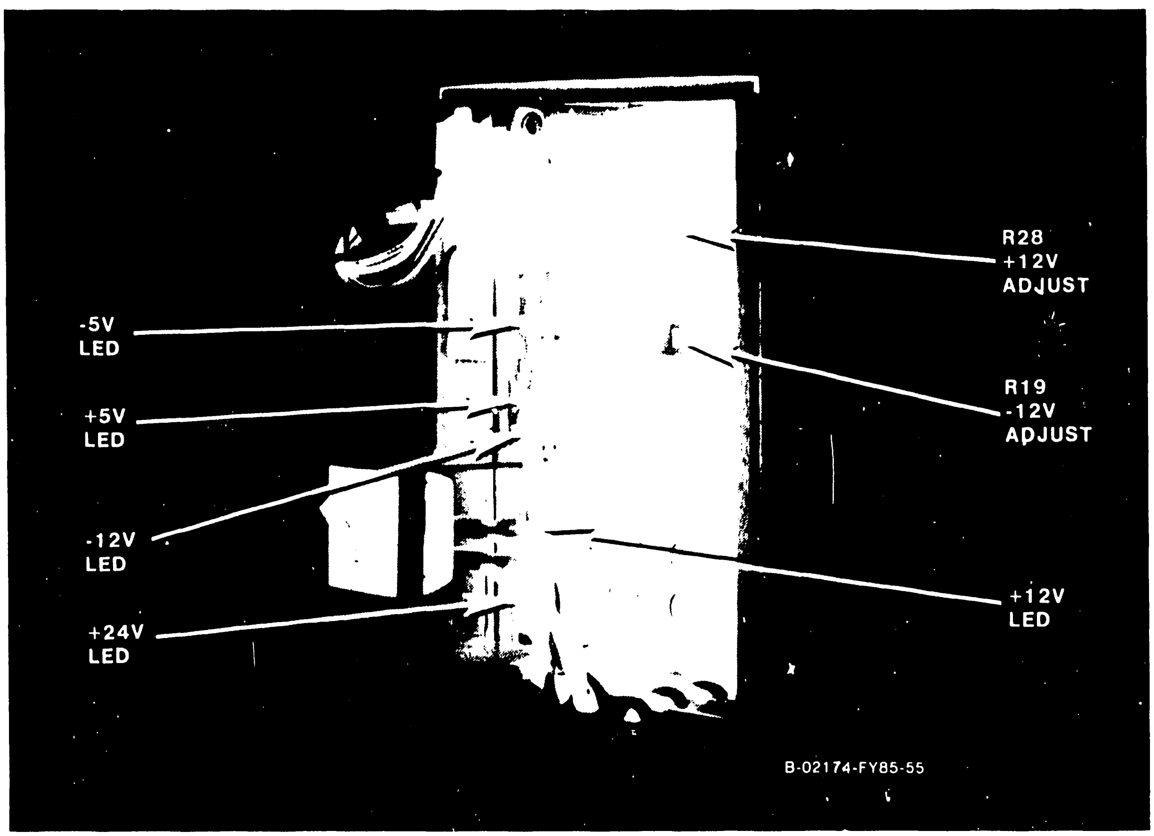


Figure 4-5. Switching Power Supply Adjustments and Indicators (Right Side View)

7. With the exception of the +24 Vdc, the dc power supply voltages must be checked at the motherboard test points (figures 4-6 and 4-7). If the dc voltages at the Motherboard are outside of the operating limits in table 4-13, the switching power supply must be adjusted.

8. With a digital voltmeter, check the voltages at the Motherboard test points. The +24 Vdc may be checked at pin 8 of J4 on the 210-8611 PCB. Note that the +24 Vdc supply CAN NOT be adjusted and requires replacing the Switching Power Supply if an out-of-tolerance condition exists.

9. With a nonmetallic adjustment tool, adjust the dc voltage(s) to within the operating limits. (See figures 4-4 and 4-5 for the locations of the adjustment pots.)

10. After completing the voltage checks/adjustments, turn to paragraph 4.8.

Table 4-13. DC Test Point Voltages

TEST POINT	DC VOLTS	DC OPERATING VOLTAGE LIMITS	AC RIPPLE VOLTAGE LIMITS
TP1	+/-0.0	- 0.05 to + 0.05	35mV RMS or 50mV Pk-to-Pk
TP2	+ 5.0	+ 4.95 to + 5.05	
TP3	- 5.0	- 4.95 to - 5.05	
TP4	+ 12.0	+11.9 to +12.1	
TP5	- 12.0	-11.9 to -12.1	
SPS	+ 24.0	+21.6 to +26.4	

4.8 VERIFY SYSTEM DISK

The VS-65 should be delivered with the internal disk drive formatted and the operating system loaded. Currently there is no method available to verify the disk drive, before bringing up the operating system, to be sure the pre-recorded system software has not been damaged. If the voltage checks are normal, proceed to paragraph 4.9 and IPL the system. If you cannot IPL, or it is suspected (or known by running the stand-alone diagnostic utility, FTUA) that the system disk drive contains errors, proceed to paragraph 4.14, the Stand-Alone Utility.

4.9 BOOTSTRAP PROGRAMS AND IPL PROCESS

Because the VS-65 system does not contain any PROM-based operational microcode, all CP and BP operational microcode must be loaded into the system by the bootstrap programs. (Note that the bootstrap programs cannot coexist with the operational CP and BP code; therefore, no system-level CP/BP functions, such as Control Mode, are available while the bootstrap programs are executing.)

Pressing the red Initialize pushbutton starts the bootstrap process from the disk device indicated by the 3-position Boot Device switch. The bootstrap programs perform power-up initialization and diagnostic functions and then uses the Workstation Zero (WS-0) screen to allow the operator to select either "IPL the system" or "Run Off-line Diagnostics" from the selected IPL device. (At FCS, the system level Diagnostic Monitor is not available. Those off-line diagnostics, which are available, must be run using the system diskette drive.)

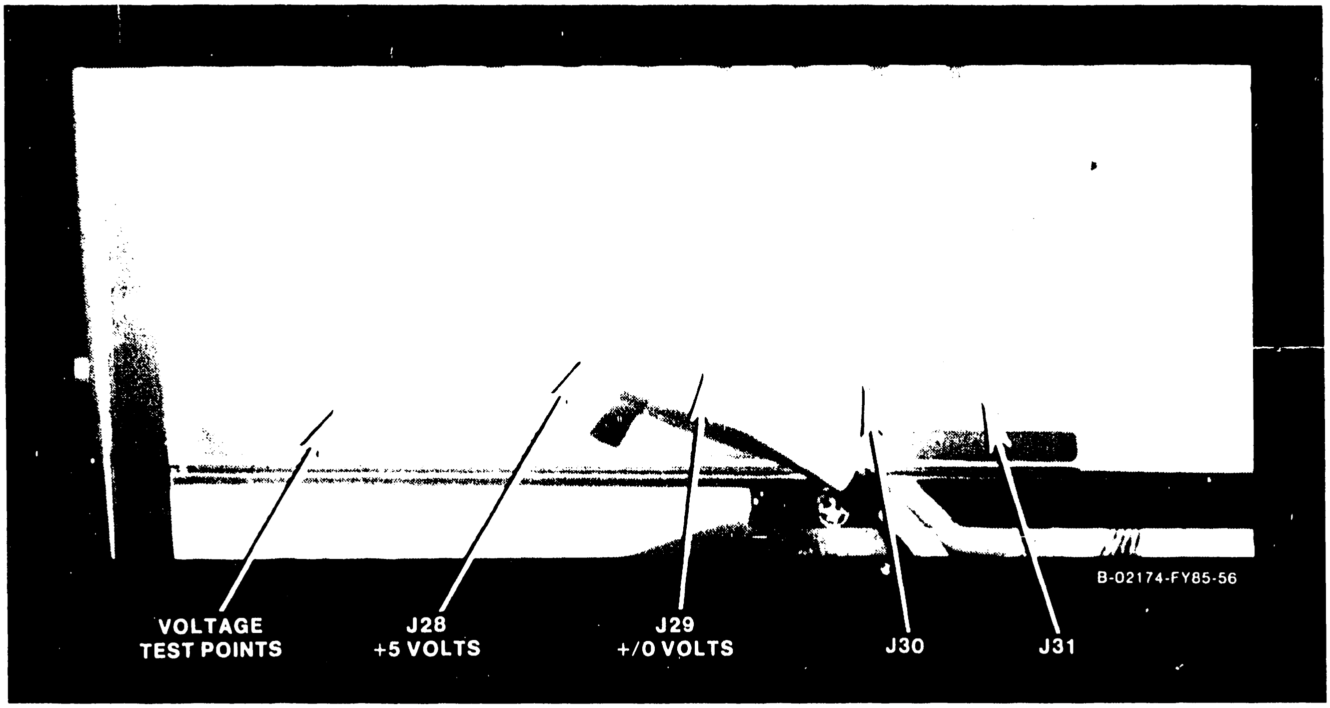


Figure 4-6. Motherboard Power Connectors

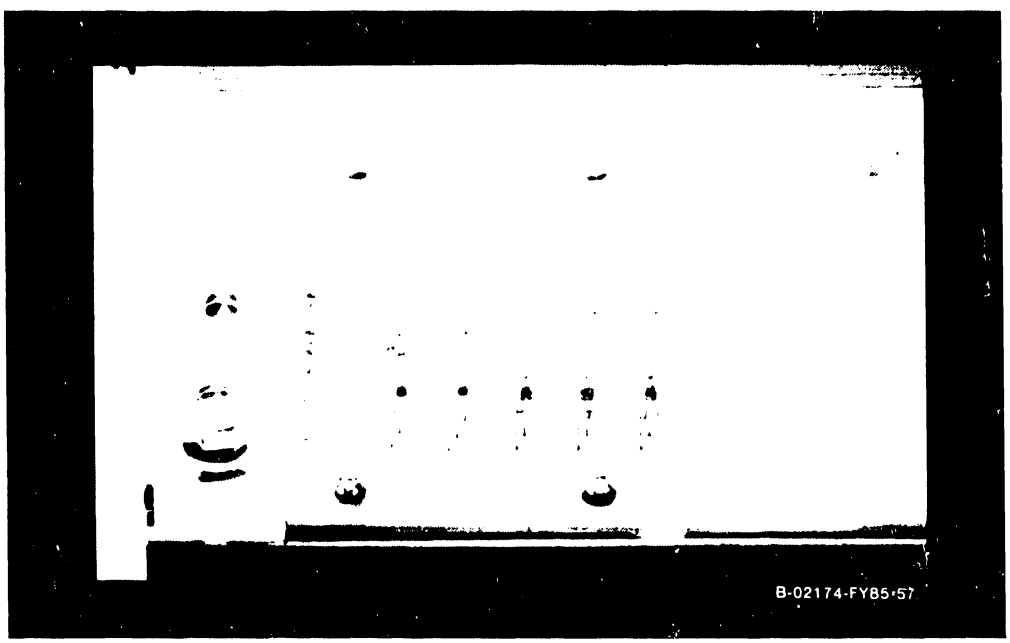


Figure 4-7. Motherboard Voltage Test Points

The VS-65 system functions just like other VS machines once execution of the IPL code has begun. However, since the bootstrap programs do not maintain the Time-of-Day clock during their power-up and initialization process, the VS-65, as with other VS Small Systems, will require resetting the clock after each power-up or initialization.

4.9.1 IPL PROCEDURE

1. Connect WS-0 to Port-0 on the Serial I/O Device Adapter, as described in paragraphs 4.10 through 4.10.2, and then power-up WS-0.

2. Make sure the Local Control/Remote Diagnostic/Remote Control switch (figure 3-3) is in the Local Control position. (The system will not IPL if the switch is in Remote.)

3. Set the Boot Device switch to the center position to select the internal fixed disk drive.

4. Press the Control Mode pushbutton on the Front Panel, and then press the Initialize pushbutton. The HEX display on the Front Panel will begin counting down from FFFF. In about 45 seconds, the power-up diagnostics will complete and WS-0 will display the first screen.

5. Press the Control Mode pushbutton as the HEX display is decrementing and the display will loop on decrement allowing visual verification of the display. Pressing the Control Mode pushbutton again will cause the HEX display to halt, allowing verification of the BP's diagnostic switch settings. If the switches (SW3) are correctly, the HEX Display will halt at 00FB (SW3-3 Closed/On). (Refer to Chapter 8 for an explanation of how to convert HEX values to switch settings.) Pressed a third time will begin the normal power-up diagnostic sequence. (See paragraph 8.3.1.4 for more detail.)

6. At the end of the power-up diagnostics, the Self-Test Monitor screen (figure 4-8) will appear. Position the cursor next to the IPL volume name (if different from the default volume) and press ENTER.

7. The Self-Test Monitor diagnostics will begin running. (See table 8-2 for diagnostic error code information.)

NOTE

Due to the limited diagnostics available at FCS, failure of any of the Self-Test Monitor diagnostics will, in most cases, require replacement of the indicated PCB. Refer to paragraph 8.5.3 to determine if the failure can be verified using DIAG63, the only fully functional stand-alone diagnostic diskette. If the Stand-Alone Diagnostic Monitor does NOT verify the error, follow the procedures given in the Customer Engineering Level Troubleshooting Flowcharts in Chapter 8. If no hardware error can be determined (short of board swapping), and the system will not IPL, refer to paragraph 4.14 and reload the system disk with the operating system software using the Stand-Alone Utility and VSOS software package.

```
        Small System VS Self Test Monitor Package   Version R2510
                         IPL Drive Selection
                      Bootstrap Volume = NEC160

        Device    Capacity    Type     Volume     Status

        2270V5    368 kb      Dsket
      _ 2268V2    147 MB      Fixed    NEC160     Media Tolerant

            Position Cursor to Indicate Device and Select:
=================================================================

(ENTER) IPL                        (8) STAND-ALONE DIAGNOSTIC MONITOR
```

Figure 4-8. IPL Drive and Diagnostic Monitor Selection Screen.

8. After the Self-Test Monitor diagnostics have completed, the system will begin the initialization process. A message will appear at the bottom of the IPL Drive Selection screen : "Loading System Microcode". In about 10 seconds, the Not-Ready LED on the Front Panel will go out and the message shown at the bottom of figure 4-9 will appear. WS-0 will then respond by requesting the date and time information needed for figure 4-10.

```
        Small System VS Self Test Monitor Package   Version R2510
                       System Hardware Status
                       System Volume = NEC160

   Status             Diagnostic

   Passed             (SIO) Serial Data Link Test
   Passed             (BP)  USART Loop-back Verification Test
   Passed             (CPU) CM/Communications Test
   Passed             (CPU) Operational Test
   Passed             (CPU) Integrity Test
   Passed             (MM)  CPU/Cache/Main Memory Test
   Passed             (BP)  BP/Main Memory DMA Test
   Passed             (MM)  Dual Processor M/M Test

         Diagnostics Completed, Beginning System Initialization
```

Figure 4-9 System Hardware Status Screen
(Normal Execution of Self-Test Monitor)

```
*** MESSAGE WN3 BY IPL

                         INFORMATION REQUIRED

SET DATE AND TIME:

YEAR = YY      MONTH    = MM     DAY      = DD
HOUR = HH      MINUTE   = MM     SECOND   = SS
```

Figure 4-10. Date and Time Information Required Screen.

9. Enter the Date and Time and press ENTER.

10. Almost immediately after ENTER, a second Request for Information screen will appear with the name of the default configuration file on the screen as shown in figure 4-11. Enter the desired configuration information and press ENTER. The System Generation process will begin and the system initialization screen will appear.

NOTE

When doing an IPL from a system disk which required the SAU procedure in paragraph 4.14, the SYSFILE = □□□□□□□□ will NOT display a default configuration file. If this is the case, press PF1 and the system will IPL WS-0 and the system disk allowing the creation of a new configuration file (@CONFIG@).

```
***Message M0001 BY SYSGEN

                         INFORMATION REQUIRED


Specify the name of the system configuration file and press (ENTER)
                              - or -
         Press (1) to use one workstation and one disk.

                         SYSFILE = @CONFIG@
                         SYSLIB  = @SYSTEM@

Specify the communications configuration file to be used, if any

                        COMMFILE = □□□□□□□□
                        COMMLIB  = @SYSTEM@

   Inhibit logons at all workstations?          Logons = NO
```

Figure 4-11. Sysgen Configuration Information Required Screen.

11. In about 5 seconds, the IPL screen, figure 4-12, will be displayed on WS-0. The screen shows the version of the VS Operating System Nucleus being used for system generation, the size of physical memory available, and the time at which each IPL level is completed.

```
                    ******
                  **      **
                 **  WANG  **
                  **      **
                    ******


             INITIAL PROGRAM LOAD

             VS OPERATING SYSTEM

          NUCLEUS VERSION   06.39.58

      01024K PHYSICAL MEMORY AVAILABLE


15:08:39  System Generation              Complete
15:08:49  I/O System Initialization      Complete
15:08:50  System Task Initialization     In Progress
```

Figure 4-12. Initial Program Load - VS Operating System Screen

12. When System Initialization has completed, the VS Operators Console screen will appear. After the Queue Verification Routine is complete, the system will be ready for normal operation.

NOTE

> If the first attempt to IPL failed, refer to section 4.14 and REFORMAT and reload the system disk drive. If the drive was REFORMATTED and IPL still fails, refer to paragraph 4.14 again and INITIALIZE and reload the disk drive.

13. Log onto the system as CSG.

14. Run the GENEDIT program given in the VSOS Software Bulletin, WLI P/N 715-0017, and verify that all peripherals have been correctly declared. If not, generate a new @CONFIG@ file from the customer's invoice or manifest, and then re-IPL.

NOTE

If the system disk was REFORMATTED or INITIALIZED, and the input media was diskette, complete the following steps. If the media was the cartridge tape, skip steps 15 through 17 and continue with paragraph 4.10.

15. Run the BACKUP program, using the RESTORE function, and copy the following non-operating system diskettes to the system disk: MACLIBs, PRCODE, WSCODE, UTILITIES, and NVRAM

16. If the message "The WORK file cannot be placed on the output volume. Please respecify." appears, press PF1 to continue.

17. When all diskettes have been copied, the procedure is complete.

4.10 SYSTEM INTERCONNECTION

After microcode is loaded and SYSGEN has been performed, power-down the mainframe and connect all peripheral devices according to the configuration created during SYSGEN. See figure 4-13 the System Interconnection Diagram, the following paragraphs, and the appropriate documents in Class Code 3000 for cabling procedures.

4.10.1 MAINFRAME REAR PANEL ASSEMBLY CABLING

Before installing the various cables at the rear of the mainframe, all cables between the Mainframe Rear Panel Assembly and associated device adapters must be verified and/or installed. Make sure that the cable from the BNC/TNC Connector Panel containing Workstation Zero (WS-0) connects to J2 of the Serial I/O Device Adapter PCB in Motherboard slot 4.

4.10.2 BNC/TNC SERIAL DEVICE CONNECTORS

Serial I/O devices (workstations, printers, etc.) connect to the rear of the mainframe by means of standard BNC/TNC connectors mounted on a 8-pair connector panel (P/N 270-0949). The maximum cable length for these devices is 2000 feet (610 meters). WS-0 MUST be connected to Port-0 on the Serial I/O Device Adapter. The connectors for WS-0 are usually located on the upper right BNC/TNC Connector Panel on the rear of the mainframe. See figure 4-14 for details on the Mainframe Rear Panel Assembly and the BNC/TNC Connector Panel configurations.

4.10.3 EXTERNAL DISK DRIVE CABLING

The external disk cables (disk drive to mainframe) must be connected through the Disk Drive Cable Connector Panel (WLI P/N 270-0981) at the rear of the mainframe. (See figure 4-15.) Two sizes of disk cable clamps are located on the connector panel. The narrow top clamp(s) are used to secure up to four

B-cables and shields; the wide bottom clamp secures the A-cable and its shield. The cable shields are peeled back and held by the clamps, and the cabling is laid along the appropriate channels and attached to the External DA PCB.

Before connecting an external disk drive cable, be sure that it is prepared as follows:

1. Remove 6 inches of plastic sheathing from one end of the cable.

2. Fold the copper shield back exposing the disk cable.

3. Disassemble the cable clamp by removing the Phillips screws on either side of the clamp.

4. Feed the cable and the shield through the appropriate cable clamp on the connector panel. The top clamp holds the B-cable which connects to Port-3 of the external disk drive DA, the second clamp holds the cable which attaches to Port-2, and so forth. The bottom clamp holds the A-cable which is daisy-chained from each drive to the mainframe.

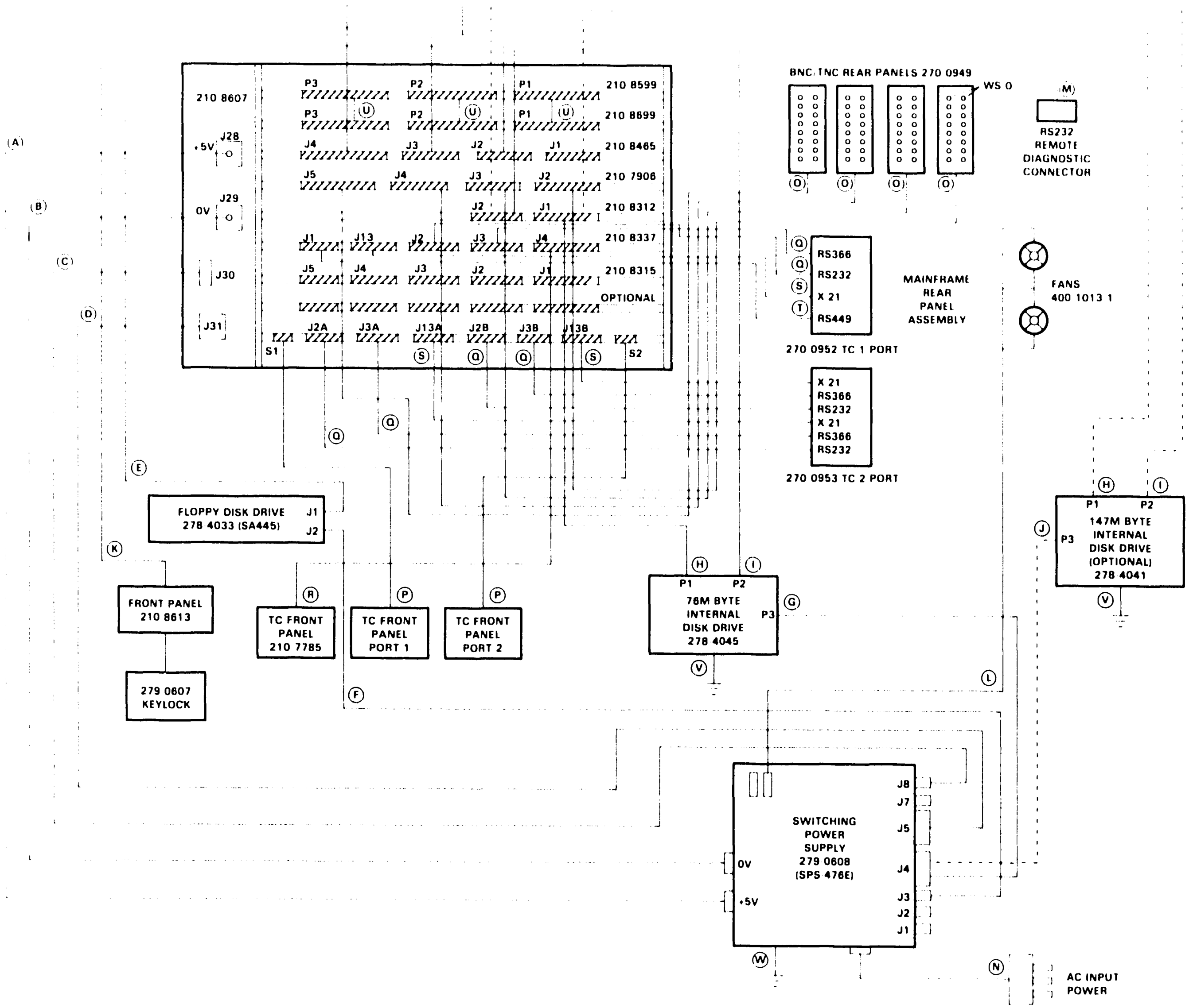
5. Peel back the cable covering, exposing enough of the shield to allow the cable to be connected to the device adapter port and to lay the cable in the proper channel without stressing it. Lay the copper shielded section of the external disk cable against the piece of the clamp still connected to the mainframe.

6. Reassemble the cable clamp by installing the two Phillips screws removed in step 1. Make sure that pin 1 of the cable is oriented properly and tighten the clamp screws until solid contact with the copper shield is made. DO NOT overtighten as this could damage the disk cable.

7. Connect the external disk drive cables to the correct connectors on the External Device Adapter PCB as shown in figure 5-21.

4.10.4 TELECOMMUNICATION CONNECTORS

The external telecommunication cables (modem to mainframe) must be connected to a cable connector panel (WLI P/N 270-0952 for the single-port TC device adapter and WLI P/N 270-0953 for the dual-port TC adapter) at the rear of the mainframe. The single-port TC Connector Panel supports four telecommunication connectors as shown in figure 4-15. The dual-port TC Connector Panel only supports the three most commonly used TC connector types. Both TC rear panels provide plugs for both modem and Automatic Calling Unit (ACU) cables. The connector panel(s) is (are) cabled internally to the Telecommunication DA (figures 5-22 or 5-23).



CABLE LOC	CABLE PART NO
A	220 0408
B	220 0409
C	220 3193
D	220 0407
E	220 3353
F	220 0405
G	220 2206
H	220 3422
I	220 3421
J	220 2205
K	220 3348 PART OF 210 8613
L	220 1980 (AC)
M	220 3349
N	220 2025(USA)(AC)
O	220 3080 PART OF 270 0949
P	220 3012
Q	220 3244
R	220 3247
S	220 3245
T	220 3246
U	220 3435
V	220 2115
W	220 2116

B 02174 FY85 82

Figure 4-13. System Interconnection Diagram

4.11 PRELIMINARY SYSTEM CHECKOUT

At this point, all peripherals should be installed, with the power off, and connected to their respective device adapters. Before proceeding, perform the following checkout procedure:

1. Visually inspect all peripheral devices to make sure that I/O cabling is correctly installed, all switch settings are correct, and all covers and panels are in place.

2. Make sure that all devices are powered-off.

4.11.1 DAILY POWER-UP AND POWER-DOWN PROCEDURES

After all peripherals are connected to the mainframe, the daily power-up and power-down procedures for the VS-65 system are as follows:

1. POWER-UP

   a. Make sure that the mainframe power connector is plugged into the power source receptacle.

   b. Power-up WS-0 and any external disk drives.

   c. Depress the mainframe ac power switch to the one '1' position.

   d. After the PROM-based power-up diagnostics have completed, position the cursor on WS-0 next to the IPL volume name (if different from the default volume) and press ENTER. The Self-Test Monitor (STM) diagnostics will begin running.

   e. After the STM diagnostics have completed and the NOT- READY light on the Front Panel has gone out, enter the date and time information requested and press ENTER. (If the STM fails to complete, or halts and displays an error code, see table 8-2 for diagnostic error code information.)

   f. Enter the date and time and press ENTER. Modify and/or enter the default system configuration file and press ENTER again.

   g. When System Initialization has completed, the VS Operators Console screen will appear and the system is ready for normal operation.

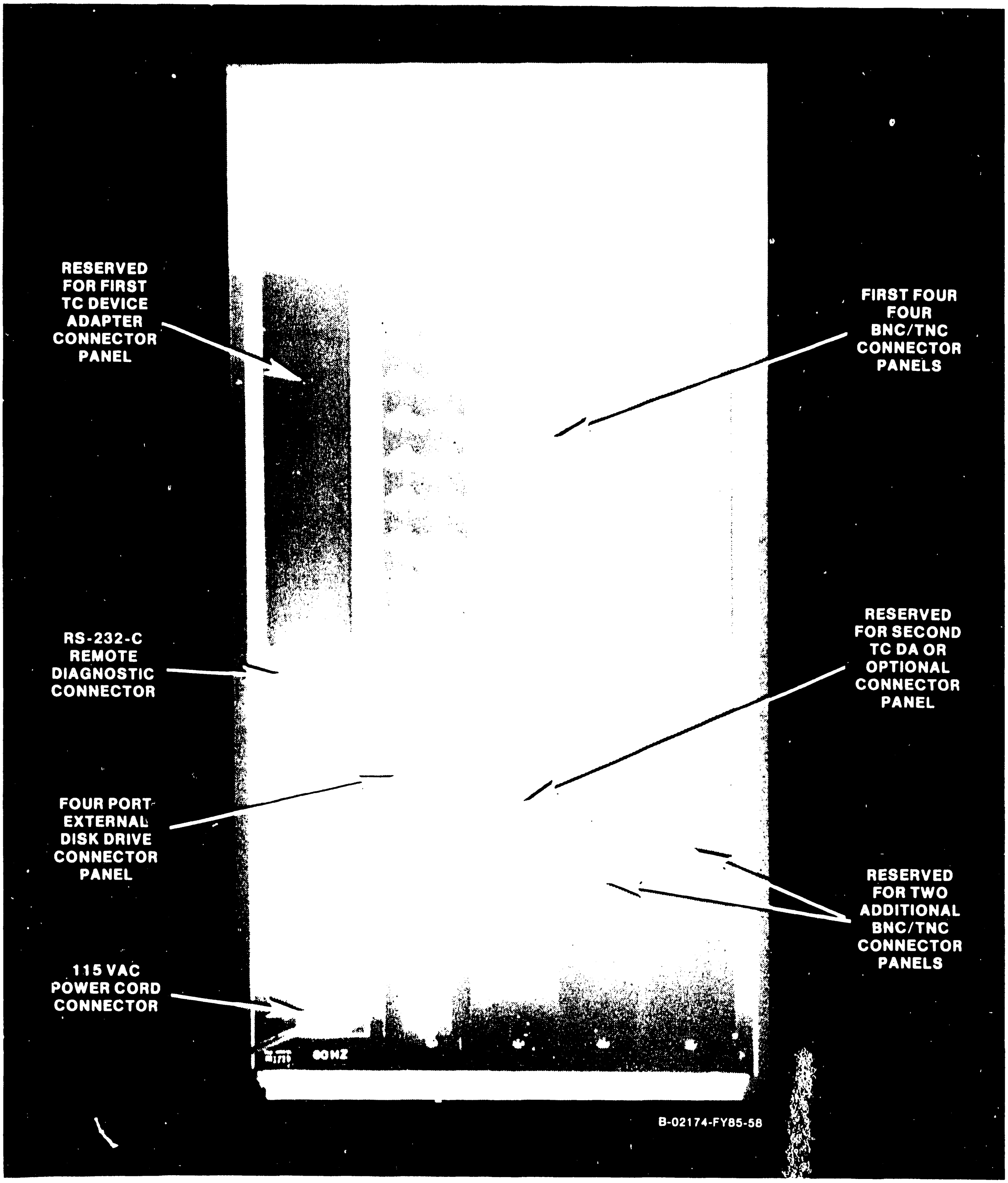


Figure 4-14. Mainframe Rear Panel Assembly Connector Panel Locations

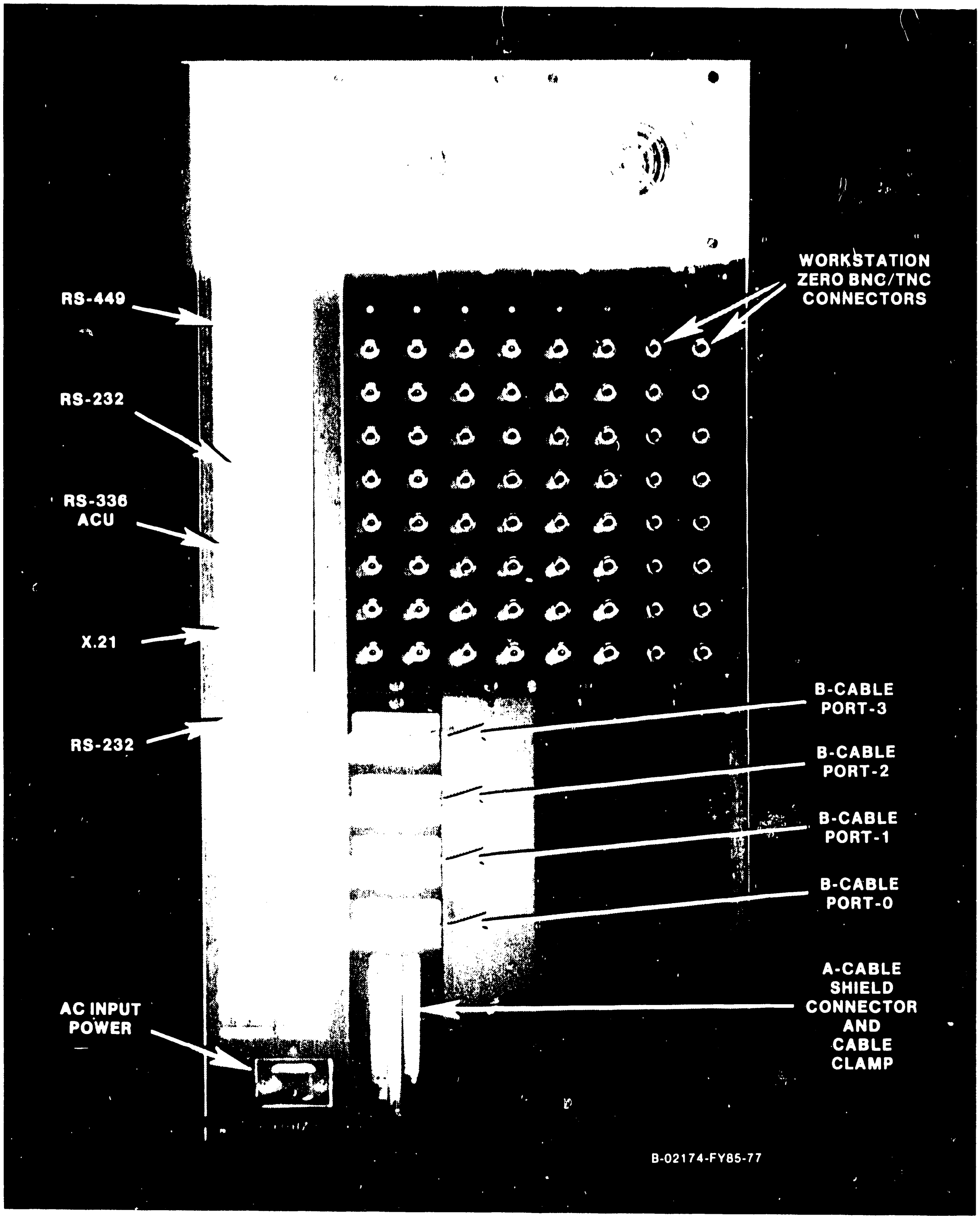


Figure 4-15. Mainframe Rear Panel Assembly Connector Locations

2. POWER-DOWN

a. Make sure all operators using the system have logged off.

1) Press PF13 (WORKSTATIONs) on an operators console to check that all operators are off the system.

2) Press PF7 (NONINTERACTIVE Tasks) on an operators console to check the background tasks on the system. Look under the User column to identify any operator running a background task.

b. Press the green Control Mode pushbutton. This prevents any disk I/O command in process from being halted prior to completion.

c. Power-down all peripheral devices according to procedures in the applicable documents in Class Code 3000.

CAUTION

Make sure all external drives are off-line before power-down.

d. Depress the mainframe ac power On/Off switch to the 0 position.

4.12 REMOTE DIAGNOSTIC CERTIFICATION PROCEDURES

Before system turnover, and before any remote diagnostic service sessions can be run, the remote maintenance data link between the VS-65 site and the home office Remote Maintenance Center (RMC) must be verified. The procedure requires that the CE work directly with RMC to establish that the data link is working. It is the responsibility of the on-site CE to troubleshoot and resolve any telecommunication related problems.

Once the data link has been certified, it should not be necessary for the CE to return to the site to participate in the remote diagnostic sessions. The customer will normally be responsible for initiating and coordinating the remote diagnostic session with the RMC.

The following flowcharts (figures 4-16A-D) describe the remote diagnostic certification procedures, while figure 4-17 shows the modem and telephone line connections and the modem switch settings.

For more information on the WA3451 Wang Modem, refer to Customer Engineering Documentation Class Code 7401 and the WA3451 Asychronous/Synchronous Modem User Manual, WLI P/N 700-6975. Also, refer to the following TAC Newsletters:

30830 = Initialize Nonvolatile RAM
30830 = Remote Maintenance Implementation
30920 = VS Remote Maintenance Information
30927 = Nonvolatile RAM

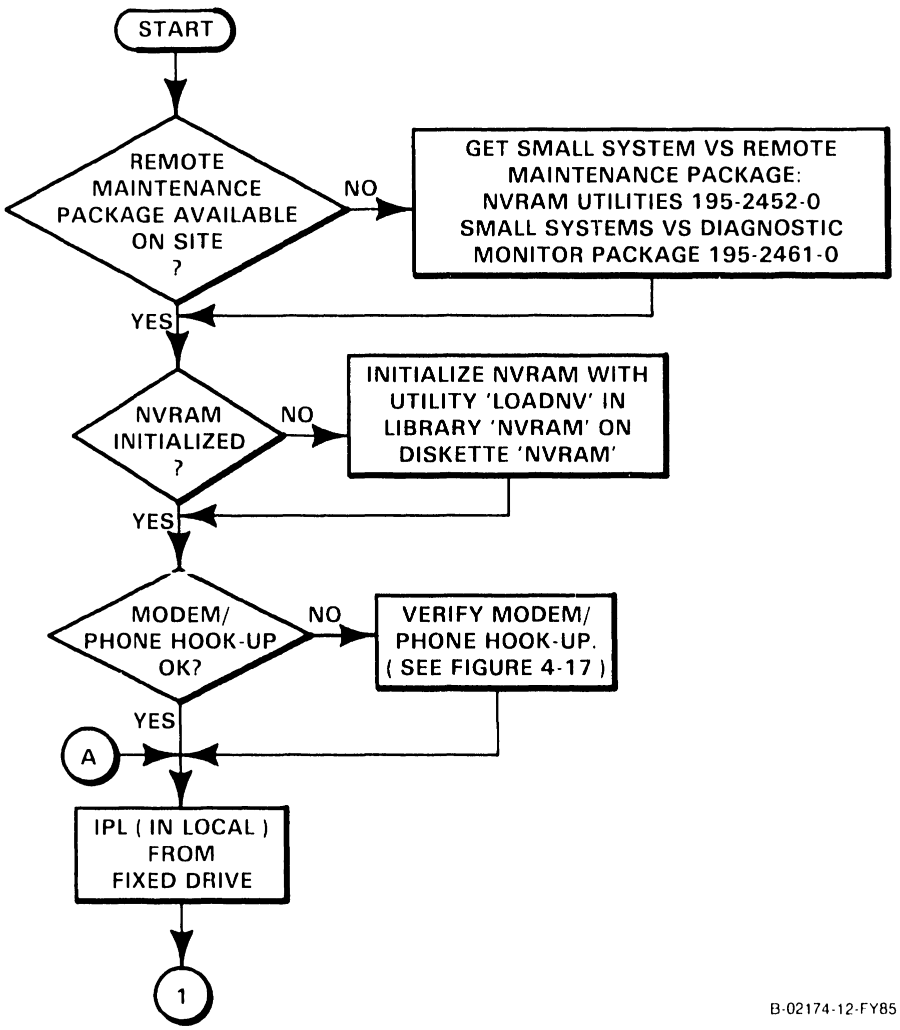


Figure 4-16A. Remote Diagnostic Certification Flowchart

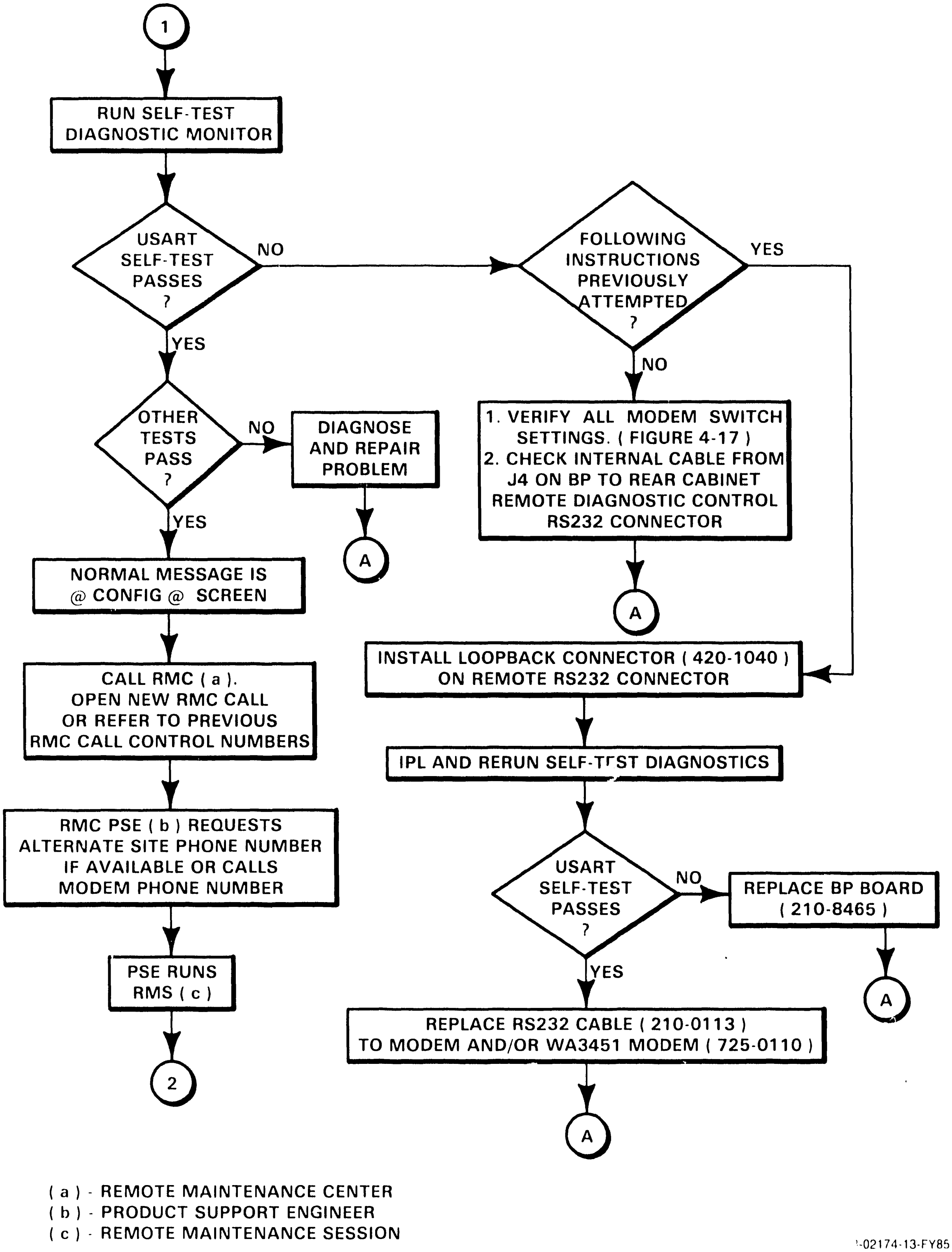


Figure 4-16B. Remote Diagnostic Certification Flowchart

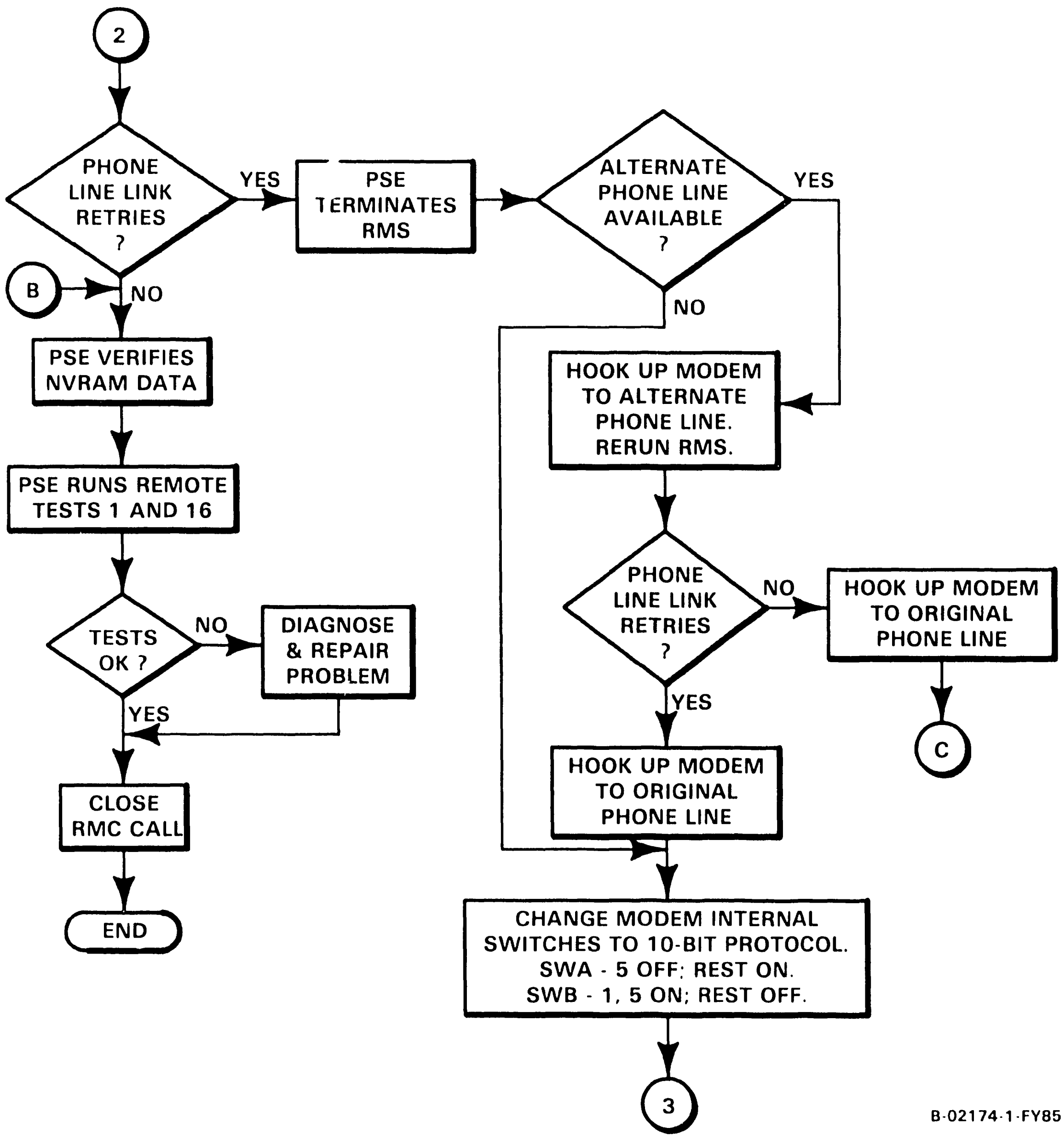


Figure 4-16C. Remote Diagnostic Certification Flowchart

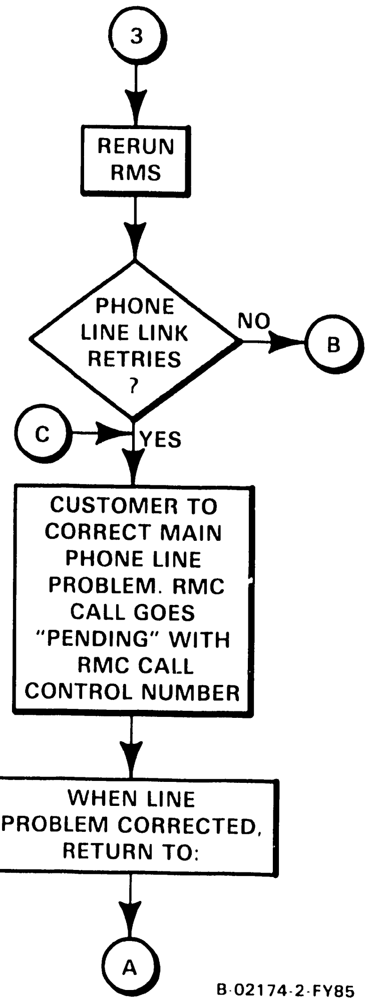
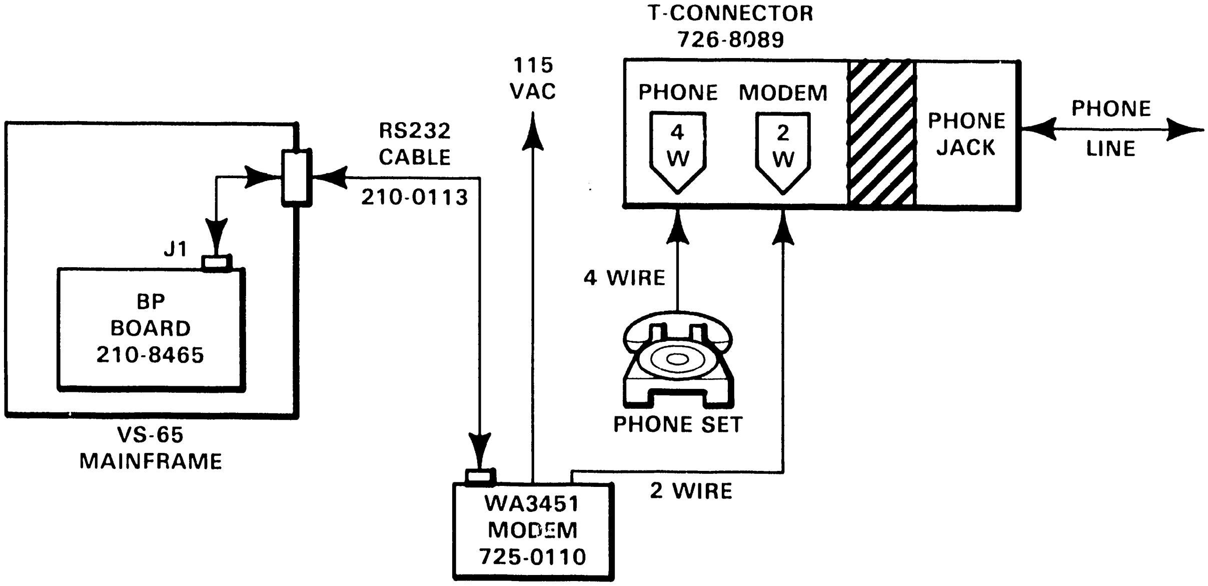
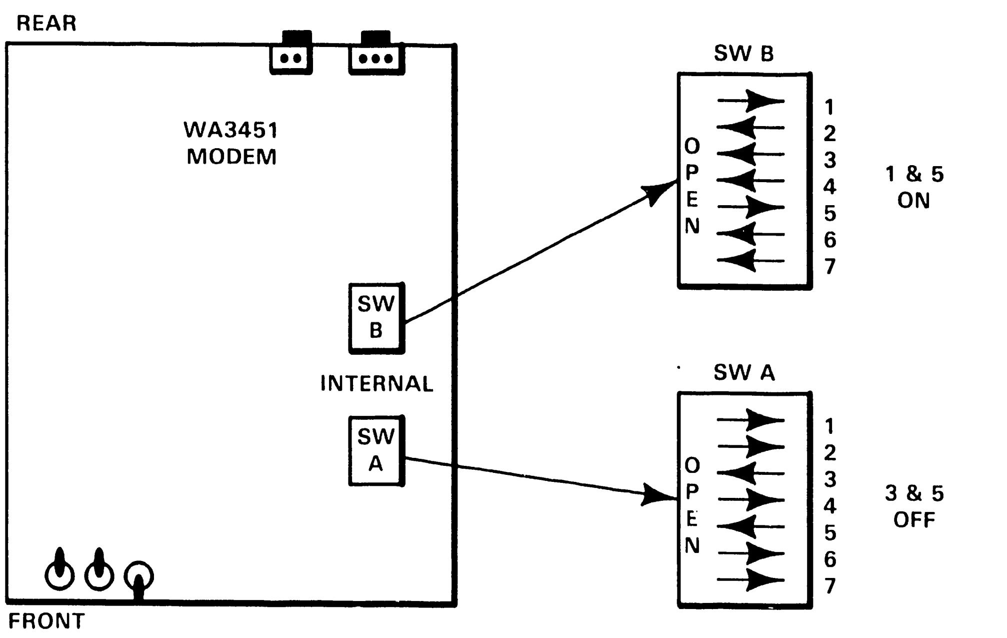


Figure 4-16D. Remote Diagnostic Certification Flowchart



MODEM/PHONE LINE HOOK-UP



MODEM SWITCHES

SW A & SW B NORMAL SETTINGS

B-02174-14-FY85

Figure 4-17. Modem to Phone Connections and Modem Switches

4.13 SYSTEM TURNOVER

1. Remove any scratch or CE diskettes from the diskette drive.

2. Perform an IPL from the system disk.

3. Log on to any Workstation designated as a VS Operator's Console.

4. Use the Command Processor display function to display the files in the @SYSTEM@ library on the customer's operating system disk. Check the listed files to make sure all customer-purchased options are present.

   For example, if the BASIC compiler was purchased by the customer, the following files should be present in the @SYSTEM@ library:

   a. BASIC
   b. CVBASIC

   If the COBOL compiler was purchased, conversely, the following files should be present:

   a. COBOL
   b. WC1PASS1
   c. WC1PASS2

   If the RPG compiler was purchased, only one file should be present.

   a. RPGII

5. Delete any of the above compilers not purchased by the customer from the related files using the Command Processor SCRATCH function.

6. Demonstrate to the customer or to the responsible computer operator how the disk initialization procedure is performed using the system DISKINIT utility program.

7. Demonstrate the Operational Procedures as given in paragraph 3.7 and explain each step to all applicable customer personnel.

8. When performing the Daily Power-Down procedure in paragraph 3.7.3, and after the system is in Control Mode, demonstrate to the users the procedures for placing each (different type of) external disk drive in the 'OFF-LINE' mode, and then continue with the power-down procedure.

9. Discuss the Emergency Shut-Down procedure given in paragraph 3.7.4. Stress the need to take external disk drives off-line, if time permits.

10. Allow the customer to test the system using his programs. If the customer is satisfied with the operation of the system, officially turn the system over to the customer. This should be a verbal notification given by the CE performing the installation.

4.14 STAND-ALONE UTILITY

The basic VS-65 computer system supports only one removable disk media, the 5-1/4" diskette. In order to bring up the VS Operating System (VSOS) on this configuration, the fixed disk must be reformatted and then loaded with the necessary operating system files. The Stand-Alone Utility (SAU) software, formerly called the Coldstart Procedure, provides this function.

The SAU is IPLed from two media tolerant diskettes. The utility uses the 2270V5 diskette drive, the internal fixed drive, and Workstation Zero (WS-0). The SAU copies the VSOS files and utilities from a series of diskettes, or the archiving cartridge tape using the 2529V archiving cartridge tape drive. It builds a media tolerant VTOC on the fixed disk as it copies the VS files and utilities. The SAU copies the CP and BP microcode, and bootstrap files to the fixed disk, allowing both bootstrapping and IPLing from the fixed disk.

The Stand-Alone Utility is self-contained. It does not use the normal operating system, nor can the normal operating system use it. The utility has two modes of operation; the Copy mode and the Backup mode. The Copy mode allows three different ways to copy data from the input diskettes or cartridge tape to the system volume.

1. Initialize the system volume before copying the data.

2. Reformat the system volume before copying the data.

3. Copy only those files which are to be added, or used to update the system volume.

The method selected depends on circumstances. The VS-65 should be delivered with the system disk initialized and loaded. If the system volume has not been initialized, or has hard I/O errors (or a bad VTOC) which will not allow the system to IPL, select the first option. Initializing a 76 megabyte drive takes about 2 hours; the 147 megabyte drive takes around 4 hours.

The second option, reformatting, can be used to bring up a system when the system volume has been initialized previously (a volume label exists). Reformatting clears the volume of existing data and rewrites the VTOC. This option is required if the system volume is not media tolerant. This option will be used if IPLing from the system disk is not successful. Reformatting takes about 15 seconds for a 76 megabyte drive and about 20 seconds for a 147 megabyte drive. If this method is unsucessful, the volume must be re-initialized.

The third option, Copy only, allows loading new system files without rebuilding the entire system. SAU checks for duplicate file names, flags each, and allows you to skip the input file or to rename either the old or new file.

The Backup mode of SAU is useful on single disk systems in a situation where, for some reason, you can read but not IPL from the system disk. By running the Backup mode before reformatting, undamaged data resident on the volume can be preserved. Since there is no customer data on the system, backup is not part of system installation and SAU Backup will not be explained here. For information on SAU Backup, refer to VS-65 Processor Handbook, WLI P/N 715-0244.

CAUTION

The Stand-Alone Utility is an unbundled and unsupported utility. The primary reason for this is that the BACKUP function has several known bugs. Using the BACKUP function is NOT recommended.

4.14.1 STAND-ALONE UTILITY PROCEDURES

If it is not possible to Initialize from the system disk drive, perform the following:

1. Connect WS-0 to Port-0 (physical port 1) of the BNC/TNC Rear Connector Panel, as described in paragraph 4.10.2. Make sure that the panel is connected to J2 of SIO DA, and then power-up WS-0.

2. When using the 2529V Cartridge Tape Drive, connect it to any unused port (logical ports 1 thru 7) on the BNC/TNC Rear Connector Panel attached to the Serial I/O Device Adapter connector J2 above and power-up the tape drive.

3. Make sure the Local Control/Remote Diagnostic/Remote Control switch (figure 3-3) is in the Local Control position. (The system will not IPL if the switch is in Remote.)

4. Set the Boot Device switch (see figure 3-3) on the Front Panel to the UP (Floppy) position to select the diskette drive.

5. Press the green Control Mode pushbutton (figure 3-3) on the Front Panel.

6. Insert the first diskette labeled SAUDK1 into the diskette drive and close the door.

7. Press the the red Initialize pushbutton.

8. The HEX display on the Front Panel will begin counting down, as described in paragraph 4.7.1, and then go out. (At the same time the HEX display on the Front Panel is counting, the Telecommunication Device Adapter PROM-based power-up diagnostics will be running as shown on the TC DA Front Indicator and Control Panel.) In about 60 seconds WS-0 will briefly flash the IPL Monitor screen below and then immediately display the next screen:

```
                         IPL MONITOR


                  Initialization In Progress
```

```
Small System VS Package  Version R2510

Loading System Micro Code
```

9. After the first diskette has loaded (about 15 seconds), WS-0 will display another screen requesting the second diskette:

```
Small System VS Package  Version R2510

Please Change Floppy to continue Loading System Code
```

NOTE

The diskette drive Activity LED will remain ON and brightly lit during the period the diskettes are being changed even though the drive door is unlatched.

10. Remove the first diskette and insert the second diskette, SAUDK2. Workstation Zero will display the following:

```
Small System VS Package  Version R2510

Loading System Micro Code
```

11. After the two diskettes have been copied, WS-0 will then display the following screen:

```
                 Small System VS Package  Version R2510

            Loading Complete, Beginning System Initialization
```

12. The Diskette Drive Activity LED will become dimly lit, and WS-0 will then display the first Stand-Alone Utility screen:

```
Stand-Alone Utility -- Version 1.01.55                    Select Function
© Copyright 1984, Wang Laboratories, Inc.

The primary purpose of  the stand-alone  utilities is to bring up a new
machine  by formatting  the system disk  and  copying  a minimum system
to it.  These utilities may also be used for system and disk maintenance.


               Press PF4 to COPY to system disk,
                     PF5 to BACKUP the system disk,
```

13. Press PF4, COPY. WS-0 will display the Define Input Device screen:

```
Stand-Alone Utility -- Version 1.01.55              Define Input Device
© Copyright 1984, Wang Laboratories, Inc.

      Please enter the device type and address of the input device.

              Device Type                     - □□□□□□□□
              Physical Device Address (Hex)   - □□□□

Device Type  Description                Device Type  Description

2260VR       10 Meg F/R Disk (R)        2265V1       75 Meg Rem Disk
2265V2       288 Meg Rem Disk           2270V0       Console Diskette
2280V1R      30 Meg F/R Disk (R)        2280V2R      60 Meg F/R Disk (R)
2280V3R      90 Meg F/R Disk (R)        2270V1       Hard Sector Diskette
2270V2       Soft Sector Diskette       2270V3       Hrd/Sft Sec Diskette
2265V1A      75MB R dual port Dk        2265V2A      288MB R dual port Dk
2270V4       Soft Sector Diskette       2270V5       5-1/4 in SS Diskette
2267V1       75 Meg RSD Disk            22670V1A     75 Meg RSD Dual Port
2270V6       5-1/4 in SS Diskette       2209V        9-Track, 1600bpi Tape
2209V2       9-Track-DD, 1600bpi        2209V3       7-Track, 800bpi Tape
2219V1       1600/6250bpi, 75ips        2219V2       1600/6250bpi, 125ips
2219V3       Tri-density, 75ips         2219V4       Tri-density, 125ips
2529V        6400bpi Cartridge Tp       2509V        9-Track,1600bpi tape

      Press (ENTER) to continue
```

14. At this point, decide which input device will be used.

    a. If the 2529V Cartridge Tape Drive is chosen, use:

       (1) 2529V for Device Type.
       (2) 2801 thru 2807 for Device Address. (The Archiver and WS-0 must be attached to the Rear Connector Panel connected to J2 on the SIO DA.)

    b. If the 2270V5 Diskette Drive is required, use:

       (1) 2270V5 for Device Type.
       (2) 2000 for Device Address.

Press ENTER for either media.

In about 15 seconds, WS-0 will then display the Define System Device screen:

```
Stand-Alone Utility - Version 1.01.55                Define System Device
© Copyright 1984, Wang Laboratories, Inc.

     Please enter the device type and address of the output disk.

               Device Type                        - □□□□□□□□
               Physical Device Address (Hex)      - □□□□

Device Type  Description                  Device Type  Description

2260VR       10 Meg F/R Disk (R)          2260VF       10 Meg F/R Disk (F)
2265V1       75 Meg Rem Disk              2265V2       288 Meg Rem Disk
2280V1R      30 Meg F/R Disk (R)          2280V1F      30 Meg F/R Disk (F)
2280V2R      60 Meg F/R Disk (R)          2280V2F      60 Meg F/R Disk (F)
2280V3R      90 Meg F/R Disk (R)          2280V3F      90 Meg F/R Disk (F)
2265V1A      75MB R dual port Dk          2265V2A      288MB R dual port Dk
2265V3       620 Meg Fixed Disk           Q2040        8 inch Fixed Disk
2265V3A      620Mb Dual Port Disk         2268V1       76meg 8in Fixed Disk
2268V2       150Mb 8in Fixed Disk         2230         32Mb 5-1/4in Fix Disk
2267V1       75 Meg RSD Disk              2267V1A      75 Meg RSD Dual Port
2268V1A      76 Meg 8in Dual Disk         2268V2A      150 Meg 8in Dual Port

     Press (ENTER) to continue
```

15. Use:

    a. Device Type:
       (1) 2268V1 (for 76 megabyte drive)
       (2) 2268V2 (for 147 megabyte drive)

    b. Device Address:
       (1) 2400 (for 76 megabyte drive)
       (2) 2400 (for 147 megabyte drive)

    c. Press ENTER.

WS-0 will display the following:

```
Stand-Alone Utility - Version xxxx                Specify Label Handling
© Copyright 1984, Wang Laboratories, Inc.


            Press (PF2) to INITIALIZE the system disk,
                  (PF3) to REFORMAT the system disk, or
                  (PF4) to COPY only.

    ----------------------------------------------------------------
    Or, press (PF1) to return to the mode selection screen.
```

16. Press PF3, REFORMAT (takes about 15 seconds for the 76MB drive and 20 seconds for the 147MB drive). WS-0 will display the following:

NOTE

If the first attempt to IPL the system failed, and the drive was then REFORMATTED and reloaded, and IPL failed again, press PF2 to INITIALIZE, and reload the disk drive. (Initializing the 76MB drive takes about 2 hours, and about 4 hours for 147MB drive.)

```
Stand-Alone Utility - Version xxxx                Specify Volume Label
© Copyright 1984, Wang Laboratories, Inc.

                            System Disk

     The following information is required for volume formatting:

Volume name                  - NEC160
Volume owner                 - □□□□□□□□□□□□□□
Date (MM/DD/YY)              - □□/□□/□□
VTOC size (in blocks)        - 252  (for 2268V1) or (494 for 2268V2)
Fault Tolerance              - MEDIA  (NONE - No fault Tolerance)
                                      (CRASH - Tolerate system halt)
                                      (MEDIA - Tolerate bad media also)
Extent limit at file creation- 003   (3-255)
Total allowable extents      - 013   (13-255)
--------------------------------------------------------------------
Please supply the required parameters and press (ENTER) to continue,
or Press (PF1) to return to mode selection screen.
```

17. Enter the requested information and press ENTER. WS-0 will display the following:

```
Stand-Alone Utility - Version 1.01.55            Writing Volume Label
© Copyright 1984, Wang Laboratories, Inc.


   Formatting of the output disk volume directory is now in progress.
```

18. After REFORMAT is complete, WS-0 will display the following:

```
Stand-Alone Utility - Version 1.01.55     Allocate dump or paging files
© Copyright 1984, Wang Laboratories, Inc.

Please specify the size of the preallocated control mode dump file.  The
size of the file should correspond to the size of main memory for any
CPU you intend to use this disk on.  Enter a size of zero (0) if you do
not want to allocate a dump file at this time.

               Size of allocated dump file      = 00000K

Please specify the size and location of the user paging pool.  The size
of the pool should be based on the number of tasks and their segment 2
sizes which may use this disk for paging.  Enter a zero (0) if you do
not want to allocate a paging pool at this time.

              Size of paging pool                 = 00000K

              Pool location (relative to VTOC)    = 0
                   0 = Nearest VTOC
                   9 = Farthest from VTOC

      Press (ENTER) to continue
```

19. Select the defaults (or enter the correct information) and press ENTER. (At this point, either the cartridge tape, or the diskettes will be used for input. For the cartridge tape, refer to paragraph 4.14.1.1. For the diskettes, refer to paragraph 4.14.1.2.)

4.14.1.1 Archiving Cartridge Tape Input

1. WS-0 will display the following:

```
Stand-Alone Utility - Version 1.01.55                Request to Mount
© Copyright 1984, Wang Laboratories, Inc.

                    Please mount the first tape.
```

2. Insert the cartridge tape into the 2529V Cartridge Tape Drive and press the "On-Line" press-point. The "On-Line" LED should light and the Tape Loaded LED will flash. After the tape rewinds (which takes about 70 seconds), WS-0 will display the following screen:

```
Stand-Alone Utility - Version xxxx
© Copyright 1984, Wang Laboratories, Inc.

                    Copy in progress
```

3. The cartridge tape will start copying onto the system disk. The current version of VSOS takes about 12 minutes to copy to the 147M drive.

4. When copying the tape is complete, WS-0 will display the following:

```
Stand-Alone Utility - Version xxxx                    Copy Completed
© Copyright 1984, Wang Laboratories, Inc.

                  Copy completed. IPL when ready.

       Or, press PF1 to copy more
```

5. If no more tapes are to be copied press the "On-Line" pushbutton on the tape drive. The "On-Line" LED should go out. Remove the cartridge tape and begin the IPL procedure, paragraph 4.9.

4.14.1.2 Diskette Input

1. WS-0 will display the following:

```
Stand-Alone Utility - Version xxxx                  Request to Mount
© Copyright 1984, Wang Laboratories, Inc.

                 Please mount the first diskette.
```

2. Insert the first diskette, labeled SYST01, into the diskette drive. WS-0 will display the following:

```
Stand-Alone Utility - Version xxxx
© Copyright 1984, Wang Laboratories, Inc.

                      Copy in progress
```

3. The diskette will start copying onto the system disk. Currently, copying all of the diskettes takes about 15 minutes.

4. When the first diskette is copied, WS-0 will display the following:

```
Stand-Alone Utility - Version xxxx                    Request to Mount
© Copyright 1984, Wang Laboratories, Inc.

              Please mount the next diskette SYST02
```

5. Insert the diskette labeled SYST02. WS-0 will again display the "Copy in process" screen.

6. After each diskette has been copied, the next diskette will be called for. Continue inserting the diskettes, in numerical order, until the last diskette (currently SYST14) has been copied.

7. After the last diskette has been copied, Workstation Zero will display the following:

```
Stand-Alone Utility - Version xxxx                    Copy Completed
© Copyright 1984, Wang Laboratories, Inc.

              Copy completed.  IPL when ready.

      Or, press PF1 to copy more
```

8. Remove the last diskette and begin the IPL procedure, paragraph 4.9.1.

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5
MAINTENANCE

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CHAPTER 5

CORRECTIVE MAINTENANCE

5.1 GENERAL

This chapter discusses the removal and replacement procedures required for corrective maintenance during installation. The following paragraphs describe the steps involved in removing and replacing, or adjusting and reinstalling all major field-replaceable components in the VS-65 mainframe.

5.2 TOOLS, TEST EQUIPMENT AND MATERIALS

The standard tools and test equipment required for maintenance of a VS-65 Computer System are listed below. No special materials are necessary to perform mainframe corrective maintenance.

DESCRIPTION	WLI P/N
Standard CE Tool Kit	726-9401
Digital Voltmeter (DVM) John Fluke Model No. 8022A	727-0119
Portable CE Vacuum Cleaner	726-9518
CE Cartridge Tape Archiver	190-0751

5.3 PERIPHERAL CORRECTIVE MAINTENANCE

Refer to the appropriate documents in Class Code 3000 for corrective maintenance procedures for all VS-65 associated peripherals.

5.4 MAINFRAME COVERS

Prior to installation, remove the mainframe covers to allow inspection for damage, loose cables, and foreign matter.

5.4.1 TOP COVER REMOVAL AND REPLACEMENT

Remove the top cover (see page 5-2, figure 5-1) as follows:

1. At the rear of the mainframe cabinet, firmly grasp the back edge of the top cover pulling it up and away from the front of the cabinet.

Reinstall the top cover by reversing this procedure.

5.4.2 FRONT COVER REMOVAL AND REPLACEMENT

Remove the front cover (see figure 5-2) as follows:

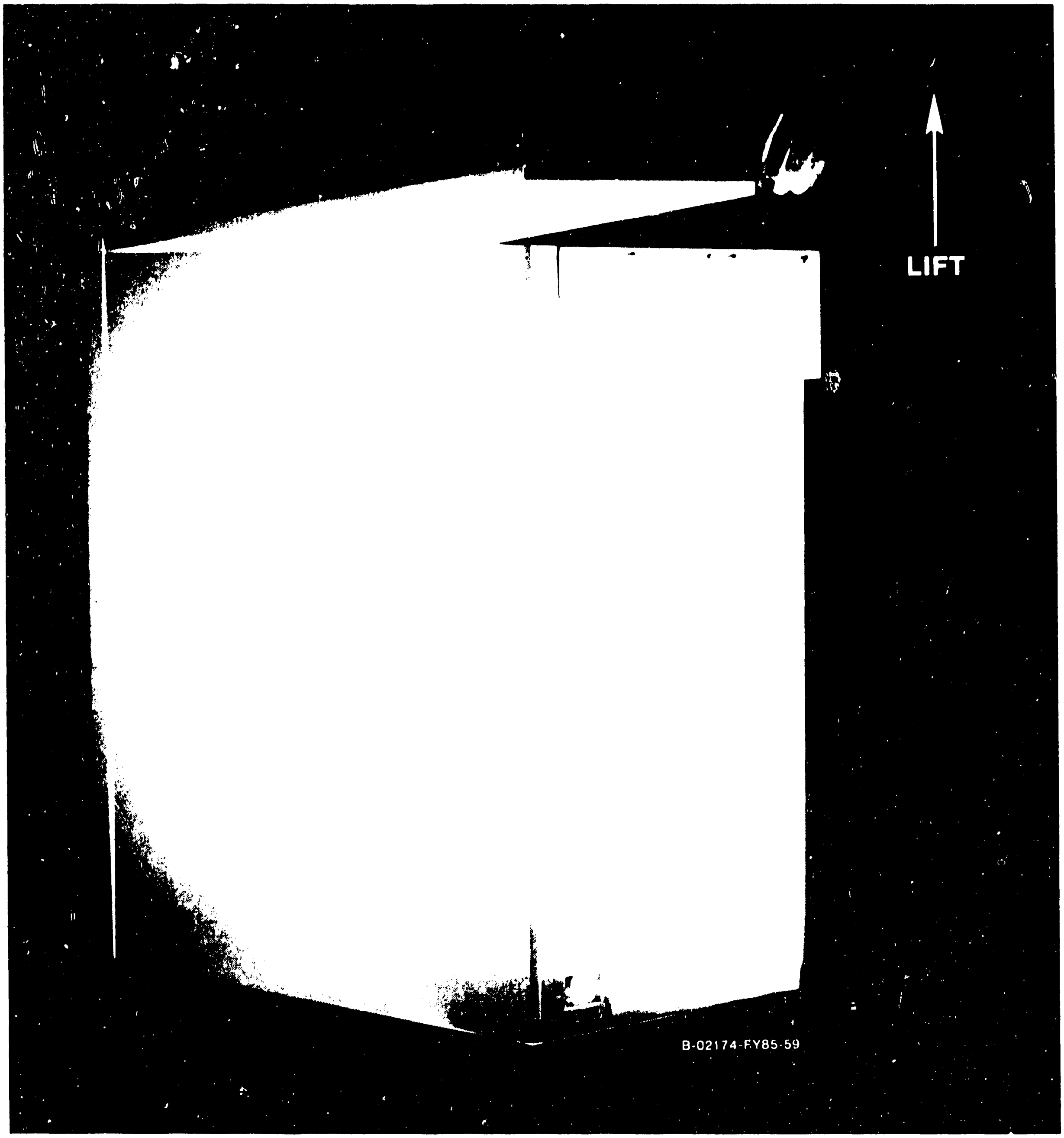


Figure 5-1. Top Cover Removal

1. Remove the top cover as previously described.

2. The top of the front cover is secured to the top cross brace of the chassis by two hex head bolts. Loosen the two hex head bolts.

3. Tilt the top of the cover out and away from the mainframe, lift it up and out of the bottom hinged brackets and away from the cabinet.

Reinstall the front cover by reversing this procedure.

NOTE

If the Operational Control Panel door does not open and close properly, adjust the ball plunger located inside the front cover, above the door cutout.

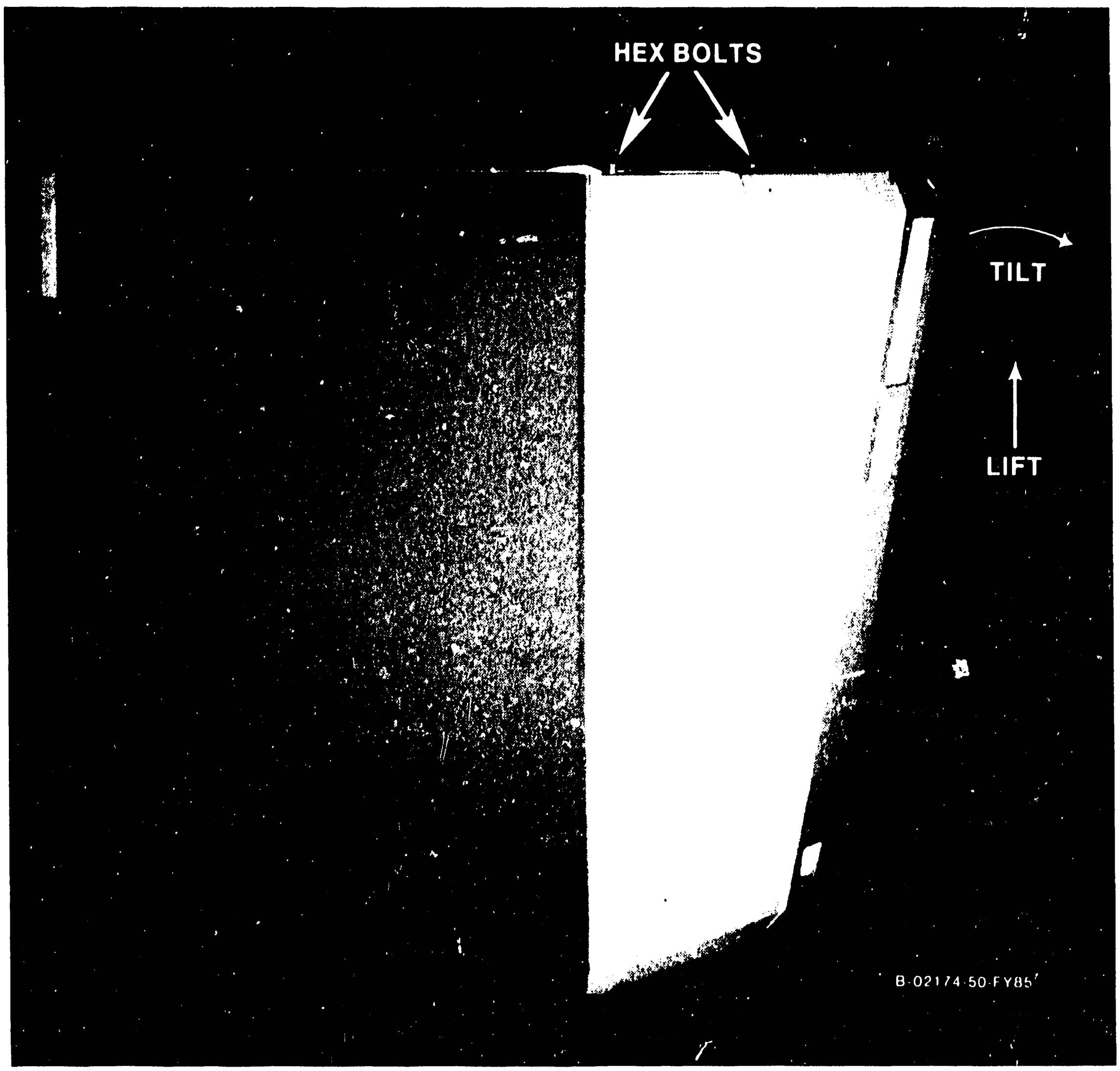


Figure 5-2. Front Cover Removal

5.4.3 SIDE COVER REMOVAL AND REPLACEMENT

Remove the side cover(s) as follows: (Figure 5-3.)

1. Remove the top cover as previously described.
2. Firmly grasp the top edge of the side cover and pull it up and away from the cabinet.

Reinstall the side cover by reversing this procedure.

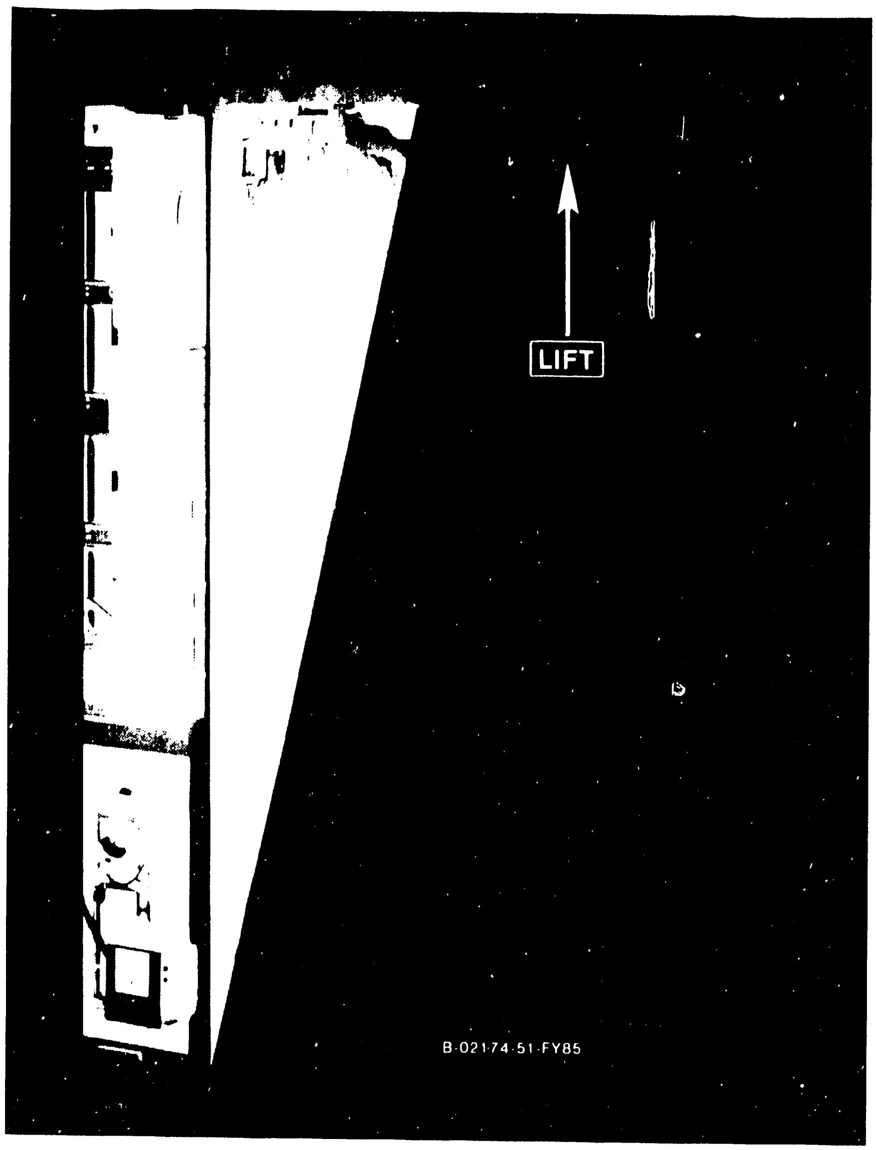


Figure 5-3. Side Cover Removal

5.5 PRINTED CIRCUIT BOARD REMOVAL AND REPLACEMENT

The removal and replacement procedures for each printed circuit board (PCB) is given in the order in which the PCB is found on the Motherboard (see figure 5-4). The general removal procedures given next should be followed whenever a printed circuit board is to be removed.

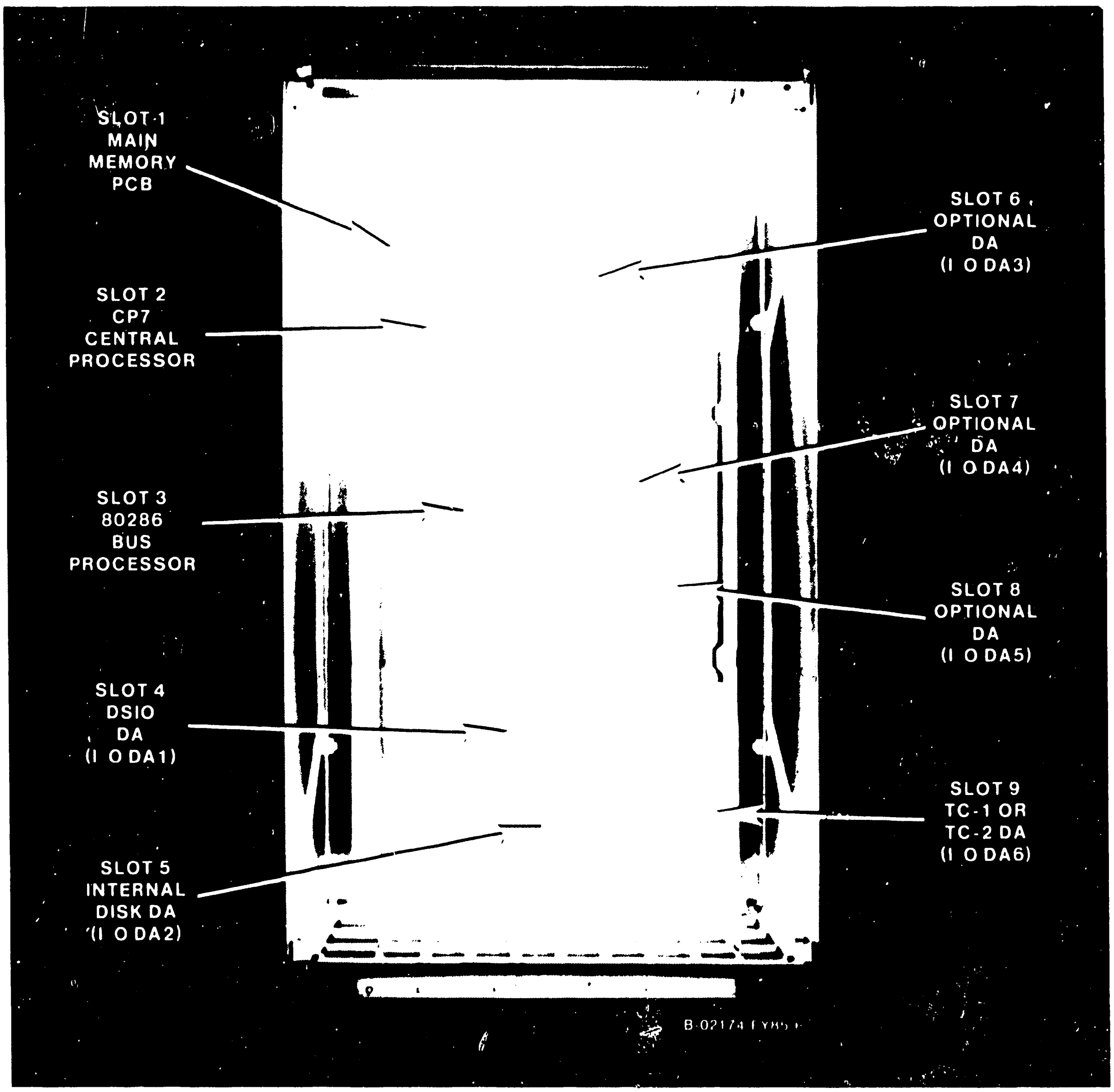


Figure 5-4. Motherboard and Card Cage Assembly

1. Press the green Control Mode button. This prevents any disk I/O command in process from being halted prior to completion.

2. Power-down the mainframe (per paragraph 4.11.1.2) by depressing the ac power On/Off switch to the zero '0' position.

3. Remove the top cover as described in paragraph 5.4.1.

4. Each PCB is held in place by two snap-lock fasteners. One snap-lock tab fits under the top edge of the front motherboard cage assembly rail and the second snap-lock tab fits under the top edge of the rear assembly rail.

CAUTION

1. Be careful when replacing the large, flexible VS-65 printed circuit boards. Make sure that all boards are seated properly in the correct Motherboard sockets. Correct seating may require a slight pressure at the bottom of the board when inserting the PCB.

2. DO NOT USE EXCESSIVE FORCE WHEN PUSHING DOWN ON THE SNAP-LOCKS.

3. Before power-up, be sure all PCB have their component sides facing right when viewed from the chassis front.

A board locator label mounted on the front of the VS-65 motherboard cage assembly is shown below.

SLOT #	1	2	3	4	5	6	7	8	9
PCB	MM	CP	BP	I/ODA1	I/ODA2	I/ODA3	I/ODA4	I/ODA5	I/ODA6

5.5.1 CPU PRINTED CIRCUIT BOARD REMOVAL AND REPLACEMENT

There are three boards found in the VS-65 which make up the Central Processing Unit (CPU). Two of the PCBs, the Main Memory and the CP7 Central Processor, are connected at the top by three 30-contact jumper cables (figure 5-5).

5.5.1.1 Main Memory PCB Removal and Replacement

1. Remove the three 30-contact jumper cables (figure 5-5) from each PCB edge connector using a rocking motion between the jumper cable jack and board.

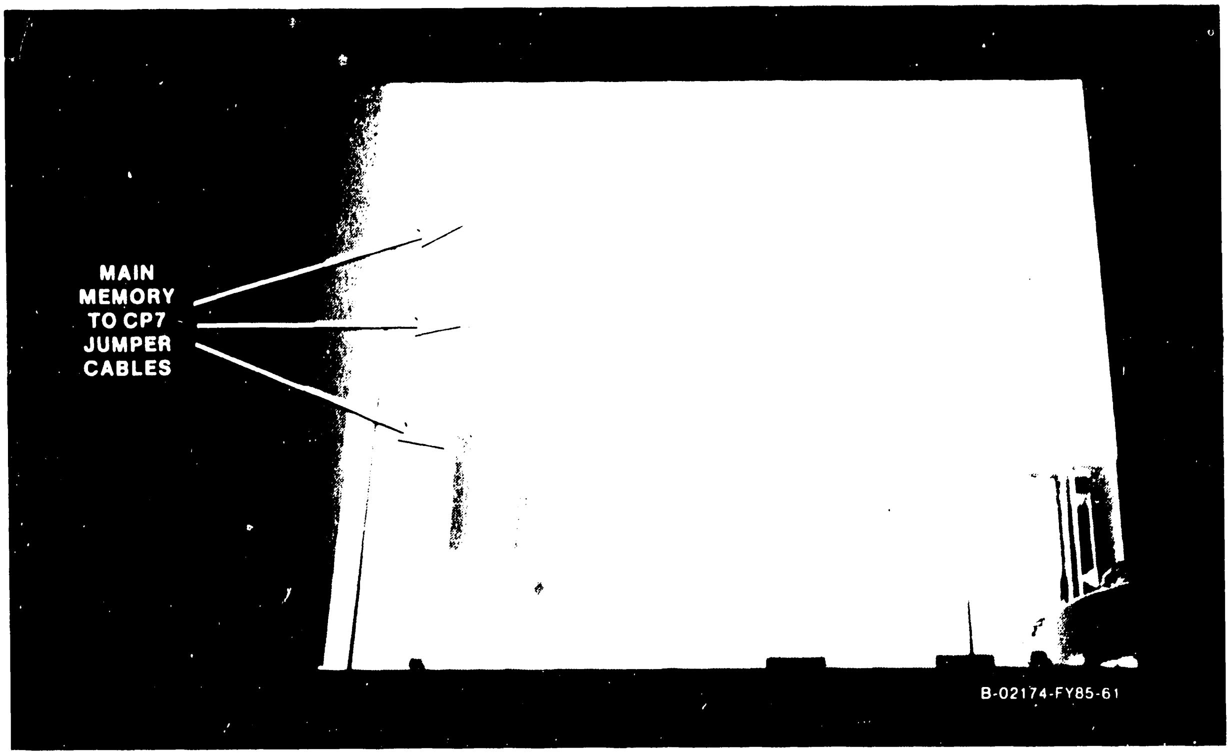


Figure 5-5. Main Memory to Central Processor Jumper Cables

2. Carefully remove the 210-8599 Main Memory PCB (figure 5-7) from Motherboard slot number 1 by lifting the snap-locks to free the PCB from the Motherboard connectors. Once the board is free of the connectors, ease it straight up in the board guides and out of the board cage.

3. Check the memory size switch settings (table 5-1 and figure 5-6) and jumper positions (table 5-2 and figure 5-8) on the Main Memory board. Reinstall or replace the MMB by carefully inserting the PCB into the board guides and lower it to the Motherboard connector.

		OFF	ON	
	O		•	1
1M Byte MMB	P		•	2
210-8599-1A	E	•		3
	N	•		4

• means DEPRESSed

Figure 5-6. Main Memory Size (1M Byte) Rocker Switch Settings

4. Make sure the board edge connectors are lined up with the Motherboard connector slots and the snap-lock tabs are under the top rails.

Table 5-1. Main Memory Size Selection Switch

WLI PART NUMBER	MEMORY SIZE (BYTES)	SWITCH NUMBER 1	2	3	4
210-8599-1A	1024K (64K RAMs)	ON	ON	OFF	OFF
210-8599-2A	2048K (256K RAMs)	ON	OFF	OFF	OFF
210-8599-4A	4096K (256K RAMs)	OFF	OFF	OFF	OFF

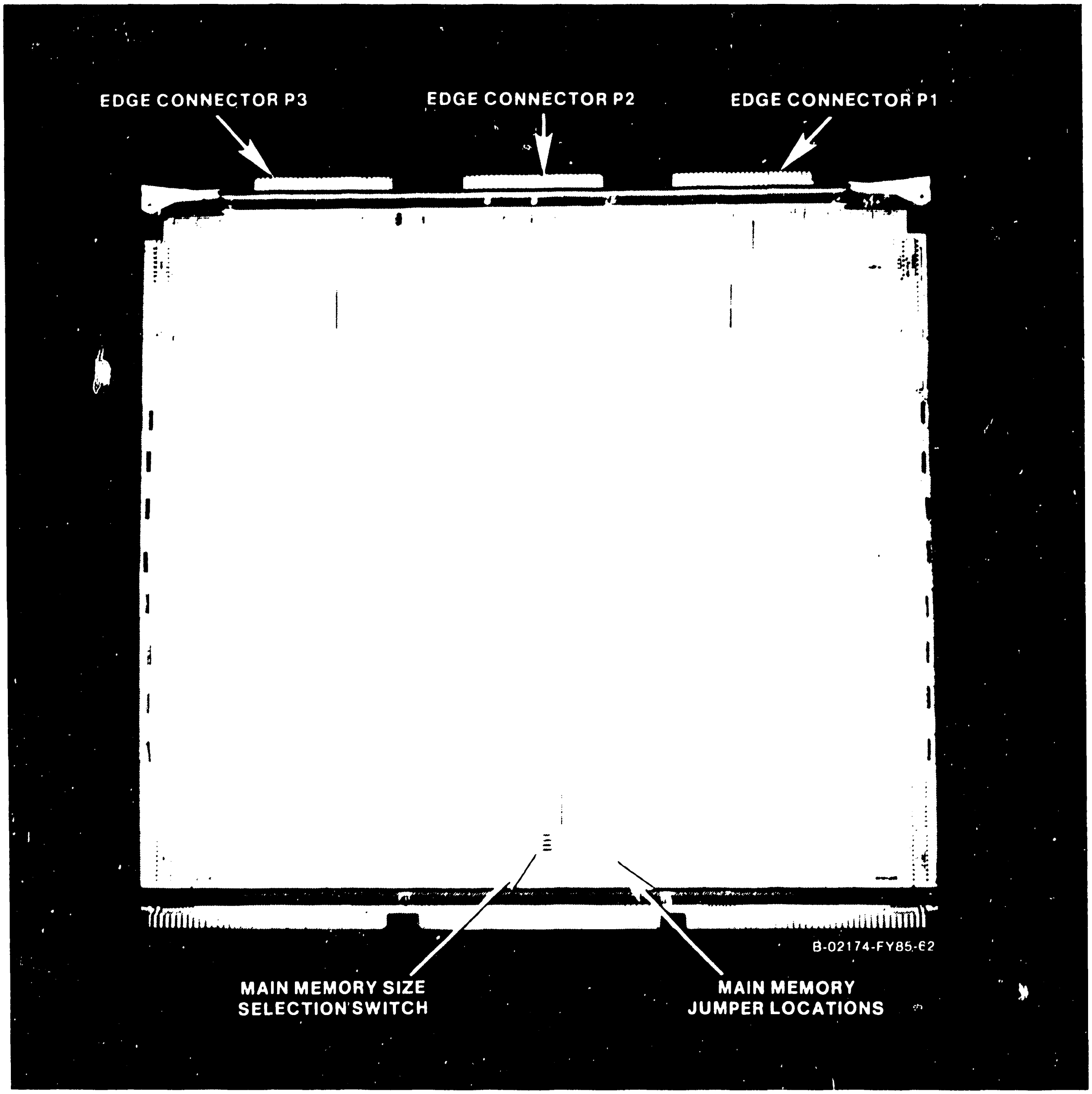


Figure 5-7. Main Memory (1M byte) Printed Circuit Board

NOTE

The switch positions given for the Main Memory PCBs may be modified to restrict the operation of the physical memory to an amount less than the maximum design of the PCB for diagnostic purposes. Refer to Chapter 8, Troubleshooting for details.

Table 5-2. Main Memory Jumper Positions Selection (For Revision 5 PCBs and above.)

MAIN MEMORY CONFIGURATION	JUMPER POSITIONS			
	JP1	JP2	JP3	JP4
1024K (64K RAMs)	BOTTOM	RIGHT	RIGHT	RIGHT
2048K (256K RAMs)	BOTTOM	LEFT	LEFT	LEFT
4096K (256K RAMs)	TOP	LEFT	LEFT	LEFT

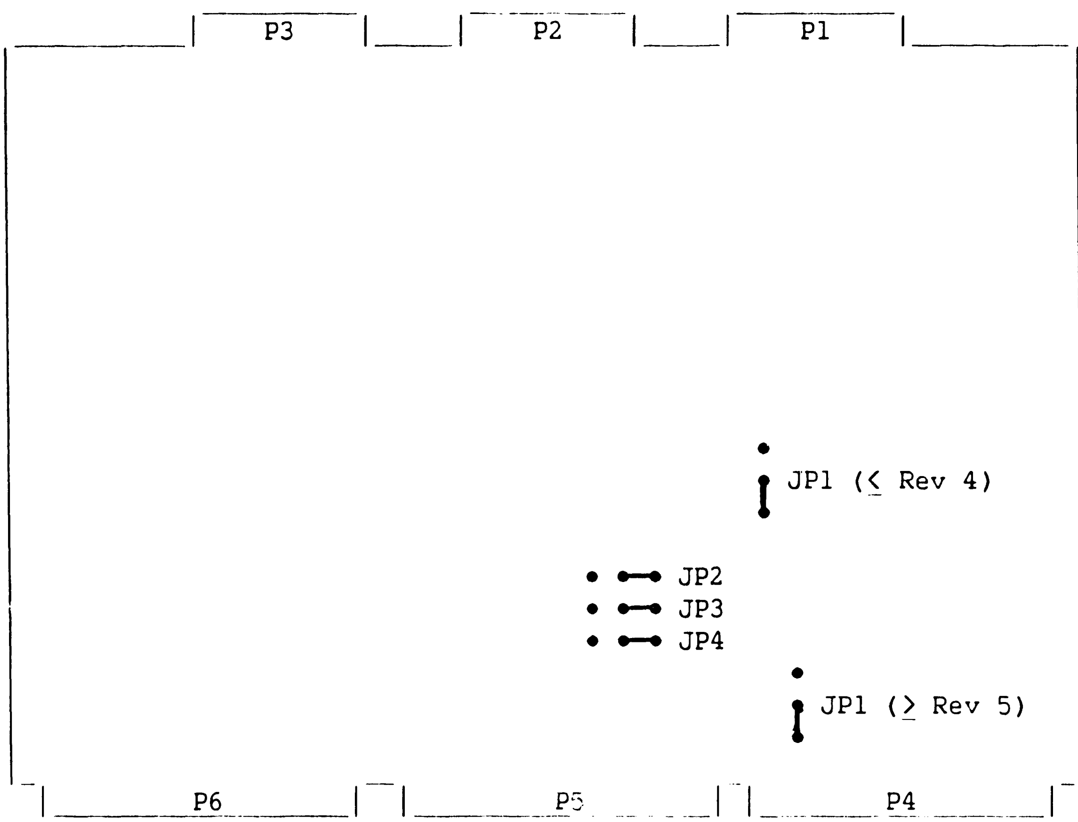


Figure 5-8. Main Memory Connector and Jumper Locations (1M Byte)

5. Carefully push down on the snap-locks with a firm steady pressure to seat the Main Memory board in the Motherboard.

6. Replace the 30-contact jumper cables from the Main Memory to the CP7 Central Processor PCB.

5.5.1.2 Central Processor PCB Removal and Replacement

1. Remove the 210-8699 Central Processor PCB (figure 5-9) from Motherboard slot 2 using those procedures given in 5.5.1 through 5.5.1.1 which apply. When lifting the snap-lock tabs, be careful not to damage the top corner components on the CP7 board.

2. There are no switches on the CP7 board, only jumpers. Refer to figure 5-10 for the jumper locations.

3. Reinstall or replace the CP7 board as described in 5.5.1.1.

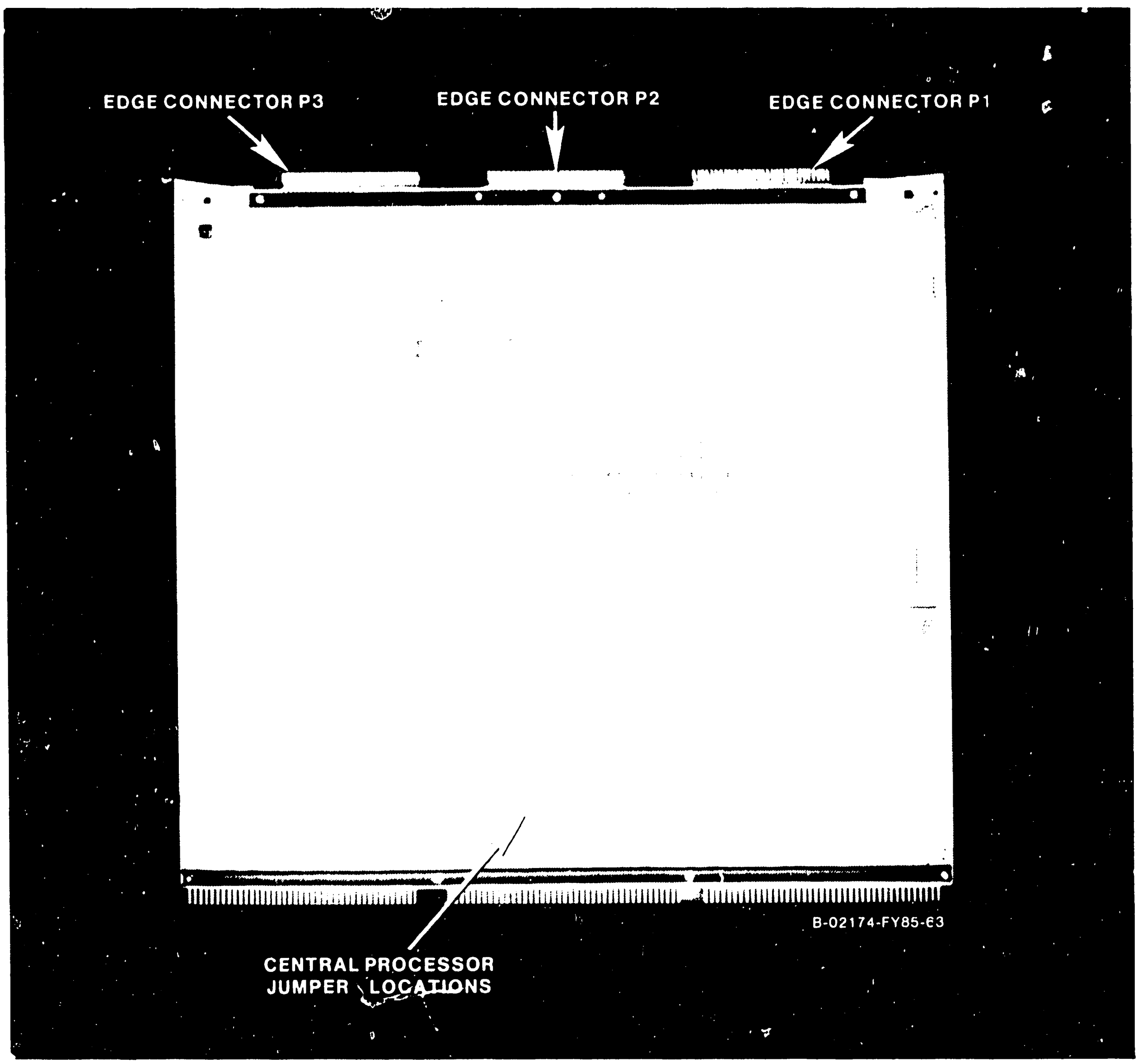


Figure 5-9. Central Processor (CP7) Printed Circuit Board

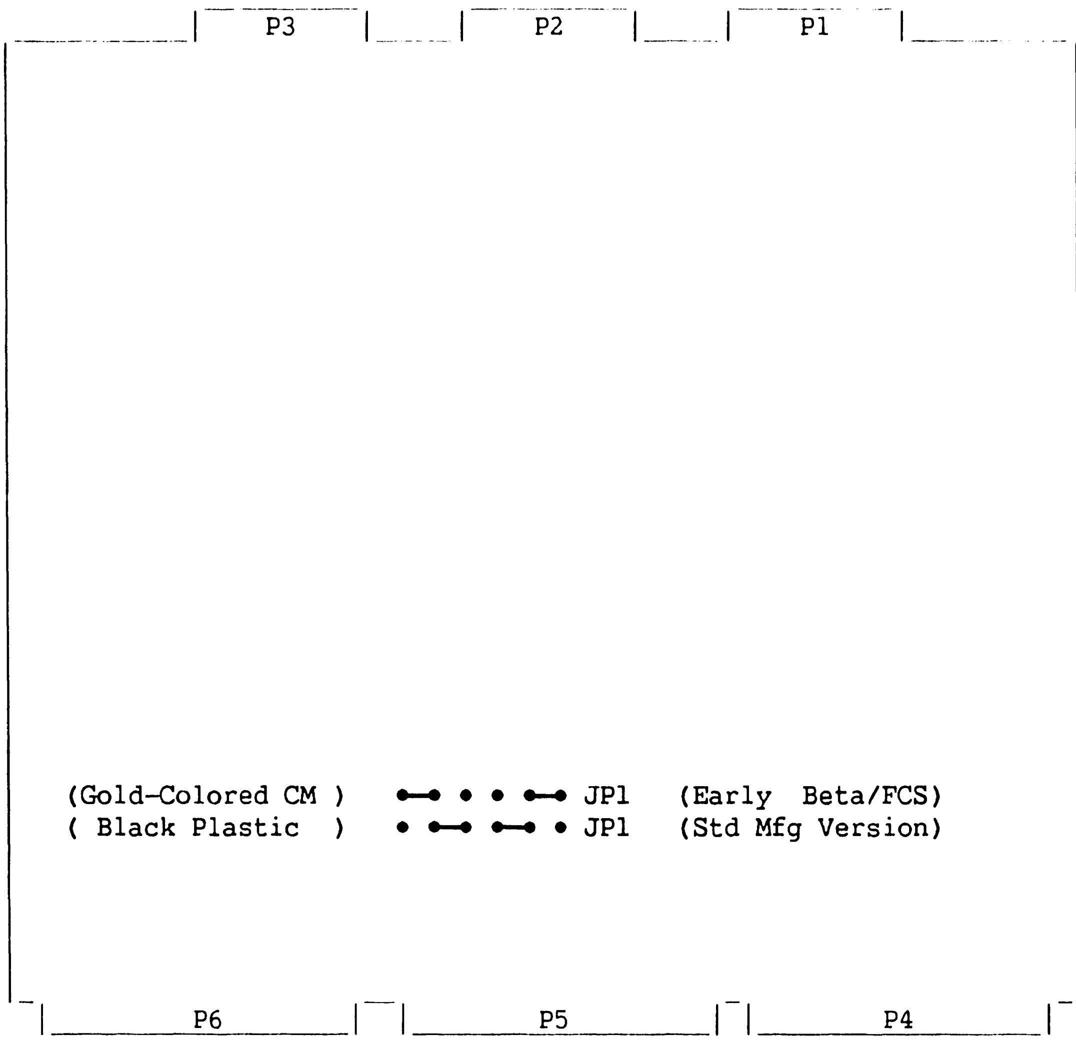


Figure 5-10. Central Processor (CP7) Jumper Locations

5.5.1.3 <u>Bus Processor PCB Removal and Replacement</u>

1. Before removing the 210-8465 Bus Processor PCB (figure 5-11) from Motherboard slot 3, disconnect the 34-pin connector from J2, the 34-pin connector from J3, and the 26-pin connector from J4 of the board. (The 50-pin connector J1, is to accommodate the eight inch diskette drive and is not used on VS-65.)

2. Remove the BP board from Motherboard slot 3 using those procedures given in 5.5.1 through 5.5.1.1 which apply.

3. Check the jumpers (figure 5-13) on the BP board for proper placement, amd make sure that the BP Diagnostic Switches (switch bank SW3) shown in figure 5-12 are in the correct positions. All switches except SW3-3 must be OFF for normal operation of power-up diagnostics and system initialization. (Switch SW3-3, which sets the BP's 80286 microprocessor clock at the 6 MHz rate, is currently independent of switch SW3-8.) The diagnostic operational mode of the BP is defined in table 5-3.

Table 5-3. Bus Processor Diagnostic Switch (SW3) Settings

SWITCH NUMBER	PURPOSE (WHEN CLOSED/ON)	NORMAL POSITION
1	Slow Data RAM clock (10% slow).	OPEN (OFF)
2	Fast Data RAM clock (10% fast).	OPEN (OFF)
3	Closed = 6Mhz clock to 80286 microprocessor. Open = 8Mhz clock to 80286 microprocessor.	CLOSED (ON)
4	Loop on error.	OPEN (OFF)
5	Loop on Core Diagnostic.	OPEN (OFF)
6	Bypass Core Diagnostic & Diagnostic Monitor.	OPEN (OFF)
7	Bypass Core Diagnostic.	OPEN (OFF)
8	Diagnostic mode. ON to read other switches.	OPEN (OFF)

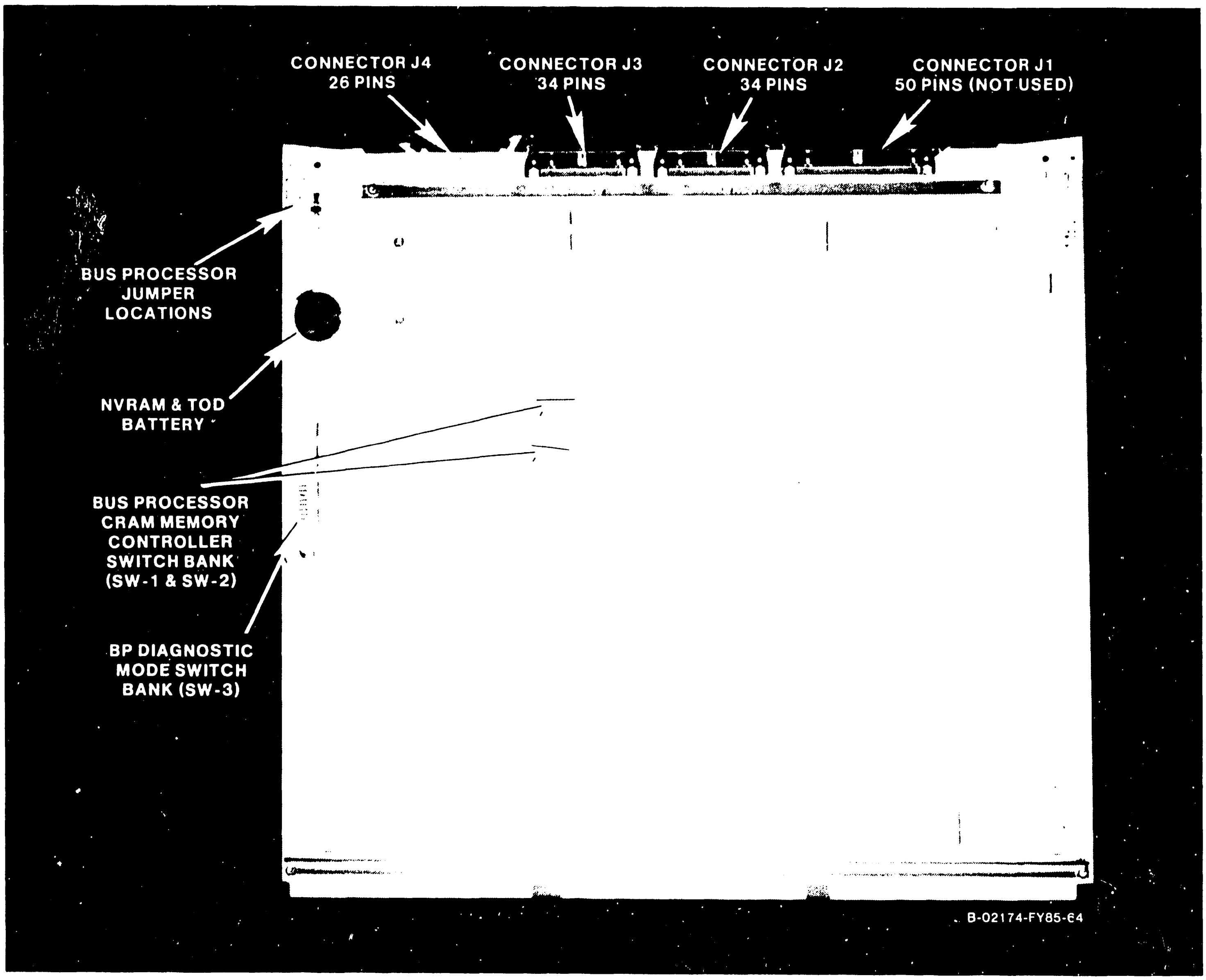


Figure 5-11. Bus Processor Printed Circuit Board

4. Verify the correct setting of the 8207 dual-port Code RAM Memory Controller switches (switch banks SW1 & SW2) as given in tables 5-4 and 5-5, and shown in figure 5-12.

Table 5-4. BP CRAM Controller Switch (SW1) Settings

SWITCH NUMBER	PURPOSE (WHEN CLOSED = ON)	NORMAL POSITION
1	Reserved for future use.	CLOSED (ON)
2	Reserved for future use.	CLOSED (ON)
3	CRAM Controller test mode is disabled.	CLOSED (ON)
4	Port A has priority over Port B.	OPEN (OFF)
5	Fast 80286 operating frequency (> 6 MHz).	CLOSED (ON)
6	CRAM Memory cycle time NOT Extended.	CLOSED (ON)
7	Long refresh period.	OPEN (OFF)
8	Refresh Count Interval is 9.833 microseconds.	CLOSED (ON)

Table 5-5. BP CRAM Controller Switch (SW2) Settings

SWITCH NUMBER	PURPOSE (WHEN CLOSED/ON)	NORMAL POSITION
1	Used with SW1-8 above (4 settings possible).	CLOSED (ON)
2	CRAM Bank occupancy set for 2 banks (RAS0 & 1).	OPEN (OFF)
3	Used with SW2-2 above (4 banks available).	CLOSED (ON)
4	Set fast RAM.	CLOSED (ON)
5	Set operating mode to 80286 (else 8086 mode)	CLOSED (ON)
6	Set Port B to asynchronous mode	CLOSED (ON)
7	Set Port A to synchronous mode	CLOSED (ON)
8	Disable CRAM ECC mode	CLOSED (ON)

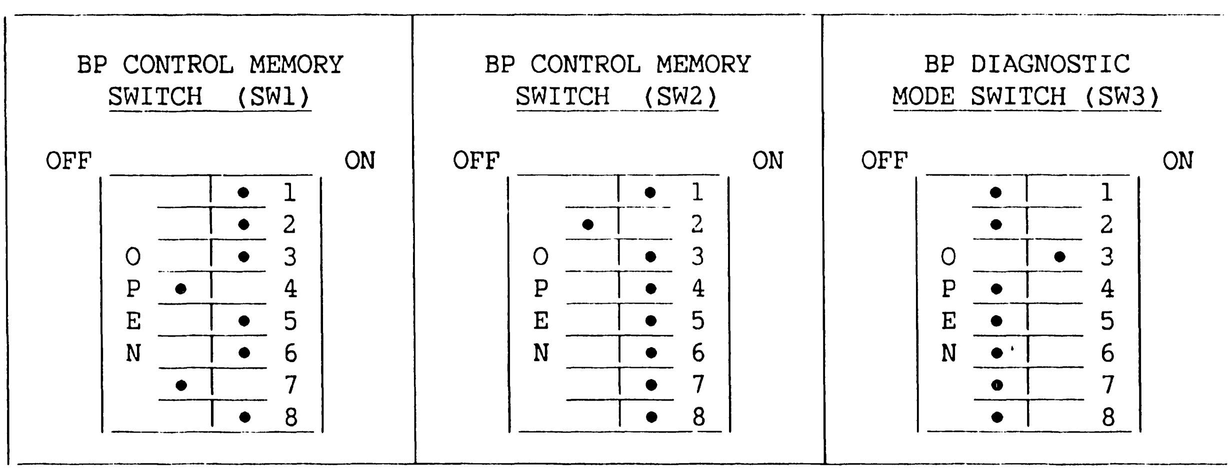


Figure 5-12. BP Control Memory and Diagnostic Rocker Switch Settings

5. Reinstall or replace the board as described in 5.5.1.1 and reconnect all cables. Cables for all boards should be reconnected with pin 1 toward the front of the mainframe. (Refer to table 5-6.)

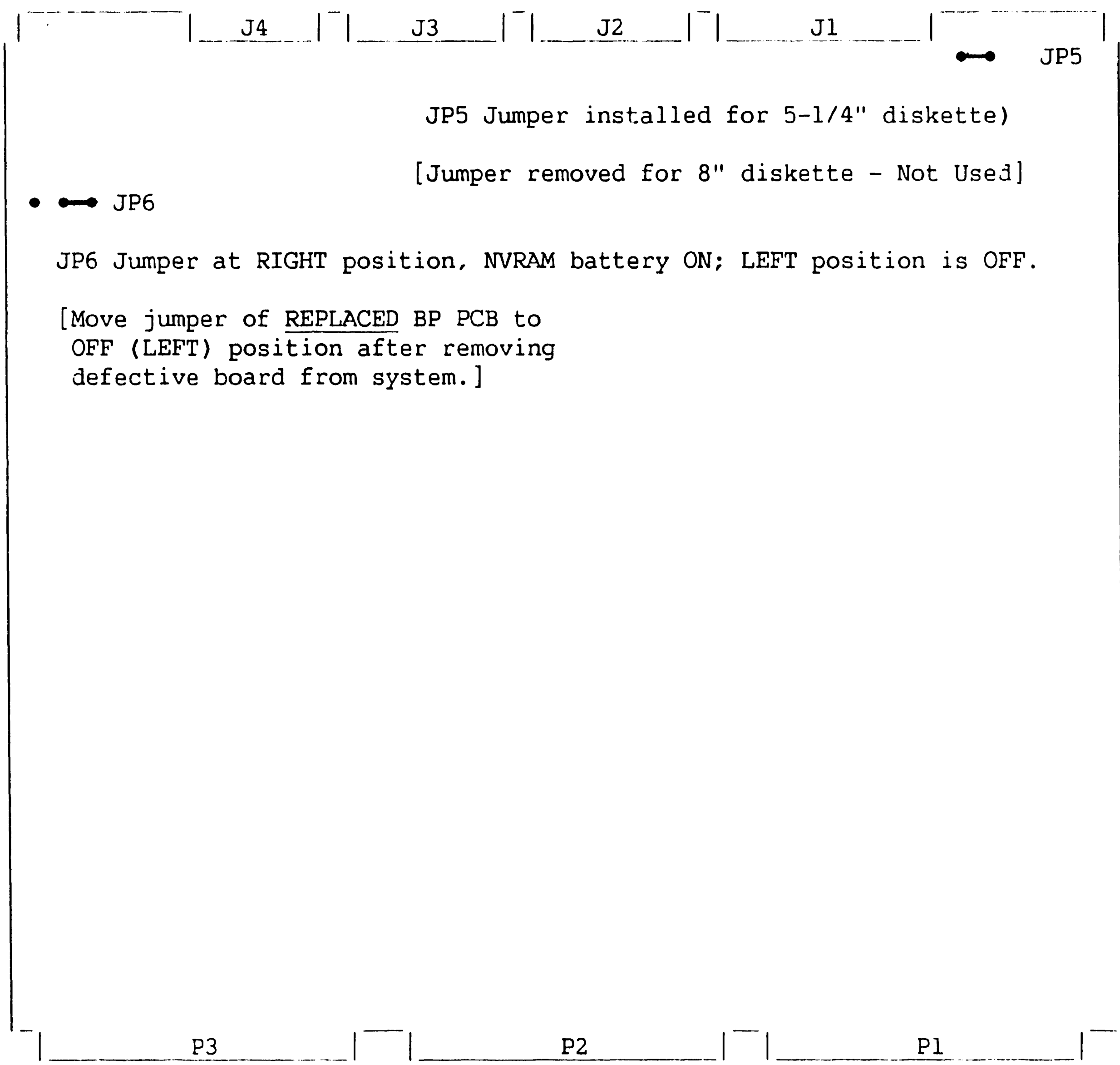


Figure 5-13. Bus Processor Connector and Jumper Locations

5.5.2 DEVICE ADAPTER PCB REMOVAL AND REPLACEMENT

There are currently six different device adapters (DAs) used in the VS-65. The removal and replacement procedures for the different DAs are given in the order in which they are typically found in the Motherboard (see figure 5-4). Device adapters may be assigned to the Motherboard (M/B) slots to coincide with their Physical Device Address (PDA) as assigned by the Genedit configuration format. Table 5-7 shows the relationship between the jumpers, PDAs, device adapter types and descriptions, and Wang part numbers.

Table 5-6. Internal Signal Cables and Connections

PC BOARD	CONNECTOR	CONNECTOR TYPE	CONNECTOR	CONNECTED TO
210-8599 Main Memory	P1 P2 P3	30-Contact Edge Connector	P1 P2 P3	210-8699 Central Processor CP7
210-8465	J1	50-pin		(Not Used)
Bus	J2	34-pin	J1	Diskette Drive
Processor	J3	34-pin	J1	Front Panel
(80286)	J4	26-pin	RS-232-C	TC Rear Panel
210-7906	J2	34-pin	BNC/TNC 0-7	270-0949
Serial I/O	J3	"	" 8-15	BNC/TNC
Device	J4	"	" 16-23	Rear Connector
Adapter	J5	"	" 24-31	Panel
210-8312	J1	60-pin A-Cable	P1	76 or 147M Byte
Int.Disk DA	J2	34-pin B-Cable	P2	Internal Disk
Ext.Disk DA	J1	60-pin Internal	A-Cable	270-0981
210-8312	J2	34-pin Internal	B-Cable	Ext. Disk Drive
210-8313	J3	" "	P2	Rear Cable
210-8314	J4	" "	P2	Clamp & Shield
210-8315	J5	" "	P2	Connector Panel
210-8337	J1	40-pin	RS-449	270-0952
One-Port	J13	20-pin	X.21	TC
TC	J2	26-pin	RS-232	Rear
Device	J3	"	RS-366	Panel
Adapter	J4	20-pin	Display	TC Front Panel
210-8637	J2A and J2B	26-pin	2 ea RS-232	270-0953
Two-Port	J3A and J3B	" "	2 ea RS-366	TC Rear
TC Device	J13A & J13B	20-pin	2 ea X.21	Panel
Adapter	S1 & S2	16-pin	2 Displays	TC Front Panel

Table 5-7. Device Adapter Relationships

I/O DA	M/B SLOT	JUMPER ADDRESS	PHYSICAL DEV. ADD.	DA TYPE	DEVICE ADAPTER DESCRIPTION	WLI PART NUMBER
1	4	4xx	2800	25V25	Serial I/O DA	210-7906
2	5	2xx	2400	25V50-0	Int. Disk DA	210-8312
3	6	3xx	2C00	25V50 or	(Limited to	210-831x
4	7	5xx	3000	25V76 or	one external	210-8337
5	8	1xx	3400	25V76-2	disk DA and/or	and/or
6	9	6xx	3800	DAs	two TC DAs)	210-8637

NOTES

1. The Internal Disk Drive Device Adapter will only support a single disk drive using Port-0. Additional ports are not recognized.

2. Jumper Addresses (JAs) and PDAs are fixed. JA 1xx is normally assigned to the External Disk Drive DA, if present. Jumper Address 3xx is recommended for a second TC DA.

3. First TC DA must be at PDA 3800 (Jumper Address 6xx).

5.5.2.1 Serial I/O Device Adapter Removal and Replacement

1. Remove the 210-7906 Serial Input/Output Device Adapter (SIO DA) using the procedures given in paragraph 5.5, steps one through four.

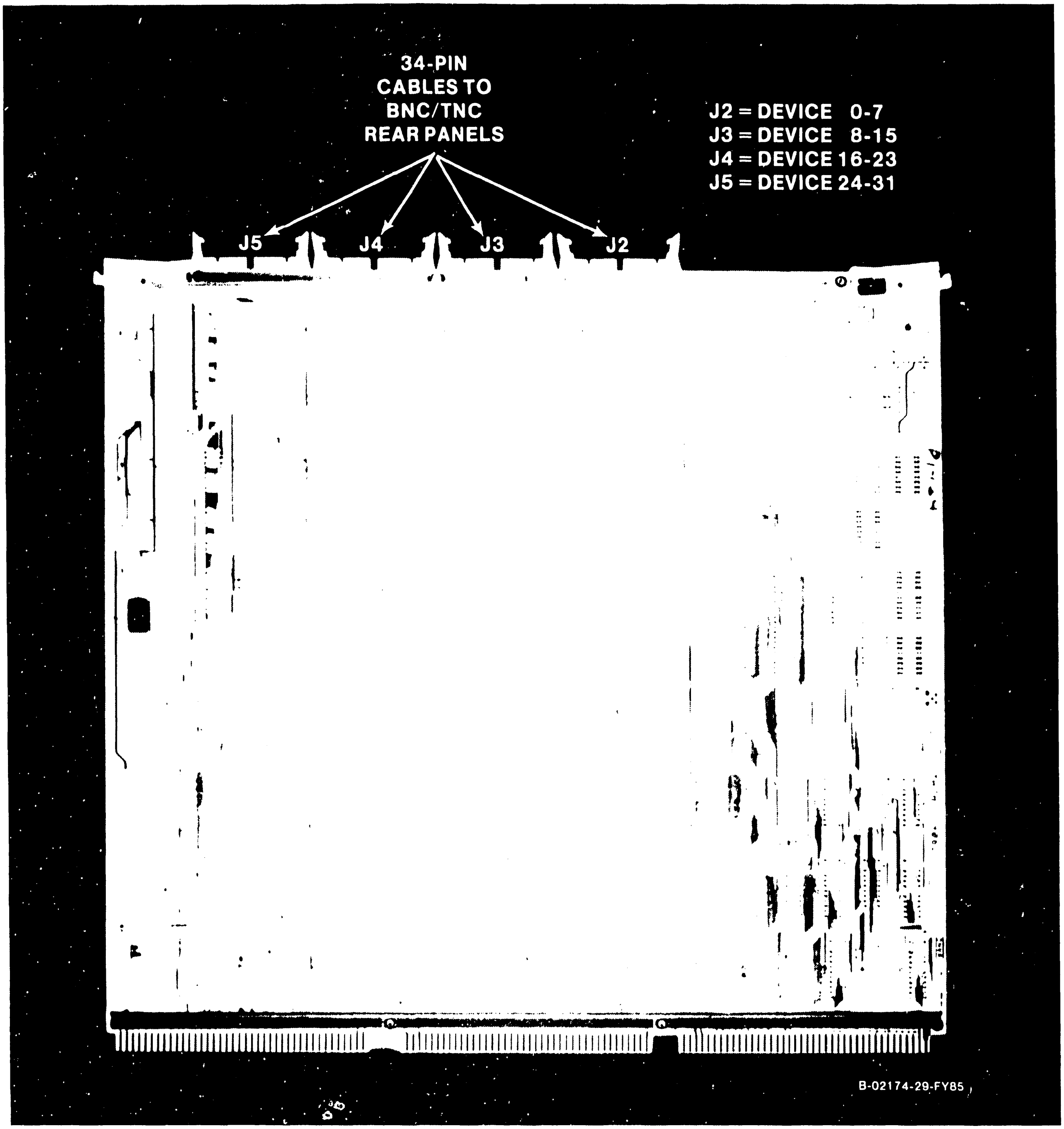


Figure 5-14. Serial Input and Output Device Adapter

2. Remove all connectors from the top of the SIO DA (figure 5-14) located in Motherboard slot number 4 (I/O DA1). Note the position of each connector for later reassembly.

3. Remove the DA from the Motherboard by lifting the snap-locks to free it from the Motherboard connectors. Once the DA is free of the connectors, ease it straight up the board guides and out of the board cage.

4. Check the jumpers (figure 5-15) on the SIO DA and reinstall or replace the DA in Motherboard slot number 4. Insert the adapter into the board guides and lower it to the Motherboard connector.

5. Make sure the adapter edge connectors are lined up with the Motherboard connector slots and the snap-lock tabs are under the top rails.

6. Carefully press down on the snap-locks to seat the adapter in the Motherboard. Do NOT use excessive force when pushing down on the snap-locks.

7. Reconnect all cables with pin 1 toward the front of the mainframe.

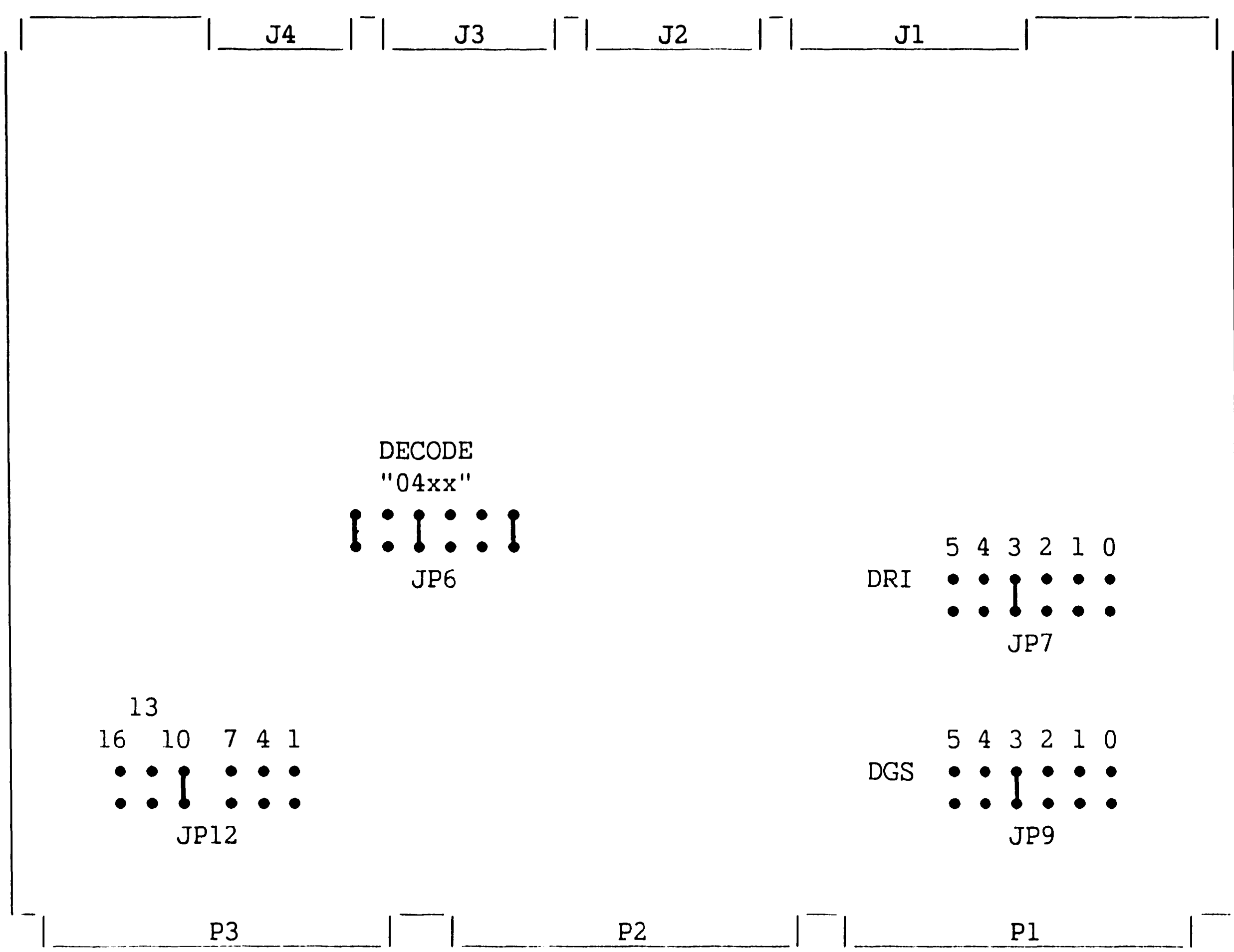


Figure 5-15. Serial I/O DA Connector and Jumper Locations

5.5.2.2 Internal Fixed Disk Device Adapter Removal and Replacement

1. Remove the 210-8312 Internal Fixed Disk Device Adapter using the procedures given in paragraph 5.5, steps one through four.

2. Remove the connectors from the top of the device adapter (figure 5-16) located in Motherboard slot number 5 (I/O DA2). Note the position of all connectors for later reassembly.

3. Remove the device adapter as previously described in 5.5.2.1.

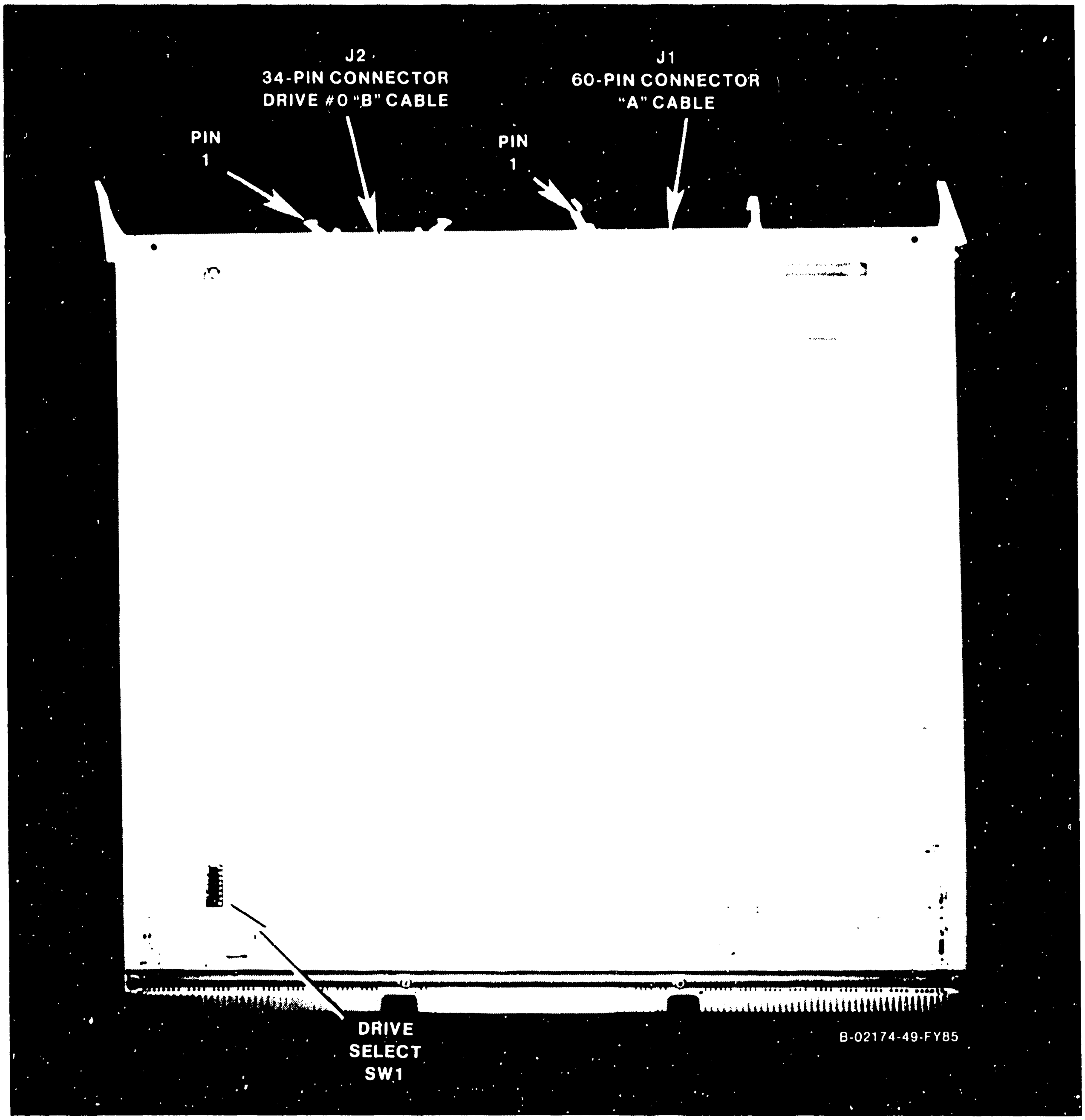


Figure 5-16. One-Port Internal Fixed Disk Device Adapter

4. Check the internal disk drive device type switch (SW1, figure 5-16) for the correct settings as shown in figure 5-17. Note that only the lower four bits are used (SW1-5 thru SW1-8). Check the jumper positions on the device adapter using figure 5-18 and reinstall or replace the DA in Motherboard slot number 5 (I/O DA2) as described in 5.5.2.1.

5. Reconnect all cables with the necessary precautions.

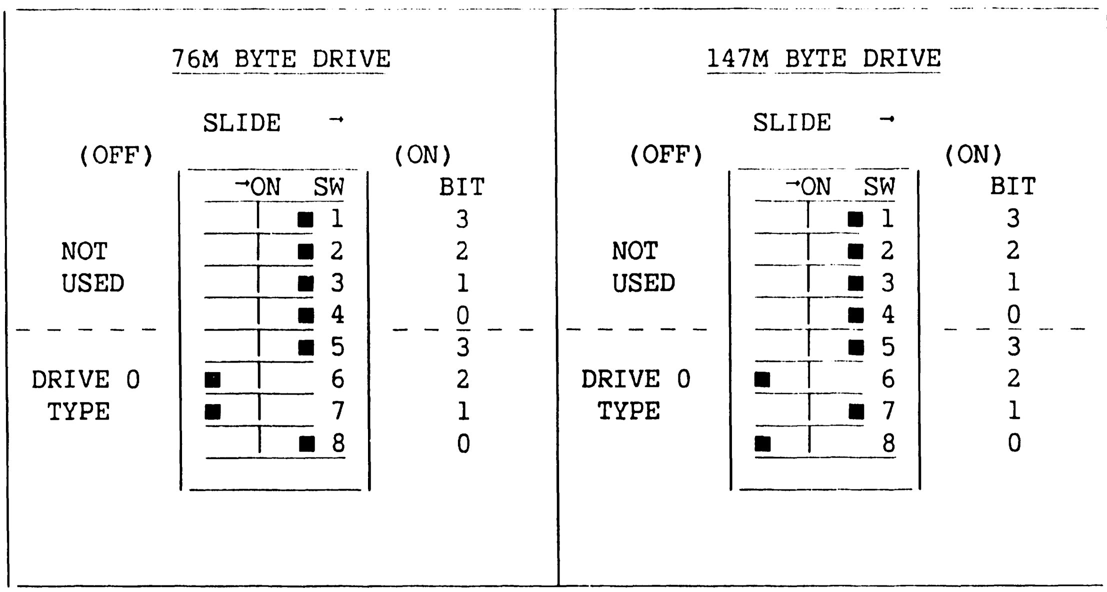


Figure 5-17. Device Type Switch Setting for 76M or 147M Byte Drive

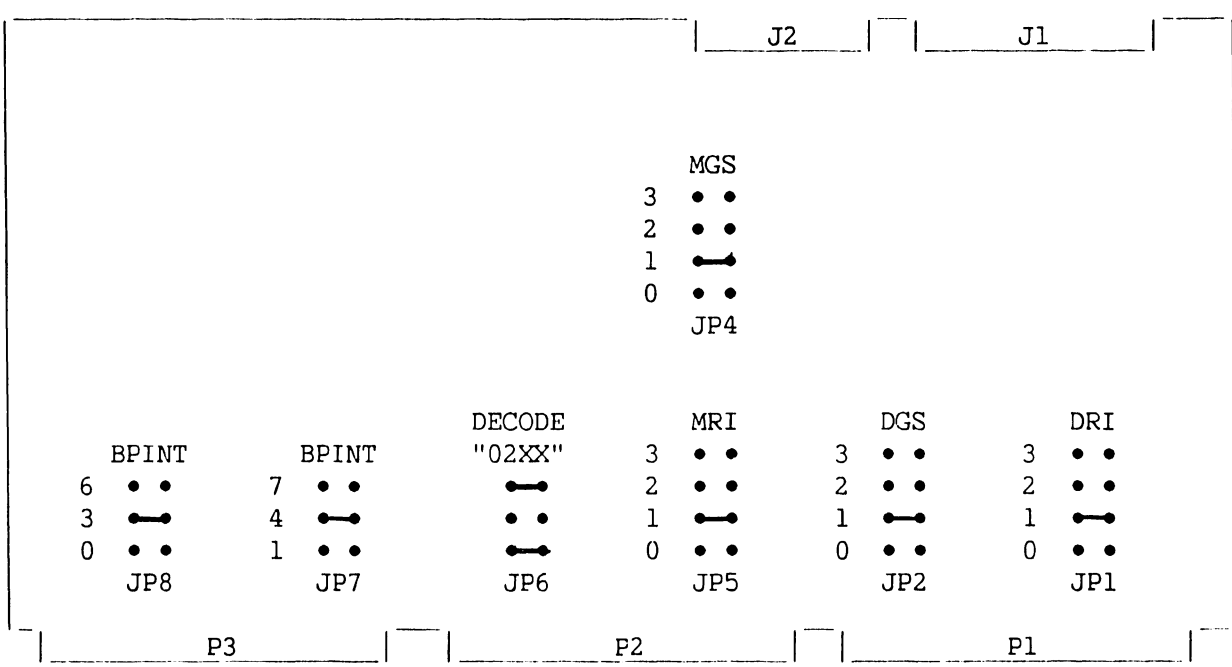


Figure 5-18. Internal Disk Drive DA Connector and Jumper Locations

5.5.2.3 External Disk Drive(s) Device Adapter Removal and Replacement

1. Remove the 210-8312, 8313, 8314, or 8315 External Disk Drive Device Adapter (figure 5-19) using the procedures given previously in paragraph 5.5.

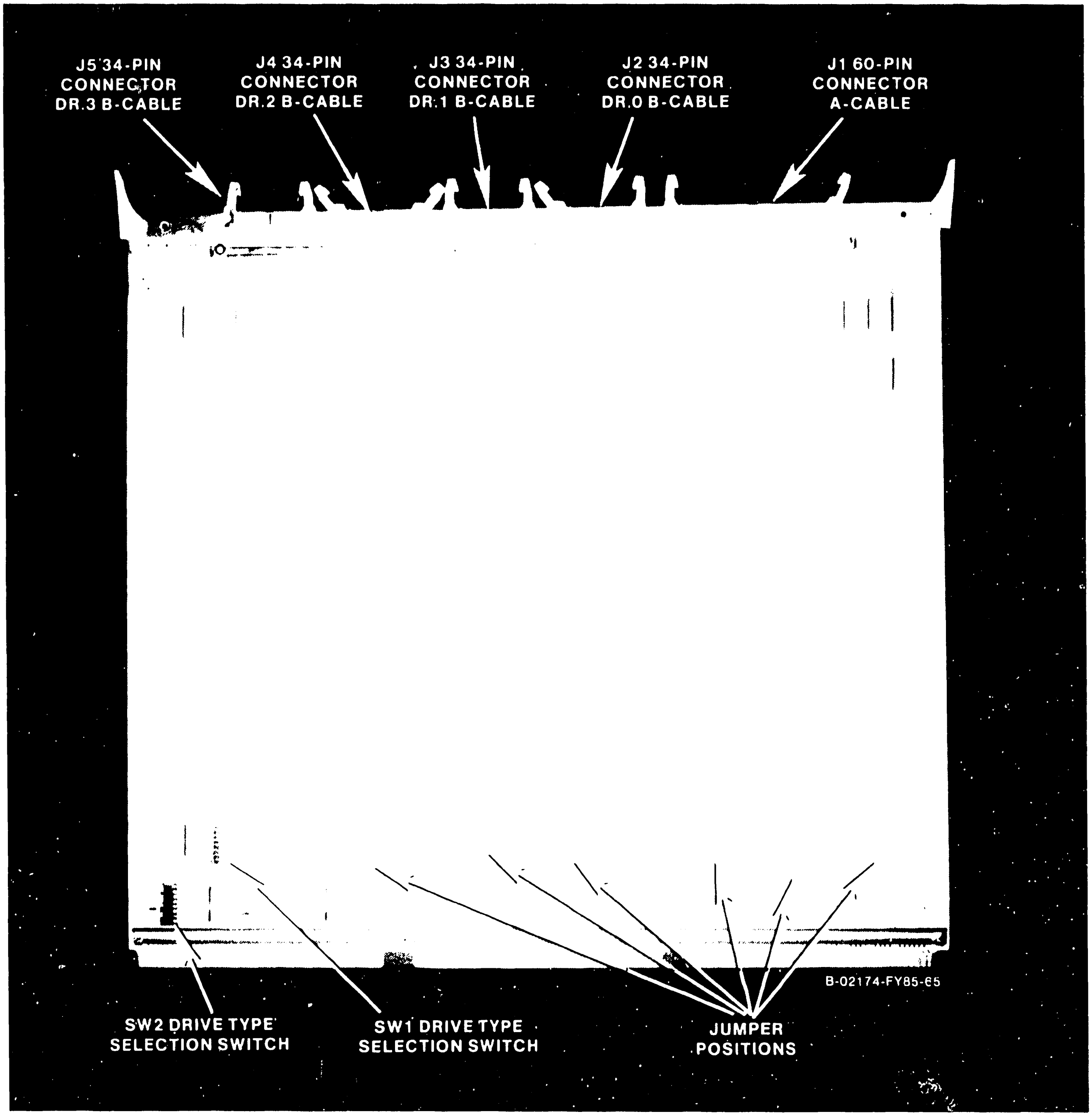


Figure 5-19. Four-Port External Disk Drive Device Adapter

2. Note the position of all cables on any other device adapters that are already installed in the system. Some of these cables may have to be removed to allow removal of the External Disk Drive DA. Remove any such connectors from the top of the device adapter(s) in the Motherboard, and remove the external disk DA from slot number 6 (I/O DA3).

3. Remove the device adapter as previously described in 5.5.2.1.

4. The two 8-bank DIP switches, SW1 and SW2, define the disk drive types connected to the External Disk Drive DA ports 0-3. Set the switch(es) for the type of drive(s) connected to the system, referring to figure 5-20, and table 5-8. On the 210-8312 (1-port) and 210-8313 (2-port) adapters, SW2 may not be installed. The switch location may be hardwired to indicate that ports number 2 and 3 cannot be used.

Table 5-8. External Disk Drive Type Selection

DRIVE TYPE	BIT 3	BIT 2	BIT 1	BIT 0
75M SMD*	OPEN	OPEN	OPEN	OPEN
288M SMD*	OPEN	OPEN	OPEN	CLOSED
30M CMD	OPEN	CLOSED	OPEN	OPEN
60M CMD	OPEN	CLOSED	OPEN	CLOSED
90M CMD*	OPEN	CLOSED	CLOSED	OPEN
76M NEC	CLOSED	OPEN	OPEN	CLOSED
147M NEC	CLOSED	OPEN	CLOSED	OPEN
620M FMD*	CLOSED	OPEN	CLOSED	CLOSED
No Drive	CLOSED	CLOSED	CLOSED	CLOSED

NOTE

The asterisk (*) in table 5-8 denotes the four external disk drive types used as examples in figure 5-20 below.

DEVICE TYPE SELECTION SWITCH (SW1)

SLIDE →

(OPEN/OFF)		→ON	SW	(CLOSED/ON) BIT
288 SMD DRIVE 1 TYPE SELECTION	■		1	3
	■		2	2
	■		3	1
		■	4	0
620M FMD DRIVE 0 TYPE SELECTION		■	5	3
	■		6	2
		■	7	1
		■	8	0

DEVICE TYPE SELECTION SWITCH (SW2)

SLIDE →

(OPEN/OFF)		→ON	SW	(CLOSED/ON) BIT
90M CMD DRIVE 3 TYPE SELECTION	■		1	3
		■	2	2
		■	3	1
	■		4	0
75M SMD DRIVE 2 TYPE SELECTION	■		5	3
	■		6	2
	■		7	1
	■		8	0

Figure 5-20. Device Type Switches for One to Four Disk Drives

5. Check the address selection jumpers as shown in figures 5-19 and 5-21. Make sure that the External Disk Drive Device Adapter address does not conflict with other device adapter addresses.

6. The device address for the Internal Disk Drive Device Adapter must be 02xx. The device address for the External Disk Drive Device Adapter must be 01xx.

7. Reinstall or replace the 210-8312, 8313, 8314, or 8315 External Disk Drive DA in Motherboard slot number 6 as described in 5.3.4.4.1.

8. Reconnect all cables observing any prior cautions and notes.

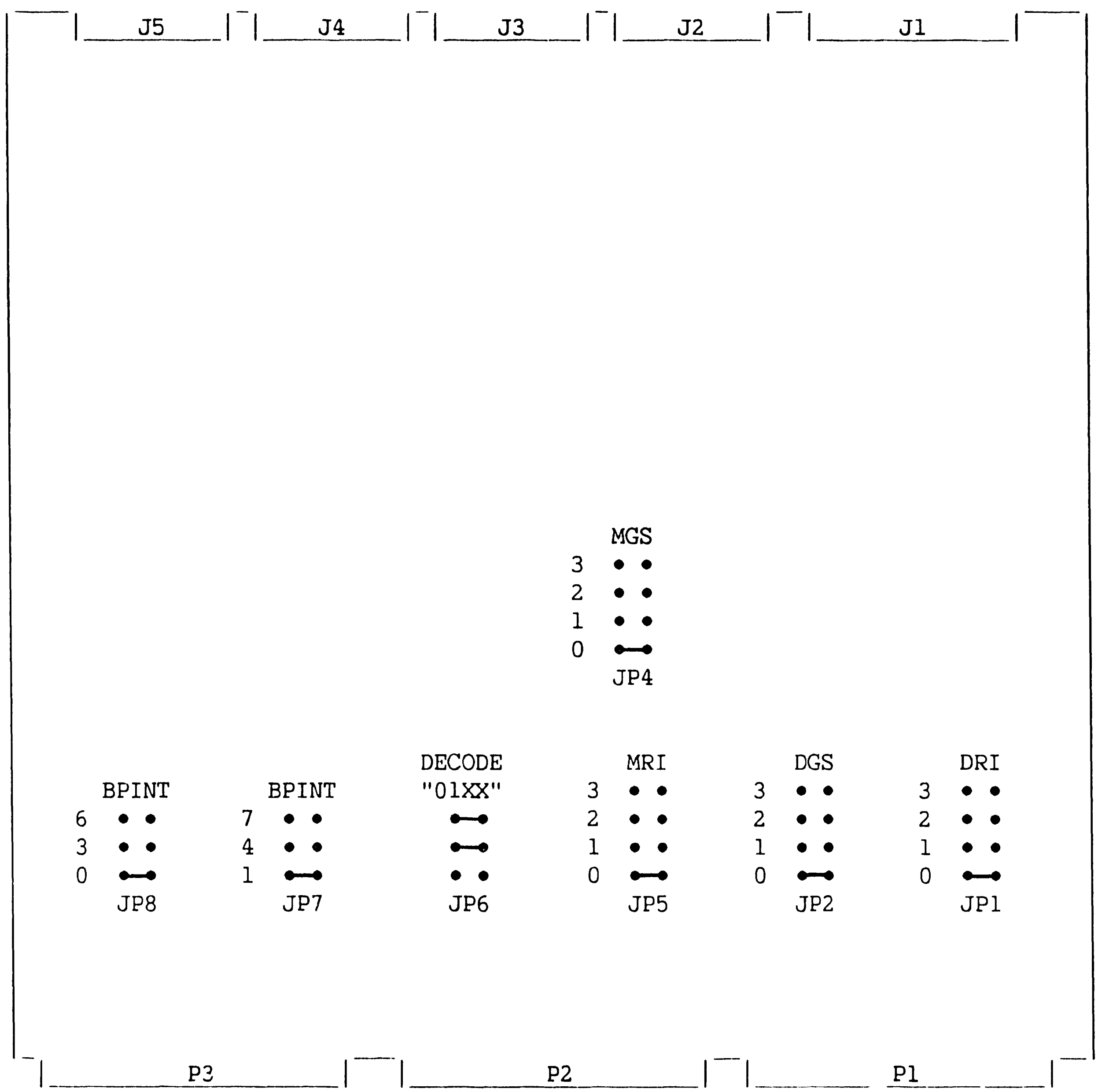


Figure 5-21. External Disk Drive DA Connector and Jumper Locations

5.5.2.4 Telecommunication Device Adapter Removal and Replacement

1. Remove all connectors from the top of the 210-8337/8637 TC Device A-dapter(s). The 1-port TC DA (210-8337) is shown in figure 5-22, and the 2-port 210-8637 in figure 5-23.

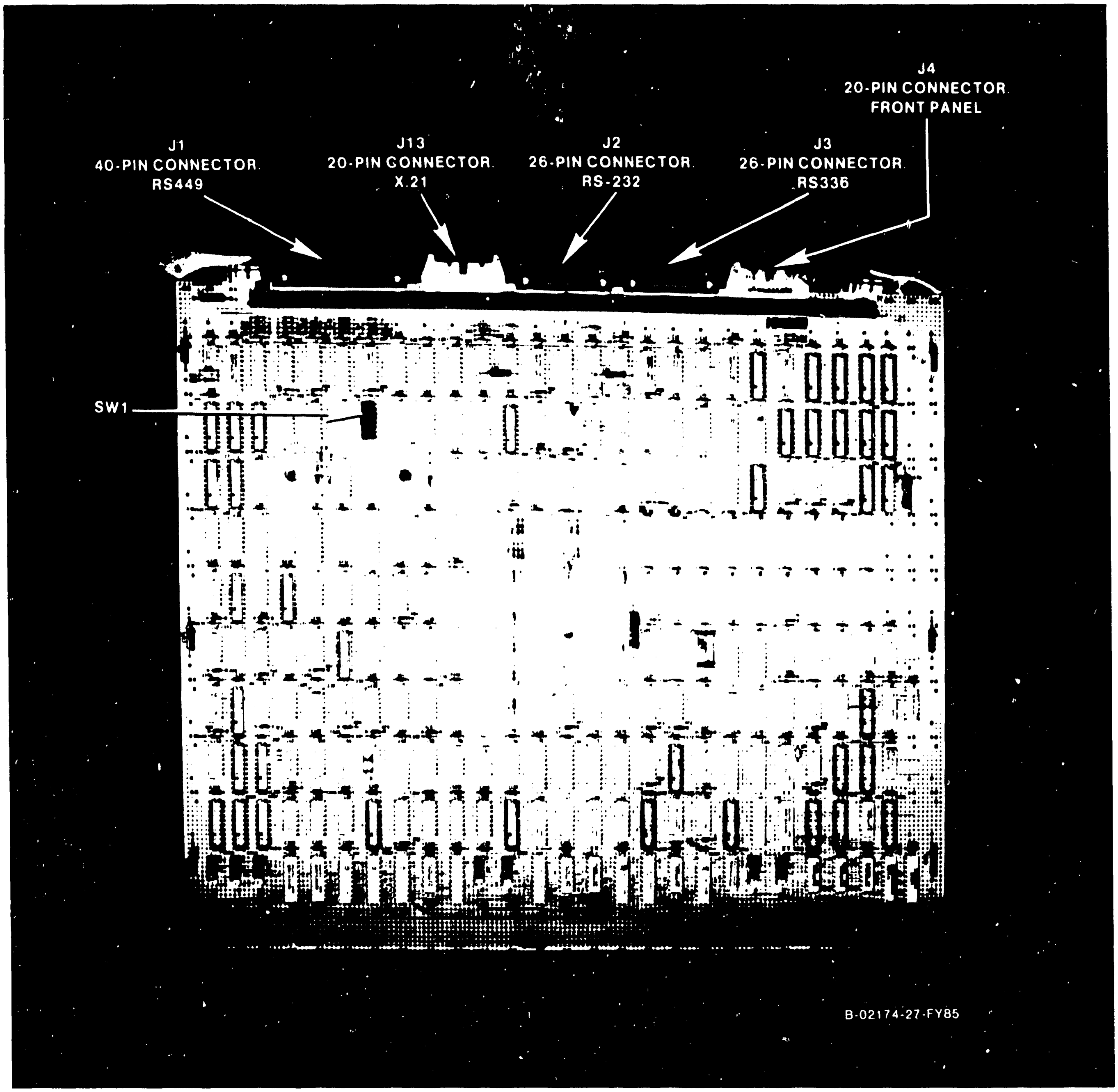
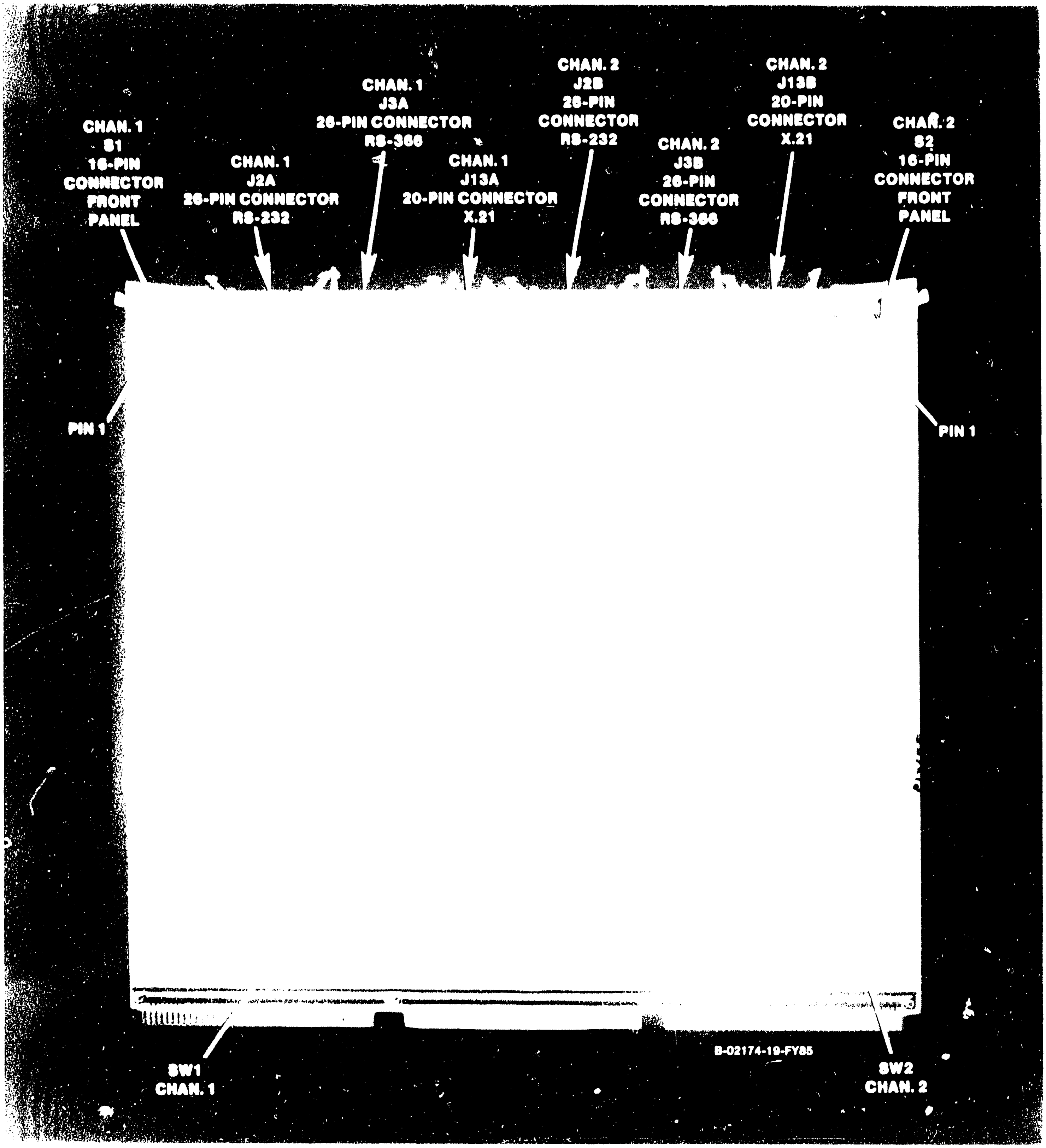


Figure 5-22. Single-Port Telecommunication Device Adapter



CHAN. 1
S1
16-PIN
CONNECTOR
FRONT
PANEL
CHAN. 1
J2A
26-PIN CONNECTOR
RS-232
CHAN. 1
J3A
26-PIN CONNECTOR
RS-366
CHAN. 1
J13A
20-PIN CONNECTOR
X.21
CHAN. 2
J2B
26-PIN
CONNECTOR
RS-232
CHAN. 2
J3B
26-PIN
CONNECTOR
RS-366
CHAN. 2
J13B
20-PIN
CONNECTOR
X.21
CHAN. 2
S2
16-PIN
CONNECTOR
FRONT
PANEL
PIN 1
PIN 1
SW1
CHAN. 1
SW2
CHAN. 2
B-02174-19-FY85

2. Note the position of all connectors for later reassembly. Note also the position of all cables on the other boards that are installed in the system. Some of these cables may have to be removed to allow removal and replacement of the Telecommunication Device Adapter.

Table 5-9. Telecommunication Mode Selection Switch Settings

SWITCH NUMBER	SWITCH NAME	PURPOSE (WHEN ON)	NORMAL POSITION
1	Loop on Bit	Repeat TC DA test sequence	OPEN (OFF)
2	External Loop-back	To support external RS232 loop-back connector	OPEN (OFF)
3	Loop on Error	Repeat any test in error	OPEN (OFF)
4	Stop on Error	Holds error code in TC DA LED display. Needs SW3 ON	OPEN (OFF)
5	Bypass Power-up	Bypass all power-up tests	OPEN (OFF)
6	Loop On Test	Repeat current TC DA test	OPEN (OFF)
7	X.21 Option	Supports X.21 interface	OPEN (OFF)
8	128K Option	Supports 128K-byte TC Device Adapter memory	OPEN (OFF)

3. Remove the device adapter as previously described in 5.5.2.1.

4. Check the settings of the 8-bank Mode Selection DIP switch(es) SW1 if 1-port, and SW1 and SW2 for 2-ports. (See figure 5-24, and table 5-9.)

NOTE

All switches should be off unless the optional 128K byte RAM or the X.21 Interface have been ordered.

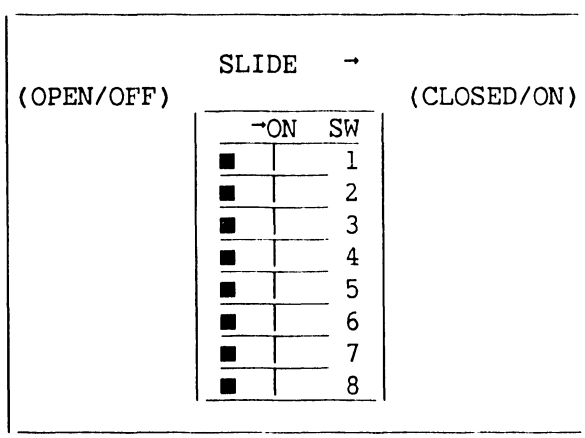


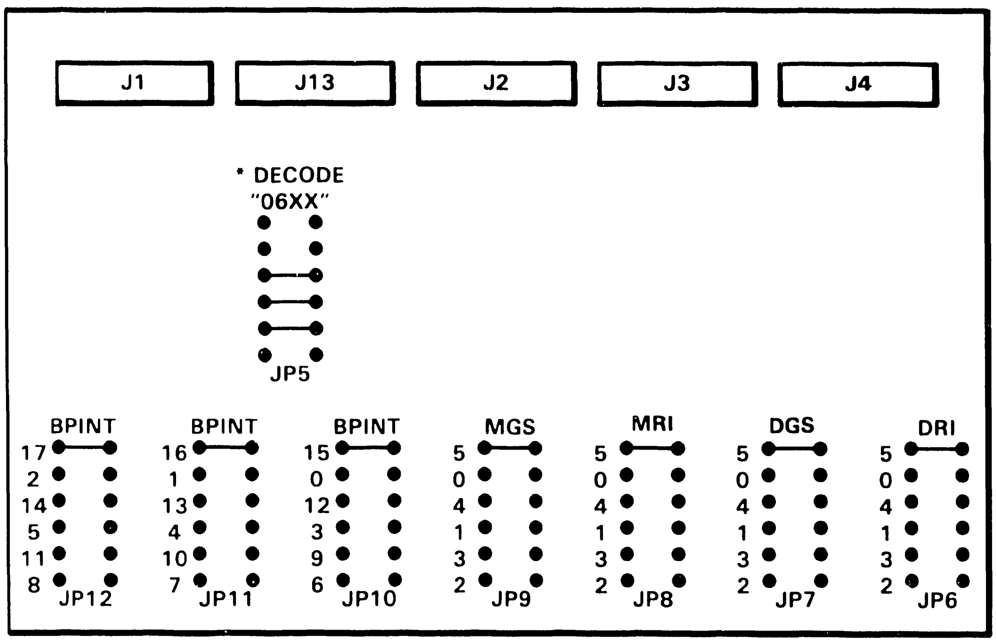
Figure 5-24. Telecommunication DA Mode Selection Switch(es) SW1(&SW2)

5. Check all jumpers as shown in figures 5-25, and 5-26. Make sure that no Telecommunication DA addresses conflict with other DA addresses. The preferred addresses for two Telecommunication Device Adapters are:

   a. Device Address for a single TC DA = 06xx.

   b. Device Address for a second TC DA = 03xx.

6. If the system has two TC DAs, the slot priorities in the Motherboard are slot 9 (I/O DA6) for the first, and slot 6 (I/O DA3) for second. If equipped with an external disk drive device adapter, the external disk DA will then occupy slot 8 (I/O DA5).



* STANDARD CONFIGURATION USED WHEN SYSTEM HAS ONLY ONE TC DA.
OTHER POSSIBLE CONFIGURATIONS.

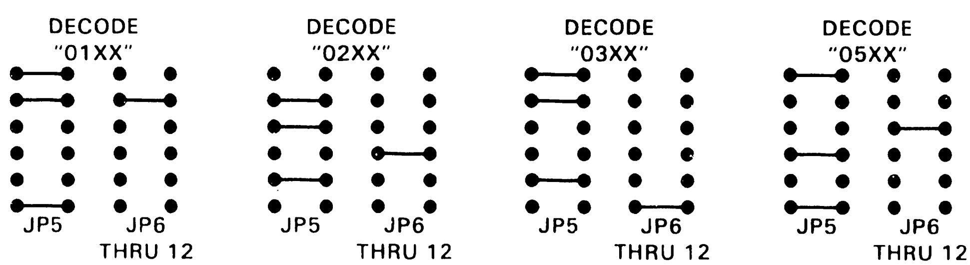


Figure 5-25. Single-Port TC DA Connector and Jumper Locations

5. Reinstall or replace the TC device adapter(s) in the designated Mother board slot(s) as described in 5.5.2.1.

6. Reconnect all cables with the necessary precautions.

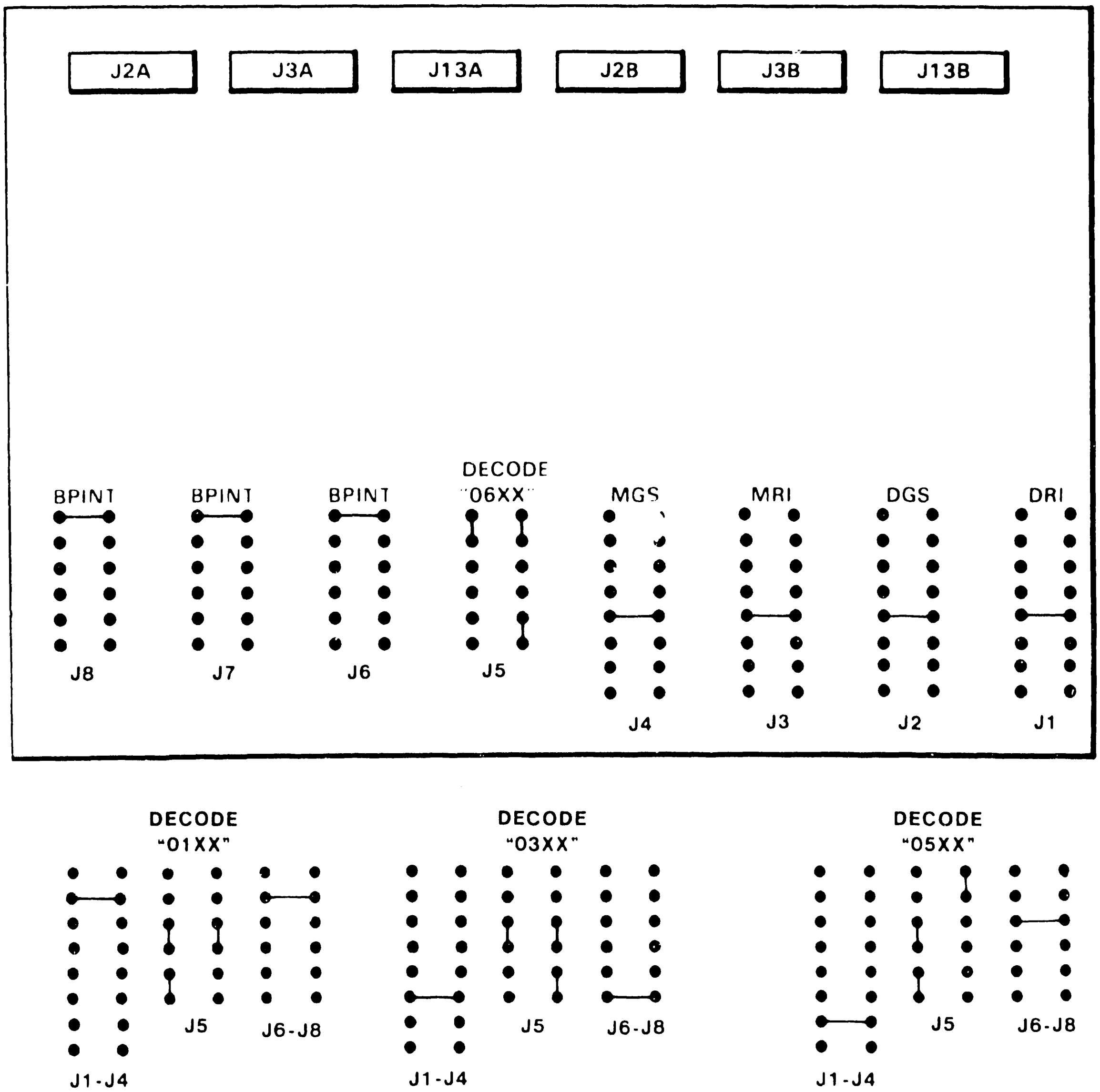


Figure 5-26. Dual-Port TC DA Connector and Jumper Locations

5.6 OPERATOR CONTROL PANELS REMOVAL AND REPLACEMENT

There are facilities for three types of operator control panels (figure 5-27) on the VS-65, the Front Panel and Operational Control Panels. The Operational Control Panels include the Boot Device and Keylock Assembly Panel, and the optional Telecommunication Control Panels. (Refer to figure 3-1 and paragraphs 3.1 through 3.3.) The installation, and/or removal and replacement of each may be accomplished by the following procedure:

1. Power-down the mainframe (per paragraph 4.11.1.2) by depressing the ac power On/Off switch to the zero '0' position.

2. Remove the top, front, and side covers (per paragraphs 5.4.1, 5.4.2, and 5.4.3).

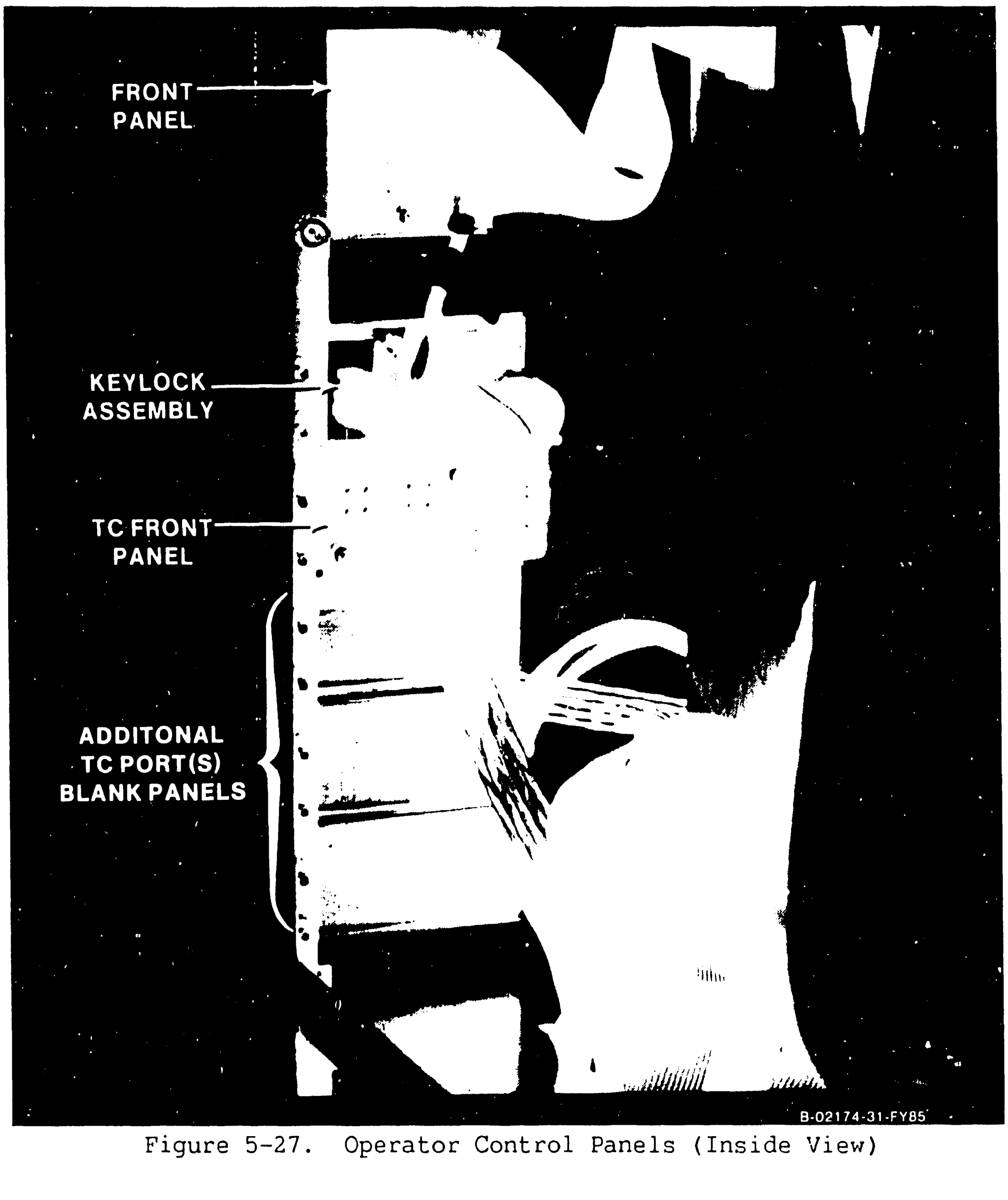


Figure 5-27. Operator Control Panels (Inside View)

5.6.1 FRONT PANEL ASSEMBLY

The 210-8613 Front Panel Assembly (figure 5-28) is mounted below the Diskette Drive. To replace the Front Panel Assembly, remove:

1. The Front Panel-to-Bus Processor cable from J3 of the BP.

2. The 6-pin cable (attached to the Keylock Assembly) from J2 of the Front Panel.

3. The two nuts holding the panel to the chassis behind the panel.

4. The panel (attached to J1 of the cable leading to the BP).

Reinstall the Front Panel by reversing the above procedures.

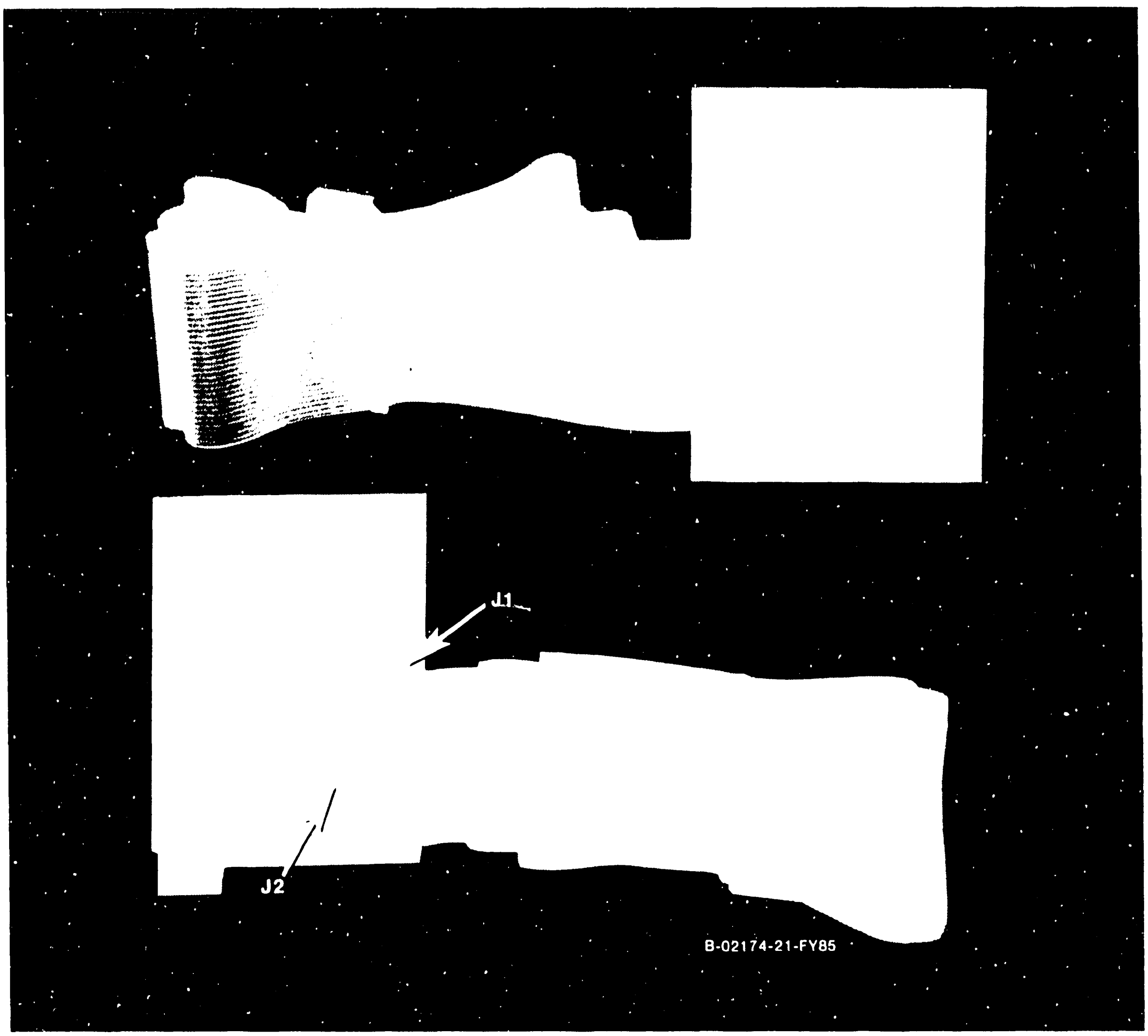


Figure 5-28. Front Panel Assembly (Front and Rear Views)

5.6.2 OPERATIONAL CONTROL PANEL

The 279-0607 Boot Device and Keylock Switch Assembly (figure 5-29) is mounted below the Front Panel Assembly. To replace the assembly:

1. Remove the 6-pin cable connector from J2 on the Front Panel.
2. Remove the two nuts holding the Keylock Assembly to the chassis from behind the assembly.
3. Remove the assembly.

Reinstall the assembly by reversing the above procedures.

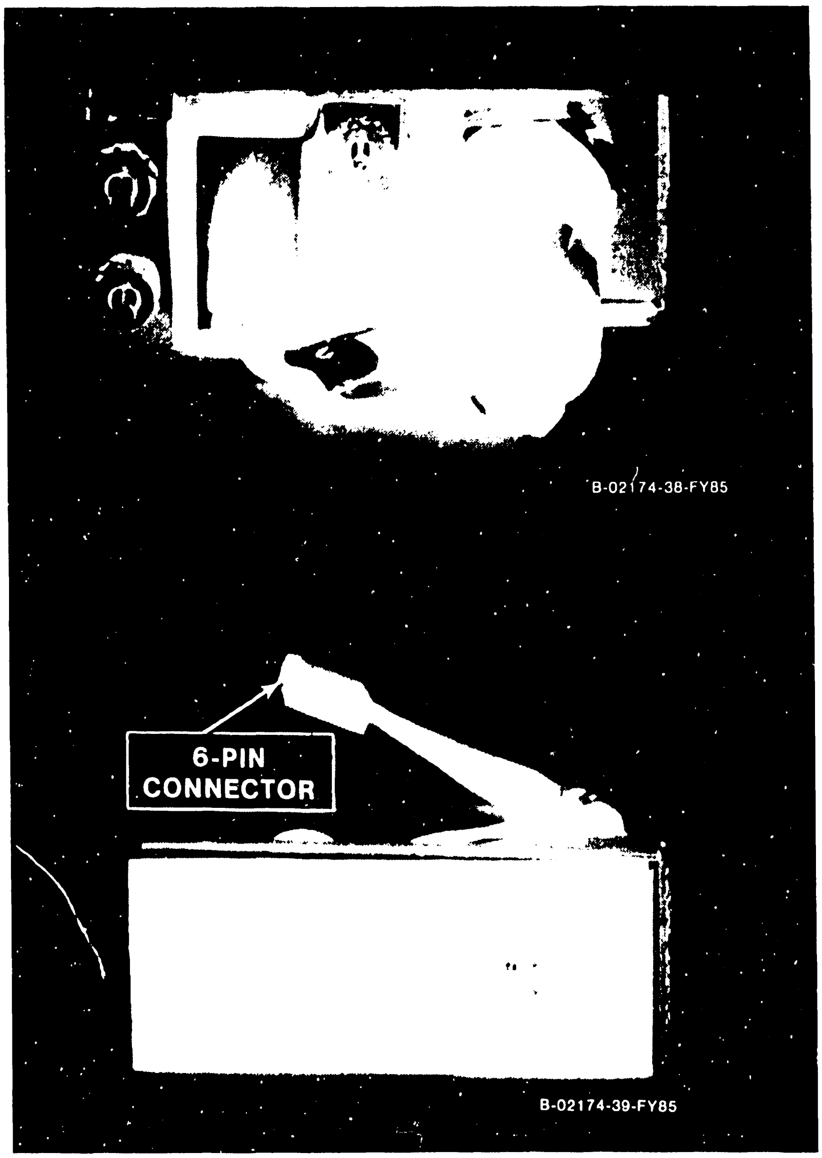


Figure 5-29. Boot Device and Keylock Switch Assembly (Front and Rear Views)

5.6.3 TELECOMMUNICATION DEVICE ADAPTER CONTROL AND INDICATOR PANEL

The 210-7785 Telecommunication DA Front Control and Indicator Panel (figure 5-30) is mounted beneath the Keylock Assembly. To remove or replace the panel:

1. Remove the 16-pin cable from J1 on the TC Front Panel.

2. At the rear of the panel, remove the two nuts holding the panel to the chassis.

3. Remove the panel.

4. Remove printed circuit board 210-7785.

Reinstall the TC Front Panel by reversing the above procedures.

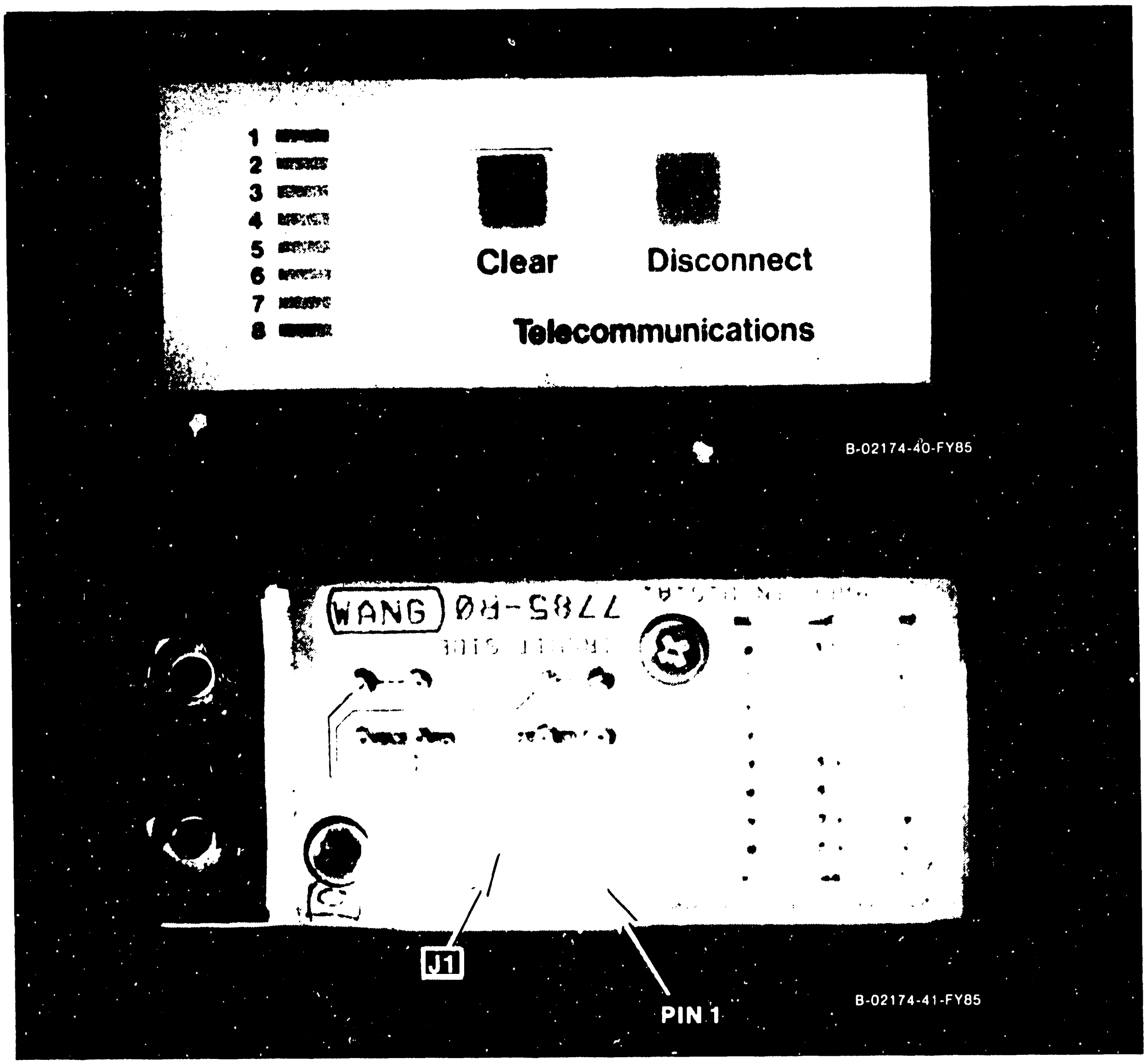


Figure 5-30. Telecommunication DA Control and Indicator Panel(s) (Front and Rear Views)

5.7 MAINFRAME SUBASSEMBLIES

The VS-65 Computer System has five major subassemblies which, on occasion, may require removal and replacement.

5.7.1 MOTHERBOARD REMOVAL AND REPLACEMENT

Removal of the 210-8607 mainframe Motherboard should be done only if it has been determined conclusively that the problem is in the Motherboard. The following steps describe the procedures involved in removing the Motherboard.

CAUTION

When reinstalling the Motherboard, make sure no conductive (metal) parts of the Motherboard come in contact with the frame. This could cause a short to ground on the Motherboard resulting in damage to the CPU or I/O PCBs when power is applied.

5.7.1.1 Motherboard Removal (Refer to figures 5-31 & 5-32 and proceed.)

1. Press the green Control Mode button, power-down the mainframe (per paragraph 4.11.1.2) and unplug the power connector.
2. Remove the top and front covers (paragraphs 5.4.1 and 5.4.2).
3. Note cable positions on all circuit boards and remove all board cables.
4. Remove all circuit boards. (See applicable paragraphs in section 5.5.)

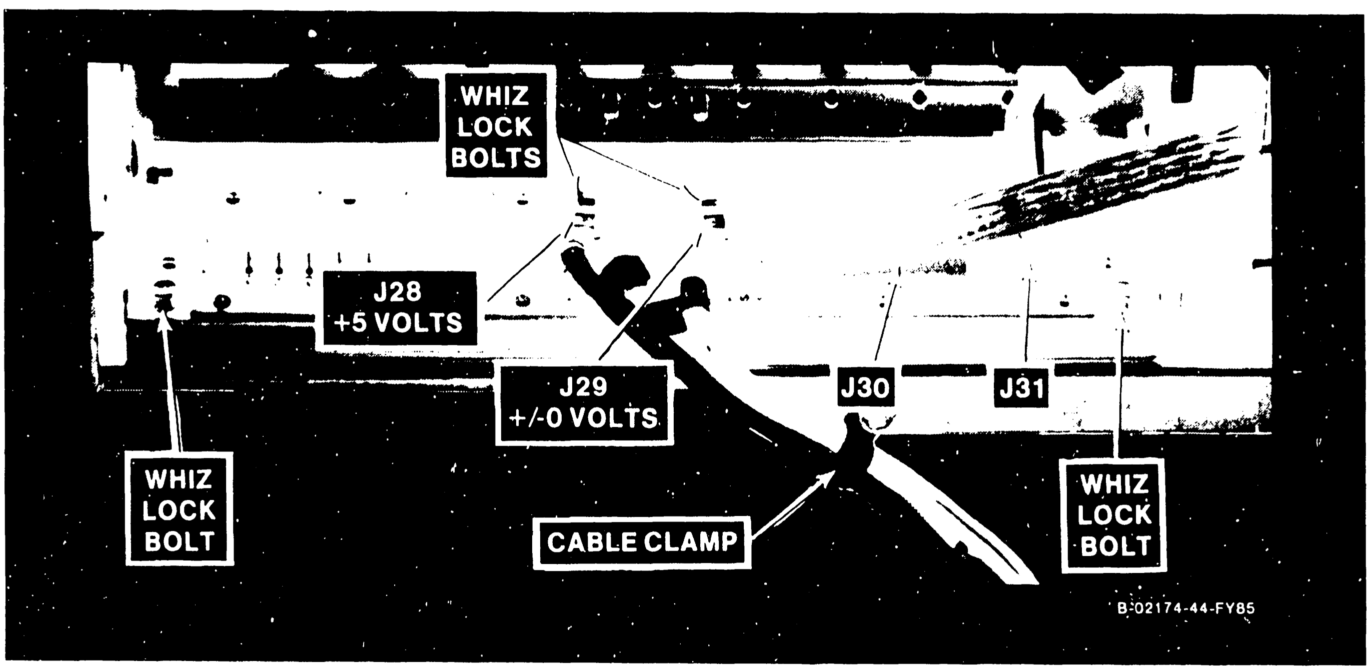


Figure 5-31. Motherboard Power Connectors

5. Disconnect the 10-pin ribbon cable connector from J30 and the 6-pin dc connector from J31 at the front of the Motherboard. Do NOT remove the two dc power cables (+5 Volts and +/- 0 Volts) from the Motherboard.

6. Remove the cable clamp securing the +5 Volt cable and +/- 0 Volt cable to the front of the mainframe.

7. Remove the two 5/16 inch Whiz Lock bolts that secure the front of the PCB cage assembly to the frame.

8. The rear of the PCB cage assembly is attached to the frame by two studs seated in slots in the frame. Pull the entire cage assembly slightly forward and lift up on the rear of the cage to disengage the studs from the slots. Next, pull the entire cage assembly forward about 6 inches.

9. Make sure that the White no. 8 dc power cable is labeled +5 Volts and the black no. 8 dc power cable is labeled +/- 0 Volts. Remove the two Whiz Lock bolts securing the White cable to J28 and the Black cable to J29 at the front of the Motherboard. The two bolts are secured by Whiz Lock nuts under the Motherboard. Remove the Whiz Lock bolts while holding the Whiz Lock nuts under the Motherboard.

10. With all bolts, nuts, and cables removed, grasp the PCB cage assembly and pull it forward and out of the mainframe.

11. Set the cage assembly on the floor or a table.

12. Remove the hex bolts from the bottom right and left sides (four each) of the cage assembly. Remove the Motherboard and the base plate.

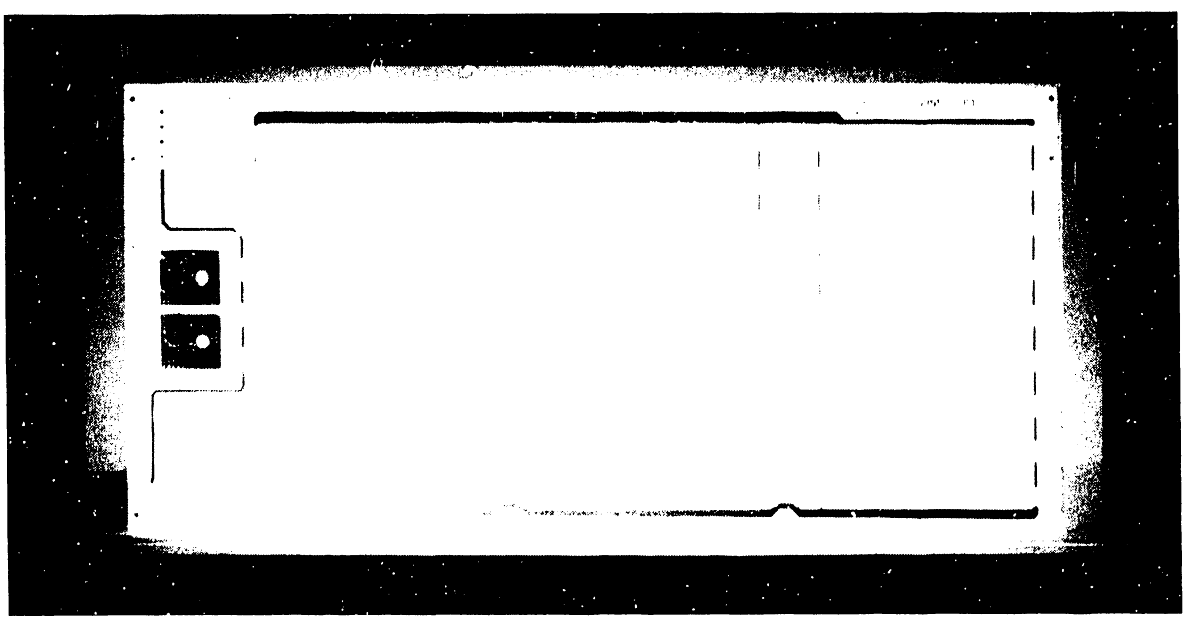


Figure 5-32. Motherboard Printed Circuit Board

13. Remove the 30 Phillips screws from the top of the Motherboard and lift the Motherboard from the base plate.

5.7.1.2 Motherboard Replacement

To replace or reinstall the Motherboard, reverse the above procedure taking care to:

1. Make sure that all screws and nuts are reinstalled in their proper locations, and that all wires and cables are installed correctly.
2. Make sure that no metal part of the Motherboard makes contact with the mainframe board cage assembly. (See CAUTION, paragraph 5.7.1.)
3. Reinstall all circuit boards (see section 5.5.) as shown in figure 5-4 and ensure that all board cabling is installed correctly.

5.7.2. SWITCHING POWER SUPPLY REMOVAL AND REPLACEMENT

WARNING

DO NOT OPEN THE SWITCHING POWER SUPPLY UNDER ANY CIRCUMSTANCE. EXTREMELY DANGEROUS VOLTAGE AND CURRENT LEVELS (IN EXCESS OF 300 VOLTS DC AND UNLIMITED CURRENT) ARE PRESENT WITHIN THE POWER SUPPLY.

DO NOT ATTEMPT TO REPAIR THE SWITCHING POWER SUPPLY; IT IS FIELD REPLACEABLE ONLY.

AFTER POWERING THE UNIT DOWN AND DISCONNECTING THE AC POWER CONNECTOR FROM THE POWER SOURCE RECEPTACLE, ALLOW ONE MINUTE BEFORE REMOVING THE POWER SUPPLY TO PROVIDE ADEQUATE TIME FOR ANY RESIDUAL VOLTAGE TO DRAIN THROUGH THE BLEEDER RESISTORS.

5.7.2.1 Switching Power Supply Removal

Perform the following procedures when removing the 279-0608 Switching Power Supply (refer to figures 5-33, 5-34, and 5-35):

1. The power supply is located at the lower right side of the mainframe with the ON/OFF switch protruding through the front cover.
2. Power-down the mainframe (per paragraph 4.11.1.2) and unplug the power connector from the power source receptacle.

3. Remove the top, front, and side covers (see paragraphs 5.4.1 through 5.4.3).

4. Remove the ac power input cable at the rear of the mainframe.

5. Remove the cable clamp securing the +5 Volt cable and +/- 0 Volt cable to the front of the mainframe.

6. Remove the quick-disconnect ground wire from the front of the power supply.

7. Unscrew the spring loaded thumbscrew securing the front of the power supply to the mainframe base plate and pull the power supply forward about 4 to 6 inches.

8. Make sure that the White no. 8 dc power cable is labeled +5V and the Black no. 8 dc power cable is labeled +/- 0V. Remove the power cables from the power busses at the front of the power supply.

9. Remove the following connectors from the front of the power supply. The connectors are keyed to ensure proper reinsertion.

   a. Two-pin fan connector from fan jack.

   b. Ten-pin ribbon connector from J8.

   c. Six-pin dc connector from J5.

   d. Four-pin in-line dc connectors from J1, J2, and J3.

Table 5-10. Internal Power Cable Connections

PC BOARD	CONNECTOR	CONNECTOR TYPE	CONNECTOR	PC BOARD
210-8611 Switching Power Supply SPS-476E	J1, J2, J3	4-pin in-line dc connectors — See Notes	J3	76/147 MB Drive
			J2	Diskette Drive
	J4	9-pin dc, 3-row box	P3	76/147 MB Drive
	J5	6-pin dc, 2-row	J31	210-8607 Motherboard
	J8	10-pin ribbon	J30	
210-8612 Switching P/S	J2	2-pin ac, each fan	Fans	Rear fan panel
	+5V Bus	Cable, #8 wire, white	J28	210-8607 Motherboard
	0V Bus	Cable, #8 wire, black	J29	

NOTES

1. Actual SPS connections may vary depending on system configuration. (For example: J1, J2, or J3, etc.)

2. Refer to figure 4-8, VS-65 Interconnection Diagram.

10. Carefully pull the power supply forward and out of the mainframe.

NOTE

If the VS-65 is to be installed outside of the USA, the power supply line voltage switch (SW1) must be checked before initial power-up to avoid damage to the system. Refer to figure 5-34 for the switch location. The switch can be accessed without removing the power supply cover. Verify that the input voltage switch is in the correct position.

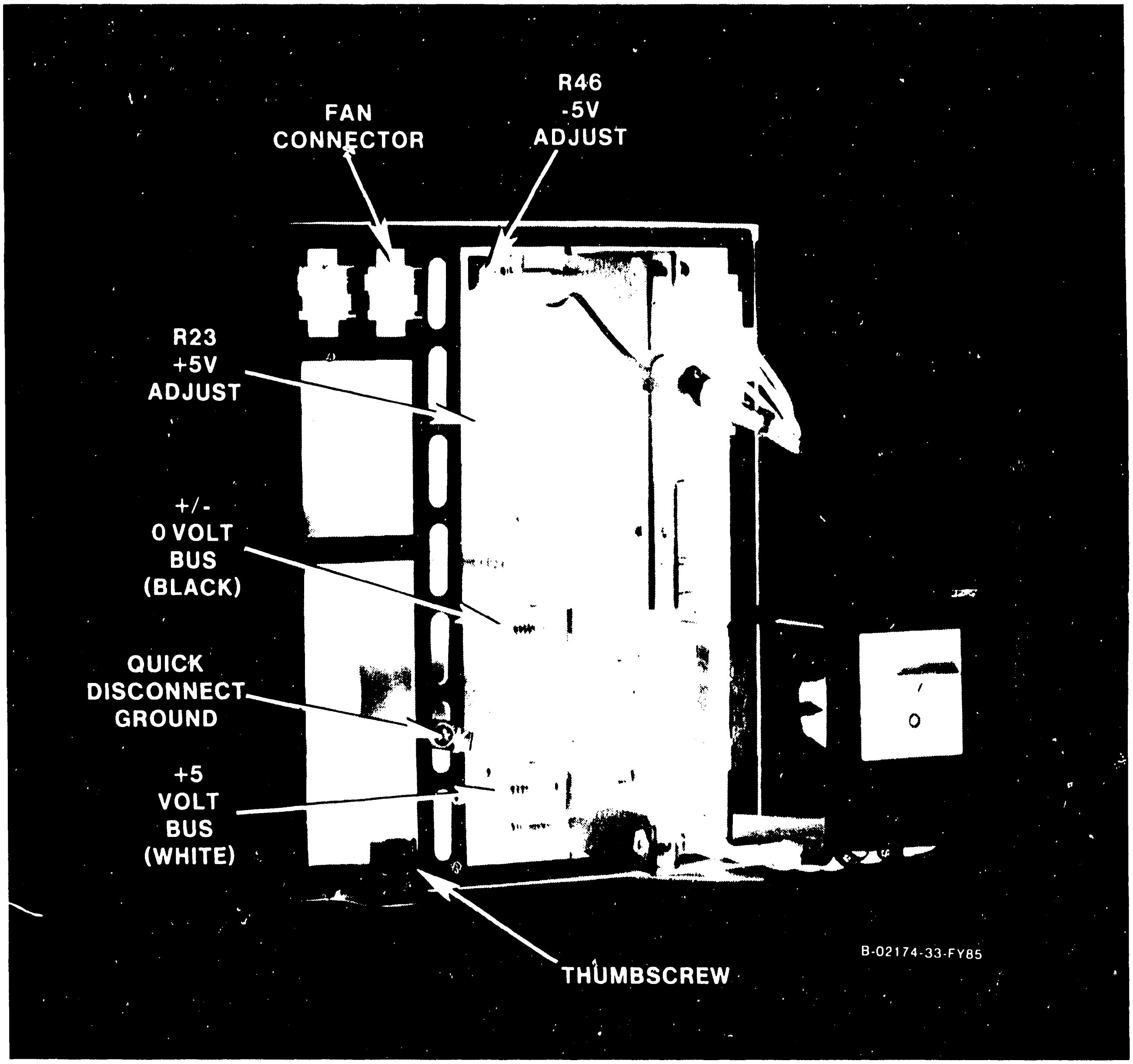


Figure 5-33. Switching Power Supply (Left Side View)

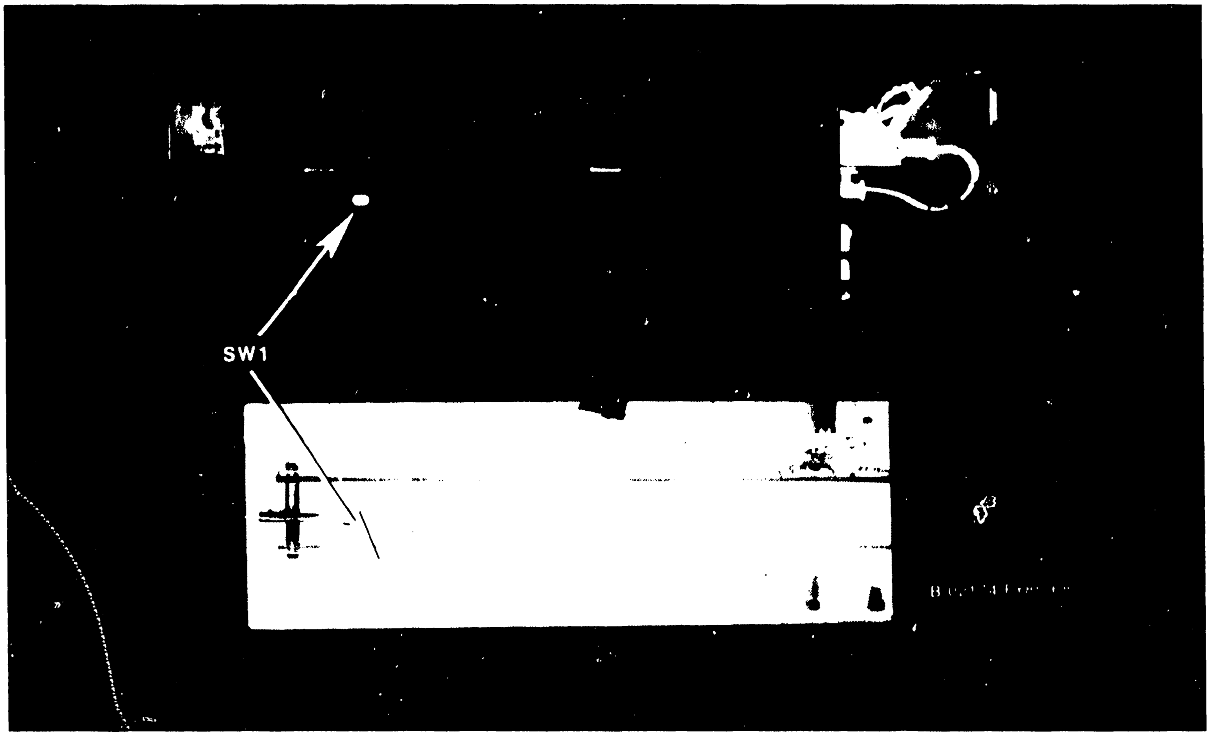


Figure 5-34. Location of 115/230 Vac Line Voltage Switch (SW1)

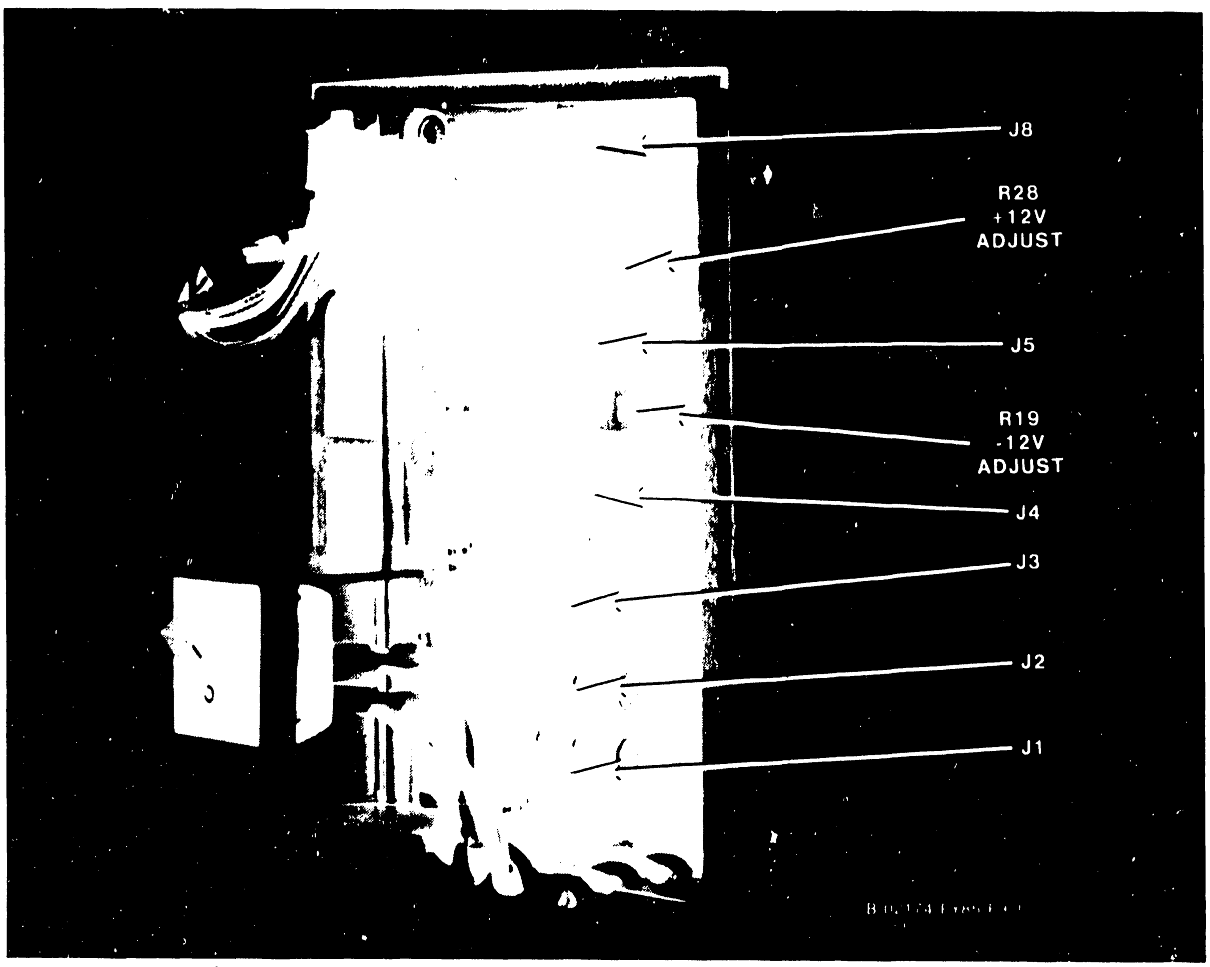


Figure 5-35. Switching Power Supply (Right Side View)

5.7.2.2 Power Supply Replacement

When replacing or reinstalling the Switching Power Supply (SPS), perform the following steps in the sequence given:

1. Reverse the procedure of paragraph 5.7.2.1 given previously.

2. After making sure that the ac power On/Off switch is in the zero '0' position, plug the mainframe power connector into the power source receptacle.

3. Depress the ac power On/Off switch to the one '1' position.

4. Make sure that the fans and the internal disk drive motor are turning. The Power-On and the Not-Ready LEDs on the Front Panel, and the HEX Displays should light after the ac power ON/OFF switch has been pressed. If the HEX Displays go out after two seconds, there is a problem with the dc voltage compare circuit in the SPS.

5. Using a digital voltmeter, check the voltages at the Motherboard test points (figure 5-36).

NOTE

After replacing or reinstalling the Switching Power Supply, the dc voltages must be checked. If the dc voltages are not within the operating limits given in table 5-11), the power supply must be adjusted.

6. With a nonmetallic adjustment tool, adjust the voltage(s) to within the operating limits. (See figures 5-33 and 5-35 for the locations of the adjustment trim pots.)

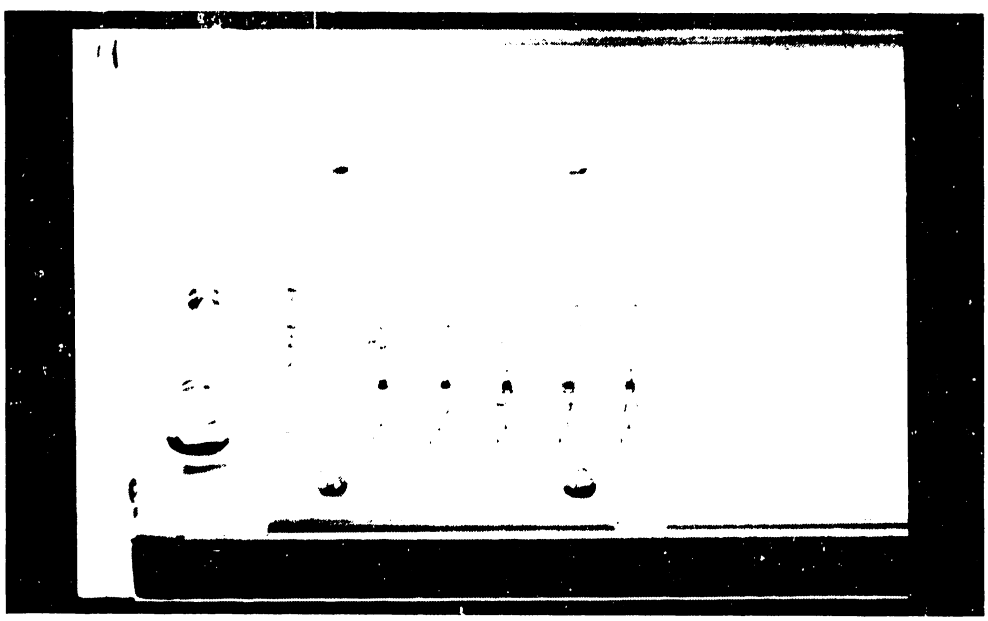


Figure 5-36. Motherboard Voltage Test Points

Table 5-11. DC Test Point Voltages

TEST POINT	DC VOLTS	DC OPERATING VOLTAGE LIMITS	AC RIPPLE VOLTAGE LIMITS
TP1	+/-0.0	- 0.05 to + 0.05	35mV RMS or 50mV Pk-to-Pk
TP2	+ 5.0	+ 4.95 to + 5.05	
TP3	- 5.0	- 4.95 to - 5.05	
TP4	+ 12.0	+11.9 to +12.1	
TP5	- 12.0	-11.9 to -12.1	
SPS	+ 24.0	+21.6 to +26.4	

5.7.3 INTERNAL SYSTEM DISK DRIVE

The procedure for removing the Internal Disk Drive is essentially the same for either the 76 or 147 megabyte drives (WLI P/N 278-4045 or 278-4041 respectively). To remove the internal disk drive follow the steps given below.

5.7.3.1 Removing the Internal Disk Drive

1. Power-down the mainframe (per paragraph 4.11.1.2) by depressing the ac power On/Off switch to the '0' position.

2. Remove the mainframe top, front, and left side covers (paragraphs 5.4.1, 5.4.2, and 5.4.3).

3. Make sure the drive has stopped turning, then remove the A and B signal, the dc power cables, and ground wire and from the front of the drive. (See figures 5-37 or 5-38.) Note the position of these cables for reinstallation.

4. Facing the rear of the drive, lock the Spindle and Actuator into their shipping positions by moving the red Spindle and Actuator Lock Control Lever on the rear of the drive (figures 5-39 or 40) to the right, push it down as far as it will go, and then move it to the left into the LOCK position.

CAUTION

The drives weigh around 32 pounds (15 kilograms).

5. Unscrew the spring loaded thumbscrew securing the front of the drive to the base plate. Slide the drive forward and out of the cabinet.

NOTE

The 76 and 147 megabyte disk drives will be repaired by replacing individual printed circuit board assemblies. (Refer to figures 5-42 or 5-45, and NEC Disk Drive Maintenance Manuals, WLI P/N 729-1452 or 729-1503 for the respective drives.) Do not order or replace the complete disk drive.

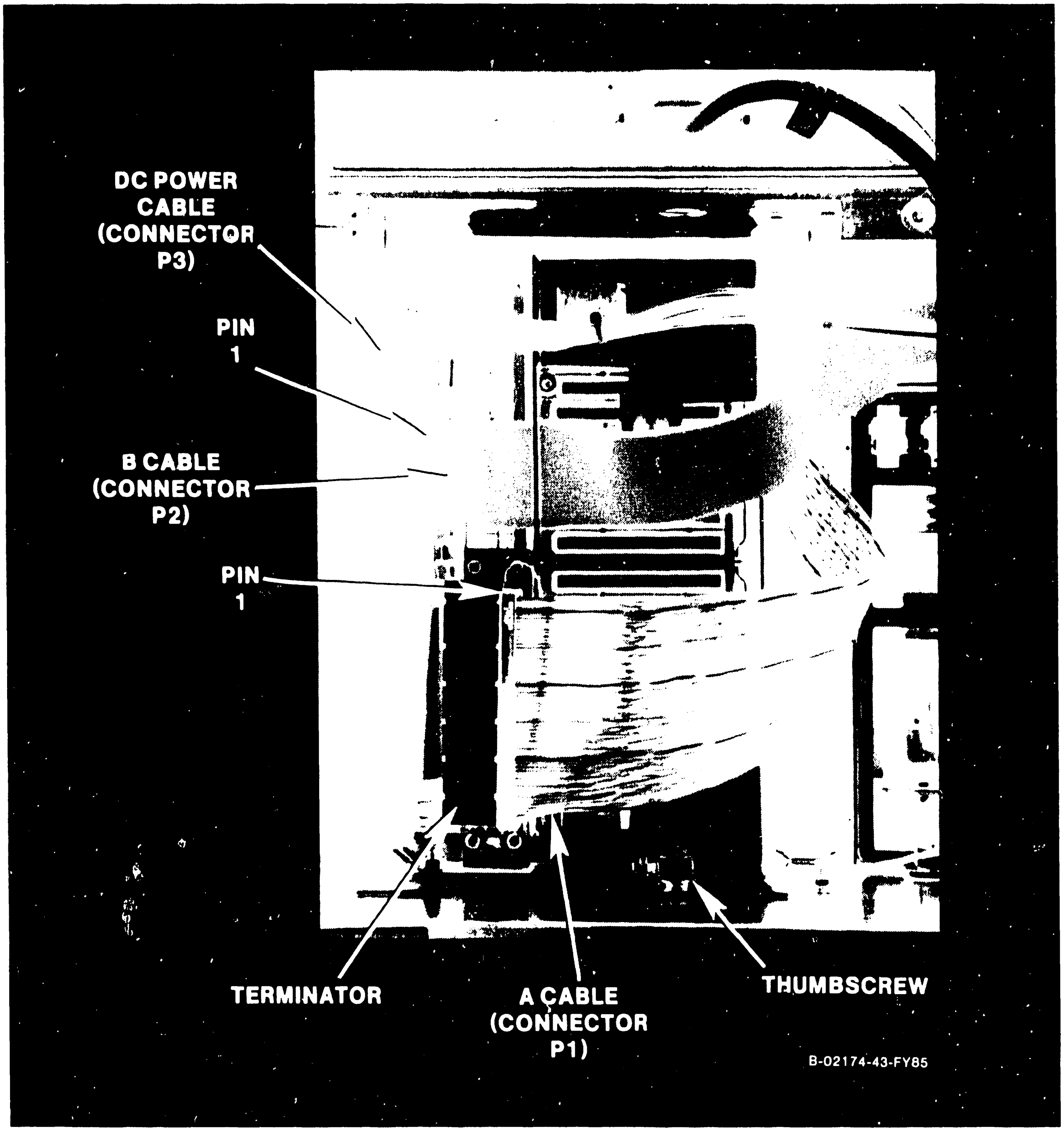


Figure 5-37. 76 Megabyte Disk Drive (Mounted View)

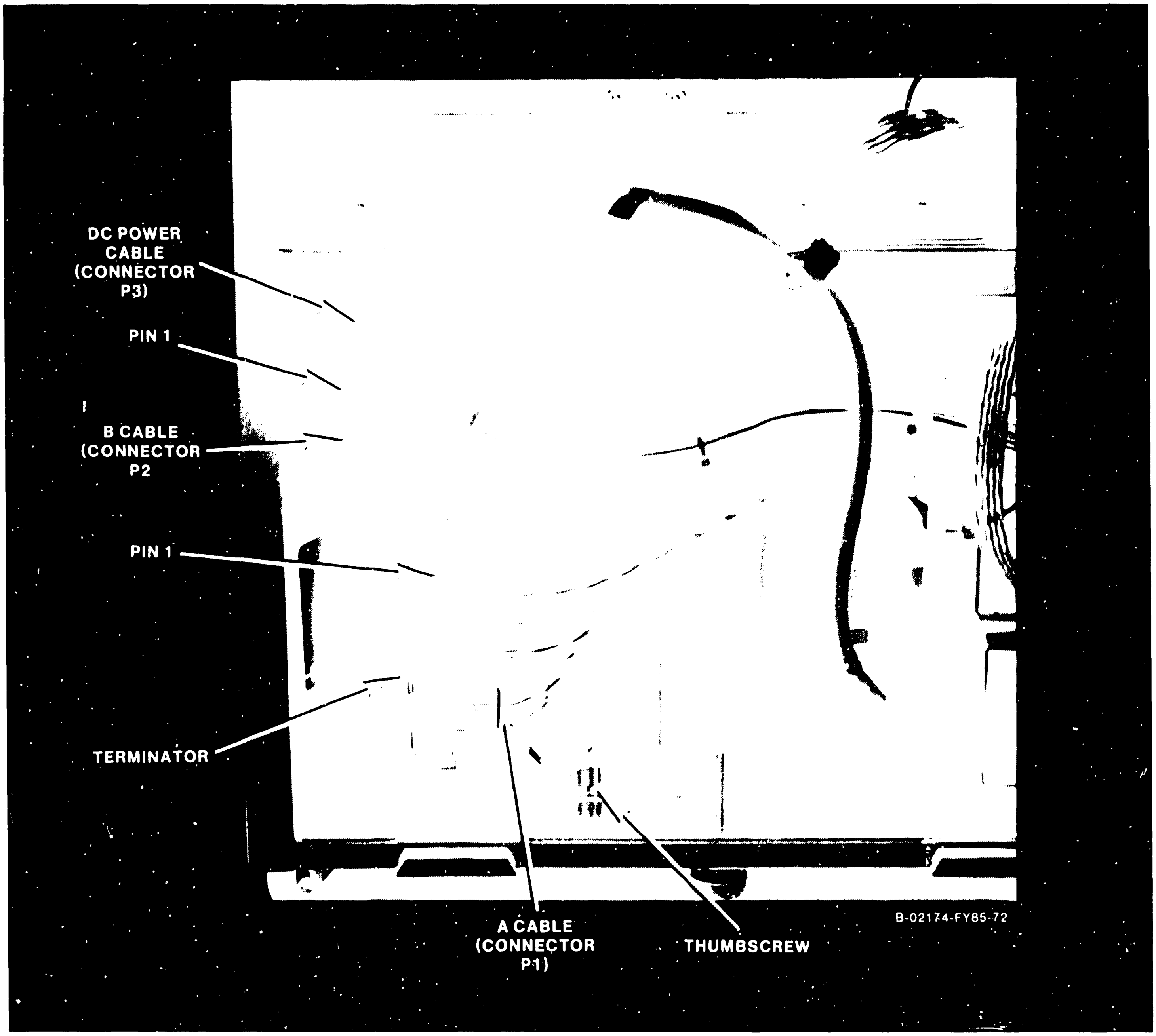


Figure 5-38. 147 Megabyte Disk Drive (Mounted View)

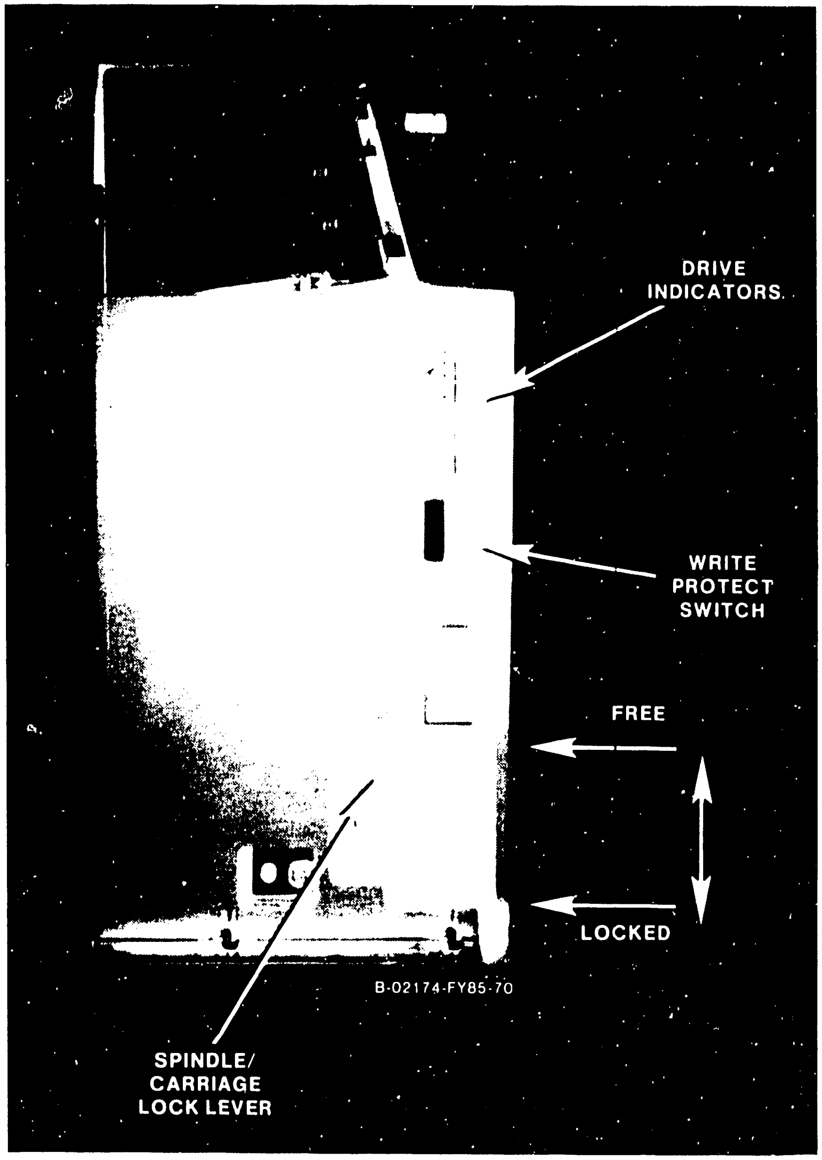


Figure 5-39. 76 Megabyte Disk Drive (Rear View)

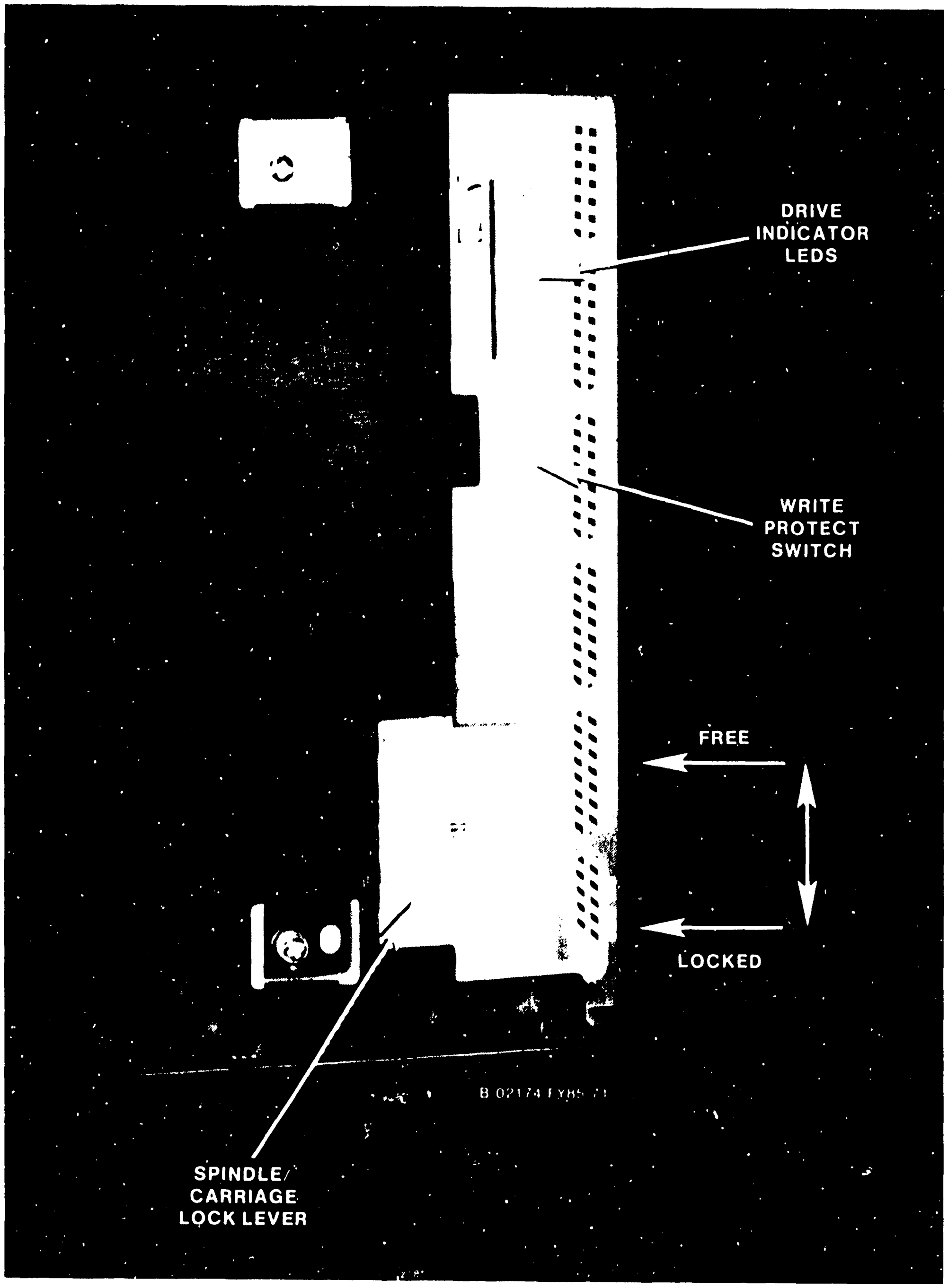


Figure 5-40. 147 Megabyte Disk Drive (Rear View)

5.7.3.2 76 Megabyte Disk Drive Replacement

If a new drive is being installed, check the terminators, the Installation Mode, Control Mode, and the Number of Sectors switches on the Logic and Servo PCB in the drive as follows:

1. Lay the drive down on its left side, with the red Spindle and Actuator Lock Control Lever facing you.

2. Remove the two Phillips screws (figure 5-41) from the upper left corner and the lower right corner of the PCB cover. Carefully lift off the cover exposing the backside of the PC board.

3. Remove the three signal cables from P55, P53, and P41 on the left of the Logic and Servo PCB, and the 'A' cable (terminator) interconnect cable at the top of the PCB. Note the positions of the cables for reinstallation.

4. Remove the four Phillips screws from the upper and lower corners of the board. Carefully turn the board to the left (as when turning the page of a book) so that the component side is facing up.

CAUTION

There is a 2-wire cable and a ground wire still connected to the board on the left side.

5. Check each of the three switches as shown in figure 5-42. They must be set as shown in the figure. The Number of Sectors and the Control Mode switches have clear plastic covers that must be removed before the switches can be set. Make sure to put the covers back on before reinstalling the board.

6. Before reinstalling the board, make sure that the four terminators have been removed from the positions shown in figure 5-42.

7. Carefully turn the board back to its normal position, backside up, and reinstall the four Phillips screws. Make sure that the two wire cable does not get caught between the board and the lower left board bracket.

8. Reconnect the three signal cables, the the 9-pin power connector, and the 'A' cable interconnect cable to the PC board. When reconnecting J53 to the PCB, make sure that the cable is positioned properly and securely in place.

9. Make sure that there are no cables in the way and carefully reinstall the PCB cover and the two Phillips screws.

10. Set the drive back on its base (normal vertical position) with the red Lock Control Lever facing away from you.

11. Carefully slide the drive (back) into the cabinet and secure the spring loaded thumbscrew to the mainframe base plate.

12. Connect the signal, power, and ground cables to the front of the drive. (The dc power cable goes to the 9-pin connector J4 on the Switching Power Supply. See figures 5-35, 5-37, and 5-43.)

13. Unlock the Spindle and Actuator from their shipping positions by moving the red Lock Control Lever on the rear of the drive (figure 5-39) to the right (as seen from the rear), push it up as far as it will go, and then move it to the left into the FREE position.

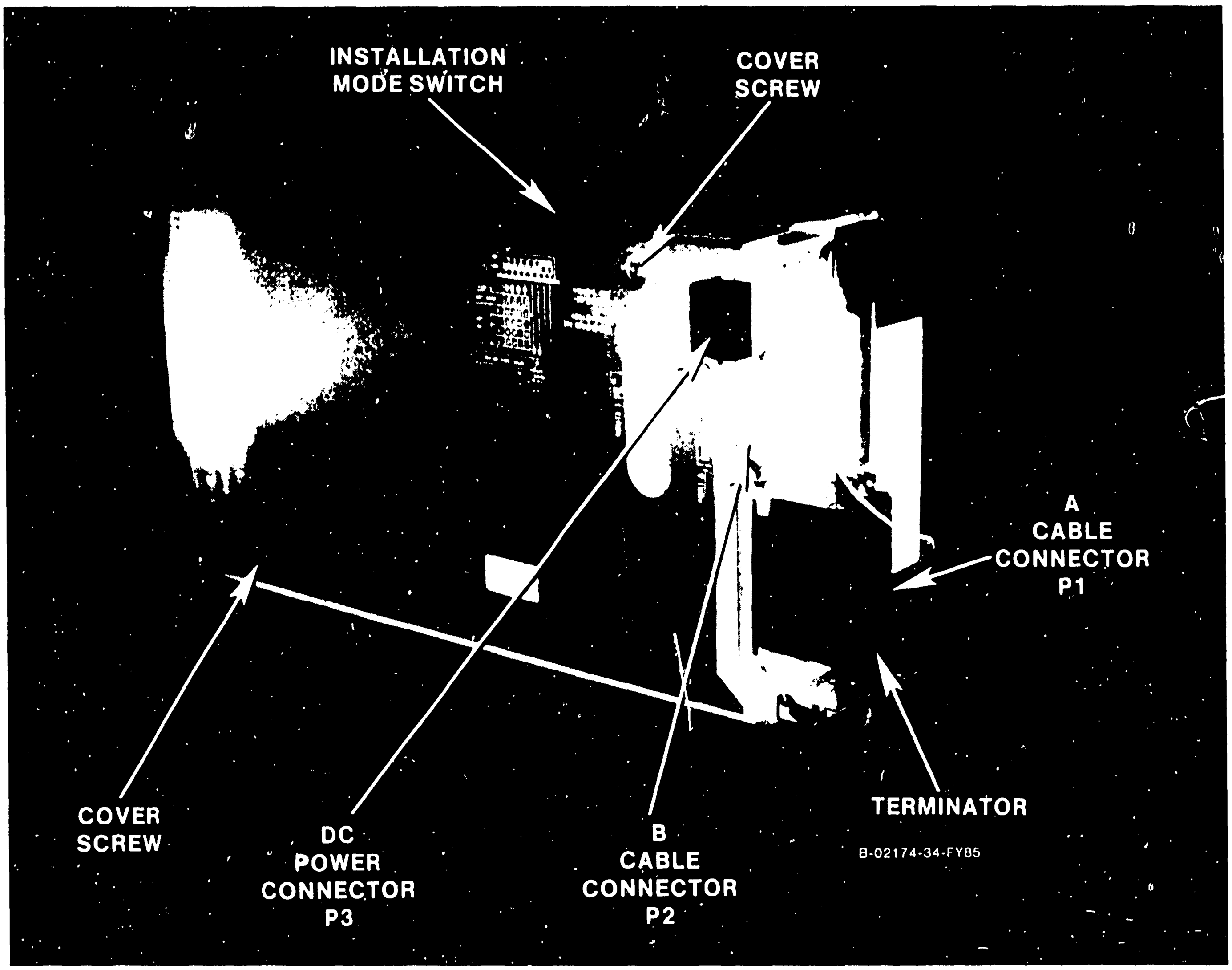
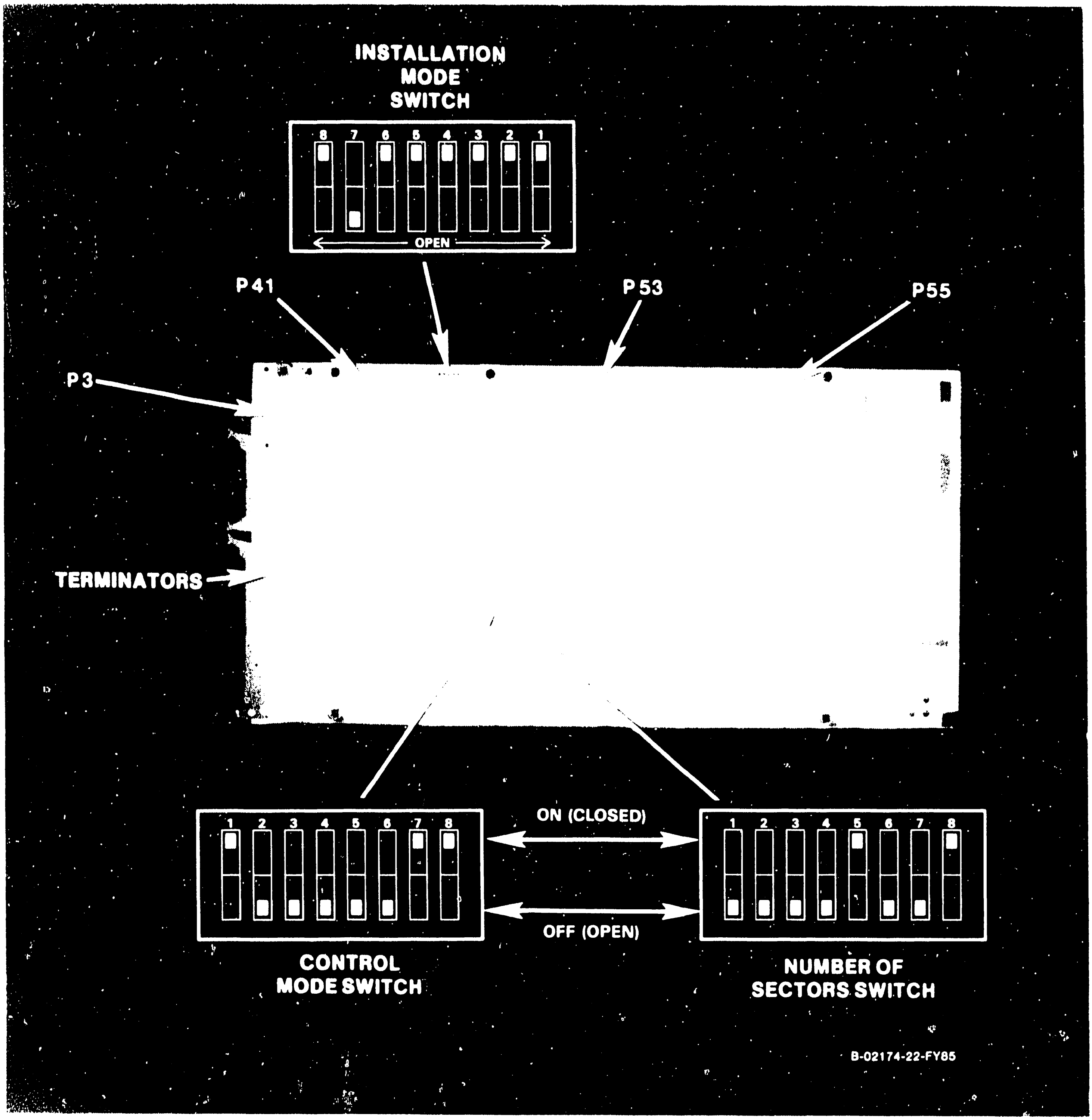


Figure 5-41. 76 Megabyte Disk Drive (Side View)


INSTALLATION MODE SWITCH
8 7 6 5 4 3 2 1
OPEN
P41
P53
P55
P3
TERMINATORS
ON (CLOSED)
OFF (OPEN)
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
CONTROL MODE SWITCH
NUMBER OF SECTORS SWITCH
B-02174-22-FY85

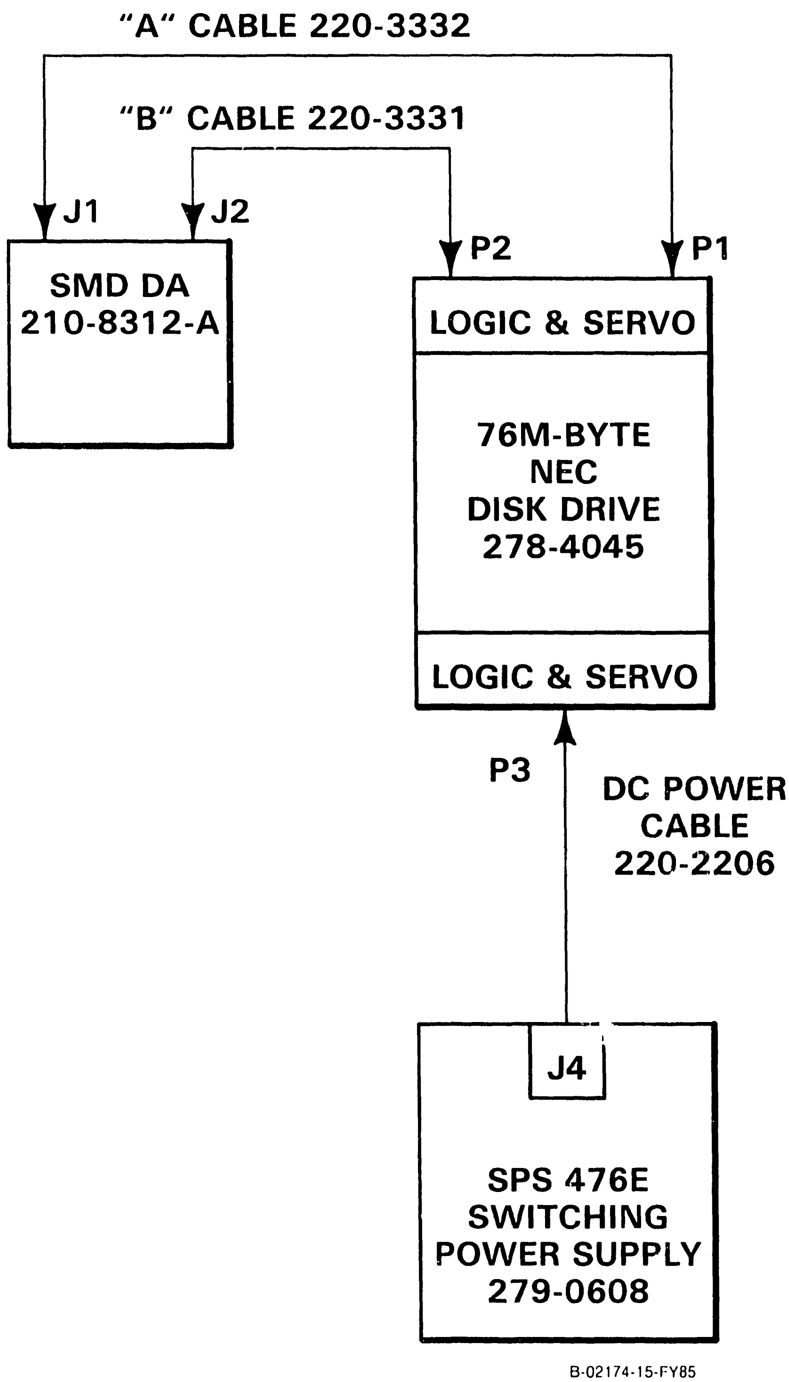


Figure 5-43. 76 Megabyte Disk Drive Cable Interconnections

5.7.3.3 147 Megabyte Disk Drive Replacement

If a new drive is being installed, check the terminators, the Installation Mode, Control Mode, and the Number of Sectors switches on the Logic and Servo PCB in the drive as follows:

1. Lay the drive down on its left side, with the red Spindle and Actuator Lock Control Lever facing you.

2. Remove the two Phillips screws (figure 5-44) from the upper right corner and the lower left corner of the PCB cover. Carefully lift off the cover exposing the backside of the PC board.

3. Remove the three signal cables from P55, P53, and P41 on the left of the Logic and Servo PCB, and the 'A' cable (terminator) interconnect cable at the top of the PCB. Note the positions of the cables for reinstallation.

4. Remove the four Phillips screws from the upper and lower corners of the board. Carefully turn the board to the left (as when turning the page of a book) so that the component side is facing up.

CAUTION

There is a 2-wire cable and a ground wire still connected to the board on the left side.

5. Check each of the three switches as shown in figure 5-45. They must be set as shown in the figure.

6. Before reinstalling the board, make sure that the four terminators have been removed from the positions shown in figure 5-45.

7. Carefully turn the board back to its normal position, backside up, and reinstall the four Phillips screws. Make sure that the two wire cable does not get caught between the board and the lower left board bracket.

8. Reconnect the three signal cables, the the 9-pin power connector, and the 'A' cable interconnect cable to the PC board. When reconnecting J53 to the PCB, make sure that the cable is positioned properly and securely in place.

9. Make sure that there are no cables in the way and carefully reinstall the PCB cover and the two Phillips screws.

10. Set the drive back on its base (normal vertical position) with the red Lock Control Lever facing away from you.

11. Carefully slide the drive (back) into the cabinet and secure the spring loaded thumbscrew to the mainframe base plate.

12. Connect the signal, power, and ground cables to the front of the

drive. (The dc power cable goes to the 9-pin connector J4 on the Switching Power Supply. See figures 5-35, 5-38, and 5-46.)

13. Unlock the Spindle and Actuator from their shipping positions by moving the red Lock Control Lever on the rear of the drive (figure 5-40) to the right (as seen from the rear), push it up as far as it will go, and then move it to the left into the FREE position.

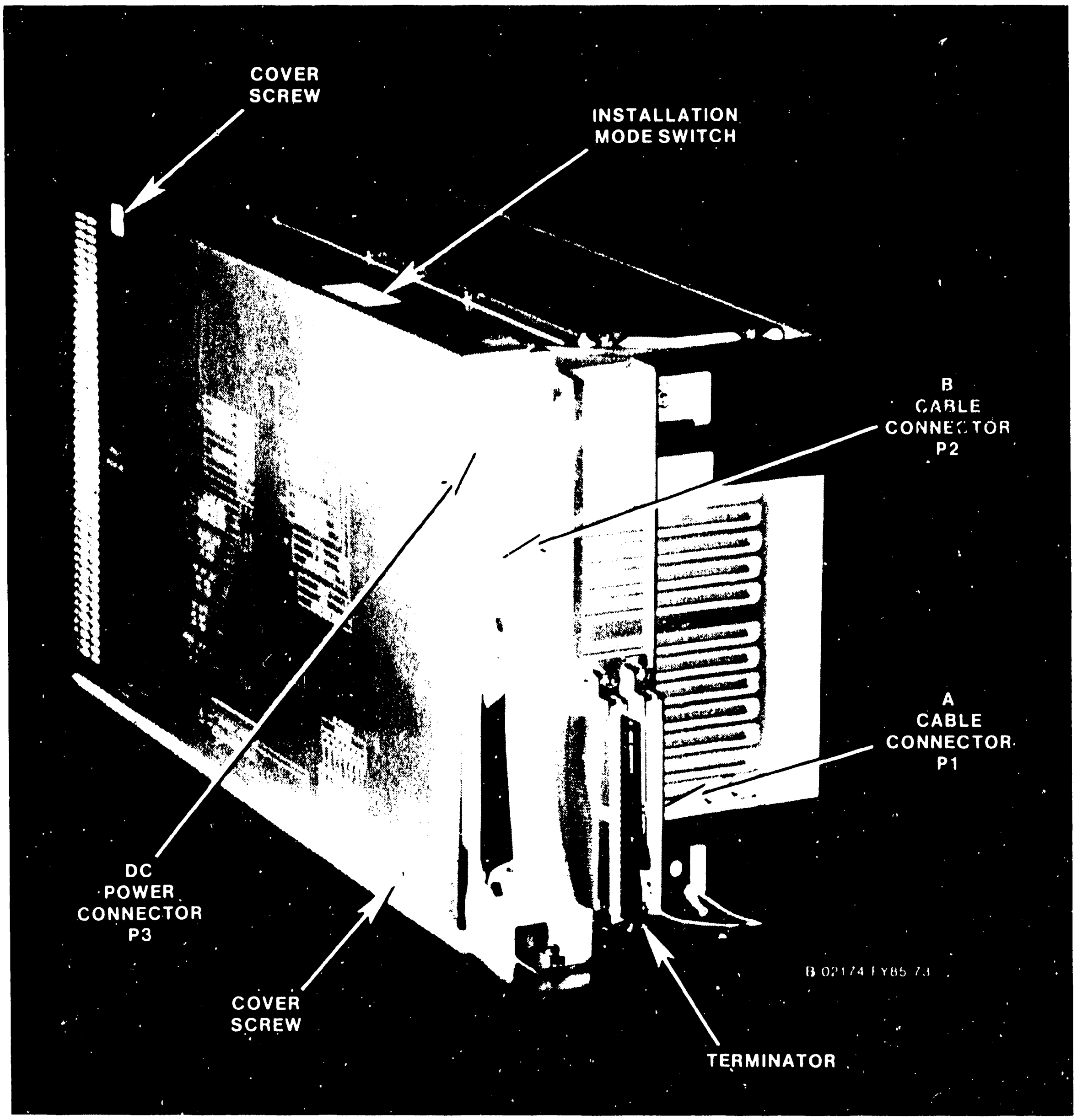


Figure 5-44. 147 Megabyte Disk Drive (Side View)

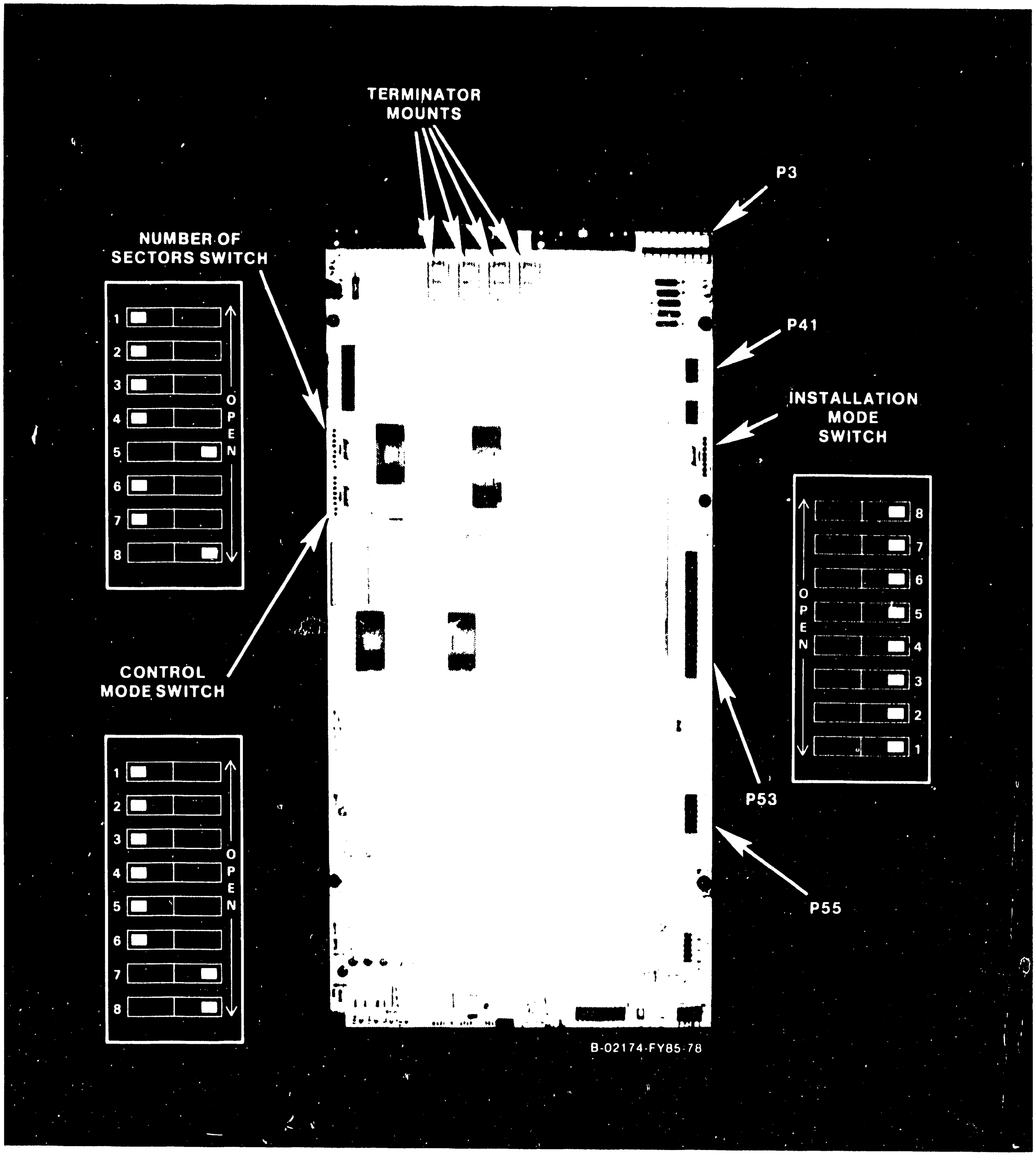


Figure 5-45. 147 Megabyte Disk Drive Logic and Servo Printed Circuit Board

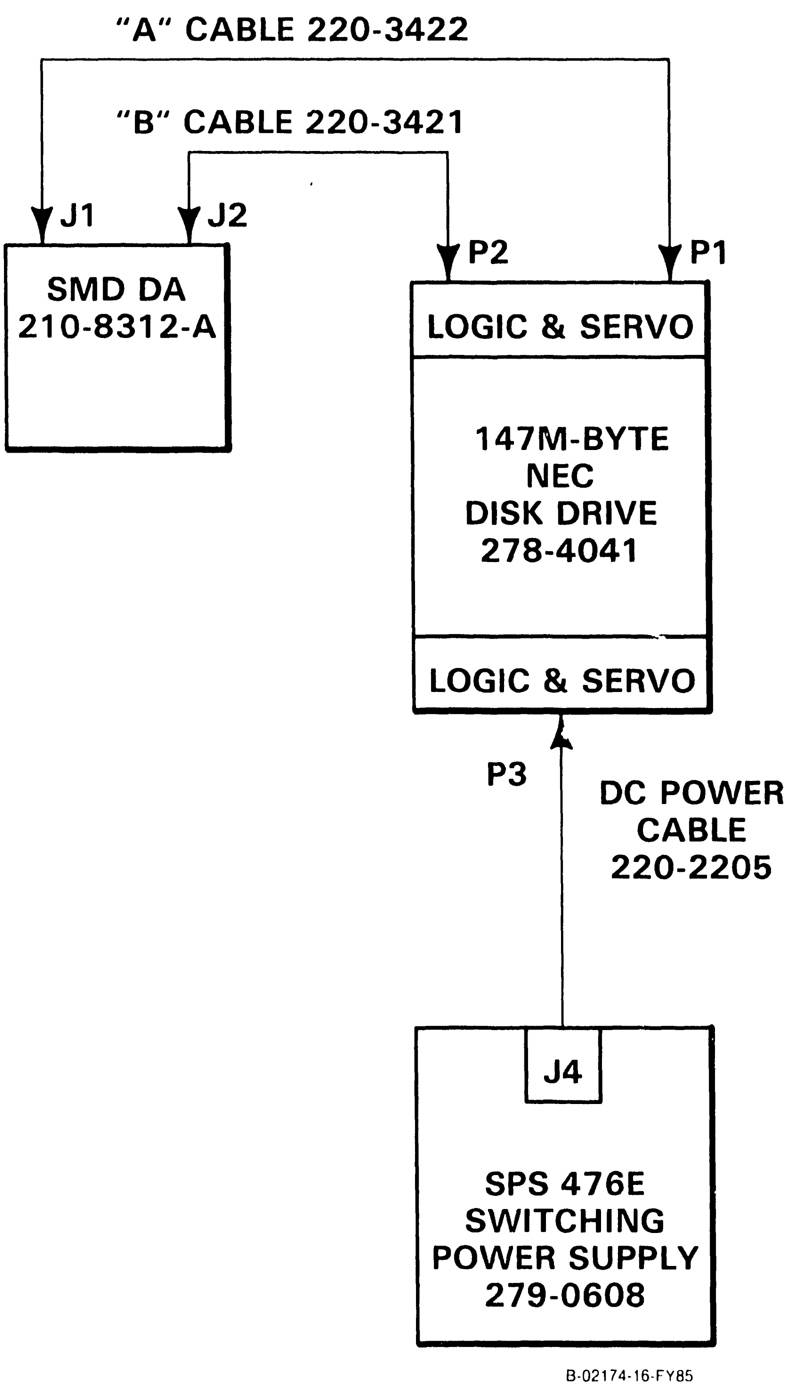


Figure 5-46. 147 Megabyte Disk Drive Cable Interconnections

5.7.4 SYSTEM DISKETTE DRIVE

The 5-1/4 inch Half-Height Diskette Drive (WLI P/N 278-4033) generates a double sided, double density formatted floppy diskette.

5.7.4.1 Diskette Drive Removal

The diskette drive is located at the top right of the mainframe chassis. To remove the diskette drive:

1. Power-down the mainframe (per paragraph 4.11.1.2) by depressing the ac power On/Off switch to the '0' position.

2. Remove the top and front covers (paragraphs 5.4.1 and 5.4.2).

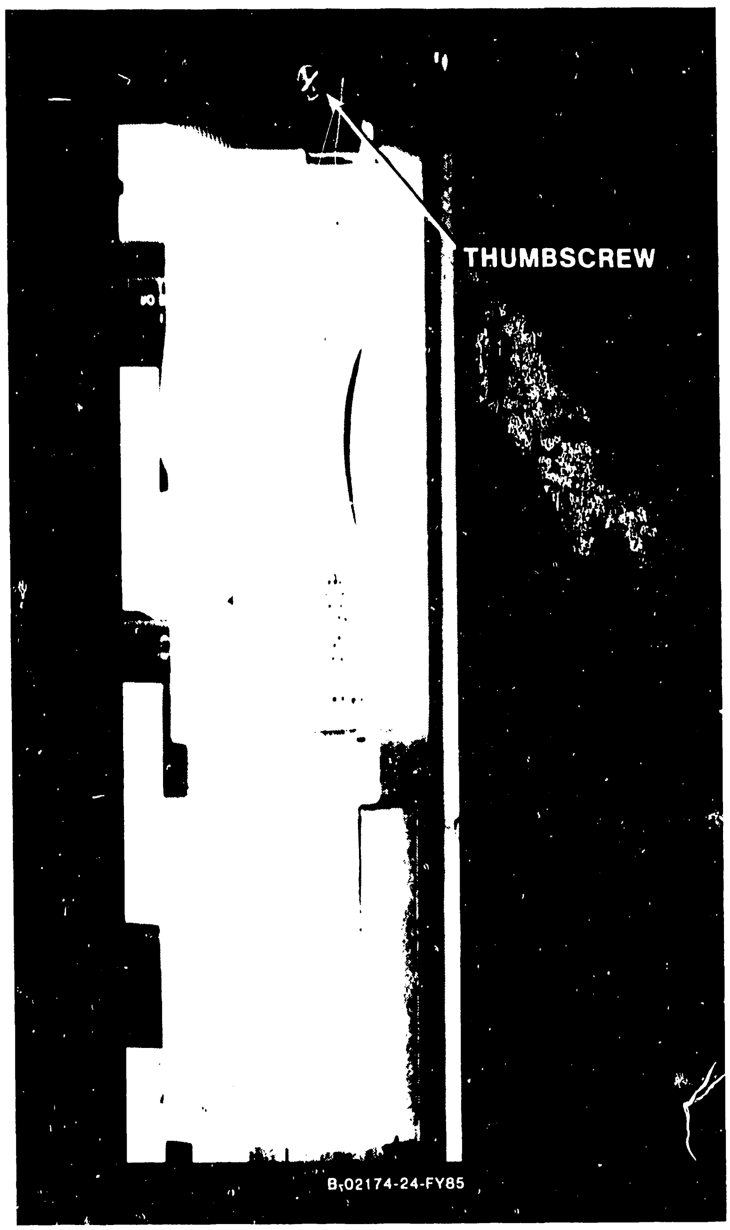


Figure 5-47. 5-1/4 Inch Half-Height Diskette Drive

3. Remove the 34-pin signal connector from J1, and the 5-pin dc connector from J2 on the rear of the drive (figure 5-48). The connectors are keyed to ensure proper reinsertion.

4. Unscrew the spring loaded thumbscrew at the top of the drive that secures the drive to the chassis (figure 5-47).

5. The drive is seated between one top and one bottom rail. Slide the drive straight out the front of the mainframe.

5.7.4.2 Diskette Drive Replacement

1. To reinstall the Diskette Drive, reverse the above procedure.

2. Check the jumpers on the component side of the logic PC board of the drive. They should be the same as the drive that was removed, as shown in figures 5-48 and 5-49.

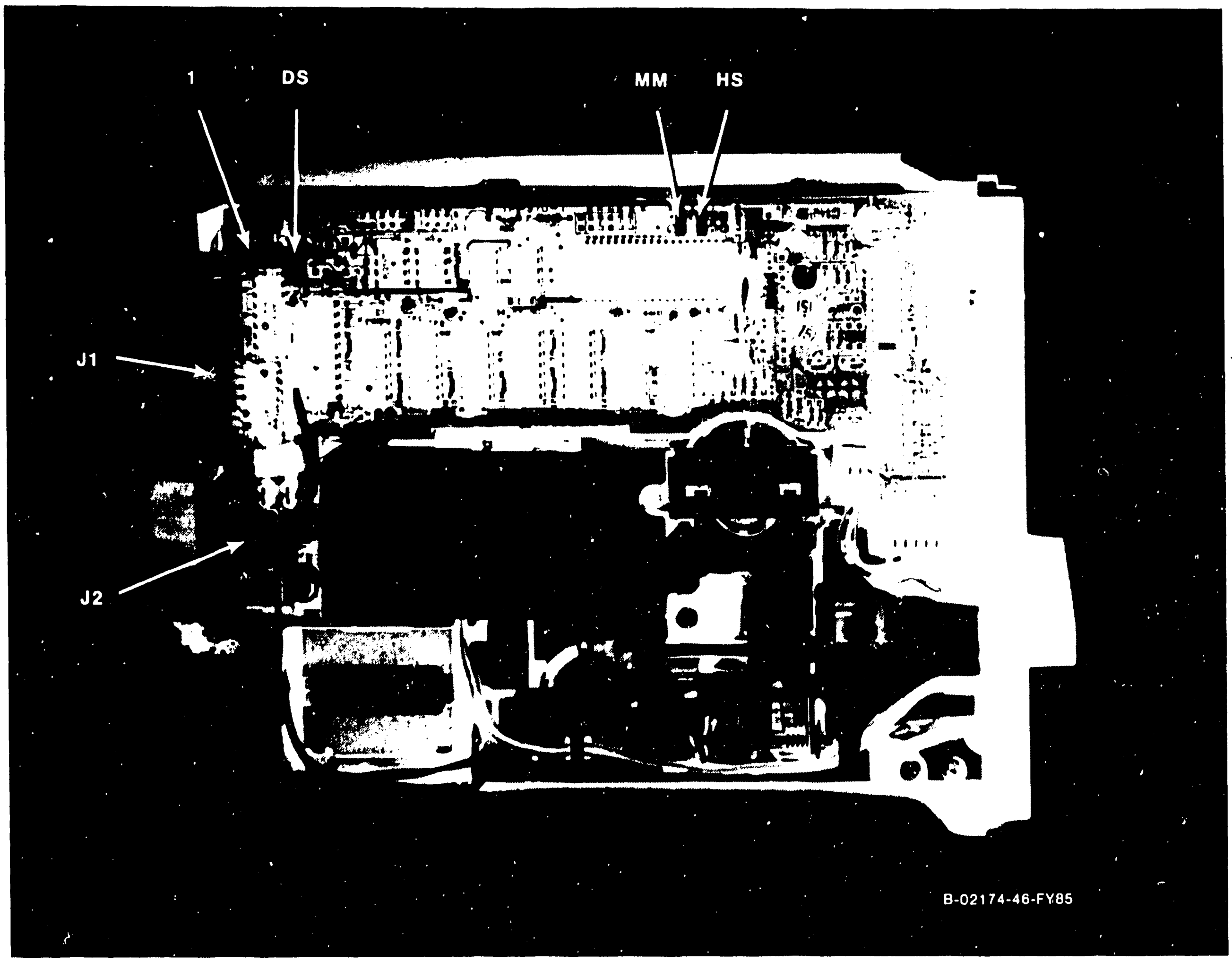


Figure 5-48. 5-1/4 Inch Diskette Drive Printed Circuit Board (Mounted View)

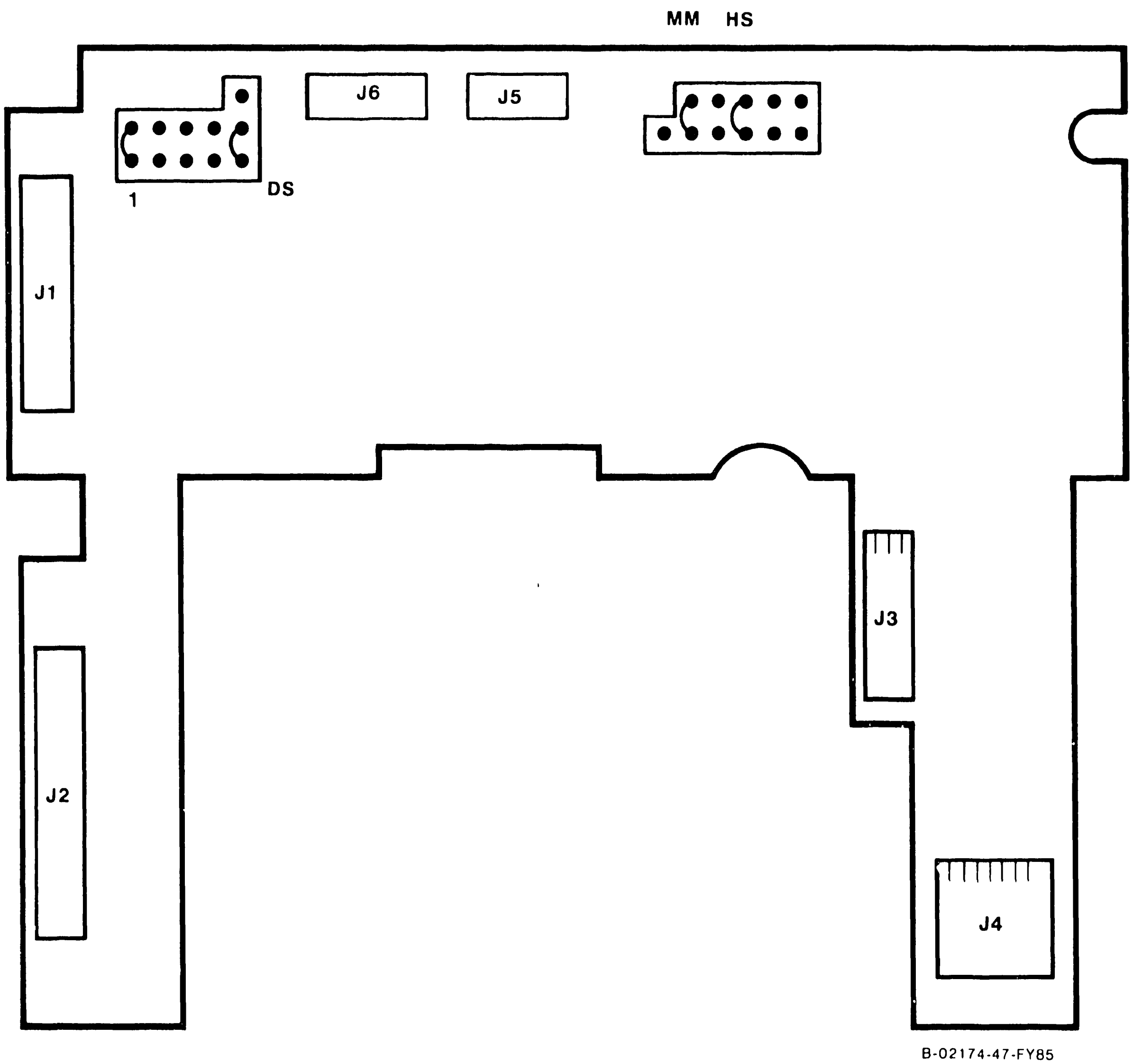


Figure 5-49. 5-1/4 Inch Diskette Drive PCB Connector and Jumper Locations

5.7.5 FAN REMOVAL AND REPLACEMENT

The two cooling fans used in the VS-65 mainframe cabinet are mounted horizontally on the back panel assembly of the mainframe. To remove a fan:

1. Power-down the mainframe (per paragraph 4.11.1.2) by depressing the ac power On/Off switch to the '0' position and unplug the power connector from the power source receptacle.

2. Remove the top cover (paragraphs 5.4.1).

3. a. If the left fan, as seen from the rear, is to be replaced, remove only the four hex head screws securing the left fan screen and fan to the rear panel assembly. (Figure 5-50.)

   b. If the right fan is to be replaced, remove all eight hex head screws securing both of the fan screens and fans to the rear panel assembly.

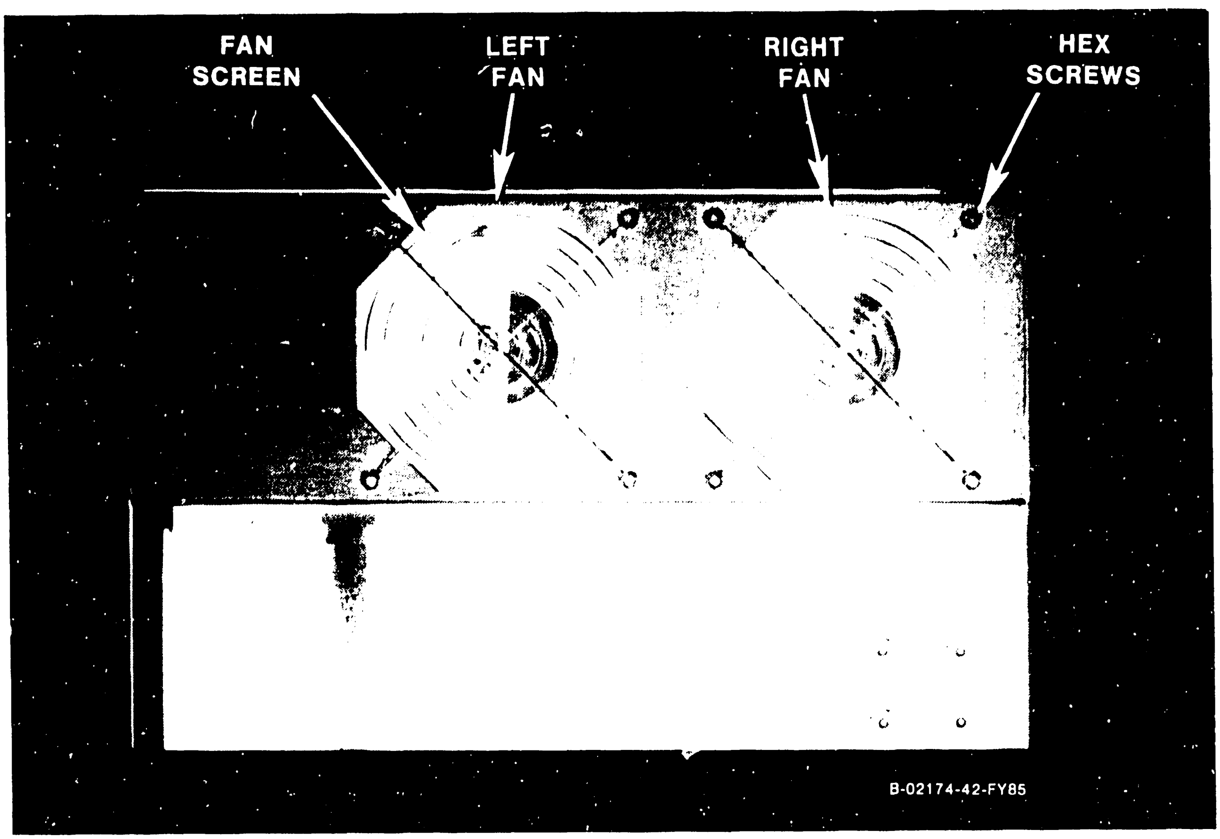


Figure 5-50. Fan Panel Assembly (Rear View)

4. Unscrew the two spring loaded thumbscrews from the inside top of the fan panel.

5. Carefully lower the entire rear panel assembly enough to allow access to the fans. Brace the panel in this position. Be careful of the I/O cables connected to the rear panel assembly.

6. Disconnect the ac power connector(s) at the fan(s). (Figure 5-51.)

7. To replace the left fan, as seen from the inside, the right fan must be removed first through the cutout in the top of the panel. Then, remove the left fan through the cutout. The right fan can be replaced without having to remove the right fan.

To install a fan, reverse the above procedure.

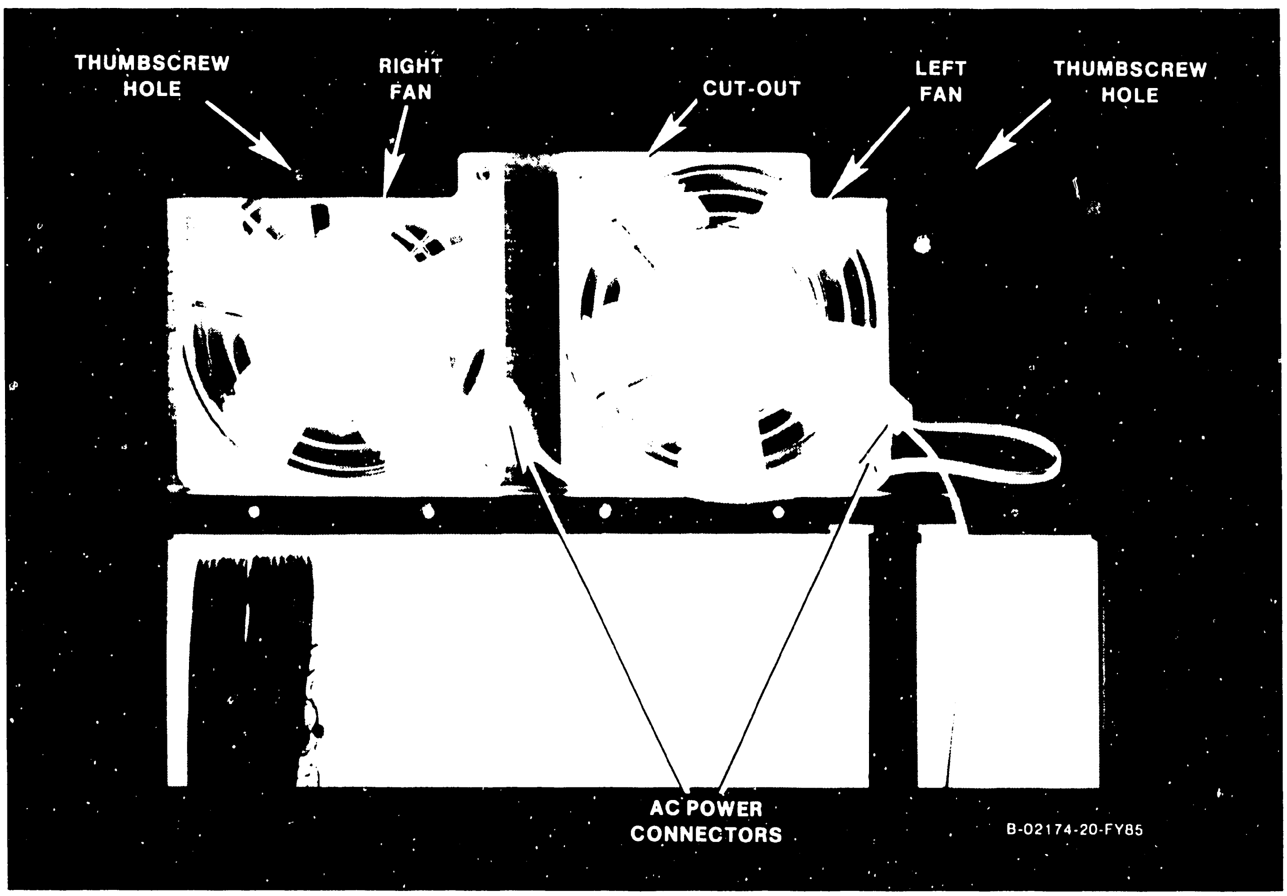


Figure 5-51. Fan Panel Assembly (Inside View)

CHAPTER 6
SCHEMATICS

CHAPTER 6

SCHEMATICS

CHAPTER 6

SCHEMATICS

Schematics are not provided as part of the VS-65 First Customer Shipment (FCS) or the Illustrated Maintenance Manuals. The schematics will appear in a separate VS-65 Schematics Manual.

CHAPTER
7
ILLUSTRATED
PARTS
BREAKDOWN

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CHAPTER 7

ILLUSTRATED PARTS BREAKDOWN

7.1 GENERAL

This chapter contains the illustrated parts breakdown for the VS-65 Computer System. Use this breakdown for part number identification when ordering field-replaceable components.

Table 7-1. Internal Signal Cable Part Numbers

FROM PCB/DEVICE	CONNECTOR	TO PCB/DEVICE/PANEL	CONNECTOR	PART NUMBER
210-8599	P1	210-8699	P1	220-3435
Cache/Main	P2	CP7	P2	"
Memory	P3	Central Processor	P3	"
210-8465	J1	8" Diskette Drive	(N/A)	(Not Used)
Bus	J2	5-1/4" Diskette Dr.	J1	220-3353
Processor	J3	210-8613	(See Note)	(220-3348)
(80286)	J4	Rear Panel	RS-232	220-3349
210-7906	J2	SIO Rear Panel	BNC/TNC	220-3080
Serial I/O	J3	" " "	"	"
Device	J4	" " "	"	"
Adapter	J5	" " "	"	"
210-8312	J1	76 Megabyte Drive	P1(A cable)	220-3422
Fixed Disk DA	J2	Internal Drive	P2(B cable)	220-3421
210-8312	J1	147 Megabyte Drive	P1(A cable)	220-3422
Fixed Disk DA	J2	Internal/External	P2(B cable)	220-3421
External Disk	P1	Daisy-Chained	P1(A cable)	220-3041-xx
210-8313	J3	External Drive	P3(B cable)	220-3033-xx
210-8314	J4	" "	P4(B cable)	220-3033-xx
210-8315	J5	" "	P5(B cable)	220-3033-xx
210-8337	J1	Rear TC Panel	RS449	220-3246
"	J13	" " "	X.21	220-3245
"	J2	" " "	RS232	220-3244
"	J3	" " "	RS366	220-3244
"	J4	Front TC Panel	Display	220-3247
210-8637	J2A & J2B	Rear TC Panel	2 ea RS232	220-3244
"	J3A & J3B	" " "	" " RS366	220-3244
"	J13A/J13B	" " "	" " X.21	220-3245
"	S1 & S2	Front TC Panel	" " Display	220-3012
76/147MB Drs.	P1	Interconnect Cable	Terminator	220-3391

NOTES

1. Cable P/N 220-3348 is part of 210-8613 Front Panel PCB Assembly and does not have a connector.

2. Cables 220-3041/3033 with suffix 'xx' vary with length and drive type.

Table 7-2. Internal Power Cable Part Numbers

FROM	CONNECTOR	TO	CONNECTOR	PART NUMBER
External AC Source Isolated Gnd.	NEMA 5-15IG Power Source Receptacle	210-8612 Switching Power Supply	J1 AC Input to SPS-476E	220-2025 Ac Power Cord (USA)
Printed	J1, J2,	Not Used	-	-
Circuit Board	J3 (Note)	Diskette Drive	J2	220-0405
210-8611	J4	76M-Byte Drive	P3	220-2206
Switching	J4	147M-Byte Drive	P3	220-2205
Power	J5	210-8607	J31	220-0407
Supply	J8	210-8607	J30	220-3193
PC Board	J2	Rear Fan Panel	Fans	220-1980
210-8612	J3	To Chassis Gnd.	Spade Lug	220-2116
Switching	+5V Bus	210-8607	J28 (+5V)	220-0408
Power Supply	+/-0V Bus	210-8607	J29 (+/-0V)	220-0409

NOTE

J1, J2, and J3 are parallel dc output connectors.

Table 7-3. Switching Power Supply Fuses

FUSE	LOCATION	RATING	WLI PART NUMBER
F1	210-8611	4 Amp/250 Volts (FB)	360-1040
F1	210-8612	10 Amp/250 Volts (FB)	360-1100
F2	210-8612	2 Amp/125 Volts (Pico)	360-1155
F3	210-8612	2 Amp/125 Volts (Pico)	360-1155

Table 7-4. External Cable Part Numbers

FROM	CONNECTOR	CABLE P/N	CONNECTOR	TO
External AC Source Isolated Gnd.	NEMA 5-15IG Power Source Receptacle	220-2025 Ac Power Cord (USA)	J1 AC Input to SPS-476E	210-8612 Switching Power Supply
270-0949 SIO Panel	BNC Socket TNC Bulkhead	Paired Cables 220-0148A	BNC Socket TNC Bulkhead	Ext. Serial Devices
270-0952	RS-232/366	220-0333(2)	RS-232/366	Modems/ACUs
Single-Port	RS-449	220-0334	RS-449	IEEE Buss
TC Rear Panel	X.21	220-0332	X.21	Euro-Modems
270-0953	2ea RS-232	220-0333	RS-232	Modems/ACUs
Dual-Port TC	2ea RS-366	220-0333	RS-366	IEEE Buss
Rear Panel	2ea X.21	220-0332	X.21	Euro-Modems
210-8313-A 210-8314-A	'A' Cable from J1 of each DA	220-3041-xx	Daisy-Chained 'A' Connectors	External Disk
210-8315-A	2-4 'B' Cables	220-3033-xx	'B' Connector	Drives

Cables 220-3041/3033 with suffix 'xx' vary with length and drive type.

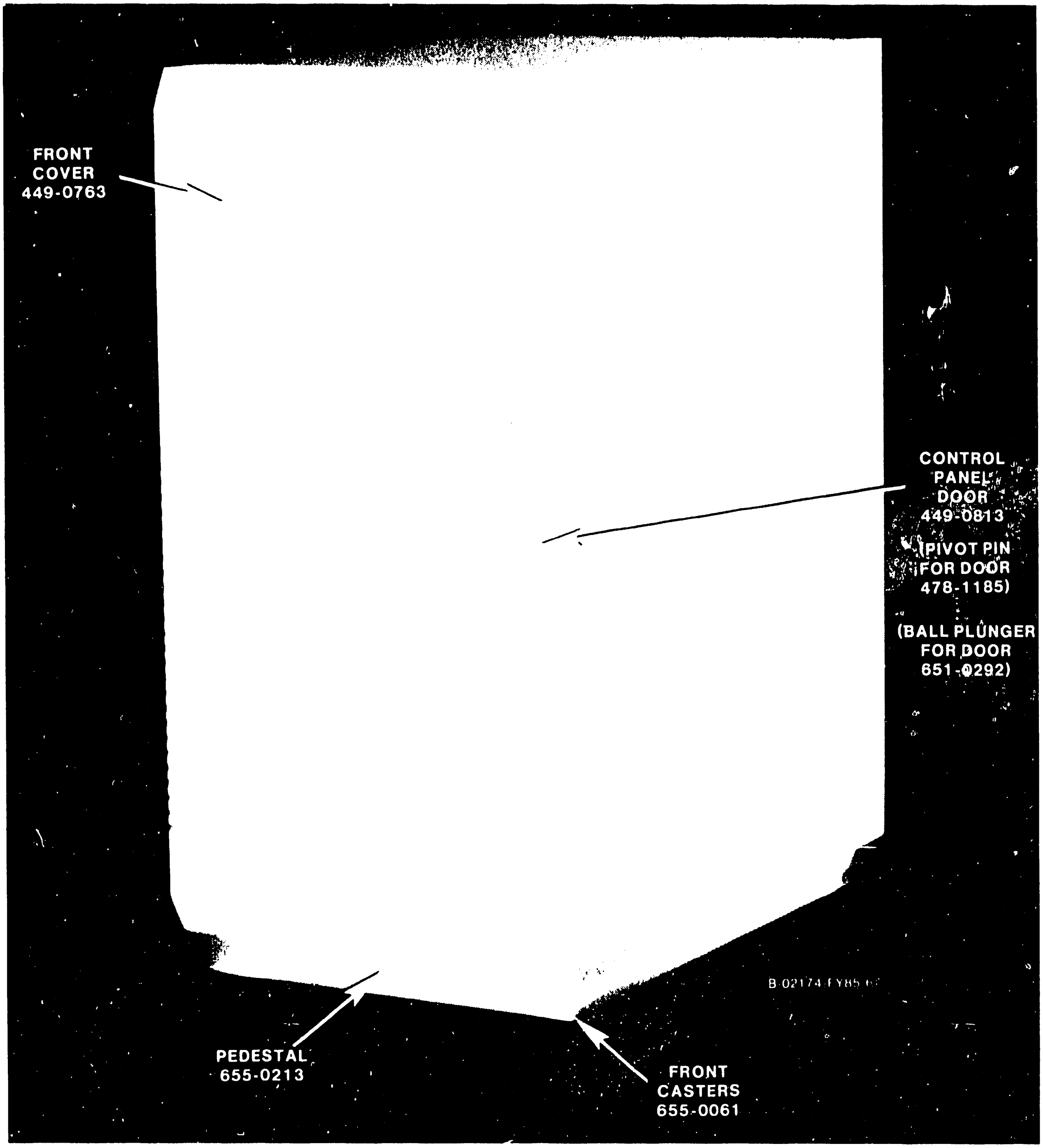

Figure 7-1. Mainframe Front Cover and Hardware

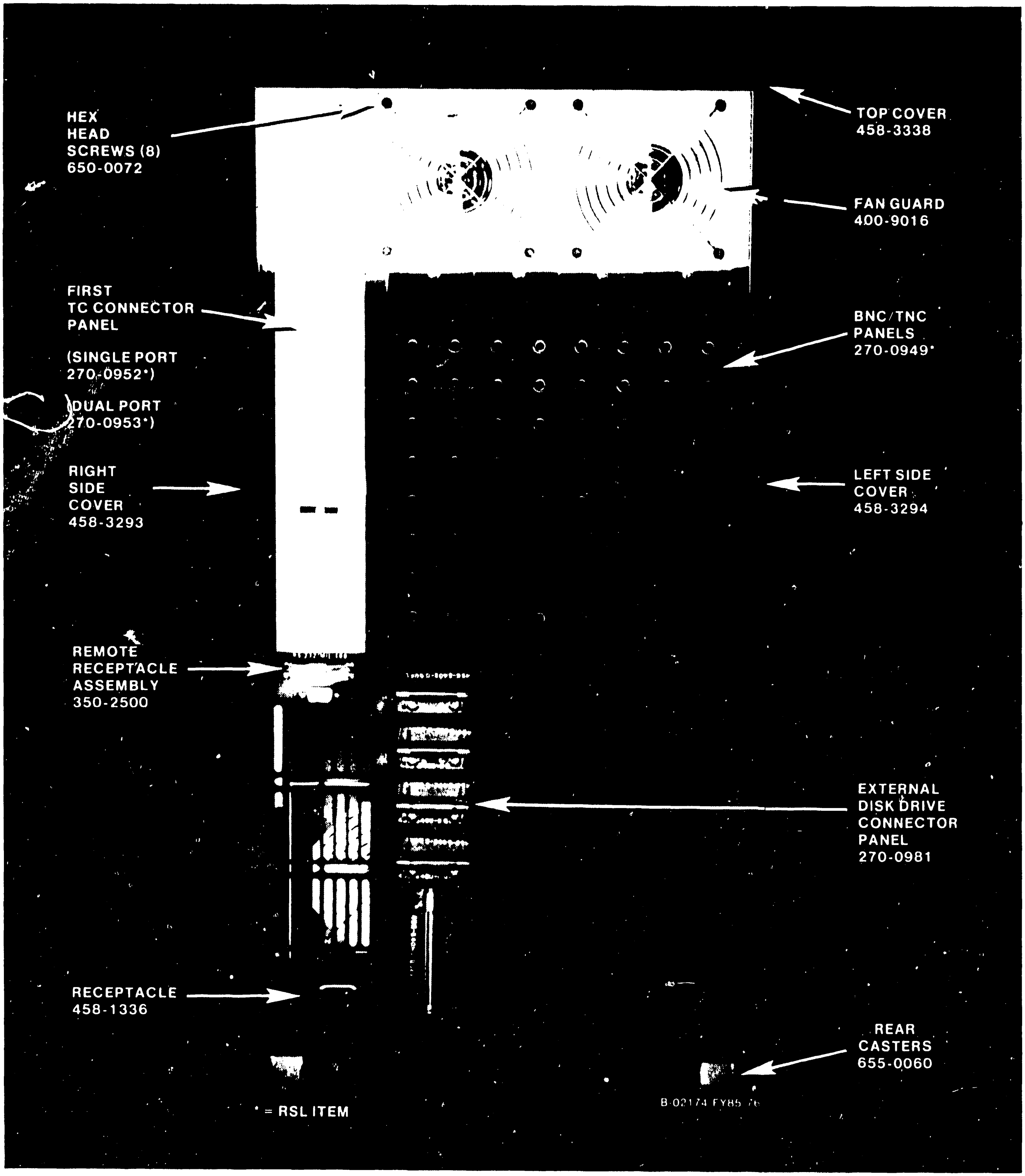

Figure 7-2. Mainframe Rear Panels and Hardware

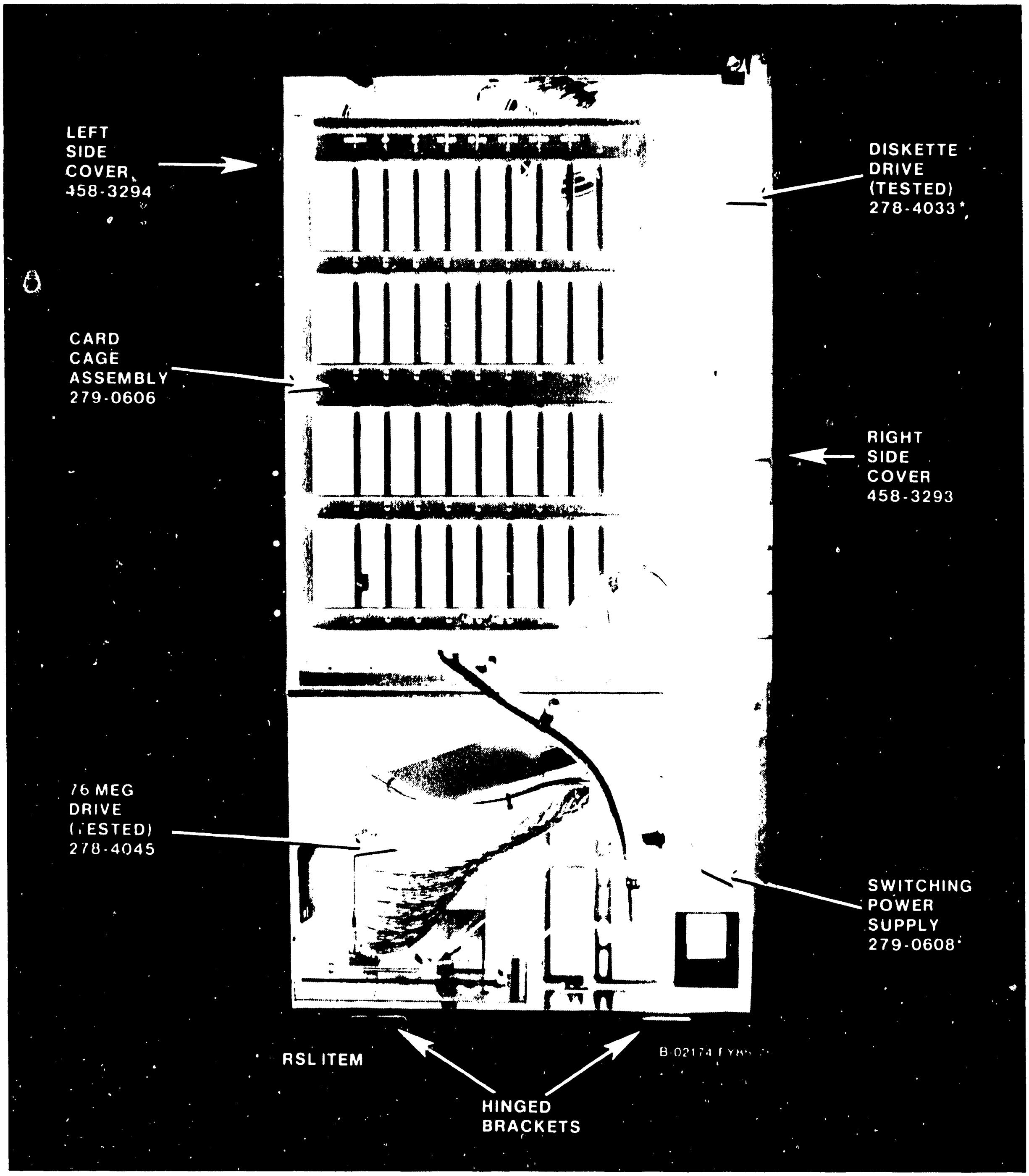

Figure 7-3. Mainframe Subassemblies and Hardware (Covers Removed)

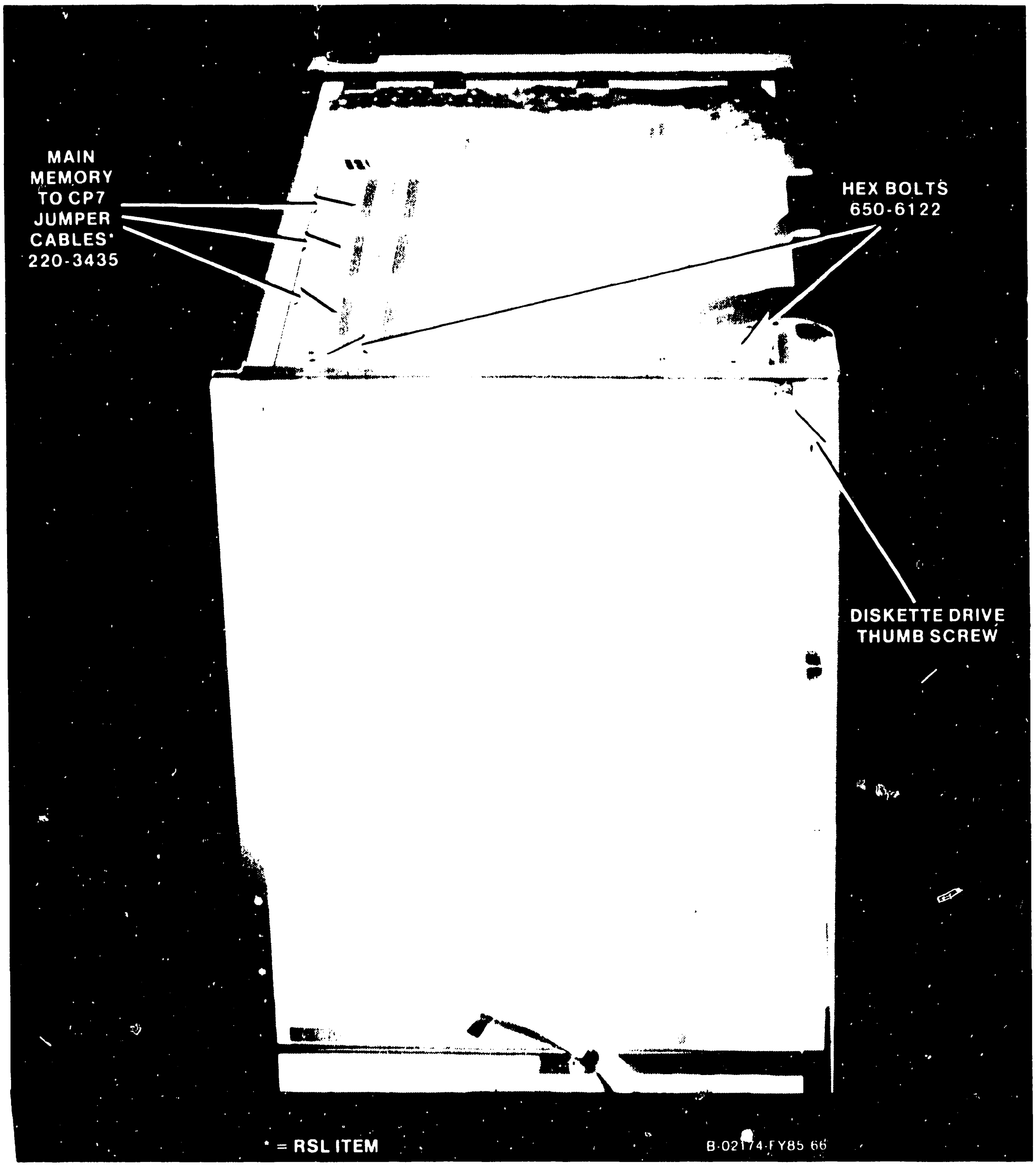

Figure 7-4. Mainframe Top View (Covers Removed)

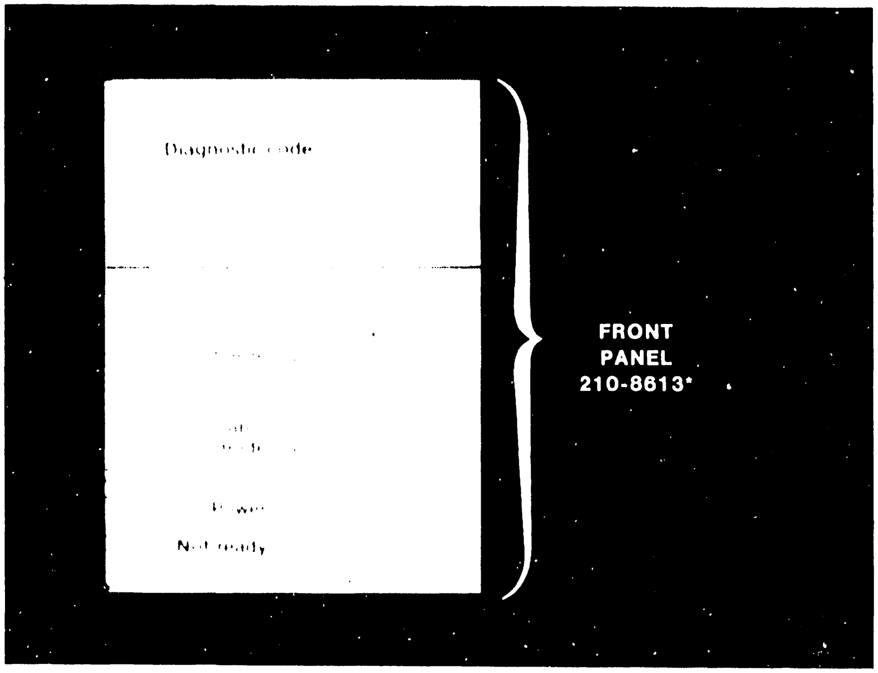

Figure 7-5. Front Panel Assembly

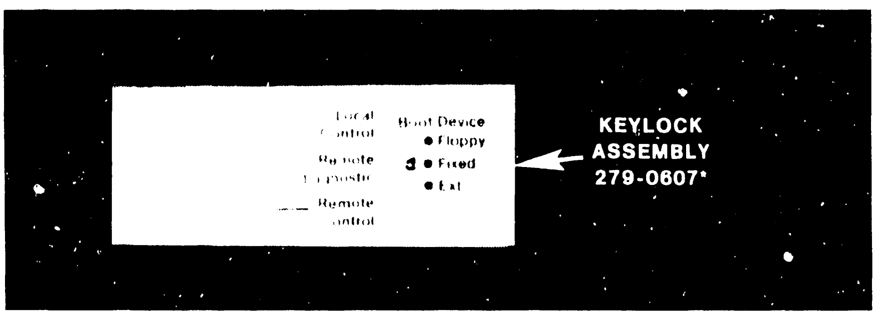

Figure 7-6. Boot Device Switch and Keylock Assembly

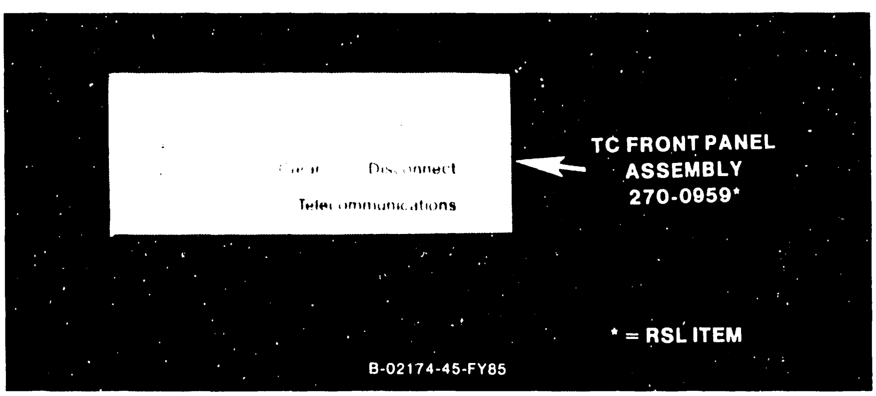

Figure 7-7. Telecommunication Control and Indicator Front Panel Assembly

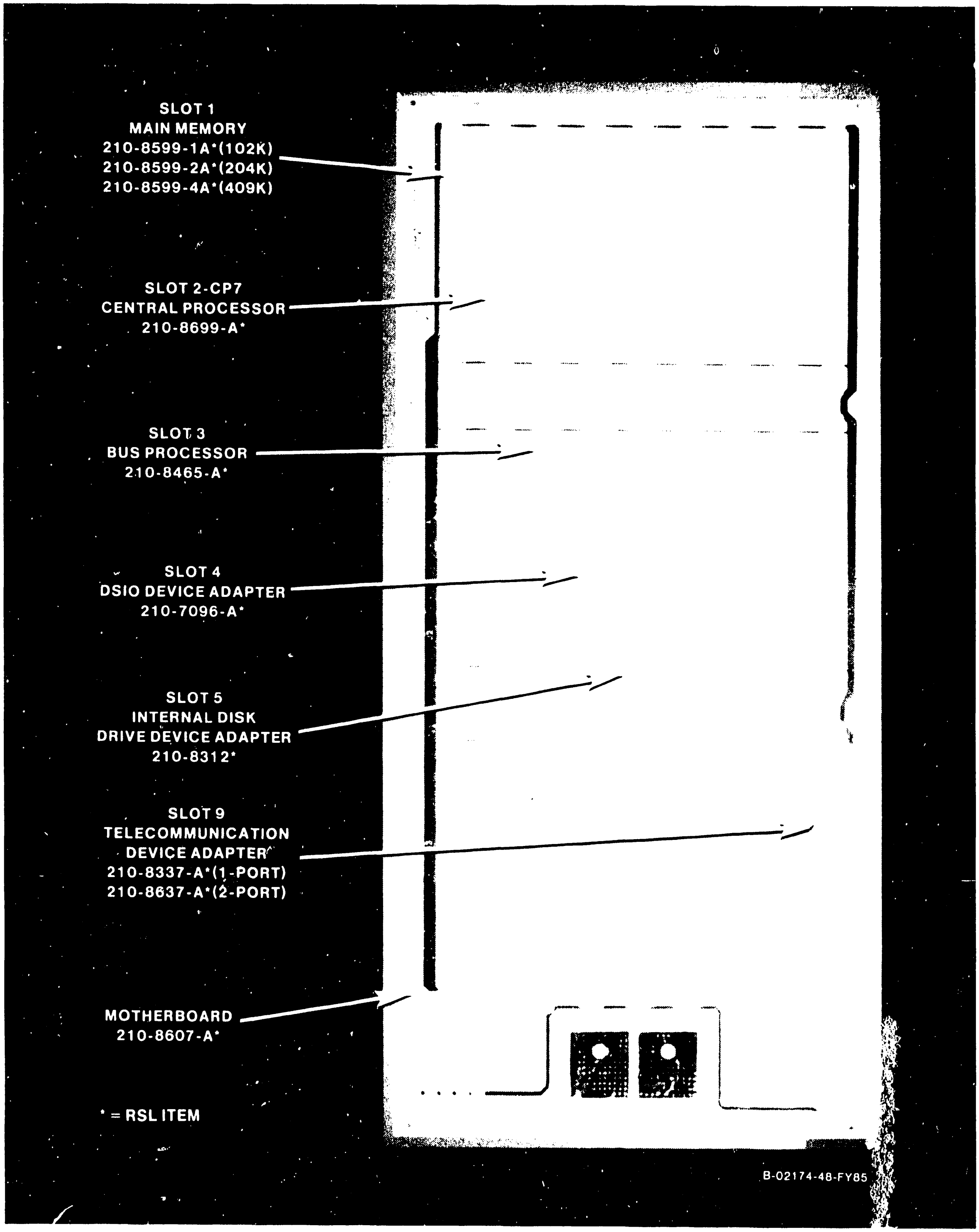

Figure 7-8. Printed Circuit Board Locations in Motherboard Slots

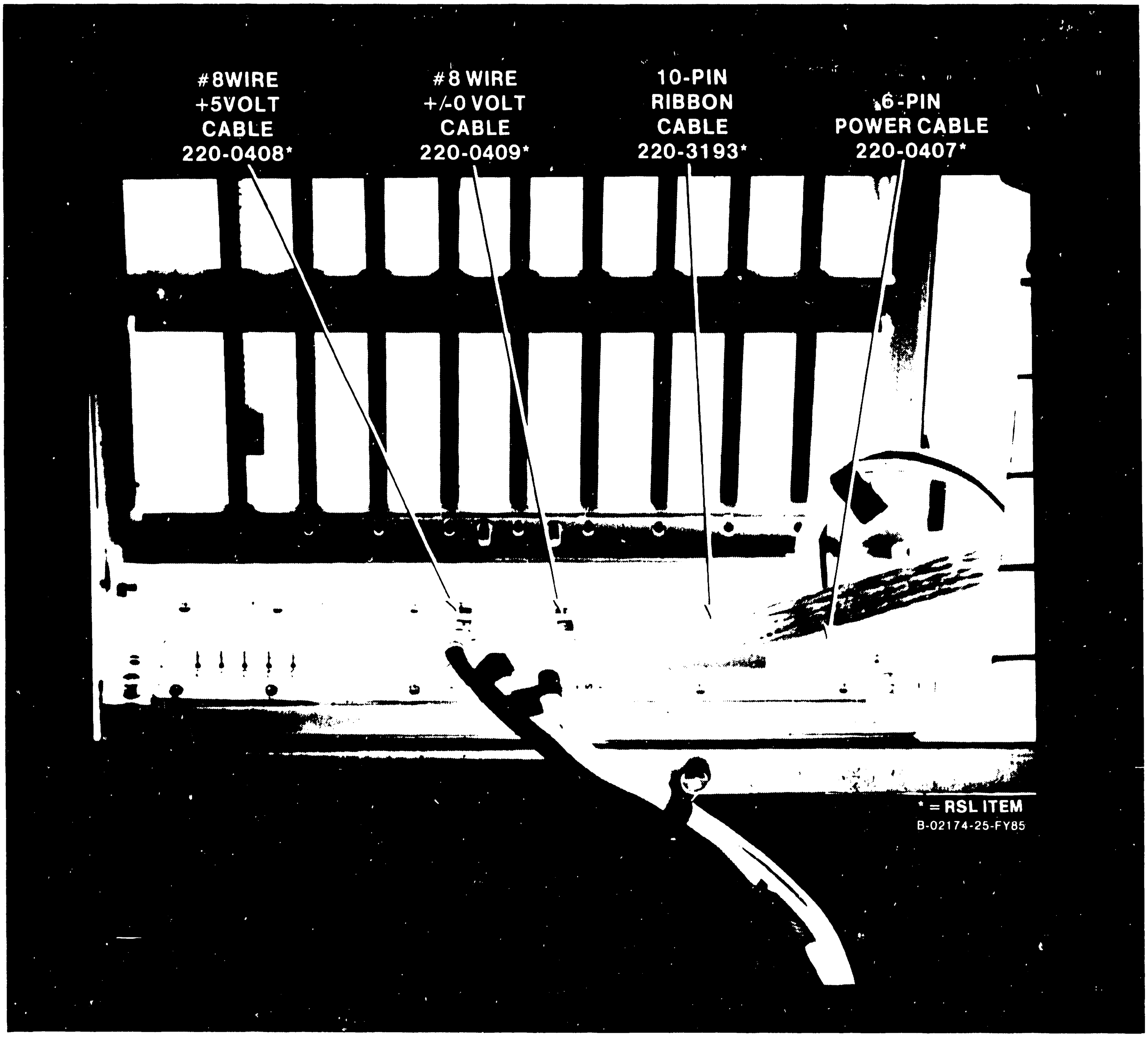

Figure 7-9. Motherboard Power Cables and Connector Locations

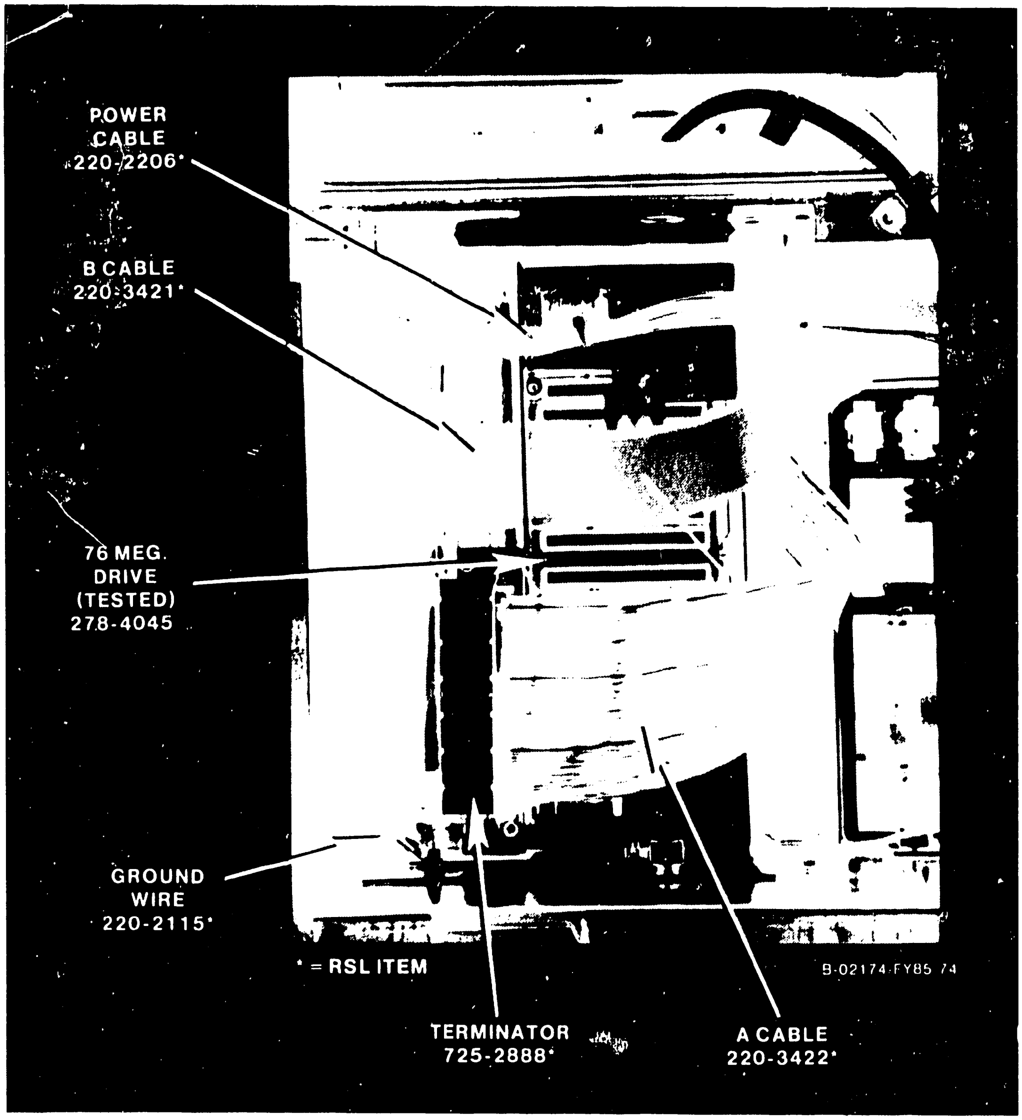

Figure 7-10. 76 Megabyte Disk Drive Cables

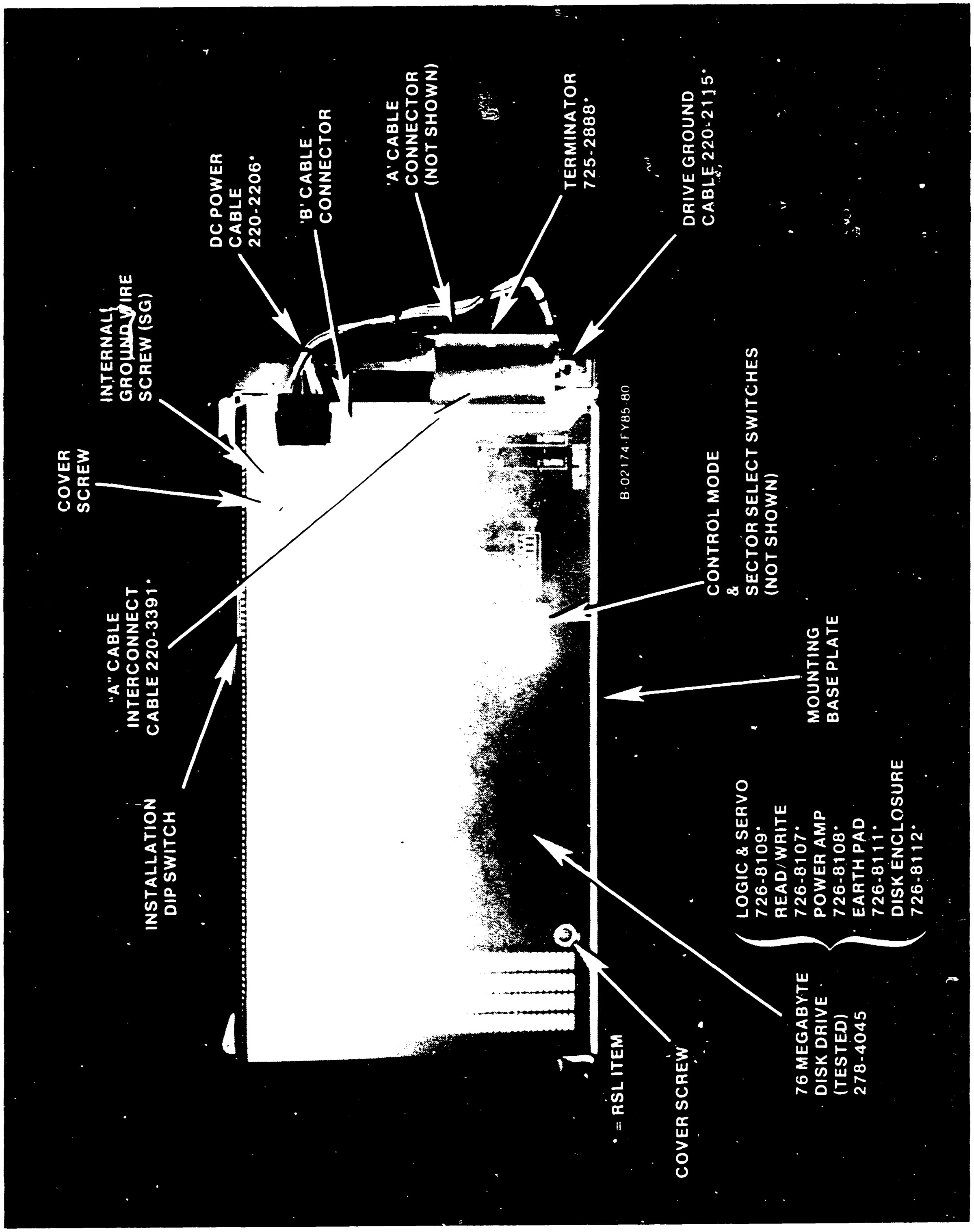

Figure 7-11. 76 Megabyte Disk Drive Hardware, Connectors, and PCBs

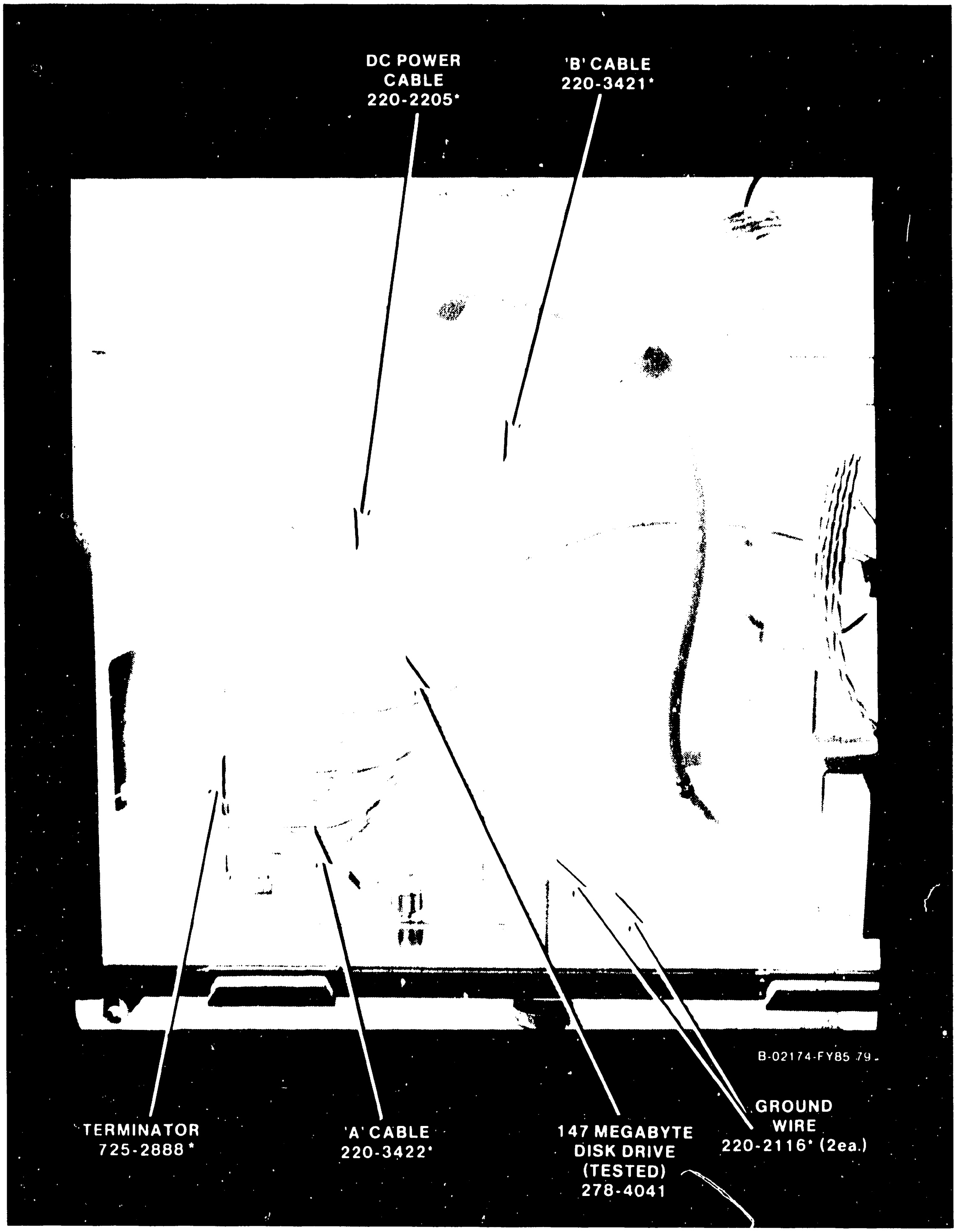

Figure 7-12. 147 Megabyte Disk Drive Cables

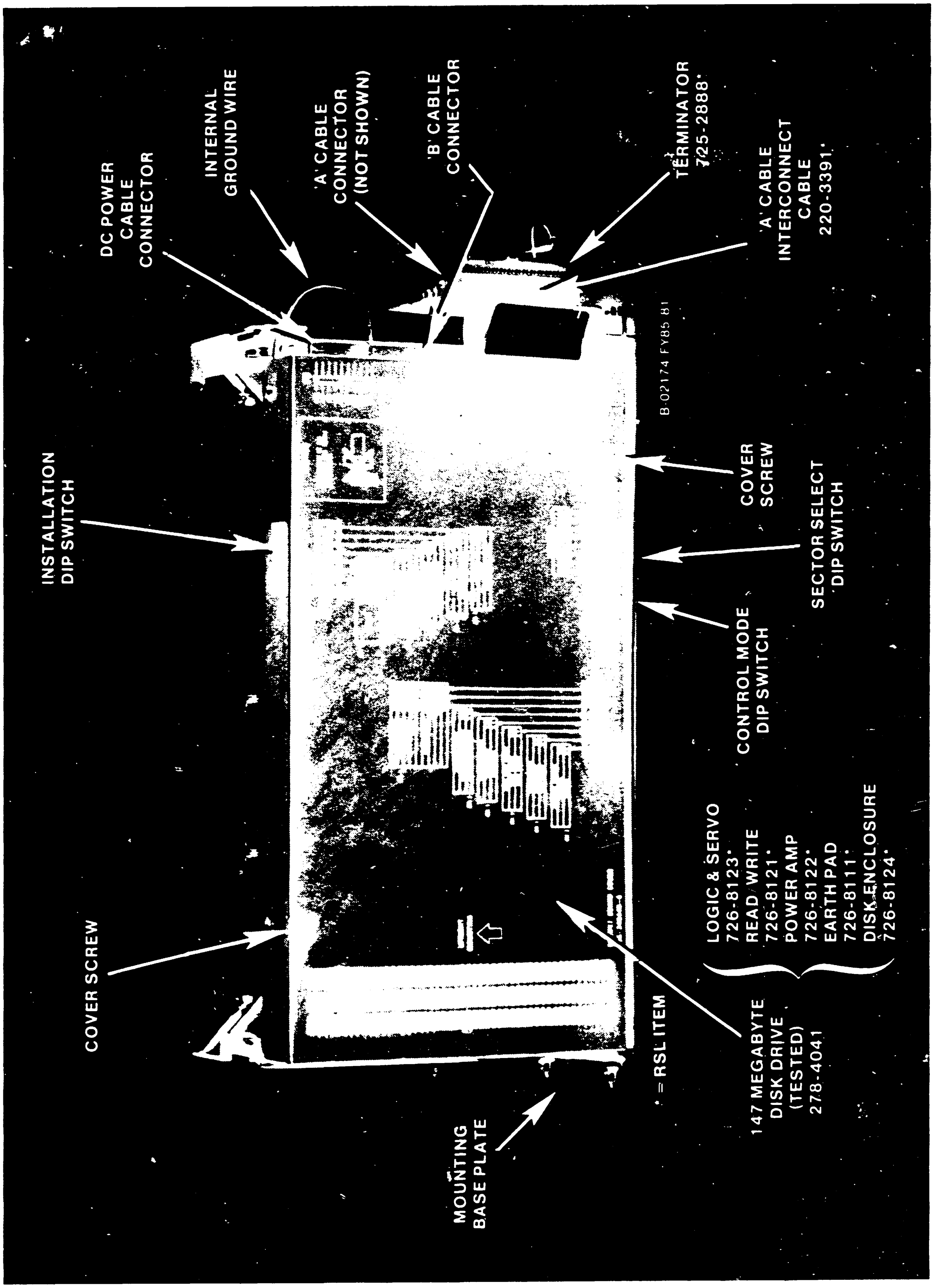

Figure 7-13. 147 Megabyte Disk Drive Hardware, Connectors, and PCBs

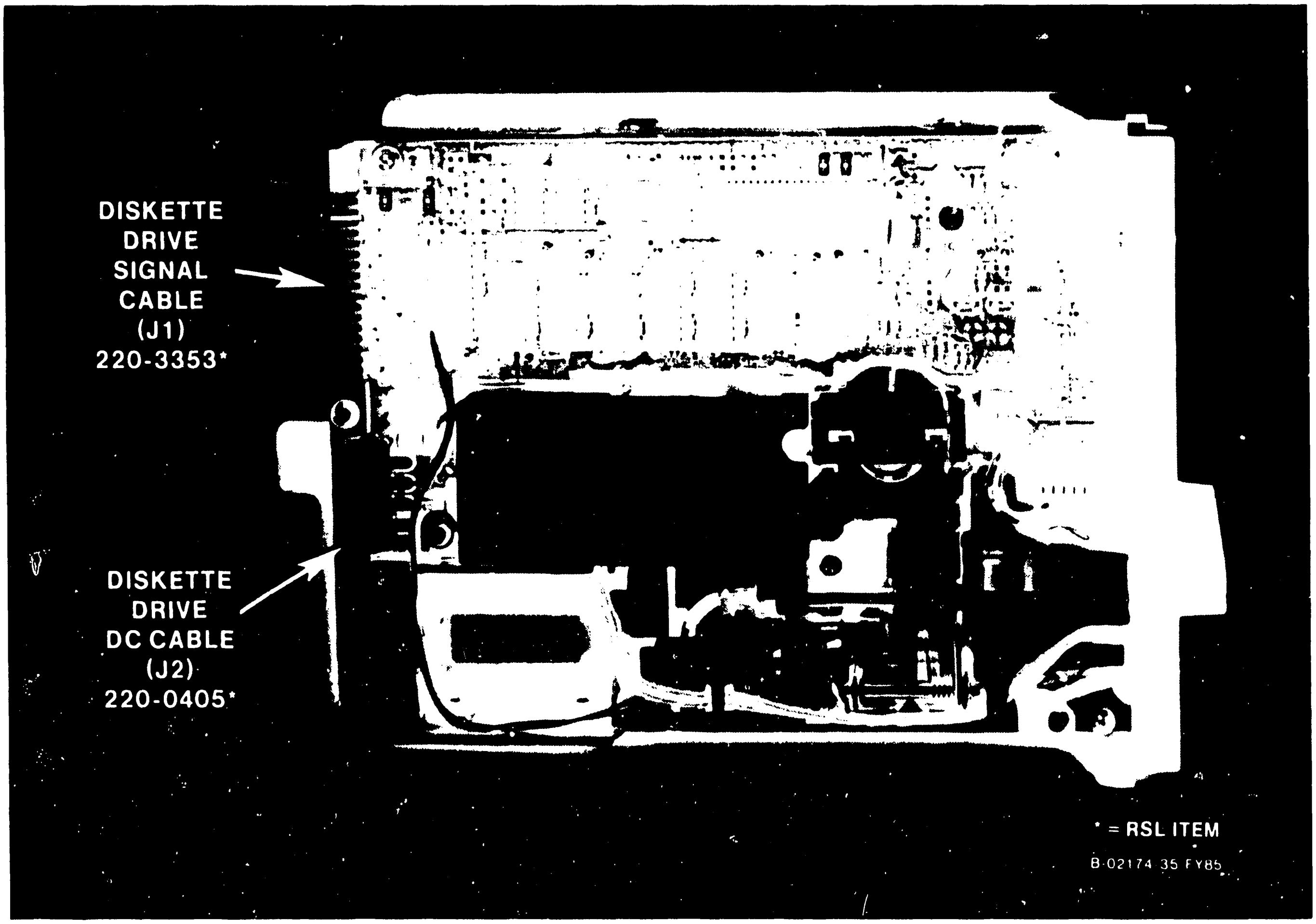

Figure 7-14. 5-1/4 Inch Half-Height Diskette Drive (SA455)
(Left Side View)

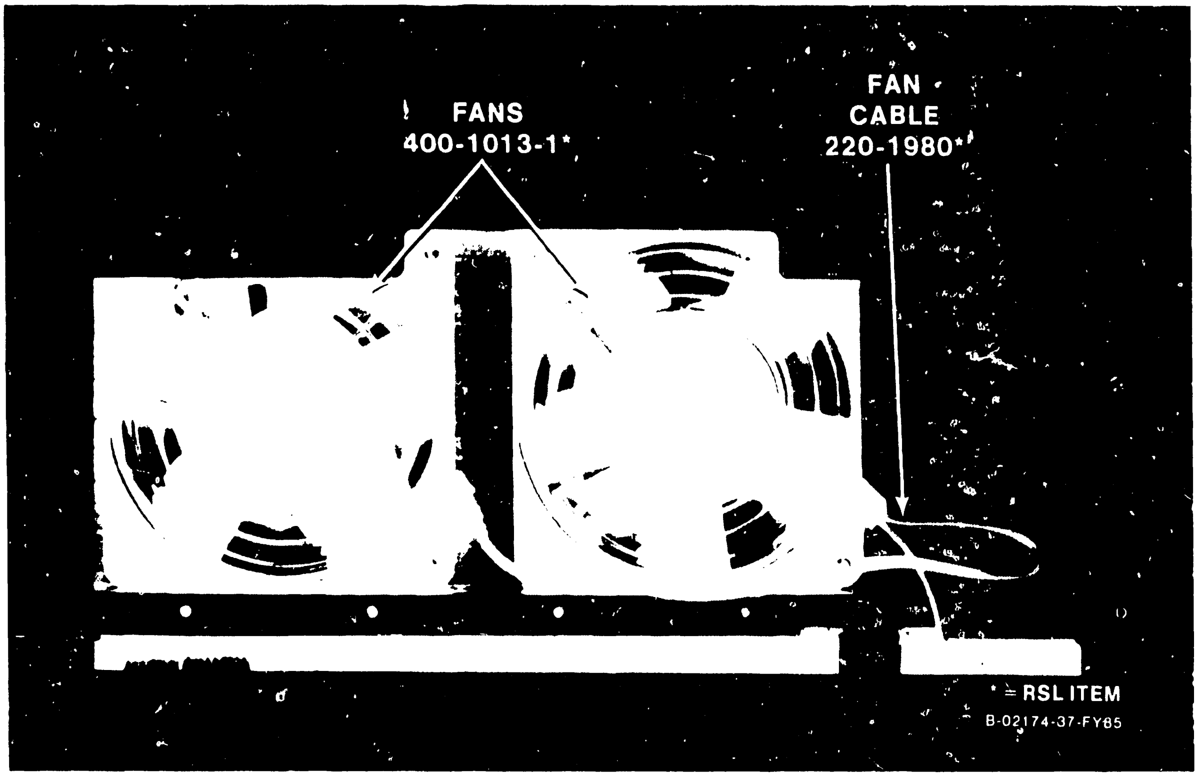

Figure 7-15. Telecommunication Front Panel PCB and Cable Connector (Rear View)

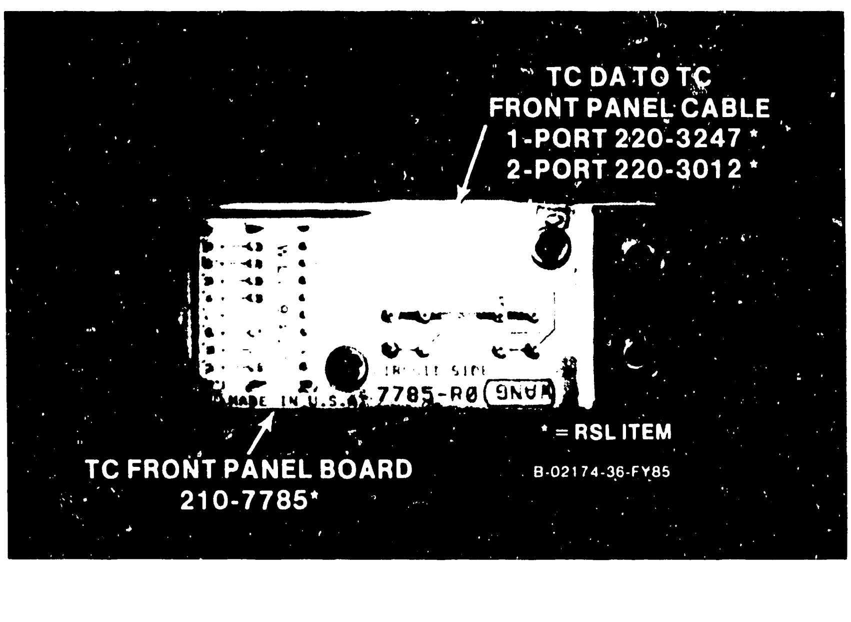

Figure 7-16. Fans and Fan Cable Daisy-Chain (Inside View)

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TROUBLESHOOTING

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TROUBLESHOOTING

8.1 GENERAL

This chapter describes the various diagnostic test programs available on the VS-65, and gives guidelines for their use. It also provides guidelines for isolating fault locations of field replaceable (or repairable) units.

The diagnostic programs perform a number of comprehensive tests of the system hardware functionality in a building block manner. They provide multilevel error isolation options so that the user can pursue error situations through the Printed Circuit Assembly (PCA) to the chip level, if necessary. The packaging of the programs on the VS-65 mini-floppy diskettes provides for easy access and usage. A description of the diagnostics available, along with a discussion of their usage follows.

8.2 DIAGNOSTIC FACILITIES

The VS-65 system uses the same diagnostic and error reporting concept as the other Small VS Systems with some differences in functionality and packaging. Three types of diagnostic facilities are available to the VS-65: Offline or stand-alone diagnostics (also referred to as inner-level diagnostics); on-line peripheral diagnostics (often referred to as outer-level diagnostics) which are operating system dependent and are under the control of the VS Operating System; and remote diagnostics via a hardware diagnostic telecommunications link to the Remote Maintenance Center (RMC). With these diagnostics the CE is able to efficiently isolate and repair most of the problems that occur in the system.

During installation (or after repair), all available off-line diagnostics must be run to check the CPU. In addition, and prior to new system turnover to the customer, the CE must initiate a remote link verification with the RMC VS Support Group to insure operation of the Remote Diagnostic Support mode (refer to paragraph 4.12, Remote Diagnostic Certification Procedures).

Like the other Small VS Systems, all VS-65 systems have a 2K byte Nonvolatile Random Access Memory (NVRAM). The primary function of the NVRAM is to provide information during a Remote Diagnostic Support session. It contains customer and service log information, system hardware and software configuration, and is maintained by battery back-up during any power-off condition.

8.3 OFF-LINE DIAGNOSTICS

The VS-65 system architecture (CPU) and disk drives can be thoroughly tested using an integrated set of off-line (stand-alone) hardware diagnostics running on the 80286 microprocessor controlled Bus Processor (BP). These offline diagnostic programs provide a sophisticated, yet user-friendly, interface with the CPU. The VS-65 uses three types of off-line core diagnostics.

1. PROM-based: Power-up diagnostics do rudimentary testing and verification of the most basic aspects of a given PCA. Currently, four PCAs have PROM-based core diagnostics: the Bus Processor, the Telecommunication Device Adapter/Controller (TC DAC), the Asynchronous Device Adapter/Controller (Async DAC), and the Universal Intelligent Serial Input/Output Device Adapter/Controller (UISIO DAC).

   Each of the DACs run power-up diagnostics concurrent with the Bus Processor. When a power-up error code is displayed, refer to paragraph 8.3.1 to determine which PCA failed and for instructions on using Appendix B (Small System VS Power-Up and Self-Test Diagnostic Error Codes), and paragraph 8.5.3 on using the Small System VS Diagnostic Monitor.

2. CRAM-Based: Self-Test Diagnostic (STD) software. It is implemented automatically by the Bus Processor upon successful completion of the PROM-based diagnostics when the system is IPLed. All PROM-based diagnostics have been completed when the HEX display changes from '4000' to '4100'. The Self-Test Diagnostic software package is resident on the system drive, and available on a stand-alone diskette.

3. CRAM-Based: The optional (and by DEFAULT when a Self-Test Diagnostic program fails), Small System VS Diagnostic Monitor, implemented on the Bus Processor, provides additional and more sophisticated tests with which the CE can isolate specific faults detected by the Self-Test Diagnostic software. The Diagnostic Monitor software package may be resident on all drives, but can only be accessed from the default drive (Drive-0), and the stand-alone diskettes.

8.3.1 POWER-UP CORE DIAGNOSTICS (PROM-BASED)

When the VS-65 is turned on (or during re-IPL), the CPU goes through an automatic initialization phase before it allows the operator to interface with the system. CPU PROM-level diagnostic programs are automatically accessed during the normal power-up procedure. CRAM-level diagnostics are bypassed (on the CPU PCAs) if the appropriate Bus Processor diagnostic switches (switch bank SW3) are not set to the correct positions (refer to paragraph 8.5.1, and Chapter 5, table 5-3).

8.3.1.1 Bus Processor Diagnostics

The PROM-based core diagnostics allow the Bus Processor to verify its internal operation and its interface to the selected bootstrap device prior to loading the first CRAM-based intelligence. Circuitry which requires signals that are not internal to the BP, or used to bootstrap the system are not verified. This includes circuitry such as Main Memory DMA, Remote Diagnostic USART, the Nonvolatile RAM (NVRAM), and the Real-Time-Clock (RTC).

Beginning with the decrementing of the Front Panel's four-character hexadecimal (HEX) display (see paragraph 8.3.1.5), the Bus Processor initiates the loading and/or testing of a number of basic core functions. For example, the Bus Processor verifies its PROM (check-sum), and loads and verifies the Programmable Interrupt Controllers and Interrupt Timers. It then tests the Code

RAM (CRAM) and Data RAM (DRAM) integrity and function, communication with data and addressing lines, and parity error detection. The bootstrap device is tested and, when available, its diagnostic space (cylinder) is verified.

The Bus Processor, after successfully completing its PROM-based diagnostics and loading the VTOC handler (@MCBOOT@), reads its diagnostic switches to determine its next operation. If all switches are in the standard operational position, the BP will find and then load the STD software, and continue with its diagnostic testing until the IPL Drive Selection screen appears. If an error occurs during the BP's power-up diagnostics, refer to table 8-1 for quick reference or Appendix B for a complete list of Diagnostic Error Codes. Error codes will be displayed as '000x', '00Ex' or '00Fx', and '01xx - 40xx.

An additional verification of the functionality of the BP's DRAM and CRAM, is the reading in of the VTOC handler and then the STD software. Each are read as data into the DRAM and then moved by the BP to the CRAM. The BP also verifies the Workstation Zero (WS-0) channel (go/no-go only), and if no errors are detected, it then loads and runs the primary serial I/O controller. (A second controller is NOT tested by the STD.) The WS-0 code is loaded, and the IPL Drive Selection screen is then displayed. This screen allows the selection of the IPL device or the loading of the Diagnostic Monitor software. After all PROM-based diagnostics are successfully completed, the IPL Drive Selection screen will appear in about 45 seconds.

8.3.1.2 Telecommunication Device Adapter/Controllers Diagnostics

The Telecommunication DACs (1 and 2-port) also have PROM-based power-up diagnostics which will run each time the system is powered-up or IPLed. The diagnostics will run at the same time as the BP power-up diagnostics and will complete successfully in about 10 seconds.

The LEDs on the TC DACs' Front Indicator and Control Panel (table 3-4) only show that a failure occurred. The type of error is not defined by the TC's LEDs. However, if a power-up error occurs, the Front Panel HEX Display will indicate the general error. Record the error code and refer to Appendix B power-up error code list. TC PROM-based failures will be indicated by error codes '0060' through '006F'.

If an error was indicated during the power-up diagnostics, press the CLEAR pushbutton to reset the TC power-up sequence and attempt to clear the error. If the error cannot be cleared, run the applicable Diagnostic Monitor program as instructed in paragraph 8.5.3.3 to verify the error. Ignore the TC DA's LED display when running the diagnostics. Any errors will be displayed on the WS-0 screen. If the error is verified, replace the Telecommunication Device Adapter/Controller PCA and note any error code(s) from the STD and Diagnostic Monitor on the return tag.

8.3.1.3 Intelligent Asynchronous Device Adapter/Controller Diagnostics

The Intelligent Asynchronous DAC is an 8-Port, RS-232-C compatible subsystem available on all Small VS Systems. Its PROM-based power-up diagnostics are initialized each time the system is powered-up or IPLed, and diagnostic failures are reported by error codes '0040' through '004F'.

Table 8-1. Small System VS Power-Up and Self-Test Diagnostic Error Codes
(Error code breakdown of the first two Front Panel HEX display characters)

GENERAL	SPECIFIC	GENERAL ERROR NAME	SPECIFIC ERROR NAME
00		Bus Processor (PROM) and BP Operational Code	
10		BP CRAM & DRAM Tests	
20		BP Parity Error Test	
30		BP Floppy Power-up and Modem Loop-Back Tests	
40		STD Bootstrap Loader	
	41		First Boot File (@MCBOOT@)
	42 - 43		STD Test Files & Overlays
	44		System Loader (@MCIPL@)
	45 - 49		Diagnostic Monitor & Files
	4A		Not Used
	4B		BP/CP Comm. & CP CM Tests
	4C		CP7 Operational Self-Test
	4D		CP7 Integrity Self-Test
	4E		CPU Main Memory Self-Test
	4F		BP/MM DMA and MARs Tests
50		5-1/4" Fixed Disk DA	
60		8" Quantum Fixed Disk DA	
70		Serial I/O DA (Note 1) (SIO/ISIO/UISIO 928W DA)	
80		Floppy Disk Controller	
90		Device Error	
	90		Workstation Zero (WS-0)
	91 - 94		Not Used
	95		8" Quantum Fixed Disk
	96		5-1/4" Fixed Disk
	97		Not Used
	98		System Diskette Device
	99 - 9A		Not Used
	9B		CMD/FMD/SMD Disk Device
	9C - 9F		Not Used
A0		Motherboard Signals	
	A0 - A3		Undetermined Error Source
	A4 - A7		SIO Signal
	A8		8" Quantum Disk Signal
	A9		5-1/4" Fixed Disk Signal
	AA - AB		Not Used
	AC - AF		CMD/FMD/SMD Disk Signal
B0		Internal SMD Disk DA	
C0		Invalid Error Code	
D0		Hardware Related Error	
	DE	(Note 2)	BP/OS Related Failure
E0 - F0		Reserved for 80286 Code	(BP 80286 Internals)

NOTES

1. Error code '7203' (rather than '9011') may occur when WS-0 is off or disconnected from the system.

NOTES - (Cont'd)

2. There is only one valid error code allowed in the DO category (DE), all others are invalid.

3. For a list of 4-character VS-65 Self-Test Diagnostic error codes, refer to Appendix B of this manual.

PROM-based power-up code provides the Bus Processor with microcode used in loading the operational code to the Async Controller. Operational microcode is disk-resident and loaded by the VSOS via the BP. The initial Async DAC does not support Control Mode and, therefore, cannot be the only workstation controller on the system. (It will not support WS-0.) An enhanced version will be available in the near future. The PROM-based power-up diagnostics test the ADAC's microprocessor PROM, RAM and static memory, timer, interrupt controllers, and USARTs, and includes a load microcode utility.

8.3.1.4 Universal Intelligent SIO Device Adapter/Controller Diagnostics

The Universal ISIO Device Adapter/Controller (UISIO DAC), the controller for the Modular SIO Subsystem, uses the same diagnostic facilities available to other intelligent PCAs on the VS-65 Computer System. PROM encoded power-up core diagnostics are used to test the internal operation of the UISIO DAC.

The status of the UISIO DAC is indicated by a LED located at the upper center of the printed circuit assembly. (Refer to Appendix C, figure C-1). The LED will light during power-up diagnostics and then go out when the diagnostics have completed successfully. If the LED stays on, the diagnostics have failed and the PCA may be defective. Refer to paragraph 8.5.3.3 and Appendix C, paragraphs C.4.6.3 and C.4.6.4 for additional instructions.

8.3.1.5 Front Panel Hexadecimal Diagnostic Error Code Display

The Hexadecimal Display, located on the Front Panel (figure 3-3), indicates system status error codes in hexadecimal (HEX) format. At initial power-up, after verifying the operational status of the 80286 microprocessor, the HEX display is decremented as a visual check of its functioning. Under operator control (refer to paragraph 8.5.1),it will loop on decrement, and loop on displaying the Bus Processor Diagnostic Switch settings.

NOTE

The decrementing of the Front Panel HEX display is ONLY a visual indication of its operation. There will be no indication of a HEX display failure. A HEX display failure will NOT stop the power-up sequence or normal STD/IPL functions.

The HEX display is used by the CE, in conjunction with the microcode diagnostics, to troubleshoot the VS-65 CPU. The four-character HEX display is arranged in a single row. The panel provides information concerning BP, CP, and MM status as well as the error condition of I/O devices in the IPL path. (For example, WS-0 and the IPL disk or diskette drive selected by the Boot Device switch.)

When a fault is detected by the power-up core diagnostics (either PROM-based or CRAM-based), the results are displayed as a HEX code which indicates which PCA or unit failed. Most errors detected by the STD are also displayed on the WS-0 screen. (Refer to table 8-1, page 8-4, for the Self-Test Diagnostic error code breakdown of the first two HEX characters, and Appendix B for a list of the four-character VS-65 Small System Power-Up and Self-Test Diagnostic Error Codes.)

Once the CE has identified the failing PCA and recorded the error code, the PCA is sent to a Repair Depot. At the depot, repair personnel will test the defective PCA using the same diagnostics as the Customer Engineer to verify the observations of the CE. This duplication of the fault conditions aids in a rapid PCA repair turnaround time while providing a mechanism for the continual verification and upgrading of field-level diagnostics.

8.3.2 POWER-UP CORE DIAGNOSTICS (CRAM-BASED)

An essential diagnostic tool for testing the VS-65 is a series of microcode diagnostic programs executed on the BP. These programs provide diagnostic services for the BP, CP, Main Memory, all VS-65 device adapters, the Remote Diagnostic Telecommunication link, and the ability to communicate with all disk drives. They allow the CE to test all primary system functions, and when used in conjunction with system supplied on-line diagnostics, insure rapid resolution of customer problems.

Loaded from disk or diskette, these CRAM-based core diagnostic programs use the Workstation Zero (WS-0) screen to allow the operator to select either the Self-Test Diagnostic (which, after passing the various diagnostic tests, will IPL the system) or the Small System VS Diagnostic Monitor. In order to run the CRAM-based Core Diagnostics, the system must first pass all of the PROM-based Core Diagnostics.

8.3.2.1 Self-Test Diagnostic Software (Disk Resident Library @DIAGST@)

The disk-resident Self-Test Diagnostic (STD) software is always loaded from the default bootstrap volume (Drive-0), regardless of which IPL volume is selected. The STD software is loaded into the BP's Code RAM (CRAM) from library @DIAGST@. It verifies all remaining logic necessary to IPL the system. The CP Control Memory, Data Path to BP, Instructions, and Status Bits; the CP, Cache and Main Memory communication; Dual Processor functionality; the Remote Diagnostic link; and the BP's ability to communicate with WS-0 are tested.

Table 8-1 is a listing of the first two HEX characters of the Error Codes when shown on the Front Panel HEX display. It reflects the error code indicated on the HEX display and on the WS-0 screen if the CPU fails any Self-Test Diagnostic. The STD writes error messages and user prompts in the lower half of the WS-0 screen. When no error is detected, the STD will complete its testing in about one minute per megabyte of memory, and begin system IPL. In order to IPL the system, the system must pass the Self-Test Diagnostic programs.

The STD software is run as part of the customer's daily power-up sequence (see paragraph 4.11.1) or each time the system is initialized (see paragraph 4.9.1). The STD is maintained in library @DIAGST@ on the system default disk and on a stand-alone Self-Test Diagnostic diskette. In order to access the STD diagnostics, the BP DIP switches (figure 5-12) must be in the 'OFF' or 'OPEN' position (except SW3-3, which must be 'ON' or 'CLOSED' for the VS-65). Table 8-2 lists the Self-Test Diagnostic Test Programs available on the VS-65.

Table 8-2. Self-Test Diagnostic Test Programs

TEST NUMBER	FILE NAME	PROGRAM NAME
1.1	@ST0500@	Serial Input/Output Device Adapter Diagnostic
1.2	@ST0800@	Universal Intelligent SIO DA (928/928W) Diag.
2	@BT0500@	USART/Modem/Loop-Back Verification Diagnostic
3	@CT0100@	BP/CP Communications and Control Memory Diag.
4	@CT0200@	Central Processor Operational Diagnostic
5	@CT0300@	Central Processor Integrity Diagnostic
6	@MT0100@	CP/Main Memory & Cache/MM Integrity Diagnostic
7	@BT0900@	BP/Main Memory DMA Diagnostic
8	@MT0200@	Dual Processor/MM Communications Diagnostic

8.3.2.2 Self-Test Diagnostic Software (Stand-Alone Diskette DIAG 6)

The (stand-alone) IPLing Self-Test Diagnostic diskette (DIAG 6) allows the user to select the IPL volume when the system default volume (Drive-0) is disabled. Under these conditions, Diagnostic Monitor software which is also loaded from Drive-0, can only be accessed using the stand-alone Diagnostic Monitor diskettes. In multiple volume systems, the system can be IPLed and operated until the faulty drive (Drive-0) can be isolated, thus minimizing the customer's down time. The diskette STD takes about 30 seconds longer than the disk version to complete. See figure 8-3 on page 8-17 and table 8-5 on 8-18.

8.3.3 SMALL SYSTEM VS DIAGNOSTIC MONITOR (CRAM-BASED @DIAGMN@)

The CP7 Small System VS Diagnostic Monitor includes 23 programs, available in library @DIAGMN@, designed to test the various components parts (or PCAs) of the VS-65 CPU. (Refer to tables 8-3 and 8-6.) These programs are intended to throughly exercise individual elements of the CPU. The applicable Diagnostic Monitor program(s) must be run when an error is detected by the Self-Test Diagnostic (the Diagnostic Monitor is the default mode), or when a new system is being installed. Included with the diagnostics, is one program (which is NOT a field supported diagnostic program) designed specifically for the informed user, the CPU Tester, test 14. Test 15 is reserved for the CP7 version of the Multitasker.

Using the Diagnostic Monitor programs, located in library @DIAGMN@, the CE loads a diagnostic operating system into the Bus Processor which displays a menu (figure 8-4, page 8-19) of the available CPU test programs. The CE then selects and executes the desired program or programs. The customer cannot access the system while these programs are being executed. A list of currently available Diagnostic Monitor Test Programs for the VS-65 is shown in table 8-3.

Table 8-3. Diagnostic Monitor Test Programs

TEST NUMBER	FILE NAME	PROGRAM NAME
1	@CT1100@	CP Control Memory Diagnostic
2	@CT2100@	BP/CP Communications Diagnostic
3	@CT3100@	CP Branch Unconditional (BU Operand) Diagnostic
4	@CT4100@	CP Conditional Branch and Subroutine Diagnostic
5	@CT5100@	CP MDR, IREG, PMR, Stack Diagnostic
6	@CT6100@	CP Arithmetic, Multiplier, CC Diagnostic Tests
7	@CT7100@	CP BNM Operations (BNM, BNMX, & BNMV) Diag. (Note 1)
8	@MT1100@	CP/Main Memory MAR Operations & TRAM Diagnostic
9	@MT2100@	CP Main Memory and Cache Diagnostic Test
10	@MT3100@	CP OF/ON/BNM Operations Diagnostic Test
11	@BT2100@	BP DRAM/MM DMA and DRAM & MM MARs Diagnostic Test
12	@MT4100@	CP/BP/MM Data Bus Diagnostic Test
13	@MT5100@	CP/BP/MM Contention/Cache Diagnostic Test
14	@CX1100@	CPU Diagnostic Control Software Tester (See CAUTION 1)
15	[@BT4100@]	[Multitasker (System Exerciser/Verifier)] (Note 2)
16	@BT3000@	Small VS BP Floppy FDC & DMA Diagnostic (See CAUTION 2)
17	@DT1000@	CMD/FMD/SMD Disk Device Adapter Diagnostics (CAUTION 3)
18	@BT1000@	BP USART, Modem/Loop-Back & RIPL Diagnostic (Note 3)
19	@BT5000@	BP NVRAM, Real-Time-Clock, DRAM Clock Diagnostic
20	@TT1000@	TC Single-Port DA Interface Diagnostic (Note 4)
21	@TT2000@	TC Dual-Port DA Interface Diagnostic (Note 4)
22	@ST1000@	Serial I/O (Dumb 928) Data Link DA Diagnostic
23	@UT1000@	UISIO/928W (Smart 928/W) DA Diagnostic (Note 5)
24	@ST3000@	Intelligent RS-232 DA Diagnostic (Note 6)

CAUTIONS

1. THE CPU DIAGNOSTIC CONTROL SOFTWARE TESTER (CX1100) IS NOT A FIELD SUPPORTED DIAGNOSTIC. ITS USE MAY DAMAGE VALUABLE CUSTOMER DATA ON ANY DISK ATTACHED TO THE SYSTEM (INCLUDING THE SYSTEM DISK).

2. UNLESS SPECIAL CARE IS TAKEN, DISKETTE DATA MAY BE DESTROYED BY THIS PROGRAM! USE A BLANK DISKETTE, IF POSSIBLE. THE 5-1/4" SOFT SECTOR DISKETTE MUST BE PREFORMATTED.

3. DISK DATA WILL BE DESTROYED BY THIS PROGRAM! A VS FORMATTED SCRATCH DISK MUST BE USED FOR THE DISK PORTION OF THIS TEST. THIS TEST WILL VERIFY THE OPERATION OF THE DEVICE ADAPTER. SPECIAL CARE MUST BE TAKEN WHEN USED WITH THE INTERNAL SYSTEM DISK DRIVE.

REFERENCED NOTES

1a. At time of publication, the System disk version of the Diagnostic Monitor program, @CT7100@ (Test 7), a prereleased version of VSOS 6.41.00, did NOT run all of the diagnostic routines within the program. However, the Monitor Pass Count increments in a normal manner, giving the appearance of a complete pass.

1b. This problem is known and may be corrected prior to the formal release. In order to successfully complete this test use the Diagnostic Monitor diskette DIAG 4, and run test number 2.

2. At time of publication, the CP7 Multitasker program @BT4100@ (Test 15) was NOT operational and only the test number was displayed on the Diagnostic Monitor Program Selection screen.

3a. Requires a WA-3451 modem, and cannot be run from a remote site (during a Remote Diagnostic Session). The LOCAL CONTROL/REMOTE DIAGNOSTIC/REMOTE CONTROL switch must be in LOCAL CONTROL position. If test fails use loop-back connector to check system hardware.

3b. To test the remote IPL interface in a system configured for RSAF, a serial workstation other than the PC must be cabled as WS-0 to allow the PCDS and Small System VS Diagnostic monitors to execute simultaneously.

4. All switches on the Telecommunication DA must be 'OFF' to fully execute this test.

5. Verifies all functions of the UISIO/928W Device Adapter/Controller Interface.

6. Verifies all functions of the Intelligent RS-232 Device Adapter/Controller Interface.

ADDITIONAL NOTES

1. Although a recent revision of the Small System VS Diagnostic Monitor Package has been released to the field, the system disk-resident Diagnostic Monitor Programs for the VS-65 are NOT operable.

2. The system disk version of the Diagnostic Monitor is scheduled for release with VSOS 6.41.00. For VSOS 6.40.xx or earlier, the stand-alone Diagnostic Monitor diskettes DIAG 1 - DIAG 5 must be used.

ADDITIONAL NOTES - (Cont'd)

3. Attempting to load the Diagnostic Monitor from the System disk (default) drive using PF8 at the IPL Drive Selection screen will result in either an error code of '414A', or the displaying of the CP5 Test Selection menu (which is incorrect and will generate invalid error messages).

4. Attempting to access the Diagnostic Monitor using PF8 at the IPL Drive Selection screen of DIAG 6 (with the Self-Test Diagnostic diskette mounted) will also fail and give the '414A' display.

8.3.4 OUTER-LEVEL DIAGNOSTICS (@DIAGSA@)

Stand-alone outer-level diagnostics are executed on the CP thus requiring a minimal operating system and the functional exclusion of all other VS system users. Off-line outer-level diagnostics are not available for the VS-65.

An off-line version of FTU (FTUA) is planned for later release. (Actually, FTU is a function tester rather than a diagnostic.) Future stand-alone outer-level diagnostics will be available on floppy diskettes (and system volumes) in library @DIAGSA@ with the possible exception of FTU (and FTUA).

8.4 ON-LINE DIAGNOSTICS (@SYSTST@)

All on-line diagnostics are stored on disk or diskette in library @SYSTST@. They may be executed under operator control, in the standard VS Operating System environment, while the customer is in operation. The majority of on-line diagnostic programs are designed for use with serial peripheral devices. They down-load diagnostic microcode to the serial devices to be tested and usually require a dedicated workstation as the test monitor.

The software packages include coverage for all serial workstations, serial printers, archiving workstations, twin-sheet feeders, envelope feeders, typesetters, special telecommunication devices (TCB/1 & 3), and laser printers.

In addition to on-line diagnostics for serial devices, on-line diagnostics for non-system disks and diskettes are available. Other applicable Small System VS on-line test routines' are available on the VS-65. Diagnostic programs currently available for individual on-line peripherals are given in table 8-4.

8.5 SYSTEM INITIALIZATION AND TEST

When the VS-65 is powered-on or re-IPLed, the system diagnostics are initialized. This process begins with the decrementing of the Front Panel HEX display and continues until an error is encountered or a system pause is reached. This section describes the procedures required to thoroughly test and bring to an operational state the VS-65 system and its peripherals.

Table 8-4. Small System VS On-Line Diagnostics

DIAGNOSTIC	WLI P/N.	FUNCTION
VS On-Line DTOS Device 2 Package	195-2615-9	Variety of serial device tests including Slave Upper RAM, CRT RAM, Display and Keyboard, Z80 Instruction Set; TC Black Box Diagnostic; Cable Interface Unit; Z80 Typesetter Test; TLC4/LS4; I/D Exerciser; Fixed Frequency Modem.
VS On-Line DTOS Device 3 Package	195-2604-9	Tests include AWS TC; Disk; Hard & Soft Sector Diskette & VCO Adjustment. Kennedy Tape Drive; 9-Track Tape Controller & Function; Archiving Cartridge Tape Drive; & Mini-Archiver Diskette.
VS On-Line Printer I Monitor	(195-xxxx-9) 732-0179	Low speed serial printers 6581 and 6581W/WC/WD, 5521, 5531, 5535, 5581WD, DW20. 6581 Status & Lamp, 5538 Twin-Sheet Feeder, Envelope Feeder Diagnostic, Matrix Printer, Lamp & Switch Tests.
VS On-Line DTOS Printer 2 Pkg	195-2535-9	High speed serial printers, including 5570, 5571, 5573, 5574, 5575, 5577, and 5531W6.
VS On-Line DTOS Printer 3 Pkg	195-2899-9	Slave Upper RAM, Z80 Instruction Set, LPS-12 Laser Printer, and Ziyag Feeder.

8.5.1 POWER-UP PROCEDURE

1. Power-up the necessary workstations, printers, and other peripherals as required.

2. Make sure the three position (LOCAL CONTROL/REMOTE DIAGNOSTICS/REMOTE CONTROL) switch (figure 3-3) is in the LOCAL CONTROL position. (The system will NOT IPL if the switch is in the REMOTE DIAGNOSTICS position.)

3. Set the Operational Control Panel Boot Device switch to the required position (refer to paragraph 3.2.2.3).

4. Power-up the VS-65 CPU. The Front Panel HEX displays will flash 0000 and then begin decrementing from FFFF to 0000.

5. The CE must observe carefully the countdown process to insure that the entire HEX display is indicating all characters correctly.

6. The four-character HEX display will continue the counting sequence with 00FB (all Bus Processor diagnostic switches 'OFF' except SW3-3), pause briefly at 1000, and progress through 1600, until the PROM-based diagnostics are complete, or the system halts due to an error.

NOTES

1. The decrementing of the Front Panel HEX display is a visual indication of its operation. A HEX display failure will NOT result in the power-up sequence stopping. There will be no other indication of the failure.

NOTES - (Cont'd)

2. If the HEX display indicate a diagnostic code other than 00FB, the display and the BP diagnostic switch settings may be verified by pressing the Control Mode pushbutton switch during the HEX display countdown. The display will continue to decrement from FFFF through 0000 and repeat until the Control Mode pushbutton is pressed a second time. The display will then halt and indicate the setting of the switches.

3. The BP diagnostic switches (switch bank SW3) are read from high to low as follows:

   a. 8765 4321, where 1 = 'OFF' and 0 = 'ON'.

   b. 1111 1011, where 4-binary ones = 'F' HEX, and 1011 = 'B' HEX.

   c. The HEX display is read from left to right, with the left two characters always set to zero (00xx), and where '00FB' means all switches are 'OFF' except SW3-3.

   d. Any display of 0080 HEX or greater means switch 8 is 'OFF' and that the entire set of BP diagnostic switches is deactivated and acceptable for system verification. However, upon completion of system check-out and prior to turn-over to the customer, all BP diagnostic switches on switch bank SW3 (except SW3-3, which is not affected by SW3-8) must be reset to 'OFF'.

   e. Pressing the Control Mode pushbutton a third time restores the BP to normal operation and the system diagnostics will continue to increment at 1000 HEX.

4. If any HEX display code halts at a given value for more than 20 seconds (with the exception of Note 2 above), the system is displaying an error code. In this case, refer to the VS-65 Customer Engi- neering Level Troubleshooting Flowchart, figure 8-12.

7. After passing the PROM-based diagnostics, the BP will test the Boot Device and then will load the CRAM-based diagnostics. (The Front Panel HEX displays will indicate a device dependent program code: B000 for the 76M or 147M byte Internal Disk; 3800 for the Floppy Diskette; or B000 for the External Disk Drive, then 4000, 4100 and finally go blank.)

NOTE

If the LEDs blank out and the system halts for more than 20 seconds (and the IPL Drive Selection screen does not appear), re-IPL the system. If the system halts again after the LEDs go blank, proceed to paragraph 8.5.2.1.

8. If the BP diagnostic switches are deactivated (all OFF), the Self-Test Diagnostic software will display the IPL Drive Selection screen (figure 8-1) on WS-0 in about 5 seconds and the system will pause.

```
           Small System VS Self-Test Package  Version R2561
                         IPL Drive Selection
                      Bootstrap Volume = SYSTEM

      Device     Capacity    Type    Volume        Status

      2270V5     368 Kb      Dsket                  [See Note 3]
      2268V2     147 Mb      Fixed   SYSTEM        Media Tolerant
      2265V3     620 Mb      Fixed   620MEG        Media Tolerant


             Position Cursor to Indicate Device and Select:
=========================================================================
             (ENTER) IPL          (8) STAND-ALONE DIAGNOSTIC MONITOR
```

Figure 8-1. IPL Drive Selection Screen

NOTES

1. If switches SW3-7 and SW3-8 are activated ('ON' or 'CLOSED'), the system will bypass loading the Self-Test Diagnostic and Diagnostic Monitor (and screens) and begin system initialization (IPL).

2. If switches SW3-6 and SW3-8 are activated, the system will bypass the STD and attempt to load the Diagnostic Monitor programs (from the default SYSTEM disk) immediately and remain in this mode until the switches (or at least switch 8) are deactivated. If the system has the VSOS of 6.40.xx or earlier, the system will halt (hang) until it is re-IPLed.

NOTES - (Cont'd)

3. On the VS-65, selecting the floppy drive as the Boot Device causes the STD to be bypassed regardless of the BP diagnostic switch bank settings. The system will attempt to IPL to whichever level of software is present on the 5-1/4" diskette.

8.5.2 SELF-TEST DIAGNOSTIC PROCEDURE

At the IPL Drive Selection screen, the CE can select the IPL (Bootstrap) Volume and continue with the Self-Test diagnostics (and consequent system initialization), or go directly to the Diagnostic Monitor Program Selection screen by pressing PF8. If system IPL is chosen, the System Hardware Status screen shown in figure 8-2 will appear and the following sequence of events will occur.

```
  Small System VS Self Test Diagnostic Package  Version 2561
                      System Hardware Status
                      System Volume = SYSTEM

Status              Diagnostic

Passed              (SIO) Serial Data Link Test
Passed              (BP)  USART Loop-Back Verification Test   [Note 1]
Passed              (CPU) CM/Communications Test
Passed              (CPU) Operational Test
Passed              (CPU) Integrity Test
Passed              (MM)  CPU/Cache/Main Memory Test          [Note 2]
Passed              (BP)  BP/Main Memory DMA Test
Passed              (MM)  Dual Processor M/M Test

   Diagnostics Completed, Beginning System Initialization

                        [Non-Fatal Error]
                 [Press ENTER To Continue Testing]

[Error Code = 3C0A]
```

Figure 8-2. System Hardware Status Screen (Normal Execution of Self-Test Diagnostic)

1. The BP will systematically load, run, and pass (or fail) each of the eight tests.

2. The System Hardware Status screen will display two types of errors, "Fatal Error" or "Non-Fatal Error".

   a. Non-fatal errors (such as the Loop-Back Plug missing from the Remote Diagnostic TC connector) will produce a flashing error code display and the 'Non-Fatal Error' statement, and will require acknowledgement by the system operator before testing can continue. By pressing ENTER on WS-0, the STD will continue with the remaining tests. (An example of a fatal error will be given in paragraph 8.5.3.3.3.)

   b. A fatal error will produce a flashing error code display and the 'Failed' statement, at which point the system operator must select the Diagnostic Monitor (PF8), or re-IPL the system (and try again).

NOTES

1. When this test is a Non-Fatal test, the STD screen will display a flashing highlighted message on the screen as shown in brackets. After pressing ENTER (to continue), the Error Code will move to the position of Note 1 above.

2. This test takes approximately 30 seconds to complete for 1M-byte of memory and will NOT detect ALL possible Main Memory errors. A new (or upgraded) installation requires running the Main Memory diagnostic using the 'FF' mode.

3. If no errors occur, the screen will continue to display the Passed, Loading, Running status messages and the lower portion of the screen will remain blank.

4. Upon successful completion of the Self-Test Diagnostic, a message at the bottom of the screen in figure 8-2 will appear: "Loading System Micro Code".

NOTES

1. The diagnostic programs cannot coexist with the operational BP and CP code; therefore, system-level BP/CP functions, with the exception of very limited applications of Control Mode (as in paragraph 8.5.1 and Note 2 following), are not available while the diagnostic programs are executing. (Refer to paragraph 8.7 for additional information on Control Mode.)

NOTES - (Cont'd)

2. However, if the Control Mode pushbutton is pressed while the STD is running and no fatal errors are encountered, the Self-Test Diagnostic screen will display the message "VS Will Enter Control Mode on Completion of Diagnostics". The system will drop into Control Mode immediately prior to the system configuration (SYSGEN) screen.

3. When using VSOS 6.40.00, the Control Mode message appears as describe in note 2, however, the system does NOT drop into Control Mode. It continues the initialization process as if the Control Mode pushbutton had not been pressed.

5. Depending on the disk drive being used, the message will change in about 10 seconds to "Diagnostics Completed, Beginning System Initialization" and the front panel NOT-READY LED will go out.

6. The Front Panel NOT-READY LED going out indicates that initialization has begun. (If it does not go out, or the system halts, refer to figure 8-12, VS-65 Customer Engineering Troubleshooting Flowchart.

7. In about 5 seconds, the system configuration (SYSGEN) screen will appear. Normal SYSGEN procedures from this point forward should bring the entire system on-line (refer to paragraph 4.9.1).

8.5.2.1 Accessing the Stand-Alone IPLing Self-Test Diagnostic Diskette

A new feature of the Small System VS Diagnostic Monitor package (WLI P/N 195-2461-0), starting with revision 2561, is the addition of a sixth diskette, DIAG6. This diskette is a stand-alone (self-booting) version of all necessary software required to bring the system up to the IPL Drive Selection screen, allow the selection of an alternate system (IPL) disk drive, and load and run the Self-Test diagnostics (see figure 8-3).

If a failure occurs in the default system disk drive (Drive-0) such that the Self-Test Diagnostics cannot be loaded from the drive, the system will hang (HALT) at some point after the PROM-based diagnostics have completed but before the IPL Drive Selection screen is displayed (and operable).

The stand-alone STD diskette will allow the system to display the IPL Drive Selection screen and an alternate disk drive (Drive 1, 2, or 3) to be selected as the system IPL drive. The system can be brought on-line allowing the possible retrieval undamaged files. Using available on-line and/or off-line diagnostics, the defective drive can be evaluated. Depending on the problem, the customer, at some point may have to bring the system down so that the stand-alone Diagnostic Monitor diskette(s) can be used to isolate the problem.

To access the stand-alone IPLing Self-Test Diagnostic (DIAG6) proceed with the following steps:

1. After noting any error code displayed on the LEDs, insert the DIAG 6 diskette into the system diskette drive.

2. Place the Boot Device Selection switch (on the Operational Control Panel) in the 'FLOPPY' (UP) position.

3. Press the green CONTROL MODE pushbutton and the red INITIALIZATION pushbutton to re-IPL the system.

4. The system will access the IPLing STD diskette after completing its power-up core diagnostics.

5. When the IPL Drive Selection screen appears, move the cursor and select the alternate IPL drive (see Note, figure 8-3).

6. The Self-Test Diagnostic screen should now appear (figure 8-2 with the System Volume equal to the selected IPL disk drive) and the system will continue with the STD procedure as given previously in paragraph 8.5.2.

```
          Small System VS Self-Test Package  Version R2561
                       IPL Drive Selection
                    Bootstrap Volume = DIAG6

      Device     Capacity     Type     Volume        Status
 -----------------------------------------------------------------
     _2270V5     1.2 Mb       Dsket    DIAG6           [See Note]
      2265V2     288 Mb       Rem      SYSTEM        Media Tolerant
      2265V3     620 Mb       Fixed    620MEG        Crash Tolerant
      2265V3     620 Mb       Fixed    620BAK        Crash Tolerant

          Position Cursor to Indicate Device and Select:
=================================================================
          (ENTER) IPL          (8) STAND-ALONE DIAGNOSTIC MONITOR
```

Figure 8-3. DIAG 6 IPL Drive Selection Screen

NOTE

The cursor will appear beside the bootstrap volume as shown. Move the cursor next to the desire IPL volume (for example; Drive 2, 620BAK). If the cursor is NOT moved, the system will run the STD and upon completion, reload the IPL Drive Selection screen from the DIAG 6 diskette.

The files required to boot the IPLing Self-Test Diagnostic diskette (DIAG 6) are similar to the files found on other stand-alone diskettes. The standard files found in library @DIAGST@ on the system disk are present allowing the system to load and run the Self-Test Diagnostics in the usual manner and do NOT require operator interaction (see table 8-5). The bootstrap files required to display the IPL Drive Selection screen and IPL from the selected disk drive are present in library @SYSTEM@. All of the files are loaded and run automatically during the IPLing process.

Table 8-5. IPLing Self-Test Diagnostic Diskette Programs (WLI P/N 732-8035 - Diskette Volume DIAG6)

LIBRARY NAME	FILE NAME	PROGRAM DESCRIPTION
@DIAGST@	@BT0500@	USART/Modem/Cable Loop-Back Verification Diag.
	@BT0900@	Bus Processor/Main Memory DMA Diagnostic
	@CT0100@	BP/CP Communications & Control Memory Diagnostic
	@CT0200@	CP Operational Diagnostic
	@CT0300@	CP Integrity Diagnostic
	@MT0100@	CP/Cache/ Main Memory (Integrity) Diagnostic
	@MT0200@	Dual Processor (BP & CP) Main Memory/Cache Diag.
	@ST0500@	Serial I/O Data Link Device Adapter Diagnostic
	@ST0800@	UISIO/928W Data Link Device Adapter Diagnostic

8.5.3 SMALL SYSTEM VS DIAGNOSTIC MONITOR PROCEDURE

The Small System VS Diagnostic Monitor should be used when:

- The system is a new installation.
- A fatal error occurs while running the Self-Test Diagnostic.
- A non-fatal error occurs and the error code indicated is unclear.
- The system halts under any of the conditions described in the VS-65 Customer Engineering Level Troubleshooting Flowchart (figure 8-12).

8.5.3.1 Accessing the Diagnostic Monitor's Menus

The Small System VS Diagnostic Monitor may be accessed:

- During normal power-up procedures by the system operator pressing PF8. (Except VSOS 6.40.xx or earlier.)
- Immediately after PROM-based diagnostics via the BP's diagnostic switches 7 & 8 ('ON' or 'CLOSED' position).
- Immediately after a Fatal Error is detected by one of the Self-Test Diagnostic Programs.
- By IPLing directly from one of the five stand-alone Diagnostic Monitor diskettes.

NOTE

The system disk Diagnostic Monitor (and Self-Test Diagnostic) are always loaded from the system default volume (Drive-0).

Responsibility for the use of the Small System VS Diagnostic Monitor program must be acknowledged by the system operator prior to access. The operator may then interface with the Diagnostic Monitor through two menus, the Program Selection Menu and the Run-Time Menu.

8.5.3.1.1 Diagnostic Monitor Program Selection Menus

The Diagnostic Monitor, when selected from the System Disk, displays the Diagnostic Monitor Test Selection Menu shown in figure 8-4. This menu allows the system operator to select one or more of 22 diagnostic test programs (and one non-diagnostic program) for use with the VS-65, or to initiate an automatic sequence (also referred to as "BURN-IN") of 13 programs. The Automatic Sequence (which must be run during installation or after CPU repair) includes programs 1 through 13 given previously in table 8-3.

```
              Small System VS Diagnostic Package  Version R2561
                            Test Selection Option
   To Select Tests, Position Cursor And Press Any NON-BLANK. Press SPACE
   or DELETE To Deselect a Test. Press PF8 to Start An Automatic Sequence.
   Press ENTER to Begin Testing. Press PF16 to Terminate.

            Test Name                                Test Name

 □  1 CP/Control Memory Test                  □ 15 BP Floppy Diskette Diagnostic
 □  2 BP/CP Communication Test                □ 16 CMD/FMD/SMD Disk DA Diag
 □  3 Unconditional Branch Test               □ 17 USART/Modem/RIPL Diagnostic
 □  4 Conditional Branch, Subroutine          □ 18 BP (D-Clk, NVRAM, RTC) Diag
 □  5 MDR, IREG, PMR, Stack Test              □ 19 TC DA 1-Port
 □  6 Arithmetic/Multiplier/CC Tests          □ 20 TC DA 2-Port
 □  7 BNM Operations, BR Tests (Note 1)       □ 21 Dumb 928 Data Link DA
 □  8 CP/MM MAR Operation, TRAM Test          □ 22 Smart 928/W Data Link DA
 □  9 Main Memory/Cache Test                  □ 23 Smart RS-232 Data Link DA
 □ 10 OF/ON/BNM Operations Test
 □ 11 BP/Main Memory DMA Diagnostic
 □ 12 CP/BP MM Data Buss Test
 □ 13 CP/BP MM Contention/Cache Test
 □ 14 CPU Tester (CP7)  (See CAUTION)
 □ 15 [Multitasker]  (Note 2)
```

Figure 8-4. System Disk Diagnostic Monitor Program Selection Screen

CAUTION

1. THE CPU TESTER IS NOT A DIAGNOSTIC AND IS NOT INCLUDED IN THE AUTOMATIC SEQUENCE. IT ALLOWS AN EXPERIENCED USER TO LOAD THE CP7 CONTROL MEMORY WITH MICROCODE LEVEL INSTRUCTIONS USING THE BP.

2. EXERCISE EXTREME CAUTION WHEN ATTEMPTING TO USE THIS UTILITY. THE ABILITY TO WRITE TO ANY DISK ATTACHED TO THE SYSTEM (INCLUDING THE SYSTEM DISK) IS MADE AVAILABLE VIA THE BUS PROCESSOR. VALUABLE CUSTOMER DATA MAY BE DAMAGED.

NOTES

1. For prerelease VSOS 6.41.00, test 7 was NOT fully functional. See Referenced Note 1, on page 8-9.

2. The Small System VS Multitasker (System Exerciser) program was NOT operational at time of publication. When available, special precautions must be taken when using this program.

```
           Small System VS Diagnostic Package  Version  Rxxxx
                          Test Selection Option
 To Select Tests, Position Cursor And Press Any NON-BLANK. Press SPACE
 or DELETE To Deselect a Test. Press PF8 to Start An Automatic Sequence.
 Press ENTER to Begin Testing. Press PF16 to Terminate.

         Test Name                                Test Name

□  1 Small VS Floppy Diagnostic
□  2 CMD/FMD/SMD Disk DA Diagnostic
□  3 CP7 MAR Operations & TRAM Test
□  4 CP7 Main Memory and Cache Test
□  5 Small System BP/MM (CP7) DMA Diag
```

Figure 8-5. Diagnostic Monitor Program Selection Screen (Floppy Diskette Volume - DIAG1)

The Small System VS Diagnostic Monitor has also been packaged as a set of six stand-alone 5-1/4" floppy diskettes. When the diskette drive is selected as the boot device, each diskette will IPL the system and display its menu of diagnostic programs. The Automatic Sequence will function on each of the diskettes which include one or more of the 13 programs from table 8-3, or each program may be selected individually. An example of a diskette Selection Menu is given in figure 8-5. The diagnostic test programs on each diskette are shown in table 8-6.

8.5.3.1.2 Diagnostic Monitor Run-Time Menus

The Diagnostic Monitor Run-Time Menu (figure 8-6, page 8-25) is accessed from the Program Selection Menu after the desired program(s) have been selected. It allows the operator to monitor and control the performance of the diagnostic program in operation. Pressing ENTER or PF8 causes a Run-Time Menu to be displayed and the programs (or Automatic Sequence) selected from figure 8-4 (or figure 8-5) to begin running.

The menu shows those commands (PF keys) which can be used for direct operator control of the diagnostic programs; the current diagnostic descriptors; and error messages and user prompts. STOP-ON-ERROR is automatically selected for each (or all) programs chosen EXCEPT when using the Automatic Sequence (PF8) selection.

8.5.3.1.3 Stand-Alone Diagnostic Monitor Run-Time Menus

When the VS-65 has been initialized from one of the Diagnostic Diskettes (DIAG 1-6), the system will display and run the diagnostics on each diskette without re-initialization. The procedure, used for on-site diagnostics, is as follows:

1. EXIT a given program in use, the Automatic Sequence (or a diskette Diagnostic Program Menu), by pressing PF16. This will return the system to the Program Selection screen.

NOTE

> After pressing PF16, WAIT for the program or routine to finish and the appropriate screen to appear before removing the diskette.

2. Remove the diskette and insert another. Pressing PF16 will result in either the new menu or reappearance of the NOTICE screen. Entering a YES response to the NOTICE screen will result in the display of the new menu and testing can be continued by selecting the desired tests.

3. If the stand-alone Self-Test diskette (DIAG6) is inserted, pressing PF16 will result in the IPL Drive Selection screen being displayed (figure 8-3). Select the IPL Volume and press ENTER and the Self-Test Diagnostics will begin the loading and running process.

4. If the system fails the Self-Test Diagnostics, remove the stand-alone diskette, DIAG6, and insert the stand-alone Diagnostic Monitor diskette required and press PF8. The system will load the diskette and display the Program Selection screen. Select the desired test program and continue testing.

5. If the system fails the disk version of the Self-Test Diagnostic, change the Boot Device switch to the Floppy (UP) position, and install the required stand-alone Diagnostic Monitor diskette as in step 4, only this time press PF8 and the system will load the diskette and display the Program Selection menu. Select the desired test program and continue testing.

Table 8-6. Stand-Alone Diagnostic Monitor Diskettes

DISKETTE WLI P/N	DISKETTE NAME	FILE NAME	TEST NUMBER	PROGRAM NAME
732-8030	DIAG 1	@BT3000@	1	Small VS Floppy Diagnostic
		@DT1000@	2	CMD/FMD/SMD Disk DA Diagnostic
		@MT1100@	3	CP MAR Operations & TRAM Test
		@MT2100@	4	CP Main Memory & Cache Test
		@BT2100@	5	BP/MM DMA Diagnostic (CP7)
732-8031	DIAG 2	@BT1000@	1	BP USART/MODEM/RIPL Diagnostic
		@BT5000@	2	BP D-Clk/NVRAM/RTC Diagnostics
		@TT1000@	3	TC 1-Port DA Interface Test
		@TT2000@	4	TC 2-Port DA Interface Test
		@ST1000@	5	Dumb 928 (SIO) Data Link DA
		@UT1000@	6	Universal Smart SIO Data Link DA
		@ST3000@	7	8-Port RS-232 DA Diag
732-8032	DIAG 3	@CT1100@	1	CP Control Memory Diagnostic
		@CT2100@	2	BP/CP Communication Test
		@CT3100@	3	Unconditional Branch Test
		@CT4100@	4	Conditional Branch, Subroutine
		@CT5100@	5	MDR, IREG, PMR, & Stack Test
		@CX1100@	6	CPU Tester (Software Interface)
732-8033	DIAG 4	@CT6100@	1	Arithmetic, Multiplier, CC Test
		@CT7100@	2	BNM Operations, BR Tests
		@MT3100@	3	OF/ON/BNM Operations Test
		@CX1100@	4	CPU Tester (Software Interface)
		[@BT4100@]	5	[Multitasker (Note 2)]
732-8034	DIAG 5	@MT4100@	1	CP/BP/MM Data Bus Diagnostic
		@MT5100@	2	CP/BP/MM Contention/Cache Test
		@CX1100@	3	CPU Tester (Software Interface)

NOTES

1. The Automatic Sequence programs are stored on Diskettes 1, 3, 4, & 5. Diskette 2 (DIAG 2) will respond to the PF8 command with an error message, '45EF', "Invalid 'Burn-in' Table".

2. If PF8 is pressed when DIAG 6 is mounted, an error message, '453A', "Monitor library not found".

3. Provisions have been made in the monitor table of diskette DIAG 4 for the CP7 Multitasker. However, the program which is not operational, displays an UNNAMED Test 5, and gives an erroneous function message.

```
            Small System VS Diagnostic Package  Version  Rxxxx

  (1) = Error Loop     (4) = Program Loop     (7) = Step           (16) = Exit
  (2) = Routine Loop   (5) = Pause           (10) = Clear all Settings
  (3) = Stop on Error                        (13) = Display Error Log

  Program Name: R152C VS-65 Fixed Disk DA Diag      Error Count          = 00000
  Routine Name: 00 Initialization & Interrupts --   Routine Loop Count = 00000
  Error Code  =                                     Program Loop Count = 00000
  Program Status: Test In Progress                  Monitor Pass Count = 00000

  Messages:
 Configuration switch data and corresponding device types
 defined by switch position 6 - 8:

 Switch 0 data = 70 / unit 0 type (J2) - Quantum Q540 32Mb
 Switch 1 data = 70 / unit 1 type (J2) - Quantum Q540 32Mb

 Type FF and press [ENTER] if types are correct.
 Otherwise, type 00 then [ENTER] for error loop.


FF
```

Figure 8-6. Diagnostic Monitor Run-Time Menu Selection Screen

When selected, the Diagnostic Monitor programs will run in the order that they are shown on the applicable disk or diskette menu. If testing is not altered by operator action or by hardware failure, the Monitor automatically cycles on the set of diagnostic programs chosen and the Monitor Pass Count will increment.

8.5.3.2 Run-Time Menu Screen Commands and Descriptors

There are nine commands and eight descriptors displayed on the Run-Time Menu Selection screen. The operator uses the Run-Time Menu to monitor test results, and the PF function key commands and alternate-action commands to control test performance. Selecting the command initiates the functioning of the command and highlights the command on the screen. The next time a command is selected, it becomes an alternate-action command and will cause the original command to be deselected. Commands PF1 through PF5 are alternate-action commands. A brief discussion of each command follows.

8.5.3.2.1 Diagnostic Monitor Run-Time Screen Commands and Function Keys

1. ERROR LOOP   PF1 = Loop on routine in which the next failure occurs.

2. ROUTINE LOOP PF2 = Loop on current test routine.

3. STOP ON ERROR PF3 = Stop the program when the next failure is detected.

4. LOOP ON PROGRAM PF4 = Loop on current diagnostic program.

5. PAUSE PF5 = Halt the program prior to the next test routine.

6. STEP PF7 = Used to STEP passed a selected option (PF1- PF5). That is, STEP through PAUSE, Program or Routine Loop, or STOP-ON-ERROR without deselecting the command.

7. CLEAR ALL SETTINGS PF8 = Resets PF Keys 1 through 7 test control commands.

8. DISPLAY ERROR LOG PF13 = Displays the 23 most recent errors in Error Buffer. ENTER returns the Run-Time screen to the routine in progress.

9. EXIT PF16 = The Diagnostic Monitor Program is terminated, and the Test Selection Option screen is reentered after the EXIT command (figures 8-4 or 8-5).

8.5.3.2.2 Diagnostic Monitor Run-Time Screen Descriptors

1. PROGRAM NAME = The name of the program currently being executed. A Program consists of one or more test routines.

2. ROUTINE NAME = The name of the test routine currently being performed.

3. ERROR CODE = The code of the most recently detected error.

4. PROGRAM STATUS = The status of the diagnostic currently being performed (e.g. TEST-IN-PROGRESS, STOP-ON-ERROR, PAUSE, STEP, etc.).

5. ERROR COUNT = A decimal count of the number of errors which have been detected. The count is cumulative and it is reset only by re-IPLing or returning to the Program Selection menu (PF16).

6. ROUTINE LOOP COUNT = A decimal count of the number of loops which have been made through the diagnostic routine currently being performed. This value is only displayed when the LOOP-ON-ROUTINE option is in effect. It is cleared when the LOOP-ON-ROUTINE option is deselected.

7. PROGRAM LOOP COUNT = Identical to Routine Loop Count except that this count applies to diagnostic programs rather than to routines.

8. MONITOR = PASS COUNT — A decimal count of the number of loops which have been made through the set of diagnostic programs. It is cleared by re-IPLing or returning to the Program Selection menu (PF16).

8.5.3.2.3 Error Messages and User Prompts

The current diagnostic program writes error messages and user prompts in the lower half of the screen. If more than one error occurs, only the last error message will be left on display, although the error count and the Diagnostic Monitor Error Log are updated for each error.

8.5.3.3 Running the Diagnostic Monitor Programs

1. Make sure the three position (LOCAL CONTROL/REMOTE DIAGNOSTICS/REMOTE CONTROL) switch (figure 3-3) is in the LOCAL CONTROL position. (The system will NOT initialize if the switch is in the REMOTE DIAGNOSTICS position.)

2. Set the Operational Control Panel Boot Device switch to the required position. (The Boot Device may be Drive-0 of the internal or external SYSTEM disk, or a stand-alone Diagnostic Monitor diskette.)

3. Press the red Initialize button on the Front Panel (or power-up the system). (The HEX display on the Front Panel will begin counting down from FFFF.) In about 45 seconds WS-0 will display the Menu shown in figure 8-1, page 8-13.

NOTES

1. When initializing from the System Diskette Drive, the screen display of figure 8-1 will be bypassed (except when using DIAG 6) as will STEP 4 below. The first screen to appear will be that of STEP 5.

2. As noted previously, the system disk-resident Diagnostic Monitor Programs for the VS-65 are NOT operational.

3. The system disk version of the Diagnostic Monitor is scheduled for release with VSOS 6.41.00. For VSOS 6.40.xx or earlier, use the stand-alone Diagnostic Monitor diskettes DIAG 1 - DIAG 5.

4. Using PF8 at the System disk IPL Drive Selection screen should result in an error code of '414A' unless the CP5 system monitor is present.

5. Attempting to access the Diagnostic Monitor using PF8 at the IPL Drive Selection screen of DIAG 6 (with the Self-Test Diagnostic diskette mounted) will also fail and give the '414A' display.

4. When the IPL Drive Selection Screen appears, the cursor will be positioned next to the default IPL volume. Press PF8 to load the Diagnostic Monitor software. The screen (figure 8-1, page 8-13) will briefly display the message "Loading Diagnostic Monitor Microcode".

NOTES

1. When loading the Diagnostic Monitor using PF8, the VS-65 will always load from the bootstrap (default) volume. (For example, 'SYSTEM'.) An alternate system volume cannot be selected.

2. When using DIAG 6 to run the Self-Test Diagnostics, the diagnostic diskettes (DIAG 1 through 5) may be mounted directly by using the PF8 function as follows:

    2a. When the IPL Drive Selection screen, and prior to pressing PF8, remove DIAG 6 and replace it with the desired diagnostic diskette.

    2b. Press PF8 and the NOTICE screen will be displayed. Continue with STEP 5 below.

5. Workstation Zero (WS-0) will display a cautionary NOTICE and request a YES or EXIT response. Enter the YES response.

6. After YES is entered, WS-0 will display a menu similar to that shown in figure 8-4 (or figure 8-5 for the 5-1/4" diskette version, DIAG 1).

7. Press PF8 to start the Automatic Sequence. (Note that on the System Volume the Automatic Sequence selects Tests 1 through 13. The last test in the Automatic Sequence is the CP/BP to Main Memory Contention/Cache Diagnostic Test . Also note that STOP-ON-ERROR is NOT selected when using the PF8 functions.)

8. Run the Diagnostic Monitor (figure 8-4) for one complete, error-free pass. This should take about 15 minutes for systems equipped with 1M-byte of Main Memory. Check the Monitor Pass Count on the WS-0 screen to determine when one complete pass has been made.

9. If any errors occur, display the Diagnostic Monitor Error Log at the end of one complete pass, using PF13 (Refer to paragraph 8.5.3.3.1.).

10. When running the Diagnostic Monitor using PF8, more than one error may occur and be listed in the Error Log. Some diagnostic programs will generate multiple errors (for example, @MT1000@) many of which may be repetitive, thus loading the Error Log with similar errors. In this case, replace the multiple error component (or PCA) first and then repeat the Automatic Sequence (PF8) to view the remaining error(s).

11. If no errors occurred, press PF16 (EXIT) to return to the Diagnostic Monitor Program Selection screen. (When using the five diagnostic diskettes, insert the next diskette, press PF16 and then press PF8 to proceed.) If a test routine is in progress when PF16 is pressed, the routine will complete before the Diagnostic Monitor Program Selection screen occurs. This may take several seconds, depending on the test routine.

12. Press PF16 again to terminate and return to the IPL Drive Selection screen. (Occasionally, PF16 may have to be pressed more than once in order to return to the IPL Drive screen.)

13. Select the desired disk drive and IPL the system.

8.5.3.3.1 Displaying the Diagnostic Monitor Error Log

The Diagnostic Monitor Error Log may be displayed by pressing PF13. The Error Log Display Screen (figure 8-7) will show up to 23 of the most recent Diagnostic Monitor errors. These errors are listed as 8-character codes followed by up to 18 HEX characters all on a single line in a 'shorthand' format. The 18 HEX characters are an extraction of all other relevant information from the message portion of the error screen.

```
ME102001 24 00 04 00 0A 00 00 24 10                              (24th error)
ME102002 20 00 00 00 0A 00 00 04 10                              ( 2nd error)
ME102001 20 01 00 01 0A 00 00 24 10
ME102002 20 01 00 01 0A 00 00 24 10
ME102001 20 02 00 02 0A 00 00 24 10
ME102002 20 02 00 02 0A 00 00 24 10
ME102001 20 04 00 04 0A 00 00 24 10
ME102002 20 04 00 04 0A 00 00 24 10
ME102001 20 08 00 08 0A 00 00 24 10
ME102002 20 08 00 08 0A 00 00 24 10
ME102001 20 10 00 10 0A 00 00 24 10
ME102002 20 10 00 10 0A 00 00 24 10
ME102001 20 20 00 20 0A 00 00 24 10
ME102002 20 20 00 20 0A 00 00 24 10
ME102001 20 40 00 40 0A 00 00 24 10
ME102002 20 40 00 40 0A 00 00 24 10
ME102001 20 80 00 80 0A 00 00 24 10
ME102002 20 80 00 80 0A 00 00 24 10
ME102001 21 00 01 00 0A 00 00 24 10
ME102002 21 00 01 00 0A 00 00 24 10
ME102001 22 00 02 00 0A 00 00 24 10
ME102002 22 00 02 00 0A 00 00 24 10
ME102002 24 00 04 00 0A 00 00 24 10                              (23rd error)
                   Press ENTER to Save Log, PF1 to Delete
```

Figure 8-7. Diagnostic Monitor Error Log Display Screen

The first two characters of the 8-character code identify the PCA (or unit) being tested and the program, routine, or error notation. The second two characters (00-FF HEX) identify the program number; the third two characters (00-FF HEX) identify the test routine within the program; the fourth two characters (00-FF HEX) identify the error within the test routine; and the remaining 18 HEX error message codes are displayed.

Since only one error screen can be displayed, only relevant data from the most recent 23 screens is saved in the Error Log. For example, the final 18 HEX characters are the Received Data, Expected Data, MAR1 address, and CP Status Register HEX characters from each error message occurring during the running of the Main Memory Test example given in figure 8-11 on page 8-33.

Error codes are written from left-to-right, top-to-bottom. They wrap around from the bottom to the top and start overlaying when the 23 line Error Log buffer becomes full. For example, the top row of the Error Log Display in figure 8-7 is the 24th error and the bottom row is the 23rd error. The second row (2nd error) will be overwritten by the 25th error and so forth.

8.5.3.3.2 Interpreting the Diagnostic Monitor Error Log Display

The CE can select the failing PCA (or unit) from the 8-character error code and replace (or repair) that unit, using the following example:

1. The USART/Modem Diagnostic portion of the Self-Test Diagnostic fails (@BT0500@). (Loop-back connector, WLI P/N 420-1040, is installed.)

2. Press PF8 to load the Diagnostic Monitor.

3. Select Test 18, BP USART, MODEM/Loop-Back and RIPL Diagnostic and press ENTER.

4. Enter 10 (Character Loop-Back through Connector) and press ENTER (the test fails).

```
BE101007 04 01
BE101007 04 02
BE101007 04 03
BE101007 04 04
BE101007 04 05
BE101007 04 06
BE101007 04 07
BE101007 04 08
BE101007 04 09
BE101007 04 0A

                    Press ENTER to Save Log, PF1 to Delete
```

Figure 8-8. USART/Modem Failure during Diagnostic Monitor Execution

5. Deselect STOP-ON-ERROR (PF3) for a few errors, and then press PF3 (or PF5, PAUSE).

6. Press PF13, DISPLAY ERROR LOG and the screen shown in figure 8-8 is displayed.

7. Observe the 1st error code character as shown in the last entry of Error Log, that is, BE101007 xx xx (where xx means don't care).

8. Use table 8-7 and compare the 1st error code character with the failing unit. In this case, 'B' compares with the Bus Processor. As the USART logic is on the Bus Processor PCA, replace the BP PCA.

9. To return to the last test running after viewing the log, press ENTER to SAVE the Diagnostic Monitor Error Log, or press PF1 to DELETE the Error Log.

Table 8-7. Diagnostic Monitor Failing Unit Error Code Character

FIRST ERROR CODE CHARACTER	FAILING UNIT
B	Bus Processor DA PCA failures include the 5-1/4" System Diskette Drive and USART/Modem/Loop-Back
C	Central Processor Device Adapter PCA
D	Internal Fixed or External Disk Drive and/or DA
M	Main Memory and Cache Memory Device Adapter PCA
S	Serial I/O (SIO/ISIO/UISIO/ASYNC) PCA or WS-0
T	Telecommunication Device Adapter PCA

8.5.3.3.3 The Main Memory Diagnostic Monitor Program (@MT1100@)

When running the Self-Test Diagnostic, one of the more common failures in the past has been the Main Memory Integrity portion of the Self-Test Diagnostic (@MT0100@). If this failure should occur, the Diagnostic Monitor may be run to verify the error and provide additional diagnostic information for the repair center.

With the recent change to wave soldered PCAs, failing chip location is no longer necessary in the field. The defective PCA is simply returned to the repair center with the error code noted on the return tag. In some cases, the failure of a PCA, and the resulting Self-Test Diagnostic error code, may not lead directly to the fault and the failing unit. In such a case, using the Diagnostic Monitor to determine the fault more precisely may be required. The Main Memory PCA will serve as an example.

The display shown in figure 8-9 will appear on Workstation Zero (WS-0) screen at the time of the failure and the Self-Test Diagnostic program will halt. Proceed as follows:

1. Press PF8 to load the Diagnostic Monitor software.

2. WS-0 will display the Diagnostic Monitor NOTICE screen. Type YES to continue, and WS-0 will then display the Diagnostic Monitor Selection screen (figure 8-4). (When the boot device is DIAG 1, the Diagnostic Monitor diskette, figure 8-5 will appear.)

```
      Small System VS Self Test Diagnostic Package  Version xxxx
                         System Hardware Status
                         System Volume = SYSTEM

Status              Diagnostic

Passed              (SIO) Serial Data Link Test
Passed              (BP)  USART Loop-Back Verification Test
Passed              (CPU) CM/Communications Test
Passed              (CPU) Operational Test
Passed              (CPU) Integrity Test
FAILED              (MM)  CP/Cache/Main Memory Test
                    (BP)  BP/Main Memory DMA Test
                    (MM)  Dual Processor M/M Test

 Error Code = 4E20

          Press PF (8) to Load Diagnostic Monitor
```

Figure 8-9. Main Memory Failure during Self-Test Diagnostic Execution

3. Select the Main Memory Test by positioning the cursor at the highlighted block (pseudo-blank) next to Test 9. Press any non-blank character, and then press ENTER. The modified Diagnostic Monitor Main Memory Test Option screen (figure 8-10) will appear.

4. The Main Memory Test Option Screen (figure 8-10) allows the system operator to choose a short version of the Main Memory Test (@MT1100@). The short MM diagnostic, which takes less than 2 minutes per Megabyte to complete, will detect all Main Memory errors previously detected by the STD. To run the short version , enter 00 in the field provided, then press ENTER. The Diagnostic Monitor Run-Time Menu Selection Screen (figure 8-11) will appear.

5. Deselect STOP-ON-ERROR function by pressing PF3 and allow the Main Memory Diagnostic Monitor to run until a significant number of Main Memory errors (less than 23) are displayed at the Error Count position or one complete pass of test program occurs. (It will loop automatically.)

6. Press PF3, STOP-ON-ERROR and continue with step 9 when the diagnostic halts (or PF5, PAUSE, if it does not detect an error, and proceed with step 7.).

```
          Small System VS Diagnostic Package  Version  Rxxxx

(1) = Error Loop    (4) = Program Loop    (7) = Step           (16) = Exit
(2) = Routine Loop  (5) = Pause          (10) = Clear all Settings
(3) = Stop on Error                      (13) = Display Error Log

Program Name: R1550 VS Main Memory Diagnostic -- Error Count        = 00000
Routine Name:                                    Routine Loop Count = 00000
Error Code  =                                    Program Loop Count = 00000
Program Status: Test In Progress                 Monitor Pass Count = 00000

Messages:

                Enter FF to run MOVING INVERSIONS Tests
                Else Enter 00


 FF
```

Figure 8-10. Diagnostic Monitor Main Memory Test Option Screen

```
          Small System VS Diagnostic Package  Version  Rxxxx

(1) = Error Loop    (4) = Program Loop    (7) = Step           (16) = Exit
(2) = Routine Loop  (5) = Pause          (10) = Clear all Settings
(3) = Stop on Error                      (13) = Display Error Log

Program Name: R1412 VS Main Memory Diagnostic -- Error Count        = 00002
Routine Name: 20 Data Buss Test --A/B 50 sec.--  Routine Loop Count = 00000
Error Code  = ME102001                           Program Loop Count = 00000
Program Status: Stopped On Error                 Monitor Pass Count = 00000

Messages:

RECEIVED DATA NOT EQUAL TO EXPECTED DATA
RECEIVED DATA  (MDR)  =  20 00
EXPECTED DATA  =  00 00
ADDRESS (MAR1)  =  A0 00 00
(Status Bit 5 = 1 indicates MM Parity Trap taken)
(Status Bit 12 = 1 indicates Invalid Address Trap taken)
CP Status Register  =  04 10
```

Figure 8-11. Main Memory Error during Diagnostic Monitor Execution

7. If for some reason, the short version of the test program does not verify the error, return to the Diagnostic Test Option screen (figure 8-10), enter 'FF' for the long test and press ENTER. If this test fails to verify the Main Memory error, return to the Diagnostic Monitor Program screen (figure 8-4 or 8-5) and press PF8 to start the Automatic Sequence.

NOTE

There are now five Main Memory related tests in the Diagnostic Monitor package.

8. When the failing unit has been determined, continue with step 9.

9. Using figure 8-11, note the additional information given for the test routine; the Routine Name, and the Error Code. In figure 8-11, the routine name is: 20 Data Buss Test - A/B 50 sec. - and the Error Code is ME102001. The Messages portion of WS-0 screen showing, which has been used in the past to decode the failing chip location is no longer necessary. Using the information given in paragraph 8.5.3.3.1, review the Error Log for additional errors (of other types) and note those also.

10. Power-down the system, remove the Main Memory PCA, and replace it with the new memory PCA using the procedures given in Chapter 5, Maintenance and Repair, paragraphs 5.5 through 5.5.1.2.

11. Power-up the system and run the Automatic Sequence (PF8) of the Diagnostic Monitor to make sure that there are no other errors.

NOTE

With respect to a Main Memory failure, when a replacement PCA is temporarily unavailable, modifying the MM size switch settings may allow the system to IPL, even though there is a faulty memory chip or some other PCA failure resulting in a similar condition.

If the failure is located in an area of physical memory which will allow continued operation of the system, this technique may serve as a stopgap measure allowing the customer to continue operation until a replacement PCA can be installed.

8.6 ON-LINE DIAGNOSTIC PROCEDURES

With on-line diagnostics, located in library @SYSTST@, the CE logs on to the system through any workstation and executes a specific test routine, which runs under control of the VS Operating System (while the customer is running). With the release of VS Operating System Release 6.20.02, the on-line diagnostics (listed in table 8-4) were available. They included the standard Small

System VS error log features. For a more detailed explanation and discussion of each, see the Customer Engineering Diagnostic Handbook.

8.7 CONTROL MODE

CONTROL MODE is a CP state where normal programming activities (under the control of the VS Operating System) are suspended and certain other facilities (mainly diagnostic and initialization) are made available to the system operator. These facilities are divided into two groups of commands as follows:

1. LOAD Group: Contains commands for initializing the Operating System, loading a stand-alone program, loading a diagnostic program, or restarting a program from an initialized state.

2. DEBUG Group: Contains commands for displaying and/or modifying Main Memory, general registers, control registers, or the Program Control Word (PCW). Also included in this group are commands for single-step program execution, a hard copy dump of Main Memory and registers, and virtual address translation.

CONTROL MODE uses Workstation Zero (WS-0) for communications between the operator and the system. To enter CONTROL MODE, WS-0 must be powered-on. CONTROL MODE uses only the top line of the CRT display (line one); the contents of the line are saved on entry into CONTROL MODE and restored at exit. This makes CONTROL MODE transparent to any program that may be using WS-0.

For a detailed discussion of CONTROL MODE commands, refer to Chapter 6 of the VS Principles of Operation manual. All standard Small VS System's control mode functions are available on the VS-65.

8.8 REMOTE DIAGNOSTICS

As part of its remote maintenance objectives, Customer Engineering offers remote diagnostic service as a maintenance program to VS-65 customers. The primary goal of the service is to isolate problems remotely so that the CE can bring the correct parts to the customer's site and supply the customer with a responsive and efficient level of service. The VS-65 uses the same remote diagnostic programs as the other Small VS Systems. Remote diagnostic service is an integral part of first level customer problem resolution.

8.8.1 REMOTE DIAGNOSTIC SUPPORT

The VS-65 hardware supports several features related to remote diagnostic service. These include a basic telecommunication capability, and the microcode required to establish a link with the Remote Maintenance Center (RMC). Necessary Customer, System, and Service information is stored and maintained without external system power. And finally, a TC link can be established over ordinary telephone lines and off-line diagnostics can be run remotely.

One of the features supported involves the use of the Nonvolatile RAM (NVRAM) on the Bus Processor PCA (refer to paragraph 8.9). The NVRAM is maintained by various VS Operating System application programs, operating system hooks and microcode support. The contents of the NVRAM is the first block of data transmitted from the VS-65 during a remote diagnostic session. The data transmitted is made up of the following sections:

1. **Customer Information**
2. **System Configuration**
3. **Hardware Configuration**
4. **Service Log**

The primary feature involves the Bus Processor's capability to run all off-line diagnostics remotely. Locally resident diagnostic packages, already loaded on the system, can be run from the RMC. (Refer to paragraphs 3.2.2.4 and 8.8.2). The 80286 microprocessor code necessary to establish the link with the Remote Maintenance Center resides in the Bus Processor Code RAM.

In the United States and Canada (except Hawaii), a Remote Diagnostic Modem (WLI WA-3451) is shipped with each VS-65 system. (The modem is to be used for remote diagnostic sessions only and will be removed from the customer's site if the service is not implemented.) Using ordinary telephone lines, the customer can easily establish a remote diagnostic session with the Remote Maintenance Center.

8.8.2 REMOTE DIAGNOSTIC PROCEDURES

It is normally the customer who initiates the remote diagnostic session and coordinates with the Remote Maintenance Center (RMC) during the testing. It is not necessary for the CE to be present at the site during the remote diagnostic session. The basic remote diagnostic procedure is as follows:

1. Experiencing a problem with the system, the customer establishes that the problem is not operator dependent by following the procedure given in the VS-65 Operator (Customer) Level Troubleshooting Flowchart (figure 3-5), and notifies the Area Call Control Center (CCC).

2. The CCC then calls the home office Remote Maintenance Center.

3. The Remote Maintenance Center (RMC) establishes a telephone line data link between the RMC diagnostic system and the customer's VS-65.

4. The RMC reads and analyzes the information from the VS-65's Nonvolatile Random Access Memory (NVRAM).

5. The RMC runs the diagnostics from the diagnostic diskette inserted by the customer into the diskette drive of the customer's system.

6. The RMC notifies the Area CCC of the test results and which Field Replaceable Unit, if any, failed.

7. The CCC notifies the local Customer Engineer who completes the service call, including updating the NVRAM.

8.9 NONVOLATILE RAM (NVRAM)

All VS-65 systems have a special 2K byte x 8-bit memory area called Nonvolatile Random Access Memory (NVRAM). The NVRAM is physically located on the Bus Processor (BP) PCA and is logically located within the BP's memory addressing space. A special long-life battery, also located on the BP, provides back-up power to make sure that the NVRAM retains its data (remains nonvolatile) during a power outage or when the system is normally powered-off.

The primary purpose of the NVRAM is to provide a condensed outline of customer information, system and hardware configurations, and service log information for the remote diagnostic facilities. At the beginning of a remote diagnostic session, all the contents of the NVRAM, plus the power-up error codes, will be transmitted to the Remote Maintenance Center. This information will aid the Center in diagnosing the customer's problem.

The NVRAM can be read and written on-site by two utility programs; LOADNV and SHOWNV. The NVRAM initially contains no information until data is entered using the LOADNV utility. From that point on, the contents of the NVRAM must be updated by the Customer Engineer during each service call.

8.9.1 NVRAM UTILITIES

Two applications programs, LOADNV and SHOWNV, are used to manage the NVRAM. These programs run under the VS Operating System and support features which include displaying, modifying, and printing any of the defined NVRAM fields. The LOADNV program also supports BACKUP/RESTORE functions between the physical NVRAM and a disk file. The NVRAM may be viewed using either the LOADNV or the SHOWNV programs, but may be modified only with the LOADNV program. For a complete description of the NVRAM Utilities refer to the Customer Engineering Technical Documentation Catalog/Index for the most recent revision/WLI Part Number.

The LOADNV and SHOWNV programs display and/or print a formatted view of the NVRAM. This formatted view currently consists of four sections. The following is an overview of the contents of each section:

1. CUSTOMER INFORMATION SECTION: This section, loaded at installation time, includes customer identification, service location, system serial number, and information regarding the type of customer service contract.

2. SYSTEM CONFIGURATION SECTION: The second section includes the VS operating system version, and the CPU and BP microcode versions. It also contains a system-wide ECO map and a system maintenance count. This, along with the Customer Information Section, covers all system-level information.

3. HARDWARE CONFIGURATION SECTION: The third section is segmented by Device Adapter (DA) with each DA's devices being tracked by their I/O Device Addresses (IODAs). Serial number, ECO-level, and error counts (maintained dynamically by the CPU and BP microcode) are stored separately for each device. The CE can view and alter devices as a group (eg: all serial devices) or individually.

4. SERVICE LOG SECTION: This last section contains one entry per service call. An entry includes call report number, and repair and subunit codes. A maximum of 12 entries can be stored, after which the oldest entry is overwritten.

8.9.1.1 LOADNV Utility

The LOADNV program provides flexible read and optional modify control to all NVRAM sections. The program supports loading the NVRAM at installation time, generating back-up disk files of the NVRAM data, and entering service call report information.

After running LOADNV, a check can be made of hard copy output to verify the changes. If any errors are detected, the program can be rerun recalling the output just generated. The CE can select only the particular field(s) within a section which need correction. These field(s) can be easily modified and the newly updated data replaced.

The program also allows a prototype disk file to be generated. This file can be initialized for a general VS-65 I/O device configuration. The prototype file can then be used as a standard starting point file for on-site running of LOADNV at system installation time. The operation of the LOADNV utility is divided into three distinct processes:

1. Selection of Input Data: The initial screen of the LOADNV program is used to define the input data to be used by the utility. One of the three input options may be selected. The three input options and their most common uses are:

   a. Disk File Input: Provides the LOADNV utility with a preformatted NVRAM image file from a disk, at which time further updates may be made.

   b. Default Input: Used when generating an NVRAM image from scratch, such as for a new VS-65 system installation.

   c. Direct NVRAM Input: Uses the actual data in the NVRAM as input for the utility. It would be most commonly used to update the service log section.

2. Processing and modification of the selected input data using the Section Selection Menu:

   a. Once the input data is defined by selecting one of the three input options, the LOADNV program then allows this data to be processed or modified.

   b. Data is accessed by logical NVRAM section name (customer information section, system configuration section, hardware configuration section, and service log section). As many sections as may be required can be accessed and modified.

c. All modifications are made to the input data and held within the LOADNV program. The final disposition of the updated data is determined by the output options.

3. Selection of the destination of the processed or modified data: After modifying the desired section(s), the LOADNV program displays the output options. One of three output options may be selected.

   a. Create NVRAM Image File: Allows the NVRAM data to be written to a user-specified disk file. Useful for saving NVRAM data to be used later.

   b. Load Data into NVRAM: Allows NVRAM data to be written directly into the physical NVRAM, destroying the previous contents. This option is most commonly used to update the service log section.

   c. Load NVRAM and Create NVRAM Image File: Combines both of the previous options, also destroying the existing contents of the NVRAM.

After the output section is chosen, the LOADNV program performs the selected function and also generates a formatted NVRAM print file. The print file is generated and placed in the system print queue on HOLD.

8.9.1.2 SHOWNV Utility

The SHOWNV program allows either examining the physical NVRAM without any possibility of accidentally modifying the current data, or examining an NVRAM image file. It will also generate hard copy printouts of either.

1. Selection of Input Data: The initial screen of the SHOWNV program is used to define the input data to be used by the utility. One of two input options may be selected, as follows:

   a. Use an existing NVRAM Image File: Provides the SHOWNV utility with a preformatted or back-up NVRAM image file from disk. Uses the 2K NVRAM disk image file as input to the utility.

   b. Use NVRAM Native: Allows current NVRAM data to be used as input by the utility. Commonly used to examine service call information. No data modifications may be made.

2. Processing Functions: Once the input data is defined, the SHOWNV program generates a formatted print file of the NVRAM or Image File data, whichever is selected as input.

3. Display Function: The print file is displayed via a link to the VS DISPLAY utility. Data is displayed in a format identical to the print format used by the LOADNV utility. All processing functions within the DISPLAY utility are available to manage the print file.

VS-65 CUSTOMER ENGINEERING LEVEL
TROUBLESHOOTING FLOWCHART (1 OF 5)

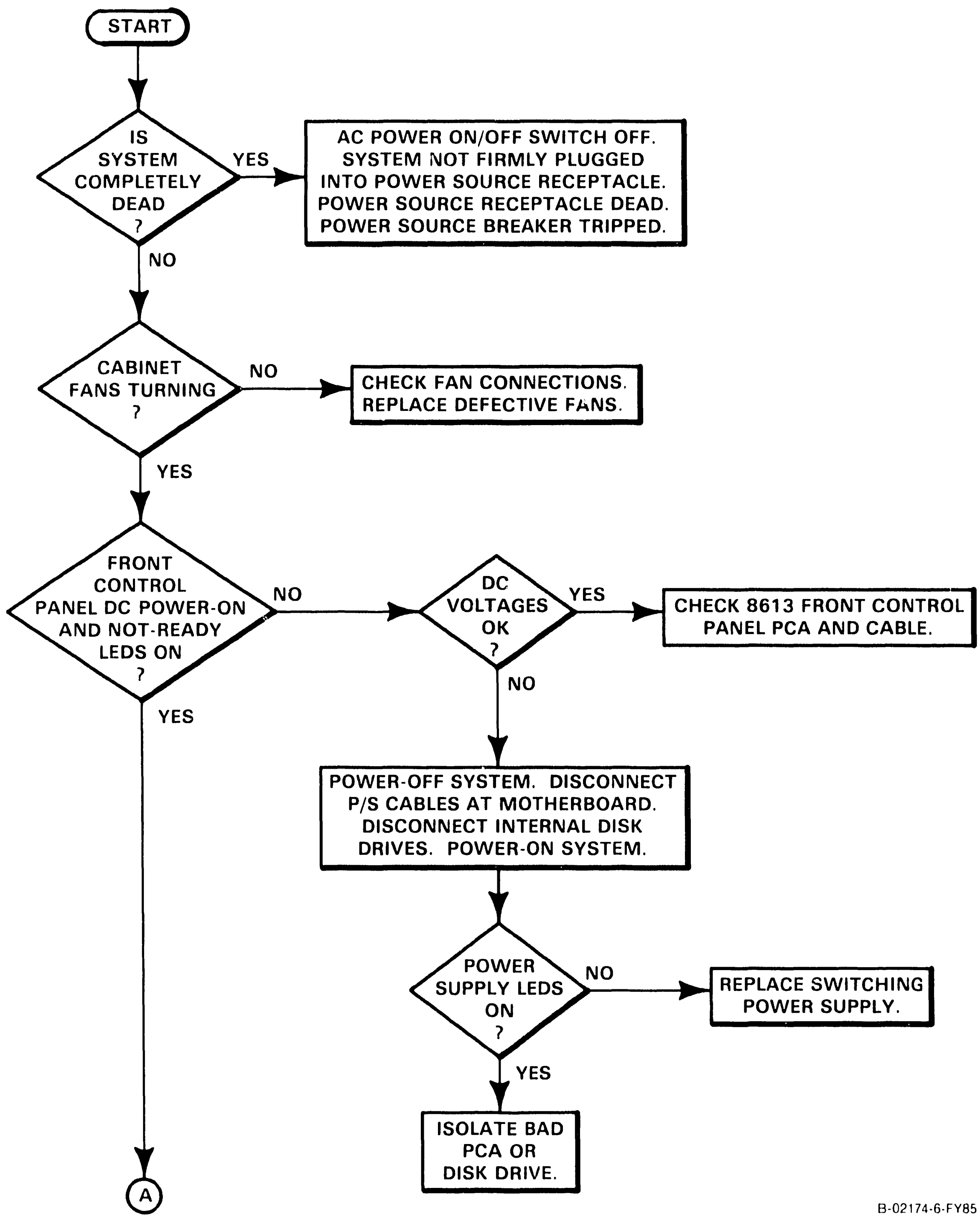

Figure 8-12A. Customer Engineering Level Troubleshooting Flowchart

VS-65 CUSTOMER ENGINEERING LEVEL
TROUBLESHOOTING FLOWCHART (2 OF 5)

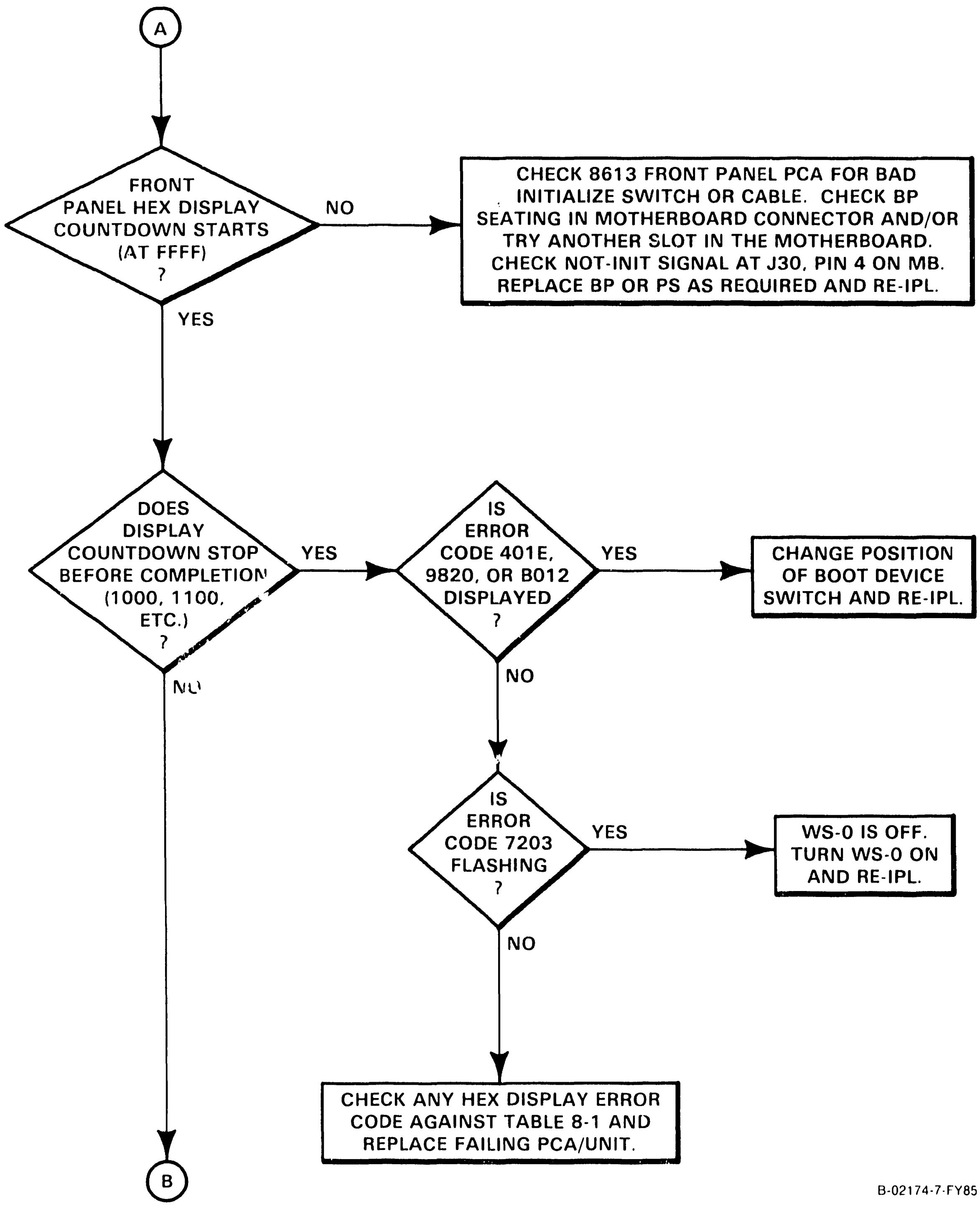

Figure 8-12B. Customer Engineering Level Troubleshooting Flowchart

VS-65 CUSTOMER ENGINEERING LEVEL TROUBLESHOOTING FLOWCHART (3 OF 5)

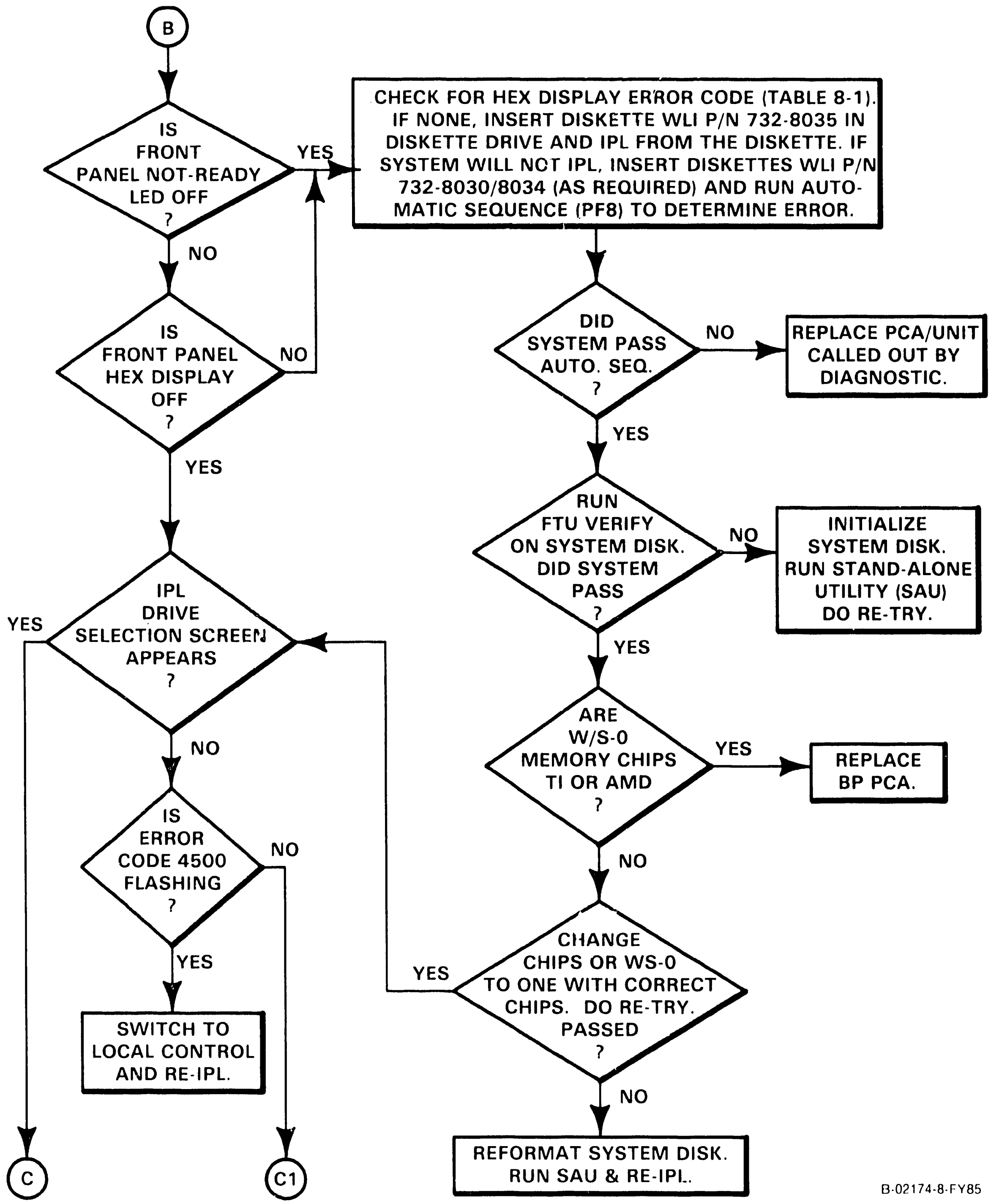

Figure 8-12C. Customer Engineering Level Troubleshooting Flowchart

VS-65 CUSTOMER ENGINEERING LEVEL TROUBLESHOOTING FLOWCHART (4 OF 5)

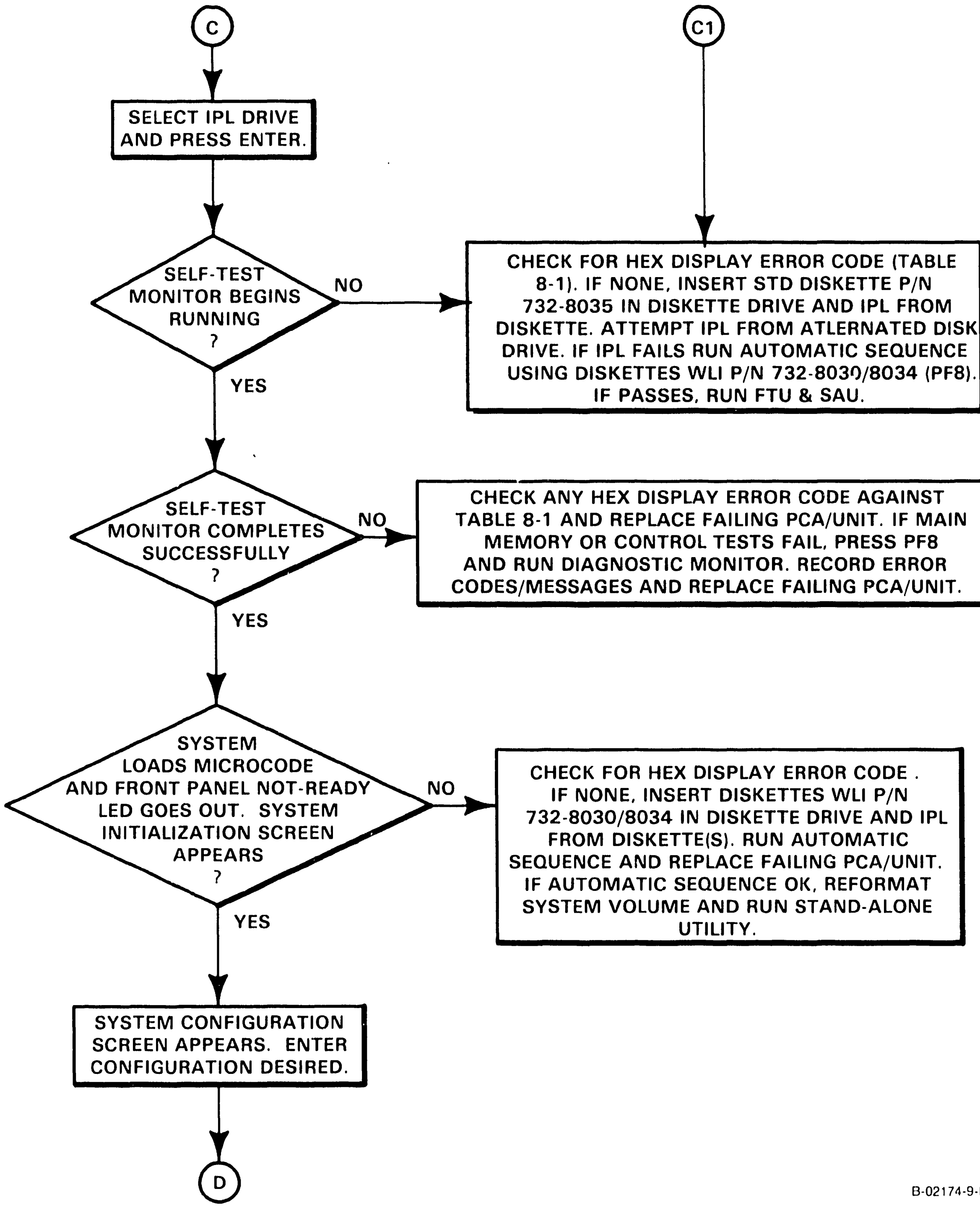

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Figure 8-12D. Customer Engineering Level Troubleshooting Flowchart

VS-65 CUSTOMER ENGINEERING LEVEL
TROUBLESHOOTING FLOWCHART (5 OF 5)

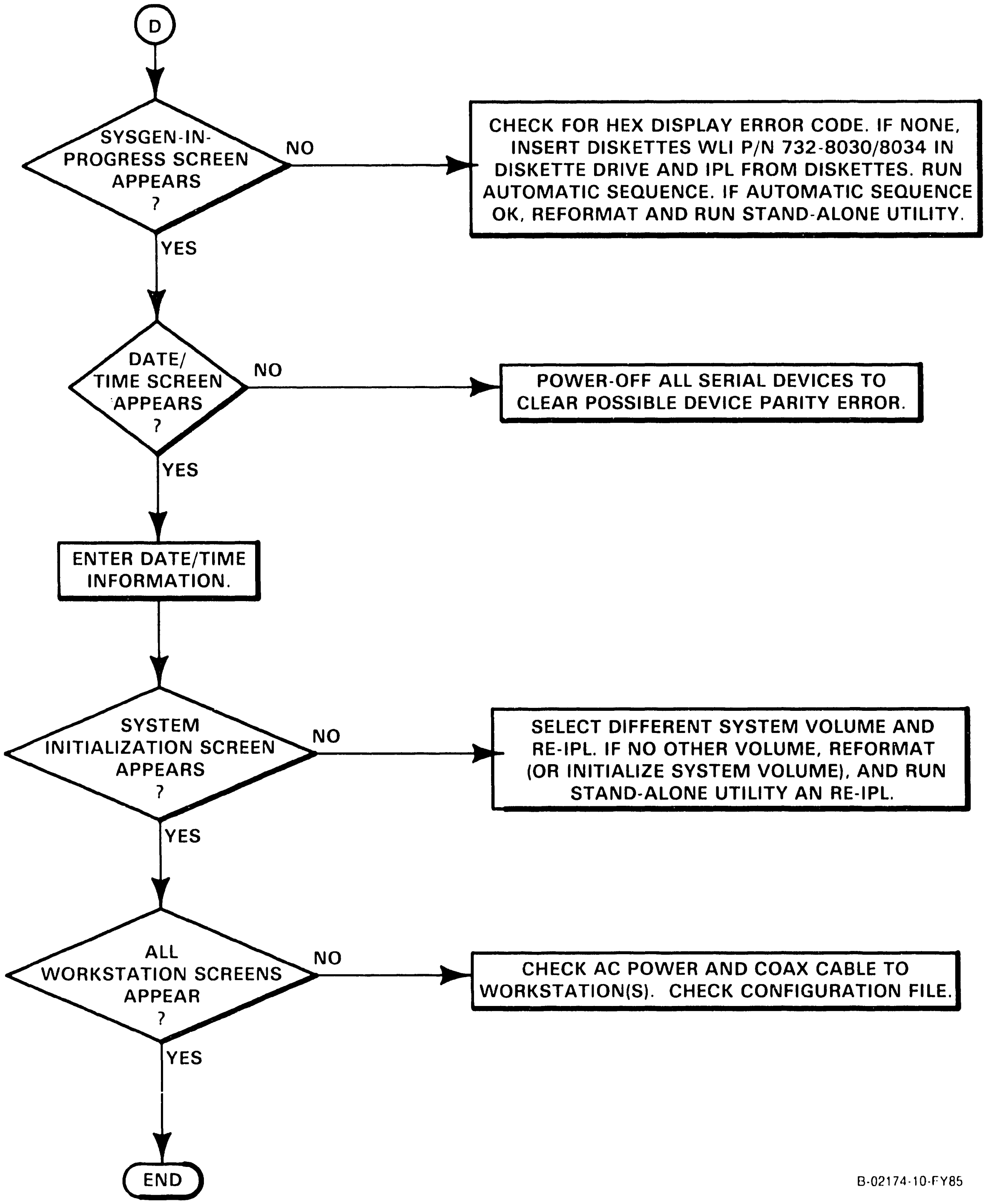

Figure 8-12E. Customer Engineering Level Troubleshooting Flowchart

APPENDIX A MNEMON-ICS

APPENDIX A

MNEMONICS

APPENDIX A

MNEMONICS

Appendix A will be provided as a PUB or with the next revision to the VS-65 Maintenance Manual. It will include mnemonics, words and/or phrases, microinstructions, and miscellaneous hardware related functions used in conjunction with the VS-65 Computer System.

APPENDIX B SELF-TEST MONITOR ERROR CODES

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APPENDIX B

VS-65 POWER-UP AND SELF-TEST DIAGNOSTIC ERROR CODES

B.1 GENERAL

This appendix provides the Customer Engineer and the Remote Maintenance Center with a listing of VS-65 Power-Up and Self-Test Diagnostic Error Codes. These four-character codes (listed in Hexadecimal notation) give diagnostic information to a much greater depth than the two-character codes given in Chapter 8, table 8-2. While the two-digit codes give sufficient information to allow rapid repair at the 'board-swap' level, many hardware and software problems are not so easily diagnosed. The Power-Up and STD diagnostic error codes allow the CE (and the RMC) to diagnose system failures without resorting to the 'board-swap' method. A numerical listing, by Error Code, and its description and/or related test is given below.

B.2 PROM-BASED POWER-UP DIAGNOSTIC ERROR CODES

Unless otherwise noted, the following Diagnostic Error Codes are PROM-based power-up error codes.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
00	**SYSTEM DEFAULT STATE AT POWER-UP**
0000	80286 Microprocessor on Bus Processor PCA is not operational.
0001	Unable to load microcode (@MCBP1@) to 80286 Microprocessor.
0002-0009	**80286 Bus Processor Microprocessor Operating System Error Codes**
0002	Divide exception noted.
0003	Invalid task reference detected.
0004	Invalid semaphore use.
0005	Invalid priority detected.
0006	Insufficient CRAM memory available (memory full).
0007	Unexpected error detected.
0008	Invalid sender identified.
0009	Wild branch (invalid branch attempted).
004	**25V36 Asynchronous RS-232-C Device Adapter/Controller (DAC)**
0040	Undefined error.
0041	Protocol error.
0042	Device Adapter/Controller not operational.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
004	**25V36 Asynchronous RS-232-C Device Adapter/Controller - (Cont'd)**
0043	Data Link Processor (DLP) request time-out error.
0044	DLP command time-out error.
0045	DLP response time-out error.
0046	Invalid DLP address detected.
0047	Address exceeds "top of memory" (maximum memory allocated).
0048	Request overflow.
0049	Reset time-out error.
004A	Bus Processor parity error.
004B	Main memory addressing error.
004C	Main memory ECC error.
004D	Invalid command detected.
004E	Invalid DRT
004F	Main memory parity error.
006	**25V76-1 and 25V76-2 Telecommunication Device Adapter/Controllers**
0060	DCT not loaded.
0061	Telecommunication Device Adapter not operational.
0062	Main memory alignment error.
0063	Main memory ECC error.
0064	Main memory addressing error.
0065	Invalid command detected.
0066	Device Adapter issued Quit command.
0067	Send command fails.
0068	Invalid request.
0069	Write not allowed.
006A	Invalid Device Adapter RAM address detected.
006B	Address exceeds "top of memory" (maximum memory allocated).
006C	Request overflow
006D	Send data fails.
006E	Request time-out error.
006F	Device Adapter hardware failure.
007	**25V67 Universal Intelligent Serial I/O DAC (Control Mode)**
0070	Undefined error.
0071	UISIO Device Adapter/Controller central processor parity error.
0072	Unknown command received from serial device.
0073	Workstation Zero (WS-0) microcode failed to be loaded.
0074	Device Adapter microcode failed to be loaded.
0075	Device Adapter response command time-out error.
0076	Protocol error.
0077	Device Adapter main memory ECC error.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
008	**25V67 Universal Intelligent SIO DAC (Non-Control Mode)**
0080	Undefined error.
0081	Protocol error.
0082	Device Adapter/Controller not operational.
0083	Device Adapter data RAM time-out error.
0084	Device Adapter static RAM time-out error.
0085	Device Adapter response command time-out error.
0086	Relative main memory address alignment error.
0088	Request overflow.
0089	Device Adapter Reset time-out error.
008A	Bus Processor parity error.
008B	Main memory ECC error.
008C	Main memory parity error.
008D	Invalid IOCW detected.
008E	Invalid DRT
009	**Initial Program Load (IPL) Generated Error Codes**
0090	Serial I/O Device Adapter PCA not found at hardware address '04xx'.
0091	Serial I/O Device Adapter detected more than four tape devices attached. (Only the last four will operate in extended MSEM mode.)
00E-00F	**80286 Bus Processor Operational Microcode (@MCBP1@)**
00E0	Unable to load microcode to Workstation Zero (WS-0). (Attempt to clear condition by powering WS-0 OFF then ON.)
00E1	Main Memory parity error occurred during a Code RAM DMA.
00E2	Main Memory (MM) DMA attempted to access a nonexistent address.
00E3	Bus Processor Data RAM (DRAM) parity error has occurred.
00E4	Boot Device switch (Operational Control Panel) in wrong position.
00E5	Pascal exception of unknown origin occurred.
00E6	Invalid device adapter type has been detected.
00E7	DMA operation between Data RAM and Main Memory time-out error.
00E8	Central Processor set an illegal command out area code.
00E9	Repeated DMA attempts for command out area failed. Bus Processor initiates entry into Control Mode.
00EA	Repeated DMA attempts for processor interrupt area failed. Bus Processor initiates entry into Control Mode.
00EB	SIO/CIO raced with Error Completion (EC) or Normal Completion (NC) IOSW (possible Operating System failure). Bus Processor initiates entry into Control Mode.
00EC	Intervention Required (IRQ)/Data Area Early Release (DAR) raced with EC or NC IOSW (possible Operating System failure). Bus Processor initiates entry into Control Mode.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
00E-00F	**80286 Bus Processor Operational Microcode (@MCBP1@) - (Cont'd)**
00ED	Main Memory error correction count exceeded its limit of one. Bus Processor initiates entry into Control Mode.
00F3	Invalid IPL device Physical Device Address (PDA) received from diagnostics.
00F4	IPL device returned damaged status (hardware error).
00F5	IPL device was not ready (IRQ - Intervention Required).
00F6	BP memory or disk address error while accessing IPL device.
00FE	Bus Processor parity error.
01	**PROM POWER-ON TEST**
0100	Bus Processor code hung on jump to routine start.
0101	Bus Processor code hung on segment register load.
0102	Bus Processor code hung when wait state generator set.
02	**PROM CHECK-SUM TEST**
0201	Bus Processor PROM check-sum error.
04	**INPUT/OUTPUT COMMUNICATION TEST**
0401	Bus Processor cannot access I/O address 4 (DMAR = Data RAM MAR).
05	**FRONT PANEL TEST**
0501	Control Mode Status Bit cannot be reset.
0502	Control Mode Latch not cleared after being set.
05xx	The value '00xx' is equal to the Bus Processor Diagnostic switch settings (in HEX) which are continuously displayed when the loop routine is initiated by system operator. (Depress Control Mode button to continue normal power-up testing.)
06	**PROGRAMMABLE INTERRUPT CONTROLLERS (PIC 0-4)**
0600	Bus Processor routine halted, unknown cause.
0601	BP 8259 mask not readable on Master. The value of the Source Index (SI) register (a register found in the 80286 microprocessor chip) is equal to the mask pattern.
0602	BP 8259 mask not readable on Slave 4: SI is equal to mask pattern.
0603	BP 8259 mask not readable on Slave 3: SI is equal to mask pattern.
0604	BP 8259 mask not readable on Slave 2: SI is equal to mask pattern.
0605	BP 8259 mask not readable on Slave 1: SI is equal to mask pattern.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
08	**PROGRAMMABLE INTERVAL TIMER NUMBER 1 (PIT-0)**
0800	Bus Processor routine halted, unknown cause.
0801	BP data miscompare on PIT count read: SI equals Expected Value; DI (Destination Index register) equals Received Value. (The DI register is found in the 80286 microprocessor chip.)
0802	Bus Processor PIT Counter 0 incorrect.
0803	Bus Processor PIT Counter 1 incorrect.
0805	Bus Processor PIT interrupt request did not occur.
0806	Bus Processor PIT interrupt level incorrect.
09	**PROGRAMMABLE INTERVAL TIMER NUMBER 2 (PIT-1)**
0900	Bus Processor routine halted, unknown cause.
0901	BP data miscompare on PIT count read: SI equals Expected Value; DI equals Received Value.
0902	Bus Processor PIT Counter 0 incorrect.
0903	Bus Processor PIT Counter 1 incorrect.
0904	Bus Processor PIT Counter 2 incorrect.
0905	Bus Processor PIT interrupt request did not occur.
0906	Bus Processor PIT interrupt level incorrect.
0A	**DATA RAM COMMUNICATION TEST**
0A01	Bus Processor Data RAM parity error cannot be cleared.
0A02	Bus Processor DRAM address 'zero' cannot be accessed.
0A03	Bus Processor DRAM low-byte parity error cannot be forced.
0A04	Bus Processor DRAM high-byte parity error cannot be forced.
0A05	Bus Processor DRAM not available: BX equals DRAM status. (BX - A general purpose data register found in the 80286 chip).
0A06	Bus Processor DRAM low-byte parity error cannot be cleared.
0A07	Bus Processor DRAM high-byte parity error cannot be cleared.
0C	**RAM AND PARITY RAM DATA LINE TEST**
0C00	Bus Processor routine halted, unknown cause.
0C01	Bus Processor RAM data miscompare.
0C02	Unexpected Bus Processor parity error.
0C03	Bus Processor RAM data miscompare.
0C04	Forced Bus Processor parity error not detected.
0E	**RAM ADDRESS LINES TEST**
0E00	Bus Processor routine halted, unknown cause.
0E01	Bus Processor RAM data miscompare.
0E02	Unexpected Bus Processor parity error.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
0E	**RAM ADDRESS LINES TEST - (Cont'd)**
0E03	Bus Processor RAM chip addressing error.
0E04	Bus Processor parity RAM chip addressing error.
0F	**BANK ADDRESSING TEST**
0F01	Data error Bank Address read.
0F02	Parity error Bank Address read.
0F03	Data error Bank Address read.
0F04	Parity error Bank Address read.
10	**DATA RAM INTEGRITY TEST, HALFWORD OPERATIONS**
1000	Bus Processor routine halted, unknown cause.
1001	Bus Processor RAM data miscompare, pattern B6DB HEX.
1002	Unexpected Bus Processor parity error, pattern B6DB HEX.
11	**CODE RAM INTEGRITY TEST, HALFWORD OPERATIONS**
1101	Bus Processor RAM data miscompare, pattern B6DB HEX.
1102	Unexpected Bus Processor parity error, pattern B6D6 HEX.
1103	Bus Processor RAM data miscompare, pattern B6D6 HEX, first read.
1104	Forced Bus Processor parity error on low byte not detected.
12	**RAM INTEGRITY TEST, LOW BYTE OPERATIONS**
1201	Bus Processor RAM data miscompare, pattern 6C HEX, low byte.
1202	Unexpected Bus Processor parity error, pattern 6C HEX, low byte.
13	**RAM INTEGRITY TEST, HIGH BYTE OPERATIONS**
1301	Bus Processor RAM data miscompare, pattern DB HEX, high byte.
1302	Forced BP parity error not detected, pattern DB HEX, high byte.
14	**RAM BLOCK MOVE OPERATIONS AND NOISE SENSITIVITY TESTS**
1403	BP RAM data miscompare, '0' in bank of '1's, low address.
1404	BP RAM data miscompare, '0' in bank of '1's, high address.
15	**CODE RAM DATA INVERSION**
1501	Bus Processor Code RAM (CRAM) parity error.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
16	**CODE RAM REFRESH TEST**
1601	Data error on initial write/read.
1602	Parity error on initial write/read.
1603	Data error on read after refresh.
1604	Parity error on read after refresh.
17	**CRAM ODD/EVEN HALFWORD/BYTE OPERATIONS**
1703	Data error after write halfword string to an odd address.
1704	Data error after write halfword string to an even address.
1705	Data error after write byte string to an odd address.
1706	Data error after write byte string to an even address.
1707	Data error after write halfword to an odd address.
1708	Data error after write halfword to an even address.
1709	Data error after write byte to an odd address.
170A	Data error after write byte to an even address.
18	**DMA LOGIC TEST**
1801	DMA chip status register not 'zero' after Master clear.
1802	Cannot access address register 'zero'.
1803	Address data not returning properly.
1804	Internal addressing on DMA chip bad.
1805	Data error after DRAM to DRAM DMA data transfer.
1806	No Terminal Count interrupt when doing memory to memory DMA.
20	**PARITY ERROR INTERRUPT ROUTINE**
2000	Bus Processor routine halted, unknown cause.
2001	Bus Processor Code RAM parity error interrupt not detected.
2002	Bus Processor Data RAM parity error interrupt not detected.
38	**DISKETTE POWER-UP TEST (See also 98xx)**
3800	Hung on floppy test entry.
380A	Floppy Disk Controller (FDC) not ready for commands after reset.
380B	FDC error on sense drive status command.
380C	FDC error on recalibrate command.
380D	Diskette drive not at track zero after recalibrate command.
3C	**MODEM LOOP-BACK SELF-TEST DIAGNOSTIC (CRAM-BASED) (@BT0500@ from @DIAGST@ Execution)**
3C01	USART (8251), or USART input line failure.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
3C	**MODEM LOOP-BACK SELF-TEST DIAGNOSTIC (CRAM-BASED) (@BT0500@ from @DIAGST@ Execution) - (Cont'd)**
3C02	USART, Carrier Detect or data line, clock, or modem failure. (Status bit 7 not set, status not equal to '0FF' HEX.)
3C03	I/O decode logic, or inverter failure. (Status bit 7 not set, status not equal to '085' HEX.)
3C04	USART, or modem failure.
3C05	USART failure. ('RxRdy' not set).
3C06	USART, buffer or modem failure. ('TxE' not set.)
3C07	USART, buffer or modem failure. ('TxRdy' not set.)
3C08	USART, buffer or modem failure. (Overrun error detected.)
3C09	USART, buffer or modem failure. ('TxE' not reset.)
3C0A	USART, modem failure. ('RxRdy' not set.)
3C0B	USART failure. ('FE' not set.)
3C0C	USART, modem failure. ('PE' not set.)
3C0D	USART failure. (Received value did not equal current value.)
3C2C	Local Control/Remote Diagnostic/Remote Control switch or buffer failure.

NOTES

1. This is a CRAM-based diagnostic test, loaded by the Self-Test Diagnostic program (during the execution of the STD) and NOT part of the PROM-based power-up diagnostic sequence.

2. Whenever a failure occurs and the error sources listed include the modem, replace the modem with a loop-back connector to isolate the failing unit.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
3E	**UNEXPECTED INTERRUPT HANDLER**
3Exx	Unexpected BP interrupt, where 'xx' equals interrupt type serviced.
3EFF	Unexpected BP interrupt. The interrupt type is unknown.
400-404	**Load Bootstrap File Hardware/Software Failure (Bootstrap Loader Sequence - Read Track Zero)**
4000	Hung during Bootstrap operation.
4010	External disk error on volume label read or unlabeled volume found.
4011	External disk (boot device) media error.
4012	External disk hardware error on device adapter.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
4014	External disk drive not ready.
4018	External disk program (parameter) error or Bus Processor failure.
401A	External disk selected is non-bootstrap volume.
401C	External disk check-sum failure on bootstrap file.
401E	External disk device adapter not present in system. (Also indicates 'Boot Device switch in EXT position incorrect position'.)
4020	Diskette error on volume label read or unlabeled volume.
4021	Diskette (boot device) media error.
4022	Diskette hardware (controller) error.
4024	Diskette drive not ready.
4028	Diskette program (parameter) error or Bus Processor failure.
402A	Diskette selected is non-bootstrap volume.
402C	Diskette check-sum failure on bootstrap file.
4040	Internal fixed disk error on volume label read or unlabeled volume.
4041	Internal fixed disk (boot device) media error.
4042	Internal fixed disk hardware error on device adapter.
4044	Internal fixed disk drive not ready.
4048	Internal fixed disk program (parameter) error or BP failure.
404A	Internal fixed disk selected is non-bootstrap volume.
404C	Internal fixed disk check-sum failure on bootstrap file.
404E	Internal fixed disk device adapter not present in system.
409-40C	**Load Bootstrap File Hardware/Software Failure (Bootstrap Loader Sequence - Read Files)**
4090	External disk error on volume label read or unlabeled volume found.
4091	External disk media error during bootstrap file read.
4092	External disk hardware error on device adapter during file read.
4094	External disk drive not ready for file read.
4098	External disk program (parameter) error or BP failure.
409A	External disk selected is non-bootstrap volume.
409C	External disk check-sum failure on bootstrap file read.
409E	External disk device adapter not present in system.
40A0	Diskette error on volume label read or unlabeled volume.
40A1	Diskette media error during bootstrap file read.
40A2	Diskette hardware (controller) error during file read.
40A4	Diskette drive not ready for file read.
40A8	Diskette program (parameter) error or Bus Processor failure.
40AA	Diskette selected is non-bootstrap volume.
40AC	Diskette check-sum failure on bootstrap file read.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
409-40C	**Load Bootstrap File Hardware/Software Failure (Bootstrap Loader Sequence - Read Files) - (Cont'd)**
40C0	Internal disk error on volume label read or unlabeled volume.
40C1	Internal disk media error during bootstrap file read.
40C2	Internal disk hardware error on device adapter during file read.
40C4	Internal disk drive not ready for file read.
40C8	Internal disk program (parameter) error or Bus Processor failure.
40CA	Internal disk selected is non-bootstrap volume.
40CC	Internal disk check-sum failure on bootstrap file read.
40CE	Internal disk device adapter not present in system.

B.3 CRAM-BASED FILE LOADING DIAGNOSTIC ERROR CODES

Unless otherwise noted, the following Diagnostic Error Codes are CRAM-based error codes generated by a file loading failure (hardware and/or software) during the system power-up sequence.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
41	**BOOTSTRAP LOADER FILE HARDWARE FAILURE (Load @MCBOOT@ from @SYSTEM@)**	
4110	Unlabeled volume (VOL1 missing).	Volume Label
4111	Media error.	Volume Label
4112	Controller hardware error.	Volume Label
4114	Drive not ready.	Volume Label
4116	Program error (divide).	Volume Label
4118	Program error (bad data).	Volume Label
4119	Media error.	Bit Map
411A	Controller hardware error.	Bit Map
411C	Drive not ready.	Bit Map
411E	Program error (divide).	Bit Map
4120	Program error (bad data).	Bit Map
4121	Media error.	VTOC
4122	Controller hardware error.	VTOC
4124	Drive not ready.	VTOC
4126	Program error (divide).	VTOC
4128	Program error (bad data).	VTOC
412A	FDX1 identification does not match.	VTOC
412B	FDX2 identification does not match.	VTOC
412C	FDR1 identification does not match.	VTOC

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
4131	Media error.	Self-Test Diagnostic
4132	Controller hardware error.	Self-Test Diagnostic
4133	Check-sum does not match.	Self-Test Diagnostic
4134	Drive not ready.	Self-Test Diagnostic
4136	Program error (divide).	Self-Test Diagnostic
4138	Program error (bad data).	Self-Test Diagnostic
413A	Library not found.	Self-Test Diagnostic
413B	File not found.	Self-Test Diagnostic
413C	FDR1 not found.	Self-Test Diagnostic
413E	Extents greater than three.	Self-Test Diagnostic
4141	Media error.	Diagnostic Monitor
4142	Controller hardware error.	Diagnostic Monitor
4143	Check-sum does not match.	Diagnostic Monitor
4144	Drive not ready.	Diagnostic Monitor
4146	Program error (divide).	Diagnostic Monitor
4148	Program error (bad data).	Diagnostic Monitor
414A	Library not found.	Diagnostic Monitor
414B	File not found.	Diagnostic Monitor
414C	FDR1 not found.	Diagnostic Monitor
414E	Extents greater than three.	Diagnostic Monitor
4151	Media error.	System Loader
4152	Controller hardware error.	System Loader
4153	Check-sum does not match.	System Loader
4154	Drive not ready.	System Loader
4156	Program error (divide).	System Loader
4158	Program error (bad data).	System Loader
415A	Library not found.	System Loader
415B	File not found.	System Loader
415C	FDR1 not found.	System Loader
415E	Extents greater than three.	System Loader
41F	**Miscellaneous Serial Device Hardware Failures (Load @MCBOOT@ from @SYSTEM@)**	
41F3	Invalid hardware configuration.	
41F4	Diskette status error.	
41FD	Bus Processor Data RAM parity error.	
41FE	Bus Processor Code RAM parity error.	
41FF	Unknown interrupt on the Bus Processor.	
420-422	**Self-Test Diagnostic Boot Device and/or IPL Device Failure (Load @NORMAL@ from @DIAGST@ on System Disk)**	
420F	Incompatible version of Self-Test Diagnostic code.	

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
420-422	**Self-Test Diagnostic Boot Device and/or IPL Device Failure (Load @NORMAL@ from @DIAGST@ on System Disk) - (Cont'd)**	
4210	Unlabeled volume (VOL1 missing).	Volume Label
4211	Media error.	Volume Label
4212	Controller hardware error.	Volume Label
4214	Drive not ready.	Volume Label
4216	Program error (divide).	Volume Label
4218	Program error (bad data).	Volume Label
4219	Media error.	Bit Map
421A	Controller hardware error.	Bit Map
421C	Drive not ready.	Bit Map
421E	Program error (divide).	Bit Map
4220	Program error (bad data).	Bit Map
4221	Media error.	VTOC
4222	Controller hardware error.	VTOC
4224	Drive not ready.	VTOC
4226	Program error (divide).	VTOC
4228	Program error (bad data).	VTOC
422A	FDX1 identification does not match.	VTOC
422B	FDX2 identification does not match.	VTOC
422C	FDR1 identification does not match.	VTOC
423	**Workstation Zero Loader Failure (Load WS-0 File from @DIAGST@)**	
4231	Media error.	@SLFWS0@ File
4232	Controller hardware error.	@SLFWS0@ File
4233	Check-sum does not match.	@SLFWS0@ File
4234	Drive not ready.	@SLFWS0@ File
4236	Program error (divide).	@SLFWS0@ File
4238	Program error (bad data).	@SLFWS0@ File
423A	Library not found.	@SLFWS0@ File
423B	File not found.	@SLFWS0@ File
423C	FDR1 not found.	@SLFWS0@ File
423E	Extents greater than three.	@SLFWS0@ File
424	**Universal Intelligent Serial I/O Loader Failure (Load UISIO File from @DIAGST@)**	
4241	Media error.	@MONISIO@ File
4242	Controller hardware error.	@MONISIO@ File
4243	Check-sum does not match.	@MONISIO@ File
4244	Drive not ready.	@MONISIO@ File
4246	Program error (divide).	@MONISIO@ File
4248	Program error (bad data).	@MONISIO@ File

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
424A	Library not found.	@MONISIO@ File
424B	File not found.	@MONISIO@ File
424C	FDR1 not found.	@MONISIO@ File
424E	Extents greater than three.	@MONISIO@ File
426	**Bus Processor USART/Modem Loop-Back Loader Failure (Diagnostic Test 2 = @BT0500@ from @DIAGST@)**	
4261	Media error.	Diagnostic Test 2
4262	Controller hardware error.	Diagnostic Test 2
4263	Controller hardware error.	Diagnostic Test 2
4264	Drive not ready.	Diagnostic Test 2
4266	Program error (divide).	Diagnostic Test 2
4268	Program error (bad data).	Diagnostic Test 2
426A	Library not found.	Diagnostic Test 2
426B	File not found.	Diagnostic Test 2
426C	FDR1 not found.	Diagnostic Test 2
426E	Extents greater than three.	Diagnostic Test 2
427	**Central Processor Control Memory and Communications Loader Failure (Diagnostic Test 3 = @CT0100@ from @DIAGST@)**	
4271	Media error.	Diagnostic Test 3
4272	Controller hardware error.	Diagnostic Test 3
4273	Controller hardware error.	Diagnostic Test 3
4274	Drive not ready.	Diagnostic Test 3
4276	Program error (divide).	Diagnostic Test 3
4278	Program error (bad data).	Diagnostic Test 3
427A	Library not found.	Diagnostic Test 3
427B	File not found.	Diagnostic Test 3
427C	FDR1 not found.	Diagnostic Test 3
427E	Extents greater than three.	Diagnostic Test 3
428	**Central Processor Operational Loader Failure (Diagnostic Test 4 = @CT0200@ from @DIAGST@)**	
4281	Media error.	Diagnostic Test 4
4282	Controller hardware error.	Diagnostic Test 4
4283	Controller hardware error.	Diagnostic Test 4
4284	Drive not ready.	Diagnostic Test 4
4286	Program error (divide).	Diagnostic Test 4
4288	Program error (bad data).	Diagnostic Test 4
428A	Library not found.	Diagnostic Test 4
428B	File not found.	Diagnostic Test 4
428C	FDR1 not found.	Diagnostic Test 4
428E	Extents greater than three.	Diagnostic Test 4

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
429	**Central Processor Integrity Loader Failure (Diagnostic Test 5 = @CT0300@ from @DIAGST@)**	
4291	Media error.	Diagnostic Test 5
4292	Controller hardware error.	Diagnostic Test 5
4293	Controller hardware error.	Diagnostic Test 5
4294	Drive not ready.	Diagnostic Test 5
4296	Program error (divide).	Diagnostic Test 5
4298	Program error (bad data).	Diagnostic Test 5
429A	Library not found.	Diagnostic Test 5
429B	File not found.	Diagnostic Test 5
429C	FDR1 not found.	Diagnostic Test 5
429E	Extents greater than three.	Diagnostic Test 5
42A	**Central Processor/Cache/Main Memory (Integrity) Loader Failure (Diagnostic Test 6 = @MT0100@ from @DIAGST@)**	
42A1	Media error.	Diagnostic Test 6
42A2	Controller hardware error.	Diagnostic Test 6
42A3	Controller hardware error.	Diagnostic Test 6
42A4	Drive not ready.	Diagnostic Test 6
42A6	Program error (divide).	Diagnostic Test 6
42A8	Program error (bad data).	Diagnostic Test 6
42AA	Library not found.	Diagnostic Test 6
42AB	File not found.	Diagnostic Test 6
42AC	FDR1 not found.	Diagnostic Test 6
42AE	Extents greater than three.	Diagnostic Test 6
42B	**Bus Processor/Main Memory DMA Loader Failure (Diagnostic Test 7 = @BT0900@ from @DIAGST@)**	
42B1	Media error.	Diagnostic Test 7
42B2	Controller hardware error.	Diagnostic Test 7
42B3	Controller hardware error.	Diagnostic Test 7
42B4	Drive not ready.	Diagnostic Test 7
42B6	Program error (divide).	Diagnostic Test 7
42B8	Program error (bad data).	Diagnostic Test 7
42BA	Library not found.	Diagnostic Test 7
42BB	File not found.	Diagnostic Test 7
42BC	FDR1 not found.	Diagnostic Test 7
42BE	Extents greater than three.	Diagnostic Test 7
42C	**Dual Processor (BP and CP) to Main Memory/Cache Loader Failure (Diagnostic Test 8 = @MT0200@ from @DIAGST@)**	
42C1	Media error.	Diagnostic Test 8
42C2	Controller hardware error.	Diagnostic Test 8

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
42C3	Controller hardware error.	Diagnostic Test 8
42C4	Drive not ready.	Diagnostic Test 8
42C6	Program error (divide).	Diagnostic Test 8
42C8	Program error (bad data).	Diagnostic Test 8
42CA	Library not found.	Diagnostic Test 8
42CB	File not found.	Diagnostic Test 8
42CC	FDR1 not found.	Diagnostic Test 8
42CE	Extents greater than three.	Diagnostic Test 8
42E-42F	**Miscellaneous Serial Device Hardware Failures (@MCBOOT@ from @SYSTEM@ Execution)**	
42E0	SIO time-out error.	
42E1	SIO overrun error.	
42E2	SIO Data RAM parity error.	
42E3	SIO serial parity error.	
42E4	UISIO time-out error.	
42E5	UISIO memory parity error.	
42E6	UISIO Data RAM parity error.	
42E7	UISIO serial parity error.	
42E8	UISIO data link time-out error.	
42E9	UISIO FIFO parity error.	
42EA	Workstation powered-off.	
42EB	Workstation coaxial parity error.	
42EC	Workstation memory parity error.	
42ED	Workstation has incorrect microcode.	
42EE	Workstation status invalid.	
42F2	Central Processor failure.	
42F3	Invalid hardware configuration.	
42F4	Diskette status error.	
42F5	Terminal identification byte not found.	
435	**Serial Input/Output (SIO) Device Adapter Loader Failure (Diagnostic Test 1.1 = @ST0500@ from @DIAGST@)**	
4351	Media error.	Diagnostic Test 1.1
4352	Controller hardware error.	Diagnostic Test 1.1
4353	Controller hardware error.	Diagnostic Test 1.1
4354	Drive not ready.	Diagnostic Test 1.1
4356	Program error (divide).	Diagnostic Test 1.1
4358	Program error (bad data).	Diagnostic Test 1.1
435A	Library not found.	Diagnostic Test 1.1
435B	File not found.	Diagnostic Test 1.1
435C	FDR1 not found.	Diagnostic Test 1.1
435E	Extents greater than three.	Diagnostic Test 1.1

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
436	**Universal Intelligent SIO Device Adapter Loader Failure (Diagnostic Test 1.2 = @ST0800@ from @DIAGST@)**	
4361	Media error.	Diagnostic Test 1.2
4362	Controller hardware error.	Diagnostic Test 1.2
4363	Controller hardware error.	Diagnostic Test 1.2
4364	Drive not ready.	Diagnostic Test 1.2
4366	Program error (divide).	Diagnostic Test 1.2
4368	Program error (bad data).	Diagnostic Test 1.2
436A	Library not found.	Diagnostic Test 1.2
436B	File not found.	Diagnostic Test 1.2
436C	FDR1 not found.	Diagnostic Test 1.2
436E	Extents greater than three.	Diagnostic Test 1.2
438	**Central Processor Operational Overlay Loader Failure (Overlay 4 = @CM0200@ from @DIAGST@)**	
4381	Media error.	Overlay 4
4382	Controller hardware error.	Overlay 4
4383	Controller hardware error.	Overlay 4
4384	Drive not ready.	Overlay 4
4386	Program error (divide).	Overlay 4
4388	Program error (bad data).	Overlay 4
438A	Library not found.	Overlay 4
438B	File not found.	Overlay 4
438C	FDR1 not found.	Overlay 4
438E	Extents greater than three.	Overlay 4
439	**Central Processor Integrity Overlay Loader Failure (Overlay 5 = @CM0300@ from @DIAGST@)**	
4391	Media error.	Overlay 5
4392	Controller hardware error.	Overlay 5
4393	Controller hardware error.	Overlay 5
4394	Drive not ready.	Overlay 5
4396	Program error (divide).	Overlay 5
4398	Program error (bad data).	Overlay 5
439A	Library not found.	Overlay 5
439B	File not found.	Overlay 5
439C	FDR1 not found.	Overlay 5
439E	Extents greater than three.	Overlay 5
43A	**Central Processor/Cache/Main Memory (Integrity) Overlay Loader Failure (Overlay 6 = @MM0100@ from @DIAGST@)**	
43A1	Media error.	Overlay 6
43A2	Controller hardware error.	Overlay 6

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
43A3	Controller hardware error.	Overlay 6
43A4	Drive not ready.	Overlay 6
43A6	Program error (divide).	Overlay 6
43A8	Program error (bad data).	Overlay 6
43AA	Library not found.	Overlay 6
43AB	File not found.	Overlay 6
43AC	FDR1 not found.	Overlay 6
43AE	Extents greater than three.	Overlay 6
43C	**Dual Processor (BP and CP) to Main Memory/Cache Overlay Loader Failure (Overlay 8 = @MM0200@ from @DIAGST@)**	
43C1	Media error.	Overlay 8
43C2	Controller hardware error.	Overlay 8
43C3	Controller hardware error.	Overlay 8
43C4	Drive not ready.	Overlay 8
43C6	Program error (divide).	Overlay 8
43C8	Program error (bad data).	Overlay 8
43CA	Library not found.	Overlay 8
43CB	File not found.	Overlay 8
43CC	FDR1 not found.	Overlay 8
43CE	Extents greater than three.	Overlay 8

B.4 CRAM-BASED LOAD IPL DEVICE FAILURE ERROR CODES

This paragraph lists the Diagnostic Error Codes displayed when a failure occurs during an attempt to load a system IPL device with applicable microcode.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
440-442	**System IPL Device Failure (Load @MCIPL@ from @SYSTEM@)**	
440F	Incompatible version of IPL code.	
4410	Unlabeled volume (VOL1 missing).	Volume Label
4411	Media error.	Volume Label
4412	Controller hardware error.	Volume Label
4414	Drive not ready.	Volume Label
4416	Program error (divide).	Volume Label
4418	Program error (bad data).	Volume Label
4419	Media error.	Bit Map
441A	Controller hardware error.	Bit Map
441C	Drive not ready.	Bit Map
441E	Program error (divide).	Bit Map
4420	Program error (bad data).	Bit Map
4421	Media error.	VTOC
4422	Controller hardware error.	VTOC

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
440-442	**System IPL Device Failure (Load @MCIPL@ from @SYSTEM@) - (Cont'd)**	
4424	Drive not ready.	VTOC
4426	Program error (divide).	VTOC
4428	Program error (bad data).	VTOC
442A	FDX1 identification does not match.	VTOC
442B	FDX2 identification does not match.	VTOC
442C	FDR1 identification does not match.	VTOC
443-44C	**System IPL Device Failure (Load Device File from @SYSTEM@)**	
4431	Media error.	Workstation File
4432	Controller hardware error.	Workstation File
4433	Check-sum does not match.	Workstation File
4434	Drive not ready.	Workstation File
4436	Program error (divide).	Workstation File
4438	Program error (bad data).	Workstation File
443A	Library not found.	Workstation File
443B	File not found.	Workstation File
443C	FDR1 not found.	Workstation File
443E	Extents greater than three.	Workstation File
4461	Media error.	@MCCP@ File
4462	Controller hardware error.	@MCCP@ File
4463	Controller hardware error.	@MCCP@ File
4464	Drive not ready.	@MCCP@ File
4466	Program error (divide).	@MCCP@ File
4468	Program error (bad data).	@MCCP@ File
446A	Library not found.	@MCCP@ File
446B	File not found.	@MCCP@ File
446C	FDR1 not found.	@MCCP@ File
446E	Extents greater than three.	@MCCP@ File
44C1	Media error.	@MCBP1@ File
44C2	Controller hardware error.	@MCBP1@ File
44C3	Controller hardware error.	@MCBP1@ File
44C4	Drive not ready.	@MCBP1@ File
44C6	Program error (divide).	@MCBP1@ File
44C8	Program error (bad data).	@MCBP1@ File
44CA	Library not found.	@MCBP1@ File
44CB	File not found.	@MCBP1@ File
44CC	FDR1 not found.	@MCBP1@ File
44CE	Extents greater than three.	@MCBP1@ File
44E-44F	**Miscellaneous Serial Device Hardware Failures**	
44E0	SIO time-out error.	

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
44E1	SIO overrun error.	
44E2	SIO Data RAM parity error.	
44E3	SIO serial parity error.	
44E4	UISIO time-out error.	
44E5	UISIO overrun error.	
44E6	UISIO Data RAM parity error.	
44E7	UISIO serial parity error.	
44E8	UISIO data link time-out error.	
44E9	UISIO FIFO parity error.	
44EA	Workstation powered-off.	
44EB	Workstation coaxial parity error.	
44EC	Workstation memory parity error.	
44ED	Workstation has no code.	
44EE	Workstation invalid status.	
44EF	Invalid 'Burn-In' table. (Also indicates Automatic Sequence function [PF8] not available.)	
44F0	DMA time-out error.	
44F1	DMA failure.	
44F2	Central Processor failure.	
44F3	Invalid hardware configuration.	
44F4	Diskette status error.	

B.5 CRAM-BASED LOAD DIAGNOSTIC MONITOR FAILURE ERROR CODES

This paragraph lists the Diagnostic Error Codes displayed when a failure occurs during the loading of the Small System VS Diagnostic Monitor software and its related programs.

45	**DIAGNOSTIC MONITOR DEVICE FAILURE (Load @MONITOR from @DIAGMN@)**	
4500	Monitor attempting to run remotely. (Also indicates LOCAL CONTROL/ REMOTE DIAGNOSTICS/REMOTE CONTROL switch is in REMOTE DIAGNOSTICS position.)	
4505	Monitor message buffer overflow.	
450F	Incompatible version of Diagnostic Monitor	
4510	Unlabeled volume (VOL1 missing).	Volume Label
4511	Media error.	Volume Label
4512	Controller hardware error.	Volume Label
4514	Drive not ready.	Volume Label
4516	Program error (divide).	Volume Label
4518	Program error (bad data).	Volume Label

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
45	**DIAGNOSTIC MONITOR DEVICE FAILURE (Load @MONITOR from @DIAGMN@) - (Cont'd)**	
4519	Media error.	Bit map
451A	Controller hardware error.	Bit map
451C	Drive not ready.	Bit map
451E	Program error (divide).	Bit map
4520	Program error (bad data).	Bit map
4521	Media error.	VTOC
4522	Controller hardware error.	VTOC
4524	Drive not ready.	VTOC
4526	Program error (divide).	VTOC
4528	Program error (bad data).	VTOC
452A	FDX1 identification does not match.	VTOC
452B	FDX2 identification does not match.	VTOC
452C	FDR1 identification does not match.	VTOC
4531	Media error.	Test Table
4532	Controller hardware error.	Test Table
4533	Controller hardware error.	Test Table
4534	Drive not ready.	Test Table
4536	Program error (divide).	Test Table
4538	Program error (bad data).	Test Table
453A	Library not found.	Test Table
453B	File not found.	Test Table
453C	FDR1 not found.	Test Table
453E	Extents greater than three.	Test Table
4541	Media error.	WS File
4542	Controller hardware error.	WS File
4543	Check-sum does not match.	WS File
4544	Drive not ready.	WS File
4546	Program error (divide).	WS File
4548	Program error (bad data).	WS File
454A	Library not found.	WS File
454B	File not found.	WS File
454C	FDR1 not found.	WS File
454E	Extents greater than three.	WS File
4551	Media error.	UISIO File
4552	Controller hardware error.	UISIO File
4553	Check-sum does not match.	UISIO File
4554	Drive not ready.	UISIO File
4556	Program error (divide).	UISIO File
4558	Program error (bad data).	UISIO File
455A	Library not found.	UISIO File
455B	File not found.	UISIO File
455C	FDR1 not found.	UISIO File
455E	Extents greater than three.	UISIO File

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
45E-45F	**Miscellaneous Serial Device Hardware Failures**	
45E0	SIO time-out error.	
45E1	SIO overrun error.	
45E2	SIO Data RAM parity error.	
45E3	SIO serial parity error.	
45E4	UISIO time-out error.	
45E5	UISIO memory parity error.	
45E6	UISIO Data RAM parity error.	
45E7	UISIO serial parity error.	
45E8	UISIO data link time-out error.	
45E9	UISIO FIFO parity error.	
45EA	Workstation powered-off.	
45EB	Workstation coaxial parity error.	
45EC	Workstation memory parity error.	
45ED	Workstation microcode not loaded.	
45EE	Workstation status invalid.	
45EF	Invalid "Burn-In" (Automatic Sequence) table. (Also indicates Automatic Sequence function [PF8] not available.)	
45F0	DMA time-out error.	
45F1	DMA failure.	
45F2	Central Processor failure.	
45F3	Invalid hardware configuration.	
45F4	Diskette status error.	
45F5	No terminal device adapter found.	
45FA	Lost Data Set Ready.	
45FB	Transmit data error.	
45FC	Receive data error.	
46x-49x	**Diagnostic Monitor Test File Failure**	
46x1	Media error.	Test File x
46x2	Controller hardware error.	Test File x
46x3	Controller hardware error.	Test File x
46x4	Drive not ready.	Test File x
46x6	Program error (divide).	Test File x
46x8	Program error (bad data).	Test File x
46xA	Library not found.	Test File x
46xB	File not found.	Test File x
46xC	FDR1 not found.	Test File x
46xE	Extents greater than three.	Test File x
47x1	Media error.	Test File x
47x2	Controller hardware error.	Test File x

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
46x-49x	**Diagnostic Monitor Test File Failure - (Cont'd)**	
47x3	Controller hardware error.	Test File x
47x4	Drive not ready.	Test File x
47x6	Program error (divide).	Test File x
47x8	Program error (bad data).	Test File x
47xA	Library not found.	Test File x
47xB	File not found.	Test File x
47xC	FDR1 not found.	Test File x
47xE	Extents greater than three.	Test File x
48x1	Media error.	Test File x
48x2	Controller hardware error.	Test File x
48x3	Controller hardware error.	Test File x
48x4	Drive not ready.	Test File x
48x6	Program error (divide).	Test File x
48x8	Program error (bad data).	Test File x
48xA	Library not found.	Test File x
48xB	File not found.	Test File x
48xC	FDR1 not found.	Test File x
48xE	Extents greater than three.	Test File x

NOTES

1. The value of 'x' is determined by the LOGICAL file number of the Test (or Overlay) Program described in table 8-3 (Diagnostic Monitor Programs, page 8-8 of this manual).

2. Error codes '46x' and '47x' are reserved for the diagnostic test programs while error codes '48x' and '49x' are reserved for the diagnostic overlay programs.

3. For example, an error code of 46EB indicates that diagnostic program number E (HEX) was not found in library @DIAGMN@. Program 'E' converts to Program 15 (14 logical) which is the Main Memory Test (@MT1000@).

4. If, however, the error code was 48EB, this would indicate that diagnostic overlay program 15 @MM1000@ was not found.

49x1	Media error.	Test File x
49x2	Controller hardware error.	Test File x
49x3	Controller hardware error.	Test File x
49x4	Drive not ready.	Test File x

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION	(LOCATION OR OTHER COMMENTS)
49x6	Program error (divide).	Test File x
49x8	Program error (bad data).	Test File x
49xA	Library not found.	Test File x
49xB	File not found.	Test File x
49xC	FDR1 not found.	Test File x
49xE	Extents greater than three.	Test File x

B.6 CRAM-BASED SELF-TEST DIAGNOSTIC EXECUTION ERROR CODES

Unless otherwise noted, the following Diagnostic Error Codes are CRAM-based error codes displayed when a failure occurs during the execution of a Self-Test Diagnostic program.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
4B	**CP CONTROL MEMORY AND COMMUNICATIONS SELF-TEST DIAGNOSTIC (@CT0100@ from @DIAGST@ Execution)**
4B80	Central Processor does not respond to HALT command from Bus Processor or Central Processor. MIC cannot be loaded to zero (0) from BP.
4B81	Data miscompare on low halfword of Control Memory.
4B82	Central Processor External Bus error.
4B83	Unable to Read/Write Control Memory.
4B84	Data miscompare on middle halfword of Control Memory.
4B85	Data miscompare on high halfword of Control Memory.
4B86	Central Processor MIC data miscompare.
4B87	Data bit and possible addressing error when accessing low halfword of Control Memory.
4B88	Data bit and possible addressing error when accessing middle halfword of Control Memory.
4B89	Data bit and possible addressing error when accessing high halfword of Control Memory.
4B8A	Error in address line, Control Memory low halfword overwritten.
4B8B	Error in address line, Control Memory middle halfword overwritten.
4B8C	Error in address line, Control Memory high halfword overwritten.
4B8D	Data miscompare in Read/Write sequence for Control Memory low halfword.
4B8E	Data miscompare in Read/Write sequence for Control Memory middle halfword.
4B8F	Data miscompare in Read/Write sequence for Control Memory high halfword.
4B90	Possible memory pattern sensitivity error (noise) on Control Memory low halfword.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
4B	**CP CONTROL MEMORY AND COMMUNICATIONS SELF-TEST DIAGNOSTIC (@CT0100@ from @DIAGST@ Execution) - (Cont'd)**
4B91	Possible memory pattern sensitivity error (noise) on Control Memory middle halfword.
4B92	Possible memory pattern sensitivity error (noise) on Control Memory high halfword.
4B93	Central Processor hardware status register error: Bit 0 not set after issuing halt.
4B94	Central Processor hardware status register error: Bit 1 not reset when comparator disabled.
4B95	Central Processor hardware status register error: Bit 1 not set when comparator enabled.
4B96	Central Processor hardware status register error: Bit 0 not set after execution of NOP instruction which should indicate halt.
4B97	Central Processor Halted interrupt not detected after execution of NOP instruction.
4B98	CP hardware status register error: Central Processor CIO 7 status bit (bit 3) not set after execution of a NOP instruction.
4B99	CP Halted interrupt not detected when a CIO 7 instruction executed.
4B9A	CP hardware status register error: Central Processor CIO 7 status bit (bit 3) not reset after execution of a NOP instruction.
4B9B	Sync interrupt not detected when comparator was enabled and MIC and comparator address should have been the same.
4B9C	Forced parity error not detected.
4B9D	Control Memory parity check error. Possible open on data line for low halfword of control memory.
4B9E	Control Memory parity check error. Possible open on data line for middle halfword of control memory.
4B9F	Control Memory parity check error. Possible open on data line for high halfword of control memory.
4BA0	Central Processor MIC value incorrect after step.
4BA1	Central Processor IO3 status bit not cleared.
4BA2	BP IO3 status bit not reset.
4BA3	Central Processor IO4 status bit not cleared.
4BA4	BP IO4B status bit not set after clear IO4B executed by CP.
4BA5	BP IO4B status bit not cleared by Central Processor.
4BA6	BP IO3 status bit not set.
4BA7	BP IO4B status bit not set.
4BA8	IO4B status bit not set by BP command.
4BA9	IO3 status bit not set by BP command.
4BAA	IO3 interrupt not detected when IO3 cleared.
4BAB	IO4B interrupt not detected when IO4B cleared.
4BAC	Central Processor not halted at CIO 7 instruction.
4BAD	Sync interrupt not received with comparator disables.
4BAE	MIC incorrect after CIO 7 executed.
4BAF	Central Processor not halted at Sync address with Sync halt enable.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
4BB0	Sync interrupt not taken with sync halt enable.
4BB1	Halt interrupt not taken with sync halt enable.
4BB2	Unexpected C-Bus latch contents after ORI instruction.
4BB3	Multiple Halt interrupts occurred.
4BB4	Multiple IO4B interrupts occurred.
4BB5	Multiple IO3 interrupts occurred.
4BB6	Multiple Sync interrupts occurred.
4BB7	Time-out on Free-Running Test. Halt interrupt should have occurred.
4C	**CENTRAL PROCESSOR OPERATIONAL SELF-TEST DIAGNOSTIC (@CT0200@ from @DIAGST@ Execution)**
4C80	Time-out error. Central Processor did not halt when expected or halt interrupt was no detected. Probable CP or Main Memory failure.
4C90	CP detected error in Central Processor or Main Memory.
4CFC	Multiple Halt interrupts occurred.
4CFD	Multiple IO3 interrupts occurred.
4CFE	Multiple IO4B interrupts occurred.
4CFF	Multiple Sync interrupts occurred.
4D	**CENTRAL PROCESSOR INTEGRITY SELF-TEST DIAGNOSTIC (@CT0300@ from @DIAGST@ Execution)**
4D80	Time-out error. Central Processor did not halt when expected or halt interrupt was no detected. Probable CP or Main Memory failure.
4D90	Central Processor detected error in Central Processor or Main Memory.
4DFC	Multiple Halt interrupts occurred.
4DFD	Multiple IO3 interrupts occurred.
4DFE	Multiple IO4B interrupts occurred.
4DFF	Multiple Sync interrupts occurred.
4Ex	**Central Processor/Cache/Main Memory (Integrity) Self-Test Diagnostic (@MT0100@ from @DIAGST@ Execution)**
4E80	Time-out error. Central Processor did not halt when expected or halt interrupt was no detected. Probable CP or Main Memory failure.
4E90	Central Processor detected error in Central Processor or Main Memory PCA.
4EFC	Multiple Halt interrupts occurred.
4EFD	Multiple IO3 interrupts occurred.
4EFE	Multiple IO4B interrupts occurred.
4EFF	Multiple Sync interrupts occurred.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
4EA	**Dual Processor (BP and CP) to Main Memory/Cache Self-Test Diagnostic (@MM0200@ from @DIAGST@ Execution)**
4EA0	Central Processor detected error in CP or Main Memory PCA.
4EA1	BP detected incomplete DMA during Main Memory WRITE operation.
4EA3	BP detected incomplete DMA during Main Memory READ operation.
4EA4	BP detected data miscompare in READ/WRITE sequence for Main Memory.
4EA5	BP detected data miscompare in READ/WRITE sequence for Main Memory.
4EA6	BP detected data miscompare in READ/WRITE sequence for Main Memory.
4EA7	BP detected data miscompare in READ/WRITE sequence for Main Memory.
4EAA	Time-out error. Central Processor did not HALT when expected, or HALT interrupt was not detected. Probable Central Processor or Main Memory failure.
4EAC	Central Processor HALTed at an undefined location.
4EAD	Unrecoverable (Fatal) error occurred.
4EAE	Central Processor HALTed at an incorrect location.
4EAF	Multiple interrupts occurred.
4F	**BUS PROCESSOR/MAIN MEMORY DMA SELF-TEST DIAGNOSTIC (@BT0900@ from @DIAGST@ Execution)**
4F01	Continuous Main Memory error correction count interrupt.
4F02	Continuous Bus Processor/Main Memory DMA interrupt.
4F03	Continuous Central Processor sync interrupt.
4F11	DRAM MAR data compare failure.
4F21	DRAM MAR changed after diagnostic ripple with ripple controls equal to 'zero'.
4F22	DRAM MAR incorrect value after diagnostic ripple with ripple controls equal to 'one'.
4F23	DRAM MAR incorrect value after diagnostic ripple with ripple controls equal to 'two'.
4F31	Main Memory MAR low data compare failure.
4F32	Main Memory MAR high data compare failure.
4F41	Main Memory MAR low incorrect value after diagnostic ripple.
4F42	Main Memory MAR high incorrect value after diagnostic ripple.
4F81	No DMA completion interrupt on transfer from DRAM to Main Memory address 'zero'.
4F82	No DMA completion interrupt on transfer from Main Memory address 'zero' to DRAM address displayed.
4F83	No data transferred on DMA from Main Memory address 'zero' to DRAM address displayed.
4F84	DRAM addressing failure: Actual address of transfer displayed not equal to Expected address.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
4F91	No DMA completion interrupt on transfer from DRAM to Main Memory address 'zero'.
4F92	No DMA completion interrupt on transfer from Main Memory to DRAM address 'zero'.
4F93	Data bus failure: Received data not equal to expected data.
4F94	Bus Processor DMA error status bits set on transfer from DRAM to Main Memory address 'zero'. (Bus Processor status displayed.)
4F95	Bus Processor DMA error status bits set on transfer from Main Memory to DRAM address 'zero'. (Bus Processor status displayed.)
4FA1	No DMA completion interrupt on transfer from DRAM to Main Memory address 'zero'.
4FA2	Bus Processor DMA error status bits set on transfer from DRAM to Main Memory address 'zero'. (Bus Processor status displayed.)
4FA3	No DMA completion interrupt on transfer from Main Memory to DRAM address 'zero'.
4FA4	BP DMA error status bits set on transfer from DRAM to Main Memory address 'zero'.
4FA5	Data received from Main Memory did not match expected data.
4FA6	No DMA completion interrupt on transfer from DRAM address 'zero' to Main Memory address displayed.
4FA7	BP DMA error status bits set on transfer from DRAM address 'zero' to Main Memory address displayed.
4FA8	Main Memory Invalid Memory Address (IMA) status bit set on access to valid Main Memory location.
4FA9	DRAM data altered on Main Memory IMA fault.
4FAA	No DMA completion interrupt on transfer from DRAM address 'zero' to Main Memory scan address displayed.
4FAB	Bus Processor DMA error status bits set on transfer from DRAM address 'zero' to Main Memory scan address displayed.
4FAC	Main Memory addressing failure: Data received from Main Memory scan location did not match expected data.
4FAD	Main Memory addressing failure: Data received from Main Memory test location did not match expected data.
4FAE	DRAM data altered by DMA to Main Memory test location.
4FAF	Access to Main Memory address greater than Lowest Word Address (LWA) set by Central Processor; sizing did not generate IMA fault.
4FD8	No DMA completion interrupt on multiword transfer from DRAM to Main Memory with MAR ripple equal to one.
4FD9	DMA register count fault: Received Value did not equal Expected Value.
4FE1	Unexpected interrupt from Main Memory ECC logging counter after initial programming.
4FE2	No DMA completion interrupt on 2K halfword transfer from DRAM to Main Memory.
4FE3	Bus Processor DMA error status bits set on 2K halfword transfer from DRAM to Main Memory.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
4F	**BUS PROCESSOR/MAIN MEMORY DMA SELF-TEST DIAGNOSTIC (@BT0900@ from @DIAGST@ Execution) - (Cont'd)**
4FE4	Unexpected interrupt from ECC logging counter on 2K halfword transfer from DRAM to Main Memory.
4FE5	No DMA completion interrupt on 2K halfword transfer from DRAM to Main Memory while operating in the non-ECC mode.
4FE6	Bus Processor DMA error status bits set on 2K halfword transfer from DRAM to Main Memory while operating in the non-ECC mode.
4FE7	Unexpected interrupt from ECC logging counter on 2K halfword transfer from DRAM to Main Memory while operating in the non-ECC mode.
4FE8	No DMA completion interrupt on 2K halfword transfer to DRAM from MM.
4FE9	Bus Processor DMA error status bits set on 2K halfword transfer to DRAM from Main Memory.
4FEA	Single-bit Main Memory error not corrected on 2K DMA transfer.
4FEB	Incorrect number or error corrections logged on 2K DMA transfer.
4FEC	No DMA completion interrupt on 2K halfword transfer from DRAM to Main Memory while operating in the non-ECC mode.
4FED	Bus Processor DMA error status bits set on 2K halfword transfer from DRAM to Main Memory while operating in the non-ECC mode.
4FEE	Unexpected interrupt from ECC logging counter on 2K halfword transfer from DRAM to Main Memory while operating in the non-ECC mode.
4FEF	No DMA completion interrupt on attempted 2K halfword transfer to DRAM from Main Memory with uncorrectable data.
4FF0	BP Main Memory ECC status bit not set after Main Memory read of uncorrectable data.
4FF1	Correctable ECC logging interrupt did not occur with limit count equal to transfer length and single-bit error correction attempted.
4FF2	DMA operation did not abort on Main Memory uncorrectable ECC error.
4FF3	No DMA completion interrupt on attempted transfer from Main Memory address 100000 HEX to DRAM.
4FF4	Bus Processor Main Memory Invalid Memory Address (IMA) status bit not set after attempted access to Main Memory location 100000 HEX.
4FF5	DMA operation did not abort on Main Memory IMA error.
4FF6	No DMA completion interrupt on attempted 2K halfword DRAM to Main Memory transfer with bad DRAM parity.
4FF7	Bus Processor Main Memory DSB status bit not set after attempted read of DRAM with bad parity.
4FF8	DMA operation did not abort on DRAM parity error.
4FF9	No DMA completion interrupt on DRAM to Main Memory transfer after correcting DRAM parity.
4FFA	Bus Processor DMA error status bit set on DRAM to Main Memory transfer after correcting DRAM parity.
4FFB	Unexpected interrupt from ECC logging counter on DRAM to Main Memory transfer after correcting DRAM parity.
4FFC	No DMA completion interrupt on two-halfword transfer to DRAM form Main Memory to start PIT clock.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
4FFD	No DMA completion interrupt on two-halfword transfer from DRAM to Main Memory rewrite "bad" data.
4FFE	Bus Processor DMA error status bits set on two-halfword transfer from DRAM to Main Memory.
70-76	**UNIVERSAL ISIO DAC SELF-TEST DIAGNOSTIC (@ST0800@ from @DIAGST@ Execution)**
7010	UISIO (928W) PCA identification not found on system.
7011	Device adapter ready bit failed to be set, software status register indicates that the internal power-up failed. (Software status register has not been tested at this time.)
7012	Device adapter ready bit failed to be set.
7013	Device adapter ready bit failed to be reset.
7014	Device adapter request bit failed to be set.
7016	Device adapter request interrupt failed to be detected.
7017	Illegal interrupt detected (DA request interrupt expected).
7018	Device adapter request bit failed to be reset.
701A	Device adapter request failed to be set.
701C	Device adapter ready interrupt failed to be detected.
701D	Illegal interrupt detected (DA ready interrupt was expected).
701E	Software status register failed walking ones pattern.
7020	Local DMA Controller Buffer Full (LDCBF), Flip-Flop (F/F) failed to be reset.
7021	LDCBF, F/F failed to be set.
7022	UISIO (or 928W) failed to internally detect a completion interrupt.
7023	Local DMA Controller Byte Counter (LDCBC) F/F failed to be reset.
7024	UISIO (or 928W) failed to internally detect LDCBC F/F being reset.
7025	Static RAM Byte Counter (SRBC) F/F failed to be reset.
7026	SRBC F/F failed to be set.
7027	Device adapter completion interrupt failed to be detected.
7028	Illegal interrupt detected. (Only device adapter completion interrupt was expected.)
7029	UISIO (or 928W) failed to internally detect a completion interrupt.
702A	SRBC F/F failed to be reset.
702B	UISIO (or 928W) failed to detect SRBC F/F being reset.
702C	Loading of LDCBC (with control register equal to SR/DR) failed to reset LDCBC F/F.
702D	Loading of SRBC (with control register equal to 0) failed to prevent SRBC F/F from resetting.
702E	Loading of SRBC (with control register equal to 0) failed to reset SRBC F/F.
702F	UISIO (or 928W) failed to set up for DMA operations.
703C	UISIO (or 928W) failed to select Static RAM (SR) Bank 1.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
70-76	**UNIVERSAL ISIO DAC SELF-TEST DIAGNOSTIC (@ST0800@ from @DIAGST@ Execution) - (Cont'd)**
7042	Dynamic RAM (DR) to SR Bank 1 (SRB-1) DMA: completion interrupt failed to be detected.
7044	DR to SRB-1 DMA: ready interrupt failed to be detected.
7046	DR to SRB-1 DMA: request interrupt failed to be detected.
7048	DR to SRB-1 DMA: hardware status bits failed.
704A	DR to SRB-1 DMA: software status bits failed.
7052	Dynamic RAM to Z80 and SRB-1 to Main Memory concurrent DMAs: completion interrupt failed to be detected.
7058	DR to Z80 and SRB-1 to Main Memory concurrent DMAs: hardware status bits failed.
705A	DR to Z80 and SRB-1 to Main Memory concurrent DMAs: software status bits failed.
705E	DR to Z80 and SRB-1 to Main Memory concurrent DMAs: interrupts failed (expected one Completion, two Readys, and two Requests.
706C	UISIO (or 928W) failed to select SR Bank 2 (SRB-2).
7072	Z80 to DR and Main Memory to SRB-2 concurrent DMAs: completion interrupt failed to be detected.
7078	Z80 to DR and Main Memory to SRB-2 concurrent DMAs: hardware status bits failed.
707A	Z80 to DR and Main Memory to SRB-2 concurrent DMAs: software status bits failed.
707E	Z80 to DR and Main Memory to SRB-2 concurrent DMAs: interrupts failed (expected one Completion, two Readys, and two Requests.
7082	SR Bank 2 to DR DMA: completion interrupt failed to be detected.
7084	SRB-2 to DR DMA: ready interrupt failed to be detected.
7086	SRB-2 to DR DMA: request interrupt failed to be detected.
7088	SRB-2 to DR DMA: hardware status bits failed.
708A	SRB-2 to DR DMA: software status bits failed.
7090	Data transfer failure.
70B0	Failure to enable microcode loading step 1.
70B2	Failure to enable microcode loading step 2.
70B4	Failure to enable microcode loading step 3.
70B6	Failure to enable microcode loading step 4.
70FD	Unexpected trap.
70FE	Unexpected SIO interrupt.
70FF	Get control of workstation failure.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
7101	Address latch integrity error.
71FE	Unexpected SIO interrupt.

NOTE

This error code is also given instead of error code '4500' (because the Diagnostic Monitor is not on the system disk) when the Local Control/Remote Diagnostic/Remote Control switch is in the Remote Diagnostic position.

7201	Write byte completion interrupt failure.
7202	Read byte completion interrupt failure.
7203	Read and test data. (Also indicates 'Workstation Zero inoperable'.)
7204	SIO status error.
7205	Static RAM MAR (SMAR) ripple failure.
72FF	Get control of workstation failure.
7301	Write 256 completion interrupt failure.
7302	Read 256 completion interrupt failure.
7303	Read and test data.
7304	SIO status error.
7305	SMAR ripple failure.
73FF	Get control of workstation failure.
7601	Give status completion interrupt failure.
7602	Status unchanged.
7603	Valid status.
7604	Valid device type.
76FF	Get control of workstation failure.

NOTE

Diagnostic Error Codes 98xx, B0xx, and D0xx are PROM-based diagnostics executed during the power-up sequence.

90 SERIAL INPUT/OUTPUT DEVICE ADAPTER SELF-TEST DIAGNOSTIC (@ST0500@ from @DIAGST@ Execution)

9011	Workstation powered-off (or disconnected) status.
9015	Coaxial parity failure, parity error, or not running status.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
98	**DISKETTE DEVICE SELF-TEST DIAGNOSTIC (PROM-BASED)**
9820	Diskette drive not ready. (Also indicates 'No floppy in IPL/Boot Device'.)
9821	Failure on initial Diskette recalibration.
9822	Failure on Diskette seek to maximum track (track 77).
9823	Failure on Diskette seek to track 00.
A4	**SERIAL INPUT/OUTPUT SELF-TEST DIAGNOSTIC (@ST0100@ from @DIAGST@ Execution)**
A400	SIO or WS-0 hung on Self-Test Diagnostic entry.
A401	SIO or WS-0 identification not found.
A402	SMAR data integrity failure.
A4FD	Unexpected trap.
A4FE	Unexpected SIO interrupt.
A4FF	Get control of workstation failure.
B0	**INTERNAL/EXTERNAL DISK DRIVE DEVICE ADAPTER SELF-TEST DIAGNOSTIC (PROM-BASED)**
B000	Hung on entry to disk drive device adapter Self-Test Diagnostic.
B004	Ready status bit failed to set.
B012	Disk drive device adapter not found on the system.
B014	Disk drive device adapter port specified does not exist.
B016	Disk drive device adapter at an illegal address (0400 HEX, 0500 HEX, or 0600 HEX).
B022	Disk drive device adapter could not be properly reset.
B032	Disk drive could not be selected.
B034	Drive Fault could not be cleared.
B042	Seek interrupt not detected after a restore (RTZ - Return to Track Zero) operation.
B048	Seek interrupt not detected after a Seek to Track operation.
B052	ECC error could not be corrected.
B062	Operation complete interrupt not detected after a read operation.
B068	Operation complete interrupt not detected after an ECC correction operation.
B082	Drive status error after restore (RTZ) operation.
B084	Drive status error after seek operation.

ERROR CODE	TEST TITLE OR ERROR CODE DESCRIPTION
B0	**INTERNAL/EXTERNAL DISK DRIVE DEVICE ADAPTER SELF-TEST DIAGNOSTIC (PROM-BASED) - (Cont'd)**
B086	Drive status error after read operation.
B092	Read sector operation failed (HCE - Header Check Error).
B094	Read sector operation failed.
D0	**HARDWARE RELATED FAILURE (PROM-BASED)**
DEAD	Program trap for attempted execution from nonexistent memory space. (CRAM address branch leads to address in 80286 PROM.)
XX	**MISCELLANEOUS ERROR CODES**
xxFD	Unexpected trap.
xxFE	Unexpected SIO interrupt.
xxFF	Get control of Workstation Zero failure.

APPENDIX C MODULAR SERIAL INPUT/OUTPUT SUBSYSTEM

APPENDIX C

MODULAR SERIAL INPUT/OUTPUT SUBSYSTEM (UISIO DEVICE ADAPTER/CONTROLLER)

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MODULAR SERIAL INPUT/OUTPUT SUBSYSTEM (UISIO DEVICE ADAPTER/CONTROLLER)

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SECTION C

MODULAR SERIAL INPUT/OUTPUT SUBSYSTEM

(UISIO DEVICE ADAPTER/CONTROLLER)

C.1 INTRODUCTION

This appendix contains the necessary information to allow the addition of the Wang Modular Serial Input/Output Subsystem to the VS-65 Computer System. The key component of the modular subsystem is the Universal Intelligent Serial Input/Output Device Adapter/Controller (UISIO DAC) with its newly configured System Bus Interface (MuxBus). The modular subsystem approach allows the addition of peripheral band (P-Band) WangNet service to existing systems using Wang's master data link serial technology.

Serial, FiberWay and/or P-Band devices may be connected in any combination on the controller as determined by the modular components installed in the system and the physical space available on the Rear Panel Assembly (RPA) of the VS-65. With the addition of the VS Small System Cable Concentrator, options requiring RPA mounting space not available on the VS-65 mainframe may be installed. The controller and options described allow the VS-65 system to be configured with up to 40 workstations and a total of 64 logical serial devices.

Instructions are provided for the installation of the UISIO DAC and the related subsystem components with which it interfaces. The effect of its installation upon the original VS-65 configuration is discussed. Descriptions, specifications, installation and removal procedures, and diagnostic information for the modular subsystem components are included.

C.1.1 APPLICABLE DOCUMENTATION

Documentation related to the application and/or use of the modular subsystem may be found under the appropriate Class Code(s) in the Wang Technical Documentation Catalog/Index (WLI P/N 742-0000). The index gives a complete listing of Customer Engineering technical documentation. The Wang Corporate Resource Catalog (WLI P/N 700-7647) identifies additional product documentation.

C.1.2 UNIVERSAL INTELLIGENT SERIAL I/O DEVICE ADAPTER/CONTROLLER

The VS-65 UISIO DAC (figure C-1) incorporates the processing functions of the existing ISIO Master Data Link device adapter and the 928W WangNet interface board on a single Printed Circuit Assembly (PCA). The UISIO DAC (25V67) provides local interconnection of peripherals through the use of Electrically Active Port Assemblies (EAPA) and remote device support using FiberWay Panels (FWAPA) and a 19-channel global modem interface to WangNet. The controller provides both the interface and power to the 19-channel peripheral band global modem.

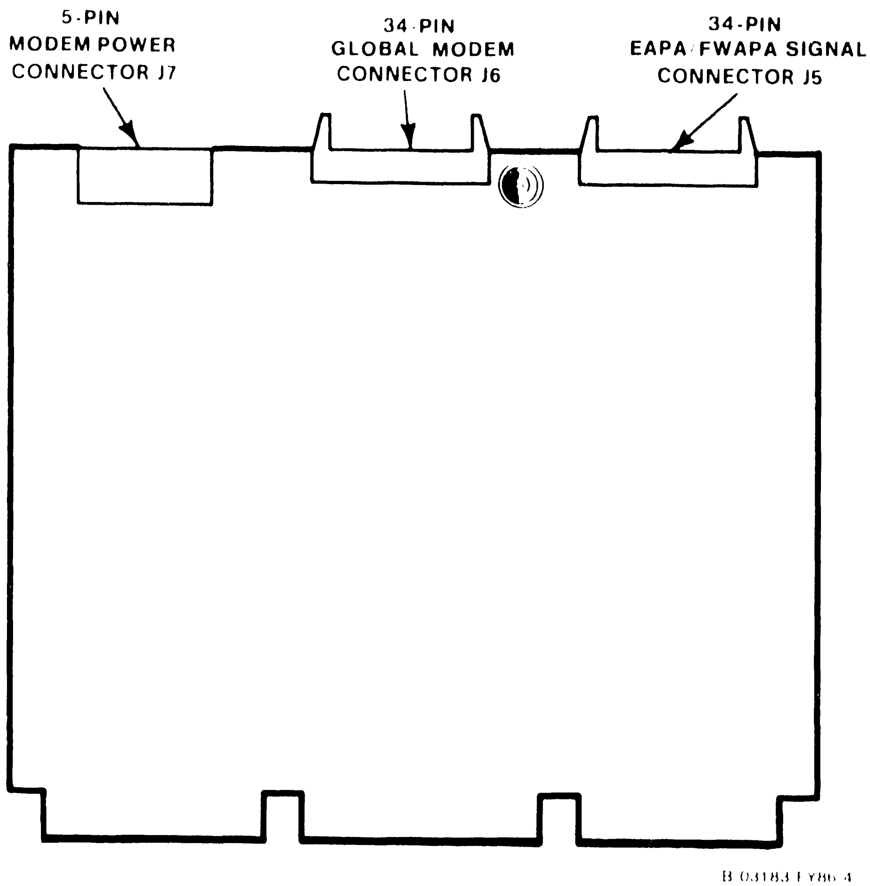


Figure C-1. Universal ISIO Device Adapter/Controller PCA

By supporting the MuxBus interface to the Electrical Active Port Assembly (EAPA) panels, the UISIO allows the use of standard BNC/TNC connectors for local peripheral devices. By supporting the MuxBus interface to the FiberWay Active Port Assembly (FWAPA) panels, the UISIO allows the use of fiber optic datalinks (via a dual fiber optic cable connected to a Remote Cluster Switch [RCS]) to remote peripheral devices located up to 7000 feet from the host.

A maximum of 32 discrete (logical) devices may be connected at one time to a single UISIO. With the addition of the Modular Serial I/O Subsystem, the VS-65 now allows concurrent support of the standard serial I/O (SIO) device adapter, or a second UISIO DAC. A single UISIO DAC supports the following features:

1. Up to 32 (currently supported) serial devices in any combination.

2. Up to four dual coaxial EAPA panels for direct connection of local peripherals. Note EAPA Panels must be mounted in adjacent panel locations thus limiting the number of panels installed to four. (Note each UISIO supports a maximum of 32 serial devices.)

3. Up to four FiberWay panels for connection to remote peripherals.

4. The System Bus Interface (MuxBus).

5. The WangNet Peripheral Band using a global modem capable of transmitting and receiving on any one of 19 peripheral band channels.

6. Addresses the full four megabyte Main Memory of the VS-65.

7. Full Duplex operation in Diagnostic Mode using Wang 928 Master Data Link circuitry.

8. The VS Small System Cable Concentrator (Model VS-SM-CC).

C.1.3 MODULAR SUBSYSTEM COMPONENTS - DESCRIPTION AND SPECIFICATIONS

The Modular Serial Input/Output Subsystem can be configured in a variety of ways. The subsystem can be equipped with one or two UISIO DACs, or one SIO DA and one UISIO DAC, or three UISIO DACs if one UISIO replaces the SIO DA. Each UISIO DAC may be configured with just the WangNet peripheral band global modem, or up to four EAPA rear cable connector panels, or up to four FiberWay panels, or a combination of the three.

The number of logical devices connected to the UISIO determines the number of actual physical ports which may be used. (For example, archiving workstations or MultiStation configurations reduce the number of actual physical ports.) Subsystem model configurations are given in the following paragraphs.

C.1.3.1 Model 25V67 - Universal ISIO Device Adapter/Controller

The 25V67 UISIO Device Adapter/Controller (figure C-1) is an intelligent (microprocessor controlled) device adapter subassembly. The UISIO supports 8 MuxBus channel devices consisting of either EAPA or FiberWay panels. Each FiberWay panel uses two MuxBus channels, one channel for each fiber optic datalink. Each EAPA uses one MuxBus channel. The 25V67 provides local and remote electrical interconnection of 32 peripheral devices using EAPA panels, FiberWay Panels or a combination of both. The 25V67 includes an 928 MuxBus terminator PCA used to terminate the last signal-out connector on the last EAPA/FiberWay panel installed.

C.1.3.2 Model VS-PA-8C - Electrical Active Port Assembly

Model VS-PA-8C Electrically Active Port Assembly panel contains one EAPA panel and the cabling required to daisy-chain power and signals to adjacent EAPA/FiberWay panels. Each EAPA panel allows the addition of up to 8 logical devices. A total of four EAPA panels can be installed on the VS-65 backpanel due to the cabling restrictions that require EAPA and FiberWay panels be mounted adjacent to each other. In order to support up to 40 workstations and 64 logical serial devices, concurrent use of one UISIO DAC and one standard SIO device adapter, or two UISIO DACs is required.

All EAPA panels for an individual UISIO must be daisy-chained together, connected to the MuxBus interface cable at one end and to the EAPA terminator at the other. EAPAs installed on the VS-65 mainframe use dc power from an existing jack (J7) on the SPS 476E Switching Power Supply.

When the optional global modem is part of the configuration, space limitations may restrict the number of EAPAs that can be installed on the mainframe, the addition of the VS Small System Cable Concentrator may be required.

Model VS-PA-8C contains the following components:

Component	Qty	Description
270-0975	1	8-Port EAPA
220-2346	1	Power Jumper Cable, 4 in. 3 Pos Plug-Plug EAPA Power Daisy Chain. EAPAs must be adjacent.
220-3234	1	Signal Cable Assembly, 4 inch, 34 Pos Soc-Soc Connects APA signal-out connector to adjacent APA signal-in connector (J1).

C.1.3.3 Model VS-WN-19C - WangNet Serial I/O Peripheral Band Modem

The VS-WN-19C WangNet 19-Channel P-Band Global Modem can be added as a separate subsystem component for attachment to the Model 25V67 UISIO DAC. The UISIO DAC supports one P-Band modem, if an additional modem is required a second UISIO DAC must be installed. The 'P-Band' modem supports up to 32 serial devices via a NetMux connected to the WangNet bus. Due to the modem's size, it can only be mounted in one rear panel location in the VS-65 mainframe. A second global modem (if required) will be mounted in the cable concentrator.

Model VS-WN-19C contains the following:

Component	Qty	Description
279-5305	1	19-Channel Global Modem
452-4757	1	Modem Mounting Panel
452-0379	1	Modem Mounting Plate

C.1.3.4 Model FW-APA-2S - FiberWay Active Port Assembly

NOTE

WORKSTATION 0 MUST BE CONNECTED TO EAPA0. THE FIBER-WAY LINK IS ESTABLISHED DURING THE IPL PROCESS.

The FiberWay panel assembly provides two optical transmit ports and two optical receive ports that support up to 32 serial devices (16 devices per port via a Wang Remote Cluster Switch). (Refer to the Remote Cluster Switch maintenance manual [Class Code 7101] for information pertaining to FiberWay panel maintenance and adjustments.) A total of four FiberWay panels can be installed providing a maximum of 128 serial device ports (only 32 logical devices can be supported per UISIO). It is required that Workstation 0 (operators console) be attached to an EAPA.

FiberWay provides additional benefits that include:

- Reduces the number of cables to be installed by a factor of 16 to 1.
- Provides for a fiber optic cable length of 5000 feet (1.5 km) from the backpanel mounted FiberWay panel to a Remote Cluster Switch.
- Provides interference-free transmission in electrically hostile environments.
- No peripheral modification is required.

The following restrictions apply to FiberWay installation:

- Workstation 0 (the system IPL console) must be connected to an APA panel. (The FiberWay link is established during the IPL process.)
- FiberWay requires a UISIO DAC be installed in the mainframe.
- The last APA (FiberWay or EAPA) signal-out connector must be terminated using the 928 MuxBus Terminator.

Model FW-APA-2S contains the following components:

Component	Qty	Description
279-0727	1	FiberWay Active Port Assembly (FWAPA)
220-2105	1	Power Jumper Cable, 4 in. 4 Pos Plug-Plug FWAPA Power Daisy Chain. FiberWay panels must be adjacent.
220-3234	1	Signal Cable Assembly, 4 inch, 34 Pos Soc-Soc Interconnects adjacent APA panels (FWAPA and EAPA) signal-in connector to adjacent APA panel signal-out connector.

C.1.3.5 Modular Subsystem Cable Kits

The cabling required to install the first subsystem panel (EAPA, FiberWay, or Modem) on the VS-65 rear panel assembly are contained in individual cable kits. When an option panel is to be installed, the corresponding cable kit must be ordered. These kits are defined as follows:

- KIT-PA-CP7 EAPA Cable Kit

  220-3396 - 34 pin Signal Cable 44 in., UISIO Connector J5 to first EAPA
  220-2202 - 3-pin Power Cable 38 in., SPS Connector J7 to first EAPA

- KIT-WN-CP7 WangNet Modem Cable Kit

  220-3236 - 34-pin Signal Cable 36 in., UISIO Connector J6 to Modem Signal
  220-2060 - 5-pin Power Cable in., UISIO Connector J7 to Modem Power
  220-0294 - Signal Cable 10 feet, Modem to WangNet Users Outlet

- KIT-FW-CP7 FiberWay Cable Kit

  220-3396 - 34-pin Signal Cable 44 in., UISIO Connector J5 to first FWAPA
  220-2503 - 5-pin to 4-pin power cable, Power Adapter 5-Pin Connector to first FWAPA
  220-2495 - Power Supply Cable Assembly Adapter

C.1.3.6 Additional UISIO Support Features

The VS Small System Cable Concentrator is a separate cabinet with its own power supply, a rear panel configured for up to four half panels (two panels over two panels), and a strain relief panel containing two shield-mounting strain-relief cable clamps. Using the MuxBus interface, up to four EAPAs or four FWAPAs or any combination of EAPAs and FWAPA panels can be mounted in the cabinet. The VS Small cable Concentrator supports two technologies at a time due to concentrator power cabling requirements. Refer to the VS Small Cable Concentrator manual (Class Code 6100) for information pertaining to panel installation, cabling, and other requirements.

C.1.4 SOFTWARE REQUIREMENTS

VSOS Software release 6.41.00 or higher is required to support the UISIO and corresponding subassemblies. The microcode software versions required to operate the Modular SIO Subsystem are 7.02.05 (@MC25V67), and 7.04.01 (@MCBP1@) or later. Auto-enclosed with CEI's 157/177-5697/7362 is MEI 291-0427, which includes the necessary software and documentation. Refer to the correct software release notice for software configuration instructions.

C.2 THEORY OF OPERATION

The theory of operation for the UISIO DAC is not provided as part of this Appendix. It will be included in the second edition of the VS-65 Maintenance Manual scheduled for completion at a later date.

C.3 OPERATION

Operation of the VS 65 Computer System equipped with the UISIO Device Adapter/Controller is transparent to the user. A general discussion of VS-65 operation may be found in Chapter 3 of the first edition maintenance manual. Minor changes in operation are given in the following paragraphs.

C.3.1 OPERATOR CONTROLS AND INDICATORS

No special operator controls or indicators are used with the addition of the UISIO DAC. Information on status and error conditions is displayed in the usual manner using the Front Panel HEX displays and LED indicators.

C.3.2 SERVICE CONTROLS AND STATUS INDICATORS

The status of the UISIO device adapter/controller is determined by a LED located at the upper center of the printed circuit assembly (figure C-2). The LED will light during power-up diagnostics and then go out when the diagnostics have completed successfully. If the LED stays on, diagnostics have failed and the PCA may be defective. Refer to paragraph C.4.6.3.

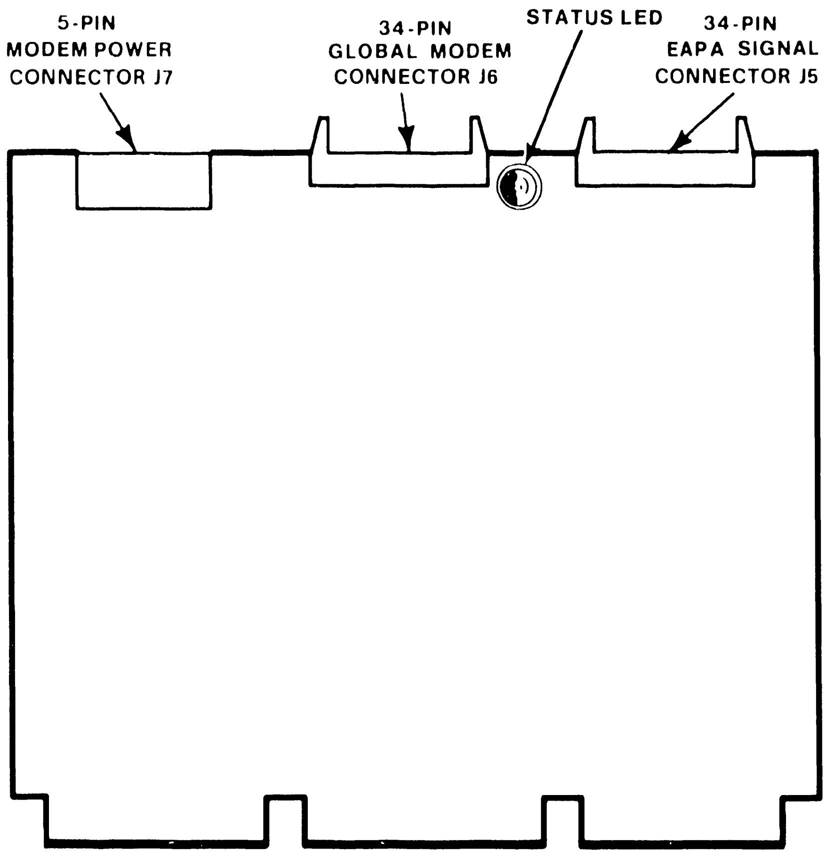


Figure C-2. UISIO Status LED Location

C.3.3 OPERATING PROCEDURES

Prior to installation of the Modular SIO Subsystem hardware, ensure the mainframe is fully operational. If necessary, perform power-up and verification procedures as outlined in the maintenance manual.

C.4 INSTALLATION

This section includes information for unpacking, inspecting and installing the components of the Modular Serial I/O Subsystem in the mainframe. General information concerning mainframe installation is found in Chapter 4 of this manual.

C.4.1 UNPACKING

Before unpacking the Modular Serial I/O Subsystems, review paragraphs 4.4 and 4.5 in the Maintenance Manual. Proceed with the unpacking and inspection as given below. If damage is noted, follow the reporting procedures given in Chapter 4.

1. Inspect the shipping containers for any visible signs of damage. If no damage is apparent, proceed with unpacking the UISIO DAC and associated subassemblies.

2. Inspect the contents of each shipping container for any sign of loss of integrity, or other signs of damaged, loose, or missing components.

3. Check all items against the shipping bill(s)/packing list(s) to ensure the correct items where shipped and that none are missing.

4. Unpack the various components and inspect for shipping damage. Any damage claims should be handled as specified in Chapter 4.

C.4.2 PREINSTALLATION SOFTWARE AND HARDWARE VERIFICATION

Perform the verification procedures outlined below to ensure correct system operation after installation. If required, refer to paragraph 4.9 in the Maintenance Manual for the complete IPL procedure.

C.4.2.1 VS Operating System Software Verification Procedure

1. From the Operator's Console Menu, verify that the operating system software is the correct versions needed to install the Modular SIO Subsystem hardware. Press PF14, SYSTEM OPTIONS, then PF7, Display SYSTEM VERSIONS, and verify the minimum VSOS Nucleus (@SYSGEN@ is 06.41.00), and BP (07.04.01) and CP (07.02.03) microcode versions.

2. If the BP, CP, or Nucleus are incorrect, be sure the correct VSOS software is available for installation with the hardware before installing the Modular Serial I/O Subsystem.

C.4.2.2 Hardware Configuration Verification Procedure

To ensure optimum performance, installation of the Modular SIO Subsystem requires the utilization of the highest available priority I/O Address Decode. Determine the I/O Address Decode, and if necessary, assist the customer in generating a new system configuration file, using the following procedure:

1. Log onto the system using any LOG-ON allowed by the customer.

2. Prior to any changes in either software or hardware, be sure that the customer has performed any system back-up required.

3. If the customer has created a new configuration file in advance, proceed with step 5 and verify the I/O Address Decode priority.

4. Run the program COPY and create a NEW system configuration file in library @SYSTEM@. Name the new file (such as @NEWFIG@) and copy the customer's system configuration file into the new file.

5. Run GENEDIT and call up the newly created system configuration file, and configure the system to support the UISIO DAC using the 25V67 model number. If an existing SIO (25V37) is being replaced, changing the 25V37 to the 25V67 will automatically set your baseband ports to the original configuration. Use PF10 and PF11 to check and/or set the baseband and peripheral band (broadband) ports.

6. If the UISIO is being installed in addition to the 25V37, select the highest I/O Address Decode ('Jumper Address') available and configure the baseband and broadband ports to meet customer requirements.

7. SAVE the new configuration file and EXIT the GENEDIT program.

8. Before installing an updated software package, rename any old files (such as @MCBP1@ to @MCBPOLD) first, then COPY the new files onto the system disk.

C.4.3 UISIO DEVICE ADAPTER/CONTROLLER HARDWARE CONFIGURATION

There are eight shunt (jumpers) connector blocks on the UISIO PCA (refer to figure C-3) which must be correctly jumpered for proper controller operation. Each block has six pairs of pins, and one pair on each block must be jumpered with the exception of JP9. JP9 sets the 'I/O Decode' Address and requires three jumpers as shown. JP1-JP3 sets BPINT, JP8 sets DRI, JP4 sets DGS, JP11 sets MRI, and JP10 sets MGS.

I/O Address Decodes are listed in numerical order in table C-1. The UISIO jumpers may be set to any of the six I/O address decodes given, and should be configured for the highest available priority decode. However, some addresses are reserved for specific peripherals which results in a recommended decode ranking as shown in the table. Figure C-3 shows the UISIO DAC jumpers set for address 03xx 'Second SIO DA'. Alternate decode priority configurations for the UISIO DAC are given in figure C-4. Set the jumpers on the UISIO PCA as required by the new system configuration.

CAUTION

POWERING THE SYSTEM AND/OR ANY EXTERNAL DISK DRIVE DOWN IMPROPERLY MAY RESULT IN DAMAGE TO THE VOLUME TABLE OF CONTENTS (VTOC) OF THE DISK DRIVE(S).

Table C-1. Input/Output (I/O) Address Decode Priority Reservations

I/O ADDRESS DECODE	I/O ADDRESS RESERVED FOR DEVICE ADAPTER/CONTROLLER FUNCTION: PRIMARY FUNCTION	ADDITIONAL FUNCTIONS	EXCLUDED FUNCTIONS
"01xx"	External Disk Drs	All except 25V50-0	Int Disk (25V50-0)
"02xx"	Int/Ext. Disk Drs	Includes 25V50-0	None
"03xx"	Second SIO DA	All Other Serial DAs	25V50 and 25V50-0
"04xx"	SIO DAs Only	None	All Other DAs
"05xx"	All Optional DAs	Includes Ext Disk DA	25V50-0
"06xx"	TC Device Adapter	All Except Disk Drs	25V50 and 25V50-0

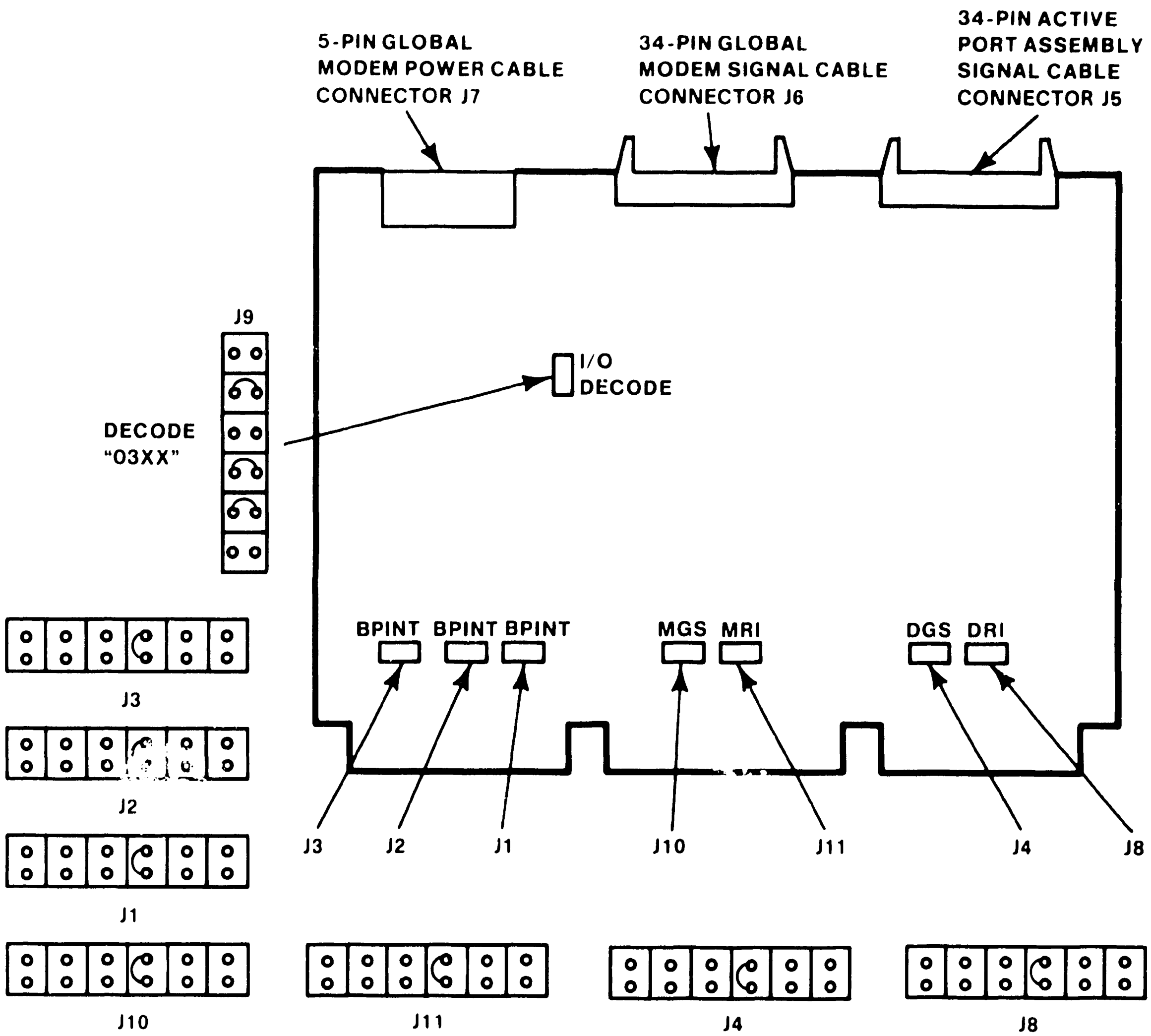


Figure C-3. UISIO Device Adapter/Controller (210-8489) Jumper Locations

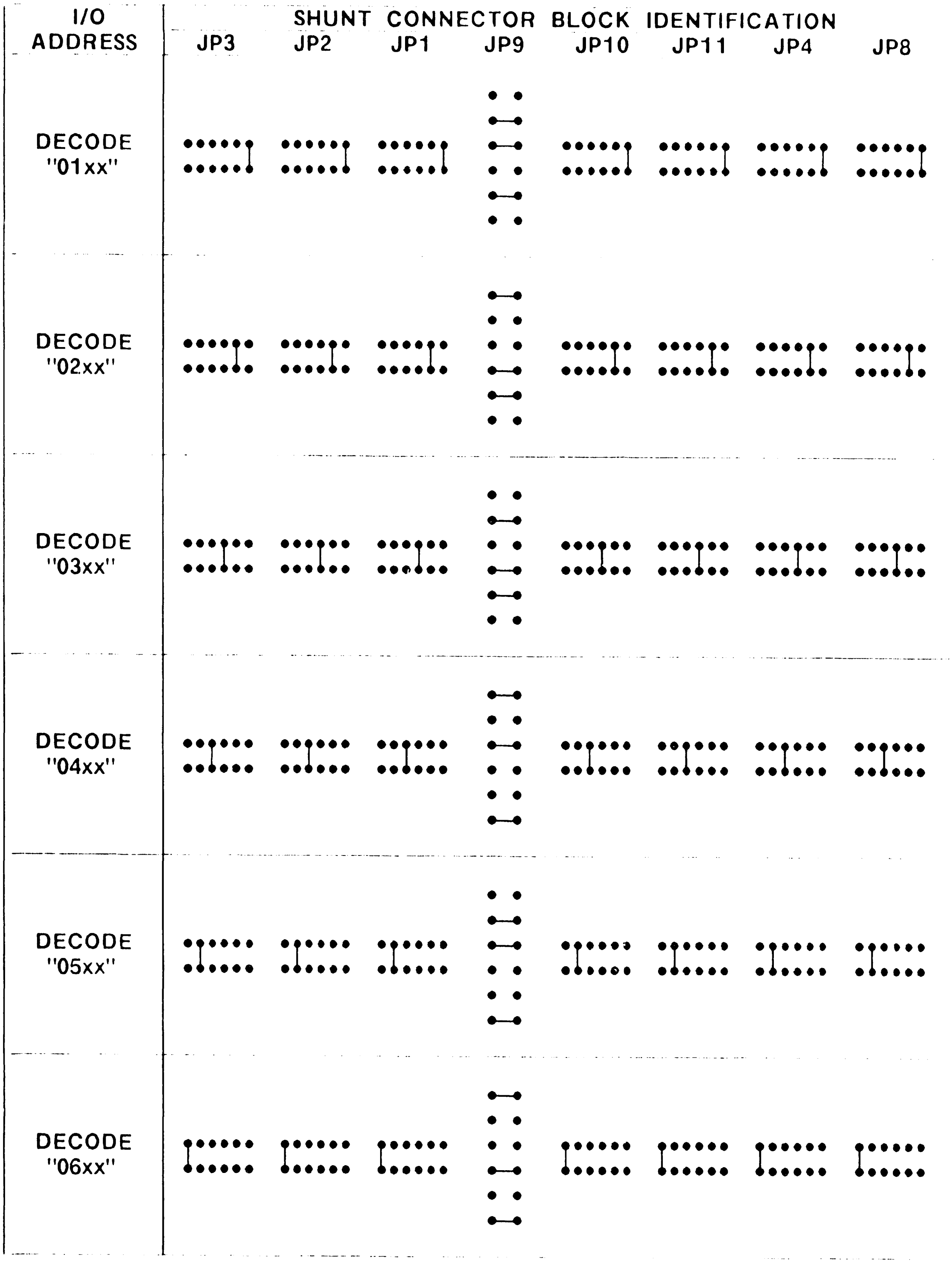


Figure C-4. Alternate "Jumper Address" Configurations

C.4.4 UISIO PCA INSTALLATION PROCEDURES

The general removal and replacement procedures given in the Maintenance Manual should be followed whenever a printed circuit assembly (PCA) is to be removed or installed. If difficulty is encountered, refer to paragraph 5.3 of the manual. Power-down the system as follows:

1. After verifying all users have logged off and all background tasks are completed, press the green Control Mode button.

2. Power-down the mainframe and peripherals as required per paragraph 3.7 of this manual while observing all necessary precautions.

3. Remove the top cover as described in paragraph 5.3.2.1 of the manual.

NOTE

The physical location of any PCA in the MotherBoard is transparent to mainframe operation. However, it is recommended that the PCA I/O Address Decode corresponds to the I/ODAx Motherboard slot.

4. Set the UISIO jumpers to address '03xx' and install the PCA into motherboard connector I/ODA3. If another decode address is required, install the UISIO PCA in the motherboard slot number corresponding to the address selected.

5. If the system configuration requires the removal of the standard SIO DA, the UISIO DAC MUST be installed with its I/O address decode set to "04xx" and the system MUST have at least one EAPA installed. WS-0 MUST be attached to the first BNC/TNC connector pair on an EAPA.

6. If a two UISIO PCA configuration is used in addition to the standard SIO (3 SIOs total), set the first UISIO PCA address to '03xx' and set the second UISIO PCA address to the next available address.

7. Figure C-5 illustrates the PCA locator label mounted on the front of the motherboard card cage assembly. For ease of I/O address decode identification by PCA, the device adapters may be installed in the I/O DAx slot which corresponds with I/O Decode Address assigned.

SLOT NO.	1	2	3	4	5	6	7	8	9
PRINTED CIRCUIT ASSEMBLY	MM	CP	BP	I/ODA1	I/ODA2	I/ODA3	I/ODA4	I/ODA5	I/ODA6

Figure C-5. Card Cage Assembly PCA Locator Label

C.4.5 MODULAR SIO SUBSYSTEM INSTALLATION PROCEDURES

This section presents guidelines and instructions for removing, installing, and/or relocating the various Rear Panel Assembly (RPA) connector panels as may be required when installing the Modular Serial I/O Subsystem (figure C-6). For detailed connector panel removal/replacement refer to section 5.5.2 of this manual.

This section contains the following subsystem configurations:

- C.4.5.1 General Rear Panel Removal/Replacement Guide Lines
- C.4.5.2 EAPA Panel Installation/Cabling
- C.4.5.3 Global Modem Installation/Cabling
- C.4.5.4 FiberWay Panel Installation/Cabling
- C.4.5.5 Combination EAPA/FiberWay Panel and Global Modem Installation

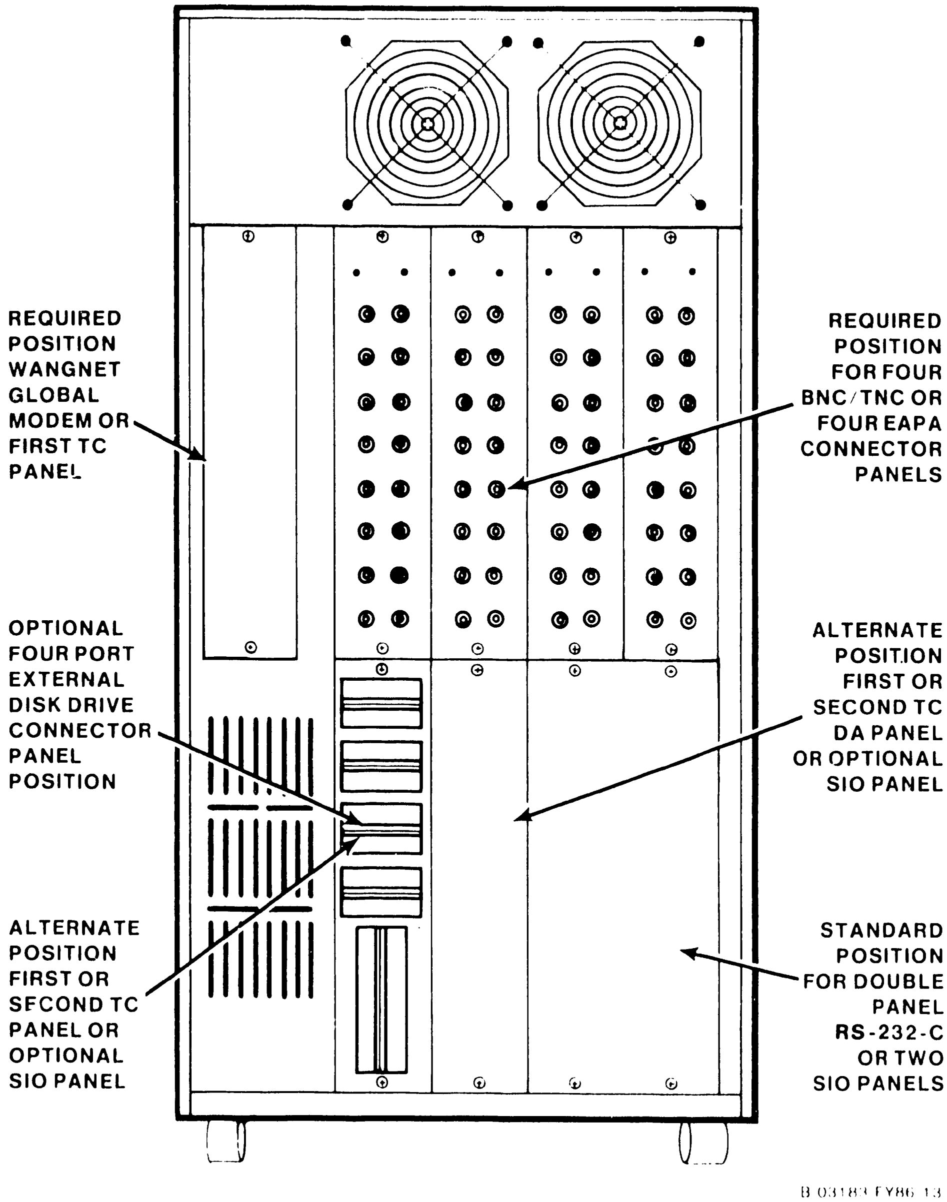


Figure C-6. Mainframe Rear Panel Assembly Connector Panel Locations

C.4.5.1 General Rear Panel Guide Lines

1. If the global modem is part of the installation, remove the blank panel (or the TC panel if so equipped) from the upper left side of the RPA. The global modem can ONLY be mounted in this position on the mainframe. An existing TC panel MUST be relocated on the RPA.

2. All APA (FiberWay and EAPA) panels connected to an individual UISIO must be installed in the same row on the Rear Panel Assembly. Remove the required panels from the RPA of the mainframe to allow relocation of any affected device panels. The standard BNC/TNC connector panels which are connected to the SIO DA may be mounted in any available position on the RPA.

3. If the system is equipped with an external drive panel, and/or a TC panel, the external drive and telecommunication panels should be mounted in the standard positions as shown in figure C-6.

4. If the VS-65 is equipped with an internal disk drive only, the APA panels will then be mounted in the lower four rear panel positions leaving the standard SIO connector panel configuration in place.

C.4.5.2 Installing the Electrical Active Port Assembly Panels

EAPA panel installation requires the following modular components:

Model 25V67	UISIO PCA includes 928 MuxBus Terminator
Model VS-PA-8C	Single EAPA panel with signal and power cables
Model KIT-PA-CP7	Cabling required for first EAPA panel installation

NOTE

Daisy-chain signal and power cables shipped with model VS-PA-8C are not used for single panel installation.

1. Ensure the required modular subsystems are available (i.e. for a two EAPA panel installation, two model VS-PA-8C, one model KIT-PA-CP7, and one model 25V67 are required).

2. **EAPA panels must be installed in adjacent backpanel locations.** If adjacent backpanel space is not available, mounting the EAPA panels in the VS Small Cable Concentrator should be considered.

3. It is recommended that standard connectors panels remain in the upper four panel locations. If backpanel space is available, install EAPA panels in the lower four panel positions. If lower panel positions are occupied (TC panels, disk panels, etc.), rearrange the option panels to provide the required number of adjacent backpanel locations.

4. Unscrew the two spring loaded thumbscrews on the inside top of the Rear Panel Assembly (RPA). Carefully lower the entire RPA enough to allow access to the required panel locations. Brace the RPA in the partially lowered position.

5. Install the EAPAs in adjacent lower backpanel locations.

6. Install EAPA Power Cable (P/N 220-2202) to J3 of the first EAPA and connect the other end to Switching Power Supply connector J7 located on PCA 210-8611 (figure C-7).

7. Daisy-chain the EAPA power interconnect cables (P/N 220-2346) from J4 of the first EAPA to J3 of the second EAPA. Perform the cabling sequence for each adjacent EAPA panel.

8. Install MuxBus Interface Cable (P/N 220-3396) between J1 (signal-in) of the first EAPA to the UISIO PCA connector J5.

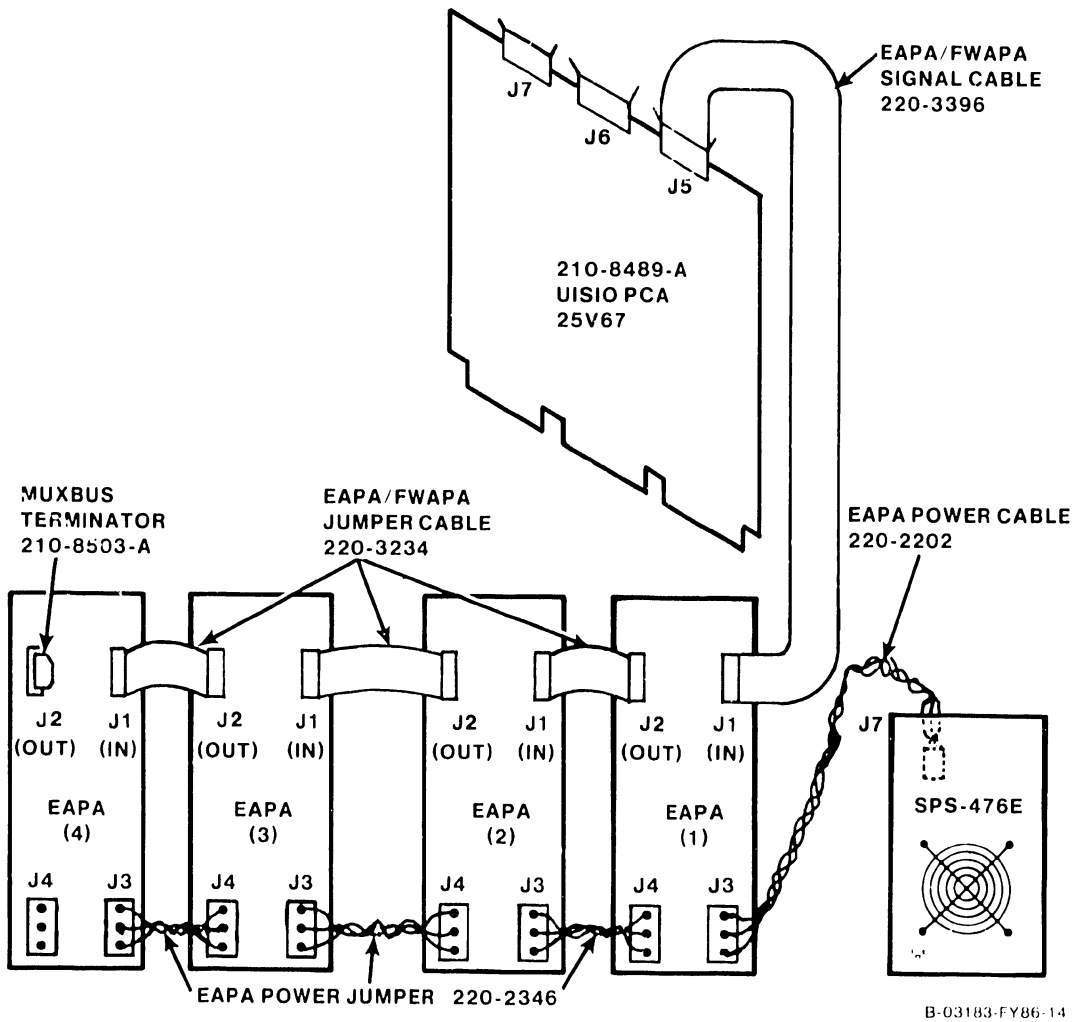


Figure C-7. EAPA Panels Internal Cabling Diagram

NOTE

EAPA panels are mounted in reverse order with respect to standard SIO BNC/TNC panels. Facing the rear of the mainframe, Logical Device Zero (Device Number One) is located on the upper left side of the EAPA panels.

9. Daisy-chain the MuxBus interconnect cables (P/N 220-3234) from J2 of the first EAPA to J1 of the second EAPA. Perform the cabling sequence for each adjacent EAPA panel.

10. Install the MuxBus Terminator in J2 of the last EAPA. The terminator should be positioned such that the terminator's PCA is over the EAPA's PCA.

12. Reattach the Rear Panel Assembly to the VS-65 mainframe.

C.4.5.3 Installing the WangNet 19-Channel Global Modem Assembly

WangNet panel installation requires the following modular components:

Model 25V67	UISIO PCA includes 928 MuxBus Terminator
Model VS-WN-19C	Single WangNet Peripheral Band Modem
Model KIT-WN-CP7	Cabling required for modem installation

The WangNet 19-Channel Global Modem Assembly includes the modem, mounting plate and panel, and should be received preassembled for installation in the VS-65 mainframe. Install the global modem assembly as follows:

1. Ensure the modem mounting plate and panel screws are secure. Install the global modem assembly into the telecommunication panel/modem slot with the modem 34-pin connector (J1) facing upward (backpanel RX connector will be at the top of the panel).

NOTE

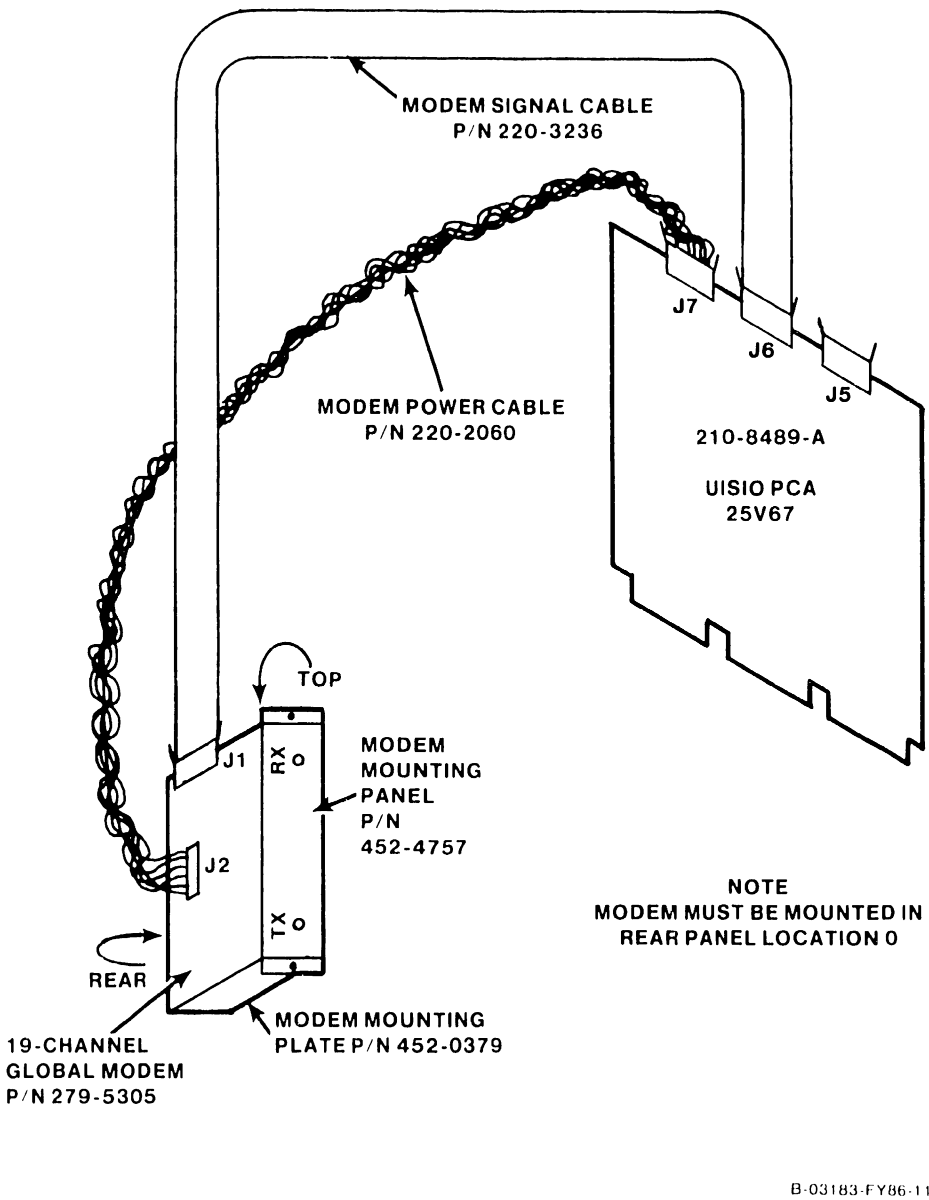
When installing modem, the inserted flange edge of the modem mounting panel must be on the left side of the Rear Panel Assembly.

2. Minimal clearance is available for positioning the mounting panel. Move (rotate) the rear of the modem assembly toward the card cage until the mounting panel flange slides under the edge of the Rear Panel Assembly.

3. Rotate the modem assembly back to its normal position. The mounting panel flange should move securely into the slot. Insert the panel mounting screws and tighten firmly in place.

4. Install modem power cable (P/N 220-2060) to modem connector J2 and UISIO connector J7 (figure C-8).

5. Install the modem signal cable (P/N 220-3236) to modem connector J1 and UISIO connector J6.



NOTE

The WangNet Global Modem Can Only Be Mounted In VS Cabinet Rear Panel Location 0.

Figure C-8. WangNet Modem Panel Internal Cabling Diagram

C.4.5.4 Installing the FiberWay Active Port Assembly Panels

FiberWay panel installation requires the following modular components:

Model 25V67	UISIO PCA includes 928 MuxBus Terminator
Model FW-APA-2S	Single FWAPA panel includes signal and power cables
Model KIT-FW-CP7	Cabling required for first FWAPA panel installation

NOTE

Daisy-chain signal and power cables shipped with model FW-APA-2S are not used for single panel installation.

1. Ensure the required modular subsystems are available (i.e. for a two FWAPA panel installation, two model FW-APA-2S, one model KIT-FW-CP7, and one model 25V67 are required).

2. **FWAPA panels must be installed in adjacent backpanel locations.** If adjacent backpanel space is not available, mounting the FWAPA panels in the VS Small Cable Concentrator should be considered.

NOTE

Workstation 0 (WS0) MUST BE attached to an EAPA or APA panel.

3. It is recommended that the standard connectors panels remain in the upper four panel locations. If backpanel space is available, install the FWAPA panels in the lower four panel positions. If lower panel positions are occupied (TC panels, disk panels, etc.), rearrange the option panels in order to provide the required number of adjacent backpanel locations.

4. Unscrew the two spring loaded thumbscrews on the inside top of the Rear Panel Assembly. Carefully lower the entire RPA enough to allow access to the required panel locations. Brace the RPA in the partially lowered position.

5. Install the FWAPAs in adjacent lower backpanel locations.

6. Disconnect power cable (220-0407) from power supply connector J5 and motherboard connector J31 and remove. Disconnect any cable connected to power supply connector J7.

7. Install Power Adapter Cable (P/N 220-2495) as follows (refer to figure C-9):

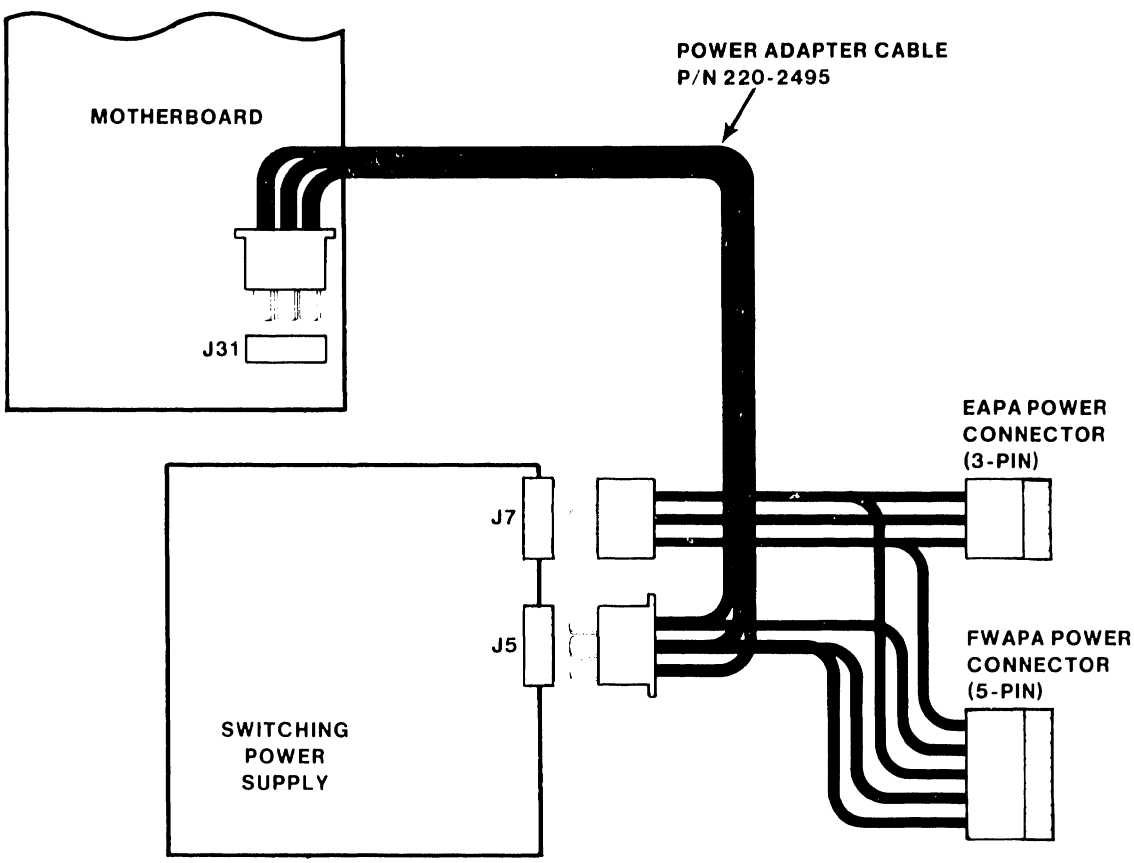
   a. Install the six-pin plug affixed to the long cable portion of the adapter cable to motherboard connector J31.

   b. Install the six-pin plug affixed to the 'Y' cable portion of the adapter cable to power supply connector J5.

   c. Install the 3-pin plug to power supply connector J7.

   d. Connect the five-pin connector (FWAPA power) to the five-pin plug on cable (220-2503).

   e. If EAPA panels are installed, connect the three-pin connector to the EAPA power cable (220-2202) removed in step 6. If EAPA panels are not used, this connector will be left open.



FigureC-8A. Power Supply Cable Adapter Assembly Connections

8. Install FWAPA Power Cable (P/N 220-2503) 4-pin plug to the first FWAPA panel upper power connector.

9. Daisy-chain power interconnect cable (P/N 220-2105) from FWAPA (1) lower power connector to FWAPA (2) lower power connector. Daisy-chain FWAPA (2) upper power connector to FWAPA (3) upper power connector and Daisy-chain FWAPA (3) lower power connector to FWAPA (4) lower power connector.

10. Install MuxBus Interface Cable (P/N 220-3396) between J6 (signal-in) of the first FWAPA to the UISIO PCA connector J5.

11. Daisy-chain MuxBus interconnect cables (P/N 220-3234) from J1 (signal-out) of the first FWAPA to J6 (signal-in) of the second FWAPA. Perform the cabling sequence for each adjacent FWAPA panel.

12. Install the MuxBus Terminator in J1 of the last FWAPA. The terminator should be positioned so the terminator's PCA is over the FWAPA's PCA.

13. Reattach the Rear Panel Assembly to the VS-65 mainframe.

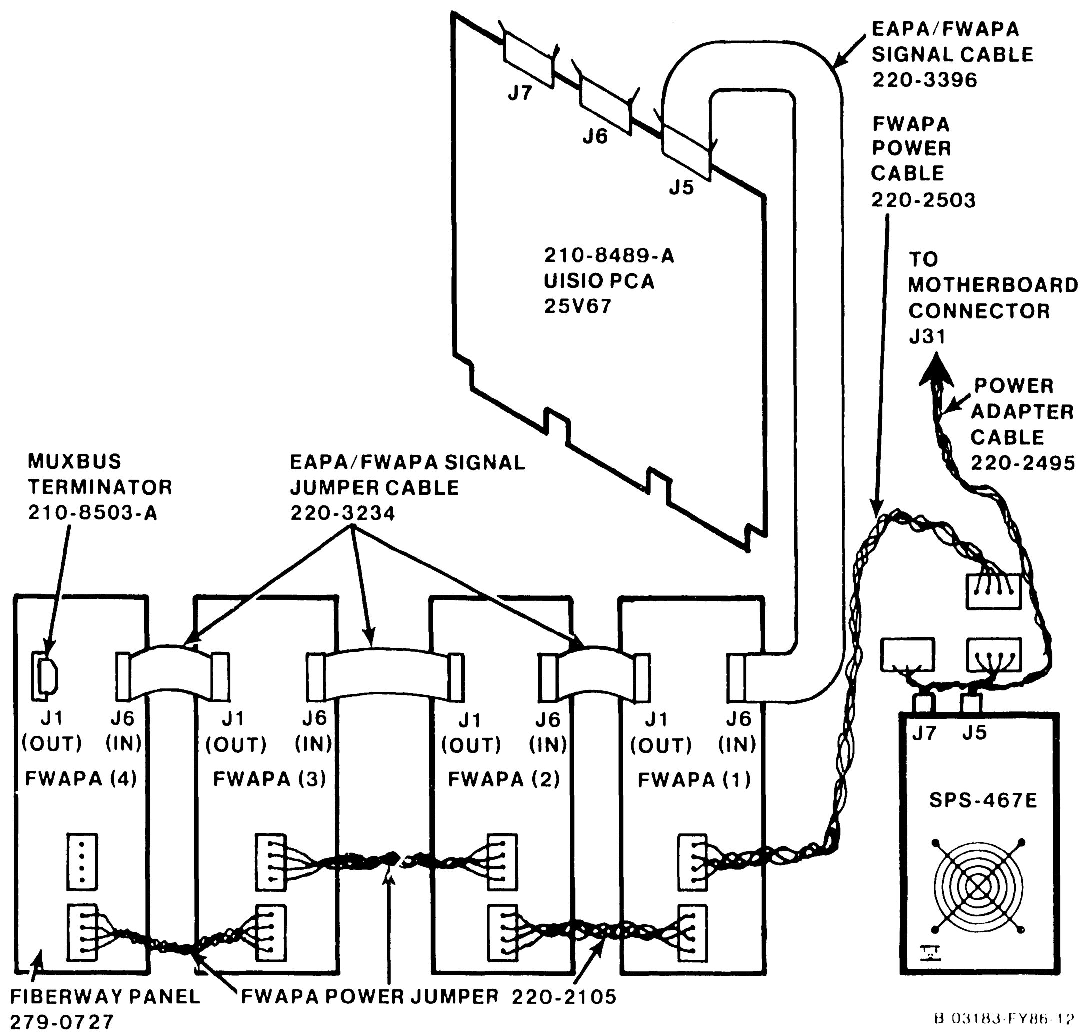


Figure C-9. FWAPA Panels Internal Cabling Diagram

C.4.5.5 Combination EAPA/FiberWay Panel and Global Modem Installation

A combination of EAPA/FiberWay panels (4 panels total) and a Global Modem can be connected to a single UISIO PCA. The example used is configured with two EAPAs, two FWAPAs, and a global modem. This configuration requires the following modular components:

Qty	Model	Description
1	25V67	UISIO PCA includes 928 MuxBus Terminator
2	FW-APA-2S	Single FWAPA panel includes signal and power cables
1	KIT-FW-CP7	Cabling required for first FWAPA panel installation
1	VS-WN-19C	Single WangNet Peripheral Band Modem
1	KIT-WN-CP7	Cabling required for modem installation
2	VS-PA-8C	Single EAPA panel with 4 in. signal and power cable
1	KIT-PA-CP7	Cabling required for first EAPA panel installation

For panel installation and cabling procedures refer to the associated panel installation procedures discussed in the preceding paragraphs.

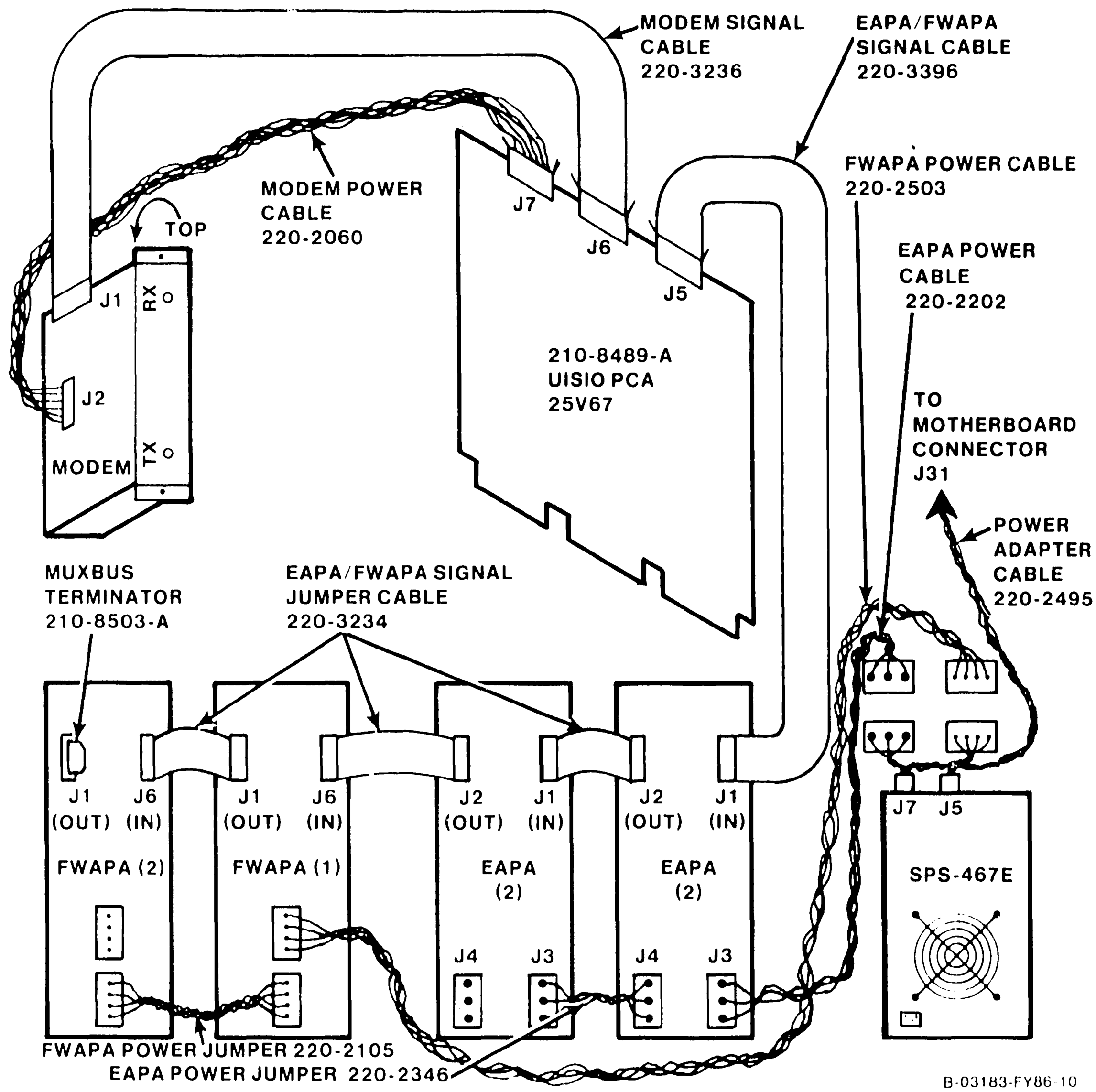


Figure C-10. Combination EAPA/FiberWay/Modem Internal Cabling Diagram

C.4.6 MAINFRAME POWER-UP AND TESTING

When the installation and/or replacement of the affected device adapters is completed, any device adapter cables removed must be reconnected. Power is applied to the mainframe and power supply voltages tested using the procedures in the maintenance manual and the following:

C.4.6.1 Device Adapter and Power Cable Connections

1. Reconnect any device adapter cables removed.

2. Return each cable to its respective cable holder while routing all new cables in a like manner along the mainframe. Refer to the maintenance manual for interconnection of original device adapter panels.

CAUTION

1. RETURNING CABLES TO THEIR CORRECT POSITIONS AND ROUTING ADDITIONAL CABLES CORRECTLY IS IMPORTANT TO ENSURE COMPLIANCE WITH FCC REGULATIONS.

2. BEFORE POWER-UP, ENSURE THE PCAs COMPONENT SIDES ARE FACING RIGHT WHEN VIEWED FROM FRONT OF THE CHASSIS.

C.4.6.2 Mainframe DC Voltage and UISIO PCA Power-Up Verification

1. Set the Boot Device switch on the Operational Control Panel to the DISKETTE (UP) position during initial power-up. There should NOT be a diskette in the drive.

2. Power-up the mainframe using the standard power-up procedures as given in Chapter 4 of the maintenance manual.

3. After installation of a new and/or additional device adapter, the dc power supply voltages must be checked at the Motherboard test points. If the dc voltages at the Motherboard are outside the operating limits as contained in table C-2, the switching power supply voltages must be adjusted. Refer to paragraph 4.7.3 of the maintenance manual.

Table C-2. Direct Current (DC) Test Point Voltages

TEST POINT	DC VOLTS	DC OPERATING VOLTAGE LIMITS	AC RIPPLE VOLTAGE LIMITS
TP1	+/-0.0	- 0.05 to + 0.05	
TP2	+ 5.0	+ 4.95 to + 5.05	35mV RMS
TP3	- 5.0	- 4.95 to - 5.05	or
TP4	+ 12.0	+11.9 to +12.1	50mV Pk-to-Pk
TP5	- 12.0	-11.9 to -12.1	
SPS	+ 24.0	+21.6 to +26.4	

4. Verify that the UISIO DAC is operational using the Built-In-Test (BIT) power-up diagnostics. The UISIO PCA power-up diagnostic LED (LED1) should light for seven to ten seconds and then go out.

NOTE

UISIO power-up diagnostics only tests the UISIO PCA. Modular Components (EAPA, FWAPA, and Modem) attached to the UISIO PCA are not tested.

5. If the LED remains ON, the UISIO has failed the power-up diagnostics. Proceed with paragraph C.4.6.3, UISIO DAC BIT failure.

6. After successfully completing the power-up diagnostics, voltage checks, and/or adjustments, continue with paragraph C.4.6.5.

5.4.6.3 Universal ISIO Device Adapter/Controller BIT Failure

Whenever power is applied to the system, or when the INITIALIZE pushbutton is pressed, the UISIO DAC power-up diagnostics will begin running concurrently with the other VS-65 system power-up diagnostics. If the UISIO DAC power-up diagnostics fail (LED remains ON), before replacing the PCA perform the following procedures:

1. Check the Front Panel HEX display for error codes 7010 through 7012. The UISIO DAC may not have set or reset a particular bit on power-up.

2. Re-IPL the system, thus resetting and restarting the BIT. If power-up diagnostics are successful continue to paragraph C.4.6.4.

   If the LED remains ON, Power-down the mainframe and remove the UISIO PCA. Examine the PCA for damaged, loose, or improperly seated components. Check the DIPs and sockets for missing or misaligned contacts. Press down firmly and carefully on each of the DIPs to ensure each is properly seated.

3. Reinstall the UISIO DAC in a different slot, ensuring that the PCA is seated properly and rerun the power-up diagnostics. If the BIT fails again, the PCA is defective and should be returned. Refer to paragraph C.5 for removal and replacement procedures. Power-down the system.

C.4.6.4 Modular SIO Subsystem Diagnostic Procedure

1. Insert the Small Systems VS Diagnostic Monitor diskette (DIAG2 - P/N 732-8031) in the diskette drive and press the INITIALIZE pushbutton. The diskette is included in diagnostic package P/N 195-2458-0, Rev 2561. (The package includes multimedia software and documentation.)

2. At the end of the power-up diagnostics, the Diagnostic Diskette will begin the stand-alone IPL process and the standard disclaimer screen will appear. A 'YES' response will continue the diagnostic process.

3. A 40db loop-back device is required to test the 19-channel global modem. Refer to paragraph C.7.3.2 for modem loop-back trouble-shooting.

4. When the Test Selection Option screen appears, run the UISIO DAC diagnostic test (UT1000) on DIAG2. If the stand-alone diagnostic fails, UISIO PCA replacement is required. Refer to paragraph C.5.

5. Upon successful completion of the stand-alone diagnostics, re-IPL the the system and proceed with paragraph C.4.6.5.

C.4.6.5 Mainframe Power-up Procedures

1. While the power-up diagnostics are running, change the Boot Device switch to the appropriate position allowing the mainframe to IPL from the system drive, and remove the DIAG2 diskette.

2. Run the Self-Test Monitor diagnostics. Enter the Date and Time when requested and press ENTER.

3. Enter the name of the new configuration file and press ENTER. The System Initialization screen will appear.

4. Verify that the VSOS Nucleus and @SYSGEN@ version's agree.

5. When system IPL is complete, log onto the system using the CSG LOG-ON.

6. Verify that all peripherals have been correctly declared and are functioning properly. If not, modify the new configuration file as required by the customer. Re-IPL and verify the system.

7. Run the NVRAM utility and enter the necessary information in the various sections of the NVRAM files. When the NVRAM is updated and the system is verified, the procedure is complete.

C.5. REMOVAL AND REPLACEMENT PROCEDURES

The general removal and replacement procedures given in the maintenance manual should be followed whenever a printed circuit assembly (PCA) or option panel is to be removed or installed. In the event the WangNet Modem must be replaced refer to paragraph C.5.1.

C.5.1 WangNet Modem Assembly Removal and Replacement

When replacing the WangNet 19-Channel Global Modem (P/N 279-5305), the mounting plate and mounting panel are NOT supplied with the modem. The Modem Mounting Panel (P/N 452-0379) and the Modem Mounting Plate (P/N 452-4757) must be removed from the defective modem and installed on the replacement modem prior to replacement installation.

1. Remove the signal and power cables from the modem assembly.

2. Support the modem assembly and remove the modem panel mounting screws.

3. Rotate the modem assembly toward the card cage enough to slip the mounting panel flange out from behind the RPA and free the modem assembly. Return the modem to its normal position and remove.

4. Hold modem assembly upright and remove the four screws (figure C-11) which secure the Modem Mounting Panel to the Modem Mounting Plate. Remove the mounting panel.

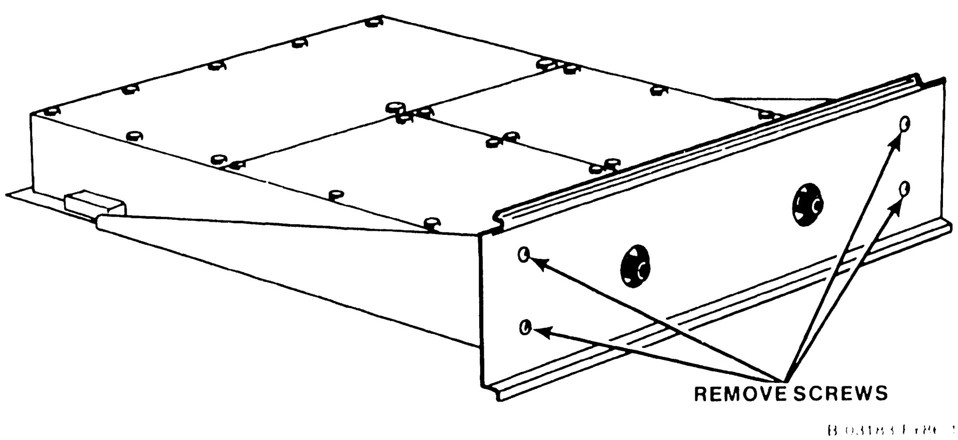


Figure C-11. Modem Mounting Panel Removal

5. Turn the modem and mounting plate over so that the 4.27 MHz label is upside-down (figure C-12).

6. Remove the six screws which secure the mounting plate to the modem and remove the mounting plate.

7. To assembly modem mounting plates, reverse procedures listed above.

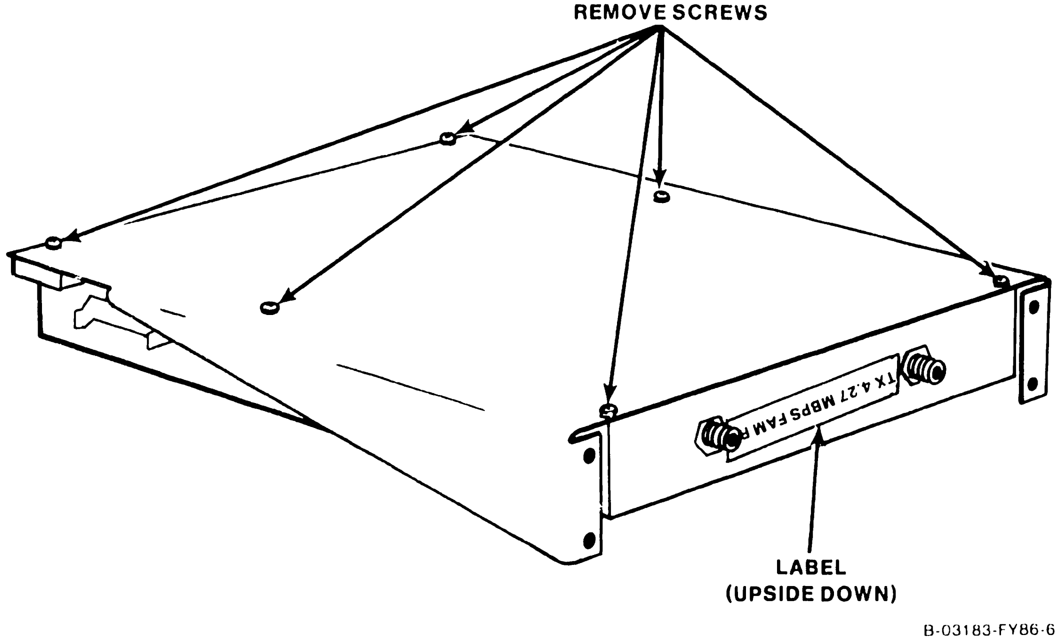


Figure C-12. Modem Mounting Plate Removal

C.6 ILLUSTRATED PARTS BREAKDOWN

This section contains the Illustrated Parts Breakdown (IPB) and power and signal cable part numbers for the Modular Serial Input/Output Subsystem. Use this breakdown for part number identification when ordering Field Replaceable Units (FRUs).

C.6.1 FIELD REPLACEABLE UNITS

Table C-3 lists the Field Replaceable Units of the Modular I/O subsystem.

Table C-3. Field Replaceable Units

PART NUMBER	ITEM DESCRIPTION
210-8489-A	PCA, Universal SIO Device Adapter/Controller
210-8503-A	PCA, 928 MC MuxBus Terminator
270-0975	ASSY, 8-Port EAPA (BNC/TNC) Panel
279-5305	ASSY, 19-Channel, 4.27 MHz WangNet Global Modem (SEE NOTE)
279-0727	ASSY, 2-Channel FiberWay Panel
220-2060	CBL, UISIO-to-WangNet Global Modem Power
220-2346	CBL, 4-Inch, 3-Pos Plug-Plug EAPA-to-EAPA Power Jumper
220-2202	CBL, 38-Inch, 3-Pos Plug-Plug First EAPA-to-Power Supply (J7)
220-3234	CBL, 4-Inch, 34-Pos Soc-Soc APA-to-APA Signal Jumper (FW/EAPA)
220-3236	CBL, 36-Inch, 34-Pos Soc-Soc UISIO (J6)-to-Modem Signal (J1)
220-3396	CBL, 44-Inch, UISIO (J5) to First APA MuxBus Signal (FW/EAPA)
220-2105	CBL, 4-Inch, 4-Pos Plug-Plug FWAPA Power Jumper
220-2503	CBL, 5-Pos to 4-Pos Plug First FWAPA Power
220-2495	CBL, Power Adapter, SPS-to-Motherboard, EAPA/FWAPA Power
220-0294	CBL, 10 Feet, Modem-to-WangNet User Outlet

NOTE

The WangNet Global Modem Assembly requires the disassembly of the mounting hardware prior to replacement. Refer to paragraph C.5.1 for mounting hardware removal and replacement procedures.

C.6.2 MODULAR SIO SUBSYSTEM POWER CABLES

Modular SIO Subsystem power cables part numbers and interconnection with system subassemblies are given in the table below. The power cable interface connector pin-outs are contained in figure C-13.

Table C-4. Modular SIO Subsystem Power Cable Part Numbers

CABLE P/N	SOURCE	DESTINATION
220-2202	SPS Connector J7 or Power Adapter Cable 3-Pos Plug	First EAPA Power Connector (J3)
220-2346	Prev. EAPA Power Connector J4	Adjacent EAPA Power Connector J3
220-2060	UISIO Connector J7	Modem Power Connector J2
220-2495	SPS Connector J7 and J5	Motherboard Connector J31, First EAPA Power Cable (220-2202) and First FWAPA Power Cable (220-2503)
220-2503	Power Adapter Cable 5-Pos Plug	First FWAPA Power Connector
220-2105	Prev. FWAPA Power Connector	Adjacent FWAPA Power Connector

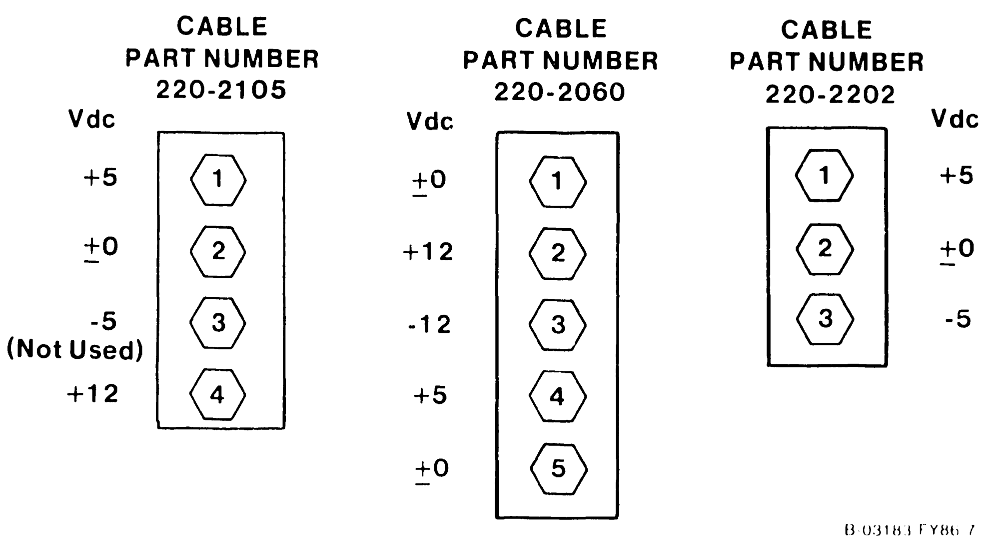


Figure C-13. Modular SIO Subsystem Power Cable Connectors

C.6.3 MODULAR SIO SUBSYSTEM SIGNAL CABLES

Modular SIO Subsystem signal cables part numbers and interconnection with system subassemblies are given in the table below. The signal cable connector pin-outs are contained in figure C-14.

Table C-5. Modular SIO Subsystem Signal Cable Part Numbers

CABLE P/N	SOURCE	DESTINATION
220-3396	UISIO PCA Connector J5	First APA Panel Signal-In Connector (EAPA J1, FWAPA J6)
220-3236	UISIO PCA Connector J6	WangNet Modem Assembly Connector J1
220-3234	Previous APA Signal-Out Connector (EAPA J2, FWAPA J1)	Adjacent APA Signal-In Connector (EAPA J1, FWAPA J6)

NOTE

The Modular Subsystem uses the RS-422 interface. TTL signals asserted low are barred.

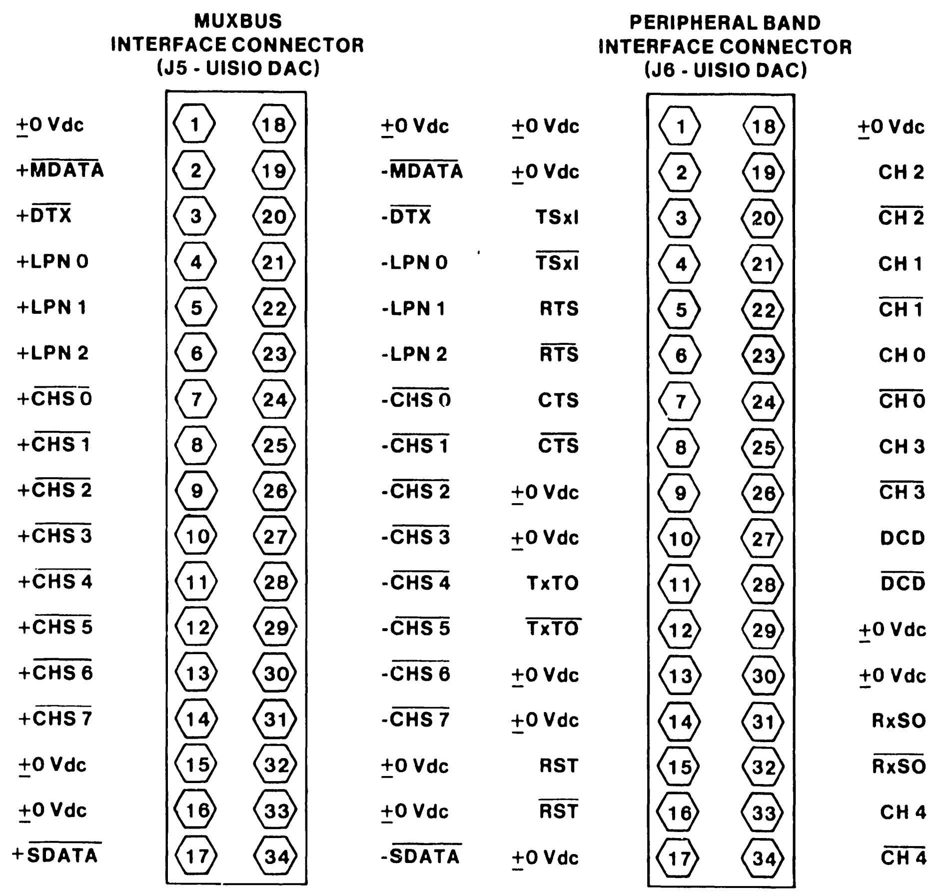


Figure C-14. UISIO Interface Connector Signals

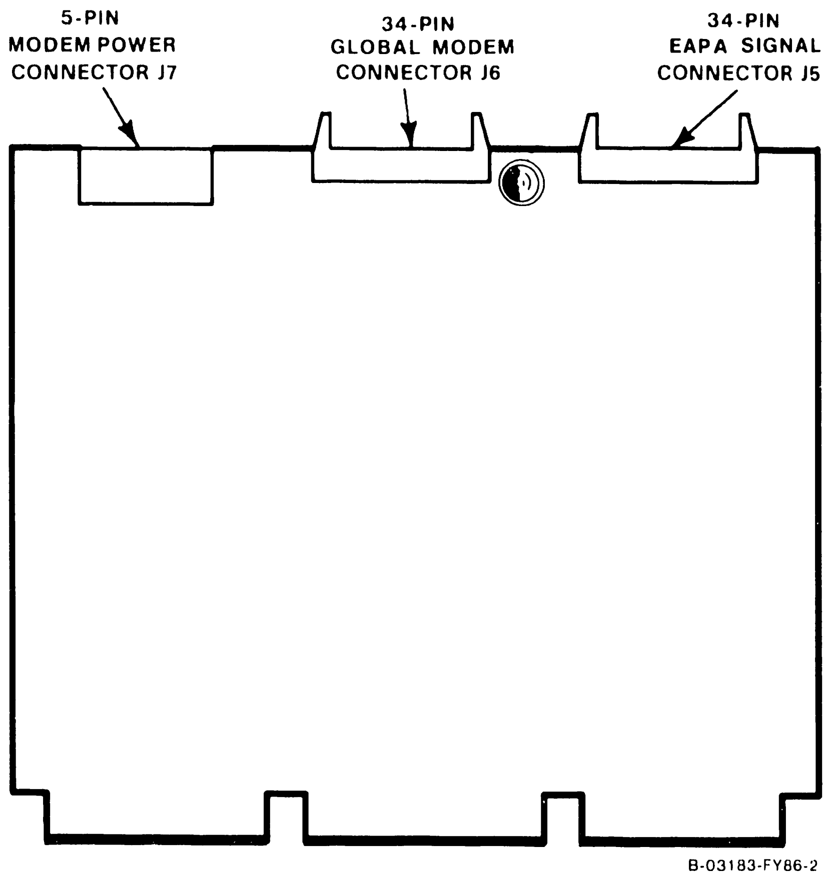


Figure C-15. UISIO PCA (210-8489-A)

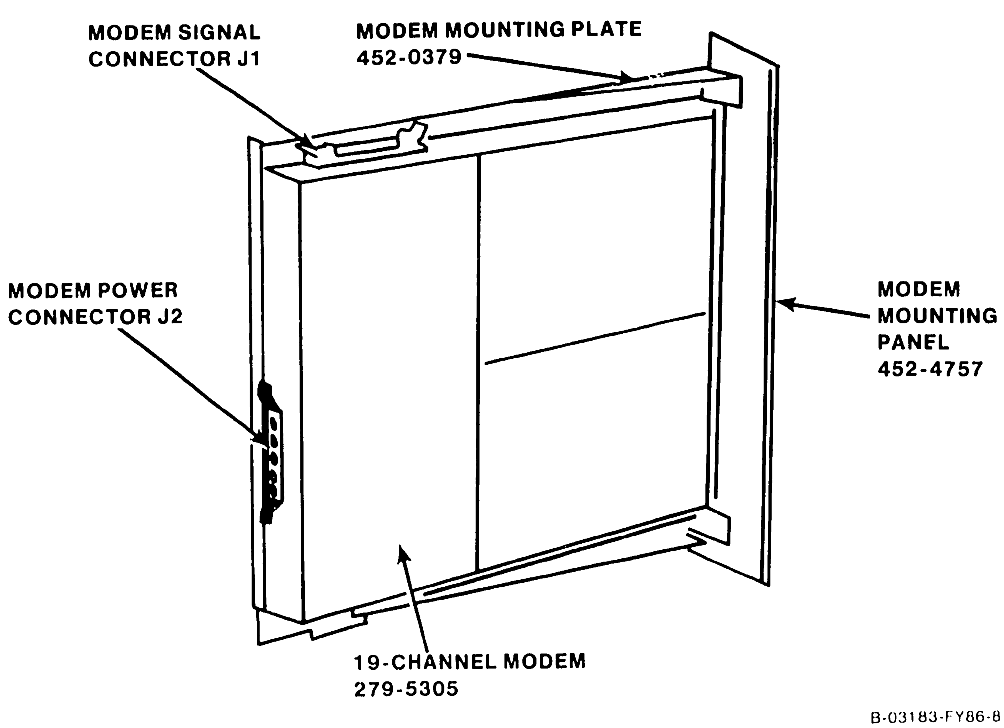
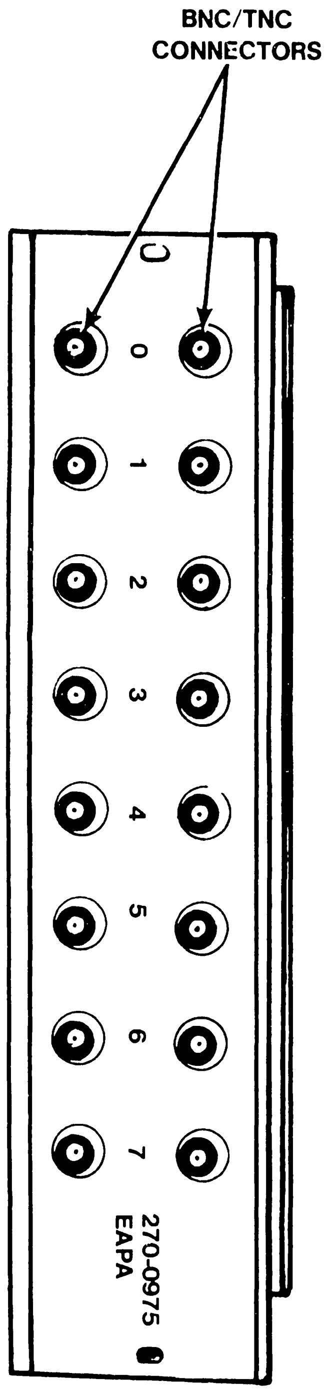


Figure C-16. WangNet 19-Channel Global Modem Assembly (270-1020)



B-02820-FY86-45

Figure C-17. Model VS-PA-8C EAPA Panel (270-0975)

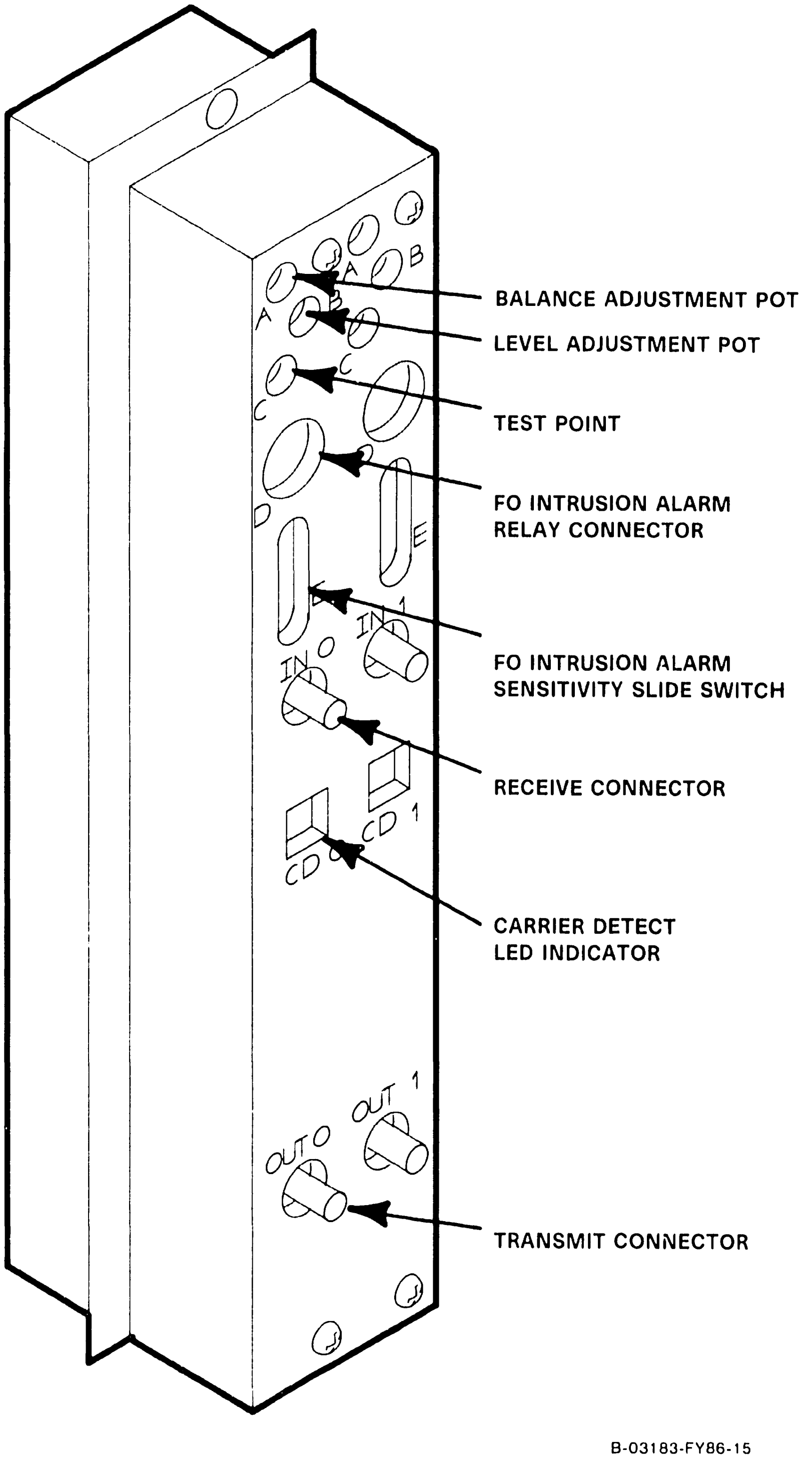


Figure C-18. Model VS-APA-2S FiberWay Panel Assembly (279-0727)

C.7 TROUBLESHOOTING

This section discusses the diagnostics available for the Modular SIO Subsystem. The diagnostic programs provide comprehensive testing of the UISIO PCA, EAPAs in conjunction with an operational workstation and UISIO, FWAPAs in conjunction with an operational workstation and UISIO, and the 19-channel global modem and UISIO using the loop-back device.

C.7.1 DIAGNOSTIC FACILITIES

The Modular SIO Subsystem uses the same diagnostic facilities available to other intelligent PCAs on the VS Computer System. PROM encoded power-up core diagnostics are used to test the internal operation of the UISIO DAC.

Off-line diagnostics controlled by the Bus Processor are used to test the operation and interfacing of the UISIO with other system subassemblies. The Self-Test Monitor (STM) has been modified to include the UISIO DAC when the UISIO is the primary serial I/O device adapter (decode address 0400). The STM performs additional subsystem tests immediately after power-up and whenever the system is initialized.

The VS Diagnostic Monitor is available in on-line and off-line versions. Normally, the on-line Diagnostic Monitor will be used to test the subsystem at installation and whenever an error is indicated by the system. Off-line diagnostics are found on diskette DIAG2 (WLI P/N 732-8031) of the CP7 Stand-Alone Diagnostic Monitor Package.

C.7.2 UISIO DAC SELF-TEST MONITOR DIAGNOSTICS (@ST0800@)

The Self-Test Monitor Diagnostics for the UISIO are functionally identical to those of the VS-15/25/45 Intelligent Serial I/O Device Adapter. The disk-based STM has been modified to recognize the UISIO (928W) hardware, the new CP7 and 80286 BP, and the timing differences found on the VS-65 Computer System.

The STM routine calls up program @ST0800@ when the UISIO is the primary serial I/O device. Workstation Zero must be attached (as logic device zero) via an EAPA and the UISIO must be set for Physical Device Address (PDA) 0400.

If the UISIO is configured as the second SIO on the system, the STM program (@ST0800@) will not test the second SIO device adapter; testing must be accomplished using either the on-line or off-line Diagnostic Monitor Package.

C.7.2.1 Self-Test Monitor Diagnostic Error Codes

The STM Diagnostic Error Codes for the Modular SIO Subsystem are identical to the error codes for the VS-15 ISIO Device Adapter. When a UISIO failure occurs while running the STM, the 70xx error code series will be activated and displayed. This condition may be corrected by re-IPLing the system. Refer to Appendix B of the VS-65 PMM for the STM Error Codes.

C.7.3 SMALL SYSTEM VS DIAGNOSTIC MONITOR PACKAGE

The Small System VS Diagnostic Monitor Package for the VS-65 has been released under WLI P/N 195-2458-0, Rev. 2561. The package includes on-line and off-line versions, documentation, and 8 inch and 5-1/4 inch floppies for documentation and software.

In addition, the package includes the latest version of the Self-Test Monitor software discussed above. VS-65 Computer Systems with VSOS 6.41.00 or higher should be updated to the most recent version.

C.7.3.1 Modular SIO Subsystem Diagnostic Monitor Program

The Diagnostic Monitor should be used when installing a new Modular SIO Subsystem or when replacing subsystem components. If a failure occurs while running the Self-Test Monitor, the system will default to the monitor and must be re-IPLed to clear the monitor access screen.

C.7.3.2 Accessing the Diagnostic Monitor's Menus

The on-line Diagnostic Monitor may be accessed during normal power-up procedures by pressing PF8 at the IPL Selection screen or by IPLing directly from the off-line Diagnostic Monitor diskette DIAG2.

Once the Diagnostic Monitor is accessed, the initial screen displayed on Workstation Zero will be the Cautionary Notice screen. Responsibility for the use of the Diagnostic Monitor must be acknowledged prior to access. The operator may then interface with the Diagnostic Monitor through three menus: the Program Selection Menu, the 928 Device Adapter Address Selection Menu, and the Modular SIO Subsystem Subassembly Test Selection Menu.

```
             Small System VS Diagnostic Package  Version  R2561
                             Test Selection Option

  To Select Tests, Position Cursor And Press Any NON-BLANK. Press SPACE
  or DELETE To Deselect a Test. Press PF8 to Start An Automatic Sequence.
  Press ENTER to Begin Testing. Press PF16 to Terminate.

             Test Name

□  1  USART/Modem/RIPL Diag
□  2  Bus Processor Diag
□  3  T.C. DA 1-Port
□  4  T.C. DA 2-Port
□  5  Dumb 928 Data Link DA
■  6  Universal Smart SIO DA
□  7  8-Port RS232 DA Diag
```

Figure C-19. Diagnostic Monitor Program Selection Screen (Floppy Diskette Volume: DIAG2)

If a 19 channel global modem is to be tested, a 40db loop-back device is required. Attach the attenuators to each other and to the silver (Rx) connector. Attach the appropriate ends of the coaxial cable to the attenuators and to the gold (Tx) connector. Refer to figure C-20.

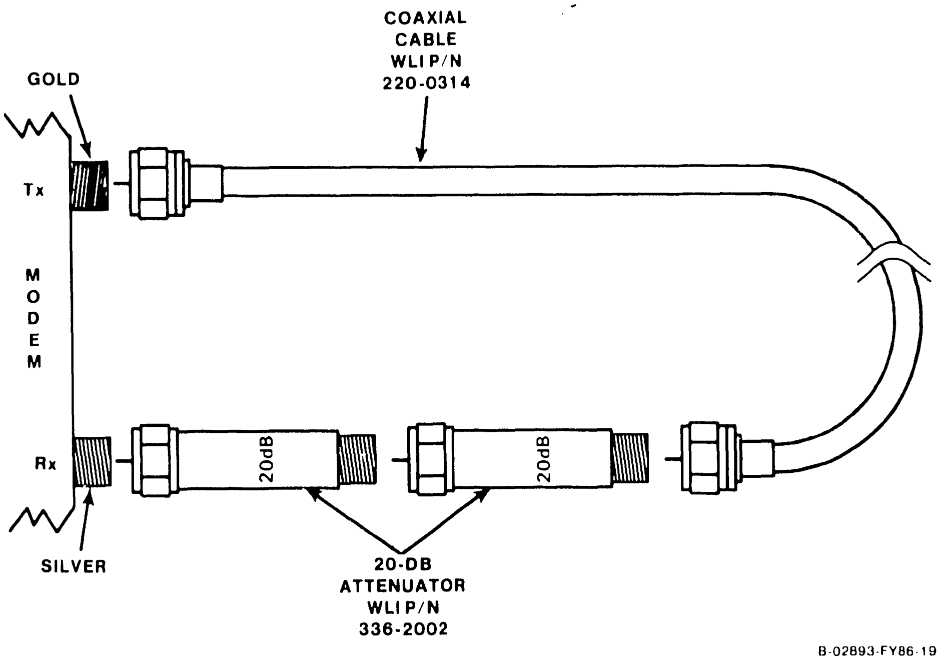


Figure C-20. Global Modem Loop-back Test Equipment

```
            Small System VS Diagnostic Package  Version  R2561

(1) = Error Loop    (4) = Program Loop    (7) = Step            (16) = Exit
(2) = Routine Loop  (5) = Pause          (10) = Clear all Settings
(3) = Stop on Error                      (13) = Display Error Log
Program Name: R14A4 928 DA Interface Diagnostic  Error Count          = 00000
Routine Name:                                     Routine Loop Count   = 00000
Error Code  =                                     Program Loop Count   = 00000
Program Status: Test In Progress                  Monitor Pass Count   = 00000

Messages:
A 928 Device Adapter has been located on the system at the address
displayed below.  Press ENTER to use the address displayed or if a
second 928 is to be tested, type in its address and then press ENTER.

(Valid DA Address: 0100, 0200, 0300, 0400, 0500, & 0600)

 00
```

Figure C-21. Diagnostic Monitor UISIO 928 DA Address Selection Screen

```
            Small System VS Diagnostic Package  Version  R2561

(1) = Error Loop    (4) = Program Loop    (7) = Step            (16) = Exit
(2) = Routine Loop  (5) = Pause          (10) = Clear all Settings
(3) = Stop on Error                      (13) = Display Error Log

Program Name: R148C VS-65 Fixed Disk DA Diag     Error Count          = 00000
Routine Name: 00 Initialization & Interrupts --  Routine Loop Count = 00000
Error Code  =                                    Program Loop Count = 00000
Program Status: Test In Progress                 Monitor Pass Count = 00000

Messages:
TYPE in the Test number in HEX to be executed, then press "ENTER".

00  BR & Refresh Test
01  BR & Modem Loop-back (Ch 0-5)
02  BR & Modem Loop-back (Ch 0-5, 13-1F)
03  BR & Modem Loop-back (User Selectable)
04  BR & Loop-back Connector #1 tests
05  BR & Loop-back Connector #2 tests
06  BR & Baseband tests (Electric, User Selectable)
07  BR & Baseband tests (Fiber-Optic, User Selectable)

 00
```

Figure C-22. Modular SIO Subsystem Subassembly Test Selection Screen

After successfully testing the Modular Serial I/O, be sure to enter the required information in NVRAM System Configuration, Hardware Configuration, and Service Log fields.

APPENDIX D
VS-45XP COMPUTER SYSTEM

APPENDIX D

VS-45XP COMPUTER SYSTEM

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APPENDIX D

VS-45XP COMPUTER SYSTEM

(VS-25/45 UPGRADE TO VS-65 FUNCTIONALITY)

D.1 INTRODUCTION

Customers who have purchased either a VS-25 or a VS-45 Computer System, and have outgrown their system, now have the option to upgrade their system to VS-65 Computer System functionality. Using a combination of VS-25/45 and VS-65 Upgrade Kits, the VS-45XP may be configured with up to 40 workstations and a total of 64 logical serial devices.

This appendix contains the necessary information required to upgrade the customer's system to the capabilities of the VS-65 Computer System. Depending on the VS-25/45 configuration, the procedure requires the replacement of the switching power supply, the Central Processing Unit (CPU) printed circuit assemblies (BP, CP, and MM), the Remote Diagnostics cable assembly, and, possibly, the Serial I/O DA and the system disk drive(s). Two BNC/TNC serial I/O rear half-panels are added (up to a maximum of four), and the Stand-Alone Utility and VS Operating System (VSOS) are updated. If required, the VS Small Cable Concentrator can be added to accommodate other VS-65 supported options.

Instructions are provided for the disassembly of the VS-25/45 to allow the installation of the standard VS-65 Printed Circuit Assemblies (PCAs). Any procedures which are specific to the VS-45XP and are not given in the VS-65 Product Maintenance Manual will be discussed. Descriptions, specifications, installation and removal procedures, and diagnostic information available in the VS-65 Preventive Maintenance Manual (PMM) will not be include in this PUB.

D.1.1 APPLICABLE DOCUMENTATION

Documentation related to the application and/or use of the VS-45XP Computer System may be found under the appropriate Class Code(s) in the Wang Technical Documentation Catalog/Index (WLI P/N 742-0000). The index gives a complete listing of Customer Engineering technical documentation. The Wang Corporate Resource Catalog (WLI P/N 700-7647) identifies additional product documentation. To order the latest revision and any applicable Publication Update Bulletins (PUBs), refer to the Wang Catalogs given above. Failure to do so may result in receiving outdated information. Directions for ordering documentation can be obtained by requesting the Wang Order/Distribution Kit from either the Wang Supplies Division or Wang Customer Engineering Branch Managers.

D.1.2 VS-45XP COMPUTER SYSTEM CAPABILITIES

The VS-45XP Computer System incorporates all of the processing speed and functionality of the VS-65. Minor differences, which are discussed in the following paragraphs do not affect the performance of the system. The system may be configured with one, two, and four megabytes of cache/main memory, and with or without an internal disk drive.

D.1.3 SYSTEM DESCRIPTION AND SPECIFICATIONS

There will only be two visible changes to the VS-25/45 Computer System Mainframe.

- A WLI Model label displaying the new system model number (VS-45XP).
- Two additional serial I/O rear panels provide a minimum of 32 ports.

Three specific limitations should be noted. The replacement power supply has a limited amount of current available for the I/O DAs. (The CP7 Central Processing Unit PCA combination requires more current than the CP5 version.) This may require the addition of the VS Small Cable Concentrator (with its own power supply) to meet the customer's I/O requirements. Model number KIT-XP-CC, the VS-45XP Cable Concentrator Installation Kit, includes a Strain Relief Panel (a new rear panel) used to mount the cables going to the Cable Concentrator.

Rear Connector Panel Assembly (RCPA) differences between the VS-15/65 and the VS-25/45 will require the use of the Cable Concentrator for recent product releases. Remote device support using the Modular Serial I/O Subsystem for the support of the Electrically Active Port Assemblies (EAPAs), FiberWay (fiber optic peripheral connections) Optical Active Port Assemblies (OAPAs), and the Peripheral Band 19-channel Global Modem interface to WangNet are examples. High current requirements for these devices are also a consideration.

The eight-inch system mounted diskette drive is supported by the VS-65 Bus Processor (with a change in a shunt connector block jumper) and a minimum OS release of 6.41.00. Since the drive is a soft sector only drive, it will not support the hard sector diskettes required for direct Word Processing document archiving. WP documents must be filed using an archiving workstation.

D.1.4 SYSTEM UPGRADE KITS

Four new upgrade kits are being offered for the VS-45XP Computer System conversion and are listed in table D-1. In addition, the UJ-3246 upgrade kit is the standard kit for adding a 76-megabyte internal drive to ANY VS-25/45 Computer System and DOES NOT include any VS-45XP hardware.

Table D-1. VS-25/45 Computer System Upgrade Kits

UJ KIT NUMBER	UPGRADE KIT CEI NUMBER	NEW SYSTEM MODEL NUMBER	DESCRIPTION OF VS-25/45 TO VS-45XP CONVERSION CONFIGURATION
UJ-3246	205/206-3246 (Note 1)	VS-45XP-1AN VS-45XP-2AN	76-Mb Internal Drive w/Controller (Note 2)
UJ-3443	205/206-3443 (Note 3)	VS-45XP-1X	1-Mb System without Internal Drive
		VS-45XP-1AN	1-Mb System with 76-Megabyte Drive
UJ-3451	205/206-3451	VS-45XP-1AN	1-Mb, 33/66-Mb to 76-Mb Disk Drive
UJ-3452	205/206-3452 (Note 3)	VS-45XP-2X	2-Mb System without Internal Drive
		VS-45XP-2AN	2-Mb System with 76-Megabyte Drive
UJ-3453	205/206-3453	VS-45XP-2AN	2-Mb, 33/66-Mb to 76-Mb Disk Drive

NOTES

1. Part numbers with a prefix of 205 indicates International systems and part numbers with a prefix of 206 indicates Domestic systems.

2. Upgrade Kits UJ-3451 or UJ-3453 CANNOT be substituted for UJ-3246 in systems without internal 33/66-megabyte drive(s).

3. Upgrade Kit UJ-3452 CANNOT be substituted for UJ-3443 in systems with one-megabyte or less of Main Memory. See also table D-2.

The three existing VS-65 system upgrade kits listed in table D-2 are required IN ADDITION to those listed in table D-1 when system Main Memory is being increased to four megabytes.

Field Replaceable Units (FRUs) are listed in paragraph D.6.1. Tables D-13 and D-14 are VS-45XP specific, while tables D-15 and D-16 list FRUs common to both VS-25/45s and VS-45XPs. Tables D-17 and D-18 detail the special requirements of the SPS-450XP switching power supply. Tables D-19 through D-23 list the contents of the Upgrade Kits available. Tables D-24 through D-26 give the various cables used by the system.

Table D-2. VS-65 Computer System Memory Upgrade Kits

UJ KIT NUMBER	UPGRADE KIT CEI NUMBER	NEW SYSTEM MODEL NUMBER	DESCRIPTION OF VS-25/45 AND/OR VS-45XP CONVERSION CONFIGURATION
UJ-3317	205/206-3317	VS-45XP-2X/2AN	Upgrade 1-Megabyte to 2-Megabyte
UJ-3318	205/206-3318	VS-45XP-4X/4AN	Upgrade 2-Megabyte to 4-Megabyte
UJ-3319	205/206-3319	VS-45XP-4X/4AN	Upgrade 1-Megabyte to 4-Megabyte

NOTE

The four-megabyte upgrade requires that all device adapter/controller PCAs MUST be changed to the 210-9xxx series or the system will NOT IPL.

D.1.5 SYSTEM SOFTWARE REQUIREMENTS

VSOS Software release 6.41.00 or higher is required to support the VS-45XP Computer System. The microcode software versions required to operate the CP7 system are 7.08.00 (@MCCP@), and 7.04.02 (@MCBP1@), and 6.41.00 (@SYSTEM@) or later. Autoenclosed with each system upgrade kit is the CEI 291-0467 software installation package. It includes the CP7 Stand-Alone Utility on an eight-inch diskette, the complete VSOS 6.40.00 release, and the VSOS 6.41.00 update software, an addendum to the VS-65 Processor Handbook (for the customer), and any additional software and documentation. Refer to the correct software release notice for software configuration instructions and prerequisites.

D.2 SYSTEM OPERATION

Operation of the VS-45XP Computer System is the same as the VS-65. Refer to Chapter 3 of the VS-65 Product Maintenance Manual (PMM). Exceptions to the system diskette drive and the Switching Power Supply (SPS), and minor changes in operation of the VS-45XP are given in the following paragraphs.

D.2.1 OPERATOR CONTROLS AND INDICATORS

Operator controls, on the VS-45XP mainframe, for the diskette drive and the DC power supply are the same as the VS-25/45. Status and error conditions are displayed as usual on the Front Panel HEX display and LED indicators.

D.2.2 SERVICE CONTROLS AND INDICATORS

Service controls and indicators for the VS-45XP which are different from the VS-65 are discussed in the paragraphs for installation and repair of this appendix. Details about additional controls and indicators for VS-65 PCAs and subassemblies are found in Chapters 3, 4, & 5, and Appendix C of the VS-65 PMM.

CAUTION

Ensure that a FULL Data Management System (DMS) BACKUP of ALL files on the System Disk(s) has been completed using the BACKUP utility before system disassembly (refer to D.5.8). Backing up the customer's USERLIST, FORMDFFN, and ALIASFL files onto a separate eight-inch system floppy diskette prior to updating the VSOS can save substantial time during software installation.

D.2.3 OPERATING PROCEDURES

Since the conversion requires substantial disassembly of the VS-25/45 mainframe, operating procedures that are unique to the VS-45XP will be discussed during the reassembly and installation sections of this PUB. Perform the power-down procedure given in paragraph 3.7.3 in the VS-65 PMM and proceed with mainframe disassembly.

D.3 UNPACKING/INSPECTION/DAMAGE INSTRUCTIONS

Proceed with the unpacking, inspection, and reporting procedures of the VS-45XP Upgrade Kit(s) as given below.

1. Inspect the shipping containers for any signs of damage (crushed corners, punctures, etc.). If no damage is apparent, proceed with unpacking the contents of the upgrade kit(s).

2. SAVE all shipping and packing materials. These will be used to return the replaced assemblies/subassemblies removed.

3. Inspect the contents of each shipping container for any sign of loss of integrity, or other signs of damaged, loose, or missing components.

4. Check all items against the shipping bill(s)/packing list(s) to ensure that the correct items where shipped and that none are missing.

5. If damage is discovered during inspection, notify your manager.

D.4 MAINFRAME DISASSEMBLY

This section discusses the procedures required to disassemble the VS-25/45 mainframe; including removal of the necessary subassemblies, PCAs, cabling, and hardware. Refer to paragraph 4.3 of the VS-65 PMM for a list of the tool and test equipment required. In order to minimize the customer's downtime, be sure to follow the procedures EXACTLY as given.

WARNING

IF THE CUSTOMER'S SYSTEM IS A SINGLE DISK (INTERNAL OR EXTERNAL) DRIVE SYSTEM, THE CP7 VS OPERATING SYSTEM SOFTWARE MUST BE PREPARED IN ADVANCE.

DO NOT DISASSEMBLE THE SYSTEM UNTIL THE CP7 OPERATING SYSTEM HAS BEEN GENERATED AND HAS BEEN ARCHIVED TO THE APPROPRIATE INSTALLATION MEDIUM.

PROCEED DIRECTLY TO PARAGRAPH D.5.8.

REVIEW ALL APPLICABLE DOCUMENTATION INCLUDED WITH UPGRADE AUTOENCLOSURE.

REFER TO TECHNICAL SERVICE BULLETIN SWT 6051 (06/03/86), FOR INSTRUCTIONS ON SAU MEDIUM CREATION FOR DIFFERENT CP TYPES.

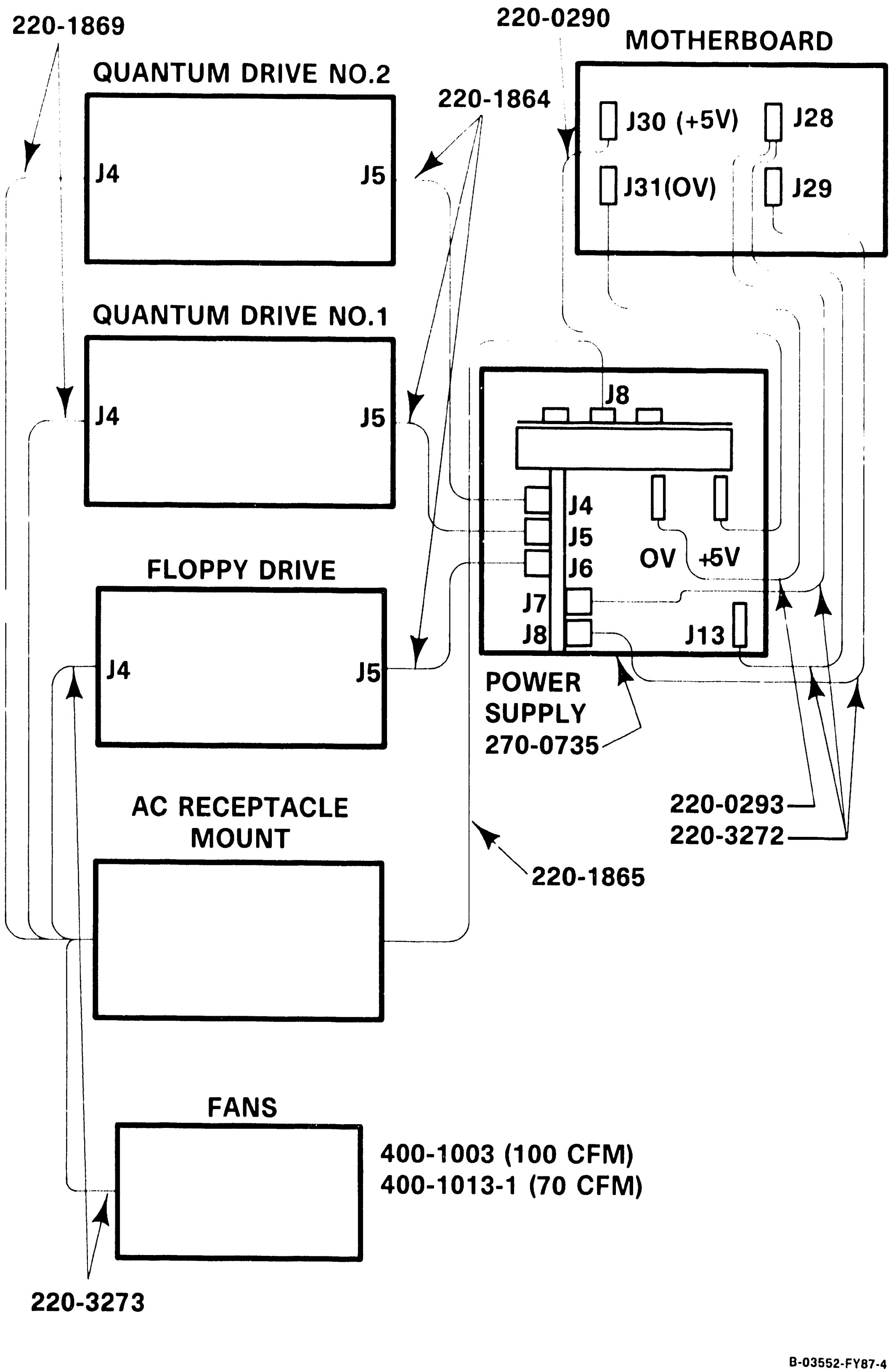


Figure D-1. Power Supply Related Cabling
(VS-25/45 Dual 33-Megabyte Internal Disk Drive Configuration)

D.4.1 COVER REMOVAL

Remove the top and front covers as follows:

1. At the rear of the mainframe cabinet, two slot-head fasteners (oval-head Dzus studs) secure the top cover to the Rear Panel Subassembly (RPS). Use a wide-blade screwdriver to disengage the fasteners by turning them 1/2-revolution counterclockwise (CCW).

2. With the fasteners free, slide the top cover 2 to 3 inches toward the front to detach the top cover from the front cover catch. This frees the top cover from the cabinet.

3. At the front of the cabinet, firmly grasp the top cover on each side, and while pulling it toward you, lift it up and away from the cabinet.

4. The front cover attaches to the upper and lower part of the cabinet by means of metal tabs inserted into slots on the cabinet. Grasp the top of the front cover firmly and lift up and out of the cabinet.

D.4.2 QUANTUM DISK DRIVE REMOVAL

If the VS-25/45 is equipped with the 76-Megabyte Disk Drive, proceed to paragraph D.4.3., otherwise remove the Quantum Disk Drive(s) as follows:

1. The Quantum drive is attached to the baseplate by a 5/16" hex head flange screw WLI P/N 650-6122 at the front of the disk drive mounting plate. A clinch-nut attached to the baseplate secures the drive to the baseplate. Remove the flange screw from the baseplate and the drive mounting plate. Set the screw aside in case it is needed later when mounting the 76-megabyte drive.

2. Carefully slide the drive forward. The A and B signal cables, and ac and dc power cables are connected to the rear of the drive. Remove the 'A' and 'B' cables from the drive and from the system.

3. Remove the ac and dc cables from the drive. The dc cable(s) from J4, J5, and J6 of the SPS-450 Switching Power Supply will be disconnected later. A new dc cable will be used with the 76-megabyte disk drive. The replacement drive does not use ac power. (Refer to figure D-1.)

4. Slide the drive forward and out of the bayonet Locking Guide slot on the bottom of the drive mounting plate. Remove the drive from the cabinet, avoiding contact between the drive and adjacent equipment.

CAUTION

ENGAGE Shipping Latches IMMEDIATELY upon removal of the Quantum Drive(s) to prevent DAMAGE to drive(s).

5. Refer to figures D-2 and D-3. Lock the Quantum Actuator and Drive Pulley. DO NOT rotate the Drive Pulley. DO NOT force the Actuator.

6. Set the Quantum Drive aside. The drive(s) will be returned to the local Repair Center for testing before being returned to stock.

7. If the system has a second Quantum Drive, repeat steps 1 through 6.

Figure D-2. Quantum Disk Drive Actuator Lock

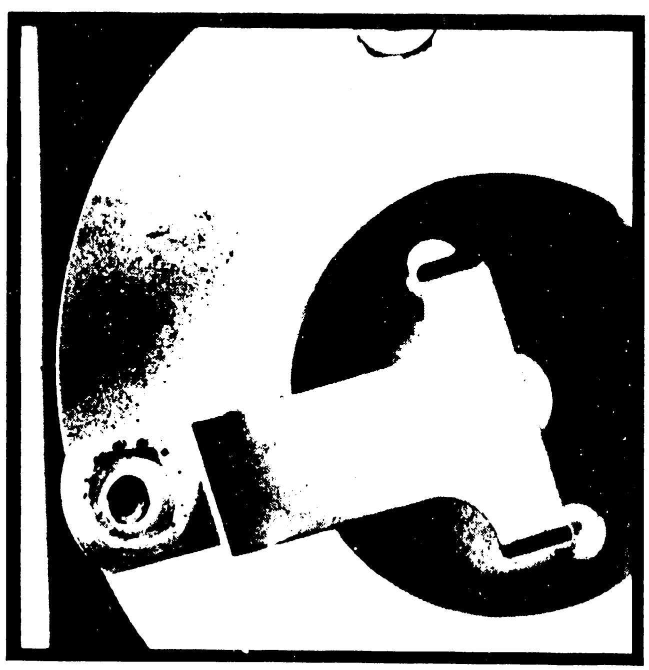


Figure D-3. Quantum Disk Drive Spindle Lock

WARNING

DO NOT ATTEMPT TO REPAIR THE SWITCHING POWER SUPPLY; IT IS FIELD REPLACEABLE ONLY.

DO NOT OPEN THE SWITCHING POWER SUPPLY UNDER ANY CIRCUMSTANCE. EXTREMELY DANGEROUS VOLTAGE AND CURRENT LEVELS (OVER 300 VOLTS DC AND UNLIMITED CURRENT) ARE PRESENT WITHIN THE POWER SUPPLY.

AFTER POWERING THE UNIT DOWN AND DISCONNECTING THE AC POWER CONNECTOR FROM THE POWER SOURCE RECEPTACLE, ALLOW ONE MINUTE BEFORE REMOVING THE POWER SUPPLY TO PROVIDE ADEQUATE TIME FOR RESIDUAL VOLTAGE TO DRAIN THROUGH THE BLEEDER RESISTORS.

D.4.3 SWITCHING POWER SUPPLY REMOVAL

The standard SPS-450E Switching Power Supply (WLI P/N 270-0735) must be replaced with a model SPS-450XP (WLI P/N 270-1068) designed to supply the higher current needed by the VS-45XP CPU. Replace the supply as follows:

1. The Switching Power Supply is located to the left of the disk drive(s). Remove the 5/16" hex head Whiz-Lock Flange screw (WLI P/N 650-6122) located directly under the front edge of the supply.

2. Slide the supply far enough forward to expose the cables at the rear of the supply. Some early models have foam sound insulating material attached to the bottom of the middle shelf above the supply. Be careful not to tear the foam when removing and replacing the supply.

3. Mark the locations of the cables on the rear of the power supply. The physical locations of the cables in the power supply connectors, in most cases, will be the same for the replacement power supply cables. Remove the cables. (See figures D-1 and D-4, and table D-5.)

4. If Quantum Disk drive(s) are installed, remove the drive(s) and dc cable(s) from the mainframe. A single ac cable goes from the power supply to a connector block on the middle shelf. The multiconnector ac breakout cable leading to the diskette drive, fan harness, and the Quantum drive(s) remains with the system. The two cables reserved for the Quantum drives are no longer used.

5. Firmly grasp the power supply under the front edge and pull the supply out of the cabinet. Set the switching power supply aside. The supply will NOT be returned to the local Repair Center, it WILL be returned to REMANUFACTURING. See paragraph D.5.11 for repacking and shipping.

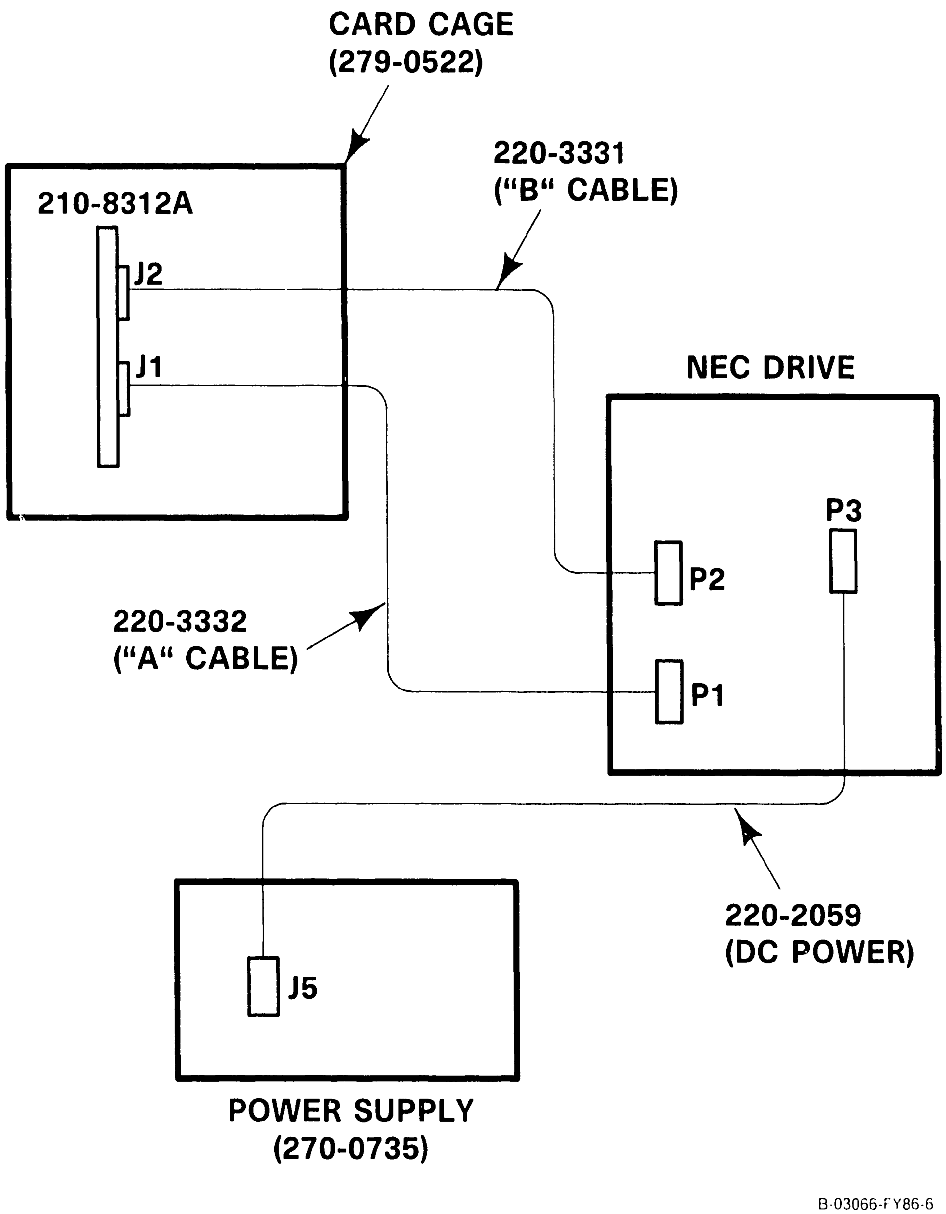


Figure D-4. Power Supply Related Cabling
(VS-25/45 76-Megabyte Internal Disk Drive Configuration)

D.4.4 PRINTED CIRCUIT ASSEMBLY REMOVAL

In order to protect the customer's system from unnecessary downtime, the following procedure MUST be followed during the conversion process. If necessary, refer to the removal and replacement instructions given in Chapter 5, paragraph 5.5, of the VS-65 PMM and the following:

1. Remove all cable connectors attached to the PCAs in Motherboard (M/B). Mark the position of the connectors removed from the device adapter PCAs for later reassembly.

2. Carefully remove ALL PCAs from the M/B by gently lifting the two extractor/fasteners to free the PCAs from the M/B connectors. Once each PCA is free of the connectors, ease it up the PCA guides and out of the Card Cage. Carefully set each PCA aside until the system is operational. Removed PCAs will be repacked in the new PCA shipping containers. (Refer to paragraph D.5.12 for repacking and shipping.)

D.5 MAINFRAME REASSEMBLY

The procedures required to reassemble the VS-25/45 into the VS-45XP configuration follow. Most of the reassembly procedures will be by reference to the VS-65 Product Maintenance Manual. Any exceptions are given in this PUB.

D.5.1 CPU PRINTED CIRCUIT ASSEMBLY INSTALLATION

Installation of the Printed Circuit Assemblies (PCAs) should be done according to the procedures given in Chapter 5, paragraph 5.5 of the VS-65 PMM with the additions, changes, and/or exceptions which follow.

D.5.1.1 Cache/Main Memory Printed Circuit Assembly Replacement

1. The WLI part numbers for CP7 Cache/Main Memory (C/MM) in table 5-1 of the VS-65 PMM have been changed to those given in table D-3 below. Early versions are also listed for reference.

Table D-3. Main Memory Size Selection Switch Bank

WLI PART NUMBER	(POSSIBLE EARLY VERSIONS)	MEMORY SIZE (BYTES)	SWITCH NUMBER 1	2	3	4
210-9599-A	(210-8599-A)	1024K (64K RAMs)	ON	ON	OFF	OFF
210-9599-1A	(210-8599-1A)	2048K (256K RAMs)	ON	OFF	OFF	OFF
210-9599-2A	(210-8599-2A)	4096K (256K RAMs)	OFF	OFF	OFF	OFF

NOTE

Be sure to set the MM jumpers (JP1 through JP4) per table 5-2 of the VS-65 PMM before installing the PCA.

D.5.1.2 Bus Processor Printed Circuit Assembly Replacement

1. Check the jumpers (figure 5-13) on the BP PCA. Set the NVRAM Battery Select Jumper (JP6) as shown. The Diskette Drive Select Jumper (JP5) MUST be repositioned to allow use of the eight-inch diskette drive. Remove the jumper from the pins and attach the jumper to one pin only.

2. Make sure that the BP Diagnostic Switches (switch bank SW3) shown in figure 5-12 are in the correct positions. All switches except SW3-3 MUST be OFF for normal operation of power-up diagnostics and system initialization. (Switch SW3-3, which sets the BP's microprocessor clock at 12 MHz, is independent of switch SW3-8.) The diagnostic operational mode of the BP is redefined in table D-4.

3. Verify the correct setting of the 8207 dual-port Code RAM Memory Controller switches (switch banks SW1 & SW2) as given in tables 5-4 and 5-5, and shown in figure 5-12 of Chapter 5 in the VS-65 PMM.

Table D-4. Bus Processor Diagnostic Switch (SW3) Settings

SWITCH NUMBER	PURPOSE (WHEN CLOSED OR ON)	NORMAL POSITION
1	Slow Data RAM Clock (10% slow)	OPEN (OFF)
2	Fast Data RAM Clock (10% fast)	OPEN (OFF)
3	Closed = 12-MHz Clock to 80286 Microprocessor Open = Nonfunctional (No optional clock)	CLOSED (ON)
4	Loop On Error	OPEN (OFF)
5	Loop On Core Diagnostic	OPEN (OFF)
6	Bypass Core Diagnostic and Diagnostic Monitor	OPEN (OFF)
7	Bypass Core Diagnostic	OPEN (OFF)
8	Diagnostic Mode - (ON to Read other switches)	OPEN (OFF)

NOTE

Switch SW3-3 of table 5-3 has been redefined as shown in table D-4. NONE of the switch POSITIONS from table 5-3 in switch bank SW3 have changed.

4. Install the new Bus Processor PCA as described in 5.5.1.3.

NOTE

The 50-pin connector J1 will be used for the eight-inch system diskette drive. Connector J2 is NOT used on VS-45XP.

5. Remove the diskette drive ribbon cable from the cable clamp under the right side of the cabinet stiffner. Feed the cable through the left-hand clamp until it is parallel to the drive housing. This will support the cable and allow enough cable length to reach J1 on the BP.

D.5.2 SWITCHING POWER SUPPLY REPLACEMENT

Installation of the Switching Power Supply will be completed in paragraph D.5.7. Leave the power supply outside of the mainframe during the various procedures which precede the actual installation.

CAUTION

Verify that the 115/220 Vac input voltage switch is in the correct position. Access the switch through the hole located on the LEFT side of the power supply cover.

1. Connect the cables leading to the mainframe which were removed from original power supply to the replacement Switching Power Supply (WLI P/N 270-1068). The cables are keyed to ensure proper insertion. If the system is equipped with a 76-megabyte internal drive, DO NOT connect the drive cable at this time. Refer to figure D-1 and table D-5.

2. Make sure that the ac power switch is in the zero (0) position. Plug the mainframe power connector into the power source receptacle.

3. Depress the ac power On/Off switch to the one (1) position. Make sure that the ac Power-On LED next to ac power On/Off switch is lit and that the mainframe cooling fans are turning.

Table D-5. SPS-450XP Switching Power Supply Internal Power Cable Connections

PCA	CONNECTOR	CONNECTOR TYPE	CONNECTOR	WHERE CONNECTED
210-8010 Switching Power Supply	(J3/J4) J8 (J9) (J10/J11)	3-Pin In-Line (I-L) 115 Vac Power (Only One Used) (See Note 1)	J4	Eight-Inch Diskette Drive
			Fan Cable Harness	Rear Panel Fan Assembly
210-8011 Switching Power Supply	J5	6-Pin Two-Row dc Box (Note 2)	P3	76-Mb Drive
	J6		J5	Diskette Drive
	J7	4-Pin I-L dc (Note 3)	J28	Motherboard
	J8	8-Pin Two-Row Box dc	J29	(8-Pin 2-Row)
210-8012 (Rev. 12) SPS-450XP	J13	5-Pin I-L dc (Note 3)	J28	(9-Pin 3-Row)
	+5V Bus	Cable, #6 Wire, Black	J30	210-7907
	0V Bus	Cable, #6 Wire, Black	J31	Motherboard

NOTES

1. The original Switching Power Supply (SPS-450E) connections may vary with a given installation.

2. If the VS-25/45 was equipped with two Quantum drives, the second drive used J4 on 210-8011.

3. The J28 wiring harness connects to two SPS PCAs. J28 through J31 are on the Motherboard.

4. Press the DC Initialize pushbutton at the front of the power supply.

CAUTION

Dc voltages within the specified operating limits, given in table D-6, are critical to the operation of the 76-Mb drive. Perform the following voltage checks/adjustments before installing the new drive.

5. With the exception of +24 Volts, the dc power supply voltages MUST be checked at the Motherboard (M/B) test points. Refer to figure D-5.

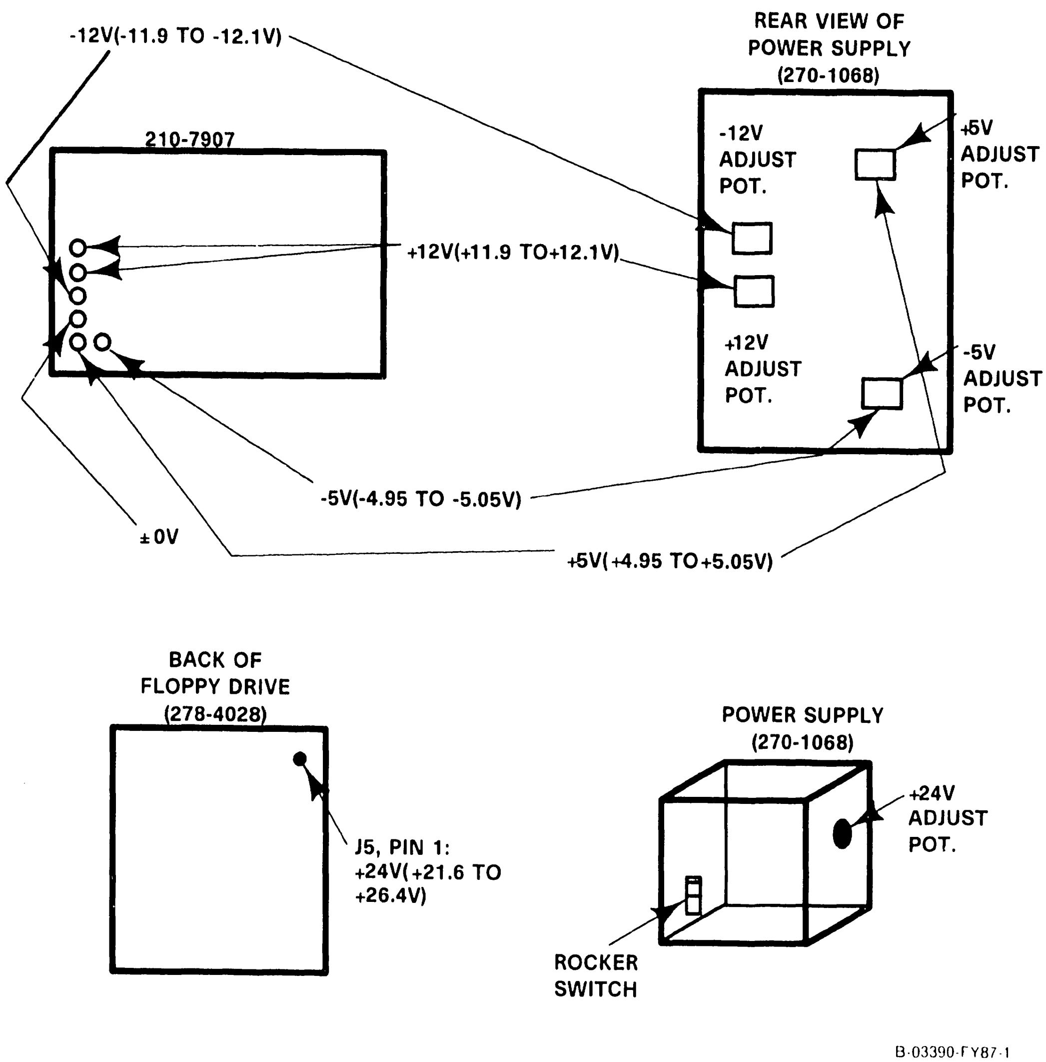


Figure D-5. Direct Current (DC) Voltage Adjustments and Test Points

6. With a digital voltmeter, check the voltages at the M/B test points. Check the +24 voltage at pin 1 of J5 at the rear of the diskette drive. If the dc voltages are within the operating limits of table D-6, turn off the ac power, and disconnect the cable from the wall receptacle. Leave the power supply removed from the mainframe, and proceed to paragraph D.5.3. Otherwise, continue with step 7.

Table D-6. Direct Current (DC) Test Point Voltages

TEST POINT	DC VOLTS	DC OPERATING VOLTAGE LIMITS	AC RIPPLE VOLTAGE LIMITS
IV	+ 12.0	+11.9 to +12.1	
+12V	+ 12.0	+11.9 to +12.1	
-12V	- 12.0	-11.9 to -12.1	35mV RMS
+/-0V	+/-0.0	-0.05 to +0.05	or
+5V	+ 5.0	+4.95 to +5.05	50mV Pk-to-Pk
-5V	- 5.0	-4.95 to -5.05	
J5/P1	+ 24.0	+21.6 to +26.4	

7. If the dc voltages are not within operating limits, the power supply MUST be adjusted. The switching power supply MUST be removed from the mainframe to make the adjustments.

8. With a nonmetallic adjustment tool, adjust the dc voltage(s) to within the operating limits. The +5V adjustment is at the upper right rear of the switching power supply. The -5V adjustment is directly below it at the bottom. The +24V adjustment is accessed through a small hole on the RIGHT side of the switching power supply cover.

9. After the voltages have been adjusted, power down the system. Remove the ac power connector from the receptacle. Leave the system power off (and the supply removed), and continue the reassembly process.

D.5.3 76-MEGABYTE DISK DRIVE INSTALLATION

If the system is equipped with the 76-Megabyte Disk Drive, proceed to paragraph D.5.4, since no changes to the drive switch settings are required.

CAUTION

The 76-Mb disk drive for the VS-45XP is the same as the optional 76-Mb VS-25/45 drive (see figure D-6 on page D-16). When installing a new 76-Mb drive, the end of the drive where the cables attach MUST have the same 3-Input DC Regulator option attached. Also, there should NOT be an A-Cable interconnect cable or an external terminator attached. If either of these conditions exist, recheck the drive for an incorrect part number. DO NOT install the drive.

D.5.3.1 New 76-Megabyte Disk Drive Switch Setting Procedure

When a new drive is being installed, check the Control Mode, Number of Sectors, and Installation switch banks as follows (if necessary, refer to TSB HWT 5120, section 3.1.12, TACNL 50625 and figure D-7 on page D-18):

CAUTION

The disk drive weighs about 31 pounds (14 kilograms). Be sure the red Lock Control is in the LOCK position.

1. Set the drive back on its base (normal vertical position) with the red Lock Control Lever to your left and the cover facing you.

2. Looking down at the top of the drive, the Installation Mode switch bank is visible through a cutout in the drive cover. The eight switches have a toggle-like action. All of the switches, except number 7, should be in the UP (CLOSED or ON) position. (Next to the numbered edge of the switch bank.) Number 7 should be in the DOWN (OPEN or OFF) position, toward the inside of the drive. Set the Installation Mode switches to the correct positions.

CAUTION

Do NOT use the switch settings illustrated on the cover of the drive. These settings are INCORRECT!

3. Lay the drive down, with the cover side facing up.

NOTE

Early versions of the 76-megabyte drive may not be equipped with the bottom cutouts, or the switches may not be visible at the lower edge of the PCA. In either case proceed with paragraph D.5.3.2.

4. Near the lower edge of the drive bottom (now facing you), are two cutouts. The Control Mode switch bank is on the left, and the Number of Sectors switch bank is on the right. From this view, the switches are numbered from RIGHT to LEFT. Set the Control Mode switches 8 and 1 to the OPEN (or OFF) position. All others should be in the CLOSED (or ON) position.

5. In a like manner, set the Number of Sectors switches 8 and 5 to the OPEN (OFF) position (nine sectors). All others should be in the CLOSED (ON) position. After the switches have been correctly set, continue the installation procedure with paragraph D.5.3.3.

D.5.3.2 Early 76-Megabyte Disk Drive Switch Setting Procedure

Early versions of the 76-megabyte drive have the sector and the control

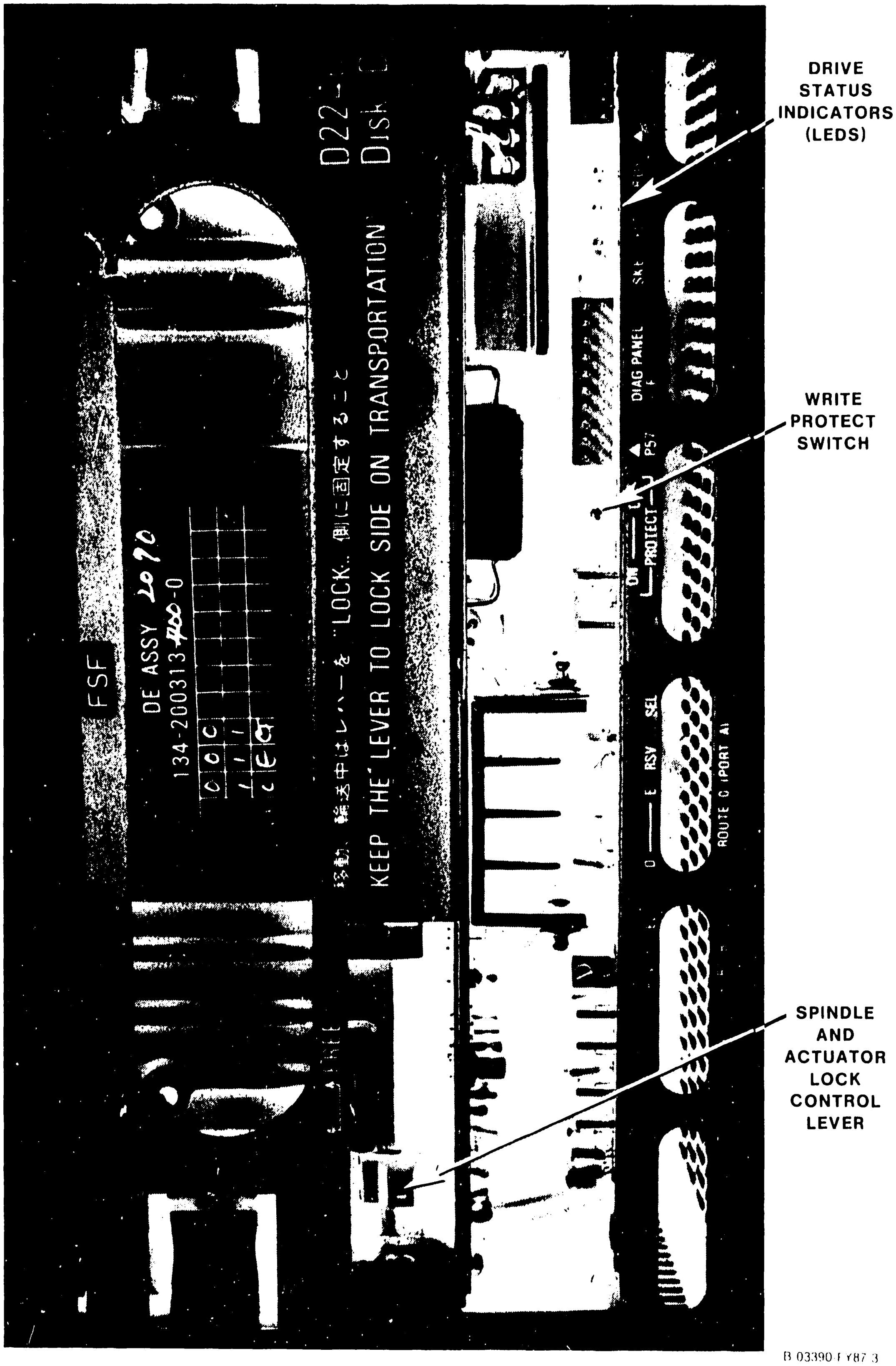


Figure D-7. 76-Megabyte Internal Disk Drive (Front View/Installed) switch banks mounted near the center of the Disk Drive Logic and Servo PCA. When installing an early version of the drive, the procedure used to set the switches on the Logic and Servo PCA in the drive must be modified as follows:

1. Rotate the drive 90 degrees to the left (CCW), with the red Spindle and Actuator Lock Control Lever facing you (see figure D-7).

2. Remove the two Phillips screws from the upper left corner and the lower right corner of the PCA cover. Carefully lift off the cover exposing the backside of the PCA.

3. Remove the three signal cables from P55, P53, and P41 on the left of the Logic and Servo PCA, and the 9-pin power connector at the top of the PCA. Mark the positions of the cables for reinstallation.

CAUTION

Be careful when performing step 4, there is a two-wire cable and a ground wire still connected to the PCA on the left side.

4. Remove the four Phillips screws from the upper and lower corners of the board. Carefully turn the board to the left (as when turning the page of a book) so that the component side is facing up.

5. Before continuing with the switch settings, check the four terminator mounting sockets. The mounting sockets MUST have terminators installed. If the terminators are missing, the drive will NOT function correctly. Do NOT install the drive without the terminators.

6. The Number of Sectors and Control Mode switch banks have clear plastic covers that must be removed before the switches can be set. Make sure to put the covers back on before reinstalling the PCA.

CAUTION

Figure 5-42 of the VS-65 PMM is incorrect. The Control Mode and Number of Sectors switches are labeled incorrectly and switches tab positions are reversed. Follow the instructions below.

7. The sector and control switch banks are black slide-type switch banks with the numbers barely visible on the LEFT side of each switch. The ON (CLOSED) position is toward the LEFT (numbered) side of each slide switch. The Control Mode switch is the switch on the LEFT and is NOT identified on the PCA. Set switch 8 (at the top) and switch 1 (at the bottom) by sliding the switch tabs to the OFF position (toward the RIGHT). If the switches have been preset, be sure that switch 7 is in the ON (LEFT) position.

8. The Number of Sectors switch bank is toward the center of the PCA and is clearly identified "7 -- SECTOR -- 0" on the PCA. Ignore the PCA label. Switch 8 is also at the top and switch 1 is at the bottom. Switches 8 and 5 should be set in the OFF position (toward the RIGHT) with all others set to the ON (LEFT) position.

9. Reinstall the plastic dust covers removed from the switch banks.

10. Carefully turn the PCA back to its normal position, backside up, and reinstall the four Phillips screws. Be sure that the two wire cable does not get caught between the PCA and the lower left PCA bracket.

11. Reconnect the three signal cables and the the 9-pin power connector to the PCA. When reconnecting J53 to the PCA, make sure that the cable is positioned properly and securely in place.

12. Make sure that there are no cables in the way and carefully reinstall the PCA cover and the two Phillips screws.

D.5.3.3 <u>76-Megabyte Disk Drive to Mainframe Installation Procedure</u>

1. Set the drive back on its base (normal vertical position) with the red Lock Control Lever facing you.

2. Set the drive on the 76-Megabyte Disk Drive Mounting Plate (WLI P/N 452-0308) and secure all four corners of the drive to the mounting plate with the mounting screws (WLI P/N 650-4080).

3. Before sliding the drive into the cabinet, connect the A-Cable (WLI P/N 220-3332) to P1 and the B-Cable (WLI P/N 220-3331) to P2, and the dc power cable (WLI P/N 220-2059) to the 6-pin connector P3 at the rear of the drive. (See figures D-4 and D-6, and tables D-5 and D-8.)

4. Carefully slide the drive and mounting plate into the cabinet. Bolt the drive down using the two holes in the mounting plate and the two holes in the mainframe baseplate where the Quantum drives would normally be bolted. Use two flange screws (WLI P/N 650-6122) provided.

5. Unlock the Spindle and Actuator from their shipping positions by moving the red Lock Control Lever on the front of the drive to the right, push it up as far as it will go, and then move it to the left into the FREE position. Refer to figure D-7.

D.5.4 REAR PANEL SUBASSEMBLY CONFIGURATION

The configuration of the Rear Panel Subassembly (RPS) may vary. The usual configuration is with the first two BNC/TNC SIO Connector Panels mounted at the lower right of the RPS. Some VS-45s equipped with External Disk Drives (EDDs) were shipped with the EDD Connector Panel mounted above the first two BNC/TNC Connector Panels. Telecommunication (TC) Connector Panels were next to the EDD panel. If changes to the RPS configuration are required, use the configuration shown in figure D-8 as the preferred rear panel positions. The Rear Panel Subassembly upgrade procedure follows on page D-23.

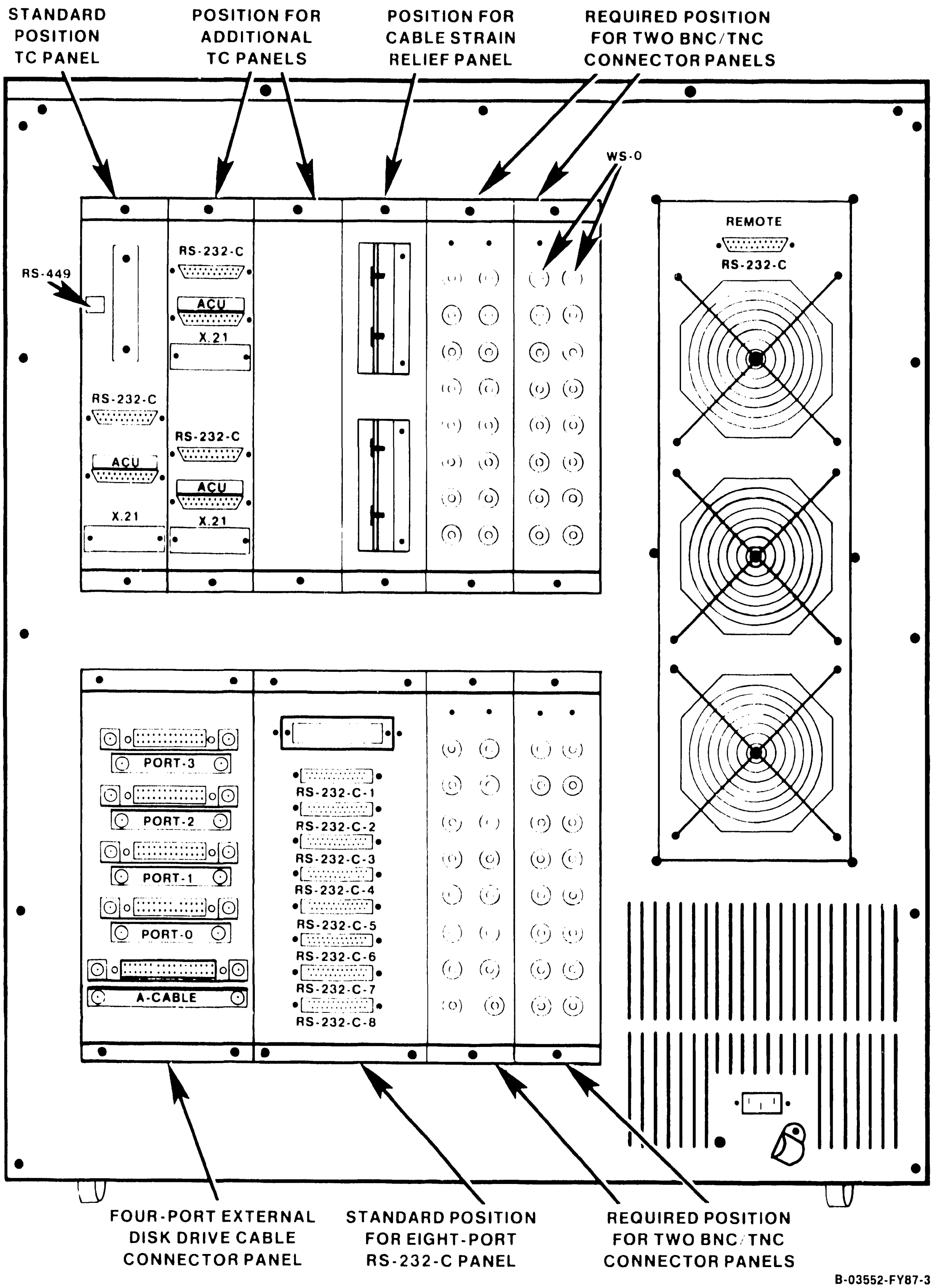


Figure D-8. Rear Panel Subassembly (Fully Configured)

Table D-7. Required E-REV Levels for Device Adapter/Controllers

DEVICE ADAPTER/CONTROLLER OR PRINTED CIRCUIT ASSEMBLY DESCRIPTION	WLI MODEL NUMBER	WLI PART NUMBER	E-REV LEVEL
Serial I/O Device Adapter (Notes 1-3)	25V27	210-7906-A	2
RS-232 Asynchronous DAC (Notes 1-3)	25V36	210-7955-A	5
Internal/External Disk DA (Notes 1-3)	25V50/50-0	210-8312/15	4
Asynchronous Transceiver Motherboard	See Note 4	210-8323	1
Asynchronous Transceiver Motherboard	See Note 5	210-8323-1	0
Asynchronous Transceiver Daughterboard	See Note 6	210-8324	1
Single-Port TC DAC (Notes 1-3)	25V76	210-8337-A	4
Universal ISIO DAC (Notes 1-3)	25V67	210-8489-A	4
Dual-Port TC DAC (Notes 1-3)	25V762	210-8637-A	7
Internal/External Drive DA (Notes 1-3)	25V50/50-0	210-9312-A	1
Internal/External Drive DA (Notes 1-3)	25V50/50-0	210-9313/15	0
Single-Port TC DAC (Notes 1-3)	25V76	210-9337-A	4
RS-232 Asynchronous DAC (Notes 1-3)	25V36	210-9355-A	2
Dual-Port TC DAC (Notes 1-3)	25V762	210-9637-A	2

NOTES

1. Early versions (E-REVs) of the VS-25/45 DA/DACs had address lines allowing a maximum main memory size of one-megabyte. Verify that the correct E-REV PCAs are installed during the upgrade using table D-7. All PCAs should be brought to current levels ASAP.

2. When installing the four-megabyte memory option, all Device Adapter/Controllers except the SIO and UISIO MUST be upgraded to the WLI P/N 210-9xxx series. If necessary, refer to TSB HWT 5224, section 6.1.07, TACNL 51015 dated 10/15/85.

3. If a two-megabyte PCA must be used (as a temporary fix) in a four-megabyte memory system, the four-megabyte cache/memory switches MUST be set for the two-megabyte positions to allow the system to IPL.

4. The RS-232-C Asynchronous Transceiver Motherboard is a passive PCA attached to the Rear Connector Panel Assembly (RCPA) WLI P/N 272-0042. Defective RS-232-C connectors are the most likely cause for replacement of this PCA. The RS-232-C Asynchronous RCPA is NOT replaced when upgrading to the 210-9355-A PCA.

5. The ONLY difference in the two PCAs (210-8323 and 210-8323-1) is the removal of the Printer Port.

6. The RS-232-C Asynchronous Transceiver Daughterboard is the active PCA attached to the RS-232-C RCPA. Use the standard removal/replacement procedures when a failure is indicated. This PCA is NOT replaced when upgrading to the 210-9355-A PCA.

1. Remove as many blank panels (WLI P/N 452-2391/2394) as necessary to upgrade the system to the new configuration.

2. Mount the two new SIO BNC/TNC Connector Panels (WLI P/N 270-0704) above the originals. If the system is equipped with four panels (32 ports), the additional BNC/TNC panels remain with the customer.

3. If the system has an EDD panel (WLI P/N 270-0702) mounted above the two SIO panels, move the EDD panel to the lower left side of the RPS.

4. If the system has a TC panel (WLI P/N 270-0824/0825) which must be moved, move it to the upper left side. A second TC panel should be mounted next to it.

5. Remove the Remote Diagnostic Connector and Cable Assembly (WLI P/N 220-3224), and replace it with the new assembly (WLI P/N 220-3244). Install the 26-pin ribbon cable connector in J4 of the Bus Processor. If necessary, refer to figure 5-13 and/or table D-9.

6. If the customer has purchased a VS Small Cable Concentrator, install the Strain Relief Panel(s) to the immediate left of new SIO BNC/TNC panels. (This may require moving the Telecommunication panel(s) in addition to removing any blank panel(s) required.)

7. The suggested position for the Eight-Port RS-232-C Asynchronous Rear Connector Panel Assembly (WLI P/N 272-0042) is the lower middle half of the Rear Panel Subassembly next to the original BNC/TNC panels. If the EDD panel is located in this position, move it per step 3 and reinstall the Asynchronous Rear Connector Panel Assembly.

D.5.5 PRINTED CIRCUIT ASSEMBLY INSTALLATION

Installation of the Printed Circuit Assemblies (PCAs) should be done according to the procedures given in Chapter 5, paragraph 5.5 of the VS-65 PMM with the additions, changes, and/or exceptions which follow.

D.5.5.1 Device Adapter/Controller Printed Circuit Assembly Replacement

There are currently six different device adapters/controllers (DAs/DACs) available for use in the VS-45XP. The six DAs/DACs are the SIO DA, UISIO DAC, Internal/External Disk Drive DAs, single-port and dual-port TC DACs, and the eight-port RS-232-C Asynchronous DAC. The VS-45XP supports two Serial I/O Device Adapter/Controllers, one SIO DA and one UISIO DAC, or two UISIO DACs.

Refer to paragraph 5.5.2 and Appendix C for removal and replacement procedures for each DA/DAC. DAs/DACs may be installed in the Motherboard (M/B) slots which coincide with their I/O Decode Jumper Addresses (JAs). Some Jumper Address are restricted by the Genedit configuration format. Table D-7 lists the DAs/DACs by WLI model number, part number, and required Electrical Revision (E-REV) level. Table D-8 shows the restrictions which may apply.

All device adapters and device adapter/controllers installed in the original VS-25/45 system, with currently implemented ECOs, can be used with the

VS-45XP CPU except when installing the four-megabyte cache/memory. However, it is important to bring all PCAs up to the Electrical Revision (E-REV) levels listed in table D-7 as soon as possible in order to take full advantage of the system's increased computing power.

Table D-8. Input/Output (I/O) Address Decode Priority Reservations

I/O ADDRESS DECODE	I/O ADDRESS RESERVED FOR DEVICE ADAPTER/CONTROLLER FUNCTION		
	PRIMARY FUNCTION	ADDITIONAL FUNCTIONS	EXCLUDED FUNCTIONS
'01xx'	External Disk Drs	All DAs except one	Int Disk (25V50-0)
'02xx'	Int/Ext. Disk Drs	Includes 25V50-0	None
'03xx'	Second UISIO DAC	All Except Disk Drs	25V50 and 25V50-0
'04xx'	SIO DA/UISIO DAC	None	All Other DAs
'05xx'	Optional DA/DACs	All Except Disk Drs	25V50 and 25V50-0
'06xx'	TC DA/Controllers	All Except Disk Drs	25V50 and 25V50-0

NOTE

The Bootstrap Device switch is address dependent. An internal disk must be jumpered for I/O Address Decode of '0200' and an external drive for '0100'.

D.5.5.1.1 Single-Port Telecommunication Device Adapter/Controller Replacement

Single-Port Telecommunication Device Adapter/Controllers (WLI P/N 210-8337) which were installed in the original VS-25/45 system, may be used with the new VS-45XP CPU. The procedure given for the single-port TC DACs in paragraph 5.5.2.4 of the VS-65 PMM is the same for all E-REV levels of the 210-8337 AND 210-9337 PCAs. The switch and jumper positions shown in figures 5-24 and 5-25 ARE CORRECT. The only variation will be the switch bank type, which is either a slide or rocker version. See paragraph D.5.5.1.2 for the dual-port TC DACs.

NOTES

1. The NOTE following step 4 IS CORRECT and is clarified as follows: All switches should be OFF (CLOSED) unless the 128K byte RAM or the X.21 Interface option has been ordered. The 128K byte option is ONLY available on the single-port TC DACs (WLI P/Ns 210-8337/210-9337).

2. Table 5-9 applies to all TC DAC PCAs. Switch banks SW1 and SW2 on the dual-port TC DAC will ONLY be different if one port is being used with the X.21 Interface and the other is NOT. SW1-8 and SW2-8 MUST be OFF (CLOSED) on ALL dual-port TC DACs (WLI P/N 210-8637 & 210-9637).

D.5.5.1.2 Dual-Port Telecommunication Device Adapter/Controller Replacement

There are three versions of the dual-port Telecommunication DACs in the field (P/Ns 210-8637 E-REV 1, 210-8637 E-REV 2 or later, and 210-9637). The four-megabyte TC DAC (210-9637 E-REV 2 or later) is identical to the E-REV 1 version of P/N 210-8637 in jumper and switch settings. A brief discussion of each DAC type follows.

CAUTION

> Pay particular attention to the Telecommunication DAC replacement procedures which follow. There are significant differences between the different dual-port TC PCAs which may be found in the field.

D.5.5.1.2.1 Early Dual-Port Telecommunication DAC (P/N 210-8637 E-REV 1)

The E-REV 1 version uses shunt connector blocks with six pairs of pins. The blocks are labeled HD1 through HD8 and require one horizontal jumper for each block with the exception of HD5 (I/O Address Decode). HD5 uses three vertical jumpers as shown in figure D-9.

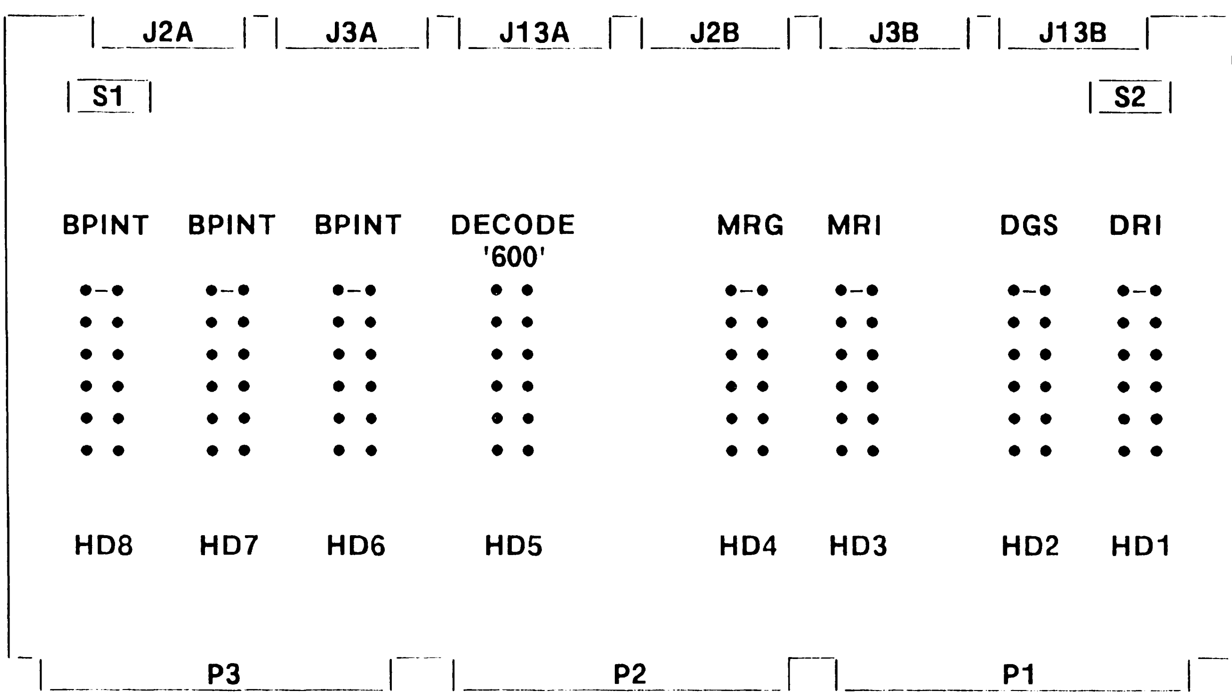


Figure D-9. Telecommunication DAC Connector and Jumper Locations (WLI P/N 210-8637 E-REV 1)

D.5.5.1.2.2 Dual-Port Telecommunication DAC (P/N 210-9637 E-REV 2 and up)

The four-megabyte dual-port version of the Telecommunication PCA differs from the 210-8637 E-REV 1 version installed in the early VS-25/45 systems by a minor change in the shunt connector block identification. The shunt connector blocks are also six-pin pairs and use the same jumper positions to set the I/O decode and interrupt priorities as can be seen when comparing figures D-9 and D-10. Refer to figure D-11 for additional I/O decodes and interrupt priorities for both types of dual-port DACs.

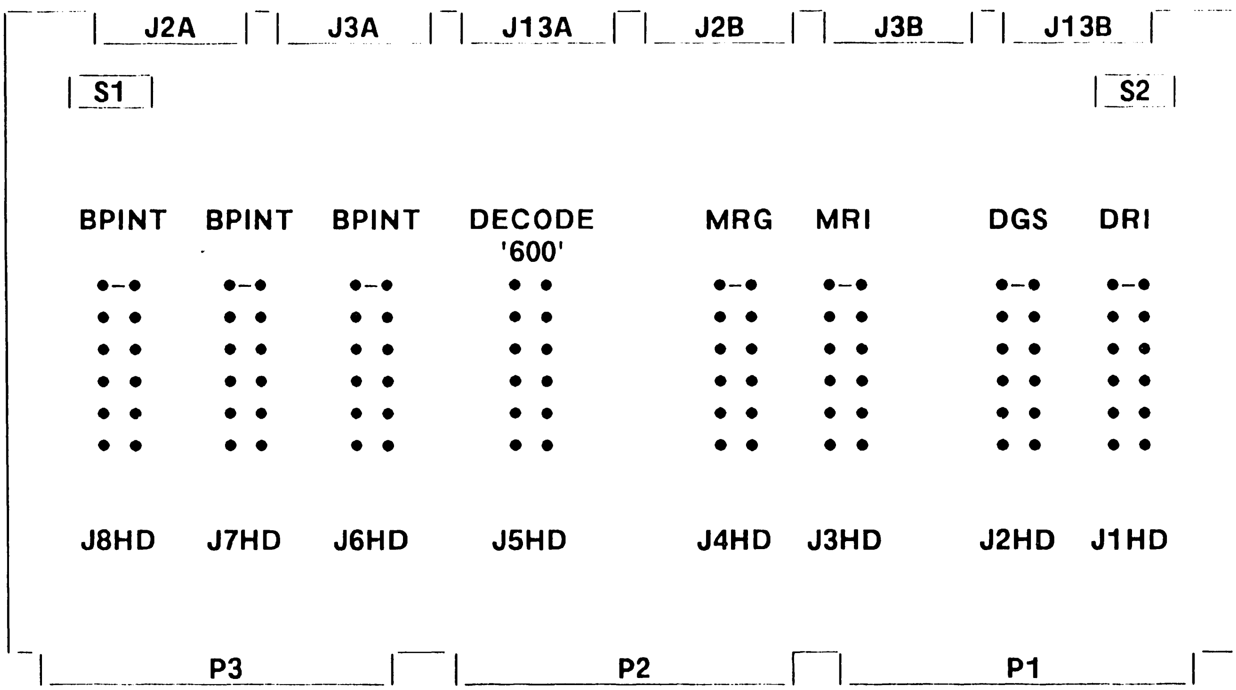


Figure D-10. Telecommunication DAC Connector and Jumper Locations (WLI P/N 210-9637 E-REV 2 or later)

D.5.5.1.2.3 Dual-Port Telecommunication DAC (P/N 210-8637 E-REV 2 and up)

The E-REV 2 (and later) version of the WLI P/N 210-8637 Telecommunication DAC is shown in figure 5-23 of the VS-65 PMM. The connector and jumper locations for the various I/O addresses are NOT given in this PUB. They are illustrated in figure 5-26 of the VS-65 PMM. Use the installation procedure given in Chapter 5, paragraph 5.5.2.4 of the manual.

NOTES

1. The shunt connector block and jumper configuration of the E-REV 2 version of the dual-port TC PCA (WLI P/N 210-8637) has eight-pin pairs for jumpers J4 through J1. The jumper positions on these blocks are NOT comparable to the six-pin pairs and MUST be checked using figure 5-26.

2. The connectors and switch bank (SW1) labeled as Chan. 1 should be Port-0, and connectors and switch bank (SW2) labeled Chan. 2 should be Port-1.

D.5.5.2 Printed Circuit Assembly Installation Completion

Once all of the PCA jumpers and switches have been set, complete the VS-45XP system installation using the following procedures.

1. Install the individual PCAs using the procedures for each as given in the VS-65 PMM. Pay close attention to the NOTES and CAUTIONS.

2. Reconnect the signal and power cables as required with pin-1 of the signal cables toward the front of the mainframe. Refer to table D-9.

DECODE I/O ADDRESS	SHUNT CONNECTOR BLOCK IDENTIFICATION							
	HD8 J8HD	HD7 J7HD	HD6 J6HD	HD5 J5HD	HD4 J4HD	HD3 J3HD	HD2 J2HD	HD1 J1HD
DECODE '0600'	●–●	●–●	●–●	● ●	●–●	●–●	●–●	●–●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
DECODE '0500'	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	●–●	●–●	●–●	● ●	●–●	●–●	●–●	●–●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
DECODE '0300'	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ●
	●–●	●–●	●–●	● ●	●–●	●–●	●–●	●–●

NOTES:

1. Shunt Connector Block Labels HDx = P/N 210-8637, E-REV 1 Only.
2. Shunt Connector Block Labels JxHD = P/N 210-9637, E-REV 2 or Later.
3. Recommended I/O Decode Address Configurations:
   a. '0600' for a Single Telecommunication DAC.
   b. '0500' for the Second Telecommunication DAC.
   c. '0300' for the Third Telecommunication DAC.
4. I/O Decode Address '0400' IS NOT Allowed.

Figure D-11. Decode and Priority Interrupts - Various Telecommunication PCAs

Table D-9. Mainframe Internal Signal Cables Connections

PC ASSEMBLY	CONNECTOR	CONNECTOR TYPE	CONNECTOR	WHERE CONNECTED
210-9599	P1	30-Contact	P1	210-8699
(210-8599)	P2	Edge	P2	Central
Main Memory	P3	Connector	P3	Processor CP7
210-8465	J1	50-pin	J1	Diskette Drive
Bus	J2	34-pin		(Not Used)
Processor	J3	34-pin	J1	Front Panel
(80286)	J4	26-pin	RS-232-C	220-3244
210-7906	J2	34-pin	BNC/TNC 0-7	270-0704
SIO Device	J3	"	" 8-15	BNC/TNC Rear
Adapter	J4	"	" 16-23	Connector Panel
(Note 1)	J5	"	" 24-31	(1 to 4 each)
210-8489	J5	34-pin	J1 (Note 2)	EAPA or OAPA
UISIO DAC	J6	"	J1 "	Global Modem
210-9312/15	J1	60-pin A-Cable	P1	76-Megabyte
(210-8312/15)	J2	26-pin B-Cable	P2	Fixed Internal
External/	J3/J4/J5	(Not Used)	(Note 3)	Disk Drive
Internal	J1	60-pin A-Cable	P1 Internal	270-0910
Disk Drive	J2	26-pin B-Cable	P2 "	Ext. Disk Drive
Device	J3	" "	" "	Rear Shield
Adapter	J4	" "	" "	Clamp & Cable
(Note 4)	J5	" "	" "	Connector Panel
210-9337	J1	40-pin	RS-449	270-0824
(210-8337)	J2	26-pin	RS-232	TC
Single-Port	J3	"	RS-366	Rear
TC	J13	20-pin	X.21	Panel
DAC	J4	"	Display	TC Front Panel
210-9637	J2A and J2B	26-pin	2 ea RS-232	270-0825
(210-8637)	J3A and J3B	"	2 ea RS-366	TC Rear
Dual-Port	J13A & J13B	20-pin	2 ea X.21	Panel
TC DAC	S1 & S2	16-pin	2 Displays	TC Front Panel
210-9355	(J1)	26-pin (Note 5)	J10	272-0042
(210-7955)	J1 (J2)	40-pin (Note 6)	J1	Rear Panel Assy
RS-232-C	J2 (J3)	" "	J2	with 210-8324
Asynchronous	J3 (J4)	" "	J3	Driver/Receiver
DAC	J4 (J5)	" "	J4	PCA

NOTES

1. Some VS-45 systems where equipped with an Intelligent SIO DAC (WLI P/N 210-8316). Replace the ISIO DAC with a correct Electrical Revision SIO DA or UISIO DAC.

2. Two UISIO DACs (210-8489) are supported by the VS-45XP mainframe. However, the APAs, and the P-Band modem MUST be mounted in a Cable Concentrator. At least ONE EAPA is required for Workstation Zero (WS-0).

3. The Internal/External Disk Drive DA require different cables when used with the 76-megabyte drive. Refer to paragraph D.6.3, table D-25 for correct part numbers.

NOTES - (Cont'd)

4. The Internal/External Disk Drive DA require different cables when used as an External Disk Drive DA. The cables leading to the Rear Connector Panel Assembly are NOT the same as the internal drive cables or the external drive cables. Refer to paragraph D.6.3, table D-25 for correct INTERNAL part numbers, and D.6.2, table D-23 for the correct EXTERNAL cable part numbers.

5. J-10, the parallel printer connector, mounted on early RS-232 Asynchronous Rear Panels (PCA 210-8323) has been removed from the replacement and new installation hardware (PCA 210-8323-1). The operational microcode required was never released. The printer cable (WLI P/N 220-3412) will NOT be supplied, and the 26-pin connector (J1 on PCA 210-7955) has been removed from the new PCA 210-9355. When replacing either PCA 210-8323 or 210-7955, the cable MUST be removed.

6. Connectors J1 through J4 are located on the Driver/ Receiver PCA (WLI P/N 210-8324). The PCA is mounted on the RS-232 Rear Panel and is included as part of the assembly part number (WLI P/N 272-0042). The connectors on the new four-megabyte RS-232 Asynchronous DAC (210-9355) have been relabeled as shown.

D.5.5.2 Printed Circuit Assembly Installation Completion - (Cont'd)

3. Return each cable to its respective cable holder while routing all new cables in a like manner along the mainframe.

CAUTION

1. When using the VS-45XP System Interconnection Diagram (figure D-12), pay close attention to the major differences between the VS-45XP and VS-65 systems. The motherboard connectors, the diskette drive, most cables and rear panel assemblies, and the power supply do not agree. Be sure to use the correct figures and tables listed in this PUB.

2. Returning the cables to their correct positions (and routing the additional cables correctly) is necessary to comply with FCC regulations.

3. Before power-up, be sure that the PCAs have their component sides facing towards the right when viewed from the front of the chassis.

4. Check the installation of the power cables connected to the switching power supply using figures D-1 and D-4, and table D-5.

D.5.6 MAINFRAME POWER-UP AND TESTING

After the installation of the new Central Processing Unit PCAs, and the replacement of the affected device adapter/controllers is completed, the dc voltages are tested under full operational load. After installation of new and/or additional device adapter/controllers, all dc voltages MUST be rechecked at the required test points. Power-up the mainframe using the power-up procedure which follows.

1. Set the Bootstrap Device switch to the UP position (diskette drive) during initial power-up. There should NOT be a diskette in the drive.

2. Make sure that the ac power switch is in the zero '0' position. Plug the mainframe power connector into the power source receptacle.

3. Depress the ac power On/Off switch to the one '1' position. The ac Power-On LED should light, the cooling fans should begin turning, and the diskette drive motor should be running.

4. Press the DC Initialize pushbutton at the front of the power supply. The internal disk drive motor should start AFTER the DC switch has been pressed, and the Power-On, Not-Ready LEDs, and the HEX displays should light. The HEX displays should count down from FFFF to 0000.

5. While the HEX displays are counting, the TC DAC PROM-based power-up diagnostics will be running. The TC DAC Control/Indicator Panel indications are described in table 3-2. The TC diagnostics should complete before the Bus Processor power-up diagnostics complete.

6. If the HEX displays go out after two seconds, there is a problem with the dc voltage compare circuit in the power supply. The HEX displays should go through a series of diagnostic routines and HALT at 9820 (diskette drive not ready). If any number (except 9820) is displayed for more than 20 seconds, the system has failed one of the diagnostics. Refer to paragraph 8.5.1 for a complete power-up discussion.

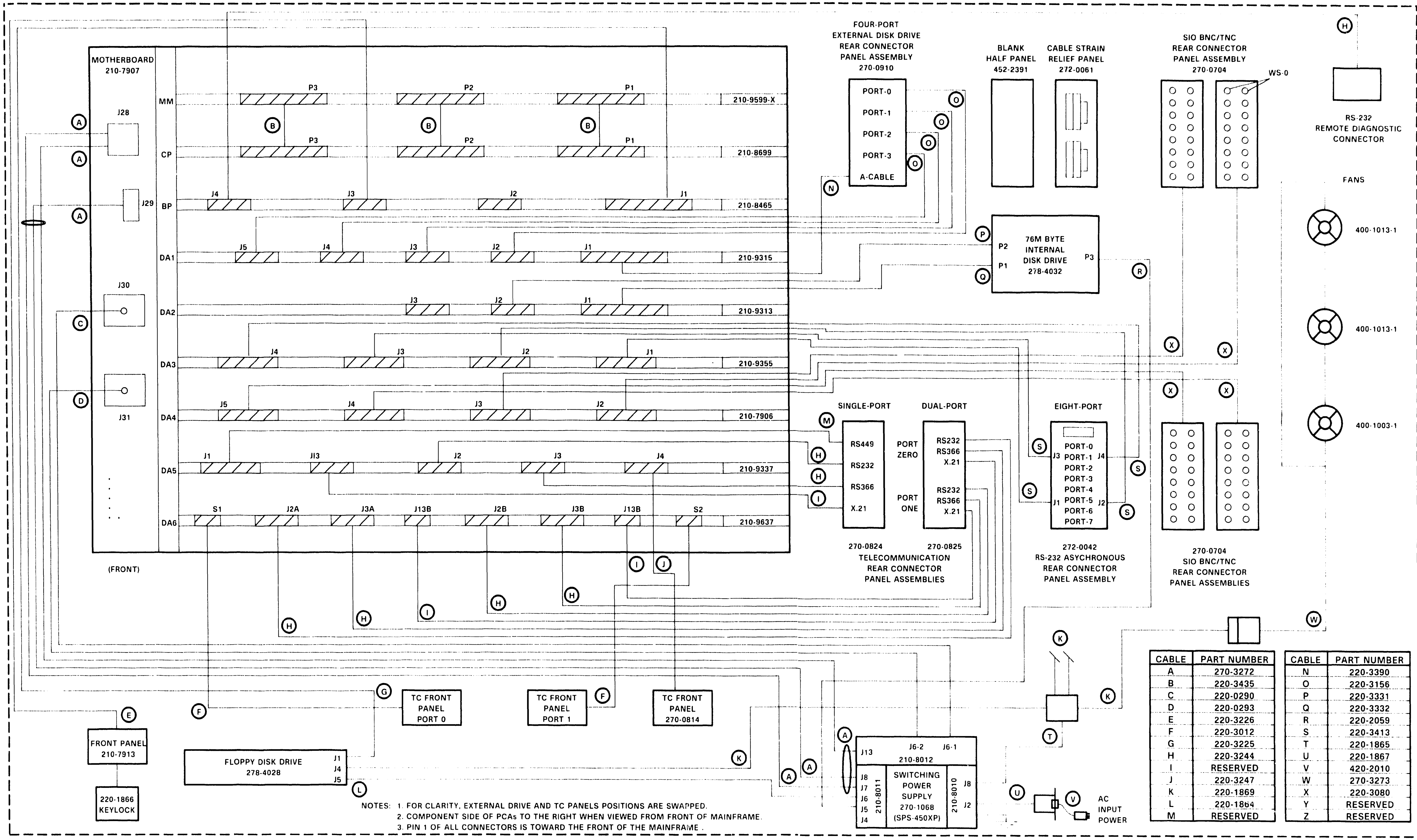
7. When the system halts at 9820, check the voltages at the Motherboard test points and the +24 dc voltage at the rear of the diskette drive. If the dc voltages are within the operating limits of table D-6, go to paragraph D.5.7, the switching power supply installation procedure. Otherwise, continue with step 8.

8. If the dc voltages at the Motherboard are outside of the operating limits in table D-6, adjust the voltages using the procedure given in paragraph D.5.2 step 8. After successfully completing the voltage adjustments, continue with paragraph D.5.7.

D.5.7 SWITCHING POWER SUPPLY INSTALLATION

After the voltages on the fully loaded system have been checked, complete the SPS-450XP Switching Power Supply installation as follows:

1. Power-down the mainframe and unplug the ac power connector from the power source receptacle.



CABLE	PART NUMBER
A	270-3272
B	220-3435
C	220-0290
D	220-0293
E	220-3226
F	220-3012
G	220-3225
H	220-3244
I	RESERVED
J	220-3247
K	220-1869
L	220-1864
M	RESERVED

CABLE	PART NUMBER
N	220-3390
O	220-3156
P	220-3331
Q	220-3332
R	220-2059
S	220-3413
T	220-1865
U	220-1867
V	420-2010
W	270-3273
X	220-3080
Y	RESERVED
Z	RESERVED

NOTES:
1. FOR CLARITY, EXTERNAL DRIVE AND TC PANELS POSITIONS ARE SWAPPED.
2. COMPONENT SIDE OF PCAs TO THE RIGHT WHEN VIEWED FROM FRONT OF MAINFRAME.
3. PIN 1 OF ALL CONNECTORS IS TOWARD THE FRONT OF THE MAINFRAME.

B-03552-FY87-30

Figure D-12. System Interconnection Diagram

2. Carefully return the supply to its original position in the mainframe. There are no positioning guides on the supply. Be careful not to damage the sound insulating foam while replacing the supply.

3. Replace the 5/16" hex head flange screw removed from under the front edge of the power supply. The clinch-nut is attached to the Carrier.

4. Plug the ac power connector into the power source connector.

D.5.8 MAINFRAME SOFTWARE

An autoenclosed software package (CEI Number 291-0467) provides the software and documentation required to complete the VS-45XP system installation. The package includes release 1.02.00 or later of the CP7 Stand-Alone Utility on an eight-inch diskette (WLI P/N 195-4409-5). VS Operating System release 6.40.00 (WLI P/N 195-2456-12F) and update release 6.41.00 (WLI P/N 295-2456-12AFD), are included on cartridge tape media ONLY. A set of user guides, manuals, and CSRNs, and an addendum to the VS-65 Processor Handbook completes the package.

Optional system software such as BASIC, COBOL, or RPG II are not included. A new software category may be required for optional system and/or application software used with an earlier VS Operating System. VSOS 6.41.00 will require a change in Software Class/Tier Level when used with the VS-45XP CPU. Upgrading the application software MUST occur along with the hardware when the new operating system is installed.

On-line and off-line diagnostics, and some utilities have been updated with the release of VS Operating System 6.41.00. See paragraphs D.5.8.5 and D.5.8.6 regarding available diagnostic software for the VS-45XP mainframe.

D.5.8.1 Stand-Alone Utility Package

The Stand-Alone Utility (SAU) package contains the minimum VS system software required to boot, load, and initiate a system IPL process. The SAU is only available on diskette and allows bootstrapping the VS Operating System kernel for CP7 systems from cartridge (or nine-track) tape media. The Stand-Alone Utilities package, listed in table D-10, includes the VS Stand-Alone Utilities User Guide (WLI P/N 715-0580).

Table D-10. Stand-Alone Utility Package (Autoenclosed Diskette Media - WLI P/N 195-4409-5)

EIGHT-INCH DISKETTE	SOFTWARE REVISION	WLI PART NUMBER
SAUDK1	1.02.xx	735-0511

D.5.8.2 VS Operating System Software Media Requirements

With the release of VS Operating System 6.40.00, the use of diskettes which allow system generation, and initialization using the Stand-Alone Utility was restricted to CP5 systems. CP7 and some VS-45 CP5 systems require the use of a cartridge or magnetic tape drive to install new VSOS releases and updates. Since the VS-45XP is a CP7 system, both VSOS 6.40.00 and 6.41.00 must be loaded using either a cartridge or magnetic tape drive. If the customer's system does not include a tape drive, one must be provided by the Customer Engineer at time of installation.

D.5.8.3 VS Operating System Software - Archiving Cartridge Tape Media

Each cartridge tape version of the VSOS software package includes all of the software listed in their respective Software Release Notices. Refer to the applicable CSNs for detailed information on operating system and base system software. In addition to media contents, the CSN includes information on the software installation and operation. Table D-11 gives a listing of the software description, revision number, and media part number.

Table D-11. VSOS Software Package - Archiving Cartridge Tape Media (VSOS 6.40.00 Bundled Media - WLI P/N 195-2456-12F) (VSOS 6.41.00 Bundled Media - WLI P/N 295-2456-12AFD)

CARTRIDGE TAPE NAME	VSOS REVISION	WLI PART NUMBER
OS640	06.40.00	705-0730
OS641	06.41.00	705-0970

D.5.8.4 VS Operating System Software - Nine Track Reel Tape Media

Each of the VSOS software packages are also available in nine-track reel tape media for use with CP7 mainframes. The applicable CSNs provide information on media contents, and on software installation and operation. Note that the nine-track reel media is NOT included in the autoenclosed installation package.

Table D-12. VSOS Software Package - Nine Track Reel Tape Media (VSOS 6.40.00 Bundled Media - WLI P/N 195-2456-7F) (VSOS 6.41.00 Bundled Media - WLI P/N 295-2456-7AFD)

NINE TRACK TAPE NAME	VSOS REVISION	WLI PART NUMBER
OS640	06.40.00	705-0412F
INFO CSRN	06.40.00	705-0548B
OS641	06.41.00	705-0969

D.5.8.5 Small System VS Diagnostic Monitor Package - System-Based

With the release of VSOS 6.40.00, the Diagnostic Monitor package included Stand-Alone diagnostics for the VS-65 CP7 mainframe, but did not include the disk-resident Diagnostic Monitor (DM). With the release of VSOS 6.41.00, the disk-resident version is now available. The Diagnostic Monitor (@DIAGMN@) and the Self-Test Diagnostic (@DIAGST@) software libraries will be automatically updated using the procedures given in paragraph D.5.9.

D.5.8.6 Small System VS Diagnostic Monitor Package - Diskette-Based

At FCS time, the Stand-Alone Diagnostic Monitor and the IPLing Self-Test Diagnostic software were NOT available on eight-inch diskette media and were NOT included with the autoenclosed package. Development of the eight-inch media required by the VS-45XP is in process and release is expected shortly. CP7 off-line diagnostics, available on the system drive ONLY, are discussed in paragraph D.5.9.1.

D.5.8.7 NVRAM Utilities Package - Diskette Media

The NVRAM Utilities Package, WLI P/N 195-2452-0, includes the documentation necessary for the CE to implement the installation, modification, or updating of the NVRAM and/or its image file. Refer to paragraph 8.9 of the VS-65 PMM.

D.5.8.8 Remote Systems Administration Facility Support

The VS-45XP supports the Remote Systems Administration Facility (RSAF). However, it supports ONLY that portion of the facility supported by the VS-45. It does NOT support the Remote Power On/Off and Remote IPL options of the VS-65. When a VS-45XP is equipped with RSAF, an administrator at a central site can perform the following functions:

- Act as Workstation Zero (WS-0).
- Monitor the Operator screens.
- View a log of remote systems activity.

RSAF for the VS-45XP requires the use of a Wang Professional Computer (PC) as WS-0 at the VS-45XP site and any Wang VS with a Telecommunications DAC at the host site. VS RSAF remote software (revision 2.00.06 or later) must be installed on the PC. VS RSAF Host software (revision 2.00.03 or later) must be installed at the host site.

NOTE

To run RSAF on the VS-45XP, the Keylock Assembly switch MUST be set to the LOCAL position.

D.5.9 MAINFRAME SOFTWARE INSTALLATION

Like the VS-65, the VS-45XP mainframe supports one removable disk media. In this case, however, the media is an eight-inch, double-sided, double-density 1.2-megabyte floppy diskette. If the mainframe is equipped with a single disk only, the system disk must be initialized and then loaded with the new CP7 operating system files. The Stand-Alone Utility (SAU) software provides the initialization and file loading function, but DOES NOT provide for CP5 to CP7 VSOS conversion. Refer to paragraph 4.14 of the VS-65 PMM for a general discussion of the SAU software procedure.

The 76-megabyte internal disk drive system (or a single external disk drive system) requires using the INITIALIZE procedure. The new internal disk WILL NOT be formatted, and an original disk MUST be thoroughly tested before the new VSOS software is loaded. Initializing the System Disk after a CPU configuration conversion, requires preparation of the VS operating system software prior to hardware installation. On multiple drive installations, VSOS conversion can be done on site. It requires using the system drive, an alternate drive with a removable disk, the two VSOS cartridge (or three nine-track) tapes (and a tape drive), backup media containing the old operating system and the customer files, and a clean (or new) disk pack or drive.

The IPL procedure given in paragraph 4.9.1 has been affected by the release of VSOS 6.40.00 and 6.41.00. Also, Chapter 8 and Appendix B have been substantially revised. As a result, differences will be noted in the IPL procedure. Exceptions and/or modifications to the procedures given in the VS-65 PMM or the autoenclosure materials follow.

D.5.9.1 Operating System Installation - Single Disk Drive System

Using the SAU COPY function, the "new" system disk can be initialized with a MEDIA tolerant VTOC. Selecting INITIALIZE will select NORMAL passes during the verification process (as when using DISKINIT). If BAD blocks are found, the initialization process will REMOVE them. The time required is memory and drive dependent, but will complete in under 30 minutes for a 76-megabyte drive.

1. Power-up Workstation Zero (WS-0), the cartridge (or 9-track) tape drive, the external disk drive (if so equipped), and the mainframe, and follow the procedure in paragraph 4.14.1 steps 1 through 8.

NOTE

The VS-25/45 Keylock Assembly switch has ONLY two functions. The REMOTE position on the VS-45XP is the same as the REMOTE DIAGNOSTICS position on the VS-65. Be sure the switch is in the LOCAL position.

2. The Stand-Alone Utility (WLI P/N 195-4409-5) for the VS-45XP CPU requires only one diskette and is loaded using the 2270V-4 drive.

3. When ac and dc power were applied to the mainframe, the Power-Up Sequence should have begun. Concurrent Power-Up Diagnostics for the CPU, and any 'intelligent' devices (TC, Asynchronous, and/or, UISIO Device Adapter/Controllers) will proceed to completion unless a failure occurs. A Device Adapter/Controller (DAC) is defined as an 'intelligent' device adapter (controller) when it is equipped with an on-board microprocessor with its own power-up PROMs (and BIT).

NOTES

1. The power-up sequence for each DACs is run concurrently with the BP/CPU. A power-up failure of any single controller will not affect the BP's diagnostic capabilities and will be ignored except when a UISIO DAC is the Workstation Zero controller on the system.

2. In the case of a system UISIO DAC failure, the Serial I/O (DA) test of the Self-Test Diagnostic WILL fail if the PROM-based UISIO power-up diagnostics fail. (See Appendix C of the VS-65 PMM for details.)

3. If an intelligent device fails power-up diagnostics, follow the instructions given in the VS-65 PMM (or PUB) for the particular DAC using the Diagnostic Monitor to determine the failure (using the Error Codes) and then take the necessary action.

4. If the system fails the Self-Test Diagnostic (STD), the system will HALT at the failing PCA. The Diagnostic Monitor is NOT resident on SAUDK1 so a detailed error analysis CANNOT be performed. Until such time as an Off-Line Diagnostic Monitor is available, replace the failing unit indicated by the STD and re-IPL. If the unit fails again, replace any related PCA and re-IPL. For example, a Central Processor failure indication may be caused by Cache/Main Memory; reinstall the original CP PCA and then replace the Cache/Main Memory PCA. Sometimes, both PCAs must be replaced. Without off-line diagnostics, troubleshooting becomes a matter of "board-swapping".

NOTE

Several differences in the functional screens of the SAU will be noticed when using SAU 1.02.08 or later.

5. When the CPU power-up diagnostics have completed, the system will load microcode from SAUDK1, begin initialization, and the Select Function screen will appear. Select PF4, to initiate the installation procedure (SAU COPY).

6. The Define Input Device screen will appear. Select the input device (2529V or the 2509V 9-track tape drive), and a Physical Device Address (PDA) of 2801 to 2807 HEX (step 14, VS-65 PMM), and press ENTER.

7. Select the output disk (system drive) with a PDA of 2400 HEX for an internal drive, or 3400 HEX for an external drive, and press ENTER. (Note that the Bootstrap Device switch is still in the UP position.)

8. Press PF2 to INITIALIZE the disk. DO NOT select REFORMAT. Complete the customer's System Disk information requirements and press ENTER.

9. The system will begin a "NORMAL" initialization process, testing all system disk blocks, removing the bad blocks, and reformat the volume directory. When Initialization has successfully completed, SAU will request system volume allocation information.

NOTE

When using SAU version 1.02.08 or later, WS-0 will display the number of blocks formatted in 50 block increments. Upon completion, the number of bad blocks removed will also be displayed.

10. If a Preallocated Dump file, and/or Paging Pool file are part of the customer's requirements, enter the required information and press ENTER. The SAU will then display the Request to Mount screen and request the mounting of the first tape.

11. Mount the updated VSOS tape (the SAU prepared version of the CP7 VSOS 6.40.00 overlaid with 6.41.00). MOUNT the cartridge tape by pressing the ONLINE switch. Mounting takes about 70 seconds to complete. If the mount is successful, the tape will begin loading automatically.

NOTE

When using SAU version 1.02.08 or later, WS-0 will display the number of transactions occurring on the Request for Mount screen. The number of transactions is a count of the I/O operations which occurred during the loading of the VSOS. It is also an indication that the system is still loading software and has not halted ('hung').

12. Refer to paragraph 4.14.1.1 of the VS-65 PMM for the cartridge tape procedure except for step 5. The operating system will dismount the tape at the completion of COPY.

13. When the operating system has been copied, the SAU will display the completion screen. If the CP7 conversion tape contains a generic CSG configuration file, the system can be IPLed immediately after the hardware testing is successfully completed. If a generic configuration file is included, proceed with paragraph D.5.10, otherwise, continue with step 14. (A generic configuration file includes the 76-megabyte internal disk drive, an appropriate external disk drive, various tape drives and multiple workstations.)

14. Set the Bootstrap Device switch to the CENTER position for systems equipped with an internal drive, or the LOWER position for systems equipped with an external disk drive.

15. Initialize the system by pressing the green Control Mode and then the red Initialize pushbuttons. Refer to paragraph 8.5.1 of the VS-65 PMM and perform the Diagnostic Power-Up Procedure.

16. Verify that the HEX displays are fully operational per steps 5 and 6 (see Notes 1 through 4), and continue with the power-up diagnostics.

17. The system should proceed with the PROM Power-Up Sequence, load the Bootstrap Loader files (HEX displays 4000) and the Diagnostic Monitor (DM) files (4100), and the Self-Test Diagnostics screen should appear.

18. When the Self-Test Diagnostics screen appears (figure 8-1), press PF8 to access the Diagnostic Monitor. The Diagnostic Monitor Program Selection screen (figure 8-4) will appear.

NOTE

The Self-Test Diagnostics screen and the Diagnostic Monitor Test Selection screen have been modified from the prerelease version shown in figures 8-1 and 8-4 of the VS-65 PMM.

19. Press PF8 to start the Automatic Sequence. The DM Run-Time Monitor screen (figure 8-6) will display the automatic loading of each program in the sequence, the routine being used, the number of errors (if any) encountered, and the number of Monitor passes.

20. Allow the Monitor to make two complete error-free passes (see Monitor Pass Count = 00002). This will take about 15 minutes per pass for one megabyte of memory. If no errors are encountered, EXIT the Diagnostic Monitor test routine in progress by pressing PF16, and continue with step 22.

NOTES

1. The current routine will be completed (which may take several seconds), and the Program Selection screen will reappear.

2. If an error is detected press PF3 (STOP ON ERROR) and review the troubleshooting procedures in Chapter 8, paragraphs 8.5.3.3.

21. After the failing PCA has been determined, and using the appropriate figure in Chapter 8, continue with the instructions in step 9, paragraph 8.5.3.3.3. Write the information on the PCA Failure Tag.

22. Replace the failing PCA and repeat steps 17 through 19 above. If the Automatic Sequence is successful, press PF16 to exit the test routine.

23. When the diagnostics have been successfully completed, press PF16 to exit the Diagnostic Monitor. The system should return to the IPL Drive Selection screen.

NOTE

It is sometimes necessary to press PF16 more than once to exit the Diagnostic Monitor and return to the IPL Drive Selection screen.

24. The cursor will be positioned next to the system drive. Press ENTER and the Self-Test Diagnostics (STD) will begin running. If the system fails the STD, the system with HALT at the failing PCA STD test.

25. Whenever a failure of the STD occurs, the Diagnostic Monitor becomes the DEFAULT software and MUST be used to determine the failing unit. Return to step 17 for instructions and rerun the Diagnostic Monitor for the individual failing unit.

NOTE

1. If the individual PCA passes the Diagnostic Monitor test, press PF16 to exit the Diagnostic Monitor and return to the IPL Drive Selection screen.

2. Run the STD again, and if the unit fails the STD a second time, the STD software is probably defective. Return to paragraph D.5.9 and rerun the SAU procedure using REFORMAT instead of Initialize. Reformatting the system drive takes less than 30 seconds.

26. When the STD has completed, the Date/Time screen will appear. Enter the date and time and press ENTER. The Sysgen Configuration screen will appear (steps 7 through 9, paragraph 4.9.1 of the VS-65 PMM).

27. The operating system has a DEFAULT configuration file. Press PF1 to continue the IPL process. Continue with steps 10 through 13 of the VS-65 PMM. DO NOT follow the remaining steps in the VS-65 procedure.

28. Run the program GENEDIT and create a minimum configuration file which will allow you to load the customer's backup media, and the system to recognize all resident disk drives, tape drives, and if available, an alternate workstation.

29. Name the new configuration file with a name that is different from any of the other customer configuration files.

30. Be sure to press PF4 to save the new f.⌄e. Log off of the system, enter Control Mode, and continue with paragraph D.5.11.

D.5.9.2 Operating System Installation - Multiple Disk Drive System

1. If a complete CP7 version of the VSOS was generated on a removable disk pack prior to the hardware installation, install the pack in external Drive-0 and continue with paragraph D.5.10. If not, continue with step 2.

2. Initialize the internal (or external Drive-0) disk using the procedure paragraph D.5.9.1. Drive-0 MUST be selected on a multiple external disk drive system (no internal drive). The system will NOT IPL unless the STD is resident on the default drive.

3. When the procedure given in paragraph D.5.9.1 is completed, and after the system is in Control Mode, install the backup pack in the alternate external drive (if not already installed) and mount the drive.

D.5.10 SYSTEM HARDWARE TESTING AND DIAGNOSTICS

1. IPL the system using the new CP7 operating system with either the customer's or the generic CSG configuration file. Refer to paragraph 8.5.1 of the VS-65 PMM and perform the Diagnostic Power-Up Procedure.

2. Verify that the HEX displays are fully operational per steps 5 and 6 (see Notes 1 through 4), and continue with the power-up diagnostics.

3. When the IPL Drive and Diagnostic Monitor Selection screen appears (figure 8-3), press PF8 to access the Diagnostic Monitor (DM). The Diagnostic Monitor Program Selection screen (figure 8-4) will appear.

NOTE

The Diagnostic Monitor Test Selection screen may have been modified somewhat from the prerelease version shown in figure 8-4 of the VS-65 PMM.

4. Press PF8 to start the Automatic Sequence. The Diagnostic Monitor Run-Time Monitor screen (figure 8-6) will display the automatic loading of each program in the sequence, the routine being used, number of errors (if any) encountered, and the number of Monitor passes.

5. Allow the Monitor to make two complete error-free passes (see Monitor Pass Count = 00002). This will take about 15 minutes per pass for one megabyte of memory. If no errors are encountered, EXIT the Diagnostic Monitor test routine in progress by pressing PF16, and continue with step 8.

NOTES

1. The current routine will be completed (which may take several seconds), and the Program Selection screen will reappear.

2. If an error is detected press PF3 (STOP-ON-ERROR) and review the troubleshooting procedures in Chapter 8, paragraphs 8.5.3.3.

6. After the failing PCA has been determined, and using the appropriate figure in Chapter 8, continue with the instructions in step 9, paragraph 8.5.3.3.3. Write the information on the PCA Failure Tag.

7. Replace the failing PCA and repeat steps 3 through 5, above. If the Automatic Sequence is successful, press PF16 to exit the test routine.

8. When the diagnostics have been successfully completed, press PF16 to exit the Diagnostic Monitor. The system should return to the IPL Drive Selection screen. IPL the system from the system disk by pressing ENTER and continue with paragraph D.5.11.

NOTE

It is sometimes necessary to press PF16 more than once to exit the Diagnostic Monitor and return to the IPL Drive Selection screen.

D.5.11 IPL PROCEDURE

After successful completion of the system hardware testing and diagnostics, IPL the system per paragraph 4.9.1 using the generic CSG configuration file and the following procedure.

1. When system initialization is complete, log onto the system as CSG.

2. RUN the VS BACKUP utility to RESTORE the system volume back-up to the system disk. Specify NOCOPY to skip duplicate files. The system will NOT copy the old VSOS files, but WILL copy all non-VSOS files that originally where stored on the system disk.

3. Press PF5, Manage Files and Libraries, and verify that the customer's existing FORMDFFN, USERLIST, and configuration files were reloaded. If new files were loaded (check date created and owner of record), SCRATCH the new files and copy the originals onto the system drive.

4. Press PF1 and RUN the program GENEDIT. The customer's latest configuration file should still be configured for the VS-25/45 CPU. When the Select CONFIG File screen appears, enter the CONFIG file name (the system defaults to the library and volume names) and press ENTER.

5. The GENEDIT Main Menu will appear. Verify the original CONFIG file name and the system model number (VS-25 or VS-45). Press PF4 and the Create/Update CONFIG File screen will appear. Enter a new file name for the customer's original CONFIG file and press ENTER. This will create a duplicate copy of the original file under the new name.

6. After the system verifies that the original CONFIG file has been duplicated, press PF16 to return to the Main Menu. Press PF16 again, and the Select CONFIG File screen will display the new CONFIG file name and the original model number (VS-25/VS-45) at the top of the screen.

7. Upgrade the original CONFIG file from the CP5 version by entering the CONFIG file name and the new VS model number (for example, '@CONFIG@' and '65') and pressing ENTER. This will reconfigure the original CONFIG file automatically. The Main Menu will appear showing the original CONFIG file name with the model number changed to VS-65.

8. Press PF4 and the Create/Update CONFIG File screen will appear. Verify that the original CONFIG file is reconfigured for the VS-65.

9. Press ENTER to SAVE the updated configuration. After the system has verified the file update, press PF16 twice. Enter the updated CONFIG file name and press ENTER. Confirm that the file is now configured for a model VS-65 Computer System at the Main Menu.

10. Press PF3 and reconfigure (or verify) the new CONFIG file for the current disk drive(s), SIO DA (or UISIO DAC), etc. When changing the internal disk drive, the new Device Adapter (22V50-0) and Disk Drive (2268V1) model numbers will have to be entered. However, when changing the ISIO DA to a SIO DA or a UISIO DAC, GENEDIT will automatically set the baseband ports to the original settings.

11. If any addition device adapters and/or controllers were added during the upgrade, modify the CONFIG file for the new devices at this time.

12. After all modifications have been completed, using PF keys 2 and 3, press PF4 and verify that device summary is correct. Press ENTER to SAVE the newly modified CONFIG file.

13. Press PF32 to EXIT GENEDIT and return to the VS Command Processor screen.

14. Press PF1 and run the program DISKINIT. Run RELABEL and rename the system disk with the customer's system disk name.

15. Press PF16 to EXIT DISKINIT and log off of the system.

16. Press the green CONTROL MODE pushbutton and then the red INITIALIZE pushbutton and re-IPL the system using the new system drive and the new configuration file.

17. Continue the installation procedure with paragraph 4.10 of the VS-65 PMM, connecting all external devices per the customer's requirements. Log onto the system use the appropriate LOG-ON, and verify that all of the customer's devices are correctly recognized and operational.

18. Complete the Remote Diagnostic Certification Procedures given in paragraph 4.12. For additional remote diagnostic information, see paragraph 8.8. A brief discussion of the NVRAM Utility can be found in paragraph 8.9.

19. When the remote certification is completed, proceed with the System Turnover requirements of paragraph 4.13

D.5.12 REPACKING AND SHIPPING PROCEDURES

1. After completing the appropriate return tags, repack each of the PCAs removed from the system, and return them to the repair center.

2. Pack the Quantum Disk Drive(s) in an appropriate container, with the necessary return tags, and return to the repair center also.

3. The "old" Switching Power Supply should be carefully packed for shipment to the Remanufacturing facility in Tewksbury. The power supply must be returned for modification to the "new" type to ensure stock for future upgrades.

D.6 ILLUSTRATED PARTS BREAKDOWN

This section contains the Illustrated Parts Breakdown (IPB) for the VS-45XP Computer System. The IPB includes both current and obsolete components, assemblies, and subassemblies which may be found during the conversion process. It also includes tables of Field Replaceable Units (tables D-13 through D-16); Switching Power Supply considerations (tables D-17 and D-18); the contents of the VS-45XP Upgrade Kits (tables D-19 through D-23); External Cable part numbers (table D-24); and Internal Power and Signal Cable part numbers (tables D-25 and D-26).

D.6.1 FIELD REPLACEABLE UNITS

The VS-45XP Computer System is equipped with a large number of components and subassemblies from early VS-25/45 systems. In addition to the standard VS-65 components, upgrades to the VS-45XP include recently modified units not found in current VS-25/45 products. The Field Replaceable Unit tables are designed as a quick reference to the many different components used in the VS-45XP Computer System. Small component parts, such as screws, bolts, clamps, etc. are NOT included. Where necessary, these components are given with the corresponding IPB drawing.

There are five FRU tables provided. Tables D-13 and D-14 give the VS-45XP upgrade cables, printed circuit assemblies (PCAs), and subassemblies which may be used during the upgrade process. Tables D-15 and D-16 list the standard VS-25/45 cables, PCAs, and subassemblies not affected by the upgrade, but required for future maintenance and repair.

Use this section as a quick reference to the use and location of a Field Replaceable Unit (FRU), and for part number identification when ordering FRUs.

Table D-13. Field Replaceable Units (VS-45XP Upgrade - PCAs)

WLI PART NUMBER	PRINTED CIRCUIT ASSEMBLY DESCRIPTION
210-7906	PCA, 32-Port Serial I/O Device Adapter (Note 1)
210-7955	PCA, Eight-Port RS-232-C Asynchronous DAC (Note 2)
210-8312/15	PCA, Internal/External Disk Drive Device Adapter (Note 3)
210-8337	PCA, Single-Port Telecommunication Device Adapter (Note 4)
210-8465	PCA, Bus Processor (32-Bit Intel 80286)
210-8637	PCA, Dual-Port Telecommunication Device Adapter (Note 5)
210-8699	PCA, CP7 Central Processor (32-Bit Intel 80286)
210-9312/15	PCA, Internal/External Disk Drive Device Adapter (Note 3)
210-9337	PCA, Single-Port Telecommunication (TC) Device Adapter
210-9355	PCA, Eight-Port RS-232-C Asynchronous DAC
210-9637	PCA, Dual-Port Telecommunication Device Adapter
210-9599	PCA, One-Megabyte Cache/Main Memory (Replaces 210-8599)
210-9599-1	PCA, Two-Megabyte Cache/Main Memory (Replaces 210-8599-1)
210-9599-2	PCA, Four-Megabyte Cache/Main Memory (Replaces 210-8599-2)

NOTES

1. Replaces PCA 210-8316 in systems previously equipped with the 76-megabyte drive. (Not part of VS-45XP Upgrade Kits.)
2. Replaced by 210-9355-A when spares depleted or used in four-megabyte memory systems.
3. Replaced by 210-9313 or 210-9315 when spares depleted or used in four-megabyte systems.
4. Replaced by 210-9337-A when spares depleted or used in four-megabyte memory systems.
5. Replaced by 210-9637-A when spares depleted or used in four-megabyte memory systems.

Table D-14. Field Replaceable Units
(VS-45XP Upgrade - Assemblies and Cables)

WLI PART NUMBER	ASSEMBLY OR CABLE DESCRIPTION
270-0704	Assembly, 8-Port BNC/TNC Rear Connector Panel Assembly (RCPA)
270-1068	Assembly, VS-45XP Switching Power Supply (SPS-450XP) (Note 1)
278-4032	Assembly, 76-Megabyte Internal Disk Drive (IDD) (Note 2)
220-2059	Cable, DC Power to Internal Drive, 6-Pos Soc to 3x2-Row Soc
220-3331	Cable, 60-Inch, 26-Pos Flat Ribbon, 13/26 Soc-to-Soc (Note 3)
220-3332	Cable, 62-Inch, 30-Twisted Pair, 30/60 Soc-to-Soc (Note 4)
220-3435	Cable, 1.625-Inch, 60-Pos Flat Ribbon, Edge-to-Edge, MM-to-CP7
220-3244	Cable, 44-Inch, 25-Pos D-Sub(F) to 26-Pos Soc (Note 5)

NOTES

1. The SPS-450XP (WLI P/N 270-1068) MUST be equipped with the WLI P/N 210-8012, E-Rev 5, Rev 12, +5V dc high current (75 A) output Printed Circuit Assembly.

2. The VS-45XP uses the same 76-Megabyte drive as the standard VS-25/45. The drive MUST be equipped with the three-voltage source, regulated power supply. The drive IS tested but NOT formatted at time of shipment.

3. Internal B-Cable from 76-megabyte drive to Single-Port Internal Disk Drive DA P/N 210-8312/13 or 210-9312/13.

4. Same as Note 3 except Internal A-Cable.

5. The Cable (WLI P/N 220-3244) is a Cable Assembly used for the Remote TC Diagnostic function and is mounted at the rear of the Fan Panel Assembly (P/N 270-0880).

Table D-15. Field Replaceable Units - Non-Upgrade Primary Components (Printed Circuit Assemblies or Subsystem Assemblies)

WLI PART NUMBER	PRINTED CIRCUIT ASSEMBLY OR SUBSYSTEM ASSEMBLY DESCRIPTION
210-7865	PCA, TCB-1 Light Board, Telecommunication Front Panel (Note 1)
210-7907	PCA, Motherboard
210-7913	PCA, Front Panel (HEX Displays, Controls & LED Indicators)
210-7955	PCA, 8-Port RS-232-C Asynchronous DAC (Note 2)
210-8323	PCA, Asynchronous Transceiver Motherboard (Note 3)
210-8323-1	PCA, Asynchronous Transceiver Motherboard (Note 3)
210-8324	PCA, Asynchronous Transceiver Daughterboard (Note 4)
270-0702	Assembly, 4-Port External Disk Drive (EDD) RCPA (Note 5)
270-0814	Assembly, TC Front Panel (Controls & LED Indicators) (Note 1)
270-0824	Assembly, Single-Port Telecommunication RCPA
270-0825	Assembly, Dual-Port Telecommunication RCPA
270-0910	Assembly, 4-Port External Disk Drive RCPA (Note 5)
270-3272	Assembly, DC Power Cable Harness, SPS-450XP to Motherboard
270-3273	Assembly, Fan Harness, AC (See also table D-16, P/N 220-3224)
272-0042	Assembly, RS-232-C Asynchronous RCPA (Note 3)
278-4028	Assembly, Diskette Drive, 8-Inch, 1.2-Mb, DSDD, 60Hz, Tested

NOTES

1. The TCB-1 Light Board (WLI P/N 210-7865) is part of the TC Front Panel Assembly (WLI P/N 270-0814).

2. Replaced by P/N 210-9355-A when spares depleted or when used in four-megabyte cache/main memory systems.

3. The Asynchronous Transceiver (DE Driver/Receiver) Motherboard (P/N 210-8323 and 210-8323-1) is part of the RS-232-C Asynchronous RCPA (272-0042). The early version (P/N 210-8323) included a printer connector (unsupported) which was removed from P/N 210-8328-1.

4. The Asynchronous Transceiver (DE Driver/Receiver) Daughterboard (WLI P/N 210-8324) is mounted on the Motherboard (WLI P/N 210-8323 or WLI P/N 210-8323-1).

5. The External Disk Drive Rear Connector Panel Assembly (P/N 270-0702) is obsolete. Use Rear Connector Panel Assembly P/N 270-0910 when replacement is required.

Table D-16. Field Replaceable Units - Non-Upgrade Assemblies or Cables

WLI PART NUMBER	ASSEMBLY OR CABLE DESCRIPTION
220-0290	Cable, 25-Feet, +5 Volt Buss, 75 Ampere, No. 6, Black
220-0293	Cable, 25-Feet, +/-0 Volt Buss, 75 Ampere, No. 6, Black
220-0333	Cable, 25-Feet, Telecommunication to Modem, Male/Male (Note 1)
220-1864	Cable, Harness Assembly, DC SPS-450XP to Diskette Drive
220-1865	Cable, Harness Assembly, AC SPS-450XP to Connector Housing
220-1866	Assembly, Keylock, Local/Remote Switch (Note 2)
220-1867	Assembly, Internal Power Cord (Cable) and Filter (Note 3)
220-1869	Cable, Harness Assembly, AC Multiconnector Breakout
220-3012	Cable, 48-Inch, 16-Pos Flat Ribbon, 8/16-Pin Dip-to-Dip
220-3156	Cable, 42-Inch, 26-Pos Flat Ribbon, 13/26 Soc-to-Soc (Note 4)
220-3390	Cable, 60-Inch, 30-Twisted Pairs, 30/60 Soc-to-Soc (Note 4)
220-3224	Cable, 14-Inch, 25-Pos D-Sub (F) to 26-Pos Soc (Fan Assembly)
220-3225	Cable, 48-Inch, 50-Pos Flat Ribbon, 25/25-Pos Soc to 50-Pos Soc
220-3226	Cable, 48-Inch, 34-Pos Flat Ribbon, 17/34 Soc-to-Soc
220-3244	Cable, 44-Inch, 25-Pos D-Sub (F) to 26-Pos Soc (Note 5)
220-3247	Cable, 46-Inch, 20-Pos Soc to 16-Pin Dip Female/Female (F/F)
220-3412	Cable, 42-Inch, 26-Pos Flat Ribbon, 13/26 Soc-to-Soc (Note 6)
220-3413	Cable, 42-Inch, 40-Pos Flat Ribbon, 20/20 Soc-to-Soc
420-1040	Loop-Back Tester, Molded, Remote TC Diagnostic Tests (Note 7)
420-2010	Cable, External AC Power Cord, Molded Connectors M/F, Black
421-0031	Cable, 25-Feet, Telecommunication to Modem, M/M (Note 1)

NOTES

1. Obsolete, listed for reference only. The Remote Diagnostic Telecommunication-to-Modem Cable (WLI P/N 220-0333) is replaced by WLI P/N 421-0031.

2. A single-twisted pair cable from Keylock Switch Assembly to Front Panel PCA (WLI P/N 210-7913).

3. The assembly uses the standard molded external ac power cord (WLI P/N 420-2010), a 10 Ampere line filter with power line connectors for the internal and external power cords.

4. B-Cables (WLI P/N 220-3156) and A-Cable (WLI P/N 220-3390) from External Disk Drive DA to RCPA.

5. This Cable (Assembly) replaces prior RS-232-C and RS-336 cable assemblies in Single and Dual-Port TC RCPAs, and the Remote TC Diagnostic Assembly.

6. Obsolete, listed for reference only. Printer cable (and rear panel connector assembly) not supplied.

7. A 25-connector RS-232-C internally wired (no cable) loop-back tester with black molded cover/handle.

D.6.2 SWITCHING POWER SUPPLY CONSIDERATIONS

Table D-17 gives the fuse requirements of the SPS-450XP Switching Power Supply, and table D-18 makes special note of the PCA Revision Levels required by the SPS-450XP power supply. (This PCA is NOT a Field Replaceable Unit.)

WARNING

DO NOT ATTEMPT TO REPAIR THE SWITCHING POWER SUPPLY; IT IS FIELD REPLACEABLE ONLY.

DO NOT OPEN THE SWITCHING POWER SUPPLY UNDER ANY CIRCUMSTANCE. EXTREMELY DANGEROUS VOLTAGE AND CURRENT LEVELS (OVER 300 VOLTS DC AND UNLIMITED CURRENT) ARE PRESENT WITHIN THE POWER SUPPLY.

AFTER POWERING THE UNIT DOWN AND DISCONNECTING THE AC POWER CONNECTOR FROM THE POWER SOURCE RECEPTACLE, ALLOW ONE MINUTE BEFORE REMOVING THE POWER SUPPLY TO PROVIDE ADEQUATE TIME FOR RESIDUAL VOLTAGE TO DRAIN THROUGH THE BLEEDER RESISTORS.

Table D-17. SPS-450XP Switching Power Supply Fuses

FUSE I.D.	SUPPLY LOCATION	FUSE RATING (FUNCTIONAL AREA)	WLI PART NUMBER
F1	Rear Panel	8 Ampere/250 Volts (Slow Blow AC)	360-1080-SB
F2	Rear Panel	8 Ampere/250 Volts (Slow Blow AC)	360-1080-SB
F1	210-8011	8 Ampere/250 Volts (+5V Regulated)	360-1080 (3AG)
F1	210-8012	10 Ampere/250 Volts (AC PCA Input)	360-1100 (3AG)

NOTE

Recent models of the SPS-450 series power supplies have been shipped with only one fuse in the power supply rear panel (primary ac input path).

Table D-18. Special Hardware Requirements (SPS-450XP)

WLI PART NUMBER	QUANTITY REQUIRED	HARDWARE DESCRIPTION	SPECIFIC REQUIREMENT
210-8012	1	+/-5 Volt Regulated PCA (SPS-450XP Only)	E-Revision 5; DWG Revision 12

NOTE

The 210-8012 PCA is NOT a Field Replaceable Unit. This information is given to allow verifying that the power supply has been modified for the VS-45XP.

D.6.3 UPGRADE KIT CONTENTS

Tables D-19 through D-23 list the contents of the Upgrade Kits available. Table D-19 lists the standard components used to add a 76-megabyte drive to VS-45XP system not equipped with an internal disk drive. Tables D-20 and D-21 are used to upgrade one and two-megabyte systems without internal drives or where the Quantum drives are being disabled. Tables D-22 and D-23 are used to upgrade one and two-megabyte systems from the Quantum drive(s) to the 76-megabyte internal drive. Specific limitations apply to each upgrade.

Table D-19. Contents of Upgrade Kit UJ-3246 (206-3246) (VS 45XP-1X or 2X to VS 45XP-1N or 2N - 289-0240)

WLI PART NUMBER	QUANTITY SUPPLIED	DESCRIPTION (SEE NOTE 1) (AND COMMENTS)
210-9313	1	Internal Disk Drive Device Adapter
220-2059	1	DC Power Cable, Internal Drive
220-3331	1	B-Cable, Internal Disk Drive
220-3332	1	A-Cable, Internal Disk Drive
278-4032	1	76-Megabyte Disk Drive (Note 2)
291-0219	1	Autoenclosure, Software/Documentation
449-0420	2	Locking Guide
452-0308	1	Disk Drive Baseplate
650-3120	2	Screw (Locking Guide Mounting)
650-4080	4	Mounting Screws (Disk Drive Baseplate)
650-6122	2	Flange Screw (Drive to Lower Shelf)

NOTES

1. RESTRICTED to VS-25/45 systems not equipped with an internal disk drive.

2. The 76-megabyte disk drive is a 60 Hz, tested, (new) drive, NOT formatted.

Table D-20. Contents of Upgrade Kit UJ-3443 (206-3443) (VS 25/45-1X or 1N to VS 45XP-1X or 1N - 289-0619)

WLI PART NUMBER	QUANTITY SUPPLIED	DESCRIPTION AND COMMENTS (SEE NOTES 1 AND 2)
210-8465	1	32-Bit Bus Processor PCA (Intel 80286)
210-8699	1	32-Bit CP7 Central Processor PCA (Intel 80286)
210-9599	1	One-Megabyte Cache/Main Memory PCA (Note 3)
220-3244	1	Remote Diagnostic TC Cable Assembly
220-3435	3	CP7/MM Edge Connector Cables
270-0704	2	Eight-Port BNC/TNC I/O Rear Connector Panel
270-1068	1	SPS-450XP Power Supply (75 Ampere @ +5 Volts)
291-0467	1	Autoenclosure, CP5 to CP7 Software/Documentation

Table D-21. Contents of Upgrade Kit UJ-3452 (206-3452) (VS 25/45-2X or 2N to VS 45XP-2X or 2N - 289-0669)

WLI PART NUMBER	QUANTITY SUPPLIED	DESCRIPTION AND COMMENTS (SEE NOTES 2 AND 4)
210-8465	1	32-Bit Bus Processor PCA (Intel 80286)
210-8699	1	32-Bit CP7 Central Processor PCA (Intel 80286)
210-8599-1	1	Two-Megabyte Cache/Main Memory PCA (Note 5)
220-3244	1	Remote Diagnostic TC Cable Assembly
220-3435	3	CP7/MM Edge Connector Cables (1-5/8 Inches)
270-0704	2	Eight-Port BNC/TNC I/O Rear Connector Panel
270-1068	1	SPS-450XP Power Supply (75 Ampere @ +5 Volts)
291-0436	1	Shipping Package BOM (Upgrade Documentation)
291-0467	1	Autoenclosure, CP5 to CP7 Software/Documentation

NOTES TO TABLES D-20 AND D-21

1. The basic CPU upgrade kit, UJ-3443, (CP5 to CP7) is used with VS-25/45 systems equipped with the (2268V1) internal 76-megabyte drive (278-4032), external disk drive(s) only, or where the internal Quantum drive(s) (278-4025) are NOT being REPLACED and ARE DISABLED.

2. VS-25/45s equipped with an ISIO DA (210-8316) require replacement of the ISIO DA with the SIO DA (210-7906).

3. RESTRICTED to ONE-MEGABYTE Main Memory systems ONLY.

4. The two-megabyte CPU upgrade kit UJ-3452 is used with two-megabyte systems only, equipped with the (2268V1) internal 76-megabyte drive (278-4032), external disk drive(s) only, or where the internal Quantum drive(s) (278-4025) are NOT being REPLACED and ARE DISABLED.

5. RESTRICTED to TWO-MEGABYTE Main Memory systems ONLY.

Table D-22. Contents of Upgrade Kit UJ-3451 (206-3451) (VS 25/45-1A to VS 45XP-1AN - 289-0240)

WLI PART NUMBER	QUANTITY SUPPLIED	DESCRIPTION AND COMMENTS (SEE NOTE 1)
206-3443	1	One-Megabyte CP5 to CP7 Upgrade (Note 2)
210-9313	1	Internal Disk Drive Device Adapter
220-2059	1	DC Power Cable
220-3331	1	B-Cable, Internal Disk Drive
220-3332	1	A-Cable, Internal Disk Drive
278-4032	1	76-Megabyte Disk Drive (Note 3)
449-0420	2	Locking Guide
452-0308	1	Disk Drive Baseplate
650-3120	2	Screw (Locking Guide Mounting)
650-4080	4	Mounting Screws (Disk Drive Baseplate)
650-6122	2	Flange Screw (Drive to Lower Shelf)

Table D-23. Contents of Upgrade Kit UJ-3453 (206-3453) (VS 25/45-2A to VS 45XP-2AN - 289-0240)

WLI PART NUMBER	QUANTITY SUPPLIED	DESCRIPTION AND COMMENTS (SEE NOTE 4)
206-3452	1	Two-Megabyte CP5 to CP7 Upgrade (Note 2)
210-9313	1	Internal Disk Drive Device Adapter
220-2059	1	DC Power Cable
220-3331	1	B-Cable, Internal Disk Drive
220-3332	1	A-Cable, Internal Disk Drive
278-4032	1	76-Megabyte Disk Drive (Note 3)
449-0420	2	Locking Guide
452-0308	1	Disk Drive Baseplate
650-3120	2	Screw (Locking Guide Mounting)
650-4080	4	Mounting Screws (Disk Drive Baseplate)
650-6122	2	Flange Screw

NOTES TO TABLES D-22 AND D-23

1. RESTRICTED to ONE-MEGABYTE systems equipped with QUANTUM Disk Drives ONLY.

2. See table D-20 for contents of 206-3443.

3. The 76-megabyte disk drive is a tested, 60 Hz, unformatted (new) drive.

4. RESTRICTED to TWO-MEGABYTE systems equipped with QUANTUM Disk Drives ONLY.

D.6.4 EXTERNAL CABLE PART NUMBERS

A large number of external cables are required by the VS-25/45 systems. Cables currently in use and which carry-over to the VS-45XP are listed along with their replacements wherever possible. The assemblies, subassemblies, or end item of use are given in the table D-24. Both external power and signal cables are listed.

Table D-24. External Cable Part Numbers

SOURCE OR ASSEMBLY	CONNECTOR TYPE OR LABEL	CABLE WLI PART NUMBER	CONNECTOR/ DESCRIPTION	DESTINATION OR FUNCTION
External AC Source with Isolated Gnd.	NEMA 5-15IG Power Source Receptacle	420-2010 Ac Power Cord (USA)	220-1867 Power Cord & Filter Assy.	210-8010 Switching Power Supply
270-0702 RCPA	(See Note 1)	220-3309-xx	A-Connector	2280V-x
Early	A-Connector	220-3041-xx	A-Connector	All Others
External Disk	(See Note 2)	220-3031-xx	Daisy-Chains	All Drives
Drive (EDD)	B-Cable	220-3308-xx	B-Connectors	2280V-x
Rear Panel	Connectors	220-3033-xx	B-Connectors	All Others
270-0704 RCPA Serial I/O Rear Panel	BNC Socket TNC Bulkhead (1-Pair Each)	220-0148-A Paired Cables	BNC Socket TNC Bulkhead (1-Pair Each)	External Serial Devices
270-0824 RCPA	RS-449	Not Available	RS-449	IEEE Buss
Single-Port	RS-232/RS-366	421-0031 (2)	RS-232/366	Modems/ACUs
TC Rear Panel	X.21	Not Available	X.21	Euro-Modems
270-0825 RCPA	2ea RS-232	421-0031	RS-232	Modems
Dual-Port TC	2ea RS-366	421-0031	RS-366	ACUs
Rear Panel	2ea X.21	Not Available	X.21	Euro-Modems
270-0910 RCPA Later EDD	A-Cable Connector	220-3358/3360	A-Connector	All External Disk
		220-3361	Daisy-Chains	
Rear Panel	B-Connectors	220-3355/3357	B-Connectors	Drives
272-0042 PCA	Standard	220-0521	Dedicated	Workstation
Asynchronous	RS-232-C	120-2381-xx	RS-232 Lines	Model 2110
Controller Rear Panel	Connectors (Eight-Ports)	220-0113	Fixed Length	RS-232-C to Modem
		220-0219/0220	RS-232 Lines	
(Note 3)	J5	220-3396	J1	EAPA
UISIO Strain	J5	220-3396	J6	OAPA (FWAPA)
Relief Panel	J6	220-3236	J1	19-Ch. Modem

NOTES

1. Cables 220-3308/3309/3031/3033/3041 with suffix of -xx vary in length and drive type. Cables 220-33xx vary in length and usage only.

2. The External Disk Drive (EDD) 270-0702 Rear Connector Panel Assembly (RCPA) is obsolete. Use P/N 270-0910 when replacement is required.

3. An Assembly number for the Modular SIO Subsystem (UISIO) Strain Relief Panel (required when using EAPA and/or OAPAs) has not been assigned.

D.6.5 INTERNAL POWER AND SIGNAL CABLES

The internal power and signal cables used in the VS-45XP are listed in tables D-25 and D-26. The part numbers for the assemblies, subassemblies, or components with which they interface are also listed.

Table D-25. Internal Power Cable Part Numbers

SOURCE OR ASSEMBLY	CONNECTOR TYPE/LABEL	DESTINATION OR FUNCTION	CONNECTOR/ DESCRIPTION	CABLE WLI PART NUMBER
Mainframe Rear Panel Receptacle	Power Cord & Filter Assy. 220-1867	Switching Power Supply SPS-450 PCA 210-8010	J2 AC Power Source Input	(Internal Power Cord) 420-2010
PCA 210-8010 SPS-450XP Power Supply	(J3/J4) J8 (Note 1) (J9/J10/J11)	VS Mainframe Assembly Middle Shelf	Internal AC Mounting Receptacle	Single AC Power Cable 220-1865
AC Internal Mounting Receptacle (Note 2)	Multicable Breakout Connector 220-1869	Diskette Drive	J4	Cable 1
		Fan Assembly	Fan Harness	270-3273
				(Cable 3)
		(See Note 3)	(Not Used)	(Cable 4)
PCA 210-8011 SPS-450XP Dc Voltages Power Source	J5	76 M-Byte Drive	P3	220-2059
	J6	Diskette Drive	J5	220-1864
	J7	Motherboard 210-7907	J28	270-3272
	J8		J29	(Note 4)
PCA 210-8012 Switching Power Supply	J13	(See Note 5)	J28	270-3272
	J6-1	+5V dc Buss	J30 (+5V)	220-0290
	J6-2	+/-0V dc Buss	J31 (+/-0V)	220-0293

NOTES

1. J3, J4, J8, J9, J11, and J12 are parallel ac output connectors. Only one connector will be used.

2. Cable 220-1865 is a single cable from the J8 of the SPS to the ac power internal mounting receptacle.

3. Cables 3 and 4 of the multiconnector breakout cable 220-1869 are only used with the Quantum Disk Drives.

4. Part number 270-3272 is a dc multicable and multi-connector Motherboard wiring harness. It connects two PCAs in the SPS to one connector (J28) at the Motherboard by interconnecting J7 and J13.

5. Connectors J6-1 and J6-2 are opposite sides of an extension to PCA 210-8012 with heavy gauge contacts.

Table D-26. Internal Signal Cable Part Numbers

SOURCE PCA OR DEVICE	CONNECTOR LABEL	DESTINATION OR FUNCTION	CONNECTOR/ DESCRIPTION	CABLE WLI PART NUMBER
210-8599/9599	P1	210-8699	P1	220-3435
Cache/Main	P2	CP7	P2	"
Memory	P3	Central Processor	P3	"
210-8465	J1	8" Diskette Drive	J1	220-3225
Bus	J2	5-1/4" Diskette Dr.	(N/A)	(Not Used)
Processor	J3	210-7913	J1	220-3226
(80286)	J4	Fan Panel Assembly	RS-232	220-3244
210-7906	J2	SIO Rear Panel	BNC/TNC	220-3080
Serial I/O	J3	" " "	"	"
Device	J4	" " "	"	"
Adapter	J5	(270-0704)	"	"
210-7913		Local/Remote Switch	Hardwired	
Front Panel	J2	Keylock Assembly	to Assembly	220-1866
210-8489	J5	EAPA/OAPA (Note 1)	J1/J6	220-3396
UISIO DAC	J6	Global Modem	J1	220-3236
210-9313	J1	76 Megabyte Drive	P1(A-cable)	220-3332
Fixed Disk DA	J2	(See Note 2)	P2(B-cable)	220-3331
External Disk	J1	Cable Assemblies	P1(A-cable)	220-3390
210-9312	J2	from EDD DA to Rear	P2(B-cable)	220-3156
210-9313	J3	Connector Panel	P3(")	"
210-9314	J4	Assembly (Note 3)	P4(")	"
210-9315	J5	(270-0910) (Note 4)	P5(")	"
210-9337	J1	Rear TC Panel	RS449	N/A
(210-8337)	J13	" " "	X.21	N/A
"	J2	" " "	RS232	220-3244
"	J3	(270-0824) (Note 4)	RS366	220-3244
"	J4	Front TC Panel	Display	220-3247
210-9637	J2A & J2B	Rear TC Panel	2 ea RS232	220-3244
(210-8637)	J3A & J3B	" " "	" " RS366	220-3244
"	J13A/J13B	(270-0825) (Note 4)	" " X.21	N/A
"	S1 & S2	Front TC Panel	" " Display	220-3012
210-9355	J1	RS-232-C	J10	(Not Used)
(210-7955)	J2	Rear Panel Subassy.	J1	220-3413
RS-232-C	J3	(272-0042) with	J2	"
Asynchronous	J4	Driver/Receiver PCA	J3	"
DAC (Note 5)	J5	(210-8324) Attached	J4	"

NOTES

1. Electrical and/or Optical Active Port Assemblies are mounted in the VS Small Cable Concentrator.

2. The Internal Disk Drive DA may be any multiport DA (210-83xx/93xx). Only Port-0 will be recognized.

3. Early VS-25/45s may have been equipped with the External Disk Drive (EDD) WLI P/N 270-0702 RCPA which used A-Cable WLI P/N 220-3158.

4. Four-megabyte systems require 210-9xxx series DAs.

D.6.6 VS-45XP COMPUTER SYSTEM MAINFRAME ASSEMBLY AND SUBSYSTEMS

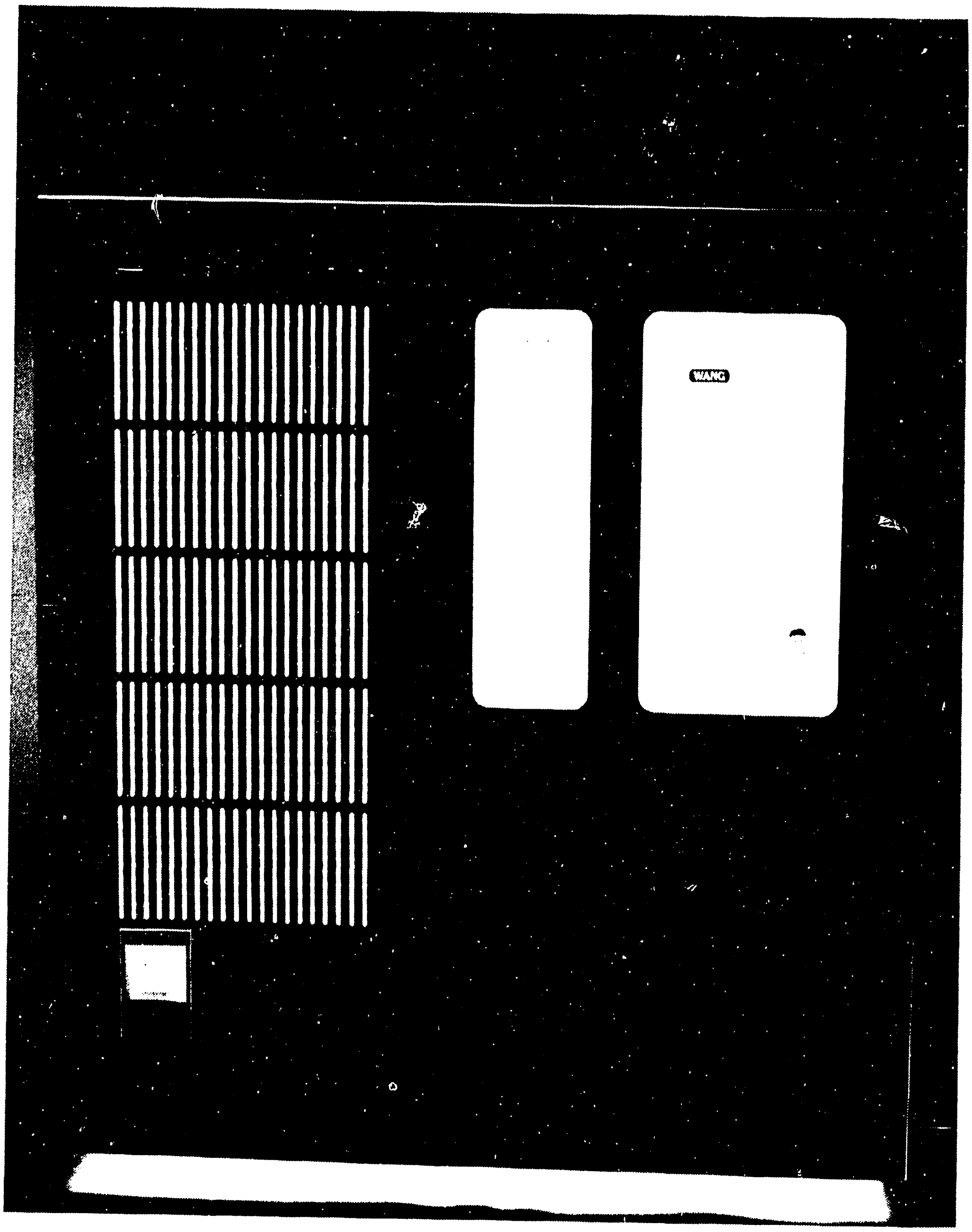


Figure D-13. VS-45XP Computer System

MAINFRAME CABINET AND SUBASSEMBLIES (VS-SN2)

ITEM	WLI PART NUMBER	ASSEMBLY/ SUBASSEMBLY COMPONENT DESCRIPTION
1	458-1095	FRONT PANEL (Weldment)
2	660-0809	SOUND ATTENUATOR, Front Panel (Located Behind Dashed Area)
3	458-1471	FRONT CONTACT STRIP (2 each)
4	458-1470	CONTACT STRIP RETAINER (2 each)
5	449-0579	SWITCH BEZEL
6	660-0817	DUST FILTER
7	458-3096	RIGHT SIDE PANEL (Weldment)
8	654-2139	CONTACT, FINGER STRIP (16" Clip-On; 4 each)
9	650-6122	FLANGE SCREW (Whiz-Lock; 10-32 x 3/8"; 28 additional)
10	452-2709	CABINET STIFFNER
11	458-3093	MIDDLE SHELF (Weldment)
12	660-1043	SOUND ATTENUATOR (4.5" x 14")
13	660-1045	SOUND ATTENUATOR (6" x 14" with Cutout)
14	660-1044	SOUND ATTENUATOR (5" x 14")
15	451-2642	AC RECEPTACLE MOUNT/COVER
15 a	220-1865	AC CABLE (Power Supply to Mounting Receptacle) (Not Shown)
15 b	220-1869	AC MULTICONNECTOR BREAKOUT CABLE (Not Shown)
16	410-0136	MULTIVOLTAGE ISOLATION TRANSFORMER, 50/60 Hz
17		LOCKING GUIDE SLOT (For Drive Mounting Plate - On Baseplate)
18	452-4322	BASEPLATE (Mainframe)
19	458-3095	LEFT SIDE PANEL (Weldment)
20	655-0195	CASTERS (2.5" Black Nylon; 4 Positions, 3 Not Shown)
21	451-5129	POWER SUPPLY BRACKET (2 each; On Baseplate)
22	458-3022	POWER SUPPLY CARRIER
23	655-0032	LEVELING GUIDES (Titan; 2-1/2"; Large Stud; 2 Positions)
24	650-6122	FLANGE SCREW (SPS Retainer; 5/16" Hex Head; 10-32 x 3/8")
25	270-1068	SPS-450XP SWITCHING POWER SUPPLY
26	449-0229	LATCH MOLDING PAD (2 Positions)
27	650-6201	FLANGE SCREW (Whiz-Lock; 10-32 x 5/8"; 2 Shown)
28	650-4080	MOUNTING SCREW (Disk Drive Baseplate; 8-32 x 1/4"; 4 each)
29	278-4032	76-MEGABYTE FIXED-DISK DRIVE (Tested; With 3 Volt Supply; 60Hz)
30	650-6122	FLANGE SCREW (Whiz-Lock; 10-32 x 3/8"; 2 each)
31	452-0308	DISK DRIVE BASEPLATE (76-Megabyte; Internal Mounting)
32	449-0420	LOCKING GUIDE (Black Nylon; 2 each)
33	650-3120	SCREW (Locking Guide; Pan Head, Phillips; 6-32 x 3/8"; 2 each)
		279-4090 - TOP COVER ASSEMBLY (VS-SN2)
34	458-3087	TOP COVER (Weldment)
35	458-1479	CONTACT STRIP (Anti-Static; 4 each)
36	651-0273	SNAP-ON, RECP (No. 4; 2 each)
37	615-3286	VS-45XP MODEL TAG
38	650-3120	SCREW (Pan Head, Phillips; 6-32 x 3/8"; 4 positions)
39	458-2059	TOP COVER STOP (Part of 458-3087)
40	660-1041	SOUND ATTENUATOR (21" x 7"; 2 positions)
41	660-1042	SOUND ATTENUATOR (21" x 5")

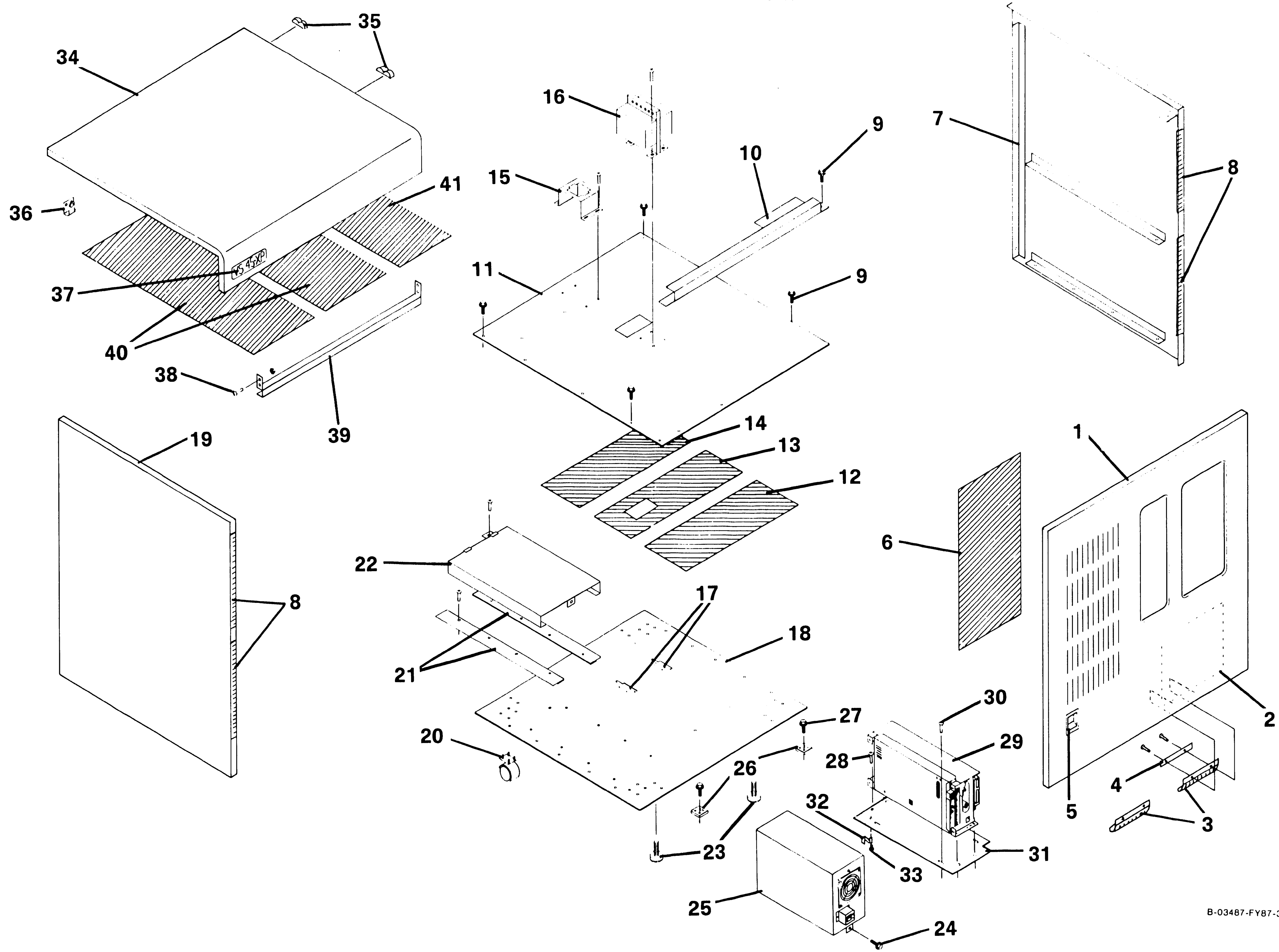


Figure D-14. MAINFRAME CABINET AND SUBASSEMBLIES (FRONTAL VIEW)
(VS-SN2 CABINET ASSEMBLY PART NUMBER 279-4146)

FRONT CONTROL PANEL SUBASSEMBLY AND COMPONENTS (VS-SN2)

ITEM	WLI PART NUMBER	ASSEMBLY/ SUBASSEMBLY COMPONENT DESCRIPTION	
1	452-2248	DEAD FRONT PANEL (Silk-Screened)	
2	220-1866	LOCAL/REMOTE KEYLOCK SWITCH ASSEMBLY	
3	451-3642	DISKETTE AND TELECOMMUNICATION PANEL	
4	220-3226	34-PIN RIBBON CABLE (Front Panel PCA to Bus Processor)	
5	210-7913	FRONT PANEL PRINTED CIRCUIT ASSEMBLY	
6	650-2160	SCREW (Pan Head, Phillips; 4-40 x 1/2"; 4 each; 3 Not Shown)	
7	615-1969	LABEL, TC CONTROL PANEL BRACKET	(See Note)
8	449-0672	TC CONTROL PANEL BRACKET	(See Note)
9	615-1970	BLANK LABEL, TC CONTROL PANEL BRACKET (6 maximum)	
10	449-0673	BLANK TC CONTROL PANEL BRACKET (6 maximum)	
11	652-0032	LOCKNUT, KEPS (6-32; 2 per Bracket; 12 each)	
12	210-7865	TCB-1 LIGHT BOARD PRINTED CIRCUIT ASSEMBLY	(See Note)
13	220-3247	CABLE, FRONT TC PANEL (To 210-9337-A PCA) OR	
	220-3012	CABLE, FRONT TC PANEL (To 210-9637-A PCA)	
14	653-2001	No. 4 FLAT WASHER (1/8" ID x 1/4" OD; 4 each)	(See Note)
15	651-0027	SCREW (Self-Tap, Pan Head, Phillips; No. 4 x 3/8"; 4 each)	(See Note)
16	451-4949	BRACKET, DISKETTE (Upper Diskette Drive Retainer Mount)	
17	652-4005	NUT, SMALL PATTERN (8-32; 2 Positions, 1 Not Shown)	
18	653-4003	WASHER, FLAT (No. 8; 3/16" x 7/16" x 3/64")	
19	650-4135	SCREW (Pan Head, Phillips; 8-32 x 3/8")	
20	278-4028	DISKETTE DRIVE (8-Inch; 1-Megabyte; DSDD; Tested; 60 Hz)	
21	220-1869	AC MULTICONNECTOR BREAKOUT CABLE (Cable Number 1)	
22	220-3225	50-PIN RIBBON CABLE (Diskette Drive to Bus Processor)	
23	220-1864	DC CABLE/HARNESS ASSEMBLY (Diskette Drive)	
24	650-6122	FLANGE SCREW (Whiz-Lock; 10-32 x 3/8"; 5 each)	
25	452-0297	MAINFRAME MOUNTING PLATE (Diskette Drive)	
26	452-0190	MOUNTING (BASE) PLATE (Diskette Drive)	
27	650-4135	SCREW (Pan Head, Phillips; 8-32 x 3/8"; 3 each)	
28	650-3120	SCREW (Pan Head, Phillips; 6-32 x 3/8"; 1 each)	
29	449-0420	LOCKING GUIDE (Black Nylon)	
30	652-0029	LOCKNUT KEPS (8-32; 2 each)	

NOTE: Part of Telecommunication Front Panel Assembly - 270-0814 (One Per Port)

ILLUSTRATED PARTS BREAKDOWN

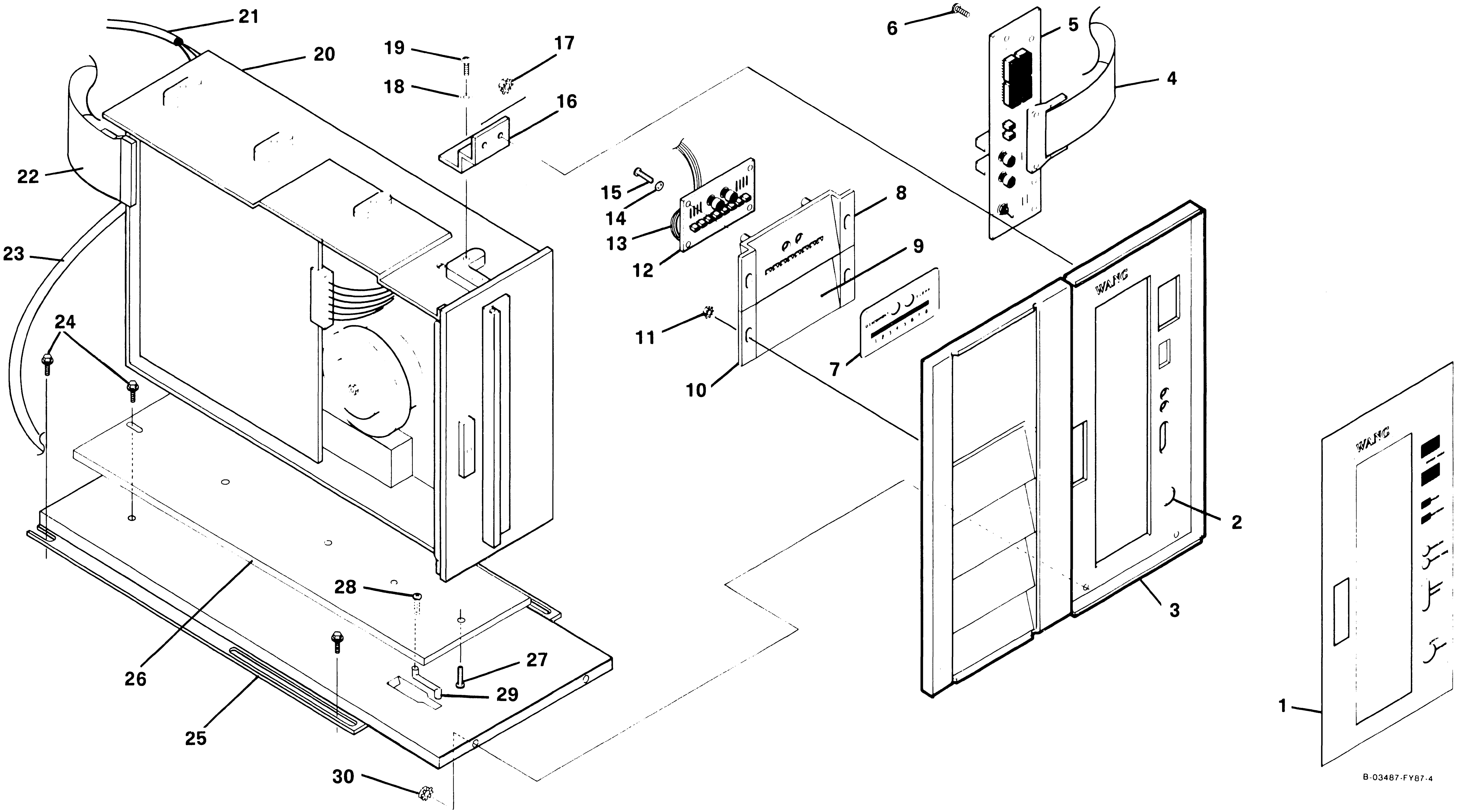


Figure D-15. MAINFRAME FRONT PANEL SUBASSEMBLIES AND COMPONENTS (VS-SN2)
(ASSEMBLY PART NUMBER NOT ASSIGNED)

279-0522 - MAINFRAME CARD CAGE ASSEMBLY (VS-SN2)

ITEM	WLI PART NUMBER	ASSEMBLY/ SUBASSEMBLY COMPONENT DESCRIPTION	
1	458-1075	CARD CAGE END (Left Hand Side)	
2	465-1237	CARD GUIDE (Nylon; 7 inch; 36 each)	
3	615-1948	CARD LOCATOR MARKER STRIP	
4	650-6122	FLANGE SCREW (Whiz-Lock; 10-32 x 3/8"; 12 each)	
5	452-2702	CARD CAGE STIFFNER (2 each)	
6	458-1076	CARD CAGE END (Right Hand Side)	
7	650-3100	SCREW (Pan Head, Phillips; 6-32 x 5/16"; 2 positions)	
8	449-0420	LOCKING GUIDE (Black Nylon; 2 each)	
9	451-1274	MOTHERBOARD BASE	
10	449-0398	MOTHERBOARD SPACE BLOCK (5 each)	
11	650-6201	FLANGE SCREW (Whiz-Lock; 10-32 x 5/8"; 2 each)	
12	652-0020	FLANGE NUT (Whiz-Lock; 1/4-20; 4 each, 2 per screw)	
12 a	650-9013	FLANGE SCREW (Whiz-Lock; 1/4-20 x 1/2"; 2 each)	(Not Shown)
13	220-0293	+/-0 VOLT BUSS CABLE (Black, No. 6, 75 Amperes)	
14	220-0290	+5.0 VOLT BUSS CABLE (Black, No. 6, 75 Amperes)	
15	451-2640	COVER, DC (5V dc Buss Terminals - Not Shown)	
16	651-0022	SCREW, SELF-TAP (Pan Head; No. 4 x 5/16"; 30 each)	
17	270-3272	DC MULTICABLE HARNESS (Power Supply to Motherboard)	
18	210-9599-A	ONE-MEGABYTE CACHE/MAIN MEMORY PCA	
(18 A)	210-9599-1A	TWO-MEGABYTE CACHE/MAIN MEMORY PCA	(See Note)
(18 B)	210-9599-2A	FOUR-MEGABYTE CACHE/MAIN MEMORY PCA	(See Note)
19	220-3435	JUMPER CABLE, MAIN MEMORY TO CP7 PCA (3 each)	
20	210-8699	CP7 (32-BIT) CENTRAL PROCESSOR PCA (Intel 80286)	
21	210-8465	32-BIT BUS PROCESSOR PCA (Intel 80286)	
(22 A)	210-9313	TWO-PORT EXTERNAL DISK DRIVE DA PCA	(See Note)
22	210-9315	FOUR-PORT EXTERNAL DISK DRIVE DA PCA	(I/O DA1)
23	210-9313	76-MEGABYTE INTERNAL DISK DRIVE DA PCA	(I/O DA2)
24	210-9355	EIGHT-PORT RS-232-C ASYNCHRONOUS DAC PCA	(I/O DA3)
25	210-7906	32-PORT SERIAL INPUT/OUTPUT DEVICE ADAPTER PCA	(I/O DA4)
(25 A)	210-8489	32-PORT UNIVERSAL INTELLIGENT SERIAL I/O PCA	(See Note)
26	210-9637	DUAL-PORT TELECOMMUNICATION DAC PCA	(I/O DA5)
27	210-9337	SINGLE-PORT TELECOMMUNICATION DAC PCA	(I/O DA6)
28	210-7907	MOTHERBOARD PRINTED CIRCUIT ASSEMBLY	

NOTE: Alternate Printed Circuit Assembly - See Table D-8 for Alternate Configurations

ILLUSTRATED PARTS BREAKDOWN

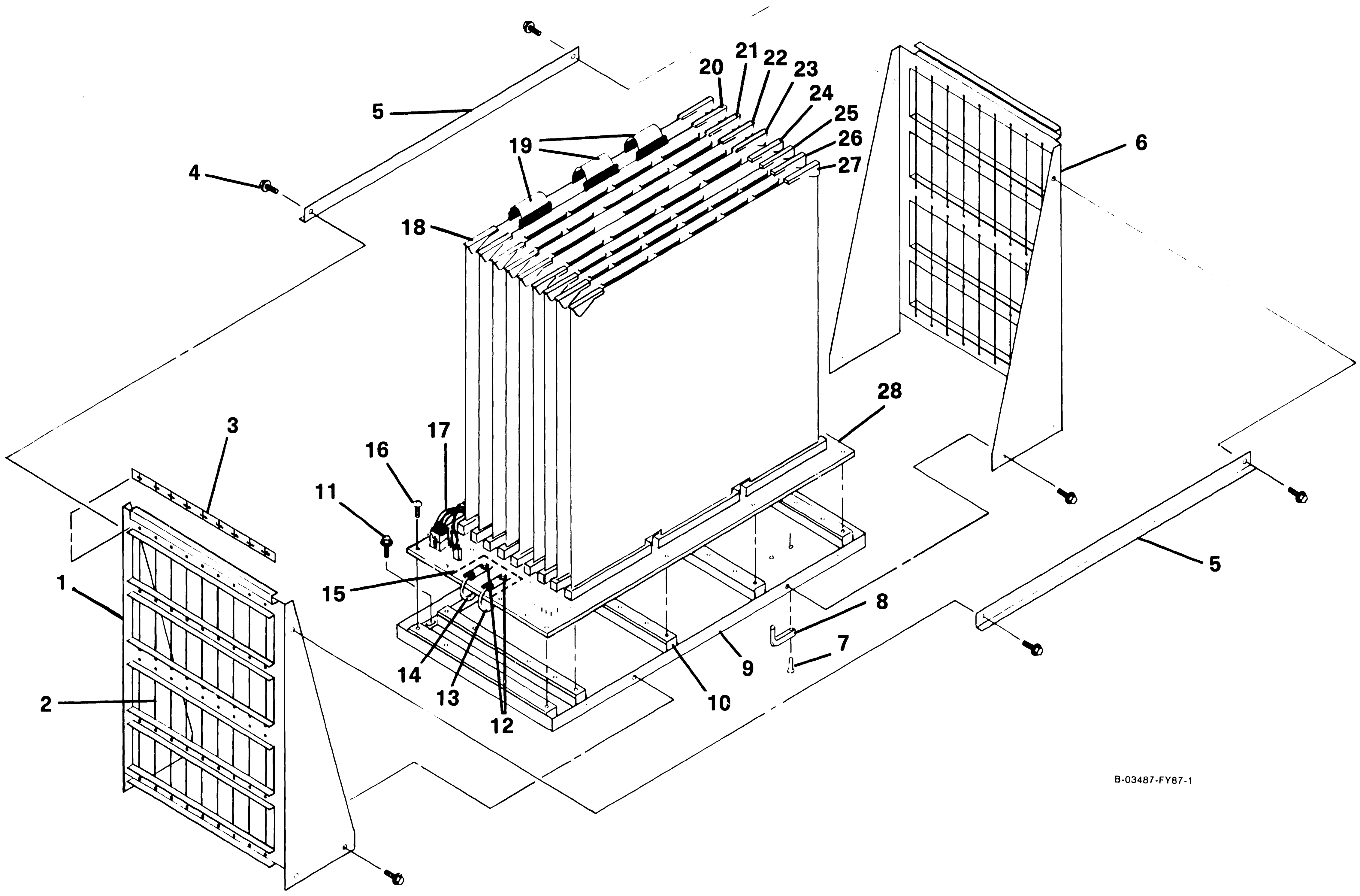


Figure D-16. MAINFRAME CARD CAGE ASSEMBLY
(ASSEMBLY PART NUMBER 279-0522)

MAINFRAME CABINET REAR PANEL ASSEMBLIES AND SUBASSEMBLIES

ITEM	WLI PART NUMBER	ASSEMBLY/ SUBASSEMBLY COMPONENT DESCRIPTION
		270-0880 - FAN PANEL ASSEMBLY
1	451-0529	FAN COWL
2	652-6002	LOCKNUT, KEPS (10-32; 2 each)
3	220-3244	CABLE ASSEMBLY AND CONNECTOR (Remote Diagnostic TC)
4	652-2005	LOCKNUT KEPS (4-40; 2 each; one shown)
5	452-4563	FAN PLATE (Silk-Screened)
6	400-1013-1	TUBEAXIAL FAN, 70 CFM, 50/60 Hz (2 each)
6 a	270-3273	FAN HARNESS ASSEMBLY (Not Shown)
7	652-0032	LOCKNUT, KEPS (6-32; 12 each)
8	653-3000	WASHER (No. 6; 12 each)
9	400-1003-1	TUBEAXIAL FAN, 100 CFM, 50/60 Hz
10	650-3280	SCREW, FAN/COWL, (Pan Head, Phillips; 6-32 x 7/8"; 8 each)
11	478-0835	STANDOFF M/F HEX (4-40 x L44, 2 each)
12	420-1040	LOOP-BACK TESTER (RS-232-C; Molded Connector)
13	400-9016	FAN GUARD, (4-1/2", 3 each)
14	650-3240	SCREW, FAN/GUARD, (Pan Head, Phillips; 6-32 x 3/4"; 4 each)
		MAINFRAME REAR PANEL SUBASSEMBLY (VS-SN2)
15	655-0055	RED CAP PLUG (0.125" O.D.; 9 each)
16	452-4135	CABLE GUIDE
17	651-0228	DZUS SNAP-RING RETAINER (No. 4; 2 each)
18	458-3092	MAINFRAME REAR PANEL (Weldment)
19	651-0224	DZUS STUD (Oval Head; No. AJ-450; 2 positions)
20	650-6201	FLANGE SCREW (Whiz-Lock; 10-32 x 5/8"; 19 positions)
21	220-1867	INTERNAL POWER CORD WITH FILTER ASSEMBLY
22	650-3169	PARKERIZED SCREW (Truss Head, Phil; 6-32 x 1/2"; 1 each)
23	654-1253	CABLE CLAMP (5/16"; 1 each)
24	650-3132	PARKERIZED SCREW (Truss Head, Phil; 6-32 x 3/8"; 2 each)
25	420-2010	EXTERNAL AC POWER CORD (Black; #14; M/F Connectors; 6.5')

MAINFRAME REAR CONNECTOR PANEL ASSEMBLIES AND SUBASSEMBLIES

ITEM	WLI PART NUMBER	ASSEMBLY/ SUBASSEMBLY COMPONENT DESCRIPTION
26	270-0704	EIGHT-PORT BNC/TNC SERIAL INPUT/OUTPUT (4 each)
26 a		BNC/TNC CONNECTOR PAIRS (8 Pairs Attached to Cable 220-3080)
26 b	220-3080	FLAT CABLE, (34-Pin Connector; Part of 270-0704) (Not Shown)
27	272-0061	STRAIN RELIEF PANEL (Used with Small Cable Concentrator)
27 a		STRAIN RELIEF CLAMP (Used with APA's and P-Band Modem Cables)
28	452-2391	BLANK REAR PANEL, HALF-PANEL (Half Plate)
28 a	452-2394	BLANK REAR PANEL, FULL-PANEL (Full Plate) (Not Shown)
29	270-0825	DUAL-PORT TELECOMMUNICATION (See Items 33 through 36)
30	270-0824	SINGLE-PORT TELECOMMUNICATION (See Items 32 through 36)
31	650-6124	PARKERIZED SCREW (Pan Head, Phillips; 10-32 x 3/8"; 4 each)
32	458-1228	PLATE, CONNECTOR FILLER (Large; RS-449)
32 a		RS-449 CONNECTOR (Not Shown or Supplied)
33	220-3244	RS-232-C CONNECTOR (Part of Cable Assembly 220-3244)
34	615-2702	AUTOMATIC CALLING UNIT (ACU) LABEL
35	220-3244	RS-366 ACU CONNECTOR (Part of Cable Assembly 220-3244)
36	458-1227	PLATE, CONNECTOR FILLER (Small; X.21)
36 a		X.21 INTERFACE CONNECTOR (Not Shown or Supplied)
37	270-0910	FOUR-PORT EXTERNAL DISK DRIVE
38		GROUND STRAP/STRAIN RELIEF CLAMP (B-Cable; 4 each)
39	220-3156	B-CABLE AND CONNECTOR (Part of Assy 270-0910; 4 each from DA)
40	220-3390	A-CABLE AND CONNECTOR (Part of Assembly 270-0910; from DA)
41		GROUND STRAP/STRAIN RELIEF CLAMP (A-Cable)
42	272-0047	RS-232-C ASYNCHRONOUS REAR CONNECTOR PANEL ASSEMBLY
43		PLATE, CONNECTOR FILLER (Parallel Printer Port)
43 a		PARALLEL PRINTER CONNECTOR (Discontinued and Not Shown)
44	350-0525	RS-232-C CONNECTOR (Part of PCA 210-8323-1; 8 each)

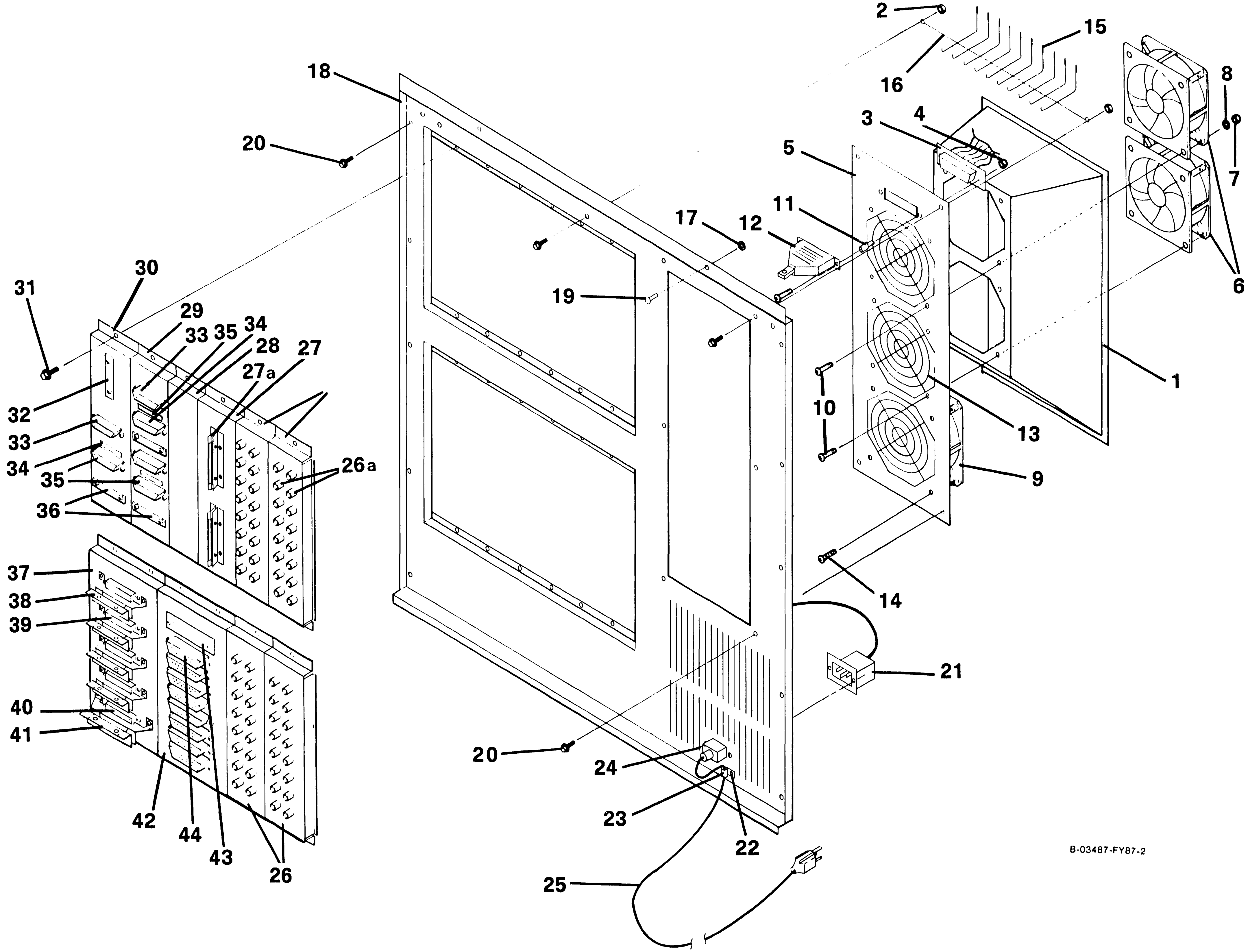


Figure D-17. MAINFRAME CABINET REAR PANEL ASSEMBLIES AND SUBASSEMBLIES (ASSEMBLY PART NUMBERS AS REFERENCED)

D.7 TROUBLESHOOTING

Refer to the VS-65 Preventive Maintenance Manual, Chapter 8, Trouble-shooting, and Appendix B for a complete listing of the Self-Test Diagnostic Four-Character Error Codes. Specific information regarding the Modular SIO Subsystem can be found in Appendix C. The Troubleshooting Flowcharts (figures D-18A through D-18E are correct for the VS-45XP. However, the diskette(s) version of the Off-Line Diagnostics (eight inch diskettes) were not available, and part number were not supplied. When the diskette(s) are released, use the appropriate diskette(s) to troubleshoot the system per CP7 specific procedures.

D.8 SCHEMATICS

Schematics for the VS-45XP Computer System are not provided with this PUB.

VS-45XP CUSTOMER ENGINEERING LEVEL TROUBLESHOOTING FLOWCHART (1 of 5)

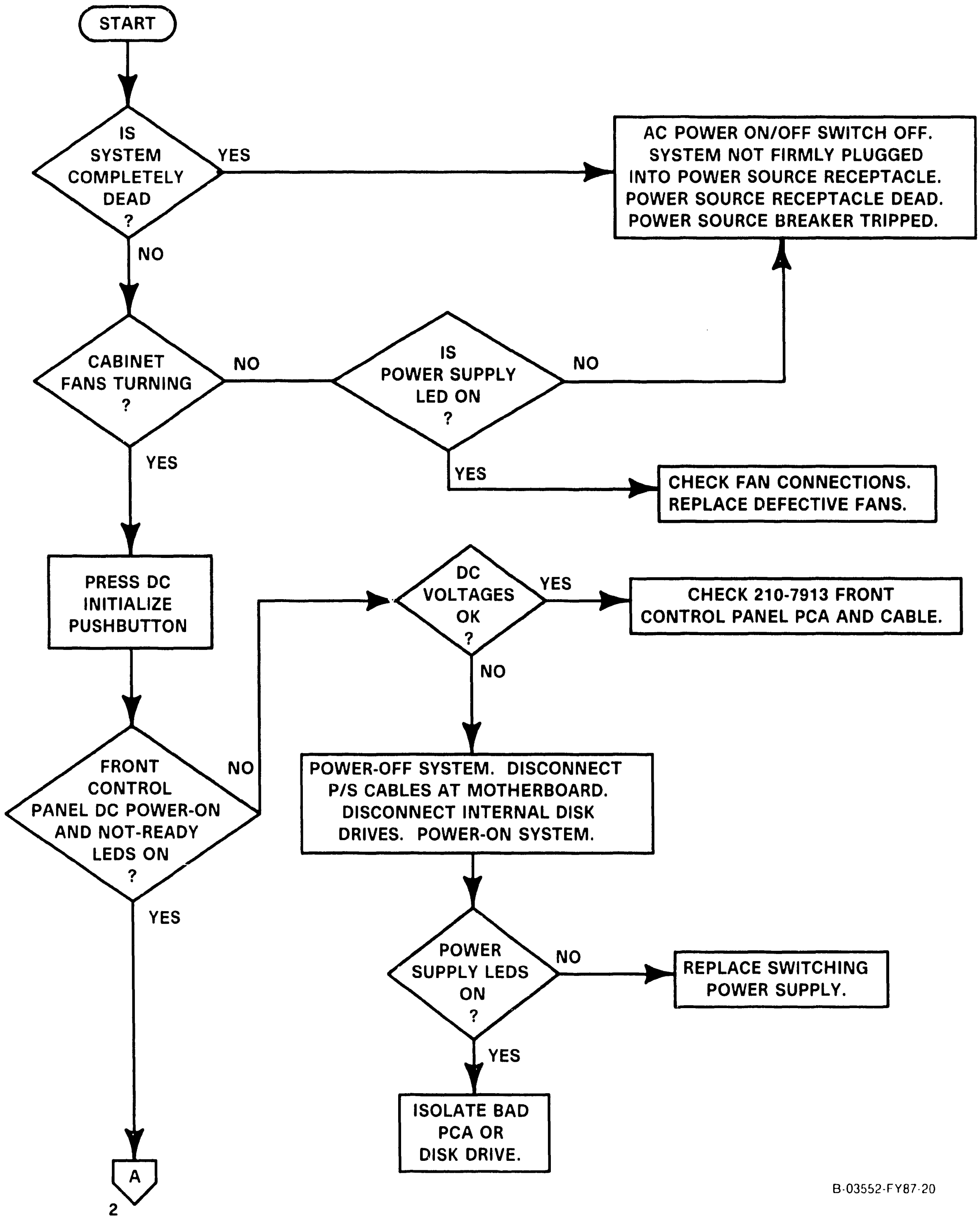


Figure D-18A. Customer Engineering Level Troubleshooting Flowchart

VS-45XP CUSTOMER ENGINEERING LEVEL TROUBLESHOOTING FLOWCHART (2 of 5)

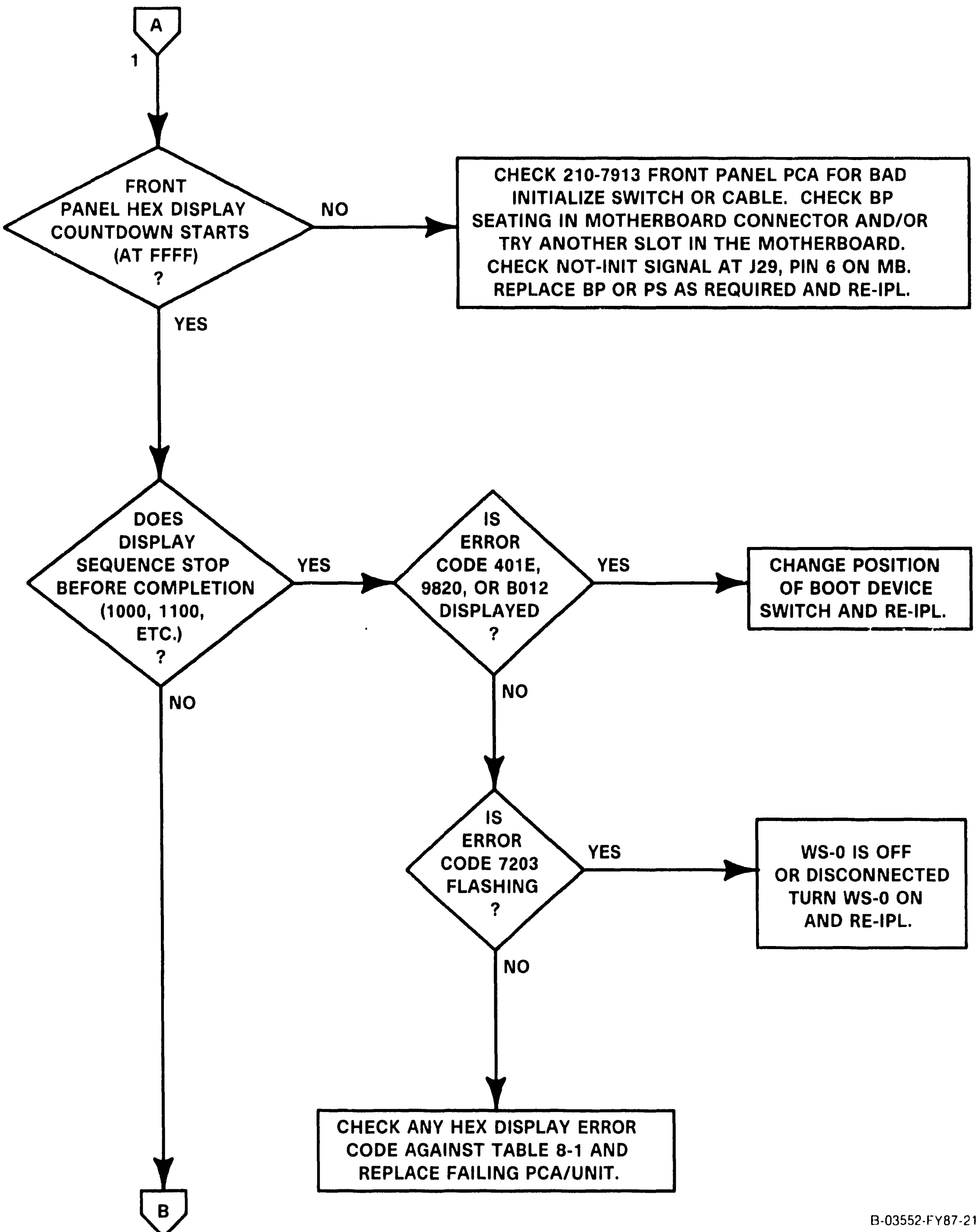


Figure D-18B. Customer Engineering Level Troubleshooting Flowchart

VS-45XP CUSTOMER ENGINEERING LEVEL TROUBLESHOOTING FLOWCHART (3 of 5)

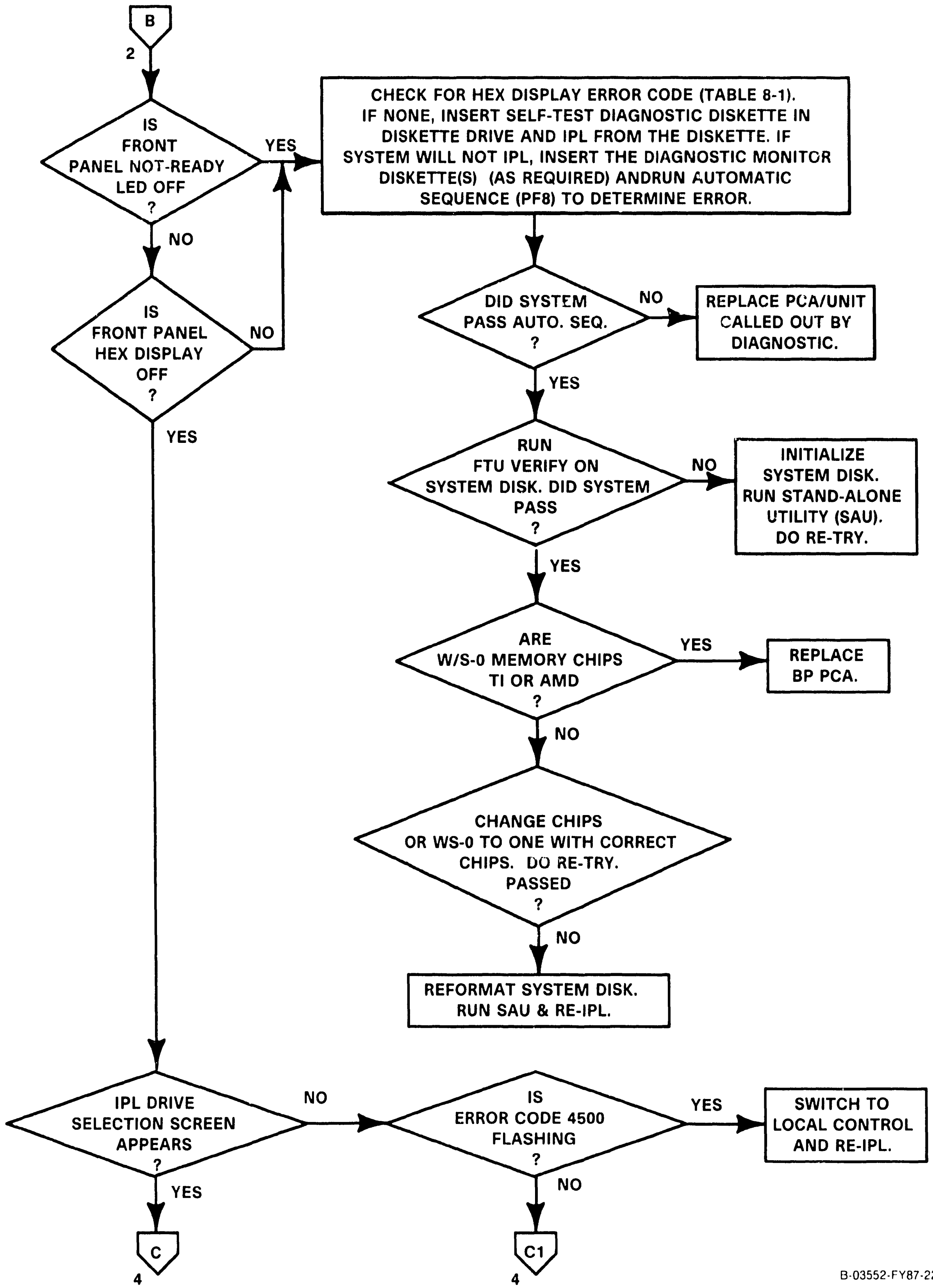


Figure D-18C. Customer Engineering Level Troubleshooting Flowchart

VS-45XP CUSTOMER ENGINEERING LEVEL TROUBLESHOOTING FLOWCHART (4 of 5)

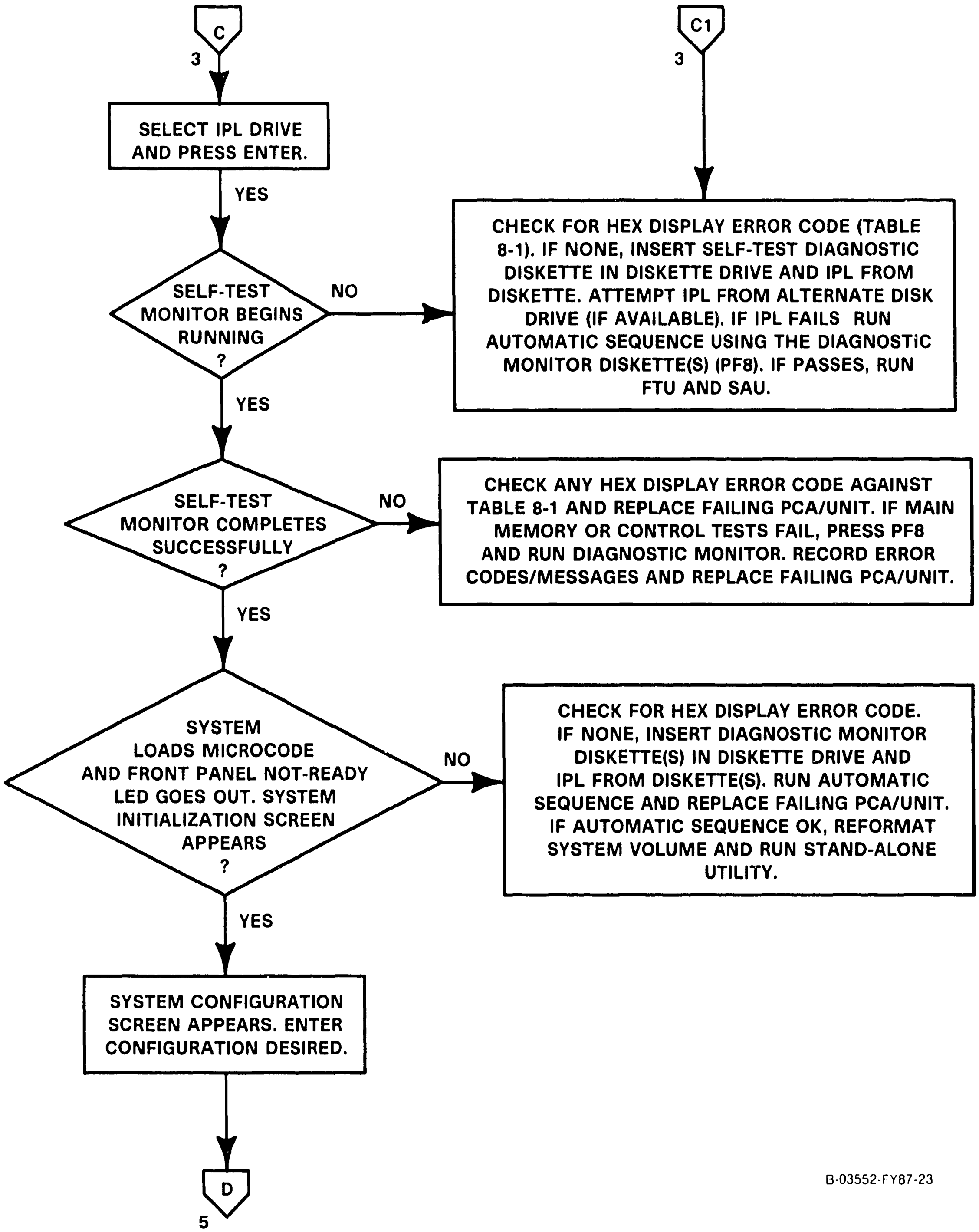


Figure D-18D. Customer Engineering Level Troubleshooting Flowchart

VS-45XP CUSTOMER ENGINEERING LEVEL TROUBLESHOOTING FLOWCHART (5 of 5)

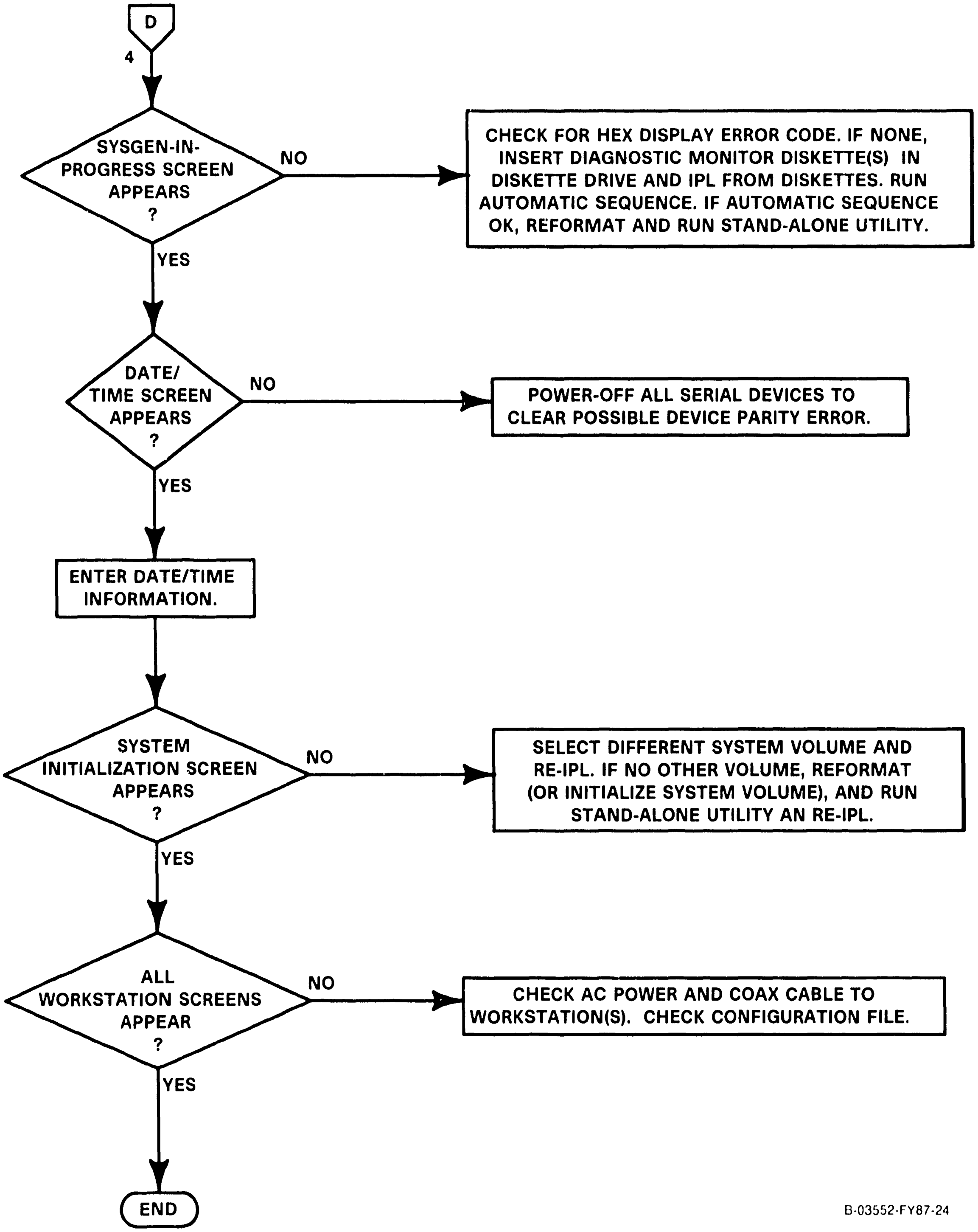


Figure D-18E. Customer Engineering Level Troubleshooting Flowchart

APPENDIX E
ENHANCED ASYNCHRONOUS DEVICE CONTROLLER (EADC)

APPENDIX E
ENHANCED ASYNCHRONOUS DEVICE CONTROLLER (EADC)

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APPENDIX E

VS-65 ENHANCED ASYNCHRONOUS DEVICE CONTROLLER

(A MODULAR SUBSYSTEM FOR VS SMALL SYSTEMS)

E.1 INTRODUCTION

This appendix describes the Model 25V36AE Eight-Port Enhanced Asynchronous Device Controller (EADC). The EADC is a modular communications subsystem designed for use in existing VS CP5 and CP7 family computers that will allow customers to use non-intelligent asynchronous terminals (ie: Wang 2110, DEC VT100) to communicate with a VS Host over RS-232-C lines. The intelligence for the terminals resides on hardware modules located on the device controller within the VS Host. This interface arrangement allows Wang Intergrated Information Processing (IIP) services (i.e., Wang Word Processing systems, Wang Office, PACE, Wang data processing applications) to run through a communication channel such as a null modem cable; an RS-232 connection through a digital PBX using data modules; a data switch like Micom; an Ungermann Bass RS-232 type network; or dial-up through the public network using modems. Communication between the terminal and host will be at transmission speeds from 1200 to 19.2K bps.

The hardware is comprised of the EADC motherboard which is a single slot device adapter PCB that plugs into the VS system bus, eight Z80 Terminal Module boards that plug into the EADC motherboard, a back panel assembly, and two interconnecting ribbon cables. The EADC motherboard handles the controller to the VS bus interaction while each of the Z80 Terminal Module boards (T-Modules) emulate the electronics of an intelligent workstation. Line Drivers on the EADC motherboard provide signals meeting RS-232-C specifications at direct connect distances of up to 2000 feet.

The 8-Port EADC is an enhanced version of the existing Wang Asynchronous Device Controller (ADC). Each of the 8 ports on the EADC can be independently configured to support workstations/printers that will be able to access all current data base, application, and program development software including that which loads microcode into the workstation. Four EADC microcode files are included with the VS Operating System for workstation controller software and printer support. Each port can be configured as either a "2256A" (for workstation support); or a "PM017E", "PM015E", or "PM019E" (for printer support). EADC ports cannot be configured to use General Async (TC) protocol. The existing ADC can be configured for "2210" or "TC" when GENEDIT is run but protocols for the ADC can not be mixed on a given controller. Also, microcode can not be loaded to the ADC. Some major software functions of the EADC are:

- Full access into VS IIP applications
- 3270 Bisync and SNA emulation
- WP and DP print capability
- Security (Auto-logoff)
- Integrity of WP documents

The EADC will support any Wang certified ANSI terminals adhering to X3.64 standards (ie 2110, 2110A, VT100/200s). Printer support will include:

- PM019 - 180 cps color NEC Pin Writer
- PM015 - 40 CPS JUKI daisy
- PM017 - 400 cps matrix (for DP use only)

Included in this appendix is information on the operation, installation, maintenance, and troubleshooting of the EADC. A list of Field Replaceable Units (FRUs) is supplied, and a functional description of the modular communition subsystem is provided.

E.1.1 APPLICABLE DOCUMENTATION

Documentation related to the application and/or use of the EADC may be found under the appropriate Class Code(s) in the Wang Technical Documentation Catalog/Index (WLI P/N 742-0000). The Catalog/Index gives a complete listing of Customer Engineering technical documentation. The Wang Corporate Resource Catalog (WLI P/N 700-7647) identifies additional product documentation including customer user's guides and configuration guides for the various EADC application/hardware supported.

E.2 HARDWARE DESCRIPTION

The operation of the Model 25V36AE EADC modular subsystem is controlled by an 80186 Microprocessor on the EADC motherboard (210-8633) which supervises the eight T-Modules (210-8618) that are surface mounted onto the motherboard. Each T-Module is the equivalent of an intelligent workstation (minus the keyboard and display) and contains a Z80 Microprocessor plus memory. The motherboard thus functions as an intelligent controller to the VS host and the T-Modules function as the intelligence for remotely located "dumb" terminals which communicate with the T-Modules over an RS-232-C connection using the Wang asychronous protocol. (This asychronous communication should not be confused with the Wang "General Asynch" application product).

The EADC subsystem working with the VS host allows the eight remote "dumb" workstations/printers to function concurrently in Data Processing (DP) and/or Word Processing (WP) modes. Each T-Module serves an RS-232-C port via drivers located on the EADC motherboard (which plugs into the VS system bus). The VS host may have up to a maximum of three 25V36AE EADC assemblies installed.

The eight RS-232-C ports are accessed through two 50-pin interconnecting cables to the Rear Connector Panel Assembly (RCPA) which is a common screw mounted panel that attaches to an available 1/2 panel slot on the rear of the VS Host.

All active components are contained on the EADC printed circuit assembly and the surface modules; there is no active logic on the RCPA. The EADC modular subsystem is made up of the following printed circuit assemblies.

E.2.1 ENHANCED ASYNCHRONOUS DEVICE CONTROLLER (EADC)

The EADC motherboard (WLI P/N 210-8633) is a standard size single slot VS PCB which serves as a motherboard to eight surface mounted T-Modules. In "GENEDIT", it is configured as one logical device. It is microprocessor controlled (see figure E-1) and uses multilayer technology. It includes the RS-232-C line drivers, and a seven-segment error code HEX Display. The EADC motherboard with the eight T-Modules comprise an EADC assembly (WLI P/N 210-8633) which is a Field Replaceable Unit (FRU). The motherboard cannot be ordered separately.

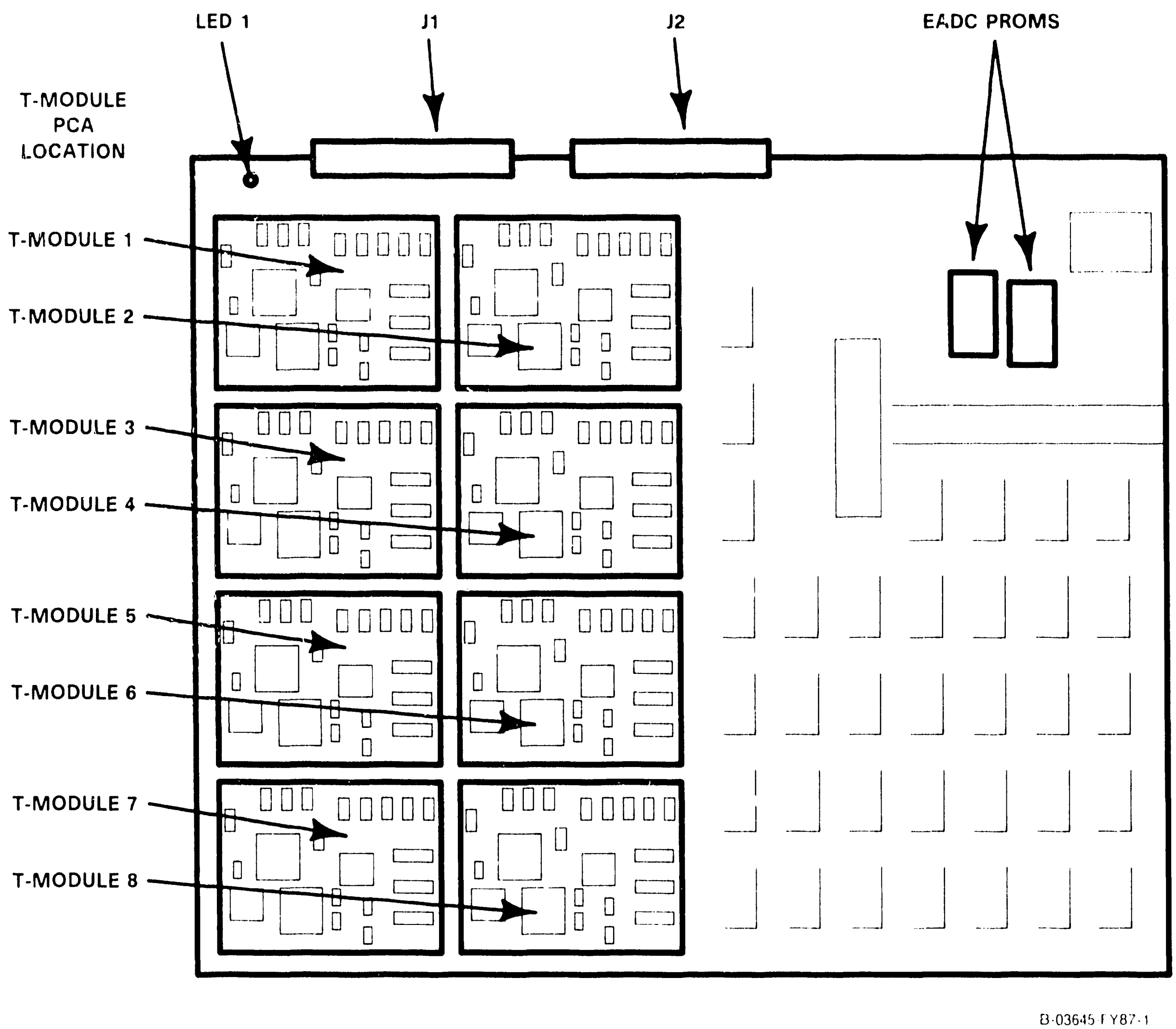


Figure E-1. Enhanced Asynchronous Device Controller (with T-Modules)

E.2.2 TERMINAL EMULATION MODULE (T-MODULE)

The Terminal Emulation Module (WLI P/N 210-8618) is a newly designed 3-1/4 inch x 4-inch multilayer printed circuit assembly (see figure E-2) which uses spring-loaded contact strips on the EADC motherboard to make electrical connection with solid contacts on the bottom of each T-Module. The microprocessor-controlled T-Module PCAs are mounted using six screws and threaded standoffs for easy removal and replacement. Eight T-Modules, one for each port, are mounted on the EADC printed circut assembly and the placement indexing can be determined from figure E-2.

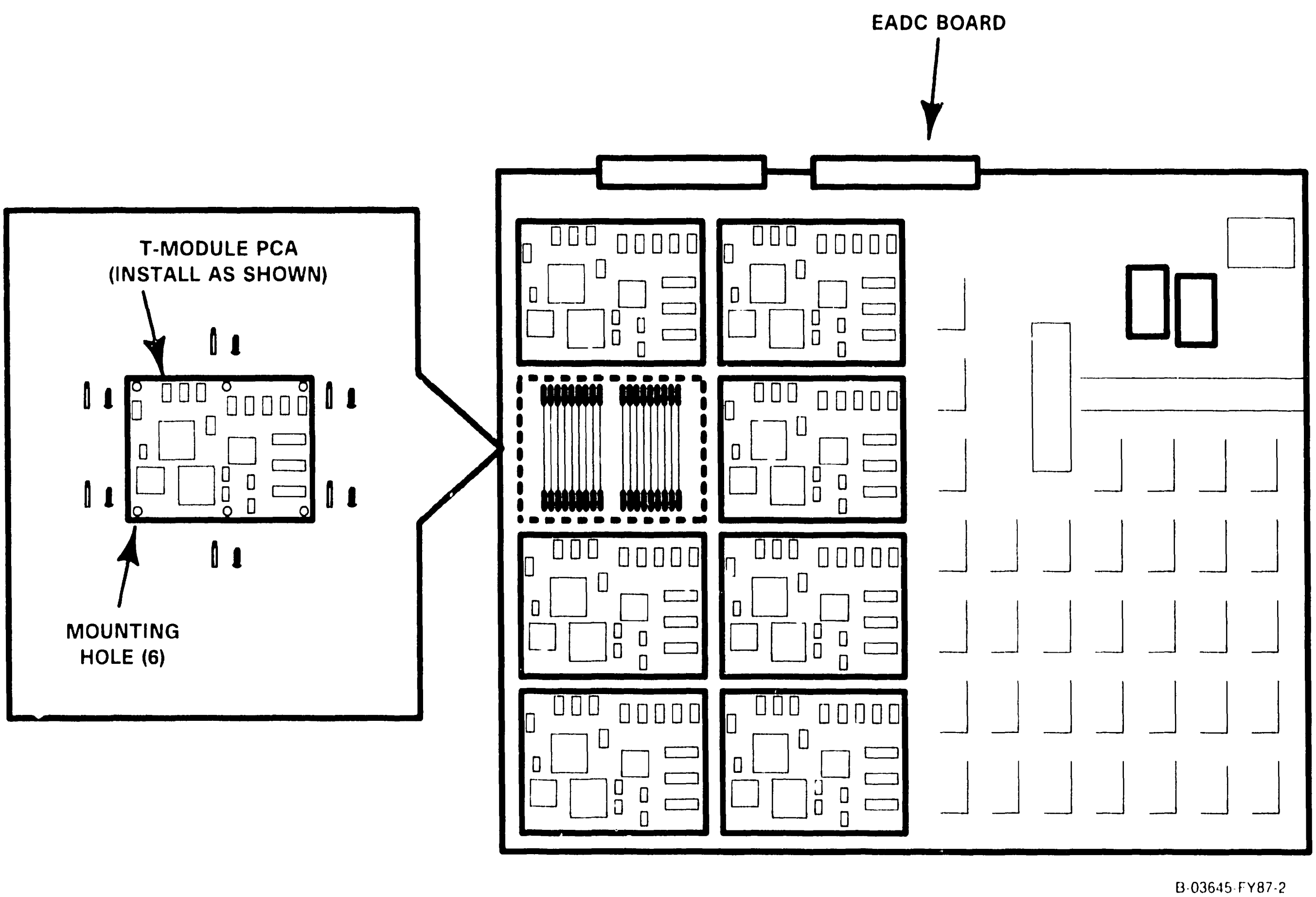


Figure E-2. Terminal Emulation Module (T-Module)

E.2.3 REAR CONNECTOR PANEL ASSEMBLY

The Rear Connector Panel Assembly (RCPA) is WLI P/N 272-0056). It includes a PC board which is used to mount the eight RS-232-C port connectors. There are also two 50-pin connectors for the signal cables that attach the RCPA to the EADC assembly (see figure E-3). J1 on the RCPA goes to J1 on the EADC assembly. J2 on RCPA goes to J2 on the EADC assembly.

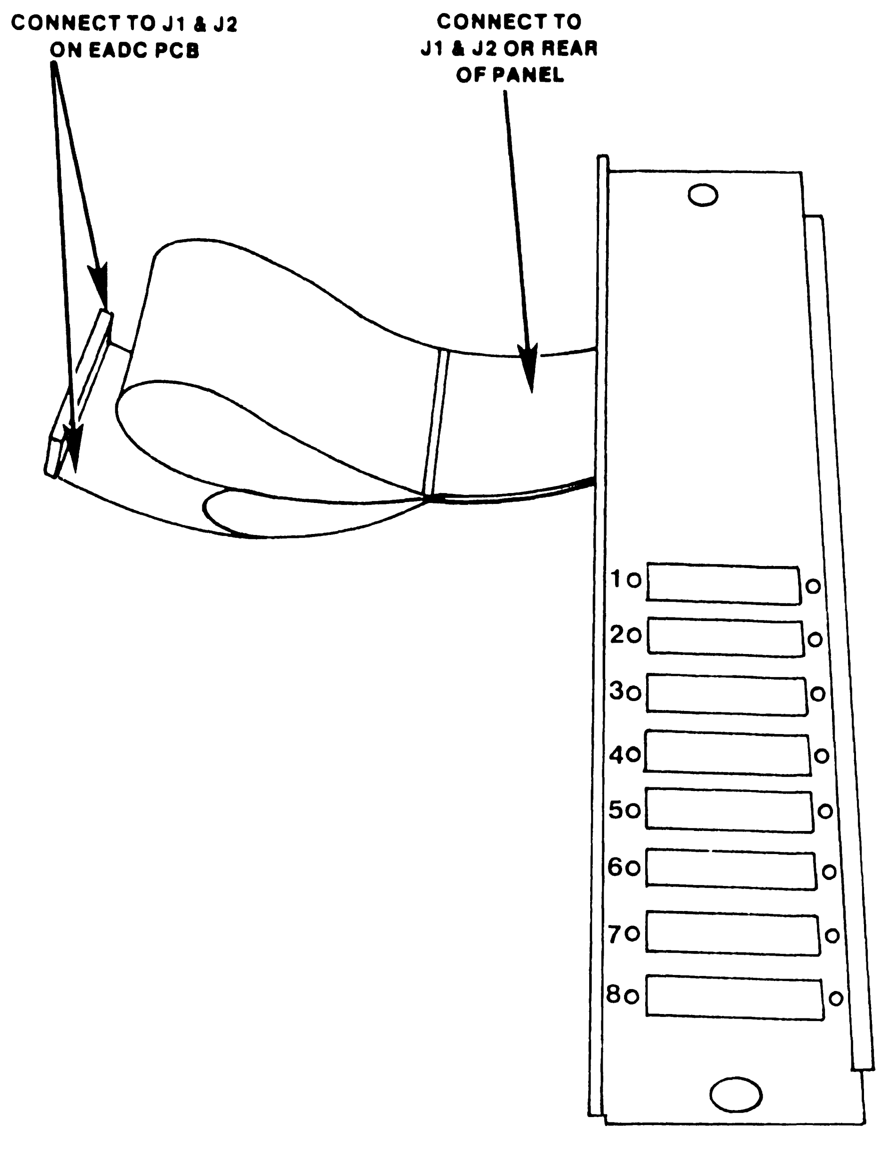


Figure E-3. Rear Connector Panel Assembly and Cables

E.3 SOFTWARE DESCRIPTION

The Operating System (OS) software contains the Z80 microcode that is downloaded to the T-Module memory. The specific microcode going to each T-Module is determined according to the GENEDIT configuration chosen by the user.

For example, if a Z80 T-Module and dumb terminal will be used as a DP workstation, then DP workstation microcode will be downloaded to it at IPL time. If a T-Module is configured as a WP device (workstation or printer), it will have WP workstation/printer microcode downloaded. If the T-Module and terminal are configured for WP or WP+ use, then peripheral software program code will also be downloaded.

NOTE

An EADC workstation cannot be used as workstation zero

Some of the more pertinent features of the operating system software for the EADC are as follows:

- Full access into VS IIP applications.
- Full Word Processing print capabilities.
- Printer/Workstation software support.
- Data Processing capabilities.
- Access Security.
- Integrity of Word Processing documents.
- Support of non-Wang Asynchronous Terminals.

E.4 FUNCTIONAL DESCRIPTION

Section E.4.1 provides an overview of the operation of the EADC, as a subsystem within the VS host (see figure E-4) and with use of a typical valid configuration will show microcode/program loading paths to the subsystem as well as data flow to other system components. This overview is provided to aid the CE in understanding the working relationship between major system components.

Section E.4.2 contains an overall block diagram of the internal working of the EADC controller board and T-Modules will be used to explain the working relationship between different functional areas within the EADC subsystem motherboard and T-Modules. Refer to figure E-5.

E.4.1 OPERATIONAL DATA FLOW

Figure E-4 shows a typical and valid VS-65 system showing a PBX, the attachment of a number of 'dumb' terminals, a hardware link to an IBM host and some device adapters including two EADC controllers. Various components have been labled (ie "A") to aid in the explanation of the working relationship between major components in the system.

Assuming that the system has been configured properly (Genedit) and the proper configuration files are accessible from disk, the Bus Processor will initiate a microcode download to the EADC controllers and 'T' modules over the system bus. The "EADC controller" on the motherboard will get "EADC controller" microcode and the T-Modules will get workstation or printer microcode. If the T-Module is configured for WP/WP+, it will also get program code.

In operation, a T-Module/dumb terminal that is configured for WP/WP+ will communicate with the EADC controller (motherboard) which is an intelligent device adapter. The Z80 processor and memory in the T-Module, which are the intelligence for the workstation keyboard and display, will process, store, etc., the keycodes coming from a 'dumb' terminal and the EADC controller motherboard with its 80186 microprocessor will interrupt the main system CP only when needed.

An example using figure E-4 to show simplified data flow starting with a keystroke is:

G -H -I - cable J - K2 - T-mod E2 - EADC board E - System Bus - CP B

E.4.1 OPERATIONAL DATA FLOW (Continued)

A T-Module/terminal configured for DP will communicate with the EADC controller motherboard, but the controller will have to interrupt the VS more often because the program code for DP workstations is run by the VS Host. The keyboard codes from the 'dumb' terminal will be communicated to the T-Module via the same Async protocol.

If a remote terminal is connected via modems or a PBX, the connection is transparent to the EADC controller/T-modules. The Async protocol allows differences in response time between 'dumb' terminal and 'T' module, but if too much time transpires without a response, the EADC controller will logoff the workstation/printer channel. The time duration is from 1.3 to 5 seconds.

If the line drops during transmission between the dumb terminal and the EADC controller, the port senses the drop and logs off. Without this feature, another incoming call to that port would connect and the caller would have the logon and rights established with that port before the line dropped. NOTE - The ADC did not have this feature

When the remote EADC terminal inputs data to another system (ie IBM host figure E4) using "General Async"/Synchronous 3270 Emulation, etc., other system components are used. In this example a TC Device Adapter (TCDA) such as a TCB-3 is used to communicate data inputed from P, through the EADC subsystem, to the CP/Memory, then to the TCDA and out the RS232 port to the host via modems. The TCDA would need microcode and/or program code appropriate for the configuration defined in Genedit.

The Data flow path starting with a keystroke is:

P - Q - K4 - E4 - E - System Bus - A & B - D - L - M - N - IBM Host

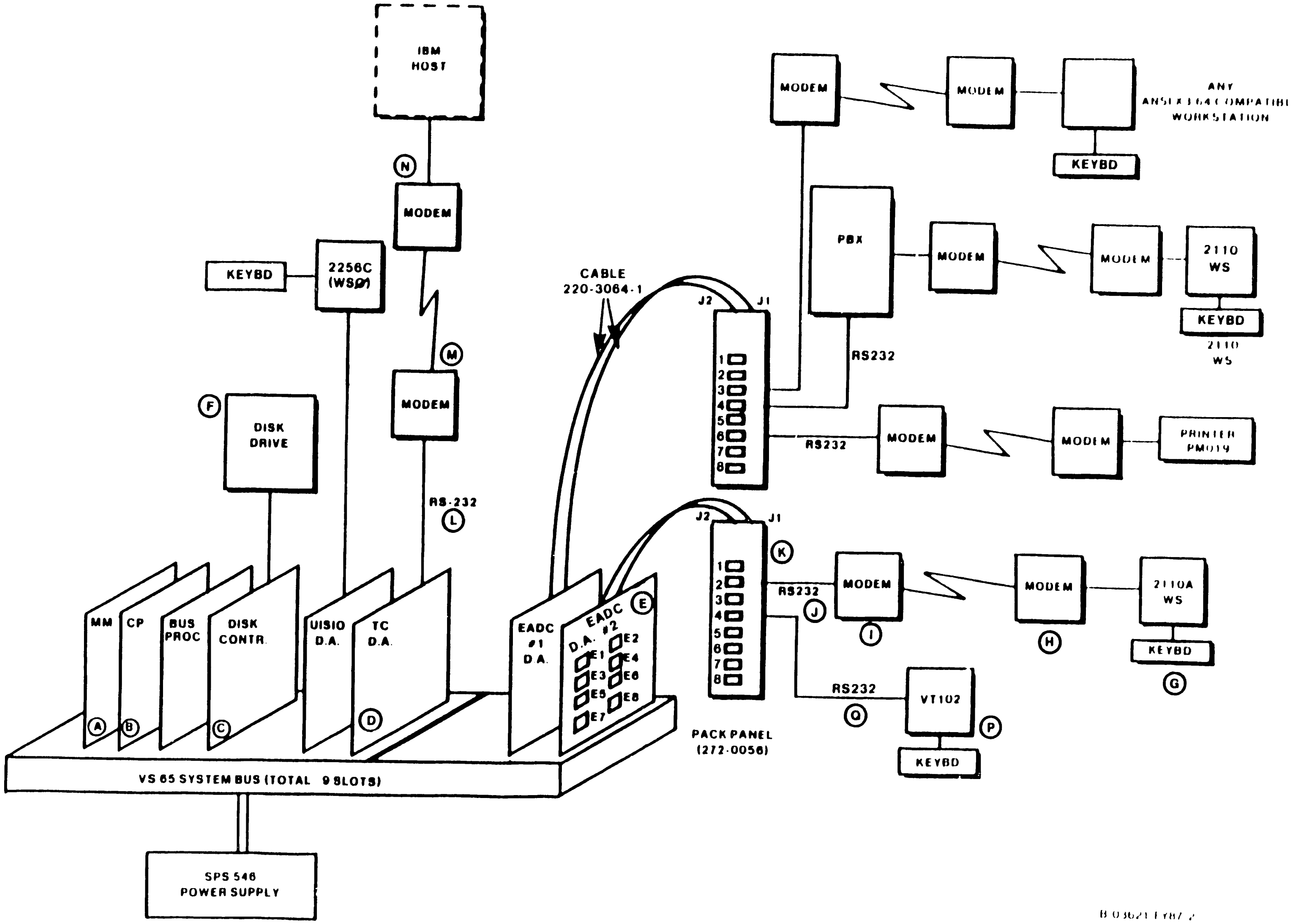


Figure E-4. Networking Operational Data Flow

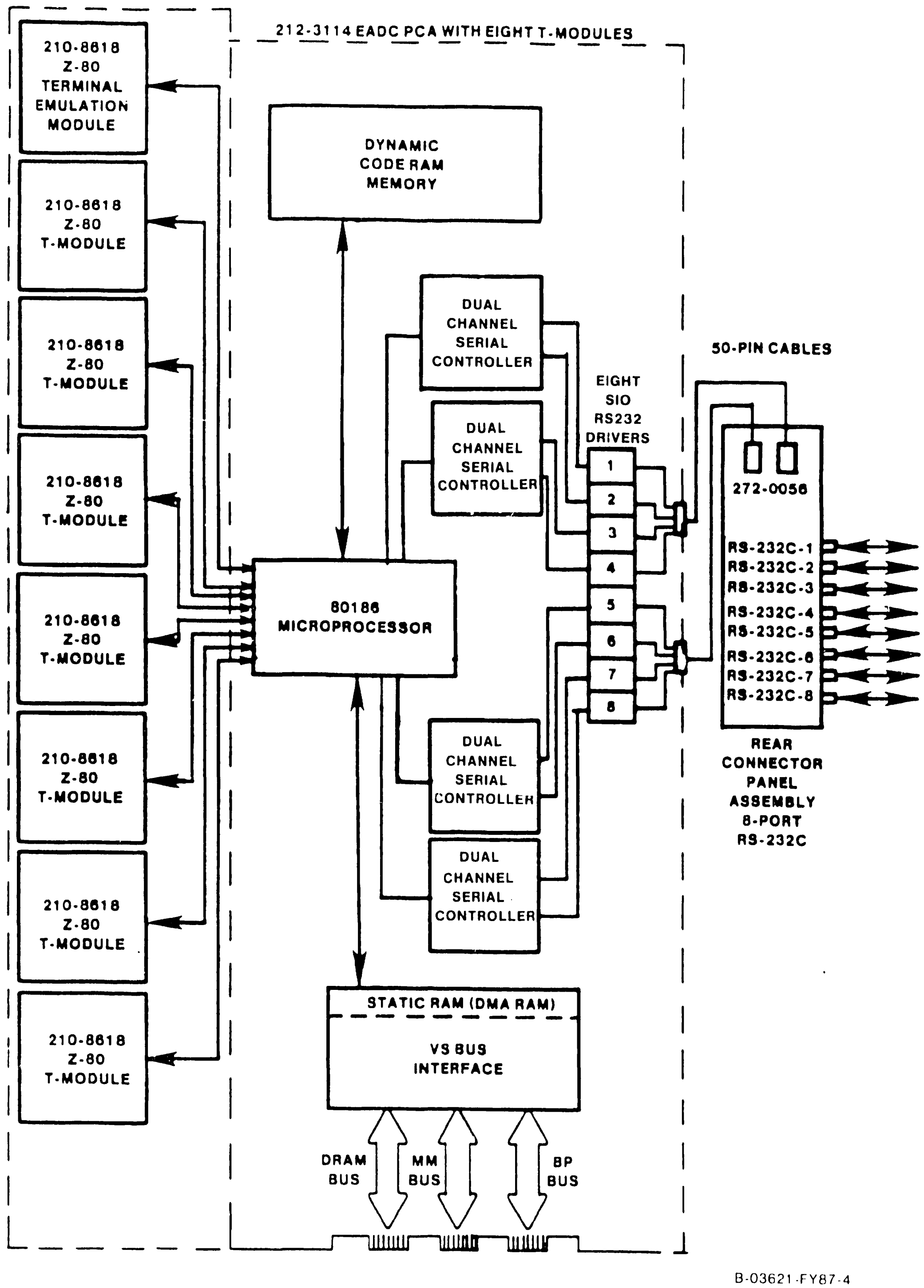


Figure E-5. EADC Overall Block Diagram

E.4.2 EADC PCA

The EADC module subsystem is controlled by a microprocessor mounted on the 210-8633 printed circuit assembly. The EADC has 512K-bytes of Dynamic Code RAM (Random Access Memory) of which only 508K-bytes can be used to store microcode, 4K-bytes of DMA RAM (Static RAM), and 32K-bytes of PROM (Shadow PROM). The EADC microprocessor can access the memory of each Terminal Emulation Module (Z-80 Dynamic Code Memory) in addition to its Dynamic Code RAM (DCRAM) and DMA RAM. The complete memory addressing scheme (Memory Map) is shown in figure E-6.

E.4.2.1 Microprocessor Control

The Intel 80186 is a 16-bit microprocessor which addresses up to 1-megabyte of memory. Since only 1-megabyte can be addressed, the address space allocated to the T-Modules is shared with the Diagnostic/IPL PROMs. Also, the upper 4K-byte of the DCRAM is NOT used allowing this address area to be used by the DMA RAM.

E.4.2.2 Dynamic Code RAM

The Dynamic Code RAM is accessible only to the 80186 microprocessor. The DCRAM operation is monitored by an 8208 memory controller. The 8208 does not require Wait States and it manages the REFRESH requirements without assistance from the 80186 microprocessor.

BYTES		HEX
1024K		FFFFF
992K	(32K-Bytes [Shadow] PROM)	F8000
960K	Terminal Emulation Module 8	F0000
896K	Terminal Emulation Module 7	E0000
832K	Terminal Emulation Module 6	D0000
768K	Terminal Emulation Module 5	C0000
704K	Terminal Emulation Module 4	B0000
640K	Terminal Emulation Module 3	A0000
576K	Terminal Emulation Module 2	90000
512K	Terminal Emulation Module 1	80000
508K	4K-Bytes (DMA) Static RAM	7F000
	508K-Bytes Dynamic Code RAM	
000K		00000

Figure E-6. EADC Memory Organization and Addressing

E.4.2.3 DMA Memory (Static RAM)

DMA operations can be accomplished by the 80186 using the Static RAM to transfer data between the EADC, the Bus Processor, and/or system Cache/Main Memory. For this reason, the Static RAM is also referred to as the DMA RAM. The DMA process, even when initiated by the EADC, is controlled by the BP.

E.4.2.4 Diagnostic/IPL PROMs

There are two PROMs on the EADC 210-8633 PCA . The PROMs contain the Built-In-Test (BIT) and are used for diagnostics and IPL. They are only used during power-up to load the diagnostic microcode and to assist with the EADC IPL sequence. They are disabled at completion of the sequence.

E.4.2.5 EADC Access to T-Modules

After the EADC hardware has been tested, the EADC microcode is loaded by the BP. The 80186 starts running from its DCRAM and the PROMs are disabled. The PROMs are disabled to allow the eighth Terminal Emulation Module access to the shared memory address area. (This sharing of the address space and the disabling of the PROMs is referred to as "Shadow PROM" addressing.) Access to the T-Modules must be accomplished using the Dynamic Code RAM Memory and the Programmable Interrupt Controllers.

E.4.2.6 Programmable Interrupt Controllers (PICs)

There are two 8259A PICs on the EADC 210-8633 PCA. The Master PIC controls the Bus Processor DMA and Status Interrupts, the Parity Error Interrupts, the four interrupts from the 8530 Communication Controllers, and the master interrupt from the 8259A Slave Programmable Interrupt Controller. The Slave PIC serves the eight interrupts from the Terminal Emulation Modules (1-8) and provides the interrupt control for each of the T-Modules. All of the interrupts are caused and/or controlled by various asynchronous processes, and not by the 80186 microprocessor.

E.4.2.7 Wait State Circuitry (SYNCH Logic)

There are two wait state generators located on the EADC 210-8633 PCA. The Wait State Circuitry is used to ensure correct timing during two types of operations performed by the EADC. It prevents the software from violating timing requirements of the 8530 controllers, and ensures the maximum rate of transfer of data to and from the T-Modules. NOTE - Memory is running with no wait states.

E.4.2.8 Dual-Channel Serial Multiprotocol Controllers

Four 8530 Dual-Channel Serial Multiprotocol Communication Controllers are used by the EADC 210-8633 PCA. Their primary function is to control the eight RS-232-C interface drivers during serial-to-parallel and parallel-to-serial conversions. Data transfers between the 8530s and VS Cache/Main Memory are executed by the 80186 using the DMA RAM. Interrupts are sent by the 8530s to the Master PIC using a single interrupt request line to the Master PIC from each. By using the two DMA channels on the 80186 microprocessor, two of the controllers can relieve the heavy communication load on the 80186.

E.4.2.9 Serial Input/Output RS-232-C Drivers

The EADC supports eight full duplex RS-232-C serial I/O channels. Eight UA-9636x Interface Drivers allow direct connection of serial devices up to 2000 feet (using null modem cables), and longer distance connection via modems or a digital PBX. All of the RS-232-C signals are transferred to the Rear Connector Panel Assembly (P/N 210-8676) using two 50-pin ribbon cables.

E.4.2.10 Diagnostic Error Code Display

A seven-segment HEX Diagnostic Error Code Display is provided on the EADC 210-8633 PCA. It indicates an error code whenever a failure occurs during the diagnostic power-up procedure (paragraph E.5.5.3).

E.4.3 T-MODULES

The Terminal Emulation Modules (T-Modules) are designed to provide Wang 928 intelligent workstation emulation within the Small System VS. Each of the T-Modules contain all the hardware functionality of a regular 2256A Workstation and supports one EIA RS-232-C (or CCITT V.24) port. When mounted on the EADC 210-8633 PCA and under the control of the 80186 microprocessor, the T-Module achieves total 2256A Workstation emulation capabilities.

The emulation capability does not include any TC (i.e., General Asynch), proportional video, or archiving workstation functions as currently implemented within the software. The emulation is designed to be totally software compatible with all other programs written for the VS.

Each Terminal Emulation Module has an eight-bit Z80 microprocessor with clock and interfacing circuitry; 64K-bytes of dual-port dynamic memory; 16K-bytes of dual-port video memory; memory arbitration, sequence, and refresh circuitry; internal DMA bus arbitration logic; keyboard simulation logic; interrupt actuation and control circuitry; and I/O control and enabling circuitry for the EADC 210-8633 and T-Module microprocessors.

E.4.4 EADC/BUS PROCESSOR COMMUNICATION

There are three communication paths between the EADC and the Bus Processor, two for messages and one for data. These three paths are two hardware status registers and the DMA Memory. Each status register allows one-way communication, either from the EADC to the BP, or the BP to the EADC. The DMA Memory (DMA RAM) is the only path allowing the transfer of data to and from the EADC.

The eight serial devices are driven through an asynchronous serial link via a full duplex RS-232-C connector on the RCPA. The EADC uses only one DMA path when communicating with the Small System VS.

E.5 INSTALLATION

The following paragraphs describe the unpacking, inspection, and installation instructions for the EADC. Refer to Chapter 4 of this VS-65 Product Maintenance Manual for more details.

E.5.1 UNPACKING, INSPECTION, AND DAMAGE CLAIM

Proceed with the unpacking, inspection, and reporting procedures of the EADC Upgrade Kit as given below.

1. Inspect the shipping containers for any signs of damage (crushed corners, punctures, etc.). If no damage is apparent, proceed with unpacking the contents of the upgrade kit.

2. Save all shipping and packing materials. These will be returned to the local branch office for further disposition.

3. Inspect the contents of each shipping container for any sign of loss of integrity, or other signs of damaged, loose, or missing components.

4. Check all items against the shipping bill(s)/packing list(s) to ensure that the correct items where shipped and that none are missing.

5. If damage is discovered during inspection, notify your manager.

E.5.2 EADC HARDWARE CONFIGURATION

There are eleven jumper connector blocks on the EADC PCA (refer to figure E-7). At this time, only eight have jumpers attached. Each block has six pairs of pins. One pair of pins on each of the designated blocks has a jumper except J21. J21 sets the "I/O Decode" Address and requires three jumpers as shown. J17, J18, and J23 set BPINT, J14 sets DRI, J20 sets DGS, J22 sets MRI, and J16 sets MGS. Do not install jumpers on J11, J13, J15, or J19.

I/O Address Decodes are listed in numerical order in table E-1. The EADC should be jumpered according to the guidelines set forth in table E-1 and in the note following the table on page E-15. Some addresses shown in table E-1 are reserved for specific peripherals which results in a recommended decode ranking. Reserved decodes should not be used except when no others are available.

Figure E-7 shows the EADC PCA jumpers set for address '03xx', which is the decode priority set before shipment. This may conflict with a "Second UISIO DA". If a UISIO DAC is installed with this decode priority, use the next available decode for the EADC. Alternate decode priority configurations for the EADC PCA are given in figure E-8. Set the jumpers on the EADC PCA as required by the new system configuration. Refer to paragraph E.5.3 for special power considerations when installing the EADC in a system equipped with a UISIO DAC, an early Asychronous Device Controller (ADC), or a multi-PCA configuration.

Table E-1. Input/Output (I/O) Address Decode Priority Reservations

I/O ADDRESS DECODE	I/O ADDRESS RESERVED FOR DEVICE ADAPTER/CONTROLLER FUNCTION		
	PRIMARY FUNCTION	ADDITIONAL FUNCTIONS	EXCLUDED FUNCTIONS
'01xx'	External Disk Drs	All DAs except one	Int Disk (25V50-0)
'02xx'	Int/Ext. Disk Drs	Includes 25V50-0	None
'03xx'	Second UISIO DAC	All Except Disk Drs	25V50 and 25V50-0
'04xx'	SIO DA/UISIO DAC	None	All Other DAs
'05xx'	Optional DA/DACs	All Except Disk Drs	25V50 and 25V50-0
'06xx'	TC DA/Controllers	All Except Disk Drs	25V50 and 25V50-0

NOTE

The Bootstrap Device switch is address dependent. An internal disk must be jumpered for I/O Address Decode of '0200' and an external drive for '0100'.

E.5.3 POWER SUPPLY CONSIDERATIONS

Early VS-65 Systems were shipped with the SPS-476E Switching Power Supply (WLI P/N 279-0608). With the availability of several new options, it is possible to exceed the current capacity (56 A) of that +5 Volt supply. In this situation, it is necessary to install the SPS-546 Switching Power Supply (WLI P/N 270-1040). In either case, it is recommended that the SPS-476E be replaced with the SPS-546 when the EADC is installed.

NOTE

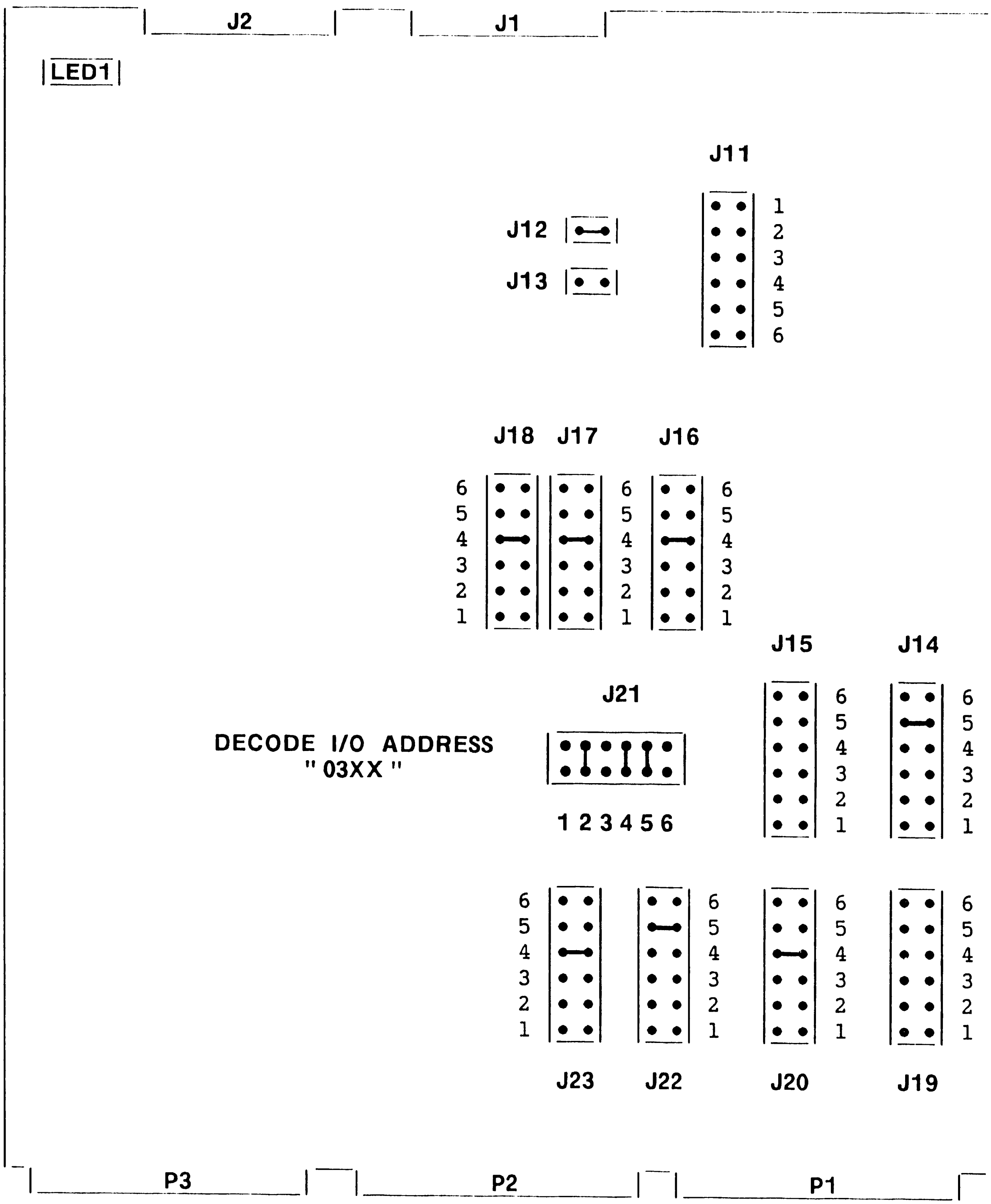
The switching power supply type may be determined by the location of the ac line voltage selection switch. The SPS-476E switch is located on the top of the supply, and the SPS-546 is located on the side.

E.5.4 EADC PCA INSTALLATION PROCEDURE

The general removal and replacement procedures given in chapter 5 should be followed whenever a printed circuit assembly (PCA) is to be removed or installed. If difficulty is encountered, refer to paragraph 5.3 of the manual. Power-down the system as follows:

CAUTION

POWERING THE SYSTEM AND/OR ANY EXTERNAL DISK DRIVE DOWN IMPROPERLY MAY RESULT IN DAMAGE TO THE VOLUME TABLE OF CONTENTS (VTOC) OF THE DISK DRIVE(S).



NOTE: J11, J13, J15, and J19 Should NOT Have Jumpers.

Figure E-7. Enhanced Asynchronous Device Controller Jumper Locations

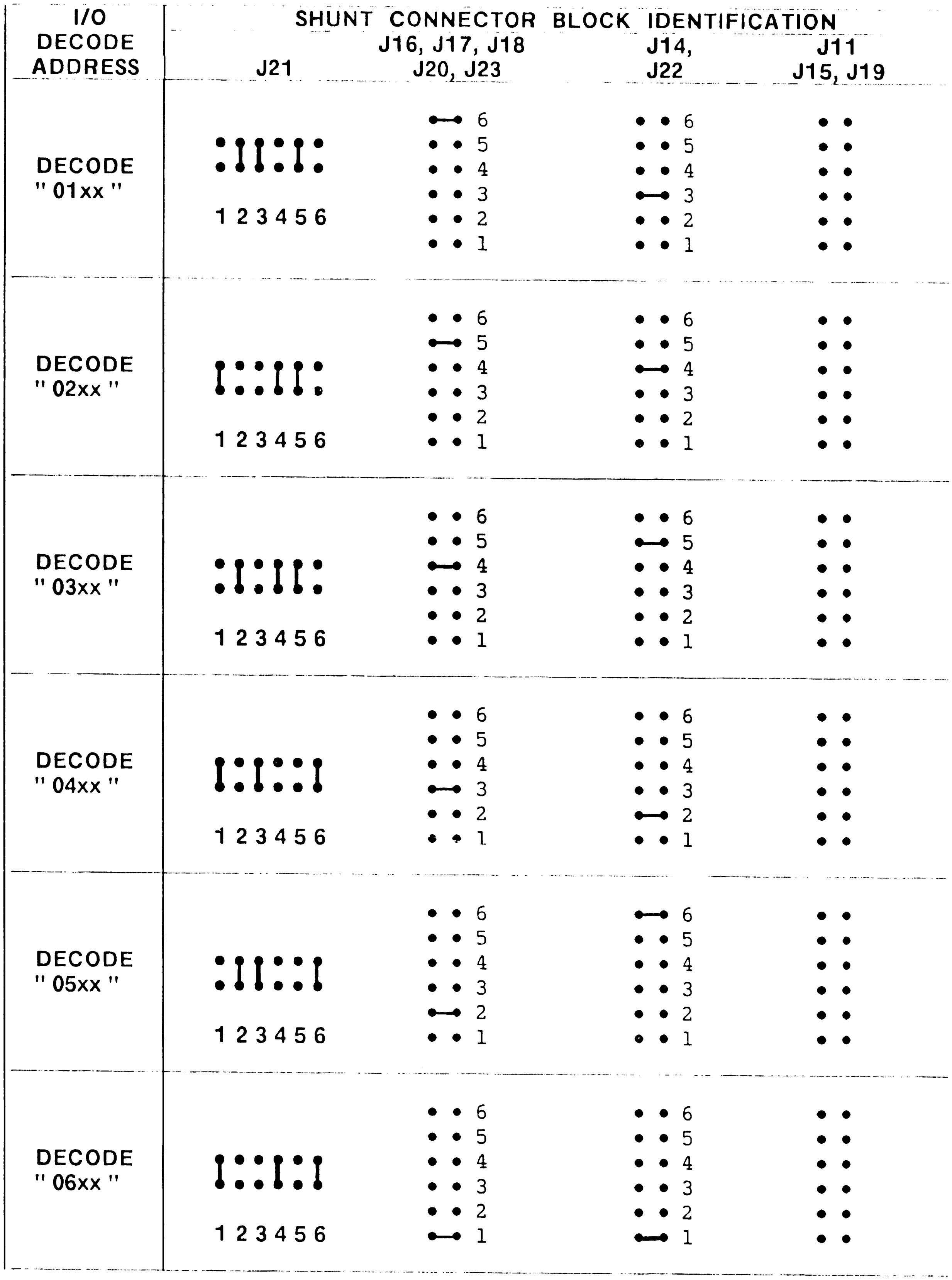


Figure E-8. Alternate "Jumper Address" Configurations

1. After verifying all users have logged off and all background tasks are completed, press the green Control Mode button.

2. Power-down the mainframe and peripherals as required per paragraph 3.7 while observing all necessary precautions.

3. Remove the top cover as described in paragraph 5.4.1.

NOTE

The physical location of I/O DAs in the Motherboard is transparent to mainframe operation. However, it is recommended that the PCA I/O Address Decode corresponds to the I/O DA Motherboard slot (I/O DA1-6).

4. Figure E-9 illustrates the PCA locator label mounted on the front of the motherboard card cage assembly. The positions of the MM, CP, and BP are fixed because of timing considerations. When installing an additional PCA, the device adapter/controllers may be installed in the I/O DA slot which corresponds with I/O Decode Address assigned. This however, is only for convenience and efficiency in determining system components/addresses. The VS-65 is not a slot-dependent system per se.

NOTE

If the corresponding slot is not available, DO NOT remove and rearrange the PCAs unless the removal is required for other reasons.

SLOT	MOTHERBOARD SLOT NUMBER								
LOCATION	1	2	3	4	5	6	7	8	9
PRINTED CIRCUIT ASSEMBLY	MM	CP	BP	I/ODA1	I/ODA2	I/ODA3	I/ODA4	I/ODA5	I/ODA6

Figure E-9. Card Cage Assembly PCA Locator Label

5. Before installation of the EADC PCA, ensure that the T-Modules are securely mounted on the EADC motherboard (see figure E-1).

6. Insert the EADC PCA into the corresponding I/ODA slot in the Motherboard. Ensure that the motherboard connectors are positioned correctly before pushing down on the board.

7. Install the EADC Rear Connector Panel Assembly, WLI P/N 272-0056 (figure E-3), in a blank connector plate location (shown in figure E-10) in the rear of the mainframe using the hardware provided.

8. Connect the ribbon cables (WLI P/N 220-3064-1) from J1 of the EADC PCA (figure E-1) to J1 of the RCPA (figure E-11).

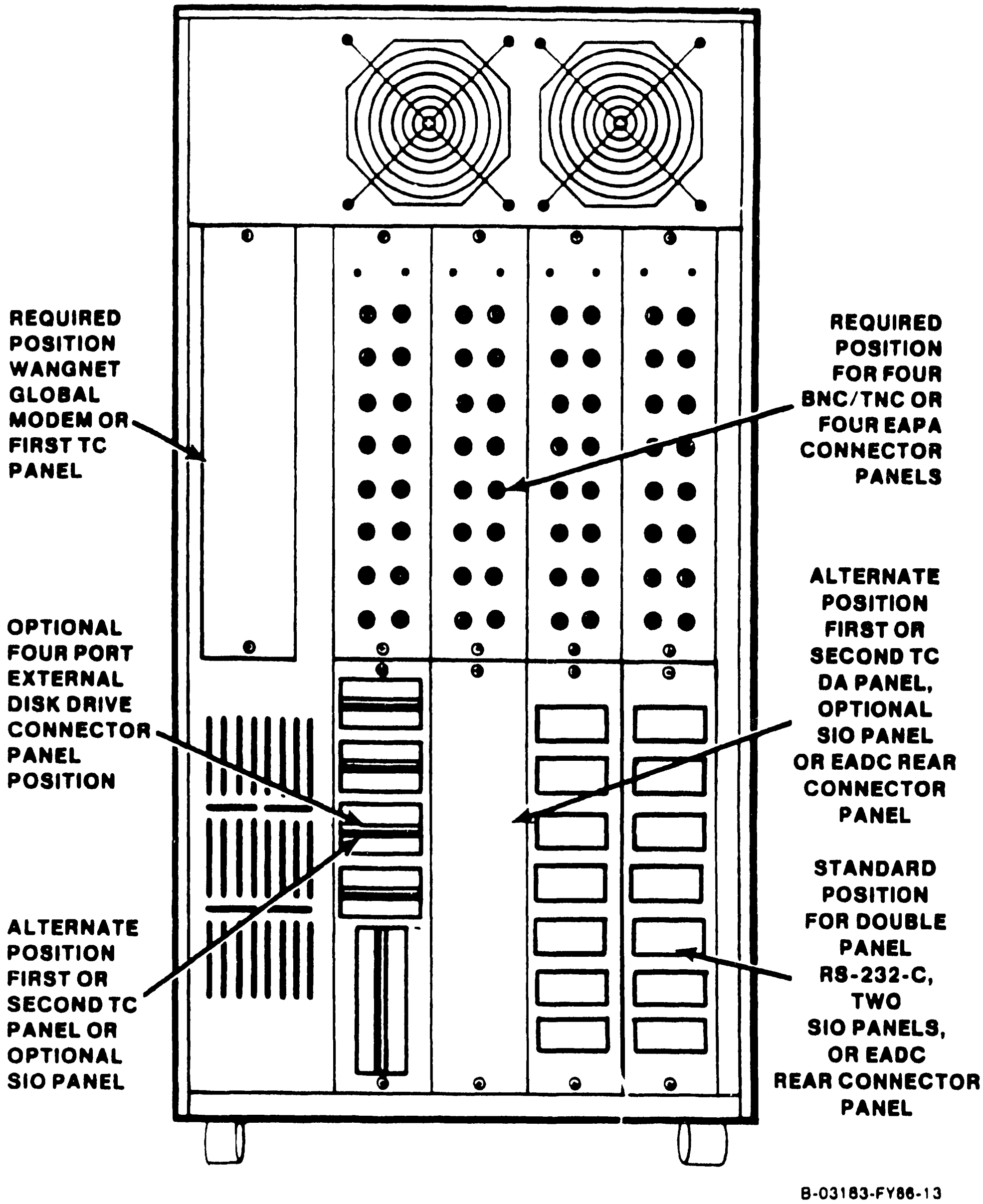


Figure E-10. Mainframe Rear Panel Assembly Connector Panel Locations

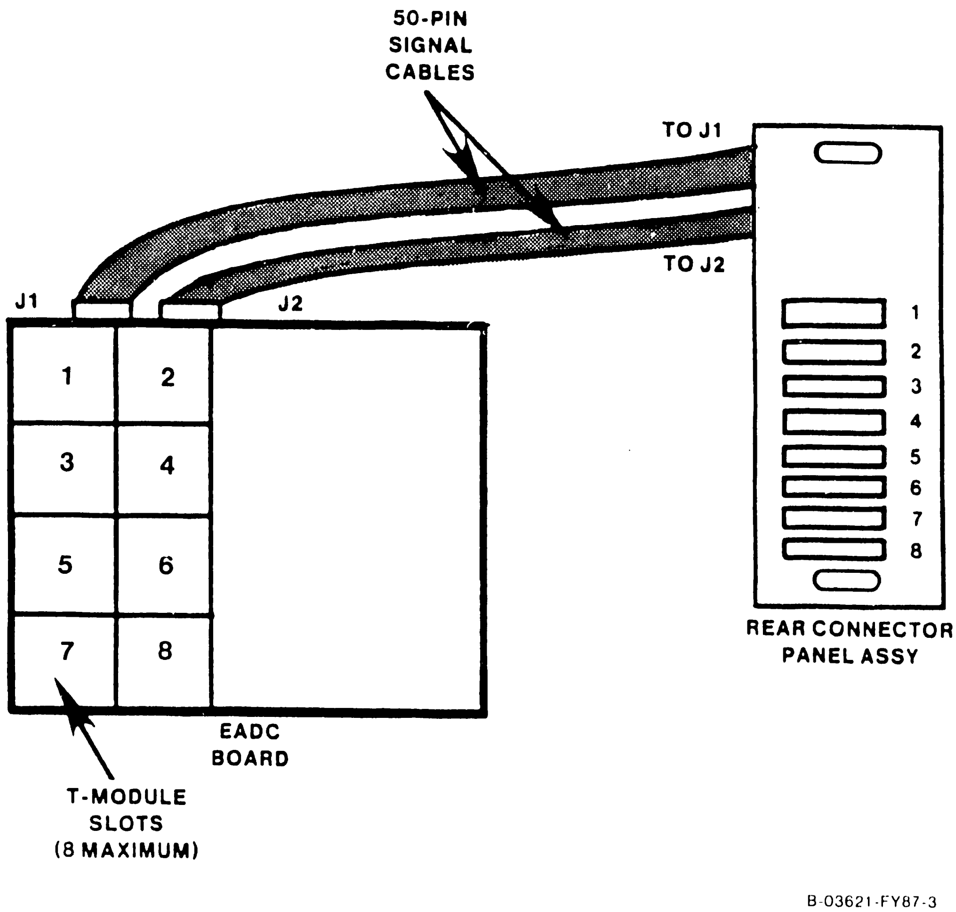


Figure E-11. Rear Connector Panel Assembly (PCA Side)

E.5.5 MAINFRAME POWER-UP AND CHECKOUT

When the installation and/or replacement of the affected device adapters is completed, any device adapter cables removed must be reconnected. Power is applied to the mainframe and power supply voltages tested using the procedures given in chapter 4 and the following:

E.5.5.1 Device Adapter and Power Cable Connections

1. Reconnect any device adapter cables removed.

2. Return each cable to its respective cable holder while routing all new cables in a like manner along the mainframe. Refer to chapter 4 for interconnection of the original rear connector panel assemblies.

CAUTION

1. RETURNING THE CABLES TO THEIR CORRECT POSITIONS AND ROUTING ADDITIONAL CABLES CORRECTLY IS IMPORTANT TO ENSURE COMPLIANCE WITH FCC REGULATIONS.

2. BEFORE POWER-UP, ENSURE THE PCAs COMPONENT SIDES ARE FACING RIGHT WHEN VIEWED FROM FRONT OF THE CHASSIS.

E.5.5.2 Mainframe DC Voltage and EADC PCA Power-Up Verification

1. Set the Boot Device switch on the Operational Control Panel to the DISKETTE (UP) position during initial power-up. There should NOT be a diskette in the drive.

2. Power-up the mainframe using the standard power-up procedures as given in chapter 4.

3. After installation of a new and/or additional device adapter, the dc power supply voltages must be checked at the Motherboard test points. If the dc voltages at the Motherboard are outside the operating limits given in table E-2, the switching power supply voltages must be adjusted (paragraph 4.7.3).

Table E-2. Direct Current (DC) Test Point Voltages

TEST POINT	DC VOLTS	DC OPERATING VOLTAGE LIMITS	AC RIPPLE VOLTAGE LIMITS
TP1	+/-0.0	- 0.05 to + 0.05	35mV RMS or 50mV Pk-to-Pk
TP2	+ 5.0	+ 4.95 to + 5.05	
TP3	- 5.0	- 4.95 to - 5.05	
TP4	+ 12.0	+11.9 to +12.1	
TP5	- 12.0	-11.9 to -12.1	
SPS	+ 24.0	+21.6 to +26.4	

4. At the beginning of the power-up sequence, the Diagnostic PROMS will automatically verify that the EADC PCA is operational using the Built-In-Test (BIT) power-up diagnostics. The EADC power-up diagnostic HEX Display (LED1) shows an error code if the BIT fails during power-up.

NOTE

The EADC Power-Up BIT Diagnostic only tests the 210-8633 PCA. It gives a GO/NO-GO status on the HEX Display (LED1). It does not test the T-Modules, transceivers, terminals, modems, PBX, cables, etc..

5. If the HEX display is anything other than "0", the EADC PCA has failed the power-up B.I.T. Proceed to paragraph E.8.1, EADC BIT FAILURE.

E.5.5.3 Mainframe Power-up Procedure

1. While the power-up diagnostics are running, change the Boot Device switch to the appropriate position allowing the mainframe to IPL from the system drive, and remove the DIAGx diskette.

2. Run the Self-Test Monitor diagnostics. Enter the Date and Time when requested and press ENTER.

3. Enter the name of the new configuration file and press ENTER. The System Initialization screen will appear.

4. Load the microcode and re-IPL the system.

5. When system IPL is complete, log onto the system using the CSG LOG-ON.

6. Verify that all peripherals have been correctly declared and are functioning properly. If not, modify the new configuration file as required by the customer. Re-IPL and verify the system.

7. Run the NVRAM utility and enter the necessary information in the various sections of the NVRAM files. When the NVRAM is updated and the system is verified, the procedure is complete.

8. Connect the workstations using the RS-232-C null modem cable (WLI P/N 220-1138) supplied with the 2110 workstations or the appropriate modem cables required by the application.

E.5.6 SYSTEM CHECKOUT

1. Ensure that all workstations configured through the EADC display the logon screen.

2. Ensure that logon is possible from each workstation.

3. Turn the system over to the customer.

E.6 MAINTENANCE

Corrective maintenance for the EADC consists of removal and replacement of defective parts.

E.6.1 EADC PCA REMOVAL AND REPLACEMENT

1. Power down the mainframe.
2. Remove the top cover.
3. Remove the cables from the top of the controller board.
4. Lift the EADC PCA straight up and out of the Card Cage.
5. To replace the EADC PCA, reverse the removal procedure.
6. Power-up the mainframe and check the dc voltages as discussed in paragraph E.5.5.2.

E.6.2 REAR CONNECTOR PANEL ASSEMBLY REMOVAL AND REPLACEMENT

1. Power down the mainframe.
2. Remove the top cover.
3. Remove the cables from the Rear Connector Panel Assembly connectors J1 and J2.
4. Remove and save the hardware securing the Rear Connector Panel to the mainframe.
5. To replace the EADC Rear Connector Panel Assembly, reverse the removal procedure.

E.7 FIELD REPLACEABLE UNITS

Table E-3 lists the Field Replaceable Units (FRUs) for the VS-65 EADC Modular Subsystem.

Table E-3. EADC Field Replaceable Units

WLI P/N	DESCRIPTION	FRU
210-8618*	PCA VS-65 EADC Module (T-Module)	PCA
212-3114	EADC Motherboard (DA) with 8 T-Modules	ASSY
220-3064-1	50-Pin Ribbon Cables (2 each)	CBL
272-0056	EADC Back Panel Assembly	ASSY

*210-8918 is also a valid part number for the T-Module

E.8 TROUBLESHOOTING

This section contains troubleshooting information for the EADC as follows:

- EADC B.I.T. failure (Section E.8.1)
- EADC Off-Line Diagnostic Procedure (Section E.8.2)
- On-Line Diagnostic Procedure for EADC Checkout (Section E.8.3)
- Hardware Troubleshooting Flowchart (Section E.8.4)
- Software Troubleshooting Flowchart (Section E.8.5)

E.8.1 EADC B.I.T. FAILURE

Whenever power is applied to the VS-65, or when the INITIALIZE pushbutton is pressed, the EADC power-up B.I.T. diagnostics will begin running concurrently with the other VS-65 system power-up diagnostics. The B.I.T. provides a go no-go evaluation of the EADC board. If the EADC power-up diagnostics fail (EADC LED1 displays something other than "0"), perform the following procedures before replacing the PCA:

1. Check the VS-65 Front Panel HEX Display for system error codes (section 6). The EADC may not have set or reset a particular bit on power-up.

2. Re-IPL the VS-65 to restart the B.I.T. Observe that LED1 on the EADC PCB cycles through various HEX digits and finally displays a "0" to indicate test completion. If any other HEX digit is displayed, power-down the VS-65 and remove the EADC PCA.

3. Re-IPL the VS-65 to recheck the system without the EADC PCA installed. This isolates VS-65 problems from EADC problems.

4. Examine the EADC PCA for damaged, loose, or improperly seated components. Check the PROMs and connectors for missing or misaligned contacts. Press down firmly and carefully on each of the PROMs to ensure each is properly seated.

5. Reinstall the EADC PCA in a different slot, ensuring that the PCA is seated properly and rerun the B.I.T. If it fails again, the PCA assembly is defective.

NOTE

Further Off-line testing as specified in section E.8.2. should be performed to determine if any of the replaceable T-modules or other components such as cables or connectors on the EADC or back panel are defective.

E.8.2 EADC OFF-LINE DIAGNOSTIC PROCEDURE

The EADC Off-Line Diagnostic test should be invoked following a B.I.T. failure (section E.8.1) to further investigate and identify a suspected component as faulty. This diagnostic test:

- Checks a major portion of the 210-8618 T-Module.
- Requires Loopback Connector 421-0025 (figure E-12).
- Checks the 8530 RS-232-C driver outputs.
- Provides selection of the port to be tested.
- Does not check the following: terminal device, modem, PBX, cables, etc.

The EADC Off-Line Diagnostic test procedure is as follows:

1. Insert the Small Systems VS Diagnostic Monitor diskette into the diskette drive and press the INITIALIZE pushbutton. (The diskette is part of a diagnostic package which also includes multimedia software and documentation).

2. At the end of the power-up B.I.T., the diskette will initiate the stand-alone IPL process and the standard disclaimer screen will appear. A 'YES' response will continue the diagnostic process.

3. When the Test Selection Option screen appears, setup the EADC Diagnostic Test (xx1000) on DIAGx. Select Loop On Error. Select all eight ports for loopback testing.

4. Do not install the loopback connector.

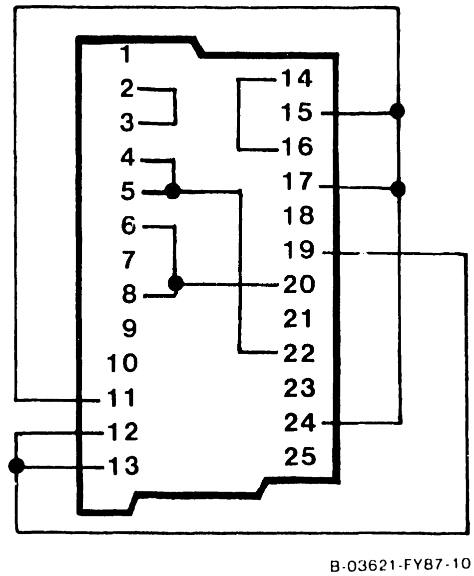
5. Observe that the loop-on-error test stops on port 1 (this is a forced error since the loopback connector is deliberately not inserted).

6. Insert the loopback connector into port 1. Observe that port 1 is now OK and port 2 indicates a loop-on-error condition. Remove the connector from port 1 and insert it into port 2. Observe that port 2 is OK and port 3 goes into a loop-on-error mode. Continue this testing sequence by moving the loopback connector through all eight ports.

   NOTE

   A port can be considered defective if it has a loopback connector inserted and still continues to loop on error. In this case, the CE should check that port for a defective T-module, wiring, and/or connector.

7. Upon successful completion of the stand-alone diagnostics, re-IPL the system



NOTE
LOOPBACK CONNECTOR MAY BE ASSEMBLED USING BLANK DB-25 CONNECTOR (350-1030)

PIN	SIGNAL	DESCRIPTION
2	TxD	Transmitted Data
3	RxD	Received Data
4	RTS	Request-To-Send
5	CTS	Clear-To-Send
6	DSR	Data Set Ready
8	DCD	Data Carrier Detected
11		(Wang Factory Test Use Only)
12	SDCD	Secondary Data Carrier Detected
13	SCTS	Secondary Clear-To-Send
14	STD	Secondary Transmit Data
15	TCLK	Transmit Signal Element Timing
16	SRD	Secondary Receive Data
17	RCLK	Receiver Signal Element Timing
19	SRTS	Secondary Request-To-Send
20	DTR	Data Terminal Ready
22	RI	Ring Indicator
24	TxCLK	External Transmit Signal Element Timing

Figure E-12 EADC Loopback Connector (421-0025)

E.8.3 ON-LINE DIAGNOSTIC PROCEDURE FOR EADC CHECKOUT

The On-Line Diagnostic performs a major portion of the diagnostic tests necessary to determine primary errors on the EADC assembly. This diagnostic test:

- Checks a major portion of each 210-8618 T-Module.
- Does not require a Loopback Connector.
- Does not check the 8530 RS-232-C driver outputs; however, if the screen displays the test name (i.e. Slave Upper RAM, Z80 CPU Instruction, etc.), the driver outputs are OK up to the CRT.
- Provides selection of the port to be tested.
- Does not check the following: terminal device, modem, PBX, cables, etc.

The On-Line Diagnostic Procedure for EADC checkout is as follows:

1. Run the VS On-Line DTOS Device 2 Diagnostic Package.
2. Select the test to be run as follows:

   Slave Upper RAM (DO NOT USE TEST #2)

   Z80 CPU Instruction

   Byte Transfer

   Block Transfer
3. Observe that the CRT displays the test name while the test is running on the VS-65.

E.8.4 HARDWARE TROUBLESHOOTING FLOWCHART

Figure E-13 is a hardware troubleshooting flowchart for the EADC. It is provided as an additional aid to help the CE analyze hardware-related problems associated with the EADC.

E.8.5 SOFTWARE TROUBLESHOOTING FLOWCHART

Figure E-14 is a software troubleshooting flowchart for the EADC. It is provided as additional CE support to analyze EADC software-related problems and should only be used after eliminating all possibilities of a hardware malfunction.

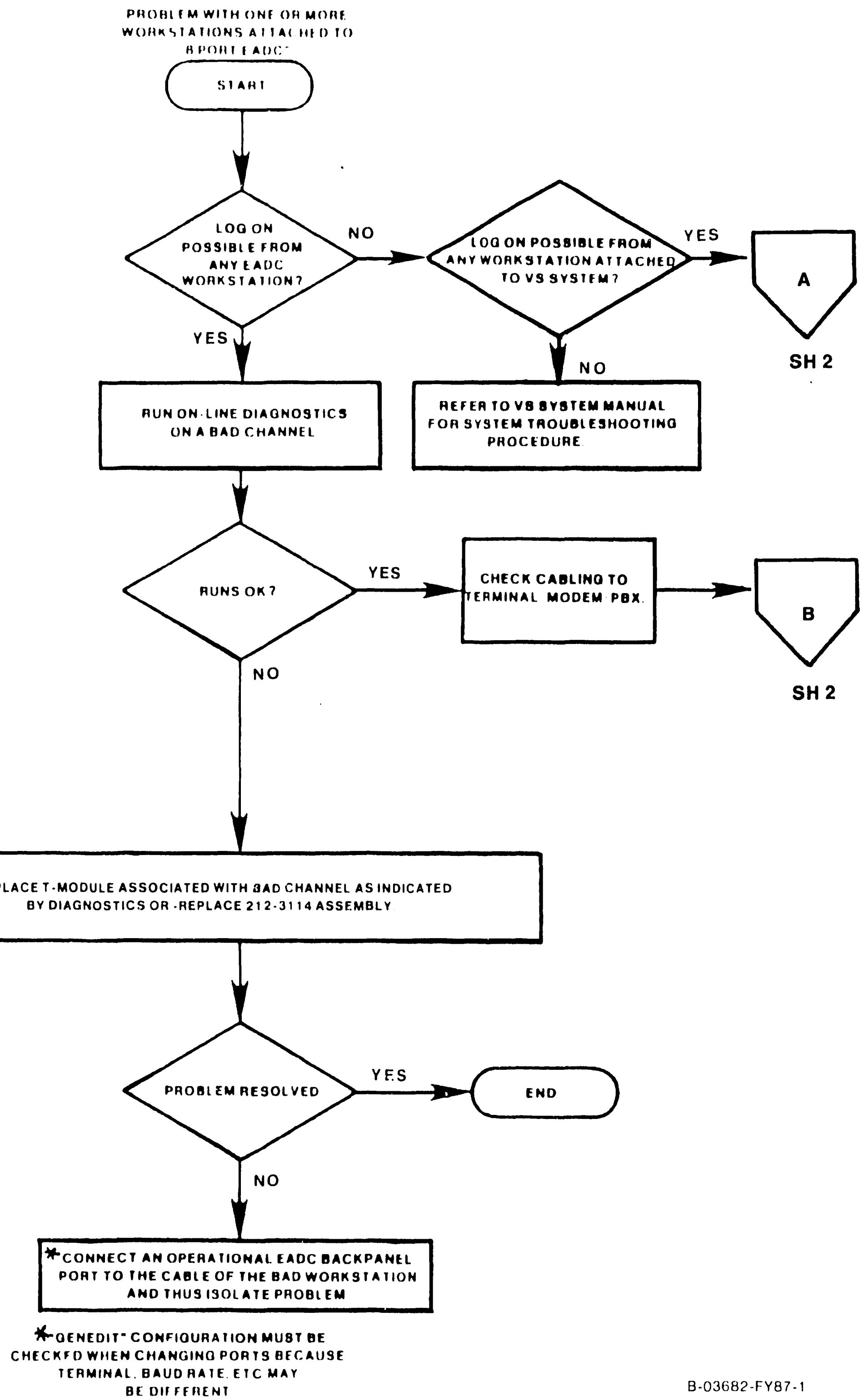


Figure E-13 EADC Hardware Troubleshooting Flowchart (Sheet 1 of 2)

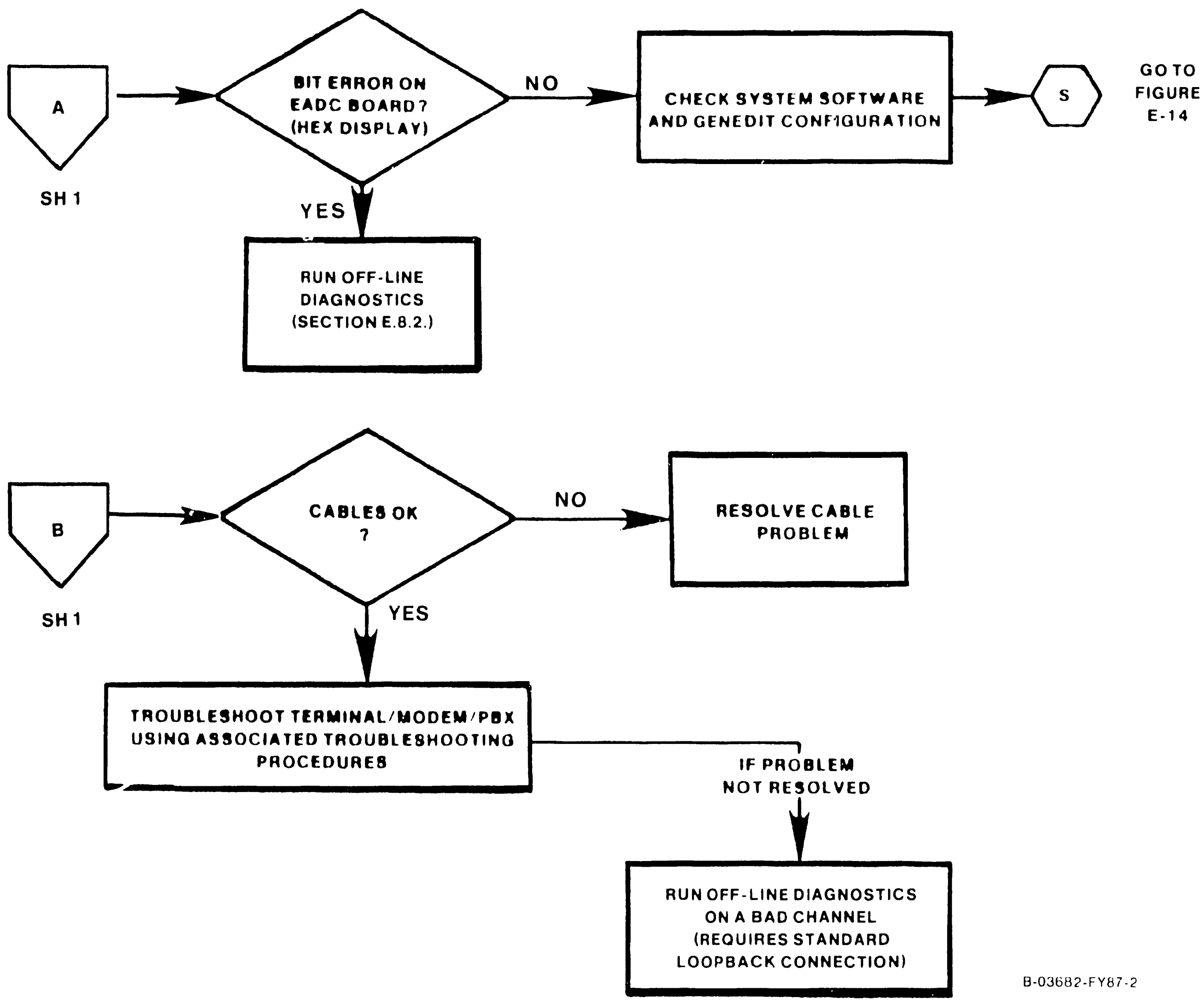


Figure E-13 EADC Hardware Troubleshooting Flowchart (Sheet 2 of 2)

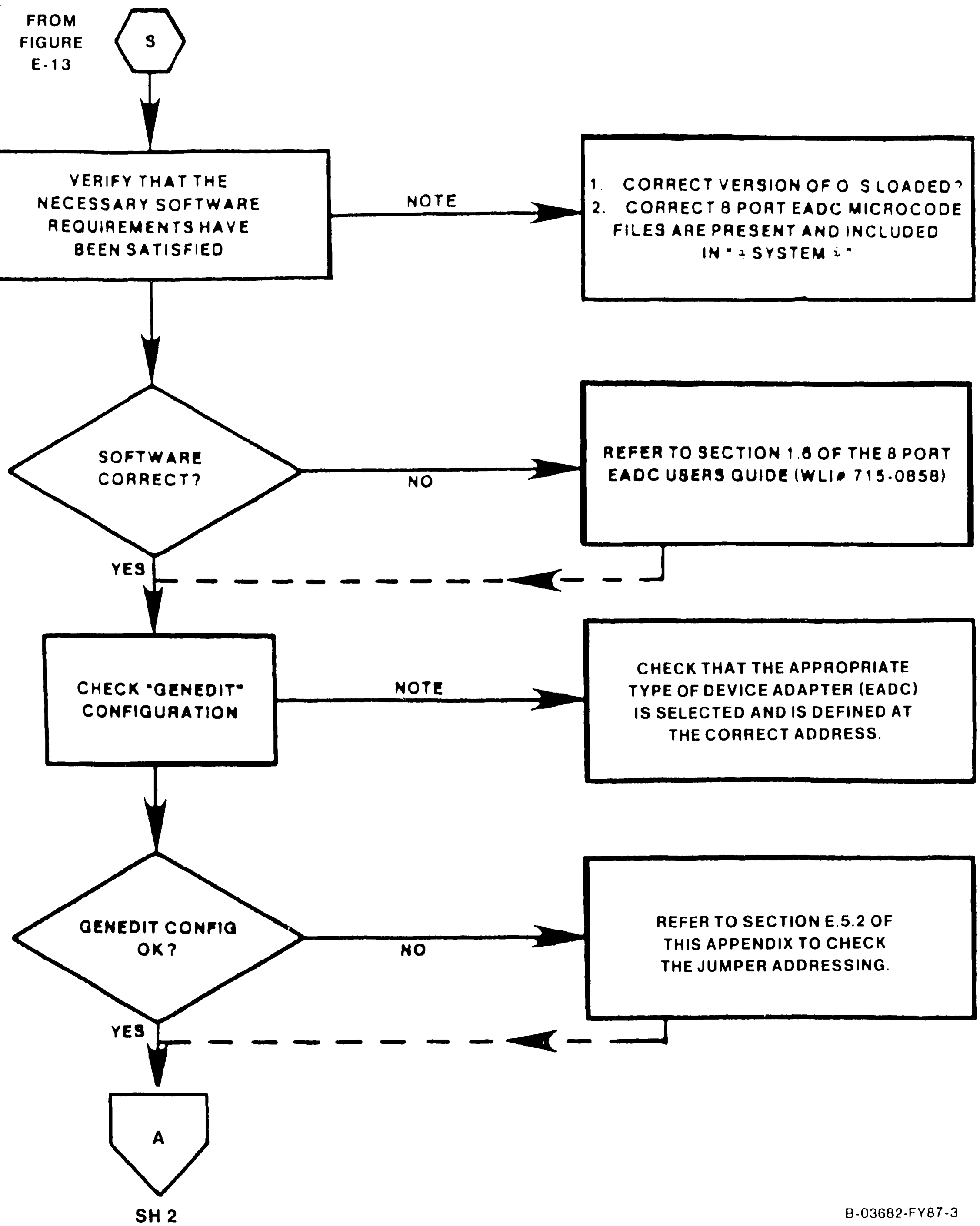


Figure E-14 EADC Software Troubleshooting Flowchart (Sheet 1 of 2)

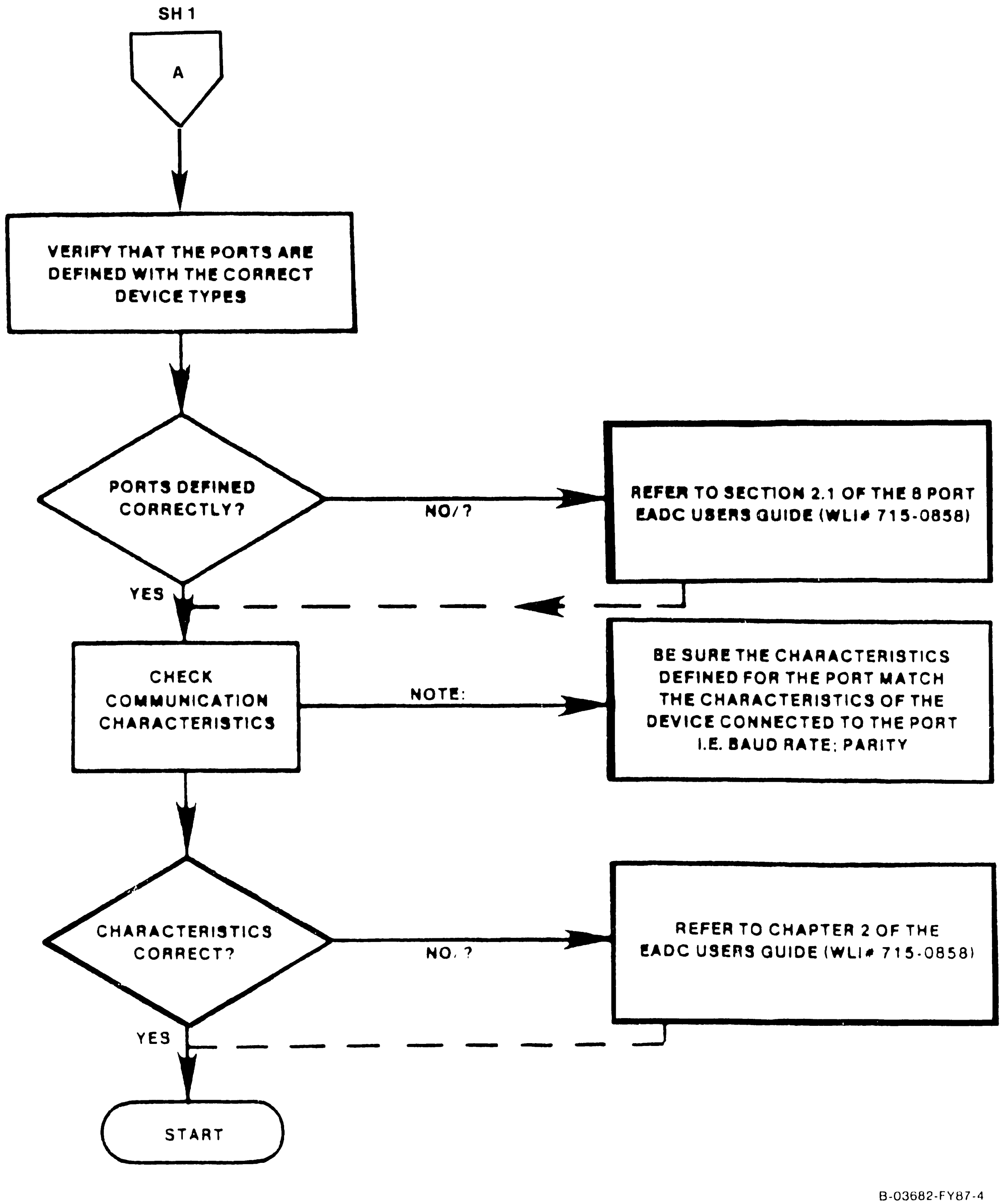


Figure E-14 EADC Software Troubleshooting Flowchart (Sheet 2 of 2)

APPENDIX F MULTILINE TELECOM-MUNICATIONS CONTROLLER

APPENDIX F

VS-65 MULTILINE TELECOMMUNICATIONS CONTROLLER

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APPENDIX F

VS-65 MULTILINE TELECOMMUNICATIONS CONTROLLER (MLTC)

F.1 SCOPE AND PURPOSE

This appendix contains detailed information for the installation, maintenance, troubleshooting, and repair of the 25V96-8/16 Multiline Telecommunications Controller, hereafter referred to simply as the MLTC. It provides procedures for unpacking and setup, and removal and replacement of the MLTC DA.

The purpose of this appendix is to provide the customer engineer with the information necessary to install, maintain, and repair the MLTC in the field.

F.2 PUBLICATIONS

A complete listing of Wang documentation can be found in the Technical Documentation Catalog/Index (WLI P/N 742-0000) and the Wang Customer Resource Catalog (WLI P/N 700-7647).

F.3 DESCRIPTION

The Multiline Telecommunications Controller comprises a single Input/-Output Device Adapter board and up to four modular half panels (figure F-1). Each half panel contains a Serial Communications Link (SCL) board, one or two Block Connector boards, and up to four Interface boards. Each Interface board services one communications line. Due to present VS-65 power requirements and physical rear panel space, the half panels must be mounted in the VS Small Cable Concentrator.

A VS-65 configured with the 25V96-8 MLTC will support of up to eight single-protocol communications lines while the 25V96-16 will support up to 16 lines. Initially, RS232-C protocol is supported (from low-speed async to 64kbps, full duplex, synchronous).

The MLTC DA resides in the small VS cabinet and is cabled to a four connector half panel mounted on the cabinet rear panel assembly. Model 25V96-8 MLTC requires two cables from the MLTC DA, where connector J1 provides communication lines 0-3 and connector J2 provides communication lines 4-7. Model 25V96-16 requires all four cables (connector J1-J4) installed following the same convention as model 25V96-8 with the addition of connector J3 providing communication lines 8-11 and connector J4 providing communication lines 12-15.

MLTC half-panels are mounted in the small cable concentrator along with a four connector half panel. The four connector half panel provides the external cable connection between the VS mainframe and cable concentrator. The cable concentrator can be located up to 25 feet from the VS mainframe.

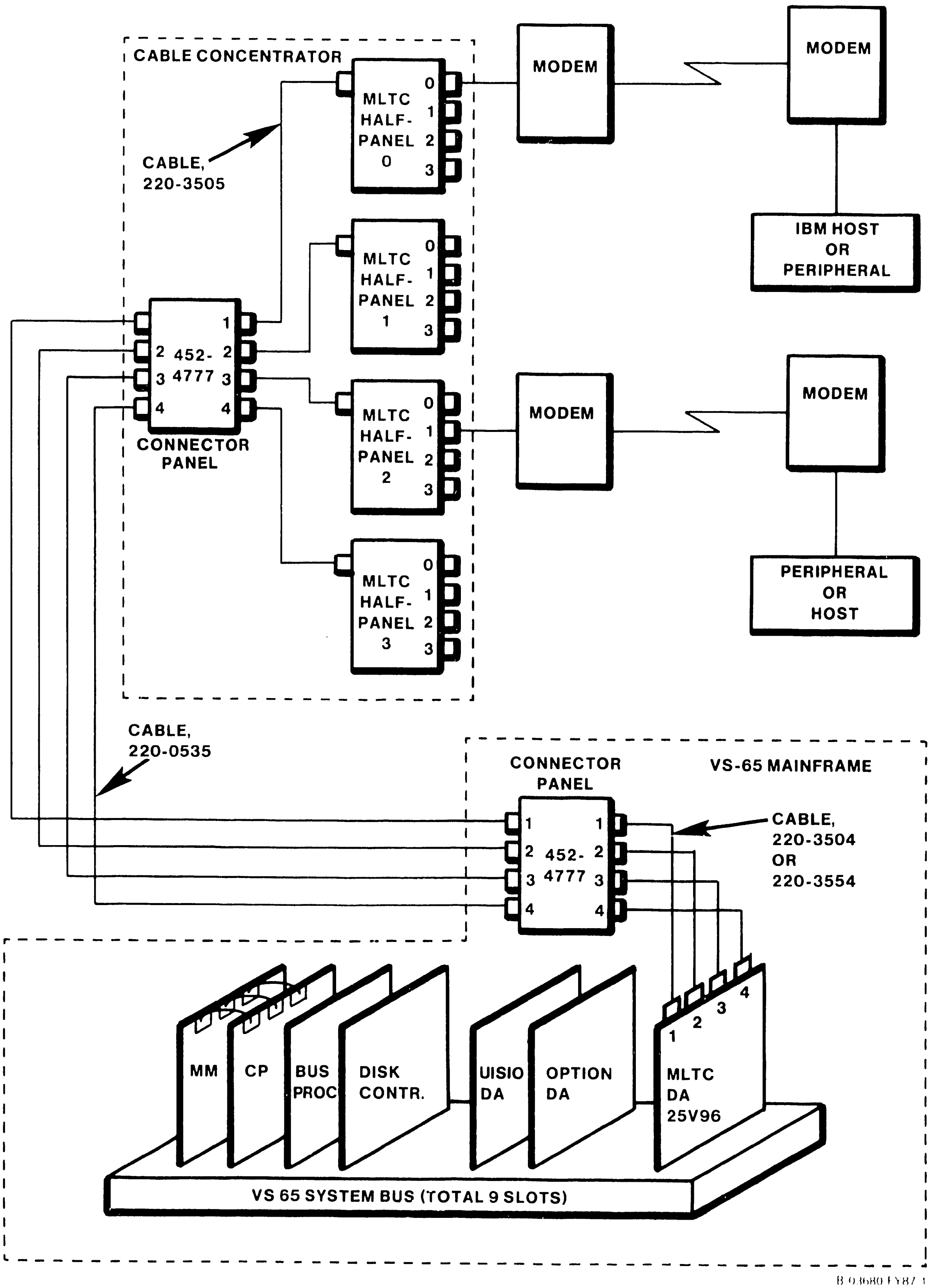


Figure F-1. MLTC Operational Block Diagram (16 lines)

The cable concentrator provides the rear panel space and power required by the MLTC half panels. Each MLTC half panel supports four communications line labeled 0-3. MLTC half panel 0 (MLTC0) supports MLTC lines 0-3, MLTC half panel 1 (MLTC1) supports MLTC lines 4-7, MLTC half panel 2 (MLTC2) supports MLTC lines 8-11 and MLTC half panel 3 (MLTC3) supports MLTC lines 12-15.

F.3.1 MLTC DA FUNCTIONAL DESCRIPTION

The MLTC is an intelligent device controller. It features two 16-bit microprocessors with common 128K byte (future 512K byte) memory and a gate array device for VS interface. An 80186 Link CPU is responsible for real-time communications housekeeping, while an 80286 DA CPU will be used to process the upper layers of the communication protocols. Two discrete DMA Controllers can access the common memory. One DMA controller (VS DMA) handles 16-bit transfers to and from the VS bus. The other DMA controller (SCC DMA) handles 8-bit transfers to and from the half panel Serial Communications Link (SCL) board.

The Link CPU handles control of the SCC Chips and associated hardware. The IOC CPU handles data management and VS I/O bus related tasks. As part of the IOC CPU data management tasks, it initializes the MLTC when power is first applied. The IOC CPU loads and runs the diagnostic BIT test to verify the MLTC hardware and then loads the Initial Program Load (IPL) instructions to MLTC memory. Both CPUs can service most devices on the MLTC with the exception that only the Link CPU can service a SCC device request. Both the Link CPU and IOC CPU have access rights to the memory bus and the peripheral bus (P Bus). Bus rights must be granted to the requesting device.

The gate array device provides the interface between the MLTC DA and the small VS Bus Processor system I/O bus and data bus. The gate array device contains the circuitry to support the device adapter I/O decode, BP I/O decode, DMA Flow control, DMA registers and byte counters, VS Main memory address register, and the BP Data Ram Address register. All messages, data, and error detection and status between the VS and the MLTC DA are processed through the gate array device.

The PROM and Memory logic consists of two 8K x 8-bit PROMS and 128K x 8-bit RAM with parity. The PROM contains the instructions for diagnostic programs and the bootstrap loading for IPL. The RAM contains the programs and memory space required for MLTC operations. The IOC CPU, Link CPU, SCC DMA and VS DMA have access to RAM memory. Prior to any of these devices having RAM access, the memory arbitration logic must grant access. The Link CPU and IOC CPU can perform 8- and 16-bit data transfers, the SCC DMA can only perform 8-bit data transfers and the VS DMA can only perform 16-bit data transfers.

The SCC DMA and Memory logic performs the data transfers between the SCC devices (located on the SCL) and the MLTC memory. All SCC DMA transfers involve two cycles; a SCC device access cycle and a memory access cycle. The SCC scanner circuitry monitors each SCL and SCC device (channel A and B) for a pending service request. Once a service request is found, the SCC DMA logic requests access to the bus. When bus access is granted, the SCC DMA circuitry performs the DMA transfer.

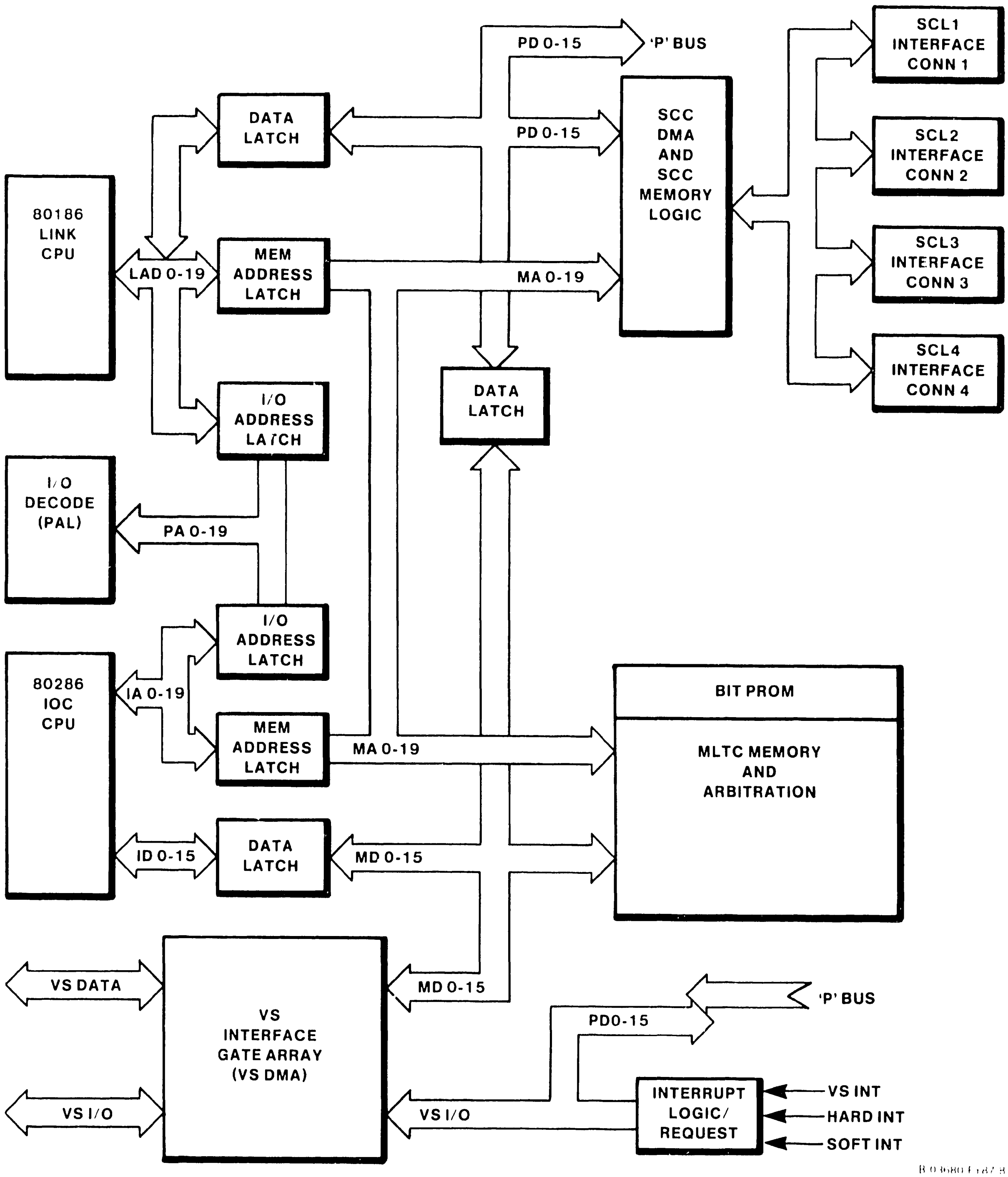


Figure F-2. MLTC DA Functional Block Diagram

The I/O Decode logic consists of number of Program Array Logic (PAL) devices under the control of the Link CPU or IOC CPU. The latched peripheral address bus (PA0-19) is presented to the PAL devices. The PALs decode the address presented on the inputs and determines the corresponding type of I/O commands (ports). These commands control the transmission of commands and data between the MLTC and the VS system bus and, the transmission of data and commands between the MLTC and the SCL I/O devices.

The Interrupt Logic provides interrupt requests to the Link CPU and IOC CPU via three interrupt controllers. The IOC CPU interrupt controller (one) provides the interrupts to the IOC CPU. These interrupts are related to the interface between the VS and the MLTC. The Link CPU interrupt controllers (two) form a master/slave arrangement to generate interrupt requests relating to the MLTC on-board functions and the SCL panels. Memory parity errors are handled through the NonMaskable Interrupt (NMI) and are sent to either the IOC CPU or the LINK CPU depending which device has control of the bus when the error occurred. The SCC DMA and VS DMA memory parity errors are reported via the interrupt controllers to either the Link CPU or IOC CPU.

The SCL Interface Logic provides the MLTC with the connections to the SCL panels located on the cable concentrator. Data and control signals and their complements pass between the MLTC interface logic and the SCL panels via four separate balanced digital cables. Direction of the data transfer between the MLTC and the SCL panels is controlled by the Link CPU, IOC CPU or the SCC DMA device. The SCL interface logic provides many common signals as well as signals unique to each interface. These signals specify the SCL panel and SCC device on that panel when it requests interrupt service or when sampled by the SCC scanner logic for a pending DMA request.

F.3.2 SERIAL COMMUNICATIONS LINK (SCL) FUNCTIONAL DESCRIPTION

The SCL board contains the control and data line drivers/receivers and two dual channel Serial Communications Controllers (SCC) and parity-checking logic.

Data and control signals pass between the MLTC DA and SCL by a balanced digital cable (50-Pin) connected at SCL J1. This balanced cable carries the control and data signals and their complements and are presented to the SCL line drivers/receivers. The direction of data transfer between the SCL and MLTC DA controls whether the line drivers or receivers are enabled. When the MLTC Link CPU or SCC DMA requests a write data to the SCC chip, the line receivers are enabled. When the MLTC Link CPU, or SCC DMA request a read from the SCC chip, the line drivers are enabled.

When data is transferred between the SCL and the MLTC, both generate a parity bit (odd). The value of the SCL parity bit is compared with the value of the MLTC generated parity bit. If the values are different, the MLTC Link CPU receives a parity error interrupt request forcing an interrupt.

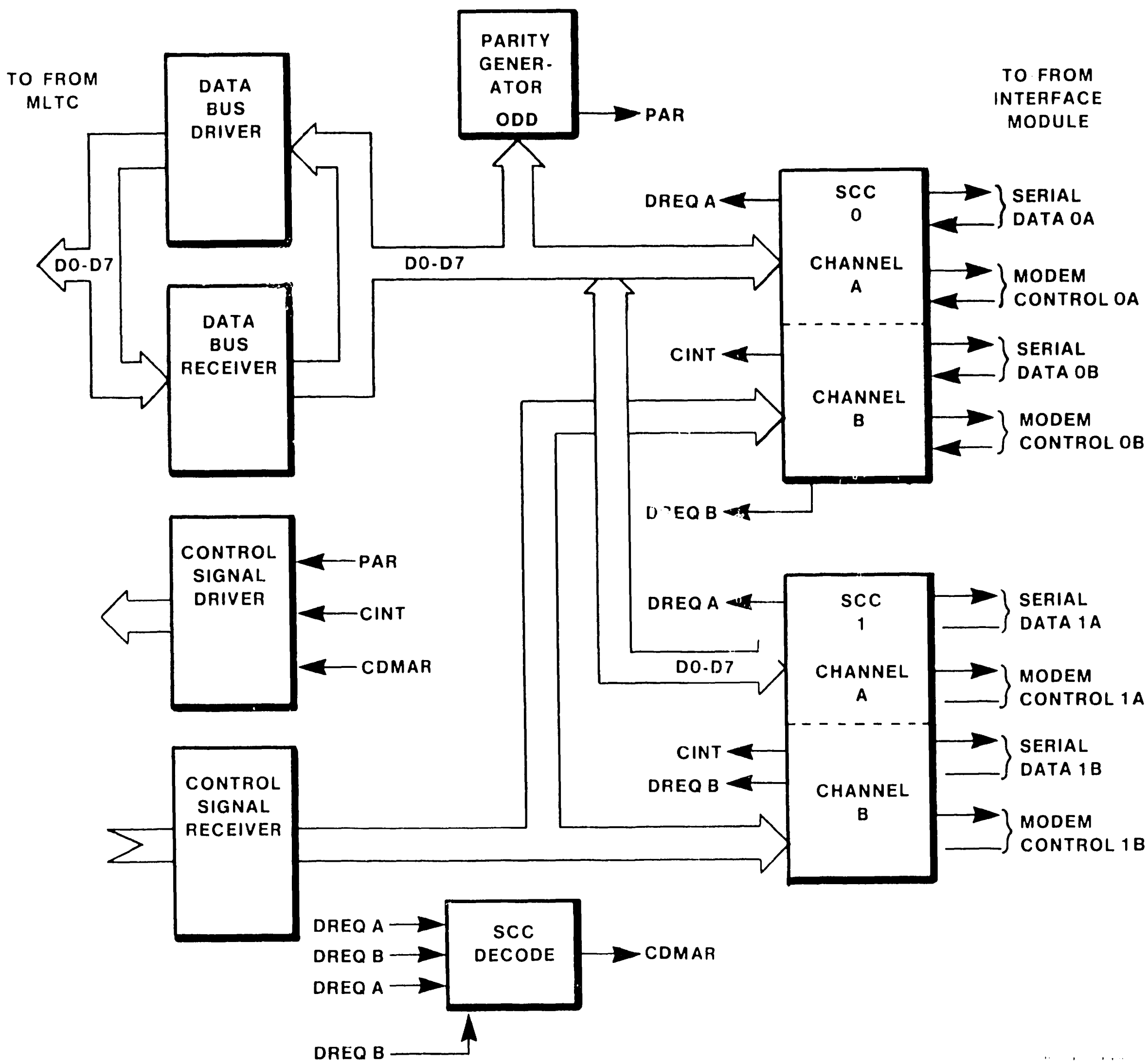


Figure F-3. SCL Functional Block Diagram

SCC chips are dual-channel, multi-protocol data communications devices that function as serial-to-parallel and parallel-to-serial converters/-controllers. The SCC chips are software programmable for either asynchronous or synchronous protocols and for the protocol format used. The SCC chips perform all the support functions required (baud rate, transmit clock, data format, etc.) as programmed for the application being run.

Each SCC chip supports two RS-232 interface modules, for a total of four RS-232 interface modules per SCL. When the MLTC Link CPU requests to send data to an external device, the CPU enables the SCC device and associated channel. CPU data is then sent to the SCC in 8-bit parallel format. The SCC chip converts the data into the pre-programmed data format and performs the interface transactions with the external device via the RS232 interface module.

External devices can interrupt the SCC chip by asserting either Ring Indicator, Data Set Ready, or Data carrier Detect signal. The SCC chip will asserts its interrupt request signal and presents it to the MLTC DA Link CPU along with the SCC channel DMA request number. This number allows the CPU to determine the SCL panel (1 of 4) and the SCC device (1 of 8) that initiated the request. Once the device is determined, the serial data from the external device is received by the SCC chip and converted to the format required (8-bit parallel) by the CPU.

F.3.2.1 RS232-C INTERFACE MODULE FUNCTIONAL DESCRIPTION

Four RS232-C Interface Modules are supported by one SCL. The modules are connected to the SCL by the Block Connectors. The RS232-C Interface Module contains the RS232 Driver/Receiver board (210-8494) which includes the physical RS232 'D' connector and two 4-LED displays.

Logic on the board provides for diagnostic loopback testing and BIT error detection via the LED display (LED2-4). The LEDs also provide a visual indication of TC activity.

F.4 INSTALLATION

This section describes the procedures for unpacking, inspecting, and installing the 25V96-8/16 MLTC in the VS-65 mainframe. Included in this section are instructions for MLTC interconnection.

NOTE

For installation of half panels in the Small Cable Concentrator, refer to the Small VS Cable Concentrator Product Maintenance Manual.

F.4.1 UNPACKING

1. Inspect shipping containers for damage (crushed corners, punctures, etc.).

2. Open the containers and remove the DA, cables, and half panel. Save all packaging material for reshipment, if necessary.

3. Check all packing slips to make sure that the proper equipment has been delivered. Make sure nothing is damaged.

F.4.2 CLAIMS INFORMATION

If damage is discovered during inspection, notify your manager.

F.4.3 MINIMUM REQUIREMENTS

F.4.3.1 Operating System

VS Operating System 7.13, or higher.

F.4.3.2 Diagnostics

1. Built-In-Test (BIT) - WLI P/N 195-5279-D, Revision 5680.
2. Small System Diagnostic Monitor Package - WLI P/N 195-2458.
3. TCTESTER - WLI P/N 195-5181

NOTE

TCTESTER requires VS Operating System 6.40 with WSN Rev. 8.21 or later.

F.4.4 MLTC DA INSTALLATION

1. Press Control Mode button on Front Panel and 'Unready' the external disk drives. Power down the external drives.
2. Power down the mainframe by pressing the ac power On/Off switch to the Off position.
3. Remove the mainframe top cover.
4. Before installing the MLTC DA (210-8827), check the 8-position Diagnostic switch at SW1 (figure F-4).
5. Set the MLTC I/O decode jumpers (JP4-JP11) to address 0600. In the event address 0600 is being used, set the MLTC I/O decode jumpers to address 0500 or 0300 (figure F-5).
6. Make sure the DA's component side is facing right when viewed from front of the mainframe, and insert the DA into an available motherboard slot.

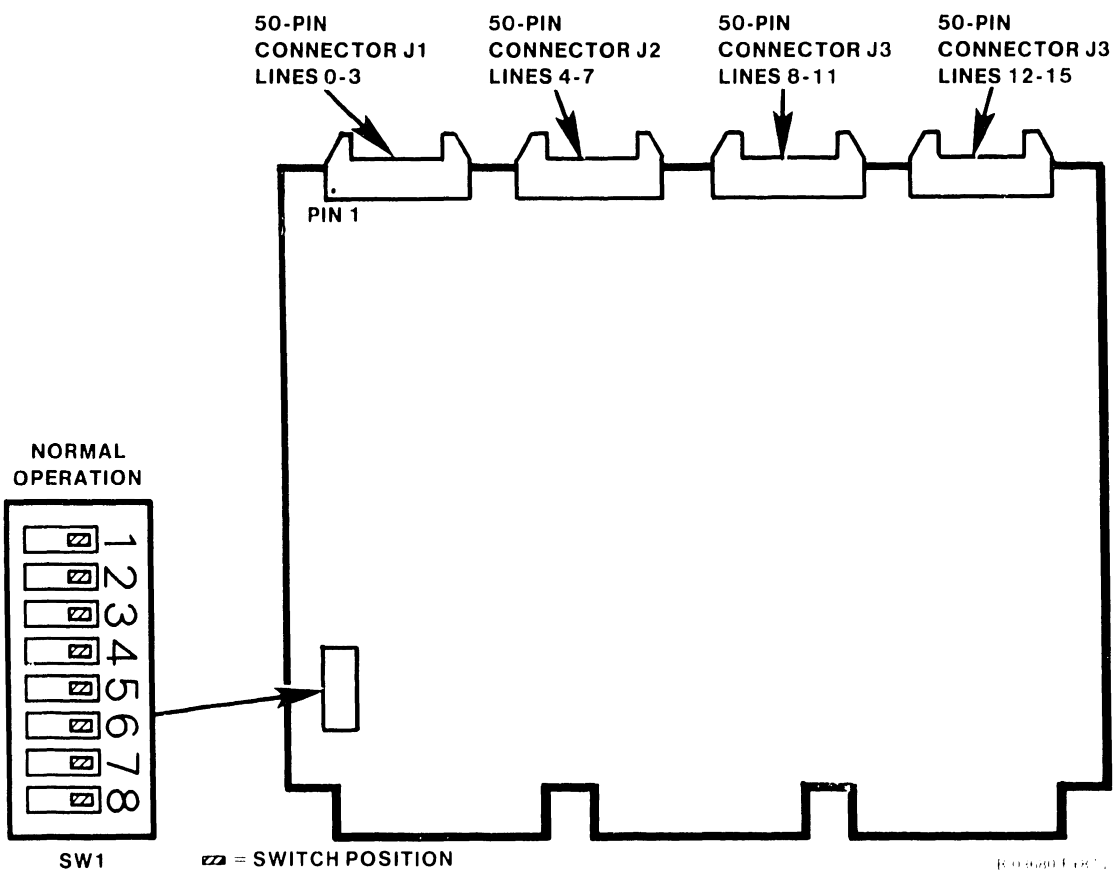


Figure F-4. 25V96 MLTC DA Switch Settings

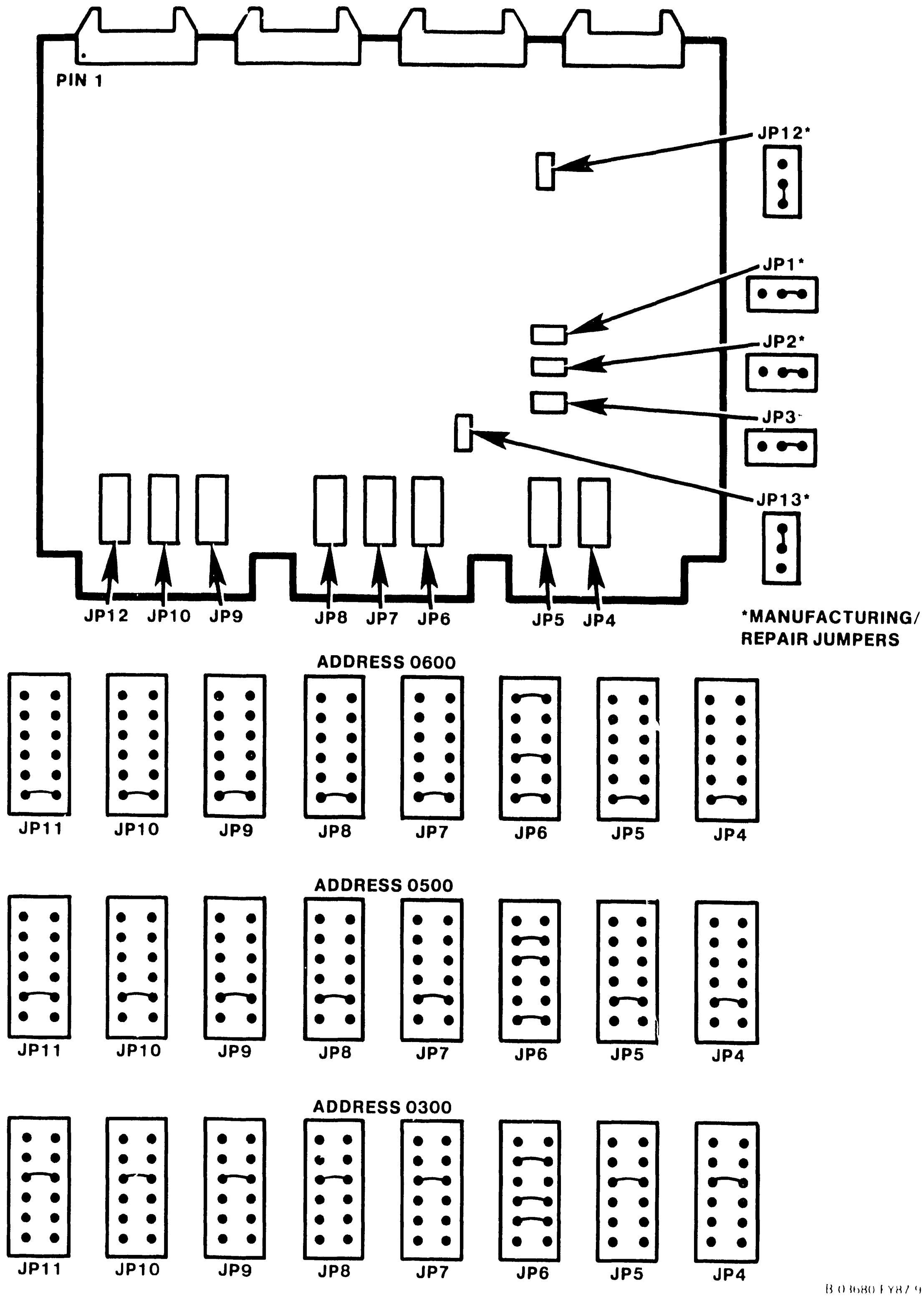


Figure F-5. 25V96 MLTC DA Jumper Settings

F.4.5 VS CABINET CONNECTOR HALF PANEL INSTALLATION

1. Install the 4-Connector half panel (WLI P/N 452-4777) in a blank half panel location on the rear of the mainframe. (Figure F-6.)

NOTE

Half panels are interconnecting. Right-most half panels must be loosened to remove left adjacent half panel (see inset).

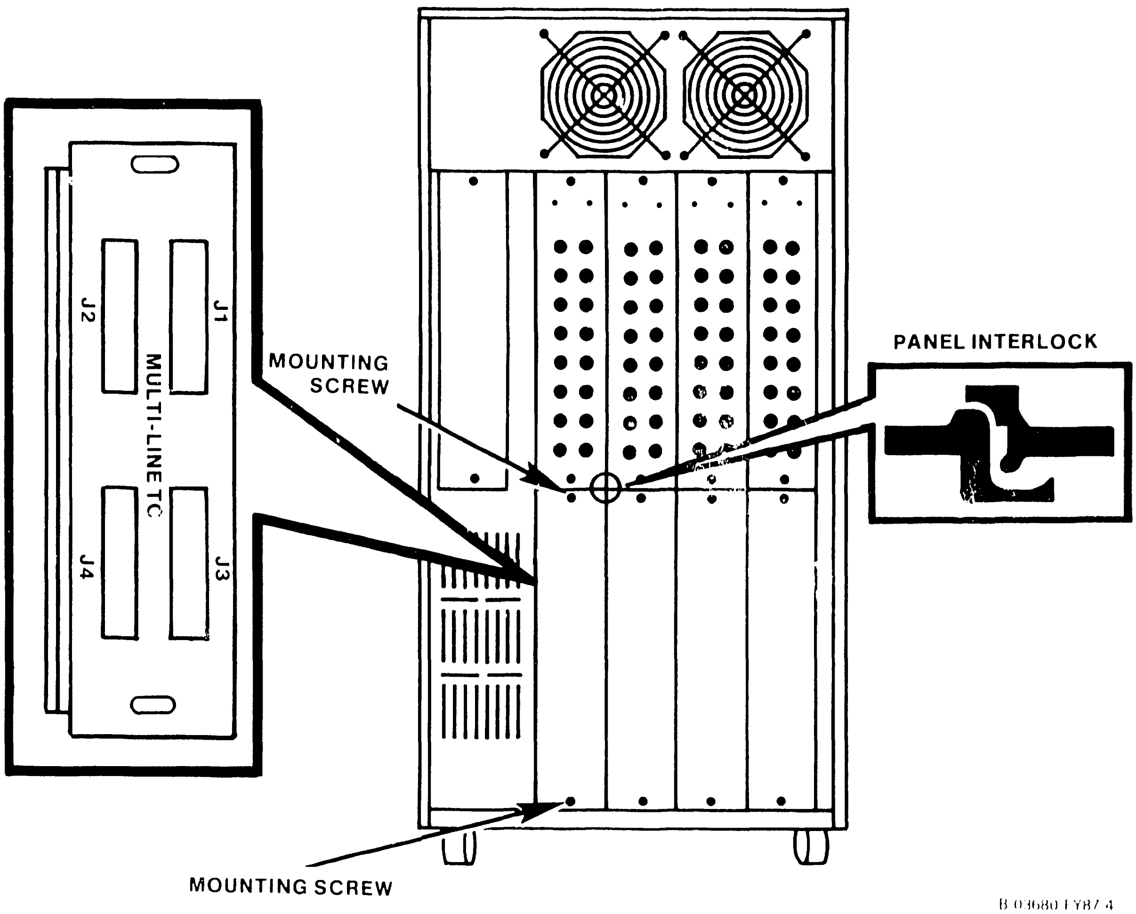


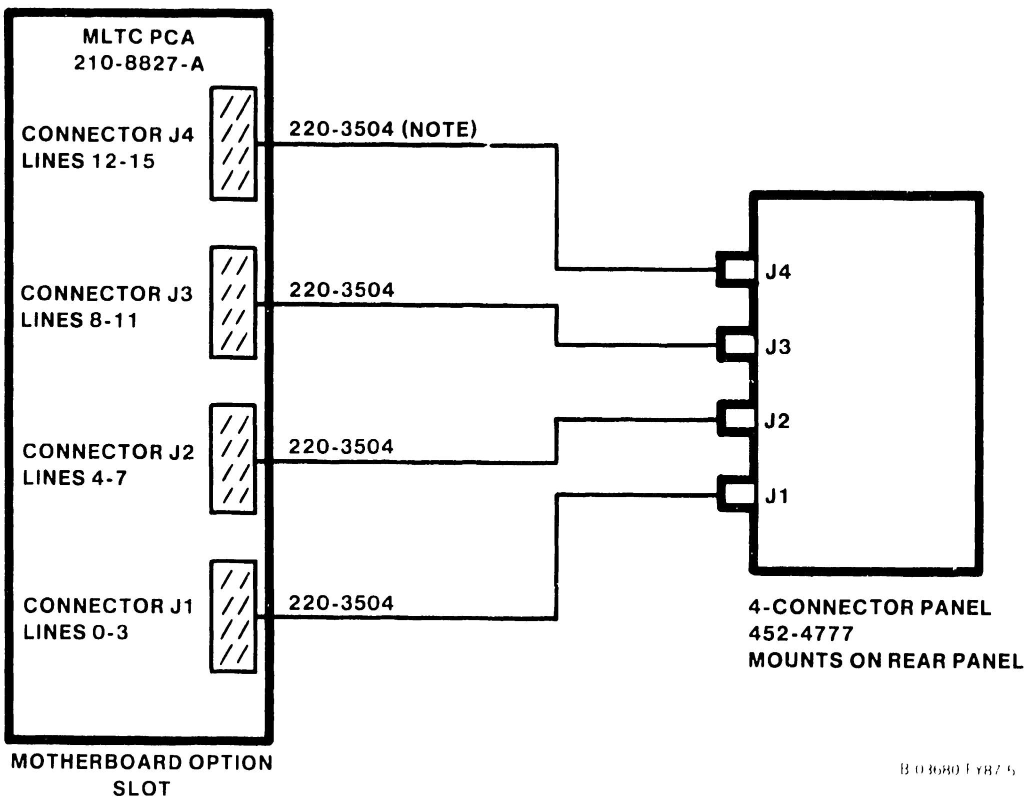
Figure F-6. VS Cabinet 4-Connector Panel (452-4777) Installation

F.4.6 VS-65 MLTC HALF PANEL INSTALLATION

Due to present VS-65 power restrictions and physical rear panel space, the MLTC half panel must be mounted in the Small VS Cable Concentrator. Refer to the Small Cable Concentrator Product Maintenance Manual for installation and cabling procedures.

F.4.7 MLTC DA INTERNAL CABLING

MLTC DA internal cabling consists of cabling between the MLTC DA connectors J1-J4 and the cabinet-mounted connector half panel (figure F-7).



NOTE

Cable part number 220-3504 (ribbon) can be replaced with cable part number 220-3554 (round).

Figure F-7. MLTC Internal Cabling (Schematic Representation)

F.4.8 EXTERNAL CABLING

External cabling requires one cable per connector installed between the cabinet-mounted connector panel and the small cable concentrator mounted connector panel (figure F-8). Cable corresponding connectors, i.e. cabinet-mounted connector panel connector J1 to concentrator-mounted connector panel connector J1. Tighten cable captive screws to the stand-offs provided on the connector panels.

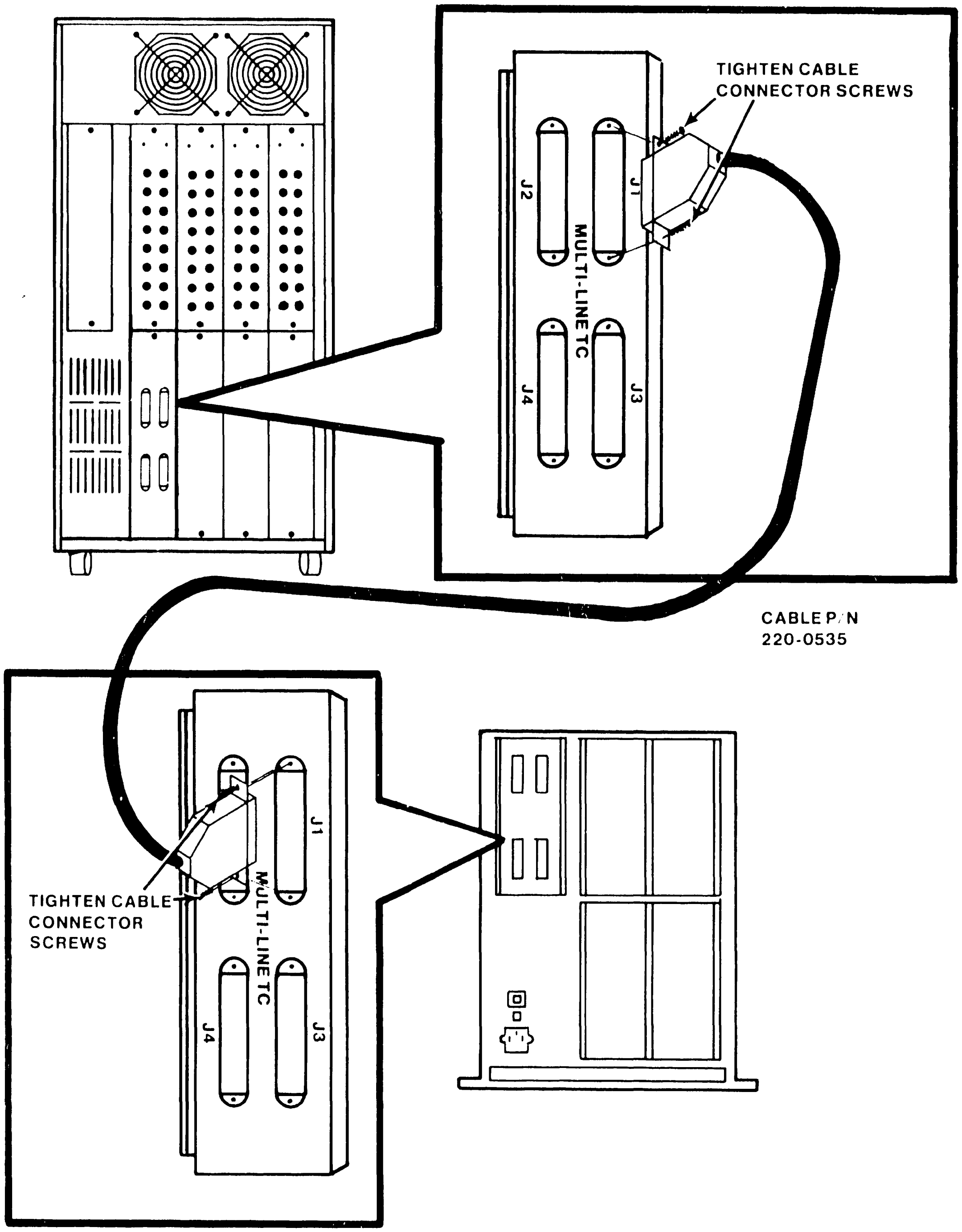


Figure F-8. External Cabling

F.4.9 MLTC HALF PANEL INDICATORS

All MLTC indicators are LEDs mounted on the MLTC half panel in the cable concentrator. Table F-1 shows EIA (Electronic Industries Association) interchange signals between the modem and the MLTC controller. All LEDs are normally on or blinking during MLTC Built In Test (BIT). If the BIT fails, the software controlled LED will go off.

Table F-1. Multiline TC Half Panel Displays (RS-232 Operation)

Indicator Name	Purpose
LED2-1	Data Set Ready
LED2-2	Data Terminal Ready
LED2-3	Carrier Detect
LED2-4	Software Controlled
LED1-1	Transmitted Data
LED1-2	Request-to-Send
LED1-3	Clear-to-Send
LED1-4	Received Data

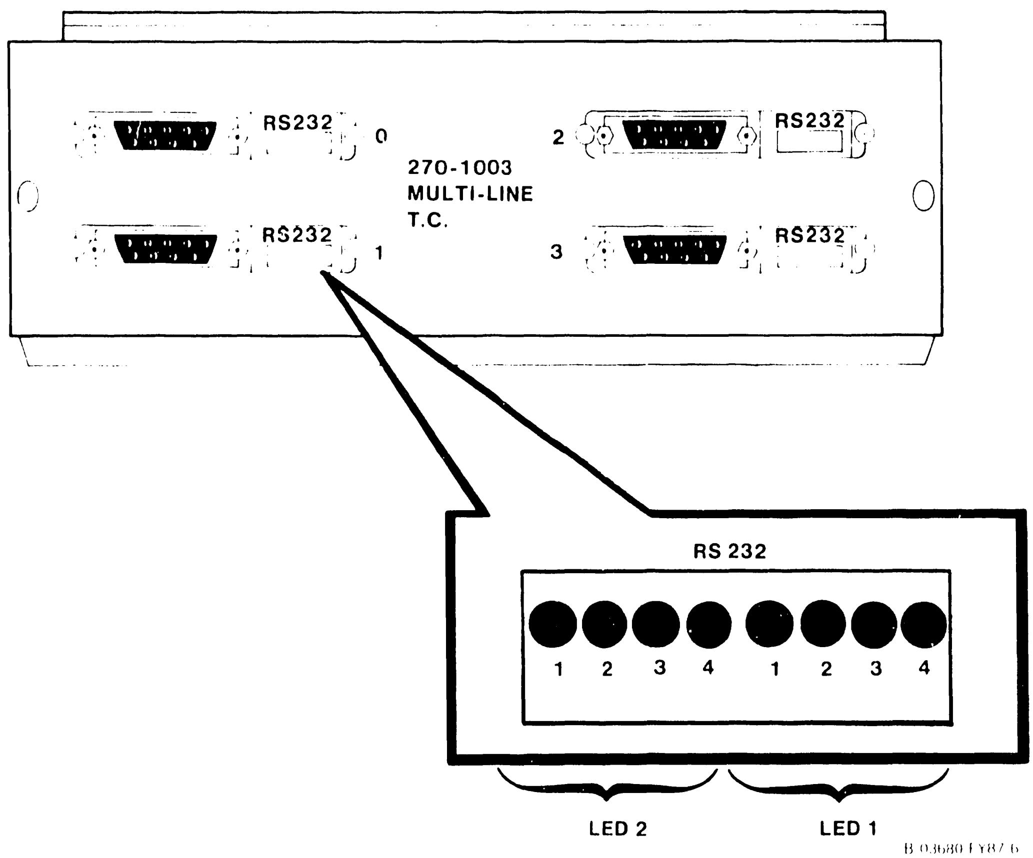


Figure F-9. RS232-C Interface Module Indicators

F.4.10 INITIAL POWER-UP

The MLTC option requires Operating System 7.13 or higher. Ensure the correct operating system is loaded on the system drive. This procedure is written for the system drive being an external drive. If the system drive is an internal drive, perform the procedures contain in brackets [ ].

1. Power-Up the external disk drive that contains the system file. The drive should be in the 'Not Ready' state. Power-Up Workstation 0 (WS0).

2. Position the VS-65 keyswitch to the local position and set the Boot device switch to the down (External) [Center, Internal] position. Power-up the mainframe.

3. Make Ready the external system drive.

4. The power-on procedure will begin to run. When the Self-Test Monitor and IPL Drive Select screen appears on WS0, position the cursor next to the IPL volume name and press ENTER.

5. When the SYSGEN screen is displayed, either select the configuration file name or enter a valid configuration file name in the SYSFILE field. Specify the communications configuration file and library if applicable. Press ENTER to continue the power-on sequence.

6. The Time and Date screen will be displayed. Enter the current time and date and press ENTER. The IPL screen will be displayed.

7. When the system initialization is successfully completed, the operators console will be displayed. When the message 'Queue Verification Routine Complete' is displayed, press PF1 to return to User mode. The VS Logon screen will be displayed.

8. Enter a Valid User ID and password and press ENTER. The Command Processor Screen will be displayed.

9. Press PF1 'RUN Program and Procedure' and run program 'GENEDIT'. Create a new configuration file to support the MLTC. Declare the MLTC as 25V96.

10. Save the new GENEDIT file (rename if required). Press Control Mode and 'Unready the External system drive'. Power down the mainframe.

11. Re-IPL the system following steps 3 and 4 above. When the SYSGEN screen is displayed, either the newly created configuration file name (step 10) in the SYSFILE field. Press ENTER to continue the power-up procedure.

12. When the VS Logon screen is displayed, a successful IPL has been completed.

F.5 MAINTENANCE

This section contains removal and replacement procedures for the MLTC DA and disassembly procedures for the concentrator-mounted MLTC half panel.

NOTE

For removal and replacement of the MLTC half panels, refer to the Small Cable Concentrator Product Maintenance Manual.

F.5.1 25V96-8/16 (210-8827) MLTC DA REMOVAL AND REPLACEMENT

1. Press the Control Mode button on the Control Panel and 'Unready' the external disk drives. Power down the external drives.
2. Power down the mainframe by pressing the ac Power On/Off switch to the Off position.
3. Remove the top cover.
4. Note the position of all cables connected to MLTC DA and remove.
5. Remove DA from the mainframe.
6. Check the switch setting of the 8-position Diagnostic switch SW1 and the position of the jumpers at JP4 - JP11 on the new DA (figure F-4).
7. Install the new DA and reconnect all cables.

F.5.2 MLTC HALF PANEL DISASSEMBLY PROCEDURES

The MLTC half panel assembly (figures F-10) includes one 270-1004 SCL Assembly consisting of a 210-8496-A Serial Communications Link (SCL) board and a 452-4759 mounting panel, fou: Interface modules and two 210-8497 Block Connectors.

1. Power-down the cable concentrator and remove front cover. Disconnect the MLTC signal cable from connector J1 and DC power cable from connector J2.

3. Remove the two screws securing the MLTC half panel to the concentrator. Remove the half panel.

4. Remove the two Block Connectors.

5. Remove two screws that secure each Interface Module to the mounting panel.

NOTE

Do Not Remove the SCL PCA from the Mounting Panel. The complete subassembly is field replaceable.

6. Reassembly the MLTC Half panel by reversing steps 1-5.

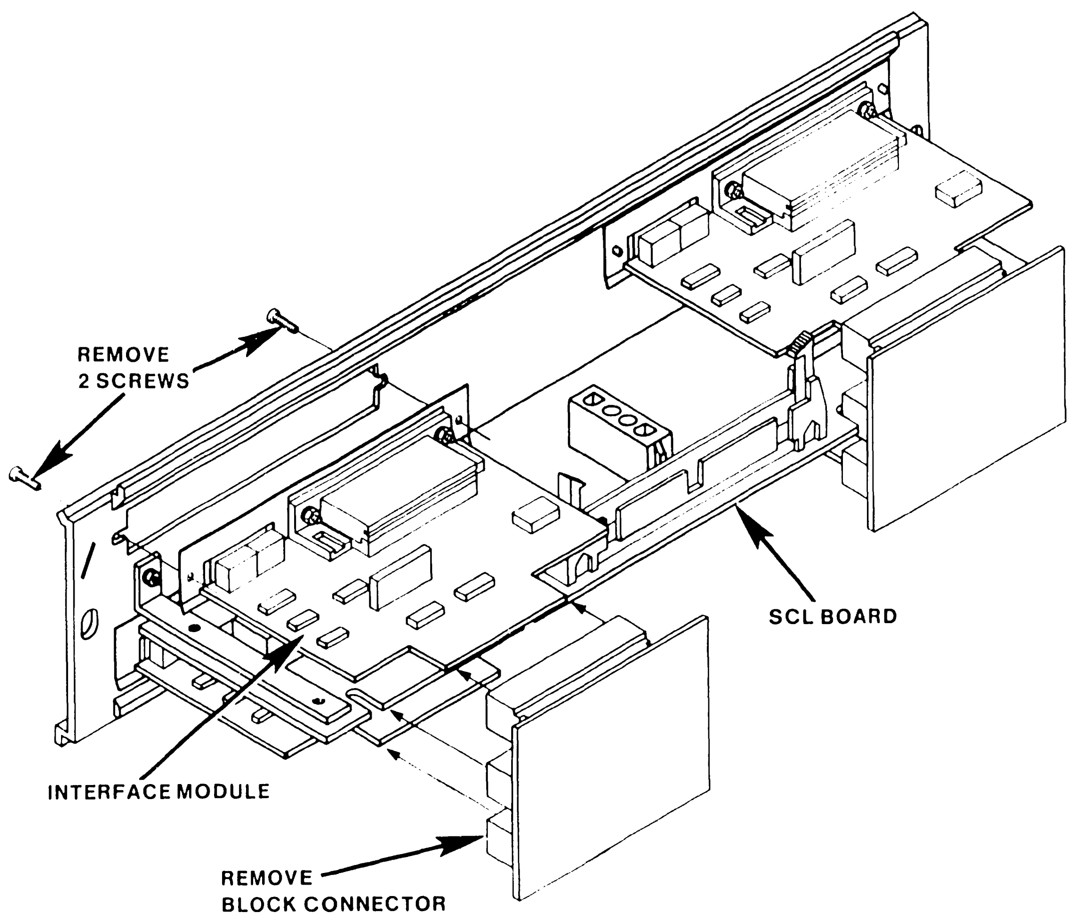


Figure F-10. MLTC Half Panel Assembly

F.6 TROUBLESHOOTING

Three types of diagnostics are available for the MLTC: BIT (Built-In-Test), On-line (TCTESTER), and Off-line (Small System Diagnostic Monitor Package).

F.6.1 MLTC BIT

MLTC BIT PROMS (WLI P/N 195-5279-D, Revision 5680) include power-up diagnostics and support routines and test options.

Power-up diagnostics run each time the VS-65 is powered-up or IPL'ed. The diagnostics run concurrently witl the BP power-up BIT test and verifies that the MLTC DA major circuitry (with the exception of the off-board serial data drivers) is operable. If an error condition occurs, error code (0050-005F) is reported to the front panel LEDs via the Bus Processor and the half panel software controlled LED will go out.

MLTC BIT also provides the following diagnostic switch selectable support routines:

Test One Channel Mode

Test One Channel Mode routine provides a loopback test on any one of the 16 channels. To run a loopback test, an RS-232 loopback connector (WLI P/N 421-0025) must be connected to the port being tested and the diagnostic switch SW1-5 must be set to Test One Channel Mode with the channel being tested selected using SW1-1 through SW1-4. (Refer to table F-2.)

Run-In Mode (Burn-In)

Run-In mode routine requires all 16 channels, with each channel having a loopback connector installed. To run this test, the diagnostic switch SW1-8 must be set to Run-In Mode [Burn-In] (refer to table F-2).

When enabled, this test will continue to run until an error is detected or the program is terminated by the operator. A detected DA error (0050-005F) will be reported to the front panel LEDs. If the error is SCL hardware related, the test number and channel number (0-F) will be alternately displayed.

Run BIT at Power-Up Only

Run BIT at Power-up Only Mode allows BIT to run at power-On only. Diagnostic switch SW1-7 must be set to Run BIT at Power-Up. (Refer to table F-2.)

Table F-2. 25V96 Multiline TC DA Diagnostics Switch Settings

S8 S7 S6 S5

S4	S3	S2	S1	Port Select (NOTE 1)
Closed	Closed	Closed	Closed	Select Port 0
Closed	Closed	Closed	Open	Select Port 1
Closed	Closed	Open	Closed	Select Port 2
Closed	Closed	Open	Open	Select Port 3
Closed	Open	Closed	Closed	Select Port 4
Closed	Open	Closed	Open	Select Port 5
Closed	Open	Open	Closed	Select Port 6
Closed	Open	Open	Open	Select Port 7
Open	Closed	Closed	Closed	Select Port 8
Open	Closed	Closed	Open	Select Port 9
Open	Closed	Open	Closed	Select Port 10
Open	Closed	Open	Open	Select Port 11
Open	Open	Closed	Closed	Select Port 12
Open	Open	Closed	Open	Select Port 13
Open	Open	Open	Closed	Select Port 14
Open	Open	Open	Open	Select Port 15

Select Single Channel Mode
Open - Single Channel Mode Selected (Enables S1-S4)
Closed - Single Channel Mode Disabled

Not Used

BIT Control
Open - Enables Run BIT at Power-UP Only
Closed - Normal IPL

Burn-In Mode
Open - Enables Burn-In Mode
Closed - Disables Burn-In Mode

NOTES

1. Switch 1-4 enabled by Switch 5 Open.
2. For normal power up, all switches must be Closed.
3. To select burn-in, switch 8 Open, all others Closed.

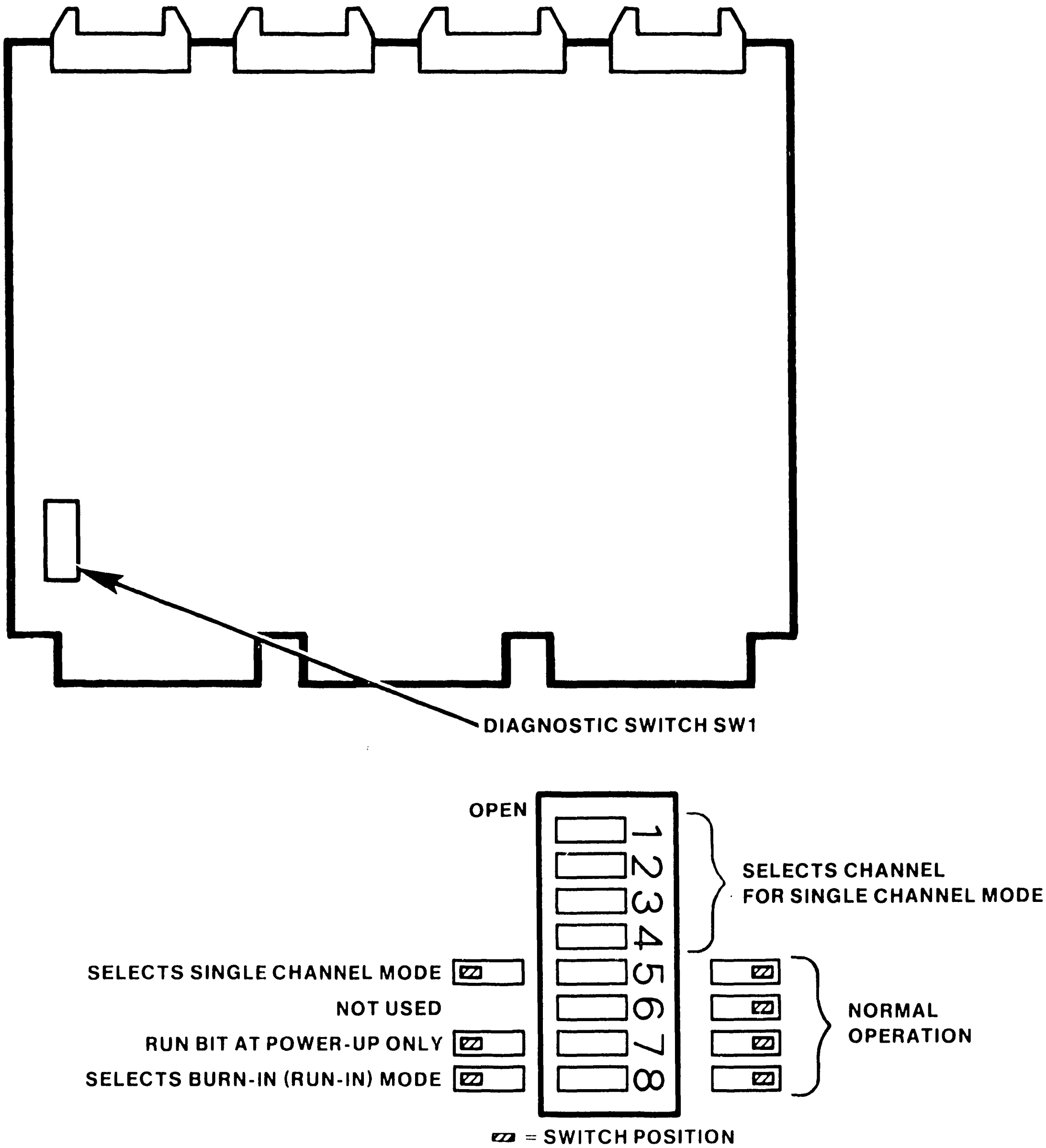


Figure F-11. 25V96 MLTC DA Diagnostic Switch

F.6.2 TCTESTER

On-line diagnostic TCTESTER (WLI P/N 195-5181), a single port exerciser, can be used to verify the individual lines connected to the MLTC. TCTESTER requires VS Operating System 6.40 with WSN Revision 8.21, or later. Refer to the TCTESTER Operating Procedures document.

F.6.3 SMALL SYSTEM DIAGNOSTIC MONITOR PACKAGE

Small System Diagnostic Monitor Package (WLI P/N 195-2458, revision ####), provides intensive off-line diagnostic programs that throughly tests the selected PCAs. Refer to the documentation included with Small System Diagnostic Monitor package.

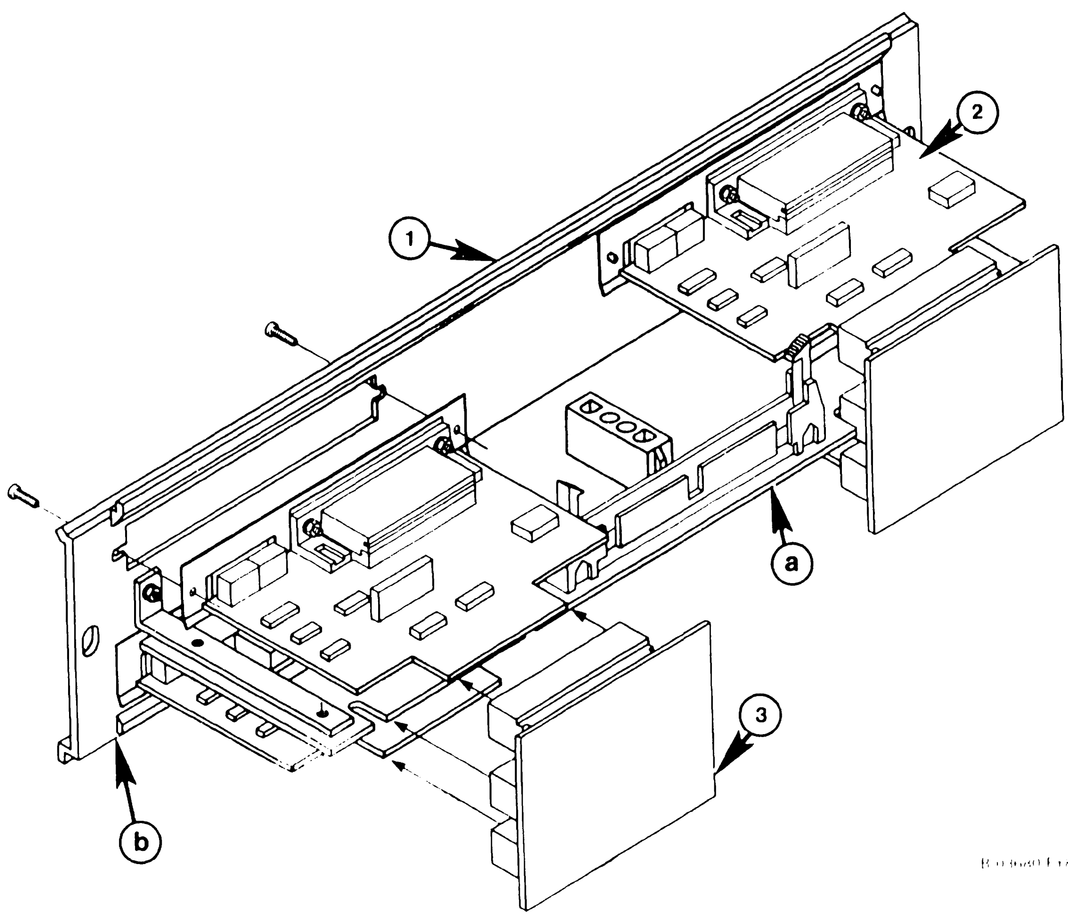
F.7 IPB

This section contains an illustrated parts breakdown for the MLTC half panel, and a listing of Field Replaceable Units (FRUs).

F.7.1 MULTILINE TC HALF PANEL PARTS BREAKDOWN

Item	Part Number	Description
1*	270-1004	Mounting Panel and SCL PCA Assembly
a	210-8496-A	Serial Communications Link (SCL) PCA
b	452-4759	Mounting Panel
2*	270-1010	RS232 Interface Module Assembly, 4 each Or
	270-1011	RS366 Interface Module Assembly, 4 each Or
	270-1012	RS449 Interface Module Assembly, 4 each Or
	270-1013	X.21 Interface Module Assembly, 4 each
3*	210-8497	Block Connector, 2 each

* denotes Field Replaceable Items



F.7.2 FIELD REPLACEABLE ITEMS

Part Number	Description
210-8827-A	MLTC Controller
452-4777	Half Panel; 4-Connector Mounts on cabinet rear panel assembly and VS-SM-CC
220-3504* 220-3554*	Cable; Ribbon, 50 Pin Soc-Soc, 60 in. or Cable; Round, 50 Pin Soc-Soc; 60 in. MLTC DA J1, J2, J3, J4 to VS-65 Connector Panel (452-4777)
220-0535	Cable; Round, 50 Pin External VS-65 Connector Panel to VS-SM-CC Connector Panel (452-4777)
220-3505* 220-3563*	Cable; Ribbon, 50 Pin Soc-Soc, 40 inches OR Cable; Round, 50 pin Soc-Soc, 40 inches VS-SM-CC Connector Panel to MLTC Panel SCL PCA Connector J1
220-2436	Cable; Power, 5 Pin to 'Y' 4 pin VS-SM-CC Power Supply Harness to MLTC Panel SCL PCA Connector J2

* denotes electrically identical cables

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