



**CDC® CONSOLE DISPLAY SUBSYSTEM
CC614, CW212**

GENERAL DESCRIPTION
OPERATION
INSTALLATION AND CHECKOUT
THEORY OF OPERATION
DIAGRAMS
MAINTENANCE
PARTS DATA

FIELD REPAIR GUIDE

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MANUAL TO EQUIPMENT LEVEL CORRELATION SHEET

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

EQUIPMENT TYPE	SERIES	WITH FCOs	COMMENTS
CC614-C CC614-D CW212-A	05 02 01		



LIST OF EFFECTIVE PAGES

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PREFACE

This manual provides maintenance information for the Control Data® CYBER 18 Console Display Subsystem. The information contained herein supports maintenance of the console display subsystem when it is incorporated in the CYBER 18 systems. The CC614 console display interfaces with the I/O-TTY controller.

The publication contains information to aid maintenance personnel in carrying out onsite maintenance tasks. The maintenance approach is to fault isolate using the

diagnostic decision logic tables (DDLTs) and to make repairs by using the removal/replacement procedures. Corrective action is accomplished by exchanging replaceable subassemblies rather than components. When repair cannot be accomplished by exchanging replaceable subassemblies, a support customer engineer is required.

The publications listed below provide more detailed information relative to equipments, systems, and subsystems.

<u>Publication</u>	<u>Publication Number</u>
751-10 Terminal Subsystem Hardware Maintenance Manual	62962300
751-10 Terminal Subsystem Operators Guide	62951400
AA132, AA133, AA153, DT120, FC402 CYBER 18 Computer Systems Central Processor Field Repair Guide	60475001
Basic Micro-Programmable Processor Hardware Maintenance Manual	39451400
CYBER 18 Computer Systems Overview Manual	60475000
CYBER 18 Computer Systems with MOS Memory Installation Manual	96768360
Operational Diagnostic System (ODS) Version 2 Reference Manual	96768410



PREFACE

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This publication contains information to aid maintenance personnel in carrying out onsite maintenance tasks. The maintenance approach is to fault isolate using the diagnostic

decision logic tables (DDLTs) and to make repairs by using the removal/replacement procedures. Corrective action is accomplished by exchanging replaceable subassemblies rather than components. When repair cannot be accomplished by exchanging replaceable subassemblies, a support customer engineer is required.

The publications listed below provide more detailed information relative to equipments, systems, and subsystems.

<u>Title</u>	<u>Publication No.</u>
CYBER 18 Computer Systems Overview Manual	60475000
CYBER 18 Computer Systems with MOS Memory Installation Manual	96768360
CW212-A I/O-TTY Controller Hardware Maintenance Manual	96728900
751-10 Terminal Subsystem Hardware Maintenance Manual	62962300
751-10 Terminal Subsystem Operators Guide	62951400
AA132, AA133, AA153, FC402, DT120 CYBER 18 Computer Systems Central Processor Hardware Maintenance Manual	60475001
Operational Diagnostic System (ODS) Version 2 Reference Manual	96768410

WARNING

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference with radio communications. As temporarily permitted by regulation, it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference. Operation of the equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

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The console display is a versatile input/output display device. The console display subsystem consists of a display terminal, keyboard, and an interface cable to connect with the processor. Figure 1-1 is an illustration of the console display.

The terminal sends manually-entered data information to and displays data information from the processor. The terminal emulates the KSR and ASR mode of operation of a teletypewriter, and displays sent or received information on the display screen. The terminal can display 24 lines at 80 characters per line of ASCII-coded data on its 12-inch (305-millimeter) (diagonal) cathode ray tube.

A basic typewriter alphanumeric keyboard that interconnects to the terminal serves as an operator entry panel to the processor. In addition, the keyboard contains an adding-machine-type numerical entry along with function control keys. Rocker-type switches and function indicators on the front panel of the terminal provide operator control of terminal-to-computer data communications. The test mode feature of the terminal provides a series of eight self-test operations; the test results are displayed on the screen. The I/O-TTY controller housed within the computer chassis (refer to the board (logic) replacement procedure in the processor manual for slot position) provides the serial data interface between the terminal and the computer. A single interface cable is used between the terminal and the I/O-TTY controller.

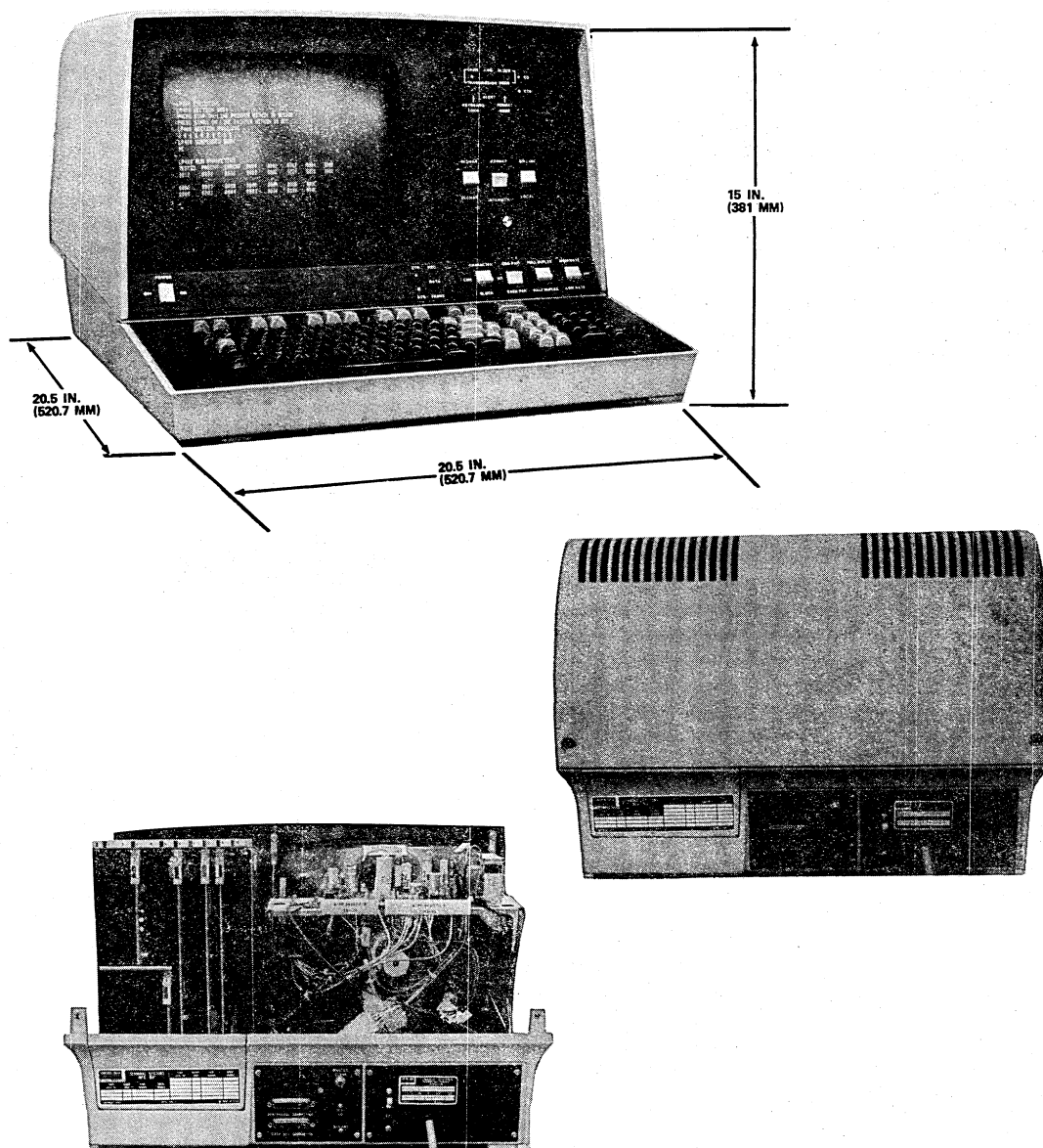


Figure 1-1. Console Display Physical Characteristics



This section contains descriptions of the operator controls and indicators contained on the console display equipment.

Figure 2-1 shows the location of the control switches and indicators in the front control panel of the console display. Figure 2-2 illustrates the location of the control switches on

the rear panel of the console display. Table 2-1 briefly describes the functions of the external switches and indicators.

The normal operation setting of both the external and internal switches of the terminal, along with the switch settings of the I/O-TTY controller are given in section 4.

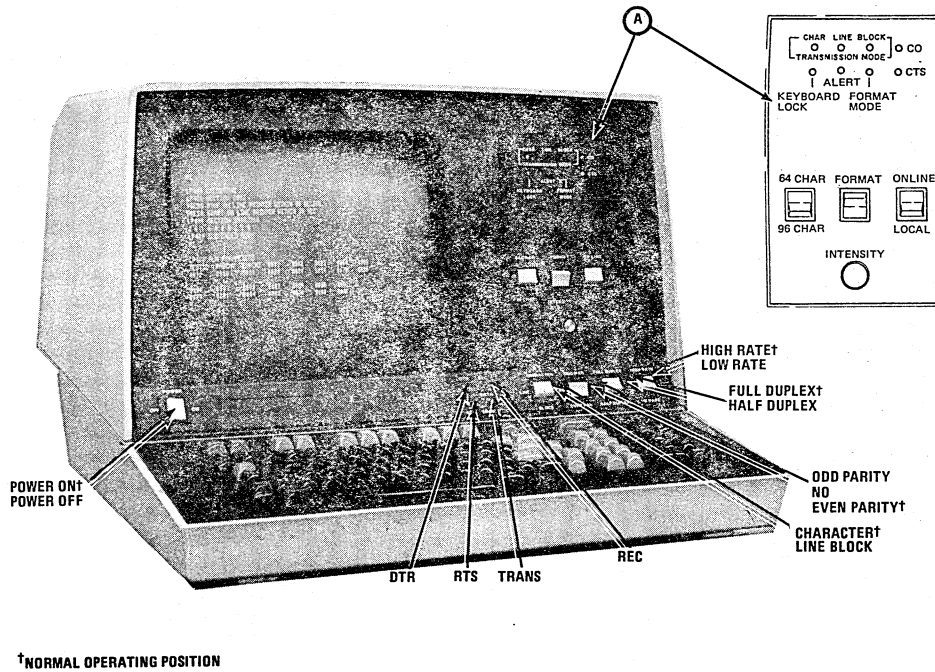


Figure 2-1. Console Display Front Panel Switches and Indicators

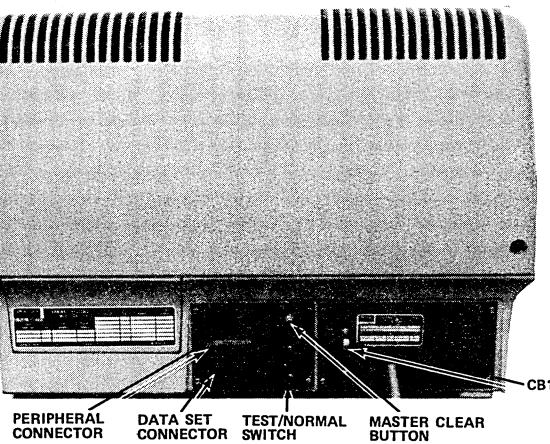


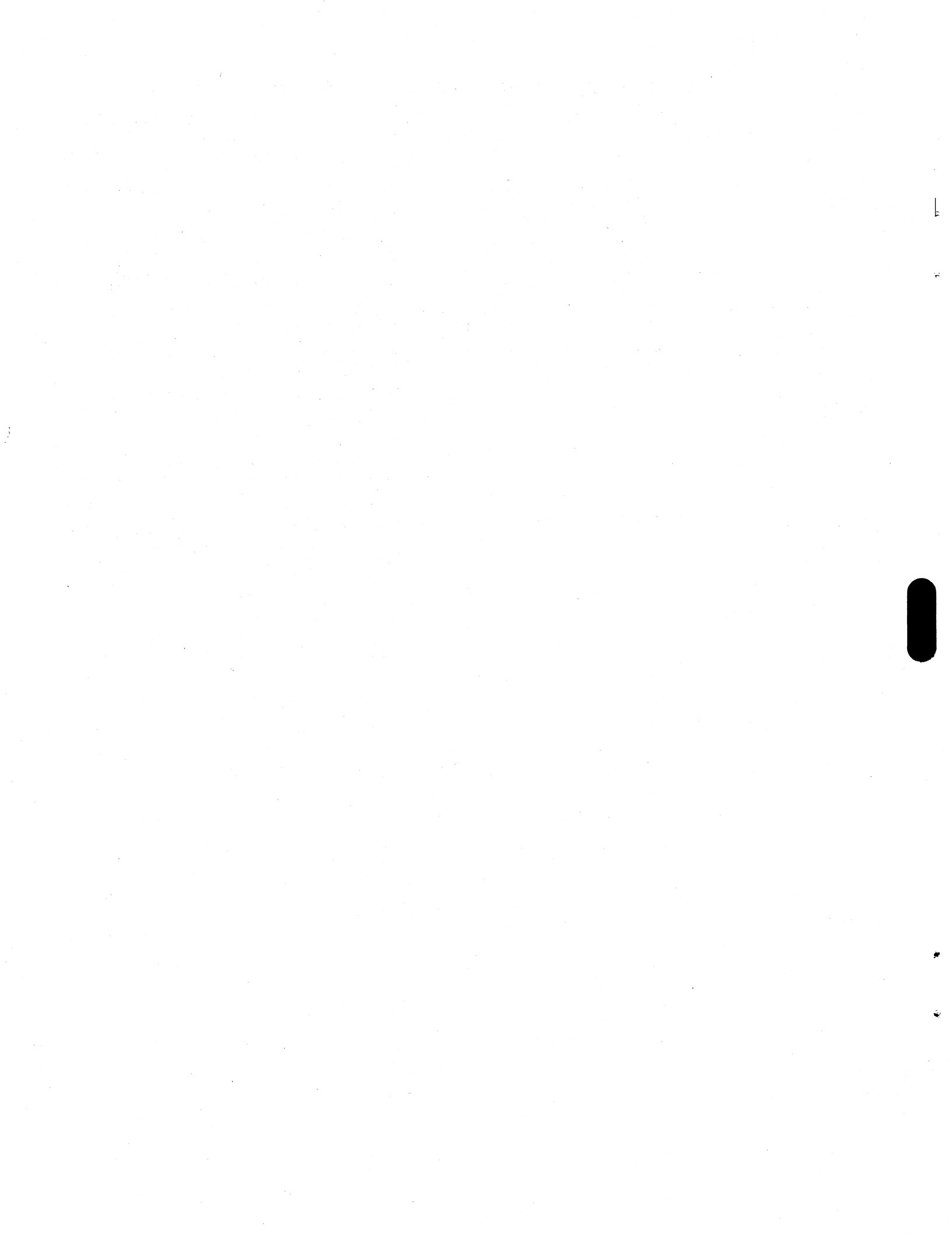
Figure 2-2. Console Display Connector and Ac Entry Panel

TABLE 2-1. CONSOLE DISPLAY CONTROLS AND INDICATORS

Control or Indicator	Type	Location	Function
POWER ON/OFF	Rocker switch	Front panel	Controls power application to the terminal when the terminal power cord is connected to the site power outlet and the circuit breaker CBI switch is set
TRANSMISSION MODE	3 indicators	Front panel	Indicates the position of the CHARACTER/LINE/BLOCK switch, except when the terminal is internally selected for batch mode
CO	Indicator	Front panel	Carrier on. Indicates that the communications interface (modem) is ready to receive data from an external device
CTS	Indicator	Front panel	Clear to send. Indicates that the communications interface (modem) is ready to transmit data from the terminal
KEYBOARD LOCK	Indicator	Front panel	Lights when the terminal keyboard is locked out (e.g., when the terminal is in the process of transmitting data). At this time, except for the peripheral control keys, no entries to the keyboard can be made.
ALERT	Indicator	Front panel	Lights upon detection of a communications line break at the modem interface circuitry
FORMAT MODE	Indicator	Front panel	Lights when the edit option is installed in the terminal and the FORMAT switch is in the FORMAT position
ON-LINE/LOCAL	Rocker switch	Front panel	In the ON-LINE position, connects the modem interface circuitry to the keyboard, memory, and display circuitry of the terminal. The LOCAL position disconnects the modem interface circuitry and allows information typed on the keyboard to be displayed.
FORMAT	Rocker switch	Front panel	In the FORMAT position, directs the operation of the CHARACTER/LINE/BLOCK mode switch
64 CHAR/ 96 CHAR	Rocker switch	Front panel	Selects only uppercase characters to be displayed when set to the 64 CHARACTER position. The 96 CHARACTER position allows the display of both upper and lower case characters. For batch terminal applications, should be set to the 64 CHARACTER position
INTENSITY	Potentiometer	Front panel	Rotating this control changes the video intensity of data displayed on the screen.
HIGH RATE/300/ LOW RATE	Rocker switch (3 position)	Front panel	A three-position switch that selects baud rates, internally preselected for high and low rates. In the center position, the terminal operating rate is fixed at 300 baud. For batch terminal applications, the high and low rates are set to 9600 baud.
FULL DUPLEX/ HALF DUPLEX	Rocker switch	Front panel	Selects whether the terminal transmits and receives serial data in the full or half duplex mode
ODD PAR/NO/ EVEN PAR	Rocker switch (3 position)	Front panel	Selects terminal odd or even parity operation. For batch terminal applications, should be set to the EVEN PARITY position. Center position is for NO parity.

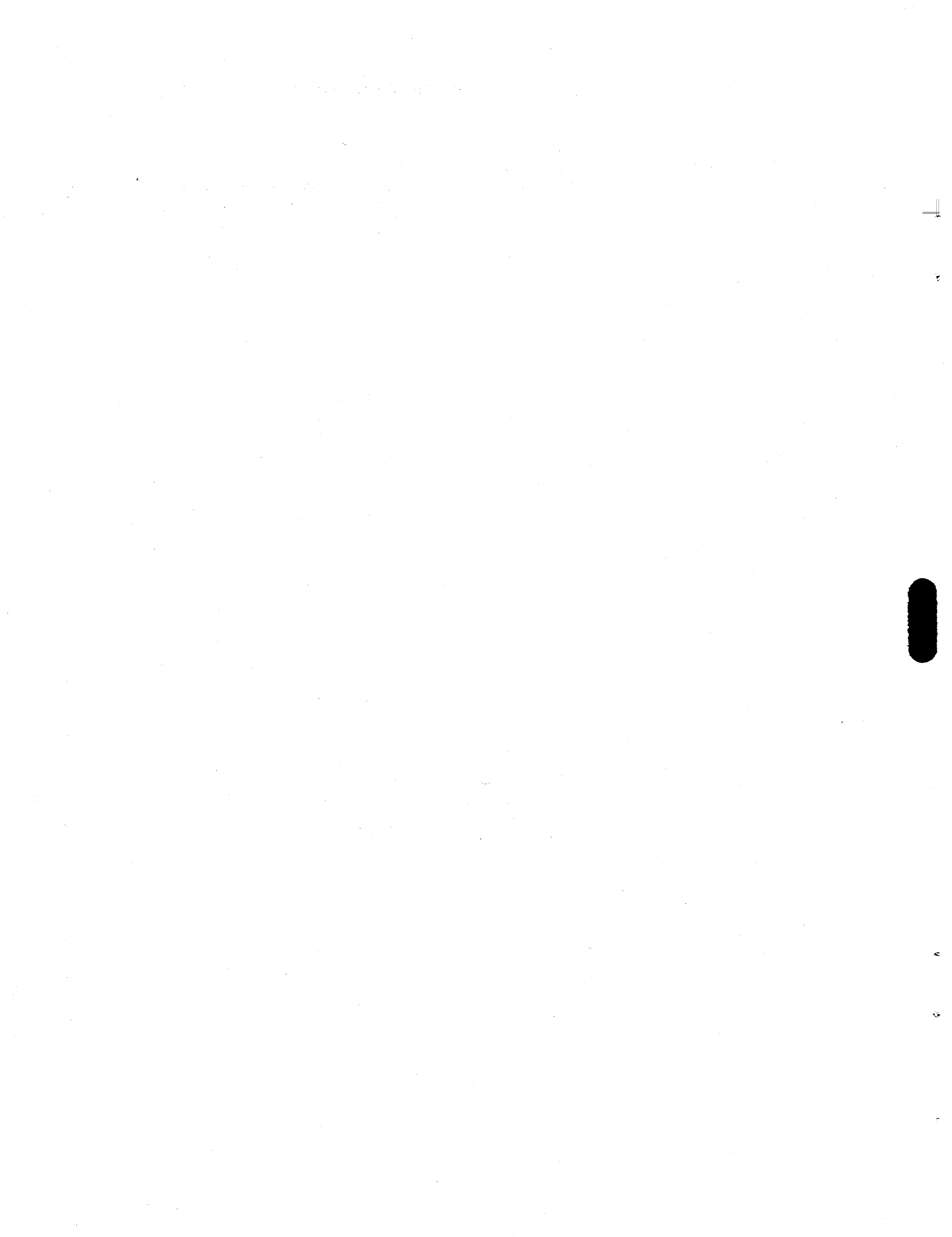
TABLE 2-1. CONSOLE DISPLAY CONTROLS AND INDICATORS (Contd)

Control or Indicator	Type	Location	Function
CHARACTER/ LINE/BLOCK	Rocker switch (3 position)	Front panel	Determines whether the terminal operates in character, line, or block mode as long as the FORMAT switch is in the FORMAT position. If the FORMAT switch is in the BLOCK position, the terminal is in edit mode.
REC DATA	Indicator	Front panel	Receive data. Indicates that data has actually been received by the communications interface (modem)
TRANS DATA	Indicator	Front panel	Transmit data. Indicates that data is actually being transmitted by the terminal
RTS	Indicator	Front panel	Request to send. Indicates that the terminal is prepared to transmit data
DTR	Indicator	Front panel	Data terminal ready. Indicates that the terminal is prepared to accept data from the communications interface (modem)
CBI	Toggle switch	Rear panel	This switch (circuit breaker) trips automatically if excessive power is drawn by the terminal. This switch must be in the set position for the POWER ON/OFF switch to function.
MASTER CLEAR	Pushbutton	Rear panel	When pressed, returns the terminal to the initial condition and clears the display. This switch must be pressed whenever the TEST/NORMAL switch is varied.
TEST/NORMAL	Slide switch	Rear panel	Selects either the test or normal operating mode of the terminal
Audible alarm	Indicator (audible)	Internal	Sounds to indicate proximity to the end of a line when keyboard data is being entered



Refer to the installation manual listed in the preface for information applicable to installing the console display

subsystem. Detailed instruction on initial system installation or adding new equipment to the system may be found in that manual.



This section contains a list of replaceable assemblies for the console display subsystem and a brief description of each replaceable assembly.

Illustrations of switch and jumper locations on the printed wiring assemblies are provided. Tables are also included that list the switch and jumper selections available and that designate the switch settings and jumper connections for normal operation.

REPLACEABLE ASSEMBLIES

Table 4-1 lists the replaceable assemblies of the console display subsystem. See section 7 for assembly and miscellaneous part numbers.

The following is a brief description of the replaceable assemblies of the console display subsystem. For additional details refer to the applicable hardware maintenance manual listed in the preface.

I/O-TTY CONTROLLER BOARD

This board provides signal interface control between the processor and the terminal (refer to the board (logic) replacement procedure in the processor manual for location).

See figure 4-1 for the location of the following assemblies within the console display.

VIDEO DRIVE BOARD

This board receives control and signal information from the refresh logic board for CRT deflection control and character display.

+5 V REGULATOR

This board regulates the ± 20 V received from the power supply to +5 V dc (10 amperes) for use by the logic module printed wiring assemblies.

REFRESH CONTROL BOARD

This board provides a regeneration of characters being displayed at either a 50 Hz or 60 Hz rate, depending on the ac input power frequency of the terminal.

RAM/ROM BOARD

This board contains a random-access memory (RAM) that serves as storage for the basic 960 displayable characters and temporary storage for the processor. In addition, it contains an erasable read-only memory (E-ROM) that provides operation execution direction (control firmware) to the processor circuit board.

TABLE 4-1. CONSOLE DISPLAY REPLACEABLE ASSEMBLIES

Replaceable Assembly	Assembly Type
I/O-TTY controller	PWA
Video drive board	PWA
+5 V regulator	PWA
Refresh control	PWA
RAM/E-ROM (memory)	PWA
Extended memory	PWA
Processor	PWA
Video module	Unit
Cathode ray tube	Unit
High voltage transformer	Unit
15 V regulator	Unit
Deflection yoke	Unit
Ac entry transformer	Unit
Ac entry panel	Unit
Power supply board	PWA
TEST MODE/MASTER CLEAR switch	Unit
Front indicator/switch panel assembly	Unit
Vertical choke coil	Unit
Keyboard module	Unit
Intensity control potentiometer	Unit
Bulk power supply	Unit
CHARACTER/LINE/BLOCK switch	Unit
Two-position switches	Unit
Audible alarm	Unit

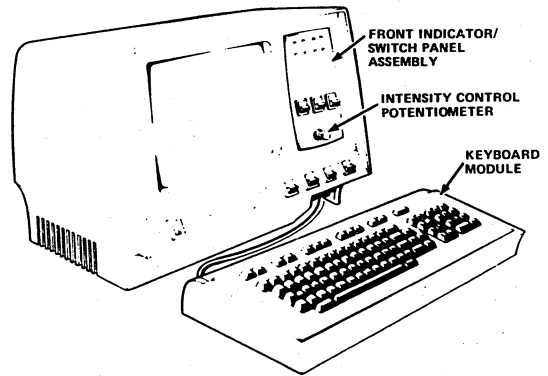
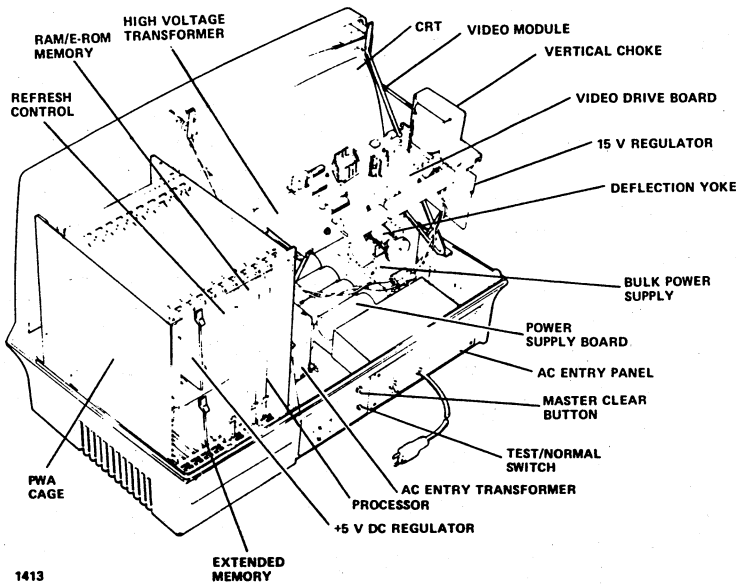


Figure 4-1. Console Display Physical Configuration

EXTENDED MEMORY BOARD

This board extends the storage capability of displayable characters of the terminal by an additional 960 characters. Along with the RAM/ROM board, this board provides a total displayable character capability of 1920 characters, a full 24-line display.

PROCESSOR BOARD

This board acts as the controlling element for all data and control signals internal and external to the logic module. The board contains an 8-bit/byte processor, a communication interface circuit for serial/parallel I/O operation, and a -5 V regulator circuit.

VIDEO MODULE

This module contains the cathode ray tube (CRT), video drive board, CRT mounting frame, and high voltage transformer.

CATHODE RAY TUBE

This device is the display element of the terminal. Information received from the video drive board is displayed on the screen of the CRT by an electron beam that is deflected at character and line increments.

HIGH-VOLTAGE TRANSFORMER

This unit develops the high voltage necessary to accelerate the electron beam from the gun elements of the CRT to its display screen.

+15 V REGULATOR

This unit provides +15 V dc regulation for video circuit drive requirements.

DEFLECTION YOKE

This unit deflects the electron beam, generated from the gun element of the CRT, in the horizontal and vertical direction on the display screen.

AC ENTRY TRANSFORMER

This unit generates ac source power to the console display power supply.

AC POWER PANEL

This unit contains the circuit breaker, connector, and ac input power cord, and supplies input power to the terminal.

POWER SUPPLY BOARD

This board provides the -9 V dc, 23 V dc, and -24 V dc used by the logic and control circuits of the terminal.

VERTICAL CHOKE COIL

This coil is used to provide collector bias to the vertical output circuit.

TEST NORMAL AND MASTER CLEAR SWITCHES

These switches provide the test mode, normal, and master clear functions of the terminal. The TEST MODE position activates a self-testing sequence when the MASTER CLEAR switch is depressed. The NORMAL position sets the terminal online to the computer.

FRONT INDICATOR/SWITCH, PANEL ASSEMBLY

This assembly provides indicators and switches for terminal I/O signal control.

KEYBOARD MODULE

This unit is used to input data to the terminal from an operator. The unit contains conventional typewriter key format and adding machine key format along with additional control keys.

INTENSITY CONTROL POTENTIOMETER

This unit controls the faster intensity of the console display.

BULK POWER SUPPLY

This unit provides low voltages to the console display.

CHARACTER/LINE/BLOCK SWITCH

This switch is located on the front panel and selects the mode of operation of the console display.

These are front panel switches: 64 CHAR/96 CHAR, FORMAT/INTENSITY, FULL DUPLEX/HALF DUPLEX, and ON LINE/LOCAL.

AUDIBLE ALARM (SONALERT)

This is used to produce an audible sound when an alarm condition is present.

SWITCH/JUMPER SETTINGS, NORMAL OPERATION

I/O-TTY BOARD (LOGIC)

To verify the normal operating positions of the switches on the I/O-TTY board (logic), the board must be removed from

the CYBER 18 processor chassis. This is done by first opening the cabinet access door and turning the captive latches on the cover plate one quarter turn counter-clockwise. An extractor tool is provided for removing the PWA.

Refer to the processor manual (section 4) for the location and normal operating positions of the baud rate select switches.

After verifying that the baud rate select switches are in the normal configuration, return the board to the chassis. Apply firm thumb pressure at the upper and lower corners of the front of the board until it is fully seated within the backplane connector.

Return the extractor tool and module cover plate to the chassis. Close the front access door.

CONTROL SWITCHES (INTERNAL)

To verify the normal operating conditions of the control switch internal to the console display, the top hood must be removed. This is done by first removing the two retaining screws at the rear of the console display and then lifting the hood backward and upward.

PARITY AND BAUD RATE SWITCHES

Verify that the parity and baud rate switches on the processor board comply with the normal operating settings illustrated in figure 4-2. This switch selects the high and the low frequency rate of I/O data communication for front operator panel selection. (Both high and low rates are set to 9600 baud.)

SPECIAL FUNCTION SWITCHES

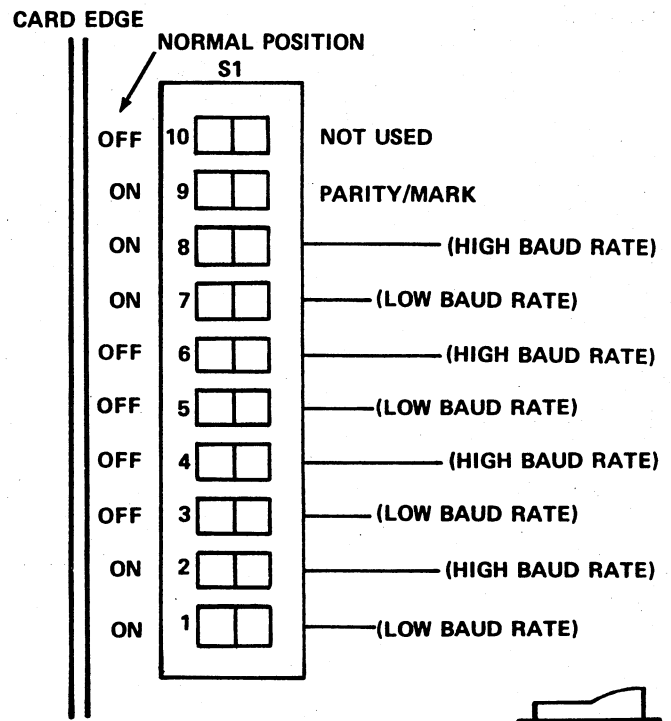
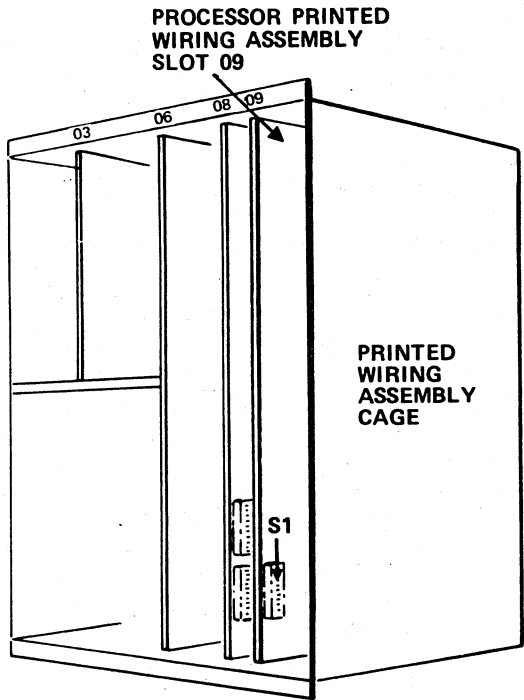
Verify that the special function switches on the memory board comply with the normal operating settings as illustrated in figure 4-3. When the batch mode switch is off, the console display operator is in page mode as required by the ODS diagnostic and 734-2 batch terminal controlware. In the ON position, the console display operator is in scroll mode as required by RTOS or MSOS. After verifying that all switches internal to the console display are at their proper settings, replace the top hood in the reverse manner in which it was removed.

CONTROL PANEL SWITCHES (EXTERNAL)

Verify that the operator control panel switches comply with the normal operating settings illustrated in figure 4-4.

REAR PANEL SWITCHES

Verify that the rear panel switches comply with the normal operating settings illustrated in figure 4-5.



LOW BAUD RATE SELECT

BAUD RATE	S1-7	S1-5	S1-3	S1-1
110	OFF	OFF	OFF	OFF
150	off	OFF	OFF	ON
200	OFF	OFF	OFF	OFF
300	OFF	OFF	ON	ON
600	OFF	ON	OFF	OFF
1200	OFF	ON	OFF	ON
1800	OFF	ON	ON	OFF
2700	OFF	ON	ON	ON
4800	ON	OFF	OFF	OFF
9600 [†]	ON [†]	OFF [†]	OFF [†]	ON [†]

HIGH BAUD RATE SELECT

BAUD RATE	S1-8	S1-6	S1-4	S1-2
110	OFF	OFF	OFF	OFF
150	OFF	OFF	OFF	ON
200	OFF	OFF	ON	OFF
300	OFF	OFF	ON	ON
600	OFF	ON	OFF	OFF
1200	OFF	ON	OFF	ON
1800	OFF	ON	ON	OFF
2400	OFF	ON	ON	ON
4800	ON	OFF	OFF	OFF
9600 [†]	ON [†]	OFF [†]	OFF [†]	ON [†]

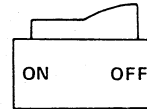
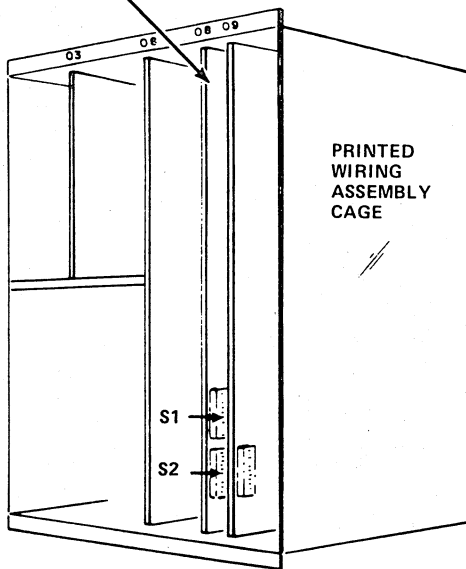
PARITY SELECT

	S1-10	S1-9
PARITY [†]	OFF [†]	ON [†]
MARK	OFF	OFF

[†]NORMAL OPERATION
0481

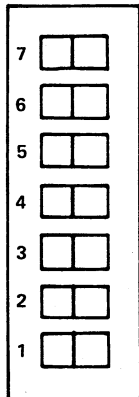
Figure 4-2. Console Display Parity and Baud Rate Switch Settings

MEMORY PRINTED
WIRING ASSEMBLY
SLOT 08



SWITCH SHOWN IN
THE ON (DISABLED)
POSITION

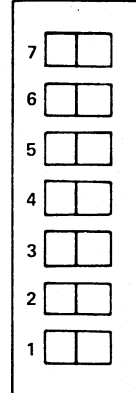
S1



- 7 NULL BACKGROUND
- 6 TERMINAL CODE TRANSMIT
- 5 CIRCUIT ASSURANCE
- 4 PROTECT FIELD TRANSMIT
- 3 X-Y POSITIONING
- 2 BATCH MODE
- 1 NOT USED

NORMAL SETTING	
ON	OFF
X	
	X
X	
	X
	X
-	-

S2



- 7 EOT DISCONNECT
- 6 60 HZ REFRESH
- 5 SCROLL
- 4 EOT TERMINATION
- 3 CONSTANT RTS
- 2 ETX TERMINATION
- 1 CONSTANT DTR

NORMAL SETTING	
ON	OFF
	X
	X
	X
X	
	X
	X
	X

0876

Figure 4-3. Console Display Special Function Switches

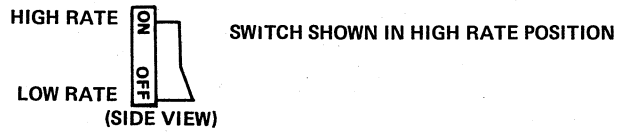
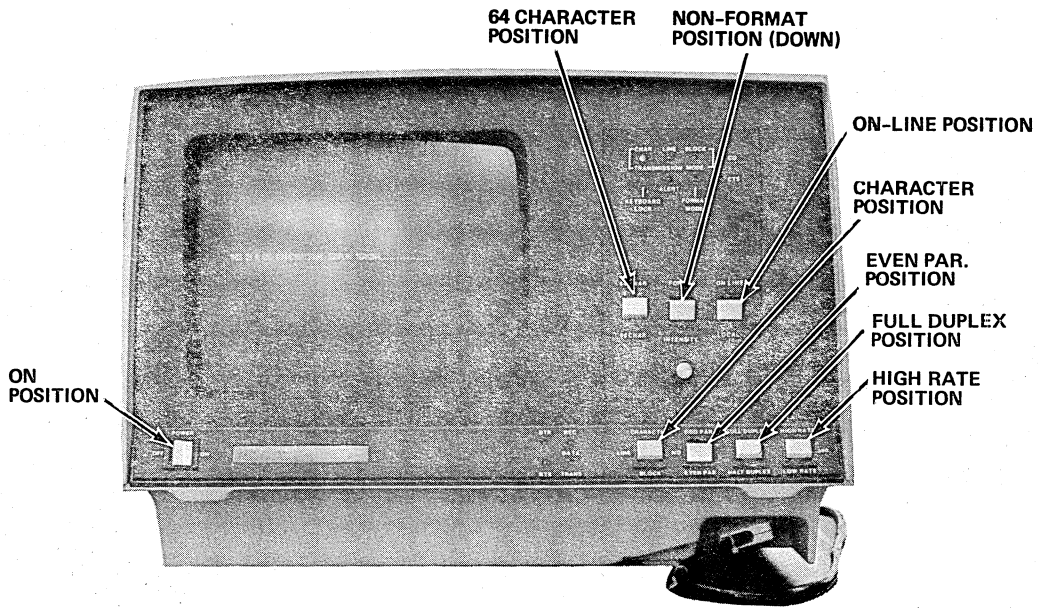


Figure 4-4. Console Display Control Panel Switch Settings

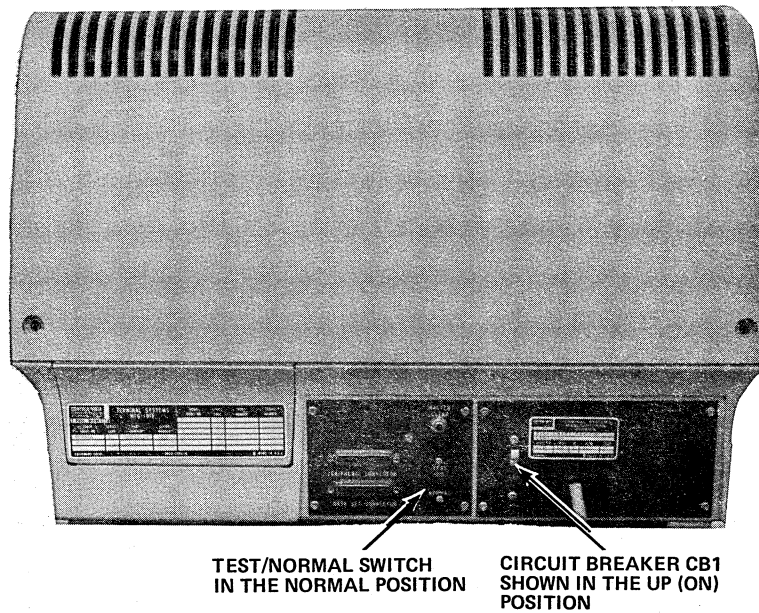
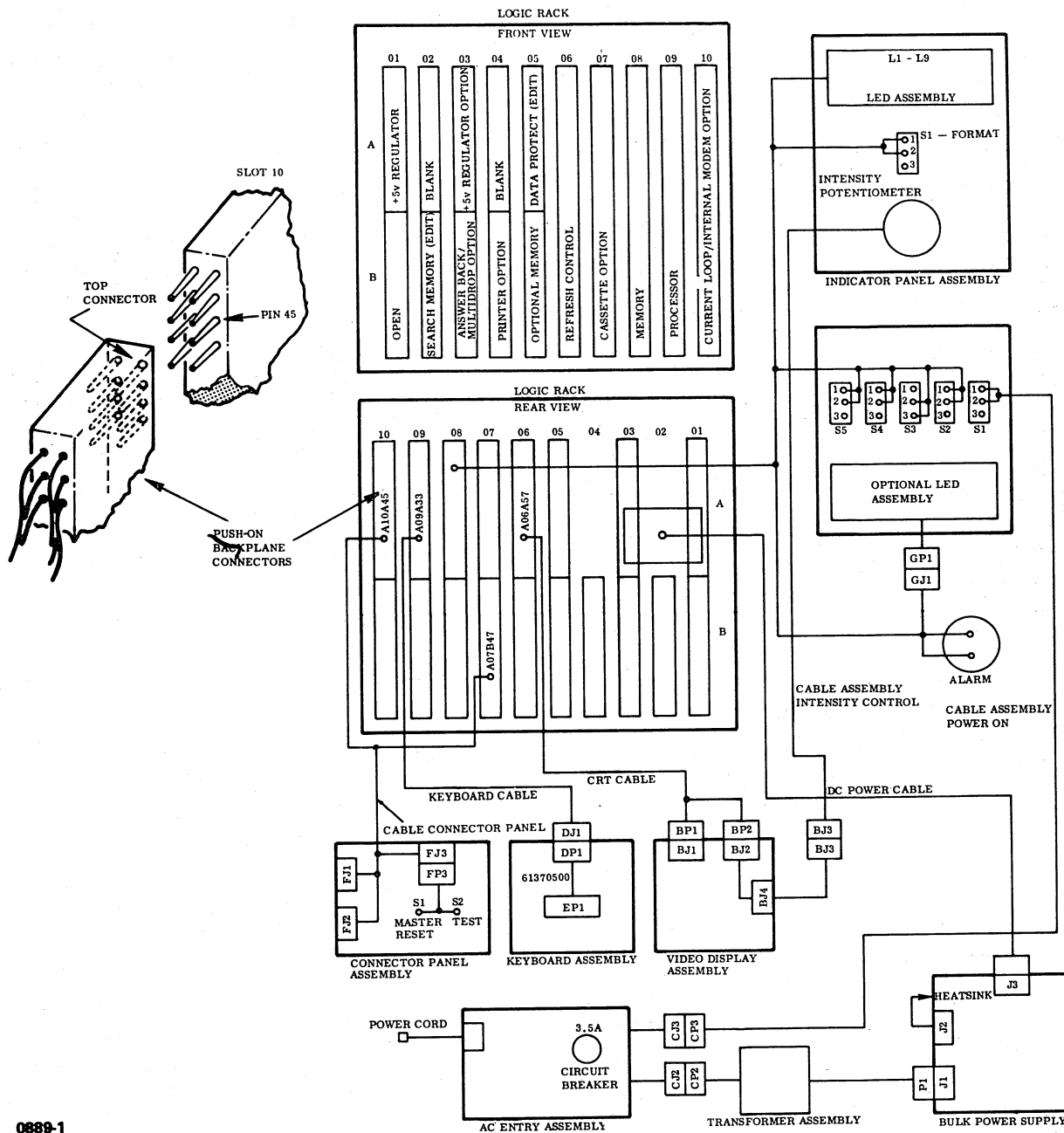


Figure 4-5. Console Display Rear Panel Switch Settings

This section contains diagrams (figures 5-1 through 5-4) illustrating the console display subsystem interconnections and the subsystem connection to the processor.



0889-1

Figure 5-1. Console Display Internal Cable Interconnections

CONNECTOR
A08A07

REGULATOR SLAVE	REGULATOR MASTER			HIGHLIGHT OPTION	REFRESH	CASSETTE OPTION	MEMORY	PROCESSOR	NUMBER OF CURRENT LOOP OR OPERATORS PANEL OPTION	10	
	01	02	03								
P1-1	+5V	X		+5V	X	+5V	X	+5V	X	+5V	X
P1-2	+5V	X		+5V	X	+5V	X	+5V	X	+5V	X
P1-3	+5V	X		+5V	X	+5V	X	+5V	X	+5V	X
P1-4	+5V	X		+5V	X	+5V	X	+5V	X	+5V	X
P1-5	+5V	X		+5V	X	+5V	X	+5V	X	+5V	X
P1-6	+5V	X		+5V	X	+5V	X	+5V	X	+5V	X
P1-7				OVER CURRENT	X			E O PARITY	X	E O PARITY	X
P1-8	OVER CURRENT	X		OVER CURRENT	X			CO LED	X	CO LED	X
P1-9	DRIVER	X		DRIVER	X			TX LED	X	TX LED	X
P1-10	DRIVER	X		DRIVER	X			RX LED	X	RX LED	X
P1-11	CURRENT SW	X		CURRENT SW	X			CTS LED	X	CTS LED	X
P1-12						G.R. TESTER	X	RTS LED	X	RTS LED	X
P1-13								DTR LED	X	DTR LED	X
P1-14								DR. PARITY	X	DR. PARITY	X
P1-15								CHAR LED	X	CHAR LED	X
P1-16								LINE LED	X	LINE LED	X
P1-17								BLK LED	X	BLK LED	X
P1-18					NEW DATA 24	X	NEW DATA 24	X	FORMAT LED	X	
P1-19					NEW DATA 23	X	NEW DATA 23	X	STRO LED LED	X	
P1-20					NEW DATA 22	X	NEW DATA 22	X	ALERT LED	X	
P1-21								M L FREQ SW	X	M L FREQ SW	X
P1-22								BLK SW	X	BLK SW	X
P1-23								LINE SW	X	LINE SW	X
P1-24								STRO LK SW	X	STRO LK SW	X
P1-25								+5V	X	+5V	X
P1-26								OW LN SW	X	OW LN SW	X
P1-27								F H DUP SW	X	F H DUP SW	X
P1-28								GND	X	GND	X
P1-29								ALARM	X	NR SW NO	X
P1-30								+5V	X	NR SW NC	X
P1-31					NEW DATA 21	X	NEW DATA 21	X	TEST SW	X	
P1-32					NEW DATA 20	X	NEW DATA 20	X	TEST SW	X	
P1-33					HIGHLIGHT OPT	X			M L FREQ SW	X	M L FREQ SW
P1-34								64 96 CHAR	X	64 96 CHAR	X
P1-35					RESERVED		RESERVED		RESERVED	X	
P1-36								GND	X	GND	X
P1-37								GND	X	GND	X
P1-38								GND	X	GND	X
P1-39								+5V	X	+5V	X
P1-40								CONTROL KEY	X	CONTROL KEY	X
P1-41								RESERVED	X	RESERVED	X
P1-42								RYDO DATA 27	X	RYDO DATA 27	X
P1-43								RYDO DATA 26	X	RYDO DATA 26	X
P1-44								RYDO DATA 25	X	RYDO DATA 25	X
P1-45					REFRESH EN	X	REFRESH EN	X	RYDO DATA 24	X	GND
P1-46					-N-COUNT	X	-N-COUNT	X	RYDO DATA 23	X	NR SW NO
P1-47					BLINK TCR	X	BLINK TCR	X	RYDO DATA 22	X	NR SW NC
P1-48	ACH				N-STYC	X	N-STYC	X	RYDO DATA 21	X	TEST SW
P1-49	ACH				LINE 10	X	LINE 10	X	RYDO DATA 20	X	PROTECTIVE
P1-50	ACH				V-UNBLANK	X	V-UNBLANK	X	-RYDO RPT	X	PROTECTIVE
P1-51	ACH				-NEW 25 & 26	X	-NEW 25 & 26	X	LOCAL TO PRT	X	TX NO
P1-52	ACH							LN TO PRT	X	LN TO PRT	X
P1-53	OPEN				REDUCED INT.	X	REDUCED INT.	X	-12V	X	TX COM
P1-54	OPEN				-NR	X	-NR	X		X	KEY POS
P1-55	OPEN							GND	X	KEY NEG	X
P1-56	OPEN							GND	X	INT RX DATA	X
P1-57	OPEN								X	INT TX DATA	X
P1-58	OPEN							DTR	X	DTR	X
P1-59	-5V							SIG GND	X	SIG GND	X
P1-60	-5V							SEC CO	X	SEC CO	X
P1-61	+12V							RING LND	X	RING LND	X
P1-62	+12V							RT DATA	X	RT DATA	X
P1-63	-12V							DSR	X	DSR	X
P1-64	-12V							CTS	X	CTS	X
P1-65	OVER VOLT							CD	X	CD	X
P1-66	OVER VOLT							TX DATA	X	TX DATA	X
P1-67	+20V							SEC RTS	X	SEC RTS	X
P1-68	+20V							RTS	X	RTS	X
P1-69	+20V								X		X
P1-70	+20V							+12V	X	+12V	X
P1-71	+20V							+12V	X	+12V	X
P1-72	GND							+20V	X	+20V	X
P1-73	GND							+20V	X	+20V	X
P1-74	GND							-12V	X	-12V	X
P1-75	-20V							-12V	X	-12V	X
P1-76	-20V							-20V	X	-20V	X
P1-77	GND							GND	X	GND	X
P1-78	GND							GND	X	GND	X
P1-79	GND							GND	X	GND	X
P1-80	GND							GND	X	GND	X

CONNECTOR
A09A33

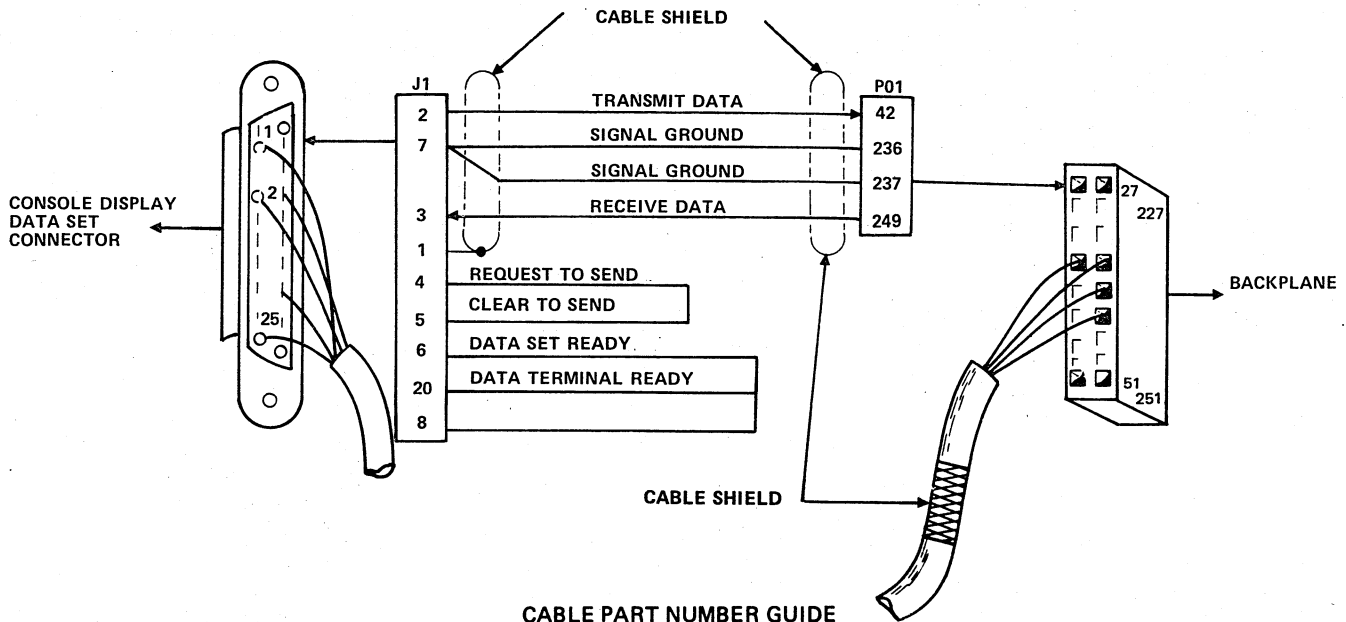
CONNECTOR
A10A45

CONNECTOR
A06A57

ROW A

1414A

Figure 5-2. Console Display Logic Module Backplane Signal/Pin Identification (Sheet 1 of 2)

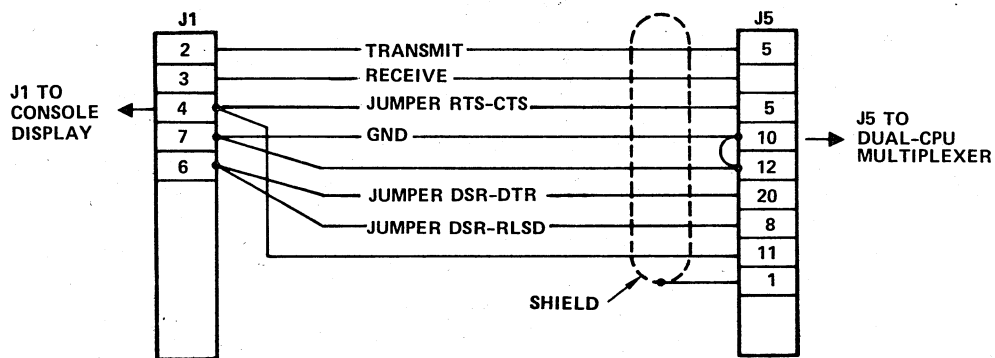


CABLE PART NUMBER GUIDE

ORIGINAL EQUIPMENT PART NO.	FCC EMI QUALIFIED PART NO.	CABLE LENGTH
96729500	88952424	6 FT (1.83 M)
96729501	88952425	10 FT (3.05 M)†
96729502	88952426	15 FT (4.57 M)†
†AVAILABLE ON SPECIAL ORDER ONLY		

0984-1

Figure 5-3. Console Display to I/O-TTY Controller Interface Cable



CABLE PART NUMBER GUIDE

ORIGINAL EQUIPMENT PART NO.	FCC EMI QUALIFIED PART NO.	CABLE LENGTH
96744876	88952422	15 FT (4.57 M)

0985-1

Figure 5-4. Dual Processor Console Display to Panel Multiplexer Cable

This section contains diagnostic decision logic tables (DDLTs) and corrective action procedures applicable to the console display subsystem. The DDLTs (tables 6-3 and 6-4) contain troubleshooting procedures that provide fault isolation of equipment malfunctions. The corrective action procedures provide for step-by-step removal and replacement of defective subassemblies.

The DDLT procedures consist of offline test sequences and/or the operational diagnostic system (ODS) tests contained on diskettes or cassette tapes. The ODS tests are used in conjunction with the DDLTs applicable to the subsystem. All ODS tests for a subsystem must use ODS programs contained on the same test medium, either diskettes or cassette tapes. Do not intermix test media during a system checkout.

MAINTENANCE AIDS

Operational diagnostic system (ODS) programs required to test the console display subsystem are:

- LDCHK
- LIAT2

For part numbers of the ODS test programs, refer to the overview maintenance manual listed in the preface.

EQUIPMENT REQUIRED

The following maintenance tools and equipment are required:

- Multimeter – 0 V dc through 500 V dc, accuracy 2 percent minimum, 20 kohm/V; 0 V ac through 250 V ac, accuracy 3 percent minimum
- Wire – 12-inch (305-millimeter) heavy insulated wire (16 AWG) with insulation stripped approximately 0.5 inch (13 millimeters) on each end
- Safety goggles – One set
- Heavy gloves – One pair

If higher level maintenance is required, the following additional maintenance tools are needed:

- Oscilloscope – Dual trace, dc to 10 MHz minimum, calibrated trigger sweep (Tektronics model 546)

DIAGNOSTICS

When testing the console display, it is necessary to set the mode switches (figure 6-1) to the page mode configuration. See table 6-1.

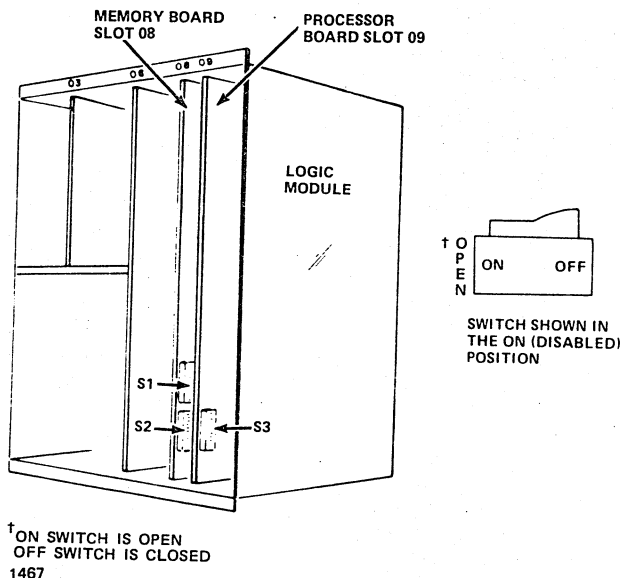


Figure 6-1. Console Display Mode Select Switches

TABLE 6-1. PAGE MODE

Switch Segment	SW 1		SW 2		SW 3	
	On	Off	On	Off	On	Off
1		X		X	X	
2		X		X	X	
3		X		X		X
4		X	X			X
5	X			X		X
6		X		X		X
7	X			X	X	
8	NA	NA	NA	NA	X	
9	NA	NA	NA	NA	X	
10	NA	NA	NA	NA		X

MODE SELECTION

When performing ODS tests on the CYBER 18 subsystems, it is more convenient at times to select an alternate mode of

operation. Table 6-1 defines switch settings for the page mode and table 6-2 defines switch settings for the scroll mode. Switch location is shown in figure 6-1.

TABLE 6-2. SCROLL MODE

Switch Segment	SW 1		SW 2		SW 3	
	On	Off	On	Off	On	Off
1	X [†]			X	X	
2	X [†]			X	X	
3		X		X		X
4		X	X			X
5	X			X		X
6		X		X		X
7	X			X	X	
8	NA	NA	NA	NA	X	
9	NA	NA	NA	NA	X	
10	NA	NA	NA	NA		X

† Switch setting changes

DESCRIPTION OF DIAGNOSTIC DECISION LOGIC TABLES

The DDLTs identify and isolate equipment malfunctions in the replaceable assemblies. The DDLT analyzes a situation down to specific conditions and then directs the customer engineer to those actions that will correct the situation, with the most likely action listed first. The table is arranged in five sections: assumptions, conditions, responses, actions, and sequence of actions (see the DDLT example in figure 6-2).

ASSUMPTIONS

The upper section of the DDLT contains the prerequisites for the specific tests to be performed. The DDLT is valid only if all assumptions are true.

CONDITIONS

The center left section of the DDLT contains the conditions or tests to be made. They are in the form of questions that can be answered yes or no.

RESPONSES

The center right section of the DDLT contains the response to the question asked in the Conditions section. Note that each condition, or question, can be answered with a yes (Y) or a no (N). The example chosen for figure 6-2 has 10 unique situations, numbered from 1 to 10, left to right. The shaded area in the example shows the conditions that define situation 9. That is, the POWER ON indicator does not illuminate, all other indicators do not illuminate when the READ CHECK indicator/switch is pressed, and no single indicator illuminates.

The first condition should be examined for a yes or no response. The applicable response directs the operator to the next condition in the column until all conditions in that column have been analyzed. In figure 6-2, column 1 identifies an everything-is-normal situation for the tests made. Therefore, the Actions section in the lower left of the table directs the customer engineer: Go to sheet 2 of this table. The customer engineer then goes to sheet 2 of the table and does not waste time with further examination of sheet 1.

ACTIONS

The lower left quadrant lists actions to correct a situation.

SEQUENCE OF ACTIONS

The lower right section lists the sequence of the actions required to correct a situation, with each succeeding action being performed only if a previous action failed to correct the condition under test. The sequential numbering of actions reflects the probability of the corresponding action correcting the problem, with the most likely listed first. An X indicates that no sequence of actions is necessary, but the single action listed must be performed. Both actions and conditions may refer to other specific procedures to follow (for example, when checking and adjusting the power supply voltages). The customer engineer must exit from the table to perform the other procedure and then return to the same point in the table to answer any questions that are related to the procedure. He also continues from this point in the table if the fault still persists. The same is true if the customer engineer exits to another table or sheet of the same table but does not find the fault, and the action that called for the exit is not the last action in the sequence. The customer engineer must return to his original DDLT exit point and continue testing from there.

After taking corrective action, the customer engineer should rerun the DDLT starting at sheet 1 to make sure that the fault has been corrected.

USER NOTES

The following are precautions the customer engineer should keep in mind while performing diagnostic testing:

- After any power to the computer is turned on or off, the computer should be master cleared.
- Power to the peripherals should be turned off before the power to the computer is turned off.
- Printed wiring assemblies may be removed from or installed in the processor with the power on.
- Do not press any key on the console display while diagnostic media is being loaded.

Whenever the ESC key on the console display terminal is pressed, the computer is placed into panel mode. This prevents further messages from being displayed on the console display. To a user it appears that the system is hung up. If the ESC key is accidentally pressed, the condition can be rectified by pressing the @ character on the keyboard.

The DDLTs presume all operator inputs are entered correctly. Any incorrect entry may cause the DDLT to direct an incorrect action. Hence, if any doubt exists about the accuracy of the operator entry, always repeat the sequence of DDLT steps that led up to an action before taking further actions.

TABLE 6-51. CARD READER DDLT

Power On	Sheet 1 of 6									
ASSUMPTIONS: 1. If card reader is load device, go to sheet 2 of this table. 2. Card reader power cord is connected to ac outlet. 3. Power is on (procedure 1). 4. Ensure card reader is not ready by pressing RESET. ①										
CONDITIONS: 1. Is POWER ON indicator on card reader illuminated/ 2. Press READ CHECK switch/indicator. Do all other indicators illuminate? 3. Do any indicators illuminate? 4. Press and release RESET switch/indicator. Does RESET indicator illuminate? 5. When RESET switch/indicator is pressed, do stacker springs and/or card drum turn? 6. Did motor power come up and then drop within 10 to 30 seconds after releasing RESET switch/indicator?	1	2	3	4	5	6	7	8	9	10
	Y						N			
	Y				N		Y	N		
					Y	N		Y	N	
	Y			N						③
	Y		N							
	Y	N								
ACTIONS: 1. Go to sheet 2 of this table. 2. Check that toggle switch S1 (rear panel) is up. 3. Check that removable power cord is connected securely to card reader. 4. Check fuses (rear panel) and ac power. 5. Check switch board and associated cabling (procedure 9). Replace if required (procedure 10). 6. Check +17-volt power supply (procedure 6). 7. Check for +17 vdc between ground and control board connector P2, pins 2 and 3, and between ground and switch board connector, pins 2 and 3 (two pins joined by foil). 8. Check cable between control board and switch board. 9. Replace lamp in failing indicator (procedure 9).										
	X									
										⑤
										2
										3
				3	2	2	2			4
									1	
									2	
									3	
							1			

RESPONSES

SEQUENCE OF ACTIONS

NOTE: ARROWS AND CIRCLED NUMBERS INDICATE SEQUENTIAL FLOW OF ANALYSIS PROCEDURE.

Figure 6-2. Example of a Diagnostic Decision Logic Table

If any characters are accidentally pressed on the console display, the KEYBOARD LOCK and ALERT lights on the display illuminate. If this occurs, the BREAK key must be pressed to continue.

ODS SOFTWARE

For additional information regarding the use of the ODS diagnostic tests, refer to the Operational Diagnostic System Reference Manual. Excerpts from this manual are listed below.

If an erroneous test entry is made and executed during a level II† test, perform the following:

1. Simultaneously press the CONTROL and BEL keys on the console display.
2. Type in:

ODS,ABRT,xxxxx

where xxxxx is the five-digit ODS test mnemonic.
3. Press the CARRIAGE RETURN key. The remainder of the test will load.
4. Reload the test and return to the DDLT (sheet 1) of the device under test.

NOTE

If step 2 above cannot be performed, restart the Loadcheck diagnostic (in the overview manual listed in the preface).

For error code typeouts not listed in the DDLTs, refer to the following:

Typeout	Description
GHOST INTERRUPT LINES xxxx	Level I tests. An unexpected interrupt was received. xxxx = A bit mask indicating which line was interrupted
MI	Level II tests. A manual interrupt (CONTROL and BEL) has been received, and the system is waiting for the ODS level II command.
MI INPUT ERROR	Level II tests. The command did not begin with ODS. Press CONTROL and BEL and then re-enter the command.
ODS BUSY	Level II tests. ODS is currently processing the last command entered. Re-enter the command.

ODS ERROR xx

Level II tests. An operator command input error occurred during loading of the test or while the test was not processing. Re-enter the command correctly.

xx = 01	Invalid command mnemonic
02	Third field must be entered
03	Invalid test availability
04	Command is not valid for the master parameter list
05	Too many field inputs for the command
06	Nonhexadecimal input
07	Invalid parameter
08	Invalid parameter index
09	Test not currently suspended
10	No change in parameter data input
11	Available memory has been exceeded
12	Test not found in library unit.

OV	Level II tests. An overflow of the monitor's usable memory has occurred. Reload the system.
PE	Level II tests. A macro MOS parity fault interrupt has occurred. Reload the system.
PF	Level II tests. A protect fault interrupt has occurred. Reload the system.
PW	Level II tests. A power failure protect interrupt has occurred. Reload the system.

Tables 6-3 and 6-4 are the DDLTs for the console display subsystem. The removal/replacement and testing procedures immediately follow the DDLTs.

† Level II tests are subsystem diagnostic programs that run under the ODS monitor and are loaded by the Level II Monitor DDLT contained in the processor manual listed in the preface.

TABLE 6-3. CC614 CONSOLE DISPLAY (CDT) OFFLINE TEST

Read-Only Memory (ROM) Test (Test Section 0)										Sheet 1 of 6																																																																																																															
ASSUMPTIONS:																																																																																																																									
<ol style="list-style-type: none"> Console display (CDT) power cord is connected to ac outlet. Circuit breaker CB1 (rear panel) is up. POWER ON switch is in ON position. If this test is not to be run, go to table 6-4. 																																																																																																																									
CONDITIONS:																																																																																																																									
<table border="1"> <thead> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> </tr> </thead> <tbody> <tr> <td>1. Does circuit breaker CB1 remain up?</td> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>N</td> </tr> <tr> <td>2. Place TEST/NORMAL switch (rear panel) in NORMAL position. Place ON LINE/LOCAL switch in LOCAL position. Wait 30 seconds. Does blinking cursor appear on screen?</td> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>N</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3. Place TEST/NORMAL switch in TEST position. Press MASTER CLEAR switch (rear panel). Does checksum display appear as shown in figure 6-41?</td> <td>Y</td> <td></td> <td>N</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4. Is ALERT indicator illuminated?</td> <td>Y</td> <td>N</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5. Turn up INTENSITY control. Is normal raster visible (figure 6-49)?</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Y</td> <td>N</td> <td></td> <td></td> </tr> <tr> <td>6. Do any characters appear on screen?</td> <td></td> <td></td> <td>Y</td> <td></td> <td></td> <td>N</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>7. Is anything visible?</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Y</td> <td>N</td> <td></td> </tr> <tr> <td>8. Is a general checksum display format recognizable?</td> <td></td> <td></td> <td>Y</td> <td></td> <td>N</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>9. Does one or more of checksum digits have nonzero value (alarm sounds)?</td> <td></td> <td></td> <td>Y</td> <td>N</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>													1	2	3	4	5	6	7	8	9	10	1. Does circuit breaker CB1 remain up?	Y									N	2. Place TEST/NORMAL switch (rear panel) in NORMAL position. Place ON LINE/LOCAL switch in LOCAL position. Wait 30 seconds. Does blinking cursor appear on screen?	Y						N				3. Place TEST/NORMAL switch in TEST position. Press MASTER CLEAR switch (rear panel). Does checksum display appear as shown in figure 6-41?	Y		N								4. Is ALERT indicator illuminated?	Y	N									5. Turn up INTENSITY control. Is normal raster visible (figure 6-49)?							Y	N			6. Do any characters appear on screen?			Y			N					7. Is anything visible?								Y	N		8. Is a general checksum display format recognizable?			Y		N						9. Does one or more of checksum digits have nonzero value (alarm sounds)?			Y	N						
	1	2	3	4	5	6	7	8	9	10																																																																																																															
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2. Place TEST/NORMAL switch (rear panel) in NORMAL position. Place ON LINE/LOCAL switch in LOCAL position. Wait 30 seconds. Does blinking cursor appear on screen?	Y						N																																																																																																																		
3. Place TEST/NORMAL switch in TEST position. Press MASTER CLEAR switch (rear panel). Does checksum display appear as shown in figure 6-41?	Y		N																																																																																																																						
4. Is ALERT indicator illuminated?	Y	N																																																																																																																							
5. Turn up INTENSITY control. Is normal raster visible (figure 6-49)?							Y	N																																																																																																																	
6. Do any characters appear on screen?			Y			N																																																																																																																			
7. Is anything visible?								Y	N																																																																																																																
8. Is a general checksum display format recognizable?			Y		N																																																																																																																				
9. Does one or more of checksum digits have nonzero value (alarm sounds)?			Y	N																																																																																																																					
ACTIONS:																																																																																																																									
1. Go to sheet 2 of this table.	X																																																																																																																								
2. Go to procedure 22 in this section and perform all voltage checks.								4	1																																																																																																																
3. Check printed wiring assemblies for proper seating.		1	1	1	1	1	1	1	6																																																																																																																
4. Perform monitor adjustment and troubleshooting (procedure 26). If required, replace monitor board (procedure 11).							8	3	7																																																																																																																
5. Replace refresh board 06 (procedure 8).			4	2	6		2	2	4																																																																																																																
6. Check CDT cables and connections and CRT for lighted filament.								5	2																																																																																																																
7. Check backpanel cable connector connection.		5	6	6	5	6	6	8	3																																																																																																																
8. Replace CRT (procedure 13).								7	11																																																																																																																

Continued on next page

TABLE 6-3. CC614 CONSOLE DISPLAY (CDT) OFFLINE TEST (Contd)

Read-Only Memory (ROM) Test (Test Section 0)										Sheet 1 of 6 (Contd)										
ACTIONS (Continued):											1	2	3	4	5	6	7	8	9	10
9. Check yoke (procedure 14). Replace yoke, if required (procedure 15).																		6	8	
10. Check voltages: +5 V, ±12 V, and -9 V (procedure 22).													7	7	7	5	7		5	
11. Replace processor board 09 (procedure 8).												4	5	5	2	4	5			
12. Replace RAM/ROM board 08 (procedure 8).												2	2	3	3	2	3			
13. Replace extended memory board 05B (procedure 8).												3	3	4	4	3	4			
14. Replace indicator panel LED board (procedure 10).												6								
15. Replace TEST/NORMAL and MASTER CLEAR switches (procedures 6 and 7).															8	7				
16. Replace high-voltage transformer (procedure 3).																			9	
17. Check INTENSITY control and related cabling (procedure 23).																			10	
18. Check POWER ON/OFF switch (procedure 28).																			12	3
19. Replace +5 V regulator board 03A (procedure 8).																				1
20. Replace circuit breaker (procedure 5).																				2
21. Call next level of support.												7	8	8	9	8	9	9	13	4

TABLE 6-3. CC614 CONSOLE DISPLAY (CDT) OFFLINE TEST (Contd)

Random-Access Memory (RAM) Test (Test Section 1)							Sheet 2 of 6						
ASSUMPTIONS:													
<ol style="list-style-type: none"> Review conditions prior to next step. The 9 key on the keyboard is pressed. 													
CONDITIONS:							1	2	3	4	5	6	
1. Does ALERT light blink off? (It must blink off to indicate start of RAM test.)							Y						N
2. Does display cycle through full screen of all 128 displayable characters twice without halting? (Second pass displays blinking underline under alternate character positions.)							Y	N					
3. Did test halt before two complete passes?								Y		N			
4. Did alarm sound?								Y	N				
5. Is checksum display from ROM test (test section 0) still being displayed?										Y	N		
ACTIONS:													
1. Go to sheet 3 of this table.							X						
2. Check for proper printed wiring assembly seating.								1	1	2	1	1	
3. Replace ROM/RAM board 08 (procedure 8).								2	2		2		
4. Replace extended memory board 05B (procedure 8).								3	3		3	6	
5. Replace processor board 09 (procedure 8).								6	4		4	2	
6. Check voltages: +5 V, ±12 V, and -9 V (procedure 22).								4	5		5		
7. Check back cable connector.								5	6	4	6	4	
8. Check keyboard cable and connector.										1		3	
9. Replace keyboard (procedure 18).										3		5	
10. Call next level of support.								7	7	5	7	7	
<p>NOTE: After completing any repairs and after performing any maintenance, verify that the system is fully operational by rerunning test mode.</p>													

TABLE 6-3. CC614 CONSOLE DISPLAY (CDT) OFFLINE TEST (Contd)

Shifting Pattern and I/O Test (Test Section 2)		Sheet 3 of 6			
<p>ASSUMPTIONS: The 9 key on the keyboard is pressed.</p>					
<p>CONDITIONS:</p>		1	2	3	4
1.	Is continuously shifting pattern of characters displayed on screen?	Y		N	
2.	Did alarm sound?			Y	N
3.	Are REC and TRANS indicators illuminated and do they blink occasionally?	Y	N		
<p>ACTIONS:</p>					
1.	Go to sheet 4 of this table.	X			
2.	Check for proper printed wiring assembly seating.		1	1	1
3.	Replace ROM/RAM board 08 (procedure 8).			6	2
4.	Replace processor board 09 (procedure 8).		3	2	3
5.	Check voltages: +5 V, ±12 V, and -9 V (procedure 22).			3	5
6.	Check back cable connection.		2	4	6
7.	Replace TEST/NORMAL switch (procedure 6).			5	7
8.	Replace LED board for indicator/switch (procedure 10).		4		
9.	Replace extended memory board 05B (procedure 8).			7	4
10.	Call next level of support.		5	8	8
<p>NOTE: After completing any repairs and after performing any maintenance, verify that the system is fully operational by rerunning test mode.</p>					

TABLE 6-3. CC614 CONSOLE DISPLAY (CDT) OFFLINE TEST (Contd)

Keyboard and Display Quality Checks (Test Section 3)							Sheet 4 of 6									
ASSUMPTIONS:																
The 9 key on the keyboard is pressed.																
CONDITIONS:							1	2	3	4	5	6	7	8	9	
1. Does shifting pattern of previous test halt?							Y									N
2. Remove hood (procedure 21). Perform keyboard checks (procedure 25). Was proper character displayed for each keyboard entry?							Y									N
3. Place 64 CHAR/96 CHAR switch in 96 CHAR position. Press lowercase M key. Are M's clear and well-defined over entire screen? (Upon completion of test, return switch to its original position.)							Y									N
4. Press uppercase H key. Are all H's same height and width?							Y									N
5. Are H's stable?							Y									N
6. Press space bar once. Turn INTENSITY control until raster appears. Is CRT phosphor free of any objectionable burn spots or blemishes?							Y									N
7. Are all four sides of raster rectangle straight?							Y									N
8. Are height and width of display approximately 5.25 in. (133 mm) and 8 in. (203 mm), respectively?							Y	N								
ACTIONS:																
1. Press a character and return INTENSITY control to normal. Press space bar twice. Go the sheet 5 of this table.							X									
2. Check printed wiring assemblies for proper seating.															4	1
3. Replace ROM/RAM board 08 (procedure 8).																2
4. Replace extended memory board 05B (procedure 8).																3
5. Replace processor board 09 (procedure 8).															5	4
6. Check voltages: +5 V, ±12 V, and -9 V (procedure 22).																5
7. Check backpanel connections.															2	6
8. Check keyboard cable and connector.															1	
9. Replace keyboard (procedure 18).															3	

Continued on next page

TABLE 6-3. CC614 CONSOLE DISPLAY (CDT) OFFLINE TEST (Contd)

Keyboard and Display Quality Checks (Test Section 3)										Sheet 4 of 6 (Contd)										
ACTIONS (Continued):											1	2	3	4	5	6	7	8	9	
10. Replace refresh board 06 (procedure 8).																			6	
11. Check 64 CHAR/96 CHAR switch (procedure 28).																	1			
12. Perform adjustment and troubleshooting (procedure 26).												1			1	1				
13. Perform refresh stability adjustment and troubleshooting (procedure 30).															2					
14. Replace CRT (procedure 13) if spot interferes with character display.														1						
15. Perform horizontal and vertical alignment adjustment and troubleshooting (procedure 14).													1							
16. Call next level of support.												2	2	2	3	2	2	7	7	

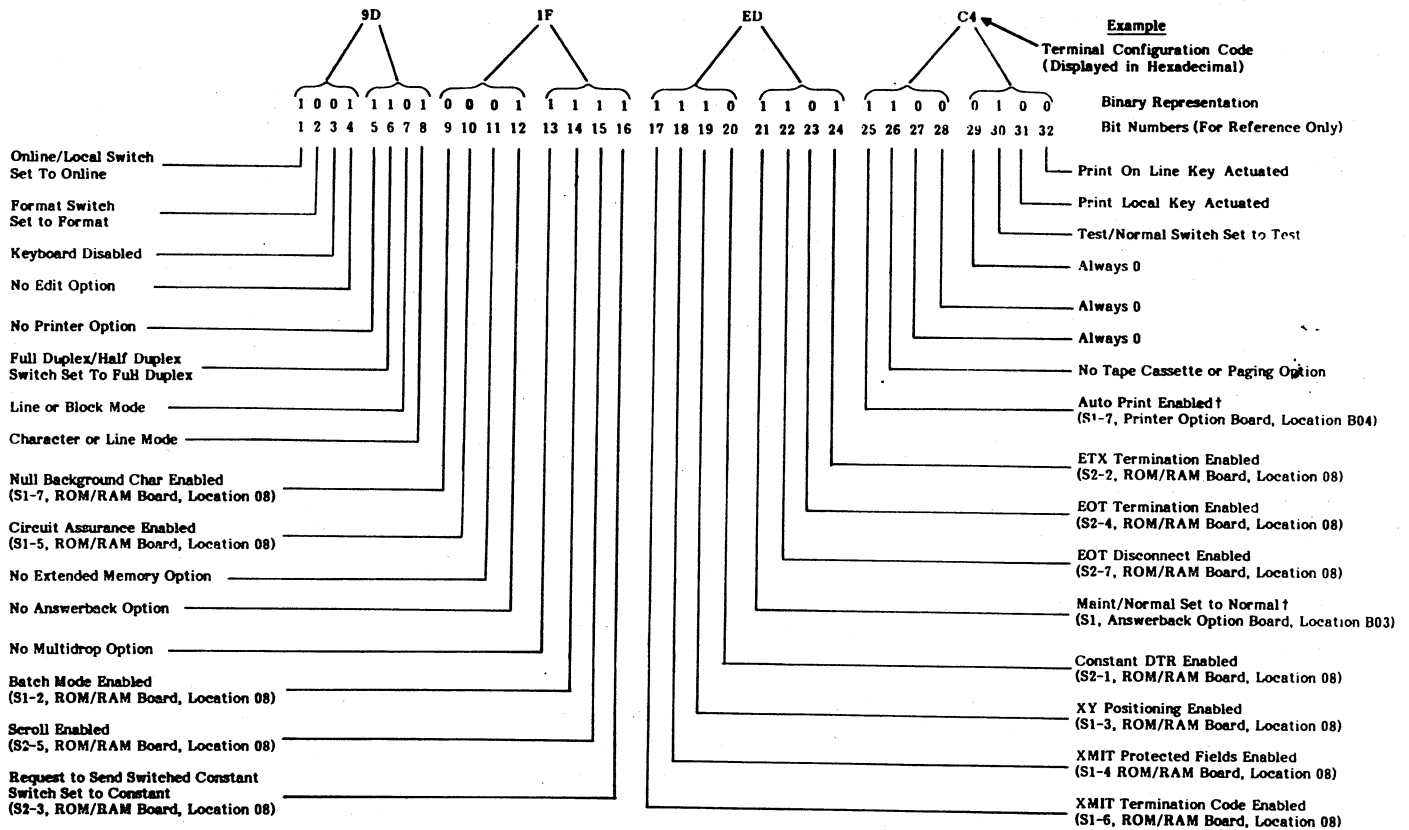
TABLE 6-3. CC614 CONSOLE DISPLAY (CDT) OFFLINE TEST (Contd)

External Switch Checks (Test Section 7)	Sheet 5 of 6						
ASSUMPTIONS:							
<ol style="list-style-type: none"> Record original position of switches listed in assumption 2 and upon completion of tests return them to these positions. External switches are set to: 64 CHAR, non-format, ON LINE, CHARACTER, EVEN PAR, FULL DUPLEX, HIGH RATE. CDT is in page mode (see table 6-1). 							
CONDITIONS:							
1. Is terminal configuration code displayed on screen? 9D 1F FD C4	1	2	3	4	5	6	7
2. Place CHARACTER/LINE/BLOCK switch in each of its positions while observing the code displayed above. Does CHARACTER = 9D 1F ED C4, LINE = 9F 1F ED C4, BLOCK = 9E 1F FD C4? (Return switch to CHARACTER.)	Y					N	O T H E R
3. Place ON LINE/LOCAL switch to ON LINE and then to LOCAL while observing the code displayed above. Does ON LINE = 9D 1F FD C4, LOCAL = 1D 1F FD C4? (Return switch to ON LINE.)	Y				N		
4. Place FULL DUPLEX/HALF DUPLEX switch to FULL DUPLEX and then to HALF DUPLEX while observing code on display. Does FULL DUPLEX = 9D 1F FD C4, HALF DUPLEX = 99 1F FD C4? (Return switch to FULL DUPLEX.)	Y		N				
5. Place FORMAT switch in FORMAT position while observing code on display. Does FORMAT = DD 1F FD C4? (Return switch to alternate position.)	Y	N					
ACTIONS:							
1. (Return test mode to NORMAL.) Press red MASTER CLEAR button at rear of CDT. Replace cover. Go to sheet 1 of the Loadcheck DDLT in the processor manual. Go to table 6-4.	X						
2. Verify that printed wiring assemblies are properly seated.		2	2	2	2	2	
3. Replace ROM/RAM boards 08 and 05 (procedure 8).		4	4	4	4	3	
4. Replace extended memory board 05B (procedure 8).		5	5	5	5	4	
5. Replace processor board 09 (procedure 8).					6	5	
6. Check voltages: +5 V, +12 V, and -9 V (procedure 22).						6	
7. Observe backpanel connections.		3	3	3	3	7	
8. Check CHARACTER/LINE/BLOCK switch and wiring (procedure 27).					1		
9. Check ON LINE/LOCAL switch and wiring (procedure 28).				1			

Continued on next page

TABLE 6-3. CC614 CONSOLE DISPLAY (CDT) OFFLINE TEST (Contd)

External Switch Checks (Test Section 7)	Sheet 5 of 6 (Contd)						
ACTIONS (Continued):	1	2	3	4	5	6	7
10. Check FULL DUPLEX/HALF DUPLEX switch and wiring (procedure 28).			1				
11. Check FORMAT switch and wiring (procedure 28).		1					
12. If the CDT display 9D IF ED C4 is not correct, see figures 4-4 and 4-5 for location and set switches as shown in the table below.						1	
13. Call next level of support.		6	6	6	7	8	X



†Bit is set to 1 when option is not installed.

Terminal Configuration Display Bit Assignments

TABLE 6-3. CONSOLE DISPLAY (CDT) OFFLINE TEST (Contd)

Voltage Checks	Sheet 6 of 6				
ASSUMPTIONS: Voltage checks are performed (procedure 20).					
CONDITIONS:					
	1	2	3	4	5
1. Were all voltage checks OK (procedure 20, steps 1 through 17)?	Y	N			
2. Were +15 V and +5 V checks OK (procedure 20, steps 18 through 26)?		Y	N		
3. Are LEDs illuminated on +5 V regulator board 03 (figure 6-35)?			Y	N	
4. Are LEDs illuminated on bulk power supply printed wiring assembly (figure 6-48)?				Y	N
ACTIONS:					
1. Replace high-voltage transformer (procedure 3).	1				
2. Replace video printed wiring assembly (procedure 11).		1			
3. Check for +19 V dc on base of +15 V regulator power transistor (figure 6-6). Check for +15 V dc on emitter of +15 V regulator power transistor (figure 6-6). If +19 ±2 V is found on base of transistor, but +15 ±2 V is not found on emitter, replace power transistor (procedure 4). If voltages are OK, replace printed wiring assembly.			1		
4. Replace +5 V regulator board 03A (procedure 8).				1	
5. Check for 110 V ac to 124 V ac at wall outlet.					1
6. Check input power cabling from ac wall outlet to bulk power supply.					2
7. Replace bulk power supply (procedure 17).					3
8. Call next level of support.	2	2	2	2	4
NOTE: After completing any repairs and after performing any maintenance, verify that the equipment is fully operational by rerunning test mode.					

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT

Diagnostic Test of CC614 When Connected to I/O-TTY Logic

Sheet 1 of 14

ASSUMPTIONS:

1. The Loadcheck and Instruction Test DDLTs in the processor manual were successfully completed.
2. The CDT offline test (table 6-3) has been performed. If not, go to table 6-3, then return to this table. CDT is in page mode (see table 6-1).
3. After xxxxx? is displayed, the following is entered at the keyboard (if xxxxx is not displayed, go to the Loader Fault DDLT in the processor manual):
 Type LIAT2
 Press CARRIAGE RETURN

 NOTE: xxxxx = test name
4. Observe the console display for the following conditions.

CONDITIONS:

1. Is LIAT2 EXECUTING displayed?
2. Is RUN indicator illuminated?

1	2	3
Y	N	
	N	Y

ACTIONS:

1. Go to sheet 2 of this table.
2. Go to the Loader Fault DDLT in the processor manual.
3. Go to the System Fault DDLT in the processor manual.

X		
	X	
		X

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic		Sheet 2 of 14		
ASSUMPTIONS:				
Observe console display for any of the following conditions.				
CONDITIONS:		1	2	3
1.	Is LIAT2 SUSPENDED ENDS displayed?	Y	N	
2.	Is there an action code?		Y	N
ACTIONS:				
1.	Go to sheet 3 of this table.	X		
2.	Go to sheet 14 of this table.		X	
3.	Call next level of support.			X

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic						Sheet 3 of 14						
ASSUMPTIONS:												
1. Conditions 1 through 6 below are understood before test execution. 2. The following is entered at the keyboard: Type GO Press CARRIAGE RETURN 3. Observe console display for any of the following conditions.												
CONDITIONS:						1	2	3	4	5	6	7
1. Does sonic alarm sound three times?						Y						N
2. Does the screen clear?						Y					N	
3. Does the cursor move from position 0 to 80 and back across the screen several times?						Y				N		
4. Are the following test patterns displayed in order (see sheet 4 of this table)?						Y			N			
5. Does the screen clear?						Y		N				
6. Is LIAT2 SUSPENDED ENDS displayed?						Y	N					
ACTIONS:												
1. Go to sheet 5 of this table.						X						
2. Replace console display processor board slot 9 (procedure 8).								1	1	3	1	2
3. Replace console display refresh board, slot 6 (procedure 8).								2	2		2	
4. Replace I/O-TTY logic (see the board (logic) replacement procedure in the processor manual).										1		1
5. Replace SMI logic (see the board (logic) replacement procedure in the processor manual).										2		
6. Go to sheet 14 of this table.							X					
7. Check and replace audible alarm (procedure 29).												3
8. Call next level of support.								3	3	4	3	

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic		Sheet 5 of 14		
ASSUMPTIONS:				
1. Conditions 1 and 2 are read to prepare for test execution.				
2. The following is entered at the keyboard: Type GO Press CARRIAGE RETURN				
3. Observe console display for any of the following conditions.				
CONDITIONS:				
1. Are test patterns on sheet 6 of this table displayed in order?		1	2	3
		Y		N
2. Is LIAT2 SUSPENDED ENDS displayed?		Y	N	
ACTIONS:				
1. Go to sheet 7 of this table.		X		
2. Go to sheet 14 of this table.			X	
3. Replace console display processor board, slot 9 (procedure 8).				1
4. Replace console display refresh board, slot 6 (procedure 8).				2
5. Call next level of support.				3

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic		Sheet 7 of 14		
ASSUMPTIONS:				
1. The following is entered at the keyboard: Type GO Press CARRIAGE RETURN				
2. Observe console display for test pattern 10 (sheet 8) and for any of the following conditions.				
CONDITIONS:		1	2	3
1. Is LIAT2 SUSPENDED ENDS displayed?		Y	N	
2. Is there an action code?			Y	N
ACTIONS:				
1. Go to sheet 9 of this table.		X		
2. Go to sheet 14 of this table.			X	
3. Call next level of support.				X

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic		Sheet 9 of 14		
ASSUMPTIONS:				
1. The following is entered at the keyboard: Type GO Press CARRIAGE RETURN				
2. Observe CDT display for any of the following conditions. NOTE: All indicators are illuminated except LINE, BLOCK MODE, ALERT and FORMAT MODE during the lamp test.				
CONDITIONS:		1	2	3
1.	Is LIAT2 SUSPENDED ENDS displayed?	Y	N	
2.	Is there an action code?		Y	N
ACTIONS:				
1.	Go to sheet 10 of this table.	X		
2.	Go to sheet 14 of this table.		X	
3.	Call next level of support.			X

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logie		Sheet 10 of 14		
ASSUMPTIONS:				
1.	The following is entered at the keyboard: Type GO Press CARRIAGE RETURN			
2.	When requested by the display, 1234567890 is typed in on the keyboard.			
3.	Observe console display for any of the following conditions.			
CONDITIONS:		1	2	3
1.	Is LIAT2 SUSPENDED ENDS displayed?	Y	N	
2.	Is there an action code?		Y	N
ACTIONS:				
1.	Go to sheet 11 of this table.	X		
2.	Go to sheet 14 of this table.		X	
3.	Call the next level of support.			X

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic		Sheet 11 of 14			
ASSUMPTIONS:					
1. The following is entered at the keyboard: Type GO Press CARRIAGE RETURN					
2. When requested by display, the following is entered at the keyboard: ABCDEFGHIJKLMN OPQRSTUVWXYZ1234567890 is typed in. CARRIAGE RETURN key is pressed.					
3. Observe console display for any of the following conditions.					
CONDITIONS:		1	2	3	4
1. Is LIAT2 SUSPENDED ENDS displayed?		Y		N	
2. Does the display repeat that data exactly below the input data?		Y	N		
3. Is there an action code?				Y	N
ACTIONS:					
1. Go to sheet 12 of this table.		X			
2. Replace console display processor board, slot 9 (procedure 8).			2		
3. Replace I/O-TTY logic (see the board (logic) replacement procedure in the processor manual).			1		1
4. Replace SMI logic (see the board (logic) replacement procedure in the processor manual).					2
5. Go to sheet 14 of this table.				X	
6. Call next level of support.			3		3

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic		Sheet 12 of 14		
ASSUMPTIONS:				
1. The following is entered at the keyboard: Type GO Press CARRIAGE RETURN				
2. Entries are made as directed by the display.				
3. Observe console display for any of the following conditions.				
CONDITIONS:		1	2	3
1. Is LIAT2 SUSPENDED ENDS displayed?		Y	N	
2. Is there an action code?			Y	N
ACTIONS:				
1. Go to sheet 13 of this table.		X		
2. Go to sheet 14 of this table.			X	
3. Call the next level of support.				X

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic		Sheet 13 of 14		
ASSUMPTIONS:				
1. The following is entered at the keyboard: Type GO Press CARRIAGE RETURN				
2. Entries and switch changes are made as directed by display.				
3. Observe console display for any of the following conditions.				
CONDITIONS:		1	2	3
1. Is LIAT2 SUSPENDED ENDS displayed?		Y	N	
2. Is there an action code?			Y	N
ACTIONS:				
1. At the keyboard: Type in GO Press CARRIAGE RETURN		1		
2. Go to the next subsystem to be tested.		3		
3. Go to sheet 14 of this table.			X	
4. Call next level of support.				X
5. Using notes prepared at the beginning of CDT testing, set switches to their original positions.		2		

TABLE 6-4. CONSOLE DISPLAY (CDT) DIAGNOSTIC DDLT (Contd)

Diagnostic Test of CC614 When Connected to I/O-TTY Logic		Sheet 14 of 14						
ASSUMPTIONS:								
<ol style="list-style-type: none"> An action code (located under Conditions) is displayed on the console display screen. Observe console display for the following conditions. 								
CONDITIONS:		1	2	3	4	5	6	7
Does the console display:								
1.	0711 or 0731 or 0721 or 0722 or 0732	Y	N					
2.	0733		Y	N				
3.	0741			Y	N			
4.	0742				Y	N		
5.	0750					Y	N	
6.	0751						Y	N
ACTIONS:								
1.	Replace console display processor board, slot 9 (procedure 8).	1	1	3	1	1	1	
2.	Replace console display refresh board, slot 6 (procedure 8).				4		2	
3.	Replace console display memory board, slot 8 (procedure 8).			1	2			
4.	Replace console display memory board, slot 5B (procedure 8).			2	3			
5.	Replace I/O-TTY logic (see the board (logic) replacement procedure in the processor manual).	2	3	4		2	3	
6.	Replace SMI logic (see the board (logic) replacement procedure in the processor manual).		2			3		
7.	Call next level of support.	3	4	5	5	4	4	1

PROCEDURES

1 POWER TURN-ON

To turn on the console display power (figure 6-3), perform the following:

1. Check that the console display ac power cord is connected to the site power outlet.
2. Place the rear panel white circuit breaker up.

3. Press the POWER ON/OFF switch on the operators panel to ON.

2 POWER TURN-OFF

To turn off console display power, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Place the rear panel white circuit breaker down.

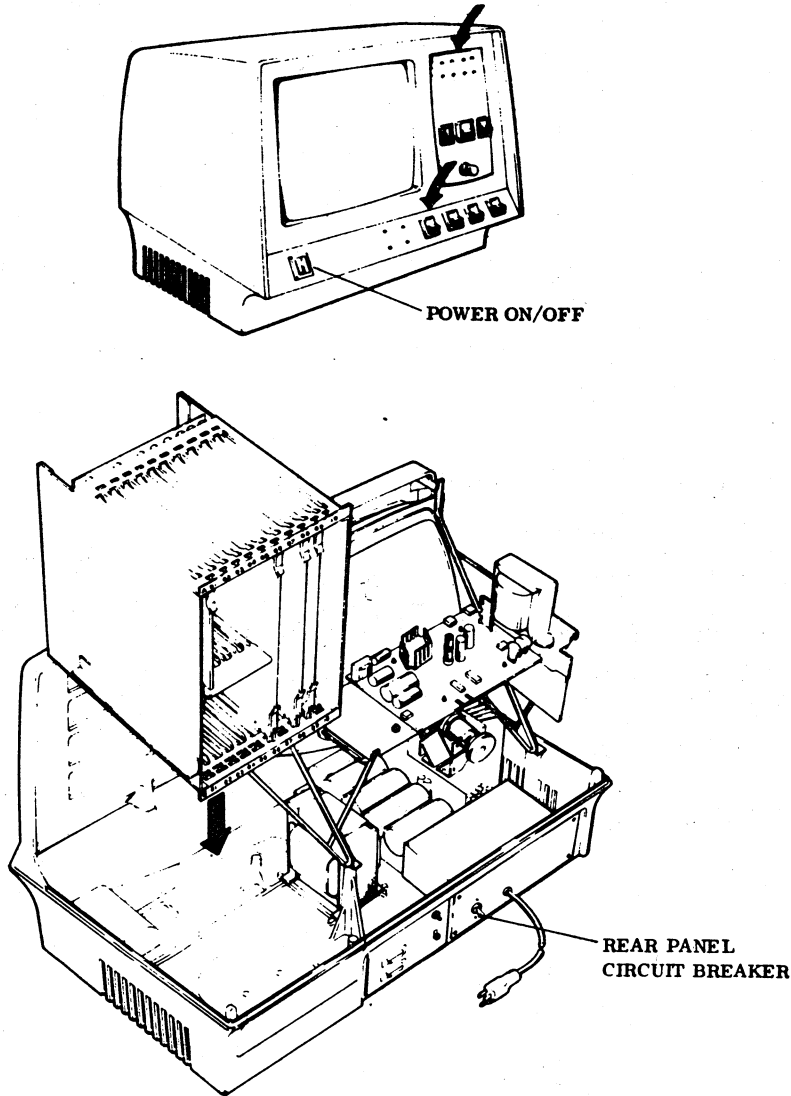


Figure 6-3. POWER ON/OFF Switches

3 HIGH-VOLTAGE TRANSFORMER REMOVAL/REPLACEMENT

To remove the high-voltage transformer, perform the following:

1. Turn power off (procedure 2) and disconnect the ac power cord.

WARNING

Be careful not to scratch the surface of the cathode-ray tube. A scratch weakens the glass substantially and can cause the tube to implode.

2. Connect a heavily insulated wire to ground. While carefully lifting the rubber anode cover, discharge the surface under the rubber cover (including the anode terminal end) by sliding the end of the grounded wire under the rubber cover and into the anode hole of the cathode-ray tube.
3. Remove the high-voltage lead by raising the rubber cover and gently compressing the spring-loaded anode lead.
4. Remove the primary wires of the transformer from connector BP4. Do this by inserting the end of a paper clip into the top of the connector between the flag-type terminal and insulation to release each wire. Tag/mark the wires according to the BP4 numbers (figure 6-4).
5. Remove the two hex nuts which hold the transformer to the chassis and carefully withdraw the transformer from the video module.

To replace the transformer, perform the following:

6. Connect the transformer to the chassis as shown in figure 6-4.
7. Connect the high-voltage lead to the anode of the cathode-ray tube.

WARNING

Connect may be hard. If using pliers to help connect, be extremely careful. It is recommended that plier tips be covered by heat shrink tubing to prevent an accident with the CRT.

8. Connect the flag-type terminals on the primary wires to connector BP4:

T1-8 to BP4-16
T1-3 to BP4-17
T1-5 to BP4-13
T1-6 to BP4-5
T1-7 to BP4-14

4 +15 V DC REGULATOR REPLACEMENT

There are two versions of the +15 V dc regulator assemblies. The early design is identified by its rectangular-shaped

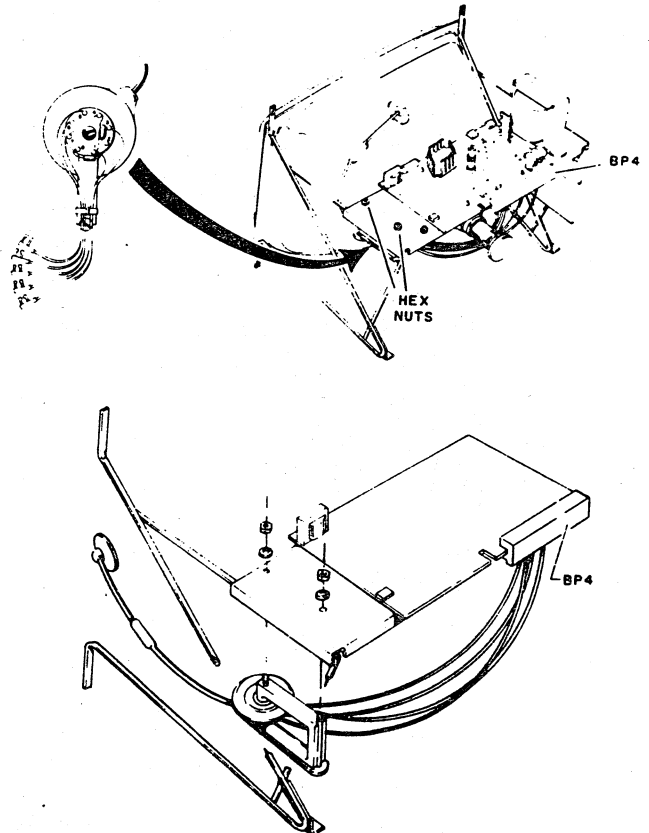


Figure 6-4. High-Voltage Transformer Installation

components. The latest design has round-shaped components. Replacement procedures differ slightly.

NOTE

The latest design contains a fuse across the input.

To remove the regulator and/or transistor from the +15 V dc regulator assembly (figure 6-5), perform the following:

1. Turn power off (procedure 2) and disconnect the ac power cord.
2. If regulator assembly is the latest design, check continuity of the fuse (F1, figure 6-6) before performing step 4.
3. On early design, remove the defective transistor (figure 6-5) by removing the mounting screw and pulling the transistor firmly from the socket.
4. On latest design, remove the screws from both the pass transistor and the regulator (figure 6-5) by removing the mounting screws and pulling firmly from the socket.

The following procedures pertain to replacement of the transistors and the regulator.

Early Design

1. If a rectangular transistor is being removed, cut the collector lead (C) of the new transistor flush with the case (figure 6-5).
2. Clean the surface of the heat sink where the transistor makes contact, and apply the thermal compound.
3. Bend the base (B) and emitter (E) leads downward at right angles to the body so they fit into the socket when the transistor is attached with its mounting hardware.
4. Plug the transistor leads into the socket and attach with the mounting hardware.

Latest Design

1. Clean the surface of the treat sink where the regulator and the pass transistor are are mounted (figure 6-5).

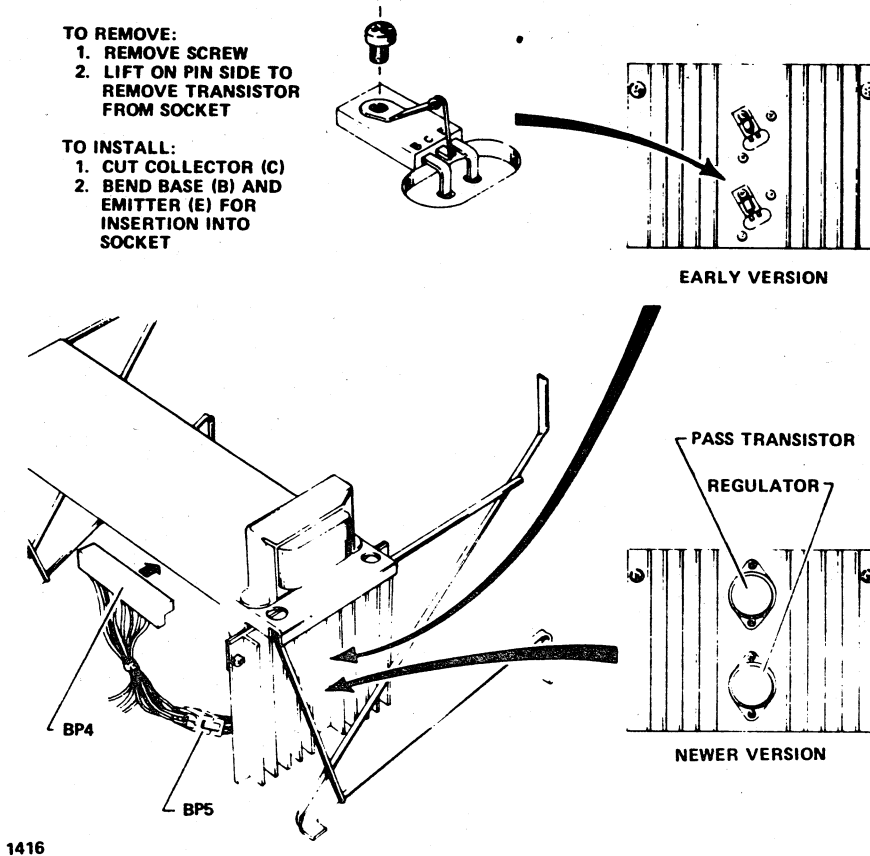
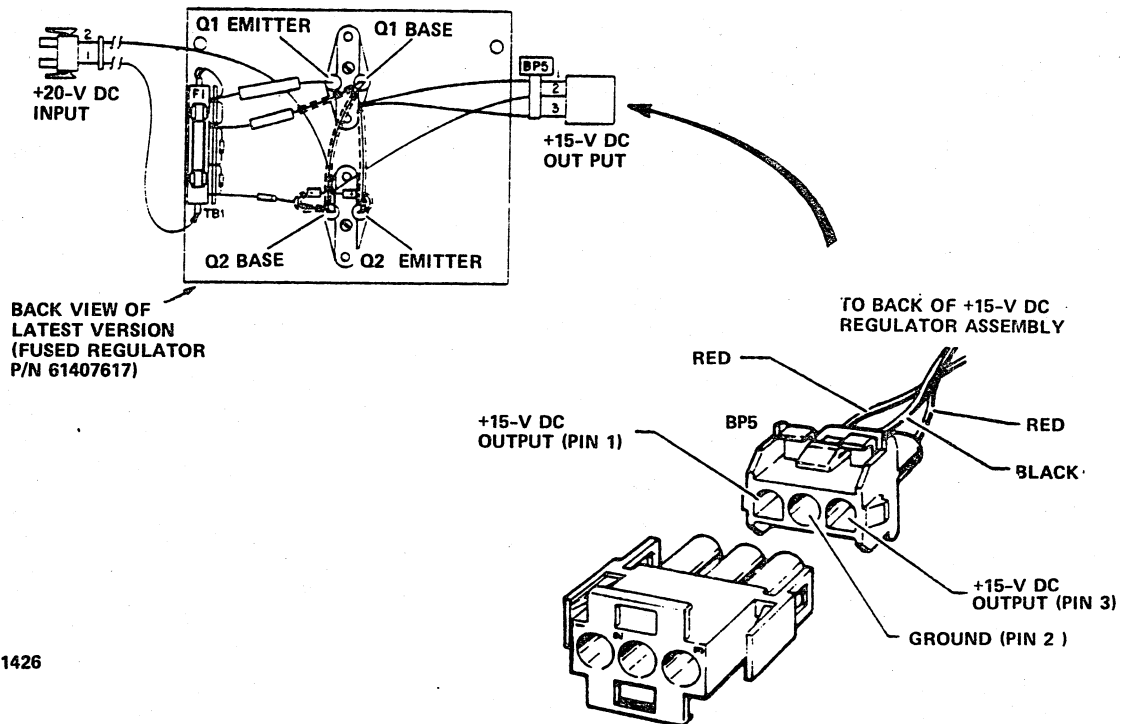


Figure 6-5. 15 V dc Regulator Assembly



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Figure 6-6. 15 V dc Regulator Transistor

2. Apply the thermal compound to both sides of the mica insulator.
3. Place the mica insulator beneath the regulator or the pass transistor and plug into the heat sink socket. Align the mounting holes and attach with hardware.

To make a voltage check, perform the following:

1. Disconnect the BP5 connector (figure 6-5), connect the power cord, and turn on power (procedure 1).
2. Using a multimeter set to read +15 V dc, check for +15 \pm 0.75 V dc between BP5 pin 1 and BP pin 2 (figure 6-6). If the indication is within tolerance proceed to step 3. If the indication is not within tolerance, replace the transistor and try again.
3. Turn power off (procedure 2) and reconnect BP5. Turn power on (procedure 1) and test the emitter again for +15 V dc.
4. If the voltage drops below +14.25 V dc when BP5 is connected, replace the video module PWA (procedure 12).

5 AC ENTRY PANEL REPLACEMENT

To remove the ac power panel assembly (figure 6-7), perform the following:

1. Turn the power off (procedure 2).

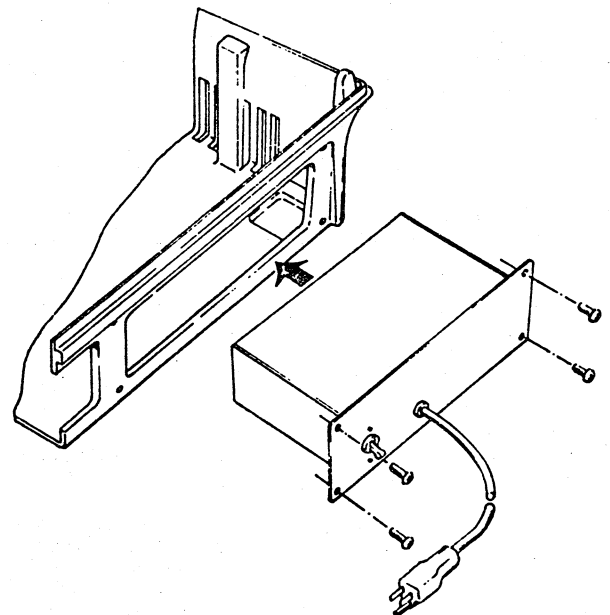


Figure 6-7. Ac Entry Panel Removal

2. Pull the ac plug from the site power outlet.
3. Remove the grounding wires connected to terminals E2, E3, and E4.
4. Disconnect the connector leading to the POWER ON/OFF switch.
5. Disconnect the connector leading to the transformer and bulk power supply.
6. Remove the four screws that anchor the panel box to the cabinet chassis.
7. Withdraw the entire ac power panel and its connectors from the console display cabinet.

To install the ac entry panel, perform the following:

8. Feed the connectors through the chassis hole and insert the ac power panel (box) into the chassis compartment.
9. Fasten the four screws (figure 6-7).
10. Attach the grounding wires to E2, E3, and E4.
11. Connect the cable connectors. The small one goes to the POWER ON/OFF switch while the large one leads to the bulk power supply.

6 TEST MODE SWITCH REPLACEMENT

To remove the TEST MODE switch, perform the following:

1. Remove the data cables from the rear data entry panel.
2. Remove the four mounting screws that hold the panel to the chassis (figure 6-8).
3. Remove the TEST MODE switch (the slide switch below the MASTER CLEAR pushbutton switch) from the panel by unscrewing the two screws holding the switch to the panel.
4. Unsolder the wires and identify them so they can be replaced correctly.

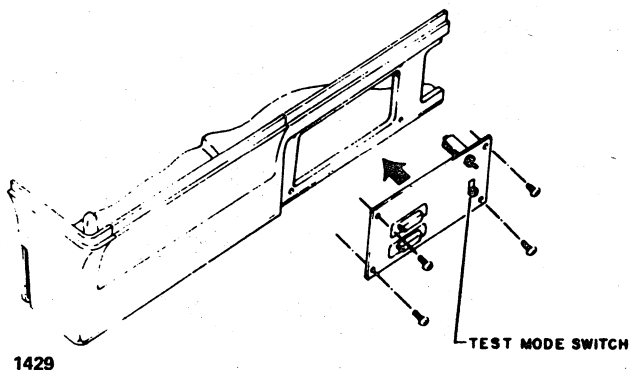


Figure 6-8. TEST MODE Switch Removal

To replace the TEST MODE switch, perform the following:

5. Solder the wires to the pins of the new TEST MODE switch in the same arrangement as they were removed.
6. Attach the switch to the panel with two mounting screws.
7. Attach the panel to the chassis with four mounting screws.

7 MASTER CLEAR SWITCH REPLACEMENT

To remove the MASTER CLEAR switch, perform the following:

1. Unscrew the four mounting screws holding the data entry panel to the chassis (figure 6-9).

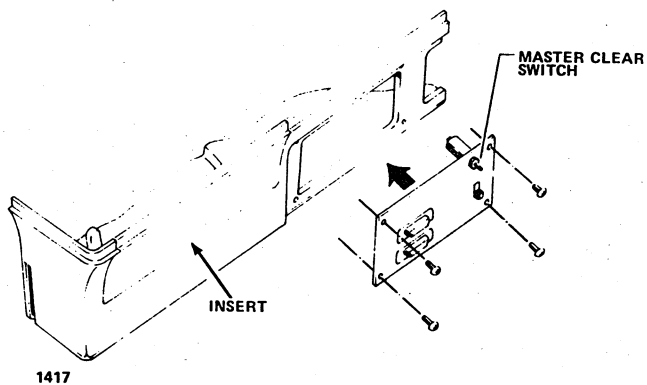


Figure 6-9. MASTER CLEAR Switch

2. Unscrew the hex nut holding the MASTER CLEAR switch to the panel.
3. Unsolder the wires and identify them so they can be replaced correctly.

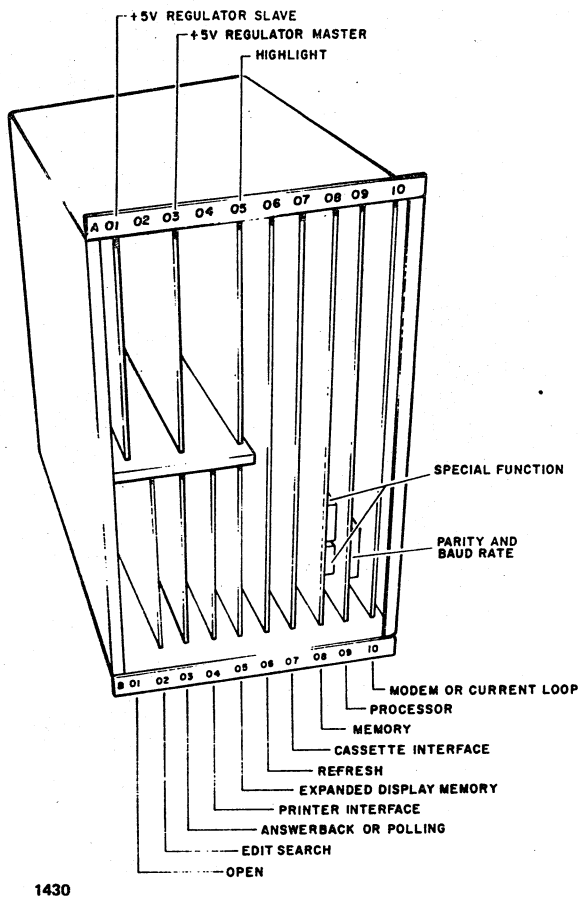
To replace the MASTER CLEAR switch, perform the following:

4. Solder the wires to the switch pins. Attach the black wire to the center pin.
5. Insert the switch into the panel and attach it with the hex nut.
6. Attach the panel to the chassis using the four mounting screws (figure 6-9).

8 LOGIC MODULE PWA REMOVAL/REPLACEMENT

To remove the PWAs from the card cage, (figure 6-10) perform the following:

1. Press the POWER ON/OFF switch to OFF.



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Figure 6-10. Logic Card Cage PWA Locations

2. Remove the two screws holding the cabinet hood to the chassis and remove the cabinet hood.
3. Lift out the cabinet-back insert from the cabinet base (figure 6-9).
4. Release the friction clamp arms holding the board in place.
5. Withdraw the PWA from the card cage.

To replace the PWAs in the card cage, perform the following:

6. Power should remain off.
7. If the PWA contains switches, compare and set up according to the assembly removed.
8. Place the PWA in the correct location (figure 6-10) and slide it in the track until it is touching the socket at the end of the track.
9. Carefully draw the PWA into the socket by locking the friction clamps.

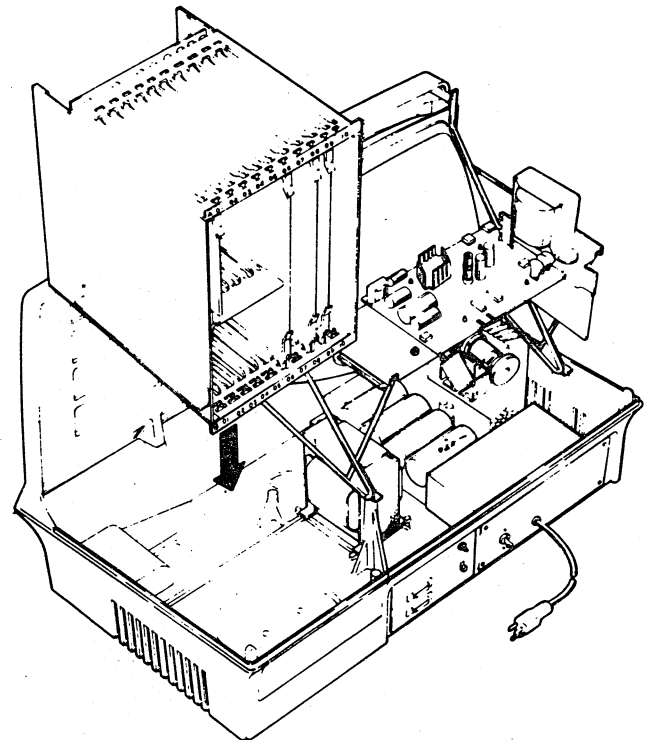
10. Replace the insert removed in step 3, and turn power on.

9 LOGIC MODULE CARD CAGE REMOVAL

To remove the logic module card cage, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Remove the two screws holding the cabinet hood to the chassis and remove the cabinet hood. Also remove the cabinetback insert (figure 6-9) from the cabinet base.
3. Tag and remove all the modules from the card cage.
4. Remove the four mounting screws, using a 5/16-inch socket and a 19-inch by 1/4-inch drive extension. Also remove the ground wires from the chassis.
5. Carefully lift the card cage upward and to the rear sufficiently to disconnect and tag the connectors mounted on the bezel side of the card cage. When the cage is back far enough, disconnect the cables and remove the card cage (figure 6-11).

To replace the logic module card cage, reverse the preceding steps.



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Figure 6-11. Logic Module Card Cage Removal

10 SWITCH AND INDICATOR REPLACEMENT

To remove an indicator or switch on the front panel, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Separate the panel from the bezel by inserting fingernails under the panel and carefully prying the panel from the bezel chassis (see arrows in figure 6-12).
3. Disconnect all wires from the indicator or switch by pulling the terminals. Identify the wires.

Replace the indicator and/or switch by reversing the above procedure.

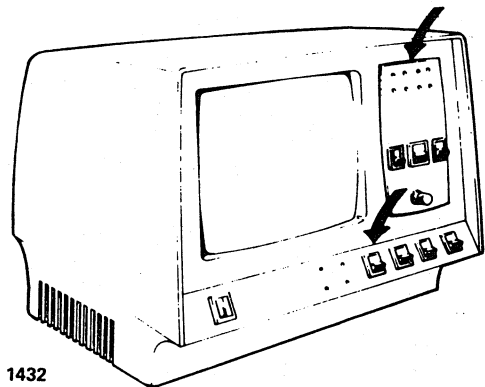
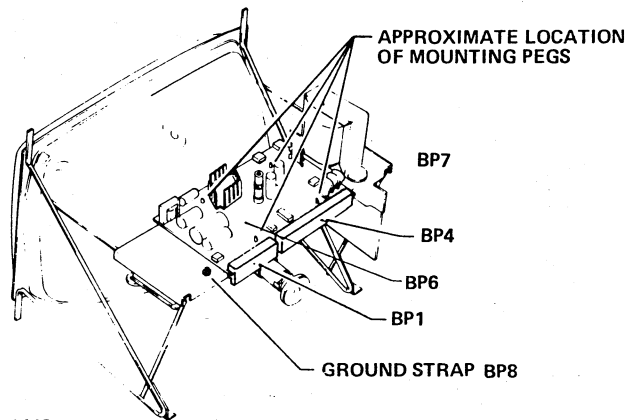


Figure 6-12. LED and Switch Panel Removal

11 VIDEO PWA REPLACEMENT

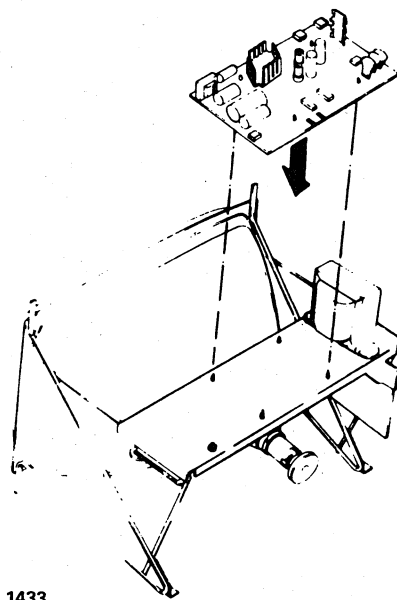
To remove the video PWA, perform the following:

1. Remove power by placing the POWER ON/OFF switch in the OFF position.
2. Disconnect the BP1 connector (figure 6-13).
3. Remove ground strap BP7 from the PWA.
4. Disconnect connector BP6 from the PWA.
5. Disconnect ground strap BP8.
6. Disconnect connector BP4.
7. Compress the retainer clips on the mounting peg and release the friction clips by pressing downward. Repeat for all four pegs. After the PWA is released from all four pegs, lift the PWA to remove it from the video module (figure 6-13).
8. Install the new PWA by positioning it over the mounting pegs (match the holes on the PWA with the pegs) and gently press the PWA down into position (figure 6-14) so that the friction clips on the pegs pass through the holes sufficiently to lock the PWA in place.



1413

Figure 6-13. Video Module PWA Replacement



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Figure 6-14. Video PWA Removal

9. Replace the connectors and the ground strap.
10. Refer to procedure 26 for video adjustments.

12 VIDEO MODULE REPLACEMENT

To remove the video module, perform the following:

1. Press the POWER ON/OFF switch to OFF and disconnect the ac power cord.

2. Disconnect the BP1 connector at J1 (the smallest connector on the video PWA).
3. Disconnect connector BP5 leading to the +15 V dc regulators that are mounted vertically on the large heat sink on the side of the video module (figure 6-15).
4. Disconnect connectors BP2 and BP3. Disconnect the ground wire from E1 on the video board.
5. Remove the 4 hex screws with a 1/4-inch socket and extension (figure 6-16). Loosen the two hex screws at bottom of the CRT.

WARNING

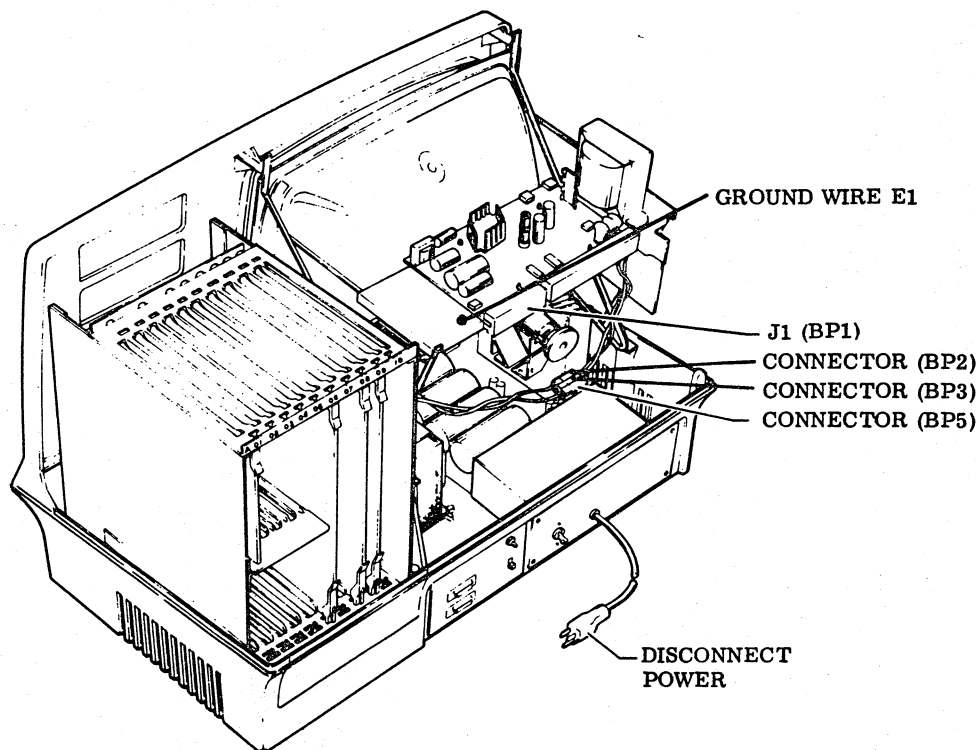
Use extreme care when handling the TV module. Rough handling can cause the CRT to implode with tremendous force resulting in severe injury. Do not nick or scratch the glass or subject it to any undue pressure during replacement. When handling the CRT, always wear safety goggles and heavy gloves for protection.

6. Grasp the video module by the mounting frames with both hands and carefully withdraw the entire module from the cabinet (figure 6-17). Check to see that the

neck of the CRT or mounting frame is not caught on the cabling.

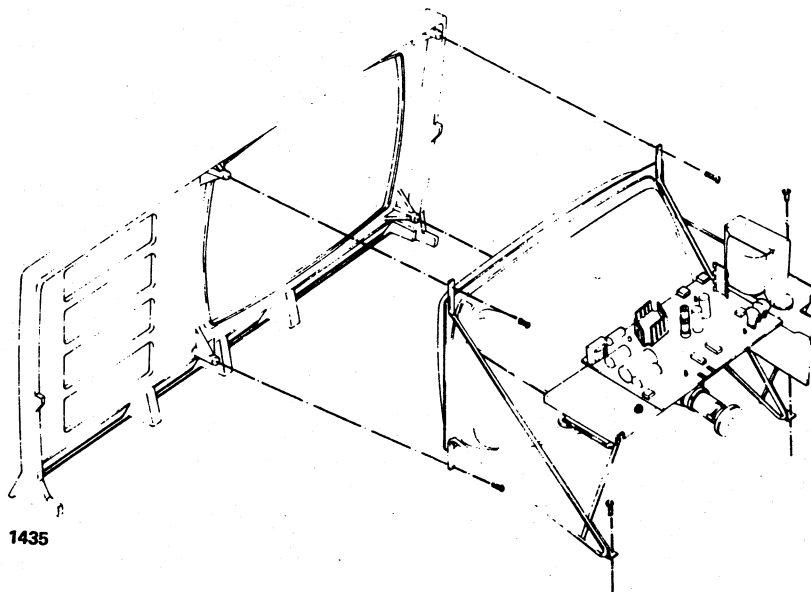
To install the video module, perform the following:

7. Insert the left bottom hex screw nearest the logic module card cage into the mounting support on the bezel (figure 6-18).
8. With the video module in both hands, lower the module into the cabinet until the slotted support in front fits over the screw inserted in the mounting (step 1).
9. Carefully steady the module with one hand and insert the top left and top right screws with the other hand; then insert the remaining bezel screw.
10. Tighten the two top screws using a 1/4-inch socket. Do not overtighten.
11. Insert the two cabinet screws that hold the back of the module in place. Do not overtighten.
12. Tighten the lower left hex screw using an 18-inch extension with a 1/4-inch socket. Do not overtighten.
13. Tighten the remaining screws so they are snug.
14. Connect the PWA BP1 connector and plug in the connector from the logic module back panel to the



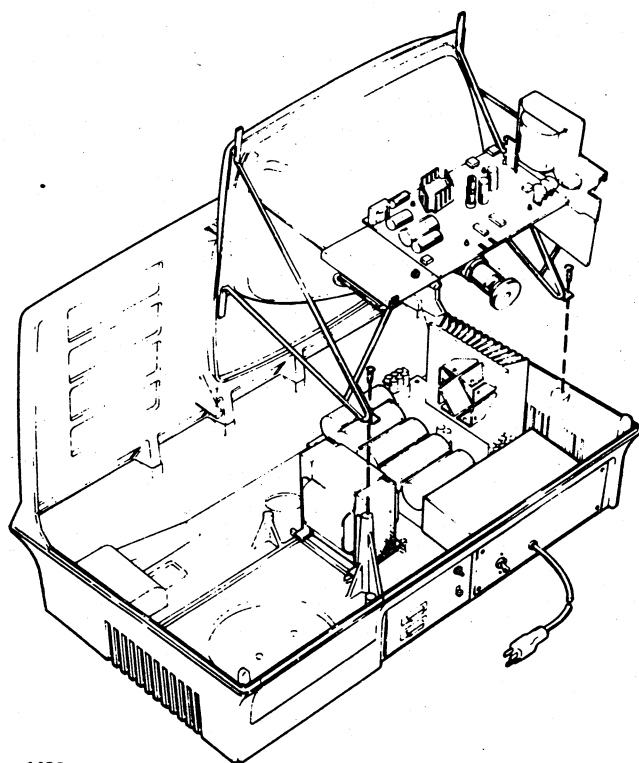
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Figure 6-15. Video Connector Removal



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Figure 6-16. CRT Mounting to Bezel



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Figure 6-17. Removing Video Module

+15 V dc regulator connector. Connect BP2, BP3, and the ground wire to E1 (figure 6-15).

15. Check that all other connectors (tube socket, J2, and transformer lead into anode) are plugged in or attached correctly.

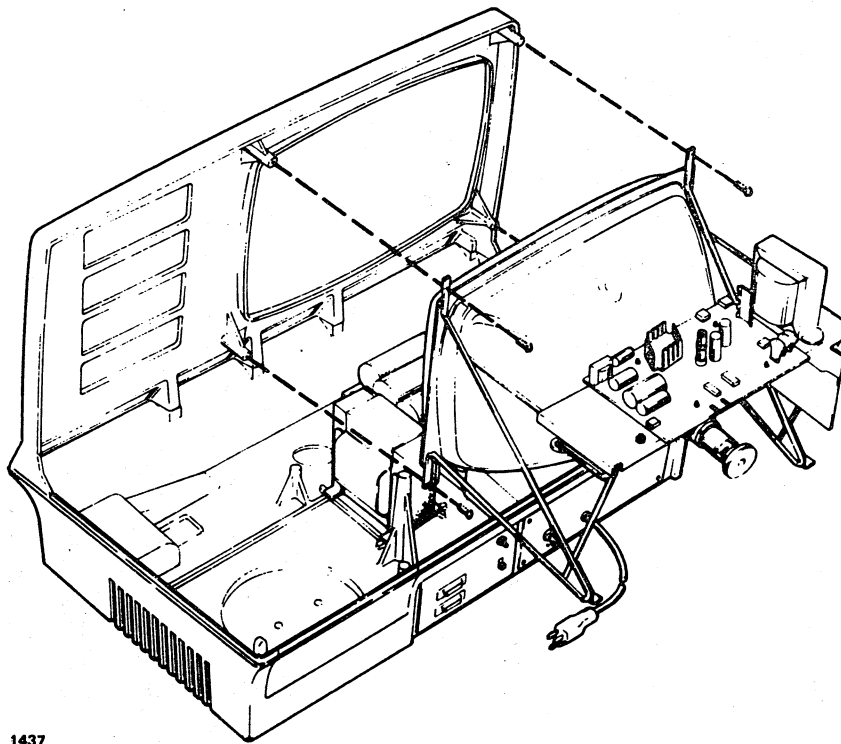
13 CATHODE RAY TUBE REPLACEMENT

To replace the cathode ray tube (CRT), perform the following:

1. Press the POWER ON/OFF switch to OFF and disconnect the ac power cord from the site power outlet.
2. Refer to procedure 3 and perform steps 1, 2, 3 and 4.
3. Remove the video module from the cabinet (see procedure 12, steps 1 through 6).
4. Disconnect the CRT tube socket carefully from the end of the neck of the CRT (figure 6-19). Do not remove the vinyl keyguide, which should be in position over the end of the tube for protection when the socket is removed. During installation, the keyguide assures that the socket is correctly positioned.

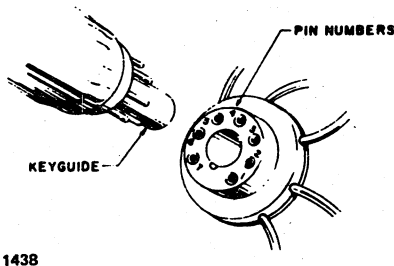
WARNING

Use extreme care when handling the TV module. Rough handling can cause the CRT to implode with tremendous force resulting in severe injury. Do not nick or scratch the glass or subject it to any undue pressure during replacement. When handling the CRT, always wear safety goggles and heavy gloves for protection.



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Figure 6-18. Video Module Installation



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Figure 6-19. CRT Socket Removal

5. Using a screwdriver, disconnect the ground clip eyelet frame, loosen the clamp that holds the yoke in place (figure 6-20).
6. After the screw is loosened, remove the ground clip and ring magnet. Gently slide the yoke and shielding sleeve (which is between the neck and the yoke) back on the CRT neck to ensure it is loose enough for later removal.

7. Remove the four Phillips-head screws that hold the CRT mounting plate to the video module chassis, being careful that the CRT does not slip or fall when the last screws are removed.

WARNING

Never allow the CRT to rest on or to be supported by its neck.

8. Support the CRT neck with one hand and carefully remove the yoke with the other hand.
9. Withdraw the CRT carefully from the wire chassis of the video module. Place the CRT face down on a clean soft, cloth-covered stable surface (bench) with the neck of the CRT pointing upward.
10. Remove the replacement CRT from the shipping carton and place it on a clean flat, soft, cloth-covered surface face down with the neck pointing upward.
11. Place the bad tube carefully into the shipping carton and secure it for shipment.
12. Without resting the CRT on its neck, position the CRT for mounting on the video module chassis (the neck is

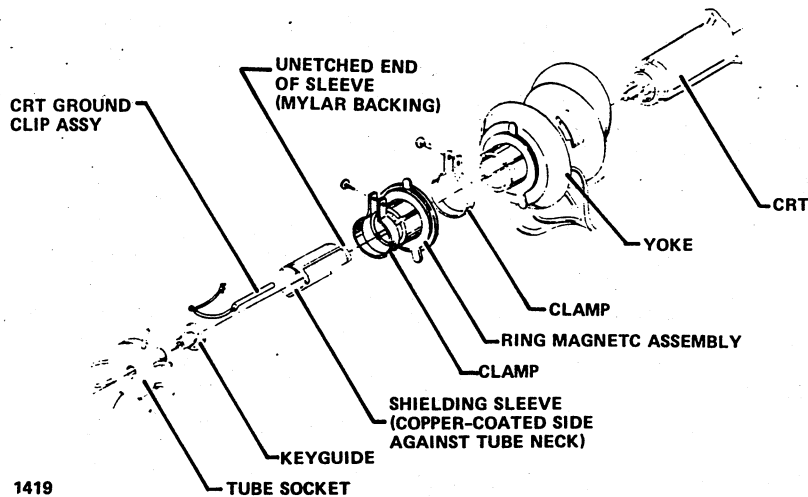


Figure 6-20. CRT Yoke Assembly

carefully inserted into the chassis frame to the vicinity of the yoke).

13. Fasten the CRT mounting plate to the wire chassis with four Phillips-head screws.
14. Position the shielding sleeve (figure 6-20) on the neck of the CRT with one hand and slip the yoke over the neck and slide it forward over the sleeve. The sleeve should stick out from the back of the yoke when the yoke is positioned forward.
15. Slip the clamp over the back tabs of the yoke and tighten the screw slightly. Slip ground clip under the shielding.
16. Ensure that the keyguide is in place over the pins on the end of the CRT (figures 6-19 and 6-20).
17. Carefully position the tube socket over the end of the CRT and gently push the socket into place so the pins enter the socket without bending.
18. Install the video module into the console display. Refer to steps 6 through 14, procedure 12.
19. Before power is applied to the device, insert the high-voltage lead from the high-voltage transformer into the CRT anode.
20. Check that the connectors are attached correctly to BJ1 and BJ4 of the video module PWA.
21. Perform horizontal and vertical alignment (procedure 14).

14 HORIZONTAL AND VERTICAL ALIGNMENT

To align the display, perform the following:

1. If this alignment is the result of the yoke having been removed or a new CRT installed, check that the high-voltage lead was reinstalled, the PWA connectors are reconnected, and the plug from the +15 V dc regulators is attached to the socket from the logic module.
2. Connect the ac power cord and turn the power on by pressing the POWER ON/OFF switch to the ON position.

WARNING

With the power applied, severe shock will be received if the high-voltage transformer, the lead to the anode, or the area of the anode on the CRT is touched. Be careful when the following procedures are performed not to touch anything higher than the yoke. Keep tools out of the area while positioning the yoke.

3. Position the ON LINE/LOCAL switch to LOCAL.
4. Position the TEST/NORMAL switch to NORMAL.
5. Press MASTER CLEAR (pushbutton on the rear data entry panel).
6. Enter a full display of H characters by momentarily pressing the H character key while pressing the

REPEAT key. Hold the REPEAT key down. If the H character display is not obtained, proceed to table 6-3.

7. Check if the raster of H characters is centered correctly on the screen. If not, turn off the power and proceed to step 8. If the raster is centered, go directly to step 11.
8. Turn the power off and loosen the clamp screw that holds the yoke in position on the neck of the CRT.
9. Turn the power on. Enter a full raster of H characters.
10. If the raster of H characters is tilted, rotate the yoke until it is straight. Centering is performed by rotating the centering rings located on the rear of the yoke assembly (figure 6-21).

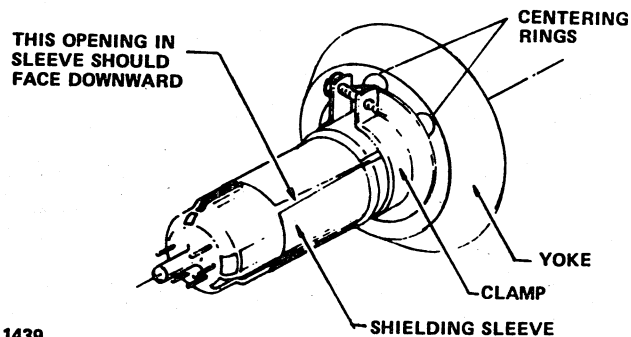


Figure 6-21. Shielding Sleeve Positioning

11. Observe the raster of H characters on the screen. Are the H characters in the leftmost column and rightmost column aligned correctly and of sufficient vertical height (similar to H characters in the center of the screen)? If not, go to step 12; if the H characters are of sufficient height on the top and bottom, go to step 13.
12. Check that the shielding sleeve between the yoke and the neck of the CRT is in place approximately as shown in figure 6-21. If the shielding sleeve is not correctly positioned, the left side of screen is distorted while the right side is not, or the right side of the screen is distorted while the left is not. Pushing the shielding sleeve inward toward the yoke has the effect of distorting the left portion of the screen; if pushed all the way forward, the entire left half of the screen is blacked out.

If the characters on the screen are not uniformly distorted on one side as opposed to the other side, but instead, H characters are compressed on the top and not the bottom, or characters are compressed on the bottom and not the top, the problem is in the adjustment of the vertical linearity potentiometer (figure 6-22). If vertical linearity cannot be improved by adjusting the vertical linearity potentiometer, replace the vertical choke and try to adjust it again. (See procedure 16 for vertical choke replacement procedures.)

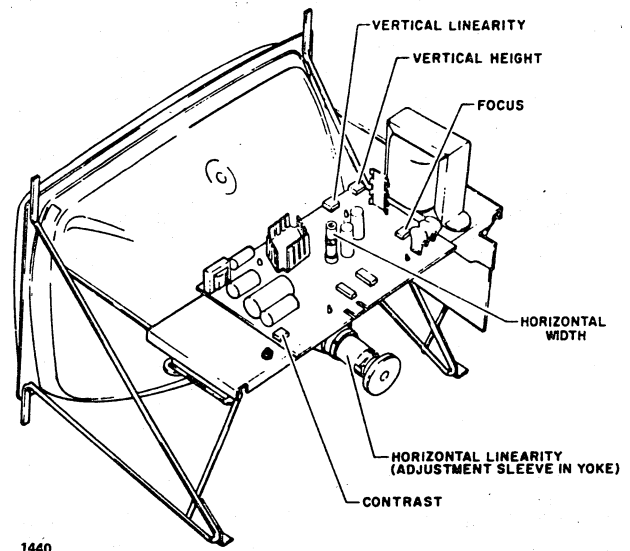


Figure 6-22. Focus, Contrast, and Vertical Linearity

13. After the yoke and shielding sleeve are correctly adjusted, carefully position the clamp over the tabs of the yoke and, without using force, tighten the clamp screw until the clamp is snug over the tabs and neck of the CRT.
14. Perform the video (data character) adjustments (procedure 26).

15 CRT YOKE REPLACEMENT

To remove the yoke from the neck of the CRT, perform the following:

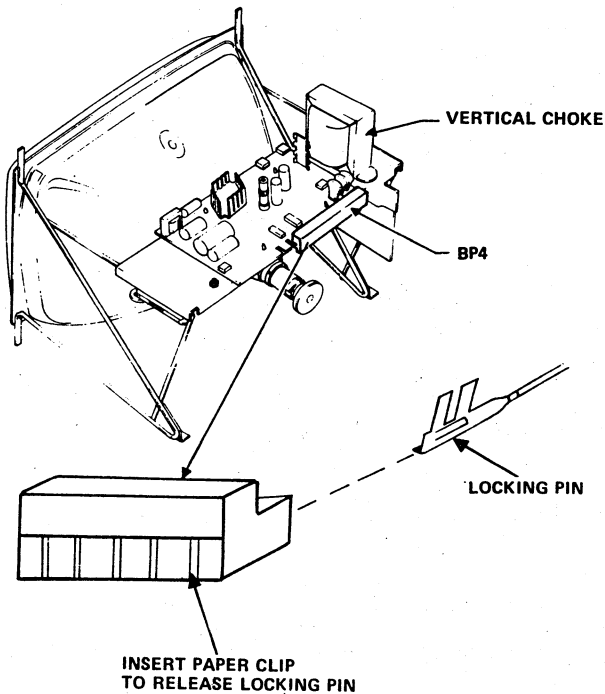
1. Press the POWER ON/OFF switch to OFF.
2. Disconnect the ac power cord from the site power outlet.

WARNING

Use extreme care when handling the TV module. Rough handling can cause the CRT to implode with tremendous force resulting in severe injury. Do not nick or scratch the glass or subject it to any undue pressure during replacement. When handling the CRT, always wear safety goggles and heavy gloves for protection.

3. Connect the heavily insulated wire to ground first and then, while carefully lifting the rubber anode cover, discharge the surface under the rubber cover (including the anode terminal end) by sliding the end of the grounded wire under the rubber cover and into the anode hole of the CRT.

4. Pull connector BP4 off the edge of the video PWA. Connector BP4 is the largest connector with wires leading to the yoke (figure 6-23).



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Figure 6-23. Removing Flag Terminals

5. Disconnect flag terminals 9, 10, 18, and 19 from connector BP4 (four wires leading to the yoke) by inserting the small end of a paper clip into the top of the connector in the space available between the flag terminal and insulation (figure 6-23) and then pulling the wire gently out from the bottom of the connector. (The flag terminal end has a wedge-type spring clip which, when released by a paper clip, permits the flag terminal to be withdrawn with the wire from the connector.)
6. Pull the CRT tube socket carefully off the end of the CRT (figure 6-24). Do not remove the vinyl keyguide.
7. Loosen the clamp that holds the yoke in place with a screwdriver (figure 6-25).
8. After the screw is loosened, gently slide the yoke and shielding sleeve (which is between the CRT neck and

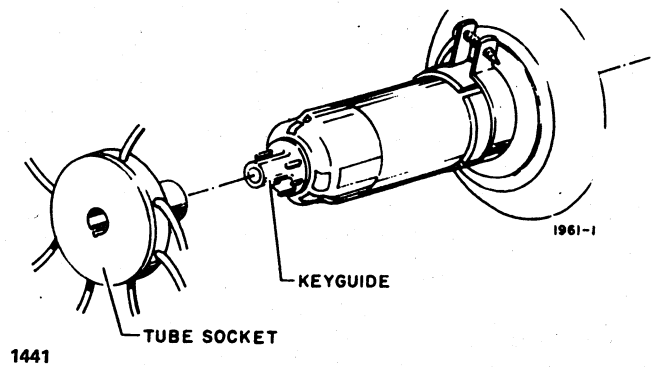


Figure 6-24. CRT Tube Socket Removal

yoke) back on the CRT neck until the yoke can be removed from the device.

WARNING

Never tighten the clamp that holds the yoke on the neck of the CRT more than enough to hold the yoke in place. If tightened excessively, it is possible to break the neck of the CRT. Wear safety goggles and heavy gloves for protection.

9. Position the sleeve approximately as shown in figure 6-26, but with the opening straight down.
10. Position the yoke over the sleeve with the wires downward.
11. Position the clamp over the end tabs of the yoke and tighten slightly.
12. Plug the CRT tube socket carefully onto the pins of the CRT, making sure the guide matches the slot in the socket.
13. Insert flag terminals into the BP4 connector:
 - a. Push the brown wire terminal into the slot (pin location 9) until the wedge-like clip locks itself in place.
 - b. Push the yellow wire into slot 10.
 - c. Push the red wire into slot 18.
 - d. Push the blue wire into slot 19.

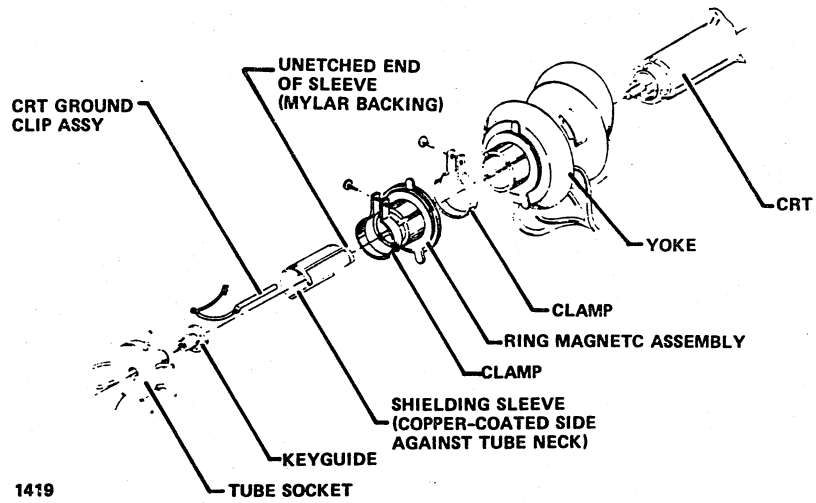


Figure 6-25. Yoke Assembly

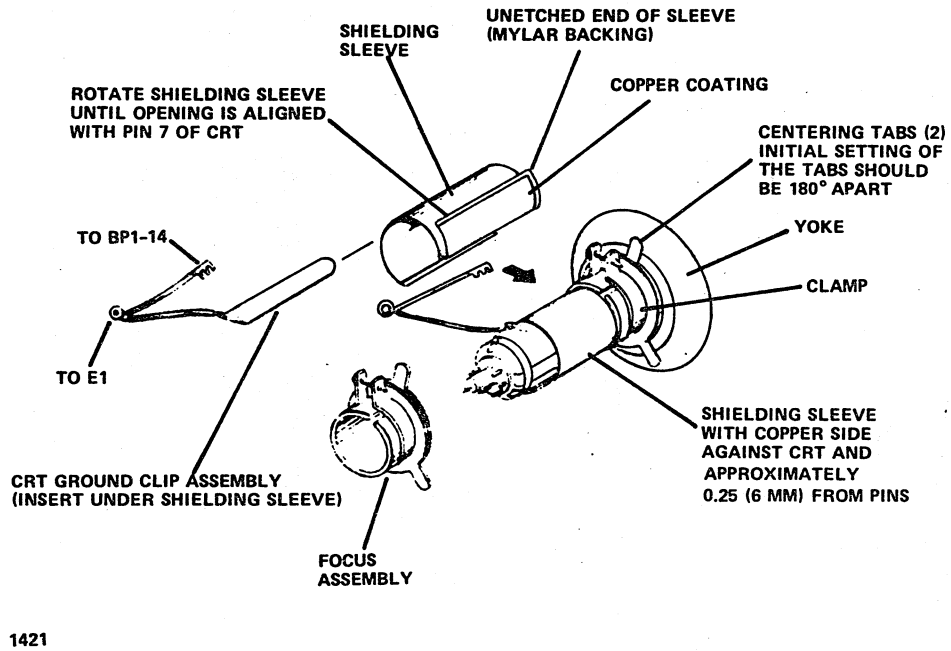


Figure 6-26. Positioning Shielding Sleeve

14. Plug connector BP4 onto the edge of the video PWA.
15. Plug the ac power cord into the site power outlet.
16. Press the POWER ON/OFF switch to ON.
17. Check to see that the TEST/NORMAL switch on the rear panel is in the NORMAL position.
18. Check that the circuit breaker on the rear panel is up.
19. Check to see that the ON LINE/LOCAL switch is at the LOCAL position.
20. Wait 30 seconds.
21. The cursor should appear in the upper-left portion of the display. If not, go to table 6-3. After the cursor appears, go to step 22.

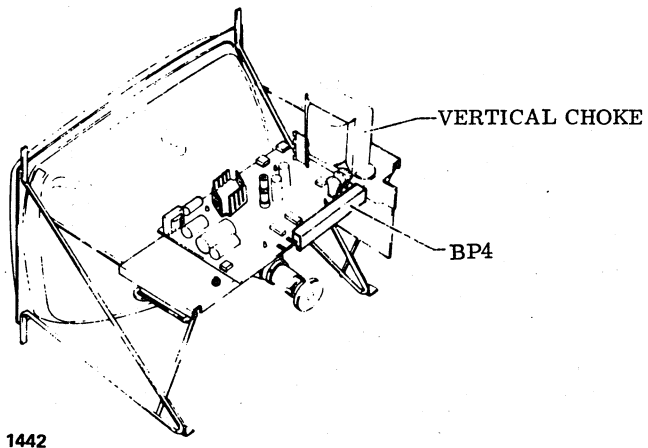


Figure 6-27. Vertical Choke

22. Press the REPEAT key and hold it down.
23. Press the H character key momentarily while holding the REPEAT key down. H characters fill the entire screen.
24. Release the REPEAT key after the screen is full.
25. Is the display tilted to the right or left? If it is, carefully grasp the yoke and rotate it slightly. If the clamp is too tight, loosen the clamp screw. Rotate the yoke in both directions around the neck of the CRT until the picture is centered.
26. Are the left and right edges of the display visible on the screen? If not, move the sleeve under the yoke forward and backward slightly until a full display appears on the screen. Use the centering rings to center the picture on screen.

WARNING

Do not overtighten the clamp on the CRT.

paper clip releases the wedge-like friction lock on the terminal and permits the entire terminal to be removed from the bottom of the connector.

27. Tighten the screw on the CRT clamp so the yoke cannot move.

16 VERTICAL CHOKE REPLACEMENT

To replace the vertical choke (figure 6-27), perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Disconnect BP4, the longest connector on the video PWA. Connector BP4 is on the PWA next to the vertical choke and has two flag terminals (pins 6 and 7) attached to the wires leading to the vertical choke.
3. Remove flag terminals 6 and 7 by inserting the end of a small paper clip in the space provided between the installed flag terminal and the connector insulation. A

4. Remove the two hex nuts holding the vertical choke to the chassis.
5. Lift the grounding wire from the rear mounting screw, but do not remove it from the PWA.
6. Lift the vertical choke from the chassis.
7. Position the new choke in place over the two mounting screws so the two wires are on the side nearest the PWA.
8. Connect the grounding wire to the rear mounting screw and fasten it with a hex nut.
9. Fasten the other hex nut to the front screw.
10. Insert the flag terminals into slots 6 and 7 of connector BP4 until the wires are locked and secured.
11. Connect connector BP4 to the PWA.
12. Press the POWER ON/OFF switch to ON.
13. Go to table 6-3.

17 BULK POWER SUPPLY BOARD REPLACEMENT

To replace the bulk power supply board, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Disconnect the ac power cord from the site power outlet.

3. Remove the cabinet hood by removing the two screws in the rear of the cabinet.
4. Remove the video module (procedure 12).
5. Disconnect the J1 and J3 connectors (figure 6-28) from the bulk power supply board.
6. Disconnect the two wires leading from J1 to the power transistor heat sink by pulling the quick disconnect terminals from the slide terminals at the heat sink.
7. Remove the four hex screws holding the board to the chassis at the corners of the board.
8. Lift the entire assembly out of the chassis.

To replace the bulk power supply board, perform the following:

9. Place the new board on the mounting pegs and fasten it with four mounting hex screws.
10. Plug the J1 and J3 connectors into the sockets (figure 6-28).
11. Connect the two ac wires to the heat sink terminal pins (two wires from J1).
12. Replace the video module (procedure 12).
13. Press the POWER ON/OFF switch to ON and go to table 6-3.

18 KEYBOARD REPLACEMENT

To replace the keyboard, perform the following:

1. Press the POWER ON/OFF switch to OFF.

2. If the display keyboard is attached to the main chassis, lift the chassis sufficiently to slide the keyboard out of the attached position.

CAUTION

If it is necessary to remove the keyboard by lifting up the main chassis, be careful not to allow the chassis to fall backward.

3. Loosen the two captive fasteners that hold the keyboard data entry cable connector in the display chassis socket at the lower right front side of the console display chassis.
4. Disconnect the keyboard assembly from the display by gently pulling the data entry cable out of the display chassis socket.
5. Turn the keyboard assembly over and remove the six screws holding the keyboard cover to the keyboard chassis.
6. Return the keyboard to the keys-up position and lift the cover off (figure 6-29).
7. Remove the cable connector from the edge of the PWA.
8. Remove the two screws that hold the PWA and mask to the chassis on one end, loosen the other two on the other slotted end, and lift out the PWA.
9. Start installing the new keyboard by placing the mask over the new PWA and position both over the four mounting screws in the keyboard chassis.
10. Insert and fasten the four screws that secure the PWA to the chassis.

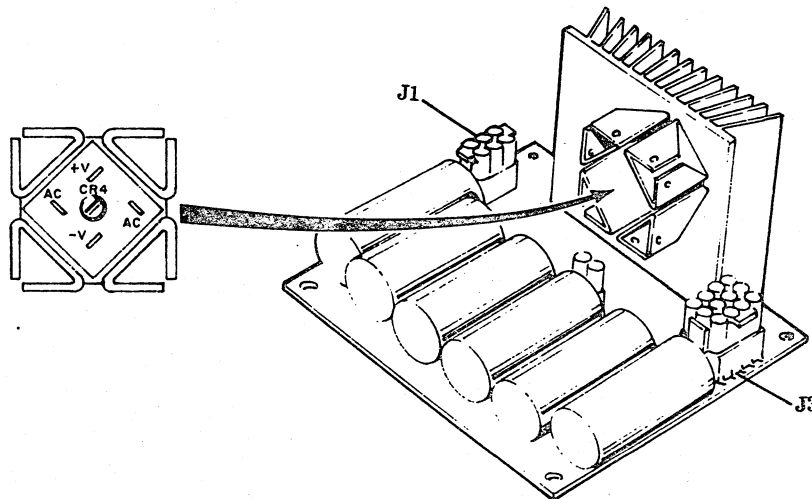


Figure 6-28. Bulk Power Supply Board

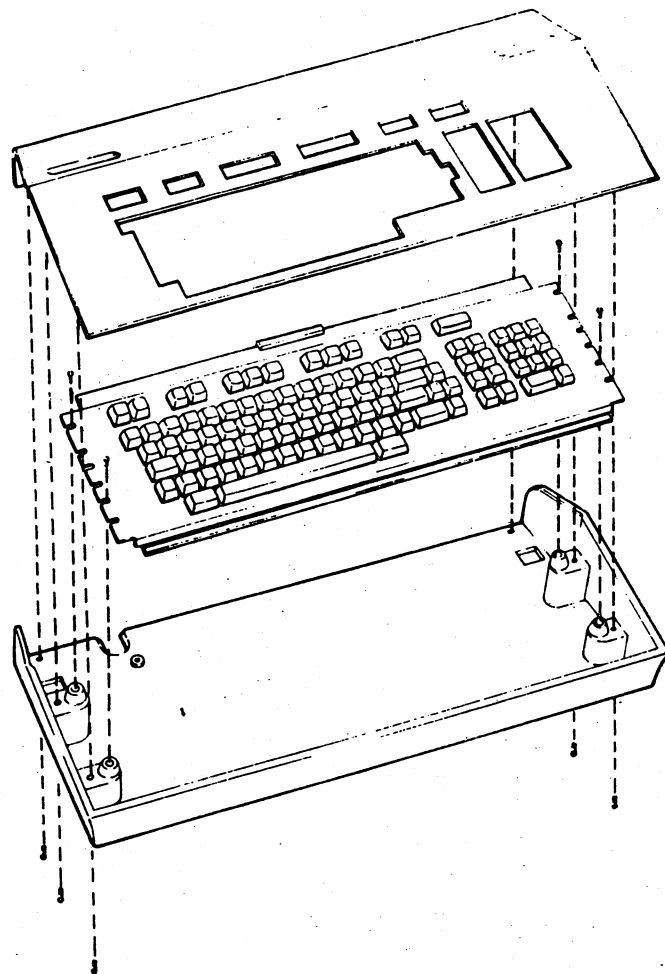


Figure 6-29. Keyboard Assembly

11. Attach the connector to the PWA.
12. Place the cover over the assembly.
13. Holding the cover in place, turn the assembly over and insert the six screws into the bottom of the chassis.
14. Complete installing the new keyboard by performing steps 4, 3, and 2 in sequence.

19 AC ENTRY TRANSFORMER REPLACEMENT

To replace the transformer (figure 6-30), perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Remove the cabinet hood by removing the two screws at the rear of the cabinet and sliding the cabinet to the rear and up.
3. Remove the video module (procedure 12, steps 1 through 6).
4. Disconnect the connector at J1 of the bulk power supply (see procedure 17 and figure 6-28).
5. Disconnect the connector leading to the ac entry panel (figure 6-7).
6. Disconnect the single quick-disconnect terminal at the transformer.
7. Remove the four screws that hold the transformer to the bottom of the chassis.

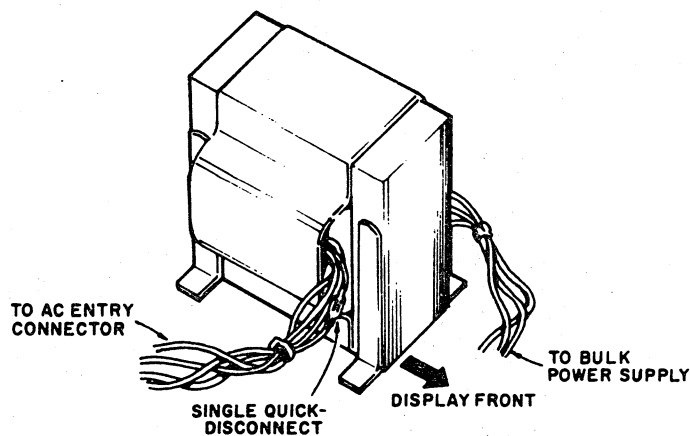


Figure 6-30. Ac Entry Transformer

8. Lift the transformer out of the chassis.
9. Place the new transformer into the position vacated by the old one.
10. Fasten the transformer down with four screws.
11. Connect the single quick-disconnect terminal at the transformer.
12. Connect the J1 connector to the bulk power supply board.
13. Connect the connector leading to the ac entry panel.
14. Replace the video module (procedure 12, steps 7 through 15).
15. Press the POWER ON/OFF switch to ON.
16. Go to table 6-3.

20 VIDEO PWA VOLTAGE MEASUREMENT

To measure +465 V dc, perform the following:

1. Set the voltmeter to measure +465 V dc.
2. Remove the cabinet hood (procedure 21).
3. Press the POWER ON/OFF switch to ON.
4. Connect the black (-) lead from the voltmeter to chassis ground.

WARNING

Do not touch anything with hands and use only one hand at a time to connect the leads to the test points.

5. Connect the red (+) lead to resistor R8A (figure 6-31).
6. Check that the voltmeter indicates $+465 \pm 47$ V dc.
7. If the voltage is within tolerances, go to step 8; if not, return to the point of origin on table 6-3 for further instructions.

To measure -190 V dc, perform the following:

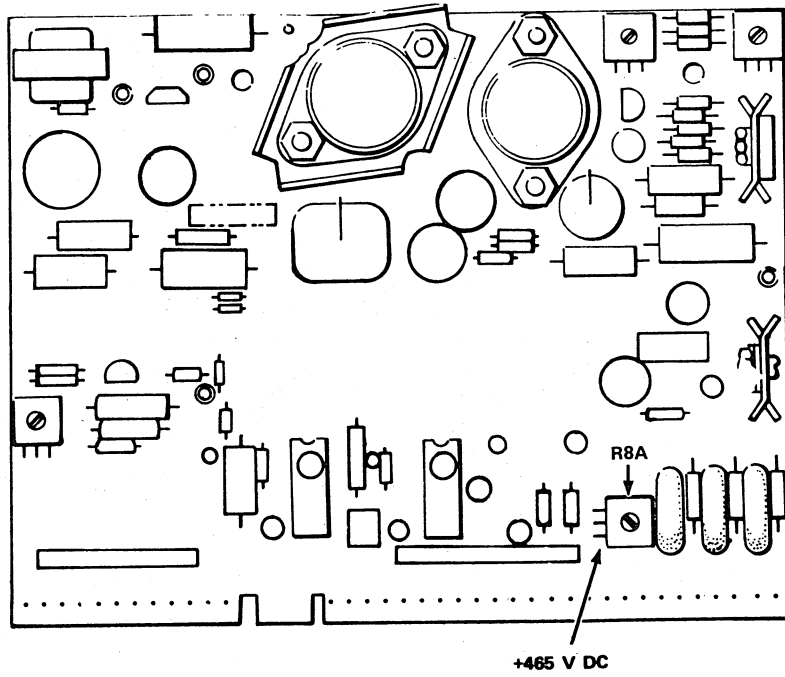
8. Set the voltmeter to measure -190 V dc.
9. Connect the positive (+) lead to the chassis ground. If the voltmeter has a separate switch for selecting -dc, reverse polarity, such as Simpson Model 260, connect the common (black lead) to chassis ground and select -dc on the meter.
10. Connect the negative (-) lead to R1A (figure 6-32).
11. Check that the voltmeter indicates -190 ± 25 V dc.
12. If the reading is within tolerances, go to step 13; otherwise, go to table 6-3.

To measure +45 V dc, perform the following:

13. Set the voltmeter to measure +45 V dc.
14. Connect the black lead (common) to chassis ground.
15. Connect the red (+) lead to diode CR4A (figure 6-33).
16. Check that the meter indicates $+45 \pm 4.5$ V dc.
17. If the voltage is within tolerances, go to step 18; if not, go to table 6-3.

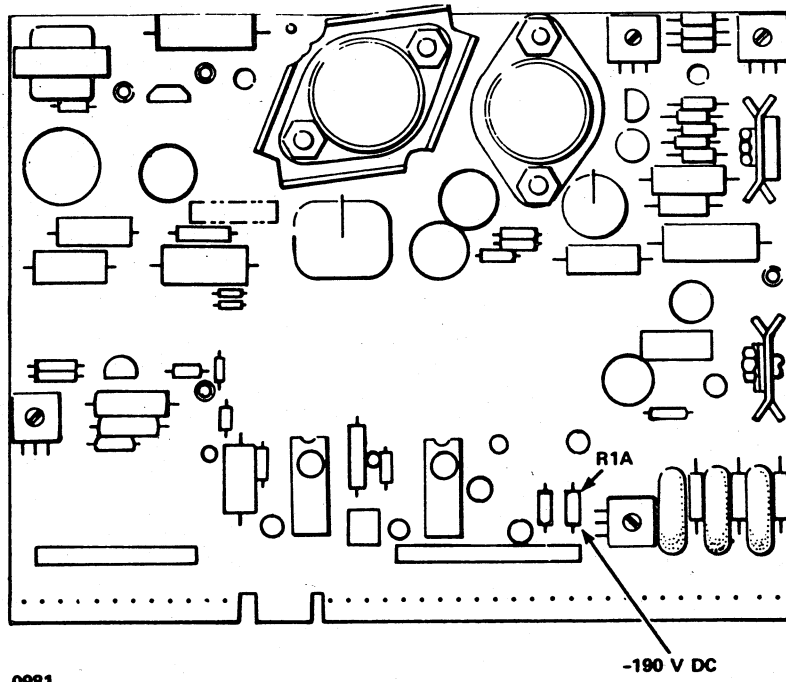
To measure +5 V dc and +15 V dc, perform the following:

18. Set the voltmeter to measure +15 V dc.
19. Connect the black (-) lead to the chassis ground.
20. Connect the red (+) lead to pin 8 of BJ4 (figure 6-34).



0980

Figure 6-31. Test Point for +465 V dc



0981

Figure 6-32. Test Point for -190 V dc

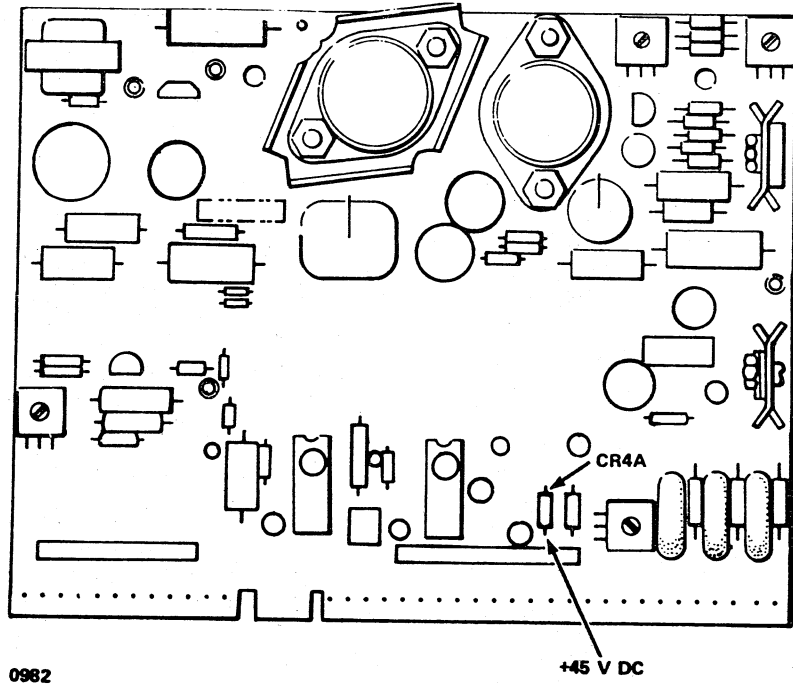


Figure 6-33. Test Point for +45 V dc

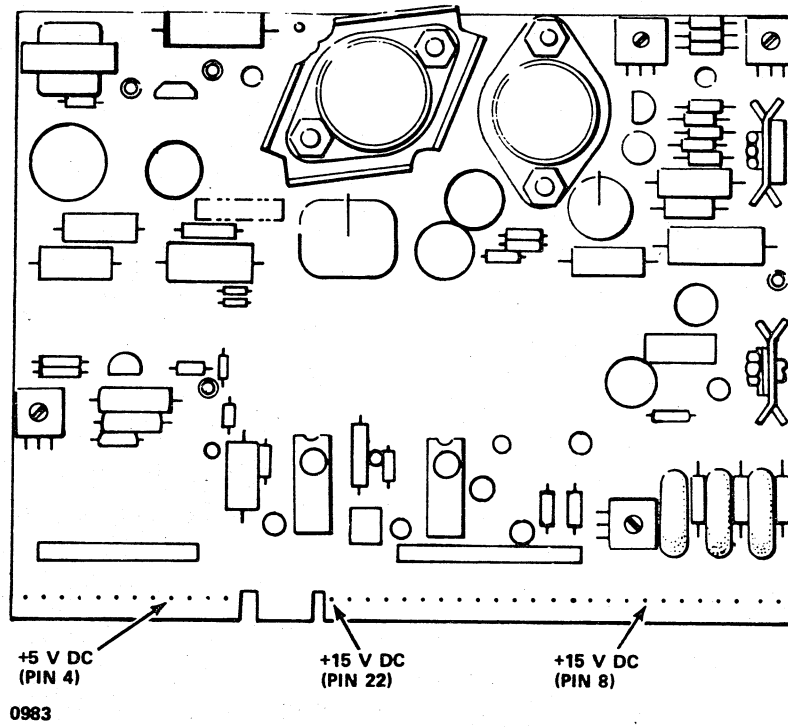


Figure 6-34. Test Pins for +5 V dc and +15 V dc

21. Check that the meter indicates $+15 \pm 0.75$ V dc.
 22. Connect the red (+) lead to pin 22 of BJ4.
 23. Check that the meter indicates $+15 \pm 0.75$ V dc.
 24. Connect the red (+) lead to pin 4 of BJ1 (figure 6-34).
 25. Check that the meter indicates $+5 \pm 0.25$ V dc.
 26. Go to table 6-3.
6. Apply the voltmeter black (-) lead to ground (GND) test point on the A03 board (figure 6-35).
 7. Apply the red (+) lead to the +5 V dc test point (figure 6-35).
 8. The meter should indicate +5 V dc. If the voltage is other than +5, adjust to +5 by turning the adjustment screw of potentiometer R12 (figure 6-35). If this cannot be adjusted, replace the A03 card.

21 CABINET HOOD REMOVAL

To remove the cabinet hood, perform the following:

WARNING

Use extreme care when handling the TV module. Rough handling can cause the CRT to implode with tremendous force resulting in severe injury. Do not nick or scratch the glass or subject it to any undue pressure during replacement. When handling the CRT, always wear safety goggles and heavy gloves for protection.

With the power applied, severe shock is received if the high-voltage transformer, the lead to the anode, or the area of the anode on the CRT is touched. Be careful when the following procedures are performed not to touch anything higher than the yoke. Keep tools out of the area.

1. Remove the two screws in the rear of the cabinet.
2. Lift the cabinet hood back and up from the chassis.

To install the cabinet hood, perform the following:

3. Position the cabinet hood in the track to the chassis.
4. Fasten the two screws in the rear of the cabinet.

22 MEASURING LOW VOLTAGES

To measure +5 V dc, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Remove the cabinet hood (procedure 21).
3. Press the POWER ON/OFF switch to ON.
4. Check for the power on condition (illuminated LEDs) on board A03 in the logic card cage. If no LED is illuminated, check that the ac power cord is plugged into the site ac power outlet. If the indicators still do not light, proceed to table 6-3.
5. Set the voltmeter to measure +5 V dc.

NOTE

Only potentiometer R12, which faces the rear of the device and can be adjusted while the card is installed, is adjustable in the field. Do not adjust any other potentiometer on the +5 V dc regulator board.

To measure +24 V dc, perform the following:

9. Set the meter to measure +24 V dc.
10. Apply the red (+) lead to the +18 V dc test point and the black (-) lead to GND (figure 6-35).
11. Check that the meter indicates a reading of $+24 \pm 6$ V dc.
12. If the measurable voltage is less than +17 V dc or more than +30 V dc, replace the bulk power supply board (procedure 17).

To measure -23 V dc, perform the following:

13. Set the meter to measure -23 V dc.
14. Apply the black (-) lead to the -18 V dc test point and the red (+) lead to GND.
15. Check the meter for -23 V dc ± 6 V dc.
16. If the measurable voltage reading is unobtainable, replace the bulk power supply board (procedure 17).

To measure -9 V dc, perform the following:

17. Set the meter to measure -9 V dc.
18. Apply the red (+) lead to GND (figure 6-36).
19. Apply the black (-) lead to the -9 V dc test point on board 08 (figure 6-36).
20. Check that the meter indicates a reading of 9 ± 0.5 V dc. If the voltage reading falls outside the indicated tolerance, replace the bulk power supply (procedure 17).

To measure -12 V dc, perform the following:

21. Set the meter to measure -12 V dc.

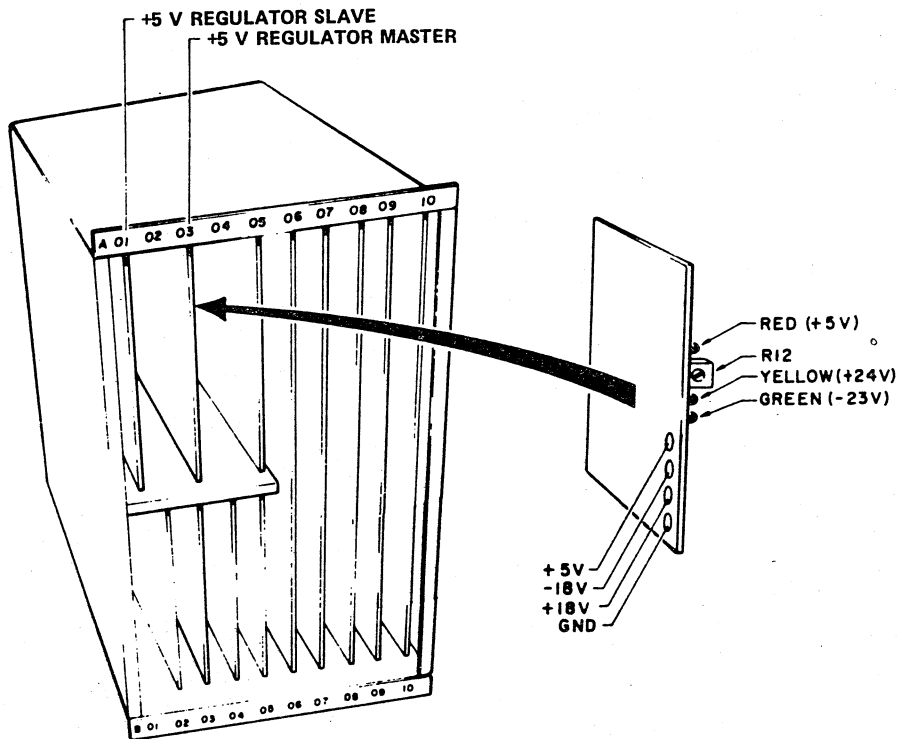


Figure 6-35. +5 V dc Regulator Board Test Points

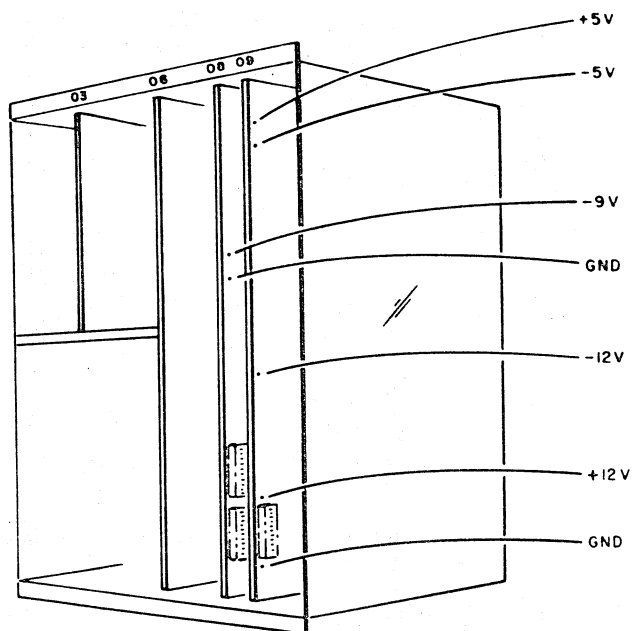


Figure 6-36. Memory and Processor Voltage Test Points

22. Apply the black (-) lead to the -12 V dc test point on the edge of board 09, just above test point 22, approximately 1.25 in. (31.75 mm) below the board midpoint (figure 6-36).

23. Apply the red (+) lead to GND (figure 6-36).

24. Check that the meter indicates a reading of -12 ± 0.6 V dc.

25. If the voltage is not within the tolerances of step 24, replace the bulk power supply (procedure 17).

To measure +12 V dc, perform the following:

26. Set the meter to measure +12 V dc.

27. Apply the red lead to the +12 V dc test point on the edge of board 09 just below test point 30.

28. Apply the black (-) lead to GND (figure 6-36).

29. Check that the meter indicates a reading of $+12 \pm 0.6$ V dc.

30. If the voltage reading falls outside acceptable tolerances (step 29), replace the bulk power supply (procedure 17).

To measure -5 V dc, perform the following:

31. Set the meter to measure -5 V dc.
32. Apply the black (-) lead to -5 V dc test point on edge of board 09 (figure 6-36).
33. Apply the red (+) lead to GND on board 09 (figure 6-36).
34. Check that the meter indicates -5 V dc ± 0.25 V dc. If the indication is incorrect and the -9 V dc check was correct, replace the processor board (procedure 8).

23 INTENSITY CONTROL ON DISPLAY PANEL CHECK/REPLACEMENT

To check the INTENSITY control (figure 6-37), perform the following:

1. Press the POWER ON/OFF switch OFF.

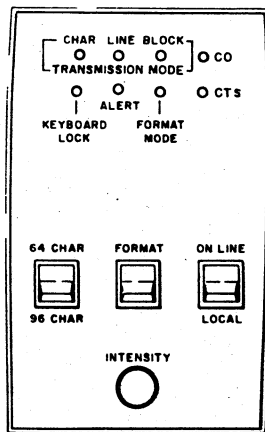


Figure 6-37. INTENSITY Control

2. Remove the indicator panel on which the control is mounted (figure 6-37) by inserting fingernails between the panel and bezel (procedure 10). Carefully pry out the panel gradually from one end and then the other to release the clips holding the panel to the bezel.
3. Set the ohmmeter to X 1000.
4. Attach one ohmmeter lead to the center pin on the back of the INTENSITY control and the other lead to one of the other two pins.
5. Rotate the INTENSITY control knob while holding the leads to the pins. Check that the meter reads 0 ohm when the INTENSITY control is fully counterclockwise (full right) and 100,000 ohms when fully clockwise (full left). Replace the INTENSITY control if the correct results are not obtained (steps 8 through 14 describe replacement).

6. Remove the lead on the outer pin and attach it to the pin on the other side of the center pin. Keep the other lead on the center pin.
7. Rotate the INTENSITY control knob as described previously (step 5) and observe the meter for the same readings. If the correct results are not obtained, replace the INTENSITY control.

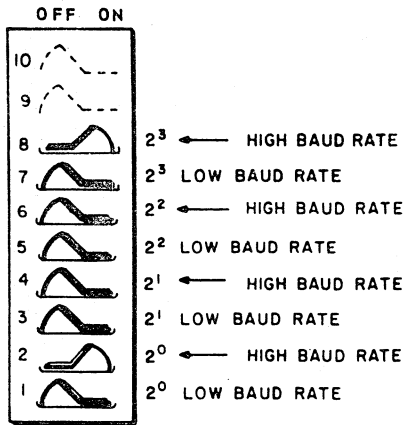
To replace the INTENSITY control, perform the following:

8. Test the new control with an ohmmeter (steps 3 through 7).
9. Unsolder three wires from the old control. Identify the wires.
10. Pull off the knob to gain access to the hex ringnut on the front side of the panel.
11. Remove the hex ringnut using a 1/2-inch socket.
12. Remove the ground wire on the inside of the panel and withdraw the old control from the unit.
13. Solder the three wires to the new control and attach it to the panel by inserting the control post through the hole in the panel and screwing on the hex ringnut from the front. Before tightening the nut fully, attach the ground wire between the control and the panel.
14. Replace the panel by inserting the bottom edge in the bezel opening and carefully pressing the panel into place while aligning the panel with the hole and gently applying pressure down and in. Slight pressure on the clips allows them to be inserted easily.

24 BAUD RATE SWITCHES CHECK/REPLACEMENT

To check the operation of the baud rate switches, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Remove the cabinet hood (procedure 21).
3. Note the setting of the baud rate switches on the processor board 09 (figure 6-10) and check their positions with the decal on the side of the card cage to verify that the low baud rate switch setting is 110 baud (switches set = 1111 on board 09) and the high baud rate switch setting is 9600 baud (switches set = 0110 on board 09). Figure 6-38 shows these two basic settings. If the system requires any of the other available low and/or high baud rate(s), check the switch settings in figures 6-39 and 6-40.
4. Press the HIGH RATE/300/LOW RATE switch on the front panel to LOW RATE.
5. Set the TEST/NORMAL switch (ac power entry panel) to TEST.
6. Press the POWER ON/OFF switch to ON.
7. Wait 30 seconds. If the checksum pattern (figure 6-41) appears on the top two display lines, proceed to step 8; otherwise, proceed to table 6-3.

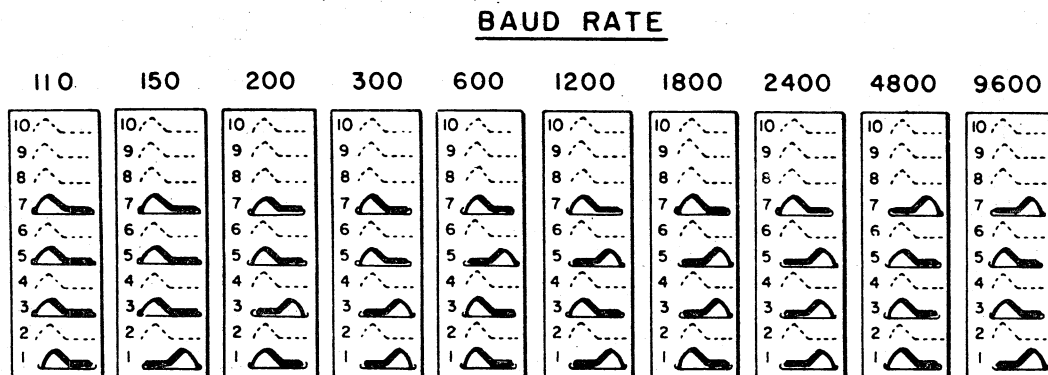


NOTE: SWITCHES INDICATED BY DOTTED LINES ARE USED FOR OTHER FUNCTIONS.

Figure 6-38. High Baud Rate Set to 9600 - Low Baud Rate Set to 110

8. Press the space bar on the keyboard twice.
9. Wait until the terminal begins writing characters on the screen at the bottom line (it may take 15 seconds for the terminal to reach the portion of memory that is displayed). Observe what should be the low rate (110 baud) characters being written on the display.
10. Press the HIGH RATE/300/LOW RATE switch on the front panel to 300 while observing the characters being written on the screen. The rate of character writing on the screen should more than double (from 110 baud to 300 baud).

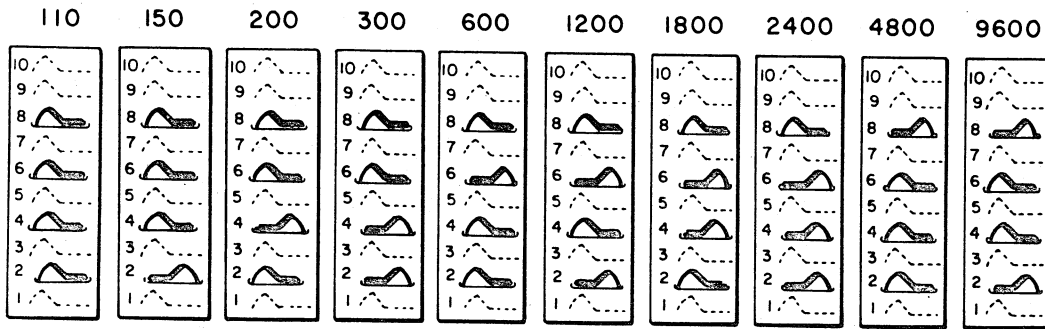
11. Press the HIGH RATE/300/LOW RATE switch on the front panel to HIGH RATE while observing the characters being written on the screen. The rate of character writing on the screen should increase by a factor of 32 (from 300 baud to 9600 baud).
12. Replace the processor board (procedure 8) if the rate at which characters are written on the screen does not speed up approximately when the rate switch is moved from LOW RATE to 300 or from 300 to HIGH RATE. If the problem still exists, check the HIGH RATE/300/LOW RATE switch (steps 13 through 18).
13. Press the POWER ON/OFF switch to OFF.
14. Remove the front switch-indicator panel by inserting fingernails or a knife between the panel and the bezel.
15. Check the continuity between the center black wire (pin S5-2) and the top white/black wire (pin S5-1) with the switch pressed to the HIGH RATE (up) position. The ohmmeter or continuity tester should indicate no resistance (closed circuit).
16. Keep the meter test leads on the top and center pins and move the switch to 300 (center) position and then to the LOW RATE (bottom) position. The meter should indicate an open circuit in both positions.
17. Check the continuity between the center black wire (pin S5-2) and the bottom white/orange wire (pin S5-3) with the switch pressed to the LOW RATE position. The meter should indicate a closed circuit (continuity). If the circuit is open, replace the switch (steps 19 through 26).
18. With the meter leads still attached to the center pin and the bottom pin, press the switch to the 300 (center) position and the HIGH RATE (top) position. The meter should show an open circuit in both switch positions. If a closed circuit is indicated, replace the switch (steps 19 through 26).



NOTE: SWITCHES INDICATED BY DOTTED LINES ARE USED FOR OTHER FUNCTIONS.

Figure 6-39. Setting Low Baud Rate Switches

BAUD RATE



NOTE: SWITCHES INDICATED BY DOTTED LINES ARE USED FOR OTHER FUNCTIONS.

Figure 6-40. Setting High Baud Rate Switches

```
0F00 00 0E00 00 0D00 00 0C00 00 0B00 00 0A00 00 0900 00 0800 00 0700 00 0600 00  
0500 00 0400 00 0300 00 0200 00 0100 00 0000 00
```

1422-1

Figure 6-41. Checksum Display

To remove the HIGH RATE/300/LOW RATE switch, perform the following:

19. Press the POWER ON/OFF switch to OFF.
20. If the panel is not removed from the bezel, insert fingernails or a knife between the bezel and the panel to remove it.
21. Identify the wires with masking tape: the top white/black wire should be marked S5-1; the center black wire should be marked S5-2; and the bottom white/orange wire should be marked S5-3.
22. Slide the wires from the switch terminals.
23. Remove the switch from the panel by pushing it out from the pin side of the panel.

To install a new switch, perform the following:

24. Insert the switch into the mounting hole in front of the panel and press it into place, making sure the pins are on the right (the same as the other switches).
25. Slide the wires on the pins; S5-1 on top, S5-2 (black) in the center, and S5-3 on the bottom.
26. Position the panel over the mounting hole in the chassis and press it gently into the bezel.

25 KEYBOARD CHECK

To check the operation of the keyboard, perform the following:

1. Check the lowercase keys (96-character set).
 - a. Set the 64/96 CHAR switch to 96 CHAR (figure 6-42).

- b. Release the SHIFT LOCK key, if it is locked.
- c. Press each black key in turn (excluding the REPEAT and CONTROL keys, but including the space bar and numeric pad), examining the display for the proper character.

2. Check the uppercase keys (96-character set).

- a. While pressing either SHIFT key, press each black key in turn (excluding the REPEAT and CONTROL keys).
- b. Repeat step a using the other SHIFT key (one key is sufficient).
- c. Press the SHIFT LOCK key.
- d. Press one or two black keys, examining the display for the proper character.

3. Check the CONTROL keyboard keys.

- a. Release the SHIFT LOCK key, if it is locked.
- b. While pressing either CONTROL key, press each of the keys shown in figure 6-43, examining the display for the control code symbols.
- c. Repeat step b using the other CONTROL key (one key is sufficient).

4. Check the alphabetic keys (64-character set).

- a. Place the 64/96 CHAR switch in the 64 CHAR position (figure 6-42).
- b. Release the SHIFT LOCK key if locked.
- c. Press any alphabetic key, examining the display for the proper uppercase alpha character.
- d. Return the 64/96 CHAR switch to normal operating position.

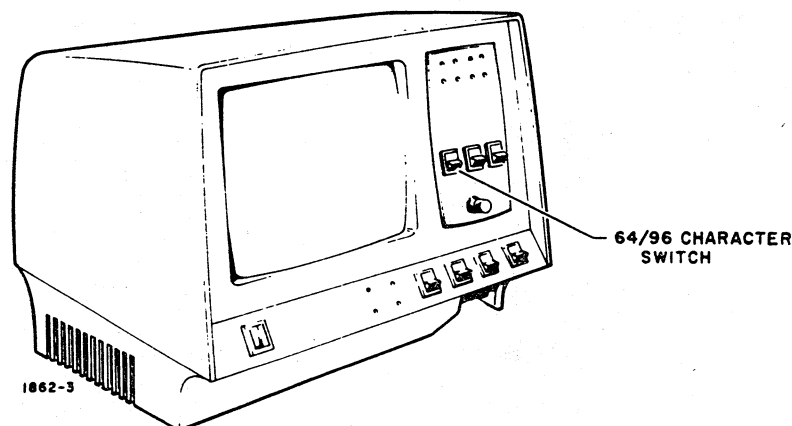
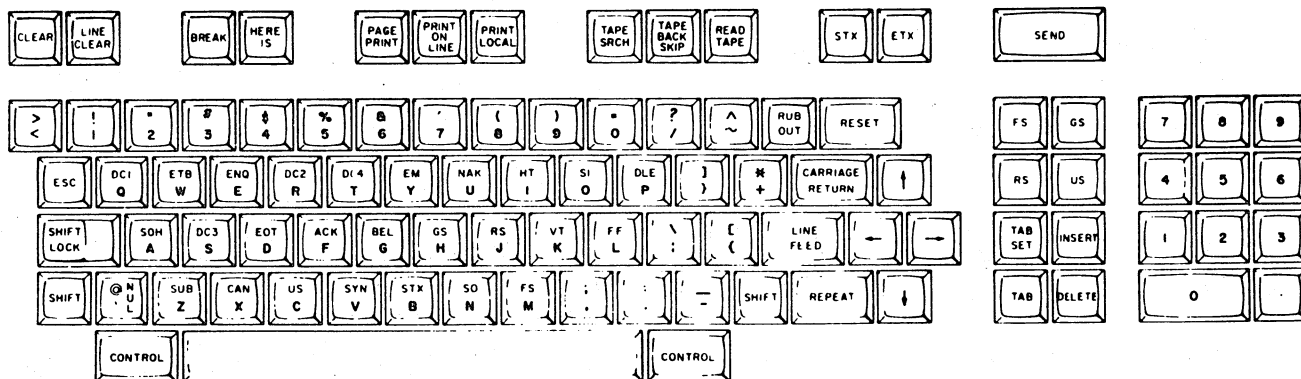


Figure 6-42. 64 CHAR/96 CHAR Switch



1443

Figure 6-43. Special Control Code Keys

26 MONITOR ADJUSTMENT

Two versions of final monitor adjustments are covered in this procedure. Version A should be followed if adjusting monitors that have part numbers 61370900 or 61370902. Use the B version when performing adjustments on monitors with part number 61370905. The part number 61370905 monitor (the new version) can be identified by the CRT ground clip and ring magnet assembly on the CRT neck.

A 61370900 and 61370902 Monitors

If the raster is tilted, the left or right side of the screen is distorted, or the raster is not centered on the screen, perform horizontal and vertical alignment (procedure 14) before making further video adjustments (see figure 6-44).

WARNING

High voltage is present in the CRT monitor when power is applied. Exercise caution when performing the following adjustments.

To make video (displayed characters) adjustments, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Remove the cabinet hood (procedure 21).
3. Position the TEST/NORMAL switch (rear panel) to TEST.
4. Press the POWER ON/OFF switch to ON. Wait 30 seconds.
5. If the checksum display appears on the screen (figure 6-41), proceed with adjustments (step 6); otherwise perform the following:
 - a. Turn the INTENSITY knob on the front panel clockwise until the raster appears.
 - b. If there is no raster, go to table 6-3.
 - c. Increase the video gain by turning the contrast control (figure 6-44) clockwise until the checksum characters appear on the display.
 - d. If no video appears, go to table 6-3.
 - e. When the checksum appears on the display, proceed with adjustments (step 6).
6. The ALERT light should be on. If not, replace the ALERT indicator (procedure 10) after the monitor adjustments are made.
7. Press the space bar on the keyboard three times.
8. Adjust the vertical height by turning the adjustment screw (figure 6-44) until the rectangle of display characters is 5.25 ± 0.1 in. (133 mm) in height.
9. Adjust the horizontal width to 8.0 ± 0.1 in. (203 mm) by turning the adjustment screw in the coil using a 3/32-inch nonmetallic hex driver.
10. Reduce the video gain to zero by turning the contrast adjustment screw (figure 6-44) fully counterclockwise.
11. Turn the INTENSITY control on the front panel fully counterclockwise.
12. Adjust the contrast control (figure 6-44) fully clockwise.
13. Turn the front panel INTENSITY control clockwise to the desired video viewing brightness. (Raster scan lines should not be visible.)
14. Check the top line, center line, and bottom line of displayed characters for uniformity. If the characters

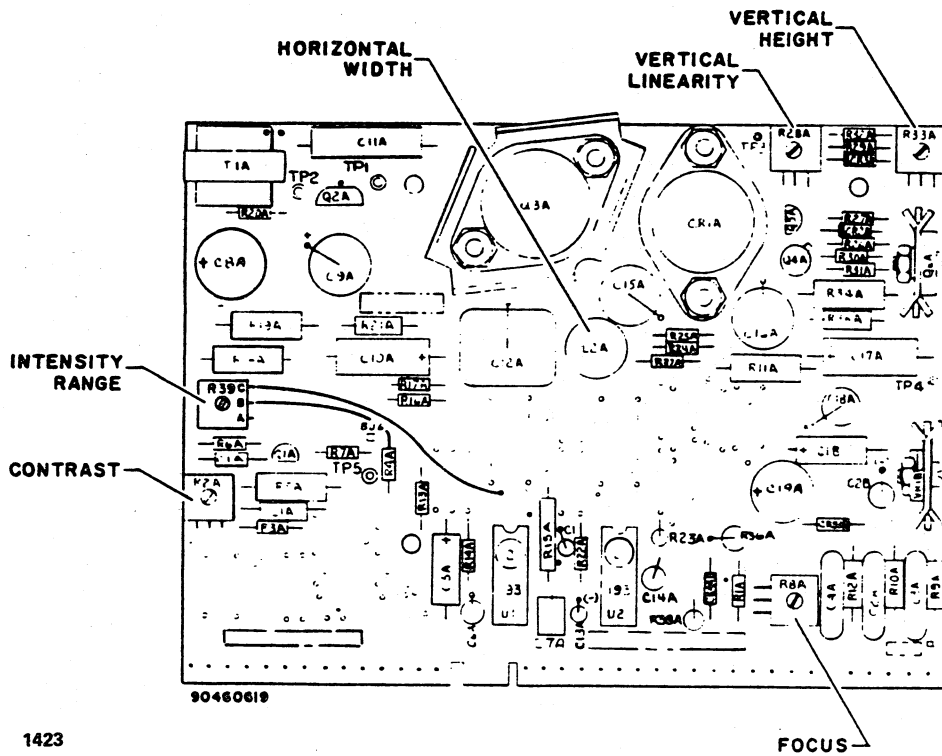
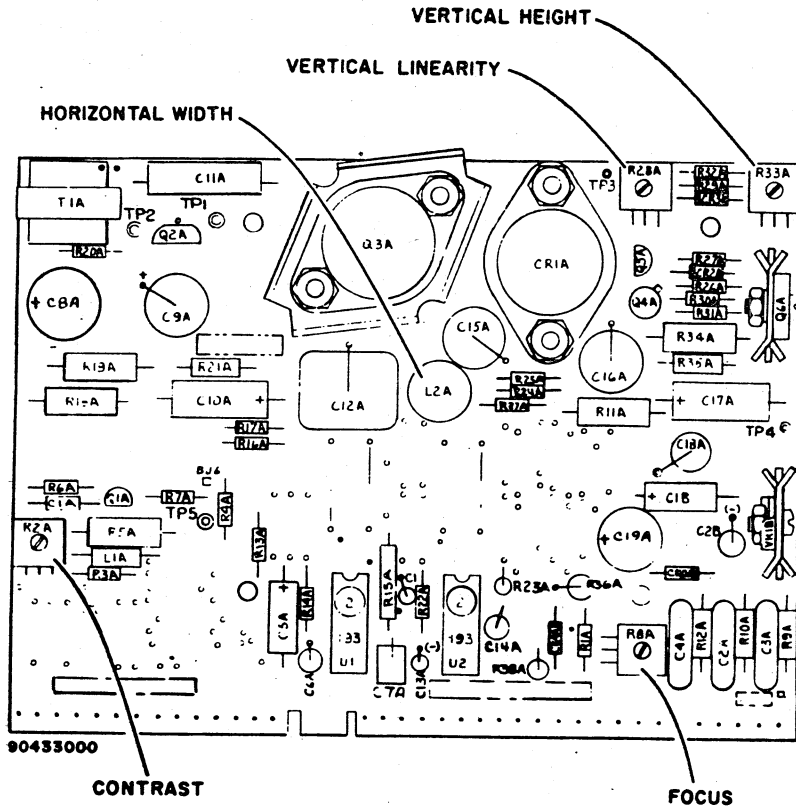


Figure 6-44. Monitor PWA Adjustments

are compressed anywhere on the screen, turn the vertical linearity adjustment screw (figure 6-44) clockwise or counterclockwise until character distortion disappears and all lines are equal in vertical size.

15. Adjust the focus adjustment screw slot (figure 6-44) while observing the characters on the screen. Turn the focus adjustment screw clockwise until the dots (each character dot matrix) elongate toward the upper-right corner of the display screen. Then turn the focus control slowly counterclockwise until the elongated dots pull back to form round dots and the entire screen is without fuzziness.

B 61370905 Monitors

If the character display is tilted, not centered, or linearity problems exist, perform the horizontal and vertical linearity adjustments (procedure 14) before this procedure.

WARNING

High voltage is present in the CRT monitor when power is applied. Exercise caution when performing the following adjustments.

1. Press the POWER ON/OFF switch to OFF.
2. Remove the cabinet hood (procedure 21).
3. Position the TEST/NORMAL switch (rear panel) to TEST.
4. Press the POWER ON/OFF switch to ON. Wait 30 seconds.
5. If the checksum display appears on the screen (figure 6-41), proceed with adjustments (step 6); otherwise perform the following:
 - a. Turn the INTENSITY knob on the front panel clockwise until the raster appears.
 - b. If there is no raster, go to table 6-3.

For video size adjustments, perform the following:

6. Press the space bar on the keyboard three times.
7. Adjust the vertical height by turning the adjustment screw (figure 6-44) until the rectangle of display characters is 5.25 ± 0.1 in. (133 mm) in height.
8. Adjust the horizontal width to 8.0 ± 0.1 in. (203 mm) by turning the adjustment screw in the coil (figure 6-44) using a 3/32-inch nonmetallic hex driver.
9. Enter a full display of lower case m characters.
10. Turn the front panel INTENSITY control maximum clockwise, then back it off approximately 1/4 of a turn.

11. Turn the contrast control to its maximum clockwise position.
12. Adjust the INTENSITY RANGE control (figure 6-44) so that the raster (background scan lines) just disappear and a normal viewing intensity is obtained.

NOTE

Only the video (m characters) should be visible at this setting. The raster, however, should be present when the front panel INTENSITY control is turned to maximum.

13. Adjust the FOCUS control (figure 6-44) to obtain the best resolution of the m characters throughout the entire display.
14. Adjust the focus magnet rings (figure 6-45) to reduce to a minimum any tails or halos visible on the characters (especially those characters located in the corners of the display).
15. If necessary, repeat steps 12, 13, and 14 to obtain the best possible character resolution over the entire screen. Refer to figure 6-46 for particular characteristics of the characters to be observed.

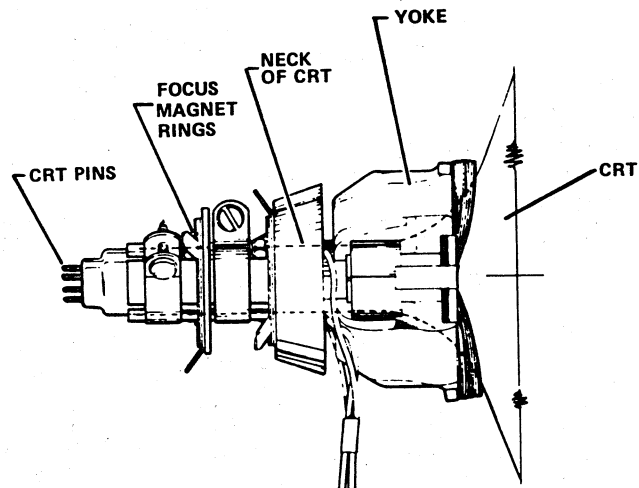


Figure 6-45. Adjusting Focus Ring Magnetic Assembly

27 CHARACTER/LINE/BLOCK SWITCH CHECK/REPLACEMENT

To check operation of the CHARACTER/LINE/BLOCK switch, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Remove the front switch-indicator panel by inserting fingernails or a knife between the panel and the bezel.
3. Check the continuity between the center black wire (pin S2-2) and the top white wire (pin S2-1) with the switch pressed up to the CHARACTER position. An ohmmeter or continuity tester should indicate no resistance (closed circuit).
4. With the test leads still on the same wires, move the switch to the center (LINE) and bottom (BLOCK) positions. The meter should indicate an open circuit in both positions.
5. Check the continuity between the black wire (center pin) and the bottom white wire (S2-3) with the switch pressed to the bottom (BLOCK mode) position. A short-circuit condition should exist. If open, replace the switch (step 7).
6. With the leads still attached to the two bottom pins, press the switch to the center position and the top position. An open should be indicated by the meter. If a short circuit is indicated on the meter, replace the switch (step 7).

To remove the switch, perform the following:

7. Press the POWER ON/OFF switch to OFF.
8. If the panel is not removed from the bezel, insert fingernails or a knife between the bezel and the panel to remove it.
9. Identify the wires with masking tape: the top white wire should be marked S2-1, the center black should be marked S2-2, and the bottom white/brown wire should be marked S2-3.
10. Slide the wires from the switch terminals.
11. Remove the switch from the panel by pushing it out from the pin side of the panel.

To install the new switch, perform the following:

12. Insert the switch into the mounting hole in the front of the panel and press it into place, making sure that pins are on the right (the same as the other switches).
13. Solder the wires to the pins; S2-1 is on top, S2-2 (black) is in the center, and S2-3 is on the bottom.
14. Position the panel over the mounting hole in the chassis and press it gently into the bezel.

28 TWO-POSITION SWITCHES CHECK/REPLACEMENT

NOTE

Disconnect input power.

To check out the two-position switches on the front panel, perform the following:

1. Press the POWER ON/OFF switch to OFF.
2. Remove the panel from the chassis by inserting fingernails or a knife between the panel and the bezel.
3. Check the continuity across the two pins of the switch when the lever is moved to both positions. The meter should move in both directions, indicating open and closed circuits.

To remove the two-position switches on front panel, perform the following:

4. With the power off and the panel separated from the chassis, mark the wires as necessary for proper reconnection, and slide the wires from the switch terminals.
5. Press the switch out the front of panel by pressing the switch from the inside of the panel.

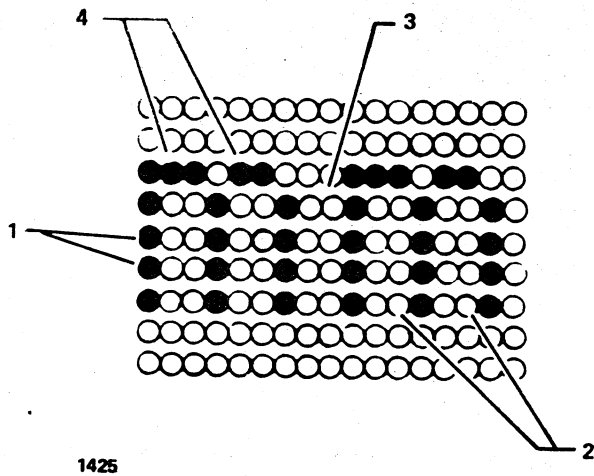
To install the new switch, perform the following:

6. Press the new switch into position through the front of the panel.
7. If the switch is FULL DUPLEX/HALF DUPLEX, connect the white wire to the top pin (S4-1).
8. If the switch is ON LINE/LOCAL, connect the white wire to the top pin (S5-1).
9. If the switch is 64 CHAR/96 CHAR, connect the brown/black/white wire to the bottom pin (S1-3).
10. If the switch is FORMAT, connect the green/white wire to the top pin (S2-1).
11. The black wire is always soldered to the center pin.
12. If the switch is POWER ON/OFF, solder all three yellow wires to the appropriate pins as marked in step 4.
13. Press the panel into the hole in the bezel carefully until it snaps into place.

29 AUDIBLE ALARM CHECK/REPLACEMENT

To check the audible alarm, perform the following:

1. Press the POWER ON/OFF switch to OFF.



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Figure 6-46. Display Character Resolution

2. Press the circuit breaker on the rear panel down and unplug the ac power cord.
3. Remove the front panel strip containing the POWER ON/OFF switch on the left side by inserting fingernails or a knife between the panel and bezel near the DTR and REC indicators and then prying gently on the panel near the CHARACTER/LINE/BLOCK switch. Continue along the edge of the panel until the entire panel is free from the bezel.
4. Set the ohmmeter to measure resistance at X 1 scale.
5. Insert the red (+) probe through the hole in the bezel and touch the Sonalert† alarm pin on the right (marked +). If the Sonalert is not in the position shown in figure 6-47, it may be necessary to remove it from its mounting in order to check it (steps 7 and 8).
6. While touching the right pin with the red lead (figure 6-47), insert the black lead through the hole in the bezel and touch it to the left lead. Thus touched, the Sonalert must sound. If the alarm does not sound, replace the Sonalert.

To remove the Sonalert, perform the following:

7. Remove the Sonalert by pushing it free from the underside of the cabinet base and gently working it out through the front panel strip slots. If your hands are too big to remove the Sonalert in this manner, first remove the video module (procedure 12, steps 1 through 6) and then remove the Sonalert by prying it away from the floor of the cabinet.

8. Pull the terminals off the Sonalert.

To install the Sonalert, perform the following:

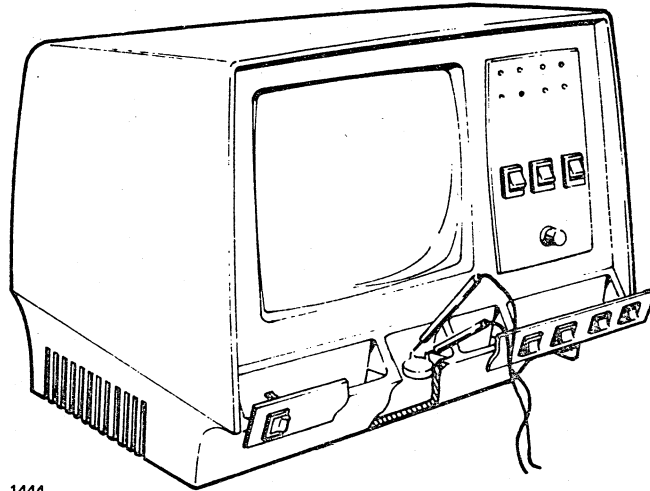
9. Press the Sonalert into the mounting snap.
10. Slide the red wire terminal on the pin marked +.
11. Slide the black wire terminal on the remaining pin.
12. If the video module was removed in step 7, replace it (procedure 12, steps 7 through 15).

30 REFRESH STABILITY ADJUSTMENT

If the video display is unstable (that is, the entire character display appears to bloom in size in a pulsating fashion) perform the following:

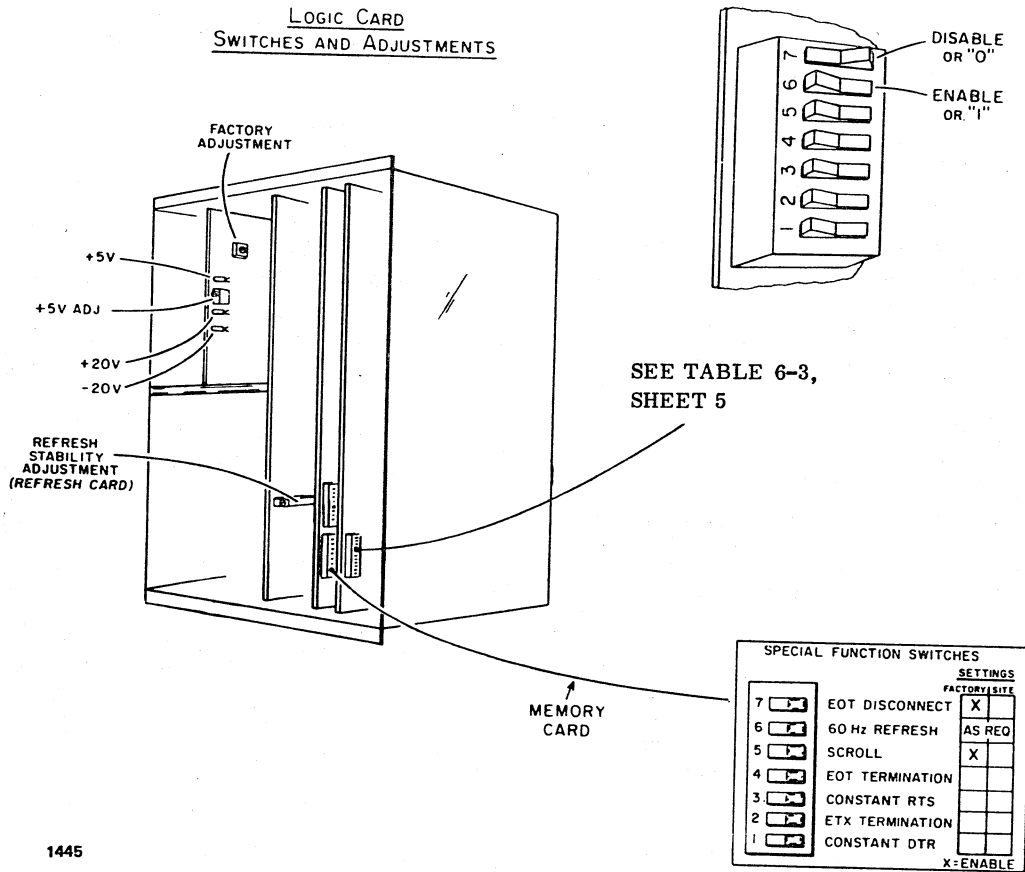
1. Press the POWER ON/OFF switch to OFF.
2. Remove the cabinet hood (procedure 21).
3. Press the POWER ON/OFF to ON. Wait 30 seconds.
4. Verify that the 60 Hz refresh switch on memory board 08 (figure 6-48) is set to match the cycles of the input power.
5. With power to the console display off, ground test point 23 of the refresh board in slot 06. Restore power to the console display.
6. With a small screwdriver, turn the refresh stability adjustment (figure 6-48) counterclockwise/clockwise slowly until the character blooming stops. This indicates that the video frequency is synchronized to the display line frequency. If the instability does not stop, replace the refresh board 06 (procedure 8). Remove ground.

† Registered trademark of P. R. Mallory Co., Inc.



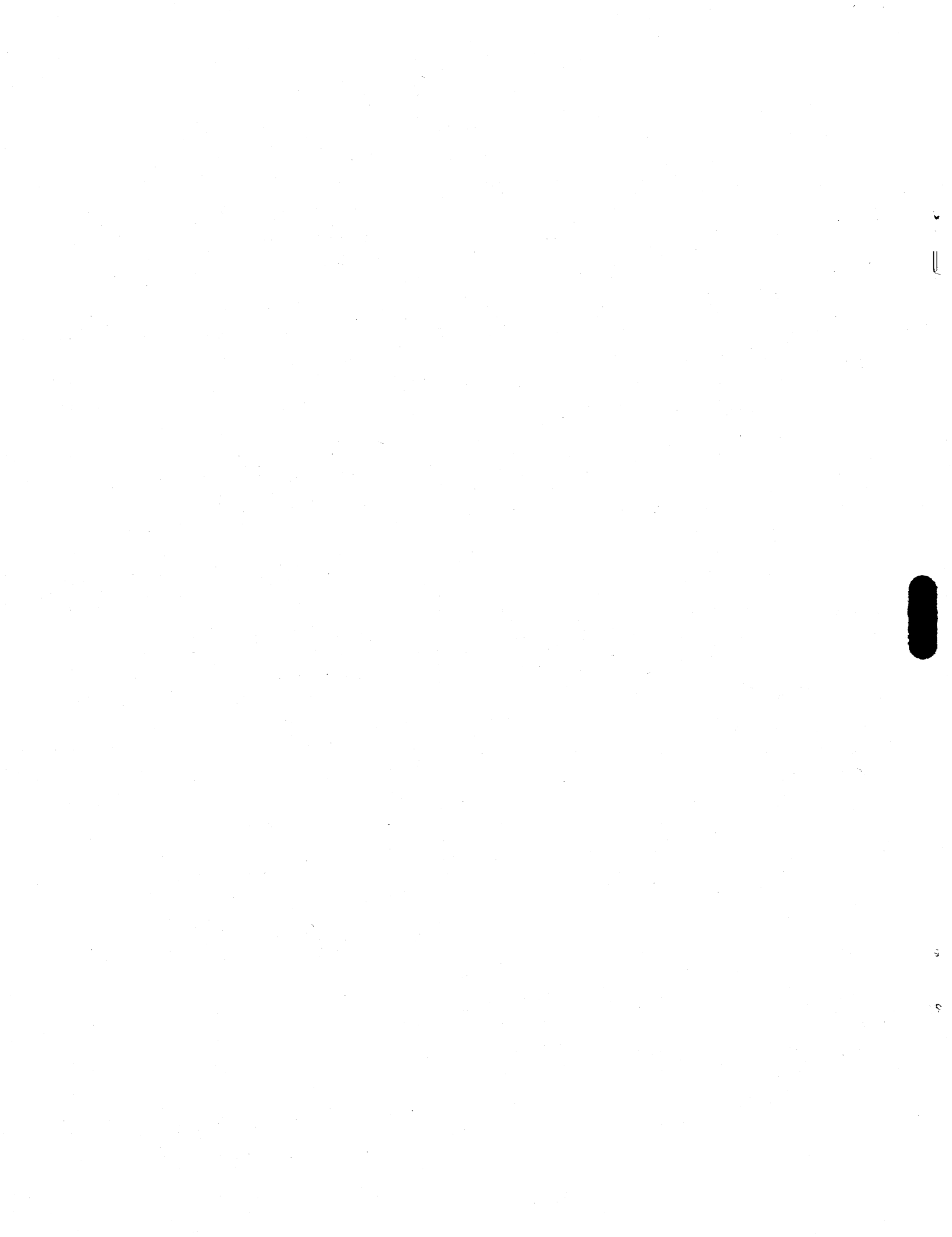
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Figure 6-47. Checking Sonalert



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Figure 6-48. Logic Module (Switches and Adjustments)



PARTS DATA

Table 7-1 lists the replaceable assemblies and their part numbers for the console display subsystem.

TABLE 7-1. PARTS DATA FOR CONSOLE DISPLAY

Assembly	Equipment Number	Spare Part	Part Number
Console display	CC614	Equipment configurator	15611302
			or 15611303
		Ac entry panel assembly	61371104
		Audible alarm	51908902
		Cable assembly, connector panel	61369900
		Cable assembly, CRT	61374900
		Cable assembly, dc power	61401200
		Cable assembly, keyboard	61402600
		Cable assembly, intensity console	61375200
		Cable assembly, power on	61375500
		Cathode ray tube (CRT)	51907300
		Deflection yoke	61407418
		Keyboard module	61375300
		Panel assembly, format	61375800/01
		Panel assembly, indicator	61370601
		Panel assembly, trans mode	90417300
		PWA, bulk power supply	90421700
		PWA, extended memory	90443700
		PWA, processor	90442100
		PWA, RAM/ROM	90444900
PWA, refresh control	90445705		
PWA, video driver	90445717		
PWA, video module	90460619		
PWA, video module	61370902/05		
PWA, +5 V regulator	90393600		

TABLE 7-1. PARTS DATA FOR CONSOLE DISPLAY (Contd)

Assembly	Equipment Number	Spare Part	Part Number		
Console display (contd)		Potentiometer, intensity control	51899042		
		Switch, CHAR/LINE/BLOCK	51906401		
		Switch, master clear	18797101		
		Switch, test mode	51781602		
		Switch, two-position	51906400		
		Transformer, ac entry	51905600		
		Transformer, high voltage	61407417		
		+15-volt regulator	61376302		
			61407441		
			61407617		
		I/O-TTY controller	CW212-A	Printed wiring assembly	88909701 or 96744241 or 96752182
				Cable, I/O-TTY controller-to-console display	96729500/02 or 88952424/26†
				Cable, dual-processor multiplexer-to-console display	96744876 or 88952422†
† FCC EMI qualified part. Use of non-qualified parts will void system certification. Consult either the system FCC EMI warning label or the equipment correlation sheet in the system hardware maintenance manual/field repair guide to determine system certification status.					

COMMENT SHEET

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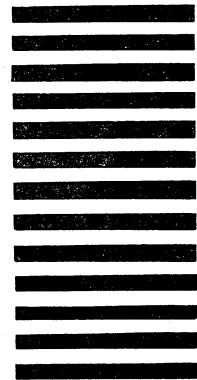


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