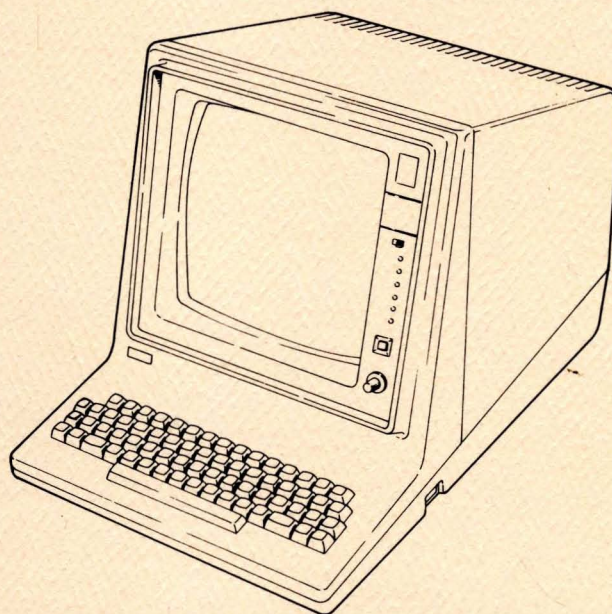


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**CDC® 40003-22/23**  
**INFORMATION SYSTEMS TERMINAL III**



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**HARDWARE MAINTENANCE MANUAL**  
**(SITE AND SUPPORT INFORMATION)**

## CAUTION

### Important Instructions

The Internal PLATO-Communications-Network Modem has been approved by the Federal Communications Commission (FCC) as not being harmful to the telephone network when connected directly to the telephone lines. In order to fully comply with Part 68, FCC Docket 19528, the following should be read carefully and followed completely where applicable:

- The FCC rules require that all direct connections to the telephone lines be made through standard plugs and jacks. These are the type that are supplied with 40003-22/23 Terminals having internal modems. No connection can be made to party lines or coin lines. Prior to connecting the device to the lines, you must inform the local telephone company of the installation required. You must also:
  - Call the local telephone company and inform them that you have an FCC registered device which you wish to connect to their lines. Give them the 14-digit FCC Registration Number and Ringer Equivalence Number, both of which are on the label located on the back of the terminal.
  - Inform the telephone company of the jack (connector) required for the device. Recently installed telephones are provided with the required jack.
- After the telephone company has installed the required jack, connect the terminal in the manner described in this manual.
- All repairs must be made as described in this manual.
- If it appears that the terminal is malfunctioning, it should be disconnected from the telephone line until it can be determined whether the equipment or the telephone line is at fault. If the equipment needs repair, it should not be reconnected until such repairs are made.

- The terminal has been designed to prevent harm to the public network. If, in the case of malfunction, out of limit parameters are noted by your telephone company, service may be temporarily discontinued.
- The telephone company may make changes in its communication facilities, equipment, operations, or procedures, when such action is required in the operation of its business and is not inconsistent with the Rules and Regulations of the FCC. If such changes render any customer's terminal equipment incompatible with telephone communication facilities, or require that terminal equipment be modified, or otherwise materially affect its use or performance, adequate notice will be given to allow you an opportunity to maintain uninterrupted service.

### Service Requirements

In the event of equipment malfunction, check with your Control Data Corporation Sales Representative on the type of service warranty you have. Under FCC Rules, Part 68, users are not authorized to maintain their own terminals. Terminals must be maintained by Control Data maintenance personnel.

Faulty terminals should be reported to the nearest Control Data Service Center.

HOTLINE

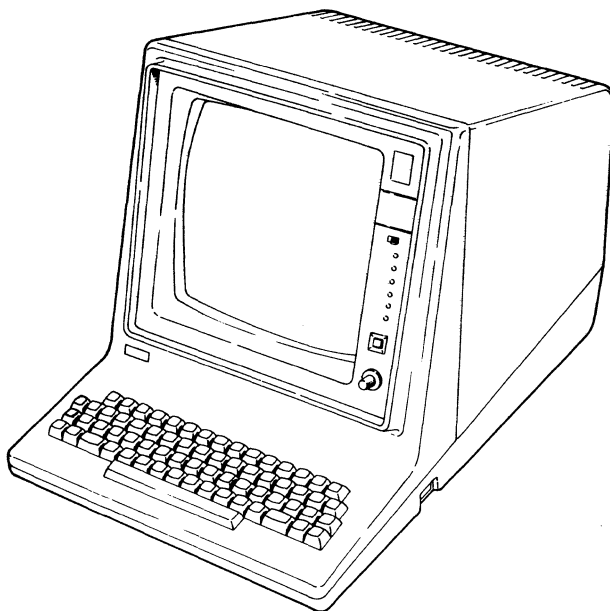
800-328-9114

612-482-2006 (MINNESOTA)



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**CDC® 40003-22/23**  
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# REVISION RECORD

REVISION	DESCRIPTION
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Technical Publications Department  
2401 North Fairview Avenue  
St. Paul, Minnesota 55113

or use Comment Sheet in the back of this manual.

# 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 FCO'S	COMMENTS
CC629-A	01 02 03	14422 14422	
CC629-B	01 02 03	14422 14422	
XA244-A	01		
XA243-A	01		

01987



# MANUAL TO EQUIPMENT LEVEL CORRELATION (CONTD)

EQUIPMENT TYPE	SERIES	WITH FCO'S	COMMENTS
XA247-B	01		
XA281-A	01		
YA254-A	01		
MF401-J	01		
MF402-J	01		

01987-3

# LIST OF EFFECTIVE PAGES

New features, as well as changes, deletions, and additions to information in this manual are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

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## PREFACE

This manual contains information for the on-site and support maintenance of the CDC® 40003-22/23 Information Systems Terminal III. Product and associated equipment number correlation is as follows:

<u>Product Number</u>	<u>Equipment Number</u>	<u>Description</u>
40003-22	CC629-A	60-Hz Model Terminal
	XA244-A	Touchpanel
40003-23	CC629-B	50-Hz Model Terminal
	XA244-A	Touchpanel
	YA254-A	Modem Cable, Part No. 61406110

In addition, the following options may be added to the terminal:

<u>Product Number</u>	<u>Equipment Number</u>	<u>Description</u>
40003-200	XA243-A	16K Random-Access Memory (RAM) Expansion
40003-201	XA247-B	Internal Modem for PLATO Network Communications
40003-220	XA281-A	Read-Only Memory (ROM) Expansion with Timeshare Program
799-11	YA254-A	Modem Cable, Part No. 61406110

The information in this manual is divided into seven sections:

- Section 1 - General Description
- Section 2 - Operation
- Section 3 - Installation and Checkout
- Section 4 - Theory of Operation
- Section 5 - Diagrams
- Section 6 - Maintenance
- Section 7 - Parts Data

Manuals providing additional information on the terminal and related devices include:

<u>Title</u>	<u>Publication Number</u>
40003-22/23 Information Systems Terminal III Operator's Guide	62940006
PLATO User's Guide	97405900
Tutorial Access Service IST III Terminal User's Guide	84001740
40003-208/209 Graphic Printers Operator's Guide/ Reference Manual	62949200
CL607-A/B Graphic Printer and XA262-A Printer Interface Hardware Maintenance Manual	62949900
40003-203/204/205/206 PLATO Flexible Disk Subsystem and 40003-200 16K RAM Expansion Hardware Maintenance Manual	62949100
PLATO Flexible Disk Subsystem Hardware Operator's Guide	62940005
CN701-A Acoustic Coupler Special Purpose Manual	62945100

All manuals may be ordered from:

Control Data Corporation  
Literature and Distribution Services  
308 North Dale Street  
St. Paul, Minnesota 55103

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This section describes the functions, major assemblies, external interfaces, and equipment specifications of the terminal, as well as its I/O cable, grounding, and tool requirements.

### FUNCTIONS

The terminal is a controlware-driven, graphic/alphanumeric display device that can operate in either the CDC® Data Services Network or the CDC® PLATO Education Network.\* In addition, timeshare-mode controlware available from the Data Services network gives the terminal the capability to operate in other networks that use ASCII coded communications.\*\* This can also be accomplished without accessing the Data Services network if the terminal is configured with a local controlware source (a flexible disk drive or additional ROM/EROM containing resident controlware).

Controlware instructions establish all functional characteristics of the terminal. The terminal automatically loads these instructions following a power on. This occurs after the load source has been selected, and if applicable, after network communications has been established. Depending on the setting of switches on the terminal, the load source may either be selected automatically or be selected manually through keyboard or touchpanel entries. The possible load sources are:

- PLATO host computer - downline loads PLATO network controlware.
- Data Services host computer - downline loads an ASCII version of PLATO controlware, controlware for graphics mode, and controlware for timeshare mode.
- Flexible disk - loads directly from an associated flexible disk drive.\*\*\*
- Internal ROM/EROM - loads from optional ROM/EROM within the terminal.

---

\*PLATO is an acronym for Programmed Logic for Automated Teaching Operations.

\*\*ASCII is an abbreviation of American Standard Code for Information Interchange, which is the type of coding used by the Data Services network.

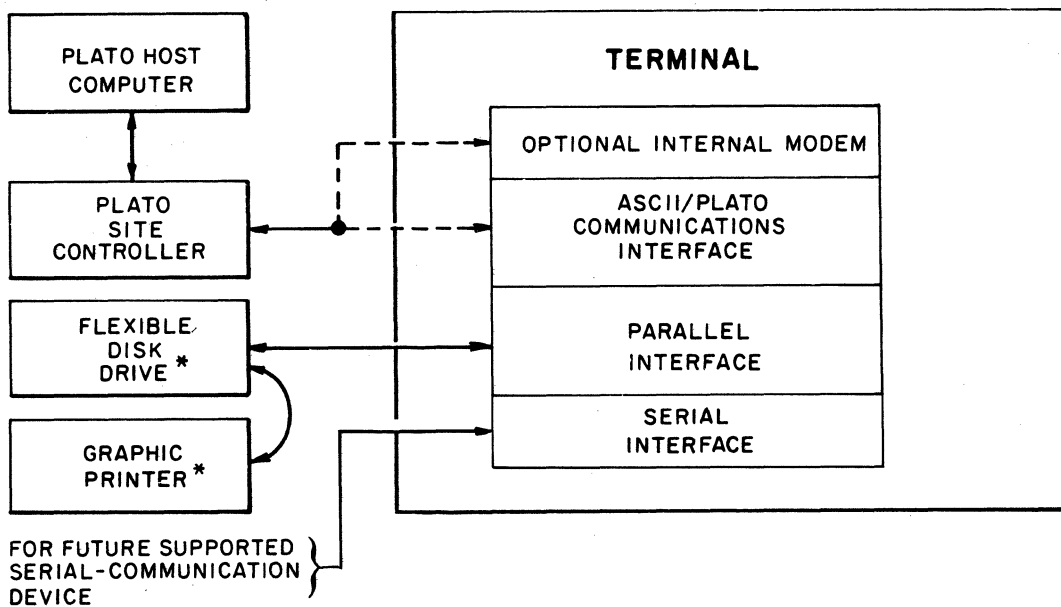
\*\*\*Loading from flexible disk requires 16K of additional RAM in terminal.

The following paragraphs describe the basic online characteristics of the terminal as it operates in the PLATO or Data Services network.

### ONLINE CHARACTERISTICS IN PLATO NETWORK

When online with the PLATO network (figure 1-1), the terminal functions as a standard PLATO terminal with the following characteristics:

- Sends keyboard and touchpanel input to the host computer for interpretation before data returns for display
- Displays data from the host computer in page fashion
- Uses a screen format of 32 lines by 64 characters per line
- Upon operator request, transfers screen contents to an associated graphics printer for copying or sends data to or inputs data from an associated flexible disk drive.



\* AVAILABLE PERIPHERALS SUPPORTED IN APPLICATION

03916-1

Figure 1-1. Terminal Configured in PLATO Network

## ONLINE CHARACTERISTICS IN DATA SERVICES NETWORK

When online with the Data Services network (figure 1-2), the terminal can operate in any of the following modes:

- PLATO mode - functionally the same as if online with the PLATO network
- Timeshare mode - simulates the operation of Teletype equipment. Once the controlware is loaded, the terminal can be put online with a different ASCII network that has compatible operation. Basic characteristics are:
  - Switch selection determines if keyboard input is displayed when returned by the host computer or displayed simultaneously as it is transmitted (the latter is applicable when mode is run on Data Services network)
  - Switch selection determines whether parity generation/checking is even, odd, or none (even parity is applicable when mode is run on Data Services network)
  - Alphanumeric data appears in scroll fashion in a 34-line by 85-character-per-line format
  - An associated graphics printer can print the data received by the terminal or copy screen contents
  - Touchpanel entries and use of a flexible disk drive are not supported

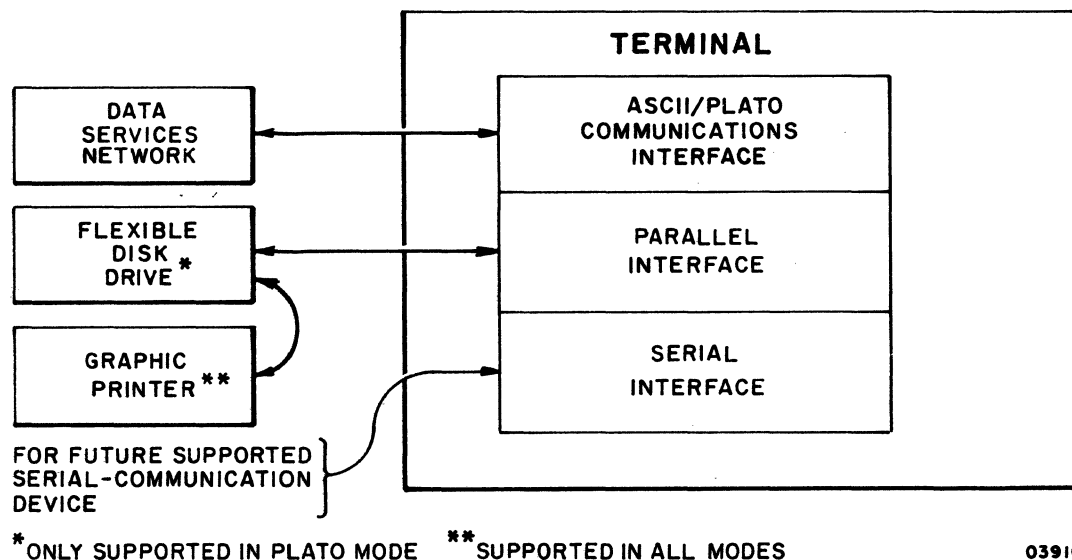


Figure 1-2. Terminal Configured in Data Services Network



- Graphics mode - simulates the composite operation of Tektronix 4010 and 4014 Graphic Terminals. Basic characteristics are:
  - Graphics are composed using the touchpanel for course positioning and the keyboard for fine positioning
  - Supports a graphics printer and has the switch-selectable features described for timeshare mode
  - Alphanumeric data appears in page fashion in a 34-line by 85-character-per-line format

## MAJOR ASSEMBLIES

The following paragraphs describe the major assemblies of the terminal (figure 1-3). This includes the display monitor, operator panel, touchpanel, keyboard, enclosure, controller board, video board, optional modem/DAA board (PLATO network use only), and the power supply.

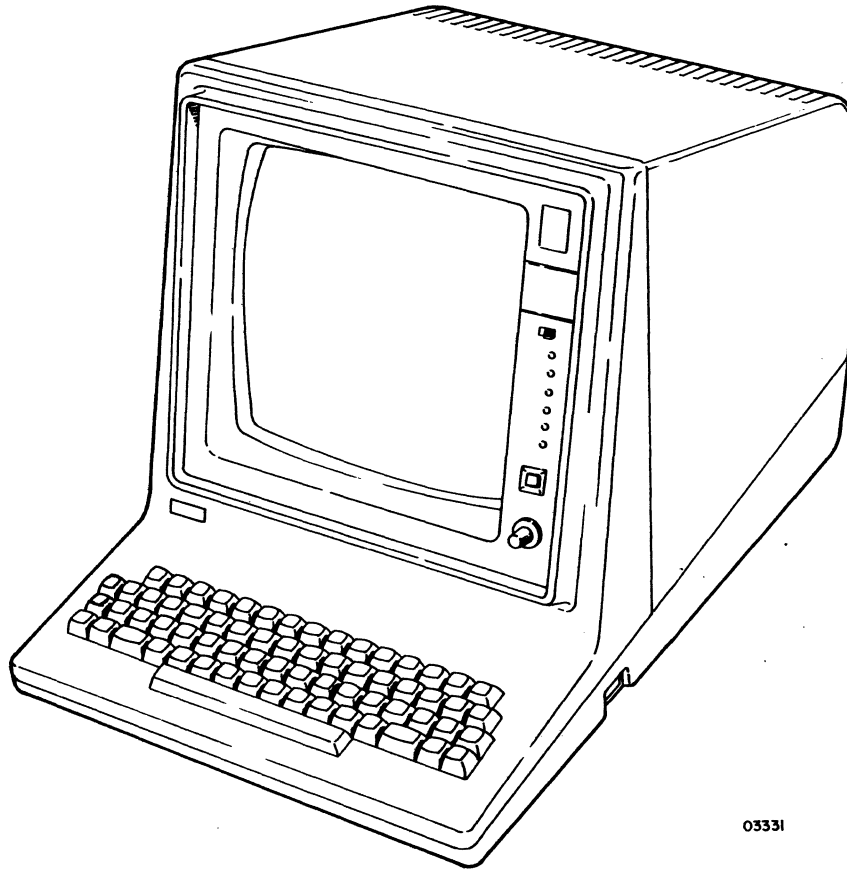
### DISPLAY MONITOR

The display monitor is a noncomposite video unit that receives vertical and horizontal sync pulses to deflect an electron beam in the cathode-ray tube (crt). The video signal received is used to unblank (illuminate) the crt at proper times to present data on the screen. The unit consists of a circuit board, yoke, flyback transformer, high-voltage rectifier, and a crt.

The active display area consists of a 512 by 512 matrix that is refreshed in a noninterlaced mode. These 262,144 matrix elements are individually programmable (illuminated or black). The active display area is approximately 216 mm by 216 mm (8.5 in by 8.5 in).

### OPERATOR PANEL

This panel, located to the right of the screen, contains all the external indicators and controls, except the ON/OFF circuit breaker. These indicators and controls are described in Operation, section 2.



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Figure 1-3. Terminal

#### TOUCHPANEL

The touchpanel forms a 16 by 16 matrix of 13 mm by 13 mm (0.5 in by 0.5 in) square touch-sensitive areas, overlaid on the display screen. In modes supporting touchpanel input, pressure applied to the touchpanel surface interrupts an X/Y scanning mechanism. When a touch is detected, the terminal captures the intersecting X/Y coordinates for processing and produces an audible tone.

#### KEYBOARD

The terminal keyboard provides for operator entry of data and control codes. When a key is pressed, an 8-bit code is generated at the controller board of the terminal. In most cases, the input goes to the central computer for interpretation before data returns to the terminal for display.

## ENCLOSURE

The terminal is housed in a four-part enclosure that consists of a base, hood, bezel/keyboard cover, and display/touchpanel mask.

All components, except the touchpanel, BRIGHTNESS control, and operator panel, fasten to the base. The removable hood gives access to all the modules of the terminal, except the keyboard, touchpanel, and operator panel.

## CONTROLLER BOARD

The controller board performs the control functions and processing required in input/output operations. Input/output operations include communications with the connected network, communications with attached peripherals, touchpanel and keyboard entries, and read/write transfers with memory on the video board. Examples of control functions are:

- Instruction decoding and execution
- Communications formatting
- Interrupt recognition and processing
- Timing generation for serial/parallel-communication interfaces

## VIDEO BOARD

The video board provides timing and memory to support the controller board and the display monitor. Features include:

- 32K 8-bit words of RAM for display refresh
- 16K 8-bit words of RAM for loading controlware programs
- Provision for 16K more RAM for additional loading storage\*

---

\*Supporting circuitry for memory expansion is already on the board, including sockets where the memory chips are inserted.

- 4K 8-bit words of ROM/EROM that contains a resident diagnostic and loader firmware program
- Provision for up to 16K more ROM/EROM (in 4K increments) for additional resident programs\*
- Timing generation for the display, memory, and the controller board
- Composite video output for external devices

OPTIONAL MODEM/DAA BOARD (PLATO NETWORK USE ONLY)

The optional modem/DAA (data-access arrangement) board is a FSK (frequency-shift-keyed), asynchronous internal modem for communicating with a PLATO site controller via a dial-up telephone line. Features include:

- Switch controlled connection with telephone line to facilitate use of a telephone plugged into the PHONE jack at back of terminal
- Full-duplex operation using frequency multiplexing on a two-wire, unconditioned telephone line
- Primary (receive) channel 1300-Hz mark, 2100-Hz space
- Secondary (transmit) channel 390-Hz mark, 490-Hz space
- Receive data rate up to 1200 bps
- Transmit data rate up to 150 bps
- Line impedance of 600 ohms
- Transmitter output level of -9 dBm (+0, -4 dBm)
- Receiver input level of -10 dBm to -43 dBm

---

\*Supporting circuitry for memory expansion is already on the board, including sockets where the memory chips are inserted.

## POWER SUPPLY

The power supply operates with 120-V ac, 50/60-Hz input, which meets domestic requirements. In international units, a stepdown transformer is included to allow use of the same power supply. Regulated output voltages are:

- +55 volts
- +12 volts
- -12 volts
- +5 volts
- -5 volts

## EXTERNAL INTERFACES

The following paragraphs describe the external interfaces of the terminal. The interface connectors (figure 1-4) are on the lower-rear panel of the terminal and are labeled PHONE, LINE, VIDEO OUT, SERIAL, ASCII/PLATO COMM, and PARALLEL. The PHONE and LINE telephone jacks are only on units that have the internal modem/DAA board installed.

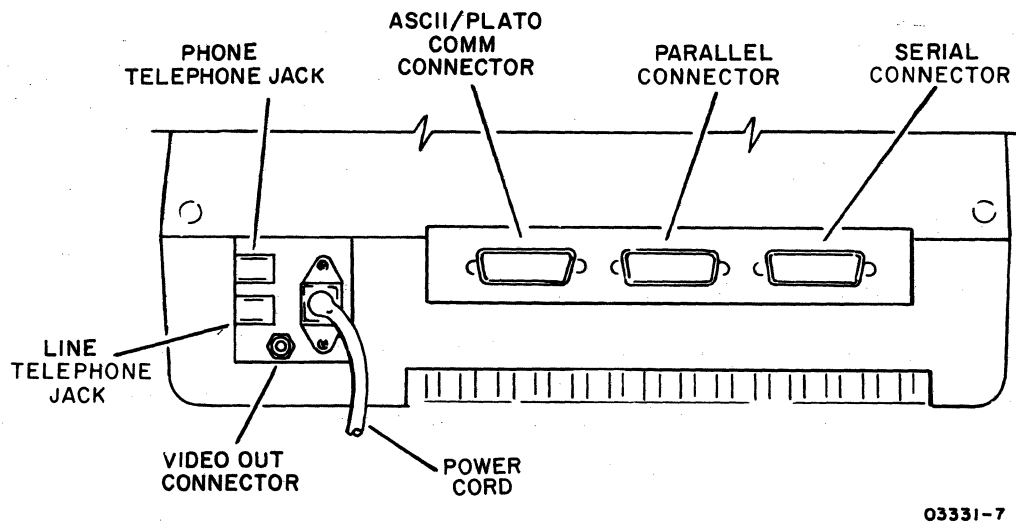


Figure 1-4. External Interface Connectors

## PHONE/LINE

These telephone jacks connect to the site telephone equipment when terminal communications are with the PLATO network through the internal modem. The connection of the telephone line to the

LINE jack can either be direct via the telephone wall jack or indirect via a CDC CN701-A Acoustic Coupler. When the connection is direct, the site telephone is plugged into the PHONE jack.

Use of the plugged-in telephone is enabled through the TALK/DATA switch on the terminal. The switch internally disconnects the telephone line from the modem and connects the line with the telephone. This also occurs automatically when the terminal is powered off.

#### VIDEO OUT

The VIDEO OUT connector provides a composite video signal of the contents of the screen that meets the RS-170 standard.\* This output can either drive a video hardcopy unit or a special monitor. Maximum length of the coaxial cable used in the connection is 150 m (500 ft).\*\*

#### SERIAL

This connector allows the terminal to interface with a serial-communication device. Characteristics are:

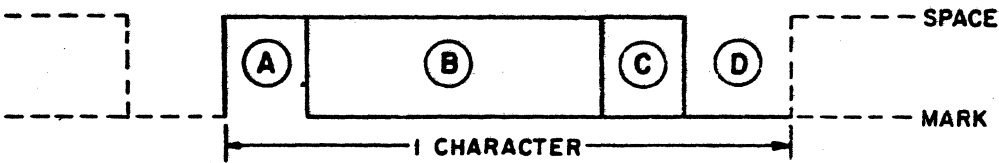
- Asynchronous, full-duplex operation with voltage signals that meet RS-232-C/CCITT V.24 and V.28 standards\*\*\*:
  - Receiver levels of -25.0 V to +0.8 V equals mark or off; +2.0 V to +25.0 V equals space or on
  - Transmitter levels of -12.0 V to -3.0 V equals mark or off; +3.0 V to +12.0 V equals space or on
- Controlware-selectable word length, parity, and stop bits (figure 1-5 shows word format)
- Controlware-selectable receive/transmit rates of 37.5, 75, 150, 300, 600, 1200, 2400, 4800, 9600, or 19 200 bps

---

\*RS-170 is the Electronic Industries Association standard for electrical performance of monochrome television studio facilities.

\*\*Maximum length is dependent on cable characteristics, signal termination, and receiver design.

\*\*\*RS-232-C is the Electronic Industries Association standard for signal interchange between data terminal equipment and data communication equipment. CCITT V.24 and V.28 are comparable European standards.



- (A) 1 START BIT (SPACE OR HIGH)
- (B) 5, 6, 7, OR 8 DATA BITS (1= MARK OR LOW, 0= SPACE OR HIGH)
- (C) 1 OR NO PARITY BIT (EVEN OR ODD)
- (D) 1, 1.5, OR 2 STOP BITS (MARK OR LOW)

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Figure 1-5. Serial Word Format

Maximum length of the cable used in the serial interface is 15 m (50 ft). Table 1-1 gives the pin assignments.

TABLE 1-1. SERIAL CONNECTOR PIN ASSIGNMENTS

PIN NUMBER*	SIGNAL
RJ3-1	Safety Ground
RJ3-2	Transmit Data
RJ3-3	Receive Data
RJ3-4	Request to Send
RJ3-5	Clear to Send
RJ3-6	Data Set Ready
RJ3-7	Signal Ground
RJ3-8	Carrier Detect
RJ3-20	Data Terminal Ready

\*Connector has 25 pins and unlisted pins are not used (open).

## ASCII/PLATO COMM (COMMUNICATIONS)

When the internal modem is not used, this interface conducts the network communications for the terminal. This can be either with an ASCII communications network such as the Data Services network or with the PLATO network. Communications compatibility with site facilities and either type network is established through switch settings on the terminal. Communication facilities accommodated are:

- RS-232-C/CCITT V.24 and V.28 compatible signals for interfacing with an external modem. The cable connecting the modem can be up to 15 m (50 ft) long.
- Current-based signals for interfacing with communications equipment that use long-line communications. This signal interchange occurs through an optically-coupled receiver and a transmitter that has an output level of 24 mA minimum to 55 mA maximum. For data rates not exceeding 1200 bps, the cable for the connection can be up to 3048 m (10 000 ft) long.

Table 1-2 lists the pin assignments and the following paragraphs describe the characteristics of the interface with each type of network.

### Characteristics with an ASCII Network

With an ASCII network, the characteristics of the ASCII/PLATO COMM interface are:

- Asynchronous, full-duplex operation
- Switch-selectable receive/transmit rates that are in effect except when reselected by controlware. Selection includes rates of 75/75, 150/150, 300/300, 600/600, 1200/75, 1200/1200, or 2400/2400 bps. In addition, switches can be set so rates are determined by external receive/transmit clocks.
- Controlware-selectable receive rate and transmit rate with separate selections of 75, 150, 300, 600, 1200, 2400, 4800, 9600, or 19 200 bps. In addition, controlware can select rates provided by external receive/transmit clocks.
- Automatic formatting of communications as follows, except when reselected by controlware:
  - One start bit
  - Seven data bits that are ASCII encoded
  - One parity bit
  - One stop bit



TABLE 1-2. ASCII/PLATO COMM CONNECTOR PIN ASSIGNMENTS

PIN NUMBER	SIGNAL	NOTES
RJ1-1	Protective Ground	
RJ1-2	Primary Channel Transmit Data	1, 3, and 4
RJ1-3	Primary Channel Receive Data	4
RJ1-4	Primary Channel Request to Send	1 and 2
RJ1-5	Primary Channel Clear to Send	1
RJ1-6	Data Set Ready	7
RJ1-7	Signal Ground	
RJ1-8	Primary Channel Carrier Detect	7
RJ1-9	Not used	Open
RJ1-10	Not used	Open
RJ1-11	Not used	Open
RJ1-12	Not used	Open
RJ1-13	Secondary Channel Clear to Send	1
RJ1-14	Secondary Channel Transmit Data	1, 3, and 4
RJ1-15	Transmit Clock	3 and 4
RJ1-16	Not used	Open
RJ1-17	Receive Clock	4
RJ1-18	Not used	Open
RJ1-19	Secondary Channel Request to Send	1 and 2
RJ1-20	Data Terminal Ready	5
RJ1-21	Long Line Transmit	6
RJ1-22	Long Line Transmit Return	6
RJ1-23	Long Line Receive	6
RJ1-24	Long Line Receive Return	6
RJ1-25	Not used	Open

Notes:

1. Primary/secondary channel is switch selectable.
2. Request to Send signal of selected channel is governed by resident loader program during controlware loading, then by controlware.
3. With PLATO network, internal/external transmit clock is switch selectable.
4. With ASCII network, use of an external transmit/receive clock is switch or controlware selectable.
5. Switch selectable - either constantly on or usually on and governed by resident loader program during controlware loading, then by controlware.
6. Unique to long-line communications.
7. With a modem, these signals must be on for terminal to receive.

- Controlware-selectable formatting of communications in words of:
  - One start bit
  - Seven data bits plus a parity bit or eight data bits and no parity
  - One stop bit
- Automatic selection of even parity except when reselected by controlware (even, odd, or none) or when in timeshare or graphics mode where even, odd, or no parity is switch selectable

### Characteristics with PLATO Network

With the PLATO network, the characteristics of the ASCII/PLATO COMM interface are:

- Asynchronous, full-duplex operation with an automatic receive rate of 1200 bps
- Switch-selectable transmit rate of 75, 120, or 1200 bps or a rate provided by an external transmit clock
- Automatic selection of even parity
- Automatic formatting of communications in unique PLATO network format:
  - Receive words of 21 bits (figure 1-6)
  - Transmit words of 13 bits (figure 1-7)

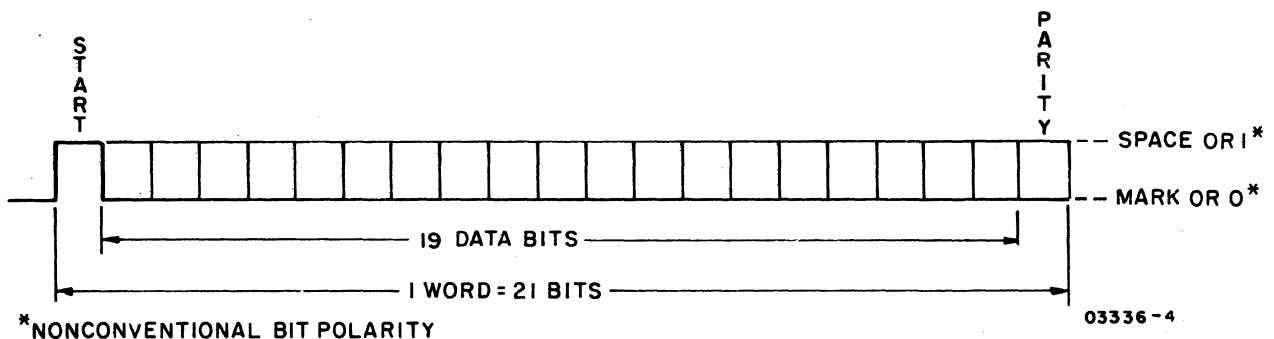
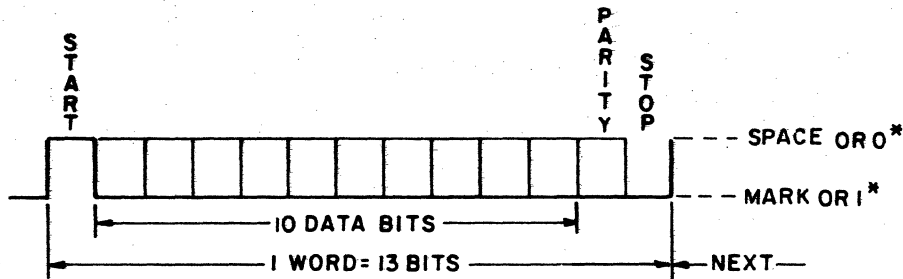


Figure 1-6. Receive Word Format in PLATO Network



\*CONVENTIONAL BIT POLARITY

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Figure 1-7. Transmit Word Format in PLATO Network

## PARALLEL

The PARALLEL connector provides the capability of connecting up to eight peripheral devices to the terminal in daisy-chain fashion. Characteristics include:

- Parallel 8-bit data transfers that are initiated by the terminal
- Maximum cable length in daisy chain (including internal cabling) of 7.6 m (25 ft)\*
- TTL (transistor-transistor logic) compatible signal levels, defined as follows:

### Terminal output

Data Lines	Others
$+2.0 \text{ V} < \text{High} < +5.25 \text{ V}$	$+2.4 < \text{High} < +5.25 \text{ V}$
$+0.0 \text{ V} \leq \text{Low} \leq +0.5 \text{ V}$	$+0.0 \leq \text{Low} \leq +0.4 \text{ V}$

### Terminal input

Data Lines	Others
$+2.0 \text{ V} < \text{High} < +5.25 \text{ V}$	$+2.4 \text{ V} < \text{High} < +5.25 \text{ V}$
$-0.25 \text{ V} \leq \text{Low} \leq +0.8 \text{ V}$	$+0.25 \text{ V} \leq \text{Low} \leq +0.8 \text{ V}$

Table 1-3 gives the pin assignments.

\*Last device in daisy chain must have terminator (part number 15632316).

TABLE 1-3. PARALLEL CONNECTOR PIN ASSIGNMENTS

PIN NUMBER	SIGNAL	ACTIVE LEVEL	IN/OUT
RJ2-15	Data Line 0	High	Both
RJ2-16	Data Line 1	High	Both
RJ2-17	Data Line 2	High	Both
RJ2-18	Data Line 3	High	Both
RJ2-21	Data Line 4	High	Both
RJ2-22	Data Line 5	High	Both
RJ2-23	Data Line 6	High	Both
RJ2-24	Data Line 7	High	Both
RJ2-2	Address Line 0	High	Out
RJ2-3	Address Line 1	High	Out
RJ2-4	Address Line 2	High	Out
RJ2-5	Address Line 3	High	Out
RJ2-6	Address Line 4	High	Out
RJ2-7	Address Line 5	High	Out
RJ2-8	External Write	Low	Out
RJ2-9	External Output	Low	Out
RJ2-10	External Read	Low	Out
RJ2-11	External Ready	High	In
RJ2-12	Interrupt	Low	In

Note: Pins RJ2-1, -14, -19, -20, and -25 are grounded.  
Pin RJ2-13 is open.

## EQUIPMENT SPECIFICATIONS

The following paragraphs describe the physical, electrical, and environmental specifications for the terminal.

### PHYSICAL SPECIFICATIONS

The terminal has the following dimensions and weights:

Width: 400 mm (15.75 in)  
Height: 419 mm (16.5 in)  
Depth: 603 mm (23.75 in)  
Weight: 18.2 kg, (40 lb) 60 Hz  
21.8 kg, (48 lb) 50 Hz

### ELECTRICAL SPECIFICATIONS

The electrical power requirements for the domestic terminal, are listed below. The electrical power requirements for the international unit, are listed within parentheses in the cases where they differ from the domestic unit.

Voltage: 120 V ac (220 to 240 V ac)  
Phase: Single  
Frequency: 60 Hz (50 Hz)  
Current: 1.4 A (0.7 A)  
Power Consumption: 0.154 kVA

### ENVIRONMENTAL SPECIFICATIONS

The environmental requirements of the terminal are:

Operating Temperature: 10°C to 35°C (50°F to 95°F)  
Storage Temperature: -40°C to 70°C (-40°F to 158°F)  
Maximum Temperature Gradient: 10°C/h (18°F/h)  
Operating Relative Humidity: 10% to 90% (no condensation)  
Storage Relative Humidity: 0% to 100% (no condensation)  
Humidity Gradient: 10%/h  
Maximum Operating Altitude: 3000 m (9850 ft)  
Heat Dissipation: 440 Btu/h (129 W)  
Cooling: natural convection

## I/O CABLE, GROUNDING, AND TOOL REQUIREMENTS

The following paragraphs describe the I/O cables, grounding, and tools that are required by the terminal.

### I/O CABLES

Table 1-4 supplies a detailed breakdown of the I/O cables used with the terminal.

### GROUNDING

No special grounding requirements are necessary for the terminal. A safety ground is provided through the three-prong ac power plug when connected to a properly grounded site outlet.

### TOOLS

Metric hand tools (wrenches, sockets, etc.) are required in the support of the terminal.

TABLE 1-4. TERMINAL I/O CABLES

CABLE		CONNECTS BETWEEN		MAX PERMISSIBLE LENGTH	NOTES
PART NO.	LENGTH	I/O CONNECTOR	EQUIPMENT		
51917907	4.3 m (14 ft)	LINE	Telephone wall jack	N/A	Supplied with internal modem.
51917911	4.3 m (14 ft)	LINE	Telephone wall box containing dedicated telephone line or CN701-A Acoustic Coupler	N/A	Supplied with internal modem.
61406110	3.2 m (10.5 ft)	ASCII/PLATO COMM	External modem	15 m (50 ft)	Supplied with international terminal, optional with domestic terminal (option 799-11/YA254-A)

TABLE 1-4. TERMINAL I/O CABLES (CONTD)

CABLE		CONNECTS BETWEEN		MAX PERMISSIBLE LENGTH	NOTES
PART NO.	LENGTH	I/O CONNECTOR	EQUIPMENT		
N/A	N/A	ASCII/PLATO COMM	Long-line inter- face of PLATO site controller or a terminal multiplexer	3000 m* (10 000 ft)	Supplied with site controller or multiplexer.
61408865	1.5 m (5 ft)	PARALLEL	Peripheral device	7.6 m** (25 ft)	Same or shorter cable supplied with peripheral device. Last device in daisy chain must have terminator (part no. 15632316).
N/A	N/A	SERIAL	Undefined serial- communication device	15 m (50 ft)	25-pin connec- tor, part no. 10129658, with contact pins, part no. 62013801 or 62013802, mate with SERIAL connector.
N/A	N/A	VIDEO OUT	Undefined- video hardcopy unit or special high-resolution monitor	150 m*** (500 ft)	75-ohm coaxial cable is recommended.

\*For data rates not exceeding 1200 bps.

\*\*Maximum length in daisy chain, including internal cabling.

\*\*\*Maximum length is dependent on cable characteristics, signal termination, and receiver design.

This section describes the function of the external and internal controls and indicators of the terminal. For terminal operating procedures, refer to the user's guide that covers the effective application (a list of publication numbers appear in the preface).

### EXTERNAL CONTROLS AND INDICATORS

The following paragraphs describe the function of the external controls and indicators (figure 2-1). The external controls include the keyboard, ON/OFF circuit breaker, BRIGHTNESS control, TALK/DATA switch, RESET switch, and the selection switches behind the protective door. The external indicators consist of six light-emitting diodes (LEDs).

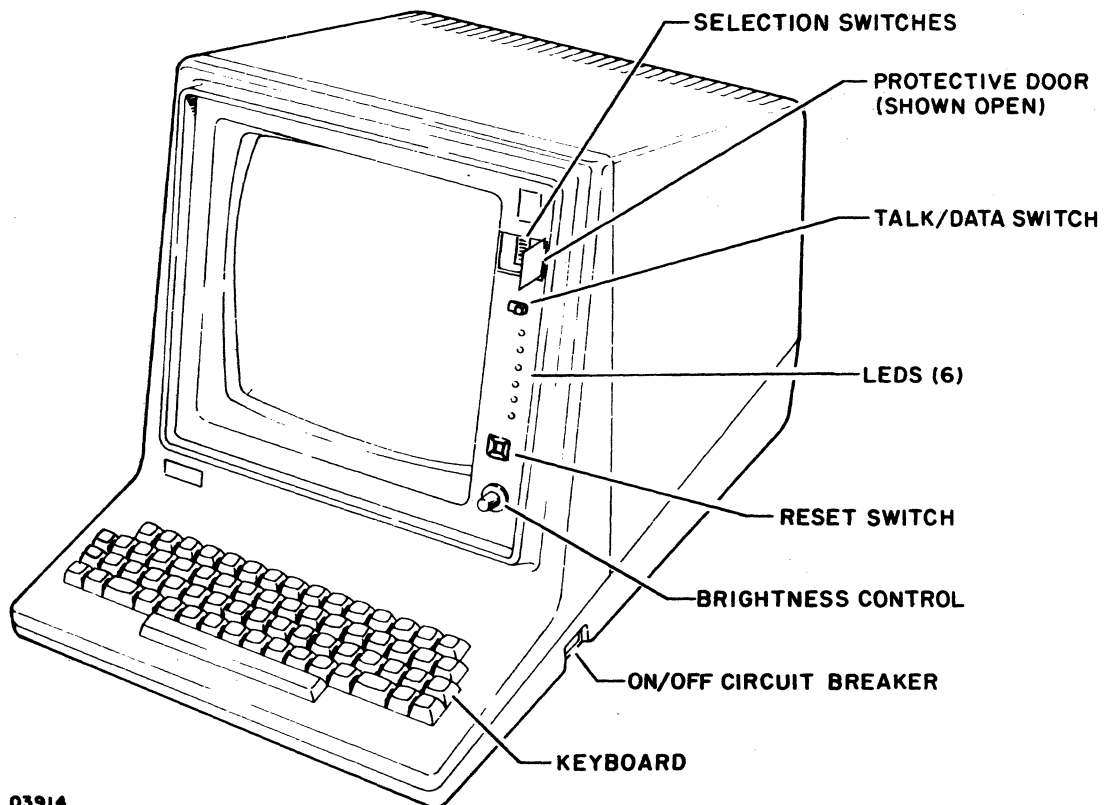


Figure 2-1. External Controls and Indicators



## KEYBOARD

The effect of the codes generated from the keyboard varies with the application. The code that each key generates is described in Theory of Operation, section 4.

## ON/OFF CIRCUIT BREAKER

Pressing the circuit breaker to ON does the following:

- Applies power to the terminal and sets logic circuits to an initial state
- If enabled by selection switches behind protective door, initiates the resident diagnostics (diagnostics are normally disabled except during maintenance)
- Generates a loading of controlware from the selected source

The crt filament requires approximately 45 seconds to warm up.

## BRIGHTNESS CONTROL

This control adjusts video brightness.

## TALK/DATA SWITCH

This slide switch has two functions:

- When the optional internal modem is installed, placing the switch in the TALK position disconnects the terminal from the PLATO network and internally connects the telephone line to the telephone plugged into the PHONE jack, thus allowing voice use of the telephone. This also occurs automatically when the terminal is powered off. Returning the switch to the DATA position reconnects the telephone line to the internal modem for PLATO network communications.

If the telephone plugged into the PHONE jack is arranged with an external modem for alternate operations in an ASCII network (such arrangements are shown in Installation, section 3), the switch must be left in the TALK position throughout those operations. This keeps the internal modem disconnected and allows the telephone line and external modem to be connected through the terminal.

- In European applications requiring a switched Data Terminal Ready signal, the TALK/DATA switch serves as an exclusion switch for the external communications equipment (no international units have internal modems). Under these circumstances, internal switch S2-1 (described later in this section) must be set for a switched Data Terminal Ready signal. This causes the resident loader program to only issue Data Terminal Ready when the TALK/DATA switch is set to DATA. After controlware is loaded, this function is governed by the controlware.

## RESET SWITCH

Pressing the RESET switch does the following:

- Resets most logic circuits
- Lights all six LEDs on operator panel
- If no controlware is loaded, initiates the resident diagnostics, if enabled, and generates a loading of controlware from the selected source
- If controlware is loaded and operations are with the PLATO network, the result varies with the length of the reset:
  - Pressing the switch momentarily causes a checksum to be performed on each major block of loaded controlware. Any blocks in error are automatically reloaded, and if three blocks are in error, a full reloading occurs.
  - Pressing the switch for 3 seconds or longer initiates a load the same as if no controlware were loaded.

- If controlware is loaded and operations are with the Data Services network, the result varies with the length of the reset and the mode of operation:
  - In timeshare or graphics mode, the results of a momentary or 3-second or longer pressing of the switch corresponds to that described for PLATO network operations. The only difference being that any controlware block found in error after a momentary pressing causes a full (rather than partial) reload.
  - In PLATO mode, pressing the switch for 3 seconds or longer causes the terminal to log off PLATO, perform a checksum on controlware, and if any block is in error, do a full reload. Regardless of whether a reload occurs or not, the terminal subsequently enters timesharing mode.

With a momentary pressing of the switch in PLATO mode, a checksum is performed, and if all controlware blocks are good, operation continues in PLATO mode. Otherwise, a block in error causes the terminal to log off PLATO, do a full reload, and then enter timeshare mode.

#### SELECTION SWITCHES BEHIND PROTECTIVE DOOR

The setting of these switches (figure 2-2) effects controlware loading, communication characteristics when in timeshare or graphics mode, and the running of the resident diagnostics. A selection is made by pressing the side of the switch as shown on the decal on the back of the door. Instructions for setting these switches are given in Checkout, section 3. Tables 2-1 and 2-2 collectively define their functions.

#### CAUTION

Do not use a "lead" pencil to set rocker switches. Graphite dust from the pencil can cause a switch malfunction.

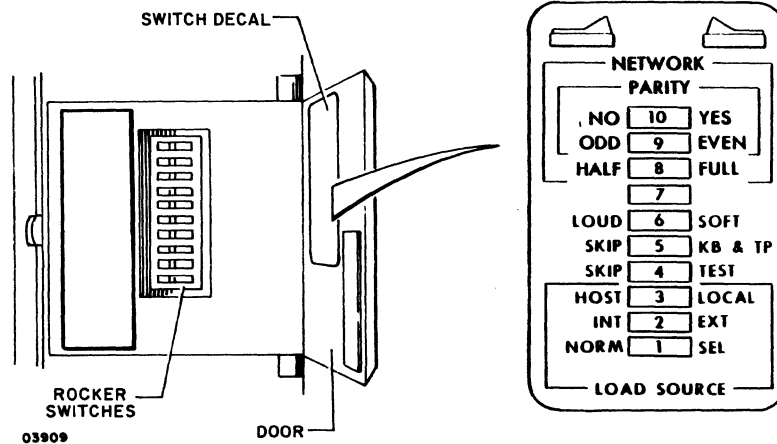


Figure 2-2. Selection Switches Behind Protective Door

TABLE 2-1. FUNCTION OF SWITCHES BEHIND DOOR

SWITCH	FUNCTION	NOTES
NETWORK PARITY NO/YES	This switch is only effective in timeshare or graphics mode. Setting switch to YES enables parity in communications during those modes; setting switch to NO disables parity.	If timeshare or graphics mode is run online with Data Services network, switch must be set to YES.
NETWORK PARITY ODD/EVEN (9)	For this switch to be effective, PARITY NO/YES switch must be set to YES. Then this switch setting determines whether terminal uses ODD or EVEN parity in communications during timeshare or graphics mode.	If timeshare or graphics mode is run online with Data Services network, switch must be set to EVEN.
NETWORK HALF/FULL (8)	This switch setting is only effective in timeshare or graphics mode. With switch in HALF position, keyboard data is displayed simultaneously as it is transmitted. In FULL position, keyboard data	If timeshare or graphics mode is run online with Data Services network, switch must be set to HALF position.

TABLE 2-1. FUNCTION OF SWITCHES BEHIND DOOR (CONTD)

SWITCH	FUNCTION	NOTES
Not used (7)	is not displayed until it returns from host computer.	
LOUD/SOFT (6)	Determines whether terminal sounds a LOUD or SOFT alarm.	Conditions that cause alarm to sound varies with application.
SKIP/KB&TP (5)	For this switch to be effective, SKIP/TEST (4) switch must be set to TEST. Setting of this switch then determines whether crt alignment, keyboard, and touchpanel tests (KB&TP) are included in running diagnostics or are bypassed (SKIP).	Resident diagnostics are described in Maintenance, section 6.
SKIP/TEST (4)	When resident diagnostics are to be run during maintenance, this switch is set to TEST. Resident diagnostics then automatically run after a power on or when RESET switch is pressed (if controlware is loaded, RESET may have to be pressed twice, each time for 3 seconds or longer).	Resident diagnostics are described in Maintenance, section 6.
LOAD SOURCE HOST/LOCAL (3), LOAD SOURCE INT/EXT (2), LOAD SOURCE NORM/SEL (1)	These switches, together with the switches listed in table 2-2, determine the source and controlware file that is accessed during loading. Table 2-2 defines the selections.	Instructions for loading is contained in startup procedure in terminal operator's guide (refer to preface for publication number).

TABLE 2-2. LOAD SWITCH SELECTIONS

LOAD SOURCE			CONNECTED NETWORK*	INTERNAL SWITCH SETTINGS**				CONTROLWARE FILE AND SOURCE
HOST/LOCAL	INT/EXT	NORM/SEL		S5-1	S5-2	S5-3	S5-4	
HOST	X***	NORM	PLATO	ON	ON	X***	X***	File 0 from PLATO network computer.
HOST	X***	NORM	PLATO	OFF	ON	X***	X***	File 1 from PLATO network computer.
HOST	X***	NORM	PLATO	ON	OFF	X***	X***	File 2 from PLATO network computer.
HOST	X***	NORM	PLATO	OFF	OFF	X***	X***	File 3 from PLATO network computer.
HOST	X***	NORM	Data Services	X***	X***	ON	ON	File 0 from Data Services network computer.
HOST	X***	NORM	Data Services	X***	X***	OFF	ON	File 1 from Data Services network computer.
HOST	X***	NORM	Data Services	X***	X***	ON	OFF	File 2 from Data Services network computer.
HOST	X***	NORM	Data Services	X***	X***	OFF	OFF	File 3 from Data Services network computer.
LOCAL	EXT	NORM	Irrelevant	X***	X***	X***	X***	File on flexible disk in associated flexible disk drive.
LOCAL	INT	NORM	Irrelevant	X***	X***	X***	X***	File from optional ROM within terminal.
X***	X***	SEL	Relevant if host is selected	Relevant upon file-entry default if host is selected and terminal is connected to PLATO network	Relevant upon file-entry default if host is selected and terminal is connected to Data Services network	With aid of displayed prompt, load selection of flexible disk, host, or internal ROM is made via keyboard or touchpanel. If host is selected, file number selection is made either through keyboard or through settings of S5-1/-2 or S5-3/-4 internal switches by default.		

\*Connected means that communications are established with network. For this to be true, internal/external modem must be detecting a carrier and terminal must be receiving network idle codes, that is, PLATO NOP codes in PLATO network; ASCII CR, LF, or / (slash) codes in Data Services network.

\*\*Internal switches S5-1 through -4 are set for the network files normally used in the application.

\*\*\*X = either position.

## LIGHT-EMITTING DIODES (LEDS)

These LEDs on the operator panel serve two purposes:

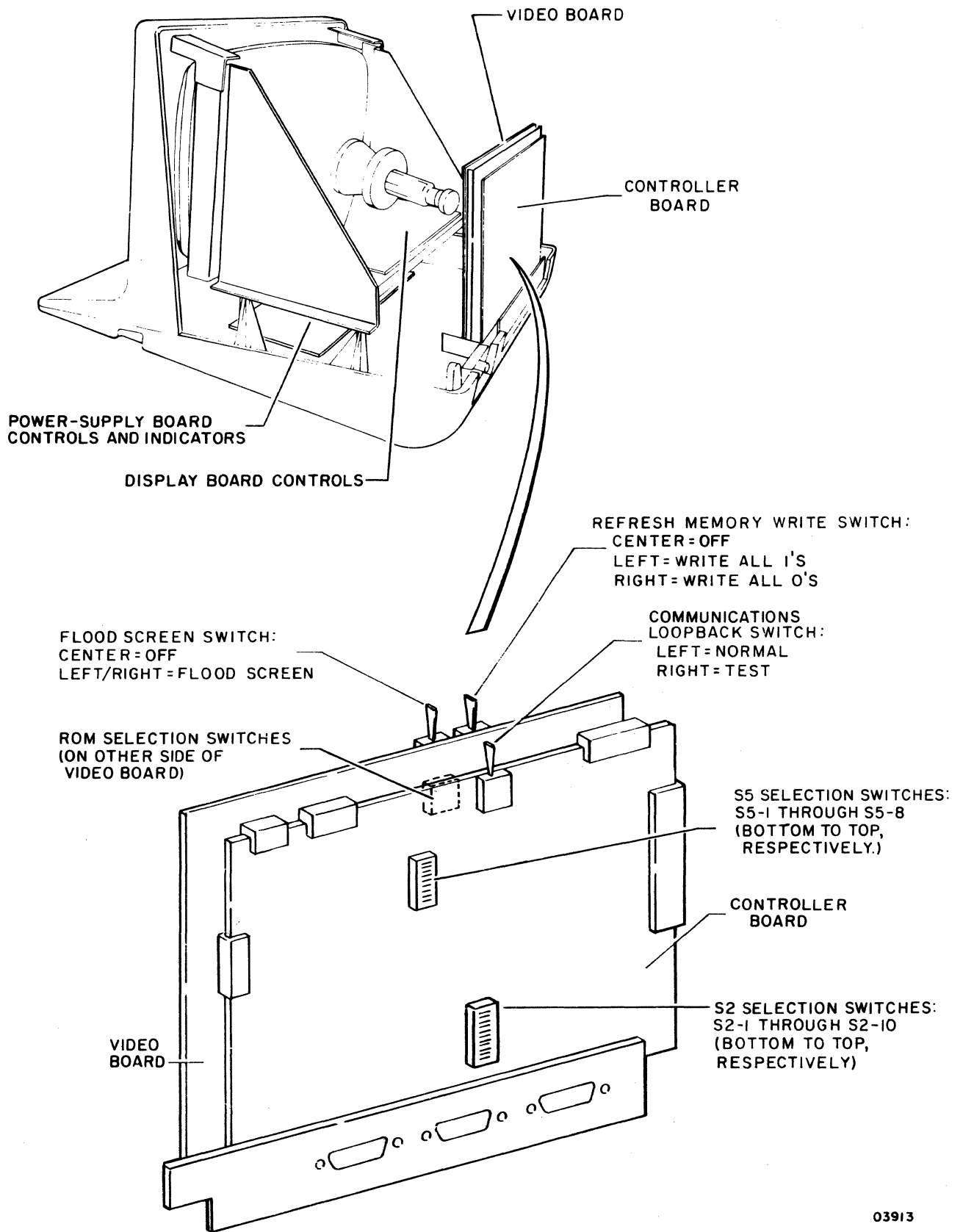
- During normal operation, they indicate network-communication status as defined in table 2-3.
- When resident diagnostics are run, the indicators show codes for detected errors. This is described in Maintenance, section 6.

TABLE 2-3. MEANING OF LEDES DURING NORMAL OPERATION

LED	MEANING WHEN LIT
DTR (Data Terminal Ready)	Terminal is issuing Data Terminal Ready signal to internal/external modem.
DSR (Data Set Ready)	Terminal is receiving Data Set Ready signal from internal/external modem.
RTS (Request to Send)	Terminal is issuing Request to Send signal to internal/external modem.
RCV (Receive Data)	Terminal is receiving data.
XMT (Transmit Data)	Terminal is transmitting data.
ERR (Error)	Terminal has detected a parity error in received data or a loss of communications has occurred. Error condition is cleared upon receipt of a retransmission, a power off/on, or a reset.

## INTERNAL CONTROLS AND INDICATORS

The following paragraphs describe the function of the controls and indicators that are inside the terminal (figure 2-3). These include the Communications Loopback switch; Refresh Memory Write switch; Flood Screen switch; the S2, S5, and ROM selection switches; the display board controls; and the power-supply board controls and indicators.



03913

Figure 2-3. Internal Controls and Indicators



## COMMUNICATIONS LOOPBACK SWITCH

If network communications are via an external modem that transmits data on the secondary channel, this switch allows the quality of the communications facilities to be tested by the host computer. Operation is as follows:

- With the switch in the TEST position, data received via the ASCII/PLATO COMM interface is looped back as secondary-channel transmit data.
- With the switch in the NORM position, data is received as normal.

## REFRESH MEMORY WRITE SWITCH

### NOTE

Operation of this switch destroys the contents of the refresh memory.

This momentary three-position switch allows the refresh memory to be tested manually. Holding the switch to one side or the other either writes all 1s (illuminate bits) or 0s (blacken bits) into refresh memory. If the memory is operating properly, the display area on the screen correspondingly becomes completely illuminated or completely black. If this does not occur, use of the following described Flood Screen switch can verify whether video output or refresh memory is faulty.

## FLOOD SCREEN SWITCH

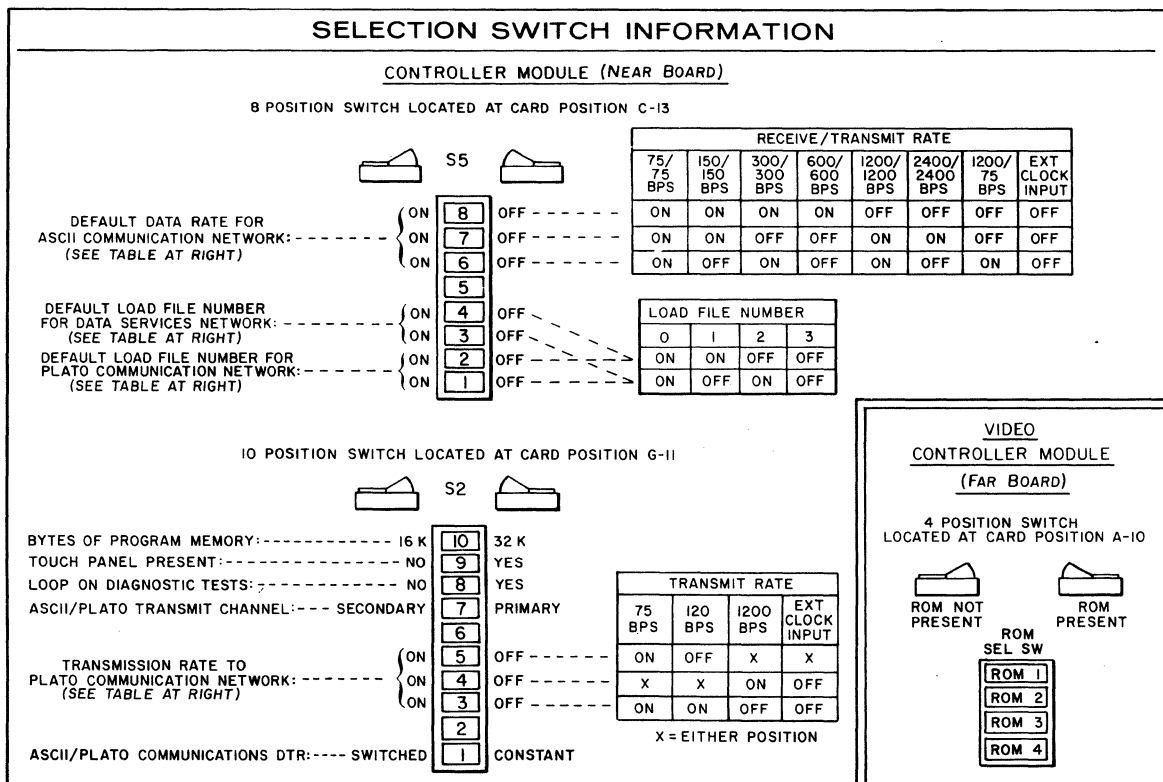
This momentary three-position switch allows the video output to be checked. Holding the switch to either side forces the video output to a constant unblinking state, thus illuminating the entire screen. This does not affect refresh memory nor stop activity of logic circuits.

## S2, S5, AND ROM SELECTION SWITCHES

These three blocks of switches are set to condition the terminal for network communications and memory options that have been installed. Instructions for setting these switches are given in Installation, section 3. A decal (figure 2-4), located inside the hood, identifies the function of each switch and tables 2-4 and 2-5 collectively define their functions.

### CAUTION

Do not use a "lead" pencil to set rocker switches. Graphite dust from the pencil can cause a switch malfunction.



03915-1

Figure 2-4. Decal Inside Hood

TABLE 2-4. FUNCTION OF INTERNAL SELECTION SWITCHES

SWITCH	FUNCTION
S2-1	Determines whether Data Terminal Ready signal of ASCII/PLATO COMM interface or internal-modem interface is constantly on or switched. A switched Data Terminal Ready signal allows TALK/DATA switch on operator panel to serve as an exclusion switch for external equipment in European applications.
S2-2	Not used.
S2-3,-4,-5	Selects transmission rate for PLATO network communications. For ASCII communications, position of switches is irrelevant.
S2-6	Not used.
S2-7	Determines whether primary-channel or secondary-channel RS-232-C/CCITT V.24/V.28 signals of ASCII/PLATO COMM interface are used for transmitting data. Affected signals are listed in table 2-5.
S2-8	This switch is only effective when SKIP/TEST switch behind protective door is set to TEST to enable resident diagnostics. With switch in YES position, terminal continuously repeats diagnostics when they are run. With switch in NO position, terminal makes one pass through diagnostics when run.
S2-9	Always set to YES position to indicate touch-panel is present.
S2-10	Indicates whether RAM expansion option is installed (32K position) or not installed (16K position). (Locations on video board for optional RAM are shown in Installation, section 3.)
S5-1,-2,-3,-4	If a file number is not entered through the keyboard, these switches designate the controlware file that is accessed from the respective network computer when loading from the host. Switches S5-1 and -2 are set for the PLATO network file normally used in the application; and switches S5-3 and -4 similarly set for the Data Services network file. For an overview of all the switches that affect load source and file selection, refer to table 2-2 which appears earlier in this section.

TABLE 2-4. FUNCTION OF INTERNAL SELECTION SWITCHES (CONTD)

SWITCH	FUNCTION
S5-5	Not used.
S5-6,-7,-8	Selects receive/transmit rates for ASCII network communications. After loading occurs, controlware can override this selection.
ROM SEL-1,-2,-3,-4	Each of these switches indicate whether an optional 4K increment of ROM/EROM is installed. (Locations on video board for optional ROM/EROM are shown in Installation, section 3.)

TABLE 2-5. INTERFACE SIGNALS AFFECTED BY SWITCH S2-7

ASCII/PLATO COMM PIN NUMBER	SIGNAL	PRIMARY SELECTED	SECONDARY SELECTED
RJ1-2	Primary Channel Transmit Data	Dynamic	Mark
RJ1-14	Secondary Channel Transmit Data	Mark	Dynamic
RJ1-4	Primary Channel Request to Send	On*	Off
RJ1-19	Secondary Channel Request to Send	Off	On*
RJ1-5	Primary Channel Clear to Send	Must be on to transmit	Ignored
RJ1-13	Secondary Channel Clear to Send	Ignored	Must be on to transmit

\*Governed by resident loader program and controlware, usually on.

## DISPLAY BOARD CONTROLS

The controls on the display board provide horizontal-linearity, horizontal-size, horizontal-frequency, vertical-linearity, vertical-size, vertical-frequency, video-gain, and focus adjustment for the display. The use of these controls is described in Maintenance, section 6.

## POWER-SUPPLY BOARD CONTROLS AND INDICATORS

The controls and indicators on the power supply board (figure 2-5) include two potentiometers, a 50/60-Hz switch, and five LEDs. Their functions are as follows:

- The potentiometers are for adjusting the +5-V and +55-V power outputs. These adjustments are described in Maintenance, section 6.
- The setting of the 50/60-Hz switch determines whether the vertical sync of the display is at a 50- or 60-Hz rate. On a domestic terminal, the switch is to be set to the 60-Hz position; on an international unit, to the 50-Hz position.
- The +5-V, +55-V, +12-V, -5-V, and -12-V LEDs light whenever the corresponding power outputs are energized. However, this does not necessarily mean that they are correct. The procedure for checking the outputs is in Maintenance, section 6.

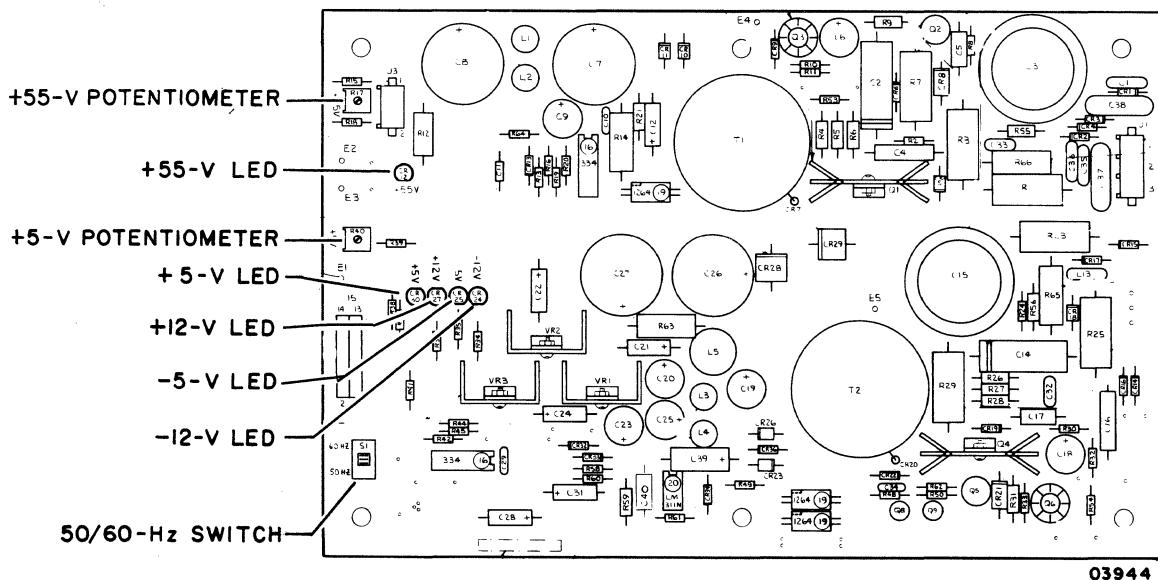


Figure 2-5. Power-Supply Board Controls and Indicators

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This section contains instructions on the crating, uncrating, installation, and checkout of the terminal.

NOTE

Metric hand tools are required to service the terminal.

CRATING

Figure 3-1 details the crating instructions to be followed when the terminal is to be shipped. Use only approved materials to protect against shipping damage. Ship only by van or air. Do not ship via truck or ocean vessel. Approximate shipping weight of the packaged terminal is 21 kg (46 lb) for the domestic unit, and 24 kg (53 lb) for the international unit.

To obtain approved instructions and materials, contact the nearest CDC representative or:

Control Data Corporation  
Corporate Traffic  
8100 34th Avenue South  
Minneapolis, Minnesota 55440

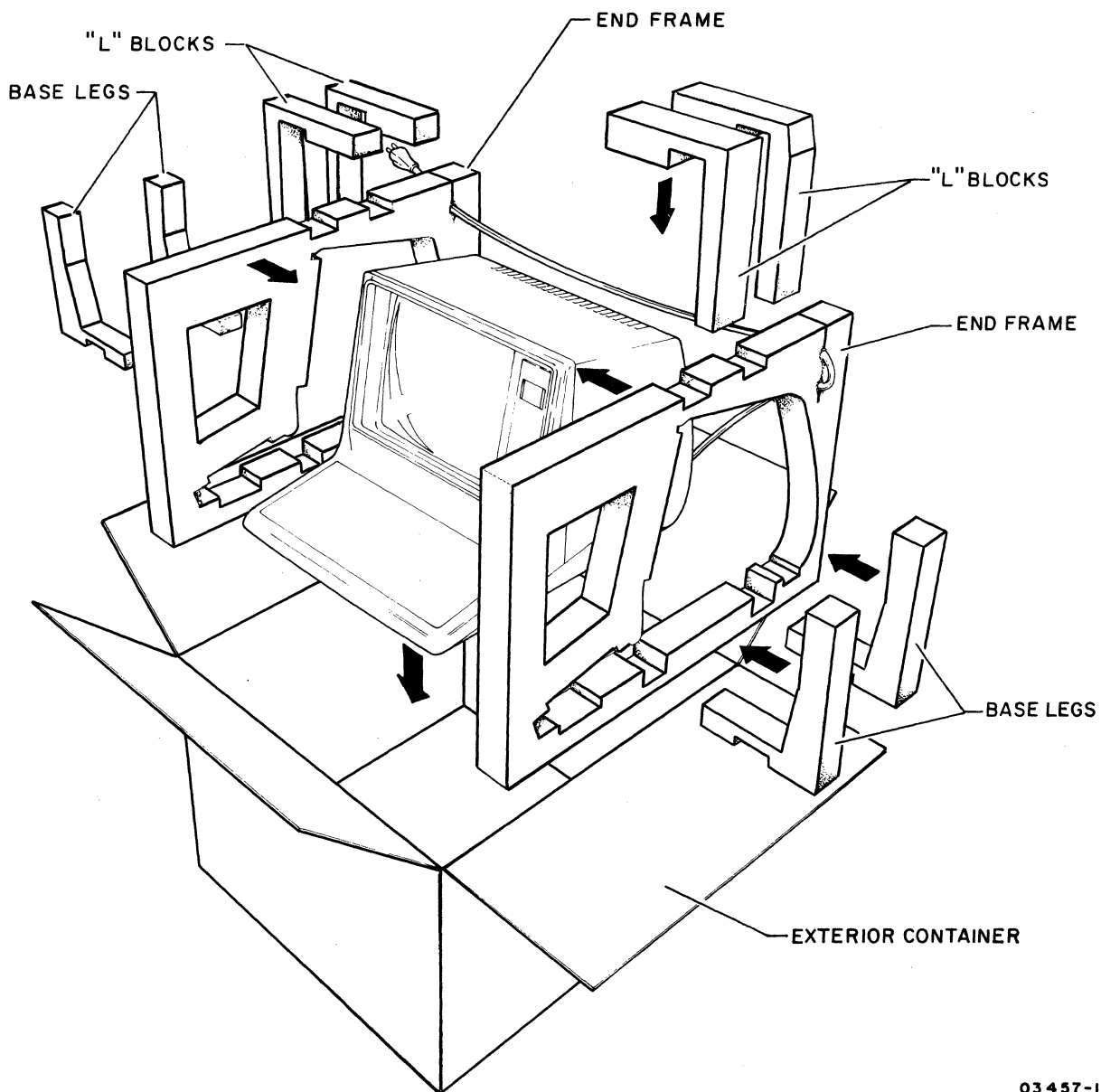
UNCRATING

To uncrate the terminal, refer to figure 3-1 and do the following:

1. Open top of exterior container.
2. Lift terminal with end frames attached from container. Remove end frames.
3. Inspect terminal for shipping damage. File promptly any claim for damage with the transporter involved. If a claim is filed, save original packaging materials.

NOTES

1. USE PREFABRICATED SHIPPING MATERIALS (CDC PART NUMBER 41038200) FOR PACKAGING.
2. INTERLOCK FOAM BASE LEGS WITH END FRAMES.
3. PLACE END FRAMES WITH BASE LEGS ON TERMINAL.
4. PLACE TERMINAL WITH END FRAME CUSHIONING INTO EXTERIOR CONTAINER.
5. LOCK "L" BLOCKS IN POSITION.
6. SECURE POWER CABLE IN SLIT OF END FRAME AS SHOWN.
7. CLOSE AND SEAL EXTERIOR CONTAINER WITH 3-IN, REINFORCED, BOX-SEALING TAPE.



03457-1

Figure 3-1. Terminal Packaging

## INSTALLATION

This portion of the section contains the installation instructions for the terminal. These instructions are divided as follows:

- Preparing terminal
- Installing options
- Installing cabling
- Setting internal switches

### PREPARING TERMINAL

To prepare the terminal for installation, do the following:

1. Set terminal on flat surface where it is to be used. A 102 mm (4 in) clearance must exist around terminal for ventilation.
2. Remove two screws from rear of hood and slide hood off rear of terminal.
3. Check that internal cable connections are secure and that there are no loose wires.
4. The following only applies to international units. If installing a domestic unit, proceed to Installing Options. Check whether power-cord plug mates with site outlet. If not, replace plug as follows:
  - a. Cut power cord next to plug and strip insulation from end of cord.
  - b. Install an appropriate plug on cord and connect:
    - Green/yellow wire to safety ground
    - Brown wire to hot
    - Blue wire to neutral

### INSTALLING OPTIONS

The following paragraphs describe the installation of the RAM expansion, ROM/EROM expansion, and internal modem/DAA options. If none of these apply, proceed to Installing Cabling.



## Installing RAM Expansion Option

The RAM expansion consists of eight 16-pin MOS type integrated-circuit chips that plug into existing sockets on the terminal video board. Observe the following caution when installing the chips.

### CAUTION

Follow precautionary rules for handling MOS type circuits as described in section 6.

To install the chips, refer to figure 3-2 and do the following:

1. Remove video board from terminal per procedure 6 in section 6
2. Insert chips into D10 through D17 locations on video board with dot or indentation at notched end of sockets.

### NOTE

If ROM/EROM expansion is to be installed, disregard the next step and leave video board out.

3. Reinstall video board in terminal per procedure 6.
4. Refer to decal inside hood and set switch S2-10 on controller board to 32K position.
5. Refer to identification label that was packaged with chips and enter that information on existing identification label at rear of terminal. Include part number, equipment-identification code, and serial number.
6. Install RAM expansion identification label and FCO log in area shown in figure 3-3.

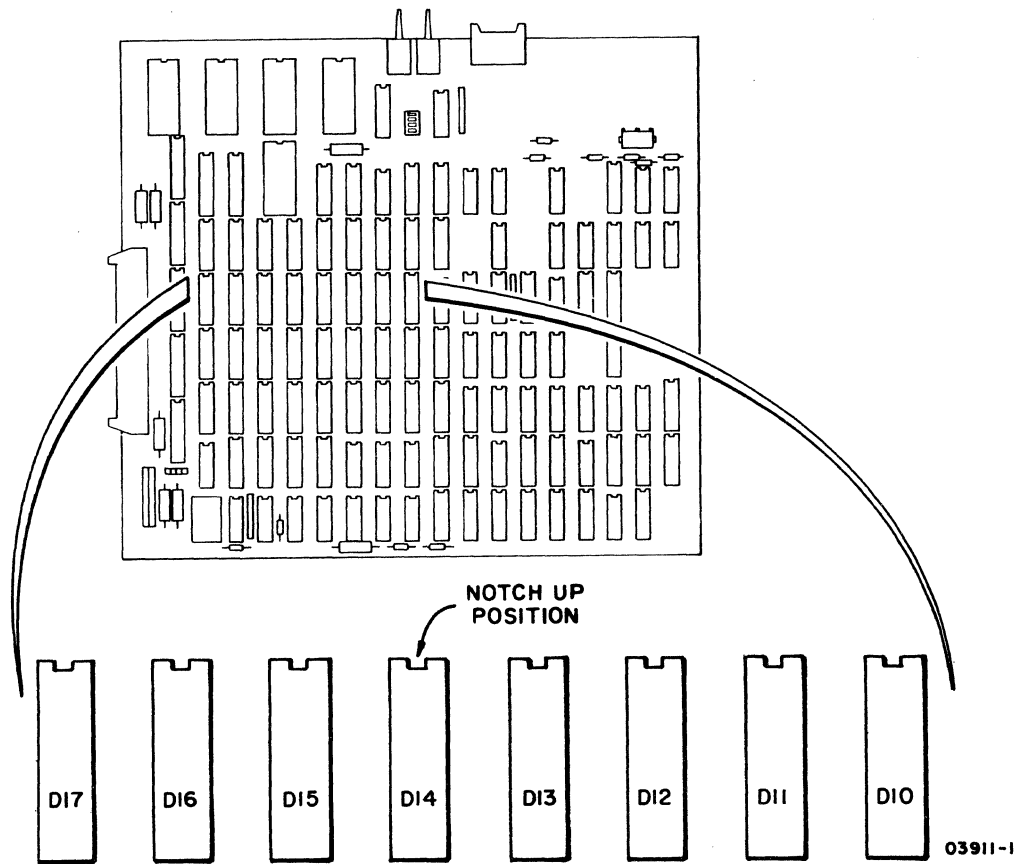


Figure 3-2. Video Board Locations for RAM Expansion

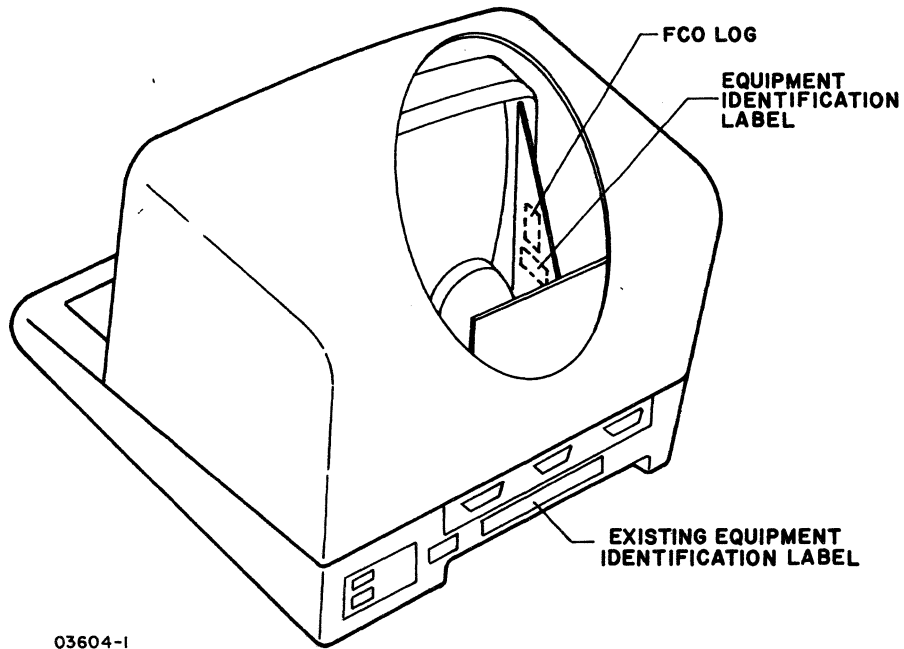


Figure 3-3. Equipment Identification Label and FCO Log Placement for Memory Expansion Options

## Installing ROM/EROM Expansion Option

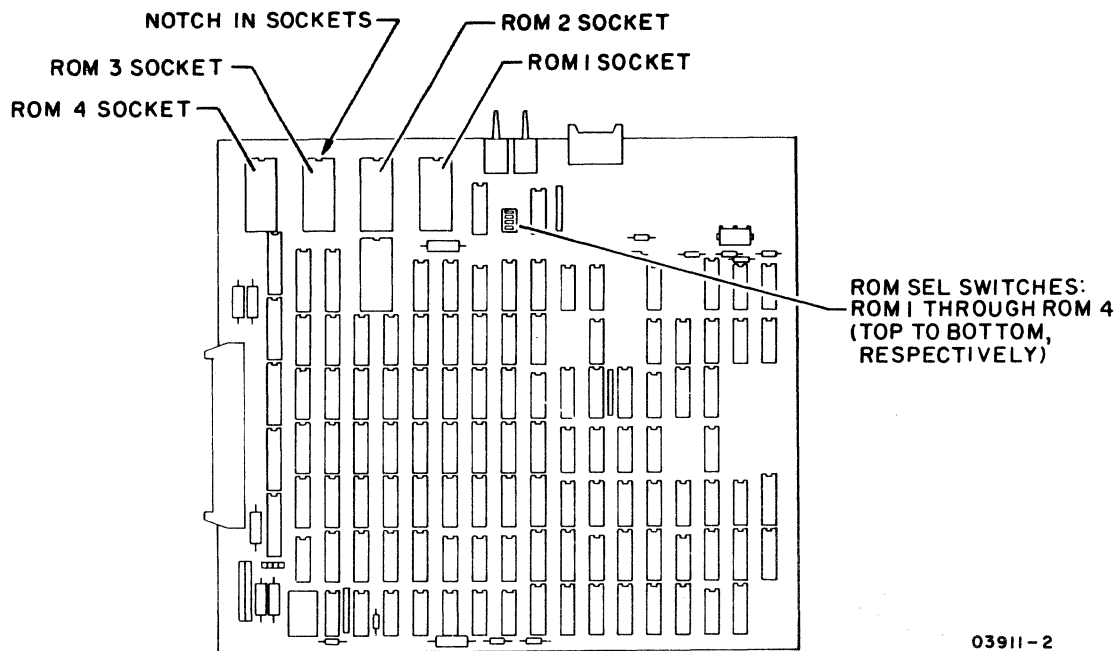
The ROM/EROM expansion consists of from one to four 24-pin MOS type integrated-circuit chips that plug into existing sockets on the terminal video board. Observe the following caution when installing the chips.

### CAUTION

Follow precautionary rules for handling MOS type circuits as described in section 6.

To install the chips, refer to figure 3-4 and do the following:

1. Remove video board from terminal per procedure 6 in section 6.
2. Each ROM/EROM expansion chip is marked with a number 1 to 4 that identifies its corresponding ROM socket. Insert chips into corresponding sockets with dot or indentation at notched end of sockets.
3. Refer to decal inside hood and set ROM SEL switches on video board to reflect which ROM sockets are now occupied.
4. Reinstall video board in terminal per procedure 6.
5. Refer to identification label that was packaged with chips and enter that information on existing identification label at rear of terminal. Include part number, equipment-identification code, and serial number.
6. Install ROM/EROM expansion identification label and FCO log in area shown in figure 3-3.



03911-2

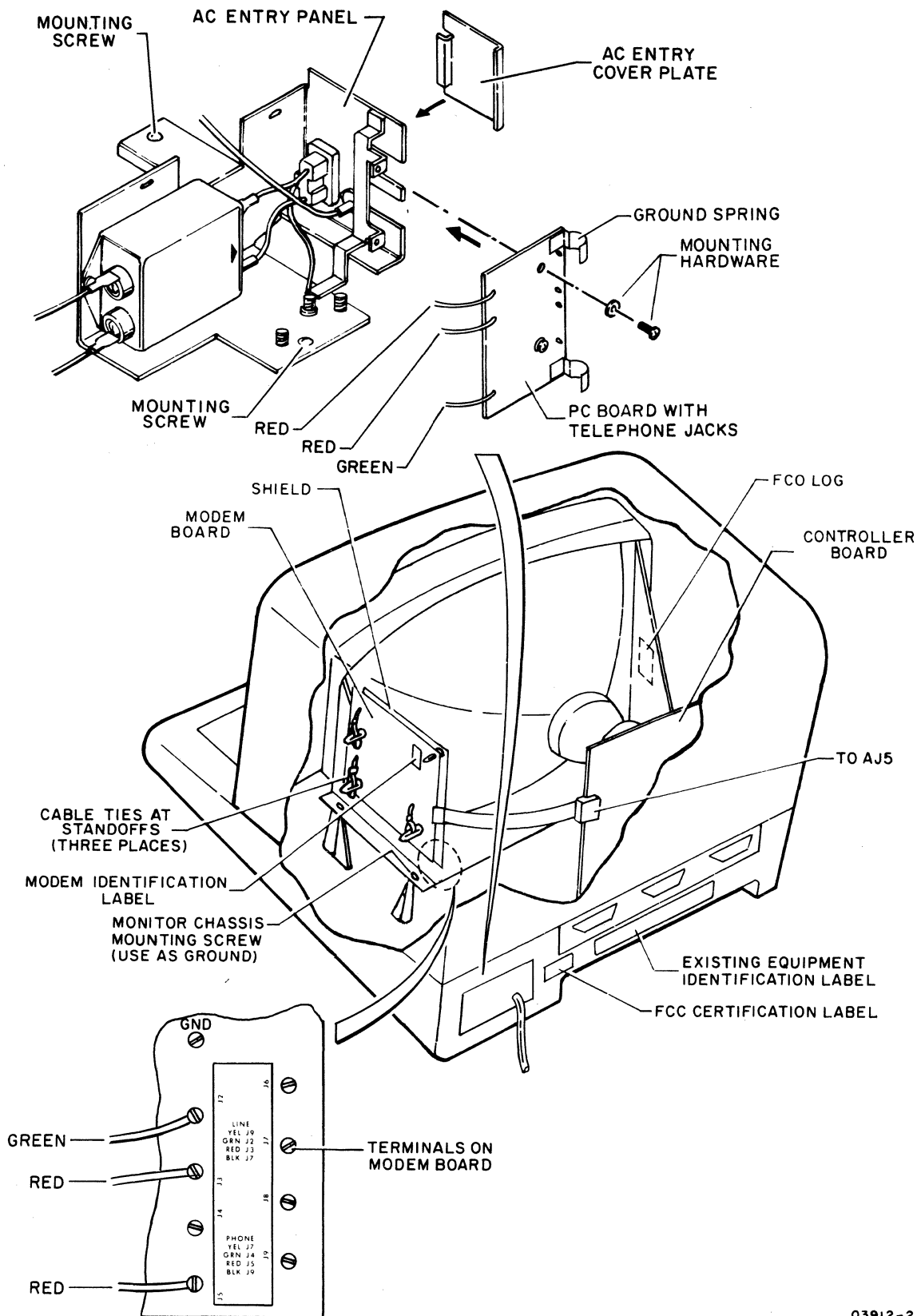
Figure 3-4. Video Board Locations for ROM/EROM Expansion

#### Installing Internal Modem/DAA Option\*

The internal modem/DAA option consists of two 4.3-m (14-ft) cables (proper cable for facilities is connected later in Installing Cabling), two PC boards, and the parts necessary for installing the boards in the terminal. To install the boards, refer to figure 3-5 and do the following:

1. Remove two screws mounting ac entry panel (figure 3-5). Leave wiring connected and raise ac entry panel and tilt forward.
2. Remove ac entry cover plate from entry panel and discard cover plate.
3. Install PC board containing telephone jacks as shown in figure 3-5 and fasten to entry panel with two screws and lockwashers.

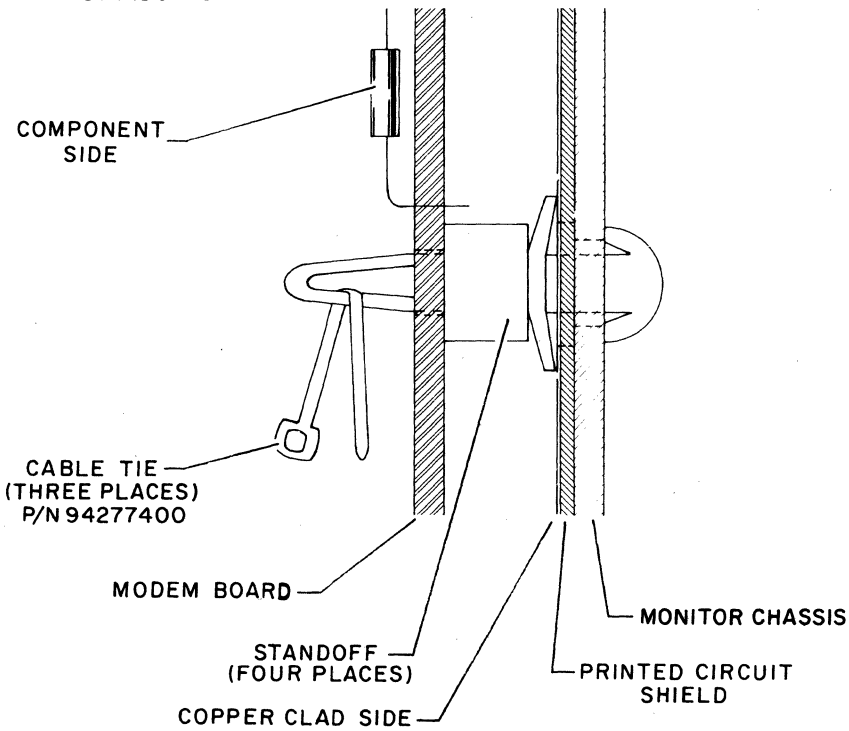
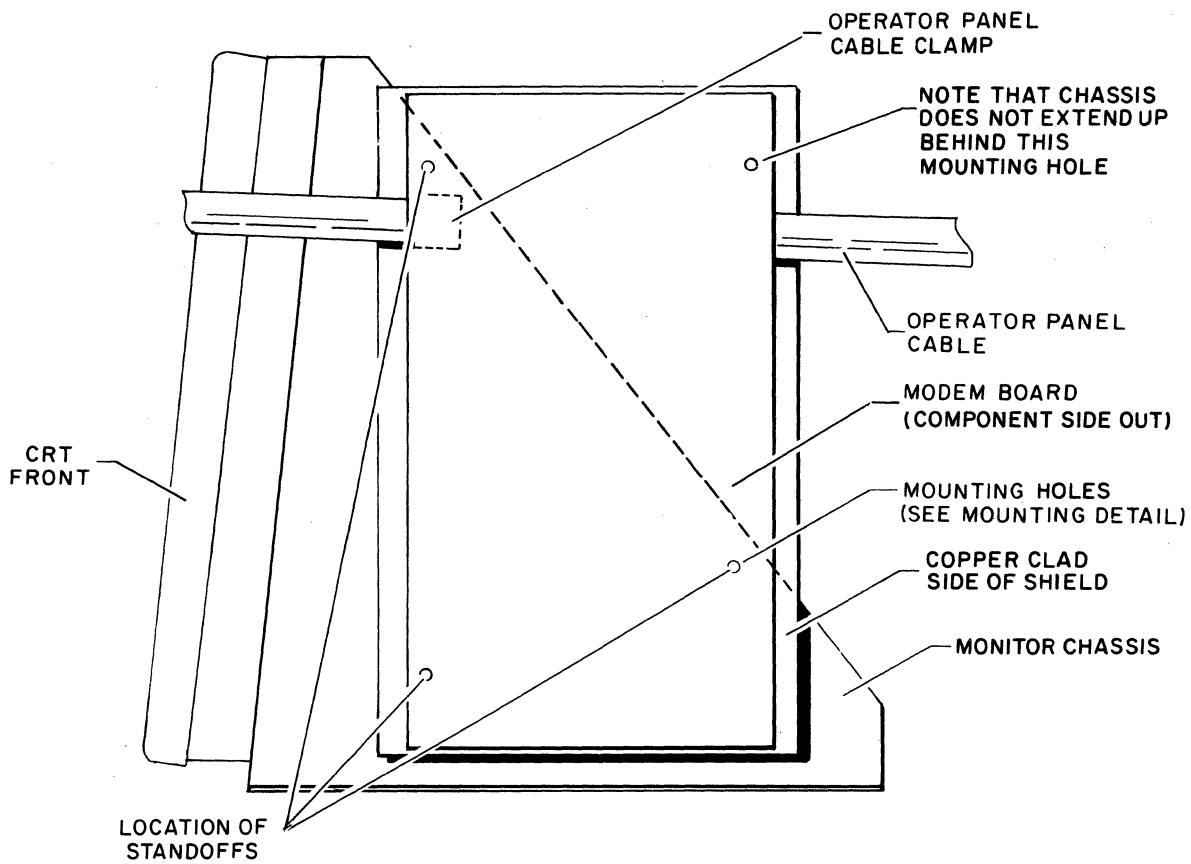
\*Internal modem is for PLATO network use only.



03912-2

Figure 3-5. Internal Modem/DAA Installation

4. Place entry panel back in position and install mounting screws, but do not tighten.
5. Slide entry panel to back of terminal so that grounding springs on newly installed PC board are firmly against hood-mounting post in base. Tighten entry panel mounting screws.
6. Remove operator panel cable clamp from monitor chassis (figure 3-6) and discard.
7. Fasten a ground wire to monitor chassis mounting screw shown in figure 3-5. (Other end will be connected later.)
8. Position shield with copper-clad side outward as shown in figure 3-6. Insert three provided standoffs and attach shield to monitor chassis.
9. Run operator panel cable along outside of shield so it will be between shield and modem board after board is installed.
10. Insert fourth provided standoff through upper-right corner of modem board (this is for proper spacing between shield and board).
11. Install modem board as follows:
  - a. Position board as shown in figure 3-6.
  - b. Make sure operator panel cable is between shield and board.
  - c. Align board so its three mounting holes line up with standoffs on shield.
  - d. Press board into place by pushing it over three standoffs. Fourth standoff protrudes through clearance hole in shield.
  - e. Insert cable ties (part number 94277400) through ends of three standoffs (leave cable tie off fourth standoff) and lock each cable tie. (Cable ties ensure that board stays securely attached to shield.)
  - f. Connect modem-board cable to AJ5 on controller board with red stripe on cable pointing down.
12. Fasten other end of ground wire installed in step 7 to ground (GND) terminal on modem board.
13. Refer to labeling and connect wires from telephone-jack board to J2, J3, and J5 terminals on modem board (figure 3-5).



**MODEM BOARD MOUNTING DETAIL**

03603-1

**Figure 3-6. Modem Shield and Board Installation**

14. Refer to identification label that was packaged with parts and enter that information on existing identification label at rear of terminal. Include part number, equipment-identification code, and serial number.
15. Install modem identification label, modem FCO log, and FCC (Federal Communications Commission) label in locations shown in figure 3-5.

## INSTALLING CABLING

The following paragraphs describe the cabling for the communication arrangements listed below. This is done with illustrations which show typical equipment setups. Refer to the paragraph that is appropriate for the installation, and be sure to tighten screws when connecting cables with connector retainers.

### NOTE

The CDC CN701-A Acoustic Coupler, which may be encountered in an installation, is only a coupler. Standard acoustic couplers are a combination coupler and modem.

### NOTE

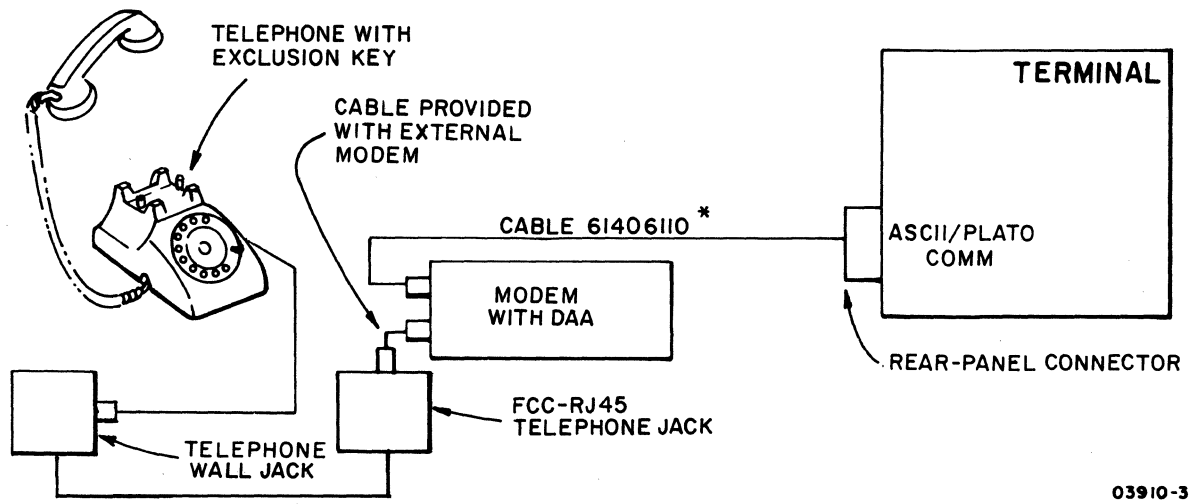
The term Dataphone used on the following pages refers to a modem and is a registered trademark of American Telephone and Telegraph.

- Communications via external modem
- Communications via internal modem
- Communications via internal/external modem
- Communications via long-line receiver/driver

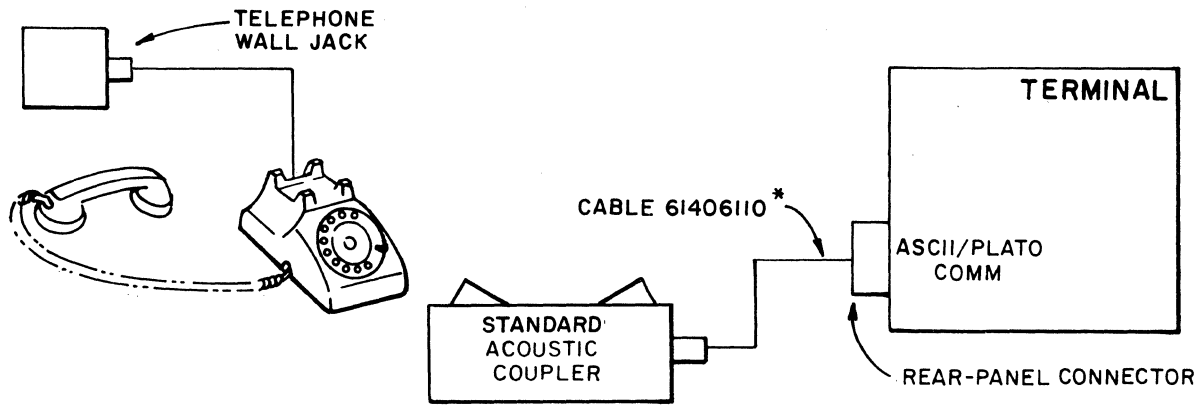
### Communications Via External Modem

To connect the terminal to an external modem, refer to figure 3-7 and make applicable connections.

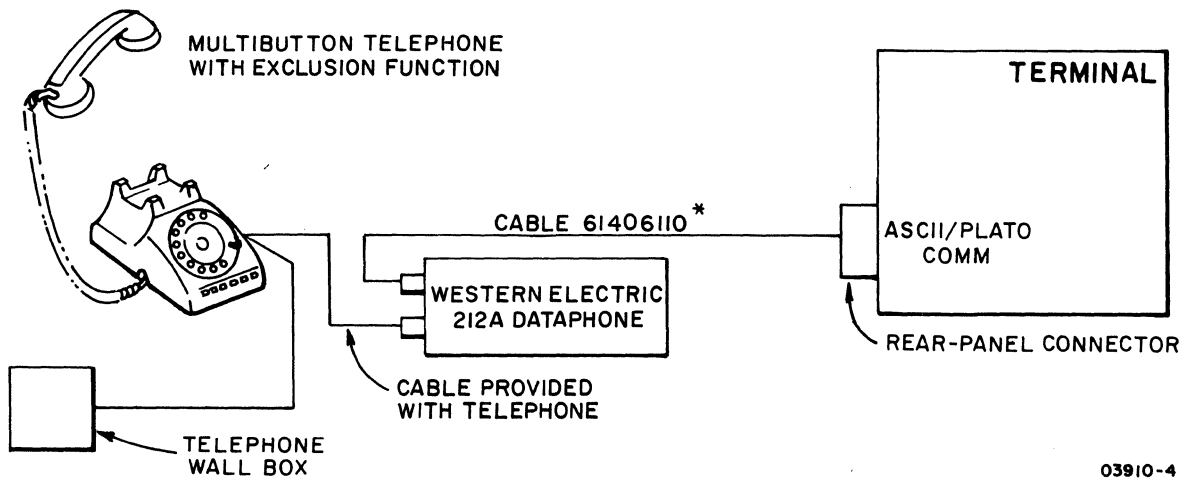




**MODEM**



**STANDARD ACOUSTIC COUPLER**



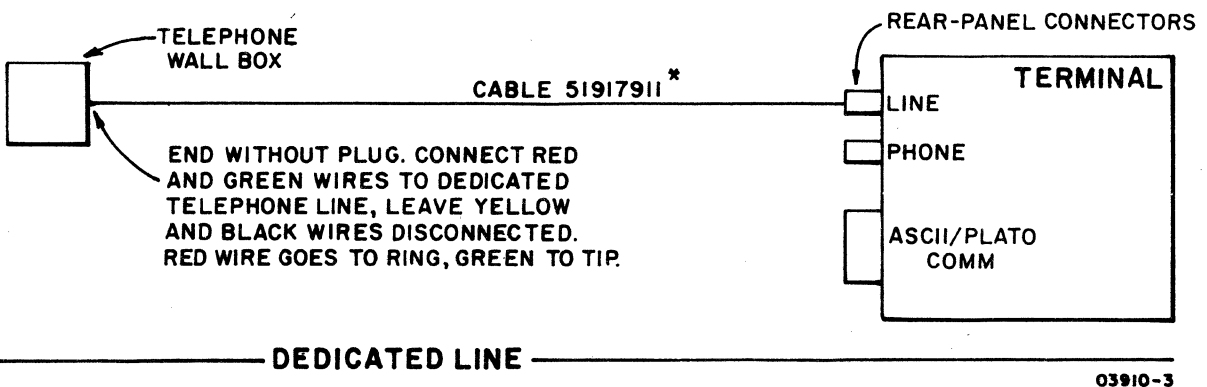
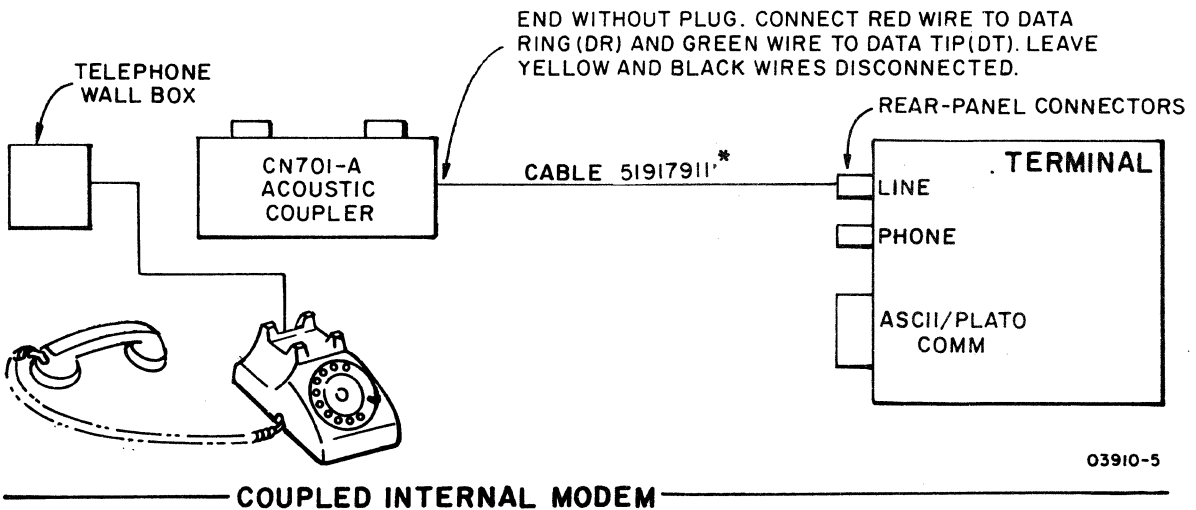
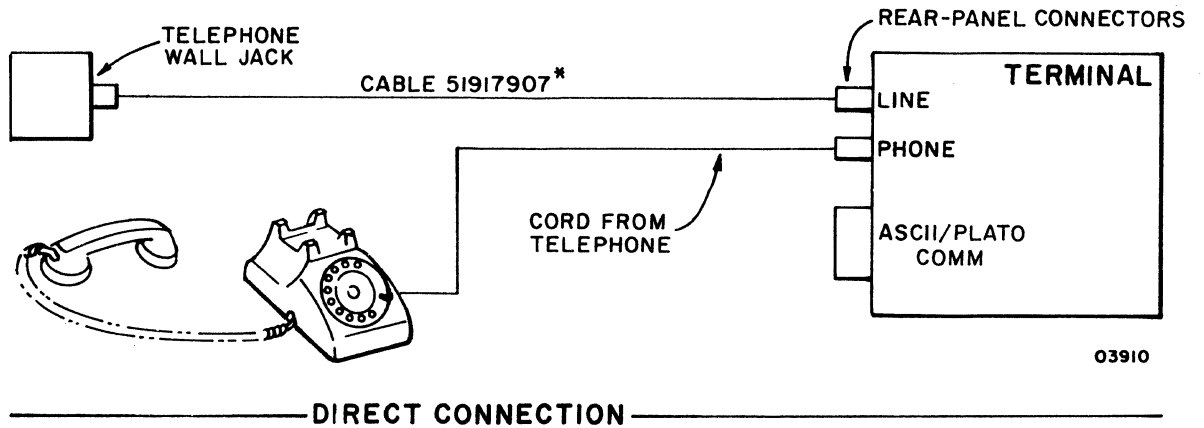
**DATAPHONE**

\* 3.2-m (10.5-ft) MODEM CABLE OR EQUIVALENT  
CABLE UP TO 15 m (50 ft) LONG

Figure 3-7. Communications Via External Modem

## Communications Via Internal Modem

To connect the internal modem to telephone facilities, refer to figure 3-8 and make connections as applicable.

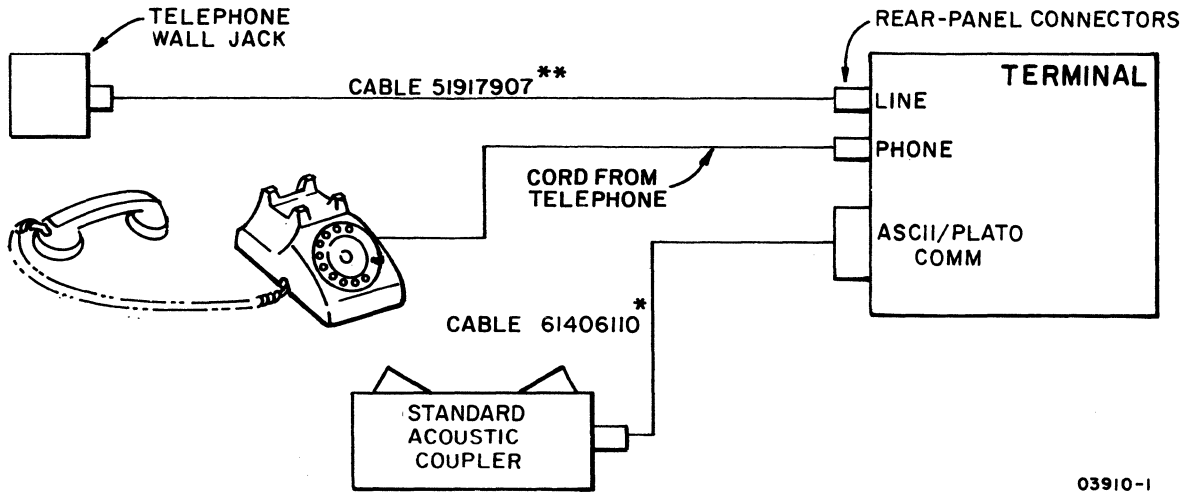


\* 4.3-m (14-ft) CABLE PROVIDED WITH INTERNAL MODEM

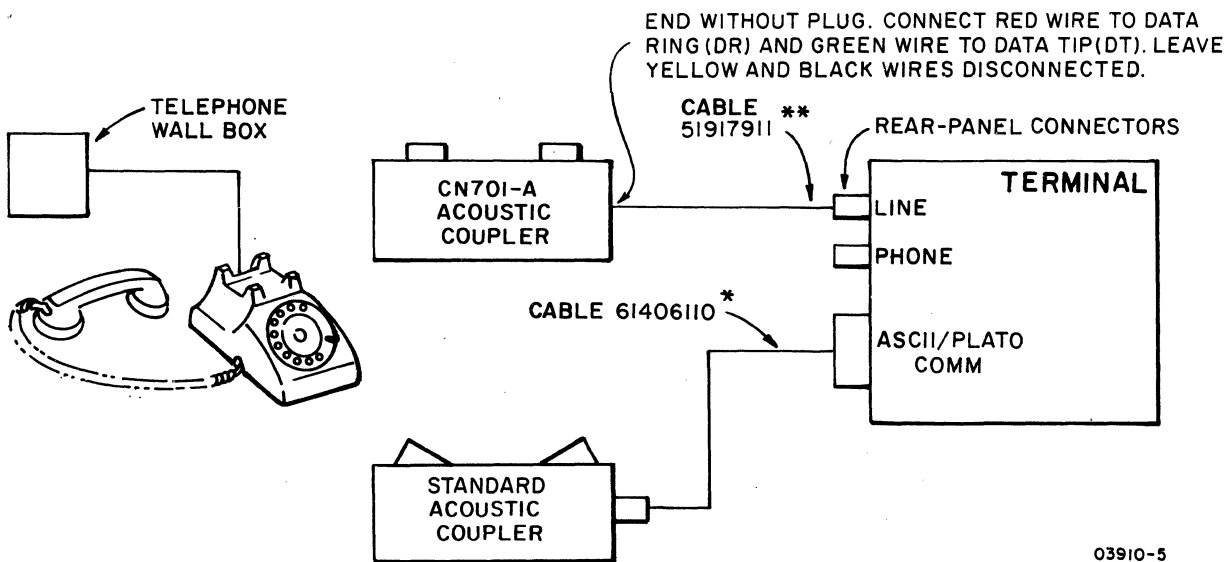
Figure 3-8. Communications Via Internal Modem

## Communications Via Internal/External Modem

This type of arrangement is for alternate network operations. When communicating with the PLATO network, the internal modem is used; when communicating with an ASCII network, the external modem is used. Refer to figure 3-9 and make connections as applicable.



**DIRECT CONNECTED INTERNAL MODEM  
AND STANDARD ACOUSTIC COUPLER**

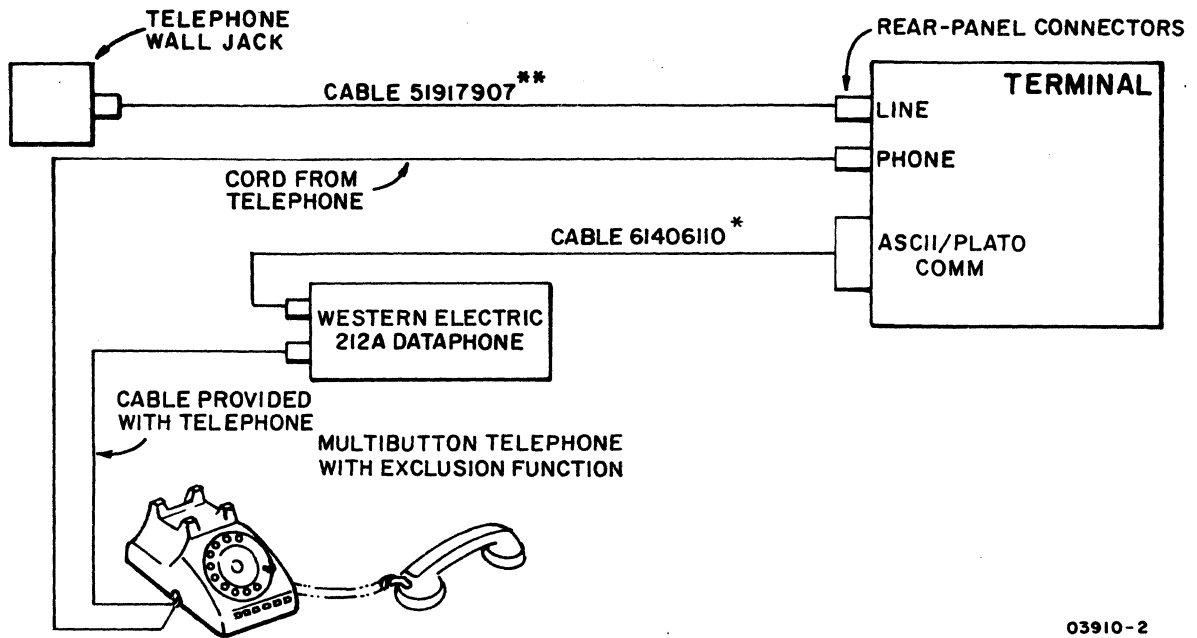


**COUPLED INTERNAL MODEM AND  
STANDARD ACOUSTIC COUPLER**

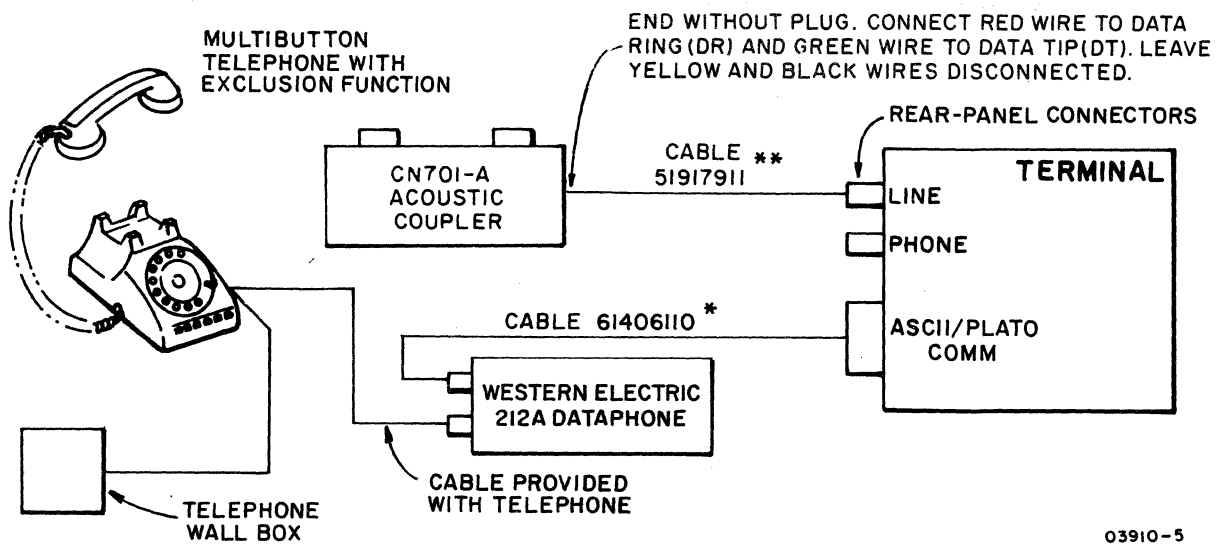
\* 3.2-m (10.5-ft) MODEM CABLE OR EQUIVALENT  
CABLE UP TO 15 m (50 ft) LONG

\*\* 4.3-m (14-ft) CABLE PROVIDED WITH INTERNAL MODEM

Figure 3-9. Communications Via Internal/External Modem  
(Sheet 1 of 2)



**DIRECT CONNECTED INTERNAL MODEM AND DATAPHONE**



**COUPLED INTERNAL MODEM AND DATAPHONE**

\* 3.2-m (10.5-ft) MODEM CABLE OR EQUIVALENT CABLE UP TO 15 m (50 ft) LONG

\*\* 4.3-m (14-ft) CABLE PROVIDED WITH INTERNAL MODEM

Figure 3-9. Communications Via Internal/External Modem (Sheet 2 of 2)

## Communications Via Long-Line Receiver/Driver

The communication arrangements that use the long-line receiver/driver are shown in figure 3-10. Connect the terminal with the cable that came with the associated equipment. If the cable has been previously used, remove any jumpers that may be installed in the connector of the cable. The effective pin assignments at the terminal with this type of communications is as follows:

### ASCII/PLATO COMM Connector

Pin	Signal
1	Protective Ground
21	Long Line Transmit
22	Long Line Transmit Return
23	Long Line Receive
24	Long Line Receive Return

### SETTING INTERNAL SWITCHES

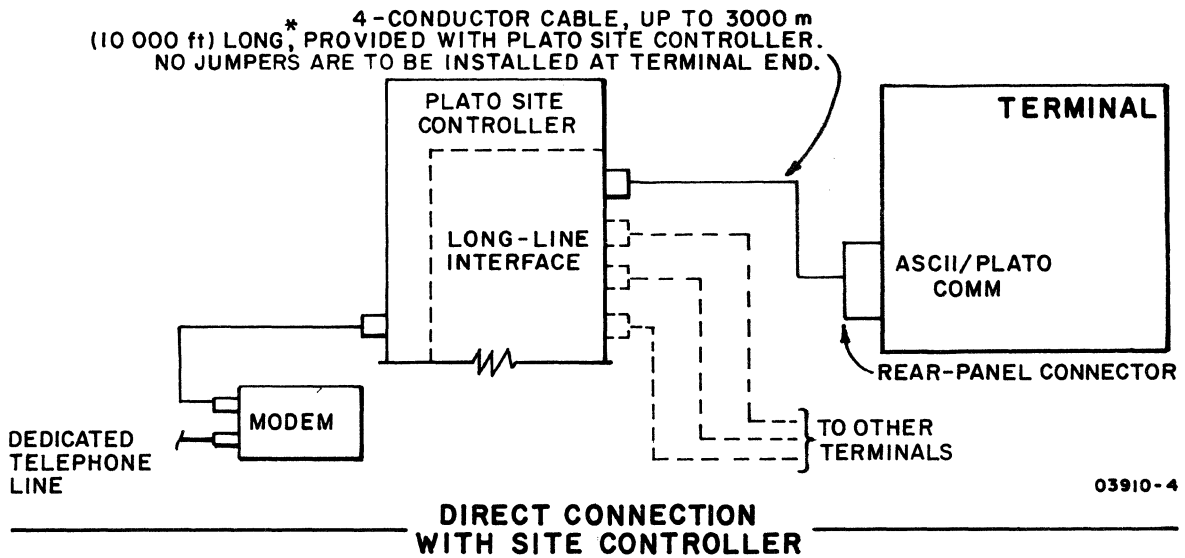
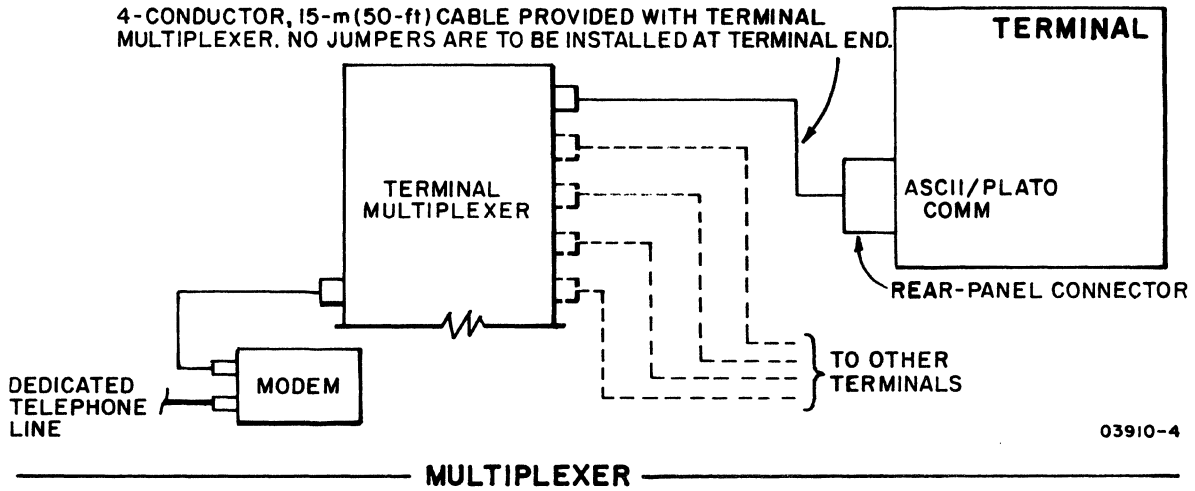
Before proceeding, obtain from the customer the requirements for the network subscription. This information gives the communication data rate and network controlware file that the internal switches are set for.

To set the switches, do the following:

#### CAUTION

Do not use a "lead" pencil to set rocker switches. Graphite dust from the pencil can cause a switch malfunction.

1. Refer to decal inside hood for switch positions and set S2 and S5 selection switches per table 3-1.



\* MAXIMUM LENGTH FOR DATA RATES NOT EXCEEDING 1200 BPS

Figure 3-10. Communications Via Long-Line Receiver/Driver

TABLE 3-1. SETTING S2 AND S5 SELECTION SWITCHES

SWITCH	PLATO NETWORK COMMUNICATIONS			ASCII NETWORK COMMUNICATIONS VIA EXTERNAL MODEM
	VIA INTERNAL MODEM	VIA EXTERNAL MODEM	VIA LONG LINE	
S2-1	Set to CONSTANT	For domestic units, set to CONSTANT. For inter- national units, setting depends on communica- tions equipment (normally SWITCHED).	Setting is irrelevant	For domestic units, set to CONSTANT. For international units, setting depends on commu- nications equipment (normally SWITCHED).
S2-2	Setting is irrelevant	Setting is irrelevant	Setting is irrelevant	Setting is irrele- vant
S2-3, -4,-5	Set accord- ing to sub- scription require- ments (nor- mally 120 bps)	Set accord- ing to sub- scription require- ments (nor- mally 1200 bps for domestic units, 75 bps for internation- al units)	Set accord- ing to sub- scription require- ments (normally 1200 bps)	Setting is irrele- vant
S2-6	Setting is irrelevant	Setting is irrelevant	Setting is irrelevant	Setting is irrele- vant
S2-7	Setting is irrelevant	If modem uses secon- dary channel for trans- mission (normal for internation- al units), set to SECONDARY; if not, set to PRIMARY	Setting is irrelevant	If modem uses secon- dary channel for transmission (normal for international units), set to SECONDARY; if not, set to PRIMARY

TABLE 3-1. SETTING S2 AND S5 SELECTION SWITCHES (CONTD)

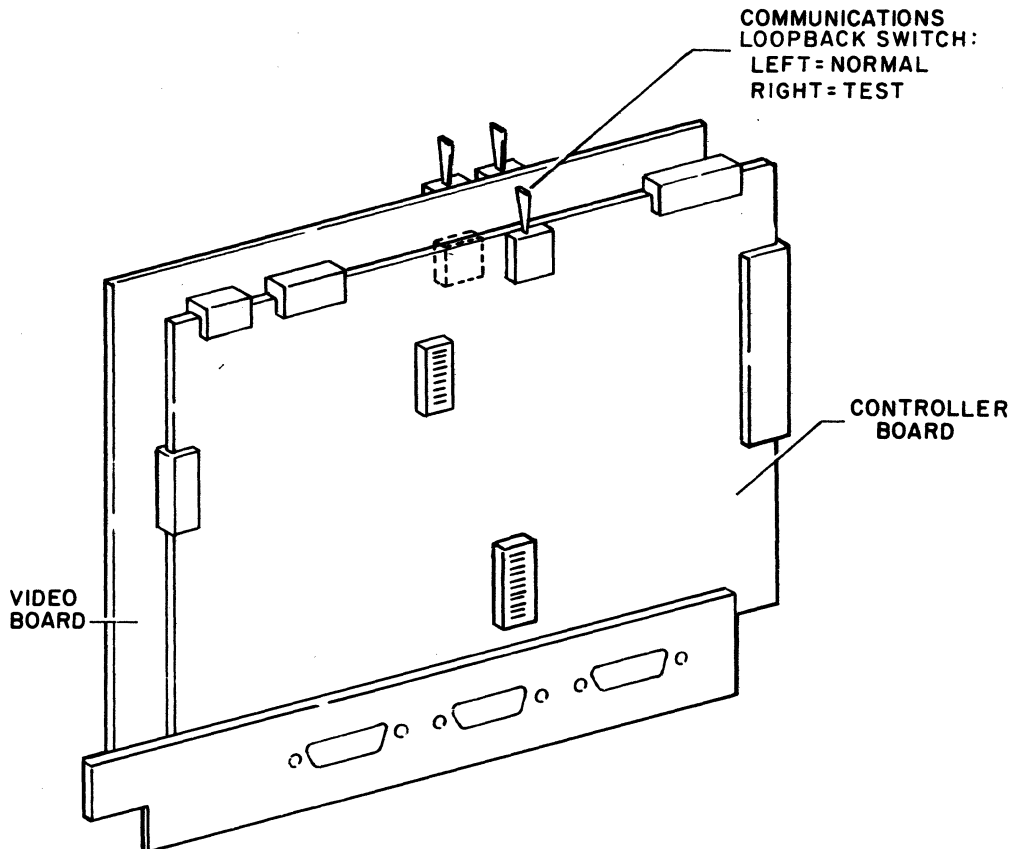
SWITCH	PLATO NETWORK COMMUNICATIONS			ASCII NETWORK COMMUNICATIONS VIA EXTERNAL MODEM
	VIA INTERNAL MODEM	VIA EXTERNAL MODEM	VIA LONG LINE	
S2-8	Set to NO	Set to NO	Set to NO	Set to NO
S2-9	Set to YES	Set to YES	Set to YES	Set to YES
S2-10	If RAM expansion has been installed, set to 32K; if not, set to 16K	If RAM expansion has been installed, set to 32K; if not, set to 16K	If RAM expansion has been installed, set to 32K; if not, set to 16K	If RAM expansion has been installed, set to 32K; if not, set to 16K
S5-1, -2	Set for file to be used in subscription. If this involves more than one, set for file that will normally be used.	Set for file to be used in subscription. If this involves more than one, set for file that will normally be used.	Set for file to be used in subscription. If this involves more than one, set for file that will normally be used.	Setting is irrelevant
S5-3, -4	Setting is irrelevant	Setting is irrelevant	Setting is irrelevant	Set for file that will be used in subscription with Data Services network. If this involves more than one, set for file that will normally be used. If not subscribed to Data Services network, setting is irrelevant.
S5-5	Setting is irrelevant	Setting is irrelevant	Setting is irrelevant	Setting is irrelevant



TABLE 3-1. SETTING S2 AND S5 SELECTION SWITCHES (CONTD)

SWITCH	PLATO NETWORK COMMUNICATIONS			ASCII NETWORK COMMUNICATIONS VIA EXTERNAL MODEM
	VIA INTERNAL MODEM	VIA EXTERNAL MODEM	VIA LONG LINE	
S5-6, -7,-8	Setting is irrelevant	Setting is irrelevant	Setting is irrelevant	Set according to subscription requirements of Data Services network. If not subscribed to Data Services network, set for requirements of applicable network.

2. If no ROM/EROM expansion option has been installed, verify that all four ROM SEL switches are set to ROM NOT PRESENT position as shown on decal inside hood.
3. Verify that Communications Loopback switch is set to NORM position (figure 3-11).



03337-1

Figure 3-11. Communications Loopback Switch

## CHECKOUT

Do the following to check out the terminal and make ready for use. If any difficulties are encountered, refer to the SAMs in section 6.

### NOTE

Apply power to terminal per next step before powering on connected peripherals

1. Connect power cord to site outlet and press ON/OFF circuit breaker to ON. Depending on random settings of switches behind protective door, this either starts an attempted controlware load or a running of resident diagnostics, and after approximately 45 seconds, a message or pattern appears on the screen.
2. Disregard message or pattern and adjust BRIGHTNESS control for proper intensity.
3. Run all resident diagnostics per procedure 2 in section 6 and check alignment pattern for acceptable display quality. If required, refer to procedure 22 for definition of an acceptable display.

### CAUTION

Do not use a "lead" pencil to set rocker switches. Graphite dust from pencil can cause a switch malfunction.

4. Refer to decal behind protective door and set the switches listed in table 3-2. The three LOAD SOURCE switches not listed in the table are set later per the applicable startup procedure mentioned in step 5.

TABLE 3-2. SETTING SELECTION SWITCHES BEHIND DOOR

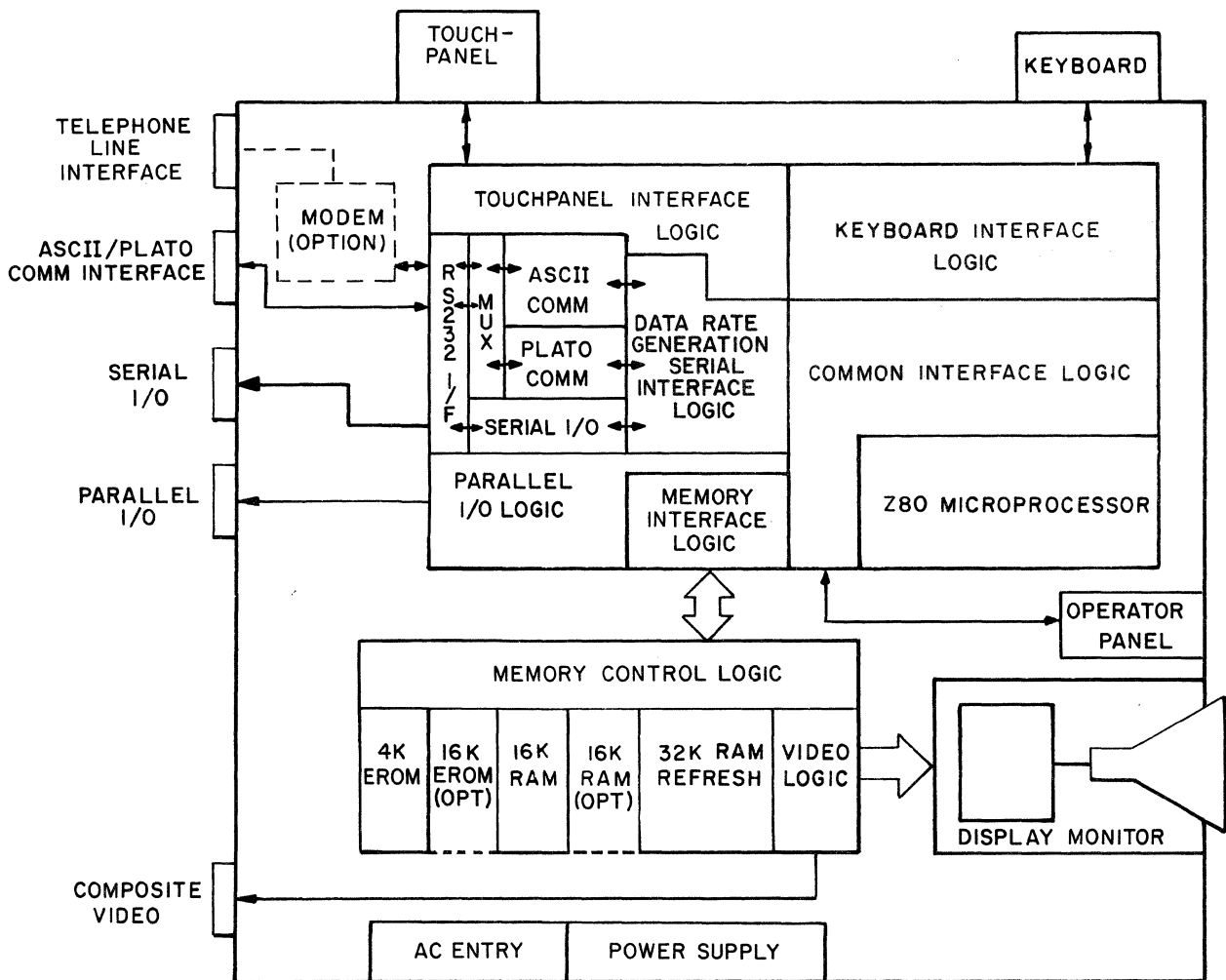
SWITCH	SUBSCRIBED NETWORK		
	PLATO	DATA SERVICES	OTHER
NETWORK PARITY NO/YES (10)	Setting is irrelevant	If timeshare or graphics mode is to be run on subscription, set to YES	If network uses parity in communications, set to YES; if not, set to NO
NETWORK ODD/EVEN (9)	Setting is irrelevant	If timeshare or graphics mode is to be run on subscription, set to EVEN	If preceding listed switch was set to YES, set this switch for type of parity used. Otherwise, setting is irrelevant
NETWORK HALF/FULL (8)	Setting is irrelevant	If timeshare or graphics mode is to be run on subscription, set to HALF	If network echoes data back, set to FULL; if not, set to HALF
Not used (7)	Setting is irrelevant	Setting is irrelevant	Setting is irrelevant
LOUD/SOFT (6)	Set for desired level of audio alarm	Set for desired level of audio alarm	Set for desired level of audio alarm
SKIP/KB&TP (5)	Setting is irrelevant - effects running of resident diagnostics during maintenance	Setting is irrelevant - effects running of resident diagnostics during maintenance	Setting is irrelevant - effects running of resident diagnostics during maintenance
SKIP/TEST (4)	Set to SKIP (disables resident diagnostics)	Set to SKIP (disables resident diagnostics)	Set to SKIP (disables resident diagnostics)

5. If site is subscribed to PLATO network or Data Services network, refer to terminal operator's guide (preface lists publication number) and do the steps that follow. If neither of these networks are subscribed to, refer to the effective user's guide manual for startup procedure and any system diagnostic that may apply.
  - a. Follow startup procedure in operator's guide and load controlware for PLATO mode from host computer.
  - b. Refer to troubleshooting portion of operator's guide and run quicklook portion of PLATO system diagnostic (DIAG).
6. Replace hood and fasten with two screws.



This section contains a functional description of the major modules of the terminal (figure 4-1). This includes the:

- Controller board
- Video board
- Optional modem/DAA board (PLATO network use only)
- Operator panel
- Touchpanel
- Keyboard
- Display monitor
- Power supply board



03333-2

Figure 4-1. Terminal Block Diagram

## CONTROLLER BOARD

This board contains a Z80A microprocessor that controls the operation of the terminal by executing program instructions. Upon a power on or reset, these instructions are provided by the resident diagnostic/loader program. This continues until controlware is successfully loaded, or if a reset occurred with controlware already loaded, until all necessary reloading is completed. The diagnostic/loader program then relinquishes control and the microprocessor executes the controlware instructions.

The other circuits on the controller board support the microprocessor by handling communications, accumulating status information, monitoring interrupt conditions, and interfacing the microprocessor with other modules. Through input/output exchanges with these circuits, the microprocessor controls:

- Read/write transfers with memory on video board
- Communications with the connected network, attached peripherals, and a serial-communication device that may be attached
- Keyboard and touchpanel entries
- Lighting of LEDs on operator panel\*
- Input of external and internal switch settings
- Input of the factory-set identification code of the terminal

The circuits on the board that handle network communications are divided in two groups, the PLATO communication circuits and the ASCII communication circuits. The group of communication circuits and interface used in network communications are established by program instructions. For example, when controlware is to be loaded from a host network, the diagnostic/loader program determines which interface and communication circuits are applicable by scanning each interface that may be connected to the network. An active Carrier Detect signal on the internal modem interface or external modem interface, or receipt of PLATO network NOP codes (21-bit blank words with only a start bit) on the long-line interface stops the scanning and selects that interface. In the case this is either the internal

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\*During resident diagnostics, the microprocessor controls all LEDs on operator panel. During other operations, it controls only the DTR and ERR LEDs, and the other four LEDs are driven by terminal/modem interchange.

modem or external modem interface, the program determines the applicable communication circuits by distinguishing if the idle codes received through the interface are PLATO network NOP codes or ASCII CR, LF, or slash (/) codes from the Data Services network.

The following paragraphs further describe the major circuits on the board: the microprocessor, PLATO communication circuits, ASCII communication circuits, serial interface circuits, and the parallel interface circuits.

## MICROPROCESSOR

The controlling microprocessor chip contains the necessary logic to decode and execute 158 different instructions. In addition, it automatically generates refresh cycles to rejuvenate the dynamic program RAM on the video board. In a refresh cycle, the microprocessor gates a count from 0 to 127<sub>10</sub> on its address bus and issues a refresh pulse which strobes that internal row in each of the RAM chips. One of these cycles occur following each op-code fetch, while the instruction is being decoded.

Timing for the microprocessor is provided by a 4MHz clock pulse from the video board, which establishes a 250 nanosecond state time (reference time for operating speed). All instructions are performed by stepping through a specific series of operations applicable to a given instruction. Each operation, such as an op-code fetch or an instructed input/output, takes from three to six state times, and when required, additional state times are inserted to synchronize the microprocessor with the slower circuit or device. The additional state times (termed wait states) are initiated by associated circuits, and each wait state delays execution time and RAM refresh cycles accordingly.

The fetching of instructions and the input/output involved in their execution is done over an 8-bit bidirectional data bus. The memory origin/destination or purpose of each data-bus exchange is dictated by the output that the microprocessor places on its 16-bit address bus. In addition, the microprocessor issues accompanying control signals that specify the direction of the exchange and whether memory or other type circuit is being addressed.

The next paragraphs describe the read/write transfers and input/output functions that are done via this interchange.



## Read/Write Memory Transfers

The read/write memory transfers performed by the microprocessor include instruction fetching and instructed reads and writes.

### Instruction Fetching

The microprocessor automatically fetches (reads) a new instruction from memory on the video board after executing the previous one. In portions of a program having no jump instructions, op-code fetches occur from sequential address locations.

The address range dedicated exclusively for program storage is from 0000 to 7FFF<sub>16</sub>. Between 0000 to 0FFF<sub>16</sub> and 4000 to 7FFF<sub>16</sub> address assignments are shared by both ROM and RAM (4000 to 7FFF<sub>16</sub> applies to memory expansion options). To handle this overlap, a ROM/RAM selection exists which works as follows:

- A power on or reset automatically selects ROM and causes the microprocessor to do an op-code fetch from address 0000<sub>16</sub>. This leads the microprocessor into the resident diagnostic/loader program contained in addresses 0000 through 0FFF<sub>16</sub> of ROM.
- When the resident program has control, momentary deselection of ROM to do a read with RAM is accomplished via an instruction sequence that uses a ROM read-through function. This function is described later in output 05<sub>16</sub> under Input/Output Functions.
- When the resident program relinquishes control to the controlware loaded in RAM, an instruction selecting RAM is made via output 00<sub>16</sub> as described under Input/Output Functions.

Each op-code fetch from either ROM or RAM requires one wait state.

### Instructed Reads and Writes

When doing a memory read/write, the microprocessor reads/writes from/to the memory address that is specified in the instruction being executed. With a memory write, the executed instruction also specifies the information that is written.

When a read or write is done in the display memory, from one to six wait states occur during the operation. This results because access to that memory is shared with the display refresh circuits on the video board.

## Input/Output Functions

The instructed input/output exchanges of the microprocessor control all operations of the terminal except the refresh of displayed data. These exchanges transfer data, control, and status information over the data bus. The purpose of each exchange is identified by the code on the address bus and the specified direction in which the exchange is to occur.

Table 4-1 lists the input/output functions and the following paragraphs describe the functions in numerical order.

TABLE 4-1 INPUT/OUTPUT FUNCTIONS

ADDRESS BUS								HEX CODE*	I/O	FUNCTION
7	6	5	4	3	2	1	0			
X	X	0	0	0	0	0	0	00	I	Read maintenance and load switches
X	X	0	0	0	0	0	0	00	O	Load maintenance register
X	X	0	0	0	0	0	1	01	I	Read keyboard data
X	X	0	0	0	0	0	1	01	O	Load PLATO transmitter lower bits
X	X	0	0	0	0	1	0	02	I	Read touchpanel data
X	X	0	0	0	0	1	0	02	O	Load PLATO transmitter upper bits
X	X	0	0	0	0	1	1	03	I	Read lower ID
X	X	0	0	0	0	1	1	03	O	Bulk write/erase and video enable/disable
X	X	0	0	0	1	0	0	04	I	Read upper ID
X	X	0	0	0	1	0	0	04	O	Load interrupt mask
X	X	0	0	0	1	0	1	05	I	Read internal switches
X	X	0	0	0	1	0	1	05	O	Miscellaneous control
X	X	0	0	0	1	1	0	06	I	Read communication switches and status
X	X	0	0	0	1	1	0	06	O	Load ASCII communication data rates
X	X	0	0	0	1	1	1	07	I	Read controller status
X	X	0	0	0	1	1	1	07	O	Load serial I/O data rate
X	X	0	0	1	X	X	X	08	I	Read PLATO communication data
X	X	0	1	X	X	0	0	10	I	Read ASCII communication data
X	X	0	1	X	X	0	0	10	O	Load ASCII communication data
X	X	0	1	X	X	0	1	11	I	Read ASCII communication status
X	X	0	1	X	X	0	1	11	O	Load ASCII communication control
X	X	0	1	X	X	1	0	12	I	Read serial I/O data
X	X	0	1	X	X	1	0	12	O	Load serial I/O data
X	X	0	1	X	X	1	1	13	I	Read serial I/O status
X	X	0	1	X	X	1	1	13	O	Load serial I/O control
X	X	1	Y	Y	Y	Y	Y	2Y,3Y	I	Input from parallel channel
X	X	1	Y	Y	Y	Y	Y	2Y,3Y	O	Output to parallel channel

NOTES: X = Either 1 or 0      Y = External device address  
 \*The hexadecimal codes listed are obtained by making X = 0

Input 00<sub>16</sub> - Read Maintenance and Load Switches

This function inputs an 8-bit word to the microprocessor that indicates the settings of the switches listed in table 4-2.

TABLE 4-2. DATA BUS WORD FOR INPUT 00<sub>16</sub>

BIT	SWITCH	SETTING INDICATION
0	LOAD SOURCE NORM/SEL	0 = NORM, 1 = SEL
1	LOAD SOURCE INT/EXT	0 = INT, 1 = EXT
2	LOAD SOURCE HOST/LOCAL	0 = HOST, 1 = LOCAL
3	SKIP/TEST	0 = SKIP, 1 = TEST
4	SKIP/KB & TP	0 = SKIP, 1 = KB & TP
5	Internal S2-10 (Bytes of Program Memory)	0 = 16K, 1 = 32K
6	Internal S2-9 (Touchpanel Present)	0 = NO, 1 = YES
7	Internal S2-8 (Loop on Diagnostic Tests)	0 = NO, 1 = YES

Output 00<sub>16</sub> - Load Maintenance Register

This function loads the 8-bit output of the microprocessor into a holding register. Table 4-3 defines the meaning of the bits.

TABLE 4-3. DATA BUS WORD FOR OUTPUT  $00_{16}$

BIT	MEANING
0	This bit drives ERR (Error) LED on operator panel. Loading a 0 lights the LED. During a power on or reset, the bit is a 0.
1	During resident diagnostics, this bit drives XMT (Transmit Data) LED on operator panel. Loading a 0 lights the LED. During other operations, the LED is driven by the respective terminal/modem interface signal. During a power on or reset, the bit is a 0.
2	Same operation as bit 1, but drives RCV (Receive Data) LED.
3	Same operation as bit 1, but drives RTS (Request to Send) LED.
4	Same operation as bit 1, but drives DSR (Data Set Ready) LED.
5	Same operation as bit 0, but drives DTR (Data Terminal Ready) LED.
6	This bit controls the diagnostic features of the terminal. Loading a 0 conditions the terminal for resident diagnostics. During a power on or reset, the bit is a 0.
7	This bit signifies the type memory selected by the program. Loading a 0 selects ROM; loading a 1 selects RAM. During a power on or reset, the bit is a 0.

Input  $01_{16}$  - Read Keyboard Data

Input  $01_{16}$  transfers 8 bits of data from the keyboard interface to the microprocessor. This data is only valid when a keyboard data-ready status/interrupt is present.

### Output 01<sub>16</sub> - Load PLATO Transmitter Lower Bits

Output 01<sub>16</sub> loads 5 bits of data from the microprocessor in a 13-bit shift register that serializes data to be sent to the PLATO network. These bits are the parity bit (always even) and the 4 least significant bits of the word. The other part of the word is transferred via output 02<sub>16</sub>, and no transmission occurs until those upper bits are loaded.

Output 01<sub>16</sub> and output 02<sub>16</sub> are only performed when the PLATO transmitter is inactive, that is, a PLATO communications-request status/interrupt is present.

### Input 02<sub>16</sub> - Read Touchpanel Data

Input 02<sub>16</sub> transfers a word from the touchpanel interface to the microprocessor. The format of this word is shown in figure 4-2. The word gives the X/Y coordinates where the touch occurred on the touchpanel. Each coordinate may range from 0000<sub>2</sub> to 1111<sub>2</sub> (F<sub>16</sub>). The X columns sequentially run from 0 to F<sub>16</sub>, left to right. The Y rows sequentially run from 0 to F<sub>16</sub>, bottom to top.

This data is only valid when a touchpanel data-ready status/interrupt is present.

### Output 02<sub>16</sub> - Load PLATO Transmitter Upper Bits

Output 02<sub>16</sub> loads 6 bits of data from the microprocessor in the PLATO transmit register. These bits are the 6 most significant bits of the word to be transmitted. Their loading initiates transmission and drops the PLATO communications-request status/interrupt.

DATA BIT	7	6	5	4	3	2	1	0
TOUCH PANEL DATA	X8	X4	X2	X1	Y8	Y4	Y2	Y1
	X COLUMN				Y ROW			

Figure 4-2. Data Bus Word for Input 02<sub>16</sub>

Input 03<sub>16</sub> - Read Lower ID

This function transfers the setting of the lower 8 bits of the ID shunts to the microprocessor. These 16 shunts on the controller board are factory set to a unique code (and sealed) for each terminal.

Output 03<sub>16</sub> - Bulk Write/Erase and Video Enable/Disable

The operation of this function is dependent on data bits 0, 1, and 2 as summarized in table 4-4. Data bits 2 through 7 are ignored during this function.

TABLE 4-4. BULK WRITE/ERASE AND VIDEO ENABLE/DISABLE FUNCTION

DATA BITS			OPERATION
2	1	0	
0	0	X	Disable video
0	1	X	Enable video
1	0	0	Bulk erase and disable video
1	0	1	Bulk write and disable video
1	1	0	Bulk erase and enable video
1	1	1	Bulk write and enable video

X = Either 1 or 0

This function with data bits 1 and 2 both a 0 places the terminal in a nondisplay mode without affecting display memory contents. In this mode, the video signal to the monitor and to the VIDEO OUT interface is forced to the blanking state. The intended use of this mode is to allow the display memory to be used for extended program memory.

This function with data bit 2 a 0 and data bit 1 a 1 reenables video to the monitor and to the VIDEO OUT interface (if previously disabled) without affecting display memory contents.

This function with data bit 2 a 1 initiates a hardware write or erase of the complete display memory. The state of data bit 0 determines whether all 1s are written, giving a completely illuminated display (when video is not disabled), or all 0s are written, giving a completely black display. Following completion of the bulk write/erase operation, the state of data bit 1 determines whether video is disabled or enabled.

Input 04<sub>16</sub> - Read Upper ID

This function does the same operation as input 03<sub>16</sub> except the upper 8 bits are transferred.

Output 04<sub>16</sub> - Load Interrupt Mask

Output 04<sub>16</sub> loads the 8 bits from the microprocessor into the interrupt mask register. Each of these eight bits is associated with one of the interrupt conditions monitored by the mask register. If the associated bit in the mask register is a 1, the incoming interrupt is allowed to pass and reach the microprocessor, otherwise it is blocked.

Each interrupt reaching the microprocessor generates an interrupt vector defining its level (interrupt trap address). If more than one interrupt level is active at the same time, all except the one having the highest priority is blocked. Table 4-5 lists the priorities, sources, data bit assignments, and vectors of the interrupt conditions handled by the register.

TABLE 4-5. MASKED INTERRUPT CONDITIONS

PRIORITY*	SOURCE	INTERRUPT MASK (DATA BIT)	INTERRUPT VECTOR (HEXADECIMAL CODE)
0 (Highest)	PLATO comm-ready status**	7	00
1	PLATO comm-request status**	4	02
2	Keyboard data-ready status**	6	04
3	Touchpanel data-ready status**	5	06
4	I/O timeout status**	0	08

TABLE 4-5. MASKED INTERRUPT CONDITIONS (CONTD)

PRIORITY*	SOURCE	INTERRUPT MASK (DATA BIT)	INTERRUPT VECTOR (HEXADECIMAL CODE)
5	Short interval - provides an interrupt every 833 microseconds when not masked	1	0A
6	External interrupt - peripheral connected to PARALLEL interface has data to exchange	3	0C
7 (Lowest)	Long interval - provides an interrupt every 17.5 ms when not masked	2	0E

\*Interrupts from a Z80A-SIO/2 communications controller chip on controller board have higher priority than those listed. The communications controller chip handles both ASCII and SERIAL interface communications.

\*\*Status conditions are described later under input 07<sub>16</sub>.

Input 05<sub>16</sub> - Read Internal Switches

This function inputs an 8-bit word to the microprocessor that indicates the settings of the S5-1 through S5-8 switches on the controller board (figure 4-2.1). The setting of S5-1 is indicated by data bit 0, S5-2 by data bit 1, S5-3 by data bit 2, etc. The state of the bits indicate switch positions, with 0 indicating an ON position and 1 indicating an OFF position. The state of bit 4 representing S5-5 has no significance.

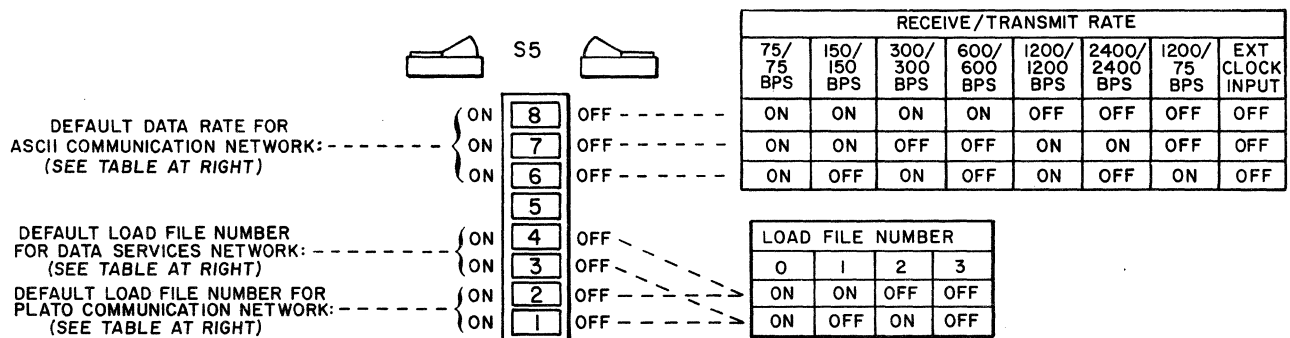


Figure 4-2.1 Significance of S5 Switches

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Output 05<sub>16</sub> - Miscellaneous Control

Output 05<sub>16</sub> loads the output from the microprocessor into a control register. This output implements the features listed in table 4-6 that are further explained in the following paragraphs.

TABLE 4-6. DATA BUS WORD FOR OUTPUT 05<sub>16</sub>

DATA BIT	CONTROL DESCRIPTION
0	1 = Sound alarm, 0 = do not sound alarm
1	1 = Reset I/O timeout status/interrupt, 0 = do not reset
2	1 = Set hardware flag, 0 = clear hardware flag
3	1 = Select PLATO communication circuits, 0 = do not select
4	1 = Select ASCII communication circuits, 0 = do not select
5	1 = Select internal modem interface, 0 = do not select
6	1 = Select external modem interface, 0 = do not select
7	1 = Select ROM read-through, 0 = do not select

Data Bit 0 (Alarm) - The output function with bit 0 set to 1 triggers a 80-ms audible tone. If bit 0 is not set, the alarm does not sound. The alarm timer is retriggerable and a repeat of the output function will keep the alarm sounding.

Data Bit 1 (I/O Timeout) - This bit controls the resetting of I/O timeout status and interrupt. A 1 resets the status and interrupt, and a 0 leaves the status and interrupt unchanged.

Data Bit 2 (Hardware Flag) - This bit controls the state of a flip-flop which is read by the microprocessor through an input 07<sub>16</sub> function. A 1 sets the flip-flop and a 0 clears it. This flip-flop automatically sets upon a power on and is not affected by the RESET switch. Since these two conditions force the microprocessor to start executing at address 0000, this flip-flop can inform the microprocessor which condition actually occurred.

Data Bit 3 (PLATO Circuits) and Data Bit 4 (ASCII Circuits) - These bits designate which set of communication circuits are used in network communications. Both bits cannot be set simultaneously or selection will be indeterminate. Bit 3 set to 1 selects the PLATO circuits, which automatically occurs upon a power on. Bit 4 set to 1 selects the ASCII circuits. The selection made is not affected by the RESET switch.

Data Bit 5 (Internal Modem) and Data Bit 6 (External Modem) - When RS-232-C/CCITT V.24/V.28 signals are selected for network communications (determined by output 07<sub>16</sub>), these bits designate the modem interface that is used. Both bits cannot be set simultaneously or selection will be indeterminate. Bit 5 set to 1 selects the internal modem interface, which automatically occurs upon a power on. Bit 6 set to 1 selects the external modem interface. The selection made is not affected by the RESET switch.

Data Bit 7 (ROM Read-Through) - This bit set to 1 causes the memory accesses between the end of the next op-code fetch and the beginning of the following op-code fetch to be from RAM even though the program being executed is in ROM. The function automatically terminates on the second fetch following the output 05<sub>16</sub> which initiated it.

Input 06<sub>16</sub> - Read Communication Switches and Status

This function inputs an 8-bit word that indicates the settings of seven switches and the status of the Data Set Ready signal of the SERIAL interface. Table 4-7 defines the word.

TABLE 4-7. DATA BUS WORD FOR INPUT 06<sub>16</sub>

BIT	SWITCH	SETTING INDICATION OR MEANING
0	Unused switch 7 on operator panel	None
1	NETWORK HALF/FULL	0 = HALF, 1 = FULL
2	Internal S2-1 (ASCII/PLATO Communications DTR)	0 = SWITCHED, 1 = CONSTANT
3	TALK/DATA	0 = TALK, 1 = DATA
4	NETWORK PARITY ODD/EVEN	0 = ODD, 1 = EVEN
5	NETWORK PARITY NO/YES	0 = NO, 1 = YES
6	Internal S2-6	None
7	-	Indicates whether Data Set Ready signal is present on SERIAL interface. 0 = not present, 1 = present

Output 06<sub>16</sub> - Load ASCII Communication Data Rates

This output, in conjunction with output 11<sub>16</sub>, establishes the receive and transmit rates used by the Z80A-SIO/2 communications controller chip for ASCII network communications. These communications are conducted through channel A of the chip. Table 4-8 lists the receive rate selection and table 4-9 lists the transmit rate selection. Data bits 0 and 1 of the output are not used. The divide-by factor that the Z80A-SIO/2 chip uses on channel A is controlled through output 11<sub>16</sub>. Unless reselected by controlware, the resultant rates match the selection made by internal switches S5-6, -7, and -8.

TABLE 4-8. ASCII RECEIVE DATA RATE SELECTION

DATA BITS			RECEIVE DATA RATE (BPS) WHEN Z80A-SIO/2 CLOCK MODE IS:		
7	6	5	DIVIDE BY 16	DIVIDE BY 32	DIVIDE BY 64
1	1	0	19 200	9 600	4 800
1	0	1	9 600	4 800	2 400
1	0	0	4 800	2 400	1 200
0	1	1	2 400	1 200	600
0	1	0	1 200	600	300
0	0	1	600	300	150
0	0	0	300	150	75
1	1	1	<u>EXT RCV CLK*</u> 16	<u>EXT RCV CLK*</u> 32	<u>EXT RCV CLK*</u> 64

\*External receive clock must be input to ASCII/  
PLATO COMM connector (RJ1-17) using an RS-232-C  
compatible signal.

Note: The Z80A-SIO/2 communications controller may  
also be operated in a divide-by-1 mode with  
an external receive clock providing the  
external clock and receive data are bit  
synchronized.

TABLE 4-9. ASCII TRANSMIT DATA RATE SELECTION

DATA BITS			TRANSMIT DATA RATES (BPS)		
			WHEN		
			Z80A-SIO/2 CLOCK MODE IS:		
4	3	2	DIVIDE BY 16	DIVIDE BY 32	DIVIDE BY 64
1	1	0	19 200	9 600	4 800
1	0	1	9 600	4 800	2 400
1	0	0	4 800	2 400	1 200
0	1	1	2 400	1 200	600
0	1	0	1 200	600	300
0	0	1	600	300	150
0	0	0	300	150	75
1	1	1	<u>EXT XMT CLK*</u> 16	<u>EXT XMT CLK*</u> 32	<u>EXT XMT CLK*</u> 64

\*External transmit clock must be input to ASCII/  
PLATO COMM connector (RJ1-15) using an RS-232-C  
compatible signal.

Note: The Z80A-SIO/2 communications controller may  
also be operated in a divide-by-1 mode with  
an external transmit clock.

Input 07<sub>16</sub> - Read Controller Status

Input 07<sub>16</sub> transfers status information from different inter-  
faces to the microprocessor. Table 4-10 defines this word.

TABLE 4-10. DATA BUS WORD FOR INPUT 07<sub>16</sub>

BIT	MEANING
0	PLATO communication-ready status - when set to 1, indicates that PLATO receiver has clocked in 7 bits of serial data and is ready to transfer them to microprocessor.
1	Hardware flag - indicates state of hardware flag flip-flop which sets upon power on and is controlled by microprocessor through output 05 <sub>16</sub> .
2	PLATO communication-request status - when set to 1, indicates that PLATO transmitter is inactive and can accept data to transmit.
3	Keyboard data-ready status - this bit set indicates that keyboard interface detected a key depression and is holding the code to transfer to microprocessor.
4	Touchpanel data-ready status - when set to 1, indicates that touchpanel interface has detected a touch and is holding X/Y-coordinate data.
5	I/O timeout status - this bit set indicates that an I/O exchange with an external device on PARALLEL interface was not completed in the allotted time (54 microseconds <u>+20%</u> ).
6	RESET switch - this bit is a 0 while RESET switch is pressed.
7	Bulk busy - during a bulk write/erase operation, this bit goes to a 1.

Output 07<sub>16</sub> - Load Serial I/O Data Rate

Output 07<sub>16</sub> does the following:

- The state of data bit 0 determines which type of interface signals are used in network communications. With the bit set to 1, long-line signals are selected, and with the bit a 0, RS-232-C/CCITT V.24/V.28 signals are selected.
- Data bits 1, 2, 3, and 4 are not used.

- Data bits 5, 6, and 7, in conjunction with output 13<sub>16</sub>, establishes the receive/transmit rate that the Z80A-SIO/2 chip uses for SERIAL interface communications. These communications are conducted through channel B of the chip. The divide-by-factor used on channel B is controlled through output 13<sub>16</sub>. Table 4-11 lists the rate selection.

TABLE 4-11. SERIAL INTERFACE DATA RATE SELECTION

DATA BITS			TRANSMIT DATA RATES (BPS) AND Z80A-SIO/2 CLOCK MODE		
4	3	2	DIVIDE BY 16	DIVIDE BY 32	DIVIDE BY 64
1	1	1	19 200	9 600	4 800
1	1	0	9 600	4 800	2 400
1	0	1	4 800	2 400	1 200
1	0	0	2 400	1 200	600
0	1	1	1 200	600	300
0	1	0	600	300	150
0	0	1	300	150	75
0	0	0	150	75	37.5

Input 08<sub>16</sub> - Read PLATO Communication Data

Input 08<sub>16</sub> transfers data from the PLATO receiver to the microprocessor. This data is only valid when a PLATO communication-ready status/interrupt is present. Three of these transfers are required to input the entire 21-bit word received from the PLATO network. The format of the transfer is described later under PLATO Communication Circuits.

Input 10<sub>16</sub> - Read ASCII Communication Data

This function inputs data received from the ASCII network. The ASCII receiver is in channel A of the Z80-SIO/2 chip.

#### Output 10<sub>16</sub> - Load ASCII Communication Data

Output 10<sub>16</sub> loads 8 bits of data from the microprocessor in a buffer register for transmission to the ASCII network. This register and the register that serializes the transmit data are in channel A of the Z80-SIO/2 chip.

#### Input 11<sub>16</sub> - Read ASCII Communication Status

Input 11<sub>16</sub> transfers 8 bits of status from channel A of the Z80-SIO/2 chip to the microprocessor. There are two registers in channel A that indicate the status of ASCII communications, status register 0 and status register 1. Each is separately accessed by an output 11<sub>16</sub> with data bits 2, 1, and 0 set to 000<sub>2</sub> or 001<sub>2</sub> respectively, followed by an input 11<sub>16</sub>.

#### Output 11<sub>16</sub> - Load ASCII Communication Control

This function loads 8 bits of information into one of the seven control registers in channel A of the Z80-SIO/2 chip. This is in addition to the use of output 11<sub>16</sub> with input 11<sub>16</sub> to access status registers.

The control registers of channel A are numbered 0 and 1 and 3 through 7. Except for register 0, two outputs are required to load a control register. The first output of 11<sub>16</sub> contains the binary register number in data bits 2, 1, and 0. The second output 11<sub>16</sub> transfers the control word that is to be loaded in the selected register. These control words dictate the word format and divide-by factor for channel A.

#### Input 12<sub>16</sub> - Read Serial I/O Data

Input 12<sub>16</sub> transfers the data received from the SERIAL interface. The receiver for the SERIAL interface is in channel B of the Z80-SIO/2 chip.

#### Output 12<sub>16</sub> - Load Serial I/O Data

Output 12<sub>16</sub> loads 8 bits of data into a buffer register in channel B of the Z80-SIO/2 chip for transmission on the SERIAL interface.



### Input 13<sub>16</sub> - Read Serial I/O Status

This function preceded by an output 13<sub>16</sub> accesses status from channel B of the Z80-SIO/2 the same as input 11<sub>16</sub> accesses status from channel A. Channel B, however, contains one more status register than channel A. This register is numbered status register 2.

### Output 13<sub>16</sub> - Load Serial I/O Control

This function loads control information in channel B of the Z80-SIO/2 the same as output 11<sub>16</sub> loads channel A. Channel B, however, contains eight control registers that are numbered 0 through 7.

### Input 2Y/3Y<sub>16</sub> - Input from Parallel Channel

This input function is denoted by address bus bit 5 being set to 1. The function transfers information from a peripheral device to the microprocessor via the PARALLEL interface. This exchange is described later under Parallel Interface Circuits.

### Output 2Y/3Y<sub>16</sub> - Output to Parallel Channel

This function results in an exchange like input 2Y/3Y<sub>16</sub>, but in the opposite direction.

## PLATO COMMUNICATION CIRCUITS

The following paragraphs describe the PLATO receiver and PLATO transmitter.

### PLATO Receiver

The PLATO receiver operates asynchronously at 1200 bps and assembles the 21-bit words from the PLATO network for transfer to the microprocessor. The receiver begins operation when an

output 05<sub>16</sub> from the microprocessor selects the PLATO communication circuits. This routes data from the selected interface (internal modem, external modem, or long line) to the receiver for word detection and word assembly.

### Word Detection

The receiver detects words by monitoring the serial data input of the selected interface for a start bit (figure 4-3). With the internal modem or external modem interfaces, the respective Data Set Ready and Carrier Detect signals must be on for monitoring to occur. When the receiver detects a start bit, that and the following 20 bits are clocked in a 7-bit shift register for word assembly.

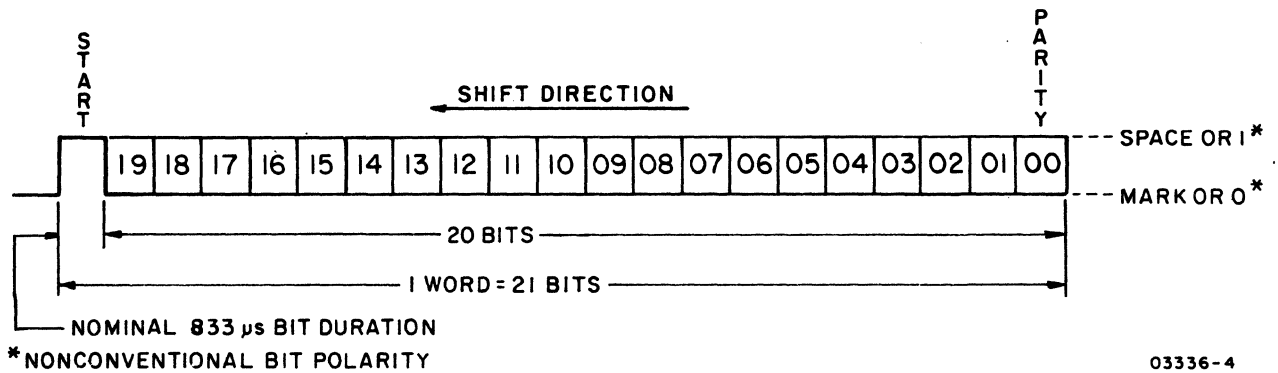


Figure 4-3. PLATO Receive Word Format

### Word Assembly

Upon detecting a start bit, the receiver clocks the incoming bits in the 7-bit shift register until the register is full. Then the 7 bits in the register are parallel transferred to a holding register and the PLATO communication-ready status/interrupt is set. While the microprocessor inputs the contents in the holding register through an input 08<sub>16</sub>, the next 7 bits are clocked in the shift register and the process is repeated.

Three input 08<sub>16</sub> transfers are required to input a complete word (figure 4-4). Data bit 7 of the first byte is set to a 1 when transferred, and then cleared to a 0 in bytes 2 and 3. Parity of words is checked by the resident loader or loaded controlware, not the receiver.

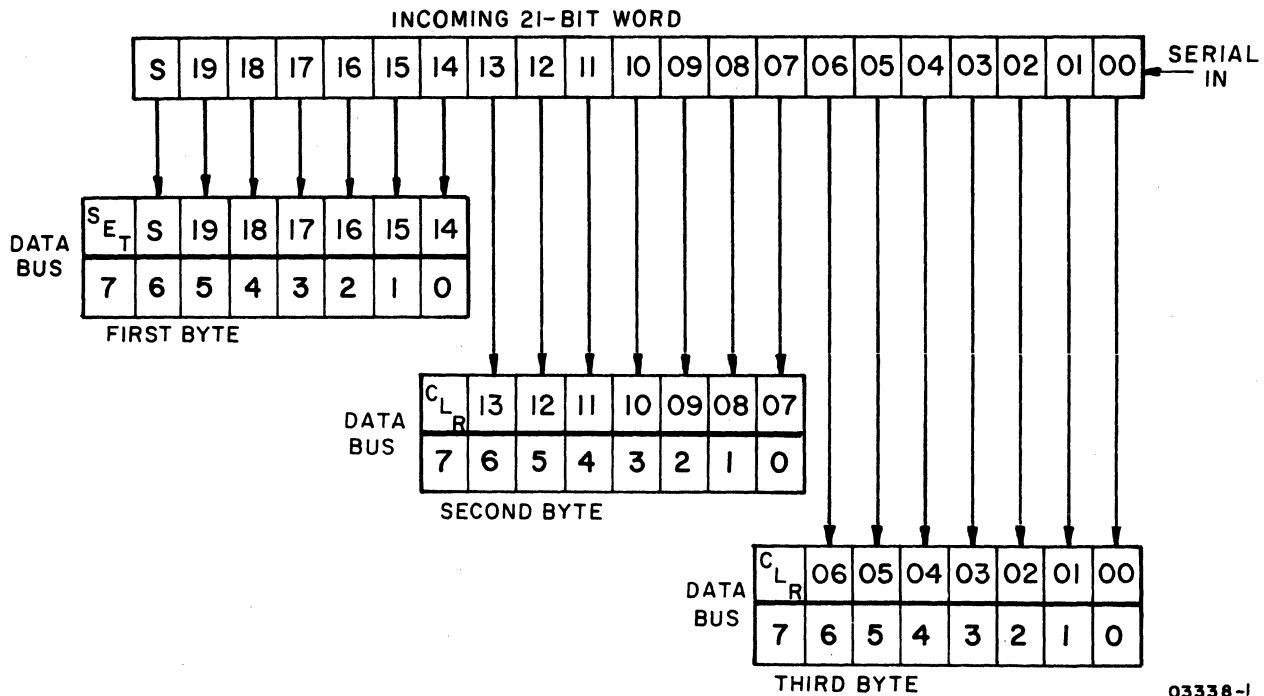


Figure 4-4. Receive PLATO Word Transfer

### PLATO Transmitter

Like the PLATO receiver, the PLATO transmitter is enabled and interconnected with the selected interface when an output 05<sub>16</sub> selects the PLATO communication circuits. The setting of internal switches S2-3, -4, and -5 determines whether the transmitter operates at 75, 120, or 1200 bps or is run by an external transmit clock on pin 15 of the ASCII/PLATO COMM connector. Operations include word transfer/serialization and word formatting.

### Word Transfer/Serialization

Each PLATO transmit word requires two output transfers by the microprocessor, an output 01<sub>16</sub> that loads the lower 5 bits in a shift register, and an output 02<sub>16</sub> that loads the upper 6 bits in a second shift register (figure 4-5). The loading of upper bits drops the normally active PLATO communication-request status/interrupt until the word is clocked from the registers.

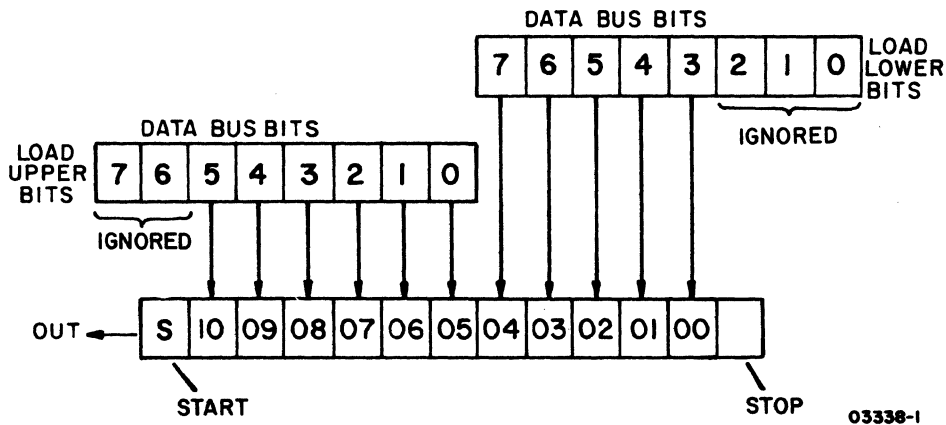


Figure 4-5. Transmit PLATO Word Transfer

### Word Formatting

As the 11 upper and lower bits are clocked from the registers, the transmitter inserts a start bit preceding the word and a stop bit at the end of the word (figure 4-6). The parity bit for each word is included in the transfer of the lower 5 bits and is not generated by the transmitter.

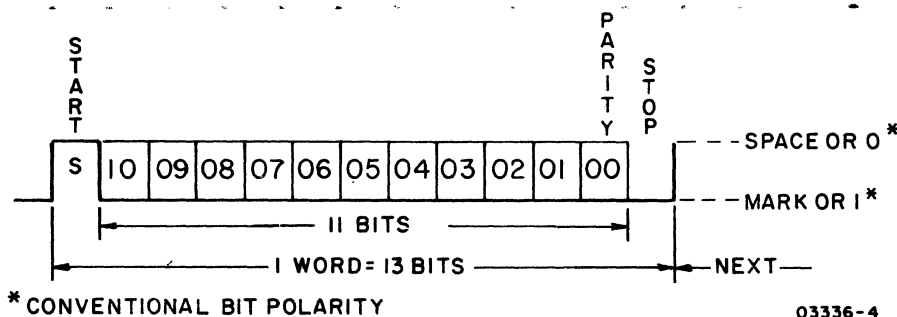


Figure 4-6. PLATO Transmit Word Format

### ASCII COMMUNICATION CIRCUITS

The circuits for ASCII network communications in channel A of the Z80A-SIO/2 chip are selected through microprocessor output 05<sub>16</sub>, which connects channel A with the selected interface. The word format, parity, and divide-by factor for the channel are specified through output 11<sub>16</sub>. The specified word format

is for receive/transmit words of one start bit, eight data bits, and one stop bit. No parity bit is specified because parity checking/generation is done by the resident loader or loaded controlware, not the channel.

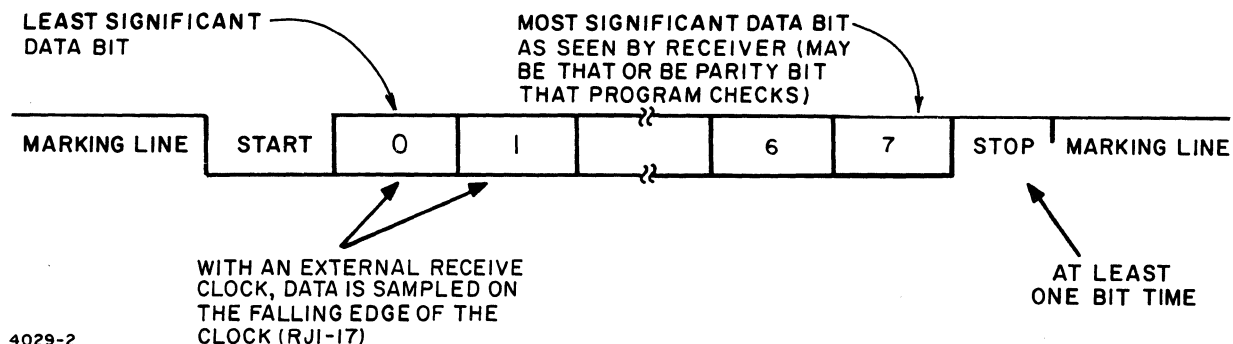
The divide-by factor established via output 11<sub>16</sub> determines whether the channel receive/transmit rates are 1/1, 1/16, 1/32, or 1/64 the rate of separate input clocks. These clocks (one for receiving, one for transmitting) are selected through output 06<sub>16</sub>. The selection includes internal clocks of 307.2, 153.6, 76.8, 38.4, 19.2, 9.6, and 4.8 kHz, or external receive/transmit clocks from a modem. Except when reselected by controlware, the receive/transmit rates derived from the selected input clocks and divide-by factor are the default rates specified by internal switches S5-6, -7, and -8.

The following paragraphs describe the ASCII receiver and ASCII transmitter within channel A.

### ASCII Receiver

To detect words, the receiver searches the serial data input of the selected interface for a start bit. Except for the long-line interface, the Carrier Detect and Data Set Ready signals of the selected interface must be on for this input to occur. Upon detecting a start bit (logical 1 to 0 transition), the receiver clocks in the eight bits that follow (least significant bit first) and the ending stop bit (figure 4-7). If a word has no stop bit, an internal framing-error status bit is set that is available to the microprocessor via output/input 11<sub>16</sub>.

Once a received word is assembled, it enters a three-stage, first-in, first-out buffer within channel A, an internal character-available status bit is set, and if enabled, an interrupt is issued to the microprocessor. An input 10<sub>16</sub> transfers the word from the buffer to the microprocessor.



4029-2

Figure 4-7. ASCII Receiver Word Format

## ASCII Transmitter

The transmitter in channel A consists of a buffer register and a shift register. A word for transmission is loaded in the buffer register through output  $10_{16}$ . If the shift register is not busy, the word is then transferred to the shift register for serialization, an internal transmit-buffer empty status bit is set, and if enabled, an interrupt is issued to the microprocessor.

In transferring a word to the shift register, the transmitter inserts a start bit preceding the word and a stop bit at the end of the word (figure 4-8).

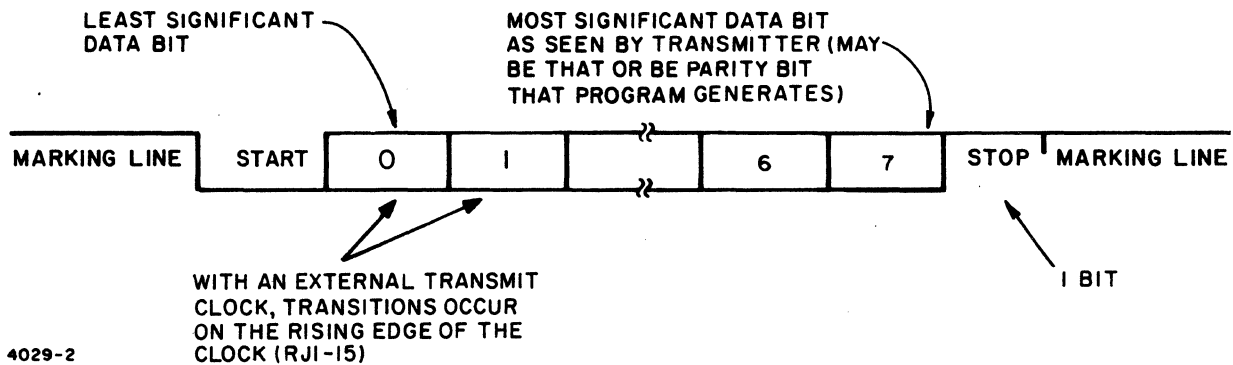


Figure 4-8. ASCII Transmitter Word Format

## SERIAL INTERFACE CIRCUITS

These circuits allow the terminal to interface with a serial-communication device via RS-232-C/CCITT V.24/V.28 signals. Use of the SERIAL interface is controlware dependent. The communication circuits for the interface are in channel B of the Z80A-SIO/2 chip. Except for the following differences, the operation of these circuits is identical to that of channel A, which was described under ASCII Communication Circuits:

- A separate set of microprocessor inputs and outputs access channel B like channel A.
- The receive/transmit words of channel B can contain 5, 6, 7, or 8 data bits.
- Channel B has a common receive/transmit rate and has no provision for use of an external clock. Also, an additional 2.4 kHz clock is included in the clock selection.
- The Carrier Detect and Data Set Ready signals of the serial interface do not have to be on in order to receive data.

## PARALLEL INTERFACE CIRCUITS

These circuits handle the information exchanges between the microprocessor and the peripheral devices connected to the PARALLEL interface. Up to eight addressable devices can be connected to this interface in a daisy chain. Exchanges over the interface are initiated through input  $2Y/3Y_{16}$  and output  $2Y/3Y_{16}$  and occur in bit-parallel fashion. The following paragraphs describe the interface signals and timing involved in these exchanges.

### Interface Signals

The signal definitions for the PARALLEL interface are as follows:

- Data Line 0 through Data Line 7 - These eight bidirectional lines carry the information from the terminal to the external devices or vice versa, depending on the External Write and External Read control signals. The kind of information is defined by the six Address Lines, which determine the device being communicated with and the function taking place.

#### NOTE

Unless a device is requested to place data on the Data Lines, its data line drivers must be in the high impedance state.

- Address Line 0 through Address Line 5 - These six output lines of the terminal determine the device to receive or send data and the kind of function to be performed on the data.
- External Write - When active, this control signal from the terminal indicates that the information on the Data Lines goes to the device defined by the Address Lines. The device should get ready to receive data.
- External Output - This control signal from the terminal complements the External Write signal. External Write defines the direction flow of data; External Output active indicates that the data on the Data Lines is stable and that the device defined by the Address Lines is to act on it.

- External Read - When active, this control signal from the terminal indicates that the device defined by the Address Lines is to place the requested information on the Data Lines. Only at this time can the device turn on its data line drivers.
- External Ready - When active, this signal from the addressed device indicates that the I/O exchange initiated by the terminal has been completed (data was received by the device during an output or placed on the Data Lines by the device during an input).
- Interrupt Line - This line is common to all devices on the PARALLEL interface and any of them can activate it at any time. Its purpose is to notify the microprocessor that a device has data to exchange. When the microprocessor services the interrupting device, the device must deactivate this line.

### Timing

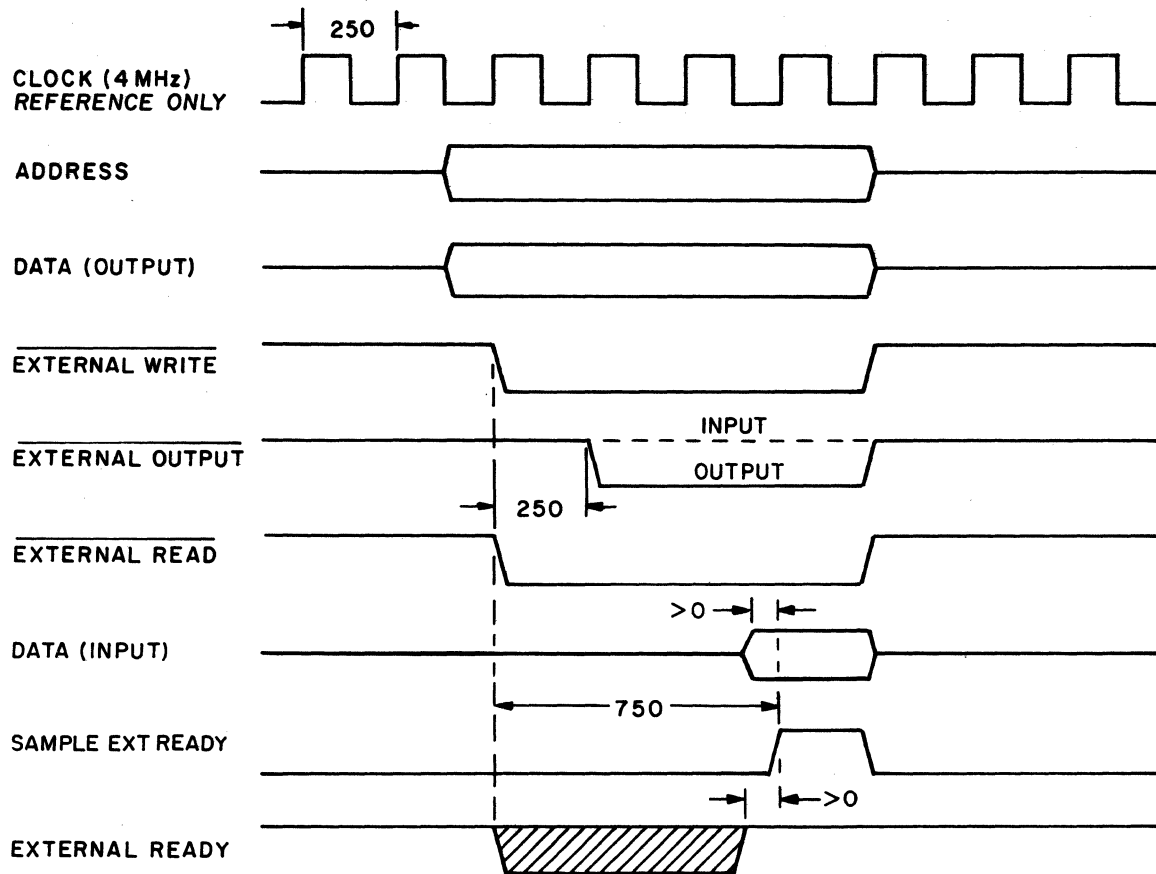
Figures 4-9, 4-10, and 4-11 show the three possible cases of interface timing for the output and input exchanges that are described next. The microprocessor and interface circuits in all three cases start the exchange in the same fashion. The difference between cases depends exclusively on the device response. All timing is referenced to the PARALLEL (RJ2) connector at the terminal.

The three cases described for an output exchange (no extra wait states, extra wait states, and timeout) also apply to an input, with the only difference being that the device must input the requested data before 750 nanoseconds for no extra wait states to occur.

### Output Exchange

An output  $2Y/3Y_{16}$  places the data and address code from the microprocessor on the Data and Address Lines (shown by the drivers going from tristate floating to bipolar state). Fifty nanoseconds later, the interface circuits drop the External Write signal active low. At this time, the devices on the interface start sampling the address code.





NOTE: ALL TIMES IN NANoseconds.

03340

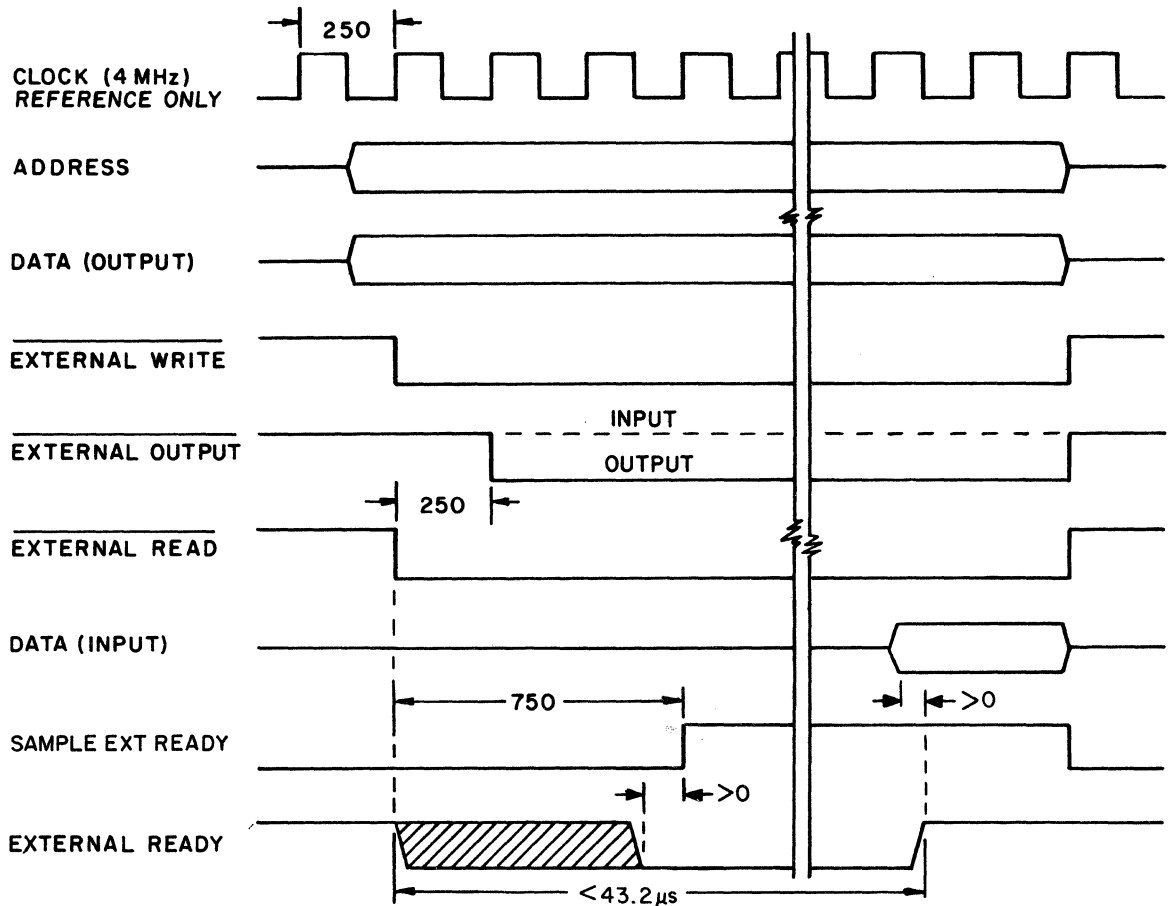
Figure 4-9. External Input/Output Timing (No Extra Wait States)

Two-hundred-fifty nanoseconds after issuing External Write, the interface circuits drop the External Output signal active low. The data is stable at this time, and the addressed device uses the External Output signal to latch the data.

From the beginning of output  $2Y/3Y_{16}$ , the interface circuits force the microprocessor to enter a series of wait states, each 250 nanoseconds long. This continues at least 750 nanoseconds after the issue of External Write. At this time, the interface circuits start sampling the External Ready line to determine which of the following cases is applicable:

- No extra wait states (figure 4-9) - If the device has raised External Ready 750 nanoseconds after External Write, the interface circuits release the microprocessor so it can continue instruction execution.

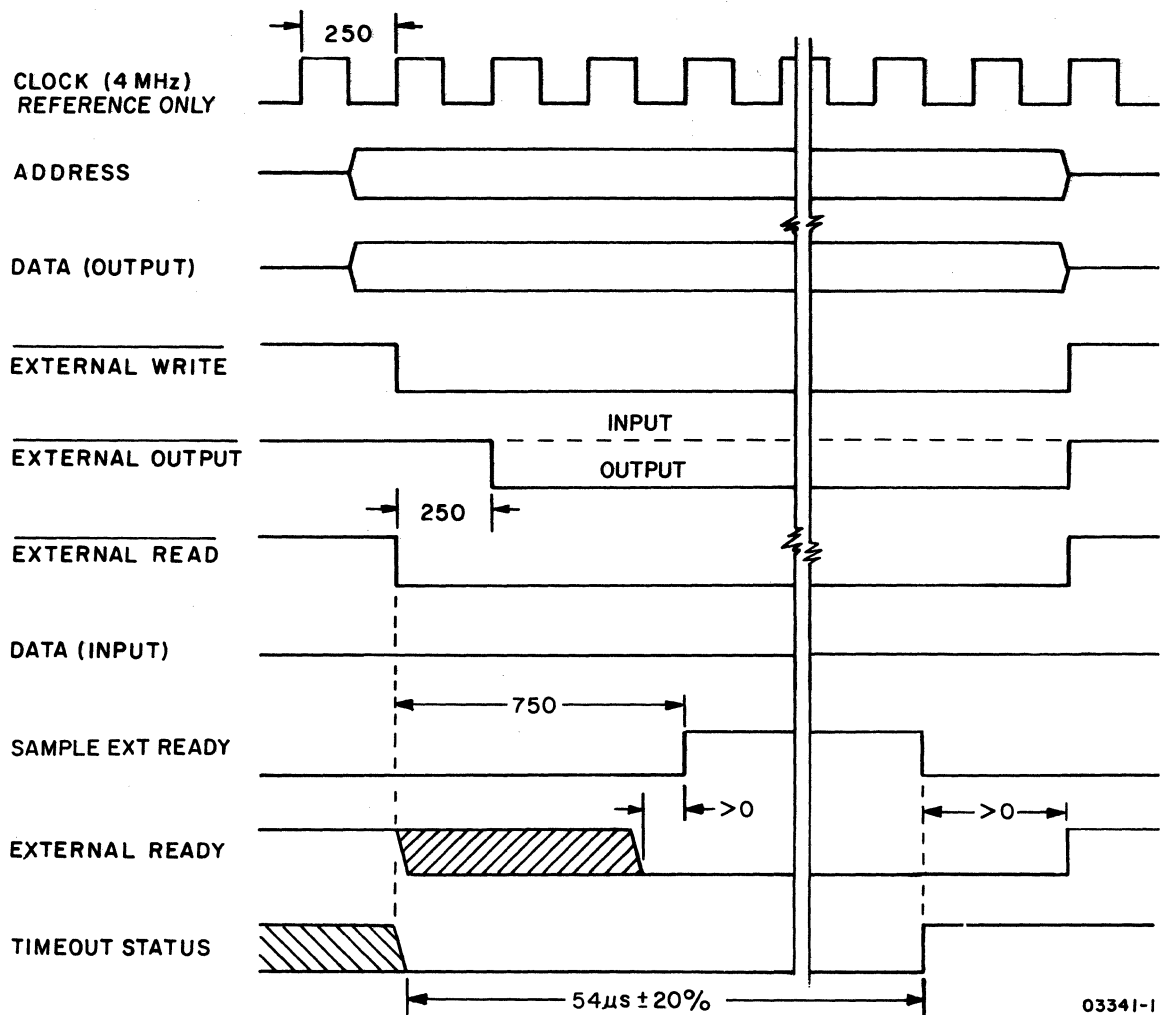
- Extra wait states (figure 4-10) - If the device has not raised External Ready 750 nanoseconds after External Write, the wait states continue until External Ready is raised or the following timeout occurs.
- Timeout (figure 4-11) - If the device has not raised External Ready within 54 microseconds (+20%) after External Write, the interface circuits simulate receipt of External Ready, release the microprocessor, and set the I/O timeout status/interrupt to inform the microprocessor that the exchange was not completed.



NOTE: ALL TIMES IN NANoseconds UNLESS STATED OTHERWISE.

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Figure 4-10. External Input/Output Timing with Delayed Device Ready (Extra Wait States)



NOTE: ALL TIMES IN NANoseconds UNLESS STATED OTHERWISE.

Figure 4-11. External Input/Output Timing with Device Not Ready (Timeout)

### Input Exchange

An input  $2Y/3Y_{16}$  places the address code from the microprocessor on the Address Lines and turns the data receivers on. Fifty nanoseconds later, the interface circuits drop the External Read signal active low. The devices then start sampling the address code, and the addressed device subsequently turns its data drivers on and conditions the External Ready line.

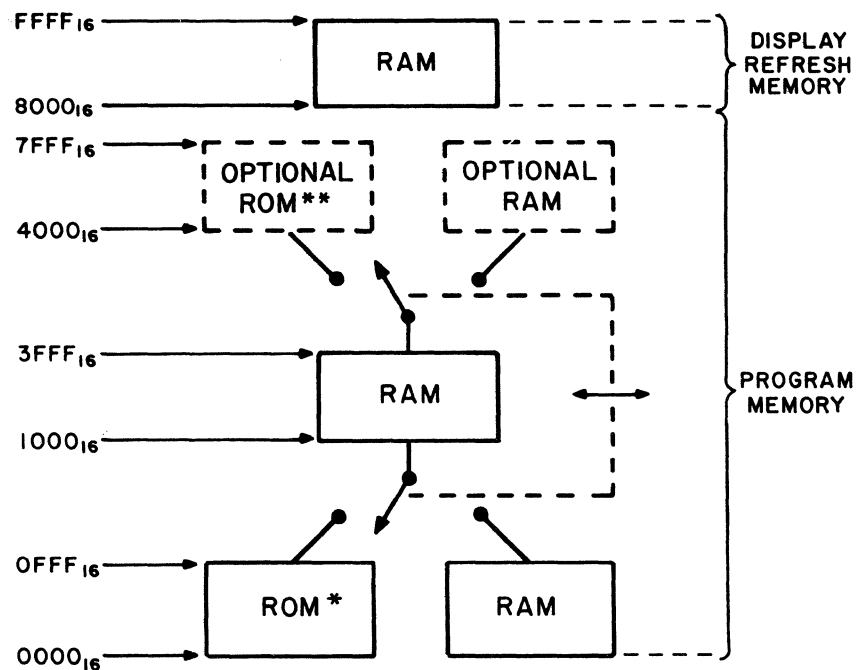
As with an output, the microprocessor is forced into wait states from the beginning of the operation until the receipt of External Ready (no extra-wait state or extra-wait state cases) or until timeout occurs.

## VIDEO BOARD

The video board contains the memory and display refresh circuits of the terminal and provides the 4-MHz clock that drives the microprocessor on the controller board. The following paragraphs describe the memory structure on the video board and the display refresh it performs.

### MEMORY STRUCTURE

Figure 4-12 shows the memory structure and address assignments. The board contains ROM and RAM that serve as program memory and RAM that serves as display-refresh memory.



\* CONTAINS RESIDENT DIAGNOSTIC/LOADER PROGRAM

\*\*EXPANDABLE IN 4K INCREMENTS TO A TOTAL OF 16K FOR ADDITIONAL RESIDENT PROGRAMS

03357-3

Figure 4-12. Memory Structure and Address Assignments

## Program Memory

The basic program memory consists of 4096 8-bit words of ROM that holds the resident diagnostic/loader program and 16 384 8-bit words of RAM for controlware storage. Through options, up to 16 384 words of ROM containing additional resident programs can be added, in 4096 word increments, and 16 384 words more RAM added. The overlap of ROM and RAM addresses is handled through the selection scheme described earlier under microprocessor instruction fetching.

The program RAM requires that the microprocessor perform 128 refresh cycles every two milliseconds to keep the storage cells of those chips active.

## Display-Refresh Memory

These 32 768 8-bit words of RAM store the information that is to be displayed. Each bit stored corresponds to a specific dot position on the screen. Both the microprocessor and display refresh circuits share access to this memory, with the display refresh circuits having priority. No refresh cycles by the microprocessor are necessary with this RAM because of the sequential reads done by the display refresh circuits.

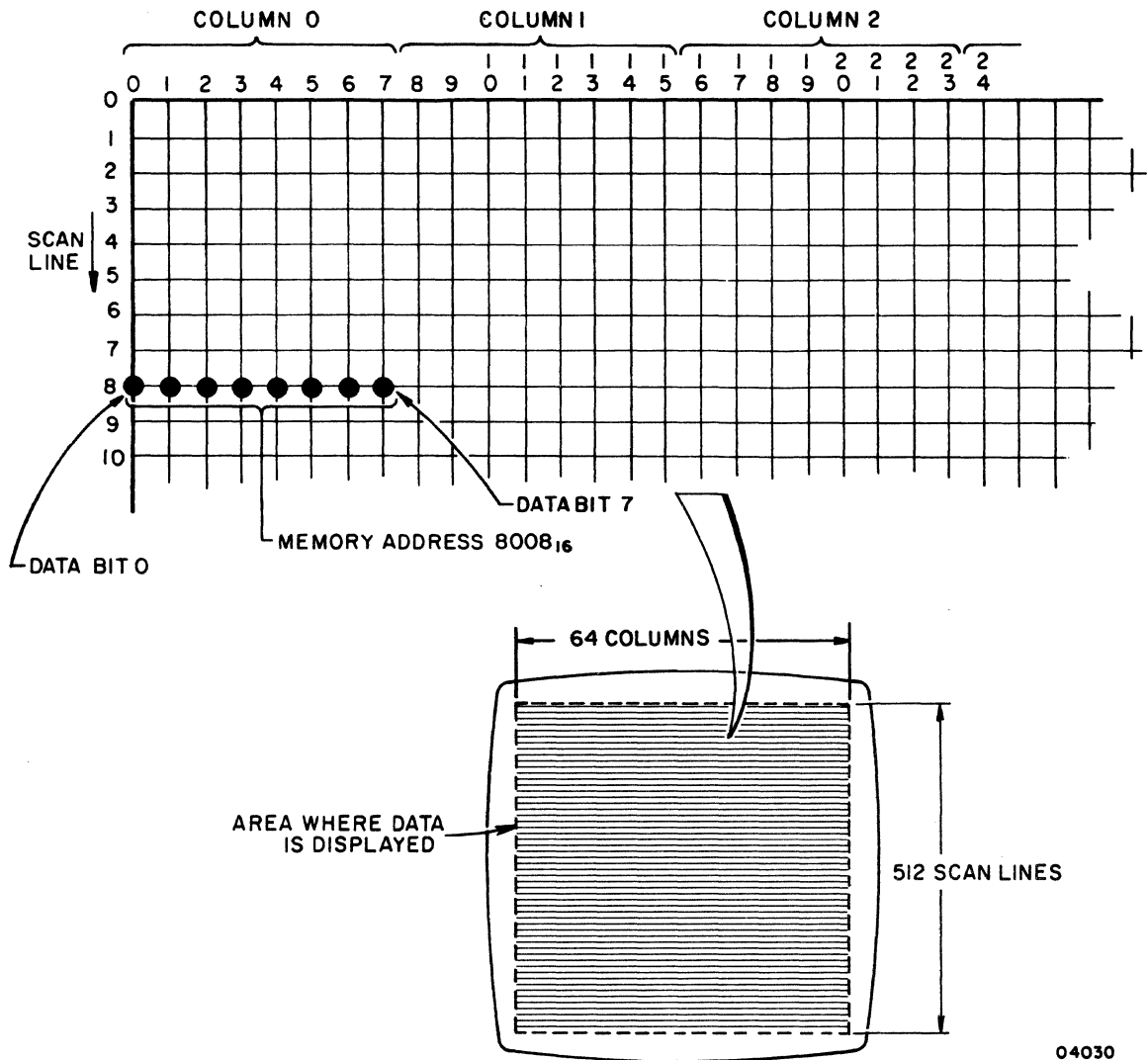
## DISPLAY REFRESH

The following paragraphs describe the refresh-memory/display relationship and display-refresh timing.

### Refresh-Memory/Display Relationship

There is a direct relationship between the address of the refresh memory where data is written and the coordinate where the data is displayed. The relationship is:

- Each refresh-memory address defines a memory location where eight bits (dots) of information are stored. These eight bits represent eight contiguous dots positioned on a scan line, with data bit 0 (least significant) on the left and data bit 7 (most significant) on the right (figure 4-13). Sixty-four of these dot groups or columns exist across the displayable area of the screen (columns 0 through 63).



04030

Figure 4-13. Refresh-Memory/Display Relationship

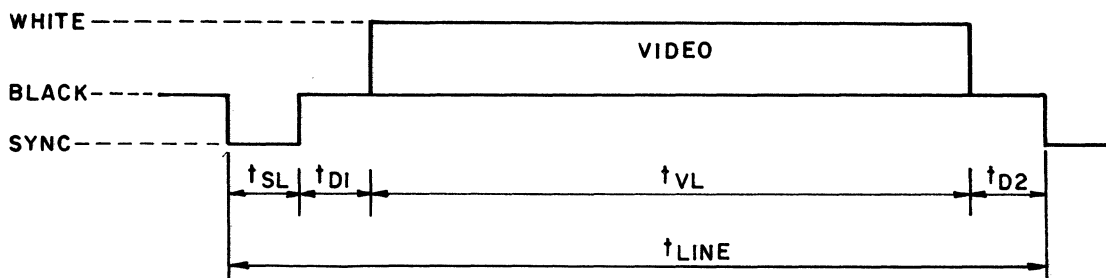
- The upper seven bits of the 16-bit refresh-memory address define one of the 64 columns. The lower nine bits of the address define one of the 512 scan lines that are within a column (lines 0 through 511). Increasing the upper 7-bit segment by one refers to the next column to the right; and increasing the lower-bit segment by one refers to the next lower line in a column.
- The lowest refresh-memory address (8000<sub>16</sub>) corresponds to the upper-left corner of the displayable area (column 0, line 0); and the highest address (FFFF<sub>16</sub>) corresponds to the lower-right corner (column 63, line 511).

As each refresh-memory address relates to an 8-dot horizontal area on the screen, illumination of dots depend on the stored bit values. A logical 1 in memory results in the corresponding dot being illuminated, and a logical 0 results in it being black.

### Display-Refresh Timing

The display refresh circuits generate a noncomposite video signal with separate line sync and field sync signals for the display monitor and a composite video signal that is output on the rear-panel VIDEO OUT connector. Both sets of signals have the following timing:

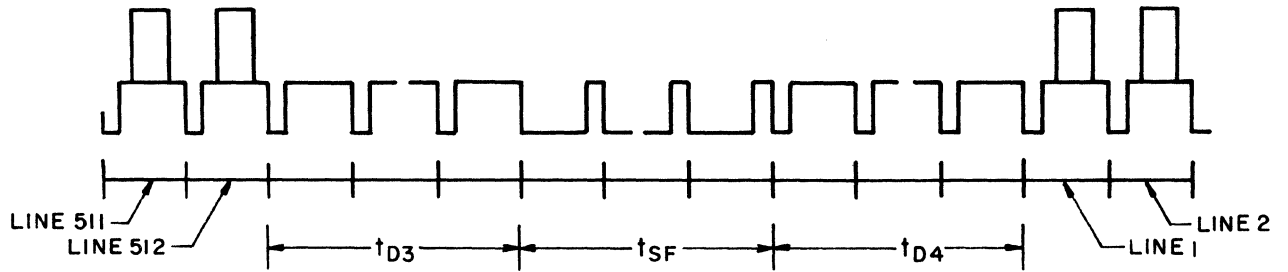
- A 34.23-KHz scanning rate making scan line timing as shown in figure 4-14. Scanning goes left to right across the screen, then retraces left and down to the next line.
- A 50- or 60-Hz frame-sync rate making frame timing as shown in figure 4-15. The 50- and 60-Hz rates are generated by internal clocks and are selected via the 50/60-Hz switch on the power supply.



$t_{SL}$  = SYNC WIDTH = 2.998  $\mu$ SEC  
 $t_{DI}$  = SYNC/VIDEO DELAY = 2.998  $\mu$ SEC  
 $t_{VL}$  = VIDEO FIELD = 21.248  $\mu$ SEC  
 $t_{D2}$  = VIDEO/SYNC DELAY = 1.972  $\mu$ SEC  
 $t_{LINE}$  = 29.216  $\mu$ SEC (34.23 KHZ)

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Figure 4-14. Scan Line Timing (Composite Video Signal)



	60 HZ		50 HZ	
	(LINES)	(m SEC)	(LINES)	(m SEC)
VIDEO WIDTH	512	14.959	512	14.959
$t_{D3}$ VIDEO/SYNC DELAY	19	0.555	73	2.133
$t_{SF}$ FRAME SYNC	4	0.117	4	0.117
$t_{D4}$ SYNC/VIDEO DELAY	25	0.730	96	2.805
FRAME TIME	570	16.653	685	20.013

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Figure 4-15. Frame Timing (Composite Video Signal)

OPTIONAL MODEM/DAA BOARD (PLATO NETWORK USE ONLY)

The internal modem/DAA (data-access arrangement) board is only applicable for PLATO network communications and is selected for operation through microprocessor output 05<sub>16</sub>. The board uses the phase-coherent frequency-shift keying (FSK) type of modulation/demodulation and operates asynchronously, full-duplex on a two-wire telephone line. Major modulation/demodulation characteristics are:

- The analog transmitter operates from 0 to 150 bps and generates a 390-Hz signal for a mark (logical 1) and a 490-Hz signal for a space (logical 0). Transmitter power is -9 dBm (maximum) to -13 dBm (minimum).
- The analog receiver operates from 0 to 1200 bps and recognizes an incoming signal of 1300 Hz as a mark and 2100 Hz as a space. The power of incoming signals can range from -10 dBm (maximum) to -43 dBm (minimum). Carrier detect occurs for signals between 1100 and 2300 Hz.

Connection of the analog receiver/transmitter with the telephone line is made through a relay on the board that is controlled by the front-panel TALK/DATA switch. Use of the TALK/DATA switch is described in Operation, section 2.



## OPERATOR PANEL

The operator panel consists of a printed-circuit board that is mounted behind the bezel/keyboard cover. Attached to the board are: the audible alarm, RESET switch, TALK/DATA switch, six LEDs, and the ten selection switches that are behind the protective door. Program access to the setting of switches on the board occurs via microprocessor inputs  $00_{16}$  and  $06_{16}$ . Output  $00_{16}$  controls the LEDs when they are under microprocessor control, and output  $05_{16}$  controls the alarm.

## TOUCHPANEL

The touchpanel consists of a mylar panel with sixteen Y signal lines in horizontal rows overlaying a glass panel with sixteen X signal lines in vertical columns. These X/Y signal lines connect to the touchpanel-interface circuits on the controller board. When the outer mylar surface is pressed against the glass, the intersecting row and column signal lines effectively short together and the interface circuits capture the X/Y coordinates for transfer to the microprocessor.

The touchpanel-interface logic operates basically as follows. The upper 4 outputs of an initially free-running 8-bit counter are fed into a 1-of-16 decoder, which sequentially drives each column (X) signal line to a logical low while leaving the others high. During the excitation of each column signal line, the lower 4 outputs of the counter are used, via a 16-input multiplexer, to sequentially select each row (Y) signal line for sampling. Upon detecting a logical low row signal line, the logic:

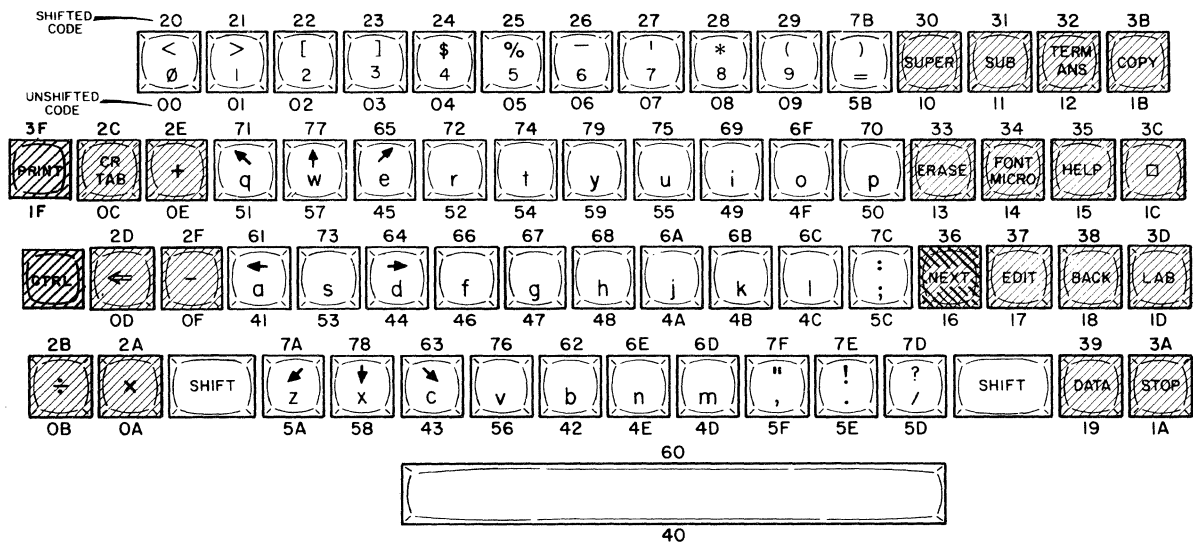
- Delays (debounces) the signal
- Stops the counter
- Sets the touchpanel data-ready status/interrupt
- Passes the current counter outputs (X/Y coordinates) to the microprocessor upon an input  $02_{16}$
- Enables the counter to continue scanning after the input  $02_{16}$  by the microprocessor

## KEYBOARD

Except for the SHIFT and CTRL (Control) keys, each keyboard key enables a shifted code (SHIFT key in use) and an unshifted code (figure 4-16). Either type code is increased by 80<sub>16</sub> when the CTRL key is in use. None of the actual keycodes are generated by the keyboard itself. Rather, the basic codes are generated by the keyboard interface circuits on the controller board and are modified by the controlling program.

A counter in the keyboard-interface circuits outputs counts that are equal to the unshifted codes assigned to keys. The keyboard decodes this output and indicates the state of the corresponding key via a Strobe signal. If the key corresponding to the current count is being pressed, an active low Strobe signal causes the keyboard interface circuits to:

- Delay (debounce) the signal
- Stop the counter
- Set the keyboard data-ready status/interrupt
- Pass the current counter output and state of SHIFT and CTRL keys to the microprocessor upon an input 01<sub>16</sub>
- Enable the counter to continue counting after the input 01<sub>16</sub> by the microprocessor



02298-1

NOTE: SHADED AREAS INDICATE DIFFERENCE IN KEYCAP COLORS.

Figure 4-16. Keyboard Codes and Legends

## DISPLAY MONITOR

The monitor is a noncomposite display that is driven by standard TTL/DTL logic-level inputs. The display inputs are line sync, field sync, and video information, which are provided by the video board. DC power for the display is provided by the power supply board. The display consists of deflection electronics, high voltage circuits, video electronics, cathode-ray tube (crt) and necessary mechanical support components. Adjustments are provided for size, centering, focus, brightness, and linearity. All adjustments except brightness are factory set, but may be adjusted by maintenance personnel.

## POWER SUPPLY BOARD

The power supply board converts 120-V ac, 50/60-Hz input power to regulated outputs of +5, -5, +12, -12, and +55 V. On international units, a stepdown transformer is associated with the power supply board to reduce the 220 to 240 Vac to the required 120 V ac level. The +5, -5, +12, and -12 V power the terminal logic circuits, and the +55 V powers the deflection and high-voltage circuits of the display monitor.

The circuits of the power supply board are divided in two sections, the section that develops +55 V and the section that develops +5, -5, +12, and -12 V. Each section contains separate transformers and separate rectifier, filter, and regulator circuits. The section for +5 V contains an additional overvoltage-protection circuit. The circuit automatically shuts off all outputs of that section when the +5-V output rises to +5.5 to +6.8 V. The +5-V and +55-V outputs are adjustable.

---

This section contains the logic diagram set for the terminal. Instructions on how to interpret the logic diagrams are contained in the preliminary sheets of the diagram set.

1  
2  
3  
4

SHEET REVISION STATUS				REVISION RECORD			
REV	CD	DESCRIPTION	DRFT	DATE	CHKD	APP	
A	12756-49	RELEASED CLASS 'A'	✓	8-21-80	EE	MS	
B	14284	REVISED PER ECO		9-29-80	EE	MS	
C	14388	REVISED PER ECO		11-21-80	MD	WJG	RGS
D	14422	REVISED PER ECO		10/10/80	EE	MS	
E	14513	REVISED PER ECO		3/12/81	EE	MS	
F	14523	ADDED CH/AS PER ECO		3/12/81	EE	MS	
G	14532	REVISED PER ECO		3/19/81	EE	MS	

SHEET NO	CROSS REFERENCE NUMBER	MODULE LOCATION	REV	LOGIC DIAGRAM TITLE
1			G	LOGIC DIAGRAM SET CONTENTS SHEET
2			G	LOGIC DIAGRAM CONTROL SHEET 2
3			A	KEY TO DIAGRAMS - PHYSICAL LOCATION CODES
4			G	KEY TO DIAGRAMS - PHYSICAL LOCATION CODES
5			A	KEY TO SYMBOLS
6	000		G	CABLING AND INTERCONNECTION DIAGRAM
7	001		D	SCHEMATIC DIAGRAM, 9CAS (ASCII 1ST POWER SUPPLY)
8	001A		F	SCHEMATIC DIAGRAM, 9CAD POWER SUPPLY
9	002		A	SCHEMATIC DIAGRAM, 9CAD POWER SUPPLY
10	003		A	VIDEO CONTROLLER (OABD) EXTERNAL CONNECTIONS
11	004		A	SCHEMATIC, DISPLAY LOGIC CABLE
12	005		C	DISPLAY SCHEMATIC
13	006		A	CONTROLLER MODULE (OACD) EXTERNAL CONNECTIONS
14			A	VIDEO CONTROLLER (OABD) BLOCK DIAGRAM
15			A	CONTROLLER MODULE (OACD) BLOCK DIAGRAM
16	100		G	SCHEMATIC DIAGRAM, OABD OSCILLATOR, CPU INTERFACE
17	101		A	SCHEMATIC DIAGRAM, OABD DOT TIMING CHAIN
18	102		A	SCHEMATIC DIAGRAM, OABD HORIZONTAL TIMING
19	103		A	SCHEMATIC DIAGRAM, OABD VERTICAL TIMING, MEMORY WINDOW TIMING
20	104		G	SCHEMATIC DIAGRAM, OABD MEMORY WINDOW TIMING
21	105		A	SCHEMATIC DIAGRAM, OABD VIDEO SHIFT RGTRS/MUX, DISPLAY DRIVE LOGIC
22	106		G	SCHEMATIC DIAGRAM, OABD BULK WRITE/ERASE, VIDEO DISABLE
23	107		G	SCHEMATIC DIAGRAM, OABD PROCESSOR MEMORY TIMING
24	108		A	SCHEMATIC DIAGRAM, OABD DISPLAY ADDRESS REGISTER, DISPLAY MEMORY TIMING
25	109		A	SCHEMATIC DIAGRAM, OABD DISPLAY MEMORY ADDRESS MUX
26	110		D	SCHEMATIC DIAGRAM, OABD DISPLAY MEMORY
27	111		D	SCHEMATIC DIAGRAM, OABD PROCESSOR MEMORY
28	112		E	SCHEMATIC DIAGRAM, OABD DATA BUS TRANSCEIVER, COMPOSITE VIDEO, MEMORY OUTPUT BUFFERS
29	113		A	SCHEMATIC DIAGRAM, OABD PROGRAMMED EPROM
30	114		G	VIDEO CONTROLLER MODULE OABD POWER, GROUND AND DECOUPLING
31			A	VIDEO DOT TIMING, CHARACTER TIMING AND MEMORY WINDOWS
32			E	LINE TIMING FIELD (50/60 HZ) TIMING
33			C	DISPLAY MEMORY TIMING
34	200		G	SCHEMATIC DIAGRAM, OACD Z80 MICROPROCESSOR, RESET LOGIC
35	201		G	SCHEMATIC DIAGRAM, OACD uP SIGNAL BUFFERS

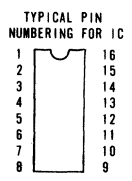
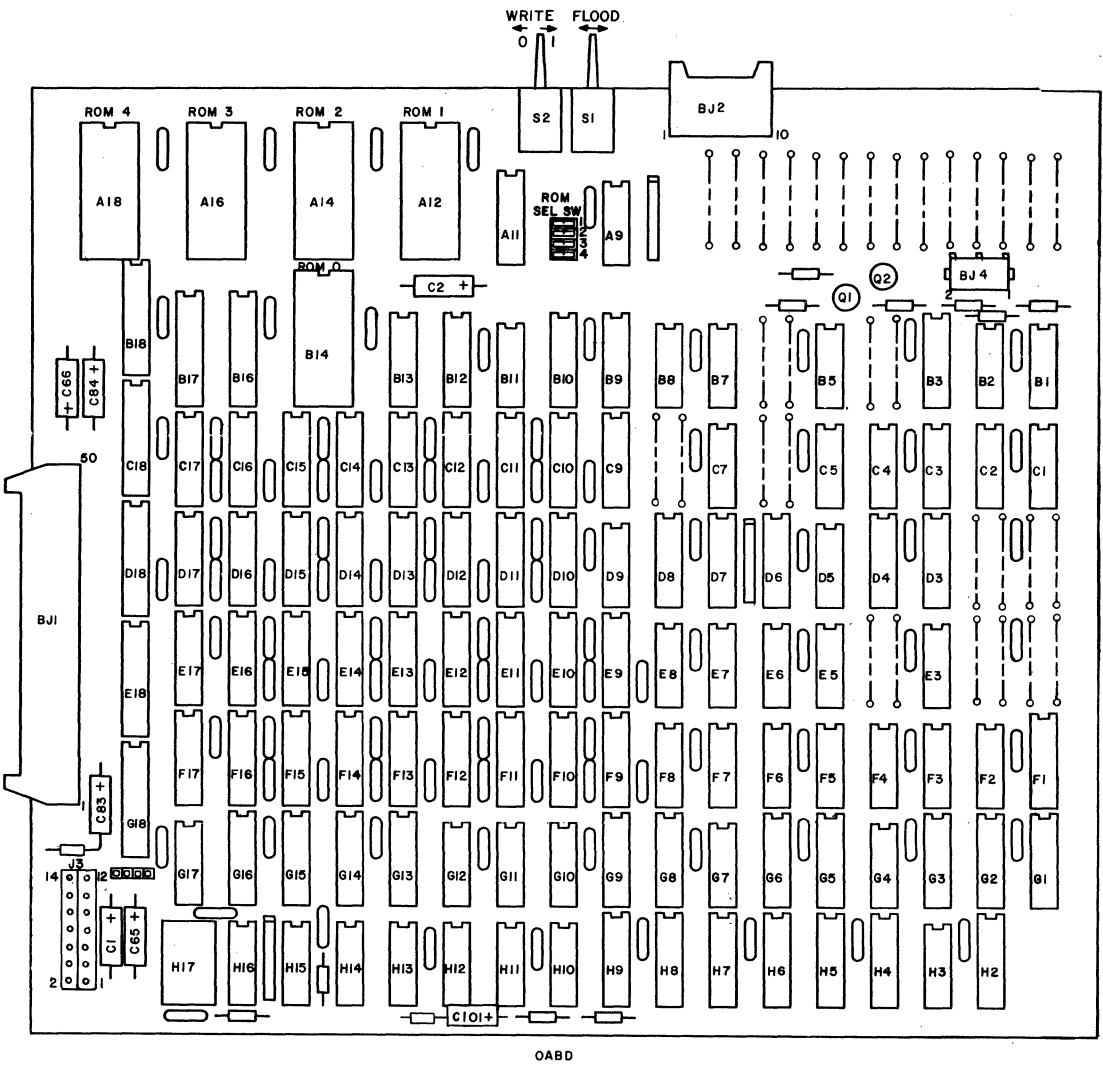
NOTES:

1. FOR LOGIC CHIP INFORMATION, REFER TO GRAPHIC SYMBOLS HANDBOOK, CDC-PUB 15006100.

REFERENCE DRAWING		CONTROL DATA		TITLE	
FIRST USED ON	DRAWN	CC629-A,B	LOGIC DIAGRAM SET CONTENTS SHEET		
CHKD	ENGR	Marty Dietz	CODE IDENT	15920	DRAWING NO
RES	TOLERANCE	8-1-80	15920	C	62201052
VAL	RATING	8-5-80	15920		
CHK		8-11-80	15920		
			SCALE		SHEET 1 OF 60



KEY TO DIAGRAMS  
 PHYSICAL LOCATION CODES

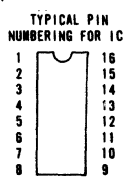
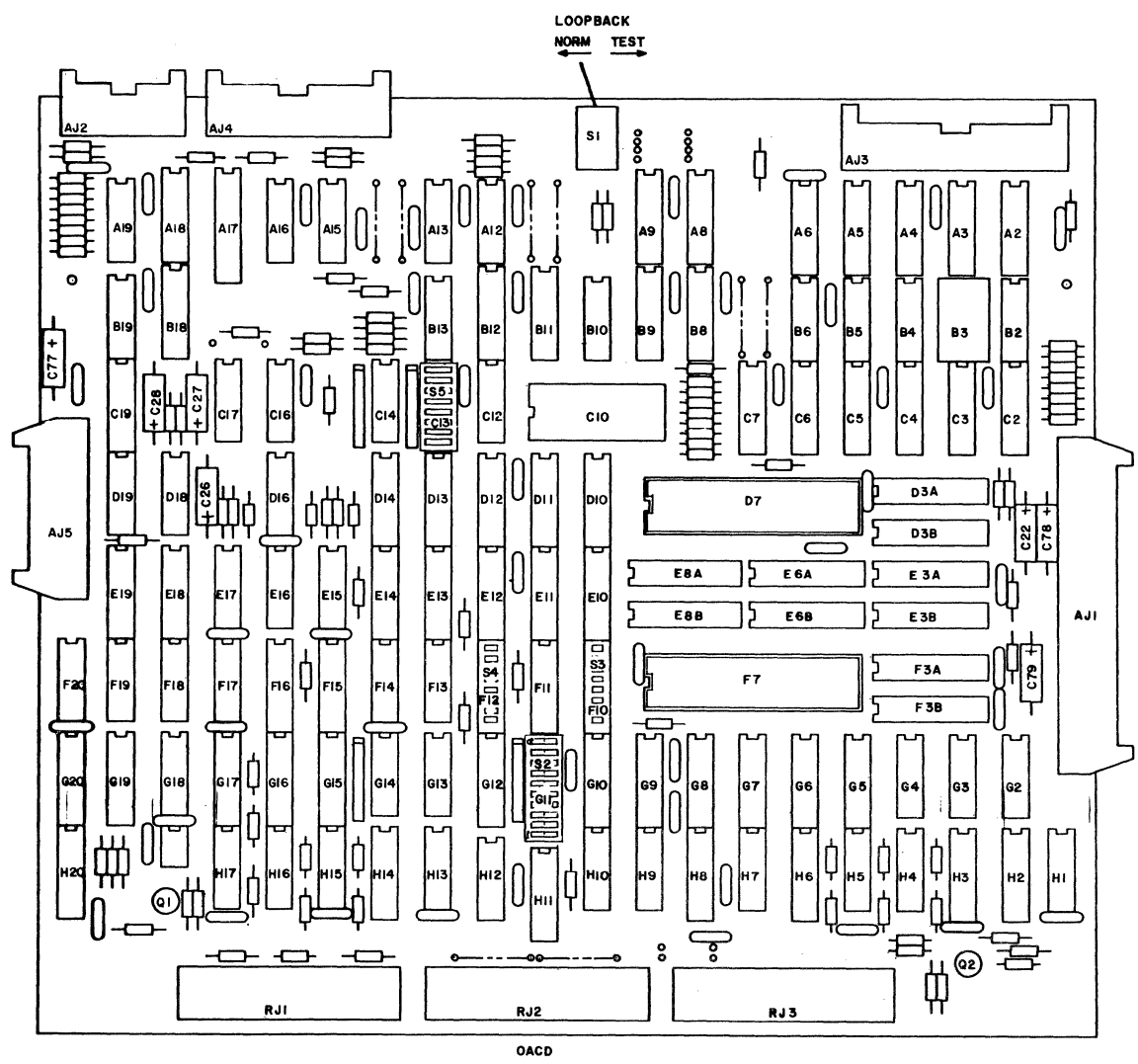


PHYSICAL LOCATION CODES  
 CIRCUIT MODULE LAYOUT. THESE DRAWINGS DEPICT THE COMPONENT SIDE ASSEMBLY OF THE TWO LOGIC MODULES DIAGRAMMED IN THIS LOGIC SET. THE ALPHANUMERIC CODES AT THE BOTTOM OF THE SYMBOLS ARE THE PHYSICAL LOCATION CODES. THESE NUMBERS CORRESPONDE TO THOSE SHOWN INSIDE THE LOGIC SYMBOL OUTLINES ON THE DIAGRAM SHEETS.

LOC  
 CROSS REF NO

KEY TO DIAGRAMS  
 PHYSICAL LOCATION CODES

LOC
CROSS REF NO

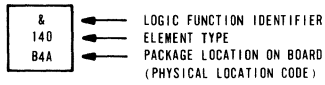


PHYSICAL LOCATION CODES  
 CIRCUIT MODULE LAYOUT. THESE DRAWINGS DEPICT THE COMPONENT SIDE ASSEMBLY OF THE TWO LOGIC MODULES DIAGRAMMED IN THIS LOGIC SET. THE ALPHANUMERIC CODES AT THE BOTTOM OF THE SYMBOLS ARE THE PHYSICAL LOCATION CODES. THESE NUMBERS CORRESPOND TO THOSE SHOWN INSIDE THE LOGIC SYMBOL OUTLINES ON THE DIAGRAM SHEETS.

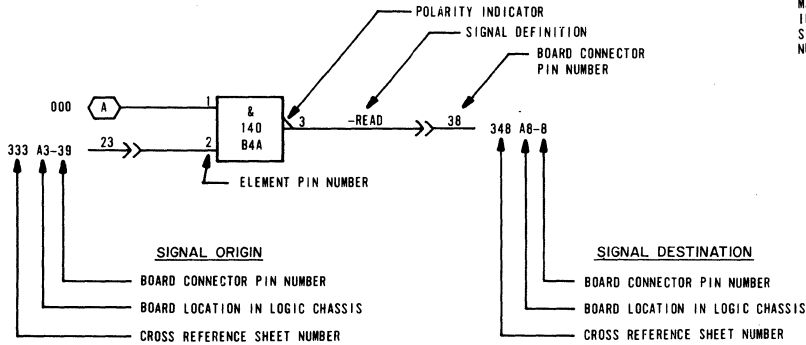


**GENERAL LOGIC SYMBOL INFORMATION**

**INTEGRATED CIRCUIT LOGIC SYMBOL**



**TAGGING INFORMATION**



**GENERAL P.C. BOARD INFORMATION**

EACH PRINTED CIRCUIT BOARD, UNDER IDEAL CONDITIONS, WOULD BE REPRESENTED ON ONE SHEET. HOWEVER, DUE TO THE LARGE NUMBER OF CIRCUITS LOCATED ON SOME BOARDS, MULTIPLE SHEETS MAY BE REQUIRED. THE BOARD TYPE IS LISTED AT THE BOTTOM OF EACH DIAGRAM SHEET. THE BOARD LOCATION WITHIN THE LOGIC CHASSIS MAY ALSO ACCOMPANY THE BOARD TYPE. EACH SYMBOL ON THE DIAGRAM REPRESENTS A PORTION OF AN INTEGRATED CIRCUIT, THE ENTIRE INTEGRATED CIRCUIT OR A DISCRETE COMPONENT. EACH SYMBOL REFLECTS THE LOGIC FUNCTION IDENTIFIER, ELEMENT OR COMPONENT TYPE, AND THE ELEMENT OR COMPONENT LOCATION ON THE BOARD. COMPONENT LOCATION IS DEFINED BY AN ALPHANUMERIC MATRIX DEPENDING ON THE TYPE OF PRINTED CIRCUIT BOARD USED. FOR INFORMATION ON THE COMPONENT OR ELEMENT TYPES USED IN THIS LOGIC SET, REFER TO KEY TO LOGIC SYMBOLOLOGY MANUAL, CDC PUBLICATION NUMBER 82172400.

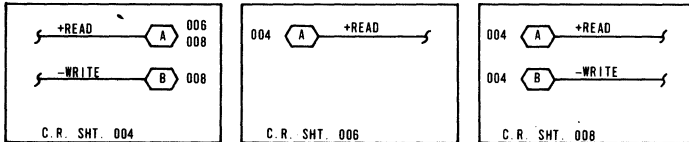
**QUALIFYING SYMBOLS**

- & = AND
- 1 = OR
- 1 = INVERTER
- X → Y = X (INPUTS) DECODED OR ENCODED TO Y (OUTPUTS)
- X/Y = X (INPUT LEVEL) CONVERTED TO Y (OUTPUT LEVEL)

**NON-STANDARD ABBREVIATIONS**

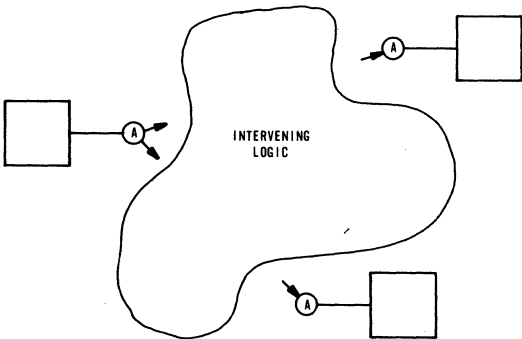
**ON BOARD, OFF SHEET TAGGING**

IN A LOGIC DIAGRAM SET HAVING MORE THAN ONE SHEET, A HEXAGON IS USED TO INDICATE THAT THE SIGNAL IS COMING FROM, OR GOING TO, ANOTHER SHEET OF THE SAME BOARD. (NOTE: EACH SIGNAL NAME IN THIS LOGIC SET HAS BEEN PRECEDED BY A '+' (INDICATING AN ACTIVE HI) OR A '-' (INDICATING AN ACTIVE LO)).



**ON SHEET TAGGING**

THE SMALL CIRCLES WITH ALPHA CHARACTERS INSIDE ARE USED TO SHOW A SIGNAL PATH WITHOUT ACTUALLY RUNNING A LINE FROM ONE POINT TO ANOTHER. A CIRCLE WITH AN ARROW POINTING AWAY FROM IT IS THE SIGNAL ORIGIN. IN DIRECT LINE WITH THE ORIGIN ARROW, ANOTHER CIRCLE IS DRAWN WITH AN ARROW POINTING TOWARD IT. THIS IS THE SIGNAL DESTINATION.



**VOLTAGE LEVELS**

1. ANALOG OR NON-LOGIC LEVELS

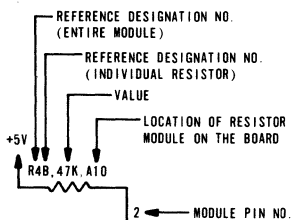
2. NON-STANDARD LOGIC LEVEL

3. LOGIC LEVELS

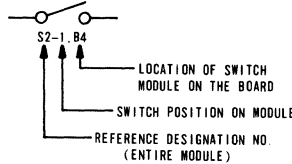
- DTL LOGIC OPERATION
- HIGH (LOGICAL 1) = +2.6 TO +5.0 VOLTS
- LOW (LOGICAL 0) = 0.0 TO +0.45 VOLTS
- SWITCHING POINT = +1.1 TO +1.9 VOLTS
- TTL LOGIC OPERATION
- HIGH (LOGICAL 1) = +2.8 TO +5.0 VOLTS
- LOW (LOGICAL 0) = 0.0V TO +0.45 VOLTS
- SWITCHING POINT = +.85V TO +1.9 VOLTS

**MISCELLANEOUS INDICATORS**

**RESISTOR MODULES**

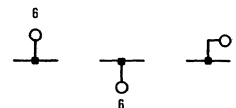


**SWITCH MODULES**



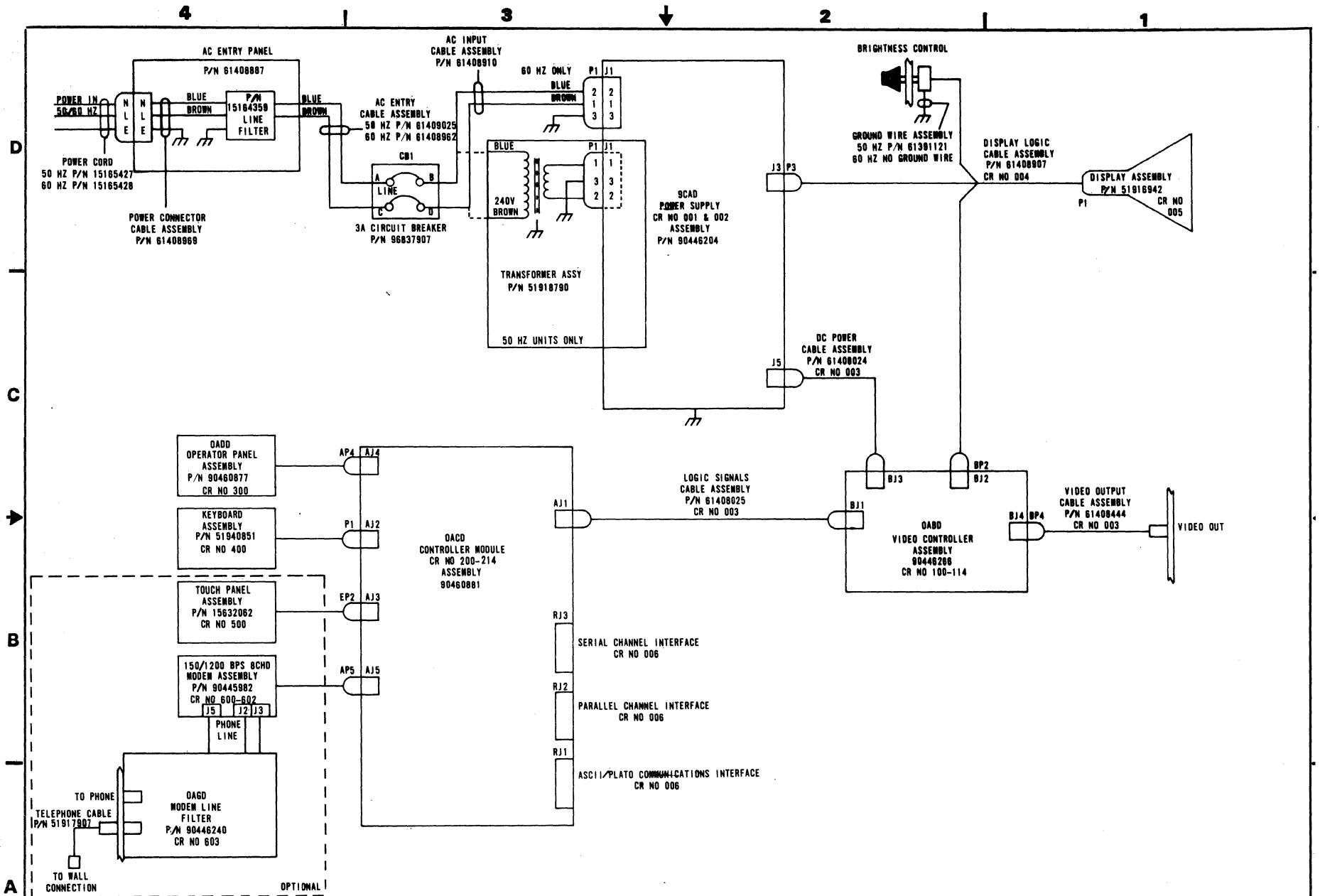
**TEST POINTS**

THE CLASS DESIGNATION LETTERS 'TP' HAVE NOT BEEN SHOWN ON THIS LOGIC SET. THEREFORE, THE TEST POINTS APPEAR AS FOLLOWS:



REV	A
DWG NO	62201052
CROSS REF NO	
SHEET	5
CODE IDENT	G
15920	
KEY TO SYMBOLS	
CONTROL DATA	

62940007 D

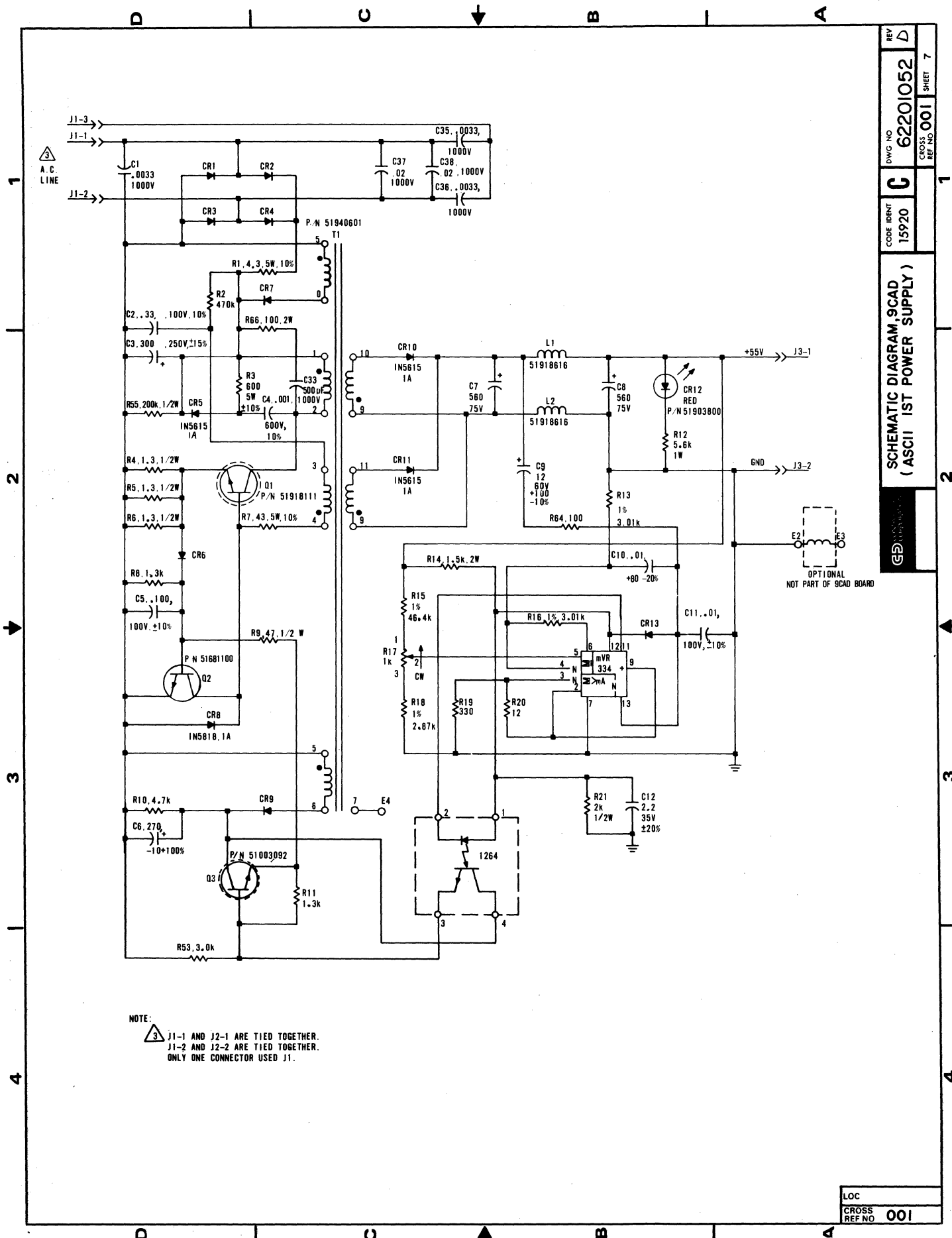


LOC	000
CROSS REF NO	000

5-7

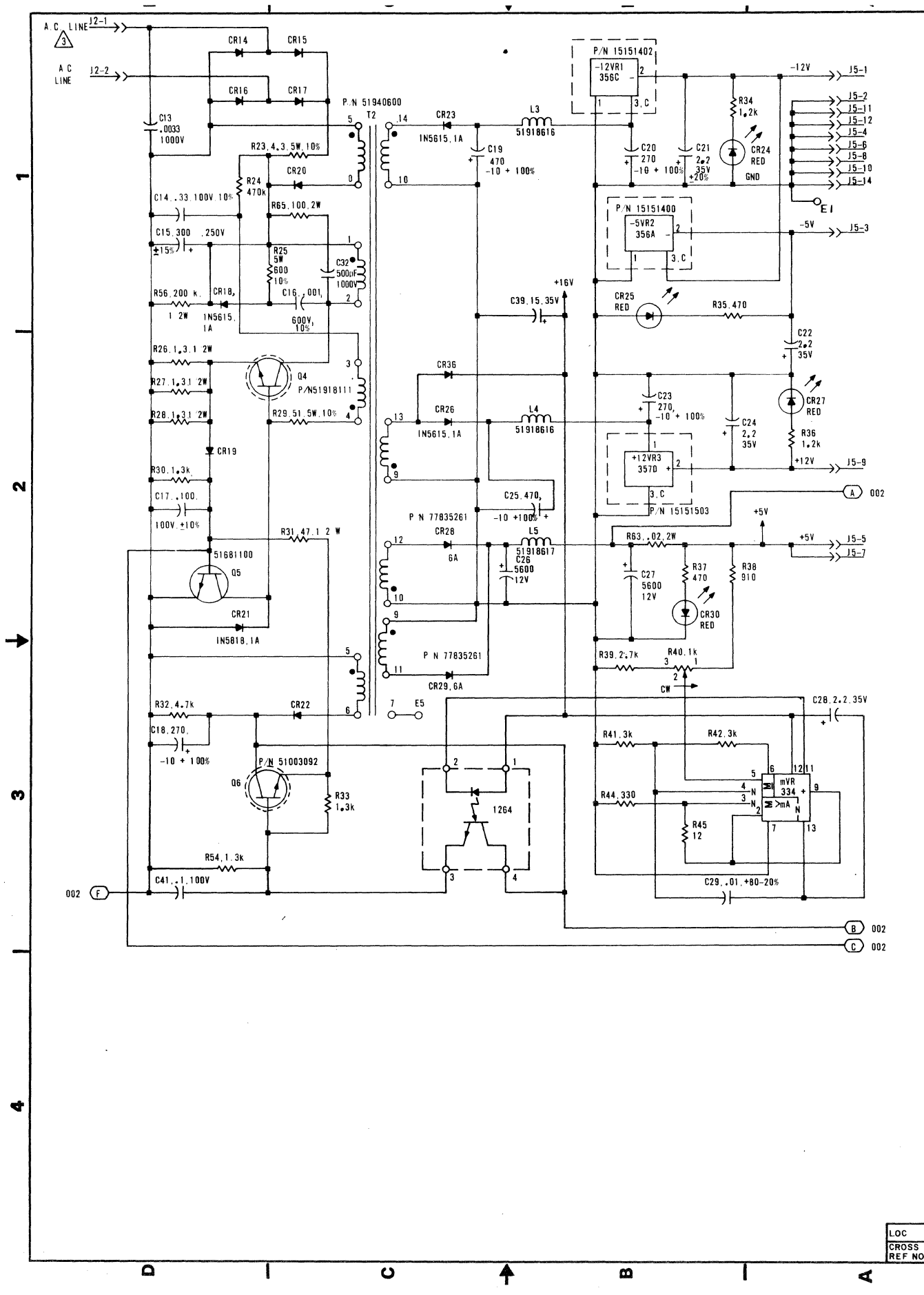
**CABLING AND INTERCONNECTION DIAGRAM**

CODE IDENT 15920	REV G	DWG NO 62201052	CROSS REF NO 000	SHEET 6
---------------------	----------	--------------------	---------------------	------------



NOTE:  
 J1-1 AND J2-1 ARE TIED TOGETHER.  
 J1-2 AND J2-2 ARE TIED TOGETHER.  
 ONLY ONE CONNECTOR USED J1.

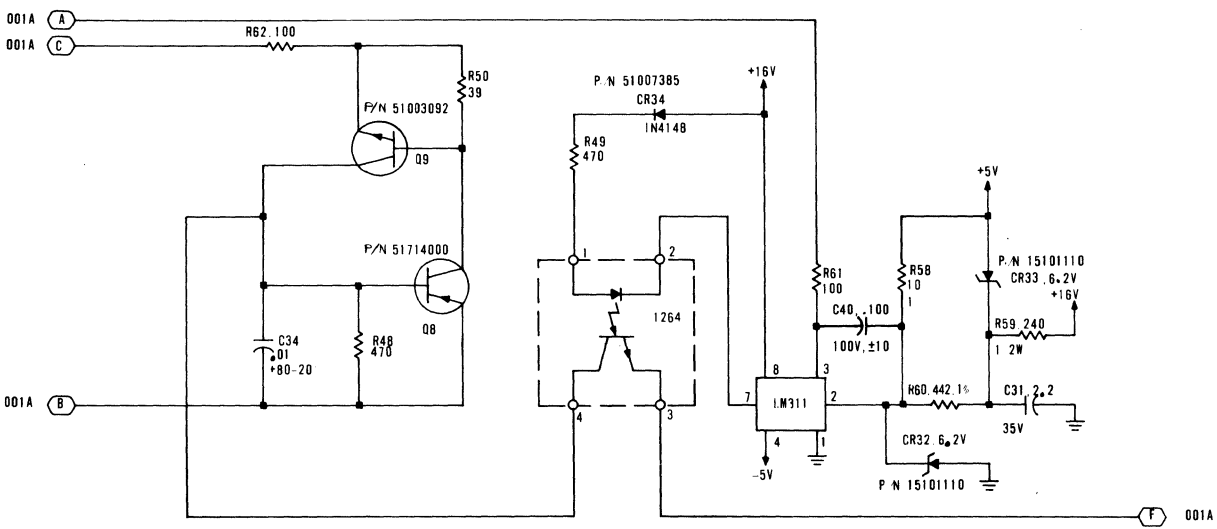
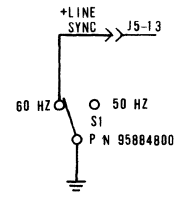
LOC	
CROSS REF NO	001



REV F  
 DWG NO 62201052  
 CROSS REF NO 001A SHEET 8  
 CODE IDENT 15920  
 SCHEMATIC DIAGRAM, 9CAD  
 POWER SUPPLY  
 CONTROL DATA

LOC  
 CROSS REF NO 001A

D I C ↓ B I A



REV	A
DWG NO	62201052
CODE IDENT	C 15920
CROSS REF NO	002
SHEET	9

SCHEMATIC DIAGRAM, 9CAD  
POWER SUPPLY



LOC	
CROSS REF NO	002

1  
2  
3  
4

1  
2  
3  
4

I C ↑ B I

CONTROLLER  
MODULE  
DABD  
CR NO 200-214  
BLOCK DIAGRAM  
SHEET 12

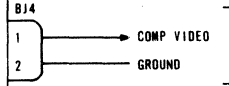
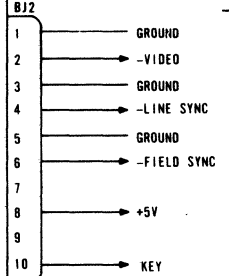
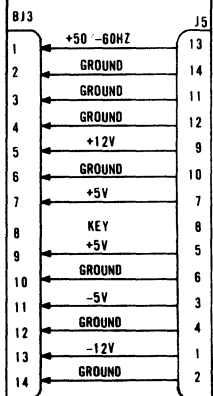
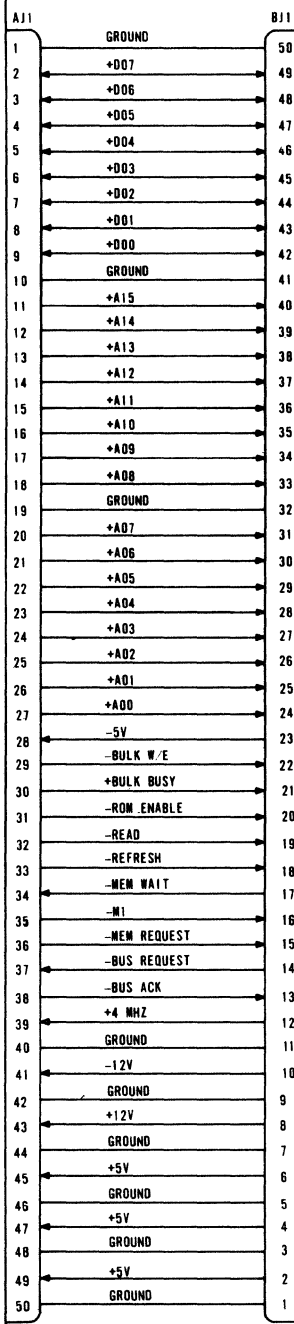
VIDEO CONTROLLER  
DABD  
CR NO 100-114  
BLOCK DIAGRAM  
SHEET 11

POWER  
SUPPLY  
9CAD  
CR NO 001-002

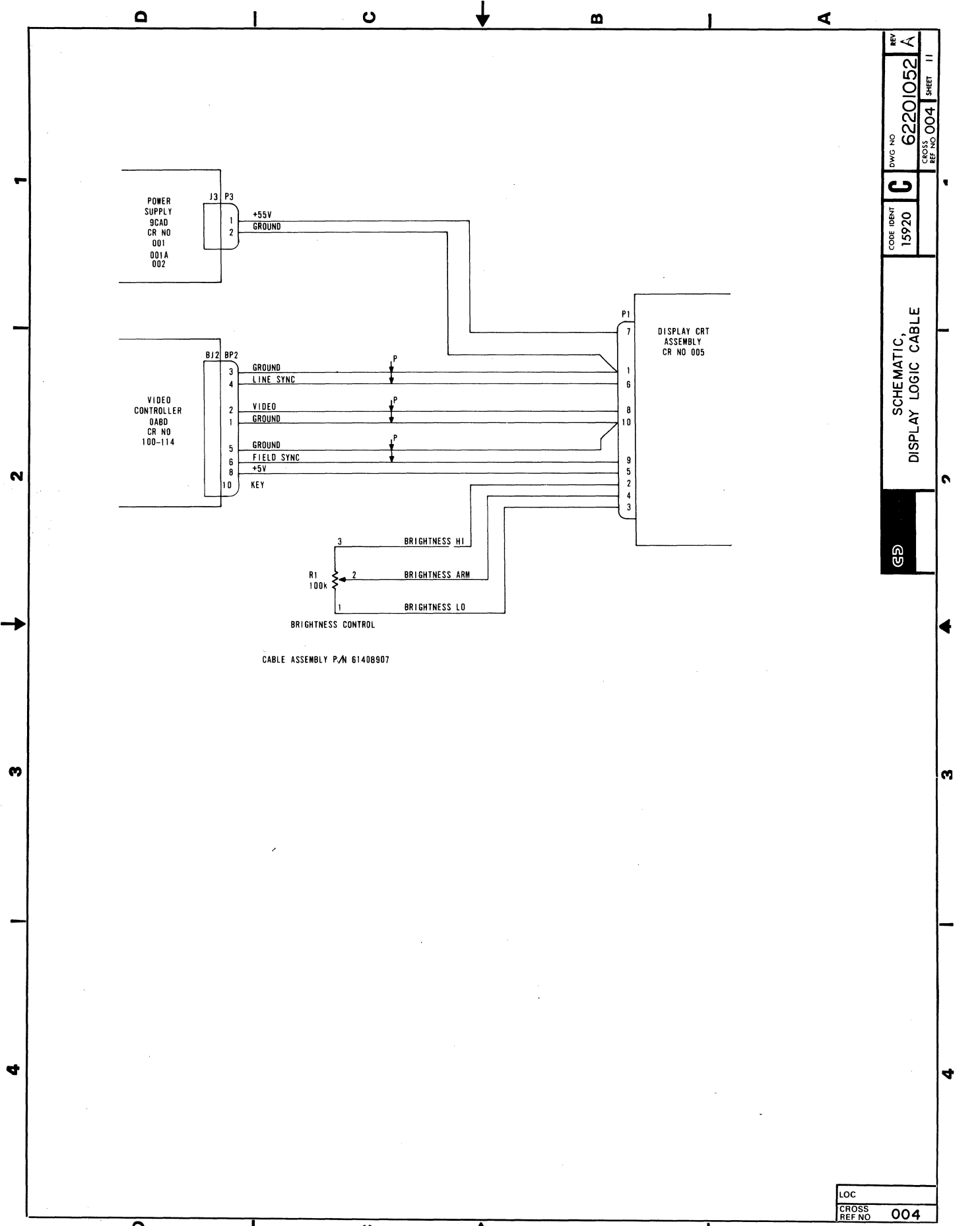
VIDEO CONTROLLER (DABD)  
EXTERNAL CONNECTIONS

REV A  
DWC NO 62201052  
SHEET 10

CODE IDENT 15920  
CROSS REF NO 003



LOC  
CROSS REF NO 003



REV	A
DWG NO	62201052
CODE IDENT	C 15920
CROSS REF NO	004
SHEET	11

SCHEMATIC,  
DISPLAY LOGIC CABLE

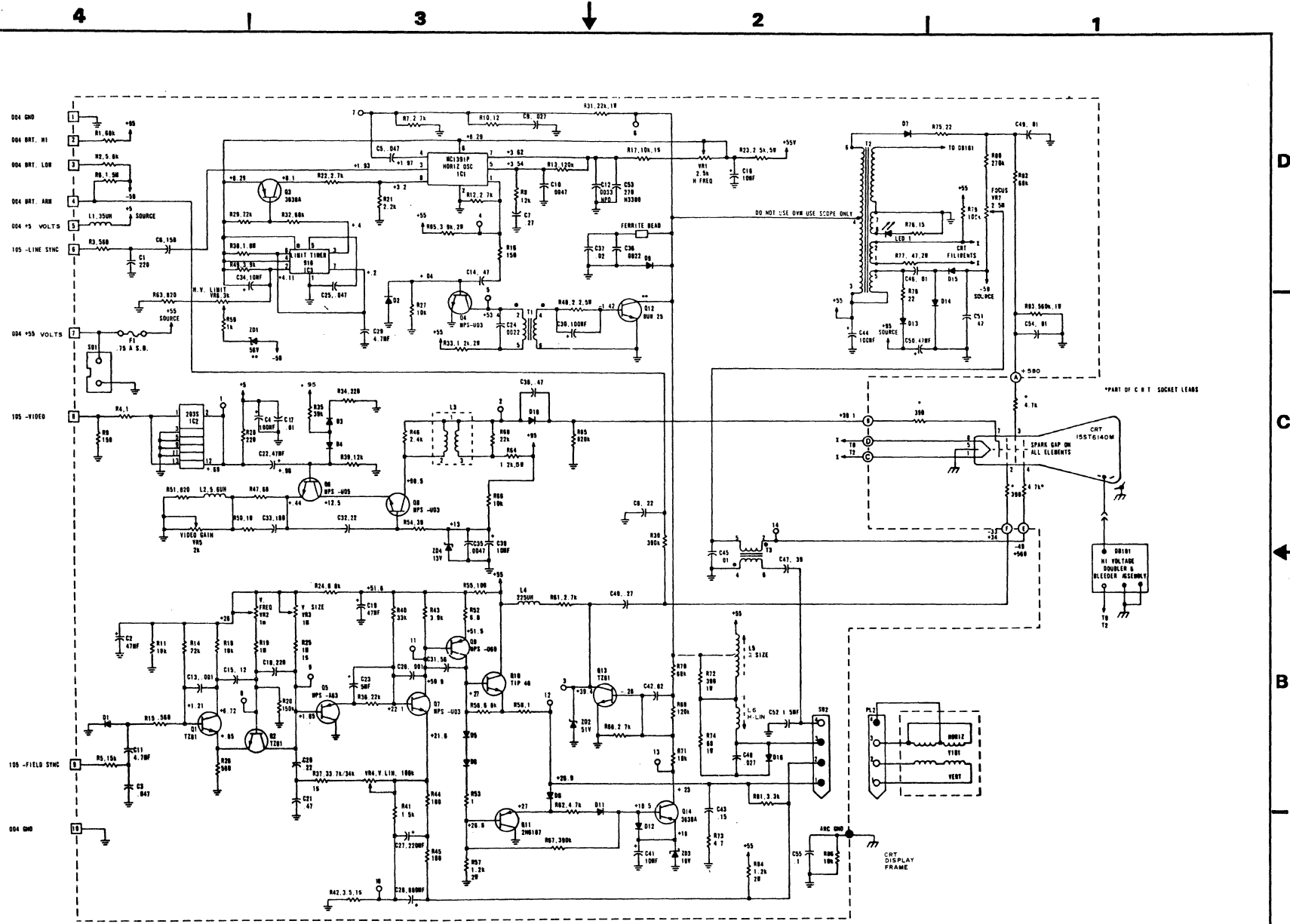
LOC	
CROSS REF NO	004

6294007 B

C

B

A



5-13

LOC
CROSS REF NO
005



DISPLAY SCHEMATIC

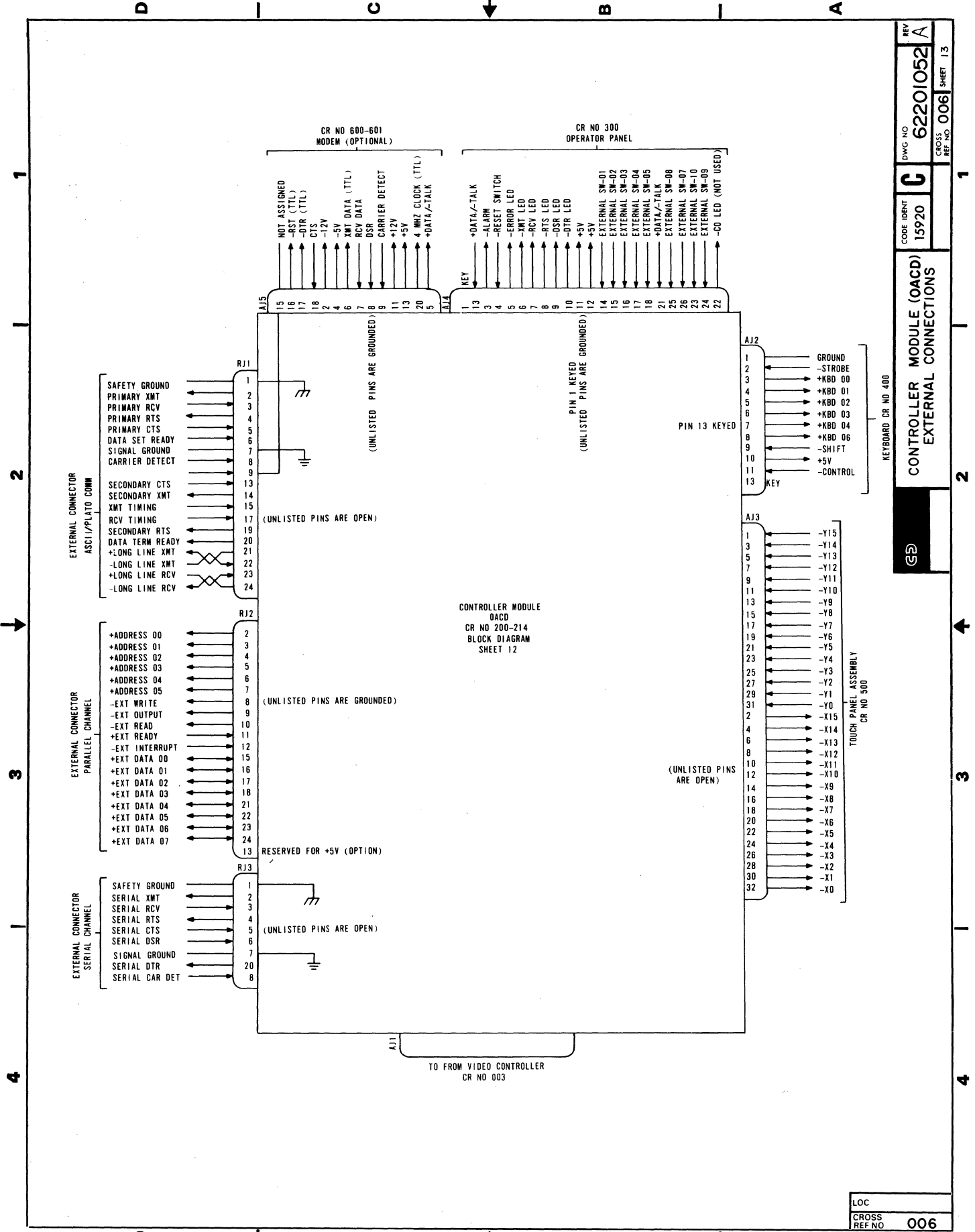
CODE IDENT	15920	DWG NO	C	REV	C
			62201052		
CROSS REF NO	005	SHEET	12		



REV	A
DWG NO	62201052
CODE IDENT	C
CROSS REF NO	006
SHEET	13

**CONTROLLER MODULE (OACD)**  
EXTERNAL CONNECTIONS

GP

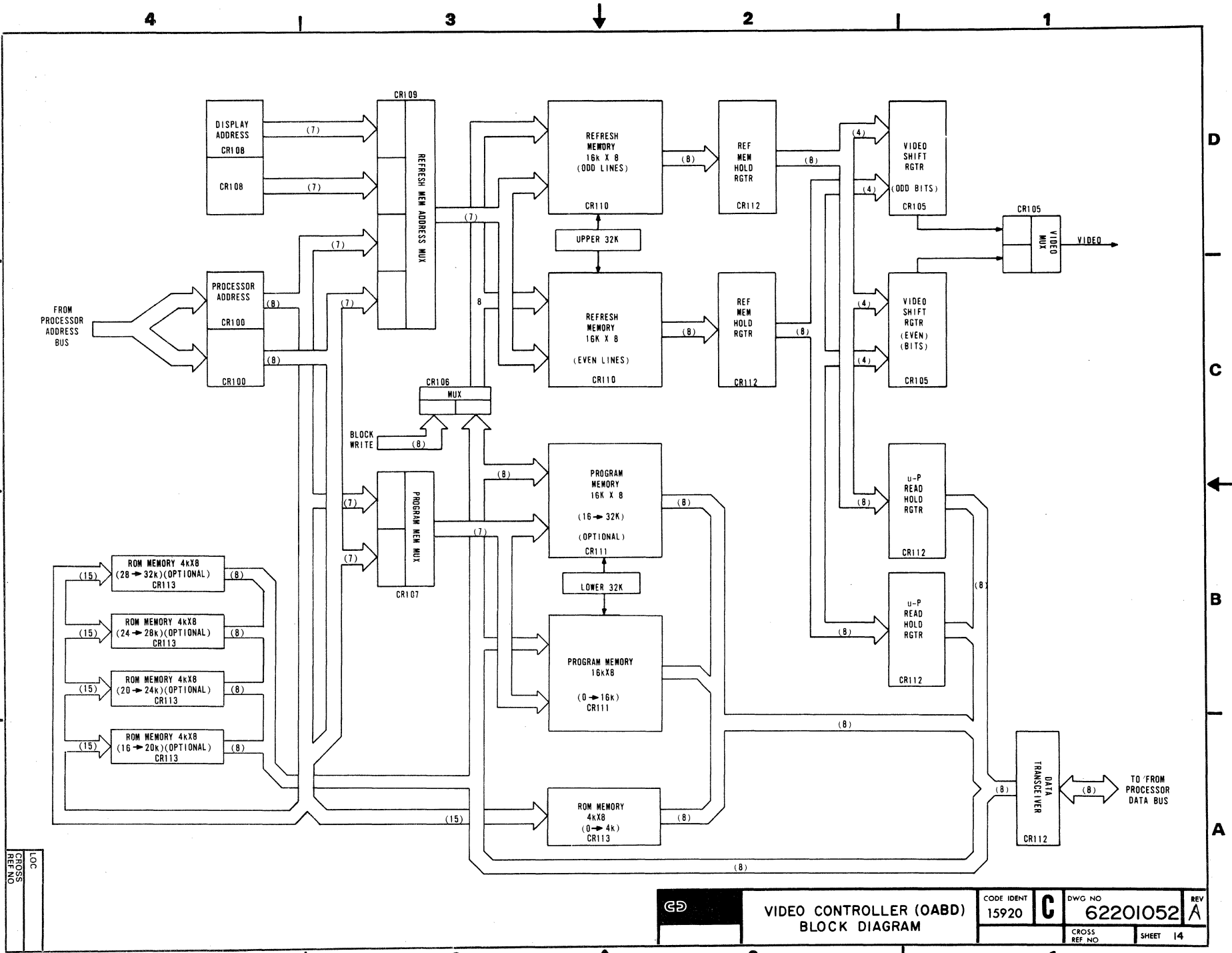


62940007

C

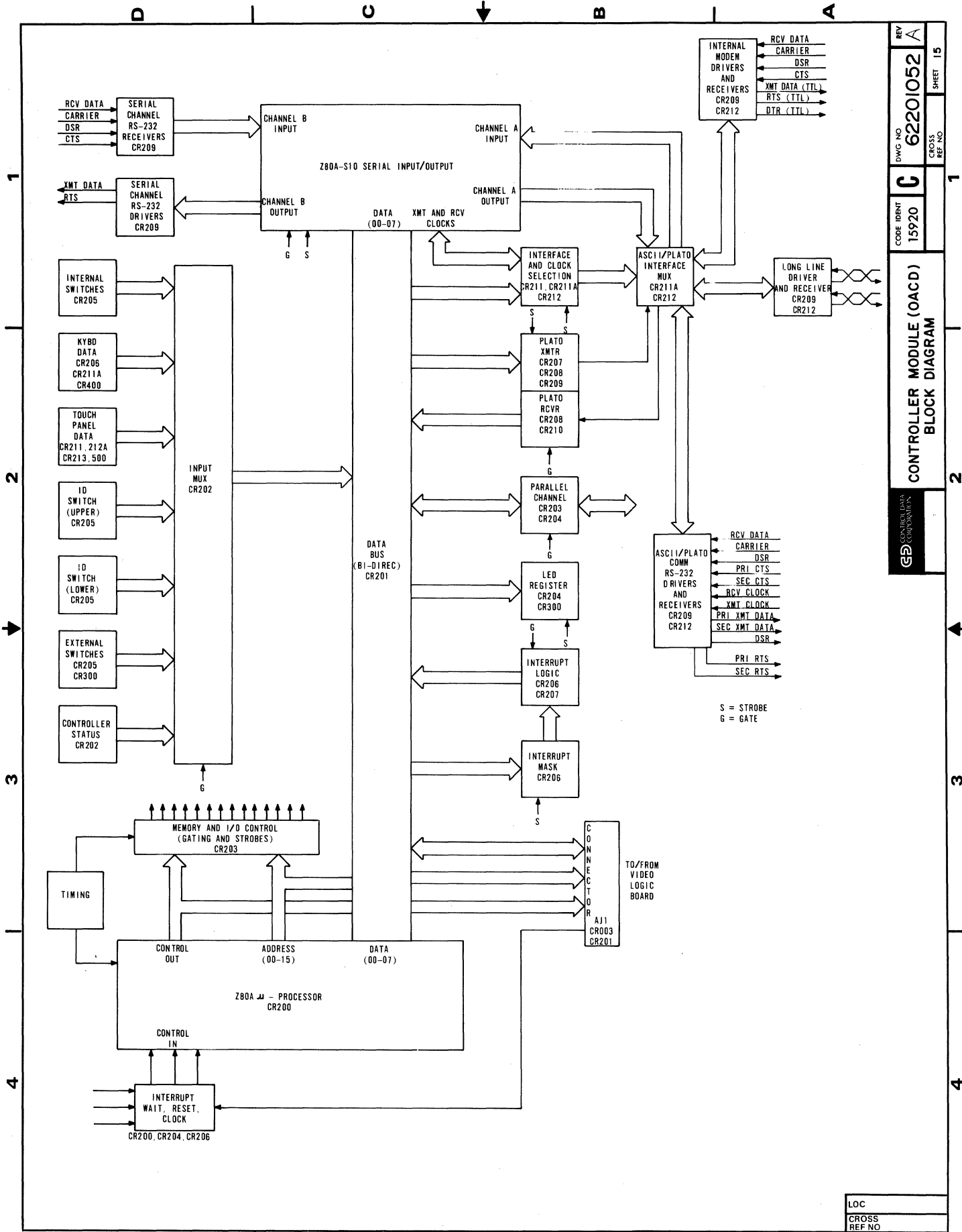
B

5-15



LOC
CROSS REF NO

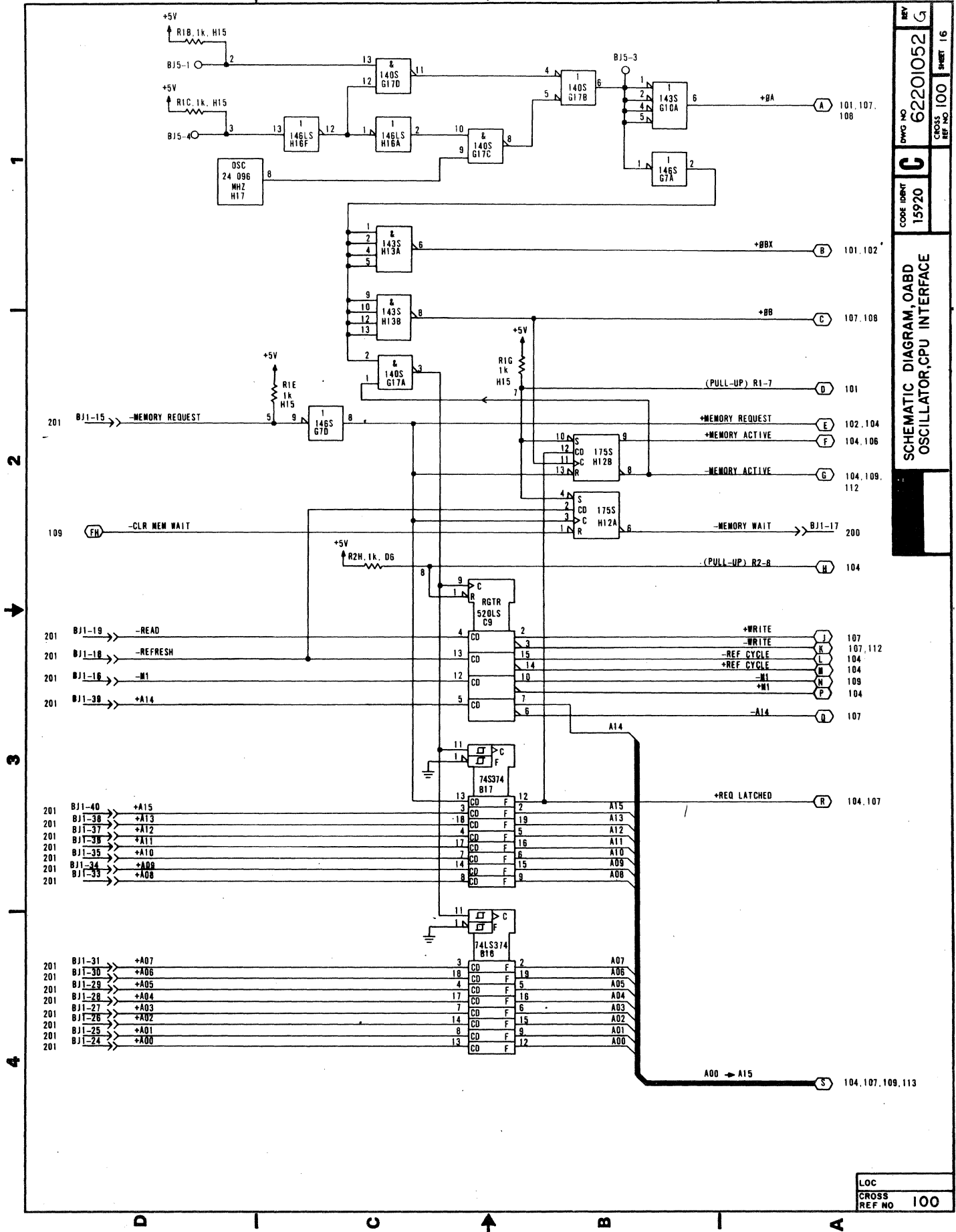
<b>GD</b>	<b>VIDEO CONTROLLER (OABD) BLOCK DIAGRAM</b>		CODE IDENT 15920	DWG NO <b>C</b> 62201052	REV <b>A</b>
			CROSS REF NO	SHEET 14	



REV	A
DWG NO.	62201052
CODE IDENT	C
CROSS REF NO.	15920
SHEET	15
<b>CONTROLLER MODULE (OACD) BLOCK DIAGRAM</b>	
GD CONTROL DATA CORPORATION	

LOC  
CROSS REF NO

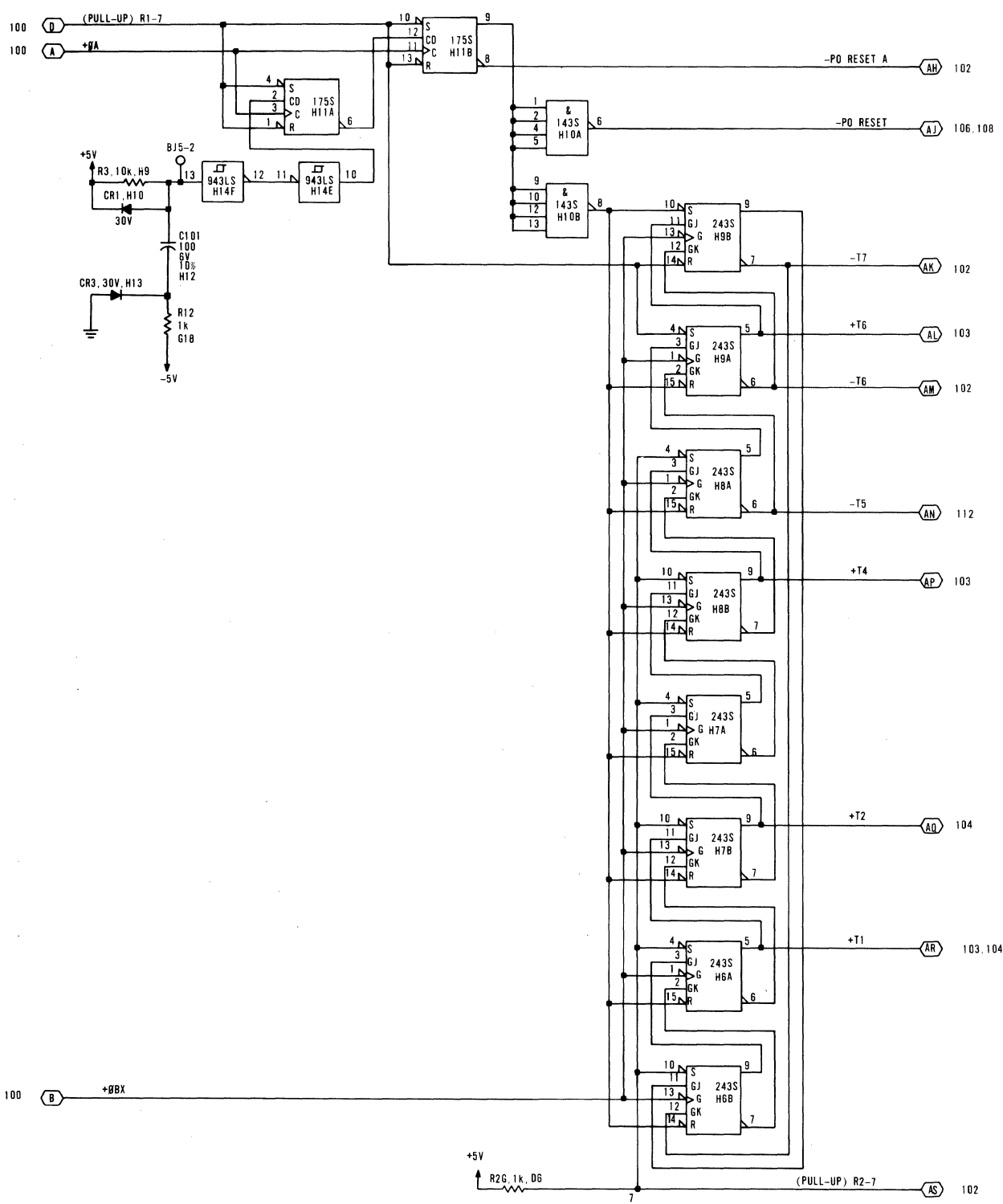
SCHEMATIC DIAGRAM, OABD  
 OSCILLATOR, CPU INTERFACE



LOC	
CROSS REF NO	100

D C B A

1  
2  
3  
4



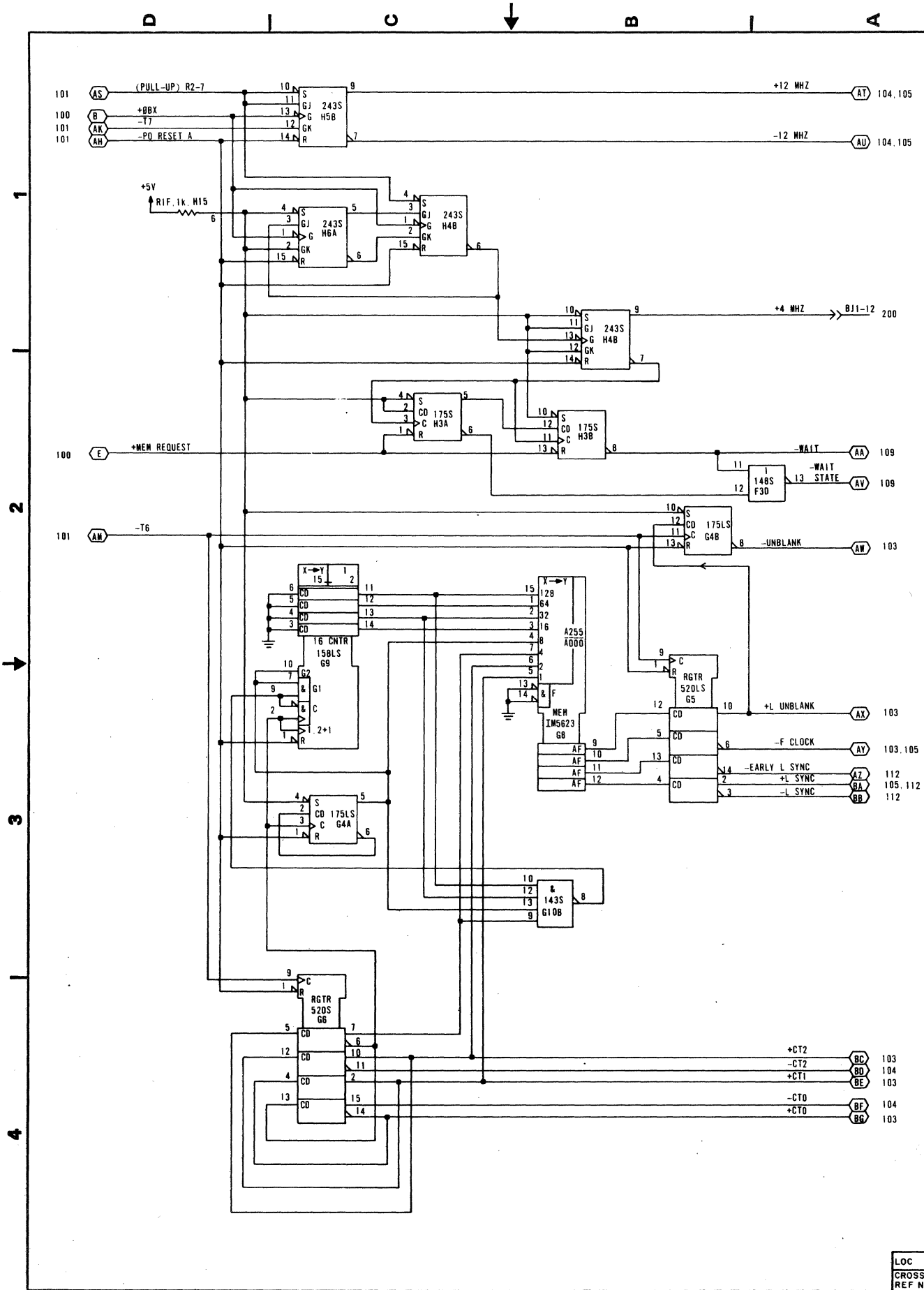
REV	A
DWG NO	62201052
CODE IDENT	C
15920	
CROSS REF NO	101
SHEET	17

SCHEMATIC DIAGRAM, OABD  
DOT TIMING CHAIN

1  
2  
3  
4

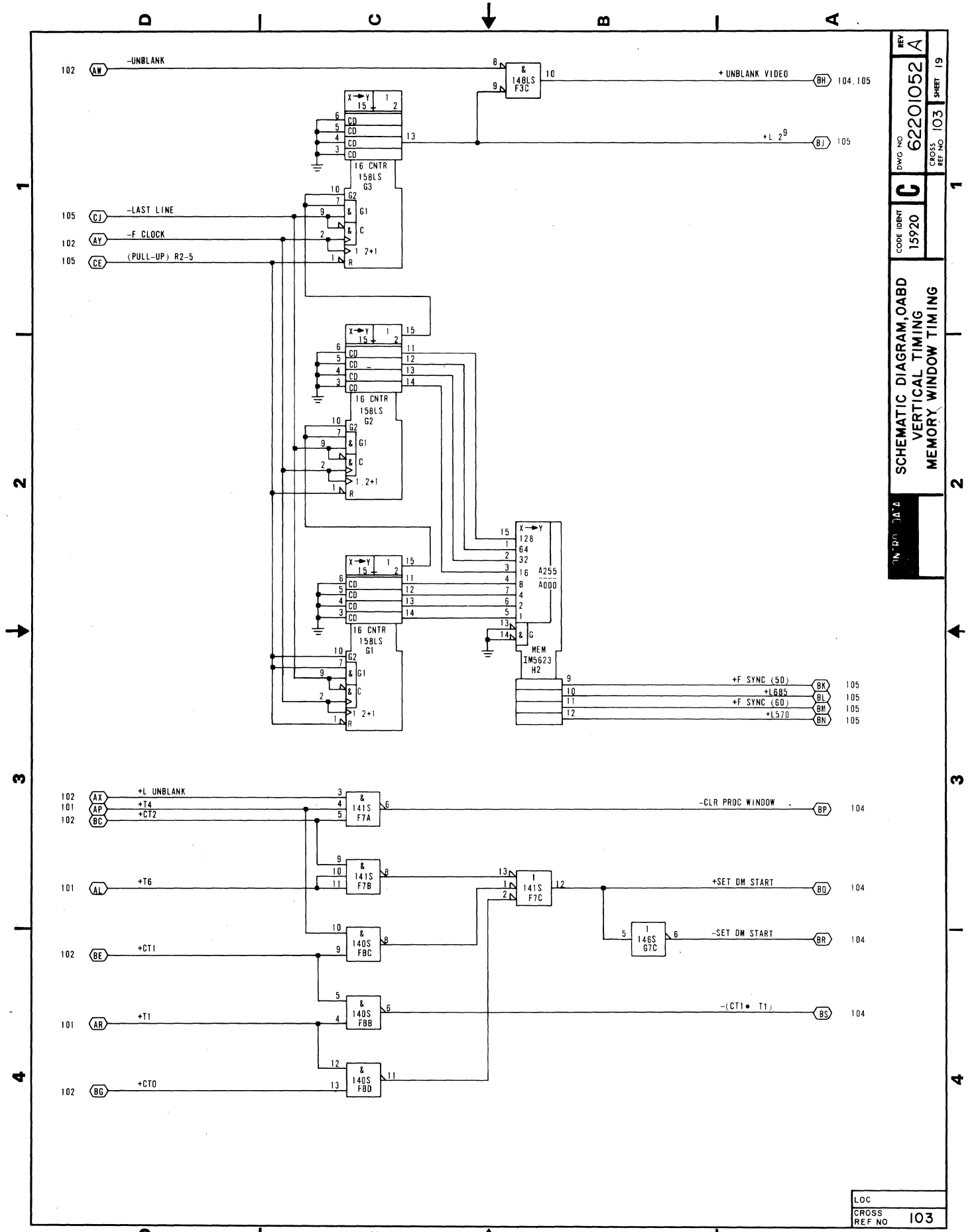
D C B A

LOC	
CROSS REF NO	101



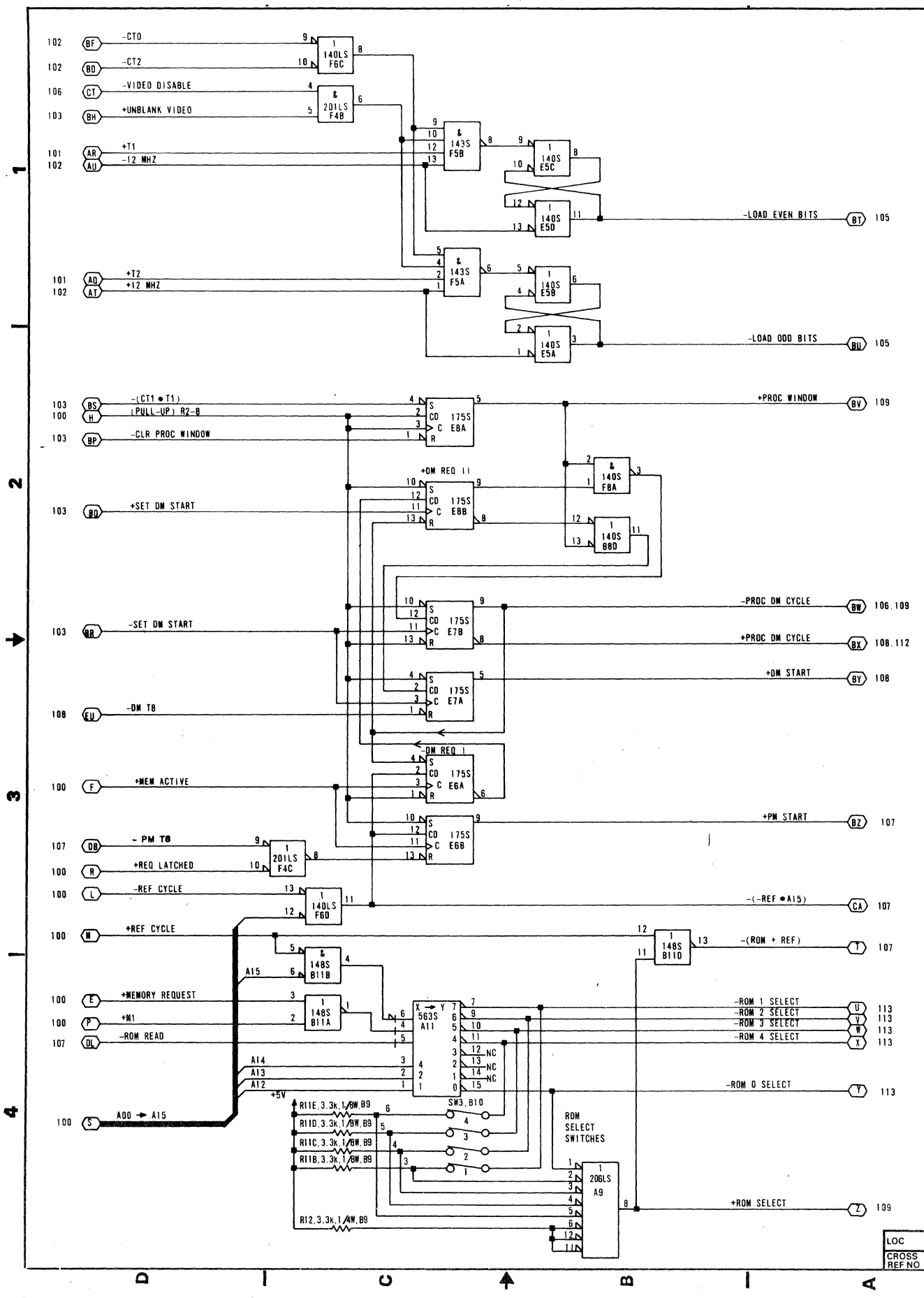
REV A  
 DWG NO 62201052  
 CODE IDENT 15920  
 CROSS REF NO 102  
 SHEET 18  
 SCHEMATIC DIAGRAM, OABD  
 HORIZONTAL TIMING

LOC  
 CROSS REF NO 102



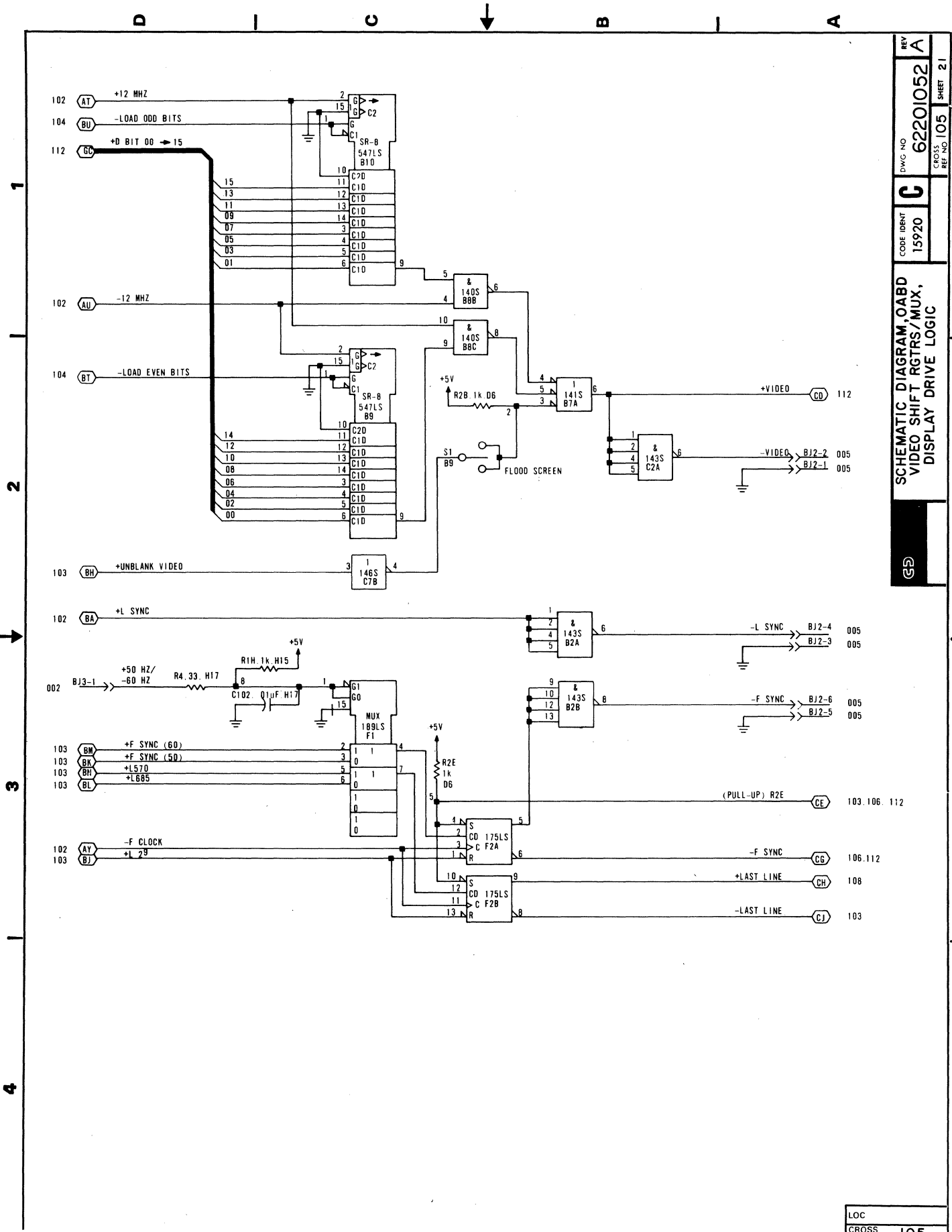
REV	A
DWG NO	62201052
CROSS REF NO	103
SHEET	19
CODE IDENT	15920
SCHEMATIC DIAGRAM, OABD	
VERTICAL TIMING	
MEMORY WINDOW TIMING	

LOC	
CROSS REF NO	103



LOC	
CROSS REF NO	104

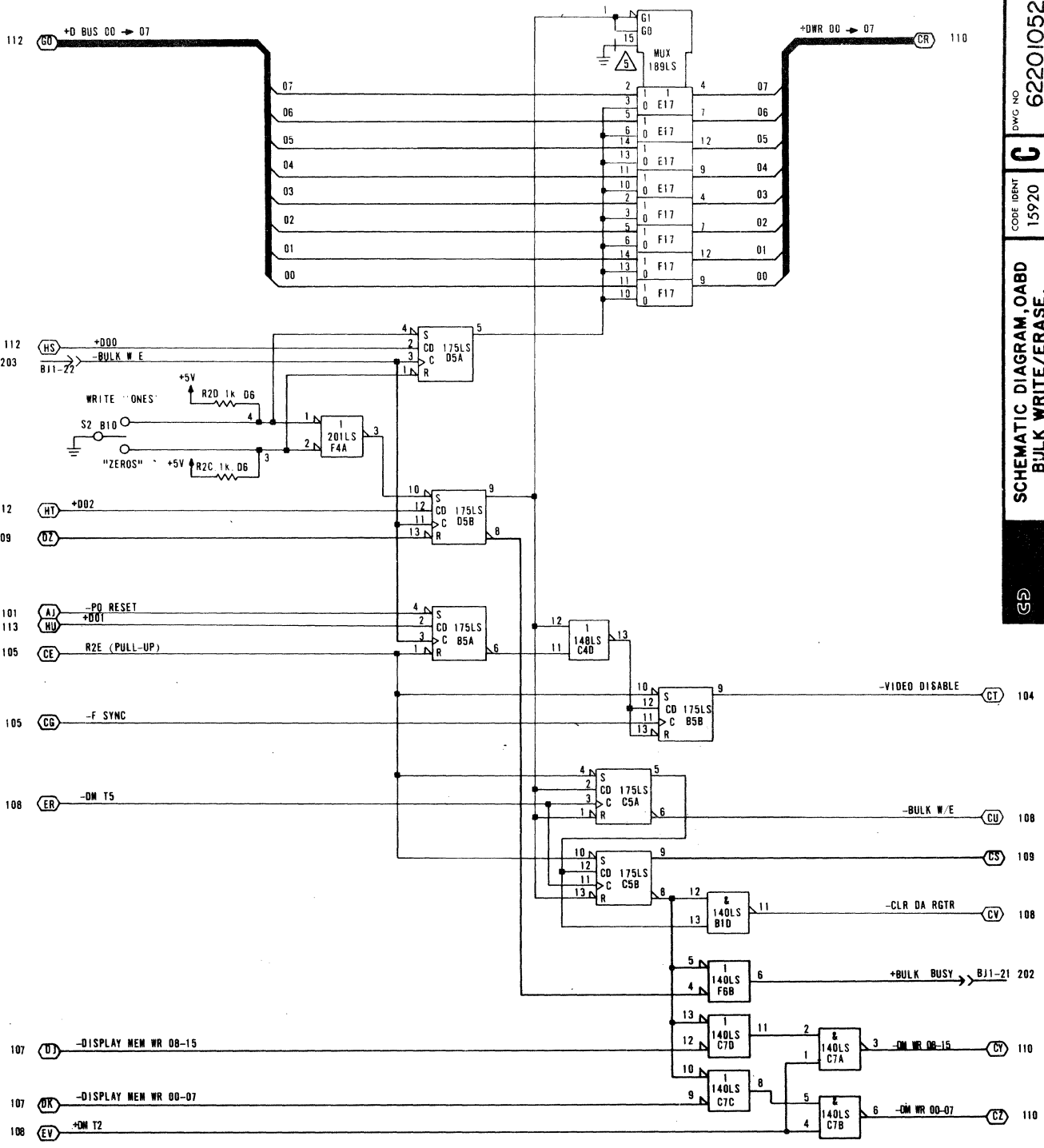





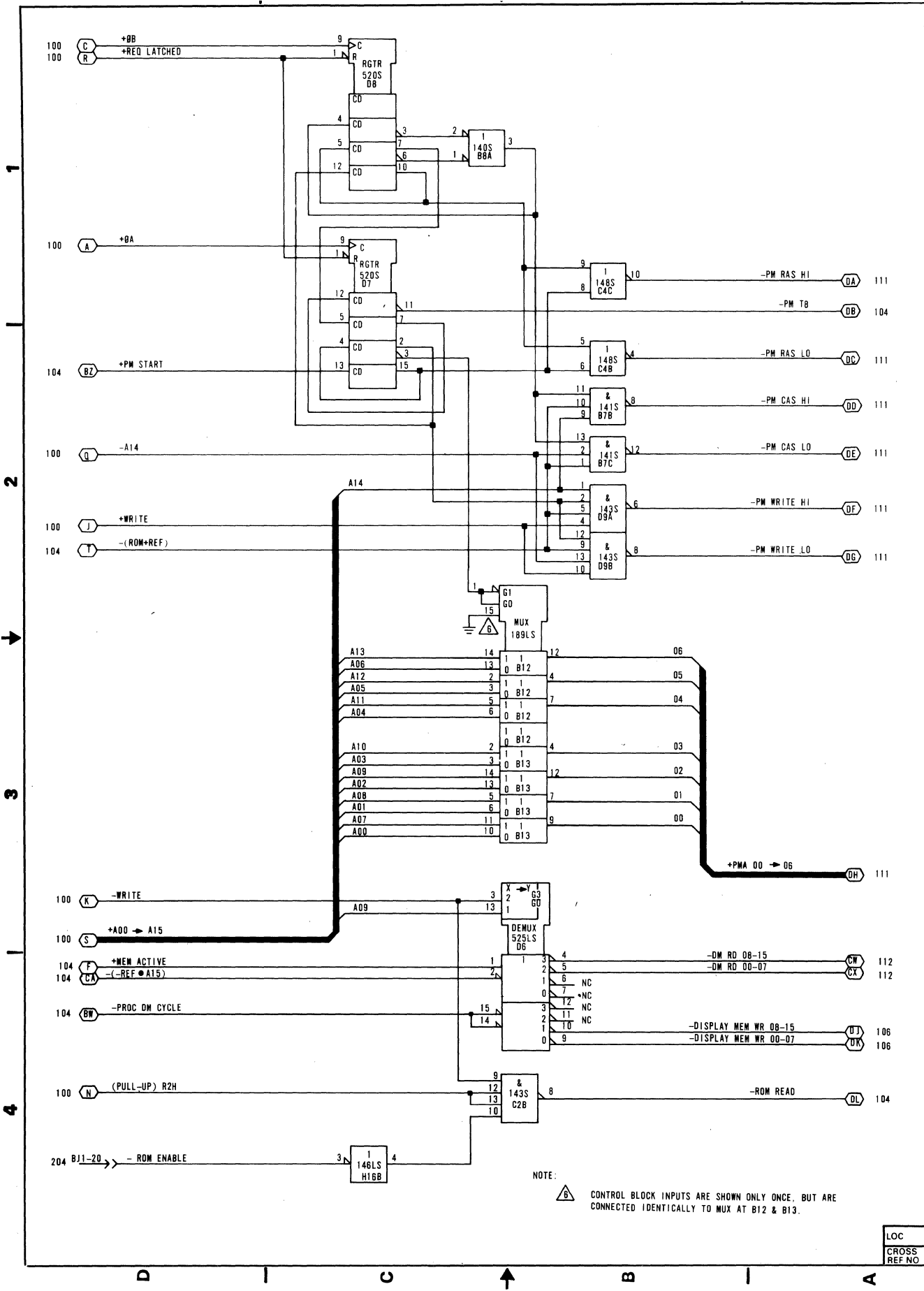
REV	A
DWG NO	62201052
CODE IDENT	C
15920	
CROSS REF NO	105
SHEET	21

**SCHEMATIC DIAGRAM, OABD  
VIDEO SHIFT RGTRS/MUX,  
DISPLAY DRIVE LOGIC**

LOC  
CROSS REF NO 105



NOTE:  
 CONTROL BLOCK INPUTS ARE SHOWN ONLY ONCE, BUT ARE CONNECTED IDENTICALLY TO MUX LOCATED AT E17 & F17.



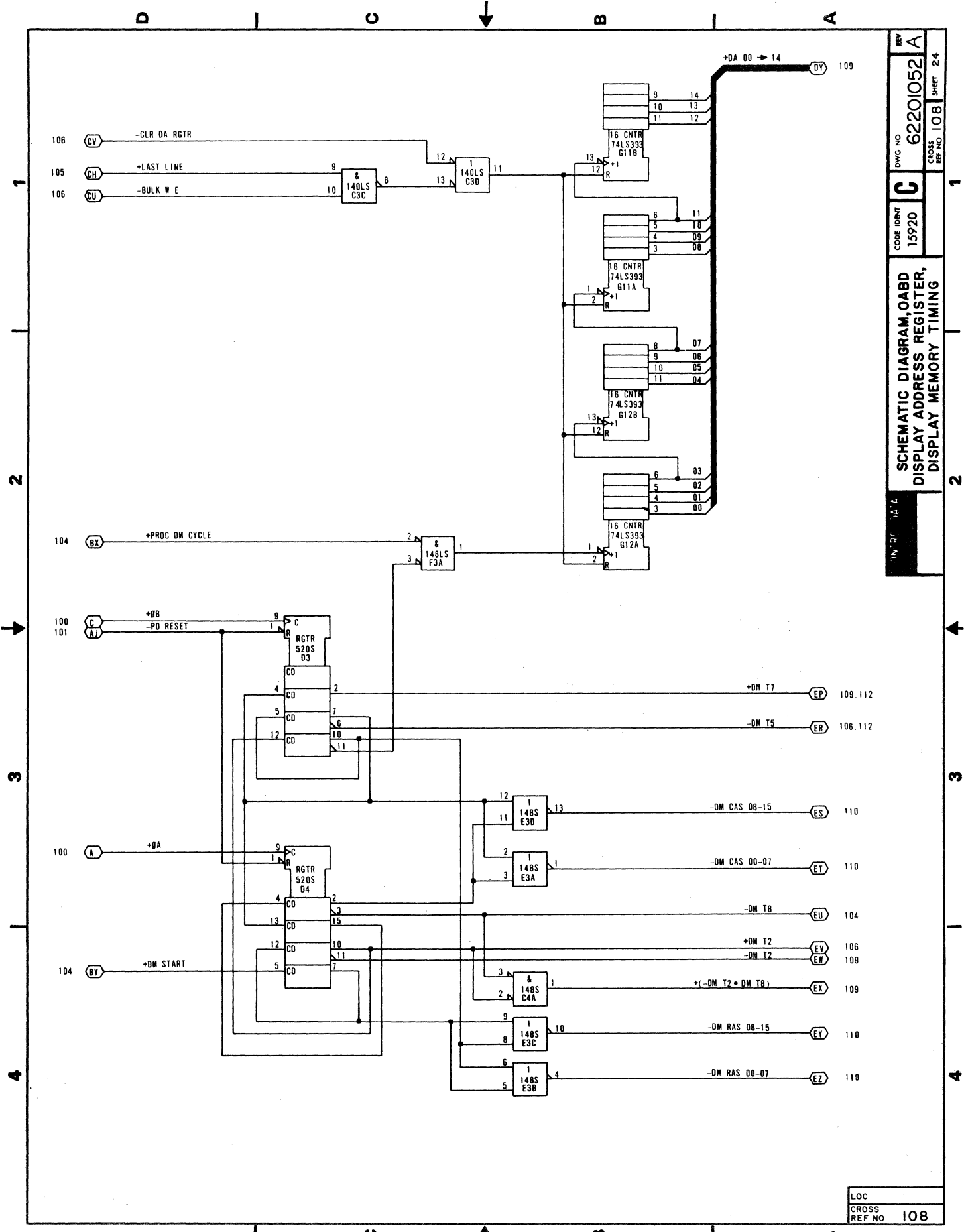
REV G  
 DWG NO 62201052  
 CODE IDENT 15920  
 CROSS REF NO 107  
 SHEET 23

**G**

**S** SCHEMATIC DIAGRAM, OABD  
 PROCESSOR MEMORY TIMING

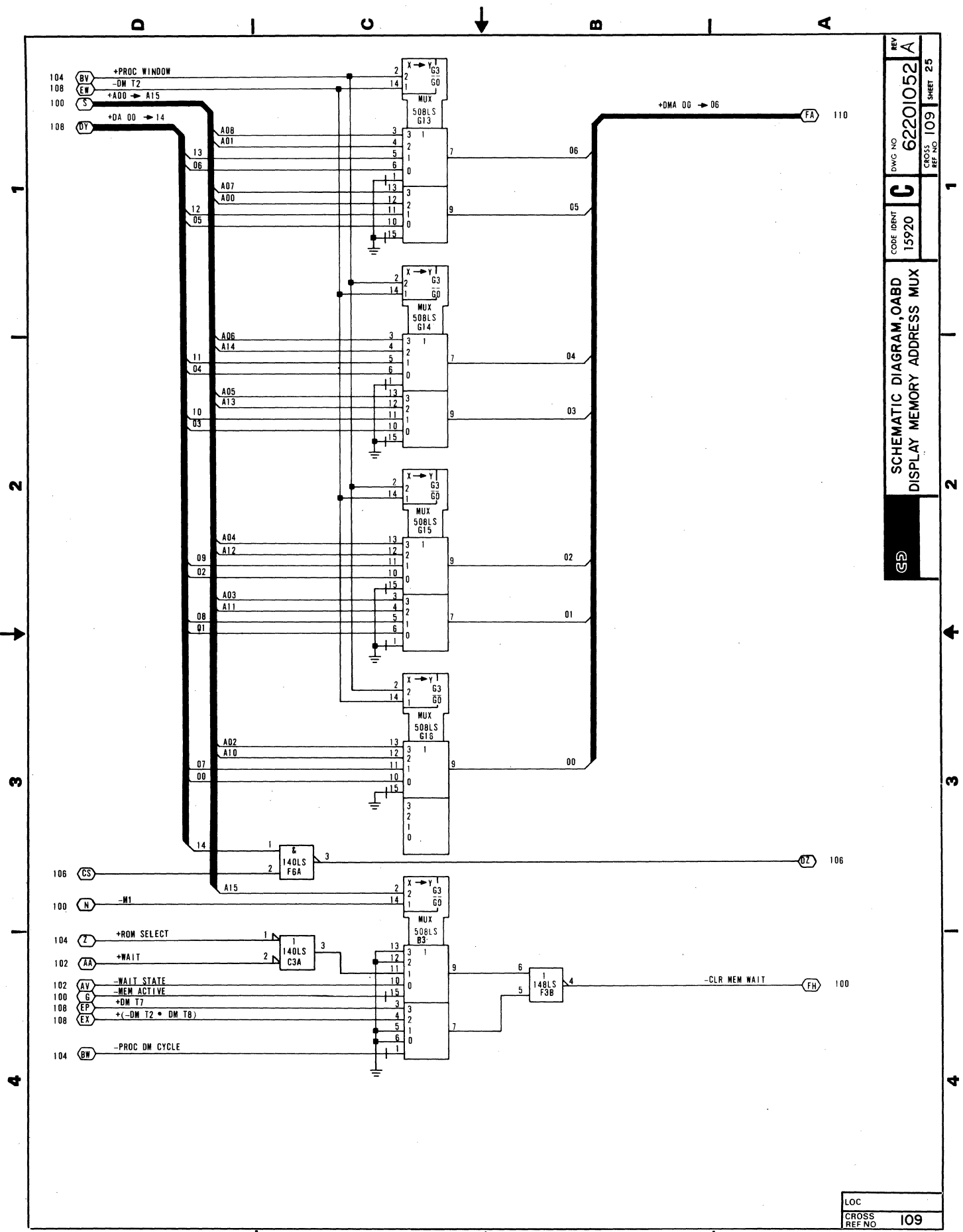
NOTE:  
 ⚠ CONTROL BLOCK INPUTS ARE SHOWN ONLY ONCE, BUT ARE CONNECTED IDENTICALLY TO MUX AT B12 & B13.

LOC	
CROSS REF NO	107



REV	A
DWG NO	62201052
CODE IDENT	C
15920	
CROSS REF NO	108
SHEET	24
<b>SCHEMATIC DIAGRAM, OABD DISPLAY ADDRESS REGISTER, DISPLAY MEMORY TIMING</b>	
IN. BY	J.A.T.

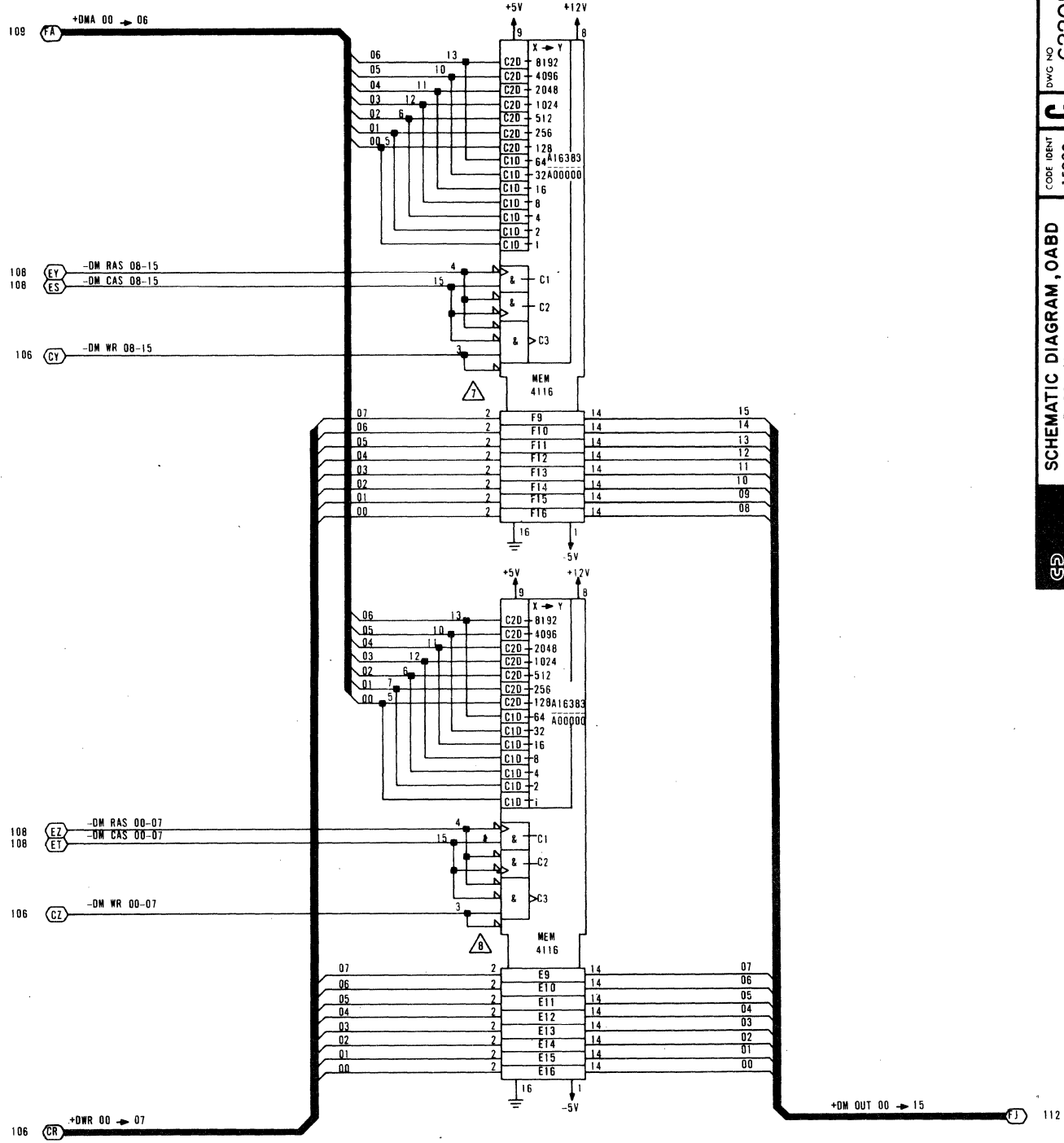
LOC  
CROSS  
REF NO 108



REV	A
DWG NO	62201052
CODE IDENT	C
15920	
CROSS REF NO	109
SHEET	25
SCHEMATIC DIAGRAM, OABD DISPLAY MEMORY ADDRESS MUX	
(G)	

D I C B A

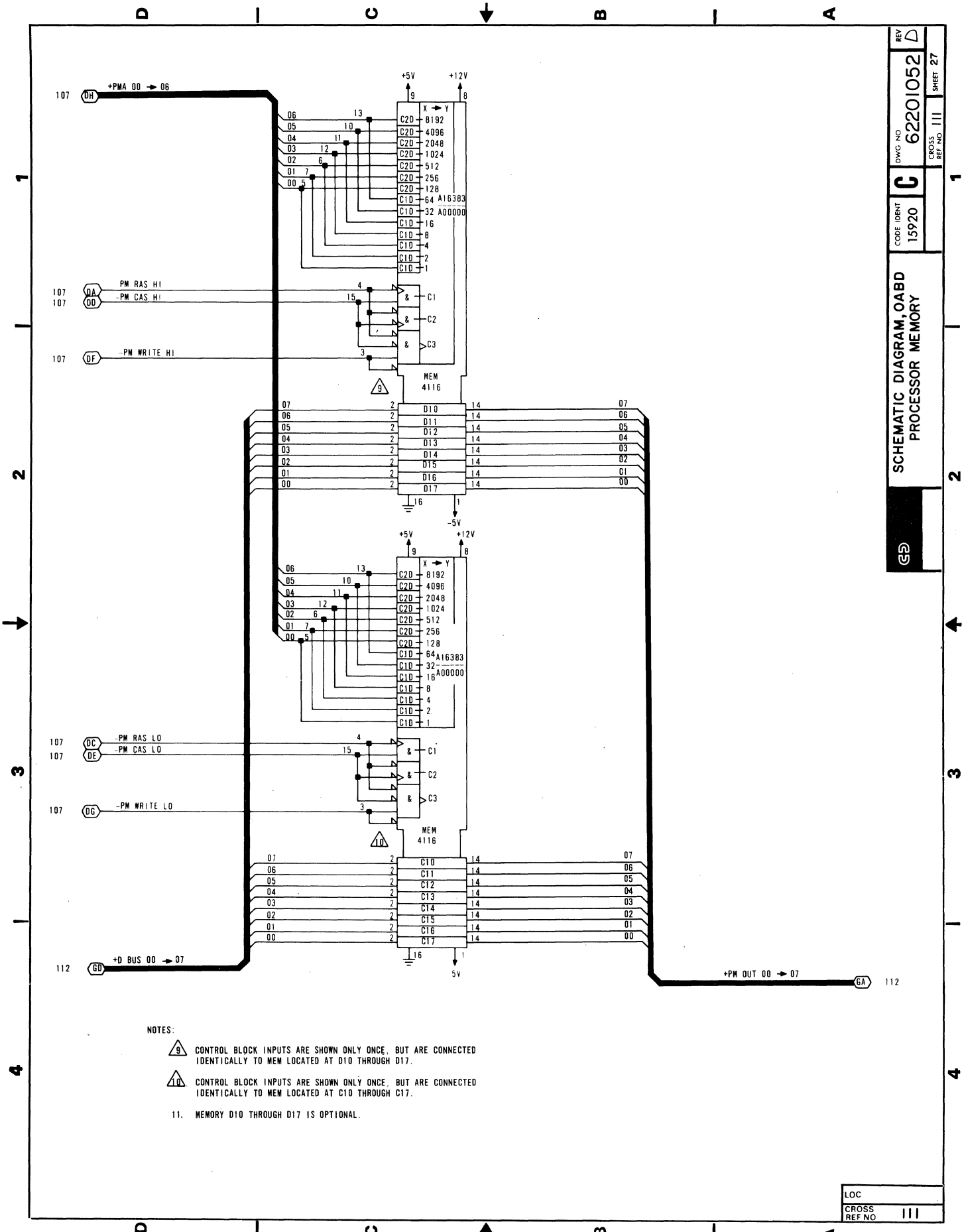
REV	D
DWG NO	62201052
CROSS REF NO	110
SHEET	26
CODE IDENT	C
15920	
SCHEMATIC DIAGRAM, OABD DISPLAY MEMORY	
GE	



NOTES:

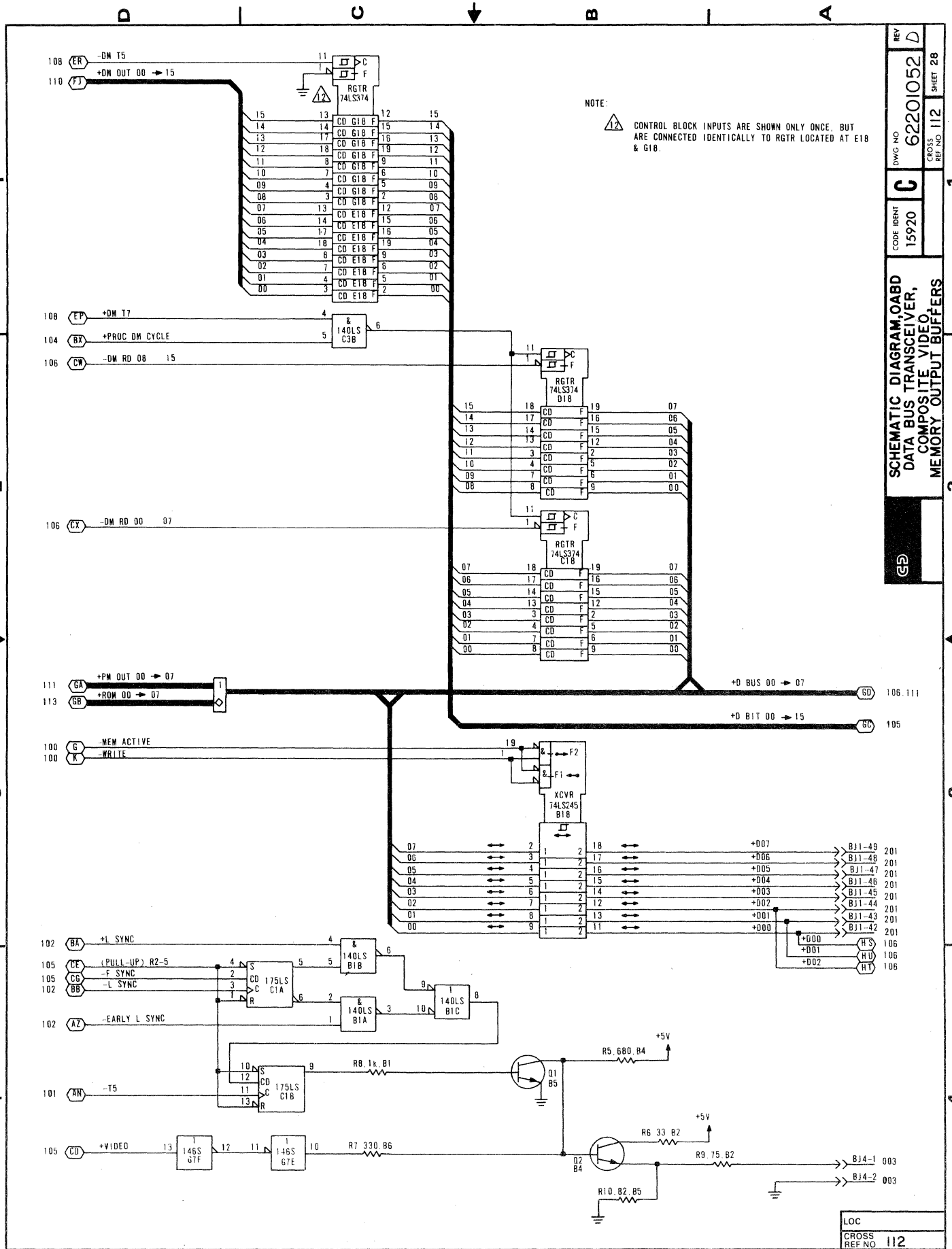
- ⚠ CONTROL BLOCK INPUTS ARE SHOWN ONLY ONCE, BUT ARE CONNECTED IDENTICALLY TO MEM LOCATED AT F9 THROUGH F16.
- ⚠ CONTROL BLOCK INPUTS ARE SHOWN ONLY ONCE, BUT ARE CONNECTED IDENTICALLY TO MEM LOCATED AT E9 THROUGH E16.

LOC  
CROSS REF NO 110



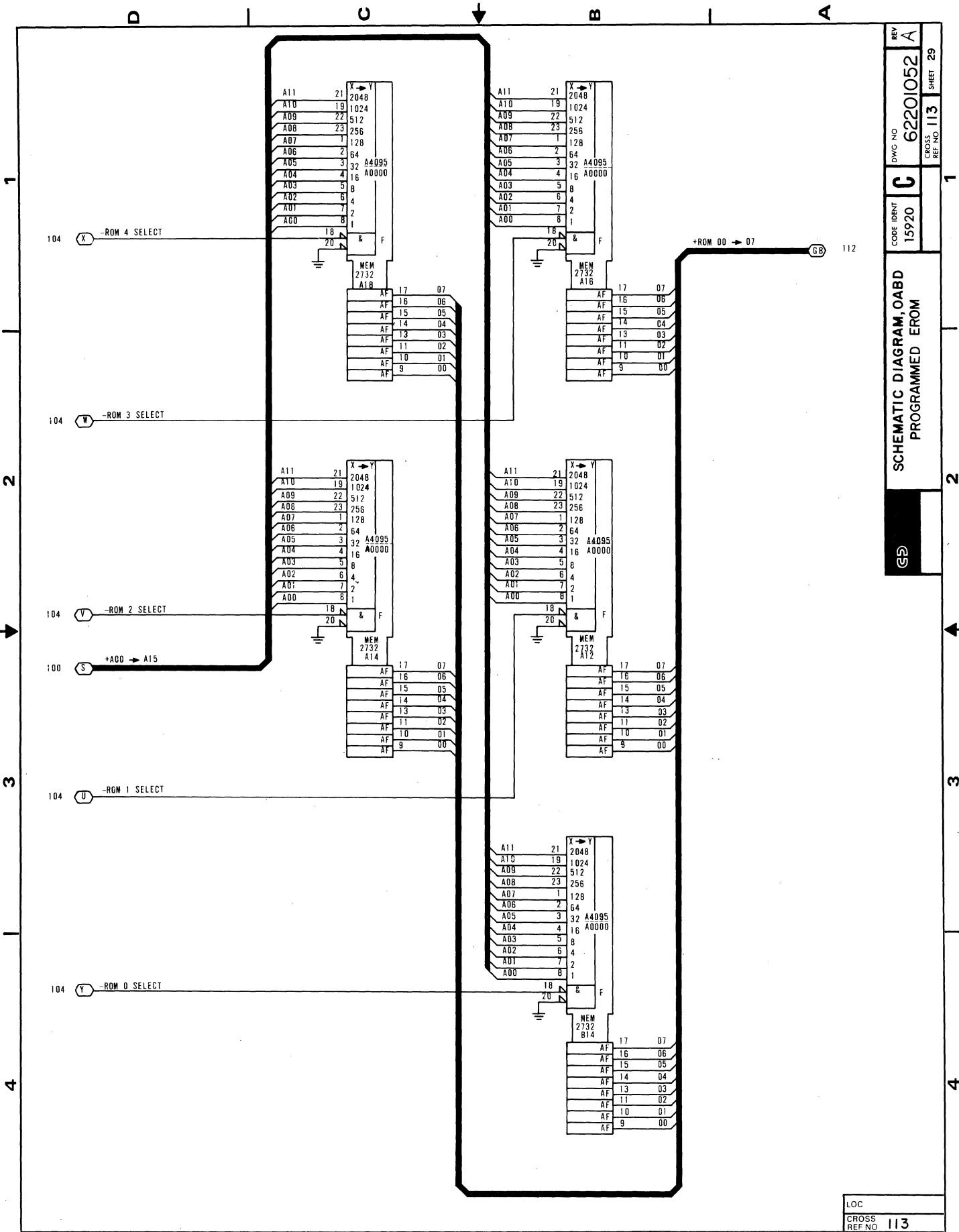
NOTES:

- ⚠ CONTROL BLOCK INPUTS ARE SHOWN ONLY ONCE, BUT ARE CONNECTED IDENTICALLY TO MEM LOCATED AT D10 THROUGH D17.
- ⚠ CONTROL BLOCK INPUTS ARE SHOWN ONLY ONCE, BUT ARE CONNECTED IDENTICALLY TO MEM LOCATED AT C10 THROUGH C17.
- 11. MEMORY D10 THROUGH D17 IS OPTIONAL.



REV D  
DWG NO 62201052  
SHEET 28  
CODE IDENT 15920  
SCHEMATIC DIAGRAM, OABD  
DATA BUS TRANSCEIVER,  
COMPOSITE VIDEO,  
MEMORY OUTPUT BUFFERS





REV A  
 DWG NO 62201052  
 CODE IDENT 15920  
 CROSS REF NO 113  
 SHEET 29

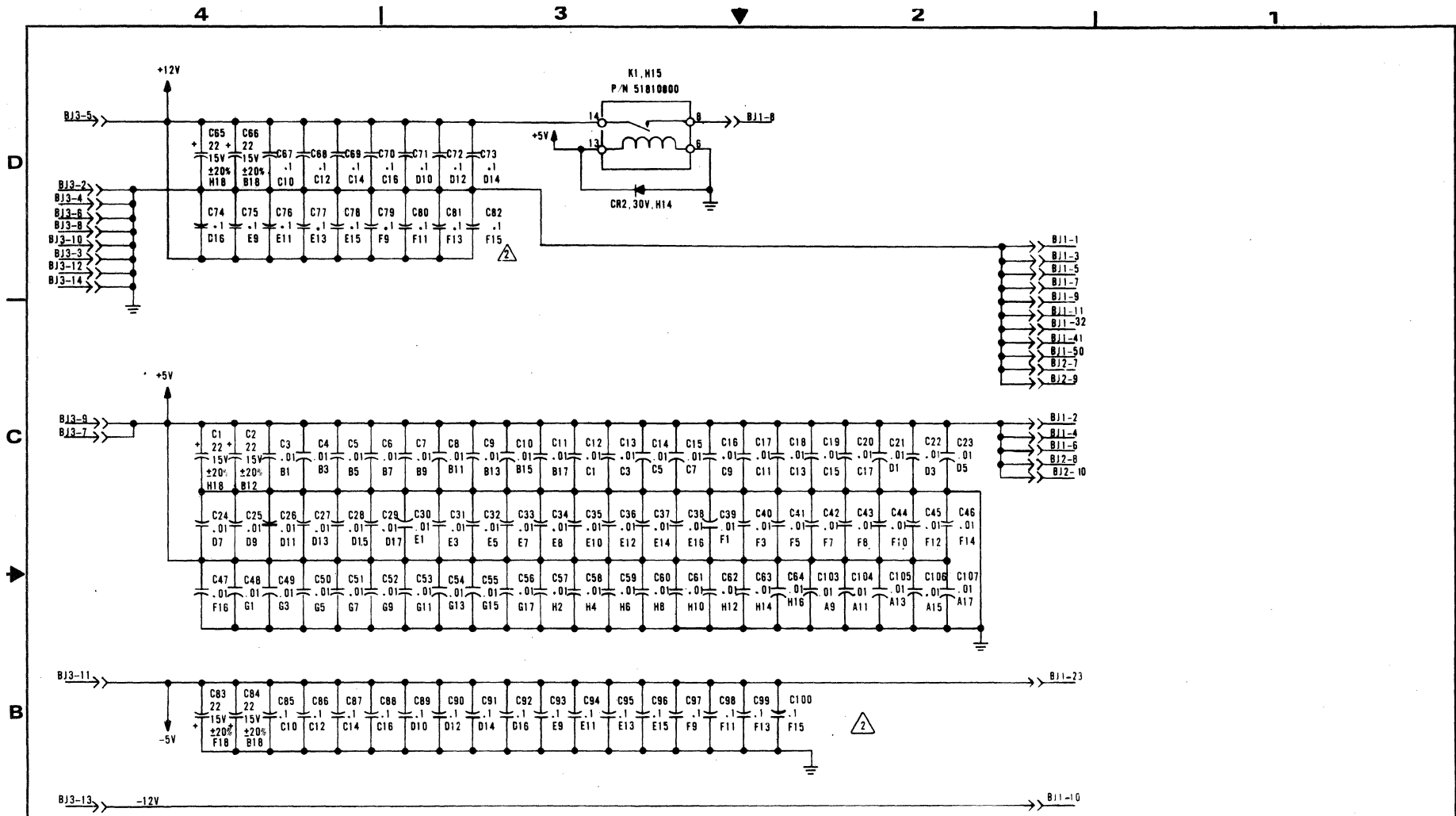
**C**

SCHMATIC DIAGRAM, OABD  
 PROGRAMMED EROM

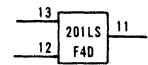
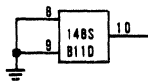
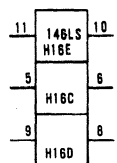
GS

LOC  
 CROSS REF NO 113

62940007 D



SPARES



NOTES:

- UNLESS OTHERWISE SPECIFIED, POWER AND GROUND PINS OF INTEGRATED CIRCUITS ARE AS LISTED BELOW.  
14 PIN INTEGRATED CKTS: PIN 14 = +5V, PIN 7 = GND.  
16 PIN INTEGRATED CKTS: PIN 16 = +5V, PIN 8 = GND.  
24 PIN INTEGRATED CKTS: PIN 24 = +5V, PIN 12 = GND.
- UNLESS OTHERWISE SPECIFIED ALL .1 CAPACITORS ARE ±20%.
- UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W AND ±5%.
- UNLESS OTHERWISE NOTED ALL CIRCUITS ARE PART OF A OADB BOARD.

A

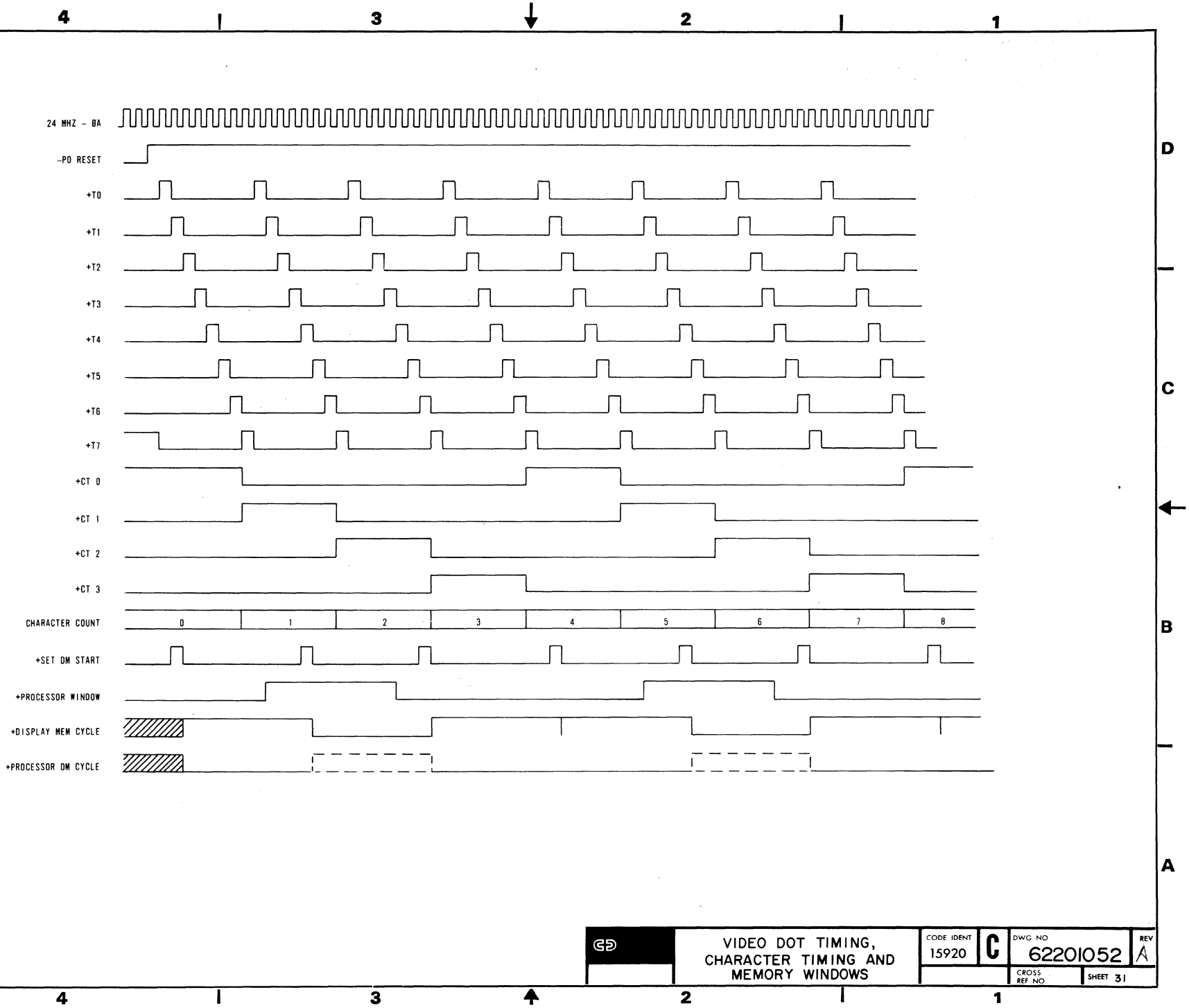
LOC  
CROSS  
REF NO 114

5-31

	VIDEO CONTROLLER MODULE OADB		CODE IDENT 15920	DWG NO 62201052	REV G
	POWER, GROUND, & DECOUPLING		CROSS REF NO 114	SHEET 30	

5-32

62940007

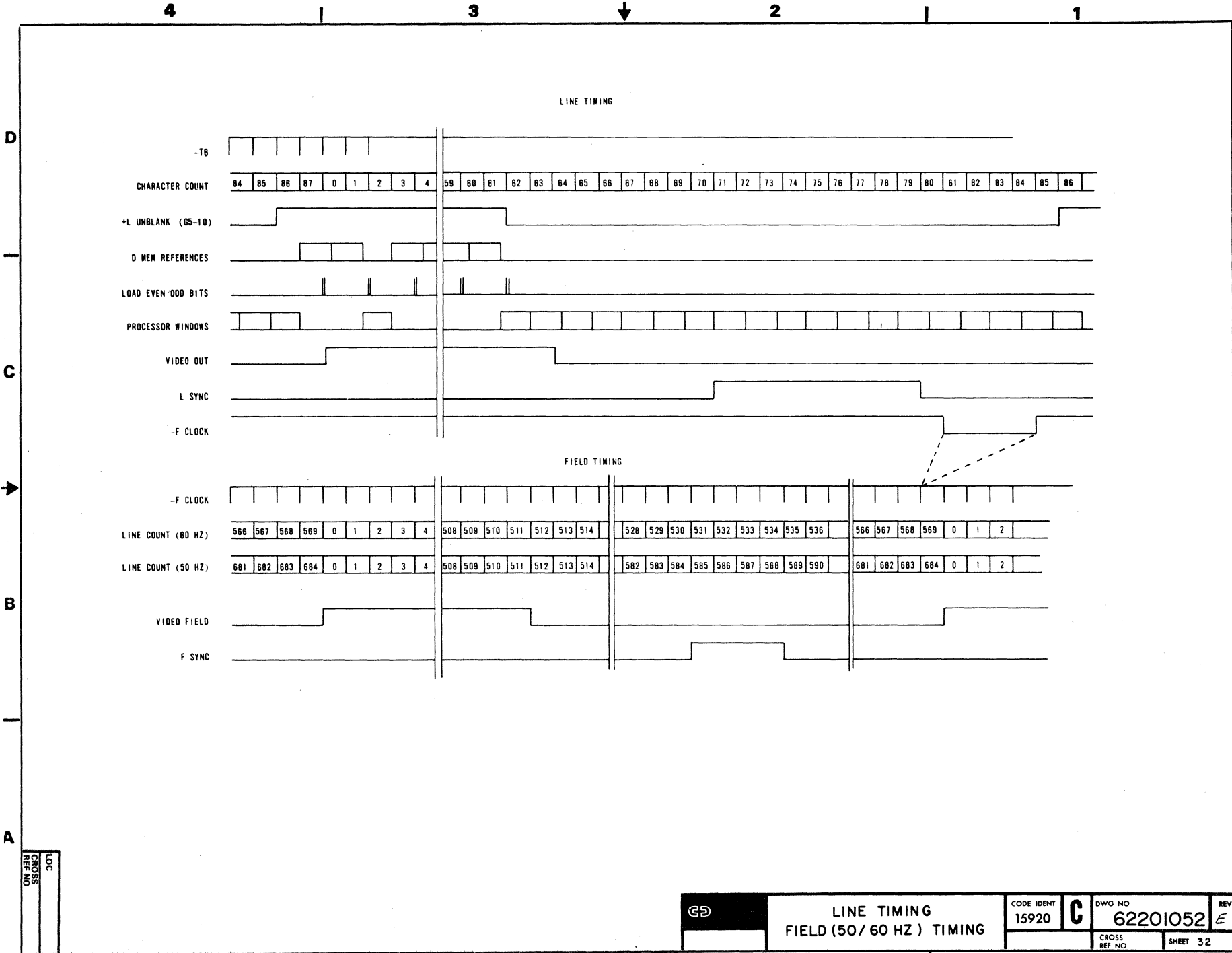


LOC
CROSS REF NO

	<b>VIDEO DOT TIMING, CHARACTER TIMING AND MEMORY WINDOWS</b>		CODE IDENT 15920	<b>C</b>	DWG NO 62201052	REV A
			CROSS REF NO	SHEET 31		

62940007 C

5-33

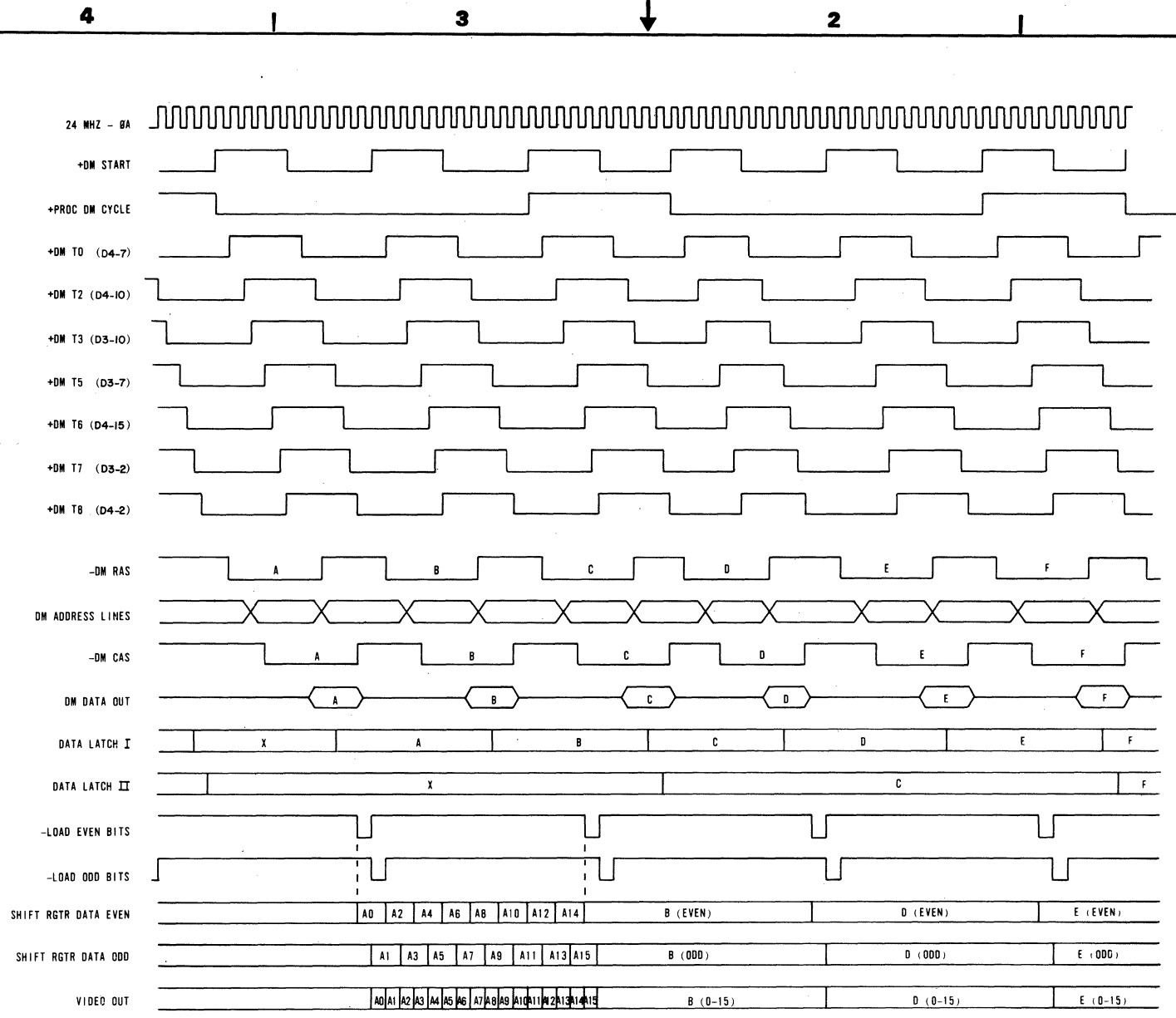


LOC
CROSS REF NO

	<b>LINE TIMING</b> FIELD (50/60 HZ) TIMING		CODE IDENT 15920	DWG NO <b>C</b> 62201052	REV E
			CROSS REF NO	SHEET 32	

5-34

62940007 B



4 1 3 2 1

4 1 3 2 1

D

D

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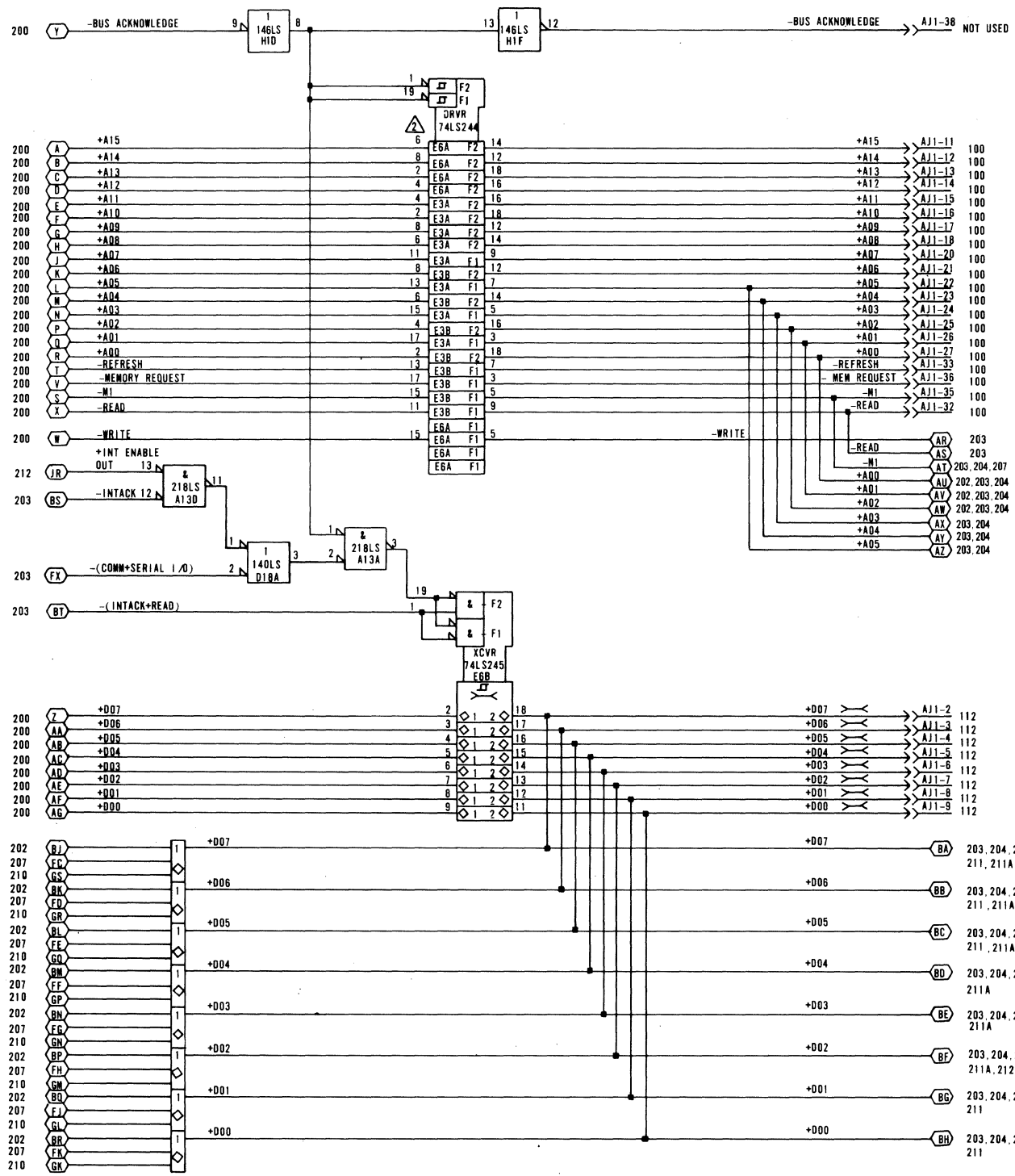
A



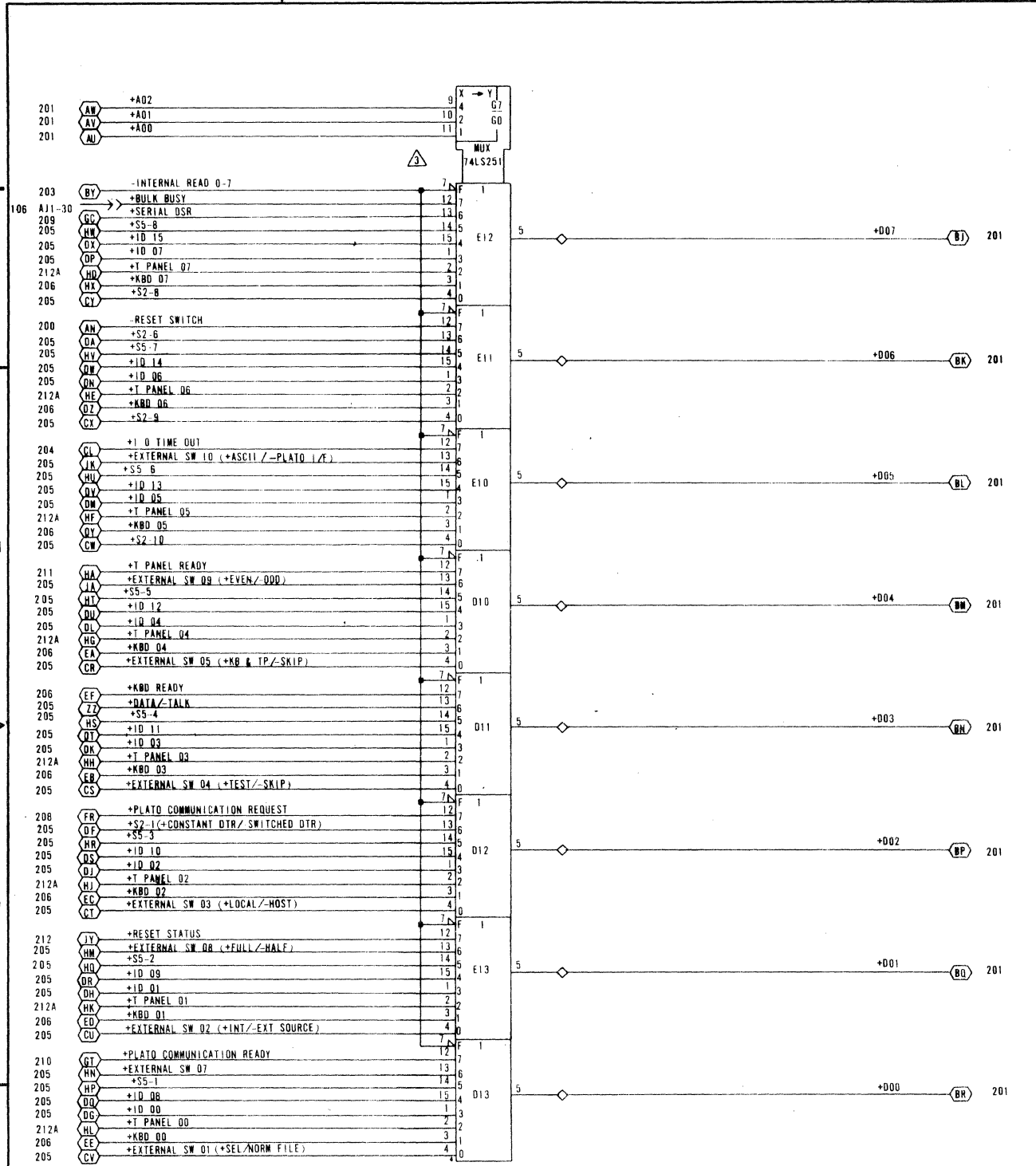
DISPLAY MEMORY TIMING

CODE IDENT 15920	DWG NO <b>C</b> 62201052	REV C
CROSS REF NO	SHEET 33	



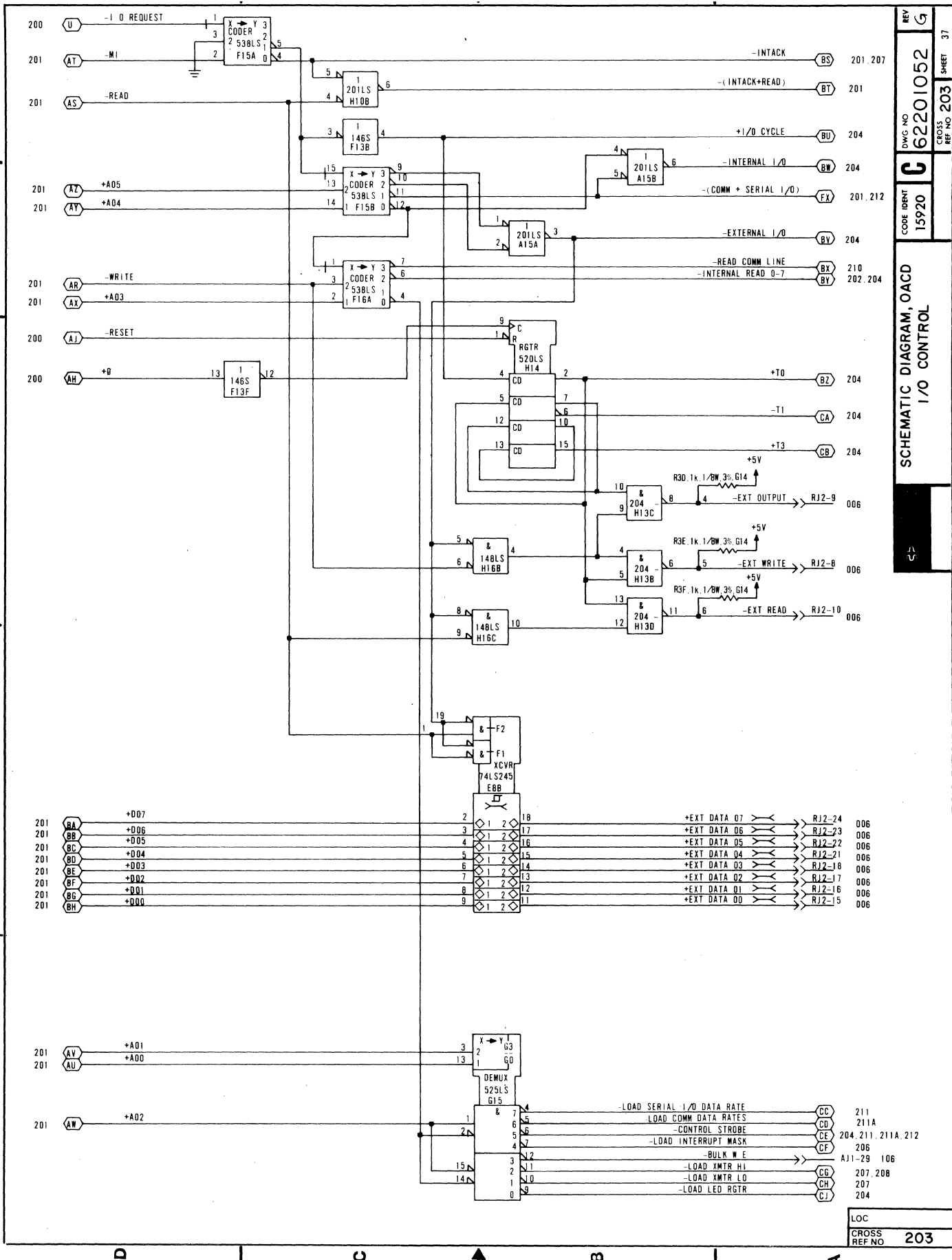


⚠ CONTROL BLOCK INPUTS ARE SHOWN ONLY ONCE, BUT ARE CONNECTED IDENTICALLY TO DRVR LOCATED AT E3A, E3B, AND E6A.



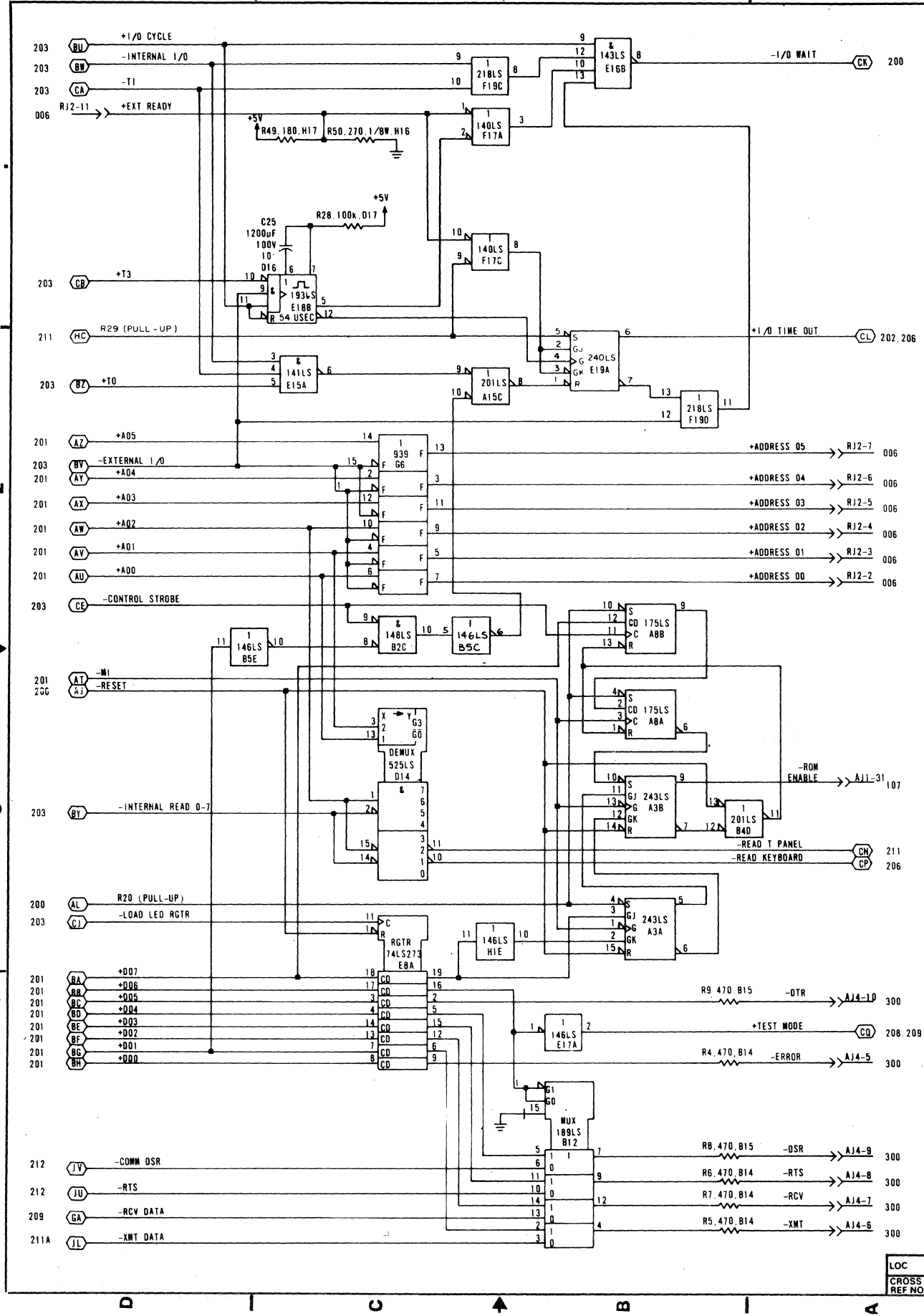
LOC  
 CROSS REF NO 202



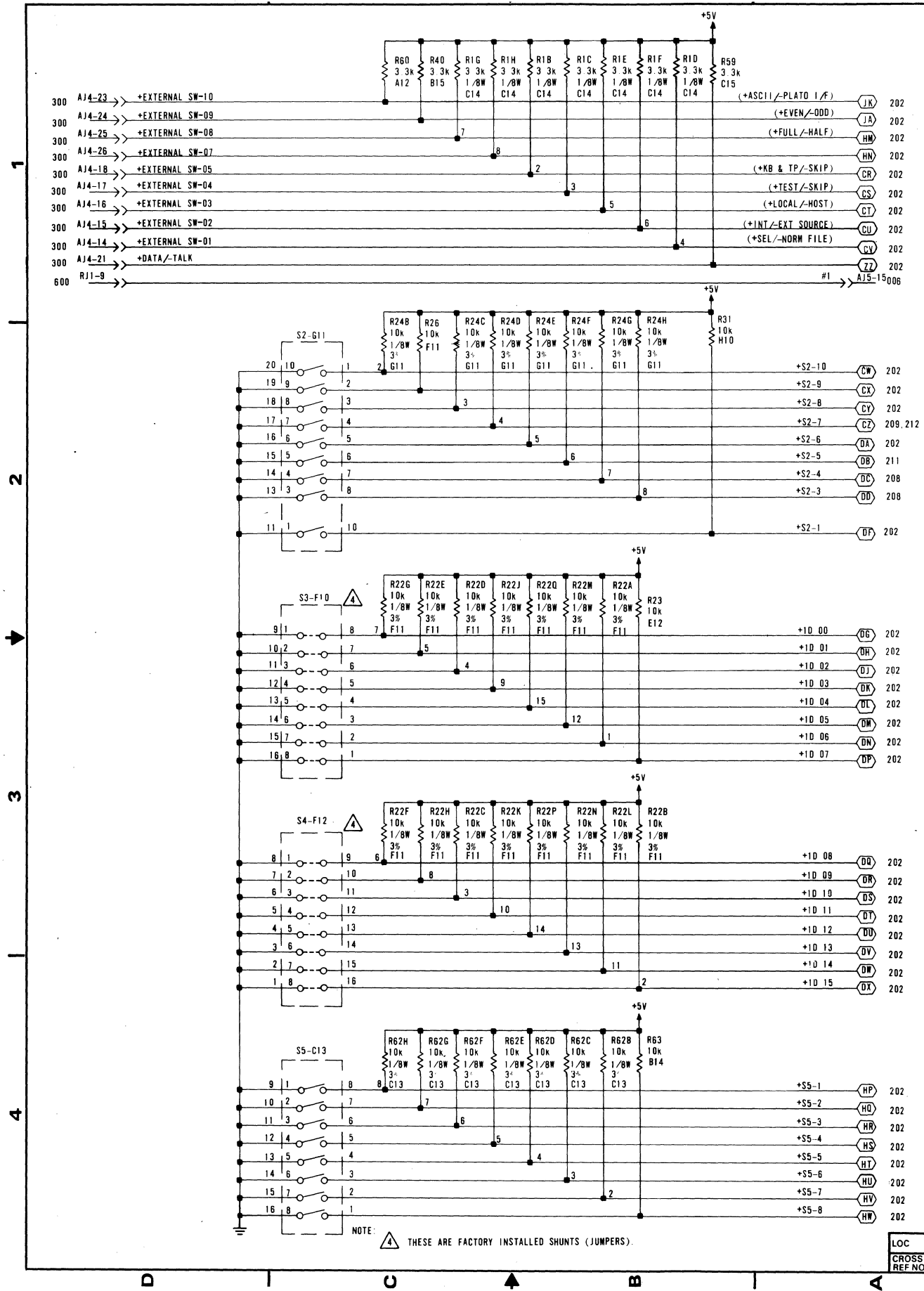


REV G  
 DWG NO 62201052  
 CODE IDENT 15920  
 CROSS REF NO 203  
 SHEET 37  
 SCHEMATIC DIAGRAM, OACD  
 I/O CONTROL

LOC	
CROSS REF NO	203

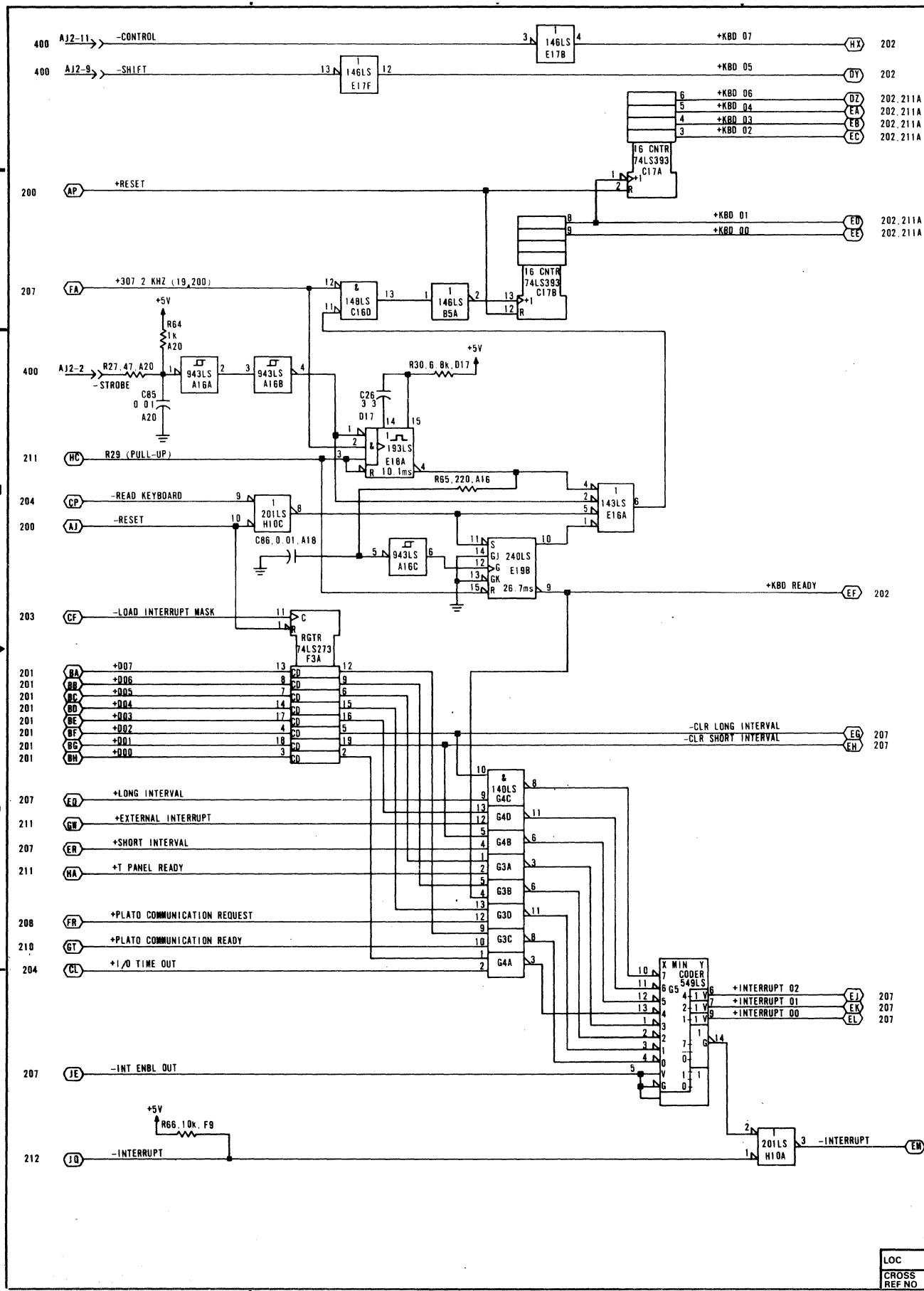


LOC  
 CROSS REF NO 204

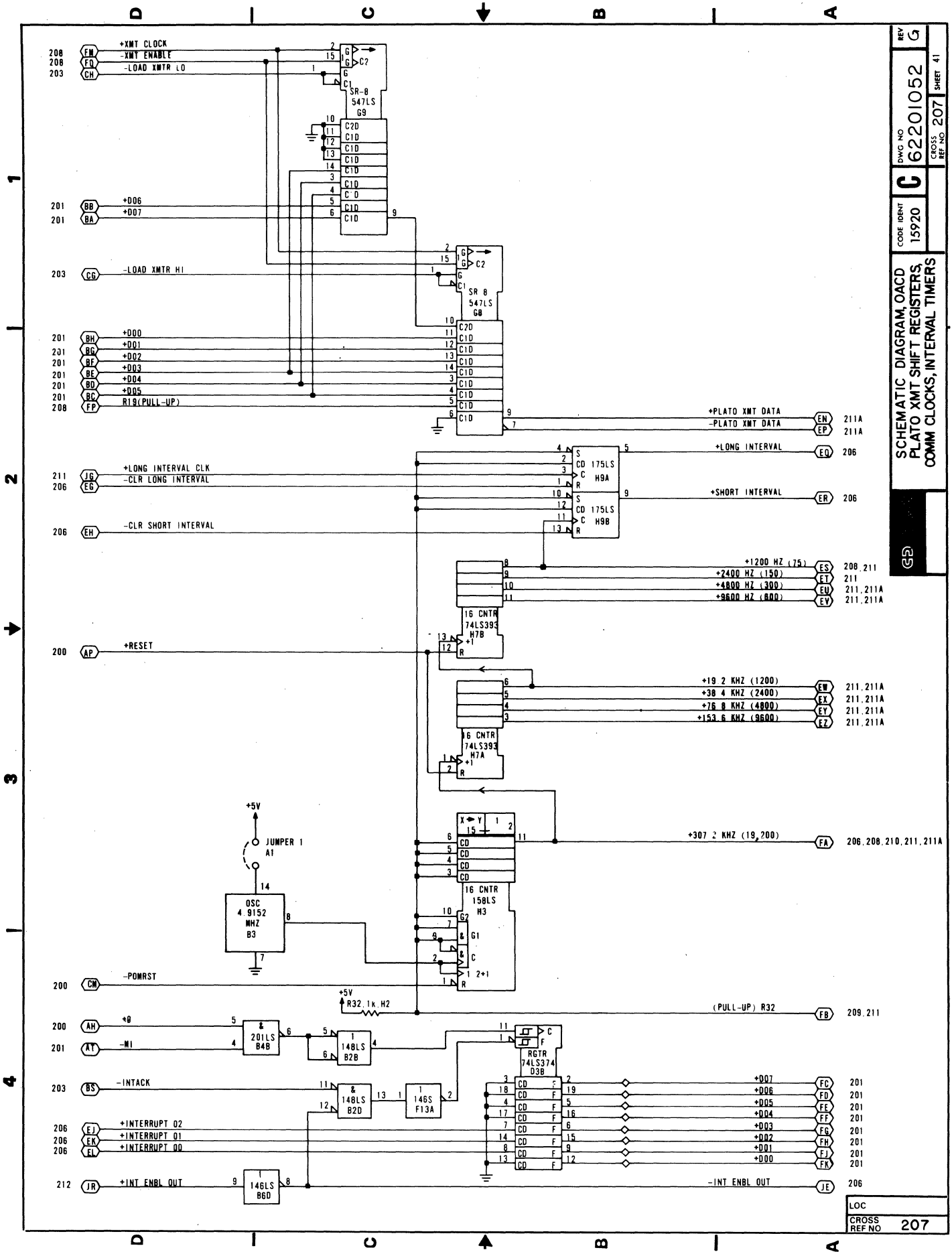


REV	G
DWG NO	C 62201052
CODE IDENT	15920
CROSS REF NO	206
SHEET	40

SCHMATIC DIAGRAM, OACD  
KEYBOARD SCANNER & CONTACT  
DETECTION LOGIC, INTERRUPT  
MASK RSTR & ENCODER

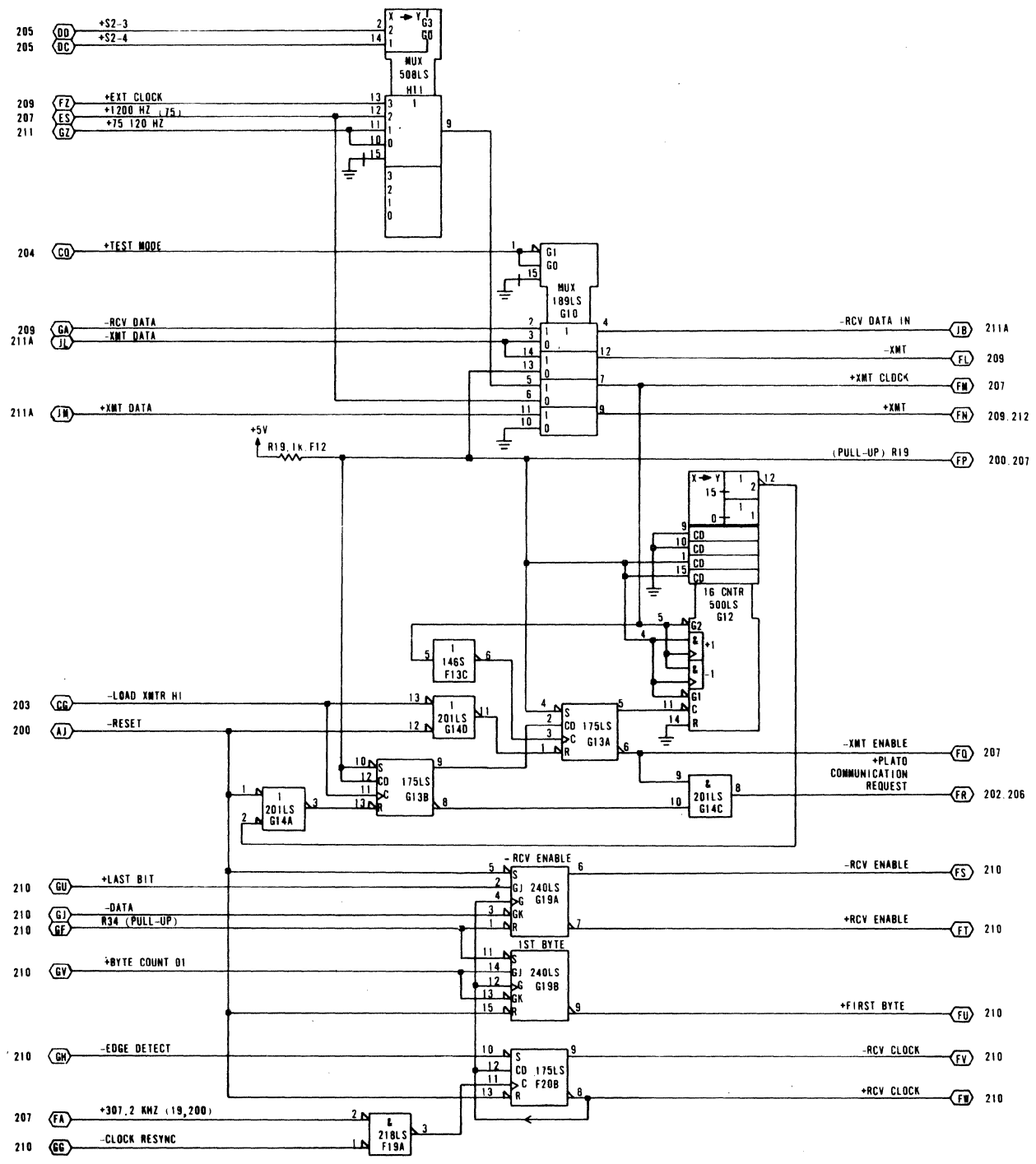


LOC  
CROSS REF NO 206



REV G  
 DWG NO 62201052  
 CODE IDENT 15920  
 SCHEMATIC DIAGRAM, OACD  
 PLATO XMT SHIFT REGISTERS,  
 COMM CLOCKS, INTERVAL TIMERS  
 CROSS REF NO 207 SHEET 41

LOC  
 CROSS REF NO 207

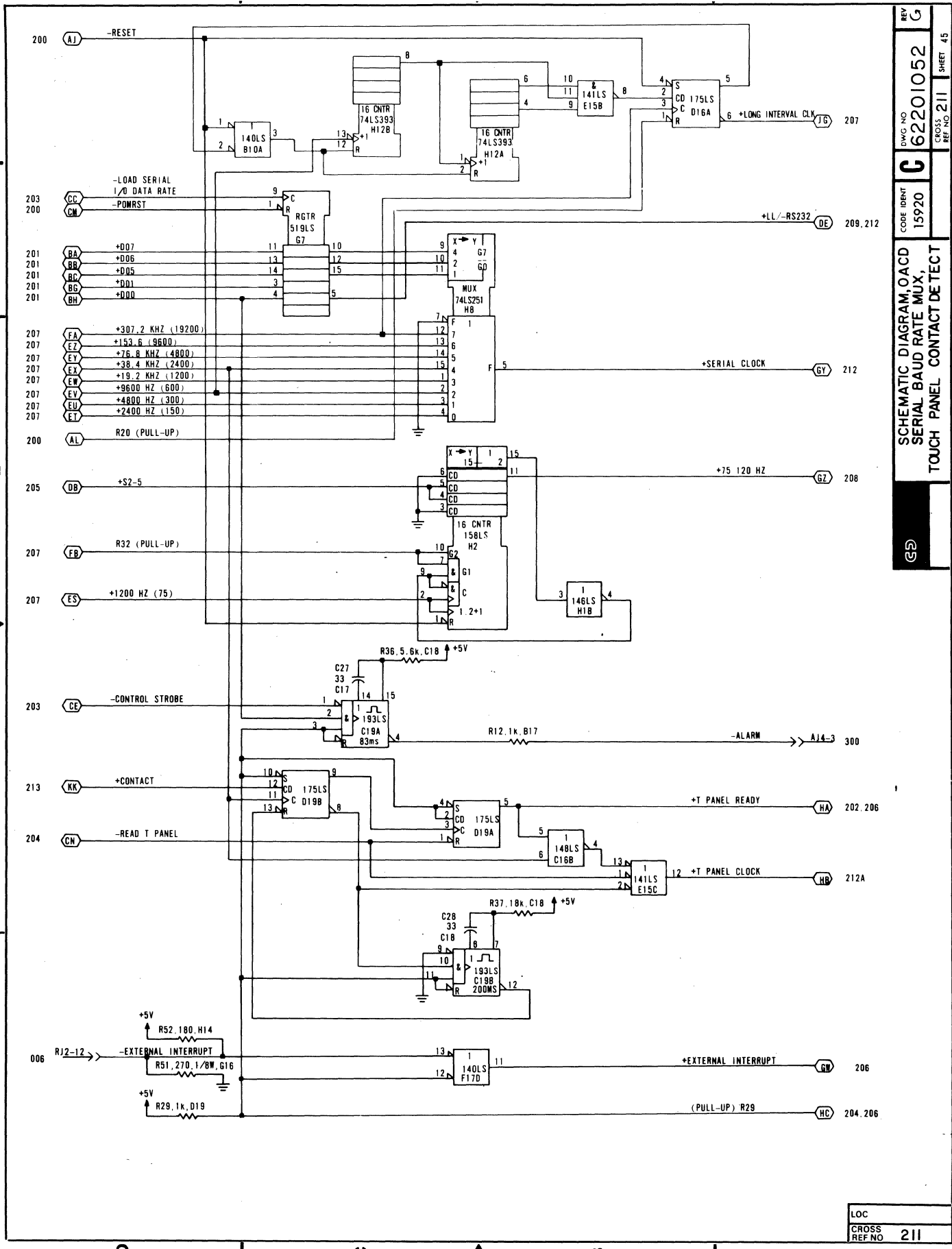


LOC  
CROSS REF NO 208





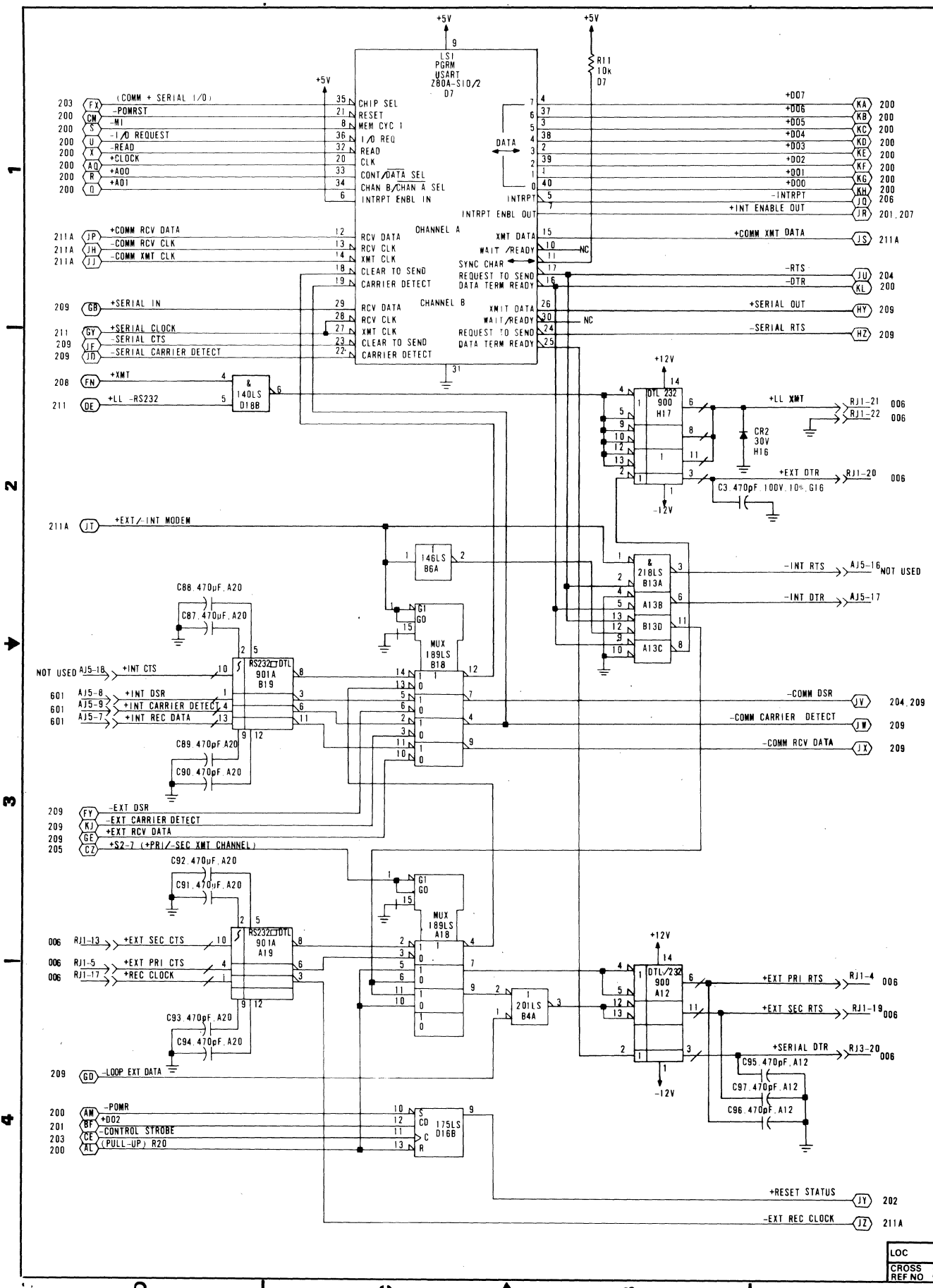




REV. G  
 DWG. NO. 62201052  
 CODE IDENT. 15920  
 CROSS. REF. NO. 211 SHEET 45  
 SCHEMATIC DIAGRAM, QACD  
 SERIAL BAUD RATE MUX,  
 TOUCH PANEL CONTACT DE TECT  
 (G)

LOC	
CROSS REF NO	211

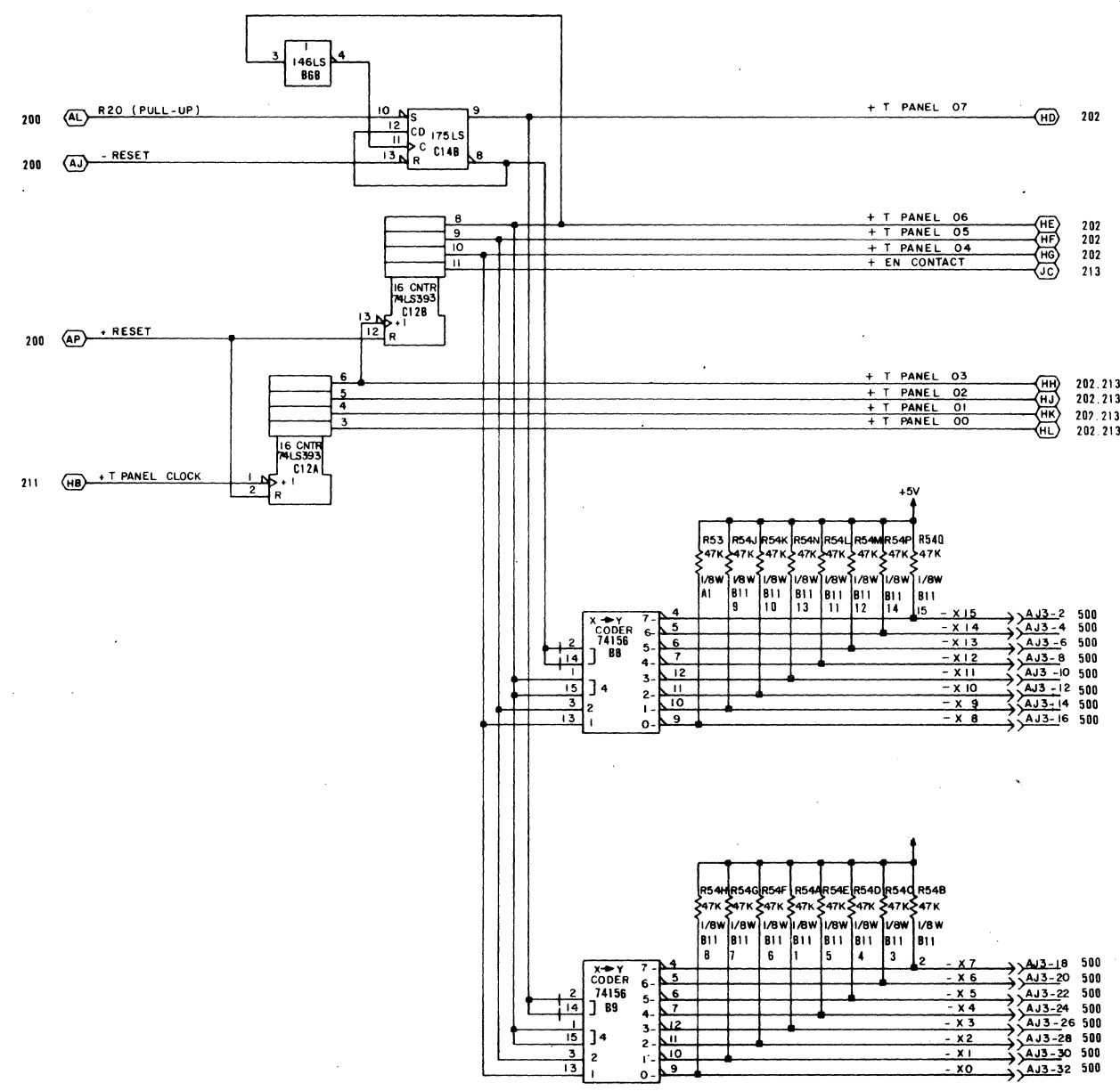




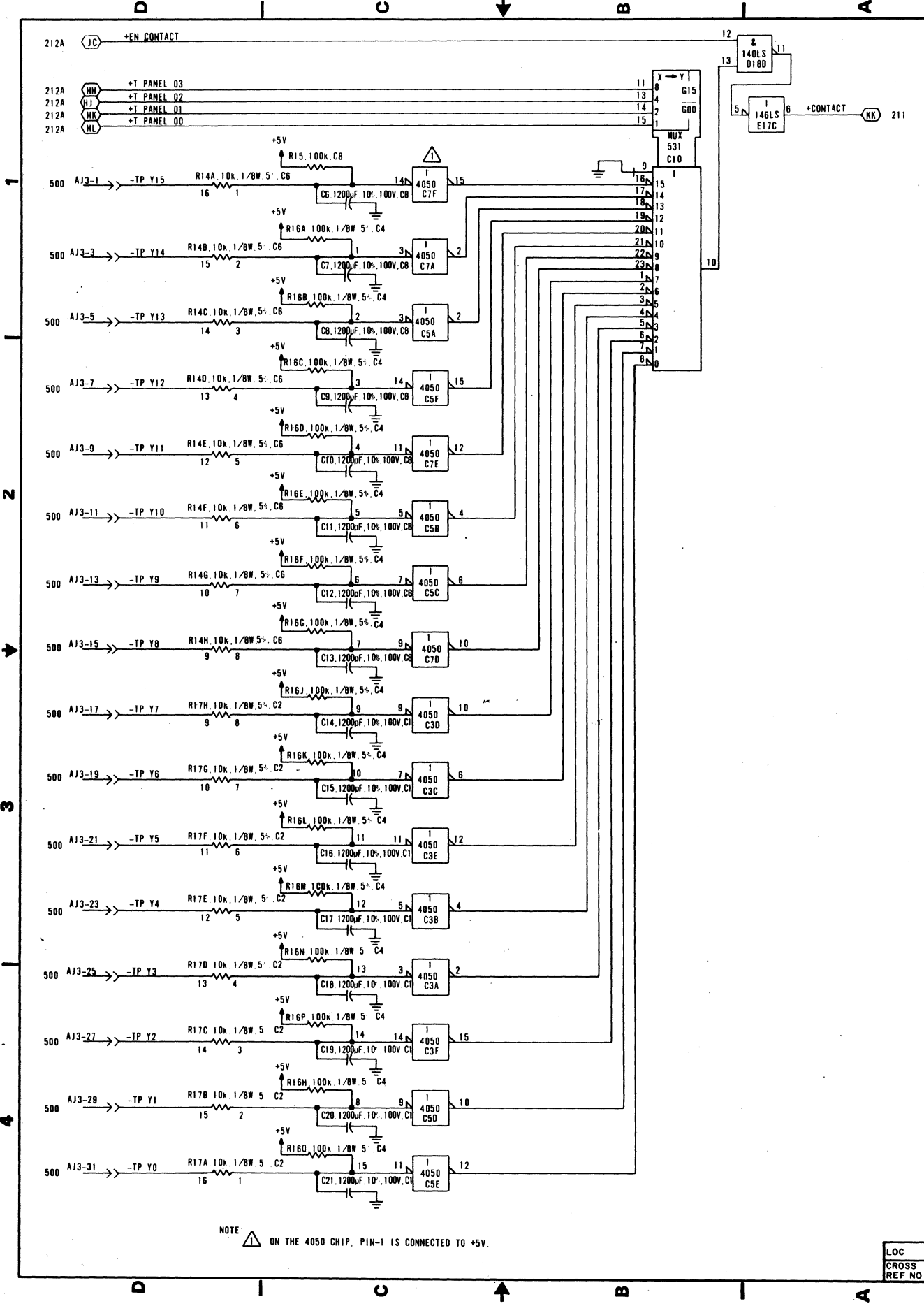
REV	G
DWG NO	62201052
CODE IDENT	15920
CROSS REF NO	212
SHEET	47

SCHEMATIC DIAGRAM, OACD  
COMMUNICATION & SERIAL  
I/O INTERFACES, LONG LINE DRIVER

LOC  
CROSS REF NO 212



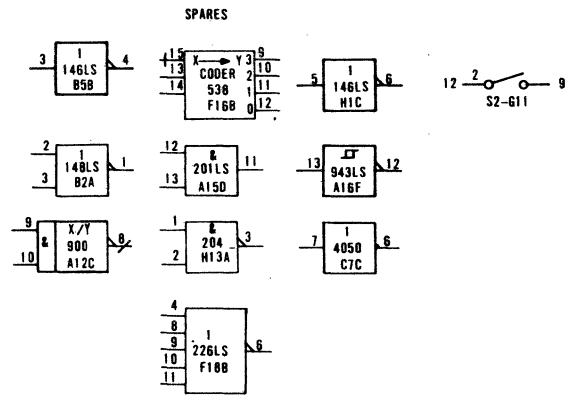
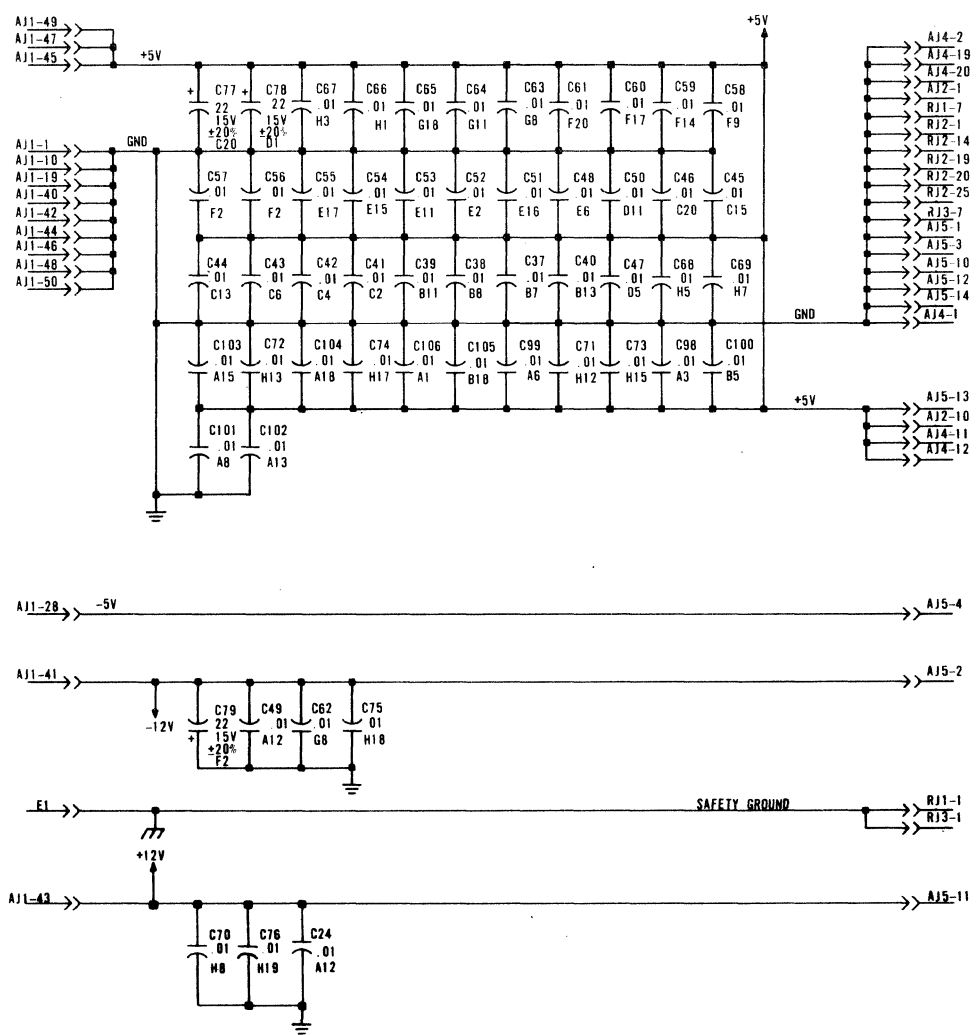
LOC  
 CROSS REF NO 212A



NOTE:  ON THE 4050 CHIP, PIN-1 IS CONNECTED TO +5V.

REV	G
DWG NO	62201052
CODE IDENT	C 15920
SCHEMATIC DIAGRAM, OACD TOUCH PANEL LOGIC Y-SCANNER	
CROSS REF NO	213
SHEET	49

LOC	
CROSS REF NO	213



- NOTES:
- UNLESS OTHERWISE SPECIFIED, POWER AND GROUND PINS OF INTEGRATED CIRCUITS ARE AS LISTED BELOW.  
 14 PIN INTEGRATED CKTS, PIN 14 = +5V, PIN 7 = GND.  
 16 PIN INTEGRATED CKTS, PIN 16 = +5V, PIN 8 = GND.  
 24 PIN INTEGRATED CKTS, PIN 24 = +5V, PIN 12 = GND.
  - UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE RATED AT 1/4W AND HAVE A TOLERANCE OF  $\pm 5\%$ . RESISTANCE IS SHOWN IN OHMS.
  - UNLESS OTHERWISE SPECIFIED, ALL CAPACITORS ARE RATED AT 25 WVDC AND HAVE A TOLERANCE OF +80% AND -20%. CAPACITANCE IS SHOWN IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
  - UNLESS OTHERWISE NOTED ALL CIRCUITS ARE PART OF OACD BOARD.

5-52

D

I

C

→

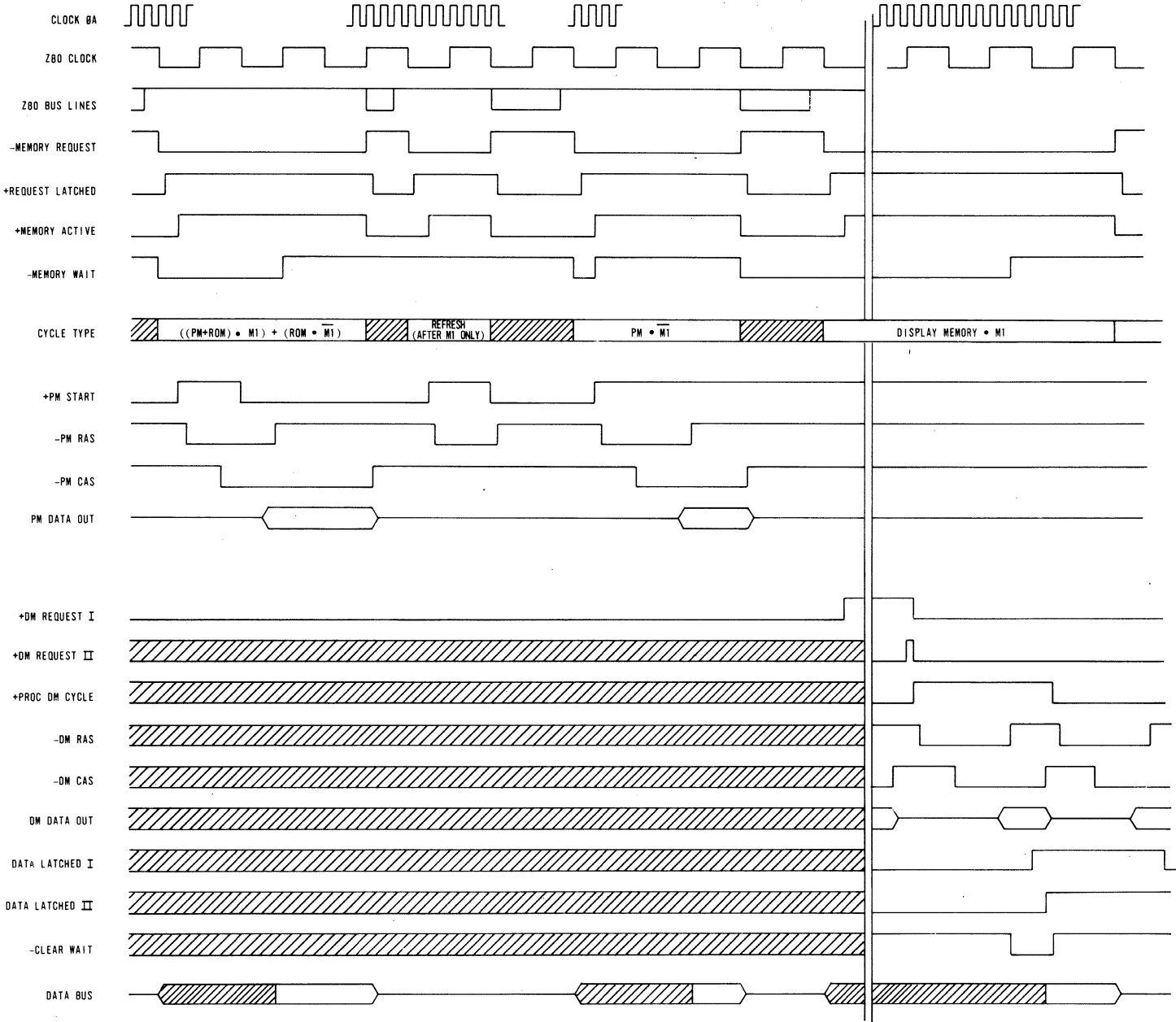
B

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LOC
CROSS REF NO

4 | 3 | 2 | 1



D

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C

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	PROCESSOR MEMORY CYCLES		CODE IDENT 15920	DWG NO <b>C</b> 62201052	REV A
	CROSS REF NO	SHEET 51			

62940007

C

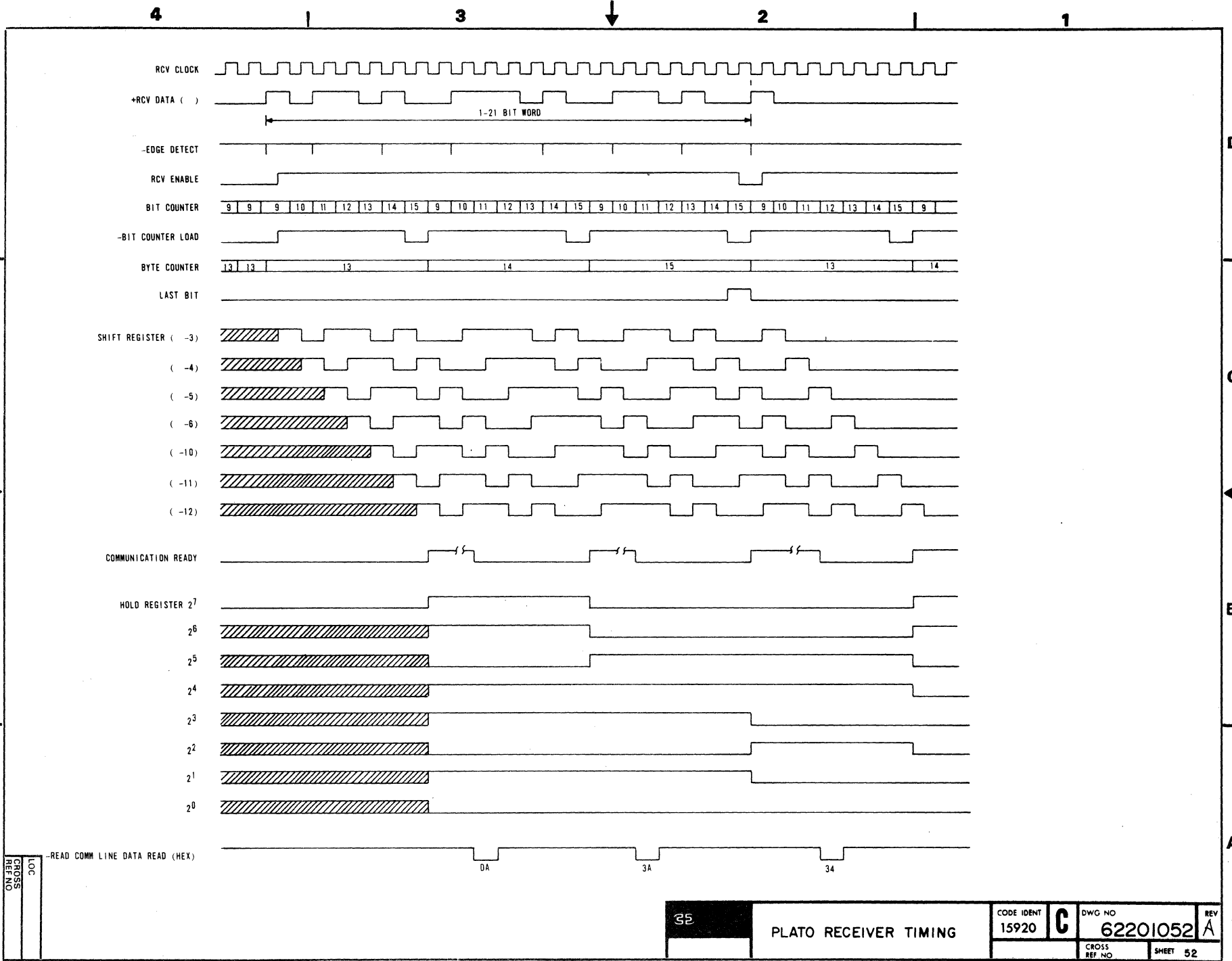
A

B

I

A

5-53



D

C

A

B

I

A

35	PLATO RECEIVER TIMING		CODE IDENT 15920	DWG NO 62201052	REV A
			CROSS REF NO	SHEET 52	

4 | 1 | 3 | 2 | 1



5-54

D

C

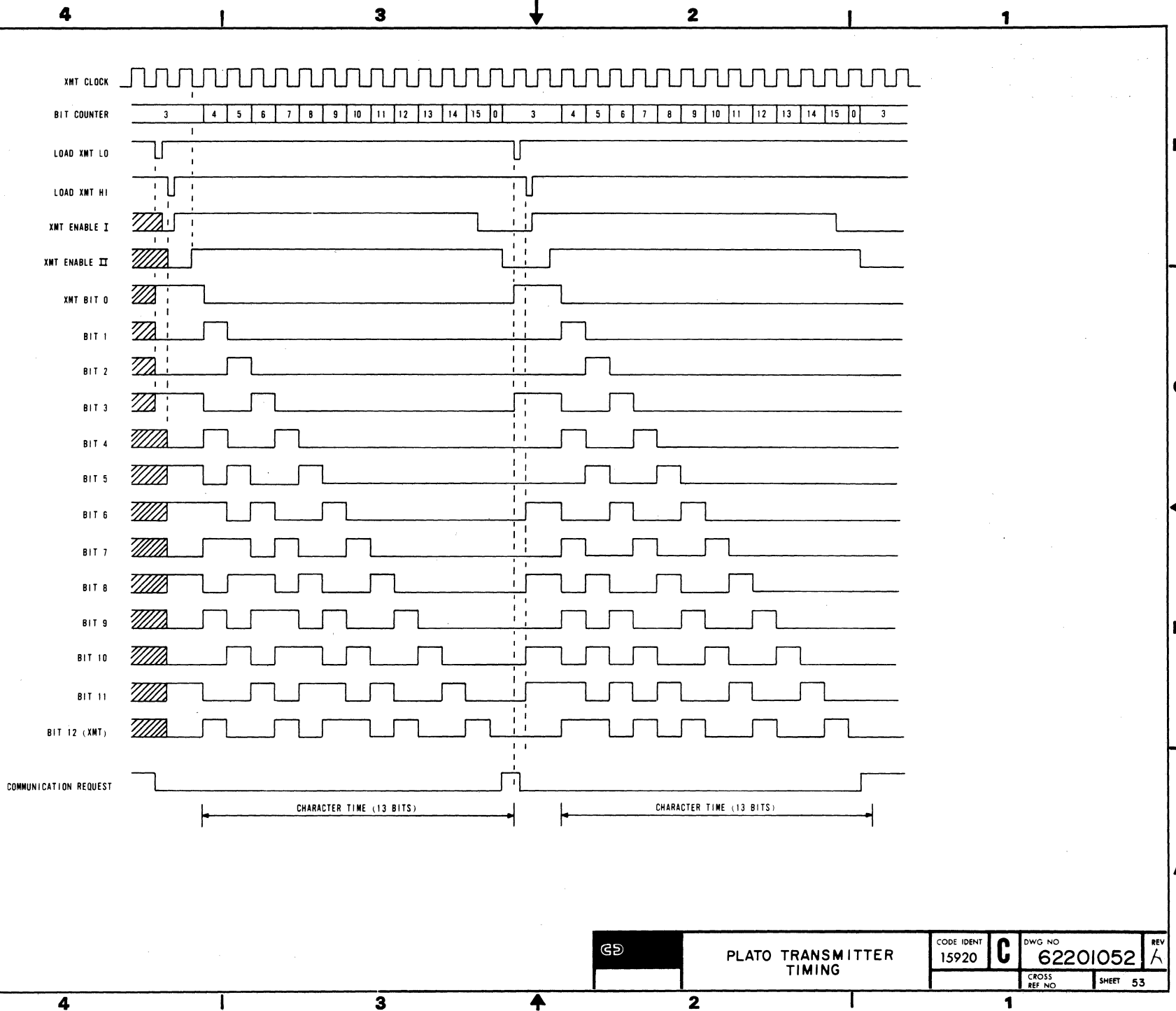
A

B

I

62940007

LOC
PROSS
REF NO



D

C

A

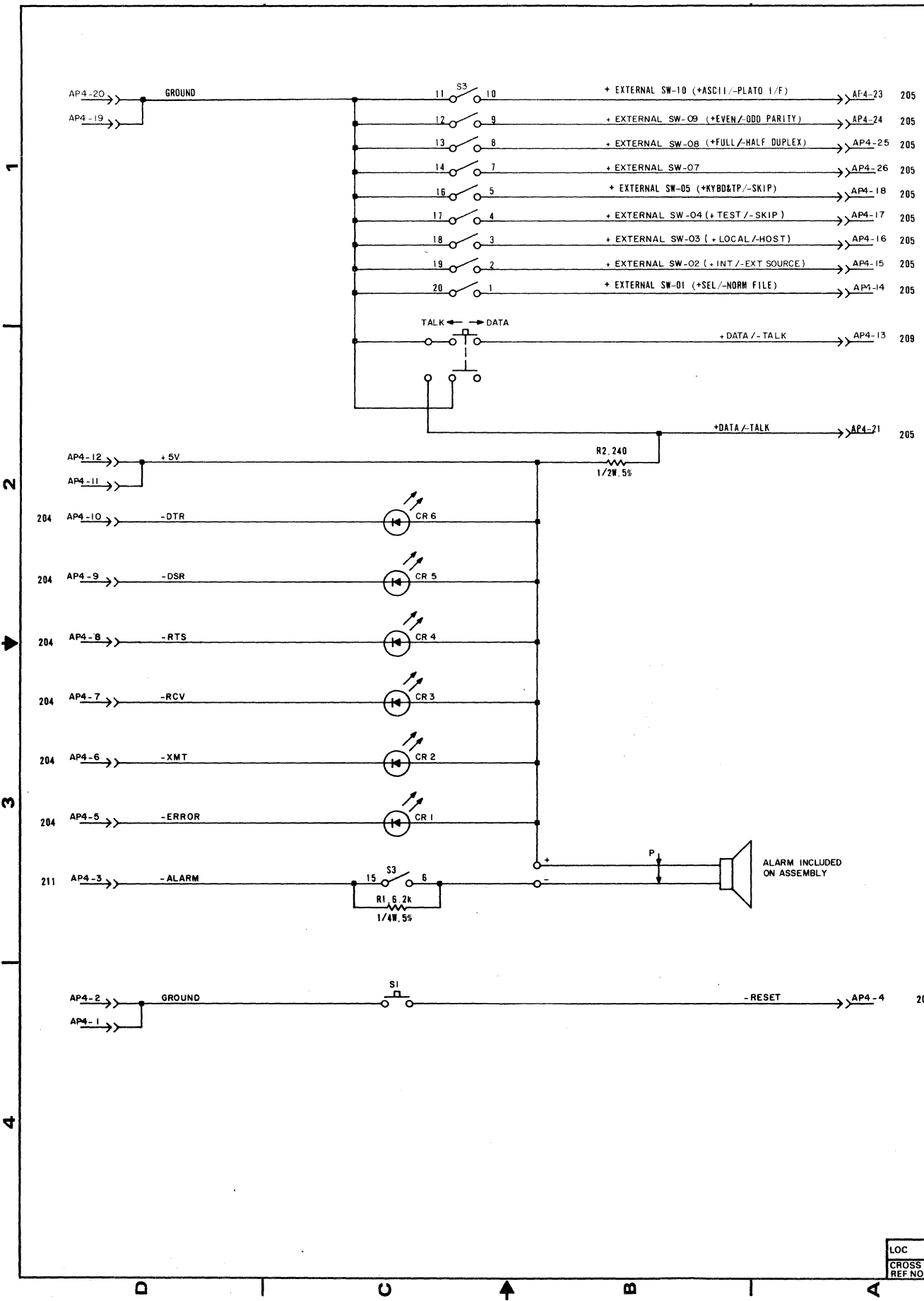
B

I

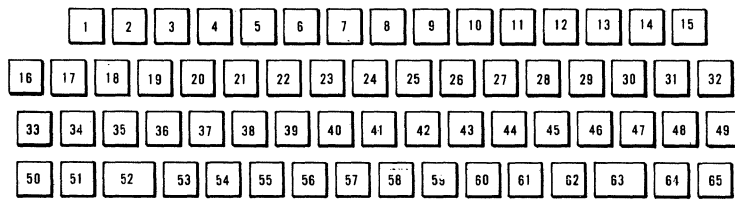
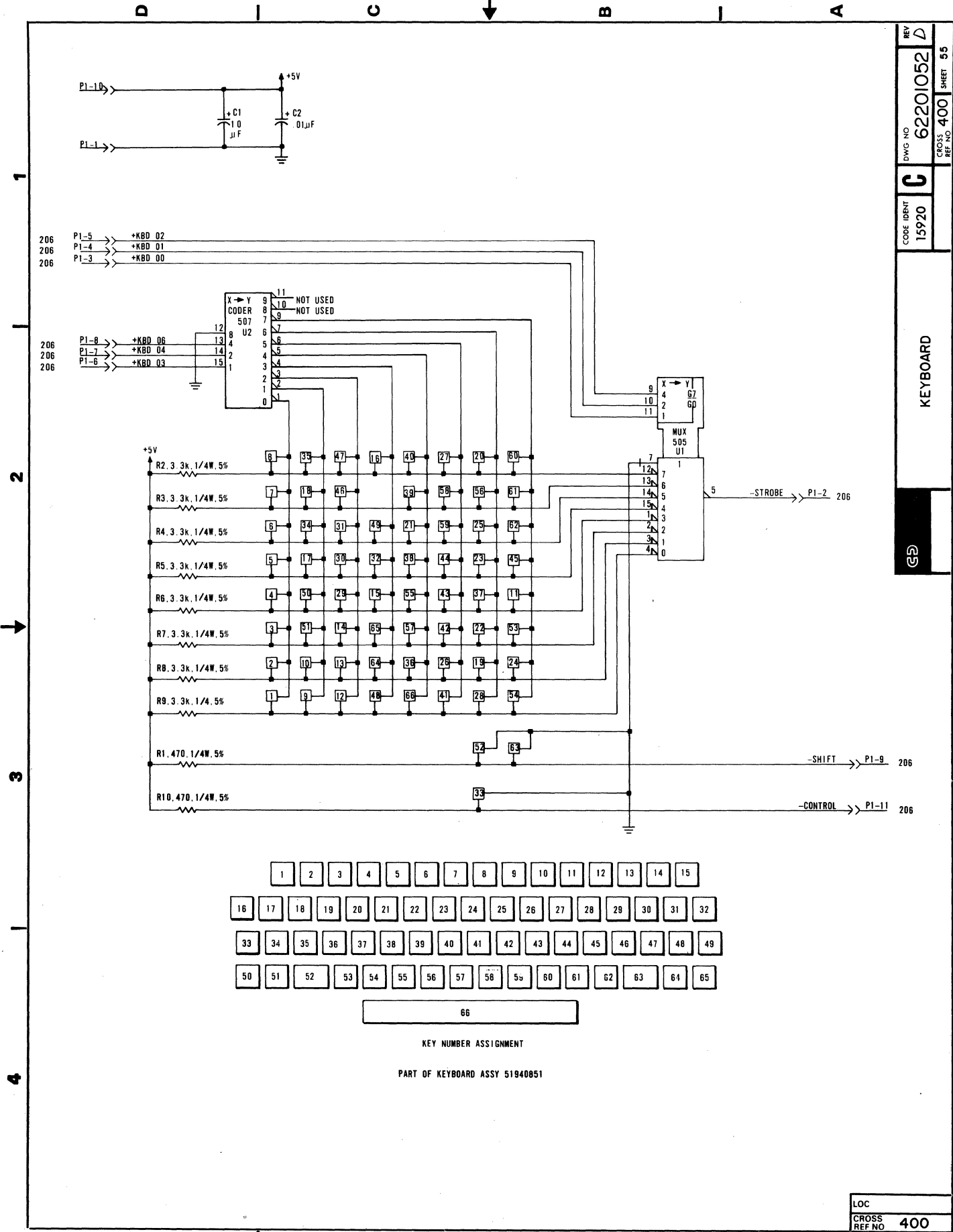
A

	PLATO TRANSMITTER TIMING		CODE IDENT 15920	<b>C</b>	DWG NO 62201052	REV A
				CROSS REF NO	SHEET 53	

4 1 3 2 1 4 1 3 2 1



LOC  
 CROSS REF NO 300



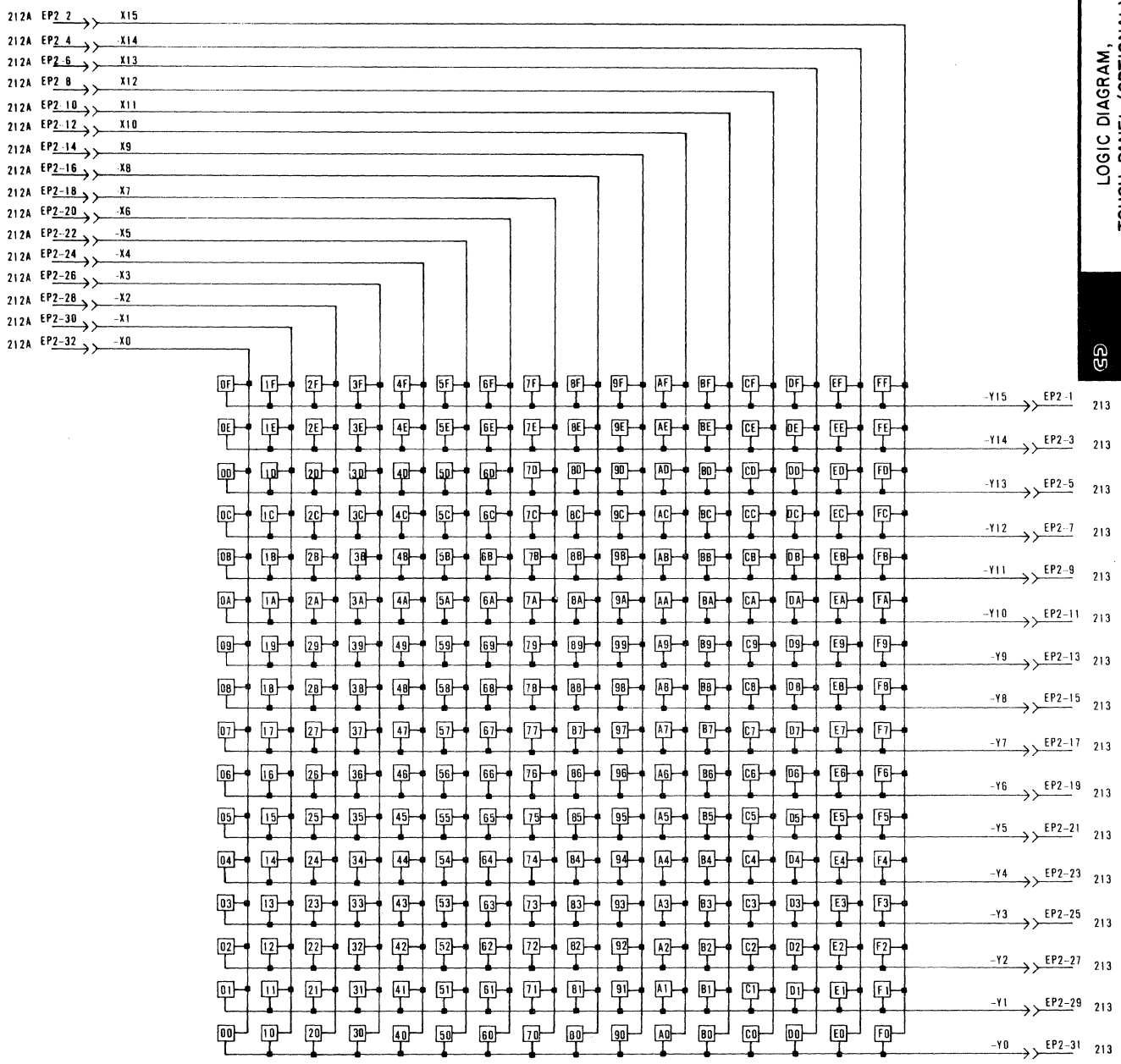
66

KEY NUMBER ASSIGNMENT

PART OF KEYBOARD ASSY 51940851

REV A  
 DWG NO 62201052  
 CODE IDENT 15920  
 CROSS REF NO 500

LOGIC DIAGRAM,  
 TOUCH PANEL (OPTIONAL)

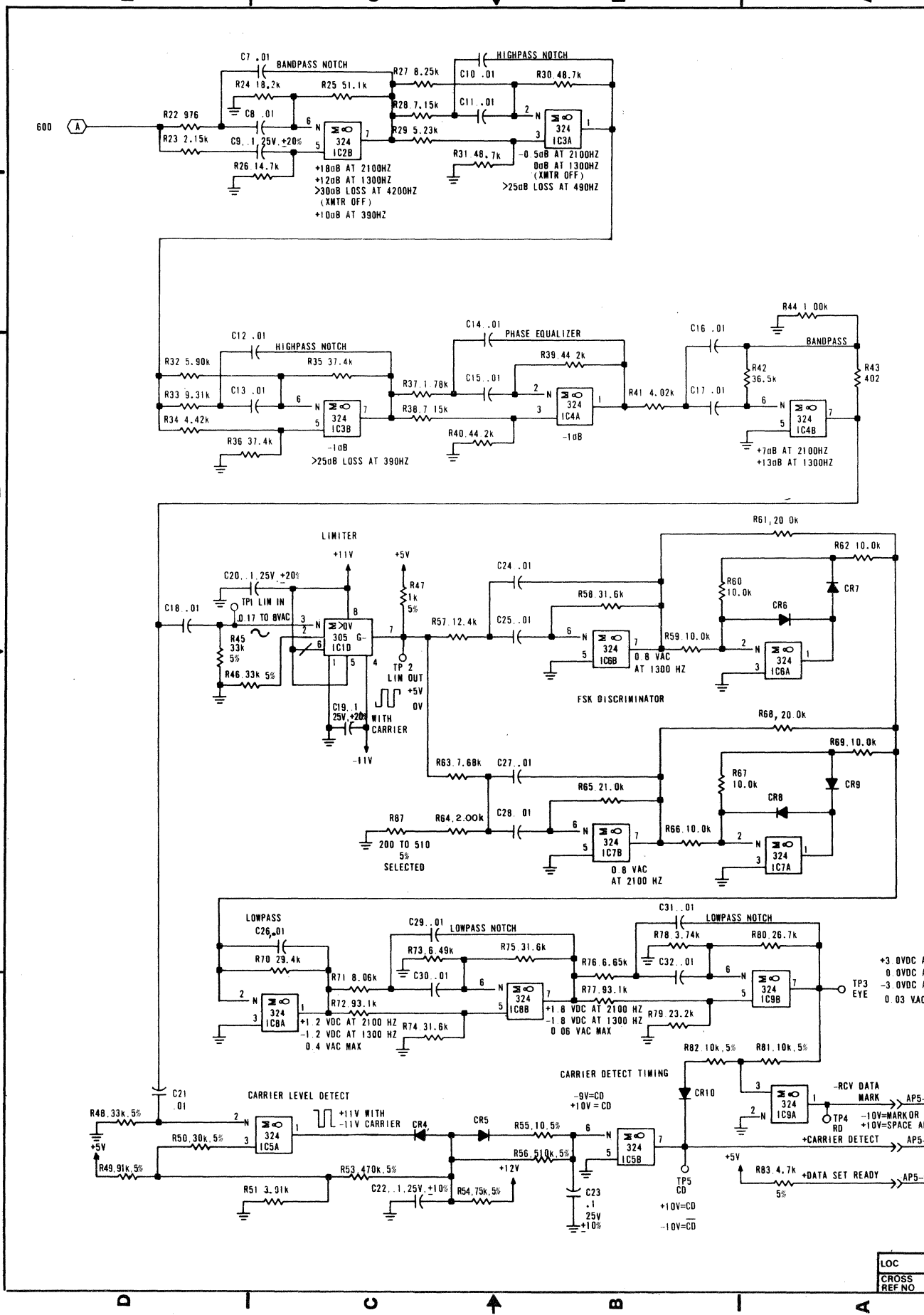


PART OF TOUCH PANEL ASSY 61408446

LOC CROSS REF NO 500



MODEM OPTION,  
 RECEIVER



LOC  
 CROSS REF NO 601

5-60

D

C

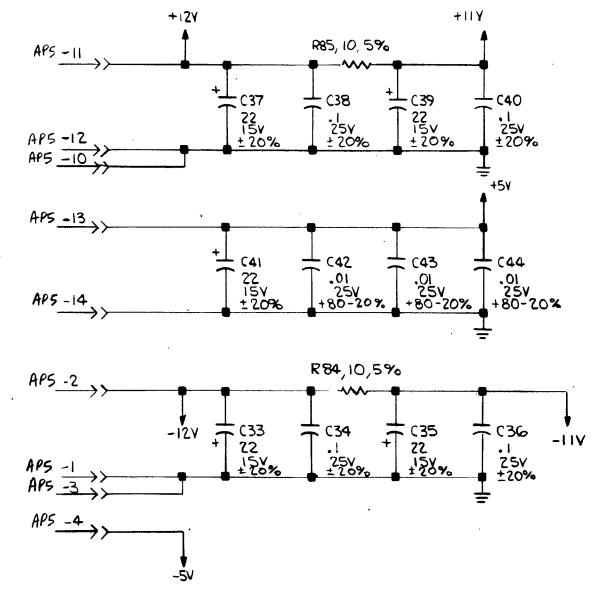
B

D

C

B

A



NOTES:

- UNLESS OTHERWISE SPECIFIED, POWER AND GROUND PINS OF INTEGRATED CIRCUITS ARE AS LISTED BELOW:  
 14 PIN INTEGRATED CKTS: PIN 14 = +5V, PIN 7 = GND.  
 16 PIN INTEGRATED CKTS: PIN 16 = +5V, PIN 8 = GND.  
 8 PIN INTEGRATED CKTS: PIN 8 = +5V, PIN 4 = GND.
- UNLESS OTHERWISE NOTED ALL DIODES TO BE P/N S1007385.
- UNLESS OTHERWISE NOTED ALL CIRCUITS ARE PART OF A BCP BOARD

62940007

LOC
CROSS
REF NO 602

	<b>MODEM OPTION; POWER, GROUND, &amp; DECOUPLING</b>	CODE IDENT	<b>C</b>	DWG NO	REV
		15920		62201052	A
		CROSS REF NO 602	SHEET 59		

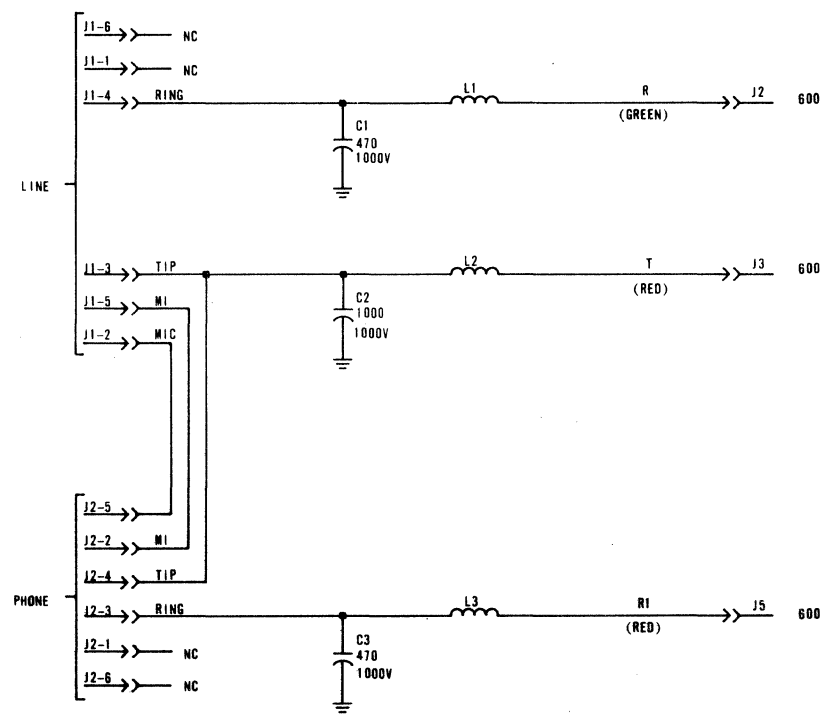
4

3

2

1

MODEM LINE FILTER







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This section provides the information necessary to perform site maintenance on the terminal. Information is organized under the following major headings:

- Suggested Emergency Maintenance Procedure - describes the suggested approach to emergency maintenance.
- Maintenance Aids - describes the diagnostics available to troubleshoot the terminal.
- Preventive Maintenance - describes the follow-up tasks to be done when a terminal requires repair.
- Special Tools and Supplies - describes special items required for terminal maintenance.
- MOS Circuit Handling Precautions - describes special procedures to be used when replacing MOS circuits.
- Diagnostic and Corrective Maintenance Procedures - contains SAM (structured analysis method) listings that provide information for troubleshooting terminal malfunctions and associated corrective maintenance procedures. Preceding the listings and procedures is a description of the format and use of the SAMs.

#### SUGGESTED EMERGENCY MAINTENANCE PROCEDURE

The following procedure provides suggested steps for the customer engineer (CE) to follow when responding to a customer request for maintenance on the terminal.

#### BEFORE LEAVING FOR CUSTOMER SITE

Before leaving for the customer site, the CE should call the customer and talk to the person operating the terminal at the time the malfunction occurred, then:

1. Determine the following:
  - a. Specific configuration of terminal; for example, does it have an internal modem, additional RAM, and/or additional ROM/EROM installed.
  - b. Type of symptoms terminal exhibited to indicate that a malfunction occurred.
  - c. Whether terminal is operating and what symptoms, if any, are present when an attempt is made to operate.
2. Decide course of action to take, for example:
  - a. Go to customer site and begin troubleshooting.
  - b. Deduce that terminal itself is probably not at fault and most likely cause of problem is either communication lines or a power reduction or loss. In either case, CE can notify responsible party (common carrier or customer) of problem.
  - c. Decide that an error in operating procedure rather than equipment failure is probable cause of problem, and notify customer of correct operating procedure.
3. If a site maintenance trip is required, CE should try to determine a probable cause for failure and gather necessary tools, manuals, and spare parts that may be needed.

#### UPON ARRIVING AT CUSTOMER SITE

Upon arriving at the customer site, the CE should locate the appropriate supervisory personnel and again talk to the terminal operator concerning the malfunction, then:

1. Visually inspect terminal to ensure that correct input/output cable connections exist.
2. Verify that a malfunction does exist, and then begin to troubleshoot terminal. This is done by:
  - a. Running the diagnostics described later in this section.
  - b. Referring to the SAM in this section that covers the malfunction and doing the prescribed corrective actions.

3. After source of malfunction is corrected, CE should:
  - a. Rerun diagnostics to ensure that terminal is operational.
  - b. Perform preventive maintenance tasks listed in this section.
  - c. Demonstrate to customer that terminal is now operating properly.

### MAINTENANCE AIDS

Resident diagnostics provide error indications of basic hardware faults. PLATO system diagnostic (DIAG), accessible in the PLATO and Data Services networks, provides additional tests.

### RESIDENT DIAGNOSTICS

The following paragraphs describe the sections of the terminal resident diagnostic program. The actual running of the resident diagnostics is described later in this section in procedure 2. The program consists of three sections:

- RAM tests
- Interface tests
- Crt alignment, touchpanel, and keyboard tests

### RAM Tests

These tests check the operation of RAM by:

- Writing/reading  $55_{16}$  (01010101<sub>2</sub>) code in all available memory locations.
- Writing/reading  $AA_{16}$  (10101010<sub>2</sub>) code in all available memory locations.
- Writing test codes into test addresses and reading all memory to ensure that the codes were written in desired addresses only.

## Interface Tests

The interface tests check the operation of the circuits that handle PLATO communications, ASCII communications, and SERIAL-interface communications.

### PLATO Communications Test

This test checks that the status and control lines of the PLATO-communication logic are functioning properly and checks that these circuits can receive and transmit data correctly. The following conditions are tested:

- Character request status is present.
- Character request status does not drop after low-order bits are output.
- Character request status drops after the high-order bits are output.
- First byte flag is set.
- Start bit is present.
- Character ready status is present.

### ASCII Communications and SERIAL-Interface Communications Tests

These tests check that the control and status lines of the ASCII-communication logic and SERIAL-interface logic are functioning properly and that each set of circuits can receive and transmit data correctly at 9600 bps, using an internal loopback feature. The following conditions are tested:

- Character request status present.
- Character read status present.

## CRT Alignment, Touchpanel, and Keyboard Tests

This section consists of three test segments. These are an alignment pattern, a touchpanel test, and a keyboard test.

The alignment pattern consists of four lines outlining the screen border with two diagonal lines intersecting at screen center. This pattern is used to check for correct crt alignment and touchpanel installation.

The touchpanel has 256 touch-sensitive areas. Touching any one of these areas causes the screen in that area to be displayed in inverse video. Repeated touches cause repeated inversions.

The keyboard segment displays a binary representation of the hexadecimal code generated as a key is pressed. This binary representation shows long bars for binary 1s and short bars for binary 0s, with the bottom bar being the lowest order bit.

### PLATO SYSTEM DIAGNOSTIC (DIAG)

If the terminal site is subscribed to either the PLATO network or Data Services network, PLATO system diagnostic-lesson DIAG can be used to troubleshoot the terminal. Available tests in the lesson include a pattern test, character tests, and a keyboard/touchpanel test.

Before lesson DIAG can be accessed, controlware from the respective network-host computer must be loaded per the startup instructions in the terminal operator's guide (refer to preface for publication number). If this is done from the Data Services host, the controlware file that is loaded must be for PLATO mode in order to access the lesson.

After successful loading, lesson DIAG is accessed per the instructions in the troubleshooting portion of the terminal operator's guide.

### PREVENTIVE MAINTENANCE

Preventive maintenance should be performed immediately following and as a part of an emergency maintenance call. The following suggested preventive maintenance steps help to minimize maintenance calls by verifying correct crt alignment and related operations of the terminal. General inspection of the terminal, including proper seating of cable connectors, should also be made. Procedures referred to are found after the SAMs in this section.

Remove power from terminal (procedure 1) and clean as follows:

CAUTION

Do not use solvents to clean keyboard. Solvent can cause defective keyswitch operation and damage keycaps.

The following agents may be used for exterior cleaning surfaces including keytops.

Bafix Germicidal Cleaner (Hysan)  
Tide Detergent (2% in H<sub>2</sub>O solution)  
Joy Detergent (1% in H<sub>2</sub>O solution)  
Formula 409 Household Cleaner  
Windex with Ammonia

Harmful examples of agents not to be used are:

Gasoline  
Carbon tetrachloride  
Acetone  
MEK (Methyl-ethyl-ketone)  
Methanol (wood alcohol)  
Ethanol (grain alcohol in concentrated form)  
Gun cleaner (Hoppe's #9)  
Freon (except freon #12)  
Iodine  
Liquid bleach

1. Dust keyboard with soft-bristled brush.
2. Clean touchpanel in front of crt screen using a soft cloth dampened with a mild soap and water solution. Apply cleaning solution to cloth to prevent solution from entering behind the bezel. Avoid splashing solution on keyboard.
3. Wipe exterior of the terminal using a damp lint-free cloth.

Reapply terminal power (procedure 1) and verify correct display alignment as follows:

4. Set SKIP/KB&TP switch behind protective door on operator panel to KB&TP. Set SKIP/TEST switch to TEST. Press RESET switch for 3 seconds or longer to run resident diagnostics and have alignment pattern appear. If controlware is loaded, this may require pressing RESET twice, each time for 3 seconds or longer.

5. Check for correct alignment and acceptable display quality (refer to procedure 22). If required, perform related adjustments per procedure 4.
6. Return SKIP/KB&TP and SKIP/TEST switches to SKIP.

#### SPECIAL TOOLS AND SUPPLIES

In addition to a normal complement of metric hand tools and test equipment, maintenance of this terminal requires the following special items:

- Alignment tool kit part number 12263463 for doing adjustments on the power supply and display boards. These adjustments may alternately be done using alignment tool part number 12263476 and hex adjustment tool part number 12263299. If the hex adjustment tool is used, its hook must be cut off to prevent the tool from locking in adjustment slugs of the display board.
- Chip removal tool part number 87365900 for removing 14-pin and 16-pin integrated-circuit chips from boards.
- Silicone adhesive part number 51004063 for glueing yoke centering rings.

#### MOS CIRCUIT HANDLING PRECAUTIONS

The controller and video boards contain a number of MOS (metal-oxide semiconductor) integrated circuits. The MOS circuits are susceptible to irreparable damage if they are exposed to excessive static electricity and thus require special handling. Follow the precautions listed here at all times when handling either board.

- Never insert, remove, or otherwise connect/disconnect any circuit(s) while power is applied.

#### CAUTION

To prevent accidental shock when observing static-grounding precautions, do not touch powered-on electrical equipment and chassis frame at the same time.

- Before touching (with hands and/or tool) or handling any circuit, cable connector, or board, always touch hand(s) (and/or tool) to an exposed portion of the associated chassis frame to discharge any buildup of static electricity.



- Especially in dry ambient air, any movement may cause static electricity buildup due to friction. In the case of shuffling one's feet across a dry carpet, such static buildup may be quite high and may easily jump from a cable connector being held onto the pins being mated to. This could damage the MOS circuits within the equipment. Thus, the chassis frame must always be touched immediately before connecting any cable to it.
- When removing, replacing, or otherwise handling any board that contains MOS circuits, do not touch circuit paths or conductors if at all possible. Do not carry a MOS circuit board across a room while touching its circuits.
- When a board is removed from the chassis and placed where it may be touched, carried to some other location, or if it is to be shipped, wrap the board in static protective material, such as aluminum foil or conductive foam.

## DIAGNOSTIC AND CORRECTIVE MAINTENANCE PROCEDURES

This portion of the section contains the SAMs and corrective maintenance procedures for the terminal. The SAM listings provide information for isolating a malfunction and refer to the applicable corrective maintenance procedure for correcting it. The corrective maintenance procedures cover the available terminal adjustments and the replacement of field-replaceable components.

The next paragraphs describe the format and use of SAMs and explain the organization of the SAMs and procedures that follow in the section.

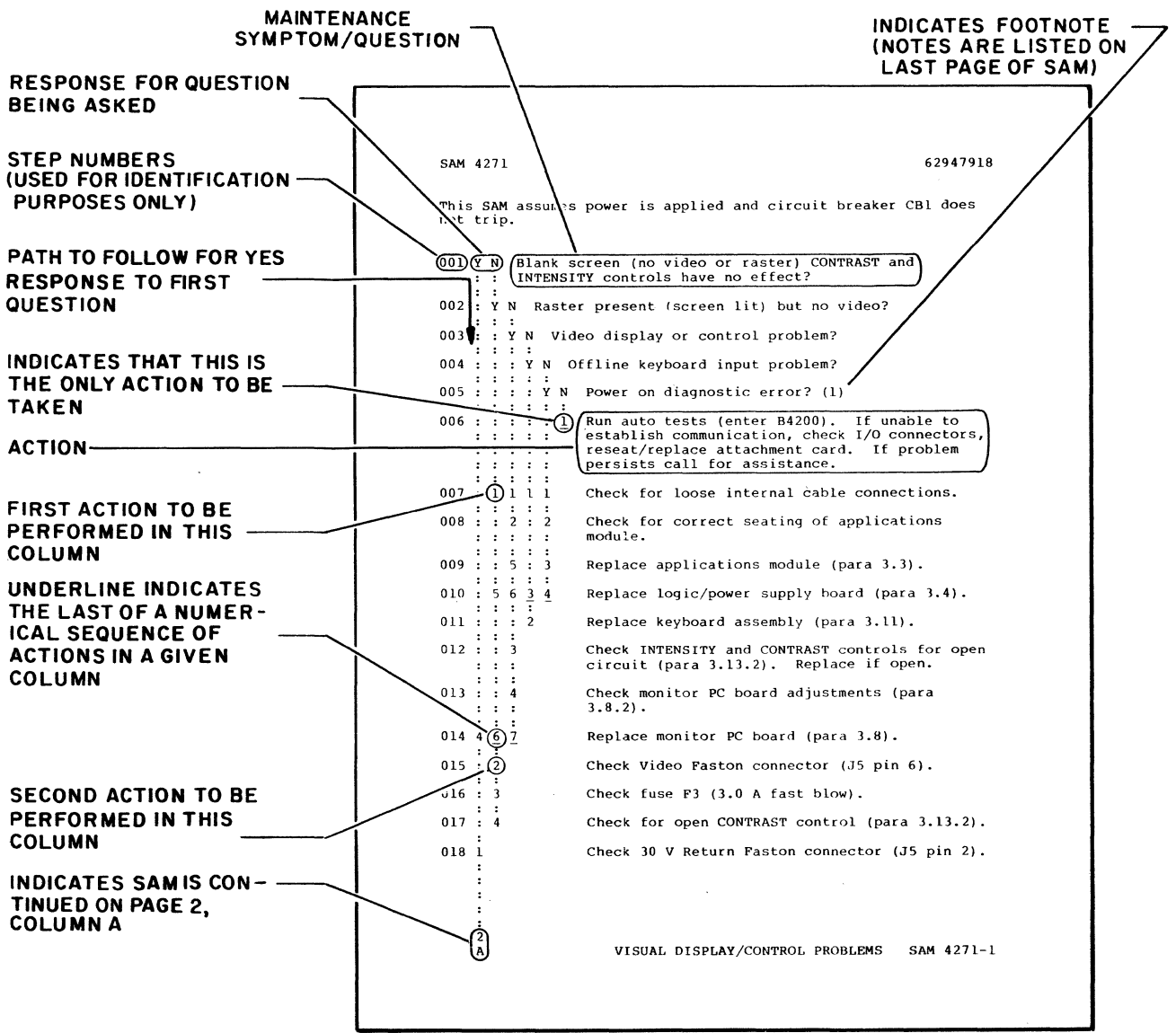
### SAM FORMAT

An example SAM showing the basic SAM format appears in figure 6-1. A SAM is a formatted listing that presents troubleshooting information in a logical manner. Each SAM contains a sequential listing of questions that can be answered yes or no. The response made to a particular question either leads to the next question or to the specific action (or numerical sequence of actions) that is to be taken to correct the problem.

Each SAM listing is identified by a SAM number and a title that denotes the type of problems that it covers. A hyphen and number following the SAM number identifies the pages within the listing.

# USE OF SAMs

The SAMs are to be used in conjunction with the diagnostics described earlier in this section. After diagnostics are run, or if they cannot be run, refer to the SAM that covers the existing problem. Verify that all assumed conditions stated at the beginning of the SAM are present and observe any preliminary instructions. Enter listing and answer yes (Y) or no (N) to the question asked or the condition being tested. Follow down the appropriate Y or N column and when column leads to action numbers, perform the corresponding actions in numerical order to correct the problem.



03388

Figure 6-1. Example of a SAM

# ORGANIZATION OF SAMs AND PROCEDURES

The organization of the following SAMs and corrective maintenance procedures is shown in figure 6-2.

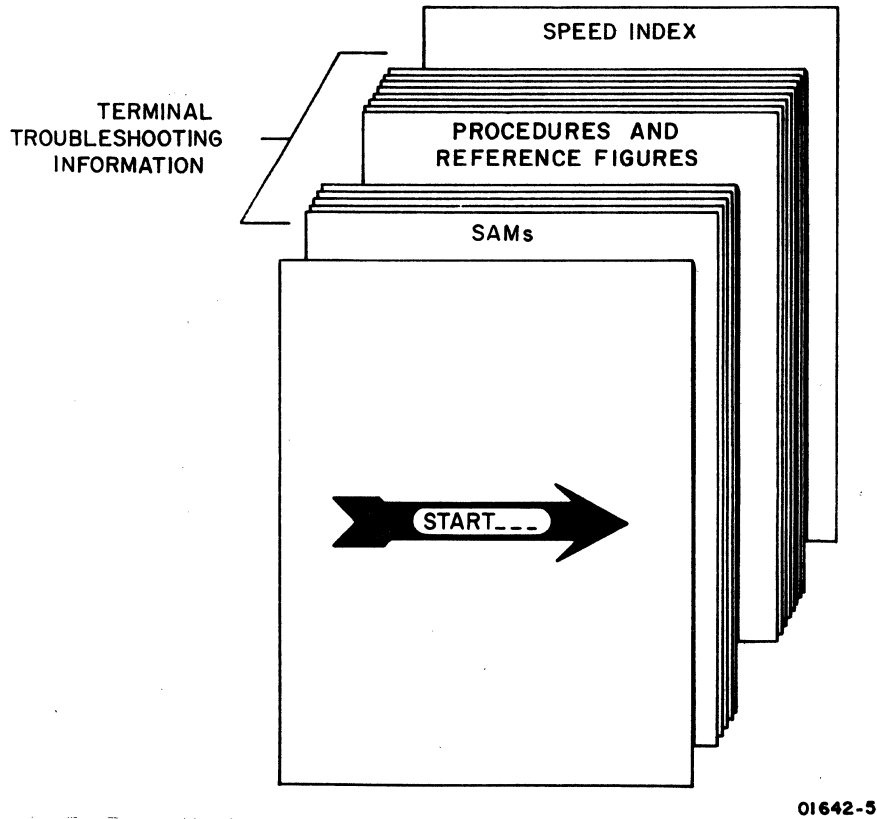


Figure 6-2. Organization of SAMs and Corrective Maintenance Procedures

WARNING

LETHAL VOLTAGES EXIST IN THE CRT MONITOR ASSEMBLY. USE EXTREME CAUTION WHEN PERFORMING INTERNAL ADJUSTMENTS OR SEVERE PERSONAL INJURY OR LOSS OF LIFE MAY RESULT.

CAUTION

MANY OF THE INTEGRATED CIRCUITS USED IN THIS TERMINAL ARE MOS TYPE THAT CAN BE DESTROYED BY STATIC ELECTRICITY. ALWAYS OBSERVE THE RULES FOR HANDLING MOS CIRCUITS AS DESCRIBED EARLIER IN THIS SECTION.

NOTE

TO AVOID REVERSED CABLE CONNECTIONS, REFER TO FIGURES 6-11 AND 6-12 WHEN MAKING CONNECTIONS TO VIDEO AND CONTROLLER BOARDS.



SAM 1 - POWER-ON PROBLEMS

Assumptions: SKIP/TEST switch behind protective door is in SKIP position to bypass resident diagnostics and terminal power cord is connected to a live power outlet.

- |     |   |          |  |
|-----|---|----------|--|
| 001 | N | Y        | Building circuit breaker for power outlet remains set when terminal ON/OFF circuit breaker is pressed to ON?   |
| 002 | N | Y        | Terminal ON/OFF circuit breaker remains set when pressed to ON?  |
| 003 | N | Y        | A message appears on screen after approximately 45 seconds.  |
| 004 |   | <u>1</u> | Power on occurred successfully. Run resident diagnostics (procedure 2).  |
| 005 |   | 1        | Turn BRIGHTNESS control clockwise to check that it is not set too low.   |
| 006 |   | 2        | Verify that power cord is securely seated in receptacle on ac entry panel.   |
| 007 |   | 3        | Remove hood (procedure 3) and check cabling for loose connections.   |
| 008 |   | 4        | Check LEDs on power supply board (figure 6-17) and do the following as applicable: <ul style="list-style-type: none"> <li>● If all five LEDs are lit, check/adjust power supply voltages (procedure 9) to make sure they are correct. If any voltages are bad, go to SAM 3 (Bad Power Supply Voltages).</li> <li>● If none are lit, go to step 010 in this SAM and isolate open in ac-entry circuits.</li> <li>● If only the +55-V LED is lit, go to SAM 3 (Bad Power Supply Voltages).</li> <li>● If none of the above, replace power supply board (procedure 10).</li> </ul> |
| 009 |   | 5        | If no raster (illumination) appears on screen when BRIGHTNESS control is fully clockwise, go to SAM 2 (No Raster). If a raster is present, run resident diagnostics (procedure 2) and go to SAM 4 (Resident Diagnostic Errors/Problems) to further troubleshoot problem.   |
|     | 3 | 2        |  |
|     | A | B        | C  |

B C

1 1

| |

010

6

If all LEDs are unlit on power supply board, Isolate open in ac-entry circuits as follows:

- a. Press ON/OFF circuit breaker to OFF and disconnect power cord from outlet.
- b. Check blue and brown ac-entry wiring for a loose connection or damage. This wiring starts at power cord receptacle on ac entry panel and ends at power supply board.
- c. Disconnect power cord from ac entry panel receptacle and check continuity of power cord. Replace if open.
- d. Slide connectors back to access terminals on line filter and check continuity of line filter. verify that continuity exists between terminals with same colored wires. If not, replace line filter (procedure 11).
- e. If terminal is a domestic unit, replace ON/OFF circuit breaker (procedure 12). If terminal is an international unit, replace ON/OFF circuit breaker (procedure 12) and stepdown transformer (procedure 11) one at a time.

011

1

Remove hood (procedure 3) and isolate short as follows:

## NOTE

The following corrective actions assume that cables are good. Before replacing an item, check associated cables for damage or shorts. When connecting cables to video and controller boards, refer to figures 6-11 and 6-12 to verify correct pin alignment.

- a. Disconnect power cable from BJ3 on video board and board-edge connector from monitor display board.
- b. Press ON/OFF breaker to ON. If breaker trips and terminal is a domestic unit, replace power supply board (procedure 10). If breaker trips and terminal is an international unit, disconnect 3-pin connector from power supply board and

(Step 011 continued on SAM 1-3).

A  
1

retry. If breaker trips, replace stepdown transformer (procedure 11); if not, replace power supply board.

- c. Press breaker to OFF. On video board, reconnect power cable to BJ3 and disconnect cable from BJ1.
- d. Press breaker to ON. If breaker trips, replace video board (procedure 6).
- e. Press breaker to OFF. Reconnect board-edge connector on monitor display board.
- f. Press breaker to ON. If breaker trips, replace display board (procedure 18).
- g. Press breaker to OFF. Reconnect cable to BJ1 on video board. On controller board, disconnect cables from AJ2, AJ3, AJ4, and AJ5 (no cable will be at AJ5 unless an internal modem is installed).
- h. Press breaker to ON. If breaker trips, replace controller board (procedure 7).
- i. Press breaker to OFF. Reconnect cables to controller board as follows to see which one makes breaker trip. Press breaker to OFF while making connections.

<u>Reconnect</u>	<u>Replace if Breaker Trips</u>
AJ2	Keyboard assembly (procedure 13)
AJ3	Touchpanel (procedure 20)
AJ4	Operator panel (procedure 14)
AJ5	Internal modem board (procedure 21)

- 012 1 Remove hood (procedure 3) and check blue and brown ac-entry wiring from power cord receptacle to ON/OFF circuit breaker for a short.
- 013 2 Disconnect power cord from outlet. Slide connectors back to access terminals on line filter and check continuity of line filter. Verify that continuity exists between terminals with same colored wires, and that no continuity exists between terminals with different colored wires. If not, replace line filter (procedure 11).
- 014 3 Replace power cord.





SAM 2 - NO RASTER

Assumptions: All LEDs are lit on power supply board and no raster (illumination) appears when BRIGHTNESS control is turned fully clockwise.

- |     |   |   |   |  |
|-----|---|---|---|--|
| 001 | N | Y | Fuse OK on monitor display board (figure 6-8)?  |  |
| 002 | N | Y | +55 +1.10 V present at fuse on display board (for ground, use ground side of C35 shown in figure 6-18). |  |
| 003 | N | Y | LED lit on display board (figure 6-8)?  |  |
| 004 | N | Y | CRT filament lit?   |  |
| 005 |   |   | 1   | Check BRIGHTNESS control as follows:   |
|     |   |   |   | a. Press ON/OFF circuit breaker to OFF and disconnect power cord from outlet.  |
|     |   |   |   | b. Disconnect board-edge connector from display board.   |
|     |   |   |   | c. Connect one ohmmeter lead to pin 4 of board-edge connector, and other lead to either adjacent pin 3 or pin 2 (pin numbering of board-edge connector is shown on display board).   |
|     |   |   |   | d. Set meter to X1000 setting and check that meter reads 0 ohm when BRIGHTNESS control is turned in one direction, and that resistance steadily increases to 100 kilohms when it is fully turned in opposite direction. If not, replace BRIGHTNESS control (procedure 16). |
| 006 |   |   | 2   | With power off, check seating of the following connections:  |
|     |   |   |   | ● Lead from flyback transformer on display board to doubler/bleeder assembly (above and left of display board)   |
|     |   |   |   | ● Yoke connector at S02 of display board   |
| 007 |   |   | 3   | Replace doubler/bleeder assembly (procedure 19).   |
|     | 2 | 2 | 2   | 2  |
|     | A | B | C   | D E  |

	A	B	C	D	E	
	1	1	1	1	1	
008				1		Press ON/OFF breaker to OFF. Wait 60 seconds for crt to bleed off power and check seating of socket at end of crt.
009			<u>1</u>	2	4	Replace display board (procedure 18).
010				<u>3</u>	<u>5</u>	Replace matched yoke/crt (procedure 18).
011		1				Check seating of cable leading from power supply board to board-edge connector on display board.
012		<u>2</u>				Do +55-V adjustment (procedure 9). If unable to adjust, replace power supply board (procedure 10).
013		<u>1</u>				Press ON/OFF breaker to OFF and replace fuse. If fuse blows again when power is applied, replace fuse and the following items one at a time:
						a. Display board (procedure 18)
						b. Doubler/bleeder assembly (procedure 19)
						c. Matched yoke/crt (procedure 18)

SAM 3 - BAD POWER SUPPLY VOLTAGES

Assumptions: Power is on, all cabling connected, and one or more voltages found bad during check/adjustment of power supply voltages or entry from SAM 1 (Power-On Problems) or SAM 4 (Resident Diagnostic Errors/Problems).

NOTE

The corrective actions in this SAM assume that cables are good. Before replacing an item, check associated cables for damage or shorts. When connecting cables to video and controller boards, refer to figures 6-11 and 6-12 to verify correct pin alignment. Pin numbering of cable connectors appears in vicinity of mating connectors on boards.

001	N	Y			All five LEDs lit on power supply board?	
002		N	Y		+5 <u>+0.25</u> V present across C78 on controller board (figure 6-16)?	
003			N	Y	-12 <u>+0.60</u> V present across C79 on controller board (figure 6-16)?	
004			N	Y	+12 <u>+0.60</u> V present across C66 on video board (figure 6-19)?	
005				N	Y	-5 <u>+0.25</u> V present across C83 on video board (figure 6-19)?
006				N	Y	+55 <u>+1.10</u> V present at fuse on display board (for ground, use ground side of C35 shown in figure 6-18).
007					<u>1</u> Power supply voltages are OK.	
008					1 If fuse is blown, go to SAM 2 (No Raster).	
009					2 If not yet done, do +55-V adjustment (procedure 9).	
010					<u>3</u> Replace power supply board (procedure 10).	
011					1 If voltage is more negative than tolerance, replace power supply board (procedure 10).	
	5	3	3	2	2	
	A	B	C	D	E	

D E

1 1

- 012 2 If voltage is less negative than tolerance, press ON/OFF breaker to OFF. Disconnect power cable from BJ3 on video board and press breaker to ON. Measure for  $-5 \pm 0.25$  V at pin 11 of loose end of power cable (pin 6 is ground). If voltage is bad, replace power supply board (procedure 10). If voltage is good, proceed to next step and isolate load fault.
- 013 3 Isolate load fault as follows:
- a. Press breaker to OFF and reconnect power cable to BJ3. Disconnect cable from BJ1 on video board.
  - b. Press breaker to ON and measure for  $-5 \pm 0.25$  V across C83 on video board. If voltage is bad, replace video board (procedure 6). If voltage is good and no internal modem is installed, replace controller board (procedure 7).
  - c. If an internal modem is installed, press breaker to OFF and reconnect cable to BJ1. Disconnect modem cable from AJ5 on controller board.
  - d. Press breaker to ON and measure again across C83 on video board. If voltage is bad, replace controller board (procedure 7). If voltage remains good, replace internal modem board (procedure 21).
- 014 1 If voltage is greater than tolerance, replace power supply board (procedure 10).
- 015 2 If voltage is less than tolerance, press ON/OFF breaker to OFF. Disconnect power cable from BJ3 on video board and press breaker to ON. Measure for  $+12 \pm 0.60$  V at pin 5 of loose end of power cable (pin 8 is ground). If voltage is bad, replace power supply board (procedure 10). If voltage is good, proceed to next step and isolate load fault.
- 016 3 Isolate load fault as follows:
- a. Press breaker to OFF and reconnect power cable to BJ3. Disconnect cable from BJ1 on video board.
  - b. Press breaker to ON and measure for  $+12 \pm 0.60$  V across C66 on video board. If voltage is bad, replace video board (procedure 6). If voltage is good and no internal modem is installed, replace controller board (procedure 7).
- (Step 016 continued on SAM 3-3)

- B C  
1 1
- c. If an internal modem is installed, press breaker to OFF and reconnect cable to BJ1. Disconnect modem cable from AJ5 on controller board.
  - d. Press breaker to ON and measure again across C66 on video board. If voltage is bad, replace controller board (procedure 7). If voltage remains good, replace internal modem board (procedure 21).
- 017 1 If voltage is more negative than tolerance, replace power supply board (procedure 10).
- 018 If voltage is less negative than tolerance, press ON/OFF breaker to OFF. Disconnect power cable from BJ3 on video board and press breaker to ON. Measure for  $-12 \pm 0.60$  V at pin 13 of loose end of power cable (pin 6 is ground). If voltage is bad, replace power supply board (procedure 10). If voltage is good, proceed to next step and isolate load fault.
- 019 3 Isolate load fault as follows:
- a. Press breaker to OFF and reconnect power cable to BJ3. Disconnect cable from AJ1 on controller board.
  - b. Press breaker to ON and measure for  $-12 \pm 0.60$  V at pin 41 of loose end of cable (pin 44 is ground). If voltage is bad, replace video board (procedure 6). If voltage is good and no internal modem is installed, replace controller board (procedure 7).
  - c. If an internal modem is installed, press breaker to OFF and reconnect cable to AJ1. Disconnect modem cable from AJ5 on controller board.
  - d. Press breaker to ON and measure for  $-12 \pm 0.60$  V across C79 on controller board. If voltage is bad, replace controller board (procedure 7). If voltage is good, replace internal modem board (procedure 21).
- 020 1 If not yet done, do  $\pm 5$ -V adjustment (procedure 9).
- 021 2 If voltage is greater than tolerance, replace power supply board (procedure 10).
- 4  
B

B  
1  
|  
022 3  
|  
|  
|  
|  
|  
|  
|  
|  
|  
023 4

If voltage is less than tolerance, press ON/OFF breaker to OFF. Disconnect power cable from BJ3 on video board and press breaker to ON. Measure for +5  $\pm$ 0.25 V at pin 9 of loose end of power cable (pin 6 is ground). If voltage is bad and cannot be adjusted, replace power supply (procedure 10). If voltage is now good, proceed to next step and isolate load fault.

Isolate load fault by doing the following. After faulty module is replaced, do +5-V adjustment (procedure 9) with all cabling connected.

- a. Press breaker to OFF. On video board, reconnect power cable to BJ3 and disconnect cable from BJ2. On controller board, disconnect cable from AJ1.
- b. Press breaker to ON and measure for +5 V at pin 45 of loose end of cable that has been disconnected from controller board (pin 50 is ground). If voltage is bad, replace video board (procedure 6).
- c. Press breaker to OFF. Reconnect cable to BJ2 on video board.
- d. Press breaker to ON and measure again at pin 45 of loose end of cable. If voltage is bad, replace monitor display board (procedure 18).
- e. Press breaker to OFF and reconnect cable to AJ1. Disconnect cables from AJ2, AJ3, AJ4, and AJ5 on controller board (no cable will be at AJ5 unless an internal modem is installed).
- f. Press breaker to ON and measure for +5 V across C78 on controller board. If voltage is bad, replace controller board (procedure 7).
- g. Press breaker to OFF. Reconnect cables to controller board as follows to see which one makes +5 V bad across C78. Press breaker to OFF while making connections.

<u>Reconnect</u>	<u>Replace if +5 V Goes Bad</u>
AJ2	Keyboard assembly (procedure 13)
AJ3	Touchpanel (procedure 20)
AJ4	Operator panel (procedure 14)
AJ5	Internal modem board (procedure 21)

A  
1  
|  
1024 1 Do the following as applicable:

- If all five LEDs are unlit, go to SAM 1 (Power-On Problems).
- If only the +55-V LED is lit (figure 6-17), insert adjustment tool through +5-V access hole in monitor chassis. Adjust +5-V potentiometer and check whether other four LEDs come on. If so, finish adjusting +5 V per procedure 9; if not, replace power supply board (procedure 10).
- If neither of the above, replace power supply board (procedure 10).





SAM 4 - RESIDENT DIAGNOSTIC ERRORS/PROBLEMS

Assumptions: Resident diagnostics executed per procedure 2 and an error detected or diagnostics will not run correctly.

001	Y	N	All LEDs on operator panel light and stay on after releasing RESET switch?														
002	Y	N	No LEDs on operator panel light when RESET switch is pressed.														
003	Y	N	Only some LEDs on operator panel light when RESET switch is pressed?														
004	Y	N	Error 01 or 02 occurred?														
005	Y	N	Error 03 occurred?														
006	Y	N	Error 04 occurred?														
007	Y	N	Error 05 occurred?														
008	Y	N	SKIP/TEST switch in TEST position and RESET switch pressed for 3 seconds or longer several times but diagnostics do not start (LEDs on operator panel do not cycle on and off)?														
009	Y	N	SKIP/KB&TP switch in KB&TP position but alignment pattern does not appear?														
010	Y	N	Absence of response when any key is pressed?														
011	Y	N	Absence of response when a particular key is pressed?														
012	Y	N	Wrong binary code shown for a key?														
013	Y	N	Touchpanel test does not cause video inversion or operates incorrectly?														
014	Y	N	Diagnostic hangs and/or alarm sounds constantly?														
015			1 Problem not covered. Call for assistance														
	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N			

	H	I	J	K	L	M	N	
	1	1	1	1	1	1	1	
016								1 Replace video board (procedure 6).
017								<u>2</u> Replace controller board (procedure 7).
018								1 Remove hood (procedure 3) and check connection of touchpanel cables at AJ3 on controller board. Figure 6-12 shows proper pin alignment of cables.
019								<u>2</u> Replace controller board (procedure 6) and touchpanel (procedure 20) one at a time until condition is corrected.
020								<u>1</u> Replace keyboard assembly (procedure 13) and controller board (procedure 7) one at a time until condition is corrected.
021								<u>1</u> Replace corresponding keyswitch (procedure 13).
022								1 Hold "0" key down and press RESET switch for 3 seconds to rerun diagnostics. When alignment pattern appears, release "0" key. If a keyswitch is shorted, its binary code appears on screen. Replace indicated keyswitch (procedure 13).
023								2 Remove hood (procedure 3) and check that keyboard cable is secure at AJ2 on controller board
024								<u>3</u> Replace keyboard assembly (procedure 13) and controller board (procedure 7) one at a time until condition is corrected.
025								1 Turn BRIGHTNESS control clockwise to check that it is not set too low.
026								2 Remove hood (procedure 3) and check that all five LEDs are lit on power supply board (figure 6-17). If not, go to SAM 3 (Bad Power Supply Voltages).
027								3 If no raster (illumination) appears with BRIGHTNESS control turned fully clockwise, go to SAM 2 (No Raster).
028								<u>4</u> Go to SAM 5 (Video Problems).
029								1 Remove hood (procedure 3) and check internal cable connections. Make sure connections are secure and that cables to video and controller boards are connected correctly. Figures 6-11 and 6-12 show proper pin alignment.

3  
H

	A	B	C	D	E	F	G	H	
	1	1	1	1	1	1	1	2	
030									2 Check LEDs on power supply board (figure 6-17). If all five LEDs are lit, check/adjust power supply voltages (procedure 9) to verify they are correct. If any voltages are bad or any of the five LEDs are unlit, go to SAM 3 (Bad Power Supply Voltages).
031								<u>3</u>	3 Replace the following items one at a time until condition is corrected: <ul style="list-style-type: none"> <li>a. EROM chip on video board that contains resident firmware program (procedure 8)</li> <li>b. Controller board (procedure 7)</li> <li>c. Video board (procedure 6)</li> </ul>
032								1	1 Replace Z80A-SIO/2 chip on controller board (procedure 8).
033							<u>1</u>	<u>2</u>	2 Replace controller board (procedure 7).
034				1					1 Second indication in LEDs identifies in which RAM chip error occurred (figure 6-4). Replace corresponding RAM chip on video board (procedure 8).
035					2				2 Check power supply voltages (procedure 9). If any voltages are bad, go to SAM 3 (Bad Power Supply Voltages).
036				3	1				3 1 Replace video board (procedure 6).
037			1	<u>4</u>	<u>2</u>				4 2 Replace controller board (procedure 7).
038			<u>2</u>						2 Replace LED(s) that did not light (procedure 15). Then rerun resident diagnostics.
039		1							1 Remove hood (procedure 3) and check internal cable connections.
040		2							2 Check power supply voltages (procedure 9). If any voltages are bad, go to SAM 3 (Bad Power Supply Voltages).
041		3							3 Replace operator panel (procedure 14).
042		1	<u>4</u>						4 Replace controller board (procedure 7).
043		<u>2</u>							2 Replace operator panel (procedure 14).



## SAM 5 - VIDEO PROBLEMS

Assumptions: RAM and interface resident diagnostics ran without error and raster (illumination) appears when BRIGHTNESS control is turned fully clockwise.

Instructions: Set SKIP/TEST and SKIP/KB&TP switches to TEST and KB&TP positions. Press RESET switch for 3 seconds to run resident diagnostics and have alignment pattern appear. If controlware is loaded, this may require pressing RESET twice, each time for 3 seconds or longer.

001	Y	N			Alignment pattern completely absent?	
002		Y	N		Display tilted or way undersize?	
003			Y	N	Display rolls vertically?	
004				Y	N	Pattern distorted or jittering?
005				Y	N	Pattern off center or unsymmetrical?
006				Y	N	Display resolution poor?
007				Y	N	Pattern has extra video?
008					<u>1</u>	Problem not covered. Call for assistance.
009					<u>1</u>	Replace video board (procedure 6).
010					1	Adjust FOCUS potentiometer (procedure 4). If FOCUS and BRIGHTNESS have little affect, adjust VIDEO GAIN potentiometer per procedure 4 to check if it is set too far clockwise.
011					2	Replace monitor display board (procedure 18).
012					<u>3</u>	Replace matched yoke/crt (procedure 18).
013					1	Perform video adjustments (procedure 4). If display is not correct after those adjustments, adjust yoke centering rings (procedure 5), then repeat video adjustments.
014					<u>2</u>	Replace monitor display board (procedure 18).
	2	2	2	2		
	A	B	C	D		

	A	B	C	D
	1	1	1	1
015			1	Perform video adjustments (procedure 4).
016			2	Replace monitor display board (procedure 18).
017			<u>3</u>	Replace video board (procedure 6).
018		1		Remove hood (procedure 3) and verify that 50/60-Hz switch on power supply board is set correctly (60-Hz position for a domestic unit; 50-Hz position for an international unit).
019		2		Adjust VERTICAL FREQ potentiometer (procedure 4).
020		3		Replace monitor display board (procedure 18).
021		<u>4</u>		Replace video board (procedure 6).
022	<u>1</u>			Remove hood (procedure 3) and do as follows:

WARNING

Lethal voltages exist in the crt monitor assembly. Use extreme caution in doing the following and only handle the plastic portion of the yoke.

- a. Loosen clamp screw securing yoke to neck of crt.
  - b. Rotate yoke to correct display tilt, and push yoke so it is snug against rear of crt.
  - c. Make sure display is still straight and tighten yoke clamp screw until snug. Do not overtighten.
  - d. Perform video adjustments (procedure 4).
- |     |          |  |  |   |
|-----|----------|--|--|---|
| 023 | 1        |  |  | Remove hood (procedure 3) and check cable connection at BJ2 on video board.   |
| 024 | <u>2</u> |  |  | Push and hold Flood Screen switch (figure 6-11) to either side. This should illuminate the entire screen. If so, replace video board (procedure 6); if not, replace the following items one at a time until condition is corrected: |
- a. 74S05 chip on monitor display board (procedure 8)
  - b. Video board (procedure 6)
  - c. Monitor display board (procedure 18)

SAM 6 - HOST LOADING PROBLEMS

Assumptions: Internal switches and switches behind protective door are set per the instructions in section 3, cabling installed per section 3, resident diagnostics ran without error, all associated communication devices are powered on, and loading is being attempted from the PLATO network computer or the Data Services network computer.

Instructions: Refer to terminal operator's guide (preface lists publication number) and follow the applicable startup procedure.

NOTE

The corrective actions in this SAM assume that cables are good. Before replacing an item, check associated cables for damage or shorts. When connecting cables to video and controller boards, refer to figures 6-11 and 6-12 to verify correct pin alignment.

001	Y	N				HOST NOT CONNECTED displayed?		
002		Y	N			LOADING FILE 00 displayed constantly?		
003			Y	N		NO REPLY displayed and XMT LED flashes every 3 or 4 seconds?		
004				Y	N	NO REPLY displayed and XMT LED flashes only occasionally?		
005					Y	N	HOST LOADING FAILURE momentarily displayed or nothing displayed?	
006						Y	N	TERMINAL READY displayed, but cannot sign on?
007							<u>1</u>	Problem not covered. Call for assistance.
008		1	1	1	1			Press RESET switch for 3 seconds or longer and retry load.
		2	2	2	2	2	2	
		A	B	C	D	E	F	



	A	B	C	D	E	F	
	1	1	1	1	1	1	
009			2	2			If loading message shows block 0 loading and then NO REPLY appears, verify that valid file number is being used. Controlware file number(s) are given in the requirements for the network subscription. If file number is wrong and is not being entered through keyboard, remove hood (procedure 3) and change settings of the appropriate pair of S5-1/-2 or S5-3/-4 switches on controller board (switch settings are shown on decal inside hood).
010		2	3	3	2		Verify that terminal is being connected to an active network and that host computer is operational.
011					3		Check power supply voltages (procedure 9). If any voltages are bad, go to SAM 3 (Bad Power Supply Voltages).
012				<u>4</u>	<u>4</u>	<u>1</u>	Replace controller board (procedure 7).
013			4		<u>5</u>		If internal modem is being used, replace internal modem board (procedure 21).
014		<u>3</u>	<u>5</u>				Replace controller board (procedure 7).
015	1						Verify that telephone connection is with an active network, or if connection is direct, that connected equipment is active.
016	2						If terminal has internal modem or is an international unit, check that TALK/DATA switch is in applicable position for communications: <ul style="list-style-type: none"> <li>● Internal modem installed - for PLATO communications, switch must be set to DATA position after making telephone connection with system. For Data Services communications in an internal/external-modem arrangement, use of the switch varies with arrangement (refer to equipment setup portion of terminal operator's guide).</li> <li>● International unit (no international units have internal modems) - if internal switch S2-1 is set for switched Data Terminal Ready signal, TALK/DATA switch must be set to DATA position after making telephone connection with system. If switch S2-1 is set for constant Data Terminal Ready signal, position of TALK/DATA switch is irrelevant.</li> </ul>

3  
A

- A  
2  
|  
017 3 Check communication cabling and verify that connections  
| are secure.  
|  
018 4 If DTR (Data Terminal Ready) LED on operator panel is not  
| lit, replace controller board (procedure 7).  
|  
019 5 If internal modem is being used, remove hood (procedure 3)  
| and check that red stripe on modem-board cable is pointing  
| down and that cable is securely connected to AJ5 on con-  
| troller board. Also check that wires from telephone-jack  
| board are correctly connected to terminals on modem board  
| (labeling on boards show correct connections).  
|  
020 6 If an external modem is being used, it should issue Data  
| Set Ready and detect a carrier after telephone connection  
| is made. If modem has signal indicators, check for this  
| at modem. If these conditions are not present, modem is  
| at fault and responsible party should be notified. If  
| these conditions are present, replace cable between ter-  
| minal and modem and retry.  
|  
021 7 If communications are via long-line receiver/driver and  
| RCV LED on operator panel does not blink, check cabling  
| to terminal for an open conductor or loose connector pin.  
|  
022 8 Replace controller board (procedure 7) and internal modem  
board, if present (procedure 21), one at a time.



## SAM 7 - LOCAL LOADING PROBLEMS

Assumptions: Resident diagnostics ran without error and terminal is conditioned in one of the following ways to allow local loading:

- ROM/EROM expansion option with resident controlware is installed.
- RAM expansion option is installed, a flexible disk drive is connected to the PARALLEL interface, the disk drive and all other connected peripherals are powered on, and a controlware flexible disk is installed in the disk drive.

Instructions: Refer to terminal operator's guide (preface lists publication number) and follow applicable startup procedure.

001	Y N	Autoload or select load attempted from ROM and ROM LOADING FAILURE displayed?
002	Y N	Autoload or select load attempted from flexible disk drive and DISK LOADING FAILURE displayed?
003	1	Problem not covered. Call for assistance.
004	1 1	Press RESET switch for 3 seconds or longer and retry load.
005	2	Verify that flexible disk is correctly installed in disk drive (refer to flexible disk drive hardware maintenance manual, publication number is listed in preface).
006	3	If another controlware flexible disk is available, install in disk drive and retry loading.
007	4	Check that all cabling connections between terminal and peripherals are secure and that a terminator is on last device.
008	5	If disk drive does not move heads during load attempt, run its resident diagnostics to check whether it is operational (refer to flexible disk drive hardware maintenance manual).
	2 2	
	A B	

A	B
1	1
009	6 If other devices than disk drive are connected to PARALLEL interface, turn power off and disconnect them from daisy chain. Install terminator on disk drive and try loading to determine whether one of the other devices are at fault.
010	7 Replace controller board (procedure 7).
011	8 Refer to flexible disk drive hardware maintenance manual and troubleshoot disk drive.
012	2 Remove hood (procedure 3) and check that ROM/EROM expansion chips are inserted in corresponding numbered sockets on video board (figure 6-14). Also check that ROM SEL switches on video board are set to reflect presence of expansion chips (switch settings are shown on decal inside hood).
013	3 Replace ROM/EROM expansion chips on video board (procedure 8).
014	4 Replace video board (procedure 6) and controller board (procedure 7) one at a time.

## SAM 8 - PARALLEL INTERFACE PROBLEMS

Assumptions: Resident diagnostics ran without error, all peripheral devices connected to PARALLEL interface are powered on, and PLATO DIAG tests for peripheral device point to a parallel interface problem.

- |     |          |          |  |
|-----|----------|----------|--|
| 001 | N        | Y        | Terminator installed on last device?   |
| 002 | N        | Y        | More than one device connected to PARALLEL interface?  |
| 003 | 1        | 1        | Check that all cable connections between terminal and device(s) are secure.  |
| 004 |          | 2        | Try to isolate problem by disconnecting peripheral devices one at a time and rerunning tests. Start with last device in daisy chain and be sure to reposition terminator on new last device. Refer to applicable hardware maintenance manual if a peripheral device is found to be at fault. |
| 005 |          | <u>3</u> | Replace controller board (procedure 7).  |
| 006 |          | 2        | Substitute a like peripheral device and rerun tests. If no error occurs, refer to applicable hardware maintenance manual and troubleshoot faulty peripheral device.  |
| 007 |          | <u>3</u> | Replace controller board (procedure 7).  |
| 008 | <u>1</u> |          | Install a terminator (part number 15632316) on last device and rerun tests.  |



## Procedure 1 - Turning Terminal On/Off

Apply power to terminal before powering on connected peripherals.

To apply power to terminal:

1. Verify that power cord is plugged into site outlet.
2. Press ON side of ON/OFF circuit breaker at lower-right side of terminal.
3. Adjust BRIGHTNESS control for desired viewing intensity.

To remove power from the terminal:

1. Press OFF side of ON/OFF circuit breaker.
2. If making parts replacement, disconnect power cord from site outlet.

## Procedure 2 - Executing Resident Diagnostics

### NOTE

This procedure assumes that internal switch S2-8 is set in NO position, so diagnostic tests do not loop. Also, it assumes that internal switch S2-10 is set to 32K position if optional RAM expansion is installed, or to 16K position if expansion is not installed. If set inaccurately, the diagnostics will either omit the expansion RAM or include nonexistent RAM in the RAM test. The latter condition results in invalid errors.

To run resident diagnostics:

1. Set switches behind protective door as follows:

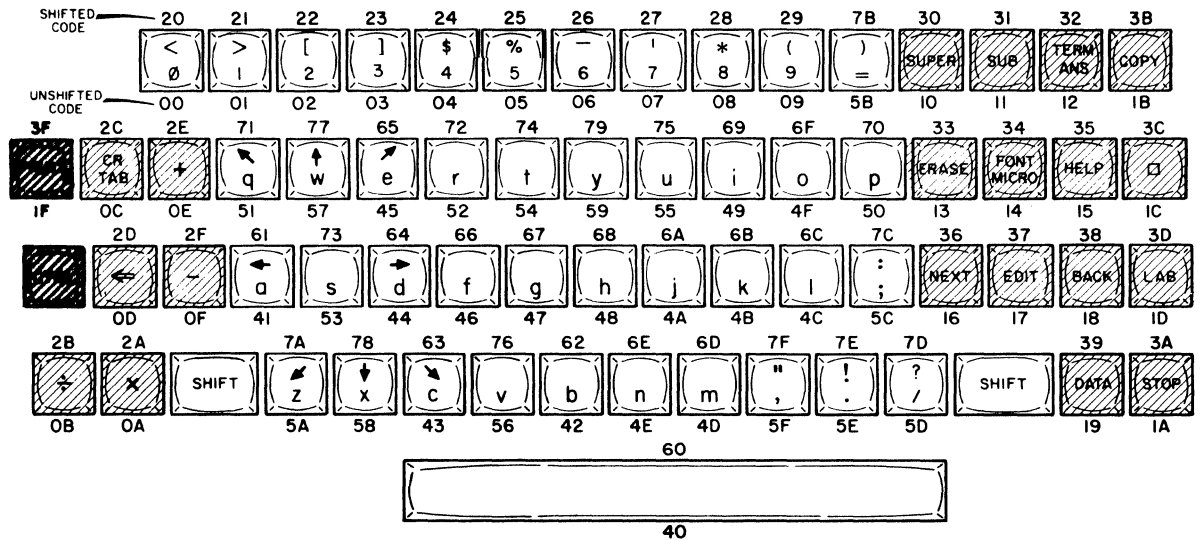
### CAUTION

Do not use a "lead" pencil to set rocker switches. Graphite dust from the pencil can cause a switch malfunction.



- SKIP/TEST switch to TEST.
  - SKIP/KB&TP switch to KB&TP if crt alignment, keyboard, and touchpanel tests are to be run with RAM and interface tests.
2. Press RESET switch for 3 seconds or longer to start tests and verify that all operator-panel LEDs light while RESET is pressed. If controlware is loaded, RESET may have to be pressed twice, each time for 3 seconds or longer before tests start. RAM and interface tests then run as follows:
- If only these two tests are run and no error is detected, the LEDs on operator panel cycle on and off and a display briefly appears with every other matrix element lit. Then terminal attempts to load controlware from the selected load source.
  - If an error is detected in either test, alarm sounds and an error code is displayed in LEDs on operator panel. If this occurs, go to step 4.
  - If no error is detected in either test and all tests are being run, an alignment pattern with two intersecting-diagonal lines appears on screen and RCV and XMT LEDs on operator panel light. Go to step 3.
3. With alignment pattern on screen, display adjustments can be made, if necessary, and operation of touchpanel and keyboard can be tested as follows. If an error occurs, refer to SAM 4 for corrective action.
- Touching any of the 256 touch-sensitive areas on touchpanel causes video to invert in that area of the screen (go from black to illuminated or vice versa). Repeated touches cause repeated inversions.
  - Pressing a keyboard key displays a binary representation of its hexadecimal code on the screen. Except for the SHIFT and CTRL (Control) keys, each key generates a shifted code (SHIFT key in use) and an unshifted code (figure 6-3). In addition, the shifted and unshifted codes can be modified by use of the CTRL key, which adds  $80_{16}$  to the code value.

The displayed representation uses long bars for binary 1s and short bars for binary 0s, with the bottom bar being the lowest order bit. For example, the representation for the  $57_{16}$  code of w is interpreted as follows:



02298-1

Figure 6-3. Keyboard Codes and Legends

Bit 7- |  
 Bit 6--- |  
 Bit 5- |  
 Bit 4--- | -- = 01010111<sub>2</sub> = 57<sub>16</sub>  
 Bit 3- |  
 Bit 2--- |  
 Bit 1--- |  
 Bit 0--- |

- To end the crt alignment, touchpanel, and keyboard tests, hold SHIFT key down and press STOP key. Terminal then attempts to load from the selected load source.

4. If alarm sounds, do as follows:

- a. Decode error code shown in LEDs. Error codes are:

<u>RCV</u>	<u>XMT</u>	<u>ERR</u>	<u>Error Code</u>	<u>Type of Error</u>
Off	Off	Lit	01	Memory error writing/reading 55 <sub>16</sub>
Off	Lit	Off	02	Memory error writing/reading AA <sub>16</sub>
Off	Lit	Lit	03	Memory error due to addressing problem
Lit	Off	Off	04	PLATO-communication logic error
Lit	Off	Lit	05	ASCII-communication logic or SERIAL interface error

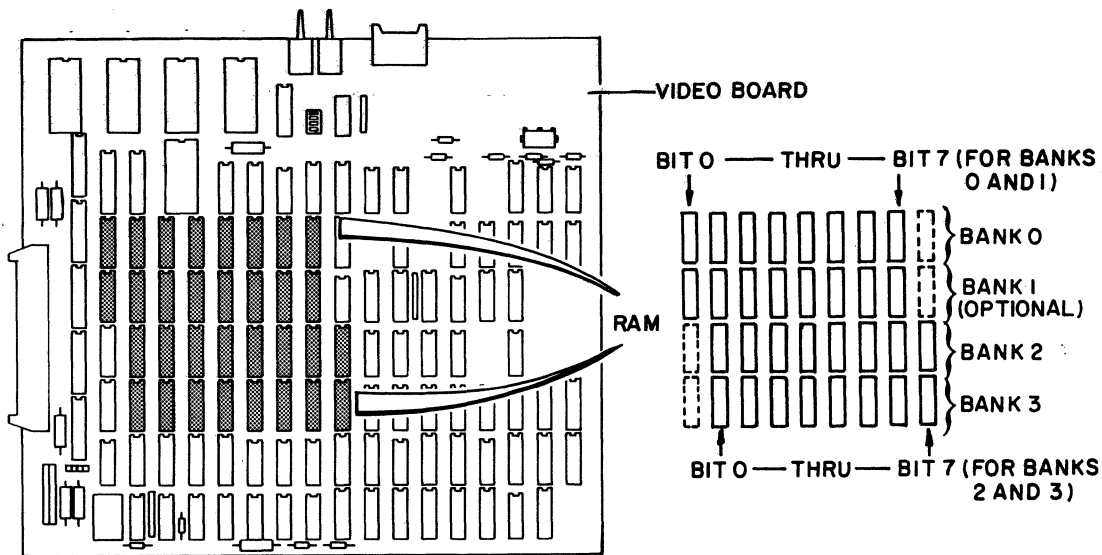
- b. Press any keyboard key to stop alarm. This also causes a second indication to appear in LEDs. If initial error code was 01 or 02, second indication identifies RAM chip that was in error (figure 6-4). If initial error code was 03, 04, or 05, refer to table 6-1 for meaning of second indication. Then refer to SAM 4 for corrective action.

TABLE 6-1. SECOND INDICATIONS FOR ERRORS 03, 04, AND 05

INITIAL ERROR CODE	X = LIT						MEANING OF SECOND INDICATION (RECORD AND PASS THIS INFORMATION ON WHEN RETURNING FAULTY MODULE)
	D	D	R	R	X	E	
03	-	-	-	-	-	-	Problem on A-00, A-07, or PMA-0 line.
03	-	-	-	-	-	X	Problem on A-01, A-08, or PMA-1 line.
03	-	-	-	-	X	-	Problem on A-02, A-09, or PMA-2 line.
03	-	-	-	-	X	X	Problem on A-03, A-10, or PMA-3 line.
03	-	-	-	X	-	-	Problem on A-04, A-11, or PMA-4 line.
03	-	-	-	X	-	X	Problem on A-05, A-12, or PMA-5 line.
03	-	-	-	X	X	-	Problem on A-06, A-13, or PMA-6 line.
03	-	-	-	X	X	X	Problem on A-00, A-07, or PMA-0 line.
03	-	X	-	-	-	-	Problem on A-00, A-07, or PMA-0 line.
03	-	X	-	-	-	X	Problem on A-01, A-08, or PMA-1 line.
03	-	X	-	-	X	-	Problem on A-02, A-09, or PMA-2 line.
03	-	X	-	-	X	X	Problem on A-03, A-10, or PMA-3 line.
03	-	X	-	X	-	-	Problem on A-04, A-11, or PMA-4 line.
03	-	X	-	X	-	X	Problem on A-05, A-12, or PMA-5 line.
03	-	X	-	X	X	-	Problem on A-06, A-13, or PMA-6 line.
03	-	X	-	X	X	X	Problem on A-00, A-07, or PMA-0 line.
03	X	-	-	-	-	-	Problem on A-00, A-07, or DMA-5 line.
03	X	-	-	-	-	X	Problem on A-01, A-08, or DMA-6 line.

TABLE 6-1. SECOND INDICATIONS FOR ERRORS 03, 04, AND 05 (CONTD)

INITIAL ERROR CODE	X = LIT						MEANING OF SECOND INDICATION (RECORD AND PASS THIS INFORMATION ON WHEN RETURNING FAULTY MODULE)
	D T R	D S R	R T S	R C V	X M T	E R R	
03	X	-	-	-	X	-	Problem on A-02, A-10, or DMA-0 line.
03	X	-	-	-	X	X	Problem on A-03, A-11, or DMA-1 line.
03	X	-	-	X	-	-	Problem on A-04, A-12, or DMA-2 line.
03	X	-	-	X	-	X	Problem on A-05, A-13, or DMA-3 line.
03	X	-	-	X	X	-	Problem on A-06, A-14, or DMA-4 line.
03	X	-	-	X	X	X	Problem on A-00, A-07, or DMA-5 line.
03	X	X	-	-	-	-	Problem on A-00, A-07, or DMA-5 line.
03	X	X	-	-	-	X	Problem on A-01, A-08, or DMA-6 line.
03	X	X	-	-	X	-	Problem on A-02, A-10, or DMA-0 line.
03	X	X	-	-	X	X	Problem on A-03, A-11, or DMA-1 line.
03	X	X	-	X	-	-	Problem on A-04, A-12, or DMA-2 line.
03	X	X	-	X	-	X	Problem on A-05, A-13, or DMA-3 line.
03	X	X	-	X	X	-	Problem on A-06, A-14, or DMA-4 line.
03	X	X	-	X	X	X	Problem on A-00, A-07, or DMA-5 line.
04	-	-	-	-	-	X	No character-request status.
04	-	-	-	-	X	-	Character request dropped after output of lower bits.
04	-	-	-	-	X	X	Character request present after output of upper bits.
04	-	-	-	X	-	-	First byte flag not set.
04	-	-	-	X	-	X	Start bit not received.
04	-	-	-	X	X	-	No character-ready status.
04	-	-	-	X	X	X	Data error.
05	-	-	-	-	-	X	No character-request status.
05	-	-	-	-	X	-	No character-ready status.
05	-	-	-	-	X	X	Data Error.



**FRONT PANEL**

<b>LEDS</b>		
DTR	} BANK	2 <sup>1</sup>
DSR		2 <sup>0</sup>
RTS	} BIT	2 <sup>2</sup>
XMT		2 <sup>1</sup>
ERR		2 <sup>0</sup>

03911-6

Figure 6-4. RAM Chip Location

**Procedure 3 - Removing Hood and Bezel**

To remove hood:

1. Remove two screws at rear of hood (figure 6-5). Lift rear slightly and slide hood toward rear to remove.
2. To reinstall, do reverse of step 1.

**NOTE**

When reinstalling hood, be sure connector panel is in slot at rear of hood

To remove bezel:

1. Remove power from terminal (procedure 1).
2. Lay terminal on its side and remove two screws at bottom of terminal (figure 6-6).
3. Set terminal upright, and remove hood per preceding instructions.

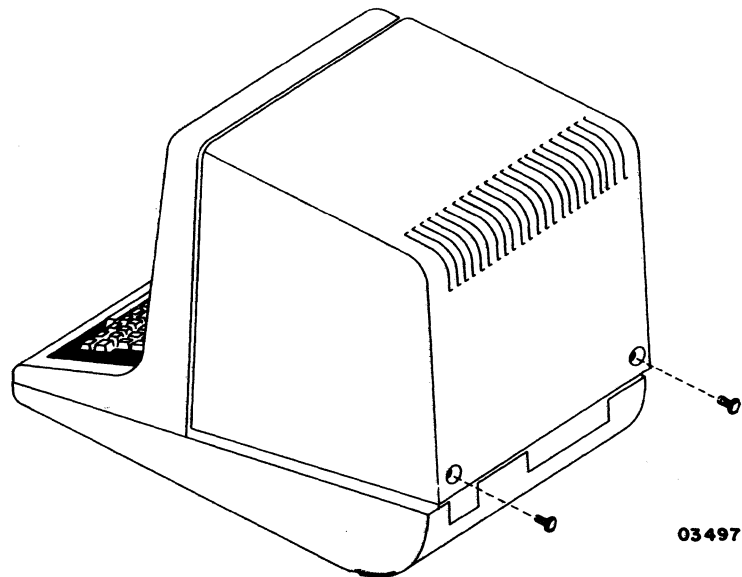


Figure 6-5. Hood Removal

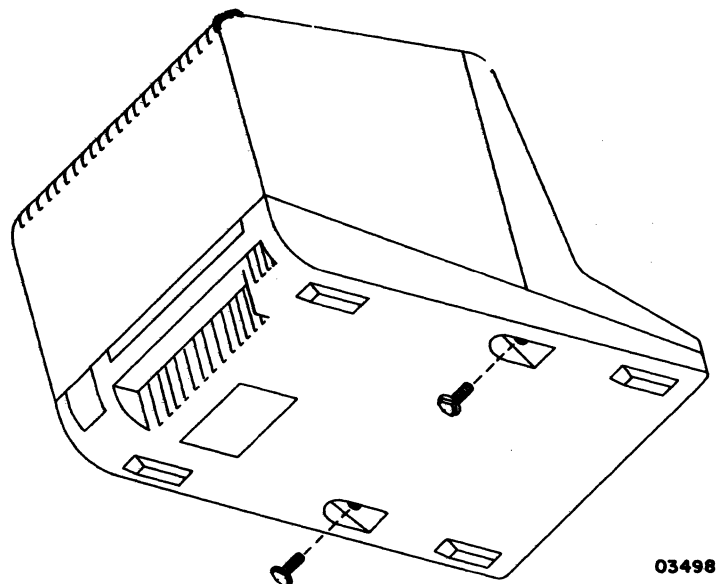


Figure 6-6. Bottom of Terminal

4. Refer to figure 6-7 and remove two bracket screws as indicated.
5. Disconnect touchpanel and operator panel cables from AJ3 and AJ4 on controller board.
6. Release touchpanel and operator panel cables from clamps on monitor chassis (no clamp for operator panel cable will exist if internal modem is installed).
7. If internal modem is installed, cut cable tie securing top of modem board to monitor chassis. Loosen top of modem board from standoff retainer and remove operator panel cable from behind modem board.
8. If adequate space is available, bezel can be removed and placed to right of terminal while leaving BRIGHTNESS control attached. If space is not available and bezel must be removed completely, continue with the following steps.

NOTE

Before bezel is replaced, it is suggested that face of crt be cleaned with a suitable glass cleaning agent.

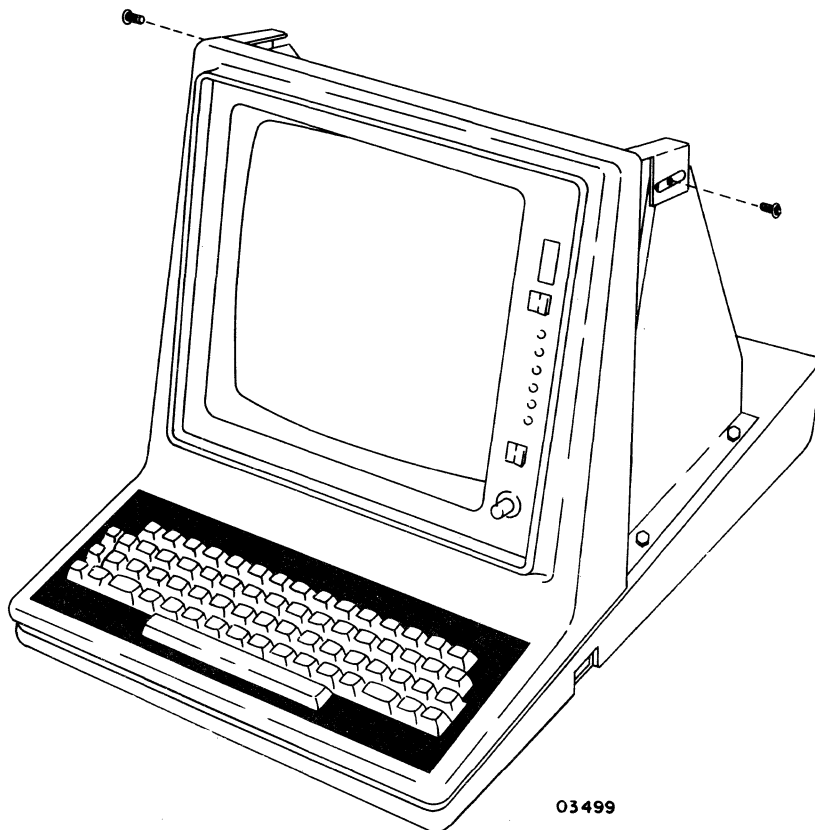


Figure 6-7. Bracket Screws Removal

9. Remove knob from BRIGHTNESS control by pulling knob straight off.
10. Remove nut and washer from front of BRIGHTNESS control.
11. Loosen touchpanel retainer clip below rear of BRIGHTNESS control and carefully work control out around touchpanel. Retighten touchpanel retainer clip. When replacing BRIGHTNESS control on international units, be sure ground-wire lug is slipped over control bushing before installing control in bezel opening.
12. Replace bezel by reversing procedure of preceding steps.

#### Procedure 4 - Adjusting Video

To adjust video:

1. Power on terminal (procedure 1).
2. Display resident-diagnostic alignment pattern by:
  - a. Placing SKIP/KB&TP switch to KB&TP.
  - b. Placing SKIP/TEST switch to TEST.
  - c. Pressing RESET switch for 3 seconds or longer. If controlware is loaded, this may require pressing RESET twice, each time for 3 seconds or longer.
3. Adjust BRIGHTNESS control for sharpest video and carefully observe the alignment pattern for a symmetrical display and correct alignment with touchpanel grid at outer edge of screen.

#### NOTE

Allow a warm-up period of 15 to 30 minutes before performing adjustments.

Refer to table 6-2 for a listing of all video controls and comments pertaining to their use.

The following adjustments are made through the VIDEO GAIN, FOCUS, H FREQ, VERTICAL FREQ, H SIZE, H LIN, V SIZE, and V LIN controls on the monitor display board with the tools of the alignment tool kit (part number 12263463). If the alignment pattern is not centered after completing these adjustments, adjust yoke centering rings (procedure 5) and then repeat these adjustments. To do the adjustments, remove hood (procedure 3) and refer to figure 6-8.



TABLE 6-2. VIDEO ADJUSTMENT CONTROLS

ADJUSTMENT	AFFECTS	ALSO AFFECTS	PROCEDURE/ COMMENTS
VIDEO GAIN Potentiometer	Maximum brightness before background raster appears.	Resolution if adjusted too far CCW.	Adjusted at factory for 40ft L with all white display using less than 50 V video.
FOCUS Potentiometer	Display element size and crispness.	Corner elements and center elements differently.	Adjust for best resolution in center of display.
Yoke Orientation	Raster tilt.	Raster size, if not snug against crt.	Rotate to correct raster. Push up against crt. Tighten clamp to keep in place.
Yoke Cen- tering Rings	Location of center of raster.	Geometry of display when moved more than 0.2 inch.	Minimum affect when ring tabs are 180° apart. Once rings are in position, glue with silicone adhesive (part number 51004063).
H FREQ (Horizontal Frequency) Potentiometer	Horizontal sync.	Center of raster and linearity if display area is shifted off center.	Not to be used to position display on raster or move display horizontally.
VERTICAL FREQ (Frequency) Potentiometer	Vertical sync.	Vertical stability.	Adjust CCW until just out of sync, then set 10° CW.
H (Horizon- tal) SIZE Coil	Raster width, high voltage, and overall size.	Vertical size because high voltage is affected.	Horizontal size, horizontal linearity, and centering rings all interact.

TABLE 6-2. VIDEO ADJUSTMENT CONTROLS (CONTD)

ADJUSTMENT	AFFECTS	ALSO AFFECTS	PROCEDURE/ COMMENTS
H LIN (Horizontal Linearity) Coil	Size ratio of left half to right half.	Overall width and high voltage.	Adjust so that center-to-left and center-to- right measure- ments are equal.
V (Vertical) SIZE Poten- Potentiometer	Raster height.	-	Vertical size, vertical lin- earity, and centering rings all interact.
V LIN (Vertical Linearity) Potentiometer	Size ratio of top half to bottom half.	Overall height.	Adjust so that center-to-top and center-to- bottom measure- ments are equal.
High Voltage Limit Potentiometer	Limits high voltage to 19 kV max.	X-ray emission.	Set with a variable power supply and high voltage meter by repair center person- nel or by vendor.

WARNING

Lethal voltages exist in the crt monitor assembly. Use extreme caution when performing adjustments or severe personal or loss of life may result.

NOTE

The term saturation in the next step refers to an overshoot or widening of the alignment pattern on the right side of the screen.

4. Turn VIDEO GAIN control counterclockwise until saturation just occurs, then turn control 30 degrees clockwise.

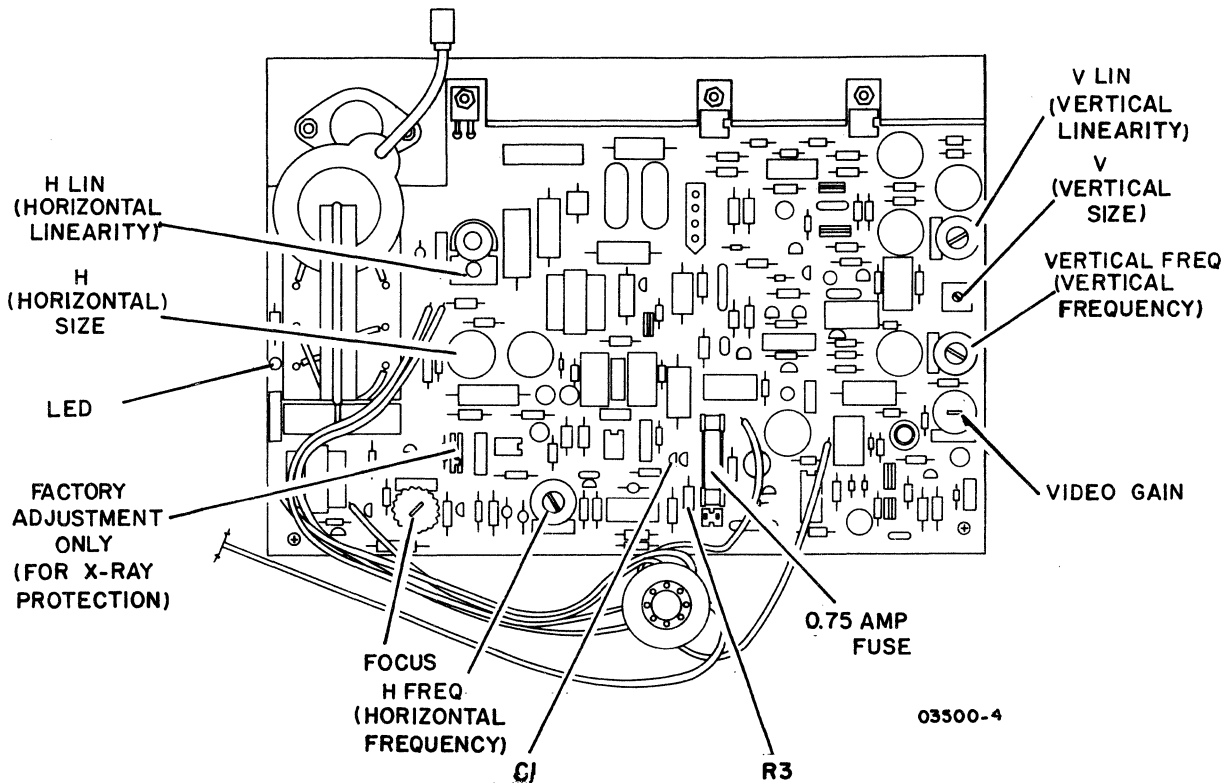


Figure 6-8. Display Board

5. Adjust FOCUS control for best resolution in center of display.
6. Adjust horizontal frequency as follows:
  - a. Disable Horizontal Sync signal by grounding side of resistor R3 closest to capacitor C1 (figure 6-8).
  - b. Adjust H FREQ control so vertical lines of alignment pattern are as vertical as possible. It is acceptable that display be unstable with some jittering and rolling in horizontal direction.

NOTE

The H FREQ control must not be used to position the display on the raster or to move the display horizontally.

- c. Unground resistor R3.

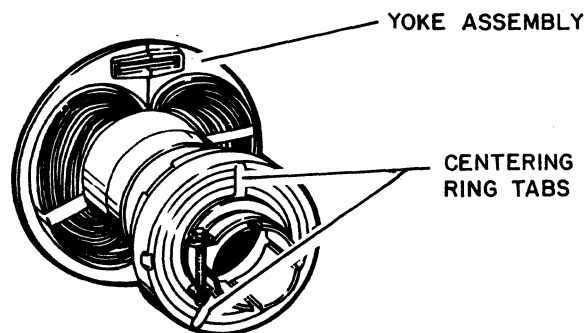
7. Turn VERT FREQ control counterclockwise until display just starts to roll, then turn control 10 degrees clockwise.
8. Adjust H SIZE control for an overall pattern width of 216 mm (8.5 in). Use plastic ruler or a piece of 8-1/2-by-11-inch paper for measuring.
9. Adjust H LIN control until pattern is horizontally centered on screen.
10. Adjust V SIZE control for an overall pattern height of 216 mm (8.5 in).
11. Adjust V LIN control until pattern is vertically centered on screen.

#### Procedure 5 - Adjusting Yoke Centering Rings

##### NOTE

Perform this procedure only after procedure 4 has been completed.

If the display is not centered after completing procedure 4, refer to figure 6-9 and do as follows:



02323-1

Figure 6-9. CRT Centering Rings

1. Remove power from terminal (procedure 1) and wait 60 seconds for crt to bleed off power.
2. Ensure that yoke is snug against crt and that yoke clamp is tight.

3. Break glue on centering rings by turning each approximately one-quarter turn each way.
4. Leave SKIP/TEST and SKIP/KB&TP switches in TEST and KB&TP positions and power on terminal.

WARNING

Lethal voltages exist in the crt monitor assembly. Use extreme caution when performing adjustments or severe personal injury or loss of life may result.

5. Adjust centering rings until alignment pattern is centered. Distance between each side and center should be 108 mm (4.25 in).
6. After pattern is centered:
  - a. Power off terminal and disconnect power cord from site outlet.
  - b. Wait 60 seconds for crt to bleed off power.
  - c. Reglue centering rings with silicone adhesive (part number 51004063).
  - d. Reapply power and verify that centering rings did not move while being glued.
7. Repeat procedure 4.

Procedure 6 - Replacing Video Board

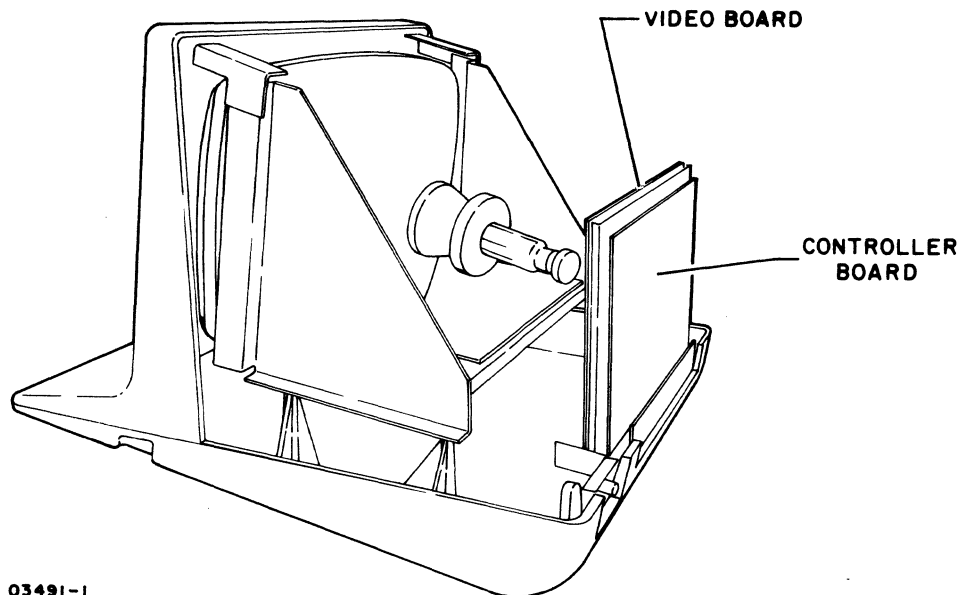
To replace the video board:

CAUTION

The video board contains MOS integrated circuits. Follow the precautionary rules for handling MOS circuits given earlier in this section.

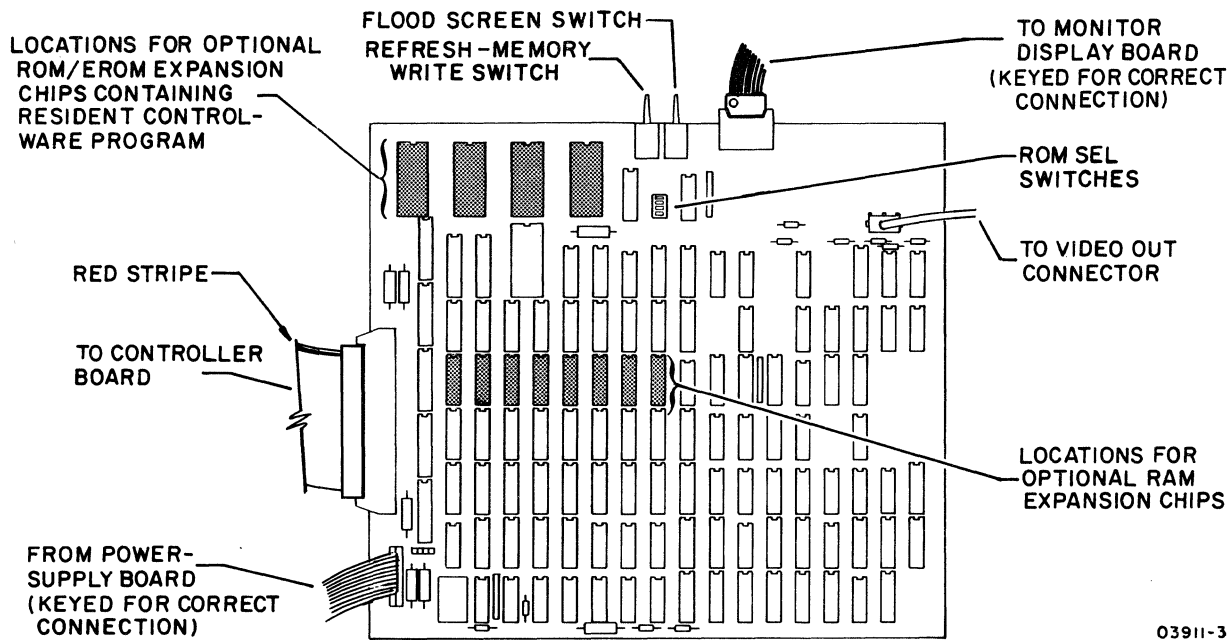
1. Remove power from terminal (procedure 1).
2. Remove terminal hood (procedure 3).

3. Disconnect cables from video board (figure 6-10) taking care not to bend pins.
4. Unlock board from two retainer clips by compressing each retainer between thumb and forefinger while gently pulling on board. Pull board out free from retainers and remove board.
5. If optional RAM expansion and/or ROM/EROM expansion chips are installed on board (figure 6-11), remove optional chips from that board and install in same locations on replacement board. Do this as follows:
  - a. Use chip removal tool (part number 87365900) for RAM chips or small screwdriver for ROM/EROM chips and lift chips straight out to avoid bending pins.
  - b. Insert chips so that dot or indentation is aligned with notch of sockets.



03491-1

Figure 6-10. Video and Controller Board Locations



03911-3

Figure 6-11. Video Board

6. Set ROM SEL switches on replacement board to same settings as on old board.
7. Place replacement board over retainer clips and press to snap into position.
8. Reconnect cables to board. Refer to figure 6-11 for cable connections.
9. Apply power and run resident diagnostics (procedure 2) to check operation of new board.
10. If optional ROM/EROM is present, verify proper loading from ROM/EROM per startup instructions in terminal operator's guide (refer to preface for publication number).

### Procedure 7 - Replacing Controller Board

To replace controller board:

#### CAUTION

The controller board contains MOS integrated circuits. Follow the precautionary rules for handling MOS circuits given earlier in this section.

1. Remove power from terminal (procedure 1).
2. Remove terminal hood (procedure 3).
3. Loosen retaining screws on connectors and disconnect external I/O cables from connector panel at rear of controller board (figure 6-10).
4. Disconnect internal cables from controller board taking care not to bend pins.
5. Unlock board from two retainer clips by compressing each retainer between thumb and forefinger while gently pulling on board. Pull board out free from retainers.
6. Disconnect board ground lead from connector plate
7. Connect ground lead to connector plate on replacement board.
8. Place replacement board over retainer clips and press to snap into position.
9. Reconnect internal cables to board. Refer to figure 6-12 for cable connections.
10. Reconnect I/O cables to board connector panel and tighten retaining screws on connectors.
11. Set S2 and S5 switches on board to same settings as on old board.
12. Verify that Communication Loopback switch on board is set to NORM position.
13. Apply power and run resident diagnostics (procedure 2) to check operation of new board.



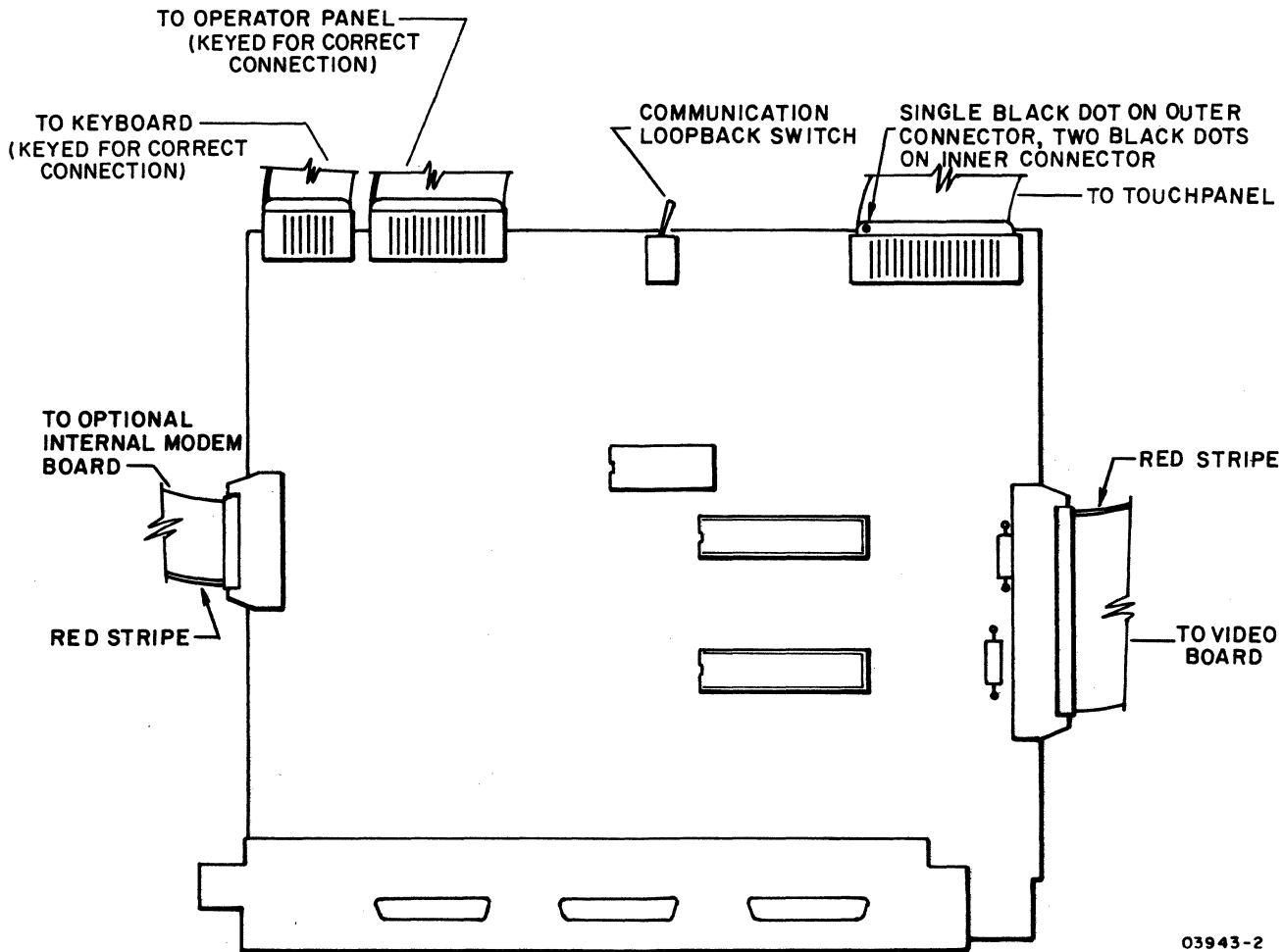


Figure 6-12. Controller Board

Procedure 8 - Replacing Integrated-Circuit Chips

The following instructions cover the replacement of the pluggable chips on the terminal, which are:

- Z80A Processor chip on controller board (figure 6-13)
- Z80A-SIO/2 Communications Controller chip on controller board (figure 6-13).
- All RAM chips on video board (figure 6-14)

- ROM/EROM chip on video board containing resident firmware program (figure 6-14)
- Optional ROM/EROM expansion chips on video board containing resident controlware program (figure 6-14)
- 74S05 chip on monitor display board (figure 6-15)

CAUTION

Follow the precautionary rules for handling MOS circuits given earlier in this section when replacing chips.

1. Remove power from terminal (procedure 1) and remove hood (procedure 3).
2. If replacing other than 74S05 chip on monitor display board, remove video board (procedure 6) or controller board (procedure 7) as applicable.
3. Use chip removal tool (part number 87365900) for 14-pin and 16-pin chips, or a small screwdriver for larger chips and lift chip(s) straight out to avoid bending pins.
4. Insert replacement chip(s) so that dot or indentation is aligned with notch of corresponding socket(s).
5. If removed, reinstall video board (procedure 6) or controller board (procedure 7).
6. Apply power and run resident diagnostics (procedure 2) to check operation of terminal.

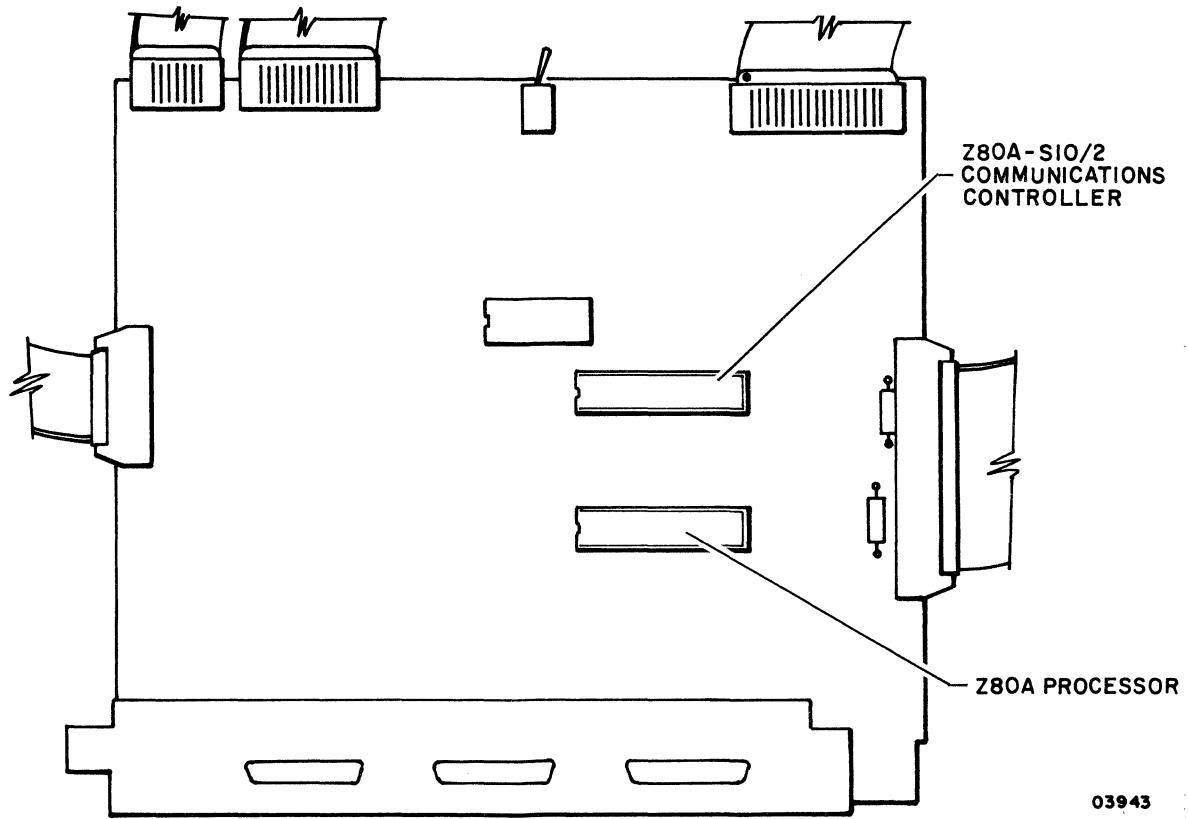


Figure 6-13. Pluggable Chips on Controller Board

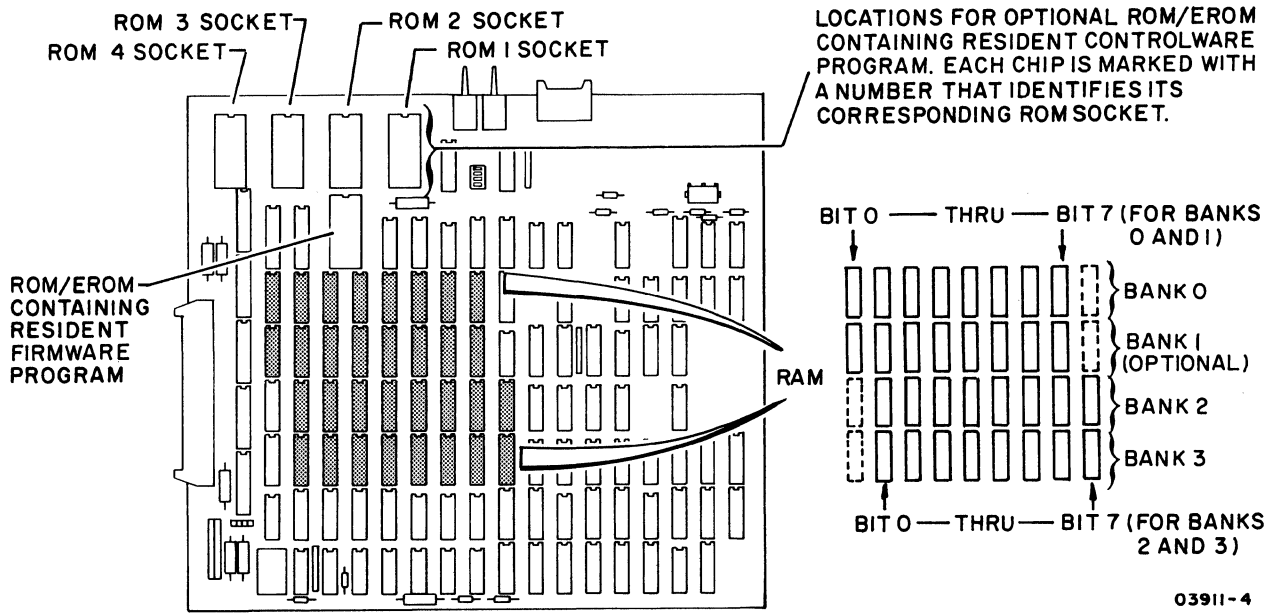


Figure 6-14. Pluggable Chips on Video Board

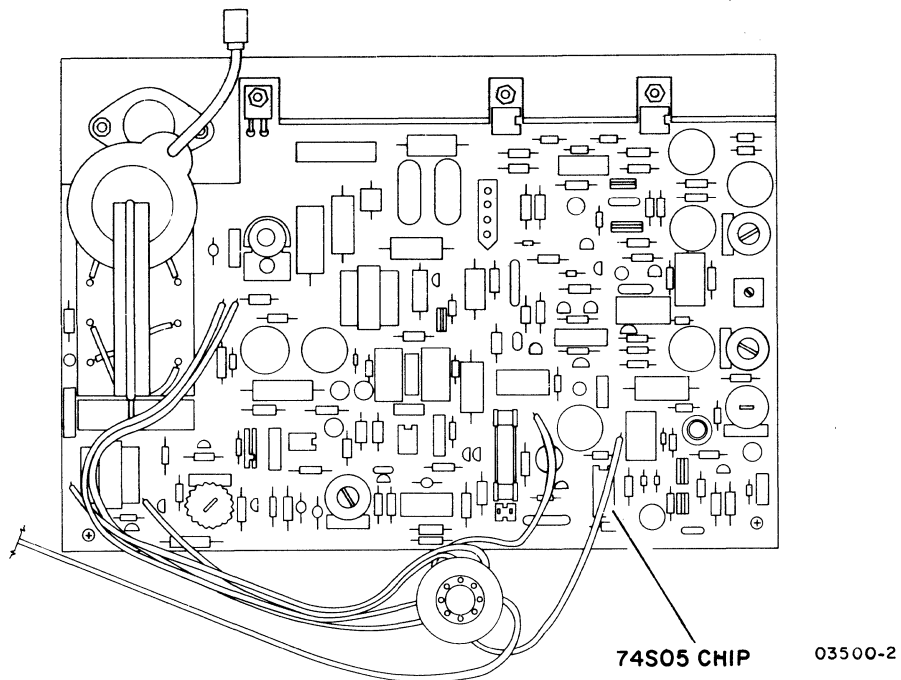


Figure 6-15. Pluggable Chip on Monitor Display Board

## Procedure 9 - Checking and Adjusting Power Supply Voltages

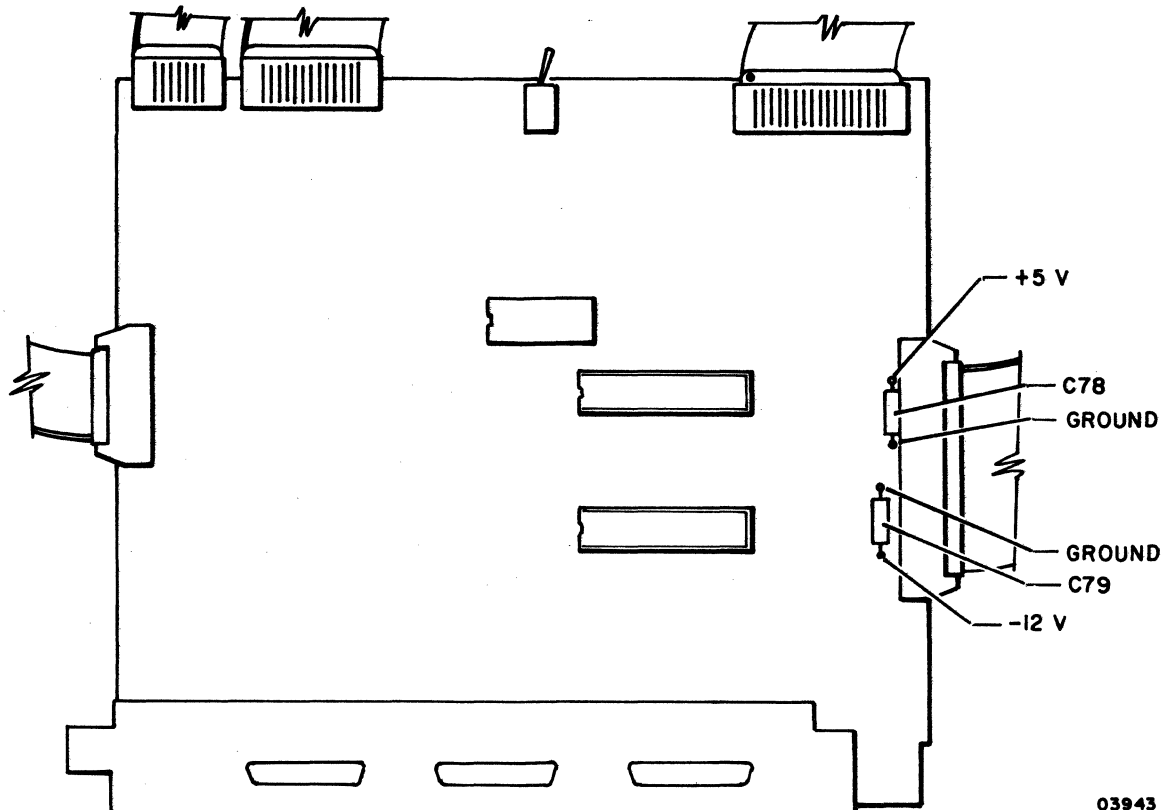
To check/adjust power supply voltages, do the following. If any voltages are found bad, refer to SAM 3 for corrective action.

1. Remove terminal hood (procedure 3).
2. With power applied, adjust +5 V output as follows:
  - a. Measure for +5 V across capacitor C78 on controller board (figure 6-16).
  - b. Insert adjustment tool of alignment tool kit (part number 12263463) through +5-V access hole in monitor chassis (figure 6-17).

### NOTE

If the +5 V output rises to between +5.5 to +6.8 V, that and all other power supply outputs except +55 V will automatically shut off.

- c. Adjust potentiometer on power supply board for a +5 V reading (+5  $\pm$  0.25 V is maximum allowable tolerance).



03943

Figure 6-16. Test Points for +5 V and -12 V on Controller Board

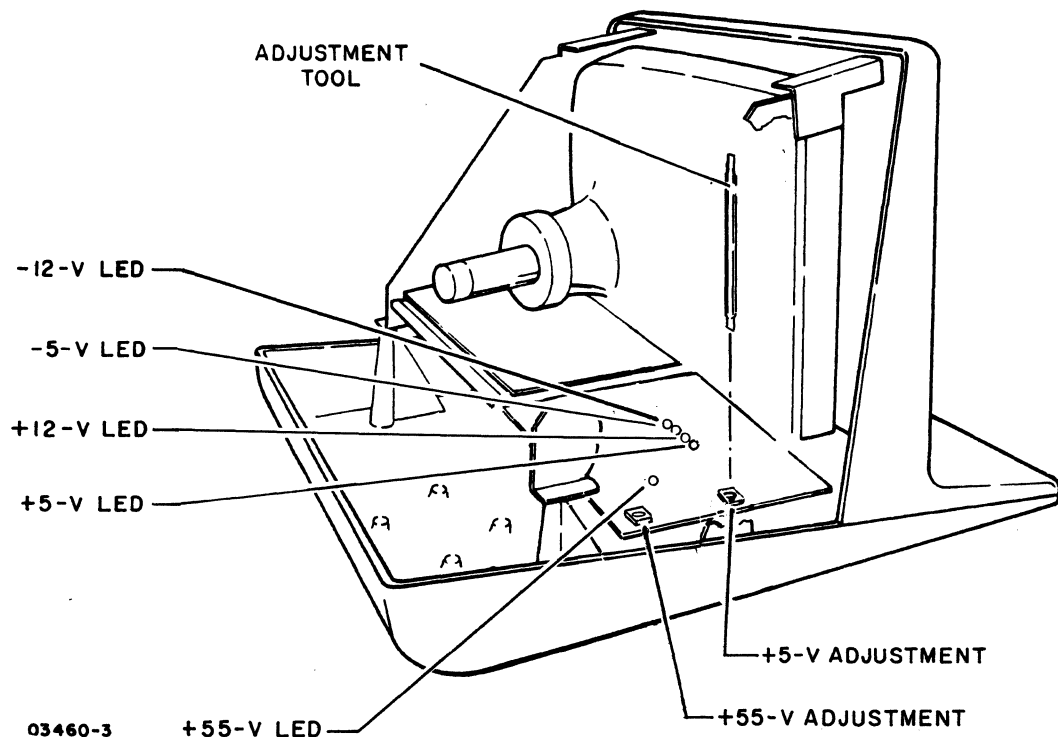


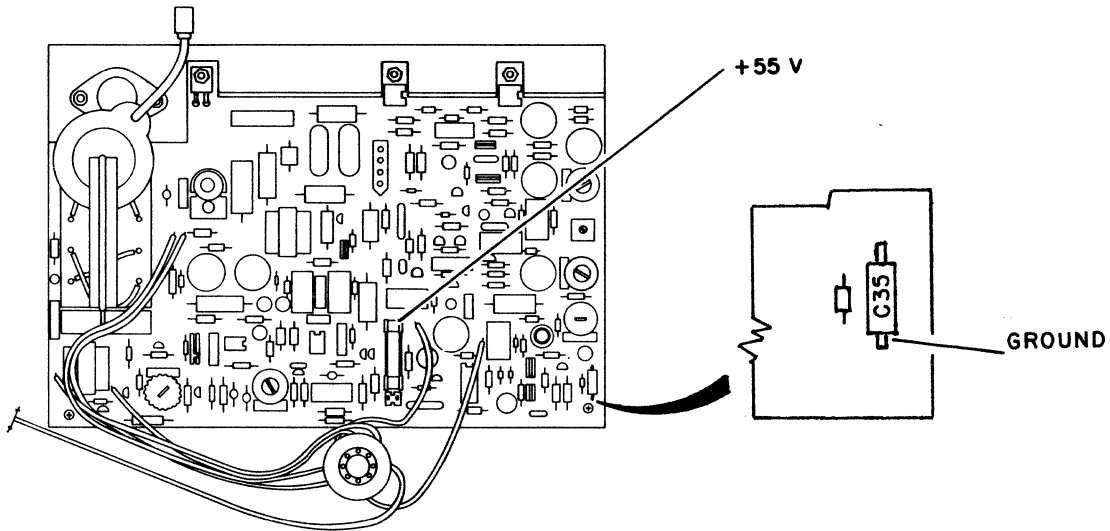
Figure 6-17. Power Supply Board Adjustments

WARNING

Lethal voltages exist in the crt monitor assembly. Use extreme caution when performing adjustments or severe personal injury or loss of life may result.

3. Adjust +55 V output:

- a. Measure for +55 V at fuse on monitor display board. For ground, use ground side of capacitor C35 (figure 6-18).
- b. Insert adjustment tool through +55-V access hole in monitor chassis.
- c. Adjust potentiometer on power supply board for a +55 V reading (+55  $\pm$ 1.10 V is maximum allowable tolerance).



03500-3

Figure 6-18. Test Points for +55 V on Display Board

4. Check that the following nonadjustable voltages are present:

- $-12 \pm 0.60$  V across capacitor C79 on controller board (figure 6-16)
- $-5 \pm 0.25$  V across capacitor C83 on video board (figure 6-19)
- $+12 \pm 0.60$  V across capacitor C66 on video board (figure 6-19)

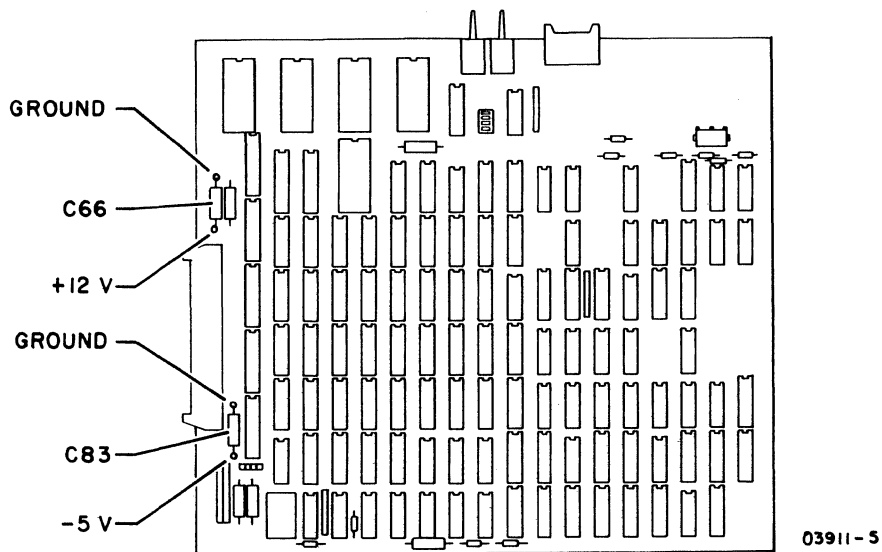


Figure 6-19. Test Points for -5 V and +12 V on Video Board

### Procedure 10 - Replacing Power Supply Board

To replace the power supply board:

1. Turn power off (procedure 1) and disconnect power cord from site outlet.
2. Remove terminal hood (procedure 3).
3. Disconnect the following cables:
  - Keyboard cable from AJ2 on controller board (figure 6-12).
  - Touchpanel cables from AJ3 on controller board (figure 6-12).
  - Operator panel cable from AJ4 on controller board (figure 6-12).
  - Board-edge connector from monitor display board.



4. If installed, remove internal modem board from monitor chassis (procedure 21).

CAUTION

When removing and installing monitor chassis, use care so that neck of crt does not bump video board. Tilt chassis so that neck is down, and do not handle crt by its neck. Also when installing chassis, use care to prevent pinching touchpanel cables.

5. Remove six mounting screws (figure 6-20) and carefully lift monitor chassis and place on a firm surface.
6. Disconnect three cables from power supply board.
7. Remove power-supply-board ground wire from ac entry panel.
8. Remove six mounting screws (figure 6-21) and remove power supply board.

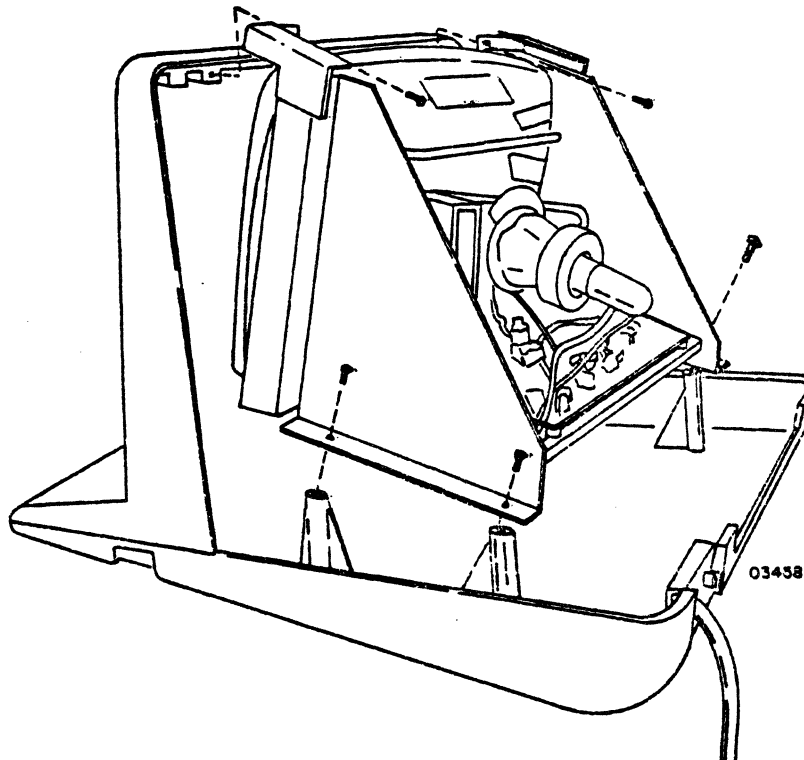


Figure 6-20. Monitor Chassis Removal

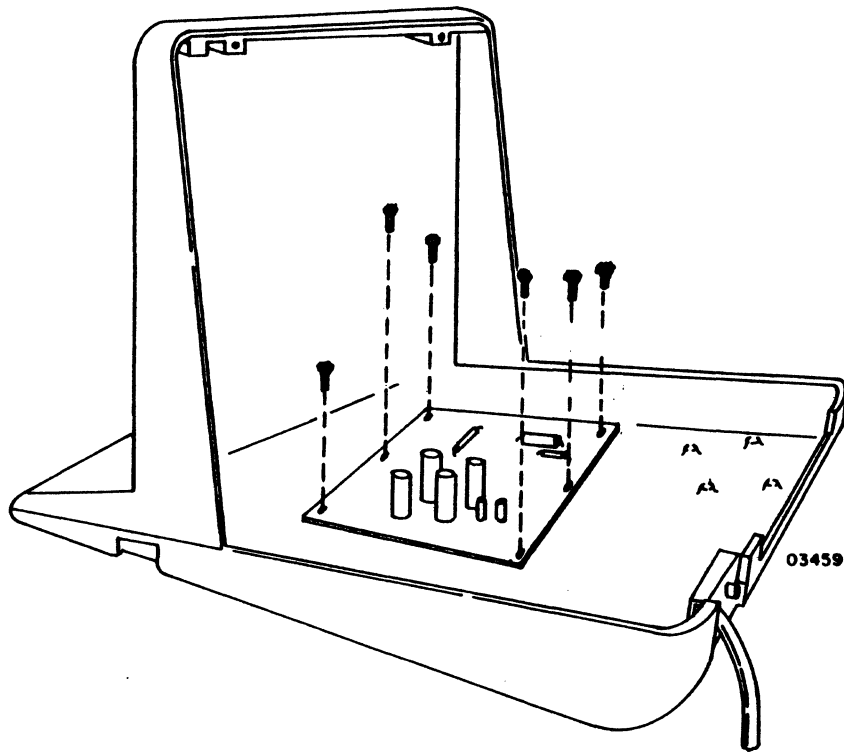


Figure 6-21. Power Supply Board Removal

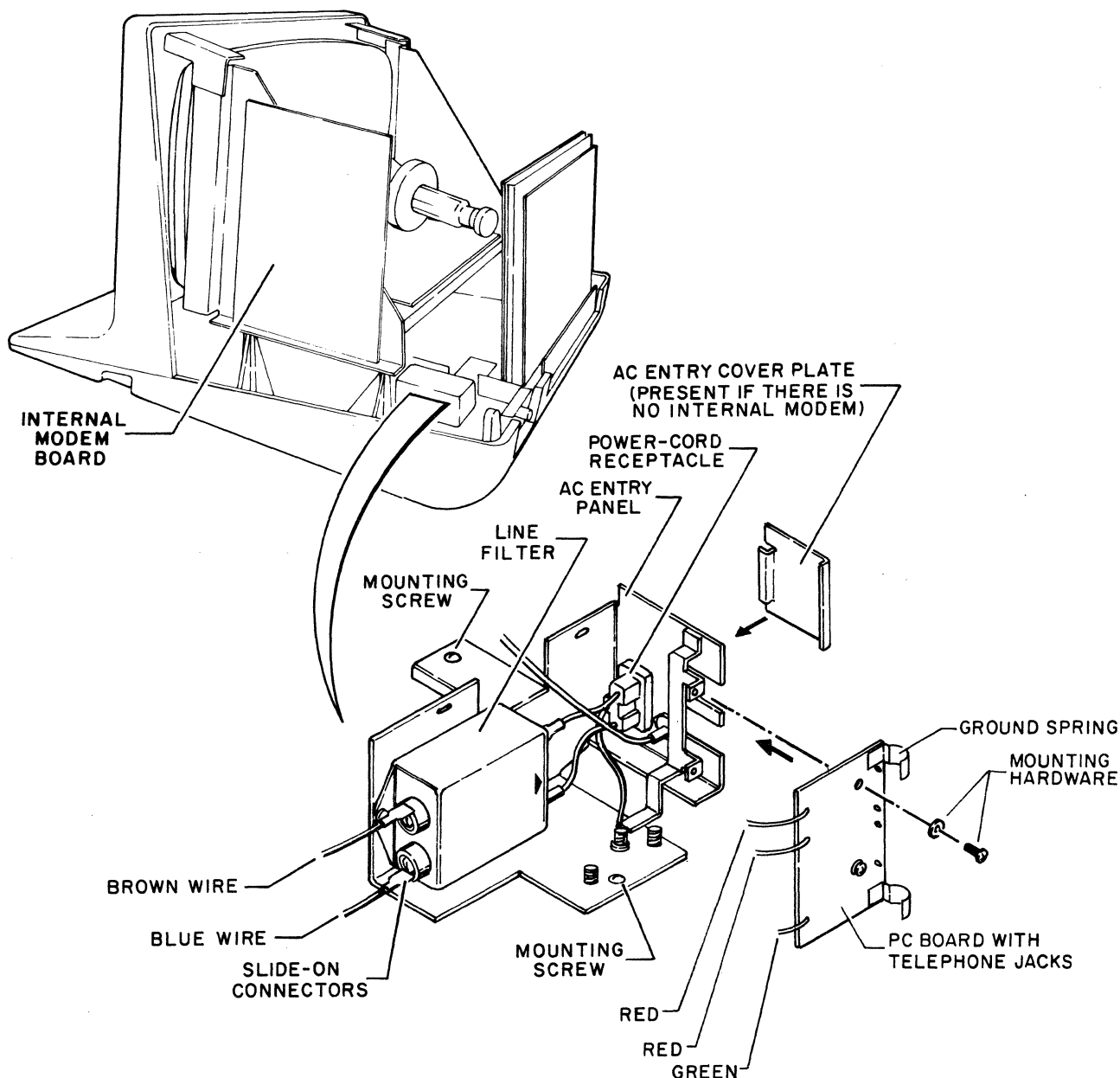
9. Install replacement power supply board in reverse procedure of preceding steps and set 50/60-Hz switch on replacement board to appropriate position (60-Hz position for a domestic unit; 50-Hz position for an international unit). After installation, check and adjust power supply voltages (procedure 9).

Procedure 11 - Replacing Line Filter, Power-Cord Receptacle, and Stepdown Transformer

To replace line filter or power-cord receptacle:

1. Power off terminal (procedure 1).
2. Unplug power cord from site outlet and from receptacle on ac entry panel.
3. Remove terminal hood (procedure 3).

4. If present, disconnect external cables from PHONE, LINE, and VIDEO OUT connectors on ac entry panel.
5. Disconnect two slide-on connectors from LOAD side of line filter (figure 6-22).
6. Disconnect cable from video board that goes to VIDEO OUT connector.
7. Remove all ground wires from ground terminals on ac entry panel except the one going to power cord receptacle.
8. Remove two screws that mount ac entry panel to terminal base (figure 6-22).



03941-3

Figure 6-22. AC Entry Panel Removal

9. If internal modem is present, raise entry panel and remove two screws and lockwashers securing telephone-jack PC board to panel. Then remove ac entry panel from unit.
10. Remove two screws securing line filter to panel. Then disconnect remaining slide-on connectors when filter is free.
11. If replacing power-cord receptacle, remove receptacle ground wire from panel. Then remove two screws securing receptacle.
12. Install replacement filter or receptacle in reverse procedure of preceding steps. When connecting slide-on connectors to filter, make sure that brown wires are installed on top terminals and blue wires on bottom terminals. If internal modem is present, also be sure that ground springs on telephone-jack board are firmly against hood-mounting post in base when securing ac entry panel.

To replace stepdown transformer (applicable only to international units):

1. Power off terminal (procedure 1) and unplug power cord from site outlet.
2. Remove terminal hood and bezel (procedure 3).
3. Remove monitor chassis per procedure 10, steps 3 thru 5.
4. Disconnect from ON/OFF circuit breaker two slide-on connectors coming from transformer.
5. Disconnect transformer connector from J1 on power supply board and remove connector ground wire from ac entry panel.
6. Disconnect transformer ground wire from ac entry panel.
7. Remove four mounting screws and lift transformer from unit (figure 6-23).
8. To install replacement transformer, perform reverse of preceding steps.

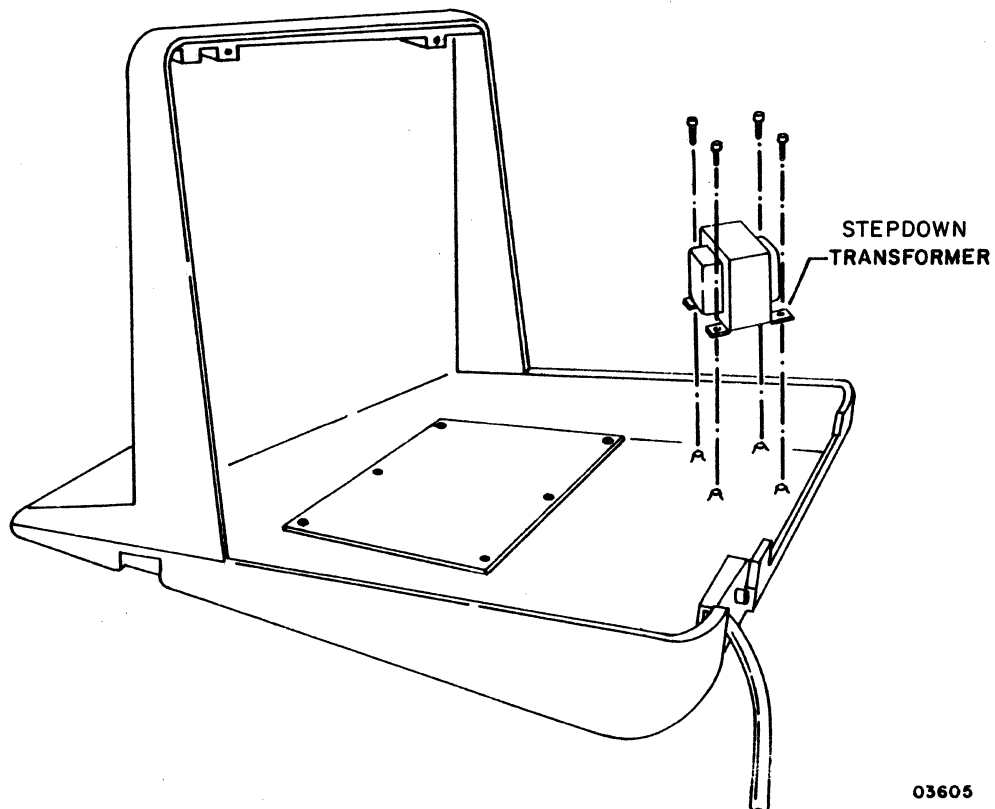


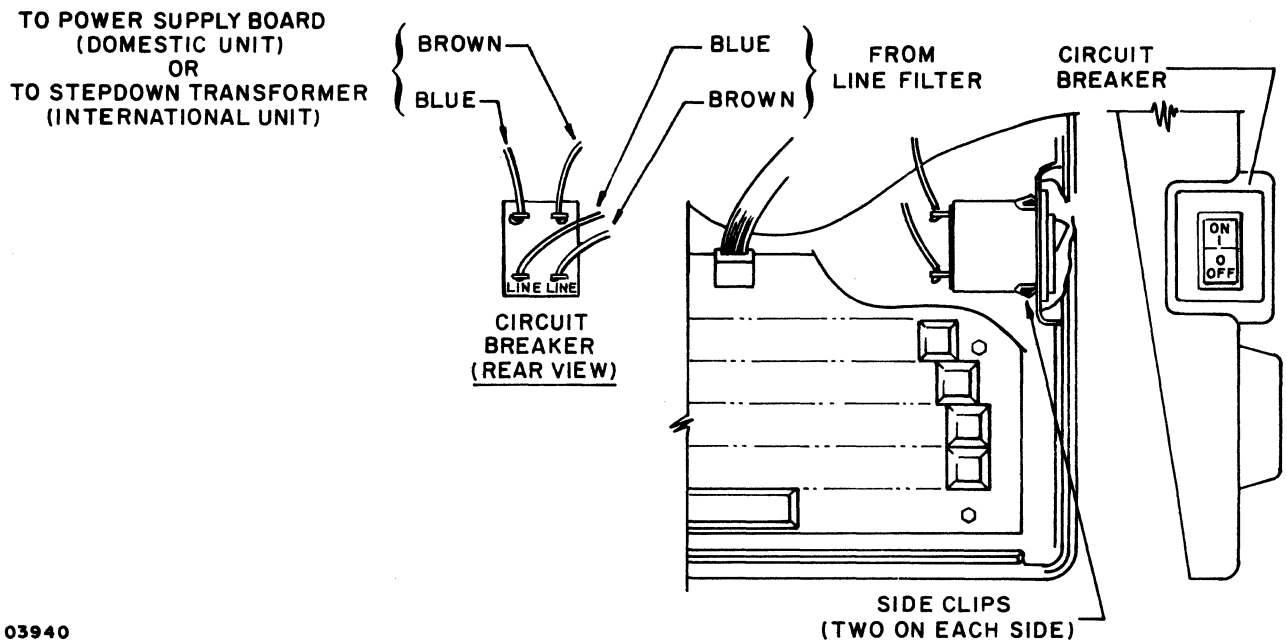
Figure 6-23. Stepdown Transformer Removal (Applicable Only to International Units)

#### Procedure 12 - Replacing ON/OFF Circuit Breaker

To replace ON/OFF circuit breaker:

1. Power off terminal (procedure 1) and unplug power cord from site outlet.
2. Remove terminal hood and bezel (procedure 3).
3. Squeeze four side clips and remove circuit breaker out opening (figure 6-24).
4. Disconnect four slide-on connectors from circuit breaker.
5. Refer to figure 6-24 and connect slide-on connectors to replacement breaker. Make sure connections are correct.

6. Position breaker so both terminals marked LINE are toward front of unit, then press into opening until side clips engage.
7. Replace bezel and hood (procedure 3).



03940

Figure 6-24. ON/OFF Circuit Breaker Replacement

### Procedure 13 - Replacing Keyboard Assembly and Components

To replace the keycaps, spacebar, keyboard, or keyswitches, perform the following steps as applicable:

To replace a keycap or spacebar:

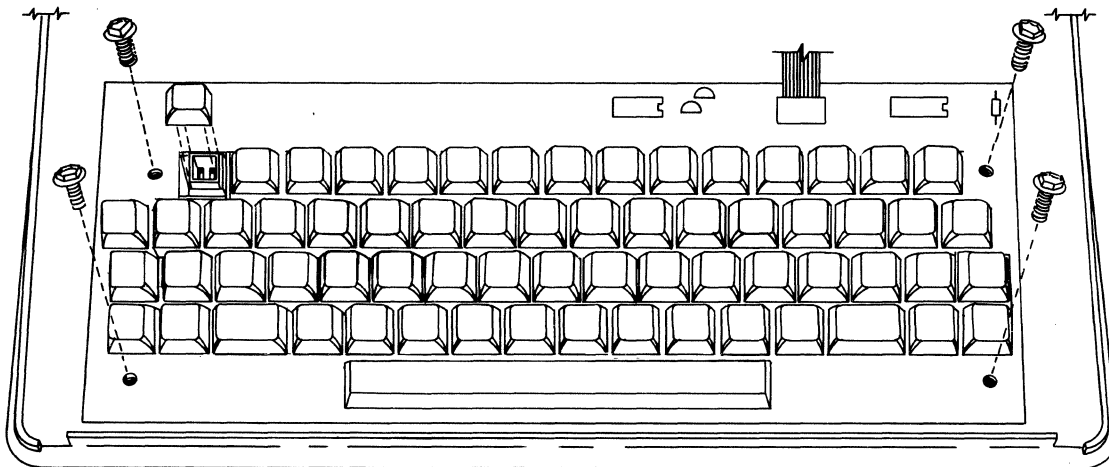
1. Turn terminal power off (procedure 1).
2. Remove keycap or spacebar using chip removal tool (part number 87365900).
3. Install new keycap or spacebar and press down until firmly seated.

To replace keyboard:

1. Turn terminal power off (procedure 1) and disconnect power cord from site outlet.
2. Remove terminal hood and bezel (procedure 3).
3. Disconnect keyboard cable from AJ2 on controller board.
4. Remove four screws mounting keyboard assembly to terminal base (figure 6-25).
5. Install new keyboard assembly by reversing preceding steps.

NOTE

Check that bezel does not bind key caps on top or sides before tightening down. If binding occurs, remove bezel, loosen keyboard and reposition slightly.



03506-2

Figure 6-25. Keyboard Assembly Removal

To replace a keyswitch (including Spacebar keyswitch), refer to figure 6-26 and do the following:

1. Turn terminal power off (procedure 1) and remove keyboard assembly as previously described in this procedure.
2. Remove keycap as described earlier in this procedure.

CAUTION

Use a low wattage soldering iron to avoid damaging PC board. A vacuum action desoldering tool or solder wick is suggested when unsoldering the switch.

3. Unsolder the contacts of switch and push on thickest contact to dislodge switch assembly from PC board and keyboard housing. Once switch assembly is free, pull it from housing.
4. Position replacement switch assembly so its contacts are aligned in same way as old switch.
5. Press replacement switch assembly down into opening of keyboard housing until it bottoms. Make sure contacts are exposed on back of PC board.
6. Solder each contact to PC board.
7. Replace keycap and reinstall keyboard.

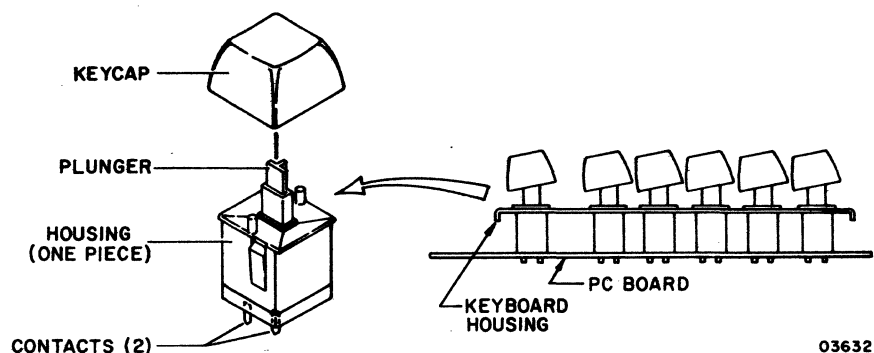


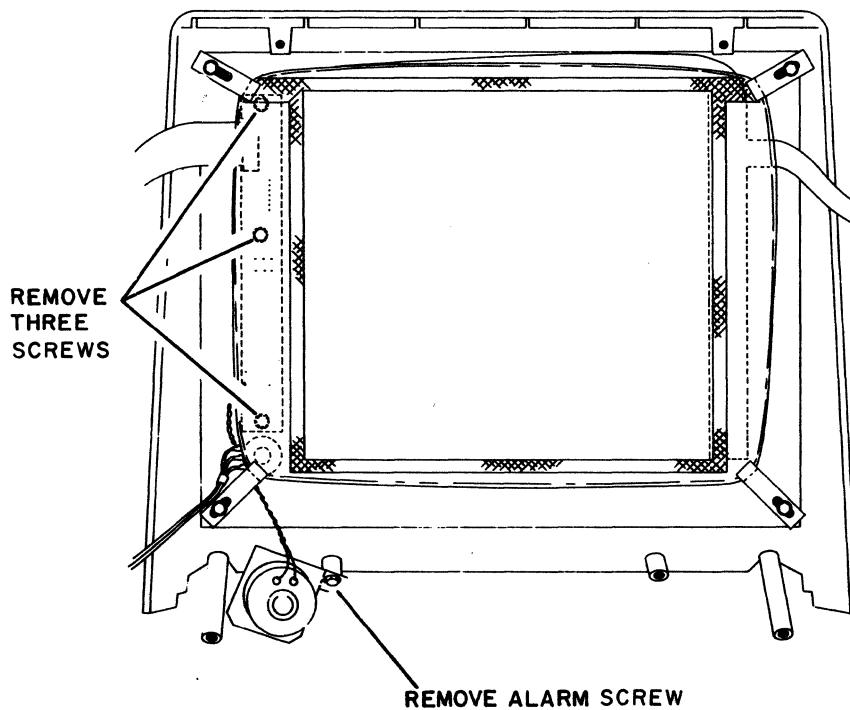
Figure 6-26. Keyswitch Replacement



## Procedure 14 - Replacing Operator Panel

To replace operator panel:

1. Power off terminal (procedure 1) and disconnect power cord from site outlet.
2. Remove hood and bezel (procedure 3).
3. Remove touchpanel (procedure 20).
4. Remove screw holding alarm (figure 6-27).
5. Remove three screws holding operator panel.
6. To replace operator panel, perform reverse of preceding steps and set selection switches on replacement panel to same settings as on old panel.



03508-1

Figure 6-27. Operator Panel Removal

## Procedure 15 - Replacing Operator Panel LEDs

To replace an LED on operator panel:

1. Turn terminal power off (procedure 1) and disconnect power cord from site outlet.
2. Remove operator panel (procedure 14).

### CAUTION

Use a low wattage soldering iron to avoid damaging PC board. A vacuum action desoldering tool or solder wick is suggested when unsoldering the LED.

3. Unsolder two leads of faulty LED and remove LED from board.
4. Install replacement LED so that flat side is oriented the same as other LEDs (figure 6-28). If replacing CR1 (ERR LED), leave the space shown in figure 6-28 between base of LED and surface of board. For other LEDs, butt base of LED against board.
5. Solder each lead to board.
6. Reinstall operator panel (procedure 14).

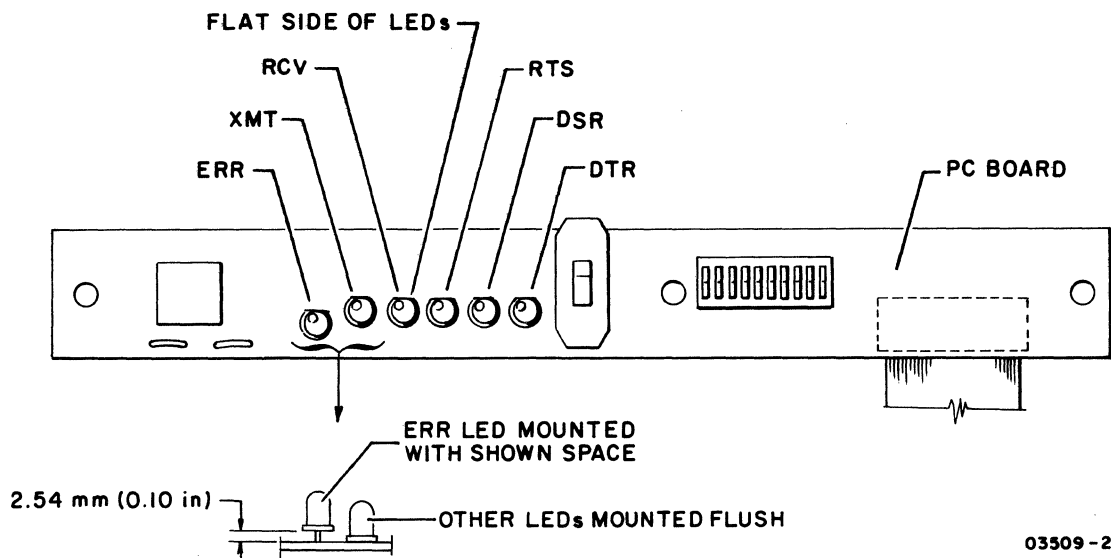


Figure 6-28. LEDs on Operator Panel

## Procedure 16 - Replacing BRIGHTNESS Control

To replace BRIGHTNESS control:

1. Power off terminal (procedure 1) and disconnect power cord from site outlet.
2. Remove hood and bezel per procedure 3, steps 1 through 8.
3. Pull BRIGHTNESS knob off and remove nut and washer from front of BRIGHTNESS control.
4. Loosen touchpanel mounting clip below rear of BRIGHTNESS control and move clip to one side.
5. Remove BRIGHTNESS control by carefully working it around touchpanel and touchpanel mounting clip.
6. Slide pieces of clear sleeving back to expose lugs on control.

### CAUTION

Use a low wattage soldering iron. A vacuum action desoldering tool or solder wick is suggested to unsolder wires from control.

7. Place replacement control next to bad one. Unsolder wires one at a time and resolder to corresponding lugs on replacement control.
8. Slide pieces of sleeving over lugs.
9. If an international unit, slip ground-wire lug over control bushing.
10. Carefully install control in bezel opening by working it around touchpanel.
11. Reposition touchpanel mounting clip and tighten.
12. Attach nut and washer to front of control.
13. Attach BRIGHTNESS knob and replace bezel and hood per procedure 3.

## Procedure 17 - Replacing Protective Door

To replace protective door on operator panel:

1. Power off terminal (procedure 1).
2. Remove hood and bezel (procedure 3).
3. Remove black bezel insert by breaking two metal keepers that hold both bezel pieces together.
4. Insert new door and fasten both bezel pieces back together using two new keepers.
5. Reinstall bezel and hood (procedure 3).

## Procedure 18 - Replacing Matched Yoke/CRT or Display Board

To replace matched yoke/crt or display board:

1. Power off terminal (procedure 1) and disconnect power cord from site outlet.
2. Remove terminal hood (procedure 3).
3. Disconnect touchpanel, operator panel, and keyboard cables from controller board (figure 6-12).
4. Disconnect board-edge connector from display board.
5. If installed, remove internal modem board from monitor chassis (procedure 21).

### CAUTION

When removing and installing monitor chassis, use care so that crt neck is not bumped against video board. Tilt the chassis so that neck is down, and do not handle crt by its neck. Also when installing chassis, use care to prevent pinching touch-panel cables.

6. Remove six screws shown in figure 6-29 and carefully lift chassis out of terminal. Set on firm surface to work on.

**WARNING**

Use care when handling crt as rough handling, nicks, or scratches can cause crt to implode. Wear heavy gloves and safety goggles.

7. Refer to figure 6-29 and disconnect the following:
  - Socket from end of crt.
  - Yoke cable from S02 on display board.
  - If removing yoke/crt, also disconnect anode lead from crt (fold back suction cup on two sides and squeeze to remove).

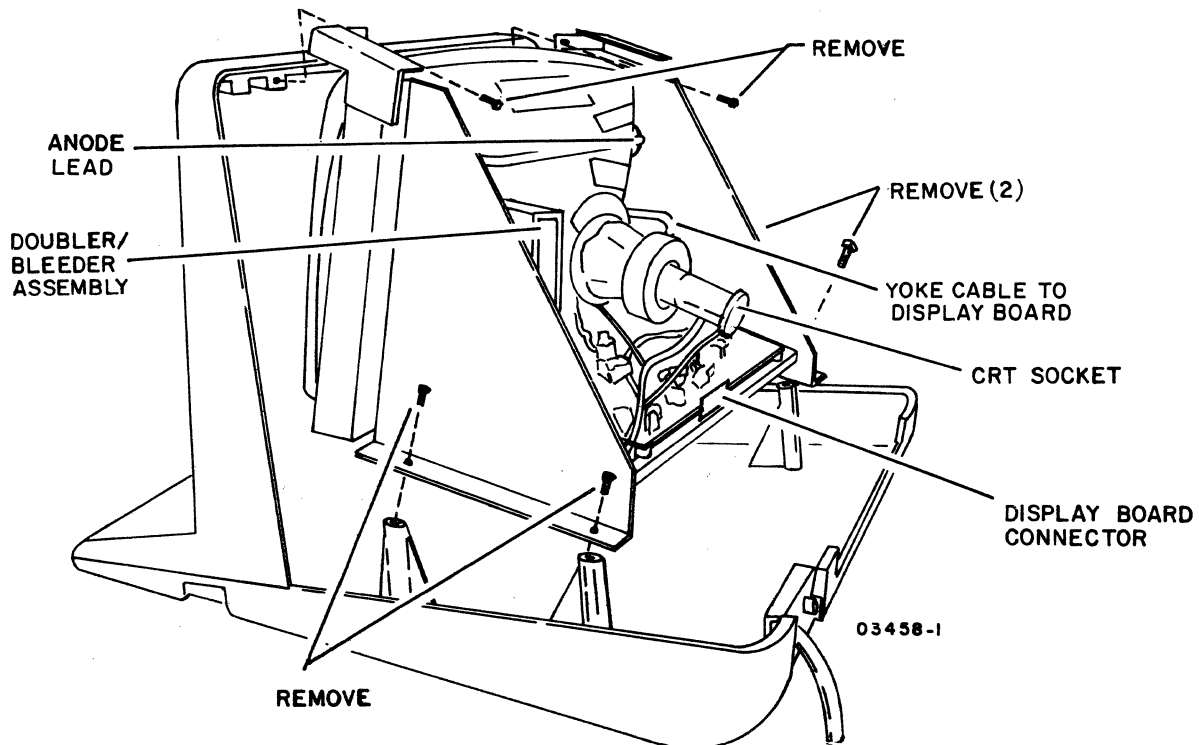
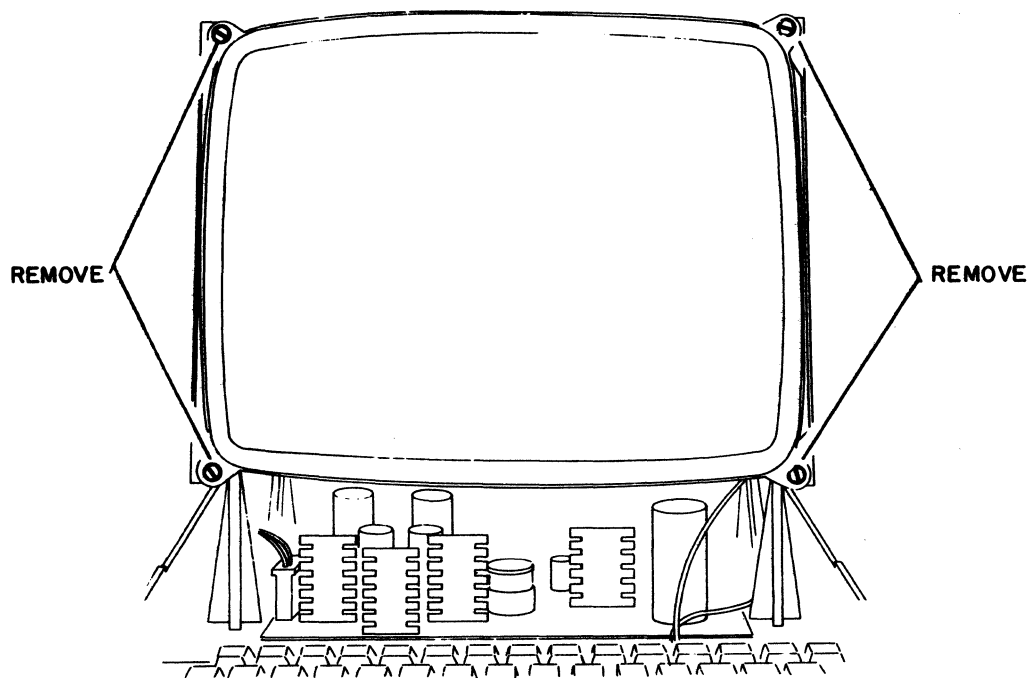


Figure 6-29. CRT Removal

To remove yoke/crt:

8. Remove four screws at front of chassis (figure 6-30) and lift crt up and out.
9. Install replacement yoke/crt per reverse of preceding steps, and after installation, perform video adjustments (procedure 4).



03510-1

Figure 6-30. Front Chassis View

To remove display board:

10. Disconnect flyback-transformer lead and white wire of crt socket from doubler/bleeder assembly.
11. Remove two screws and remove board.
12. Install replacement board per reverse of preceding steps. When replacing board, align tongue on board with slot on chassis. After installation, perform video adjustments (procedure 4).

## Procedure 19 - Replacing Voltage Doubler/Bleeder Assembly

To replace the voltage doubler/bleeder assembly, refer to figure 6-29 and do the following:

1. Turn terminal power off (procedure 1) and disconnect power cord from site outlet.
2. Remove hood (procedure 3).

### WARNING

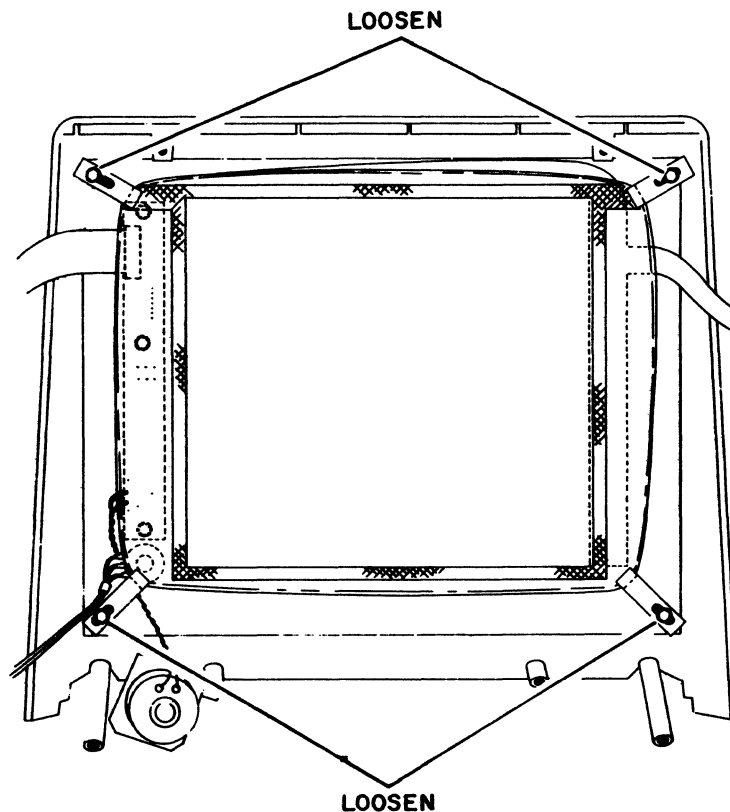
Lethal voltages exist in the leads of the doubler/bleeder assembly. After turning off power, a period of 60 seconds is required for these voltages to bleed off.

3. Disconnect anode lead from crt (to remove, fold back suction cup and squeeze).
4. Disconnect input lead from flyback transformer.
5. Remove doubler/bleeder assembly by loosening bottom mounting screw and removing top screw. If proper length screwdriver is not available, remove yoke/crt (procedure 18) to access screws.
6. Replace assembly by reversing preceding steps. Be sure to attach white wire of crt socket and black wire of assembly to top mounting screw.

## Procedure 20 - Replacing Touchpanel

To replace the touchpanel:

1. Turn terminal power off (procedure 1) and disconnect power cord from site outlet.
2. Remove terminal hood and bezel (procedure 3).
3. Remove touchpanel from bezel by loosening four mounting-bracket screws (figure 6-31).



03512-1

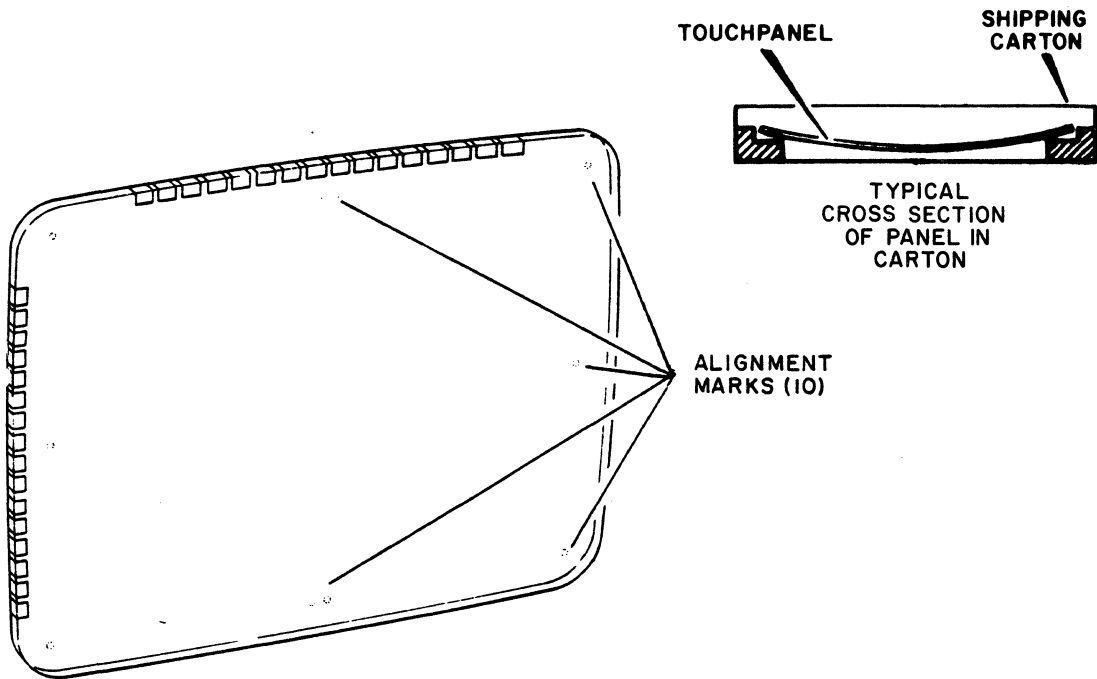
Figure 6-31. Touchpanel Removal

To install replacement touchpanel:

4. Place touchpanel in bezel opening with ribbon cable at top.
5. Align touchpanel so that etched alignment marks on panel (figure 6-32) are lined up with marks on bezel. Alignment marks on bezel are hard to see. Use a lead pencil to highlight them.
6. Carefully tighten four brackets while holding touchpanel to bezel. Check that touchpanel remains correctly aligned.
7. Check front of touchpanel for dimples in mylar. Any dimples caused by tightening touchpanel down too tight may cause errors and requires loosening.



8. Reinstall bezel (procedure 3).
9. Connect touchpanel connectors to controller board (figure 6-12).
10. Reconnect power cord and turn power on.
11. Run resident diagnostics (procedure 2) and test touchpanel operation when alignment pattern appears. Also check that border of alignment pattern coincides with touchpanel grid. If misalignment exists, perform video adjustments (procedure 4).
12. Place defective touchpanel in shipping carton which held replacement (figure 6-32).
13. Replace hood (procedure 3).



02319-2

Figure 6-32. Touchpanel Alignment Marks

## Procedure 21 - Replacing Internal Modem Board

To replace internal modem board:

1. Power off terminal (procedure 1) and disconnect power cord from site outlet.
2. Remove hood (procedure 3).
3. Disconnect wires from terminals on modem board.
4. Disconnect modem cable from controller board (figure 6-12).
5. Remove modem board by cutting cable ties and pulling board off retainers.
6. Install new modem board by pressing board over retainers and installing new cable ties (part number 94277400).
7. Refer to labeling and reconnect wires to J2, J3, and J5 terminals on modem board.
8. Connect ground wire to board GND terminal.
9. Reconnect modem cable to controller board (figure 6-12).
10. Replace hood (procedure 3).

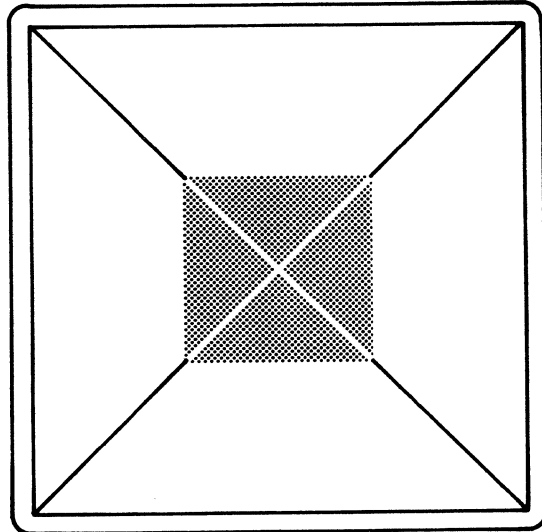
## Procedure 22 - Defining Acceptable Display Quality

The following information is for reference whenever definitions of acceptable display quality are required.

**Brightness** - the retrace and nonintensified scan lines should not be visible. The intensity should be set high enough for a display to be seen from at least 1 meter (3 feet) away, but not so high that displayed data changes in size and symbols appear defocused.

**Focus** - focus is to be adjusted for best resolution in the center of the screen.

Orthogonality and Linearity - with the resident-diagnostic alignment pattern displayed (figure 6-33), the pattern should appear square and coincide with the outer edges of the touch-panel grid. The point where the diagonals intersect should be an equal distance from each edge of the square. If the pattern does not meet these requirements, perform procedures 4 and 5.



03633

Figure 6-33. Orthogonality and Linearity of Alignment Pattern

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This section contains parts data information for the terminal. This includes a genealogy chart, spare parts lists, and assembly drawings with assembly parts lists.

TABLE 7-1. EXPLANATION OF COLUMN HEADINGS OF COMPUTER-GENERATED ASSEMBLY PARTS LISTS

COLUMN HEADING	EXPLANATION
FIND NO.	Identifies an electrical or mechanical part on an assembly drawing. If more than one listing appears for a find number, refer to LI, WK IN, and WK OUT.
LI (Line Item)	Gives a chronological or historical record of the addition of a new part to a find number. For example, 01 indicates that the part was the first one used, and 02 indicates the second, etc. See also WK IN and WK OUT.
PART NUMBER	Gives the Control Data Corporation part identification. Use this number when ordering replacements.
CD (Check Digit)	Gives the information-control system a means of cross-checking the correctness of a part number.
QUANTITY	Lists the total number of a part required to complete an assembly. The vertical line near the center of the column acts as a decimal point. Numbers to the left of the line are whole numbers. Those to the right of the line are tenths, hundredths, and thousandths.
U/M (Unit of Measure)	Indicates how the information-control system counts or supplies a part.
PART DESCRIPTION	Describes the physical appearance, type, or name of a part.
MC (Material Code)	Supplies additional descriptive data to the information-control system.
YLD (Yield)	A 2-digit number that indicates the usable portion of any quantity of parts expressed as a percentage.
ECO NO. IN	Engineering Change Order that adds a new part to an assembly. See also WK IN.
ECO NO. OUT	Engineering Change Order that deletes a part from an assembly. See also WK OUT.
S/N (Serial Number)	Used to specify an ECO's effectivity by serial number.
WK IN (Week In)	Lists the date when manufacturing begins using a new part and when it is available for parts replacement. For example, 7222 means a part is available of the 22nd week of 1972.
WK OUT (Week Out)	Lists the date when manufacturing no longer uses a part in building an assembly. See also WK IN. Do not order a part after its week-out date.

0643-2A







DWN	W. Glaser	3/80	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV.	
CHKD		5/13/80		SPARE PARTS LIST	SPL	66312053	F	
ENG		5/13/80		ASCII IST-II BASIC TERMINAL				
MFG		7-2-80		FIRST USED ON				
APPR	S. H. Nee	7-23-80	CODE IDENT	CC629A/B		SHEET	1 OF 4	
			15920					
SHEET REVISION STATUS				REVISION RECORD				
				REV	ECO	DESCRIPTION	DRFT DATE APP	
				00	50004-97	RELEASED CLASS B	- 5-14-80 EOR	
				00	01	51176	F/N 8 WAS 90446221 D.S 5-23-80 JPT	
				A	A	A	A	11565-97 RELEASED CLASS "A" / 7/24/80 K.C.T.
				B	B	B	B	14284 REVISED PER ECO WJG 9-26-80 9-29-80 JPT
				B	B	C	C	14346 51919707 WAS 66308604 WJH 11-3-80 11-4-80 JPT
				B	D	D	D	14422 F/N 8 WAS 90446225, F/N 9 WAS 66313413, F/N 11 WAS 90460876 M.D 12-12-80 12-23-80 JPT
				B	E	E	E	14437 F/N 3 WAS 66312055 EE 1/26/81 JPT
				B	F	F	F	14532 F/N 11 WAS 90446265 D.S 3-24-81 3-24-81 JPT
NOTES: 1. Quantities shown are those used per equipment. Quantities used for CC629A are under Heading A CC629B are under Heading B								
EQUIPMENT		EQUIPMENT CONFIGURATOR		TOP LEVEL ASSY				
CC629A 60 HZ		15632331		15632332				
CC629B 50 HZ		15632333		15632334				
DETACHED LISTS								

AA3180 REV. 6/71

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CONTROL DATA CORPORATION	CODE IDENT	SHEET	DOCUMENT NO.	REV.
	15920	2	SPL 66312053	F

2. Individual keycaps are documented in drawing 66312517.
3. Indicated parts are included as part of Keyboard Assy 51940851.
4. Indicated part is included as part of Display PC Assy 51919804.
5. Indicated parts are included as part of DABD PC Assy 90446266.
6. Indicated parts are included as part of DACD PC Assy 90460881.
7. Xformer required for CC629B only. Not used on CC629A.
8. Other Applicable / Reference Documents.
  - 51919707 - CDC P/N to vendor P/N cross Ref PL for Display Assy.
  - 66308094 - SPL for Touch Panel Option {XA244-A}.
  - 66313919 - SPL for Internal Modem Option {XA247-g}.
  - 66308096 - SPL for Memory Expansion Option {XA243-A}.
9. Indicated part is included as part of DADD PC Assy 90460877.
10. When ordering access door FN21, also order bezel insert Mtg. hardware FN26 push on fastener 4TY.2.


AA3180

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DWN	R. Trautman	4/79	 CONTROL DATA CORPORATION	TITLE	SPARE PARTS LIST MEMORY EXPANSION OPTION	PREFIX	DOCUMENT NO.	REV.
CHKD	R. Trautman	5/1/79		FIRST USED ON	FC816A/B	SPL	66308096	A
ENG.	J. P. Key	5/4/79		CODE IDENT	15920	SHEET 1 of 2		
MFG.	R. A. Jones	6/26/79						
APPR	F. V. N.	6/27/79						
ES	R. A. Jones	6/27/79						

SHEET REVISION STATUS										REVISION RECORD				
2	1	REV	ECO	DESCRIPTION	DRFT	DATE	APP							
-	-	-	50007.10	RELEASED CLASS B	-	5/1/79	R							
A	A	A	18254-52	RELEASED CLASS "A"	/	6/27/79	not							

NOTES

- Quantity shown is that used per equipment.
- EQUIPMENT CONFIGURATOR-----15632060  
TOP LEVEL ASSEMBLY -----15632061

DETACHED LISTS

AA3180 REV. 8 71

PRINTED IN U.S.A.

CONTROL DATA		CODE IDENT	SHEET	SPL	DOCUMENT NO.	REV.
		15920	2		66308096	A

FIND NO.	PART IDENTIFICATION	QUANTITY REQUIRED	UNIT OF MEAS	NOMENCLATURE OR DESCRIPTION	SPECIFICATIONS, NOTES, OR MATERIAL
1	15153821	8	PC	4116 RAM (16K)	

PRINTED IN U.S.A.

DWN	W. Glaser	10/80	CONTROL DATA	TITLE	SPARE PARTS LIST TIMESHARE ROM OPTION	PREFIX	DOCUMENT NO.	REV.
CHKD	<i>[Signature]</i>	10-10-80		FIRST USED ON		SPL	66313918	A
ENG	<i>[Signature]</i>	12-18-80						
MFG	<i>[Signature]</i>	12-18-80						
APPR	<i>[Signature]</i>	12-18-80	CODE IDENT				SHEET	
E.C.	<i>[Signature]</i>	12-18-80	15920		XA281-A		1 of 2	

SHEET REVISION STATUS										REVISION RECORD							
										REV	ECO	DESCRIPTION	DRFT	DATE	APP		
										00	00	00	50005 36	RELEASED CLASS B	-	10/10/80	<i>[Signature]</i>
										A	A	A	13459 13	13459-13	-	12/17/80	<i>[Signature]</i>

NOTES: 1. Quantity shown is that used per equipment.  
2. EQUIPMENT CONFIGURATOR -----15632587  
TOP LEVEL ASSEMBLY -----15632588

DETACHED LISTS

AA3180 REV. 8/71

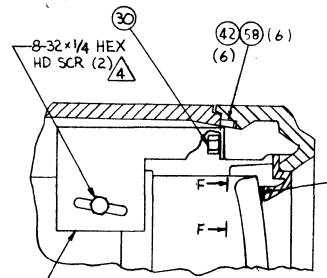
PRINTED IN U.S.A.

CONTROL DATA			CODE IDENT	SHEET	PREFIX	DOCUMENT NO.	REV.			
			15920	2	SPL	66313918	A			
FIND NO.	PART IDENTIFICATION	QUANTITY REQUIRED						UNIT OF MEAS	NOMENCLATURE OR DESCRIPTION	SPECIFICATIONS, NOTES, OR MATERIAL
1	66313920	1						PC	IC Programmed Timeshare ROM 1	
2	66313921	1						PC	IC Programmed Timeshare ROM 2	

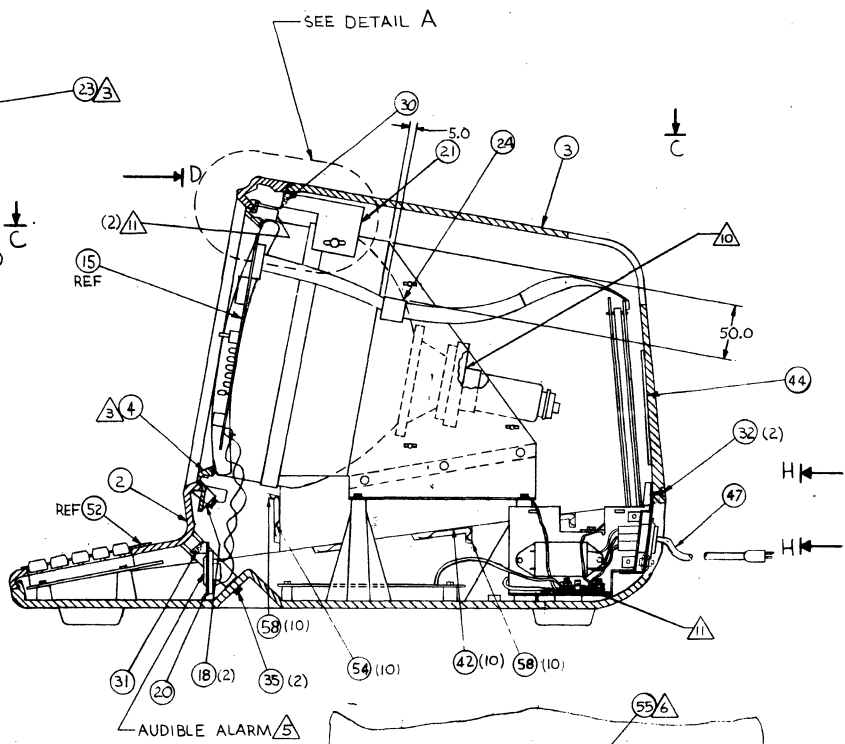
AA3181 REV. 8/71

PRINTED IN U.S.A.

SHEET REVISION STATUS		REVISION RECORD			
REV	ECO	DESCRIPTION	DATE	BY	CHK
3	2	REVISED SHEET 2			
1	1	RELEASED CLASS B	8/5/80	WJK	
1	1	ADDED NOTE 11			
1	1	RELEASED CLASS A	8/6/80		
1	1	CHG NOTE 10 TO PL CHG 7	8/13/80	WJK	
1	1	REVISED PER ECO	10/27/80	WJK	
1	1	CHG DIM 19 & 18	10/27/80	WJK	
1	1	PL CHANGE ONLY	1/18/81	WJK	
1	1	REVISED SHEET 2	5-10-81	WJK	

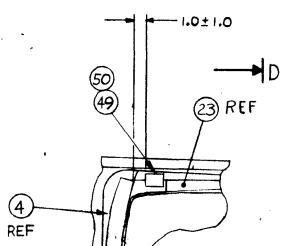


DETAIL A (FARSIDE)  
SCALE: 1/2  
CRT BRACKET LH  
ROTATED 10° CW

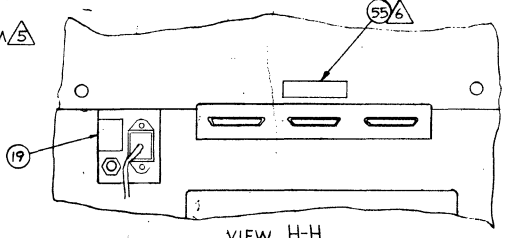


NOTES:  
 11 ELECTRICAL CONTINUITY MUST EXIST BETWEEN THESE POINTS ON F/N 4 AND F/N 9. RESISTANCE MUST NOT EXCEED 0.2 OHMS.

- 1. ALL DIMENSIONS ARE IN MILLIMETERS (MM) UNLESS OTHERWISE SPECIFIED.
- 2. MARK "ASSY 1563232" IN AREA SHOWN PER CDC SPEC 1012150B.
- 3. F/N 23 IS APPLIED ACROSS THE TOP, BOTTOM, & UP RIGHT SIDE OF OPENING IN F/N 4.
- 4. FURNISHED AS PART OF F/N 8.
- 5. FURNISHED AS PART OF F/N 15.
- 6. LOCATE ON HOOD APPROX AS SHOWN.
- 7. FURNISHED AS PART OF F/N 14.



VIEW F-F  
SCALE: 1/2  
TYP 4 PLACES



VIEW H-H  
SCALE 1/2

- 2. BEND TANGS(2) OF F/N 51 TO HOLD IN PLACE
- 10. ADJUST CENTERING MAGNET TO CENTER CROSS PATTERN (8) TO F/N 4 FRAMEWORK AND TOUCH PANEL CENTER FOILS, IF INSTALLED. BOND CENTERING MAGNET USING F/N 58 AFTER ADJUSTMENT. DO NOT USE HORIZONTAL FREQUENCY ADJUSTMENT TO CENTER CROSS PATTERN.

METRIC

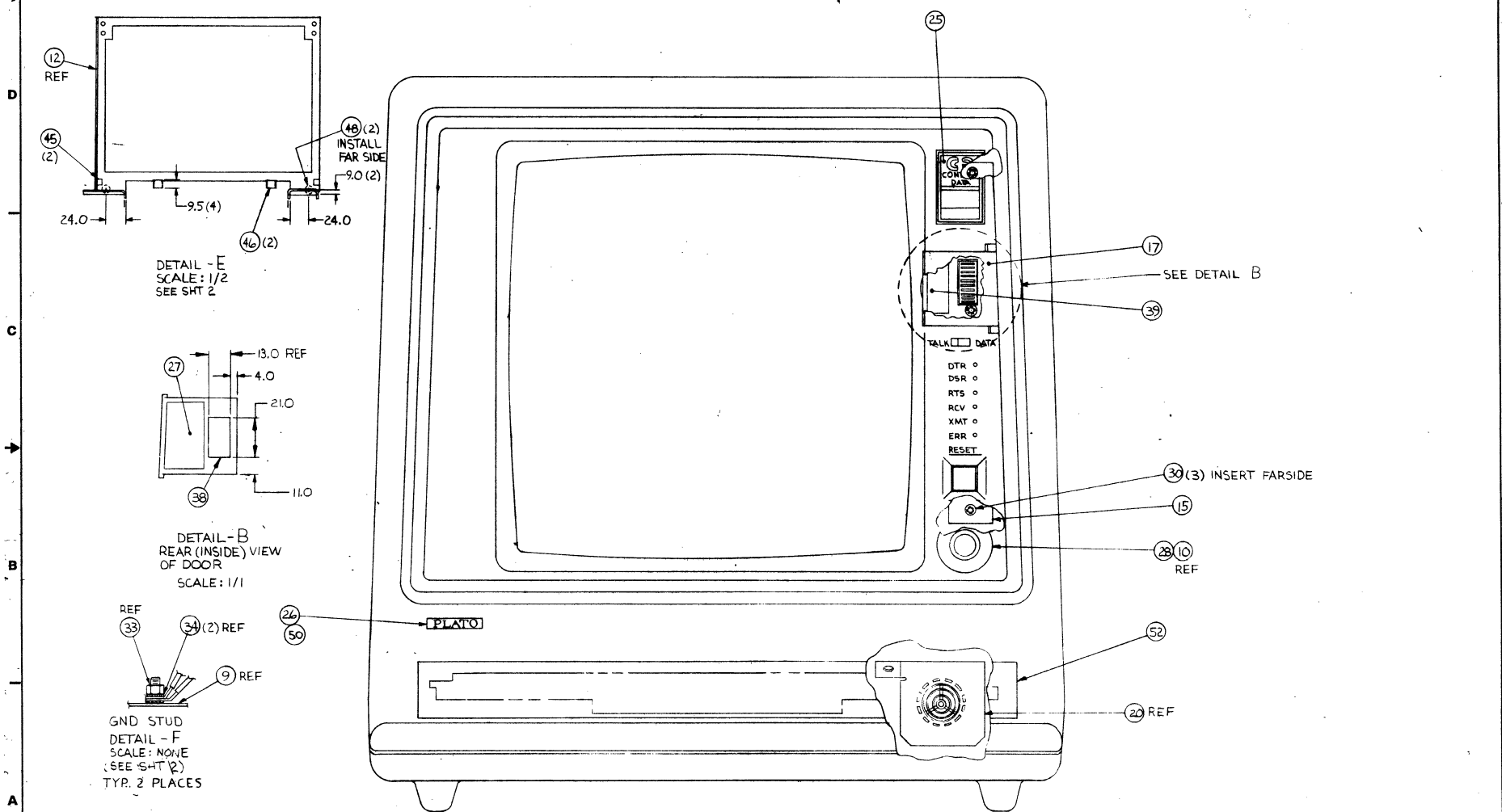
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS (MM)		CONTROL DATA		TITLE	
3 PLACE	3 PLACE	3 PLACE	3 PLACE	ASCII TERMINAL	
1	1	1	1	60 HZ. TLA	
DRAWN BY: SAND		DATE: 5/16/80		DRAWING NO: 15632332	
DO NOT SCALE DRAWING		CHECKED BY: [Signature]		CODE IDENT: 15920	
MATERIAL: [Blank]		ENGINEER: [Signature]		SCALE: 1/2	
DATE: [Blank]		APPROVED: [Signature]		PART: 15632331	
SHEET: [Blank]		SHEET: [Blank]		SHEET 1 OF 3	





15632332

REVISION RECORD						
REV	ECO	DESCRIPTION	DEPT	DATE	CHKD	APP



VIEW D-D  
FRONT VIEW  
SCALE: 1/1

ASC II TERMINAL 60 HZ TLA	FORM 1081-1 15920	REV. NO. D	15632332	REV /
		SHEET 3		

BUILD ARC 440

### ASSEMBLY PARTS LIST

BUILD ARC 440										PRINT DATE		PAGE		FILE CHANGE NO.	
										02-26-81		1		00014532	
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION				MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	15632332	1	F	D	TERM, ASCII IST-II 60HZ (TA)				G	REL	08-21-80	CC629A	02-26-81		
PRD NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION			MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	71493120	1	1		PC	BASE, PAINTED/ZINC		P						
002	01	71493154	3	1		PC	BEZEL PAINTED/ZINC		P						
003	01	71492483	4	1		PC	HOOD, PAINTED W/SHLD (WHT)		P						
004	01	71493156	5	1		PC	BEZEL INSERT ZINC		P						
005	01	51940851	2	1		PC	KYBD, IST II 66KEY		P						
006	01	61408024	0	1		PC	CABLE ASSY, LOGIC DC		A						
007	01	61408025	7	1		PC	CABLE ASSY, BRD INTC		A						
008	01	51916942	9	1		PC	CRT, 15IN PH/P4 M-RSLTN SHORT		P						
009	01	61408887	0	1		PC	PANEL ASSY AC ENTRY		A						
010	01	61408907	6	1		PC	CABLE ASSY, DISPLAY		A						
011	01	90446204	1	1		PC	CD ASSY 9CAD		A						
012	01	71492484	2	1		PC	BRACKET, PCB		P						
013	01	90446229	8	1		PC	REPLACED BY 90446266 14422		G						
013	02	90446266	0	1		PC	CD ASSY 0ABD VIDEO CONT MOD		G	14422	14422			8102	8102
014	01	90446221	5	1		PC	REPLACED BY 90460876 14284		S		14284			8041	8041
014	02	90460876	7	1		PC	REPLACED BY 90446265 14422		S	14284	14422			8041	8102
014	03	90446265	2	1		PC	REPLACED BY 90460881 14532		S	14422	14532			8102	8110
014	04	90460881	7	1		PC	PC CD ASSY OACD		S	14532				8110	
015	01	90446224	9	1		PC	REPLACED BY 90460877 14284		A		14284			8041	8041
015	02	90460877	5	1		PC	CD ASSY OADD		A	14284				8041	
016	01	51777315	6	4		PC	SUPPORT CKT BD		P						
017	01	71492795	1	1		PC	DOOR		P						
018	01	93539009	6	2		PC	FASTENER PUSH ON TYPE C		P						

BUILD ARC 440

### ASSEMBLY PARTS LIST

BUILD ARC 440										PRINT DATE		PAGE		FILE CHANGE NO.	
										02-26-81		2		00014532	
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION				MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	15632332	1	F	D	TERM, ASCII IST-II 60HZ (TA)				G	REL	08-21-80	CC629A	02-26-81		
PRD NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION			MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
019	01	71493096	3	1		PC	PLATE, AC ENTRY		P						
020	01	71492749	8	1		PC	ALARM BRACKET		P						
021	01	71492750	6	1		PC	CRT BRACKET RH		P						
022	01	71492751	4	1		PC	CRT BRACKET LH		P						
023	01	51803904	5	2	250	FT	TAPE, NEO SELF-ADM 1/4WX1/8T		B						
024	01	94241017	6	1		PC	CLIP CABLE ADM BACK TYPE VII		B						
025	01	71492818	1	1		PC	NAMEPLATE		P	13888				8003	
026	01	71492805	8	1		PC	LABEL		P						
027	01	66312523	5	1		PC	REPLACED BY 66313416 14284		P		14284			8041	8041
027	02	66313416	1	1		PC	LABEL, SWITCH SETTING		P	14284				8041	
028	01	51915101	3	1		PC	KNOB, P-0 SKIRTED/INSERT PLN		P						
029	01	15164916	7	4		PC	MSCR HEX-LK PLN M4X22MM STL Z		B		14477			8104	8104
029	02	15164915	9	4		PC	SCR MET HEX M4		B	14477				8104	
030	01	15164911	8	8		PC	MSCR HEX-LK PLN M4X8MM STL ZP		B						
031	01	15165013	2	11		PC	SCR TPG HEX PLN M4.5X13MM STL		B						
032	01	15164919	1	6		PC	MSCR HEX-LK PLN M5X13MM STL Z		B						
033	01	91975724	5	3		PC	NUT HEXAGON SZ 5MM		B						
034	01	91975671	8	9		PC	WASHER EX TOOTH SZ 5		B						
035	01	15164920	9	2		PC	SCR MET HEX M5		B						
036	01	61408910	0	1		PC	CABLE ASSY AC I/P		A						
038	01	51940544	3	070		FT	TAPE MAG .500 WIDTH .036THICK		B						
039	01	71492926	2	1		PC	PLATE STRIKER		P						



BUILD ARC 440

### ASSEMBLY PARTS LIST

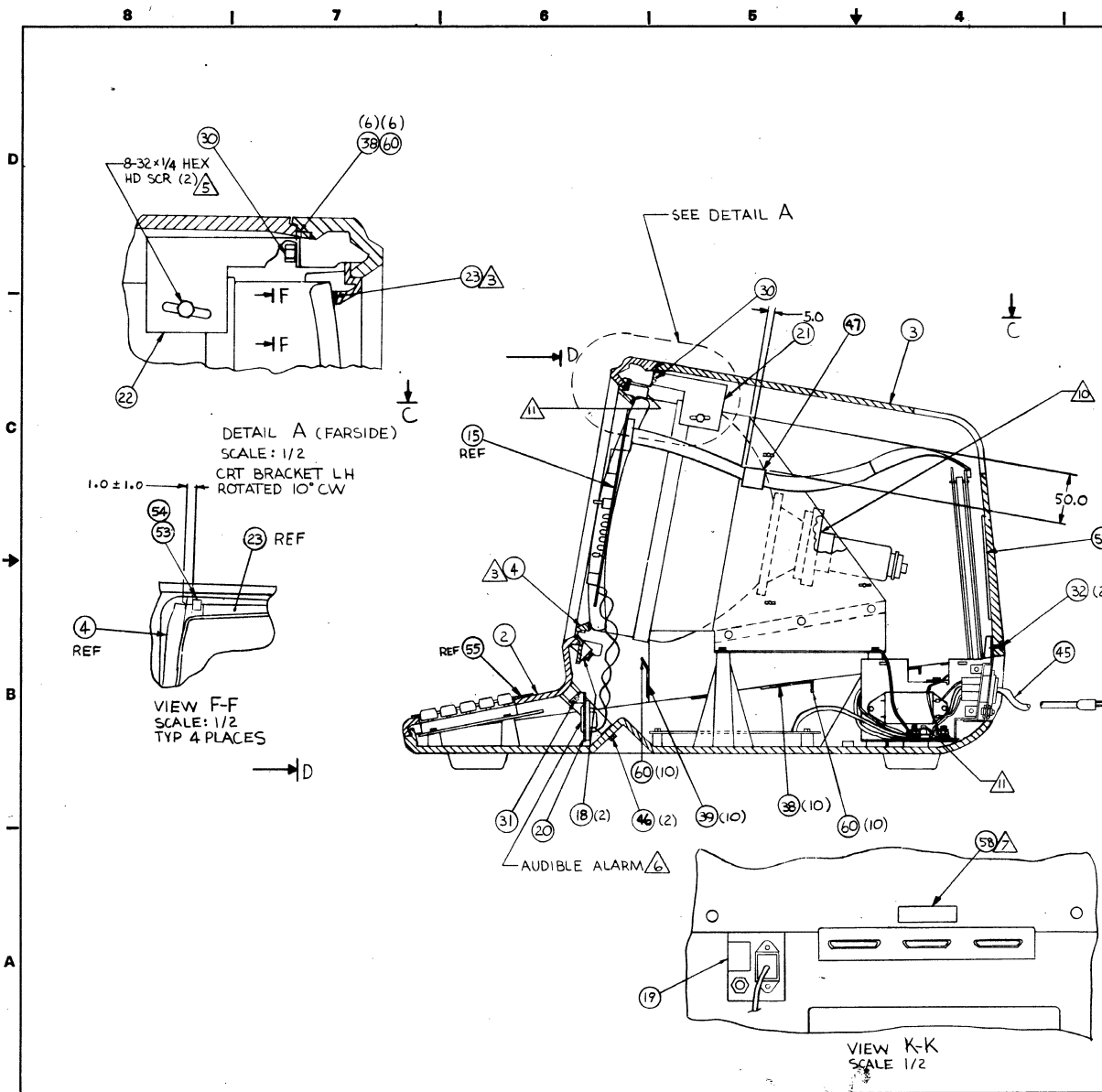
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										02-26-81	3	00014532		
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION			MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	15632332	1	F	D	TERM, ASCII 1ST-II@ 60HZ (TA)			G	REL	08-21-80	CC629A	02-26-81		
TRND NO.	U	PART NUMBER	CD	QUANTITY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
040	01	96837907	3	1		PC	CKT BRKR MAGNETIC 3.0 AMPS	P						
041	01	94277411	8	2		PC	STRAP, CBL TIE TYP 1 TO 1-1/8	B			14532		8110	8110
041	02	94277411	8	4		PC	STRAP, CBL TIE TYP 1 TO 1-1/8	B		14532			8110	
042	01	51918752	0	16		PC	SPRING FINGER FIG 2	P						
043	01	61391119	7	1		PC	GND WIRE ASSY	A						
044	01	66312545	8	1		PC	REPLACED BY 66313415 14284	P			14284		8041	8041
044	02	66313415	3	1		PC	LABEL, SWITCH POSITION	P		14284			8041	
045	01	24534709	1	060		FT	SLVG, 1/4 HT/SHRINK BLK UL	B						
046	01	24534710	9	060		FT	SLVG, 3/8 HT/SHRINK BLK UL	B						
047	01	15165428	2	1		PC	CABLE 3-COND 18 AWG 125 VAC	P						
048	01	51805700	5	2		PC	BUMPER SELF STICKING	P						
049	01	71492970	0	4		PC	BUMPER, TOUCH PANEL	P						
050	01	94850711	6	050		OZ	SEAL, EASTMAN CLR (910)	B						
051	01	71493159	9	1		PC	SCREEN BOTTOM CENTER	P						
052	01	71493175	5	1		PC	MASK KEYBOARD	P						
053	01	61391117	1	1		PC	GND WIRE ASSY (5.5 IN BRAID)	A						
054	01	51918753	8	10		PC	SPRING FINGER FIG 3	P						
055	01	66310664	9	1		PC	LABEL HOOD CAUTION	P						
056	01	71493160	7	1		PC	SCREEN BOTTOM REAR	P						
057	01	61408962	1	1		PC	CABLE ASSY AC ENTRY	A						
058	01	51004063	7	500		OZ	ADHESIVE, SEALANT SIL RUBBER	B						
059	01	95670603	0	850		FT	TAPE MYLAR	B			14359			8047

BUILD ARC 440

### ASSEMBLY PARTS LIST

										PRINT DATE	PAGE	FILE CHANGE NO.		
										02-26-81	4	00014532		
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION			MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	15632332	1	F	D	TERM, ASCII 1ST-II@ 60HZ (TA)			G	REL	08-21-80	CC629A	02-26-81		
TRND NO.	U	PART NUMBER	CD	QUANTITY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
060	01	09040204	1	4		PC	WSHR, NO.10 DISHED LOCK STL	B						
							0068 TOTAL LINES							

SHEET REVISION STATUS		REVISION RECORD			
REV	DATE	DESCRIPTION	DRFT	APPR	CHKD
01	01/01/80	RELEASED CLASS 0	DS		
02	01/01/80	ADDED NOTE 11	DS		
03	01/01/80	RELEASED CLASS A	DS		
04	01/01/80	CHG NOTE 10, PL CHG F/N 15	WJG		
05	01/01/80	REVISED PER ECO	WJG		
06	01/01/80	CHG F/N 13 & 4	WJG		
07	01/01/80	PL CHANGE ONLY	WJG		
08	01/01/80	REVISED SHEET 2	DS		

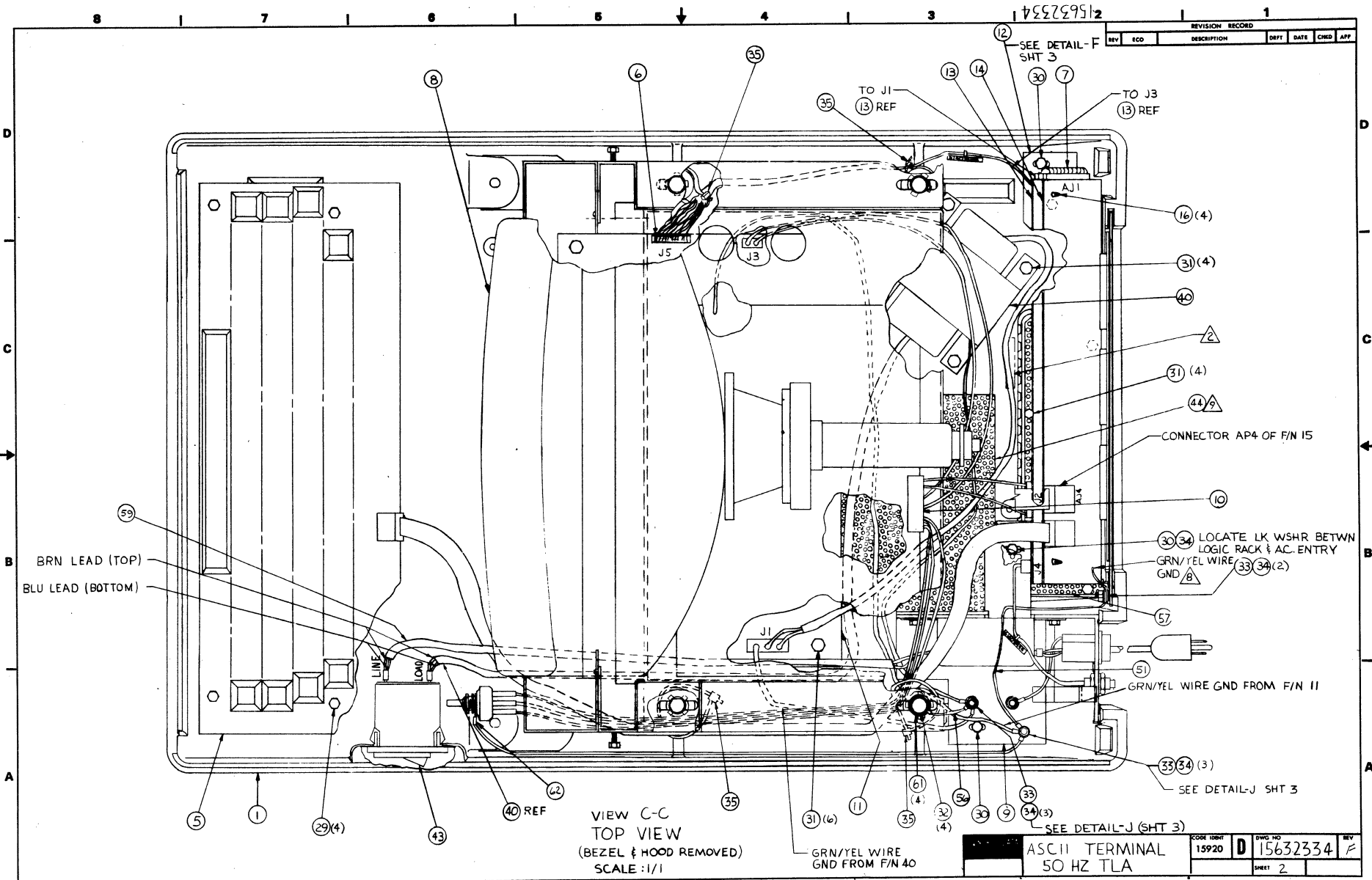


- NOTES:
- ⚠ ELECTRICAL CONTINUITY MUST EXIST BETWEEN THESE POINTS ON F/N 4 AND F/N 9. RESISTANCE MUST NOT EXCEED 0.2 OHMS.
  - 1. ALL DIMENSIONS ARE IN MILLIMETERS (MM) UNLESS OTHERWISE SPECIFIED.
  - ⚠ MARK "ASSY 1563234" IN AREA SHOWN PER CDC SPEC 10121508.
  - ⚠ F/N 23 IS APPLIED ACROSS THE TOP, BOTTOM, & UP RIGHT SIDE OF OPENING IN F/N 4.
  - ⚠ FURNISHED AS PART OF F/N 8.
  - ⚠ FURNISHED AS PART OF F/N 15.
  - ⚠ LOCATE ON HOOD APPROX AS SHOWN.
  - ⚠ FURNISHED AS PART OF F/N 14
  - ⚠ BEND TANGS(2) OF F/N 44 TO HOLD IN PLACE
  - ⚠ ADJUST CENTERING MAGNET TO CENTER CROSS PATTERN (X) TO F/N 4 FRAMEWORK AND TOUCH PANEL CENTER FOILS, IF INSTALLED. BOND CENTERING MAGNET USING F/N 60 AFTER ADJUSTMENT. DO NOT USE HORIZONTAL FREQUENCY ADJUSTMENT TO CENTER CROSS PATTERN.

APL15632334		CONTROL 02-4		TITLE	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS (MM)		FIRST ISSUE		ASCII TERMINAL	
TOLERANCES		CC629 B		50 HZ TLA	
3 PLACE	2 PLACE	DATE	5/23/80	PROJECT IDENT	DRAWING NO
4	7	DESIGNED BY	05/23/80	15920	D 15632334
DO NOT SCALE DRAWING		CHECKED BY	5/28/80		
MATERIAL		ENGINEER	5/28/80		
FINISH		APPROVED	5/28/80		
		SCALE	1/2		
		NHA		15632333	SHEET 1 OF 3

62940007 D

7-17





BUILD ARC 440

### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
02-25-81	1	00014532

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE				
0860	15632334	7	F	D	TERM, ASCII IST-II @ 50HZ (TA)	G	REL	08-21-80	CC6298	02-25-81				
T PWD NO.	LI	PART NUMBER	CD	IN	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	71493120	1		1		PC BASE, PAINTED/ZINC	P						
002	01	71493154	0		1		PC BEZEL PAINTED/ZINC	P						
003	01	71492483	4		1		PC HOOD, PAINTED W/SHLD (WHT)	P						
004	01	71493156	5		1		PC BEZEL INSERT ZINC	P						
005	01	51940851	2		1		PC KYBD, IST II 66KEY	P						
006	01	61408024	0		1		PC CABLE ASSY, LOGIC DC	A						
007	01	61408025	7		1		PC CABLE ASSY, BRD INTC	A						
008	01	51916942	9		1		PC CRT, 15IN PH/P4 H-RSLTN SHORT	P						
009	01	61408887	0		1		PC PANEL ASSY AC ENTRY	A						
010	01	61408907	6		1		PC CABLE ASSY, DISPLAY	A						
011	01	90446204	1		1		PC CD ASSY 9CAD	A						
012	01	71492484	2		1		PC BRACKET, PCB	P						
013	01	90446229	8		1		PC REPLACED BY 90446266 14422	G		14422	14422		8102	8102
013	02	90446266	0		1		PC CD ASSY 0ABD VIDEO CONT MOD	G					8102	8102
014	01	90446221	5		1		PC REPLACED BY 90460876 14284	S		14284	14284		8041	8041
014	02	90460876	7		1		PC REPLACED BY 90446265 14422	S		14284	14422		8102	8110
014	03	90446265	2		1		PC REPLACED BY 90460881 14532	S		14422	14532		8110	8110
014	04	90460881	7		1		PC PC CD ASSY OACD	S		14532			8110	8110
015	01	90446224	9		1		PC REPLACED BY 90460877 14284	A		14284	14284		8041	8041
015	02	90460877	5		1		PC CD ASSY OADD	A		14284			8041	8041
016	01	51777315	6		4		PC SUPPORT CKT BD	P						
017	01	71492795	1		1		PC DOOR	P						
018	01	93539009	6		2		PC FASTENER PUSH ON TYPE C	P						

BUILD ARC 440

### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
02-25-81	2	00014532

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE				
0860	15632334	7	F	D	TERM, ASCII IST-II @ 50HZ (TA)	G	REL	08-21-80	CC6298	02-25-81				
T PWD NO.	LI	PART NUMBER	CD	IN	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
019	01	71493096	3		1		PC PLATE, AC ENTRY	P						
020	01	71492749	8		1		PC ALARM BRACKET	P						
021	01	71492750	6		1		PC CRT BRACKET RH	P						
022	01	71492751	4		1		PC CRT BRACKET LH	P						
023	01	51803904	5		2	250	FT TAPE, NEO SELF-ADM 1/4WX1/8T	B						
024	01	95670603	0		850		FT TAPE MYLAR	B			14359			8047
025	01	71492818	1		1		PC NAMEPLATE	P						
026	01	71492805	8		1		PC LABEL	P						
027	01	66312523	5		1		PC REPLACED BY 66313416 14284	P		14284	14284		8041	8041
027	02	66313416	1		1		PC LABEL, SWITCH SETTING	P		14284			8041	8041
028	01	51915101	3		1		PC KNOB, P=0 SKIRTED/INSERT PLN	P						
029	01	15164916	7		4		PC MSCR HEX-LK PLN M4X22MM STL Z	B		14477	14477		8104	8104
029	02	15164915	9		4		PC SCR MET HEX M4	B		14477			8104	8104
030	01	15164911	8		8		PC MSCR HEX-LK PLN M4X8MM STL ZP	B						
031	01	15165013	2		15		PC SCR TPG HEX PLN M4.5X13MM STL	B						
032	01	15164919	1		6		PC MSCR HEX-LK PLN M5X13MM STL Z	B						
033	01	91975724	5		3		PC NUT HEXAGON SZ 5MM	B						
034	01	91975671	8		8		PC WASHER EX TOOTH SZ 5	B		14284A	14284A		8041	8041
034	02	91975671	8		9		PC WASHER EX TOOTH SZ 5	B		14284A			8041	8041
035	01	94277411	8		2		PC STRAP, CBL TIE TYP 1 TO 1-1/8	B		14532	14532		8110	8110
035	02	94277411	8		4		PC STRAP, CBL TIE TYP 1 TO 1-1/8	B		14532			8110	8110
038	01	51918752	0		16		PC SPRING FINGER FIG 2	P						
039	01	51918753	8		10		PC SPRING FINGER FIG 3	P						





BUILD ARC 440

### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
02-25-81	3	00014532

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	15632334	7	F	D	TERM, ASCII IST-II 50HZ (TA)	G	REL	08-21-80	CC6298	02-25-81			
TRND NO.	U	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	SCD. NO. IN	SCD. NO. OUT	S/N	WK IN	WK OUT
040	01	51918790	0	1		PC XFMR STEP-DOWN 220/240V	P						
041	01	51940544	3	070		FT TAPE MAG .500 WIDTH .036THICK	B						
042	01	71492926	2	1		PC PLATE STRIKER	P						
043	01	96837907	3	1		PC CKT BRKR MAGNETIC 3.0 AMPS	P						
044	01	71493159	9	1		PC SCREEN BOTTOM CENTER	P						
045	01	15165427	4	1		FT CABLE 3-COND 18 AWG 125 VAC	P						
046	01	15164920	9	2		PC SCR MET HEX M5	B						
047	01	94241017	6	1		PC CLIP CABLE ADH BACK TYPE VII	B						
048	01	24534709	1	060		FT SLVG, 1/4 HT/SHRINK BLK UL	B						
049	01	51805700	5	2		PC BUMPER SELF STICKING	P						
050	01	24534710	9	060		FT SLVG, 3/8 HT/SHRINK BLK UL	B						
051	01	61391119	7	1		PC GND WIRE ASSY	A						
052	01	66312545	8	1		PC REPLACED BY 66313415 14284	P		14284	14284		8041	
052	02	66313415	3	1		PC LABEL, SWITCH POSITION	P		14284			8041	
053	01	71492970	0	4		PC BUMPER, TOUCH PANEL	P						
054	01	94850711	6	005		OZ SEAL, EASTMAN CLR (910)	B						
055	01	71493175	5	1		PC MASK KEYBOARD	P						
056	01	61391117	1	1		PC GND WIRE ASSY (5.5 IN BRAID)	A						
057	01	71493160	7	1		PC SCREEN BOTTOM REAR	P						
058	01	66310664	9	1		PC LABEL HOOD CAUTION	P						
059	01	61408962	1	1		PC CABLE ASSY AC ENTRY	A			14284			8041

BUILD ARC 440

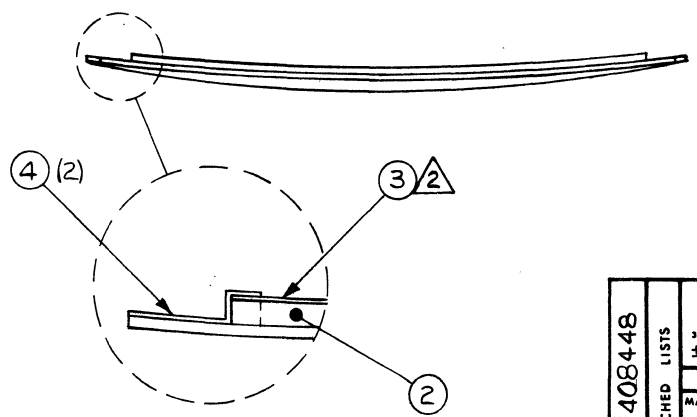
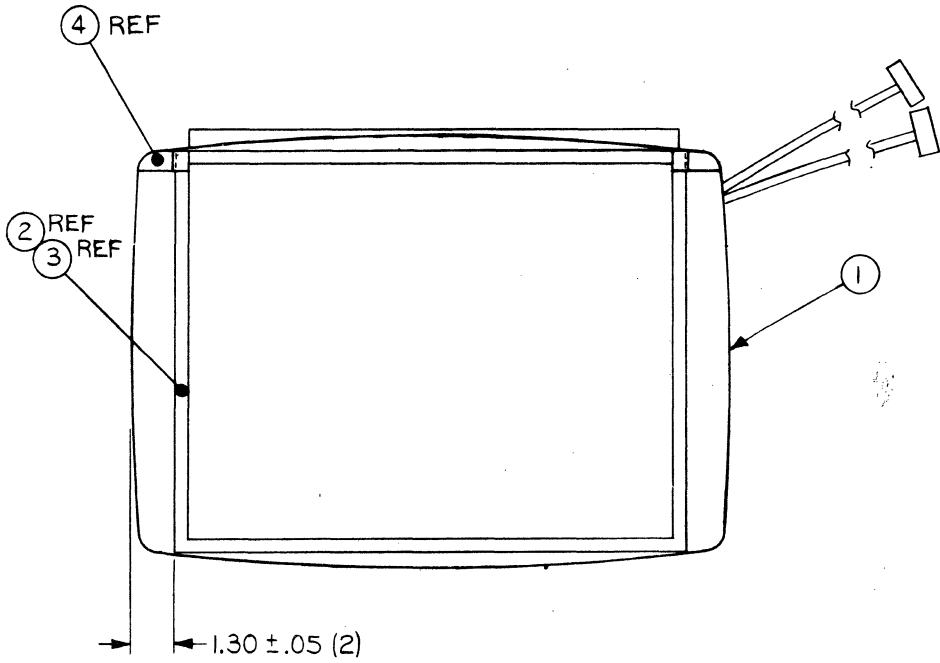
### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
02-25-81	4	00014532

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	15632334	7	F	D	TERM, ASCII IST-II 50HZ (TA)	G	REL	08-21-80	CC6298	02-25-81			
TRND NO.	U	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	SCD. NO. IN	SCD. NO. OUT	S/N	WK IN	WK OUT
059	02	61409025	6	1		PC CABLE ASSY AC ENTRY	A		14284				8041
060	01	51004063	7	500		OZ ADHESIVE, SEALANT SIL RUBBER	B						
061	01	09040204	1	4		PC WSHR, NO.10 DISHED LOCK STL	B						
062	01	61391121	3	1		PC GND WIRE ASSY (18IN 18AWG)	A		14284				8041
0071 TOTAL LINES													

SHEET REVISION STATUS				REVISION RECORD			
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
-	50002-59	RELEASED CLASS B	-	1/18/79	-	JL	
A	11565-52	RELEASED CLASS A	/	8/9/79	-	McL	

7-22  
C  
B  
62940007



NOTES:  
 ⚠ BULK IDENTIFY WITH CDC PART NUMBER AND REVISION LETTER.  
 ⚠ FIND NO 3 TO BE APPLIED AROUND PERIPHERY OF FIND NO 2 WITH OVER-LAPPING JOINTS AT CORNERS SO AS TO FORM A CONTINUOUS ELECTRICAL CONNECTION.

D  
C  
B  
61408448  
A

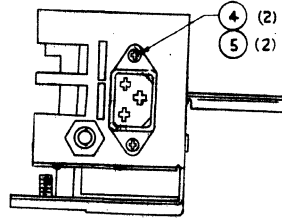
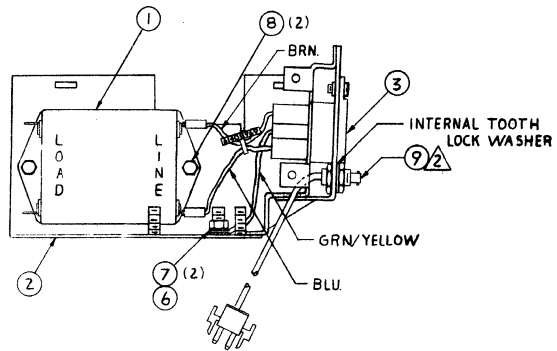
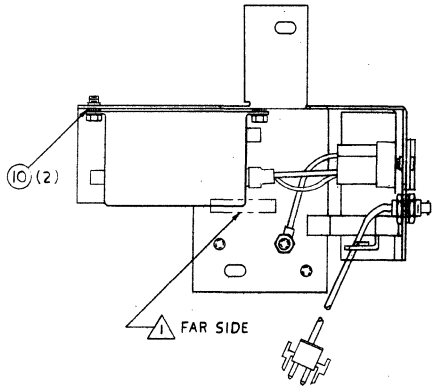
APL 61408448	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES			TITLE	
	3 PLACE ±	2 PLACE ±	ANGLES ±	FIRST USED ON	FC816A
	DO NOT SCALE DRAWING			DWN	W J (Class) 1-12-79
	MATERIAL	CHKD	ENGR	MFG	APPR
			CHKD	W J	
			ENGR	R. J. S. 1-15-79	
			MFG	Stefone 8-01-79	
			APPR	E. H. N. 8-6-79	
			SCALE	NMA 15632146 SHEET / OF /	

4 1 3 2 1

BUILD ARC D06

# ASSEMBLY PARTS LIST

DIV.		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	PRINT DATE	PAGE	FILE CHANGE NO.		
0860		61408448	1	A	C	PANEL + GASKET ASSY	V	REL	01-17-80	1	11565-52		
TRFNO	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	51916945	2	1		PC CRT TOUCH PNL ASSY		P					
002	01	51911517	4	3 333		FT TAPE, POLY SLF-ADH 1/4WX1/4T		B					
003	01	51916980	9	3 333		FT TAPE COPPER FOIL W .25		B					
004	01	51916982	5	278		FT TAPE COPPER FOIL W .50		B					
						0004 TOTAL LINES							



SHEET REVISION STATES		REVISION RECORD				
REV	ECO	DESCRIPTION	DATE	BY	CHKD	
01	51095	ADD F/N 10	D.S	5/20/88	WJS	
A	71565-97	RELEASED CLASS 'A'		7-28-90	WJS	

NOTES:

- 1 MARK ASSY 61408887 IN AREA SHOWN PER CDC SPEC 10121508.
- 2 DISCARD GASKET FROM F/N 9.

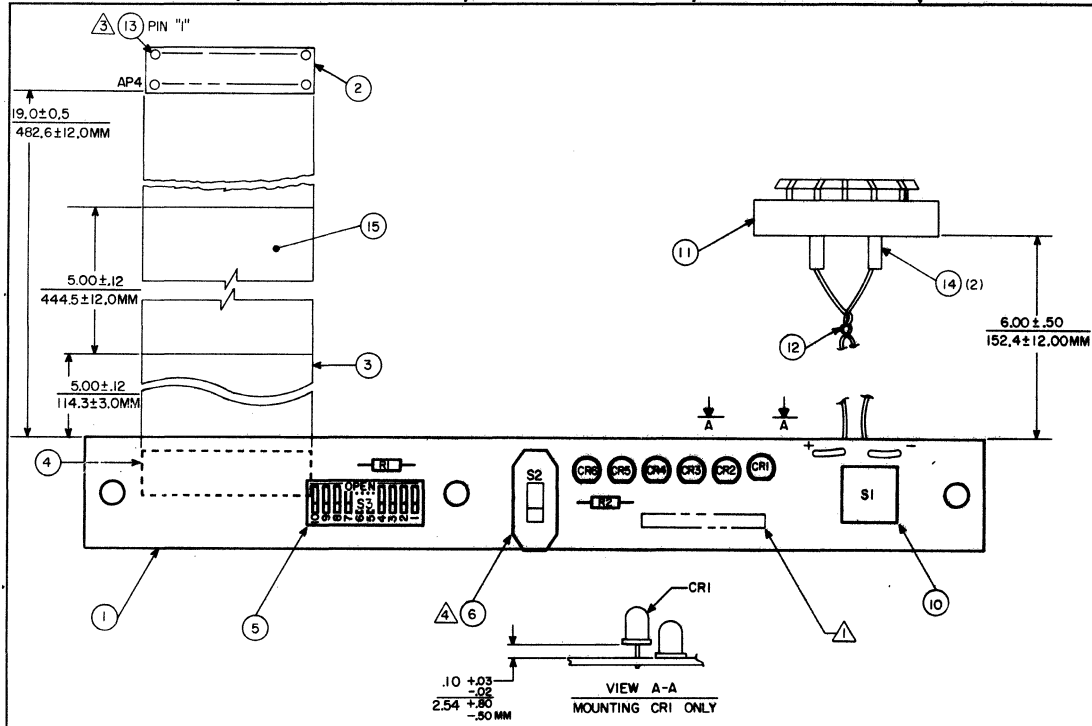
APL 61408887 REVISED DATA	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TITLE	
	TOLERANCES		A.C. ENTRY ASSY	
	FINISH	PLACES	FINISH	PLACES
	ASSEMBLY	ASSEMBLY	ASSEMBLY	ASSEMBLY
DO NOT SCALE DRAWING		DESIGNED BY	CC 629-A/B	DATE
MATERIAL		CHECKED BY	D. SAND	5/9/88
EQUIPMENT		APPROVED	S. H. H.	7-22-79
SCALE		15920	D	61408887
SHEET		15632332		SHEET OF

BUILD ARC 230

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
07-28-80	1	11565-97

DIV.		ASSEMBLY NUMBER		CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE	
0860		6140887		0	A	D	PANEL ASSY AC ENTRY		A	REL	07-24-80	CC629A/B	07-28-80	
FIND NO	LI	PART NUMBER	CD	QUANTITY	U/M	PART DESCRIPTION		MC	TLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	15164399	0	1		PC LINE FILTER			P					
002	01	71493097	1	1		PC PANEL, AC ENTRY			P					
003	01	61408969	6	1		PC CABLE ASSY POWER CONN			0					
004	01	91976626	1	2		PC MSCR PAN PHL M3X8MM STL ZP			0					
005	01	91975682	5	2		PC WSHR METRIC EXT TOOTH SZ 3			0					
006	01	91975724	5	1		PC NUT HEXAGON SZ 5MM			0					
007	01	91975671	0	2		PC WASHER EX TOOTH SZ 5			0					
008	01	15164911	0	2		PC MSCR HEX=LK PLN M4X8MM STL ZP			0					
009	01	61408444	0	1		PC CABLE ASSY-VIDEO OUTPUT			A					
010	01	91975670	0	2		PC WASHER EX TOOTH SZ 4			0					
						0010 TOTAL LINES								



SHEET REVISION STATUS		REVISION RECORD					
REV	ECO	DESCRIPTION	DEPT	DATE	CHKD	APP'D	
A		RELEASED CLASS					

FIND NUMBER	REFERENCE DESIGNATION
7	RI
8	RE
9	CR1, CR2, CR3, CR4, CR5, CR6

- NOTES:
- APPLY ASSY NO., REV LEVEL, LOC CODE, AND DATE CODE IN AREA SHOWN. MARK PER CDC SPEC 10121508; CHARACTER HEIGHT .12 (12 PT) COLOR WHITE.
  - FIND NUMBERS, ELEMENT IDENTIFIERS, AND REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON PART.
  - KEY CONNECTOR (F/N 2) PIN 1 VIA PLUG (F/N 13).
- F/N 6 TO BE POSITIONED AS CLOSE TO F/N 10 AS POSSIBLE, PERPENDICULAR TO F/N 1 AND HAND SOLDERED.

DELETIONS	ADDITIONS

APL 90460877 DETACHED LIST	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		DATE		TITLE	
	TOLERANCES		PART NUMBER		P.C. CARD ASSEMBLY, OADD OPERATOR PANEL (2ND GENERATION)	
	3 PLACE	2 PLACE	CC629A/B		CODE IDENT	
			DRAWN BY		DRAWING NO	
DO NOT SCALE DRAWING			CHECKED BY		15920 D 90460877	
MATERIAL			ENGINEER		N/A 5632532	
			MFG		1562534	
			APPROVED		SCALE 2 / 1	
			DATE		SHEET 1 OF 1	

BUILD ARC 210

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
07-23-80	1	11565-94

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	90460877	5	A	D	CD ASSY OADD	A	REL	07-22-80	CC629A/B	07-23-80			
ITEM NO	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	90460878	3	1		PC PW BD OADD	P						
002	01	65853401	1	1		PC CONN, 26 CONT F/CBL 28-30AWG	P						
003	01	65832216	9	1	800	FT CBL, FLAT 26 CNCT 28AWG PVC	P						
004	01	65776902	2	1		PC CONN, 26PIN FIG 3 PCB-FLT CBL	P						
005	01	51862506	6	1		PC SW, PC BD TGL 10 IN-LINE SPST	P						
006	01	36139802	7	1		PC SWITCH-SLIDE-OPDT	P						
007	01	94402175	7	1		PC RES FM 6.2K OHM 1/4W CARBON	P						
008	01	94402141	9	1		PC RES FM 240 OHM 1/4W CARBON	P						
009	01	51903800	4	6		PC LED, S-S GAP RED 1.0MCD 180MW	P						
010	01	51918728	0	1		PC SW, M-PUSH N.O./SP .01A 12VDC	P						
011	01	51908902	3	1		PC ALARM AUDIBLE LUG FIG 2	P						
012	01	17605900	4	600		FT WIR 24GA TWP BLK/RED 300V	W						
013	01	51870337	6	1		PC PLUG, PLZG NYLON 10/STRIP	P						
014	01	51758101	3	083		FT INS SLV CLR PVC HEAT SHRINK	B						
015	01	65736820	5	420		FT TAPE PRESS 5EN 1/16X1IN	B						
016	01	16006500	9	REF		PC FABRICATION SPECIFICATION	D						
017	01	90446222	3	REF		PC SCH DIAG OADD OPERATOR PNL	D						
						0017 TOTAL LINES							





# ASSEMBLY PARTS LIST

DESCRIPTION: CD ASSY OABD W/FIRMWARE      DRAWING SIZE: A

PREPARED BY: \_\_\_\_\_ DATE: 12754-92  
 AUDITED BY: \_\_\_\_\_ DATE: 11-26-80

12754-92  
11-26-80

DRY CODE: 86  
 PRE CODE: 101

ASSEMBLY NUMBER: 7-14  
 CL. NO.: 904462660  
 TO REV.: A

**TRANSACTION CODES:**

1. DELETE ASSY P/L FROM FILE
2. ADD ASSY P/L TO FILE
3. DELETE LINE ITEM(S) WITH 250 HISTORY
4. ADD LINE ITEM(S)
5. DELETE LINE ITEM(S) WITH HISTORY
6. CHANGE, ADD, OR DELETE ANY FIELD EXCEPT "ECO OUT" & "WK IN" ON CURRENT RECORD
7. REQUEST PARTS LIST ONLY
8. CHANGE, ADD, OR DELETE ANY FIELD EXCEPT "ECO IN" & "WK IN" ON CURRENT RECORD.

CC629A/B

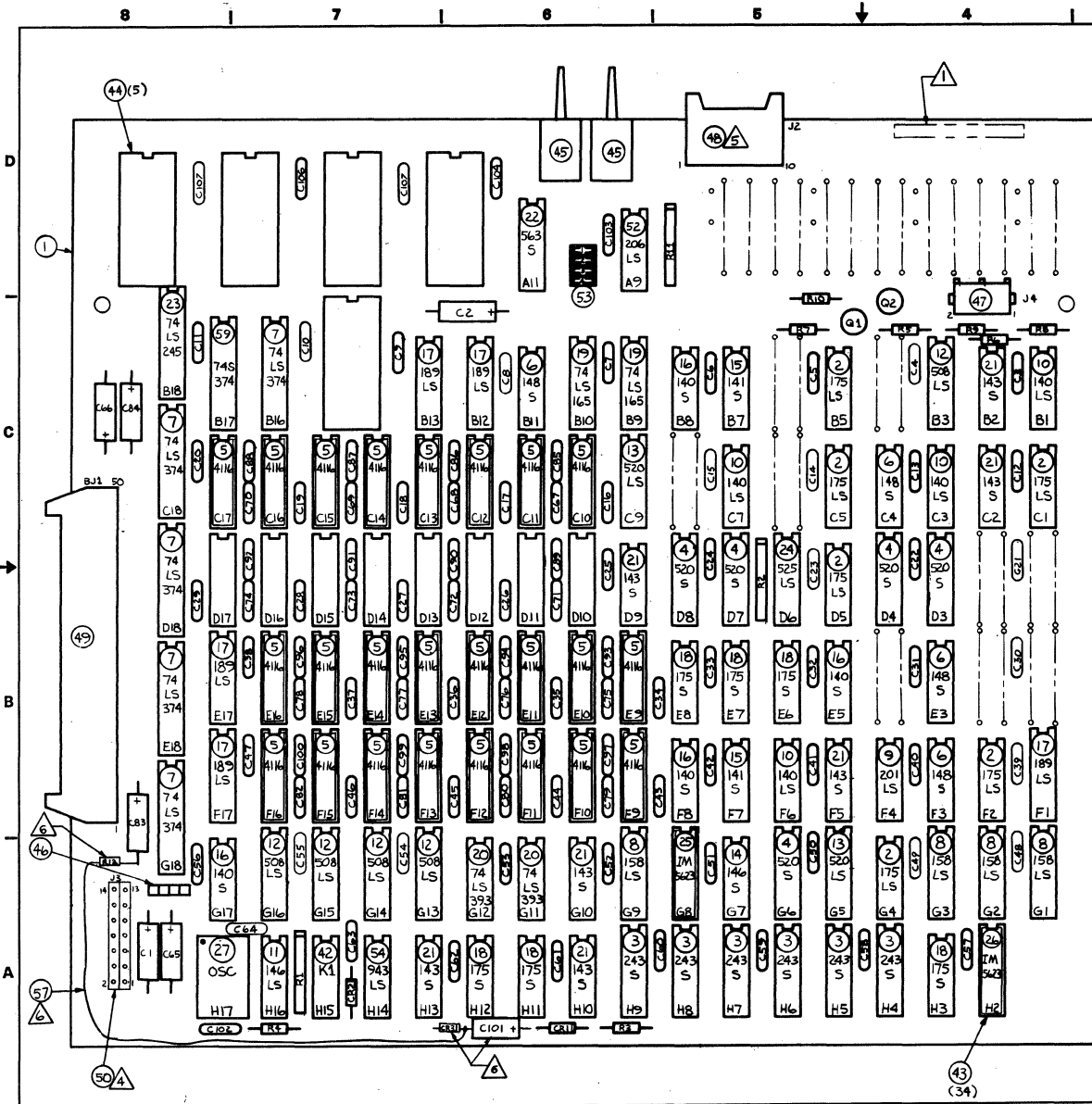
SHEET 1 OF 1

PRD. NO.	L.I.	PART NUMBER	QTY	REF	DESCRIPTION (REF. ONLY)	YIELD	ECO. NO. & REV.	SERIAL NO.	EFC. WK
		904462157			CD ASSY OABD (VIDEO CONTROLLER)				
		66313933			IC PROGRAMMED EPROM ASCII				
		101215085		REF	MARKING INK STP-STENCILS/C				

REV 872AA2976

1st COPY-ORIGINATOR/2nd COPY-KEYPUNCH

512944062



SHEET REVISION STATUS		REVISION RECORD				
REV	ECO	DESCRIPTION	DEPT	DATE	CHKD	APP
00	50044	RELEASED CLASS 0		4-17-74		2-3
01	51092	F/N 37 WAS 5100120	WAG	5-28-74	WJK	
A	11525-20	REVIS PER CLASS 21		6-20-74		
B	11526	REVIS PER ECO	MD	7-1-74	WJK	C2
C	11526	F/N 37 WAS 5100119	WJK	7-4-74	WJK	C1
D	14513	REVIS PER ECO	EE	7-11-74	EE	
E	14524	REVIS PER ECO	OS	7-27-74	WJK	

FIND NO.	REFERENCE DESIGNATION
28	G1, G2
29	R4, R6
30	R9
31	R10
32	R7
33	R5
34	R8, R12
35	R3
36	R1, R2
37	C3 THRU C64, C102 THRU C107
38	C67 THRU C82, C85 THRU C100
39	C1, C2, C65, C66, C68, C84
40	C81, C82, C83
41	C101
51	R11

CHANGE TABLE	
DELETIONS	ADDITIONS

- NOTES:
- APPLY ASSY NO., REV LEVEL, LOC CODE, AND DATE CODE IN AREA SHOWN. MARK PER CDC SPEC 1012150B, CHARACTER HEIGHT .12(12PT) COLOR WHITE.
  - FIND NUMBERS, ELEMENT IDENTIFIERS, AND REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON PART.
  - D10-D17, IC 4116 INCLUDED WITH MEMORY EXPANSION OPTION ONLY.
  - CUT PIN B OF POWER CONNECTOR J3 AFTER ASSY FOR CABLE KEYING.
  - CUT PIN 10 OF CONNECTOR J2 AFTER ASSY FOR CABLE KEYING.
  - ATTACH TO BOARD USING F/N 58

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES		CONTROL DATA		TITLE	
SPACE	SPACE	FILE	CC629	PC CARD ASSEMBLY OABD, VIDEO CONTROLLER	
±	±	DESIGNED BY	W. J. [Signature]	DATE	4-15-74
DO NOT SCALE DRAWING		CHECKED BY	[Signature]	DATE	4-17-74
MATERIAL		ENGINEER	[Signature]	DATE	6-26-74
FINISH		APPROVED	[Signature]	DATE	6-21-74
APL 904446215 DETACHED LIST				CODE IDENT	15920
				DRAWING NO	90446215
				SCALE	2/1
				SHEET	OF

BUILD ARC 214

### ASSEMBLY PARTS LIST

										PRINT DATE	PAGE	FILE CHANGE NO.				
										03-24-81	1	0014594				
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION					MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0850	90446215	7	E	D	CD ASSY OABD(VIDEO CONTROLLER					S	REL	06-30-80	CC629A	03-24-81		
T/P NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION				MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	90446214	0	1		PC	PW	BD	OABD	P						
002	01	15146300	7	6		PC	IC	74LS74	175LS F/F DUAL D	P						
003	01	15158606	5	6		PC	IC	74S112	TTL DUAL J-K NET	P						
004	01	15132000	9	5		PC	IC	74S175	LATCH TTL 4-BIT	P						
005	01	15153821	2	24		PC	IC	4116	MOS 16384-BIT RAM	P						
006	01	15158500	7	4		PC	IC	74S02	TTL QUAD 2I/P NOR	P						
007	01	15163404	5	6		PC	IC	74LS374	OCTAL D-EDGE F-F	P						
007	02	15163404	5	5		PC	IC	74LS374	OCTAL D-EDGE F-F	P	14513	14513			8112	8112
008	01	15144800	6	4		PC	IC	74LS161	158LS 4BIT COUNTER	P						
009	01	15145400	6	1		PC	IC	74LS08	201LS 2INP AND	P						
010	01	15144900	6	4		PC	IC	74LS00	140LS QUAD 2-1NP	P						
011	01	15145100	2	1		PC	IC	74LS04	146LS TTL HEX INV	P						
012	01	15148700	6	5		PC	IC	74LS153	TTL DUAL 4I/P	P						
013	01	15146900	4	2		PC	IC	74LS175	520LS LATCH 4 BIT	P						
014	01	88883700	2	1		PC	IC	74S04	146S TTL HEX INVTR	P						
015	01	88884200	2	2		PC	IC	74S10	141S TTL 3 3-IN NAND	P						
016	01	88884500	5	4		PC	IC	74S00	140S TTL QD 2IN NAND	P						
017	01	15146700	8	5		PC	IC	74LS157	189LS TTL QD MPX	P						
018	01	88923000	9	6		PC	IC	74S74	TTL DUAL	P						
019	01	15163415	1	2		PC	IC	74LS165	8B SHIFT REGISTER	P						
020	01	15163419	3	2		PC	IC	74LS393	DL 4B BIN COUNTER	P						

BUILD ARC 214

### ASSEMBLY PARTS LIST

										PRINT DATE	PAGE	FILE CHANGE NO.				
										03-24-81	2	0014594				
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION					MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	90446215	7	E	D	CD ASSY OABD(VIDEO CONTROLLER					S	REL	06-30-80	CC629A	03-24-81		
T/P NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION				MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
021	01	15161400	5	7		PC	IC	74S40	TTL 2 AND G	P						
022	01	15142500	6	1		PC	IC	TYPE 74S138	TTY 3TO8 L/D	P						
023	01	15163324	5	1		PC	IC	74LS245	OCTAL BUS RECEIVER	P						
024	01	15163413	6	1		PC	IC	74LS155	DUAL 2 TO 4 DECODE	P						
025	01	66305713	1	1		PC	IC	TYP 5623	PROM 256X4 B/MAP	P						
026	01	66305714	9	1		PC	IC	TYP 5623	PROM 256X4 B/MAP	P						
027	01	51904106	5	1		PC	OSC	TTL DIP	24.096MHZ 500MW	P						
028	01	51003059	6	2		PC	XSTR	DD1 106	EPITAX NPN SIL	P						
029	01	94402120	3	2		PC	RES	FM 33 OHM	1/4W CARBON	P						
030	01	94402129	4	1		PC	RES	FM 75 OHM	1/4W CARBON	P						
031	01	94402130	2	1		PC	RES	FM 82 OHM	1/4W CARBON	P						
032	01	94402144	3	1		PC	RES	FM 330 OHM	1/4W CARBON	P						
033	01	94402152	6	1		PC	RES	FM 680 OHM	1/4W CARBON	P						
034	01	94402156	7	1		PC	RES	FM 1K OHM	1/4W CARBON	P						
034	02	94402156	7	2		PC	RES	FM 1K OHM	1/4W CARBON	P	14228	14228			8031	8031
035	01	94402180	7	1		PC	RES	FM 10K OHM	1/4W CARBON	P						
036	01	94375109	9	2		PC	RES	8SIP NTWK	1000 R 3P 1.0W	P						
037	01	51001119	0	68		PC	CAP	CER F-1	.01UF .80-20P 25V	P			14306			8111
037	02	51001121	6	68		PC	CAP	CER F-1	.01UF .80-20P 25V	P	14306	14513			8111	8112
037	03	51001121	6	52		PC	CAP	CER F-1	.01UF .80-20P 25V	P	14513	14594			8112	8112
037	04	51001121	6	68		PC	CAP	CER F-1	.01UF .80-20P 25V	P	14594				8112	
038	01	51000989	7	32		PC	REPLACED BY	94354826	14170	P			14170			8052
038	02	94354826	3	32		PC	CAP	FXD CER	0.10UF 50V	P	14170				8052	



BUILD ARC 214

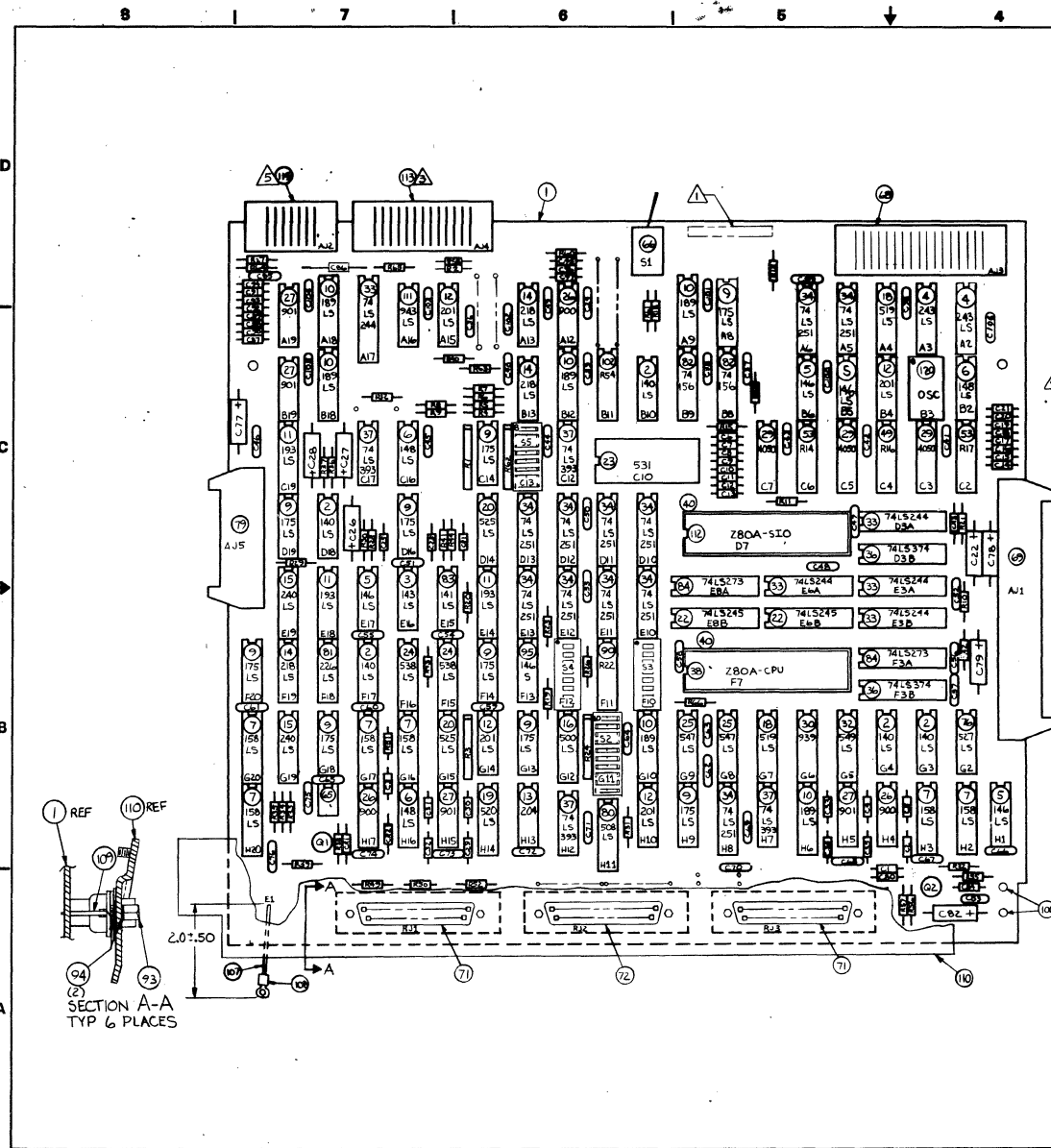
### ASSEMBLY PARTS LIST

DIV		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860		90446215	7	E	D	CD ASSY OABD (VIDEO CONTROLLER)	S	REL	06-30-80	CC629A	03-24-81		
TRND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
039	01	24504371	6	6		PC CAP FXD TANT 22UF 20P 15VDCW	P						
040	01	51007385	1	2		PC DIO IN4148 10MA MICRO SIL 30V	P		14228	14228		8031	8031
040	02	51007385	1	3		PC DIO IN4148 10MA MICRO SIL 30V	P					8031	
041	01	51879105	8	1		PC CAP FXD TANT 100UF 10P 6VDCW	P						
042	01	51810800	6	1		PC RELAY REED DIP	P						
043	01	51848411	9	34		PC SOCKET, IC 16 POS D-I-L TIN	P						
044	01	51848404	3	5		PC SOCKET, IC 24 POS D-I-L TIN	P						
045	01	41347806	6	2		PC SWITCH TOGGLE 3POS	P						
046	01	76379302	3	1		PC HEADER, 4 PIN STRAIGHT PCB	P						
047	01	5106100	6	1		PC CONN, 2 PIN PC MTD TIN FIG 1	P						
048	01	51847511	6	1		PC CONN, PCB 10POS 2RX5P FIG 3	P						
049	01	51847504	1	1		PC CONN, PCB 50POS 2RX25P FIG 1	P						
050	01	510917031	0	2		PC CONN, 7 PIN STRAIGHT PC FIG 1	P						
051	01	94375102	4	1		PC RES 8SIP NTWK 3300 R 3P 1.0W	P						
052	01	15146100	1	1		PC IC 74LS30 206LS TTL 8I/P NAND	P						
053	01	51862501	7	1		PC SW, PC BD TGL 4 IN-LINE SPST	P						
054	01	15148500	0	1		PC IC 74LS14 943LS TTL 6 ND RCVR	P						
056	01	90446213	2	REF		PC SCH DIAG OABD	D						
057	01	52629949	0	500		FT WIR WW 30GA SLD WHT UL KYNAR	W		14228			8031	
058	01	51846000	1	250		OZ PKG EPOXY TWO PART EXTRA FAST	B		14228			8031	
059	01	15163310	4	1		PC IC 74S374 OCTAL D TYPE	P		14513			8112	

BUILD ARC 214

### ASSEMBLY PARTS LIST

DIV		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860		90446215	7	E	D	CD ASSY OABD (VIDEO CONTROLLER)	S	REL	06-30-80	CC629A	03-24-81		
TRND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
						0065 TOTAL LINES							



CROSS REFERENCE TABLE

FIND NO.	REFERENCE DESIGNATION
39	S2
42	R3
43	R2, R12, R19, R20, R29, R32-R35, R36, R40
44	R4-R7, R13
45	R37
51	R15, R28, R39
54	R11, R18, R23, R26, R31, R42, R43, R61, R63, R66
55	C86
56	C22, C27, C28
57	C6-C8, C23, C25, C81
59	C24, C37-C39, C40-C49, C50-C59, C60-C63, C70-C74, C83, C85, C98, C99, C100-C106
60	C77-C79, C82
61	C1-C5, C29-C35, C80, C87-C97
62	C26
63	C81, C82, C83
73	Q1
77	R36, R41, R44
78	R24, R62
86	R10, R40, R60
87	R21
89	R1
91	S3, S4
96	Q2
97	C84
98	R35
99	R26, R65
100	R57
103	R53
104	R49, R52
105	R50, R51
116	R27, R58
117	S5
118	C36
122	R30

REVISION RECORD

REV	ECO	DESCRIPTION	DEPT	DATE	CHG	APP
1	A	RELEASED CLASS 'A'		11-24-80		
2	B	FIN 59 IS NOT AVAILABLE YET		1-9-81		
3	C	REMOVE USE ONLY		5-19-81		
4	C	INACTIVE-REMOVED BY 7040881				

- NOTES:
- APPLY ASSY NO., REV LEVEL, LOC CODE, AND DATE CODE IN AREA SHOWN. MARK PER CDC SPEC 10121508; CHARACTER HEIGHT .12 (10 PT) COLOR WHITE.
  - FIND NUMBERS, ELEMENT IDENTIFIERS, AND REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON PART
  - CUT PIN 1 FROM CONNECTOR AJ4 FOR KEYING PURPOSES.
  - MARKING IS OPTIONAL WHEN SHUNT DIP IS INSTALLED BEFORE CODING.
  - CUT PIN 13 FROM CONNECTOR AJ2 FOR KEYING.

CHANGE TABLE

DELETIONS	ADDITIONS
CUT FOIL:	ADD WIRE:
① G7-1 TO H2-1	1) F14-5 TO D3A-17
② A4-1 TO A3-15	2) A4-1 TO D7-21 TO D3A-3 TO G7-4 TO A2-15
③ A2-15 TO A3-14	3) G7-5 TO E17-9
④ D7-21 TO D3A-18	4) A13-4 TO GND (ADJACENT .01 CMP LEAD)
⑤ E17-9 TO G11-9 (DEILL FEED-THEU)	5) A13-10 TO GND (ADJACENT .01 CMP LEAD)
⑥ A13-4 TO B13-1	6) B2-10 TO A15-10
⑦ A13-10 TO B13-12	7) B5-6 TO A15-10
⑧ B2-10 TO A15-10	8) E16-4 TO R65 (CUT FOIL END OF R65)
⑨ A16-4 TO R65	9) B5-3 TO C16-13
⑩ C16-3 TO C17-13	10) B5-4 TO C17-13

SEE SHEET 2

INACTIVE

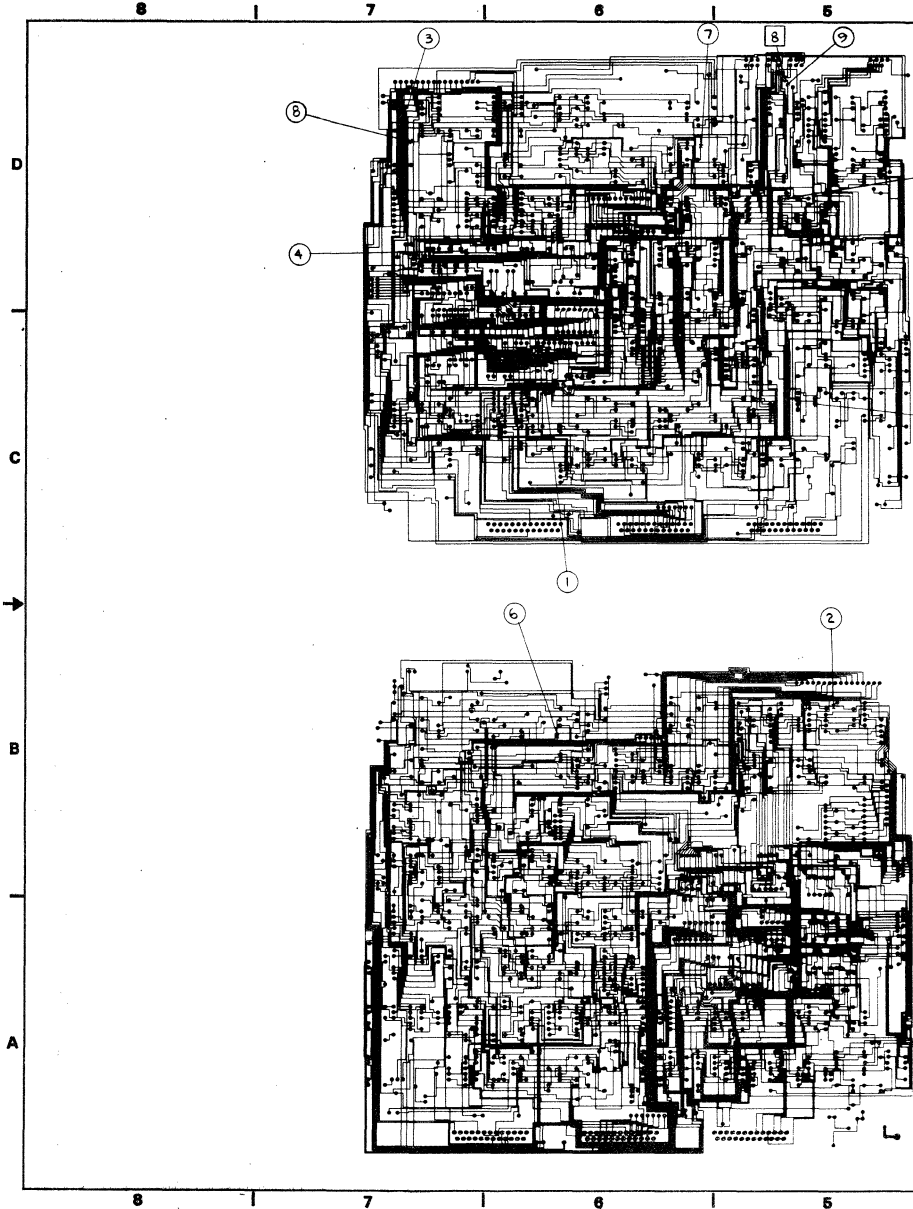
APL 90446265 DETACHED LISTS	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	CONTROL DATA		TITLE	
	3 PLACE TOLERANCES 3 PLACE ANGLES	PART NUMBER	CC629A/B		P.C. CARD ASSEMBLY, OACD CONTROLLER MODULE
	DO NOT SCALE DRAWING	CHECKED BY	DATE	11-24-80	CODE IDENT
	MATERIAL	ENGINEER	DATE	11-25-80	DRAWING NO
APPROVED	DATE	12-22-80	15920	90446265	
MECH	DATE	1-23-81	SCALE NONE	NHA 15632531	SHEET 1 OF 2

62940007 D

7-35

90446265

REVISION RECORD						
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP



LAYERS 6 & 7  
SOLDER SIDE

LAYERS 2 & 3  
COMPONENT SIDE

P.C. CARD ASSEMBLY		CODE 15920	DWG. NO. 90446265	REV. C
OACD		SHEET 2	1	



BUILD ARC 214

### ASSEMBLY PARTS LIST

										PRINT DATE	PAGE	FILE CHANGE NO.		
										02-25-81	1	00014532		
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION			MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	90446265	2	C	D	REPLACED BY 90460881 14532			S	INA	02-23-81	CC629A/B	02-25-81		
T/PND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	90460875	9	1		PC	PW BD 0ACD ASCII IST II	P						
002	01	15144900	6	5		PC	IC 74LS00 140LS QUAD 2-1NP	P						
003	01	15163416	9	1		PC	IC 74LS40 DUAL 4 I/P NAND BUF	P						
004	01	15146500	2	2		PC	IC 74LS112 243LS TTL DUAL F/F	P						
005	01	15145100	2	4		PC	IC 74LS04 146LS TTL HEX INV	P						
006	01	15145000	4	3		PC	IC 74LS02 148LS Q2INP NOR	P						
007	01	15146800	6	6		PC	IC 74LS161 158LS 4BIT COUNTER	P						
009	01	15146300	7	9		PC	IC 74LS74 175LS F/F DUAL D	P						
010	01	15146700	8	6		PC	IC 74LS157 189LS TTL QD MPX	P						
011	01	15163422	7	3		PC	IC 74LS123 DUAL MULTIVIBRATOR	P						
012	01	15145400	6	4		PC	IC 74LS08 201LS Q2INP AND	P						
013	01	15158300	2	1		PC	IC 7438 204 TTL QD 2IN ND BFR	P						
014	01	15146200	9	3		PC	IC 74LS32 218LS Q2INP OR	P						
015	01	15148000	1	2		PC	I C 74LS109 TTL JKFF DUAL	P						
016	01	15147000	2	1		PC	IC 74LS193 COUNTER TTL 4 BIT	P						
018	01	15147500	1	2		PC	IC 74LS174 TTL 6 BIT 16 PIN	P						
019	01	15146900	4	1		PC	IC 74LS175 520LS LATCH 4 BIT	P						
020	01	15163413	6	2		PC	IC 74LS155 DUAL 2 TO 4 DECODE	P						
022	01	15163324	5	2		PC	IC 74LS245 OCTAL BUS XCEIVER	P						
023	01	88881300	3	1		PC	IC 74150 16 BIT SELECTOR	P						
024	01	15146600	0	2		PC	IC 74LS139 538LS DECODER 10F4	P						

BUILD ARC 214

### ASSEMBLY PARTS LIST

										PRINT DATE	PAGE	FILE CHANGE NO.		
										02-25-81	2	00014532		
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION			MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	90446265	2	C	D	REPLACED BY 90460881 14532			S	INA	02-23-81	CC629A/B	02-25-81		
T/PND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
025	01	15163415	1	2		PC	IC 74LS165 8B SHIFT REGISTER	P						
026	01	36186400	2	3		PC	IC MC1488 900 DTL QD LN DRV	P						
027	01	15163326	0	4		PC	IC 1489A	P						
029	01	15134800	0	3		PC	IC 4050 CMOS HEX BFR NON-INV	P						
030	01	15140400	1	1		PC	IC DM 8097 HEX BUFFER TRI STA	P						
032	01	15163418	5	1		PC	IC 74LS148 ENCODER 8-3LINE PR	P						
033	01	15163414	4	5		PC	IC 74LS244 OCTAL BFR 3-5 OP	P						
034	01	15163421	9	11		PC	IC 74LS251 DATA SELECT MPLXR	P						
036	01	15163404	5	2		PC	IC 74LS374 OCTAL D-EDGE F-F	P						
037	01	15163419	3	4		PC	IC 74LS393 DL 4B BIN COUNTER	P						
038	01	15163201	5	1		PC	IC Z80A MOS 8BIT PROCESSOR	P						
039	01	51862506	6	1		PC	SW, PC BD TGL 10 IN-LINE SPST	P						
040	01	51848406	8	2		PC	SOCKET, IC 40 POS D-I-L TIN	P						
042	01	94375109	9	1		PC	RES 8SIP NTKW 1000 R 3P 1.0W	P						
043	01	94402156	7	11		PC	RES FM 1K OHM 1/4W CARBON	P						
044	01	94402148	4	7		PC	RES FM 470 OHM 1/4W CARBON	P						
045	01	94402186	4	1		PC	RES FM 18K OHM 1/4W CARBON	P						
049	01	62012926	2	1		PC	RES 16PIN NTKW 100K 5P 125MW	P						
051	01	94402204	5	3		PC	RES FM 100K OHM 1/4W CARBON	P						
053	01	62012932	0	2		PC	RES 16PIN NTKW 10K 5P 125MW	P						
054	01	94402180	7	10		PC	RES FM 10K OHM 1/4W CARBON	P						

BUILD ARC 214

### ASSEMBLY PARTS LIST

DIV		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	BNG. RESP.	FILE DATE			
0860		90446265	2	C	D	REPLACED BY 90460881 14532	S	INA	02-23-81	CC629A/B	02-25-81			
P/NO	LI	PART NUMBER	CD	REV.	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
055	01	94240411	2		1		PC CAP CER 10000 PF 50V 10P	P						
056	01	51786437	7		3		PC CAP SOLID TANT 33UF 20P 15V	P						
057	01	51839125	5		19		PC CAP FXD CER 1200PF 10P 100VDC	P						
059	01	51001121	6		52		PC CAP CER F-1 .01UF +80-20P 25V	P		14458	14458		8050	8050
059	02	51001119	0		52		PC CAP CER F-1 .01UF +80-20P 25V	P		14458			8050	
060	01	24504371	6		4		PC CAP FXD TANT 22UF 20P 15VDCW	P						
061	01	51839120	6		24		PC CAP FXD CER 470PF 10P 100VDC	P						
062	01	24504335	1		1		PC CAP FXD TANT 3.3UF 20P 35VDCW	P						
063	01	51007385	1		3		PC DIO IN4148 10MA MICRO SIL 30V	P						
065	01	95791300	7		1		PC OPTICAL ISOLATOR	P						
066	01	41347800	9		1		PC SW, PC BD TGL 2POS ON-ON	P						
068	01	51847514	0		1		PC CONN, PCB 34 POS 2RX17P FIG 3	P						
069	01	51847504	1		1		PC CONN, PCB 50POS 2RX25P FIG 1	P						
071	01	10129633	3		2		PC CONN RCPT, PCB 25SKT .125 TIN	P						
072	01	10129643	2		1		PC CONN PLUG, PCB 25PIN .125 TIN	P						
073	01	51003059	6		1		PC XSTR DD1 106 EPITAX NPN SIL	P						
074	01	16033200	3	REF			PC FABRICATION SPEC 70 PAK	D						
075	01	90460874	2	REF			PC SCH DIAG 0ACD ASCII IST II	D						
076	01	15163303	9		1		PC IC 74LS164 527LS TTL 8B R0TR	P						
077	01	94402174	0		3		PC RES FM 5.6K OHM 1/4W CARBON	P						
078	01	94375105	7		2		PC RES 85IP NTKW 10000 R 3P 1.0W	P						

BUILD ARC 214

### ASSEMBLY PARTS LIST

DIV		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	BNG. RESP.	FILE DATE			
0860		90446265	2	C	D	REPLACED BY 90460881 14532	S	INA	02-23-81	CC629A/B	02-25-81			
P/NO	LI	PART NUMBER	CD	REV.	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
079	01	51847500	9		1		PC CONN, PCB 20POS 2RX10P FIG 1	P						
080	01	15148700	6		1		PC IC 74LS153 TTL DUAL 4T/P	P						
081	01	15148600	8		1		PC IC 74LS260 TTL DUAL 5T/P NOR	P						
082	01	88881500	8		2		PC IC 74156 DECODER TTL DUAL	P						
083	01	15145600	1		1		PC IC 74LS10 141LS TTL 3T/P NAND	P						
084	01	15163420	1		2		PC IC 74LS273 OCTAL D FLIP FLOP	P						
086	01	94402168	2		3		PC RES FM 3.3K OHM 1/4W CARBON	P						
087	01	94402192	2		1		PC RES FM 33K OHM 1/4W CARBON	P						
089	01	94375102	4		1		PC RES 85IP NTKW 3300 R 3P 1.0W	P						
090	01	62012902	3		1		PC RES MOD DUAL 10K OHMS 125MW	P						
091	01	66308144	6		1		PC SHUNT SET CODED	N						
093	01	94288024	6		6		PC LKG DEVICE, CONN TYP 4 W/TYP3	P		14453	14453		8051	8051
093	02	18252501	4		6		PC SCREW LOCK ASSY	P		14453			8051	
094	01	10126400	0		12		PC WSHR, NO.4 EXT/T LK STL ZP	B						
095	01	88883700	2		1		PC IC 74S04 1465 TTL HEX INVTR	P						
096	01	51714000	0		1		PC XSTR 2N2907 PNP SIL	P						
097	01	51839106	5		1		PC CAP FXD CER 33 PF 10P 100VDC	P						
098	01	94402158	3		1		PC RES FM 1.2KOHM 1/4W CARBON	P						
099	01	94402140	1		2		PC RES FM 220 OHM 1/4W CARBON	P						
100	01	94402116	1		1		PC RES FM 22 OHM 1/4W CARBON	P						
102	01	62012910	6		1		PC RES MOD DUAL 47K OHMS 125MW	P						

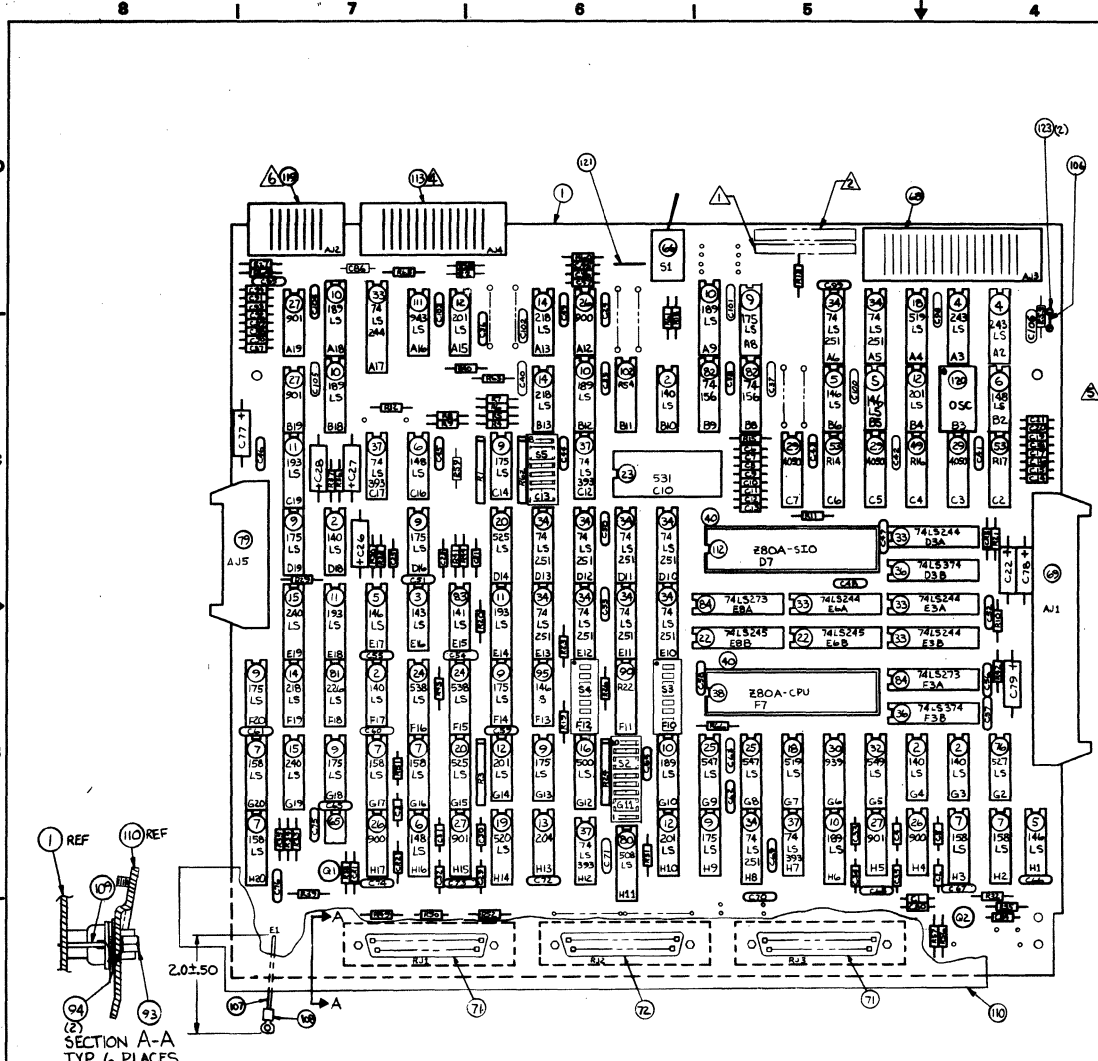


BUILD ARC 214

### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
02-25-81	5	00014532

QTY	U/M	PART NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. DESG.	FILE DATE		
0860		90446265	2	C	D	REPLACED BY 90460881 14532	S	INA	02-23-81	CC629A/B	02-25-81		
QTY	U/M	PART NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
103	01	24563054	6			PC RES FXD COMP 47K OHM 5P 1/8W		P					
104	01	94402138	5			PC RES FM 180 OHM 1/4W CARBON		P					
105	01	24563024	9			PC RES FXD COMP 270 OHM 5P 1/8W		P					
106	01	65832103	9			PC SOCKET SPRING TIN		P					
107	01	52810020	9			200 FT WIR 18GA STRD GRN YEL STRIPE		W					
108	01	51797217	0			PC LUG, NO.10 CRMP-R 22-18AWG		B					
109	01	71493172	2			PC ANGLE CONNECTOR GROUNDING		P					
110	01	71493173	0			PC PLATE CONNECTOR MOUNTING		P					
111	01	15148500	0			PC IC 74LS14 943LS TTL 6 ND RCVR		P					
112	01	15163460	7			PC IC 780A-SIO/2 DUAL SER RCVR		P					
113	01	51847513	2			PC CONN, PCB 26 POS 2RX13P FIG 3		P					
116	01	94402124	5			PC RES FM 47 OHM 1/4W CARBON		P					
117	01	94354826	3			PC CAP FXD CER 0.10UF 50V		P					
118	01	51862504	1			PC SW, PC BD TGL 8 IN-LINE SPST		P					
119	01	51847517	3			PC CONN, PCB		P					
120	01	51904111	5			PC OSC, TTL DIP		P					
121	01	52629949	0			3 500 FT WIR WW 30GA SLD WHT UL KYNAR		W					
122	01	94402176	5			PC RES FM 6.8K OHM 1/4W CARBON		P					
						0102 TOTAL LINES							



SECTION A-A  
TYP 6 PLACES

CROSS REFERENCE TABLE	
FIND NO.	REFERENCE DESIGNATION
39	S2
42	R3
43	R2, R19, R20, R29, R32-R35, R38, R40
44	R4, R7, R13
45	R37
51	R15, R28, R39
54	R11, R18, R23, R26, R31, R42, R43, R61, R63, R66
55	C86
56	C22, C27, C28
57	C6-C21, C23, C25, C81
58	C24, C37-39, C40-44, C50-C59, C60-C69, C70-C76, C85, C98, C99, C100-C106
59	
60	C77-C79
61	C1-C5, C29-C35, C80, C87-C97
62	C26
63	CR1, CR2, CR3
73	Q1
77	R36, R41, R44
78	R24, R62
86	R10, R40, R59, R40
87	R21
89	R1
91	S3, S4
92	Q2
97	C84
98	R55
99	R56, R65
100	R57
103	R53
104	R49, R52
105	R30, R51
116	R27, R58
117	C36
118	S5
122	R30

SHEET REVISION STATUS		REVISION RECORD					
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
A	1368r 24	RELEASED CLASS A					
B	14594	REVISED PER ECO	D.S	3/31/87	WJG		

- NOTES:
- MARK ASSY. NO., REV LEVEL IN AREA SHOWN. MARK PER CDC SPEC 1021508 CHARACTER HEIGHT .12 (10PT) COLOR WHITE.
  - MARK SERIAL NUMBER IN AREA SHOWN PER RVLOPS P&P NO. 80:20:34 AND PER MARKING REQUIREMENTS IN NOTE (1) ONE.
  - FIND NUMBERS, ELEMENT IDENTIFIERS, AND REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON PART
  - CUT PIN 1 FROM CONNECTOR AJ4 FOR KEYING PURPOSES.
  - MARKING IS OPTIONAL WHEN SHUNT DIP IS INSTALLED BEFORE CODING.
  - CUT PIN 13 FROM CONNECTOR AJ2 FOR KEYING.

CHANGE TABLE	
DELETIONS	ADDITIONS

APL 904608B1 DETACHED LISTS	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	CONTROL DATA		TITLE
	TOLERANCES	SHEET C6629A/B	P.C. CARD ASSEMBLY, OACD CONTROLLER MODULE	
DO NOT SCALE DRAWING	MATERIAL	DESIGNED BY	CODE IDENT	DRAWING NO
		15920	D	904608B1
		APPROVED	SCALE NONE	SHEET 1 of 1

BUILD ARC 214

### ASSEMBLY PARTS LIST

DIV		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE	ENG. RESP.	FILE CHANGE NO.		
0860		90460881	7	B	D	PC CD ASSY OACD		S	REL	02-02-81	CC629A/B	0014594		
TRND NO.	LI	PART NUMBER	CD	REV.	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	90460880	9	1	1		PC PW 8D OACD ASCII 1ST II	P						
002	01	15144900	6	5	1		PC IC 74LS00 140LS QUAD 2-INP	P						
003	01	15163416	9	1	1		PC IC 74LS40 DUAL 4 I/P NAND BUF	P						
004	01	15146500	2	2	1		PC IC 74LS112 243LS TTL DUAL F/F	P						
005	01	15145100	2	4	1		PC IC 74LS04 146LS TTL HEX INV	P						
006	01	15145000	4	3	1		PC IC 74LS02 148LS Q2INP NOR	P						
007	01	15146800	6	6	1		PC IC 74LS161 158LS 4BIT COUNTER	P						
009	01	15146300	7	9	1		PC IC 74LS74 175LS F/F DUAL D	P						
010	01	15146700	8	6	1		PC IC 74LS157 189LS TTL QD MPX	P						
011	01	15163422	7	3	1		PC IC 74LS123 DUAL MULTIVIBRATOR	P						
012	01	15145400	6	4	1		PC IC 74LS08 201LS Q2INP AND	P						
013	01	15158300	2	1	1		PC IC 7438 204 TTL QD 2IN ND BFR	P						
014	01	15146200	9	3	1		PC IC 74LS32 218LS Q2INP OR	P						
015	01	15148000	1	2	1		PC IC 74LS109 TTL JKFF DUAL	P						
016	01	15147000	2	1	1		PC IC 74LS193 COUNTER TTL 4 BIT	P						
018	01	15147500	1	2	1		PC IC 74LS174 TTL 6 BIT 16 PIN	P						
019	01	15146900	4	1	1		PC IC 74LS175 520LS LATCH 4 BIT	P						
020	01	15163413	6	2	1		PC IC 74LS155 DUAL 2 TO 4 DECODE	P						
022	01	15163324	5	2	1		PC IC 74LS245 OCTAL BUS XCEIVER	P						
023	01	88881300	3	1	1		PC IC 74150 16 BIT SELECTOR	P						
024	01	15146600	0	2	1		PC IC 74LS139 538LS DECODER 10F4	P						

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### ASSEMBLY PARTS LIST

DIV		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE	ENG. RESP.	FILE CHANGE NO.		
0860		90460881	7	B	D	PC CD ASSY OACD		S	REL	02-02-81	CC629A/B	0014594		
TRND NO.	LI	PART NUMBER	CD	REV.	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
025	01	15163415	1	2	1		PC IC 74LS165 8B SHIFT REGISTER	P						
026	01	36186400	2	3	1		PC IC MC1488 900 DTL QD LN DRVR	P						
027	01	15163326	0	4	1		PC IC 1489A	P						
029	01	15134800	0	3	1		PC IC 4050 CMOS HEX BFR NON-INV	P						
030	01	15140400	1	1	1		PC IC DM 8097 HEX BUFFER TRI STA	P						
032	01	15163418	5	1	1		PC IC 74LS148 ENCODER 8-3LINE PR	P						
033	01	15163414	4	5	1		PC IC 74LS244 OCTAL BFR 3-5 OP	P						
034	01	15163421	9	11	1		PC IC 74LS251 DATA SELECT MPLXR	P						
036	01	15163404	5	2	1		PC IC 74LS374 OCTAL D-EDGE F-F	P						
037	01	15163419	3	4	1		PC IC 74LS393 DL 4B BIN COUNTER	P						
038	01	15163201	5	1	1		PC IC Z80A MOS 8BIT PPROCESSOR	P						
039	01	51862506	6	1	1		PC SW, PC BD TGL 10 IN-LINE SPSI	P						
040	01	51848406	8	2	1		PC SOCKET, IC 40 POS D-I-L TIN	P						
042	01	94375109	9	1	1		PC RES 8SIP NTWK 1000 R 3P 1.0W	P						
043	01	94402156	7	11	1		PC RES FM 1K OHM 1/4W CARBON	P						
044	01	94402148	4	7	1		PC RES FM 470 OHM 1/4W CARBON	P						
045	01	94402186	4	1	1		PC RES FM 18K OHM 1/4W CARBON	P						
049	01	62012926	2	1	1		PC RES 16PIN NTWK 100K 5P 125MW	P						
051	01	94402204	5	3	1		PC RES FM 100K OHM 1/4W CARBON	P						
053	01	62012932	0	2	1		PC RES 16PIN NTWK 10K 5P 125MW	P						
054	01	94402180	7	10	1		PC RES FM 10K OHM 1/4W CARBON	P						

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### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
03-25-81	3	00014594

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	90460891	7	B	D	PC CD ASSY OACD	S	REL	02-02-81	CC629A/B	03-25-81			
T/PND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
055	01	94240411	2	1		PC CAP CER 10000 PF 50V 10P	P						
056	01	51786437	7	3		PC CAP SOLID TANT 33UF 20P 15V	P						
057	01	51839125	5	19		PC CAP FXD CER 1200PF 10P 100VDC	P						
059	01	51001121	6	38		PC CAP CER F-1 .01UF +80-20P 25V	P		14594	14594		8112	8112
059	02	51001121	6	51		PC CAP CER F-1 .01UF +80-20P 25V	P					8112	
060	01	24504371	6	4		PC CAP FXD TANT 22UF 20P 15VDCW	P		14594	14594		8112	8112
060	02	24504371	6	3		PC CAP FXD TANT 22UF 20P 15VDCW	P					8112	
061	01	51839120	6	24		PC CAP FXD CER 470PF 10P 100VDC	P						
062	01	24504335	1	1		PC CAP FXD TANT 3.3UF 20P 35VDCW	P						
063	01	51007385	1	3		PC DIO IN4148 10MA MICRO SIL 30V	P						
065	01	95791300	7	1		PC OPTICAL ISOLATOR	P						
066	01	41347800	9	1		PC SW, PC 8D TGL 2POS ON-ON	P						
068	01	51847514	0	1		PC CONN, PCB 34 POS 2RX17P FIG 3	P						
069	01	51847504	1	1		PC CONN, PCB 50POS 2RX25P FIG 1	P						
071	01	10129633	3	2		PC CONN RCPT, PCB 25SKT .125 TIN	P						
072	01	10129643	2	1		PC CONN PLUG, PCB 25PIN .125 TIN	P						
073	01	51003059	6	1		PC XSTR DD1 106 EPITAX NPN SIL	P						
074	01	16033200	3	REF		PC FABRICATION SPEC 70 PAK	D						
075	01	90460879	1	REF		PC SCH DIAG OACD	D						
076	01	15163303	9	1		PC IC 74LS164 527LS TTL 8B RQTR	P						
077	01	94402174	0	3		PC RES FM 5.6K OHM 1/4W CARBON	P						
078	01	94375105	7	2		PC RES 8SIP NTWK 10000 R 3P 1.0W	P						

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### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
03-25-81	4	00014594

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	90460891	7	B	D	PC CD ASSY OACD	S	REL	02-02-81	CC629A/B	03-25-81			
T/PND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
079	01	51847500	9	1		PC CONN, PCB 20POS 2RX10P FIG 1	P						
080	01	15148700	6	1		PC IC 74LS153 TTL DUAL 4I/P	P						
081	01	15148600	8	1		PC IC 74LS260 TTL DUAL 5I/P NOR	P						
082	01	80881500	8	2		PC IC 74LS6 DECODER TTL DUAL	P						
083	01	15145600	1	1		PC IC 74LS10 141LS TTL 3I/P NAND	P						
084	01	15163420	1	2		PC IC 74LS273 OCTAL D FLIP FLOP	P						
086	01	94402168	2	3		PC RES FM 3.3K OHM 1/4W CARBON	P		14594	14594		8112	8112
086	02	94402168	2	4		PC RES FM 3.3K OHM 1/4W CARBON	P					8112	
087	01	94402192	2	1		PC RES FM 33K OHM 1/4W CARBON	P						
089	01	94375102	4	1		PC RES 8SIP NTWK 3300 R 3P 1.0W	P						
090	01	62012902	3	1		PC RES MOD DUAL 10K OHMS 125MW	P						
091	01	66308144	6	1		PC SHUNT SET CODED	N						
093	01	94288024	6	6		PC LKG DEVICE, CONN TYP 4 W/TYP3	P						
094	01	10126400	0	12		PC WSHR, NO.4 EXT/T LK STL ZP	B						
095	01	80883700	2	1		PC IC 74S04 146S TTL HEX INVTR	P						
096	01	51714000	0	1		PC XSTR 2N2907 PNP SIL	P						
097	01	51839106	5	1		PC CAP FXD CER 33 PF 10P 100VDC	P						
098	01	94402158	3	1		PC RES FM 1.2KOHM 1/4W CARBON	P						
099	01	94402140	1	2		PC RES FM 220 OHM 1/4W CARBON	P						
100	01	94402116	1	1		PC RES FM 22 OHM 1/4W CARBON	P						
102	01	62012910	6	1		PC RES MOD DUAL 47K OHMS 125MW	P						

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### ASSEMBLY PARTS LIST

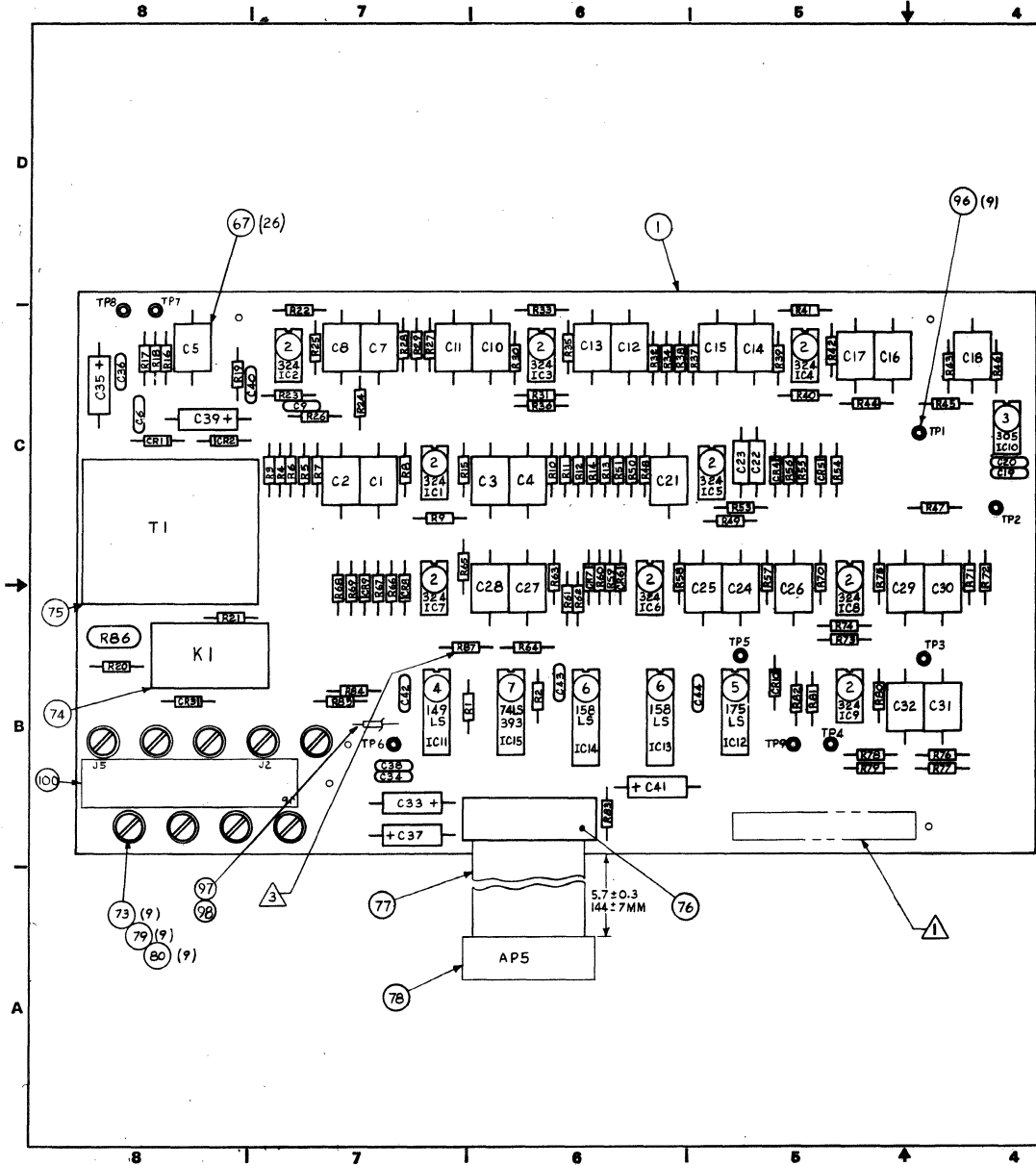
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										03-25-81	5	00014594			
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION				MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	90460881	7	B	D	PC CD ASSY OACD				S	REL	02-02-81	CC629A/B	03-25-81		
T/RND NO.	U	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION			MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
103	01	24563054	6	1		PC RES FXD COMP 47K OHM 5P 1/8W	P								
104	01	94402138	5	2		PC RES FM 180 OHM 1/4W CARBON	P								
105	01	24563024	9	2		PC RES FXD COMP 270 OHM 5P 1/8W	P								
106	01	65832103	9	2		PC SOCKET SPRING TIN	P								
106	02	77612624	5	1		PC CONNECTOR, JUMPER	P			14594	14594			8112	8112
107	01	52810020	9	200		FT WIR 18GA STRD GRN YEL STRIPE	W								
108	01	51797217	0	1		PC LUG, NO.10 CRMP-R 22-18AWG	B								
109	01	71493172	2	1		PC ANGLE CONNECTOR GROUNDING	P								
110	01	71493173	0	1		PC PLATE CONNECTOR MOUNTING	P								
111	01	15148500	0	1		PC IC 74LS14 943LS TTL 6 ND RCVM	P								
112	01	15163460	7	1		PC IC Z80A-SIO/2 DUAL SER RCVR	P								
113	01	51847513	2	1		PC CONN, PCB 26 POS 2RX13P FIG 3	P								
116	01	94402124	5	2		PC RES FM 47 OHM 1/4W CARBON	P								
117	01	94354826	3	1		PC CAP FXD CER 0.10UF 50V	P								
118	01	51862504	1	1		PC SW, PC BD TGL 8 IN-LINE SPST	P								
119	01	51847517	3	1		PC CONN, PCB	P								
120	01	51904111	5	1		PC OSC, TTL DIP	P								
121	01	52629949	0	3	500	FT WIR WW 30GA SLD WHT UL KYNAR	W								
121	02	24501801	5	3	83	FT WIRE BUSS 22GA SOLID CU TP	W			14594	14594			8112	8112
122	01	94402176	5	1		PC RES FM 6.8K OHM 1/4W CARBON	P								
123	01	51003400	3	2		PC PIN, .025 IN SQ PC MTG 2A	P								
124	01	77612624	5	1		PC CONNECTOR, JUMPER	P				14594				8112

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### ASSEMBLY PARTS LIST

										PRINT DATE	PAGE	FILE CHANGE NO.			
										03-25-81	6	00014594			
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION				MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	90460881	7	B	D	PC CD ASSY OACD				S	REL	02-02-81	CC629A/B	03-25-81		
T/RND NO.	U	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION			MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
125	01	24501801	5	383		FT WIRE BUSS 22GA SOLID CU TP	W					14594			8112
						0108 TOTAL LINES									





CROSS REFERENCE TABLE	
FIND NO.	REFERENCE DESIGNATION
8	R43
9	R22
10	R44
11	R19
12	R23
13	R37
14	R51
15	R78
16	R41
17	R34
18	R29
19	R32
20	R73
21	R76
22	R28, R38
23	R63
24	R71
25	R27
26	R12
27	R33
28	R64
29	R59, R60, R62, R66, R67, R69
30	R14
31	R57
32	R26
33	R24
34	R61, R68
35	R65
36	R79
37	R80
38	R70
39	R7
40	R58, R74, R75
41	R42
42	R35, R36
43	R5, R39, R40
44	R30, R31
45	R25
46	R10
47	R13
48	R8
49	R72, R77
50	R11
51	R15
52	R20, R21, R84, R85, R55
53	R6
54	R17
55	R47
56	R1, R2, R3, R4, R83
57	R16
58	R18, R81, R82
59	R50
60	R45, R46, R48
61	R9
62	R49

SHEET REVISION STATUS		REVISION RECORD					
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP	
03	50674	REVISED & REDRAWN PER ECO	H	6-9-79			
04	50711	ADDED R/N'S #3 & 94	H	6-22-79			
A	(2/25/5)	RELEASED CLASS "A"		6-22-79			
B	13774	APL CHANGE ONLY	NJJL	9-14-79			
C	13734	APL CHANGE ONLY	NJJL	10-17-79			
D	13786	REVISED PER ECO	EMG	10-19-79			
E	13850	ADD P/N 100 AND P/N 127 TO TRAIL	NJJL	12-7-79			
F	13827	APL CHANGE ONLY	PH	11/1/80			
G	14368	APL CHANGES ONLY	NJJL	11-20-80			

63	R56
64	R54
65	R53
66	R86
67	C1-C5, C7, C8, C10-C18, C21, C24-C32
68	C6, C42, C43, C44
69	C9, C19, C20, C34, C36, C38, C40
70	C33, C35, C37, C39, C41
71	CR1, CR2
72	CR3, CR4, CR5, THRU CR10
81	R87
81	THRU 91
92	C22, C23

CHANGE TABLE	
DELETES	ADDITIONS
OUT FOIL AT:	ADD WIRE FROM:
TP5	TP9 TO IC 13 PIN 9
IC 13 PIN 9	INSTALL FIND NOS. 97 AND 98

- △ APPLY ASSY NO., REV LEVEL, LOC CODE, AND DATE CODE AND S/N IN AREA SHOWN. MARK PER CDC SPEC 10121508; CHARACTER HEIGHT .12 (12 PT) COLOR WHITE.
- 2. FIND NUMBERS, ELEMENT IDENTIFIERS, AND REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON PART.
- △ RESISTOR (R87) SHALL BE SELECTED. DO NOT INSTALL ON ASSEMBLY UNTIL FINAL CHECKOUT.
- 4. THIS ASSY IS REGISTERED WITH THE FEDERAL COMMUNICATIONS COMMISSION PER FCC RULES, PART 68. ANY CHANGE MUST BE APPROVED BY ENGINEERING DESIGN AND POSSIBLY THE FCC DEPENDING ON THE TYPE OF CHANGE.
- 5. PERMANENT REWORK SHALL CONFORM TO CDC SPEC 16019500.

APL 904445982 DETACHED LISTS	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TOLERANCES		PART NUMBER <b>CN703A</b>	TITLE <b>P.C. CARD ASSEMBLY, 8 CHD (MODEM 150/1200 BPS)</b>
	3 PLACE	2 PLACE	1 PLACE	ASSEMBLY		
DO NOT SCALE DRAWING		DESIGNED BY W.J. BERGMAN 11/3-78	DATE 12-5-78	ENGINEER R. SCHULTZ 12-7-78	CODE IDENT 15920	DRAWING NO 90445982
APPROVED BY <i>[Signature]</i> 6-21-79		MECH <i>[Signature]</i>	SCALE 2/1	N/A	SHEET 1 OF 1	

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### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
11-19-80	1	00014388

DIV		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE				
0860		90445982	3	G	D	CD ASSY MODEM 150/1200 BPS		A	REL	06-22-79	CN703A	11-19-80				
T	P	NO.	LI	PART NUMBER	CD	IN	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01			90445981	5		1		PC PW 8D 8CHD MODEM 150/1200	P						
002	01			15109000	8		9		PC IC MC1458/N5558 324 DL OP/AMP	P						
003	01			15163443	3		1		PC IC LM311N VOLT COMP HI IMP	P						
004	01			15146400	5		1		PC IC 74LS86 149LS TTL 2I/P OR	P						
005	01			15146300	7		1		PC IC 74LS74 175LS F/F DUAL D	P						
006	01			15146800	6		2		PC IC 74LS161 158LS 4BIT COUNTER	P						
007	01			15163419	3		1		PC IC 74LS393 DL 4B BIN COUNTER	P						
008	01			94360258	1		1		PC RES FXD FM 402 OHM 1P 1/4W	P						
009	01			94360295	3		1		PC RES FXD FM 976 OHM 1P 1/4W	P						
010	01			94360300	1		1		PC RES FXD FM 1000 OHM 1P 1/4W	P						
011	01			94402166	6		1		PC RES FM 2.7K OHM 1/4W CARBON	P						
012	01			94360332	4		1		PC RES FXD FM 2150 OHM 1P 1/4W	P						
013	01			94360324	1		1		PC RES FXD FM 1780 OHM 1P 1/4W	P						
014	01			94360346	4		1		PC RES FXD FM 3010 OHM 1P 1/4W	P						
015	01			94360355	5		1		PC RES FXD FM 3740 OHM 1P 1/4W	P						
016	01			94360358	9		1		PC RES FXD FM 4020 OHM 1P 1/4W	P						
017	01			94360362	1		1		PC RES FXD FM 4420 OHM 1P 1/4W	P						
018	01			94360369	6		1		PC RES FXD FM 5230 OHM 1P 1/4W	P						
019	01			94360374	6		1		PC RES FXD FM 5900 OHM 1P 1/4W	P						
020	01			94360378	7		1		PC RES FXD FM 6490 OHM 1P 1/4W	P						
021	01			94360379	5		1		PC RES FXD FM 6650 OHM 1P 1/4W	P						

BUILD ARC 210

### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
11-19-80	2	00014388

DIV		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE				
0860		90445982	3	G	D	CD ASSY MODEM 150/1200 BPS		A	REL	06-22-79	CN703A	11-19-80				
T	P	NO.	LI	PART NUMBER	CD	IN	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
022	01			94360382	9		2		PC RES FXD FM 7150 OHM 1P 1/4W	P						
023	01			94360385	2		1		PC RES FXD FM 7680 OHM 1P 1/4W	P						
024	01			94360387	8		1		PC RES FXD FM 8060 OHM 1P 1/4W	P						
025	01			94360388	6		1		PC RES FXD FM 8250 OHM 1P 1/4W	P						
026	01			94360389	4		1		PC RES FXD FM 8450 OHM 1P 1/4W	P						
027	01			94360393	6		1		PC RES FXD FM 9310 OHM 1P 1/4W	P						
028	01			94360333	2		1		PC RES FXD FM 2210 OHM 1P 1/4W	P						
028	02			94360329	0		1		PC RES FXD FM 2000 OHM 1P 1/4W	P		14388	14388		8101	8101
029	01			94360400	9		6		PC RES FXD FM 10.0K OHM 1P 1/4W	P						
030	01			94360344	9		1		PC RES FXD FM 2870 OHM 1P 1/4W	P						
031	01			94360409	0		1		PC RES FXD FM 12.4K OHM 1P 1/4W	P						
032	01			94360416	5		1		PC RES FXD FM 14.7K OHM 1P 1/4W	P						
033	01			94360425	6		1		PC RES FXD FM 18.2K OHM 1P 1/4W	P						
034	01			94360429	8		2		PC RES FXD FM 20.0K OHM 1P 1/4W	P						
035	01			94360431	4		1		PC RES FXD FM 21.0K OHM 1P 1/4W	P						
036	01			94360435	5		1		PC RES FXD FM 23.2K OHM 1P 1/4W	P						
037	01			94360441	3		1		PC RES FXD FM 26.7K OHM 1P 1/4W	P						
038	01			94360445	4		1		PC RES FXD FM 29.4K OHM 1P 1/4W	P						
039	01			94360447	0		1		PC RES FXD FM 31.9K OHM 1P 1/4W	P						
040	01			94360448	8		3		PC RES FXD FM 31.6K OHM 1P 1/4W	P						
041	01			94360454	6		1		PC RES FXD FM 36.5K OHM 1P 1/4W	P						

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### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
11-19-80	3	00014388

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	90445982	3	G	D	CD ASSY MODEM 150/1200 BPS	A	REL	06-22-79	CN703A	11-19-80			
T/PND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
042	01	94360455	3	2		PC RES FXD FM 37.4K OHM 1P 1/4W	P						
043	01	94360462	9	3		PC RES FXD FM 44.2K OHM 1P 1/4W	P						
044	01	94360466	0	2		PC RES FXD FM 48.7K OHM 1P 1/4W	P						
045	01	94360468	6	1		PC RES FXD FM 51.1K OHM 1P 1/4W	P						
046	01	94360522	0	1		PC RES FXD FM 169K OHM 1P 104W	P						
047	01	94360437	1	1		PC RES FXD FM 24.3K OHM 1P 1/4W	P						
048	01	94360489	2	1		PC RES FXD FM 84.5K OHM 1P 1/4W	P						
049	01	94360493	4	2		PC RES FXD FM 93.1K OHM 1P 1/4W	P						
050	01	94360500	6	1		PC RES FXD FILM 100KOHM 1/4W 1P	P						
051	01	94360510	5	1		PC RES FXD FM 127K OHM 1P 1/4W	P						
052	01	94402108	8	5		PC RES FM 10 OHM 1/4W CARBON	P						
053	01	94402207	8	1		PC RES FM 130K OHM 1/4W CARBON	P						
054	01	94402153	4	1		PC RES FM 750 OHM 1/4W CARBON	P						
055	01	94402156	7	1		PC RES FM 1K OHM 1/4W CARBON	P						
056	01	94402172	4	5		PC RES FM 4.7K OHM 1/4W CARBON	P						
057	01	94402161	7	1		PC RES FM 1.6K OHM 1/4W CARBON	P						
058	01	94402180	7	3		PC RES FM 10K OHM 1/4W CARBON	P						
059	01	94402191	4	1		PC RES FM 30K OHM 1/4W CARBON	P						
060	01	94402192	2	3		PC RES FM 33K OHM 1/4W CARBON	P						
061	01	94402202	9	1		PC RES FM 82K OHM 1/4W CARBON	P						
062	01	94402203	7	1		PC RES FM 91K OHM 1/4W CARBON	P						

BUILD ARC 210

### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
11-19-80	4	00014388

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	90445982	3	G	D	CD ASSY MODEM 150/1200 BPS	A	REL	06-22-79	CN703A	11-19-80			
T/PND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
063	01	94402221	9	1		PC RES FM 510K OHM 1/4W CARBON	P						
064	01	94402201	1	1		PC RES FM 75K OHM 1/4W CARBON	P						
065	01	94402220	1	1		PC RES FM 470K OHM 1/4W CARBON	P						
066	01	51918136	6	1		PC RES, MTL VARISTOR 250 RMS (2)	P						
067	01	15164041	4	26		PC CAP FXD PPP .01UF 2.5P 160VDC	P						
068	01	51001119	0	4		PC CAP CER F-1 .01UF +80-20P 25V	P						
069	01	51000989	7	7		PC REPLACED BY 94354826 14170	P						
069	02	94354826	3	7		PC CAP FXD CER 0.10UF 50V	P		14170	14170		8052	8052
070	01	24504371	6	5		PC CAP FXD TANT 22UF 20P 15VDCW	P						
071	01	15101111	1	2		PC DIO IN754A 400MW ZEN VR 6.8V	P						
072	01	51007385	1	8		PC DIO IN4148 10MA MICRO SIL 30V	P						
073	02	51940688	8	9		PC STANDOFF SWAG TYPE	B		13734			7940	
074	01	51918070	7	1		PC RELAY, 5V DC PCB MT 64 OHM	P						
075	01	51917882	6	1		PC XFMR, TEL CPLG 1000VAC P-S	P						
076	01	75810340	2	1		PC CONN, PC 20CONT FLAT CBL SKT	P						
077	01	65832210	2	666		FT CBL, FLAT 20 CNDCT 28AWG PVC	P						
078	01	65853405	2	1		PC CONN, 20 CONT F/CBL 28-30AWG	P						
079	02	10127320	9	9		PC MSCR PAN SLT 4-40X.250 STL ZP	B		13674	13875		7940	8010
079	03	92004074	8	9		PC MSCR 4-40 1/4L SST	B		13875			8010	
080	01	92009041	2	9		PC WASHER FLAT NO 4	B						
081	01	94402139	3	100		PC RES FM 200 OHM 1/4W CARBON	P						
082	01	94402141	9	100		PC RES FM 240 OHM 1/4W CARBON	P						

BUILD ARC 210

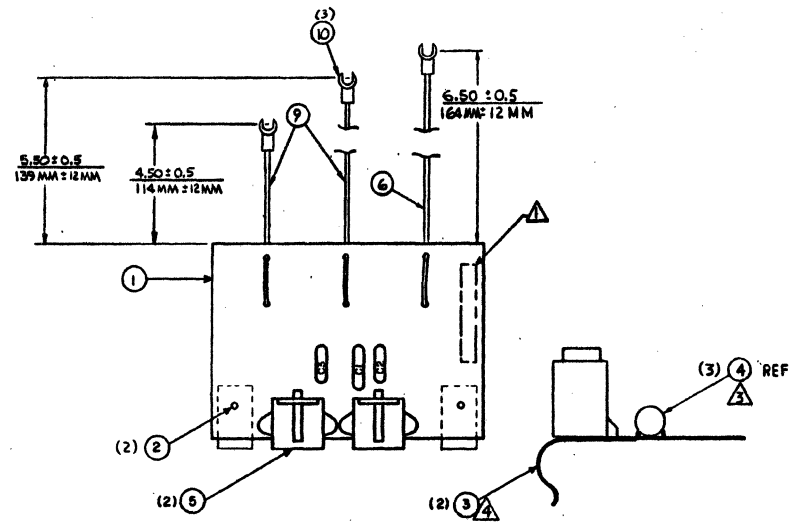
# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
11-19-80	5	00014388

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	INO. RESP.	FILE DATE			
0860	90445982	3	G	D	CD ASSY MODEM 150/1200 BPS	A	REL	06-22-79	CN703A	11-19-80			
PRD NO.	U	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	BOC. NO. IN	BOC. NO. OUT	S/N	WK IN	WK OUT
083	01	94402142	7	200	PC	RES FM 270 OHM 1/4W CARBON	P						
084	01	94402143	5	200	PC	RES FM 300 OHM 1/4W CARBON	P						
085	01	94402144	3	300	PC	RES FM 330 OHM 1/4W CARBON	P						
086	01	94402145	0	300	PC	RES FM 360 OHM 1/4W CARBON	P						
087	01	94402146	8	200	PC	RES FM 390 OHM 1/4W CARBON	P						
088	01	94402147	6	200	PC	RES FM 430 OHM 1/4W CARBON	P						
089	01	94402148	4	100	PC	RES FM 470 OHM 1/4W CARBON	P						
090	01	94402149	2	100	PC	RES FM 510 OHM 1/4W CARBON	P						
091	01	94402150	0	100	PC	RES FM 560 OHM 1/4W CARBON	P			14388			8101
092	02	75808549	2	2	PC	CAP PF 100000 .400L	P	13674				7938	
093	01	90445980	7	REF	PC	SCH DIAG 8CHD MODEM 150/1200	D						
094	01	16006500	9	REF	PC	FABRICATION SPECIFICATION	D						
096	01	92498021	2	9	PC	TEST POINT TYPE D	P						
097	01	24563704	6	500	FT	INS SLVNG HI TEMP 18AWG	B	13756				7943	
098	01	24501808	0	1	FT	WIRE BUSS 20GA SOLID CU TP	W	13756				7943	
099	01	52629949	0	1	500	FT	WIR WW 30GA SLD WHT UL KYNAR	W	13756A			7943	
100	01	66311971	7	1	PC	LABEL-TERMINAL DESIGNATION	P	13850				7949	
0102 TOTAL LINES													

REV	ECO	DESCRIPTION	DATE	CHKD	APP
A	1977/01	RELEASED CLASS 'A'			
B	16375	CHANGE DIM ON WIRES	MJD	W/680	WJS

FIND NUMBER	REFERENCE DESIGNATION
4	C2, C3
11	C1



- NOTES:
- 1. APPLY ASSY NO., REV LEVEL, LOC CODE, AND DATE CODE IN AREA SHOWN, MARK PER CDC SPEC 10121508; CHARACTER HEIGHT .12 (10 PT) COLOR WHITE.
  - 2. FIND NUMBERS, ELEMENT IDENTIFIERS, AND REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON PART.
  - 3. MOUNT F/N 4 TIGHT AGAINST F/N 1 TO ENSURE THE SHORTEST POSSIBLE LEAD LENGTHS.
  - 4. HAND SOLDER THE ENTIRE PERIMETER OF F/N 3 TO F/N 1.

DELETIONS	ADDITIONS

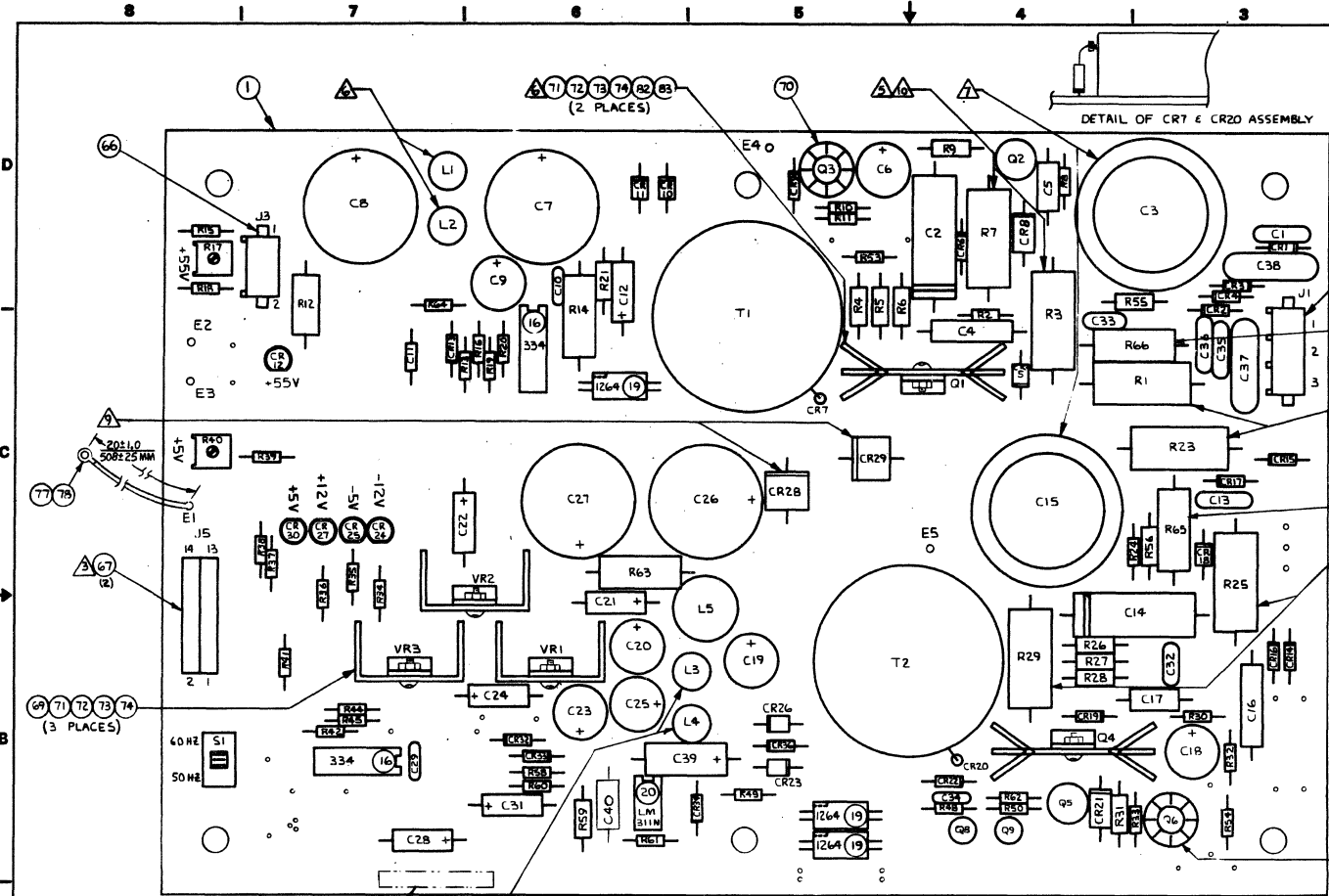
APL 90446240 DETACHED LISTS	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS	CONTROL DATA	TITLE
	TOLERANCES FRACTIONS DECIMALS ANGLES	PROJECT NO. XA247-R	P.C. CARD ASSEMBLY, OAGD MODEM LINE FILTER
DO NOT SCALE DRAWING	DESIGNED BY CHECKED BY ENGINEER	DATE DATE DATE	QUANTITY 15920
INTERNAL	APPROVED BY	DATE	DRAWING NO. 90446240
FORM	DATE	DATE	SCALE 2/1
			SHEET 1 OF 1

BUILD ARC 210

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
11-13-80	1	00014373

DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE				
0860	90446240	5	B	D	CD ASSY OAGD MODEM LINE FILTR	A	REL	10-10-80	XA247B	11-12-80				
T	PRD NO.	U	PART NUMBER	CD	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	001	01	90446239	7	1		PC PW BD OAGD MODEM LINE FILTER	P						
	002	01	51787002	8	2		PC EYELET	B						
	003	01	71493174	8	2		PC CONTACT, 90 DEGREE FINGER	V						
	004	01	17620504	5	2		PC CAP FXD CER 470PF 5P 1000VDCW	P						
	005	01	51917912	1	2		PC CONN TEL FIG 6 6CONT	P						
	006	01	24548306	0	600		FT WIR 24GA STRD GRN 300V UL PVC	W						
	007	01	90446238	9	1		PC SCH DIAG OAGD MODEM FILTER	D						
	008	01	16006500	9	1		PC FABRICATION SPECIFICATION	D						
	009	01	24548303	7	1		FT WIR 24GA STRD RED 300V UL PVC	W						
	010	01	51698600	7	3		PC TERMINAL LUG INS SPADE SZ 4	P						
	011	01	17620509	4	1		PC CAP FXD CER 1000PF 1000V 5P	P						
							0011 TOTAL LINES							



SHEET REVISION STATUS		REVISION RECORD				
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
00		RELEASED CLASS B				
A	1327-85	RELEASED CLASS A		8/26/85		
B	1432G	REVISED PER ECO	EE	10/19/85		

- NOTES:
- 1. APPLY ASSY NO., REV LEVEL, LOC CODE, AND DATE CODE IN AREA SHOWN. MARK PER CDC SPEC IOI2150B; CHARACTER HEIGHT .12 (1/2 PT) COLOR WHITE.
  - 2. FIND NUMBERS, ELEMENT IDENTIFIERS, & REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY & DO NOT APPEAR ON PART.
  - 3. AFTER ASSEMBLY, CUT PIN B OF CONNECTOR J5 AT CONNECTOR BODY. (CABLE KEYING).
  - 4. RESISTORS TO BE INSTALLED WITH PROTRUSION TOWARD THE BOARD.
  - 5. APPLY F/N 83 BETWEEN COMPONENT SIDE OF BOARD AND L1, L2, L3 & L4 TO KEEP STATIONARY. APPLY F/N 83 TO PROTRUDING TABS (2) ON F/N 82 ON SOLDER SIDE OF BOARD (2 PLACES).
  - 6. LEADS ON C3 & C15 NEED NOT BE TRIMMED.
  - 7. MOUNT RESISTORS .500 INCH OFF BOARD. USE F/N 76 TUBING .750 INCH ON EACH LEAD.
  - 8. MOUNT DIODES .300 MIN .500 MAX OFF BOARD.
  - 9. MOUNT RESISTORS .500 INCH OFF BOARD. USE F/N 87 TUBING .750 INCH ON EACH LEAD.

FIND NO.	REFERENCE DESIGNATION
2	T1
3	T2
4	Q1, Q4
5	Q2, Q5
6	Q3, Q6, Q9
7	Q8
8	CR1, CR2, CR3, CR4, CR6, CR7, CR9, CR13 THRU CR17, CR19, CR20, CR22, CR36
9	CR32, CR33
10	CR34

11	CR5, CR10, CR11, CR18, CR23, CR26
12	CR28, CR29
13	CRB, CR21
14	CR12, CR24, CR25, CR27, CR30
15	VR2
17	VR1
18	VR3
21	L1, L2, L3, L4
22	L5
23	C5, C17, C40
24	C6, C18, C20, C23
25	C1, C13, C35, C36
26	C7, C8

27	C26, C27
28	C9
29	C10, C29, C34
30	C32, C33
31	C12, C21, C22, C24, C28, C31
32	C3, C15
33	C2, C14
34	C4, C16
35	C19, C25
36	C11
37	R5B
38	R20, R45
39	R50
40	R61, R62, R64
41	R65, R66
42	R19, R44

43	R35, R37, R48, R49
44	R60
45	R8, R11, R30, R33, R54
46	R38
47	R34, R36
48	R41, R42, R53
49	R13, R16
50	R10, R32
51	R15
52	R2, R24
53	R55, R56
54	R4, R5, R6, R26, R27, R28
55	R9, R31
56	R59
57	R18
58	R17, R40

59	R21
60	R12
61	R63
62	R14
63	R1, R23
64	R7
65	R3, R25

75	S1
81	R29
84	C37, C38
85	C39
86	R39

APL 90446204 DETACHED LISTS	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		CONTROL DATA		TITLE
	3 PLACE	2 PLACE	ANGLES	FREE LIBERON	CC629-A/B
	DO NOT SCALE DRAWING			DESIGNED BY	M. KEAR
	MATERIAL			CHECKED BY	5-27-80
FINISH			ENGINEER	6-10-80	P.C. CARD ASSEMBLY, 9CAD ASCII 1ST POWER SUPPLY
			APPROVED	5-11-80	
				CODE IDENT	15920
				DRAWING NO	90446204
				SCALE	2/1
				NHA	15632332/A
				SHEET 1 OF 1	

BUILD ARC 210										ASSEMBLY PARTS LIST					PRINT DATE	PAGE	FILE CHANGE NO.
															11-04-80	1	00014326
Q860	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION					MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	90446204	1	B	D	CD ASSY 9CAD					A	REL	06-30-80	CC629A/B	11-04-80			
T/PND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION				MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT	
001	01	90446203	3	1		PC	PW	BD	9CAD	P							
002	01	51940601	1	1		PC	TRANSFORMER	FLYBACK	25 KHZ	P							
003	01	51940600	3	1		PC	TRANSFORMER	FLYBACK	25 KHZ	P							
004	01	51918111	9	2		PC	XSTR	NPN	400V 8A TO 220	P							
005	01	51681100	7	2		PC	XSTR	2N5189	NPN SIL	P							
006	01	51003092	7	3		PC	XSTR	2N2222	HI SPEED NPN SIL	P							
007	01	51714000	0	1		PC	XSTR	2N2907	PNP SIL	P							
008	01	95637304	7	16		PC	DIO	IN4004	400PIV SIL 1.1V/1A	P							
009	01	15101110	3	2		PC	DIO	IN753A	400MW ZEN VR 6.2V	P							
010	01	51007385	1	1		PC	DIO	IN4148	10MA MICRO SIL 30V	P							
011	01	95691500	3	6		PC	RECT.	IN5615	F-R SIL 1 AMP	P							
012	01	77835261	7	2		PC	POWER DIODE	FAST RECOVER		P							
013	01	12081500	6	2		PC	DIO	PWR SCHOTTKY	INV VOLT/21V	P							
014	01	51903800	4	5		PC	LED.	S-S GAP	RED 1.0MCD 180MW	P							
015	01	15151400	7	1		PC	IC	UA7900-5	356A NEG V RGLTR	P							
016	01	51718400	8	2		PC	IC	723C	334 VOLTAGE REGULATOR	P							
017	01	15151402	3	1		PC	IC	UA7900-12	356C NEG V RGLTR	P							
018	01	15151503	8	1		PC	IC	UA7800+12	357D POS V RGLTR	P							
019	01	15165538	8	3		PC	ISOLATOR	OPTICALLY COUPLED		P							
020	01	15163443	3	1		PC	IC	LN311N	VOLT COMP HI IMP	P							
021	01	51918616	7	4		PC	INDUCTOR			P							

BUILD ARC 210										ASSEMBLY PARTS LIST					PRINT DATE	PAGE	FILE CHANGE NO.
															11-04-80	2	00014326
Q860	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION					MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	90446204	1	B	D	CD ASSY 9CAD					A	REL	06-30-80	CC629A/B	11-04-80			
T/PND NO.	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION				MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT	
022	01	51918617	5	1		PC	INDUCTOR			P							
023	01	51839147	9	3		PC	CAP	FXD CER	.100UF 10P 100VDC	P							
024	01	95691133	3	4		PC	CAP	ELEC	270UF -10+100P 25VDC	P							
025	01	94842168	0	4		PC	CAP	FXD CER	.0033UF GMV 1000V	P							
026	01	94397161	4	2		PC	CAP	AL ELECT	560UF OHM 75V	P							
027	01	94397162	2	2		PC	CAP	AL ELECT	5600UF OHM 12V	P							
028	01	95691150	7	1		PC	CAP	ELECT	12UF -10+100P 60VDC	P							
029	01	51001120	8	3		PC	CAP	CER F-2	.01UF +80-20P 25V	P							
030	01	94842145	8	2		PC	CAP	FXD CER	500PF 20P 1K	P							
031	01	24504333	6	6		PC	CAP	FXD TANT	2.2UF 20P 35VDCW	P							
032	01	51918627	4	2		PC	CAP	ALUM ELECT	300UF 250V 15P	P							
033	01	24506816	8	2		PC	CAP	FXD MYL	.33UF 10P 100VDCW	P							
034	01	36180753	0	2		PC	CAP	FXD MYL	.001MFD 600V	P							
035	01	95691135	8	2		PC	CAP	ELEC	470UF -10+100P 25VDC	P							
036	01	51839136	2	1		PC	CAP	FXD CER	.010UF 10P 100VDC	P							
037	01	94360100	5	1		PC	RES	FXD FM	10 OHM 1P 1/4W	P							
038	01	94402110	4	2		PC	RES	FM	12 OHM 1/4W CARBON	P							
039	01	94402122	9	1		PC	RES	FM	390HM 1/4W CARBON	P							
040	01	94402132	8	3		PC	RES	FM	100 OHM 1/4W CARBON	P							
041	01	24504839	2	2		PC	RES	FXD COMP	100 OHM 5P 2WATT	P							
042	01	94402144	3	2		PC	RES	FM	330 OHM 1/4W CARBON	P							



BUILD ARC 210

### ASSEMBLY PARTS LIST

BUILD ARC 210										PRINT DATE		PAGE		FILE CHANGE NO.	
										11-04-80		3		00014326	
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION			MC	STATUS	STATUS DATE	ENGR. RESP.		FILE DATE		
0860	90446204	1	B	D	CD ASSY 9CAD			A	REL	06-30-80	CC629A/B		11-04-80		
PRD NO.	U	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
043	01	94402148	4		4		PC RES FM 470 OHM 1/4W CARBON	P							
044	01	94360262	3		1		PC RES FXD FM 442 OHM 1P 1/4W	P							
045	01	94402159	1		5		PC RES FM 1.3K OHM 1/4 W CARBON	P							
046	01	94402155	9		1		PC RES FM 9100HM 1/4W CARBON	P							
047	01	94402158	3		2		PC RES FM 1.2KOHM 1/4W CARBON	P							
048	01	94402167	4		3		PC RES FM 3K OHM 1/4W CARBON	P							
049	01	94360346	4		2		PC RES FXD FM 3010 OHM 1P 1/4W	P							
050	01	94402172	4		2		PC RES FM 4.7K OHM 1/4W CARBON	P							
051	01	94360464	5		1		PC RES FXD FM 46.4K OHM 1P 1/4W	P							
052	01	94402220	1		2		PC RES FM 470K OHM 1/4W CARBON	P							
053	01	17720519	2		2		PC RES FXD COMP 0.2MEG .5W 5P	P							
054	01	65019518	3		6		PC RES CARB COMP 1/2W 1.3 OHMS	P							
055	01	24500131	8		2		PC RES FXD COMP 47 OHM 5P 1/2W	P							
056	01	24500148	2		1		PC RES FXD COMP 240 OHM 5P 1/2W	P							
057	01	94360344	9		1		PC RES FXD FM 2870 OHM 1P 1/4W	P							
058	01	51918876	7		2		PC RES VAR CER 1K OHM 20P 1/2W	P							
059	01	24500170	6		1		PC RES FXD COMP 2000 OHM 5P 1/2W	P							
060	01	24507181	6		1		PC RES FXD COMP 5600 OHM 5P 1W	P							
061	01	51903001	9		1		PC RES FXD WW .02 OHM 5P 2WATT	P							
062	01	24504867	3		1		PC RES FXD COMP 1500 OHM 2W 5P	P							
063	01	95596503	3		2		PC RES FXD WW 4.3 OHM 10P 5WATT	P							

BUILD ARC 210

### ASSEMBLY PARTS LIST

BUILD ARC 210										PRINT DATE		PAGE		FILE CHANGE NO.	
										11-04-80		4		00014326	
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION			MC	STATUS	STATUS DATE	ENGR. RESP.		FILE DATE		
0860	90446204	1	B	D	CD ASSY 9CAD			A	REL	06-30-80	CC629A/B		11-04-80		
PRD NO.	U	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
064	01	95596511	6		1		PC RES FXD WW 43 OHM 10P 5WATT	P							
065	01	95596520	7		2		PC RES FXD WW 600 OHM 10P 5WATT	P							
066	01	51906100	6		1		PC CONN, 2 PIN PC MTD TIN FIG 1	P							
067	01	51917031	0		2		PC CONN, 7 PIN STRAIGHT PC FIG 1	P							
068	01	51906101	4		1		PC CONN, 3 PIN PC MTD TIN FIG 1	P							
069	01	51918101	0		3		PC HT/SK PLSTC SEMI FIG1 AND2	P							
070	01	51719600	2		2		PC HEAT SINK ELCTR COMP FAN TOP	P							
071	01	51003962	1		001		OZ PASTE, HEAT XFR CMPD NON-COND	B							
072	01	10127103	9		5		PC MSCR PAN PHL 4-40X.312 STL ZP	B							
073	01	10126400	0		5		PC WSHR, NO.4 EXT/T LK STL ZP	B							
074	01	10125103	1		5		PC NUT, HEX 4-40 MSCR STL ZP	B							
075	01	95884801	2		1		PC SWITCH SLIDE SPDT SNAP ACTION	P							
076	01	51797418	4		1		FT TBG INS .059 DIA T/W	B							
076	02	24565704	4		1		PC RES FXD W W 0.36 OHMS 2W 5P	P		14326	14326			8102	8102
076	03	24563704	6		1		FT INS SLVNG HI TEMP 18AWG	B		14326A				8102	
077	01	52810020	9		1	750	FT WIR 18GA STRD GRN YEL STRIPE	W							
078	01	51797217	0		1		PC LUG, NO.10 CRMP-R 22-18AWG	B							
079	01	16006500	9		REF		PC FABRICATION SPECIFICATION	D							
080	01	90446202	5		REF		PC SCH DIAG 9CAD	D							
081	01	95596512	4		1		PC RES FXD WW 51 OHM 10P 5W	P							
082	01	51906601	3		2		PC HT SINK, SEMI FIG 3 ALUM BLK	P							
083	01	94850716	5		050		OZ SEAL, 3M (4400)	B			14326				8102

BUILD ARC 210

### ASSEMBLY PARTS LIST

BUILD ARC 210										PRINT DATE		PAGE		FILE CHANGE NO.	
										11-04-80		5		00014326	
DIV	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION				MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860	90666204	1	B	D	CD ASSY 9CAD				A	REL	06-30-80	CC629A/B	11-04-80		
ITEM NO.	U	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION			MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
083	02	62019900	0	050	OZ	EPOXY, 2-PART 5-MINUTE CLEAR			B		14326			8102	
084	01	94842184	7	2	PC	CAP FXD CER .02UF +80-20P 1K			P						
085	01	24504343	5	1	PC	CAP FXD TANT 15UF 20P 35VDCW			P						
086	01	94402166	6	1	PC	RES FM 2.7K OHM 1/4W CARBON			P						
087	01	24563708	7	300	FT	INSU SLEEVING 14AWG NATURAL			B		14326A			8102	
0090 TOTAL LINES															

DWN	D. WELLS	7-1476	CONTROL DATA	TITLE	CABLE ASSY DATA SET	PREFIX	A	DOCUMENT NO.	61406110 thru 61406119	REV.	B
CHKD	<i>B. Jones</i>	<i>7-23-76</i>		FIRST USED ON	CC6B1D	NHA	15620600	SHEET	1 of 4		
ENG	<i>John Smith</i>	<i>7-23-76</i>		CODE IDENT	15920						
MFG	<i>John Smith</i>	<i>7-23-76</i>									
APPR	<i>R. N. Lee</i>	<i>7-23-76</i>									

SHEET REVISION STATUS					REVISION RECORD					
4	3	2	1	REV	ECO	DESCRIPTION	DRFT	DATE	APP	
A	A	A	A	A	10653-60	RELEASED CLASS A		7/30/76	m.T.	
A	B	A	B	B	13949	REVISED PER ECO	WJG 3-3-80		WJS	

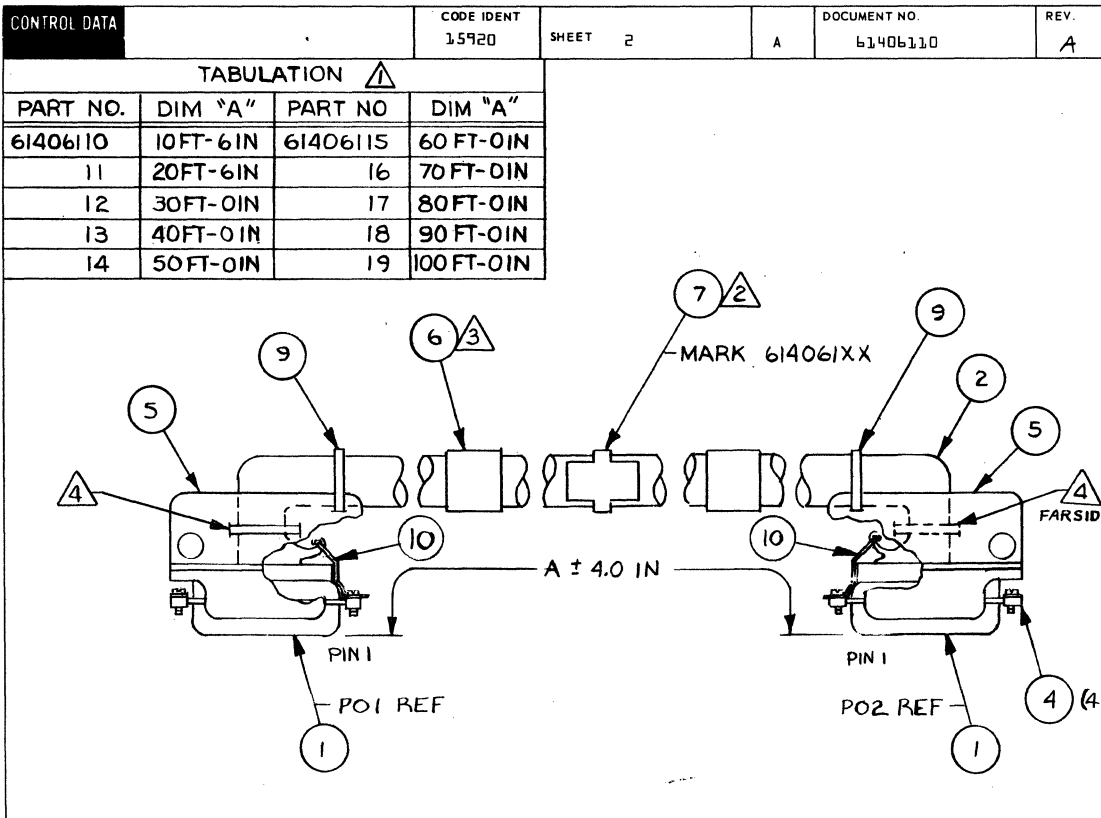
NOTES:

- 1 CABLE LENGTH PER TAB (SEE SHEET 2).
- 2 APPLY LABEL TO CABLE PER DRAWING 82191061, METHOD 5. MARK PER TAB ON SHEET 2.
- 3 APPLY LABEL TO CABLE PER CDC SPEC 1.30.008.
- 4 CABLE TIE FURNISHED WITH CONNECTOR.

APL 61406110 thru 61406119  
DETACHED LISTS

AA3180 REV. 8-71

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BUILD ARC 104

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
03-12-80	1	00013949

DIV.		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE	
TRFIND NO	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
0860		61406110	9	B	A	CABLE ASSY DATA SET 17FT 6IN	A	REL	07-30-76	CC681D		03-12-80	
001	01	53397814	4	2		PC CONN, MALE 25POSN PLUG ALONE		P					
002	01	51908500	5	10	500	FT CBL, SHLD FIG 1 25 CONDCT 300V		P					
003	01	53397817	7	50		PC CONTACT, STRIP PINS 20-24GA		P					
004	01	94288021	2	4		PC LKG DEVICE, CONNECTOR TYP 3M		P					
004	02	1R252504	8	4		PC SCREW LOCK ASSY CONFIG A		B	13960	13960		8040	8040
005	01	51908402	4	2		PC CONN HOOD, .430/.390 CBL DIA		P					
006	01	10123821	0	2		PC LABEL, CBL MK (CDC 12 RVL0PS)		P					
007	01	94277407	6	1		PC STRAP, CBL TIE TYP 4 TO 5/8		B					
008	01	24528606	7	200		FT TBG, NO.17 INS BLK UL PVC		B					
009	01	94277400	1	2		PC STRAP, CBL TIE TYP 1 TO 5/8		B					
010	01	71491967	7	2		PC CLIP, GROUND (COPPER/TIN PL)		P					
011	01	24548301	1	100		FT WIR 24GA STRD BLK 300V UL PVC		W					
						0012 TOTAL LINES							



BUILD ARC 104

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
03-06-80	1	11565-72

DIV.		ASSEMBLY NUMBER		CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE		ENG. RESP.	FILE DATE	
0860		61408907		6	A	A	CABLE ASSY, DISPLAY		A	REL	03-05-80		CC629A	03-06-80	
TRFIND NO	LI	PART NUMBER	CD	QUANTITY	U/R	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT	
001	01	24548301	1	4	800	FT WIR 24GA STRD BLK 300V UL PVC W									
002	01	24548303	7	7	800	FT WIR 24GA STRD RED 300V UL PVC W									
003	01	24552336	0	13		PC SLEEVE, 5/8LG INS CLR 10GA UL B									
004	01	38905301	8	1		PC CONN, 10 PIN PWB MTG GOLD									
005	01	51832900	8	1		PC KEY POARIZING									
006	01	51906000	8	1		PC CONN, 2 SKT PLUG FIG 1 NYLON F									
007	02	51906200	4	2		PC CONT, SKT 20-14GA .130IT STR F									
009	01	51911801	2	1		PC RES VAR COMP 100K W/O SWITCH F									
010	01	15003302	5	2	700	FT WIR 18GA STRD RED 300V UL PVC W									
011	01	94248602	1	7		PC CONT, SKT 22-26GA 7 W/F STRIP F									
012	01	94361107	9	1		PC CONN HSG, 14 CAV 2RXTSKT BLK F									
013	01	94277400	1	11		PC STRAP, CBL TIE TYP 1 TO 5/8 B									
014	01	94277409	2	1		PC STRAP, CBL TIE TYP 5 TO 5/8 B									
015	01	51870337	6	1		PC PLUG, PLZG NYLON 10/STRIP F									
0014 TOTAL LINES															

DWN	W. Glaser	5-80	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV.
CHKD	<i>[Signature]</i>	5-20-80		Cable Assy-Power Conn	A	61408969	A
ENG	<i>[Signature]</i>	5/14/80		FIRST USED ON	NHA		
MFG	<i>[Signature]</i>	7-23-80	CODE IDENT	CC629-A/B	61408887	SHEET 1 OF 2	
APPR	E. H. Hore		15920				

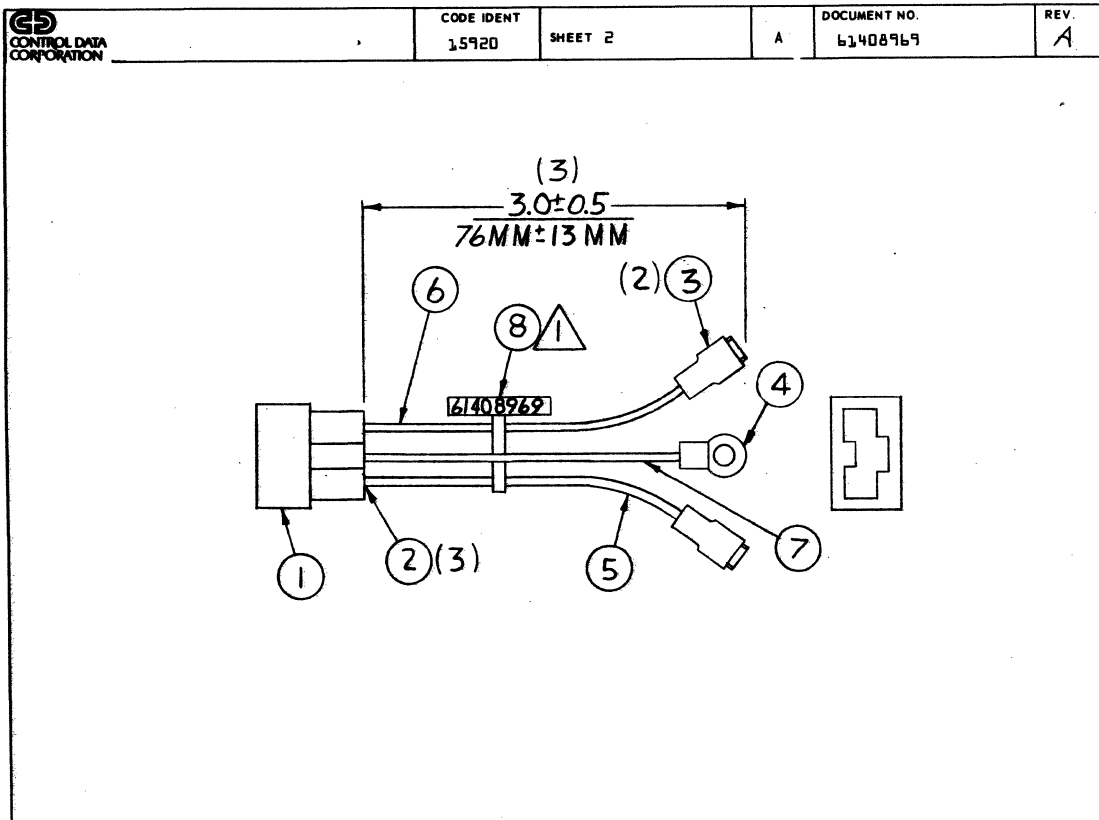
SHEET REVISION STATUS				REVISION RECORD						
2	1	REV	ECO	DESCRIPTION	DRFT	DATE	APP			
		0000	00	50001-94				RELEASED CLASS B		
		0001	01	51169				REMOVED BULK IDENTIFY NOTE	D.S. 7/18/80	
		A A	A	11565-97				RELEASED CLASS 'A'	7/24/80 mch	

NOTES:  
 ⚠ Apply label to Cable Per CDC DWG 82191061, Method b. Mark as shown.

APL 61408969  
DETACHED LISTS

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BUILD ARC 104

### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
07-28-80	1	11565-97

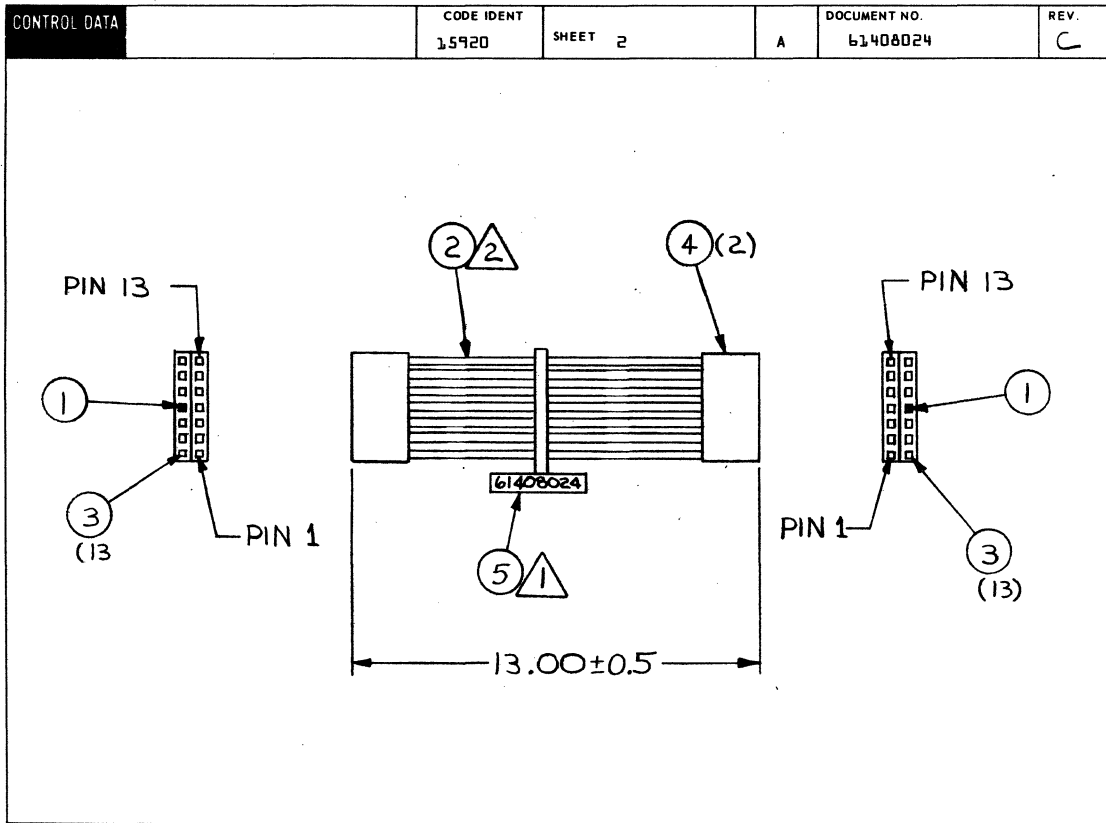
DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0060	61408969	6	A	A	CABLE ASSY POWER CONN	G	REL	07-24-80	CC629A	07-28-80			
ITEM NO	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	44674034	2	1		PC CONN POWER RECEPT							
002	01	44674036	7	3		PC CONN PWR RECEPT							
003	01	95643231	4	2		PC LUG, Q-CONN 22-18AWG FIG 5							
004	01	51797217	0	1		PC LUG, NO.10 CRMP-R 22-18AWG							
005	01	52810001	9		250	FT WIR 18GA STRD BRN 600V UL PVC W							
006	01	52810006	8		250	FT WIR 18GA STRD BLU 600V UL PVC W							
007	01	52810020	9		250	FT WIR 18GA STRD GRN YEL STRIPE W							
008	01	94277409	2	1		PC STRAP, CBL TIE TYP 5 TO 5/8							
						0008 TOTAL LINES							



DWN	W GLASER	12-78	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV.
CHKD	<i>[Signature]</i>	12-78		CABLE ASSY- D C POWER	A	61408024	C
ENG	<i>[Signature]</i>	12-78		FIRST USED ON	NHA		
MFG	<i>[Signature]</i>	6-77	CODE IDENT	FC816A	15631280	SHEET	1 of 2
APPR	E. H. [Signature]	6-77	15920				
SHEET REVISION STATUS				REVISION RECORD			
				REV	ECO	DESCRIPTION	DRFT DATE APP
				2	1		
				-	-	5002-52 Released Class B	- 1/3/79 JAL
				01	01	50592 ADD NOTE 2 & FIN 6	WJG 3-28-79 JEL
				02	02	50672 ADD NOTE 3 & PL CHG'S	WJG 5-23-79 ORA
				02	03	50701 ADD F/N 7	WJG 6-19-79 GRZ
				A	A	12754-5A RELEASED CLASS "A"	/ 6/27/79 Mch
				B	B	13700 DELETED NOTES & REVISED P/L PER ECO	WJG 10-1-79 ORA
				C	C	13916 DELETE F/N 6. F/N 3 WAS 942-456076 F/N 2 WAS 15003402	WJG 2/14/80 ORA
NOTES:							
<p>1 Apply label to cable per CDC drawing 82191061. Method B. Mark as shown.</p> <p>2 Wiring to be point to point.</p>							
						APL 61408024	
						DETACHED LISTS	

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BUILD ARC 1:4

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
01-17-80	1	00013916

DIV.		ASSEMBLY NUMBER		REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860		61408024		C	A	CABLE ASSY, LOGIC DC		A	REL	06-27-79	FC816A	01-17-80		
FIND NO	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	51870337	6	2		PC PLUG, PLZG NYLON 10/STRIP		P						
002	01	15003302	5	16	500	FT WIR 18GA STRD RED 300V UL PVC		W			13700		7940	8003
002	02	15003402	3	16	500	FT WIR 20GA STRD RED 300V UL PVC		W		13916	13916		7940	8003
002	03	52860802	9	16	500	FT WIR 22GA STRD RED 300V UL PVC		W		13916			8003	
003	01	94245607	0	26		PC CONT, SKT 18-20GA 2 W/F STRIP		P			13916		8003	
003	02	94245601	3	26		PC CONT, SKT 22-26GA 2 W/F STRIP		P					8003	
004	01	51920465	5	4		PC CONNECTOR HOUSING		P			13700		7940	7940
004	02	94261806	7	2		PC CONN HSG, 14 SKT 2RX7SKT BLK		P		13700			7940	
005	01	94277409	2	1		PC STRAP, CBL TIE TYP 5 TO 5/8		B						
006	01	94277401	9	2		PC STRAP, CBL TIE TYP 1 TO 1-3/4		B			13916			8003
0010 TOTAL LINES														



BUILD ARC 104

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
06-28-79	1	12754-51

DIV.		ASSEMBLY NUMBER		CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE		ENG. RESP.	FILE DATE	
0860		61408025		7	A	A	CABLE ASSY, BRD INTC			REL	06-27-79		FC816A	06-28-79	
TRFIND NO	LI	PART NUMBER		CD	QUANTITY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	65832240		9	125	FT	CBL, FLAT 50 CNDCT 28AWG PVC			W					
002	01	65853411		0	2	PC	CONN, 50 CONT F/CBL 28-30AWG			P					
0002 TOTAL LINES															

DWN	W. GLASER	12-78	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV.
CHKD	<i>[Signature]</i>	12-87		CABLE ASSY-VIDEO OUTPUT	A	61408444	A
ENG	<i>[Signature]</i>	12-87		FIRST USED ON	NHA		
MFG	<i>[Signature]</i>	6-87		FC616A	15631280	SHEET	1 of 2
APPR	S. H. [Signature]	6-77	CODE IDENT 15920				

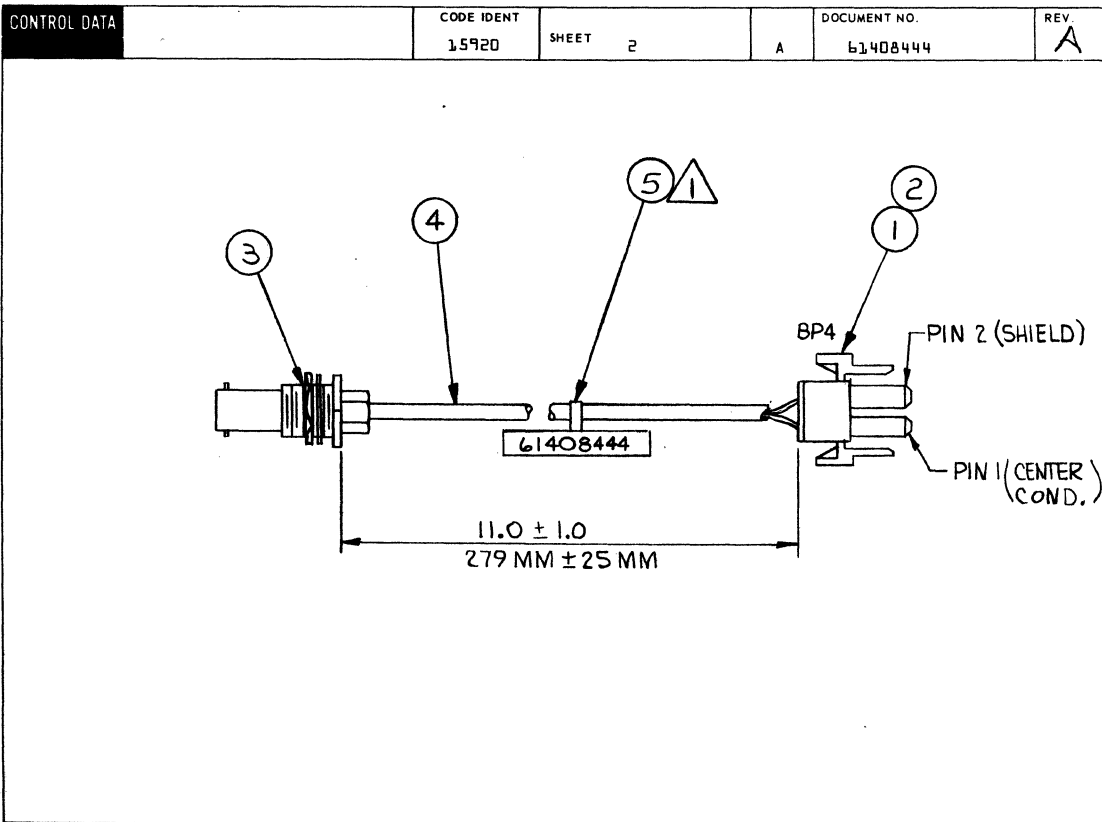
SHEET REVISION STATUS				REVISION RECORD			
REV	ECO	DESCRIPTION	DRFT	DATE	APP	REV	ECO
-	-	Released Class B	-	12/79	<i>[Signature]</i>	2	1
01	01	PL CHG	WJG	1-19-79	<i>[Signature]</i>	01	01
02	02	REVISED PER ECO	WJG	4-5-79	<i>[Signature]</i>	02	02
A	A	RELEASED CLASS "A"	1	6/27/78	<i>[Signature]</i>	A	A

NOTES:  
 ⚠ Apply label to cable per CDC drawing 82191061, Method b. Mark as shown.

APL 61408444  
DETACHED LISTS

AA3180 R.C.V. 8-71

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
PRINTED IN U.S.A.

BUILD ARC 134

# ASSEMBLY PARTS LIST

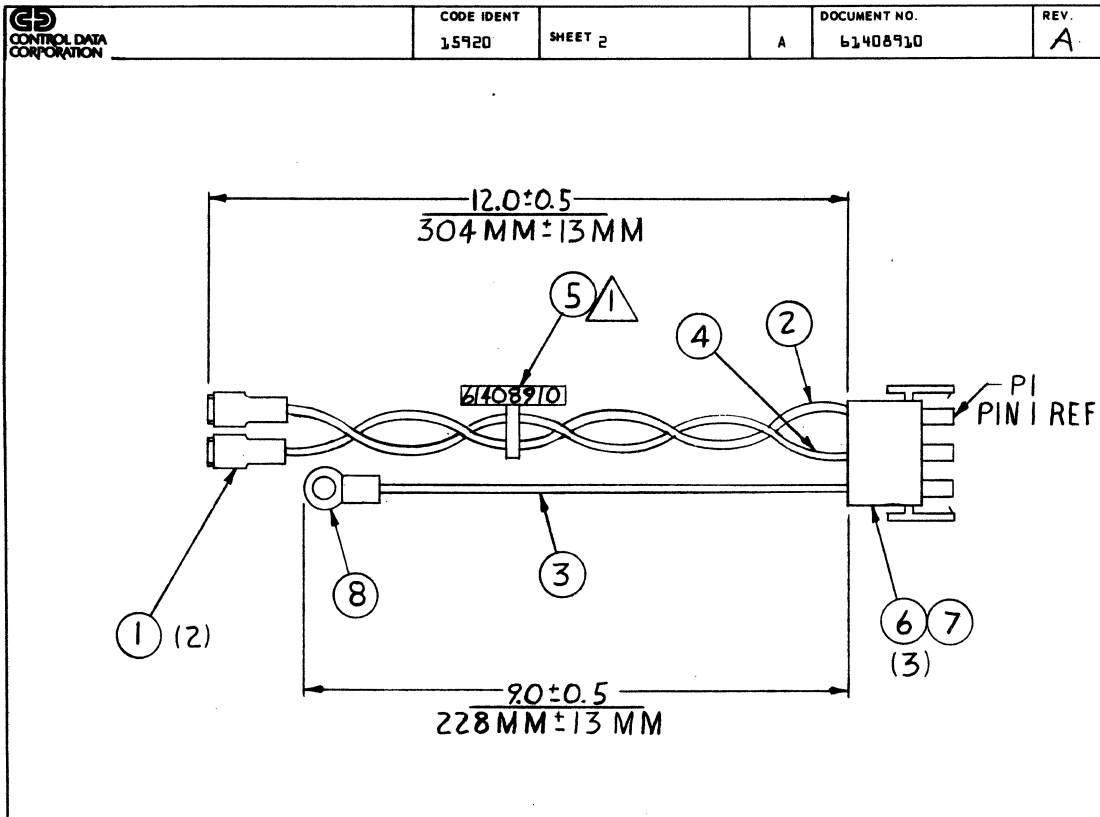
PRINT DATE	PAGE	FILE CHANGE NO.
06-28-79	1	12754-51

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0860	61608AAA		A	A	CABLE ASSY-VIDEO OUTPUT	A	REL	06-27-79	FCB16A	06-28-79			
ITEM NO	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	51906207	9	2		PC CONT, SKT 24-18GA .100I T STR	P						
002	01	51906000	8	1		PC CONN, 2 SKT PLUG FIG 1 NYLON	P						
003	01	51589702	3	1		PC CONN RECPT COAX 1 PIN	P						
004	01	17649400	3	1	166	FT CABLE R.F. 1 COND COAX STRD	W						
005	01	94277409	2	1		PC STRAP, CBL TIE TYP 5 TO 5/8	B						
						0005 TOTAL LINES							

DWN	W. Glaser	5-80	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV				
CHKD	<i>[Signature]</i>	5-77		Cable Assy-AC Input	A	61408910	A				
ENG	<i>[Signature]</i>	5/1/60		FIRST USED ON	NHA						
MFG	<i>[Signature]</i>	7-21-60		CC629-A			SHEET 1 OF 2				
APPR	S. H. Noe	7-22-60	CODE IDENT		15632332						
SHEET REVISION STATUS				REVISION RECORD							
				2	1	REV	ECO	DESCRIPTION	DRFT	DATE	APP
				00	00	00	500049A	RELEASED CLASS B		5/4/80	<i>[Signature]</i>
				00	01	01	51170	REMOVED BULK IDENTIFY NOTE	D5	7/17/80	<i>[Signature]</i>
				A	A	A	11565-97	RELEASED CLASS "A"		7-24/80	<i>[Signature]</i>
NOTES:											
 Apply Label to Cable Per CDC drawing 82191061-Method B. Mark as shown.											
										APL 61408910	
										DETACHED LISTS	

AA3180 REV. B 71

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BUILD ARC 104

### ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
07-28-80	1	11565-97

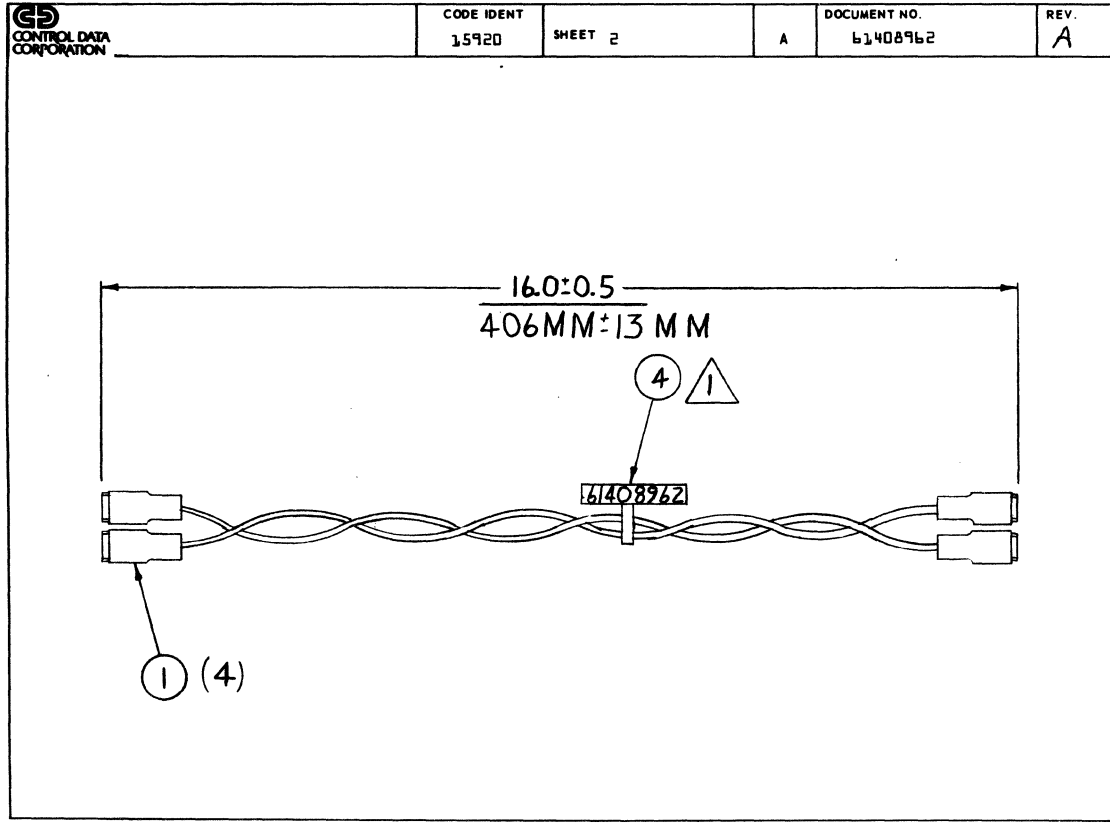
DIV.		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE				
0060		61408910	0	A	D	CABLE ASSY AC T/P	A	REL	07-24-80	CC629A/B	07-28-80				
T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	001	01	95643231	4		2		PC LUG, Q-CONN 22-18AWG FIG 5	P						
	002	01	52810001	9		1		FT WIR 18GA STRD BRN 600V UL PVC	W						
	003	01	52810020	9		75		FT WIR 18GA STRD GRN YEL STRIPE	W						
	004	01	52810006	8		1		FT WIR 18GA STRD BLU 600V UL PVC	W						
	005	01	94277409	2		1		PC STRAP, CBL TIE TYP 5 TO 5/8	B						
	006	01	51906200	4		3		PC CONT, SKT 20-14GA .130IT STR	P						
	007	01	51906001	6		1		PC CONN, 3 SKT PLUG FIG 1 NYLON	P						
	008	01	51797219	6		1		PC LUG, NO.10 CRMP-R 22-18AWG	B						
								0008 TOTAL LINES							



DWN	H. Claser	5-80	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV				
CHKD	<i>[Signature]</i>	5-80		Cable Assy-AC Entry	A	61408962	B				
ENG	<i>[Signature]</i>	5-80									
MFG	<i>[Signature]</i>	7-22-80		FIRST USED ON	NHA						
APPR	<i>[Signature]</i>	7-22-80	CODE IDENT	CCL29-A	15632332		SHEET 1 of 2				
SHEET REVISION STATUS				REVISION RECORD							
				2	1	REV	ECO	DESCRIPTION	DRFT	DATE	APP
				00	00	00	50004-94	RELEASED CLASS B		5/1/80	<i>[Signature]</i>
				00	01	01	51170	REMOVED BULK IDENTIFY NOTE	D.S	7/17/80	<i>[Signature]</i>
				A	A	A	11565-97	RELEASED CLASS "A"		7-24-80	<i>[Signature]</i>
				A	B	B	14284	CABLE USED ON CCL29A	WJG 8-24-80	10-3-80	<i>[Signature]</i>
NOTES:											
⚠ Apply Label to Cable Per CDC drawing 82191061, method b. Mark as shown.											
						APL 61408962					
						DETACHED LISTS					

A43180 REV. 6 71

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BUILD ARC 104

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
09-18-80	1	00014284

DIV.		ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION		MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE		
0860		61408962	1	B	A	CABLE ASSY AC ENTRY		A	REL	07-24-80	CC629A	09-18-80		
ITEM NO	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION		MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	95643231	4	4		PC LUG, Q-CONN 22-18AWG FIG 5								
002	01	52810001	9	1	350	FT WIR 18GA STRD BRN 600V UL PVC W								
003	01	52810006	8	1	350	FT WIR 18GA STRD BLU 600V UL PVC W								
004	01	94277409	2	1		PC STRAP, CBL TIE TYP 5 TO 5/8								
0004 TOTAL LINES														

DWN	D. SAND	9-80	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV
CHKD	<i>J. J. Jones</i>	9-2-80		CABLE ASSY-AC ENTRY	A	61409025	B
ENG	<i>J. J. Jones</i>	9-2-80		FIRST USED ON	NHA		
MFG	<i>J. J. Jones</i>	9-3-80		CC629-B	15632334	SHEET	1 of 2
APPR	<i>E. N. Moore</i>	7-3-80	CODE IDENT				
			15920				

SHEET REVISION STATUS				REVISION RECORD			
2	1	REV	ECO	DESCRIPTION	DRFT	DATE	APP
		A	A	RELEASED CLASS "A"		9-3-80	<i>mt</i>
		B	B	SHORTEN BY 1.5" & ADD CB END LABEL	WJG 1-8-81	1-9-81	<i>JTG</i>

NOTES:

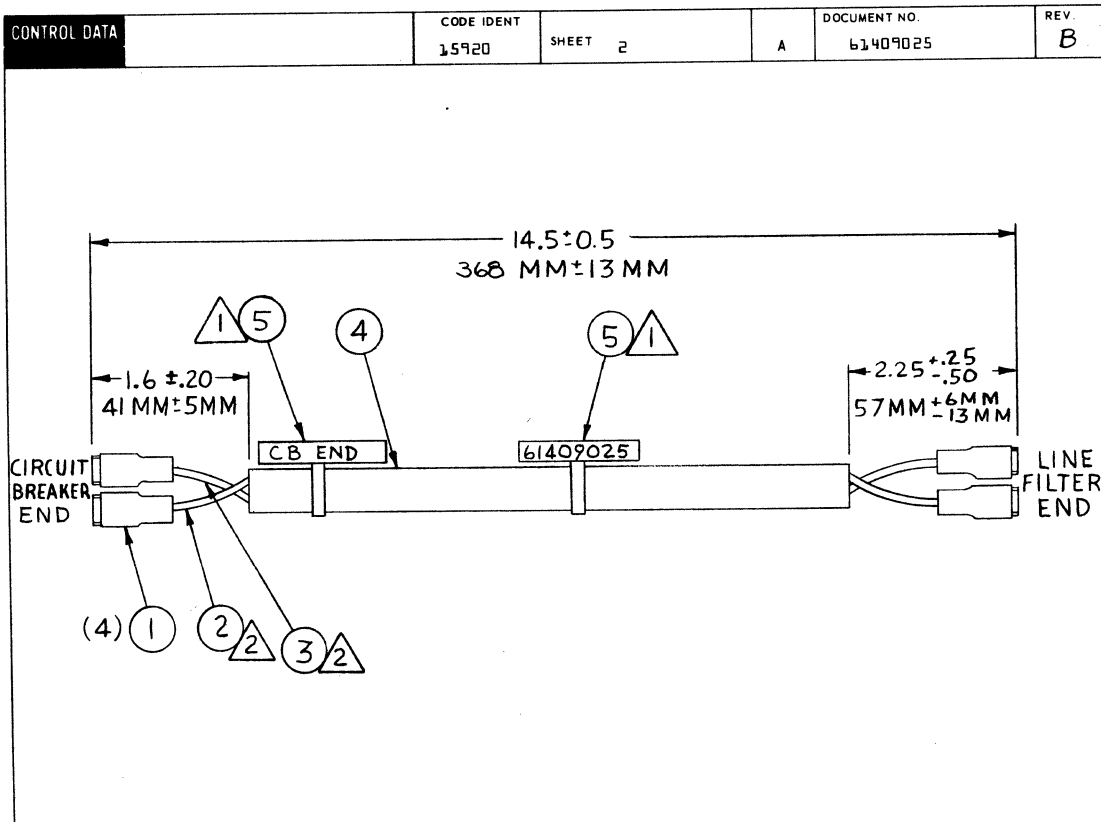
⚠ Apply Label To Cable Per CDC Drawing 821910b1, Method b. Mark As Shown.

⚠ F/N 2 and 3 are a twisted pair.

APL 61409025
DETACHED LISTS

AA3180 REV. 8 71

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BUILD ARC 104

# ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
01-06-81	1	00014444

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE			
0060	61409025	6	W	A	CABLE ASSY AC ENTRY	A	REL	09-03-80	CC6298	01-06-81			
ITEM NO	LI	PART NUMBER	CD	QTY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
001	01	95643231	4	4		PC LUG, Q-CONN 22-18AWG FIG 5	P						
002	01	52810001	9	1	350	FT WIR 180A STRD BRN 600V UL PVC	W			14444		8101	8101
002	02	52810001	9	1	300	FT WIR 180A STRD BRN 600V UL PVC	W		14444			8101	
003	01	52810006	8	1	350	FT WIR 180A STRD BLU 600V UL PVC	W			14444		8101	8101
003	02	52810006	8	1	300	FT WIR 180A STRD BLU 600V UL PVC	W		14444			8101	
004	01	95679622	1	1	100	FT SLEEVING INSUL SZ 1 BLK	B			14444		8101	8101
004	02	95679622	1	1		FT SLEEVING INSUL SZ 1 BLK	B		14444			8101	
005	01	94277409	2	1		PC STRAP, CBL TIE TYP 5 TO 5/8	B			14444		8101	8101
005	02	94277409	2	2		PC STRAP, CBL TIE TYP 5 TO 5/8	B		14444			8101	
0009 TOTAL LINES													



# COMMENT SHEET

MANUAL TITLE: 40003-22/23 Information Systems Terminal III  
Hardware Maintenance Manual (Site and Support Information)

PUBLICATION NO.: 62940007

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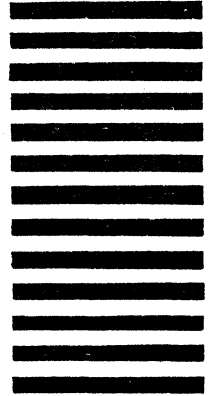


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