SPERRY RAND

UNIVAC

1557/1558

ADVANCED
GRAPHIC
DISPLAY SYSTEM

OPERATORS
REFERENCE

UNIVAC 1557/1558
**ADVANCED GRAPHIC DISPLAY SYSTEM
OPERATORS REFERENCE**

UP-7791

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FIGURES

TABLES

1. INTRODUCTION

DISPLAY CONTROLLER   DISPLAY CONSOLE

Figure 1—1. UNIVAC Advanced Graphic Display System Type 1557/1558

1.1. SCOPE

This manual contains information required for basic operation of the UNIVAC Advanced Graphic Display System Type 1557/1558 (Figure 1—1). It includes turn-on and turn-off procedures, fault correction and recovery procedures, functional description of various switches and indicators, and maintenance procedures performed by the operator. The display console keyboard and light pen are the only sources of inputs to the display controller program, therefore additional information concerning the keyboard and light pen functions is provided.

The manual is divided into the following sections:

■ Introduction

■ Operator's Responsibilities

■ Controls and Indicators

■ Operation

■ Operator-Performed Maintenance

1.2. PURPOSE

The UNIVAC Advanced Graphic Display System Type 1557/1558 is a self-contained
system that provides dynamic computing and control capabilities to handle and dis-
play alphanumeric characters, special symbols and graphic data. It is composed of
two major units: the UNIVAC Display Controller Type 1557 and the UNIVAC Display
Console Type 1558. These units operate under control of programs stored in the display
controller. The programs may receive their inputs from the display console keyboard
and light pen (an optional feature), from a general purpose computer by way of a modem
(modulator/demodulator) and telephone circuits, or from a UNIVAC 1108 Multi-Processor
System (or 1106) by way of a direct channel interface. The programs display their
output on the display console screen and interact it with the central computer. The
system can have up to three display consoles, each of which can act independently
or together with the others. The system configuration is presented in Figure 1—2.
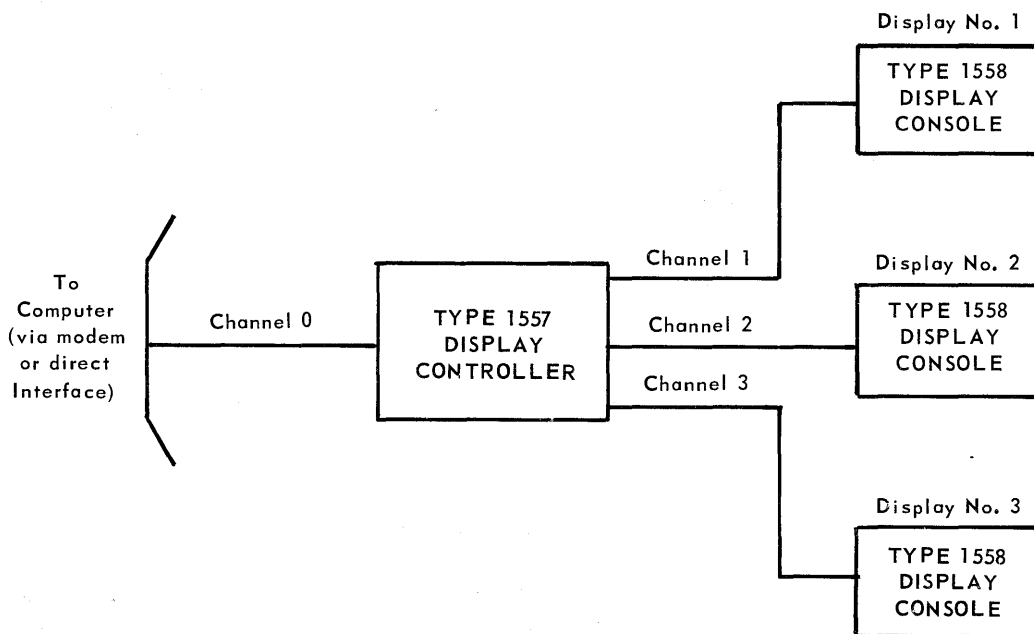
Figure 1—2. System Configuration

2. OPERATOR'S RESPONSIBILITIES

2.1. GENERAL

The operator has the responsibility for using the keyboard and light pen to enter or alter data on the display console, as well as to interpret and respond to messages and other output from the display controller. In addition, the operator must make the equipment operational (bootstrapping) prior to using it, correct and recover from faults, and perform simple maintenance on the air filters.

2.2. REQUIREMENTS

To fully utilize maximum processing capabilities of the system and compose and respond to messages, the operator must be familiar with operational features of the display console and display controller. Also, the operator must know the functions of the program so that a broader range of control may be obtained through the software.

The operator must be familiar with the turn-on procedure for the display controller, which includes bootstrapping the operating program from the central processor. He must know the procedure for the display console turn-on and reset, fault indications, and correction and recovery procedures.

Maintenance requirements are restricted to replacement of air filters. All cabinet doors should be kept closed to maintain proper circulation of air. Temperature and humidity must be kept at suitable levels.

3. CONTROLS AND INDICATORS

3.1. GENERAL

This section contains a description of the operating controls and indicators located on the display controller and the display console or consoles.

3.2. DISPLAY CONTROLLER

All controls, switches and indicators on the display controller used for maintenance and start-up procedures (except the circuit-breaker/switch) are located on the maintenance panel inside the front cabinet door on the right-hand side.

3.2.1. Maintenance Panel and Circuit Breaker

The display controller maintenance panel (Figure 3–1) contains switches, switch/indicators, and indicators which are grouped according to the following functions:

- Register switch/indicators – set up or display contents of specific registers

- Register-clear switches – clear specific registers and extinguish the associated indicators

- Timing indicators – light during specific cycles

- Program indicators – light when specific designators are selected

- Data-transfer-control indicators – light when specific flip-flops or buffers are selected.

Specific functions of operating components are described in Table 3–1.

The display controller circuit-breaker/switch (Figure 3–2) protects against a current overload, and is used as an AC power on/off switch during start-up procedures. The circuit-breaker/switch is located inside the rear cabinet on the right-hand side.

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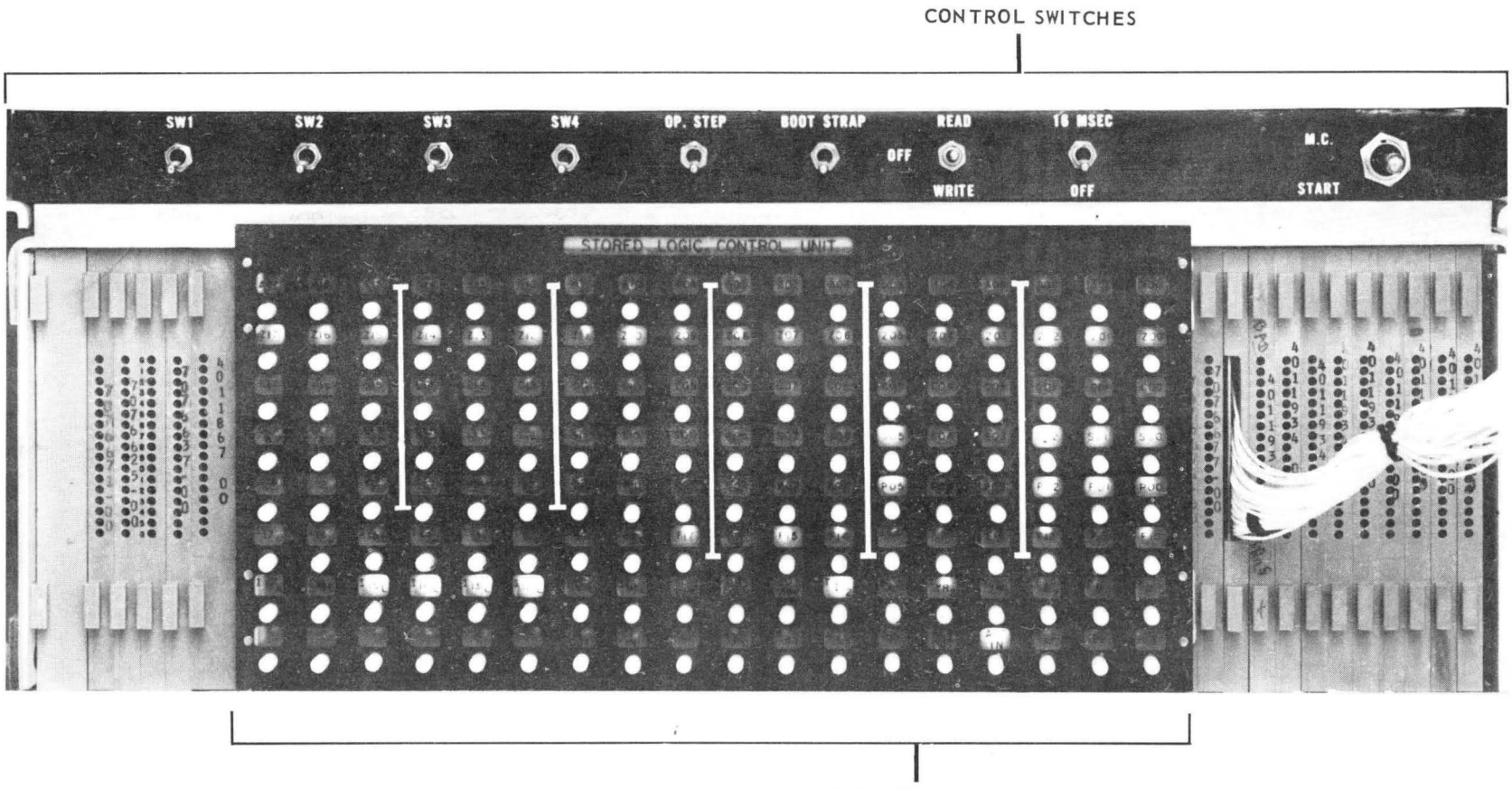
CONTROL SWITCHES

FUNCTION SWITCHES
Figure 3-1. Display Controller Maintenance Panel

3.3. DISPLAY CONSOLE

All controls and indicators on the display console used for operation and maintenance (except the circuit-breaker/switch) are located on the display console maintenance panel and the keyboard control panel.

CONTROL/INDICATOR	FUNCTION
CONTROL SWITCHES	
BOOTSTRAP	Up — enables bootstrap program loading Down — null position
OP STEP	Up — enables single instruction execution Down — enables sequential instruction execution
16 MSEC — OFF	Up — enables the 16-millisecond (60-Hertz) clock Down — disables the 16-millisecond (60-Hertz) clock
READ-WRITE-OFF	READ — enables single address reading WRITE — enables single address writing OFF — null position
MC-START	MC — clears all registers START — initiates normal program execution Center — null position

Program Switches
SW1, SW2, SW3, SW4
	Up — enables the skip instruction associated with:
	    SW1 - K-bit 6
	    SW2 - K-bit 7
	    SW3 - K-bit 8
	    SW4 - K-bit 9

REGISTER SWITCH/INDICATORS	
A17 - A00	Set and/or display the current contents of the 18-bit A register
Z17 - Z00	Set and/or display the current contents of the 18-bit Z register
C17 - C00	Set and/or display the current contents of the 18-bit C register
S13 - S00	Set and/or display the current contents of the 14-bit S register
P13 - P00	Set and/or display the current contents of the 14-bit P register
1_{17L} - 1_{10L}	Set and/or display the interrupt priority level of the interrupt entrance address
1_{17U} - 1_{10U}	Display the priority level of the highest priority interrupt and its controller entrance address
F17 - F10	Set and/or display the current function code (bits 14 through 17) and the function code extension (bits 10 through 13)

Table 3-1. Display Controller Maintenance Panel,
Controls and Indicators (Part 1 of 3)

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CONTROL/INDICATOR	FUNCTION
REGISTER CLEAR SWITCHES	
CLR A	Clears the 18-bit A register to 0 and extinguishes the associated indicators
CLR Z	Clears the 18-bit Z register to 0 and extinguishes the associated indicators
CLR C	Clears the 18-bit C register to 0 and extinguishes the associated indicators
CLR S	Clears the 14-bit S register to 0 and extinguishes the associated indicators
CLR F	Clears the function code (bits 14 through 17) and function-code extension (bits 10 through 13) register to 0 and extinguishes the associated indicators
CLR P	Clears the 14-bit P register to 0 and extinguishes the associated indicators
TIMING INDICATORS	
T_{1_2}	Lights during an instruction access cycle
T_{A_2}	Lights during the operand address incrementation cycle (advance mode)
$T_{\tau R_2}$	Lights during an operand read cycle
$T_{\tau \omega_2}$	Lights during an operand write cycle
$T_{\alpha_2}, T_{\beta_2}, T_{\tau_2}$	Lights during the α, β, or τ portion of the I/O timing chain
PROGRAM INDICATORS	
D LOCK	Lights when the interrupt lockout designator is set
D ADV	Lights when the advance mode designator is set
C CLK	Lights when the clock control designator is set

*Table 3-1. Display Controller Maintenance Panel,
Controls and Indicators (Part 2 of 3)*

CONTROL/INDICATOR	FUNCTION
DATA TRANSFER CONTROL INDICATORS	
I OUT	Lights when the I OUT control flip-flop is set. The flip-flop sets for the internally specified index mode or for the execution of the enter-channel instruction and then provides control for an output data transfer.
I IN	Lights when the I IN control flip-flop is set. The flip-flop sets for the internally specified index mode or for the execution of the store-channel instruction and then provides control for an input data transfer.
$A_{K_0}, A_{K_1}, A_{K_2}, A_{K_3}$	Lights when the acknowledge flip-flop for the corresponding channel (0, 1, 2, or 3) is set.
ACT OUT	Lights when an output buffer is being established.
ACT IN	Lights when an input buffer is being established.
E_1, E_2, E_3	Lights when an input or output data request is made by the associated channel (1, 2, or 3).

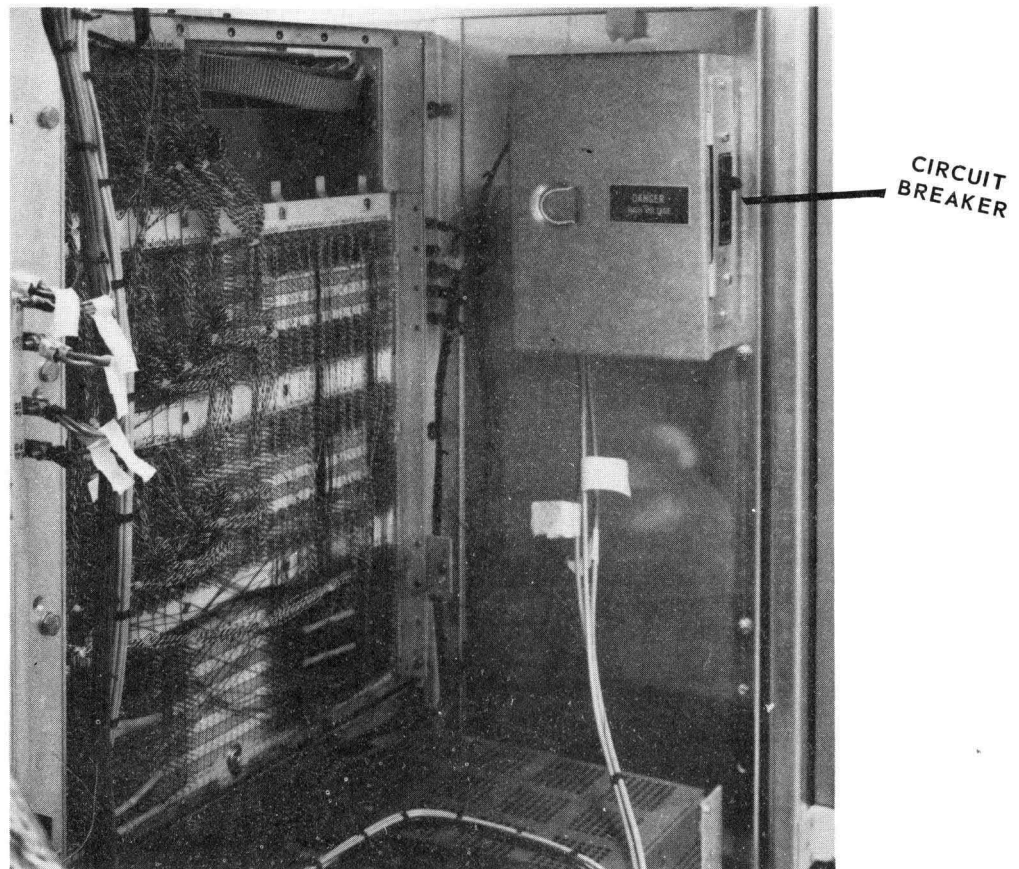Table 3–1. Display Controller Maintenance Panel, Controls and Indicators (Part 3 of 3)

Figure 3–2. Display Controller Circuit Breaker

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3.3.1. Maintenance Panel and Circuit Breaker

The display console maintenance panel (Figure 3–3) contains switches, switch/indicators, and indicators that are primarily used for maintenance of the console. However, the HORIZ 04 (master clear) switch is used routinely by the operator to initialize the console prior to normal program operation.

A lighted switch/indicator or indicator specifies that the associated flip-flop is set or a function is activated. The specific functions of the panel elements are described in Table 3–2.

The display console circuit-breaker/switch (Figure 3–4) protects the console against a current overload, and is used as an AC power on/off switch. It is located behind a panel on the right-hand side of the display console.

3.3.2. Keyboard and Control Panel

The display console keyboard and control panel (Figure 3–5) contains keyboard, controls, and indicators which enable the operator to send information to the display controller, apply and monitor power, adjust the display, and monitor the display console temperature.

The display console keyboard contains alphanumeric keys, function keys, and the TRANSMIT key. Pressing any key on the keyboard (some in conjunction with the shift key) causes a nine-bit ASCII code to be set up in a keyboard-interrupt word and an interrupt to be sent to the display controller. The display controller then reads the interrupt word, determines the key identity by the lower seven bits (2^0 through 2^6) of the code, and the type key, whether alphanumeric, function, or TRANSMIT, by the upper two bits (2^7 and 2^8).
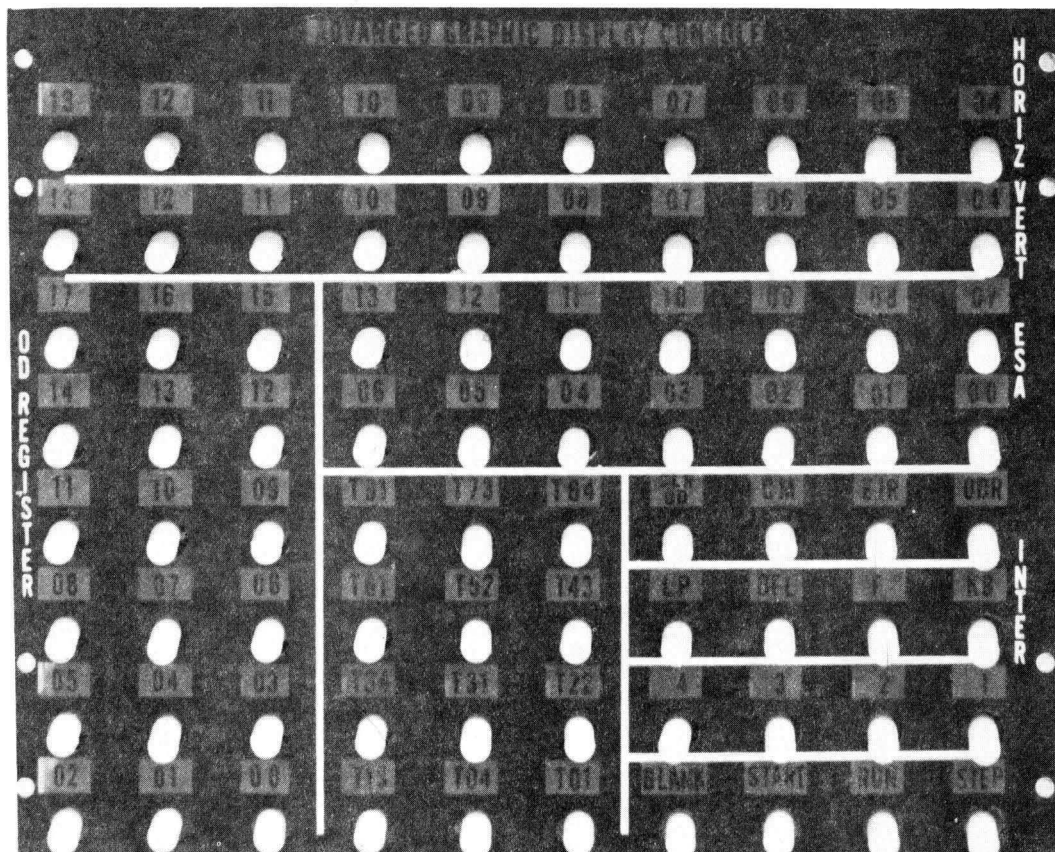

Figure 3–3. Display Console Maintenance Panel

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CONTROL/INDICATOR	FUNCTION
HORIZ 04 to 13	Ten indicators that display the status of bits 2^4 through 2^{13} of the horizontal data register.
HORIZ 04 (Master Clear)	A switch that initiates the display console for normal controller program operation by setting or clearing the following logic circuits: (a) Clears the horizontal and vertical data register (indicators are extinguished). (b) Clears the start flip-flop (START indicator extinguishes). (c) Sets the run flip-flop (RUN indicator is lighted). All other circuits and indicators remain unchanged.
VERT 04 to 13	Ten indicators that display the status of bits 2^4 through 2^{13} of the vertical data register.
OD REGISTER 00 to 17	Eighteen switch/indicators that set and display the status of bits 2^0 through 2^{17} of the output data register.
ESA 00 to 13	Fourteen indicators that display the status of bits 2^0 through 2^{13} of the externally specified address register.
CLR OD	Clears the output data register to 0.
EIR	A switch/indicator that sets an interrupt and indicates that an interrupt is being sent to the display controller.
LP	This indicator lights when a light pen interrupt is generated.
OFL	This indicator lights when an overflow interrupt is generated.
KB	This indicator lights when a keyboard interrupt is generated.

Table 3–2. Display Console Maintenance Panel,
Controls and Indicators (Part 1 of 2)

CONTROL/INDICATOR	FUNCTION
F	This indicator lights when a flag interrupt is generated.
ODR	This indicator lights when an output data request is being sent to the display controller.
CM	This indicator lights when the display console is executing words in the character mode.
START	This switch/indicator is used to set the start flip-flop and to indicate when it is set.
BLANK	This indicator lights when the beam on the display tube is blanked.
STEP	This switch/indicator sets the four-phase timing chain at a maximum rate of one phase per second and indicates when the display console is incrementing it at that rate. The indicator is extinguished when the four-phase timing chain is under control of the display console's clock.
1, 2, 3, 4	These are four indicators that light when the corresponding phase of the display console's timing chain is active.
RUN	This switch/indicator sets the run flip-flop and indicates that the display console is under control of the display controller.
T01, T04, T13, T22, etc.	Twelve indicators that light when the corresponding pulses of the display console's timing chain are active.

*Table 3—2. Display Console Maintenance Panel,
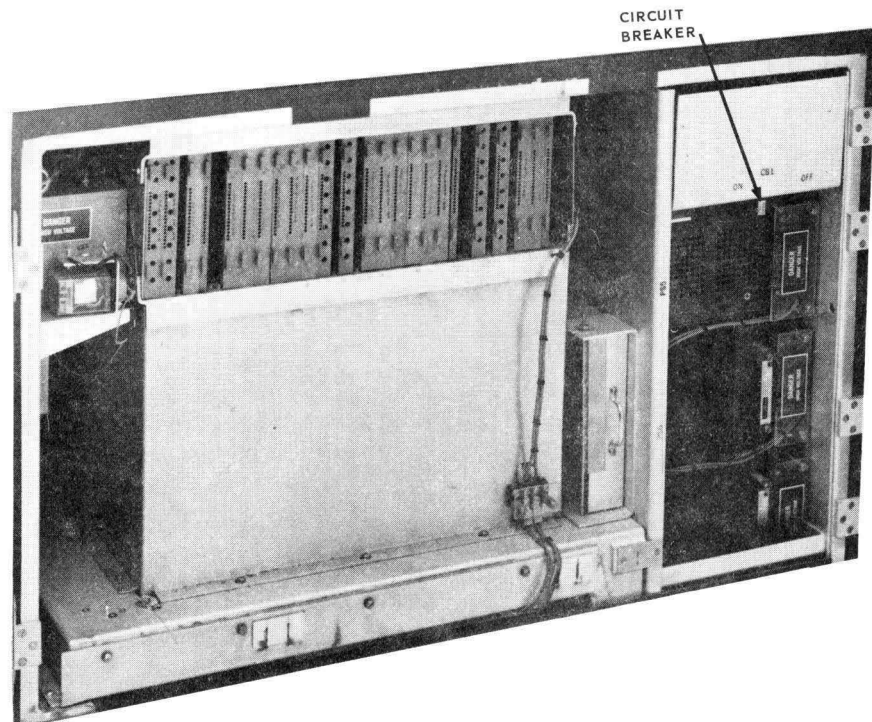Controls and Indicators (Part 2 of 2)*

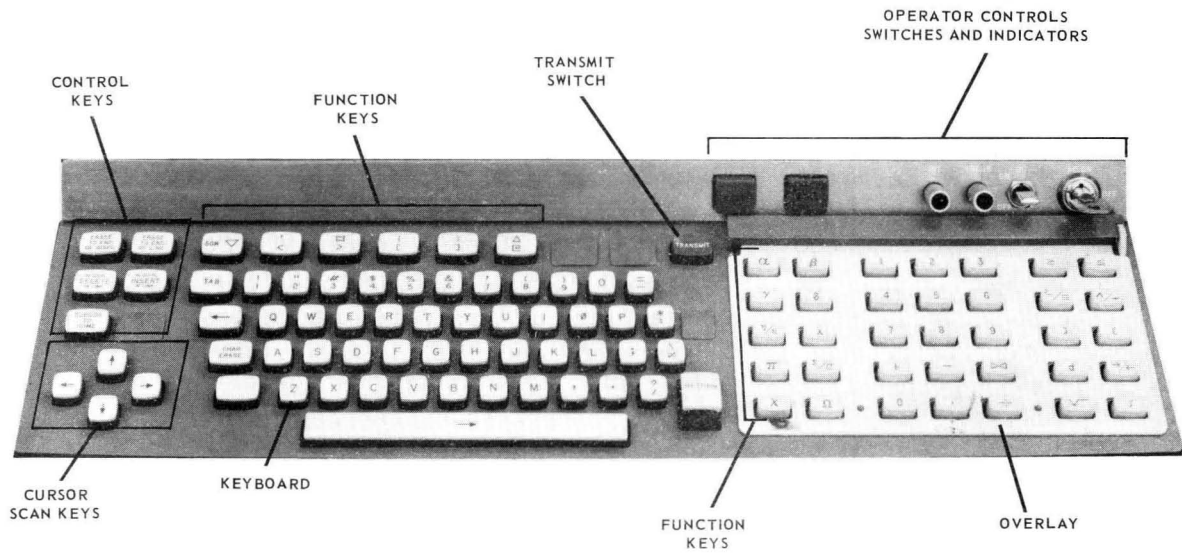*Figure 3—4. Display Console Circuit Breaker*

Figure 3–5. Display Console Keyboard and Control Panel

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KEY	FUNCTION
ERASE TO END OF DISPL	Erases and enters spaces in all character positions from and including the cursor position to the end of the display.
ERASE TO END OF LINE	Erases and enters spaces in all character positions from and including the cursor position to the end of that line.
DELETE IN LINE	When used alone, it causes the characters in the line to the right of the cursor to shift left one position. The original character at the cursor position is deleted and a space is written into the last character position. The key is pressed once for each character to be deleted.
DELETE IN DISPL	When used in conjunction with the shift key, it causes all of the display characters to the right of the cursor to move left one position. The original character at the cursor position is deleted and a space is written into the last character position. The key is pressed once for each character to be deleted.
INSERT IN LINE	When used alone, it causes all of the characters from and including the cursor position to shift right one space in that line only. A space is entered in the cursor position. If a character is moved out of the last position in the line, it is lost.
INSERT IN DISPL	When used in conjunction with the shift key, it causes all characters in the display from and including the cursor position to shift right one space. A space is entered in the cursor position. If a character is shifted out of the last position of the display, it is lost.
CURSOR TO HOME	Causes the cursor to move to the first character position on the display.
CHAR ERASE	Causes a space to be inserted in the position occupied by the cursor. The character previously in this position is lost.
TAB	Moves the cursor forward until a special tab character is detected on the display. The cursor stops one position beyond the tab character or at the end of the display if a tab character is not detected.
RETURN	Causes the cursor to move to the first character position each time the key is pressed.
→ (Scan Forward)	The cursor moves forward one position when this key is momentarily pressed. The cursor moves continuously if the key is held down.
← (Scan Backward)	The cursor moves backward one position when this key is momentarily pressed. The cursor moves continuously if the key is held down.
↑ (Scan Upward)	The cursor moves upward one position when this key is momentarily pressed. The cursor moves continuously if the key is held down.
↓ (Scan Downward)	The cursor moves downward one position when this key is momentarily pressed. The cursor moves continuously if the key is held down.

*Table 3—3. Display Console, Editing and
Cursor Control Keys*

The alphanumeric keys, located on the left-hand side of the keyboard (Figure 3—5), are essentially the same as those found on a standard typewriter. Pressing one of these keys sets up a keyboard-interrupt word and interrupts the display controller. The display controller reads the interrupt word and, if the controller is so programmed, displays the key character on the screen.

The function keys consist of all keys on the keyboard other than the alphanumeric keys or the TRANSMIT key. Pressing one of these keys sets up a keyboard-interrupt word and interrupts the display controller. The sequence of events following receipt of the interrupt word is determined by the display controller program.

Included among the function keys (Figure 3—5) are 35 keys on the right-hand side of the keyboard and six keys at the top on the left-hand side of the keyboard that are controlled by a plastic overlay which fits around the 35 keys. The absence of an overlay inhibits the display controller interrupt when one of these keys is pressed, which means the function keys are not usable without an overlay.

Several of the function keys are nominally termed as editing and cursor control keys. These editing keys may be interpreted to perform specific tasks as determined by the display controller program. Each of the cursor-movement keys move the cursor one location, or, if held pressed, repeats the movement until the key is released. The keyboard-interrupt word set up by the pressing of one of these keys will, upon being read by the controller (if the display controller is so programmed), cause the function printed on the key to be executed. Table 3—3 lists the editing and cursor control keys and their intended functions.

The final key on the keyboard is the overlay TRANSMIT switch (Figure 3—5). The function of this key is best described along with its associated overlays. The display console is provided with a number of plastic overlays that fit down around the function keys on the right-hand side of the keyboard. These overlays are inserted and locked into position by turning the knurled knob down to engage the pressure bar. The overlays contain eight tabs, seven of which may be removed in any of 128 different combinations. When the overlay is locked in place, these tabs activate switches including one that indicates that the overlay is in place.

Pressing the TRANSMIT key sets up an interrupt word that contains the status of these switches and then interrupts the display controller. The display controller can then read this interrupt and use the overlay information to determine how to process interrupt words from the overlay-controlled function keys.

The controls and indicators on the display console control panel are listed and described in Table 3—4.

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3.3.3. Light Pen

The display console light pen is a device that senses images on the cathode-ray tube screen by means of a photocell located in its body. It is an optional item on the display console and is not strictly required for basic operation. The light pen can be used to draw, detect, alter, and erase lines and points on the screen in conjunction with an appropriate display controller program.

The light pen is held by the back of the barrel as shown in Figure 3–6, with the index finger held above, not touching, the front part of the barrel. The pen is held over the desired image and the finger is then placed on the front of the barrel to enable detection of the spot. If the pen is aimed properly, a detection should occur immediately (within 16 milliseconds), an interrupt word is generated, and an interrupt sent to the display controller. The display controller program is presented with sufficient data to determine which image was sensed by the pen. The action to be taken (to add or delete a line) is determined by the display controller program.

There are two lenses available for the light pen (Figure 3–7). One lens has a viewing angle of 33 degrees and is used when the points on the screen are wide-spread; the other lens has a viewing angle of four degrees and is used where more careful discrimination of images is required.
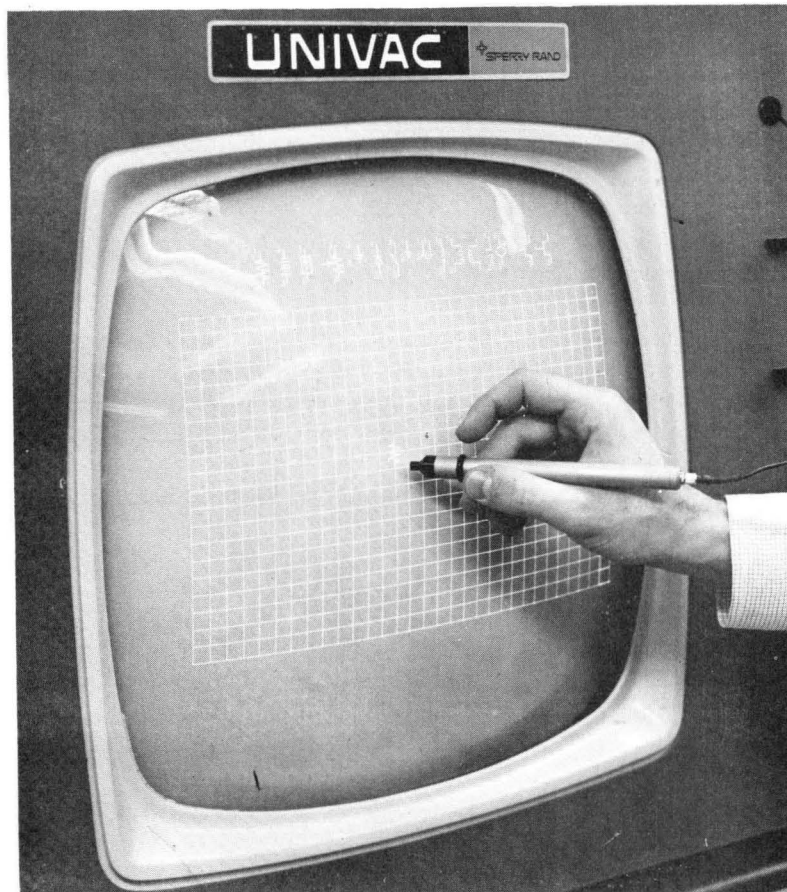

Figure 3–6. Use of Light Pen

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CONTROL/INDICATOR	FUNCTION
AC ON – OFF	This is a key-activated switch with two positions: ON – Applies AC power to the display console. OFF– Removes AC power from the display console.
DC ON – OFF	ON – Applies AC power to the DC power supplies. OFF– Removes AC power from the DC power supplies.
FOCUS	Adjusts sharpness of the image displayed on the cathode-ray tube screen.
INT	Adjusts the intensity of brightness of the image displayed on the cathode-ray tube screen.
READY	Lights (green) when output of the +12 volts power supply reaches its nominal value and extinguishes when the output drops below nominal value.
HI TEMP	Lights (red) when the internal temperature of the display console exceeds +125 degrees Fahrenheit.

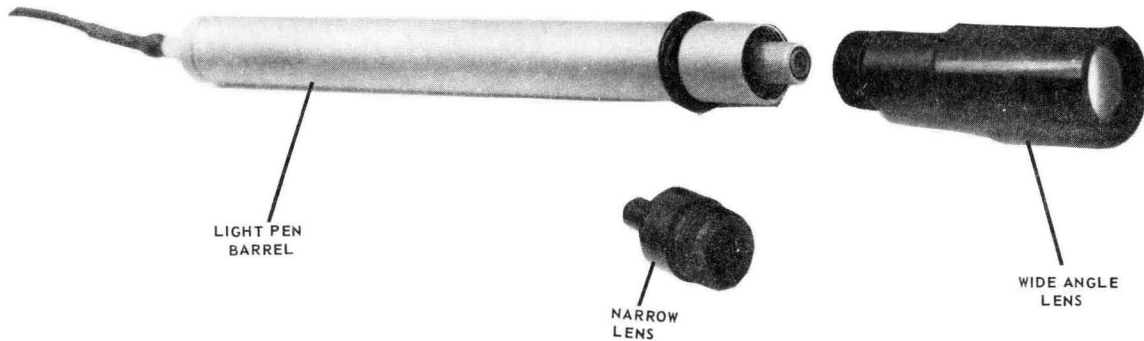*Table 3—4. Display Console Control Panel,
Controls and Indicators*

Figure 3—7. Light Pen and Lenses

4. OPERATION

4.1. GENERAL

The operator is required to turn on the display controller, display console, and data set (if so equipped), load the operating program in the display controller using a bootstrap routine, and reset the display console logic circuits. He is also required to restart the equipment in case of loss of power or an interruption of data from the central computer unit or between the display console and the display controller. He is required to operate and turn off the equipment.

The information presented in this section, along with illustrations and tables presented in Section 3, should be sufficient to allow the operator to perform the following procedures:

■ Turnon

■ Turnoff

■ Operation

■ Fault correction and recovery

4.2. TURNON PROCEDURE

Turnon procedures for the display controller, display console, and data set consist of applying AC and DC power, bootstrapping the controller program, and resetting the logic circuits. Step-by-step turnon procedures are described in the following paragraphs.

4.2.1. Display Controller

Three separate procedures are required to turn on the display controller.

4.2.1.1. Bootstrap Procedure

Power, both AC and DC, is turned on using the circuit breaker inside the rear cabinet doors on the right-hand side (see Figure 3–2). The display controller program is then bootstrapped into the display controller storage from the central computer by way of either the data set (data set should be turned on — see 4.2.3) and a communications link or the direct channel interface as follows (see Figure 3–1):

(a) Set OP. STEP switch to UP position.

(b) Set 16 MSEC switch to OFF position.

(c) Set BOOTSTRAP switch to up position.

(d) Set READ-WRITE-OFF switch to OFF position.

(e) Set MC-START switch to MC position.

(f) Set P register to nnnnn

where: nnnnn is the starting address of the bootstrap routine.

(g) Set MC-START switch to START position.

(h) Set BOOTSTRAP switch to down position.

(i) Hand-load additional instructions, if required, for particular bootstrap routine.

   (1) Set OP-STEP switch to UP position.

   (2) Set READ-WRITE-OFF switch to WRITE position.

   (3) Set P register to nnnnn-1

   (4) Set A register to nnnnn

   (5) Set MC-START switch to START position.

   (6) If additional instructions are loaded, operate the CLR A switch, set A register to new instruction, and operate MC-START switch.

(k) Set P register to nnnnn-1.

where: nnnnn is the starting address of the bootstrap routine.

(l) Set OP-STEP switch to down position.

(m) Operate START switch.

All doors on the display controller are then closed to maintain proper cooling of the equipment.

4.2.1.2. Manual Storage Readout

Manual interrogation of the storage is accomplished from the display controller maintenance panel as follows (see Figure 3-1):

(a) Set OP-STEP switch to UP position.

(b) Set READ-WRITE-OFF switch to READ position.

(c) Set P register to memory location (nnnnn-1).

(d) Operate START switch.

(e) Readout displayed at Z register indicators.

4.2.2. Display Console

AC power is turned on the display console using the circuit breaker inside the cabinet doors on the right-hand side (Figure 3–4), and then by turning the key-operated AC ON-OFF switch to the ON position (Figure 3–5).

DC power is turned on by placing the DC ON-OFF switch in the ON position and waiting for the green READY light to come on (Figure 3–5).

The display console is then initiated for normal display controller program operation by pressing the master clear switch (HORIZ 04) on the console maintenance panel (inside the cabinet doors on the left-hand side of the console, see Figure 3–3).

Focus and brightness are adjusted using the FOCUS and INT controls (Figure 3–5), but may not be set until an image appears on the display. The brightness control (INT) should be set to maximum (fully clockwise) initially to ensure that the first image may be viewed.

All cabinet doors on the console are to be closed to maintain proper cooling of the equipment.

4.2.3. Data Set

If the system uses a data set, it should be turned on prior to attempting to bootstrap the display controller program. The turnon procedure is dependent upon the particular data set type. Instructions are included with the data set.

4.3. OPERATING PROCEDURES

When turnon is completed, all normal operation of the system takes place at the display console or consoles. (Refer to 4.2.1.) The next procedures followed are:

■ Overlay insertion

■ Message composition

■ Message transmission

■ Message reception

■ Light pen operation

4.3.1. Overlay Insertion

An overlay must be in place before the overlay-controlled function keys can operate. To insert the overlay proceed as follows (see Figure 4-1):

(a) Turn knurled knob until pressure bar is retracted.

(b) Place overlay over the group of 35 function keys with the notched edge of the overlay between the pressure bar and the keyboard base, and the alignment pins projecting through the alignment holes.

(c) Turn the knurled knob down to re-engage pressure bar. The pressure bar presses the overlay tabs against the identification switches.

4.3.2. Composing and Transmitting Messages

Interrupt words to the display controller are generated by the operator pressing the the various alphanumeric and function keys, or the TRANSMIT key on the display console keyboard; or by causing the light pen to be activated by the CRT display. The display controller is then interrupted and, based on its program, reads and acts upon the information in the interrupt word.

The alphanumeric and function keys generate unique interrupt words that contain the specific key code. The TRANSMIT key generates an interrupt word that contains the identification of the current overlay. The light-pen-interrupt word contains the location in the operational program where the interrupt occurred, thus identifying the location on the CRT display of the activating image.

4.3.3. Receiving Display Controller Messages

All messages transmitted to the display console are under control of the display controller program. Thus, there is no way of determining the response to an operator's action without knowledge of the current operational program.

4.4. TURNOFF PROCEDURE

The turnoff procedure for the display controller, display console, and data set consists of removing AC and DC power. Emergency and normal condition turnoff procedures are described in the following paragraphs.

4.4.1. Display Controller

Emergency and normal turnoff procedure for the display controller consists of turning off all power with the circuit breaker inside the rear cabinet doors on the right-hand side. Normally, however, except for emergencies, power is left on continuously, even when the equipment is not in use.

4.4.2. Display Console

Emergency turnoff procedure for the display console consists of turning off all power with the circuit breaker inside the cabinet door on the right side of the console (see Figure 3—4). This procedure can be preceded by turning the key-operated AC ON-OFF switch to the OFF position, if convenient. Except for emergencies, AC power should be left on continuously, even when the equipment is not in use.

For normal turnoff procedure, place the DC ON-OFF switch in the OFF position.

4.4.3. Data Set

If the system uses a data set, the emergency and normal turnoff procedures for both power and data are specified in accompanying literature.

4.5. FAULT CORRECTION AND RECOVERY PROCEDURES

Fault correction and recovery procedures are those actions required to correct abnormal conditions resulting from operator, communications, processor, or AC power malfunctions. These abnormal conditions and probable causes as well as the operator's action that is required are shown in Table 4—1.

| DISPLAY CONSOLE INDICATION	PROBABLE CAUSE	OPERATOR ACTION
HI TEMP indicator (see Figure 3—5) is lighted	1. Ventilation fan inoperative. 2. Clogged air filter	1. Turn console off using circuit breaker (see Figure 3—4). Notify supervisor of failure. 2. Clean air filter (refer to Section 5).
Display console is completely inoperative	AC power circuit breaker (see Figure 3—4) inside right cover has tripped due to surge in line voltage or defective component.	Set power circuit breaker to ON position. If it remains on, resume operation. If it trips again, notify supervisor of failure.
Bootstrapping apparently completed successfully but no initial display.	1. Intensity is set too low. 2. Display console logic is not cleared.	1. Increase intensity (Figure 3—5). 2. Press HORIZ 04 switch on display console maintenance panel (Figure 3—3).

Table 4—1. System Trouble Analysis
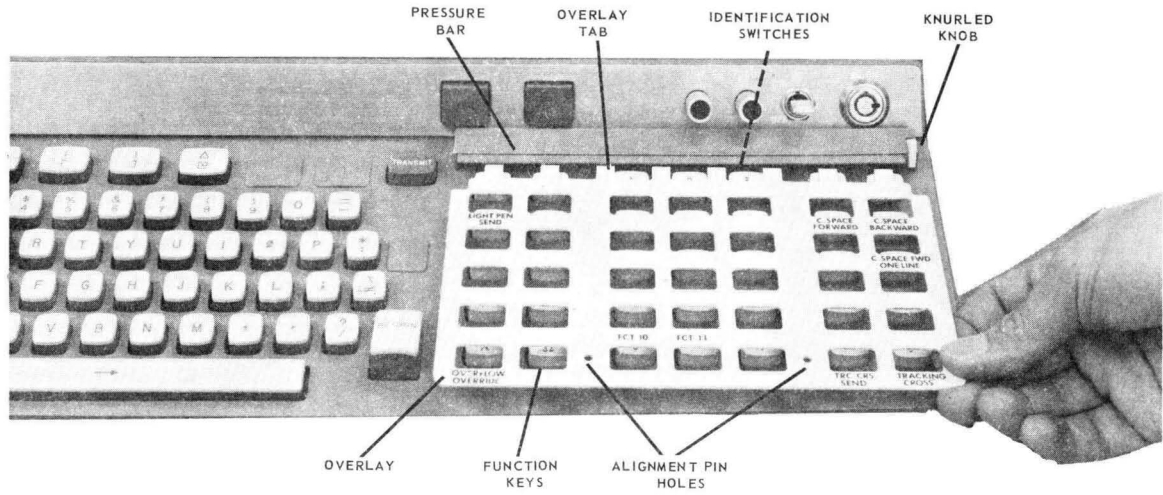
Figure 4–1. Overlay Insertion

5. OPERATOR-PERFORMED MAINTENANCE

5.1. GENERAL

Operator-performed maintenance for the display controller and display console is limited to air-filter replacement. It is necessary that the air filters be replaced as specified to prevent the units from overheating and causing premature component failure. The air filters should be replaced by qualified personnel once each month if the unit is in continuous operation, or less often if operation is not continuous.

5.2. DISPLAY CONTROLLER

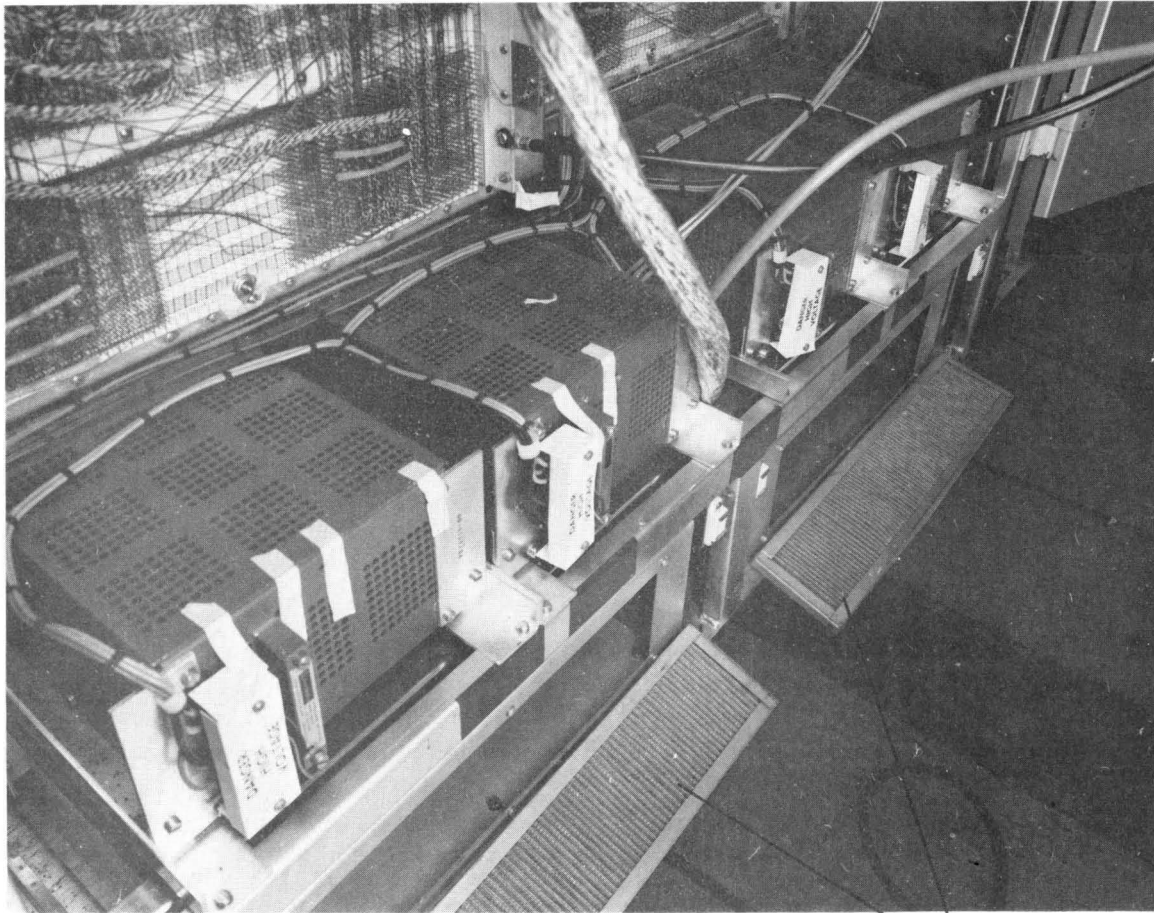To replace the filters in the display controller cabinet, proceed as follows (see Figure 5—1):

(a) Remove filter by pulling outward on the exposed end of the filter. If the filter does not pull free, place one hand into the mouth of the fan assembly and pry filter upward and outward while at the same time pulling outward on the exposed end with the other hand.

(b) Replace filter by inserting it in the upper end of the filter holder and pushing it completely into the holder.

5.3. DISPLAY CONSOLE

To replace filters in the display console, proceed as follows (see Figure 5—2):

(a) Unscrew two screws beneath the outer edge of the display console which secures the filter bracket to the frame, and remove the bracket.

(b) Lift the filter upward and outward.

(c) Replace the filter in the reverse manner of steps (a) and (b).

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AIR FILTERS
REMOVED

Figure 5—1. Display Controller Air Filters

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LEFT SIDE
FILTER COVER
(REMOVED)

AIR FILTER

Figure 5—2. Display Console Air Filters (Part 1 of 2)

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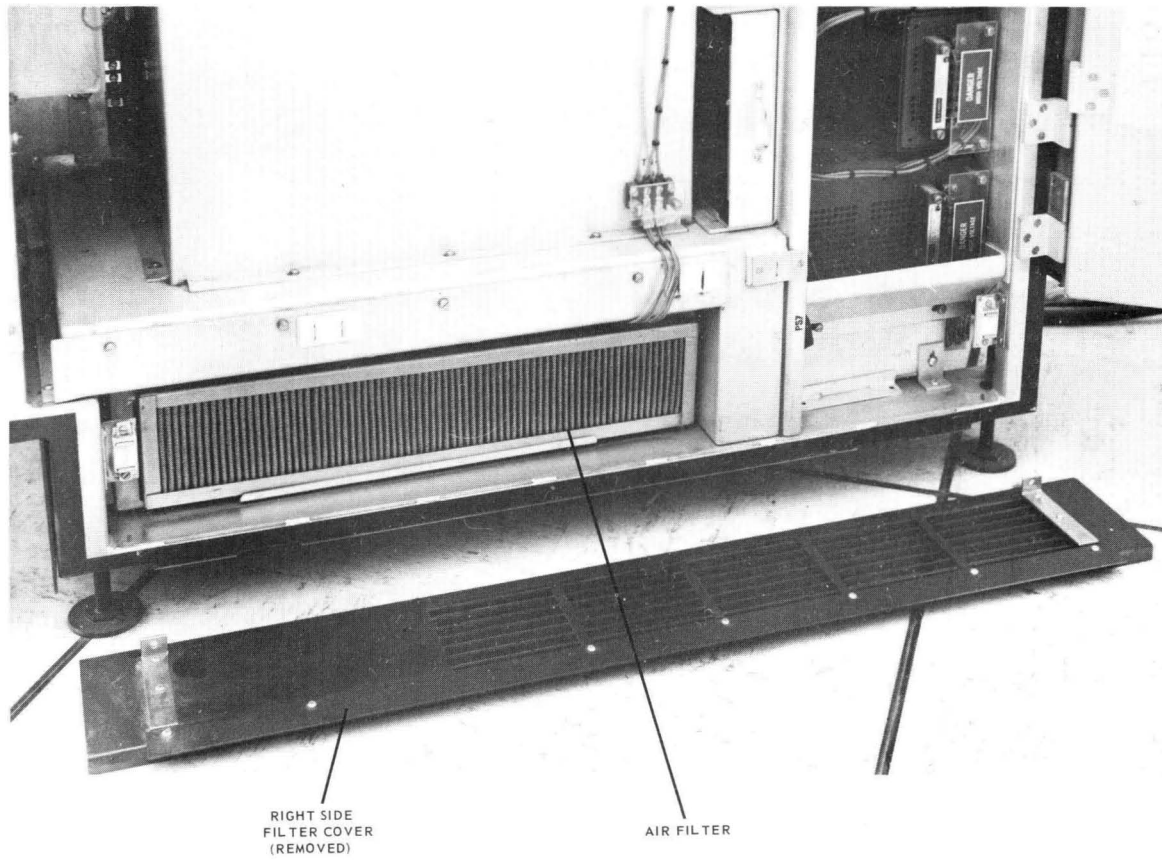
SECTION: 5

PAGE: 4

RIGHT SIDE
FILTER COVER
(REMOVED)

AIR FILTER

Figure 5—2. Display Console Air Filters (Part 2 of 2)

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