

SECTION 18. FRONT PANEL ASSEMBLY (A18)

18.1 DESCRIPTION

The Front Panel assembly (A18) contains controls, switches, and LEDs which control the System Analyzer. It also contains miscellaneous input and output ports. Most of the control devices are mounted directly to the Front Panel; however, some of them are mounted on the Display board (A18A1). Front Panel circuitry is connected to the rest of the system by two flexible printed wiring boards — the Front Panel Left Flex, which connects the Display board to the System Motherboard (A19), and the Right Flex, which connects the Scope controls to the Motherboard (A19). A ribbon cable assembly also connects the Display board to the Front-Panel Interface board (A15).

A schematic of the Front Panel assembly is shown at the end of this section in Figure 18-1. This is followed by Figure 18-2a-f, which coordinates the Front Panel parts list with three views of the Front Panel,

with the printed wiring board assemblies of the Left and Right Flexes, and with the Switch Interconnect board.

A schematic of the Display board follows these figures in Figure 18-3, with the printed wiring board assembly and parts list in Figure 18-4.

18.2 CONTROLS, SWITCHES AND LEDs

Table 18-1 describes each control device on the Front Panel, including those on the Display board (A18A1). (See Figure 18-2a at the end of the section for exact positions of these controls.)

The step-attenuator control knob (Step), the Antenna port, the RF In/Out port, the Duplex Generator Output port, and the Duplex Generator On/Off switch are part of the RF Input module (A17). For information on these ports and switches, refer to Section 17 on the A17 module.

Table 18-1. Controls, Switches and LEDs on the Front Panel

Control, Switch, or LED	Function
Main Switches	
POWER (S3)	In the On position, the system is powered up. In the Standby and DC Off positions during ac operation, and in the Standby position during dc operation, all modules are powered down except the Frequency-Standard Interface board (A16). In the DC Off position during dc operation, all modules are powered down.
FUNCTION (S2)	Determines whether the system is in Generate or Monitor mode.
MODULATION (S1)	Determines whether the modulation generator output is continuously on (Cont), Off, or Burst.
RF SECTION Controls	
RF Level (R12 and R26)	Regulates the RF output power by controlling the reference voltage applied to the ALC loop on the Wideband Amplifier board (A17A2).
RF Port Sel	Controls which port (Antenna or RF In/Out) is enabled. Pulled out enables Antenna port. Pushed in enables RF In/Out port.
Ports: Antenna, RF In/Out, and Ext Wattmeter	See Section 17 on the RF Input module (A17).
OSCILLOSCOPE Controls	
Vert (S12 and R11) S12	Selects from 4 values of vertical-input sensitivity: 0.01V, 0.1V, 1V, and 10V/Div. When one of the 0.01V to 10V/Div RNG SEL outputs is low, the corresponding vertical-input sensitivity has been selected. These outputs are interfaced to the Processor board by circuitry on the Front-Panel Interface board.
R11	Provides a continuously variable but uncalibrated vertical-input sensitivity. When turned fully clockwise, calibrates the vertical-input sensitivity.

Table 18-1. Controls, Switches and LEDs on the Front Panel (Cont)

Control, Switch, or LED	Function
OSCILLOSCOPE Controls	
<p>Trig Level/Position (S11 and R10) S11</p> <p>R10</p> <p>Horiz (S10, R9, R8) S10</p> <p>R9</p> <p>R8</p> <p>Vert (R14) and Horiz (R15) R14</p> <p>R15</p> <p>Port: Vert/Sinad/Dist/DVM/Counter In – Multipurpose Input</p> <p>Port: Ext Horiz (External Horizontal Input)</p>	<p>Selects automatic or normal triggering. In automatic mode, the AUTO/NOR TRIG SEL output, which goes to the Scope Amplifier board (A2), is –5V. In this mode, the scope sweep free-runs when there is no triggering. In normal mode, the AUTO/NOR TRIG SEL output is pulled to +5V by a pull-up resistor on A2, and the scope sweep is blanked in the absence of triggering.</p> <p>Adjusts the reference (Trig Level) to which the input signal is compared for scope triggering. The triggering circuit is on the Scope/DVM Control board (A7).</p> <p>Selects one of six horizontal-sweep speeds or external horizontal input. When one of the SWP SEL or EXT HORIZ SEL outputs is high, the corresponding horizontal mode has been selected. These outputs are interfaced to processor control by circuitry on the Front-Panel Interface board.</p> <p>Provides a continuously variable dc voltage at the SWP VERNIER VOLT output, which goes to the Scope Amplifier board, and thus provides a continuously variable horizontal-sweep speed. When R9 is fully clockwise, the horizontal-sweep speed is calibrated.</p> <p>In external horizontal mode, adjusts the horizontal-input sensitivity over a range of 0.1V/Div to 10V/Div.</p> <p>Adjusts the scope’s vertical position by adjusting the offset in the vertical pre-amplifier on the Front-Panel Interface board.</p> <p>Adjusts the scope’s horizontal position by adjusting the offset in the horizontal amplifier on the Scope Amplifier board.</p> <p>Most of the basic measurement functions of the System Analyzer can be performed on signals connected to this port. The particular measurement being performed is indicated by the display LEDs.</p> <p>Controls the scope’s horizontal sweep in external-horizontal mode. R8 controls input sensitivity of 0.1V/Div to 10V/Div.</p>
MONITOR Controls	
<p>Squelch (R7)</p> <p>Volume (R6)</p> <p>Image/Dplx (S17) – Image/Duplex Switch</p> <p>BW (S16) – Bandwidth Switch</p> <p>BFO (R18)</p> <p>Port: Demod Out</p>	<p>Controls the dc voltage at the SQUELCH LEVEL output (which goes to the Receiver), and thus controls the RF level below which the Receiver is squelched.</p> <p>Controls the volume of the speaker output.</p> <p>Selects high-side or low-side mixing during normal monitor operation, and selects high-side or low-side offset during Duplex operation. During high-side mix or high-side offset, S17 is open and the IMAGE HI/LO signal is pulled up to +5V by a resistor on the Front-Panel Interface board. During low-side mix or low-side offset, S17 is closed and the IMAGE HI/LO signal is pulled low. The IMAGE HI/LO output is interfaced to processor control by circuitry on the Front-Panel Interface board.</p> <p>Controls the generator’s FM sensitivity, the Receiver’s demodulation sensitivity, and audio filters in the Receiver. In wideband mode, S16 is open, and the WB/NB output is pulled up to +5V by a resistor on the Front-Panel Interface board. In narrowband mode, S16 is closed, and the WB/NB output is pulled low. The WB/NB output is interfaced to processor control by circuitry on the Front-Panel Interface board.</p> <p>Controls the dc voltage at the BFO FREQ CNTL output, and thus controls the frequency of the varactor-tuned BFO on the Receiver board.</p> <p>In monitor mode, the Receiver’s demodulation output comes out of this port. In FM, the output level is 1 volt-peak per kHz of peak deviation in narrowband, and 1 volt-peak per 10 kHz of peak deviation in wideband. In AM, the output level is a nominal 1 volt-peak per 10 percent AM.</p>

Table 18-1. Controls, Switches and LEDs on the Front Panel (Cont)

Control, Switch, or LED	Function
MODULATION Controls	
<p>Code Synth Lvl (R5), Ext Level (R4), 1 KHz Level (R13)</p> <p>Switch S15</p> <p>Port: Mod Out</p> <p>Port: Ext Mod In</p> <p>Port: Mic (Microphone Input)</p>	<p>Adjust the amplitude of the signals that modulate the RF signal generator.</p> <p>Turns the 1 KHz signal on and off.</p> <p>Connects to the modulation generator's output. In generate mode, this port is the modulation source for the signal generator.</p> <p>Allows external signals to be summed into the output of the modulation generator. The sensitivity of this output to the EXT MOD input is adjusted with the Ext Level control.</p> <p>Allows voice information to be incorporated into the internal modulation. Its level is set by the Ext Level control.</p>
Miscellaneous Controls	
<p>Intensity (R2) and Focus (R3)</p> <p>Dispr/Sweep (R1)</p> <p>RF Scan</p>	<p>Control the intensity and focus of the CRT by controlling the dc level on the INTENSITY LEVEL and FOCUS LEVEL signals going to the Scope Amplifier board (A2).</p> <p>Controls the amplitude of the SYNTH SWEEP signal going to the RF Synthesizer and thus controls the dispersion of the spectrum-analyzer sweep or the frequency range of the sweep generator's output.</p> <p>Scans the RF Synthesizer frequency up or down. When the optical encoder is rotated clockwise, the OPTICAL ENC B signal leads the OPTICAL ENC A signal by 90°. When the optical encoder is rotated counter clockwise, OPTICAL ENC A leads OPTICAL ENC B by 90°. The OPTICAL ENC A and B signals go to circuitry on the A15 board, which interfaces these signals with the Processor board.</p>
DISPLAY BOARD (A18A1) Controls	
<p>Keypad Switches (S1-S4) S1 S2, S3, S4</p> <p>Display, Function and Modulation LEDs (DS1-DS24)</p> <p>Batt and AC LEDs (DS25, DS26)</p> <p>Oven-Ready LED</p>	<p>Contains 12 switches which control the cursor and allow entry of numeric data.</p> <p>Control system display, function, and modulation, respectively. The particular display, function, and modulation modes are indicated by LEDs DS1-DS24. Pressing any of these switches connects a unique combination of row and column lines. A PIA on the Processor board detects this, and the processor takes the appropriate action.</p> <p>Indicate display, function, and modulation status. Control output to these LEDs is accomplished via AF BUS addresses 0, 1, and 2 on the Front-Panel Interface board. Latch-selects LS0, LS1, and LS2 are pulsed low to latch the data on the AF DATA BUS into latches on U6, U7, and U8, respectively, when the corresponding address is enabled on the AF ADD BUS. This data is decoded (as shown in Table 18-2) by U6, U7, and U8, and the appropriate LEDs are lit by drivers U1-U4. For more information on the AF BUS, refer to Section 15 on the Front-Panel Interface board.</p> <p>Indicate application of dc and ac power, respectively.</p> <p>Indicates when the oven has reached operating temperature on System Analyzers that have the ovenized frequency standard.</p>

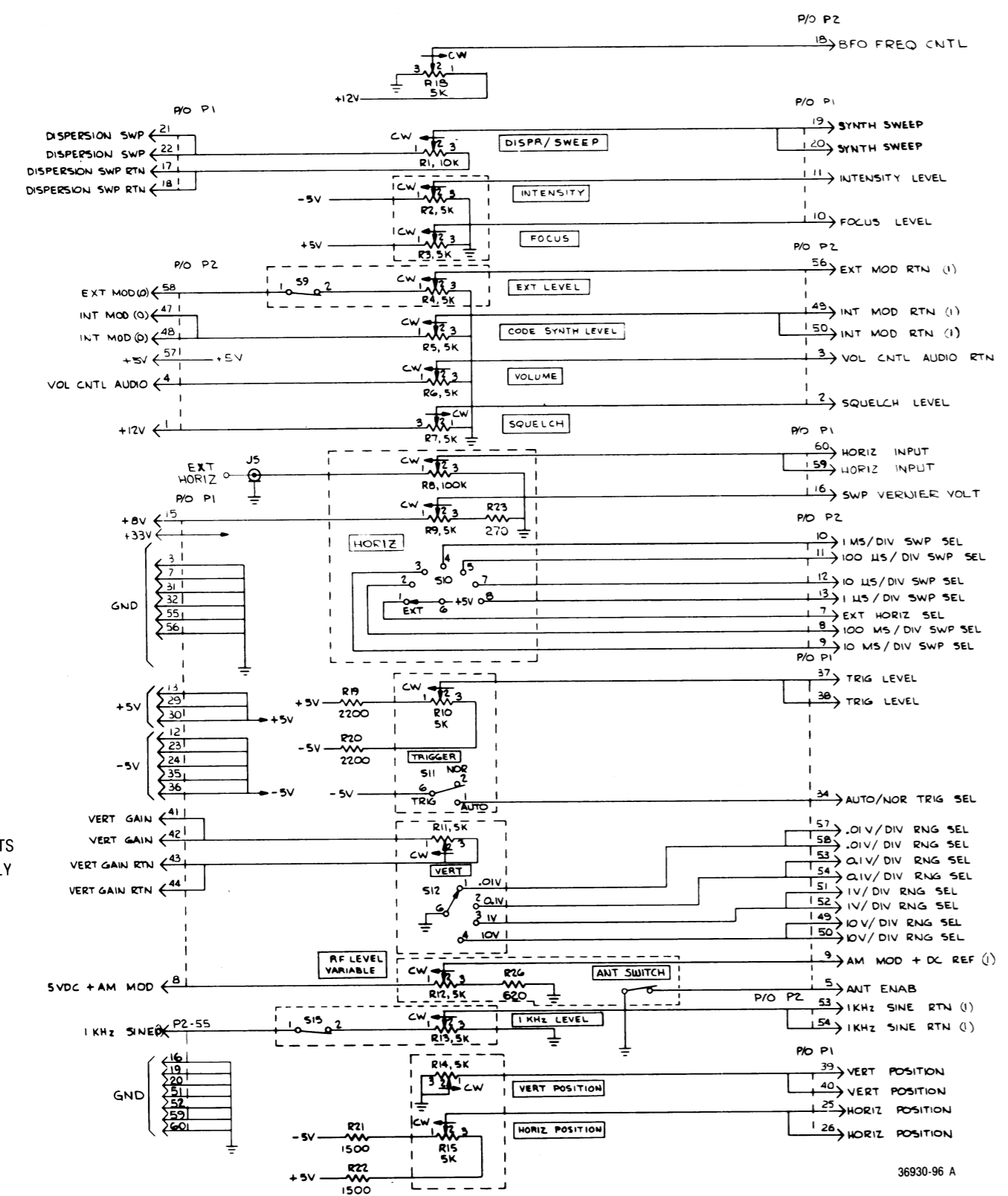
18.3 DECODING FOR DISPLAY, FUNCTION AND MODULATION LEDs

Table 18-2 shows which LED is selected for each state of the AF DATA BUS when the appropriate latch-select (LS0, LS1, or LS2) is strobed low.

Table 18-2. Decoding for Display, Function, and Modulation LEDs

Configuration of AF DATA BUSSES				Display LED Selected (LS0 strobed low)	Function LED Selected (LS1 strobed low)	Modulation LED Selected (LS2 strobed low)
0	1	2	3			
0	0	0	0	Gen/Mon Mtr	FM	PL/DPL
0	0	0	1	Modulation	CW	PL/DPL INV
0	0	1	0	Spect Analyzer	AM	Tone A
0	0	1	1	Duplex Gen	SSB/DSBSC	Tone B
0	1	0	0	RF Memory	SWP 1-10 MHz	Tone Seq.
0	1	0	1	Signaling Seq	SWP 0.01-1 MHz	Tone Remote
0	1	1	0	Freq Counter	Not Allowed	Not Allowed
0	1	1	1	DVM/DIST	Not Allowed	Not Allowed
1	0	0	0	Ext Wattmeter	Not Allowed	Not Allowed
1	0	0	1	IF	Not Allowed	Not Allowed
1	0	1	0	Scope AC	Not Allowed	Not Allowed
1	0	1	1	Scope DC	Not Allowed	Not Allowed
1	1	0	0	Not Allowed	Not Allowed	Not Allowed
1	1	0	1	Not Allowed	Not Allowed	Not Allowed
1	1	1	0	Not Allowed	Not Allowed	Not Allowed
1	1	1	1	Not Allowed	Not Allowed	Not Allowed

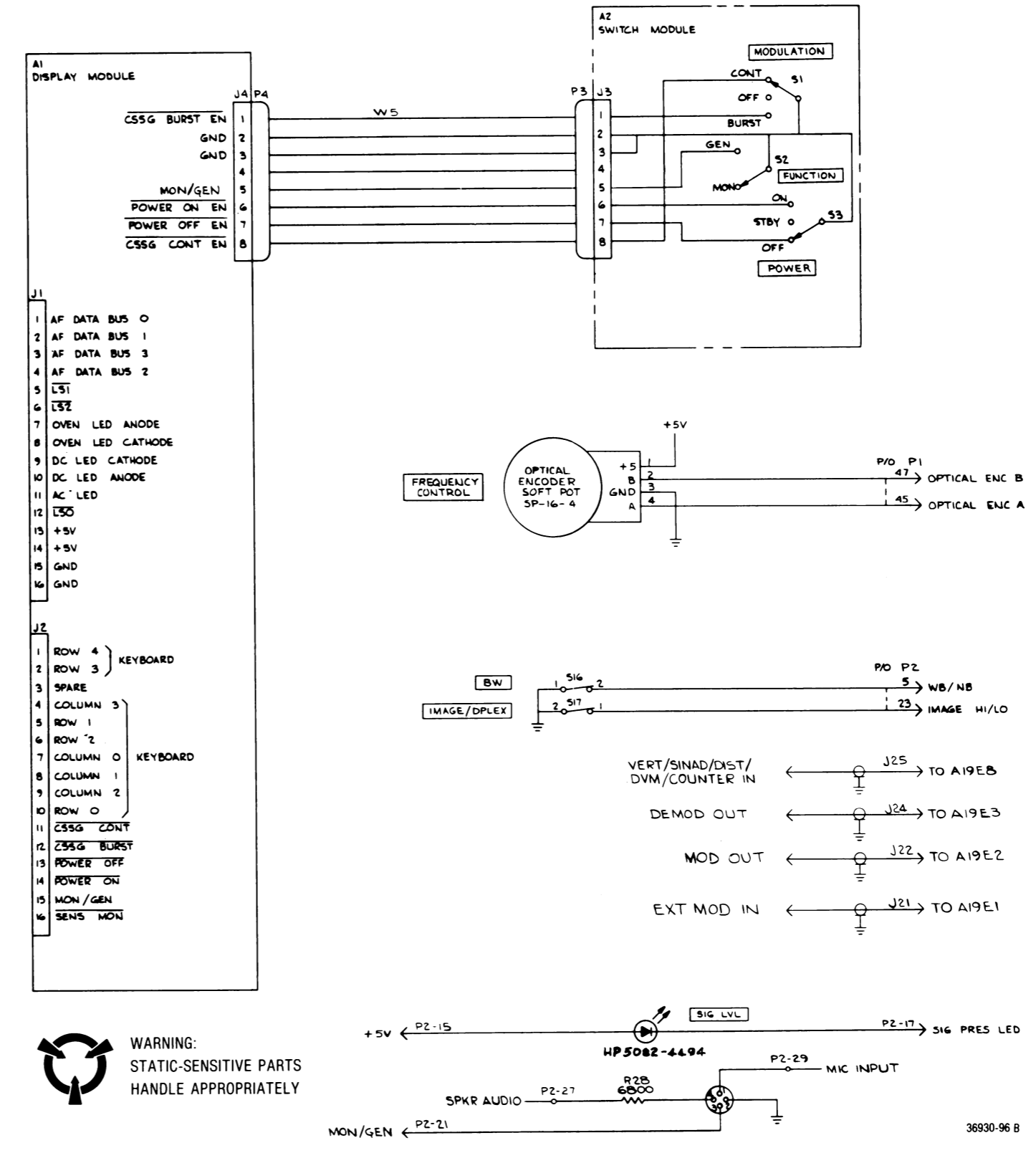
NOTES:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH IA1A.
2. UNLESS OTHERWISE SPECIFIED: ALL RESISTORS ARE IN OHMS, 2.5 PCT., 1/4 WATT. ALL VOLTAGES ARE DC.



WARNING:
STATIC-SENSITIVE PARTS
HANDLE APPROPRIATELY

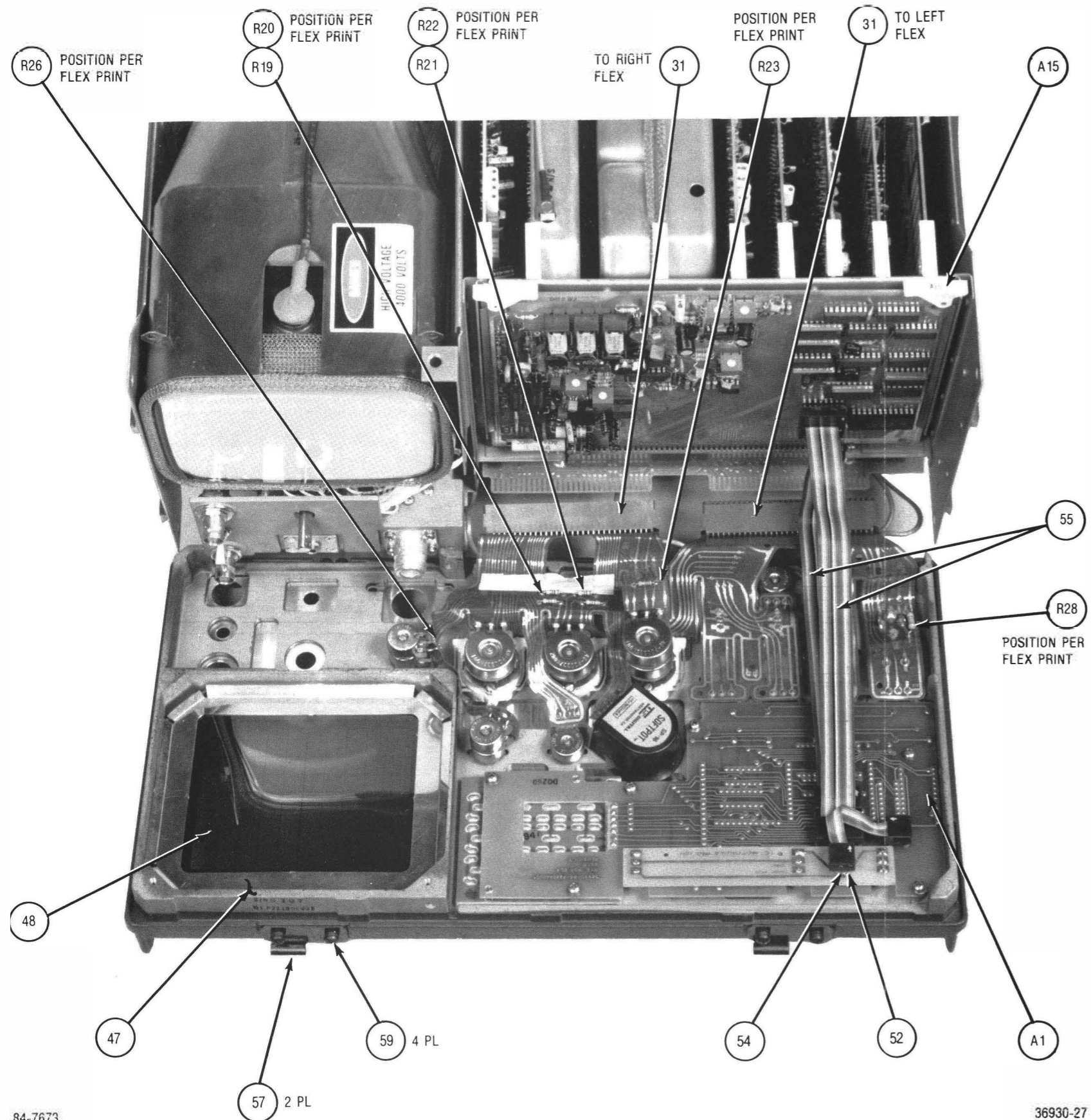
REF DESIGNATIONS	
HIGHEST USED	NOT USED
DS3	DS1, DS2
R2B	R24, R25
S19	S4-S7, S13
VR2	

Figure 18-1a. Front Panel Assembly - Schematic (Sheet 1 of 2)



WARNING:
STATIC-SENSITIVE PARTS
HANDLE APPROPRIATELY

Figure 18-1b. Front Panel Assembly - Schematic (Sheet 2 of 2)



84-7673

Figure 18-2b. Inside Front Panel - Photo (See Sheet 4, p. 18-9, for Parts List)

36930-27

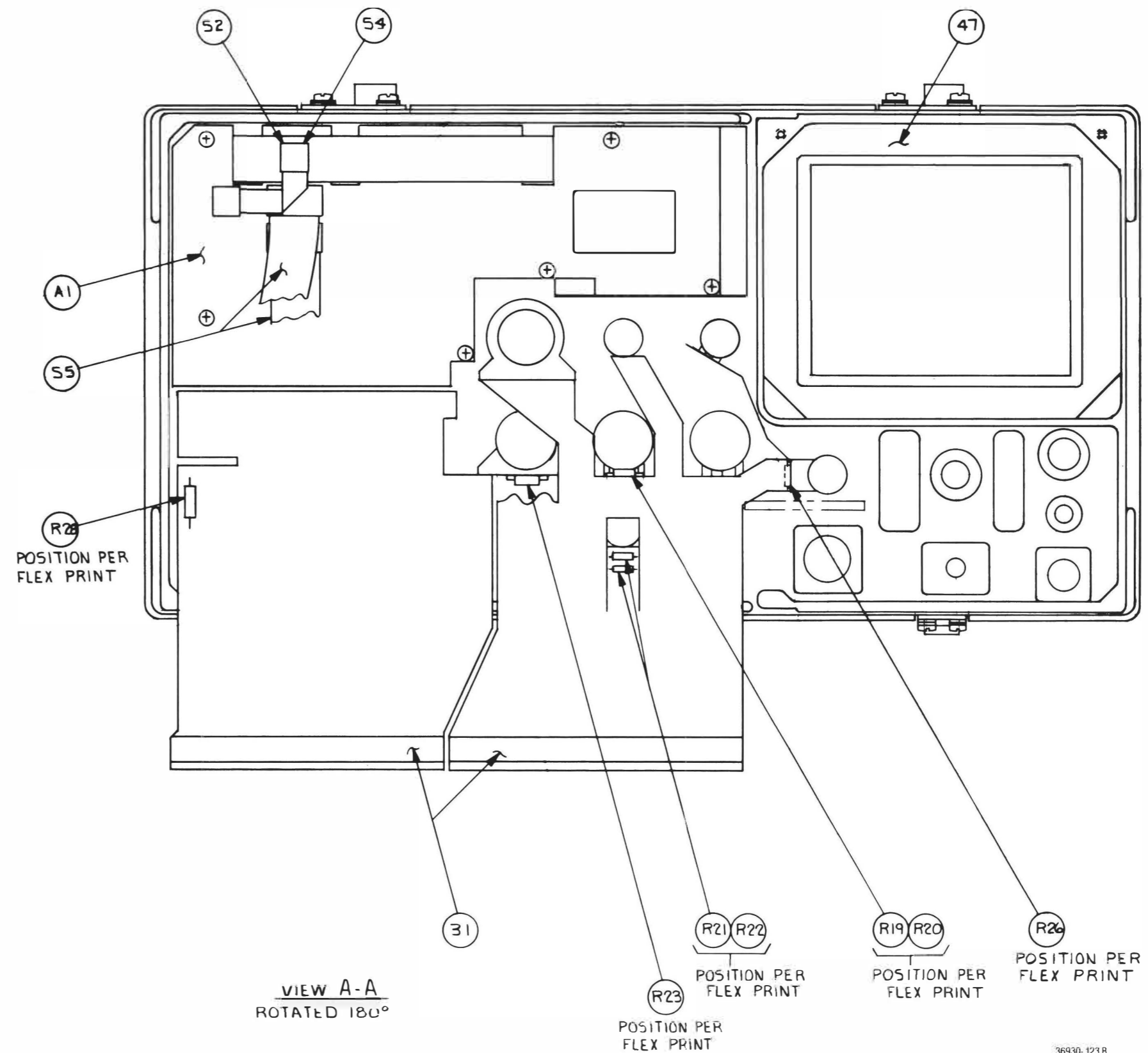


Figure 18-2c. Inside Front Panel - Drawing (See Sheet 4, p. 18-9, for Parts List)

FRONT PANEL ASSEMBLY (A18)

INSIDE FRONT PANEL

Figure 18-2b. Photo and Parts List

Figure 18-2c. Drawing and Parts List

(Sheet 2 of 4)

FRONT PANEL ASSEMBLY (A18)
FRONT PANEL LEFT AND RIGHT FLEXES
 Figure 18-2d. and 18-2e. Printed Wiring
 Board Assemblies and Parts List
 (Sheet 3 of 4)

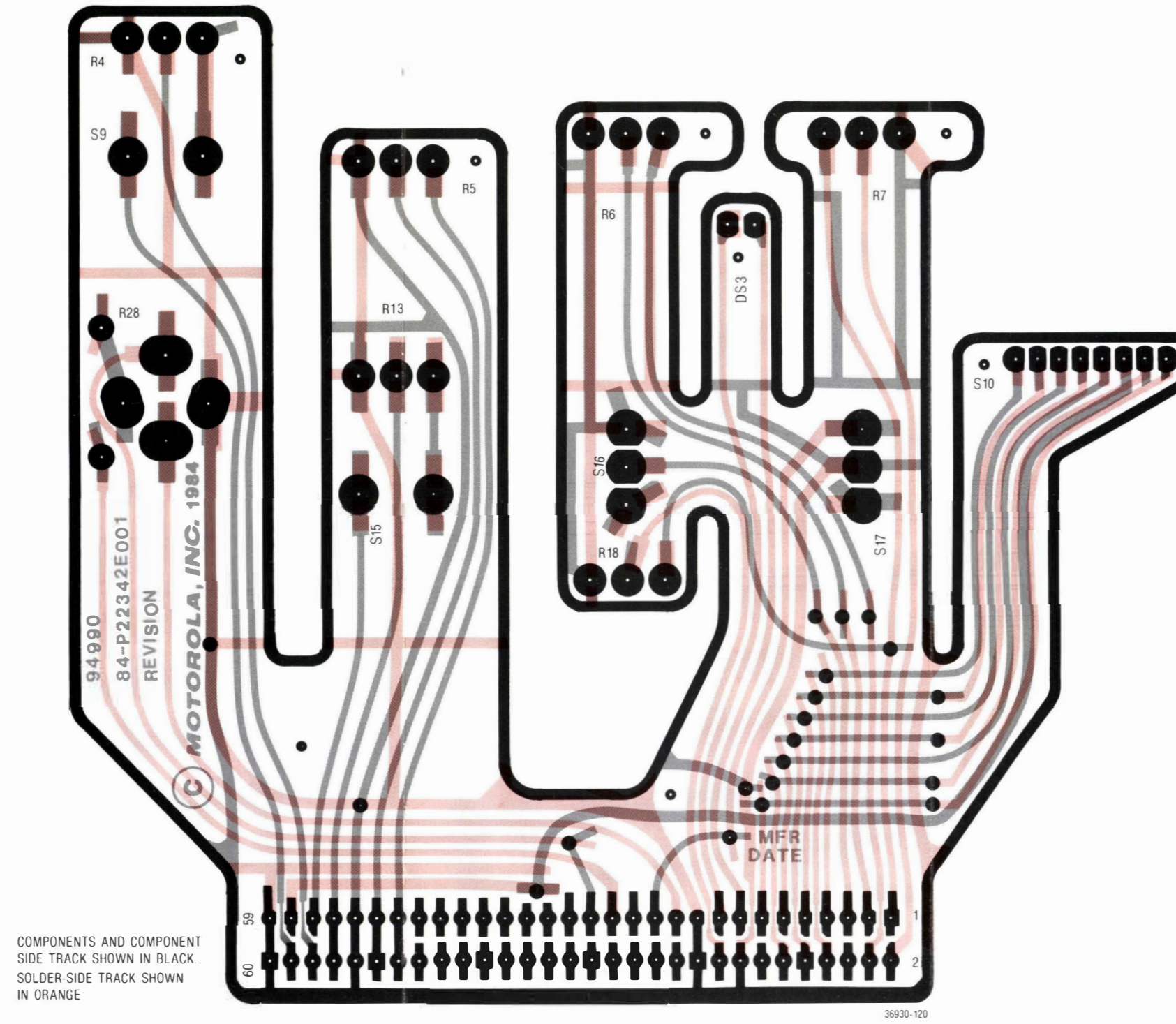


Figure 18-2d. Front Panel Left Flex (Display) (See Sheet 4, p. 18-9, for Parts List)

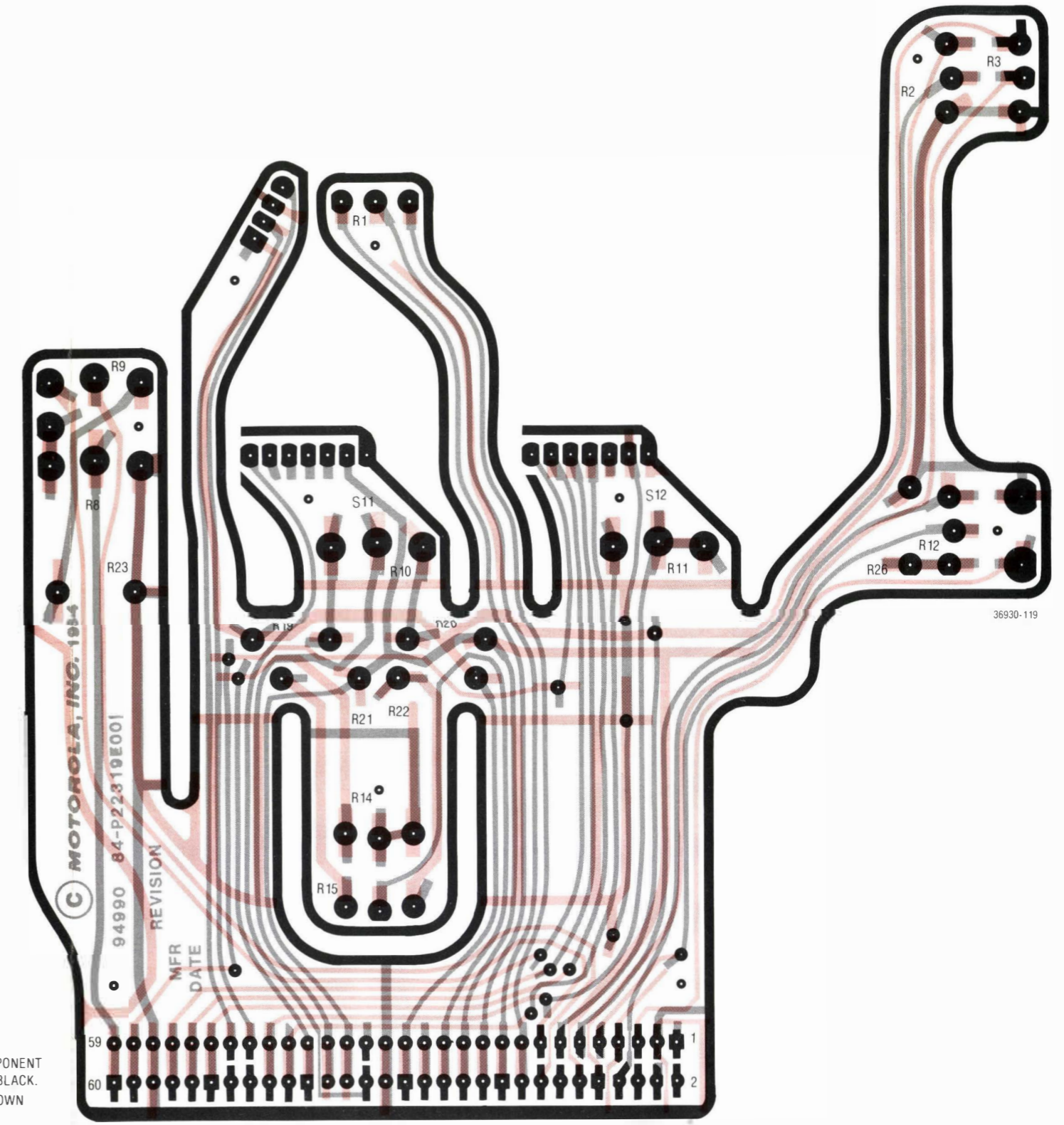


Figure 18-2e. Front Panel Right Flex (Scope) (See Sheet 4, p. 18-9, for Parts List)



COMPONENTS AND COMPONENT
SIDE TRACK SHOWN IN BLACK.
SOLDER-SIDE TRACK SHOWN
IN ORANGE

FRONT PANEL ASSEMBLY (A18)

Find No.	Qty. Req.	Part No.	Nomenclature	Part Value
002	6	02-80342B23	NUT, COMPONENT	3.8-32
003	8	02-80342B24	NUT, COMPONENT	1.4-32
010	1	40-80335A78	SWITCH, RESISTOR VARIABLE	SCOPE TRIG
011	1	40-80335A77	SWITCH, RESISTOR VARIABLE	SCOPE VERT.
012	1	40-80335A76	SWITCH/DUAL RESISTOR, VAR	SCOPE HORIZ
013	1	18-80346A13	RESISTOR, VARIABLE	
015	1	18-80346A13	RESISTOR, VARIABLE	
016	1	18-80346A18	RESISTOR, VARIABLE SWITCH	
017	1	18-80346A18	RESISTOR, VARIABLE SWITCH	
018	1	64-80343B59	OVERLAY, FRONT PANEL	
020	1	38-80331A49	PUSHBUTTON, SWITCH-0	
021	1	38-80331A50	PUSHBUTTON, SWITCH-1	
022	1	38-80331A51	PUSHBUTTON, SWITCH-2	
023	1	38-80331A52	PUSHBUTTON, SWITCH-3	
024	1	38-80331A53	PUSHBUTTON, SWITCH-4	
025	1	38-80331A54	PUSHBUTTON, SWITCH-5	
026	1	38-80331A55	PUSHBUTTON, SWITCH-6	
027	1	38-80331A56	PUSHBUTTON, SWITCH-7	
028	1	38-80331A57	PUSHBUTTON, SWITCH-8	
029	1	38-80331A58	PUSHBUTTON, SWITCH-9	
030	8	38-80331A48	PUSHBUTTON, SWITCH, DELTA	
031	2	09-80340B40	CONNECTOR	60 PIN W/O EARS
032	1	15-80341B26	HOLDER	
036	1	04-00007699	WASHER, COMP	
037	8	36-80343B03	KNOB	1.8 SHAFT
038	1	36-80343B04	KNOB	1.4 SHAFT
039	2	36-80343B01	KNOB, DUAL	1.8-1.4 SHAFT
047	1	75-80335A50	ISOLATOR, FRONT CRT	
048	1	13-80331A99	BEZEL	
049	1	36-80342B99	KNOB, DUAL	1.8-1.4 SHAFT
052	1	30-80343B91	CABLE ASSEMBLY, RIBBON	
053	2	36-80343B02	KNOB, DUAL	158-.238 SHAFT
054	1	09-80331A95	SOCKET, SOLDER DIP	8 PIN
055	2	30-80343B90	CABLE ASSEMBLY, RIBBON	
057	2	55-80335A89	HINGE	
058	2	55-00847016	STRIKE, CATCH	
059	8	03-80341B37	SCREW, PH ASSEMBLED	6-32X.312
060	1	30-80343B96	WASHER	
A 001	1	RTC-4049A	CABLE ASSEMBLY	A18J5/FLEX
DS003	1	48-84404E03	DISPLAY BOARD ASSY, A18A1	
J 001	1	09-00830418	CONNECTOR, MIC	
R 001	1	18-80346A15	RESISTOR, VAR, DISPR/SWP	10K-10-1.4
R 005	1	18-80346A16	RESISTOR, VAR, INT, MOD.	5K
R 006	1	18-80346A14	LVL	
R 007	1	18-80346A14	RESISTOR, VARIABLE	5K
R 012	1	18-80342B31	RESISTOR, VARIABLE	5K WITH SWITCH
R 018	1	18-80346A14	RESISTOR, VARIABLE	5K
R 019	1	06-11009C57	RESISTOR, VAR	2.2K-5-1.4
R 020	1	06-11009C57	RESISTOR	2.2K-5-1.4
R 021	1	06-11009C53	RESISTOR	1.5K-5-1.4
R 022	1	06-11009C53	RESISTOR	1.5K-5-1.4
R 023	1	06-11009C35	RESISTOR	270-5-1.4
R 026	1	06-11009C44	RESISTOR	620-5-1.4
R 028	1	06-11045A69	RESISTOR	6.8K-5-1/2
S 001	1	40-80335A82	SWITCH, TOGGLE	
S 002	1	40-80335A80	SWITCH, TOGGLE	
S 003	1	40-80335A81	SWITCH, TOGGLE	
S 008	1	18-80340B84	SOFTPOT, RF SCAN	
S 016	1	40-80335A80	SWITCH, TOGGLE	SPST, WB/NB
S 017	1	40-80335A80	SWITCH, TOGGLE	SPST, IMAGE

Cable Assembly (A18J5/FLEX)
30-80343B96

002	1	28-80342B90	CONNECTOR, BNC	
-----	---	-------------	----------------	--

FRONT PANEL ASSEMBLY (A18)

SWITCH INTERCONNECT BOARD (A18A2)

Figure 18-2f. Printed Wiring Board
Assembly and Parts List (Sheet 4 of 4)

Figure 18-2f. Switch Interconnect Board - Printed Wiring Board Assembly

FRONT PANEL ASSEMBLY

DISPLAY BOARD (A18A1)

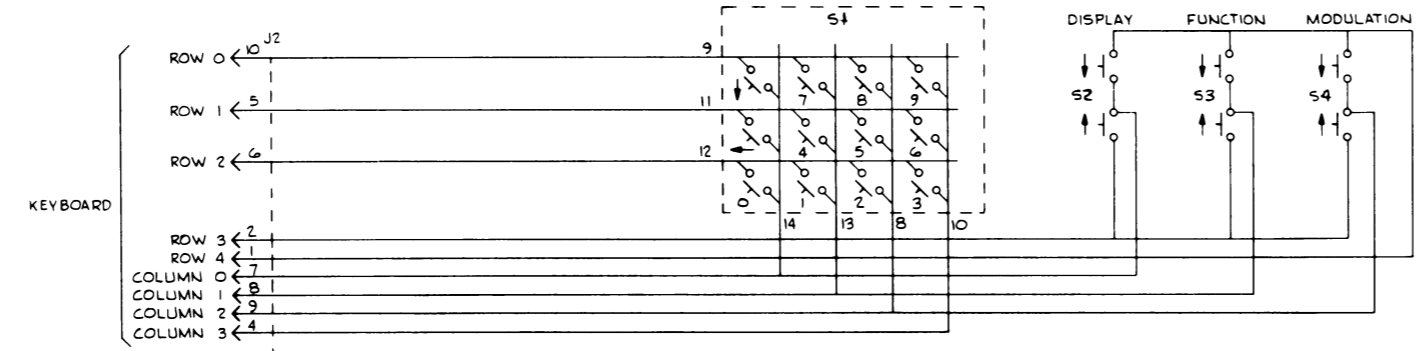
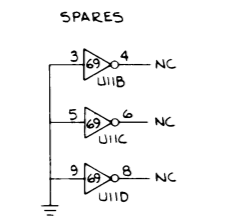
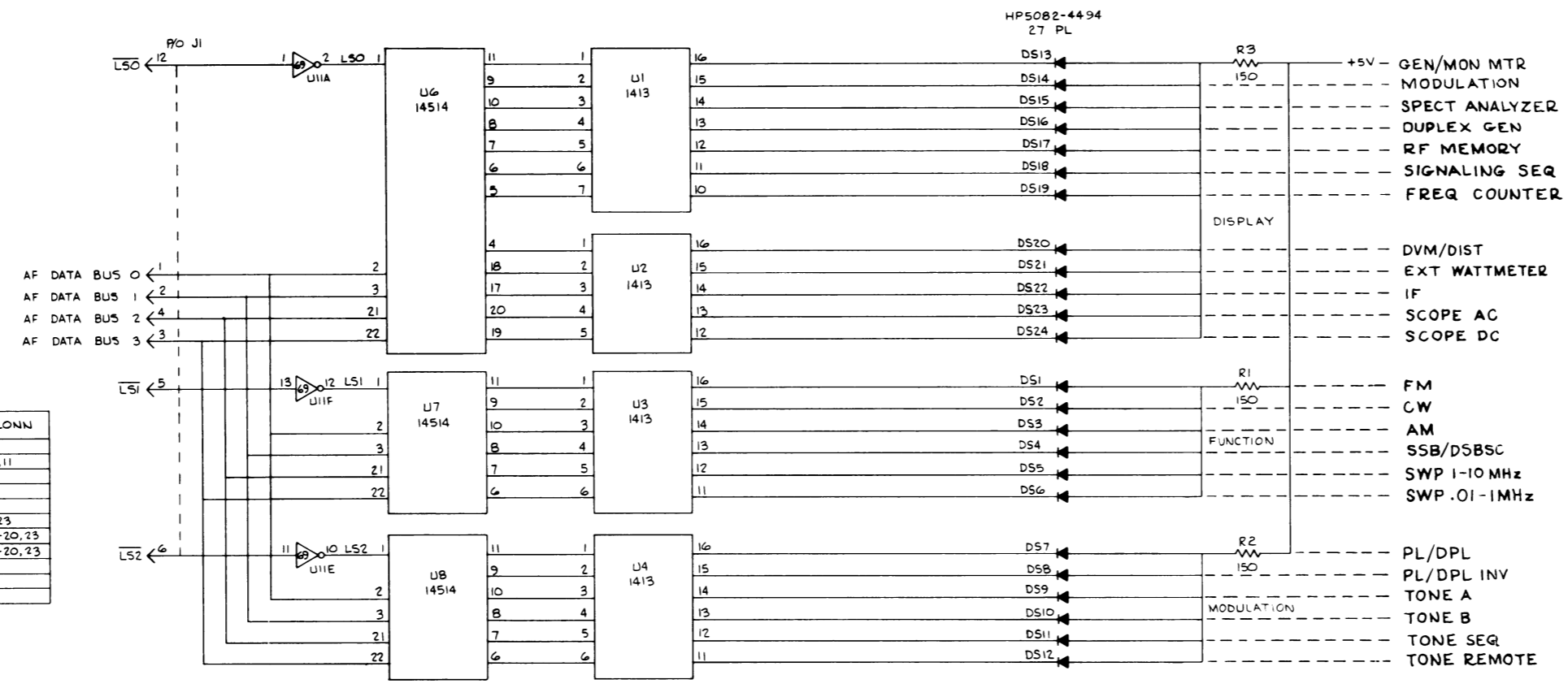
(RTC-4049A)

Figure 18-3. Schematic

- NOTES
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH A18A1.
 2. UNLESS OTHERWISE SPECIFIED: ALL RESISTORS ARE IN OHMS, 5% PCT, 1/4WATT. ALL VOLTAGES ARE DC.
 3. DEVICE TYPE AND CONNECTIONS NOT SHOWN ON SYMBOL ARE LISTED IN TABLE 1. UNDERLINED PORTION OF TYPE NUMBER IS USED AS A CODE TO IDENTIFY DEVICES ON DIAGRAM.


TABLE 1

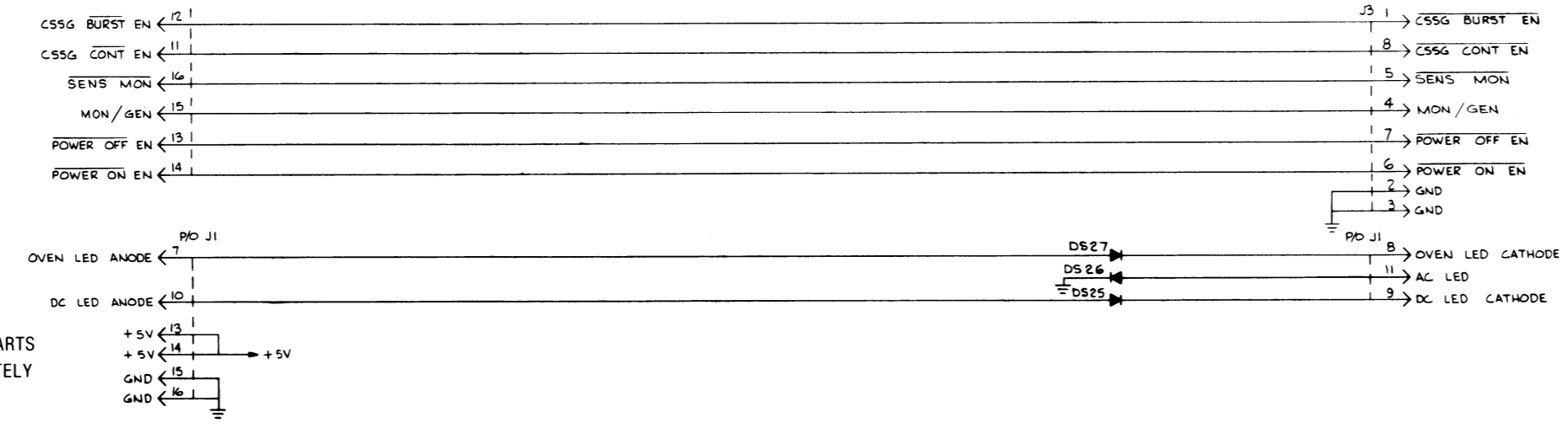
REF DES	DEVICE TYPE SEE NOTE 4	GND	+5V	NO CONN
U1	MC1413	8	9	
U2	MC1413	8	9	6,7,10,11
U3	MC1413	8	9	7,10
U4	MC1413	8	9	7,10
U6	MC14514	12	24	13-16,23
U7	MC14514	12	24	4,5,13-20,23
U8	MC14514	12	24	4,5,13-20,23
U11	MC14069	7	14	



REF DESIGNATIONS

HIGHEST USED	NOT USED
R3	
S7	
U * SEE TABLE 1	

WARNING:

 STATIC-SENSITIVE PARTS
 HANDLE APPROPRIATELY

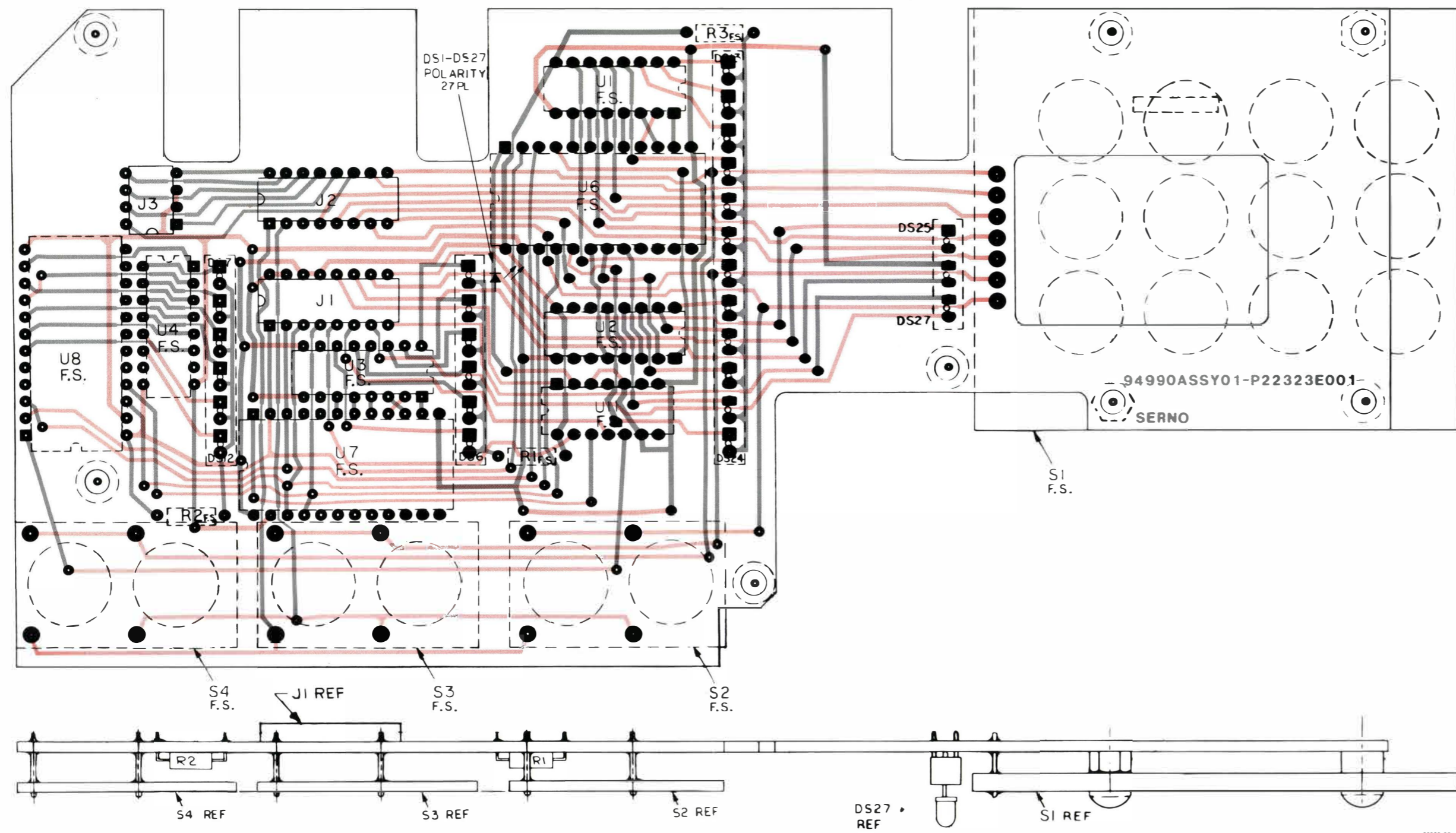


DISPLAY BOARD ASSEMBLY (A18A1)
RTC-4049A

FRONT PANEL ASSEMBLY
DISPLAY BOARD (A18A1)

(RTC-4049A)
Figure 18-4. Printed Wiring Board Assembly
and Parts List

Find No.	Qty. Req.	Part No.	Nomenclature	Part Value
DS001	1	48-80396A26	LED	
DS002	1	48-80396A26	LED	
DS003	1	48-80396A26	LED	
DS004	1	48-80396A26	LED	
DS005	1	48-80396A26	LED	
DS006	1	48-80396A26	LED	
DS007	1	48-80396A26	LED	
DS008	1	48-80396A26	LED	
DS009	1	48-80396A26	LED	
DS010	1	48-80396A26	LED	
DS011	1	48-80396A26	LED	
DS012	1	48-80396A26	LED	
DS013	1	48-80396A26	LED	
DS014	1	48-80396A26	LED	
DS015	1	48-80396A26	LED	
DS016	1	48-80396A26	LED	
DS017	1	48-80396A26	LED	
DS018	1	48-80396A26	LED	
DS019	1	48-80396A26	LED	
DS020	1	48-80396A26	LED	
DS021	1	48-80396A26	LED	
DS022	1	48-80396A26	LED	
DS023	1	48-80396A26	LED	
DS024	1	48-80396A26	LED	
DS025	1	48-80396A26	LED	
DS026	1	48-80396A26	LED	
DS027	1	48-80396A26	LED	
J 001	1	09-80331A97	SOCKET, SOLDER DIP	16 PIN
J 002	1	09-80331A97	SOCKET, SOLDER DIP	16 PIN
J 003	1	09-80331A95	SOCKET, SOLDER DIP	8 PIN
R 001	1	06-11009C29	RESISTOR	150-5-1/4
R 002	1	06-11009C29	RESISTOR	150-5-1/4
R 003	1	06-11009C29	RESISTOR	150-5-1/4
S 001	1	40-80396A32	SWITCH, PUSHBUTTON	12 POS
001	1	40-80335A64	SWITCH ASSEMBLY	3 x 4
S 002	1	40-80369A09	SWITCH, PUSHBUTTON	2 POS
001	1	40-80369A10	SWITCH, STRIP	M/F 1KS208
S 003	1	40-80369A09	SWITCH, PUSHBUTTON	2 POS
001	1	40-80369A10	SWITCH, STRIP	M/F 1KS208
S 004	1	40-80369A09	SWITCH, PUSHBUTTON	2 POS
001	1	40-80369A10	SWITCH, STRIP	M/F 1KS208
U 001	1	51-82884L70	INTEGRATED CIRCUIT	
U 002	1	51-82884L70	INTEGRATED CIRCUIT	
U 003	1	51-82884L70	INTEGRATED CIRCUIT	
U 004	1	51-82884L70	INTEGRATED CIRCUIT	
U 006	1	51-82884L32	INTEGRATED CIRCUIT	
U 007	1	51-82884L32	INTEGRATED CIRCUIT	
U 008	1	51-82884L32	INTEGRATED CIRCUIT	
U 011	1	51-05596E02	INTEGRATED CIRCUIT	



COMPONENTS AND COMPONENT
SIDE TRACK SHOWN IN BLACK.
SOLDER-SIDE TRACK SHOWN
IN ORANGE

36930-97

