TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT

MAINTENANCE MANUAL

COMMUNICATIONS SUBSYSTEM
P/O
SATELLITE COMMUNICATIONS
TERMINAL AN/TSC-86

(NSN 5895-01-083-6891)

HEADQUARTERS, DEPARTMENT OF THE ARMY

11 APRIL 1983

TECHNICAL MANUAL
No11-5895-1123-34

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 11 April 1983

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR

COMMUNICATIONS SUBSYSTEM

P/O
SATELLITE COMMUNICATIONS TERMINAL AN/TSC-86
(NSN 5895-01-083-6891)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DR-SEL-ME-MP, Fort Monmouth, NJ 07703. In either case, a reply will be furnished direct to you.

LIST OF ILLUSTRATIONS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual contains the description and maintenance information for the direct support and general support levels for the communications subsystem (fig. 1-1) used in the Super High Frequency (SHF) Satellite Communications Terminal AN/TSC-86. Maintenance procedures include test, troubleshooting, and repair. A list of reference documents is included as a appendix A to this manual.

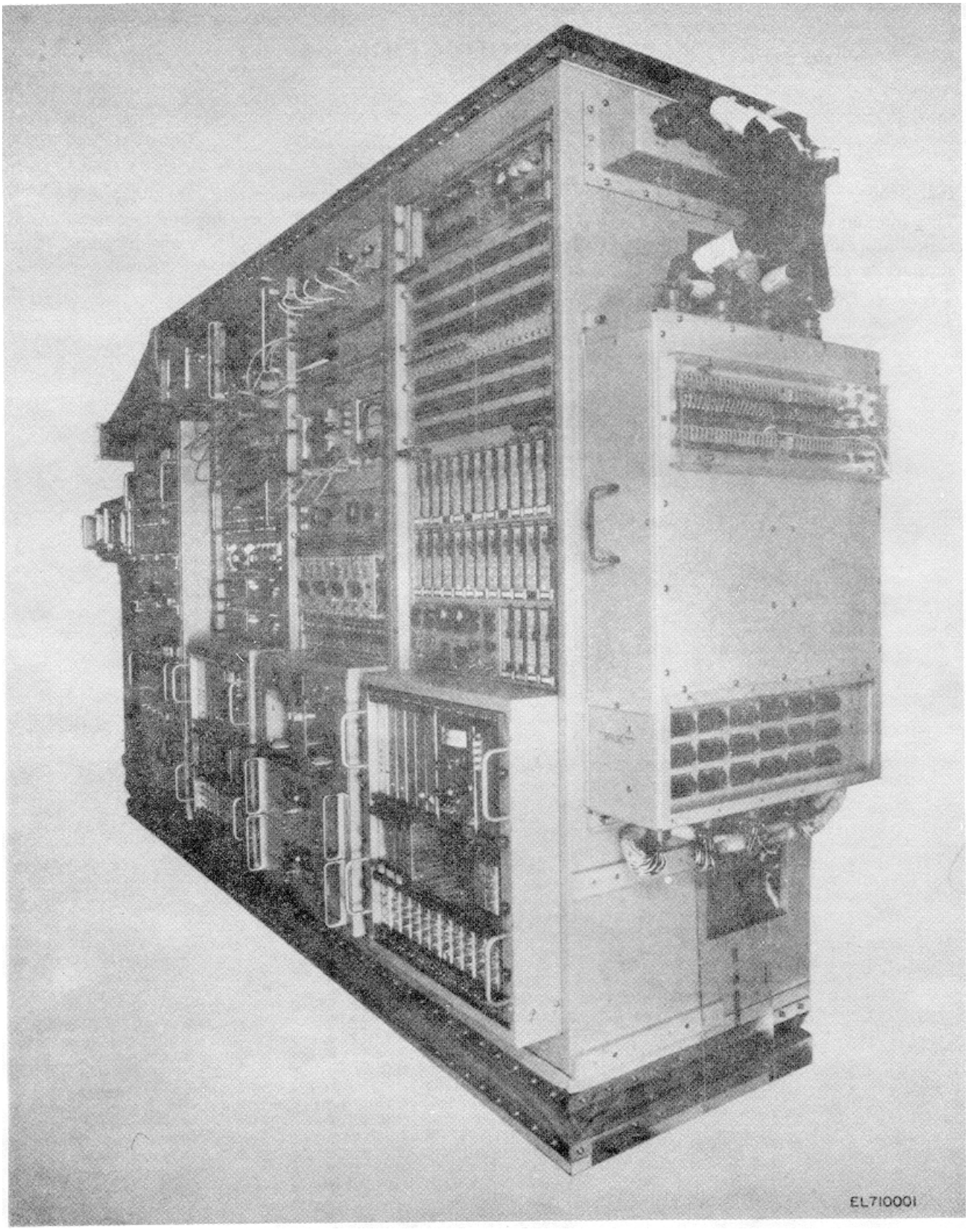


Figure 1-1. Communications Subsystem.

1-2. Consolidated Index of Army Publications and Blank Forms

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-3. Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

b. Report of Packaging and Handling Deficiencies. Fil out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73/AFR 400-54/MCO 4430.3E.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO P4610.19C/DLAR 4500.15.

1-4. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-5. Reporting Equipment Improvement Recommendations (EIR)

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. We'll send you a reply.

Section II. DESCRIPTION AND DATA

1-6. Purpose and Use

The AN/TSC-86 Communications Subsystem (CSS) is composed of all signal processing equipment necessary to interface the Defense Communications System (DCS) field user and the Radio Subsystem (RSS) on a full duplex basis. Refer to table 1-1 for a list of the CSS equipment complement and table 1-2 for the tabulated data.

Table 1-1. Equipment Complement

Qty	Nomenclature	Common name/unit No	Manual number
1	Teletype AN/UGC-74A(V)3	TTY	TM 11-5815-602-12
1	Oscilloscope R7704	Scope	TM 11-6625-2922-14&P
1	Meter, Power HP-436A	Power meter	
I	Generator, Pattern PG-404	Pattern generator	
1	Analyzer, Data DA-404	Data analyzer	
I	Frame Assembly, Central Distribution SM-F-935726	CTL DISTR FR ASSEM (CDF}	
1	Test Set, C/N TS-3580	C/N test set	TM 11-6625-2772-12
1	Regulator, Ac Line SM-C-936847	AC line regulator	
1	Monitor Panel, Ac Regulator SM-D-936692	AC RGLTR MON panel	
1	Patch Panel, IF SM-F-935727	IF patch panel	
2	Modem MD-1002	Modem	TM 11-5820-847-12
2	Encoder-Decoder KY-801A/GSC	Key generator	TM 11-5895-807-13
1	Analyzer, Spectrum IP-1216/PRC	Spectrum analyzer	TM 11-6625-2781-14
1	Test Set, Digital TS-3642	Digital test set	TM 11-6625-2839-14
1	Order wire RT-964(V)GRC Farinon type 70100	Orderwire	TM 11-5805-601-15
2	Converter, AD CV-3034A/G	A/D converter	TM 11-5895-797-14
2	Multiplexer, PCM AN/FCC-98	PCM MULTR Multiplexer	TM 11-5805-711-13
1	Panel, Communication Data Patch SM-A-936517	Data patch panel	
1	TestSet, SM-F-935746	Telephone Transmission (XMSN) test set	AN/USM-181B TM 11-6625-602-12-1
1	Monitor, Teletype Loop SM-D-936640	TTY loop MON	
1	Monitor, Control-48V/20 Hz SM-D-937511	Control monitor	
1	Generator, Key KG-81	Key generator	TM 11-5810-293-12P
2	Power Supply SM-A-935807	KG-81, PWR SPLY	Lambda LMB-28-M-R-7229-2

Table 1-1. Equipment Complement-Continued

Qty	Nomenclature	Common name/unit No	Manual number
Grp	Line Isolation Equipment consisting of:		
3	Isolator, Telegraph Line CU-1819/T	TLG line isolator	TO-31WA-2T-102
1	Power Supply CMT-0696	PWR SPLY CMT-0696	Stelma LIU-PS-6
1	Patch Panel, TTY/Low Level COMM SM-A-935861	TTY/LL COMM patch panel	
Grp	Keyer/Converter consisting of:		
	4 Keyer, Frequency Shift TK-201F	FSK	Stelma 90416001-100
	4 Converter, Frequency Shift TG-301F	FREQ shift CONV	Stelma 90415002-100
16	Filter, Bridge SM-A-935292	Bridge filter	Stelma 82520020-201 thru 216.
1	Suppressor, Echo ES-3B SM-A-935237	Echo suppressor	
1	Patch Panel, COMMIVF SM-A-935851	COMM/VF patch panel	
Grp	Line Conditioning Equipment consisting of:		
	48 Vdc Supply SM-F-935778	48-vdc supply	
	Converter, 20-Hz Ringdown CV-3250/FTC	20-Hz ringdown CONV	TM 11-5805-676-14&P
	Board, Carrier MT-4722	Carrier board	TM 11-5805-672-14&P
	Attenuator, Line Signal CV- 1449/FTC	Line SIG ATTEN	TM 11-5805-672-14&P
	Amplifier, Line AM-6745/FTC	Line amplifier	TM 11-5805-675-14&P
	Terminating Set TA-9451FTC	Terminating set	TM 11-5805-668-14&P
	Signal Unit, FREQ TA-941/FTC	FREQ SIG unit TA-941/FTC	TM 11-5805-667-14&P
	Signal Unit, FREQ TA-942/FTC	FREQ SIG unit TA-942	TM 11-5805-667-14&P
	Signaling Supply TA-943/FTC	SIG SPLY TA-943/FTC	TM 11-5805-667-14&P
	Signaling Supply TA-944/FTC	SIG SPLY TA-944/FTC	TM 11-5805-667-14&P
1	Patch Panel, COMM/TTY/FSK SM-A-935888	COMM/TTY/FSK patch panel	
1	20-Hz Ringing Supply Assembly SM-F-935784	20-Hz ring generator	

Table 1-2. Tabulated Data

PRIMARY POWER INTERFACE:	
Voltage	120 VAC + 10% single phase
Frequency	50 to 60 Hz ± 5%
VF INTERFACE:	
Impedance	600 ohm ± 10% over a frequency range of 300 to 3400 Hz.
Longitudinal Balance	Greater than 40 dB over a frequency range of 300 to 3400 Hz.
Return Loss	Minimum of 23 dB over the frequency range of 300 to 3400 Hz against a 600 ohm resistive load.
Frequency Response	The amplitude frequency response shall be within the following limits relative to a 1020 Hz ± 5 Hz test tone.

Frequency Band	Amplitude Range
Below 180 Hz	Greater than 0 dB
180-300 Hz	+4 to -1.5 dB
300-3000 Hz	+ 1.5 dB
3000-3400 Hz	+4 to -1.5 dB
3400-4600	Greater than 3 dB
Above 4600	Greater than 40 dB

Envelope Delay Distortion	400 microseconds maximum over the 500 to 3000-Hz band with bypassed line conditioning and echo suppressors. 175 microseconds maximum over the 1000 to 2500-Hz band with bypassed line conditioning and echo suppressors. 560 microseconds over the 500 to 3400-Hz when the line amplifiers are added to the bypassed situation.
Harmonic Distortion	Single harmonic product produced by any single 0 dBm 0 test tone within the band of 300 to 3400 Hz shall be at least 37 dB below reference measuring from the junction box input to the TD- 1192 output with a single line amplifier.
Idle Noise	Not greater than 30 dB measured overall utilizing line amplifiers in full duplex.
Crosstalk	Isolation on adjacent channels 65 dB minimum overall when a 0 dBm 0 test tone at 1020 + 5 Hz is inserted with all other channels terminated in 600 ohms ± 10%.
HIGH LEVEL TELETYPE INTERFACE:	
Voltage Levels	±60 volt polar or 130 volt to neutral

Table 1-2 Tabulated Data-Continued

Crosstalk	Not to exceed - 50 dBm O between any terminated audio line and high level TTY line as measured in any VF channel of 300 to 3400 Hz.
LOW LEVEL TELETYPE:	
Voltage Levels	+6 volts and -6 volts
BASEBAND DIGITAL DATA USER INTERFACE:	
Data Rates	20 kb/s 50 kbls 256 kb/s 512 kb/s 9.9999 Mb/s (10 Mb/s) externally processed.
Bit Error Rate	The amount of time for error free performance: User Rate — Time 20 kb/s — 9 minutes minimum 50 kb/s — 4 minutes minimum 256 kb/s — 40 seconds minimum 512 kb/s — 20 seconds minimum
Logic Levels	Low level +6 volts and -6 volts
Impedance	78 ohms balanced
Pulse Coded Modulation	Return to bias except for the externally processed 9.9999 Mb/s (10 Mb/s) which is NRZ.
IF OUTPUT INTERFACE:	
Frequency Output	70 MHz + 1 kHz center frequency, double sideband suppressed carrier.
Power Level	+ 10 dBm (terminated)
Impedance	50 ohms, + 10%, unbalanced
Type Modulation	NRZ Quadraphase or biphase shift keying (QPSK/BPSK)
Data Rates	1544 kb/s internally processed 9.9999 Mb/s (10 Mb/s) externally processed.

The CSS accepts Voice Frequency (VF), teletype (TTY), and baseband digital signals from external cable transmission networks and combines them with onboard teletype and voice orderwire signals to form a composite, multiplexed, digital signal called the mission bit stream. This bit stream is applied to a bulk encryption device for channel utilization security before routing to the digital data modem. The modulated 70-MHz Intermediate Frequency (IF) signal from the modem, defined as the output signal of the CSS, interfaces with the RSS via the IF patch panel. The IF patch panel is the radio-side terminus of the communications subsystem while the signal entry panels at the shelter wall form the user-side of the CSS. Received communications from the far-end radio system flow through the CSS in the reverse order from the IF patch panel to the user by way of the signal entry panel. Various critical equipments in the CSS are redundant for reliability enhancement. In addition, a group of test equipments is included to support specific CSS requirements.

1-7. Description

The AN/TSC-86 terminal CSS is capable of interfacing with various types of DCS field user communications and the RSS.

a. The CSS is able to receive VF, TTY, and baseband digital signals and process them into multiplexed, encryptioned bit stream modulated on a 70-MHz IF carrier compatible with the input requirements of the RSS. The RSS then converts the IF to SHF for transmission to the communications satellite.

b. For maximum processing of VF, the CSS can handle up to 12 VF (four wire or two wire) sets with an additional two channels for the orderwire and TTY.

c. The CSS can process up to nine duplex TTY channels, five of which are dedicated to remote FSK users. The remaining four channels may be apportioned among any combination of high-level and lowlevel TTY users, except that the number of high-level circuits is limited to a maximum of three.

d. The CSS is equipped to process baseband digital signals which, at the maximum multiplexer capability, may consist of two 50 kb/s and four 0-20 kb/s asynchronous bit streams, together with one synchronous bit stream that may be at either a 256 or a 512 kb/s data rate.

e. Various combinations of VF, TTY, and digital signals can be simultaneously processed, with the total multiplexed data rate not to exceed 1544 kb/s. The multiplexer can operate at the lower data rates of 192, 384, or 768 kb/s for conservation of transmitted if power and bandwidth, but at these lower data rates, the number and/or types of input signals must be reduced accordingly.

f. The CSS is also capable of receiving an externally processed 9. Mb/s (10 Mb/s) data stream at the input of either modem to be modulated on a 70-MHz IF carrier for insertion into the RS for transmission.

g. The receive signal processing is the same as for transmit except that it is in the reverse order and direction through the CSS equipment.

h. Tunk encryption equipment in the CSS is used to maintain the appearance that the system is always operating at maximum channel density so that any change in the intensity of message traffic cannot be detected.

CHAPTER 2

FUNCTIONING OF EQUIPMENT

2-1. General

This chapter contains the overall functional description of the AN/TSC-86 CSS along with a functional description of each active assembly.

2-2. Overall Functional Description

a. The CSS overall functional block diagram, as shown in figure 2-1, consists of four major processing functions and three signal entry panels.

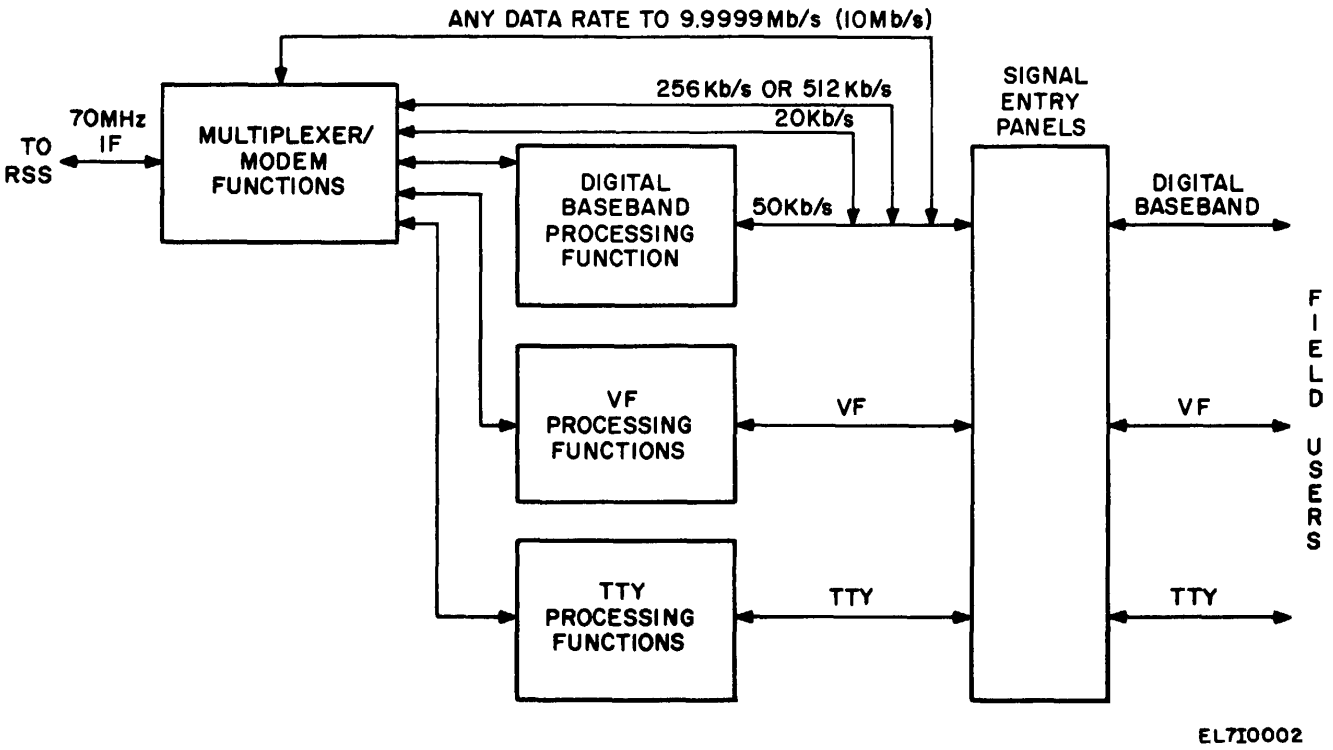


Figure 2-1. Overall Function Block Diagram of CSS.

b. The data at the signal entry panels can be digital baseband, TTY, and/or VF.

c. The TTY inputs are applied to the TTY processing functions where they are prepared for interfacing with the input of the Multiplexer/Modem Functions. The TTY processing functions are capable of processing up to nine full duplex TTY channels of which five must be externally generated FSK TTY. Of the remaining four channels, three can be high level TTY which is first changed to low level TTY before being converted to FSK for interfacing with the input of the Multiplexer/Modem functions. The remaining channel can only be used to convert a low level TTY signal to FSK. If any of the three high level TTY input channels are not being used to process high level TTY, they can be used for low level TTY inputs. The nine processed TTY channels are fed through a nine channel filter bridge which forms them into a single stream to be fed into one VF channel of the Multiplexer/Modem functions. On the receive part of the CSS operation, the output from the Multiplexer/ Modem functions is fed back through the TTY Processing Unit, reversing the process described above, to provide the TTY field users with the appropriate TTY format compatible with their teletype system.

d. Up to 12 VF channels can be processed in the CSS. The VF channels can either be two-wire or fourwire service. In the VF processing function, the signals coming from or going to the field users are adjusted to a 0 dBm level. The four wire channels can either use 1600-Hz or 2400-Hz frequencies for signaling purposes and the two-wire uses a 20-Hz frequency. The signaling units and ringdown converters detect and translate the signaling frequencies into transmit (M) and receive (E) signals. the M signals are sent to the Multiplexer/Modem functions for transmission with their assigned bit stream on a timed shared basis with the framing information. The two-wire service is converted to four-wire transmitting and back to two-wire for the user upon receiving. The 12 VF channels are fed through echo suppressors before being sent to the Multiplexer/Modem functions for transmitting.

e. The CSS is also capable of processing baseband digital data inputs from field users. The data channels available are four 20 kb/s, two hybrid 50 kb/s, 256 kb/s or 512 kb/s, and a channel for externally multiplexed data up to 9.9999 Mb/s (10 Mb/s). The 20 kb/s and 256/512 kb/s channels are in a format that permits them to interface directly into the input of the Mutiplexer/Modem functions. The two hybrid 50 Kb/s channels which have been externally encrypted for voice secure transmissions (scrambled) must pass through the internal Digital Baseband Processing Function to be converted into a pulse coded modulated (PCM) format suitable to be applied to the input of the Multiplexer/Modem functions. Since the Multiplexer used in the Multiplexer/Modem functions is only capable of providing up to 1.544 Mb/s on its output, the 10 Mb/s data line bypasses the multiplexer and is applied directly to the modem. This direct path to the modem provides a means of transmitting any externally multiplexed PCM data stream up to 9.9999 Mb/s (10 Mb/s). When receiving data, the processes described above are reversed in order that each field user is provided with the proper data rate and format.

f. The Multiplexer/Modem functions are used to convert the various digital baseband, VF, and TTY data streams into a 70-MHz IF, biphase, or quadraphase shift keyed data stream required by the input of the RSS to prepare it for final transmission to the satellite. Other than externally multiplexed data rate input, the Multiplexer/Modem functions can process any combination of TTY, VF, and digital baseband channels not to exceed 24 channels, including one for the orderwire. The combined data rate of the multiplexed 24 channels cannot exceed 1.544 Mb/ s. The Multiplexer/Modem functions include an encoder/decoder for error correction. Also encryption equipment is provided to prevent any change in message traffic level from being detected.

g. The signal entry panels are equipped with Electromagnetic Pulse (EMP) protectors for protection against the combination of electric and magnetic fields produced by an exoatmospheric nuclear detonation. Such detonation creates an extremely high energy RF pulse of duration on the order Of 250 nanoseconds and rise time of 5KV/nanosecond. The electric field strength can be on the order of 100,000 volts/meter. In addition, interior bulkhead connectors are employed which include radio frequency interference suppression and series element fuse protectors.

h. The CSS contains an orderwire and a standard telephone which can be connected into a local telephone system. Entry panel connectors for patching a 5-MHz standard, and 70/700-MHz auxiliary inputs to the RSS are provided. The CSS also has entry panel connectors to accommodate four additional four-wire inputs from miscellaneous VF users.

i. Test equipment is provided to monitor the operation of some equipment in the CSS.

2-3. Functional Description of Teletype Processing System

a. The Teletype (TTY) Processing System's Simplified Diagram is shown in figure 2-2.

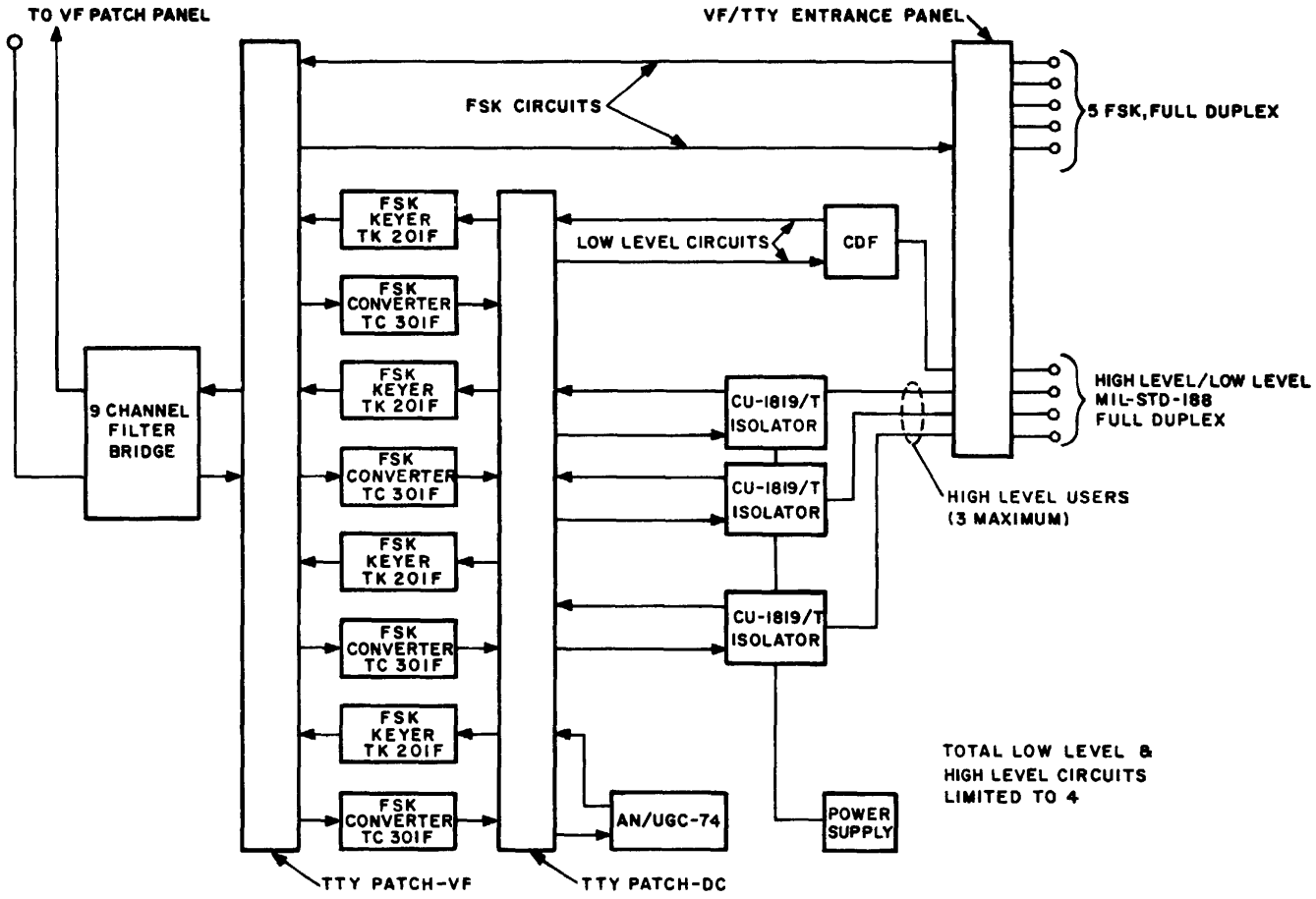


Figure 2-2. Teletype Processing System-Simplified Diagram.

b. The TTY Processing System can process a maximum of nine full duplex TTY channels to include:

(1) Five external Frequency Shift Keyed (FSK) channels.

(2) One low level TTY channel.

(3) Three high level TTY channels which can be used for low level TTY if three high level TTY channels are not required.

c. The five FSK TTY channels from the voice (VF) TTY entrance panel pass thru the Central Distribution Frame (CDF) and terminate on the TTY Patch-VF panel at the input to the nine channel filter bridge.

d. nine channel TTY filter bridge is provided with 16 pairs of channel cards (16 for transmit and 16 for receive) which will allow the nine channels to operate at any nine of the 16 frequencies listed in table 2-1.

Table 2-1. Channel Frequencies

Channel frequencies		
Center frequency	Space frequency	Mark frequency
(Hz)	(Hz)	(Hz)
425	467.5	382.5
595	637.5	552.5
765	807.5	722.5
935	977.5	892.5
1105	1147.5	1062.6
1275	1317.5	1232.5
1445	1487.5	1402.5
1615	1657.5	1572.5
1785	1827.5	1742.5
1955	1997.5	1912.5
2125	2167.5	2082.5
2295	2337.5	2252.5
2465	2507.5	2422.5
2635	2677.5	2592.5
2805	2847.5	2762.5
2975	3017.5	2932.5

The receive and transmit frequencies are normally the same for any particular channel.

e. Each TTY input is patched from the TTY Patch-VF panel to the channel on the nine channel TTY bridge which is set to operate at its appropriate frequency.

f. The output from the nine channel TTY bridge is a composite VF signal of the inputs which is fed to the input of the multiplexer as one VF channel via the VF patch panel.

g. A maximum of three high level TTY inputs can be sent to the inputs of three separate CU-1819/T isolators which convert the high level TTY voltage of neutral to 130 volts (20 ma or 60 ma) or +60 volts (2 ma) polar to low level TTY voltages of +6 volts before they are patched to the low level TTY patch panel.

h. From the TTY Patch panel, the high level TTY channels can be patched to any three of the four FSK keyers which convert them into audio/tones to interface with three of the input channels of the nine channel TTY filter bridge.

i. The FSK keyers can be set to operate at any of the 16 channel frequencies listed for the nine channel TTY filter bridge.

j. The three FSK keyers can be used to process low level TTY user data, instead of high level by bypassing the CU-1819/T isolators via patching and applying them directly to the TTY Patch panel.

k. An additional low level TTY user channel is available which comes from the VF/TTY entrance panel through the CDF directly to the TTY Patch panel.

l. The internal CSS teletype which is low level TTY can also be patched into one of the FSK keyers via the TTY Patch panel in lieu of a field user.

m. The outputs of the four FSK keyers ultimately are combined with the five external FSK users in the nine channel TTY filter bridge to form the composite VF signal allotted as the one input VF channel for the multiplexer.

n. During the receive operation, a composite VF signal is received from one VF channel of the multiplexer and is fed back through the receive channels of the nine channel TTY filter bridge where it is separated, by filtering, into nine separate TTY channels.

o. The separated channels are patched back through the TTY Patch-VF.

p. Five of the channels are then sent to the five FSK field users, with the remaining four channels being patched through the four FSK converters which converts them from FSK VF signals back to low level TTY.

q. The outputs of three converters at the TTY

Patch panel can be fed through the CU-1819/T isolators to be converted back to high level TTY voltages for field users or be used in conjunction with the one remaining FSK converter to supply as many as four low level TTY channels for field users and/or the internal TTY.

2-4. Voice Frequency Processing System

a. The Voice Frequency Processing System is capable of processing 12 VF channels. The 12 channels can be any combination of four-wire VF channels using 1600-Hz or 2600-Hz signaling frequencies and/or two-wire VF channels using 20-Hz signaling frequencies.

b. Figure 2-3 shows a block diagram for one channel of four-wire VF and one channel for two-wire VF.

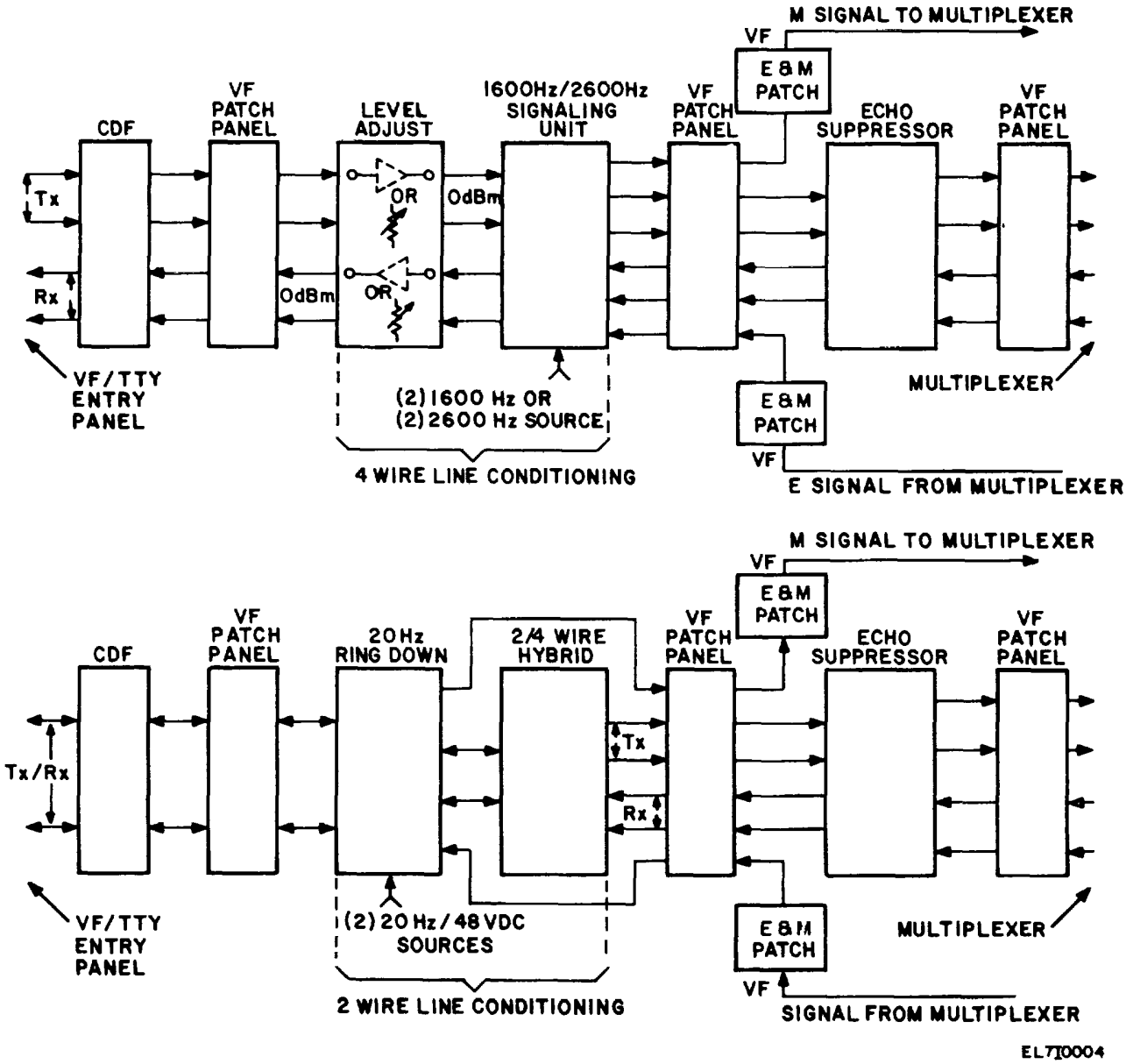


Figure 2-3. 2- Wire VF channels.

c. The main difference between the two types of VF processing is in the line conditioning equipment.

d. For four-wire VF channel processing, the line conditioning equipment consists of a level adjust stage which is responsible for ensuring that the signal on each Tx line from the user is set for a 0 dBm level. This level adjustment is accomplished by either inserting an amplifier to boost the signal

strength or an attenuator pad to reduce the signal. The level adjust stage also ensures that the signal on the Rx line is sent to the user at the same 0 dBm level during a receive operation.

e. In the signaling unit, during idle (on-hook) con ditions at both terminals, both transmit signal (M) leads are grounded, a continuous tone is transmitted from both terminals, and both receive signal (E) leads are open.

f. When a call is originated at one of the terminals, dc-dial pulses are placed on the M-lead and the transmit section of the signaling unit produces corresponding tone-bursts on the send line for transmission to the distant terminal.

g. The receive section of the signaling unit at the distant terminal converts the received tones into open or ground E-lead conditions.

h. When dialing is completed, the M-lead at the calling terminal assumes a steady -48 volt level, which halts transmission of the tone (from the calling terminal) and causes the E-lead at the distant terminal to assume a steady-ground condition.

i. When the distant terminal answers, the distant M-lead assumes a steady -48 volt level.

j. Also, transmission of the tone ceases, and the E-lead at the calling terminal assumes a steady ground condition.

k. This action allows the Tx and Rx lines to be cleared for normal voice channel communications.

l. When the call is completed and both terminals are in the on-hook condition, ground is applied to the M-leads, the transmit sections transmit tones, and the E-leads are open.

m. In trunk applicators, supervisory signals are transmitted from one terminal to the other through activation of the M-lead. Multiply-frequency dial tone pulses may also be used for signaling with the signaling unit in the line.

n. Two-wire VF channel 20-IHz ringdown opera tion is similar to dc-dialing operation described above except for E and M-lead conditions.

o. In 20-Hz ringdown, during the on-hook or traffic conditions, the M-lead is at -48 volts, the E-lead is grounded, and tone is off.

p. During signaling, the M-lead is grounded, the E-lead is open, and a tone is transmitted for the duration of the 20-Hz ringdown.

q. For ringdown operation, a two to four-wire Hy brid termination device-must be used to interface the four-wire dropside of the signaling unit and the two wire ringdown circuit.

r. In addition, a ringdown converter must be used to convert E and M signaling to 20 Hz (and vice versa) between the signaling unit and ringdown circuit.

s. The 12 two and/or four-wire VF channels are equipped with dual 1600 Hz, 2600 Hz, and 20 Hz/48 vdc sources to provide automatic switch over from an online source to a standby source in the event of equipment failure. The redundancy helps to provide continuous operation under most conditions.

t. The outputs from the 12-line conditioning cir cuits can be patched through the echo suppressor to the multiplexer via the VF patch panel.

u. The echo suppressor, which has 14 channels (two for spares), is used to reduce or eliminate feed back signals in the VF channels.

v. The receive operation is the same except that the signals flow in the reverse direction from the multiplexer back to the field users.

2-5. Digital Baseband Processing System

a. Figure 2-4 is a simplified diagram of the Digital Baseband Processing System in the CSS.

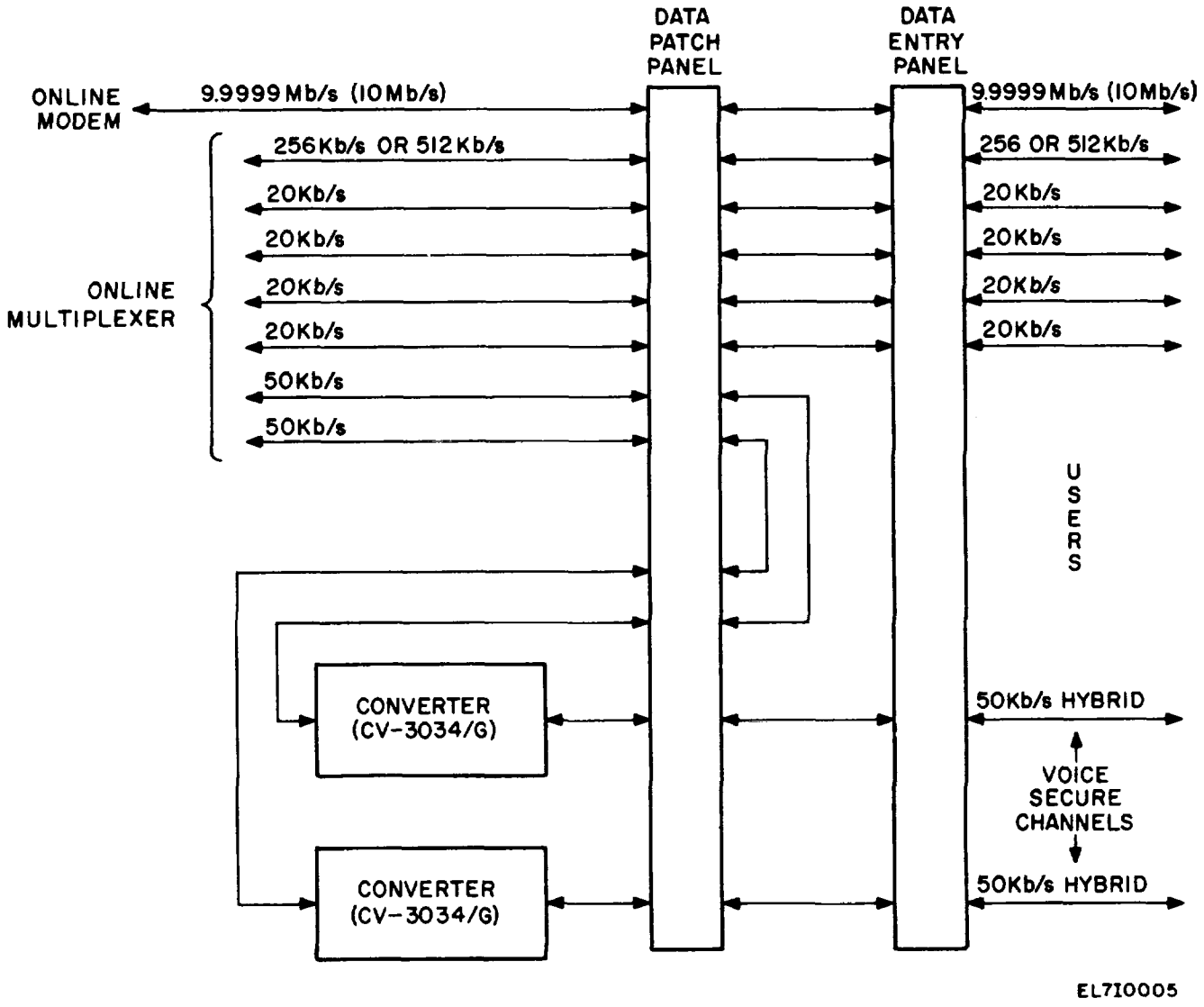


Figure 2-4. Digital Baseband Processing-Simplified Diagram.

b. The digital inputs from the users can be four 20-kbs/s channels, a 256 or 512-kb/s channel, two 50-kb/s Hybrid channels, and a channel which can be operated at any data rate up to 9.9999 Mb/s (10 Mb/ s). The four 20-kb/s channels and the 256/512-kb/s channels are patched from the data entry panel through the data patch panel to the multiplexer for further processing. The two 50-kb/s Hybrid channels, which are externally encrypted for secure voice transmission, must first pass through A-to-D con verters before being sent to the multiplexer.

c. The A-to-D converters change the analog hybrid signals applied to the inputs to digital data that is compatible with the multiplexer input.

d After the analog hybrid signals are converted to digital form, they are patched back through the data patch panel to the online multiplexer.

e. The multiplexers in the CSS are limited to a maximum mission bit stream data rate of 1.544 me 2-8 ing-Simplified Diagram. gabits per second. The modems, however, can handle data streams of up to a 9.9999 Mb/s rate (commonly referred to as 10 Mb/s). An additional input line is provided at the data entry panel so that a 10 Mb/s mission bit stream from an external multiplexer can be routed directly to the online modem. This input is patched to the modem by way of the data patch panel.

f. The operation described above is the same for receiving data, except the data passes through the unit in the reverse direction to the field user.

.

2-6. Multiplexer/Modem Processing Units

a. Figure 2-5 is a simplified diagram of the Multiplexer/Modem processing functions. As can be seen dual equipments are provided throughout this part of the CSS to provide a backup supplement in case of equipment failure

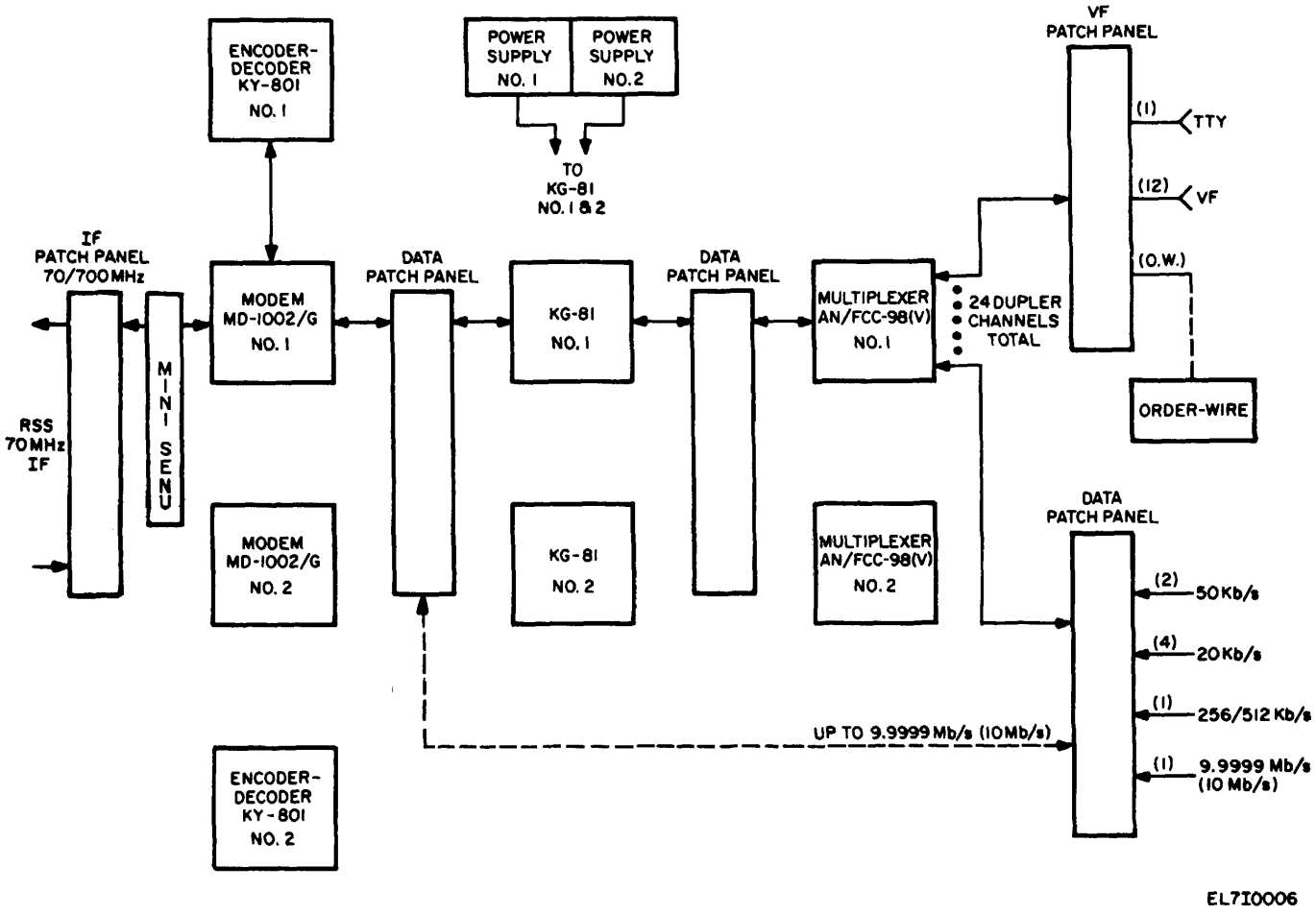


Figure 2-5. Multiplexer/Modem Processing Functions, Simplified Diagram

b. In figure 2-5, the data is shown being patched through the upper units (designated No. 1) but in reality the data can be patched through the lower units (designated No. 2) or any combination of No. 1 and No. 2 units as desired or necessary.

c. The overall purpose of these units is to accept up to 24 channels of VF, TTY, order wire (OW), and/or digital baseband data from their appropriate processing functions described above, and combine them into one stream of data on a 70-kHz IF carrier. The 70-kHz IF modulated carrier is the output of the CSS. This output is patched to the Radio Subsystem (RSS) through the IF patch panel.

d. In the receive mode of operation, the modem/ multiplexer processing function receives the 70-kHz IF signal from the RSS, removes the stream of data from the 70-kHz IF carrier, and then separates the data stream into 24 separate channels. The 24 channels are then patched back through the TTY, VF, OW, and/or digital baseband circuits for final preparation to be sent to the field users.

e. To initially perform the transmit process, data is patched through the VF and data patch panels to the input channels of the AN/FCC-98(V) multiplexer.

f. The multiplexer is capable of operating in four different channel modes; three, six, twelve or twenty four at the corresponding output rates of 192, 384, 768, and 1544 kb/s respectively. Each of the 24 avail able channels can support up to 64 kb of VF or digital dat*a.* Data rates of 20, or 50 kb/s therefore only re quire one channel for each field user input, while the 256/512 kb/s field user input requires multiple channels. The 256 kb/s user requires four input channels and the 512 kb/s user requires eight. The proper number of channels for the 256/512 kb/s data input is selected by inserting an appropriate data card into the multiplexer. When inserted into the multiplexer, the 256 kb/s data card will utilize the channel position where it is inserted and the next three higher numbered channels. Similarly, a 512 kb/s data card will utilize the channel of the insertion position and the next seven higher channels. Because the maxi mum output data rate of the multiplexer is limited to 1544 kbls (1536 information bits plus eight overhead timing bits), externally multiplexed data rates up to 9.9999 Mb/s (10 Mb/s) (which is the operating limit of the modem) bypass the multiplexer and are directly applied to the modem, as shown in figure 2-5. Digital data users of the 50 kb/s, 20 kb/s, and 256/512 kb/s rates are patched into channels one through twelve only, while the OW, TTY, and 12 VF channels can be patched into any of the 24 available input channels. It is normal operating practice to reserve one VF channel for orderwire. The OW is usually used as a communication means between operators at each end of the satellite link, but may also be patched to subscribers by way of the VF patch panel. The dedication of one VF channel for OW may be preempted when warranted by heavy demand for the availability of VF channels. Table 2-2 lists the maximum number of channel types that may be used in each of the four data rate modes of the mission bit stream.

Table 2-2. Maximum Number of Channel Types in CSS (Not Simultaneous)

	Mission Bit Stream			
	192 kb/s	384 kb/s	768 kb/s	1544 kb/s
	3 chan	6 chan	12 chan	24 chan
VOICE CHANNELS (includes 1 order wire and possibly 1 FSK teletype group):	3 max.	6 max.	12 max.	14 max.
50 kb/s asynchronous	2 max.	2 max.	2 max.	2 max.
256 kbls synchronous	NO	NO	NO	1 max.
512 kb/s synchronous	NO	NO	NO	1 max.
0-20 kb/s asynchronous	3 max.	4 max.	4 max.	4 max.

Prior to referring to table 2-3, which lists full loading examples of the different types of traffic at the different data rates, the following should be noted to avoid confusion: In example K of table 2-3, it appears that the 512 kb/ s data input is in conflict with the previous statement that the signals from digital data users are patched into channels one through twelve only In actuality, he 512 kb/s data input is being patched only into channel 12 which contains the 512 kb/s data card required by the multiplexer for this input bit rate.

The 512 kb/s data card will not only utilize its own channel (12), but also the next seven higher numbered channels (13 through 19) Therefore, although 512 db/s input is patched into channel 12, it overflows into channels 13 through 19.

MODE	192 kb/s			384 kb/s			768 kb/s			1544 kb/s		
EXAMPLE	A	B	C	D	E	F	G	H	I	J	K	L
Channel 1	VF	VF	O. W.	VF	O. W.	50K	VF	TTY	50K	*	O. W.	50Kb
2	VF	VF	TTY	O. W.	VF	VF	VF	VF	50K	256	TTY	*
3	VF	O. W.	VF	VF	TTY	VF	VF	VF	VF	K	50K	
4				VF	VF	20K	VF	VF	TTY		VF	
5				VF	50K	O. W.	VF	VF	20K	20K	20K	512
6				VF	20K	20K	VF	VF	O.W.	50K	VF	Kb
7							O. W.	VF	VF	20K	50K	
8							VF	O. W.	VF	20K	VF	
9							VF	50K	20K	50K	20K	
10							VF	VF	VF	20K	20K	50K
11							VF	20K	20K	TTY	20K	TTY
12							VF	VF	20K	O.W.	*	O.W.
13										VF		VF
14										VF		VF
15										VF	512	VF
16										VF	Kb	VF
17										VF		VF
18										VF		VF
19										VF		VF
20										VF	VF	VF
21										VF	VF	VF
22										VF	VF	VF
23										VF	VF	VF
24										VF	VF	VF

NOT AVAILABLE (B, E, H)

*Data Module installed in this slot.

g. Upon receipt of the data at the input channels, the multiplexer combines all the data on the input channels into one stream which is called the mission bit stream.

h. This bit stream is routed through the data patch panel to the KG-81 where it is encrypted.

Encryption of the mission bit stream causes the terminal to appear to be operating at maximum traffic density at all times, so that any change in the level of message traffic cannot be detected.

i. After being encrypted, the mission bit stream is patched through the Data Patch Panel to the online modem. In the modem, the pulse coded modulation (PCM) mission bit stream is applied to a 70-MHz IF carrier in the form of either biphase or quadraphase, phase-shift keying (BPSK or QPSK).

j. In the coded mode of operation, the mission bit stream passes from the modem to the KY-801A/ GSC encoder-decoder unit by way of dedicated cabling. The coded mission bit stream then reenters the modem where it is PSK modulated onto the 70-MHz carrier.

k. Coding serves the purpose of significantly re ducing the received energy-per-bit to noise ratio, Eb/ No, required to achieve a given bit error rate (BER). In the coded mode, a BER of 10-5 can be achieved with 5 dB less signal strength than that needed for the uncoded mode. This improvement is accomplished by the coder's ability to detect and correct errors arising from noise in the received signal.

l. When receiving a BPSK or QPSK modulated, 70-MHz IF signal from the RSS, the opposites of the processes described above are performed in reverse order and direction through the CSS to result in digital, voice, or TTY signals which are then sent out to the users.

2-7. Functional Description, Voltage Regulator Monitor Panel

The voltage regulator monitor panel at the bottom of rack 5 serves to monitor the output of the voltage regulator mounted behind the data patch panel at location A8 in rack 6. The regulated voltage is nomi nally 115V va*c.* If the regulated voltage should fall outside the limits set by the two red marker needles on the VR monitor (meter-relay), contacts within the VR monitor will close, illuminating the yellow VR fault lamp. The lower and upper voltage limits should normally be set to 110 and 120 volts, respectively. The fault reset switch is used to clear a fault indication by the VR fault lamp after the regulated voltage has been restored to a value within the preset limits. Momentary actuation of the switch removes 24 vdc from the latching coils in the meter-relay unit, allowing the contact to return to the open condition, which in turn removes power from the fault lamp A receptacle wired to the regulated 115 vac is pro vided on the VR monitor panel for the purpose of supplying power to the HP 436A power meter.

This power meter is part of the shelter test equipment.

2-8. Functional Description, TTY Loop Monitor Assembly.

The TTY loop monitor assembly, located in rack 7, monitors the high level TTY loop currents and low level TTY circuit voltages. The assembly contains two monitoring meters, loop current and low level TTY voltage, and associated selector switches permitting the operator to observe the signal characteristics on all TTY circuits processed within the CSS equipment.

2-9. Functional Description, Control Monitor - 48V/20 Hz Assembly

a. The purpose of the Control Monitor -48V/20 Hz assembly is for the control and monitoring of the two -48 volt power supplies and the two 20-Hz generators. Both power supplies and 20-Hz generators are online simultaneously.

b. The 115 vac line voltage for the power supplies is coupled through the control monitor power sup plies. Circuit breaker CB1 controls the 115 vac line voltage to the -48 vdc generator No. 1 and circuit breaker CB2 controls the 115 vac line voltage for -48 vdc generator No. 2. The voltage and current of the power supplies can be monitored by the 48 vdc monitor meters M1 and M2 located on the front panel of the control monitor assembly. If a malfunction develops with the online power supply, the associated faulty indicator will light, the audible alarm will sound, and the load will be automatically transfered to the standby power supply.

c. The 20-Hz generators are both online simulta neously, as indicated by their ON LINE indicators being lit. If a malfunction should occur in one of the generators, the fault indicator associated with that generator will light the audible alarm will sound. The defective generator can be put offline by placing its power switch in the OFF position.

CHAPTER 3

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I. TOOLS AND TEST EQUIPMENT

3-1. General

a. This chapter contains the procedures required to perform corrective maintenance on the AN/ TSC-86 communications subsystem (CSS) equipments which are not covered in other technical manuals.

b. Prior to repairing a defective unit, a thorough visual inspection should be given to locate broken or otherwise defective components that are not noted on the repair tag.

c. Each major unit to be maintained is assigned a separate section in this chapter. Each section includes instructions for removal of the unit from its rack in the CSS, replacement of defective components, and reinstallation of the unit in its rack.

d. To aid in troubleshooting, wiring tables and dia grams for the various CSS equipments are included in this manual as follows:

Communications TTY/FSK Patch Panel	Table 3-1
VF Patch Panel	Table 3-2
TTY/Low Level Patch Panel	Table 3-3
IIF Patch Panel	Fig. FO-1
Central Distribution Frame	Fig. FO-2
Voltage Regulator Monitor Panel	Fig. FO-3
Communications Subsystem	Fig. FO-4
Control Monitor-48V/20Hz	Table 3-4
TTY Loop Monitor	Table 3-5

e. Figures 3-5 and 3-6 show reference designa tions of the VF and TTY/low level patch panels.

TABLE 3-1. Wiring List for Communications TTY/FSK Patch Panel

FR0M	T0	FR0M	T0	FR0M	T0
J1-A	A1J1-A1	J5-a	A1J17-B2	J5-A	A1J9-B1
J1-B	A1J1-A2	J2-b	A1J18-A1	J5-B	A1J9-B2
J4-A	A11J-B1	J2-c	A1J18-A2	J3-A	A2J1-B1
J4-B	A1J1-B2	J5-b	A1J18-B1	J3-B	A2J1-B2
J2-D	A1J10-A1	J5-c	A1J18-B2	J3-D	A2J2-B1
J2-E	A1J10-A2	J1-D	A1J2-A1	J3-E	A2J2-B2
J5-D	A1J10-B1	J1-E	A1J2-A2	J3-G	A2J3-B1
J5-E	A1J10-B2	J4-D	A1J2-B1	J3-H	A2J3-B2
J2-G	A1J11-A1	J4-E	A1J2-B2	J3-K	A2J4-B1
J2-H	A1J1-A2	J1-G	A1J3-A1	J3-L	A2J4-B2
J5-G	AJ111-B1	J1-H	A1J3-A2	J3-N	A2J5-B1
J5-H	A1J11-B2	J4-G	A1J3-B1	J3-P	A2J5-B2
J2-K	A1J12-A1	J4-H	A1J3-B2	J3-S	A2J6-B1
J2-L	A1J12-A2	J1-K	A1J4-A1	J3-T	A2J6-B2
J5-K	A1J12-B1	J1-L	A1J4-A2	J2-C	J3-C
J5-L	A1J12-B2	J4-K	A1J4-B1	J2-F	J3-F
J2-N	A1J13-A1	J4-L	A1J4-B2	J2-J	J3-J
J2-P	A1J13-A2	J1-N	A1J5-A1	J2-M	J3-M
J5-N	A1J13-B1	J1-P	A1J5-A2	J2-R	J3-R
J5-P	A1J13-B2	J4-N	A1J5-B1	J2-U	J3-U
J2-S	A1J14-A1	J4-P	A1J5-B2	J1-a	J4-a
J2-T	A1J14-A2	J1-S	A1J6-A1	JJ1-c	J4-C
J5-S	A1J14-B1	J1-T	A1J6-A2	J1-F	J4-F
J5-T	A1J14-B2	J4-S	A1J6-B1	J1-M	J4-M
J2-V	A1J15-A1	J4-T	A1J6-B2	J1-R	J4-R
J2-W	A1J15-A2	J1-V	A1J7-A1	J1-U	J4-U
J5-V	A1J15-B1	J1-W	A1J7-A2	J1-X	J4-X
J5-W	A1J15-B2	J4-V	A1J7-B1	J1-J	J4-J
J2-X	A1J16-A1	J4-W	A1J7-B2	J2-C	J5-C
J2-Y	A1J16-A2	J1-Y	A1J8-A1	J2-F	J5-F
J5-X	A1J16-B1	J1-Z	A1J8-A2	J2-J	J5-J
J5-Y	A1J16-B2	J4-Y	A1J8-B1	J2-M	J5-M
J2-Z	A1J17-A1	J4-Z	A1J8-B2	J2-R	J5-R
J2-a	A1J17-A2	J2-A	A1J9-A1	J2-U	J5-U
J5-Z	A1J17-B1	J2-B	A1J9-A2		

Table 3-1. Wiring List for Communications TTY/FSK Patch Panel--Continued

T0	FR0M	T0	FR0M	T0	FR0M
J1-C	J4-C	J3-G	A2J3-B1	J3-FF	A1J8-A2
J1-A	A1J1-A1	J3-H	A2J3-B2	J3-A	A1J9-A1
J1-a	J4-a	J3-K	A2J4-B1	J3-B	A1J9-A2
J1-B	A1J1-A2	J3-L	A2J4-B2	J3-D	A1J10-A1
J1-D	A1J2-A1	J3-N	A2JS5-B1	J3-E	A1J10-A2
J1-E	A1J2-A2	J3-P	A2J5-B2	J3-G	J1J11-A1
J1-F	J4-F	J3-S	A2J6-B1	J3-H	A1J11-A2
J1-G	A1J3-A1	J3-T	A2J6-B2	J3-K	A1J12-A1
J1-H	A1J3-A2	J4-A	A1J1-B1	J3-L	A1J12-A2
J1-J	J4-J	J4-B	A1J1-B2	J3-N	A1J13-A1
J1-K	A1J4-A1	J4-D	A1J2-B1	J3-P	A1J13-A2
J1-L	A1J4-A2	J4-E	A1J2-B2	J3-S	A1J14-A1
J1-M	J4-M	J4-G	A1J3-B1	J3-T	A1J14-A2
J1-N	A1J5-A1	J4-H	A1J3-B2	J3-a	A1J15-A1
J1-P	A1J5-A2	J4-K	A1J4-B1	J3-b	A1J15-A2
J1-R	J4-R	J4-L	A1J4-B2	J3-d	A1J16-A1
J1-S	A1J6-A1	J4-N	A1J5-B1	J3-e	A1J16-A2
J1-T	A1J6-A2	J4-P	A1J5-B2	A2J21-B1	A2J23-B1
J1-U	J4-U	J4-S	A1J6-B1	A2J42-B1	A2J40-B1
J1-V	A1J7-A1	J4-T	A1J6-B2	A2J42-B2	A2J40-B2
J1-W	A1J7-A2	J4-V	A1J7-B1	A3S1-A3	+6VDC Bus
J1-X	J4-X	J4-W	A1J7-B2	A3S1-B5	+6VDC Bus
J1-Y	A1JS-A1	J4-Y	A1J8-B1	A3S1-A6	A4J1-A4
J1-Z	A1J8-A2	J4-Z	A1J8-B2	A3S2-A3	+6VDC Bus
J2-A	A1J9-A1	J5-a	A1J17-B2	A3S2-B5	+6VDC Bus
J2-a	A1J17-A2	J5-A	A1J9-B1	A3S3-A3	+6VDCBus
J2-b	A1J18-A1	J5-b	A1J18-B1	A3S3-B5	+6VDC Bus
J2-B	A1J9-A2	J5-B	A1J9-B2	A3S4-A3	+6VDC Bus
J2-c	A1J18-A2	J5-c	A1J18-B2	A3S4-B5	+6VDC Bus
J2-C	JS5-C	JS-D	A1J10-B1	A3SS-A3	+6VDC Bus
J2-C	J3-C	J5-E	A1J10-B2	A3S5-B5	+6VDC Bus
J2-D	A1J10-A1	J5-G	A1J11-B1	A3S6-A3	+6VDC Bus
J2-E	A1J10-A2	J5-H	A1J11-B2	A3S6-B5	+6VDC Bus
J2-F	J5-F	J5-K	A1J12-B1	A3S7-A3	+6VDC Bus
J2-F	J3-F	J5-L	A1312-B2	A3S7-B5	+6VDC Bus
J2-G	AiJi1-A1	J5-N	A1J13-B1	A3S8-A3	+6VDC Bus
J2-H	A1J11-A2	J5-P	A1J13-B2	A3S8-B5	+6VDC Bus
J2-J	JS-J	J5-S	A1J14-B1	A3S8-A3	+6VDC Bus
J2-J	J3-J	JS-T	A1J14-B2	A3S9-B5	+6VDC Bus
J2-K	A1J12-A1	J5-V	A1J15-B1	A3S10-A3	+6VDC Bus
J2-L	A1J12-A2	J5-W	A1J15-B2	A3S10-B5	+6VDC Bus
J2-M	J3-M	J5-X	A1J16-B1	A3S11-A3	+ 6VDCBus
J2-M	J5-M	JS-Y	A1J16-B2	A3S11-B5	+6VDCBus
J2-N	A1J13-A1	J5-Z	A1J17-B1	A3S12-A3	+6VDC Bus
J2-P	A1J13-A2	J3-h	A1J1-A1	A3S12-B5	+6VDC Bus
J2-R	J3-R	J3-i	A1J1-A2	A3S13-A3	+6VDC Bus
J2-R	J5-R	J3-k	A1J2-A1	A3S13-B5	+6VDC Bus
J2-S	A1J14-A1	J3-m	A1J2-A2	A3S14-A3	+6VDC Bus
J2-T	A1J14-A2	J3-p	A1J3-A1	A3S14-B5	+ 6VDC Bus
J2-U	J3-U	J3-q	A1J3-A2	A3S15-A3	+6VDC Bus
J2-U	J5-U	J3-s	A1J4-A1	A3S15-B5	+6VDC Bus
J2-V	A1J15-A1	J3-t	A1J4-A2	A3S16-A3	+6VDC Bus
J2-W	A1J15-A2	J3-v	A1J5-A1	A3S16-B5	+6VDC Bus
J2-X	A1J16-A1	J3-w	A1J5-A2	A3S1J57-A3	+6VDCBus
J2-Y	A1J16-A2	J3-y	A1J6-A1	A3S17-B5	+6VDCBus
J2-Z	A1J17-A1	J3-z	A1J6-A2	A3S18-A3	+6VDCBus
J3-A	A2J1-B1	J3-BB	A1J7-A1	A3S18-B5	+6VDC Bus
J3-B	A2J1-B2	J3-CC	A1J7-A2	A4J1-A4	A3S1-A6
J3-D	A2J2-B1	J3-EE	A1JS-A1	J2-V	A5J7-B1
J3-E	A2J2-B2			J3-X	+6V Common

Table 3-2. Wiring List for the VF Patch Panel

FR0M	T0	FR0M	T0	FR0M	T0
A1J1-A1	J1-1	A1J19-Bi	Ji-100	A1J30-A1	A1J30-A3
A1J1-A2	J1-2	A1J19-B2	J1-101	A1J30-A1	J2-43
A1J1-A3	A1J1-A1	A1J2-A1	J2-1	A1J30-A2	J2-44
A1J1-A4	A1J1-A2	A1J2-A2	J2-2	A1J30-A2	A1J30-A4
A1J1-B1	J1-73	A1J2-A3	A1J2-A1	A1J30-A3	A1J30-A1
A1J1-B2	J1-74	A1J2-A4	A1J2-A2	A1J30-A4	A1J30-A2
A1J10-A1	J2-13	A1J2-B1	J2-73	A1J31-A1	J1-46
A1J10-A2	J2-14	A1J2-B2	J2-74	A1J31-A2	J1-47
A1J10-A3	A1J10-A1	A1J20-A1	J2-28	A1J31-A3	A1J31-A1
A1J00-A4	A1J10-A2	A1J20-A2	J2-29	A1J31-A4	A1J31-A2
A1J10-B1	J2-85	A1J20-A3	A1J20-A1	A1J32-A1	J2-46
A1J10-B2	J2-86	A1J20-A4	A1J20-A2	A1J32-A2	J2-47
A1J11-A1	J1-16	A1J20-B1	J2-100	A1J32-A3	A1J32-A1
A1J11-A2	J1-17	A1J20-B2	J2-101	A1J32-A4	A1J32-A2
A1J11-A3	A1J11-A1	A1J21-A1	J1-31	A1J33-A1	J1-49
A1J11-A4	A1J11-A1	A1J21-A2	J1-32	A1J33-A2	J1-50
A1J11-B1	J1-88	A1J21-A3	A1J21-A1	A1J33-A3	A1J33-A1
A1J11-B2	J1-89	A1J21-A4	A1J21-A2	A1J33-A4	A1J33-A2
A1J12-A1	J2-16	A1J21-B1	J1-103	A1J34-A1	J2-49
A1J12-A2	J2-17	A1J21-B2	J1-104	A1J34-A2	J2-50
A1J12-A3	A1J12-A1	A1J22-A1	J2-31	A1J34-A3	A1J34-A1
A1J12-A4	A1J12-A2	A1J22-A2	J2-32	A1J34-A4	A1J34-A2
A1J12-B1	J2-88	A1J22-A3	A1J22-A1	A1J35-A1	J1-52
A1J12-B2	J2-89	A1J22-A4	A1J22-A2	A1J35-A2	J1-53
A1J13-A1	J1-19	A1J22-B1	J2-103	A1J35-A3	A1J35-A1
A1J13-A2	J1-20	A1J22-B2	J2-104	A1J35-A4	A1J35-A2
A1J13-A3	A1J13-A1	A1J23-A1	J1-34	A1J36-A1	J2-52
A1J13-A4	A1J13-A2	A1J23-A2	J1-35	A1J36-A2	J2-53
A1J13-B1	J1-91	A1J23-A3	A1J23-A1	A1J36-A3	A1J36-A1
A1J13-B2	J1-92	A1J23-A4	A1J23-A2	A1J36-A4	A1J36-A2
A1J14-A1	J2-19	A1J23-B1	J1-106	A1J37-A1	J1-55
A1J14-A2	J2-20	A1J23-B2	J1-107	A1J37-A2	J1-56
A1J14-A3	A1J14-A1	A1J24-A1	J2-34	A1J37-A3	A1J37-A1
A1J14-A4	A1J14-A2	A1J24-A2	J2-35	A1J37-A4	A1J37-A2
A1J14-B1	J2-91	A1J24-A3	A1J24-A1	A1J38-A1	J2-55
A1J14-B2	J2-92	A1J24-A4	A1J24-A2	A1J38-A2	J2-56
A1J15-A1	J1-22	A1J24-B1	J2-106	A1J38-A3	A1J38-A1
A1J15-A2	J1-23	A1J24-B2	J2-107	A1J38-A4	A1J38-A2
A1J15-A3	A1J15-A1	A1J25-A1	J1-37	A1J39-A1	J11-58
A1J15-A4	A1J15-A2	A1J25-A2	J1-38	A1J39-A2	J1-59
A1J15-B1	J1-94	A1J25-A3	A1J25-A1	A1J39-A3	A1J39-A1
A1J15-B2	J1-95	A1J25-A4	A1J25-A2	A1J39-A4	A1J39-A2
A1J16-A1	J2-22	A1J26-A1	J2-37	A1J4-A1	J2-4
A1J16-A2	J2-23	A1J26-A2	J2-38	A1J4-A2	J2-5
A1J16-A3	A1J16-A1	A1J26-A3	A1J26-A1	A1J4-A3	A1J4-A1
A1J16-A4	A1J16-A2	A1J26-A4	A1J26-A2	A1J4-A4	A1J4-A2
A1J16-B1	J2-94	A1J27-A1	J1-40	A1J4-B1	J2-76
A1J16-B2	J2-95	A1J27-A2	J1-41	A1J4-B2	J2-77
A1J17-A1	J1-25	A1J27-A3	A1J27-A1	A1J40-A1	J2-58
A1J17-A2	J1-26	A1J27-A4	A1J27-A2	A1J40-A2	J2-59
A1J17-A3	A1J17-A1	A1J28-A1	J2-40	A1J40-A3	A1J40-A1
A1J17-A4	A1J17-A2	A1J28-A2	J2-41	A1J40-A4	A1J40-A2
A1J17-B1	J1-97	A1J28-A3	A1J28-A1	A1J41-A1	J1-61
A1J17-B2	J1-98	A1J28-A4	A1J28-A2	A1J41-A2	J1-62
A1J18-A1	J2-25	A1J29-A1	J1-43	A1J41-A3	A1J41-A1
A1J18-A2	J2-26	A1J29-A2	J1-44	A1J41-A4	A1J41-A2
A1J18-A3	A1J18-A1	A1J29-A3	A1J29-A1	A1J42-A1	J2-61
A1J18-A4	A1J18-A2	A1J29-A4	A1J29-A2	A1J42-A2	J2-62
A1J18-B1	J2-97	A1J3-A1	J1-4	A1J42-A3	A1J42-A1
A1J18-2	J2-98	A1J3-A2	J1-5	A1J42-A4	A1J42-A2
A1J19-A1	J11-28	A1J3-A3	A1J3-A1	A1J43-A1	J1-64
A1J19-A2	J1-29	A1J3-A4	A1J3-A2	A1J43-A2	J1-65
A1J19-A3	A1J19-A1	A1J3-B1	J1-76	A1J43-A3	A1J43-A1
A1J19-A4	A1J19-A2	A1J3-B2	J11-77	A1J43-A4	A1J43-A2

Table 3-2. Wiring List for the VF Patch Panel-Continued

FR0M	T0	FR0M	T0	FR0M	T0
A1J44-A1	J2-64	A2J11-A2	J3-17	A2J20-B1	J4-64
A1J44-A2	J2-65	A2J11-A3	A2J11-A1	A2J20-B2	J4-65
A1J44-A3	A1J44-A1	A2J11-A4	A2J11-A2	A2J21-A1	J3-31
A1J44-A4	A1J44-A2	A2J11-B1	J3-52	A2J21-A2	J3-32
A1J45-A1	J1-67	A2J11-B2	J3-53	A2J21-A3	A2J21-A1
A1J45-A2	J1-68	A2J12-A1	J4-16	A2J21-A4	A2J21-A2
A1J45-A3	A1J45-A1	A2J12-A2	J4-17	A2J21-B1	J3-67
A1J45-A4	A1J45-A2	A2J12-A3	A2J12-A1	A2J21-B2	J3-68
A1J46-A1	J2-67	A2J12-A4	A2J12-A2	A2J22-A1	J4-31
A1J46-A2	J2-68	A2J12-B1	J4-52	A2J22-A2	J4-32
A1J46-A3	A1J46-A1	A2J12-B2	J4-53	A2J22-A3	A2J22-A1
A1J46-A4	A1J46-A2	A2J13-A1	J3-19	A2J22-A4	A2J22-A2
A1J47-A1	J1-70	A2J13-A2	J3-20	A2J22-B1	J4-67
A1J47-A2	J1-71	A2J13-A3	A2J13-A1	A2J22-B2	J4-68
A1J47-A3	A1J47-A1	A2J13-A4	A2J13-A2	A2J23-A1	J3-34
A1J47-A4	A1J47-A2	A2J13-B1	J3-55	A2J23-A2	J3-35
A1J48-A1	J2-70	A2J13-B2	J3-56	A2J23-A3	A2J23-A1
A1J48-A2	J2-71	A2J14-A1	J4-19	A2J23-A4	A2J23-A2
A1J48-A3	A1J48-A1	A2J14-A2	J4-20	A2J23-B1	J3-70
A1J48-A4	A1J48-A2	A2J14-A3	A2J14-A1	A2J23-B2	J3-71
A1J5-A1	J1-7	A2J14-A4	A2J14-A2	A2J24-A1	J4-34
A1J5-A2	Ji-8	A2J14-B1	J4-55	A2J24-A2	J4-35
A1J5-A3	A1J5-A1	A2J14-B2	J4-56	A2J24-A3	A2J24-A1
A1J5-A4	A1J5-A2	A2J15-A1	J3-22	A2J24-A4	A2J24-A2
A1J5-B1	J1-79	A2J15-A2	J3-23	A2J24-B1	J4-70
A1J5-B2	J1-80	A2J15-A3	A2J15-A1	A2J24-B2	J4-71
A1J6-A1	J2-7	A2J15-A4	A2J15-A2	A2J25-A1	Ji-1i0
A1J6-A2	J2-8	A2J15-B1	J3-58	A2J25-A2	A2J26-A2
A1J6-A3	A1J6-B1	A2J15-B2	J3-59	A2J25-A2	J1-111
A1J6-A4	A1J6-A2	A2J16-A1	J4-22	A2J25-A3	A2J25-A1
A1J6-B1	J2-79	A2J16-A2	J4-23	A2J25-A4	A2J25-A2
A1J6-B2	J2-80	A2J16-A3	A2J16-A1	A2J25-B1	J10-u
A1J7-A1	J1-10	A2J16-A4	A2J16-A2	A2J26-A1	J1-112
A1J7-A2	J1-i1	A2J16-B1	J4-58	A2J26-A2	J1-113
A1J7-A3	A1J7-A1	A2J16-B2	J4-59	A2J26-A2	A2J27-A2
A1J7-A4	A1J7-A2	A2J17-A1	J3-25	A2J26-A3	A2J26-A1
A1J7-B1	J1-82	A2J17-A2	J3-26	A2J26-A4	A2J26-A2
A1J7-B2	J1-83	A2J17-A3	A2J17-A1	A2J26-B1	J10-v
A1J8-A1	J2-10	A2J17-A4	A2J17-A2	A2J27-A1	J1-114
A1J8-A2	J2-11	A2J17-B1	J3-61	A2J27-A2	J1-115
A1J8-A3	A1J8-A1	A2J17-B2	J3-62	A2J27-A2	A2J28-A2
A1JS-A4	A1J8-A2	A1J18-A1	J4-25	A2J27-A3	A2J27-A1
A1J8-B1	J2-82	A2J18-A2	J4-26	A2J27-A4	A2J27-A2
A1J8-B2	J2-83	A2J18-A3	A2J18-A1	A2J27-B1	J10-w
A1J9-A1	J1-13	A2J18-A4	A1J18-A2	A2J28-A1	1J1-116
A1J9-A2	J1-14	A2J18-B1	J4-61	A2J28-A2	J1-117
A1J9-A3	A1J9-A1	A2J18-B2	J4-62	A2J28-A2	A2J29-A2
A1J9-A4	A1J9-A2	A2J19-A1	J3-28	A2J28-A3	A2J28-A1
A159-B1	J1-85	A2J19-A2	J3-29	A2J28-A4	A2J28-A2
A1J9-B2	J1-86	A2J19-A3	A2J19-A1	A2J28-B1	J10-x
A2J1-A1	J3-1	A2J19-A4	A2J19-A2	A2J29-A1	J1-118
A2J1-A2	J3-2	A2319-B1	J3-64	A2J29-A2	J1-119
A2J1-A3	A2J1-A1	A2J19-B2	J3-65	A2J29-A2	A2J30-A2
A2J1-A4	A2J1-A2	A2J2-A1	J4-1	A2J29-A3	A2J29-A1
A2J1-B1	J3-37	A2J2-A2	J4-2	A2J29-A4	A2J29-A2
A2J1-B2	J3-38	A2J2-A3	A2J2-A1	A2J29-B1	J10-y
A2J10-A1	J4-13	A2J2-A4	A2J2-A2	A2J3-A1	J3-4
A2J10-A2	J4-14	A2J2-B1	J4-37	A2J3-A2	J3-5
AW10-A3	A2J10-A1	A2J2-B2	J4-38	A2J3-A3	A2J3-A1
A2J10-A4	A2J10-A2	A2J20-A1	J4-28	A2J3-A4	A2J3-A2
A2J10-B1	J4-49	A2J20-A2	J4-29	A2J3-B1	J3-40
A2310-B2	J4-50	A2J20-A3	A2J20-A1	A2J3-B2	J3-41
A2J11-A1	J3-16	A2J20-A4	A2J20-A2	A2J30-A1	J1-120

Table 3-2. Wiring List for the VF Patch Panel- Continued

FR0M	T0	FR0M	T0	FR0M	T0
A2J30-A2	A2J31-A2	A2J44-B2	A2J45-B2	A2J9-B1	J3-49
A2J30-A2	J1-121	A2J45-B1	A2J44-B1	A2J9-B2	J3-50
A2J30-A3	A2J30-A1	A2J45-B2	A2J44-B2	A3J1-A1	J3-73
A2J30-A4	A2J30-A2	A2J46-B1	A2J45-B1	A3J1-A2	J3-74
A2J30-B1	J10-z	A2J46-B2	A2J45-B2	A3J1-A3	A3J1-A1
A2J31-A1	J2-110	A2J47-B1	FL2-1N-1	A3J1-A4	A3J1-A2
A2J31-A2	J2-111	A2J47-B2	FL2-1N-2	A3J1-B1	J5-1
A2J31-A2	A2J32-A2	A2J48-B1	FL2-0UT-3	A3J1-B2	J5-2
A2J31-A3	A2J31-A1	A2J48-B2	FL2-0UT-4	A3J10-A1	J4-85
A2J31-A4	A2J31-A2	A2J49-B1	A2J50-B2	A3J10-A2	J4-86
A2J31-B1	J100-AA	A2J49-B2	A2J50-B1	A3J10-A3	A3J100-A1
A2J32-A1	J2-112	A2J5-A1	J3-7	A3J10-A4	A3J10-A2
A2J32-A2	A2J33-A2	A2J5-A2	J3-8	A3J10-B1	J6-13
A2J32-A2	J2-113	A2J5-A3	A2J5-A1	A3J10-B2	J6-14
A2J32-A3	A2J32-A1	A2J5-A4	A2J5-A2	A3J11-A1	J3-88
A2J32-A4	A2J32-A2	A2J5-B1	J3-43	A3J11-A2	J3-89
A2J32-B1	J10-BB	A2J5-B2	J3-44	A3J11-A3	A3J11-A1
A2J33-A1	J2-114	A2J50-B1	A2J49-B2	A3J1111-A4	A3J11-A2
A2J33-A2	J2-115	A2J50-B2	A2J49-B1	A3J11-B1	J5-16
A2J33-A3	A2J33-A1	A2J51-B1	A2J52-B2	A3J11-B2	J5-17
A2J33-A2	A2J34-A2	A2J51-B2	A2J52-B1	A3J12-A1	J4-88
A2J33-A4	A2J33-A2	A2J52-B1	A2J51-B2	A3J12-A2	J4-89
A2J33-B1	J10-CC	A2J52-B2	A2J51-B1	A3J12-A3	A3J12-A1
A2J34-A1	J2-116	A2J53-B1	A2J54-B2	A3J12-A4	A3J12-A2
A2J34-A2	A2J35-A2	A2J53-B2	A2J54-B1	A3J12-B1	J6-16
A2J34-A2	J2-117	A2J54-B1	A2J53-B2	A3J12-B2	J6-17
A2J34-A3	A2J34-A1	A2J54-B2	A2J53-B1	A3J13-A1	J3-91
A2J34-A4	A2J34-A2	A2J55-B1	A2J56-B1	A3J13-A2	J3-92
A2J34-B1	J10-DD	A2J55-B2	A2J56-B2	A3J13-A3	A3J13-A1
A2J35-A1	J2-118	A2J56-B1	A2J55-B1	A3J13-A4	A3J13-A2
A2J35-A2	J2-119	A2J56-B1	A2J57-B1	A3J13-B1	J5-19
A2J35-A2	A2J36-A2	A2J56-B2	A2J55-B2	A3J13-B2	J5-20
A2J35-A3	A2J35-A1	A2J56-B2	A2J57-B2	A3J14-A1	J4-91
A2J35-A4	A2J35-A2	A2J57-B1	A2J56-B1	A3J14-A2	J4-92
B2J35-B1	J10-EE	A2J57-B1	A2J56-B1	A3J14-A3	A3J14-A1
A2J36-A1	J2-120	A2J58-B1	A2J57-B1	A3J14-44	A3.114-A2
AWJ36-A2	A2J35-A2	A2J58-B2	A2J57-B2	A3J14-B1	J6-19
A2J36-A2	AJ2-121	A2J59-B1	FL1-1N-1	A3J14-B2	J6-20
A2J36-B2	J10-HH	A2J59-B2	FL1-1N-2	A3J15-A1	J3-94
A2J36-A3	A2J36-A1	A2J6-A1	J4-7	A3J15-A2	J3-95
A2J36-A4	A2J36-A2	A2J6-A2	J4-8	A3J15-A3	A3J15-A1
A2J36-B1	J10-FF	A2J6-A3	A2J6-A1	A3J15-A4	A3J15-A2
A2J37-B1	A2J38-B1	A2J6-A4	A2J6-A2	A3J15-B1	J5-22
A2J37-B2	A2J38-B2	A2J6-B1	J4-43	A3J15-B2	J5-23
A2J38-B1	A2J37-B1	A2J6-B2	J4-44	A3J16-A1	J4-94
A2J38-B2	A2J37-B2	A2J60-B1	FL1-0UT-3	A3J16-A2	J4-95
A2J39-B1	A2J38-B1	A2J60-B2	FL1-0UT-4	A3J16-A3	A3J16-A1
A2J39-B2	A2-J38-B2	A2J7-A1	J3-10	A3J16-A4	A3J16-A2
A2J4-A1	J4-4	A2J7-A2	J3-11	A3J16-B1	J6-22
A2J4-A2	J4-5	A2J7-A3	A2J7-A1	A3J16-B2	J6-23
A2J4-A3	A2J4-A1	A2J7-A4	A2J7-A2	A3J17-A1	J3-94
A2J4-A4	A2J4-A2	A2J7-B1	J3-46	A3J17-A2	J3-95
A2J4-B1	J4-40	A2J7-B2	J3-47	A3J17-A3	A3J17-A1
A2J4-B2	J4-41	A2J8-A1	J4-10	A3J17-A4	A3J17-A2
A2J40-B1	A2J41-B1	A3J8-A2	J4-11	A3J17-A1	J5-25
A2J40-B2	A2J41-B2	A2J8-A3	A2J8-A1	A3J17-B2	J5-26
A2J41-B1	A2J40-B1	A2J8-A4	A2J8-A2	A3J18-A1	J4-97
AJ41-B2	A240-B2	A2J8-B1	J4-46	A3J18-A2	J4-98
A2J42-B1	600	A2J8-B2	J4-47	A3J18-A3	A3J18-A1
A2J42-B2	600	A2J9-A1	J3-13	A3J18-A4	A3J18-A2
A2J43-B1	600	A2J9-A2	J3-14	A3J18-B1	J6-25
A2J43-B2	600	A2J9-A3	A2J9-A1	A3J18-B2	J6-26
A2J44-B1	A2J45-B1	A2J9-A4	A2J9-42	A3J19-A1	J3-100

Table 3-2. Wiring List for the VF Patch Panel-Continued

FR0M	T0	FR0M	T0	FR0M	T0
A3J19-A2	J3-101	A3J3-A3	A3J3-A1	A3J43-A2	J9-f
A3J19-A3	A3J19-A1	A3J3-A4	A3J3-A2	A3J43-A3	A3J43-A1
A3J19-A4	A3J19-A2	A3J3-B1	J5-4	A3J43-A4	A3J43-A2
A3J19-B1	J5-28	A3J3-B2	J5-5	A3J44-A1	J10-e
A3J19-B2	J5-29	A3J30-A1	J100-G	A3J44-A2	J10-f
A3J2-A1	J4-73	A3J30-A2	J10-H	A3J44-A3	A3J44-A1
A3J2-A2	J4-74	A3J30-A3	A3J30-A1	A3J44-A4	A3J44-A2
A3J2-A3	A3J2-A1	A3J30-A4	A3J30-A2	A3J45-A1	J9-h
A2J2-A4	A3J2-A2	A3J31-A1	J9-K	A3J45-A2	J9-i
A3J2-B1	J6-1	A3J31-A2	J9-L	A3J45-A3	A3J45-A1
A3J2-B2	J6-2	A3J31-A3	A3J31-A1	A3J45-A4	A3J45-A2
A3J20-A1	J4-100	A3J31-A4	A3J31-A2	A3J46-A1	J10-h
A3J20-A2	J4-101	A3J32-A1	J10- K	A3J46-A2	J10-i
A3J20-A3	A3J20-A1	A3J32-A2	J10-L	A3J46-A3	A3J46-A1
A3J20-A4	A3J20-A2	A3J32-A3	A3J32-A1	A3J46-A4	A3J46-A2
A3J20-B1	J6-28	A3J32-A4	A3J32-A2	A3J47-A1	J9-k
A3J20-B2	J6-29	A3J33-A1	J9-N	A3J47-A2	J9-m
A3J21-A1	J3-103	A3J33-A2	J9-P	A3J47-A3	A3J47-A1
A3J21-A2	J3-104	A3J33-A3	A3J33-A1	A3J47-A4	A3J47-A2
A3J21-A3	A3J21-A1	A3J33-A4	A3J33-A2	A3J48-A1	J10-k
A3J21-A4	A3J21-A2	A3J34-A1	J10-N	A3J48-A2	J10-m
A3J21-B1	J5-31	A3J34-A2	J10-P	A3J48-A3	A3J48-A1
A3J21-B2	J5-32	A3J34-A3	A3J34-A1	A3J48-A4	A3J48-A2
A3J22-A1	J4-103	A3J34-A4	A3J34-A2	A3J5-A1	J3-79
A3J22-A2	J4-104	A3J35-A1	J9-S	A3J5-A2	J3-80
A3J22-A3	A3J22-A1	A3J35-A2	J9-T	A3J5-A3	A3J5-A1
A3J22-A4	A3J22-A2	A3J35-A3	A3J35-A1	A3J5-A4	A3J5-A2
A3J22-B1	J6-31	A3J35-A4	A3J35-A2	A3J5-B1	J5-7
A3J22-B2	J6-32	A3J36-A1	J10-S	A3J5-B2	J5-8
A3J23-A1	J3-106	A3J36-A2	J10-T	A3J6-A1	J4-79
A3J23-A2	J3-107	A3J36-A3	A3J26-A1	A3J6-A2	J4-80
A3J23-A3	A3J23-A1	A3J36-A4	A3J36-A2	A3J6-A3	A3J6-A1
A3J23-A4	A3J23-A2	A3J37-A1	J9-V	A3J6-A4	A3J6-A2
A3J23-B1	J5-34	A3J37-A2	J9-W	A3J6-B1	J6-7
A3J23-B2	J5-35	A3J37-A3	A3J37-A1	A3J6-B2	J6-8
A3J24-A1	J4-106	A3J37-A4	A3J37-A2	A3J7-A1	J3-82
A3J24-A2	J4-107	A3J38-A1	J10-V	A3J7-A2	J3-83
A3J24-A3	A3J24-A1	A3J38-A2	J10-W	A3J7-A3	A3J7-A1
A3J24-A4	A3J24-A2	A3J38-A3	A3J38-A1	A3J7-A4	A3J7-A2
A3J24-B1	J6-34	A3J38-A4	A3J38-A2	A3J7-B1	J5-10
A3J24-B2	J6-35	A3J39-A1	J9-Y	A3J7-B2	J5-11
A3J25-A1	J9-A	A3J39-A2	J9-Z	A3J8-A1	J4-82
A3J25-A2	J9-B	A3J39-A3	A3J39-A1	A3JS-A2	J4-83
A3J25-A3	A3J25-A1	A3J39-A4	A3J39-A2	A3J8-A3	A3J8-A1
A3J25-A4	A3J25-A2	A3J4-A1	J4-76	A3J8-A4	A3J8-A2
A3J26-A1	J10-A	A3J4-A2	J4-77	A3J8-B1	J6-10
A3J26-A2	J10-B	A3J4-A3	A3J4-A1	A3J8-B2	J6-11
A3J26-A3	A3J26-A1	A3J4-A4	A3J4-A2	A3J9-Ai	J3-85
A3J26-A4	A3J26-A2	A3J4-B1	J6-4	A3J9-A2	J3-86
A3J27-A1	J9-D	A3J4-B2	J6-5	A3J9-A3	A3J9-A1
A3J27-A2	J9-E	A3J40-A1	J10-Y	A3J9-A4	A3J9-A2
A3J27-A3	A3J27-A1	A3J40-A2	J10-Z	A3J9-B1	J5-13
A3J27-A4	A3J27-A2	A3J40-A3	A3J40-A1	A3J9-B2	J5-14
A3J28-A1	J10-D	A3J40-A4	A3J40-A2	A4S1A-1	A6J1-A1
A3J28-A2	J10-E	A3J41-A1	J9-b	A4S1A-10	TB7-1
A3J28-A3	A3J28-A1	A3J41-A2	J9-c	A4S1A-11	A5J25-A1
A3J28-A4	A3J28-A2	A3J41-A3	A3J41-A1	A4S1A 2	TB9-1
A3J29-A1	J9-G	A3J41-A4	A3J41-A2	A4S1A-3	A7J1-A1
A3J29-A2	J9-H	A3J42-Ai	J10-b	A4S1A-5	A6J2-A1
A3J29-A3	A3J29-A1	A3J42-A2	J10-c	A4S1A-6	TB11-1
A3J29-A4	A3J29-A2	A3J42-A3	A3J42-A1	A4S1A-7	A7J2-A1
A3J3-A1	J3-76	A3J42-A2	A3J42-A2	A4S1A-9	A5J1-A1
A3J3-A2	J3-77	A3J43-A1	J9-e	A4S1B-1	A6J1-A2

Table 3-2. Wiring List for the VF Patch Panel-Continued

FR0M	T0	FR0M	T0	FR0M	T0
A4S1B-10	TB8-1	A4S13A-11	A5J37-A1	A4S16B-11	A5J40-A2
A4S1B-11	A5J25-A2	A4S13A-2	TB9-1	A4S16B-2	TB10-4
A4S1B-2	TB10-1	A4S13A-3	A7J25-A1	A4S16B-3	A7J31-A2
A4S1B-3	A7J1-A2	A4S13A-5	A6J26-A1	A4S16B-5	A6J32-A2
A4S1B-5	A6J2-A2	A4S13A-6	TB11-1	A4S16B-6	TB12-4
A4S1B-6	TB12-1	A4S13A-7	A7J26-A1	A4S16B-7	A7J32-A2
A4S1B-7	A7J2-A2	A4S13A-9	A5J13-A1	A4S16B-9	A5J16-A2
A4S1B-9	A5J1-A2	A4S13B-1	A6J25-A2	A4S17A-1	A6J33-A1
A4S10A-1	A6J19-A1	A4S13B-10	TB-1	A4S17A-10	TB7-5
A4S10A-10	TB7-10	A4S13B-11	A5J37-A2	A4S17A-11	A5J41-A1
A4S10A-11	A5J34-A1	A4S13B-2	TB10-1	A4S17A-2	TB9-5
A4S100A-2	TB9-10	A4S13B-3	A7J25-A2	A4S17A-3	A7J33-A1
A4S100A-3	A7J19-A1	A4S13B-5	A6J26-A2	A4S17A-5	A6J34-A1
A4S100A-5	A6J20-A1	A4S13B-6	TB12-1	A4S17A-6	TB11-5
A4S100A-6	TB11-10	A4S13B-7	A7J26-A2	A4S17A-7	A7J34-A1
A4S100A-7	A7J20-A1	A4S13B-9	A5J13-A2	A4S17A-9	A5J17-A1
A4S01A-9	A5J10-A1	A4S14A-1	A6J27-A]	A4S17B-1	A6J33-A2
A4S10B-1	A6J19-A2	A4S14A-10	TB7-2	A4S17B-10	TB8-5
A4S10B-10	TB8-10	A4S14A-11	A5J38-A1	A4S17B-11	A5J41-A2
A4S10B-11	A5J34-A2	A4S14A-2	TB9-2	A4S17B-2	TB10-5
A4S100B-2	TB10-10	A4S14A-3	A7J27-A1	A4S17B-3	A7J33-A2
A4S100B-3	A7J19-A2	A4S14A-5	A6J28-A1	A4S17B-5	A6J34-A2
A4S100B-5	A6J20-A2	A4S14A-6	TB11-2	A4S17B-6	TB12-5
A4S100B-6	TB12-10	A4S14A-7	A7J28-A1	A4S17B-7	A7J34-A2
A4S100B-7	A7J20-A2	A4S14A-9	A5J14-A1	A4S17B-9	A5J17-A2
A4S10B-9	A5J10-A2	A4S14B-1	A6J27-A2	A4S18A-1	A6J35-A1
A4S11A-1	A6J21-A1	A4S14B-10	TB8-2	A4S18A-10	TB7-6
A4S11A-10	TB7-11	A4S14B-11	A5J38-A2	A4S18A-11	A5J42-A1
A4S11A-2	TB9-11	A4S14B-2	TB10-2	A4S18A-2	TB9-6
A4S11A-3	A7J21-A1	A4S14B-3	A7J27-A2	A4S18A-3	A7J35-A1
A4S11A-5	A6J22-A1	A4S14B-5	A6J28-A2	A4S18A-5	A6J36-A1
A4S11A-6	TB11-111	A4S14B-6	TB12-2	A4S18A-6	TB11-6
A4S11A-7	A7J22-A1	A4S14B-7	A7J28-A2	A4S18A-7	A7J36-A1
A4S11A-9	A5J11-A1	A4S14B-9	A5J14-A2	A4S18A-9	A5J18-A1
A4S11B-1	A6J21-A2	A4S15A-1	A6J29-A1	A4S18B-1	A6J35-A2
A4S11B-10	TB8-11	A4S15A-10	TB7-3	A4S18B-10	TB8-6
A4S11B-11	A5J35-A2	A4S15A-11	A5J39-A1	A4S18B-11	A5J42-A2
A4S11B-2	TB10-11	A4S15A-2	TB9-3	A4S18B-2	TB10-6
A4S11B-3	A7J21-A2	A4S15A-3	A7J29-A1	A4S18B-3	A7J35-A2
A4S11B-5	A6J22-A2	A4S15A-5	A6J30-A1	A4S18B-5	A6J36-A2
A4S11B-6	TB12-11	A4S15A-6	TB11-6	A4S18B-6	TB12-6
A4S11B-7	A7J22-A2	A4S15A-7	A7J30-A1	A4S18B-7	A7J36-A2
A4S11B-9	A5J11-A2	A4S15A-9	A5J15-A1	A4S18B-9	A5J18-A2
A4S12A-1	A6J23-A1	A4S15B-1	A6J29-A2	A4S19A-1	A6J37-A1
A4S12A-10	TB7-12	A4S15B-10	TB8-3	A4S19A-10	TB7-7
A4S12A-11	A5J36-A1	A4S15B-11	A5J39-A2	A4S19A-11	A5J43-A1
A4S12A-2	TB9-12	A4S15B-2	TB10-3	A4S19A-2	TB9-7
A4S12A-3	A7J23-A1	A4S15B-3	A7J29-A2	A4S19A-3	A7J37-A1
A4S12A-5	A6J24-A1	A4S15B-5	A6J30-A2	A4S19A-5	A6J38-A1
A4S12A-6	TB11-12	A4S15B-6	TB12-3	A4S19A-6	TB11-7
A4S12A-7	A7J24-A1	A4S15B-7	A7J30-A2	A4S19A-7	A7J38-A1
A4S12A-9	A5J12-A1	A4S15B-9	A5J15-A2	A4S19A-9	A5J19-A1
A4S12B-1	A6J23-A2	A4S16A-1	A6J31-A1	A4S19B-1	A6J37-A2
A4S12B-10	TB8-12	A4S16A-10	TB7-4	A4S19B-10	TB8-7
A4S12B-11	A5J36-A2	A4S16A-11	A5J40-A1	A4S19B-11	A5J43-A2
A5S12B-2	TB10-12	A4S16A-2	TB9-4	A4S19B-2	TB10-7
A4S12B-3	A7J23-A2	A4S16A-3	A7J31-A1	A4S19B-3	A7J37-A2
A4S12B-5	A6J24-A2	A4S16A-5	A6J32-A1	A4S19B-5	A6J38-A2
A4S12B-6	TB12-12	A4S16A-6	TB11-4	A4S19B-6	TB12-7
A4S12B-7	A7J24-A2	A4S16A-7	A7J32-A1	A4S19B-7	A7J38-A2
A4S12B-9	A5J12-A2	A4S16A-9	A5J16-A1	A4S19B-9	A5J19-A2
A4S13A-1	A6J25-A1	A4S16B-1	A6J31-A2	A4S2A-1	A6J3-A1
A4S13A-10	TB7-1	A4S16B-10	TB8-4	A4S2A-10	TB7-2

Table 3-2. Wiring List for the VF Patch Panel-Continued

FROM	TO	FROM	TO	FROM	TO
A4S2A-11	A5J26-A1	A4S22B-111	A5J46-A2	A4S4A-11	A5J28-A1
A4S2A-2	TB9-2	A4S22B-2	TB10-10	A4S4A-2	TB9-4
A4S2A-3	A7J3-A1	A4S22B-3	A7J43-A2	A4S4A-3	A7J7-A1
A4S2A-5	A6J4-A1	A4S22B-5	A6J44-A2	A4S4A-5	A6JS-A1
A4S2A-6	TB11-2	A4S22B-6	TB12-10	A4S4A-6	TB11-4
A4S2A-7	A7J4-A1	A4S22B-7	A7J44-A2	A4S4A-7	A7J8-A1
A4S2A-9	A5J2-A1	A4S22B-9	A5J22-A2	A4S4A-9	A5J4-A1
A4S2B-1	A6J3-A2	A4S23A-1	A6J45-A1	A4S4B-1	A6J7-A2
A4S2B-10	TB8-2	A4S23A-10	TB7-11	A4S4B-10	TB8-4
A4S2B-11	A5J26-A2	A4S23A-11	A5J47-A1	A4S4B-111	A5J28-A2
A4S2B-2	TB10-2	A4S23A-2	TB9-11	A4S4B-2	TB10-4
A4S2B-3	A7J3-A2	A4S23A-3	A7J45-A1	A4S4B-3	A7J7-A2
A4S2B-5	A5J4-A2	A4S23A-5	A6J46-A1	A4S4B-5	A6J8-A2
A4S2B-6	TB12-2	A4S23A-6	TB11-11	A4S4B-7	A7J8-A2
A4S2B-7	A7J4-A2	A4S23A-7	A7J46-A1	A4S4B-9	A5J4-A2
A4S2B-9	A5J2-A2	A4S23A-9	A5J23-A1	A4S5A-1	A6J9-A1
A4S20A-1	A6J39-A1	A4S23B-1	A6J45-A2	A4S5A-10	TB7-5
A4S20A-10	TB7-8	A4S23B-10	TB8-11	A4S5A-11	A5J29-A1
A4S20A-11	A5J44-A1	A4S23B-11	A5J47-A2	A4S5A-2	TB9-5
A4S20A-2	TB9-8	A4S23B-2	TB10-11	A4S5A-3	A7J9-A1
A4S20A-3	A7J39-A1	A4S23B-3	A7J45-A2	A4S5A-5	A6J10-A1
A4S20A-5	A6J40-A1	A4S23B-5	A6J46-A2	A4S5A-6	TB11-5
A4S20A-6	TB11-8	A4S23B-6	TB12-11	A4S5A-7	A7J10-A1
A4S20A-7	A7J40-A1	A4S23B-7	A7J46-A2	A4S5A-9	A5J5-A1
A4S20A-9	A5J20-A1	A4S23B-9	A5J23-A2	A4S5B-1	A6J9-A2
A4S20B-1	A6J39-A2	A4S24A-1	A6J47-A1	A4S5B-10	TB8-5
A4S20B-10	TB8-8	A4S24A-10	TB7-12	A4S5B-111	A5J29-A2
A4S20B-11	A5J44-A2	A4S24A-11	A5J48-A1	A4S5B-2	TB10-5
A4S20B-2	TB10-8	A4S24A-2	TB9-12	A4S5B-3	A7J9-A2
A4S20B-3	A7J39-A2	A4S24A-3	A7J47-A1	A4S5B-5	A6J100-A2
A4S20B-5	A6J40-A2	A4S24A-5	A6J48-A1	A4S5B-6	TB12-5
A4S20B-6	TB12-6	A4S24A-6	TB11-12	A4S5B-7	A7J10-A2
A4S20B-7	A7J40-A2	A4S24A-7	A7J48-A1	A4S5B-9	A5J5-A2
A4S20B-9	A5J20-A2	A4S24A-9	A5J24-A1	A4S6A-1	A6J1-A1
A4S21A-1	A6J41-A1	A4S24B-1	A6J47-A2	A4S6A-10	TB7-6
A4S21A-10	TB7-9	A4S24B-10	TB8-12	A4S6A-11	A5J30-A1
A4S21A-11	A5J45-A1	A4S24B-111	A5J48-A2	A4S6A-2	TB9-6
A4S21A-2	TB9-9	A4S24B-2	TB10-12	A4S6A-3	A7J11-A1
A4S21A-3	A7J41-A1	A4S24B-3	A7J47-A2	A4S6A-5	A6J12-A1
A4S21A-5	A6J42-A1	A4S24B-6	TB12-12	A'4S6A-6	TB11-6
A4S21A-6	TB11-9	A4S24B-7	A7J48-A2	A4S6A-7	A7J12-A1
A4S21A-7	A7J42-A1	A4S24B-9	A5J24-A2	A4S6A-9	A5J6-A1
A4S21A-9	A5J21-A1	A4S24B-5	A6J48-A2	A4S6B-1	A6J11-A2
A4S21B-1	A6J41-A2	A4S3A-1	A6J5-A1	A4S6B-10	TB8-6
A4S21B-10	TB8-9	A4S3A-10	TB7-3	A4S6B-11	A5J30-A2
A4S21B-11	A5J45-A2	A4S3A-111	A5J27-A1	A4S6B-2	TB10-6
A4S21B-2	TB10-9	A4S3A-2	TB9-3	A4S6B-3	A7J11-A2
A4S21B-3	A7J41-A2	A4S3A-3	A7J5-A1	A4S6B-5	A6J12-A2
A4S21B-5	A6J42-A2	A4S3A-5	A6J6-A1	A4S6B-6	TB12-6
A4S21B-6	TB12-9	A4S3A-6	TB11-3	A4S6B-7	A7J12-A2
A4S21B-7	A7J42-A2	A4S3A-7	A7J6-A1	A4S6B-9	A5J6--A2
A4S21B-9	A5J21-A2	A4S3A-9	A5J3-A1	A4S7A-1	A6J13-A1
A4S22A-1	A6J43-A1	A4S3B-1	A6J5-A2	A4S7A-10	TB7-7
A4S22A-10	TB7-10	A4S3B-10	TB8-3	A4S7A--11	A5J31-A1
A4S22A-111	A5J46-A1	A4S3B-111	A5J27-A2	A4S7A-2	TB9-7
A4S22A-2	TB9-10	A4S3B-2	TB10-3	A4S7A-3	A7J13-A1
A4S22A-3	A7J43-A1	A4S3B-3	A7J5-A2	A4S7A-5	A6J14-A1
A4S22A-5	A6J44-A1	A4S3B-5	A6J6-A2	A4S7A-6	TB11-7
A4S22A-6	TB11-10	A4S3B-6	TB12-3	A4S7A-7	A7J14-A1
A4S22A-7	A7J44-A1	A4S3B-7	A7J6-A2	A4S7A-9	A5J7-A1
A4S22A-9	A5J22-A1	A4S3B-9	A5J3-A2	A4S7B-1	A6J13-A2
A4S22B-1	A6J43-A2	A4S4A-1	A6J7-A1	A4S7B-10	TB8-7
A4S22B-10	TB8-10	A4S4A-10	TB7-4	A4S7B-11	A5J31-A2

Table 3-2. Wiring List for the VF Patch Panel- Continued

FROM	TO	FROM	TO	FROM	TO
A4S7B-2	TB10-7	A5J14-A4	A5J14-A2	A5J29-A3	A5J29-A1
A4S7B-3	A7J13-A2	A5J14-B1	J12-40	A5J29-A4	A5J29-A2
A4S7B-5	A6J14-A2	A5J14-B2	J11-40	A5J29-B1	J12-56
A4S7B-6	TB12-7	A5J15-A3	A5J15-A1	A5J29-B2	J11-56
A4S7B-7	A7J14-A2	A5J15-A4	A5J15-A2	A5J3-A3	A5J3-A1
A4S7B-9	A5J7-A2	A5J15-B1	J12-41	A5J3-A4	A5J3-A2
A4S8A-1	A6J15-A1	A5J15-B2	J11-41	A5J3-B1	J12-29
A4S8A-10	TB7-8	A5J16-A3	A5J16-A1	A5J3-B2	J11-29
A4S8A-11	A5J32-A1	A5J16-A4	A5J16-A2	A5J30-A3	A5J30-A1
A4S8A-2	TB9-8	A5J16-B1	J12-42	A5J30-A4	A5J30-A2
A4S8A-3	A7J15-A1	A5J16-B2	J11-42	A5J30-B1	J12-57
A4S8A-5	A6J16-A1	A5J17-43	A5J17-A1	A5J30-B2	J11-57
A4S8A-6	TB11-8	A5J17-A4	A5J17-A2	A5J31-A3	A5J31-A1
A4SSA-7	A7J16-A1	A5J17-B1	J12-43	A5J31-A4	A5J31-A2
A4SSA-9	A5J8-A1	A5J17-B2	J11-43	A5J31-B1	J12-58
A4S8B-1	A6J15-A2	A5J18-A3	A5J18-A1	A5J31-B2	J11-58
A4S8B-10	TB8-8	A5J18-A4	A5J18-A2	A5J32-A3	A5J32-A1
A4S8B-11	A5J32-A2	A5J18-B1	J12-44	A5J32-A4	A5J32-A2
A4S8B-2	TB10-8	A5J18-B2	J11-44	A5J32-B1	J12-59
A4S8B-3	A7J15-A2	A5J19-A3	A5J19-A1	A5J32-B2	J11-59
A4SSB-5	A6J16-A2	A5J19-A4	A5J19-A2	A5J33-A3	A5J33-A1
A4S8B-6	TB12-8	A5J19-B1	J12-45	A5J33-A4	A5J33-A2
A4S8B-7	A7J16-A2	A5J19-B2	J11-45	A5J33-B1	J12-60
A4S8B-9	A5JS-A2	A5J2-A3	A5J2-A1	A5J33-B2	J11-60
A4S9A-1	A6J17-A1	A5J2-A4	A5J2-A2	A5J34-A3	A5J34-A1
A4S9A-10	TB7-9	A5J2-B1	J12-28	A5J34-A4	A5J34-A2
A4S9A-11	A5J33-A1	A5J2-B2	J11-28	A5J34-B1	J12-61
A4S9A-2	TB9-9	A5J20-A3	A5J20-A1	A5J34-B2	J11-61
A4S9A-3	A7J17-A1	A5J20-A4	A5J20-A2	A5J35-A3	A5J35-A1
A4S9A-5	A6J18-A1	A5J20-B1	J12-46	A5J35-A4	A5J35-A2
A4S9A-6	TB11-9	A5J20-B2	J11-46	A5J35-B1	J12-62
A4S9A-7	A7J18-A1	A5J21-A3	A5J21-A1	A5J35-B2	J11-62
A4S9A-9	A5J9-A1	A5J21-A4	A5J21-A2	A5J36-A3	A5J36-A1
A4S9B-1	A6J17-A2	A5J21-B1	J12-47	A5J36-A4	A5J36-A2
A4S9B-10	TBS-9	A5J21-B2	J11-47	A5J36-B1	J12-63
A4S9B-11	A5J33-A2	A5J22-A3	A5J22-A1	A5J36-B2	J11-63
A4S9B-2	TB10-9	A5J22-A4	A5J22-A2	A5J37-A3	A5J37-A1
A4S9B-3	A7J17-A2	A5J22-B1	J12-48	A5J37-A4	A5J37-A2
A4S9B-5	A6J18-A2	A5J22-B2	J11-48	A5J37-B1	J12-64
A4S9B-6	TB12-9	A5J23-A3	A5J23-A1	A5J37-B2	J11-64
A4S9B-7	A7J18-A2	A5J23-A4	A5J23-A2	A5J38-A3	A5J38-A1
A4S9B-9	A5J9-A2	A5J23-B1	J12-49	A5J38-A4	A5J38-A2
A5J1-A3	A5J1-A1	A5J23-B2	J11-49	A5J38-B1	J12-65
A5J1-A4	A5J1-A2	A5J24-A3	A5J24-A1	A5J38-B2	J11-65
A5J1-B1	J12-27	A5J24-A4	A5J24-A2	A5J39-A3	A5J39-A1
A5J1-B2	J11-27	A5J24-B1	J12-50	A5J39-A4	A5J39-A2
A5J10-A3	A5J10-A1	A5J24-B2	J11-50	A5J39-B1	J12-66
A5J10-A4	A5J10-A2	A5J25-A3	A5J25-A1	A5J39-B2	J111-66
A5J10-B1	J12-36	A5J25-A4	A5J25-A2	A5J4-A3	A5J4-A1
A5J10-B2	J11-36	A5J25-B1	J12-52	A5J4-A4	A5J4-A2
A5J11-A3	A5J11-A1	A5J25-B2	J11-52	A5J4-B1	J12-30
A5J11-A4	A5J11-A2	A5J26-A3	A5J26-A1	A5J4-B2	J11-30
A5J1-B1	J12-37	A5J26-A4	A5J26-A2	A5J40-A3	A5J40-A1
A5J11-B2	J11-37	A5J26-B1	J12-53	A5J40-A4	A5J40-A2
A5J12-A3	A5J12-A1	A5J26-B2	J11-53	A5J40-B1	J12-67
A5J12-A4	A5J12-A2	A5J27-A3	A5J27-A1	A5J40-B2	J11-67
A5J12-B1	J12-38	A5J27-A4	A5J27-A2	A5J41-A3	A5J41-A1
A5J12-B2	J11-38	A5J27-B1	J12-54	A5J41-A4	A5J41-A2
A5J13-A3	A5J13-A1	A5J27-B2	J11-54	A5J41-B1	J12-68
A5J13-44	A5J13-A2	A5J28-A3	A5J28-A1	A5J41-B2	J11-68
A5J13-B1	J12-39	A5J28-A4	A5J28-A2	A5J42-A3	A5J42-A1
A5J13-B2	J11-39	A5J28-B1	J12-55	A5J42-A4	A5J42-A2
A5J14-A3	A5J14-A1	A5J28-B2	J11-55	A5J42-B1	J12-69

Table 3-2. Wiring List for the VF Patch Panel-Continued

FROM	TO	FROM	TO	FROM	TO
A5J42-B2	J11-69	A6J13-B1	J5-91	A6J28-A4	A6J28-A2
A5J43-A3	A5J43-A1	A6J13-B2	J5-92	A6J28-B1	J8-4
A5J43-A4	A5J43-A2	A6J14-A3	A6J14-A1	A6J28-B2	J8-5
A5J43-B1	J12-70	A6J14-A4	A6J14-A2	A6J29-A3	A6J29-A1
A5J43-B2	J11-70	A6J14-B1	J6-19	A6J29-A4	A6J29-A2
A5J44-A3	A5J44-A1	A6J14-B2	J6-20	A6J29-B1	J7-7
A5J44-A4	A5J44-A2	A6J15-A3	A6J15-A1	A6J29-B2	J7-8
A5J44-B1	J12-71	A6J15-A4	A6J15-A2	A6J3-A3	A6J3-A1
A5J44-B2	J11-71	A6J15-B1	J5-94	A6J3-A4	A6J3-A2
A5J45-A3	A5J45-A1	A6J15-B2	J5-95	A6J3-B1	J5-76
A5J45-A4	A5J45-A2	A6J16-A3	AbJ16-A1	A6J3-B2	J5-77
A5J45-B1	J12-72	A6J16-A4	A6J16-A2	A6J30-A3	A6J30-A1
A5J45-B2	J11-72	A6J16-B1	J6-22	A6J30-A4	A6J30-A2
A5J46-A3	A5J46-A1	A6J16-B2	J6-23	A6J30-B1	J8-7
A5J46-A4	A5J46-A2	A6J17-A3	A6J17-A1	A6J30-B2	J8-8
A5J46-B1	J12-73	A6J17-A4	A6J17-A2	A6J31-A3	A6J31-A1
A5J46-B2	J11-73	A6J17-B1	J5-97	A6J31-A4	A6J31-A2
A5J47-A3	A5J47-A1	A6J17-B2	J5-98	A6J31-B1	J7-10
A5J47-A4	A5J47-A2	A6J18-A3	A6J18-A1	A6J31-B2	J7-11
A5J47-B1	J12-74	A6J18-A4	A6J18-A2	A6J32-A3	A6J32-A1
A5J47-B2	J11-74	A6J18-B1	J6-25	A6J32-A4	A6J32-A2
A5J48-A3	A5J48-A1	A6J18-B2	J6-26	A6J32-B1	J8-10
A5J48-A4	A5J48-A2	A6J19-A3	A6J19-A1	A6J32-B2	J8-11
A5J48-B1	J12-75	A6J19-A4	A6J19-A2	A6J33-A3	A6J33-A1
A5J48-B2	J11-75	A6J19-B1	J5-100	A6J33-A4	A6J33-A2
A5J5-A3	A5J5-A1	A6J19-B2	J5-101	A6J33-B1	J7-13
A5J5-A4	A5J5-A2	A6J2-A3	A6J2-A1	A6J33-B2	J7-14
A5J5-B1	J12-31	A6J2-A4	A6J2-A2	A6J34-A3	A6J34-A1
A5J5-B2	J11-31	A6J2-B1	J6-1	A6J34-A4	A6J34-A2
A5J6-A3	A5J6-A1	A6J2-B2	J6-2	A6J34-B1	J8-13
A5J6-A4	A5J6-A2	A6J20-A3	A6J20-A1	A6J34-B2	J8-14
A5J6-B1	J12-32	A6J20-A4	A6J20-A2	A6J35-A3	A6J35-A1
A5J6-B2	J11-32	A6J20-B1	J6-28	A6J35-A4	A6J35-A2
A5J7-A3	A5J7-A1	A6J20-B2	J6-29	A6J35-B1	J7-16
A5J7-A4	A5J7-A2	A6J21-A3	A6J21-A1	A6J35-B2	J7-17
A5J7-B1	J12-33	A6J21-A4	A6J21-A2	A6J36-A3	A6J36-A1
A5J7-B2	J11-33	A6J21-B1	J5-103	A6J36-A4	A6J36-A2
A5J8-A3	A5J8-A1	A6J21-B2	J5-104	A6J36-B1	J8-16
A5J8-A4	A5J8-A2	A6J22-A3	A6J22-A1	A6J36-B2	J8-17
A5J8-B1	J12-34	A6J22-A4	A6J22-A2	A6J37-A3	A6J37-A1
A5J8-B2	J11-34	A6J22-B1	J6-31	A6J37-A4	A6J37-A2
A5J9-A3	A5J9-A1	A6J22-B2	J6-32	A6J37-B1	J7-19
A5J9-A4	A5J9-A2	A6J23-A3	A6J23-A1	A6J37-B2	J7-20
A5J9-B1	J12-35	A6J23-A4	A6J23-A2	A6J38-A3	A6J38-A1
A5J9-B2	J11-35	A6J23-B1	J5-106	A6J38-A4	A6J38-A2
A6J1-A3	A6J1-A1	A6J23-B2	J5-107	A6J38-B1	J8-19
A6J1-A4	A6J1-A2	A6J24-A3	A6J24-A1	A6J38-B2	J8-20
A6J1-B1	J5-73	A6J24-A4	A6J24-A2	A6J39-A3	A6J39-A1
A6J1-B2	J5-74	A6J24-B1	J6-34	A6J39-A4	A6J39-A2
A6J10-A3	A6J10-A1	A6J24-B2	J6-35	A6J39-B1	J7-22
A6J10-A4	A6J10-A2	A6J25-A3	A6J25-A1	A6J39-B2	J7-23
A6J10-B1	J6-13	A6J25-A4	A6J25-A2	A6J4-A3	A6J4-A1
A6J10-B2	J6-14	A6J25-B1	J7-1	A6J4-A4	A6J4-A2
A6J11-A3	A6J 1-A1	A6J25-B2	J7-2	A6J4-B1	J6-4
A6J11-A4	A6JJ-A2	A6J26-A3	A6J26-A1	A6J4-B2	J6-5
A6J11-B1	J5-88	A6J26-A4	A6J26-A2	A6J40-A3	A6J40-A1
A6J 11-B2	J5-89	A6J26-B1	J8-1	A6J40--A4	A6J40-A2
A6J12-A3	A6J12-A1	A6J26-B2	J8-2	A6J40-B1	J8-22
A6J12-A4	A6J12-A2	A6J27-A3	A6J27-A1	A6J40-B2	J8-23
A6J12-B1	J6-16	A6J27-A4	A6J27-A2	A6J41-A3	A6J41-A1
A6J12-B2	J6-17	A6J27-B1	J7-4	A6J41-A4	A6J41-A2
A6J13-A3	A6J13-A1	A6J27-B2	J7-5	A6J41-B1	J7 25
A6J13-A4	A6J13-A2	A6J28-A3	A6J28-A1	A6J41-B2	J7-26

Table 3-2. Wiring List for the VF Patch Panel-Continued

FROM	TO	FROM	TO	FROM	TO
A6J42-A3	A6J42-A1	A7J12-B2	J8-53	A7J27-B1	J7-76
A6J42-A4	A6J42-A2	A7J13-A3	A7J13-A1	A7J27-B2	J7-77
A6J42-B1.	J8-25	A7J13-A4	A7J13-A2	A7J28-A3	A7J28-A1
A6J42-B2	J8-26	A7J13-B1	J7-55	A7J28-A4	A7J28-A2
A6J43-A3	A6J43-A1	A7J13-B2	J7-56	A7J28-B1	J8-76
A6J43-A4	A6J43-A2	A7J14-A3	A7J14-A1	A7J28-B2	J8-77
A6J43-B1	J7-28	A7J14-A4	A7J14-A2	A7J29-A3	A7J29-A1
A6J43-B2	J7-29	A7J14-B1	J8-55	A7J29-A4	A7J29-A2
A6J44-A3	A6J44-A1	A7J14-B2	J8-56	A7J29-B1	J7-79
A6J44-A4	A6J44-A2	A7J15-A3	A7J15-A1	A7J29-B2	J7-80
A6J44-B1	J8-28	A7J15-A4	A7J15-A2	A7J3-A3	A7J3-A1
A6J44-B2	J8-29	A7J15-B1	J7-58	A7J3-A4	A7J3-A2
A6J45-A3	A6J45-A1	A7J15-B2	J7-59	A7J3-B1	J7-40
A6J45-A4	A6J45-A2	A7J16-A3	A7J16-A1	A7J3-B2	J7-41
A6J45-B1	J7-31	A7J16-A4	A7J16-A2	A7J30-A3	A7J30-A1
A6J45-B2	J7-32	A7J16-B1	J8-58	A7J30-A4	A7J30-A2
A6J46-A3	A6J46-A1	A7J16-B2	J8-59	A7J30-B1	J8-79
A6J46-A4	A6J46-A2	A7J17-A3	A7J17-A1	A7J30-B2	J8-80
A6J46-B1	J8-31	A7J17-A4	A7J17-A2	A7J31-A3	A7J31-A1
A6J46-B2	J8-32	A7J17-B1	J7-61	A7J31-A4	A7J31-A2
A6J47-43	A6J47-A1	A7J17-B2	J7-62	A7J31-B1	J7-82
A6J47-A4	A6J47-A2	A7J18-A3	A7J18-A1	A7J31-B2	J7-83
A6J47-B1	J7-34	A7J18-A4	A7J18-A2	A7J32-A3	A7J32-A1
A6J47-B2	J7-35	A7J18-B1	J8-61	A7J32-A4	A7J32-A2
A6J48-A3	A6J48-A1	A7J18-B2	J8-62	A7J32-B1	J8-82
A6J48-A4	A6J48-A2	A7J19-A3	A7J19-A1	A7J32-B2	J8-83
A6J48-B1	J8-34	A7J19-A4	A7J19-A2	A7J33-A3	A7J33-A1
A4J48-B2	J8-35	A7J19-B1	J7-64	A7J33-A4	A7J33-A2
A6J5-A3	A6J5-A1	A7J19-B2	J7-65	A7J33-B1	J7-85
A6J5-A4	A6J5-A2	A7J2-A3	A7J2-A1	A7J33-B2	J7-86
A6J5-B1	J5-79	A7J2-A4	A7J2-A2	A7J34-A3	A7J34-A1
A6J5-B2	J5-80	A7J2-B1	J8-37	A7J34-A4	A7J34-A2
A6J6-A3	A6J6-A1	A7J2-B2	J8-38	A7J34-B1	J8-85
A6J6-A4	A6J6-A2	A7J20-A3	A7J20-A1	A7J34-B2	J8-86
A6J6-B1	J6-7	A7J20-A4	A7J20-A2	A7J35-A3	A7J35-A1
A6J6-B2	J6-8	A7J20-B1	J8-64	A7J35-A4	A7J35-A2
A6J7-A3	A6J7-A1	A7J20-B2	J8-65	A7J35-B1	J7-88
A6J7-A4	A6J7-A2	A7J21-A3	A7J21-A1	A7J35-B2	J7-89
A6J7-B1	J5-82	A7J21-A4	A7J21-A2	A7J36-A3	A7J36-A1
A6J7-B2	J5-83	A7J21-B1	J7-67	A7J36-A4	A7J36-A2
A6J8-A3	A6J8-A1	A7J21-B2	J7-68	A7J36-B1	J8-88
A6J8-A4	A6J8-A2	A7J22-A3	A7J22-A1	A7J36-B2	J8-89
A6J8-B1	J6-10	A7J22-A4	A7J22-A2	A7J37-A3	A7J37-A1
A6J8-B2	J6-11	A7J22-B1	J8-67	A7J37-A4	A7J37-A2
A6J9-A3	A6J9-A1	A7J22-B2	J8-68	A7J37-B1	J7-91
A6J9-A4	A6J9-A2	A7J23-A3	A7J23-A1	A7J37-B2	J7-92
A6J9-B1	J5-85	A7J23-A4	A7J23-A2	A7J38-A3	A7J38-A1
A6J9-B2	J5-86	A7J23-B1	J7-70	A7J38-A4	A7J38-A2
A7J1-A3	A7J1-A1	A7J23-B2	J7-71	A7J38-B1	J8-91
A7J1-A4	A7J1-A2	A7J24-A3	A7J24-A1	A7J38-B2	J8-92
A7J1-B1	J7-37	A7J24-A4	A7J24-A2	A7J39-A3	A7J39-A1
A7J1-B2	J7-38	A7J24-B1	J8-70	A7J39-A4	A7J39-A2
A7J10-A3	A7J10-A1	A7J24-B2	J8-71	A7J39-B1	J7-94
A7J10-A4	A7J10-A2	A7J25-A3	A7J25-A1	A7J39-B2	J7-95
A7J10-B1	J8-49	A7J25-A4	A7J25-A2	A7J4-A3	A7J4-A1
A7J10-B2	J8-50	A7J25-B1	J7-73	A7J4-A4	A7J4-A2
A7J11-A3	A7J11-A1	A7J25-B2	J7-74	A7J4-B1	J8-40
A7J1 1-A4	A7J1 -A2	A7J26-A3	A7J26-A1	A7J4-B2	J8-41
A7J1 1-B1	J7-52	A7J26-A4	A7J26-A2	A7J40-A3	A7J40-A1
A7J1 -B2	J7-53	A7J26-B1	J8-73	A7J40-A4	A7J40-A2
A7J12-A3	A7J12-A1	A7J26-B2	J8-74	A7J40-B1	J8-94
A7J12-A4	A7J12-A2	A7J27-A3	A7J27-A1	A7J40-B2	J8-95
A7J12-B1	J8-52	A7J27-A4	A7J27-A2	A7J41-43	A7J41-A1

Table 3-2. Wiring List for the VF Patch Panel-Continued

FROM	TO
A7J41-A4	A7J41-A2
A7J41-B1	J7-97
A7J41-B2	J7-98
A7J42-A3	A7J42-A1
A7J42-A4	A7J42-A2
A7J42-B1	J8-97
A7J42-B2	J8-98
A7J43-A3	A7J43-A1
A7J43-A4	A7J43-A2
A7J43-B1	J7-100
A7J43-B2	J7-101
A7J44-A3	A7J44-A1
A7J44-A4	A7J44-A2
A7J44-B1	J8-100
A7J44-B2	J8-101
A7J45-A3	A7J45-A1
A7J45-A4	A7J45-A2
A7J45-B1	J7-103
A7J45-B2	J7-104
A7J46-A3	A7J46-A1
A7J46-A4	A7J46-A2
A7J46-B1	J8-103
A7J46-B2	J8-104
A7J47-A3	A7J47-A1
A7J47-A4	A7J41-A2
A7J47-B1	J7-106
A7J47-B2	J7-107
A7J48-A3	A7J48-A1
A7J48-A4	A7J48-A2
A7J48-B1	J8-106
A7J48-B2	JS-107
A7J5-A3	A7J5-A1
A7J5-A4	A7J5-A2
A7J5-B1	J7-43
A7J5-B2	J7-44
A7J6-A3	A7J6-A1
A7J6-A4	A7J6-A2
A7J6-B1	J8-43
A7J6-B2	J8-44
A7J7-A3	A7J7-A1
A7J7-A4	A7J7-A2
A7J7-B1	J7-46
A7J7-B2	J7-47
A7JS-A3	A7J8-A1
A7JS-A4	A7JS-A2
A7J8-B1	J8-46
A7J8-B2	J8-47
A7J9-A3	A7J9-A1
A7J9-A4	A7J9-A2
A7J9-B1	J7-49
A7J9-B2	J7-50
J1-12	J1-84
J1-122	TB6-14
J1-15	J1-87
J1-18	J1-90
J1-21	J1-93
J1-24	J1-96
J1-27	J1-99
J1-3	J1-75
J1-30	J1-102
J1-33	J1-105
J1-36	J1-108
J1-39	TB1-13
J1-42	TB1-14
J1-45	TB1-15
J1-48	TB1-16
J1-51	TB1-17
J1-54	TB1-18
J1-57	TB1-19
J1-6	J1-78
J1-60	TB1-20
J1-63	TB1-21
J1-66	TB1-22
J1-69	TB2-17
J1-72	TB2-17
J1-9	J1-81
J10-a	TB6-4
J10-C	TB4-13
J10-d	TB6-5
J10-F	TB4-14
J10-g	TB6-6
J10-GG	TB6-13
J10-HH	TB6-12
J1o-j	TB6-7
J10-J	TB4-15
J10-M	TB4-16
J10-n	TB6-8
J10-R	TB6-1
J10-u	A2J25-B1
J10-U	TB6-2
J10-X	TB6-3
J11-1	TB8-1
J11-10	TB8-10
J11-11	TB8-11
J11-12	TB8-12
J11-13	TB5-16
J11-14	TB8-1
J11-15	TBS-2
J11-16	TB8-3
J11-17	TBS-4
J11-18	TB8-5
J11-19	TB8-6
J11-2	TB8-2
J11-20	TB8-7
J11-21	TB8-8
J11-22	TB8-9
J11-23	TB8-10
J11-24	TB8-11
J11-25	TB8-12
J11-26	TB5-17
J11-27	A5J1-B2
J11-28	A5J2-B2
J11-29	A5J3-B2
J11-3	TBS8-3
J11-30	A5J4-B2
J11-31	A5J5-B2
J11-32	A5J6-B2
J11-33	A5J7-B2
J11-34	A5J8-B2
J11-35	A5J9-B2
J11-36	A5J10-B2
J11-37	A5J11-B2
J11-38	A5J12-B2
J11-39	A5J13-B2
J11-4	TB8-4
J11-40	A4J14-B2
J11-41	A5J15-B2
J11-42	A5J16-B2
J11-5	TB8-5
J11-51	TB5-18
J11-6	TBS8-6
J11-7	TB8-7
J11-76	TB5-19
J11-8	TB8-8
J11-9	TB8-9
J12-1	TB7-1
J12-10	TB7-10
J12-11	TB7-11
J12-12	TB7-12
J12-13	TB5-11
J12-14	TB7-1
J12-15	TB7-2
J12-16	TB7-3
J12-17	TB7-4
J12-18	TB7-5
J12-19	TB7-6
J12-2	TB7-2
J12-20	TB7-7
J12-21	TB7-8
J12-22	TB7-9
J12-23	TB7-10
J12-24	TB7-11
J12-25	TB7-12
J12-26	TB5-12
J12-3	TB7-3
J12-4	TB7-4
J12-5	TB7-5
J12-51	TB5-13
J12-6	TB7-6
J12-7	TB7-7
J12-76	TB5-14
J12-8	TB7-8
J12-9	TB7-9
J2-12	J2-84
J2-122	TB6-15
J2-15	J2-87
J2-18	J2-90
J2-21	J2-93
J2-24	J2-96
J2-27	J2-99
J2-3	J2-75
J2-30	J2-102
J2-33	J2-105
J2-36	J2-108
J2-39	TB3-13
J2-42	TB3-14
J2-45	TB3-15
J2-48	TB3-16
J2-51	TB3-17
J2-54	TB3-18
J2-57	TB3-19
J2-6	J2-78
J2-60	TB3-20
J2-63	TB3-21
J2-66	TB3-22
J2-69	TB4-17
J2-72	TB4-17
J2-9	J2-81
J3-102	J5-30

Table 3-2. Wiring List for the VF Patch Panel-Continued

FROM	TO	FROM	TO	FROM	TO
J3-105	J5-33	J5-50	TB10-5	J6-65	TB12-10
J3-108	J5-36	J5-51	TB1-5	J6-66	TB3-10
J3-12	J3-48	J5-52	TB9-6	J6-67	TB11-11
J3-15	J3-51	J5-53	TB10-6	J6-68	TB12-11
J3-18	J3-54	J5-54	TB1-6	J6-69	TB3-11
J3-21	J3-57	J5-55	TB9-7	J6-70	TB11-12
J3-24	J3-60	J5-56	TB10-7	J6-71	TB12-12
J3-27	J3-63	J5-57	TB1-7	J6-72	TB3-12
J3-3	J3-39	J5-58	TB9-8	J6-75	TB3-1
J3-30	J3-66	J5-59	TB10-8	J6-78	TB3-2
J3-33	J3-69	J5-60	TB1-8	J6-81	TB3-3
J3-36	J3-72	J5-61	TB9-9	J6-84	TB3-4
J3-6	J3-42	J5-62	TB10-9	J6-87	TB3-5
J3-75	J5-3	J5-63	TB1-9	J6-90	TB3-6
J3-78	J5-6	J5-64	TB9-10	J6-93	TB3-7
J3-81	J5-9	J5-65	TB10-10	J6-96	TB3-8
J3-84	J5-12	J5-66	TB1-10	J6-99	TB3-9
J3-87	J5-15	J5-67	TB9-11	J7-102	TB2-10
J3-9	J3-45	J5-68	TB10-11	J7-105	TB2-11
J3-90	J5-18	J5-69	TB-111	J7-108	TB2-12
J3-93	J5-21	J5-70	TB9-12	J8-99	TB4-9
J3-96	J5-24	J5-71	TB10-12	J9-a	TB5-4
J3-99	J5-27	J5-72	TB1-12	J9-C	TB2-13
J4-102	J6-30	J5-75	TB1-1	J9-d	TB5-5
J4-105	J6-33	J5-78	TB1-2	J9-F	TB2-14
J4-108	J6-36	J5-81	TB1-3	J9-g	TB5-6
J4-12	J4-48	J5-84	TB1-4	J9-J	TB2-15
J4-15	J4-51	J5-87	TB1-5	J9-j	TB5-7
J4-18	J4-54	J5-90	TB1-6	J9-M	TB2-1fi6
J4-21	J4-57	J5-93	TB1-7	J9-n	TB5-8
J4-24	J4-60	J5-96	TB1-8	J9-q	TB2-18
J4-27	J4-63	J5-99	TB1-9	J9-r	TB5-1
J4-3	J4-39	J6-102	TB3-10	J9-r	TB6-10
J4-30	J4-66	J6-105	TB3-11	J9-s	TB5-20
J4-33	J4-69	J6-108	TB2-12	J9-t	TB4-18
J4-36	J4-72	J6-37	TB11-1	J9-U	TB5-2
J4-6	J4-42	J6-38	TB12-1	J9-X	TB5-3
J4-75	J6-3	J6-39	TB3-1	TB3-1	TB'3-2
J4-78	J6-6	J6-40	TB11-2	TB3-10	TB3-11
J4-81	J6-9	J6-41	TB12-2	TB3-11	TB3-12
J4-84	J6-12	J6-42	TB3-2	TB3-12	TB3-13
J4-87	J6-15	J6-43	TB11-3	TB3-13	TB3-14
J4-9	J4-45	J6-44	TB12-3	TB3-14	TB3-15
J4-90	J6-18	J6-45	TB3-3	TB3-15	TB3-16
J4-93	J6-21	J6-46	TB11-4	TB3-16	TB3-17
J4-96	J6-24	J6-47	TB12-4	TB3-17	TB3-18
J4-99	J6-27	J6-48	TB3-4	TB3-18	TB3-19
J5-102	TB1-10	J6-49	TB11-5	TB3-19	TB3-20
J5-105	TB1-11	J6-50	TB12-5	TB3-2	TB3-3
J5-108	TB1-12	J6-51	TB3-5	TB3-20	TB3-21
J5-37	TB9-1	J6-52	TB11-6	TB3-21	TB3-22
J5-38	TB10-1	J6-53	TB12-6	TB3-22	TB3-21
J5-39	TB1-1	J6-54	TB3-6	TB3-22	TB4-1
J5-40	TB9-2	J6-55	TB31-7	TB3-3	TB3-4
J5-41	TB10-2	J6-56	TB12-7	TB3-4	TB3-5
J5-42	TB1-2	J6-57	TB3-7	TB3-5	TB3-6
J5-43	TB9-3	J6-58	TB11-8	TB3-6	TB3-7
J5-44	TB10-3	J6-59	TB12-8	TB3-7	TB3-8
J5-45	TB1-3	J6-60	TB3-8	TB3-8	TB3-9
J5-46	TB9-4	J6-61	TB11-9	TB3-9	TB3-10
J5-47	TB10-4	J6-62	TB12-9	TB4-1	TB4-2
J5-48	TB1-4	J6-63	TB3-9	TB4-10	TB4-11
J5-49	TB9-5	J6-64	TB11-10	TB4-11	TB4-12

Table 3-2. Wiring List for the VF Patch Panel--Continued

FROM	TO	FROM	TO	FROM	TO
TB4-12	TB4-13	J7-48	TB1-4	J8-48	TB3-4
TB4-13	TB4-14	J7-51	TB1-5	J8-51	TB3-5
TB4-14	TB4-15	J7-54	TB1-6	J8-54	TB3-6
TB4-15	TB4-16	J7-57	TB1-7	J8-57	TB3-7
TB4-16	TB4-17	J7-6	TB2-2	J8-6	TB4-2
TB4-17	TB4-18	J7-60	TB1-8	J8-60	TB3-8
TB4-18	TB4-17	J7-63	TB1-9	J8-63	TB3-9
TB4-18	J9-t	J7-66	TB1-10	J8-66	TB3-10
TB4-2	TB4-3	J7-69	TB1-11	J8-69	TB3-11
TB4-3	TB4-4	J7-72	TB1-12	J8-72	TB3-12
TB4-4	TB4-5	J7-75	TB2-1	J8-75	TB4-1
TB4-5	TB4-6	J7-78	TB2-2	J8-78	TB4-2
TB4-6	TB4-7	J7-81	TB2-3	J8-81	TB4-3
TB4-7	TB4-8	J7-84	TB2-4	J8-84	TB4-4
TB4-8	TB4-9	J7-87	TB2-5	J8-87	TB4-5
TB4-9	TB4-10	J7-9	TB2-3	J8-9	TB4-3
TB5-11	TB5-12	J7-90	TB2-6	J8-90	TB4-6
TB5-12	TB5-13	J7-93	TB2-7	J8-93	TB4-7
TB5-13	TB5-14	J7-96	TB2-8	J8-96	TB4-8
TB5-14	TB5-15	J7-99	TB2-9	TB5-20	TB5-19
TB5-15	TB5-16	J8-102	TB4-10	TB6-1	TB6-2
TB5-16	TB5-17	J8-105	TB4-11	TB6-10	TB6-9
TB5-17	TB5-18	J8-108	TB4-12	TB6-12	TB6-13
TB5-18	TB5-19	J8-12	TB4-4	TB6-13	TB6-14
TB5-19	TB5-20	J8-15	TB4-5	TB6-14	TB6-15
J7-12	TB2-4	J8-18	TB4-6	TB6-15	TB6-16
J7-15	TB2-5	J8-21	TB4-7	TB6-16	TB6-15
J7-18	TB2-6	J8-24	TB4-8	TB6-2	TB6-3
J7-21	TB2-7	J8-27	TB4-9	TB6-3	TB6-4
J7-24	TB2-8	J8-3	TB4-1	TB6-4	TB6-5
J7-27	TB2-9	J8-30	TB4-10	TB6-5	TB6-6
J7-3	TB2-1	J8-33	TB4-11	TB6-6	TB6-7
J7-30	TB2-10	J8-36	TB4-12	TB6-7	TB6-8
J7-33	TB2-11	J8-39	TB3-1	TB6-8	TB6-9
J7-36	TB2-12	J8-42	TB3-2	TB6-9	TB6-10
J7-39	TB-11	J8-45	TB3-3		
J7-42	TB1-2				
J7-45	TB1-3				

Table 3-2. Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
A1J1-A3	A1J1-A1	A1J19-A4	A1J19-A2	A1J29-A3	A1J29-A1
A1J1-A4	A1J1-A2	A1J2-A3	A1J2-A1	A1J29-A4	A1J29-A2
A1J10-A3	A1J10-A1	A1J2-A4	A1J2-A2	A1J3-A3	A1J3-A1
A1J1 0-A4	A1J10-A2	A1J20-A3	A1J20-A1	A1J3-A4	A1J3-A2
A1J11-A3	A1J11-A1	A1J20-A4	A1J20-A2	A1J30-A3	A1J30-A1
A1J11-A4	A1J11-A2	A1J21-A3	A1J21-A1	A1J30-A4	A1J30-A2
A1J12-A3	A1J12-A1	A1J21-A4	A1J21-A2	A1J30-A1	A1J30-A3
A1J12-A4	A1J12-A2	A1J22-A3	A1J22-A1	A1J30-A2	A1J30-A4
A1J13-A3	A1J13-A1	A1J22-A4	A1J22-A2	A1J31-A3	A1J31-A1
A1J13-A4	A1J13-A2	A1J23-A3	A1J23-A1	A1J31-A4	A1J31-A2
A1J14-A3	A1J14-A1	A1J23-A4	A1J23-A2	A1J32-A3	A1J32-A1
A1J14-A4	A1J14-A2	A1J24-A3	A1J24-A1	A1J32-A4	A1J32-A2
A1J15-A3	A1J1S-A1	A1J24-A4	A1J24-A2	A1J33-A3	A1J33-A1
A1J15-A4	A1J15-A2	A1J25-A3	A1J25-A1	A1J33-A4	A1J33-A2
A1J16-A3	A1J16-A1	A1J25-A4	A1J25-A2	A1J34-A3	A1J34-A1
A1J16-A4	A1J16-A2	A1J26-A3	A1J26-A1	A1J34-A4	A1J34-A2
A1J17-A3	A1J17-A1	A1J26-A4	A1J26-A2	A1J35-A3	A1J35-A1
A1J17-A4	A1J17-A2	A1J27-A3	A1J27-A1	A1J35-A4	A1J35-A2
A1J18-A3	A1J18-A1	A1J27-A4	A1J27-A2	A1J36-A3	A1J36-A1
A1J18-A4	A1J18-A2	A1J28-A3	A1J28-A1	A1J36-A4	A1J36-A2
A1J19-A3	A1J19-A1	A1J28-A4	A1J28-A2	A1J37-A3	A1J37-A1

Table 3-2. Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
A1J37-A4	A1J37-A2	A2J22-A3	A2J22-A1	A2J50-B1	A2J49-B2
A1J38-A3	A1J38-A1	A2J22-A4	A2J22-A2	A2J5-A3	A2J5-A1
A1J38-A4	A1J38-A2	A2J23-A3	A2J23-A1	A2J5-A4	A2J5-A2
A1J39-A3	A1J39-A1	A2J23-A4	A2J23-A2	A2J49-B2	A2J50-B1
A1J39-A4	A1J39-A2	A2J24-A3	A2J24- A1	A2J49-B1	A2J40-B2
A1J4-A3	A1J4-A1	A2J24-A4	A2J24-A2	A2J52-B2	A2J51-B1
A1J4-A4	A1J4-A2	A2J25-A3	A2J25-A1	A2J52-B1	A2J51-B2
A1J40-A3	A1J40-A1	A2J25-A4	A2J25-A2	A2J51-B2	A2J52-B1
A1J40-A4	A1J40-A2	A2J26-A3	A2J26-A1	A2J51-B1	A2J52-B2
A1J41-A3	A1J41-A1	A2J26-A4	A2J26-A2	A2J54-B2	A2J53-B1
A1J41-A4	A1J41-A2	A2J25-A2	A2J26-A2	A2J54-B1	A2J53-B2
A1J42-A3	A1J42-A1	A2J27-A3	A2J27-A1	A2J53-B2	A2J54-B1
A1J42-A4	A1J42-A2	A2J26-A2	A2J27-A2	A2J53-B1	A2J54-B2
A1J43-A3	A1J43-A1	A2J27-A4	A2J27-A2	A2J56-B1	A2J55-B1
A1J43-A4	A1J43-A2	A2J28-A3	A2J28-A1	A2J56-B2	A2J55-B2
A1J44-A3	A1J44-A1	A2J27-A2	A2J28-A2	A2J57-B1	A2J56-B1
A1J44-A4	A1J44-A2	A2J28-A4	A2J28-A2	A2J55-B1	A2J56-B1
A1J45-A3	A1J45-A1	A2J29-A3	A2J29-A1	A2J57-B2	A2J56-B2
A1J45-A4	A1J45-A2	A2J29-A4	A2J29-A2	A2J55-B2	A2J56-B2
A1J46-A3	A1J46-A1	A2J28-A2	A2J29-A2	A2J58-B1	A2J57-B1
A1J46-A4	A1J46-A2	A2J3-A3	A2J3-A1	A2J56-B1	A2J57-B1
A1J47-A3	A1J47-A1	A2J3-A4	A2J3-A2	A2J58-B2	A2J57-B2
A1J47-A4	A1J47-A2	A2J30-A3	A2J30-A1	A2J56-B2	A2J57-B2
A1J48-A3	A1J48-A1	A2J30-A4	A2J30-A2	A2J6-A3	A2J6-A1
A1J48-A4	A1J48-A2	A2J29-A2	A2J30-A2	A2J6-A4	A2J6-A2
A1J5-A3	A1J5-A1	A2J31-A3	A2J31-A1	A2J7-A3	A2J7-A1
A1J5-A4	A1J5-A2	A2J30-A2	A2J31-A2	A2J7-A4	A2J7-A2
A1J6-A3	A1J6-A1	A2J31-A4	A2J31-A2	A2J8-A3	A2J8-A1
A1J6-A4	A1J6-A2	A2J32-A3	A2J32-A1	A2J8-A4	A2J8-A2
A1J7-A3	A1J7-A1	A2J32-A4	A2J32-A2	A2J9-A3	A2J9-A1
A1J7-A4	A1J7-A2	A2J31-A2	A2J32-A2	A2J9-A4	A2J9-A2
A1J8-A3	A1J8-A1	A2J33-A3	A2J33-A1	A3J1-A3	A3J1-A1
A1J8-A4	A1J8-A2	A2J33-A4	A2J33-A2	A3J1-A4	A3J1-A2
A1J9-A3	A1J9-A1	A2J32-A2	AZJ33-A2	A3J10-A3	A3J10-A1
A1J9-A4	A1J9-A2	A2J34-A3	A2J34-A1	A3J10-A4	A3J10-A2
AW1-A3	A2J1-A1	A2J33-A2	A2J34-A2	A3J11-A3	A3J11-A1
AW1-A4	A2J1-A2	A2J34-44	A2J34-A2	A3J11-A4	A3J11-A2
AW10-A3	A2J10-A1	A2J35-A3	A2J35-A1	A3J12-A3	A3J12-A1
A2J10-A4	A2J10-A2	A2J34-A2	A2J35-A2	A3J12-A4	A3J12-A2
A2J11-A3	A2J11-A1	A2J36-A2	A2J35-A2	A3J13-A3	A3J13-A1
A2J11-A4	A2J11-A2	A2J35-A4	A2J35-A2	A3J13-A4	A3J13-A2
A2J12-A3	A2J12-A1	A2J36-A3	A2J36-A1	A3J14-A3	A3J14-A1
A2J12-A4	A2J12-A2	A2J36-A4	A2J36-A2	A3J14-A4	A3J14-A2
A2J13-A3	A2J13-A1	A2J35-A2	A2J36-A2	A3J15-A3	A3J15-A1
A2W13-A4	A2J13-A2	A2J38-B1	A2J37-B1	A3J15-A4	A3J15-A2
A2J14-A3	A2J14-A1	A2J38-B2	A2J37-B2	A3J16-A3	A3J16-A1
A2J14-A4	A2J14-A2	A2J39-B1	A2J38-B1	A3J16-A4	A3J16-A2
A2J15-A3	A2J15-A1	A2J37-B1	A2J38-B1	A3J17-A3	A3J17-A1
A2J15-A4	A2J15-A2	A2J39-B2	A2J38-B2	A3J17-A4	A3J17-A2
AW16-A3	A2J16-A1	A2J37-B2	A2J38-B2	A3J18-A3	A3J18-A1
AW16-A4	A2J16-A2	A2J4-A3	A24-A1	A3J18-A4	A3J18-A2
A2J17-A3	A2J17-A1	A2J4-A4	A2J4-A2	A3J19-A3	A3J19-A1
A2J17-A4	A2J17-A2	A2J41-B1	A2J40-B1	A3J19-A4	A3J19-A2
A2J18-A3	A2J18-A1	A2J41-B2	A2J40-B2	A3J2-A3	A3J2-A1
AW18-A4	A2J18-A2	A2J40-B1	A2J41-B1	A3J2-A4	A3J2-A2
A219-A3	A2J19-A1	A2J40-B2	A2J41-B2	A3J20-A3	A3J20-A1
AW19-A4	A2J19-A2	A2J45-B1	A2J44-B1	A3J20-A4	A3J20-A2
AW2-A3	A2J2-A1	A2J45-B2	A2j44-B2	A3J21-A3	A3J21-A1
A2J2-A4	A2J2-A2	A2J46-B1	A2J45-B1	A3J21-A4	A3J21-A2
A2J20-A3	A2J20-A1	A2J44-B1	A2J45-B1	A3J22-A3	A3J22-A1
AW20-A4	A220-A2	A2J46-B2	A2J45-B2	A3J22-A4	A3J22-A2
A2J21-A3	A2J21-A1	A2J44-B2	A2J45-B2	A3J23-A3	A3J23-A1
A2J21-A4	A2J21-A2	A2J50-B2	A2J49-B1	A3J23-A4	A3J23-A2

Table 3-2 Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
A3J24-A3	A3J24-A1	A3J9-A4	A3J9-A2	A5J21-A3	A5J21-A1
A3J24-A4	A3J24-A2	A5J1-A3	A5J1-A1	A5J21-A4	A5J21-A2
A3J25-A3	A3J25-A1	A4S1A-9	A5J1-A1	A4S21B-9	A5J21-A2
A3J25-A49	A5J1-A2	A5J22-A3	A5J22-A1	A5J22-A3	A5J22-A1
A3J26-A3	A3J26-A1	A5J1-A4	A5J1-A2	A4S22A-9	A5J22-A1
A3J26-A4	A3J26-A2	J11-27	A5J1-B2	A4S22B-9	A5J22-A2
A3J27-A3	A3J27-A1	A4S10A-9	A5J10-A1	A5J22-A4	A5J22-A2
A3J27-A4	A3J27-A2	A5J10-A3	A5J10-A1	A5J23-A3	A5J23-A1
A3J28-A3	A3J28-A1	A4S10B-9	A5J10-A2	A4S23A-9	A5J23-A1
A3J28-A4	A3J28-A2	A5J10-A4	A5J10-A2	A5J23-A4	A5J23-A2
A3J29-A3	A3J29-A1	J11-36	A5J10-B2	A4S23B-9	A5J23-A2
A3J29-A4	A3J29-A2	A4S11A-9	A5J11-A1	A4S24A-9	A5J24-A1
A3J3-A3	A3J3-A1	A5J11-A3	A5J11-A1	A5J24-A3	A5J24-A1
A3J3-A4	A3J3-A2	A5J11-A4	A5J11-A2	A4S24B-9	A5J24-A2
A3J30-A3	A3J30-A1	A4S11B-9	A5J11-A2	A5J24-A4	A5J24-A2
A3J30-A4	A3J30-A2	J11-37	A5J11-B2	A5J25-SA3	A5J25-A1
A3J31-A3	A3J31-A1	A4S12A-9	A5J12-A1	A4S1A-11	A5J25-A1
A3J31-A4	A3J31-A2	A5J12-A3	A5J12-A1	A4S1B-11	A5J25-A2
A3J32-A3	A3J32-A1	A5J12-A4	A5J12-A2	A5J25-A4	A5J25-A2
A3J32-A4	A3J32-A2	A4S12B-9	A5J12-A2	A4S2A-11	A5J26-A1
A3J33-A3	A3J33-A1	J11-38	A5J12-B2	A5J26-A3	A5J26-A1
A3J33-A4	A3J33-A2	A5J13-A3	A5J13-A1	A5J26-A4	A5J26-A2
A3J34-A3	A3J34-A1	A4S13A-9	A5J13-A1	A4S2B-11	A5J26-A2
A3J34-A4	A3J34-A2	A4S13B-9	A5J13-A2	A5J27-A3	A5J27-A1
A3J35-A3	A3J35-A1	A5J13-A4	A5J13-A2	A4S3A-11	A5J27-A1
A3J35-A4	A3J35-A2	J11-39	A5J13-B2	A5J27-A4	A5J27-A2
A3J36-A3	A3J36-A1	A4S14A-9	A5J14-A1	A4S3B-11	A5J27-A2
A3J36-A4	A3J36-A2	A5J14-A3	A5J14-A1	A5J28-A3	A5J28-A1
A3J37-A3	A3J37-A1	A5J14-A4	A5J14-A2	A4S4A-11	A5J28-A1
A3J37-A4	A3J37-A2	A4S14B-9	A5J14-A2	A4S4B-11	A5J28-A2
A3J38-A3	A3J38-A1	J11-40	A5J14-B2	A5J28-A4	A5J28-A2
A3J38-A4	A3J38-A2	A5J15-A3	A5J15-A1	A4S5A-11	A5J29-A1
A3J39-A3	A3J39-A1	A4S15A-9	A5J15-A1	A5J29-A3	A5J29-A1
A3J39-A4	A3J39-A2	A5J15-A4	A5J15-A2	A4S5B-11	A5J29-A2
A3J4-A3	A3J4-A1	A4S15B-9	A5J15-A2	A5J29-A4	A5J29-A2
A3J4-A4	A3J4-A2	J11-41	A5J15-B2	A5J3-A3	A5J3-A1
A3J40-A3	A3J40-A1	A5J6-A3	A5J16-A1	A4S3A-9	A5J3-A1
A3J40-A4	A3J40-A2	A4S16A-9	A5J16-A1	A5J3-A4	A5J3-A2
A3J41-A3	A3J41-A1	A4S16B-9	A5J16-A2	A4S3B-9	A5J3-A2
A3J41-A4	A3J41-A2	A5J16-A4	A5J16-A2	J11-29	A5J3-B2
A3J42-A3	A3J42-A1	J11-42	A5J16-B2	A4S6A-11	A5J30-A1
A3J42-A4	A3J42-A2	A4S17A-9	A5J17-A1	A5J30-A3	A5J30-A1
A3J43-A3	A3J43-A1	A5J17-A3	A5J17-A1	A4S6B-11	A5J30-A2
A3J43-A4	A3J43-A2	A5J17-A4	A5J17-A2	A5J30-A4	A5J30-A2
A3J44-A3	A3J44-A1	A4S17B-9	A5J17-A2	A5J31-A3	A5J31-A1
A3J44-A4	A3J44-A2	A5J18-A3	A5J28-A1	A4S7A-11	A5J31-A1
A3J45-A3	A3J45-A1	A4S18A-9	A5J18-A1	A4S?B-11	A5J31-A2
A3J45-A4	A3J45-A2	A4S1SB-9	A5J18-A2	A5J31-A4	A5J31-A2
A3J46-A3	A3J46-A1	A5J18-A4	A5J18-A2	A4S8A-11	A5J32-A1
A3J46-A4	A3J46-A2	A5J19-A3	A5J19-A1	A5J32-A4	A5J32-A2
A3J47-A3	A3J47-A1	A4S19A-9	A5J19-A1	A4S8B-11	A5J32-A2
A3J47-A4	A3J47-A2	A5J119-A4	A5J19-A2	A5J33-A3	A5J33-A1
A3J48-A3	A3J48-A1	A4S19B-9	A5J19-A2	A4S9A-11	A5J33-A1
A3J48-A4	A3J48-A2	A5J2-A3	A5J2-A1	A5J32-A3	A5J33-A1
A3J5-A3	A3J5-A1	A4S2A-9	A5J2-A1	A4S9B-11	A5J33-A2
A3J5-A4	A3J5-A2	A5J2-A4	A5J2-A2	A5J33-A4	A5J33-A2
A3J6-A3	A3J6-A1	A4S2B-9	A5J2-A2	A5J34-A3	A5J34-A1
A3J6-A4	A3J6-A2	J11-28	A5j2-B2	A4S10A-11	A5J34-A1
A3J7-A3	A3J7-A1	A5J20-A3	A5J20-A1	A4S10B-11	A5J34-A2
A3J7-A4	A3J7-A2	A4S20A-9	A5J20-A1	A5J34-A4	A5J34-A2
A3J8-A3	A3J8-A1	A4S20B-9	A5J20-A2	A5J35-A3	A5J35-A1
A3J38-A4	A3J8-A2	A5J20-A4	A5J20-A2	A4S1B-11	A5J35-A2-
A3J9-A3	A3J9-A1	A4S21A-9	A5J21-A1	A5J35-A4	A5J35-A2

Table 3-2. Wiring List for the VF Patch Panel- Continued

TO	FROM	TO	FROM	TO	FROM
A4S12A-11	A5J36-A1	A4S6A-9	A5J6-A1	A6J2-A3	A6J2-A1
A5J36-A3	A5J36-A1	A4S6B-9	A5J6-A2	A4S1A-5	A6J2-A1
A5J36-A4	A5J36-A2	A5J6-A4	A5J6-A2	A6J2-A4	A6J2-A2
A4S12B-11	A5J36-A2	J11-32	A5J6-B2	A4S1B-5	A6J2-A2
A4S13A-11	A5J37-A1	A5J7-A3	A5J7-A1	A6J20-A3	A6J20-A1
A5J37-A3	A5J37-A1	A4S7A-9	A5J7-A1	A4S10A-5	A6J20-A1
A4S13B-11	A5J37-A2	A4S7B-9	A5J7-A2	A6J20-A4	A6J20-A2
A5J37-A4	A5J37-A2	A5J7-A4	A5J7-A2	A4S100B-5	A6J20-A2
A4S14A-11	A5J38-A1	J11-33	A5J7-B2	A4S11A-1	A6J21-A1
A5J38-A3	A5J38-A1	A4S8A-9	A5J8-A1	A6J21-A3	A6J21-A1
A5J38-A4	A5J38-A2	A5J8-A3	A5J8-A1	A6J21-A4	A6J21-A2
A4S14B-11	A5J38-A2	A4SS8B-9	A5J8-A2	A4S11B-1	A6J21-A2
A4S15A-11	A5J39-A1	A5J8-A4	A5J8-A2	A6J22-A3	A6J22-A1
A5J39-A3	A5J39-A1	J11-34	A5J8-B2	A4S11A-5	A6J22-A1
A5J39-A4	A5J39-A2	A5J9-A3	A5J9-A1	A6J22-A4	A6J22-A2
A4S15B-11	A5J39-A2	A4S9A-9	A5J9-A1	A4S11B-5	A6J22-A2
A4S4A-9	A5J4-A1	A4S9B-9	A5J9-A2	A4S12A-1	A6J23-A1
A5J4-A3	A5J4-A1	A5J9-A4	A5J9-A2	A6J23-A3	A6J23-A1
A4S4B-9	A5J4-A2	J11-35	A5J9-B2	A6J23-A4	A6J23-A2
A5J4-A4	A5J4-A2	A6J1-A3	A6J1-A1	A4S12B-1	A6J23-A2
J11-30	A5J4-B2	A4S1A-1	A6J1-A1	A6J24-A3	A6J24-A1
A5J40-A3	A5J40-A1	A4S1B-1	A6J1-A2	A4S12A-5	A6J24-A1
A4S16A-11	A5J40-A1	A6J1-A4	A6J1-A2	A6J24-A4	A6J24-A2
A4S16B-11	A5J40-A2	A6J10-A3	A6J10-A1	A4S12B-5	A6J24-A2
A5J40-A4	A5J40-A2	A4S5A-5	A6J10-A1	A6J25-A3	A6J25-A1
A5J41-A3	A5J41-A1	A6J10-A4	A6J10-A2	A4S13A-1	A6J25-A1
A4S17A-11	A5J41-A1	A4S5B-5	A6J10-A2	A4S13B-1	A6J25-A2
A5J41-A4	A5J41-A2	A4S6A-1	A6J11-A1	A6J25-A4	A6J25-A2
A4S17B-11	A5J41-A2	A6J11-A3	A6J11-A1	A6J26-A3	A6J26-A1
A4S18A-11	A5J42-A1	A6J11-A4	A6J11-A2	A3S13A-5	A6J26-A1
A5J42-A3	A5J42-A1	A4S6B-1	A6J11-A2	A6J26-A4	A6J26-A2
A4S18B-11	A5J42-A2	A6J12-A3	A6J12-A1	A4S13B-5	A6J26-A2
A5J42-A4	A5J42-A2	A4S6A-5	A6J12-A1	A4S14A-1	A6J27-A1
A4S19A-11	A5J43-A1	A6J12-A4	A6J12-A2	A6J27-A3	A6J27-A1
A5J43-A3	A5J43-A1	A4S6B-5	A6J12-A2	A4S14B-1	A6J27-A2
A4S19B-11	A5J43-A2	A4S7A-1	A6J13-A1	A6J27-A4	A6J27-A2
A5J43-A4	A5J43-A2	A6J13-A3	A6J13-A1	A6J28-A3	A6J28-A1
A4S20A-11	A5J44-A1	A4S7B-1	A6J13-A2	A4S14A-5	A6J28-A1
A5J44-A3	A5J44-A1	A6J13-A4	A6J13-A2	A6J28-A4	A6J28-A2
A5J44-A4	A5J44-A2	A6J14-A3	A6J14-A1	A4S14B-5	A6J28-A2
A4S20B-11	A5J44-A2	A4S7A-5	A6J14-A1	A6J29-A3	A6J29-A1
A5J45-A3	A5J45-A1	A6J14-A4	A6J14-A2	A4S15A-1	A6J29-A1
A4S21A-11	A5J45-A1	A4S7B-5	A6J14-A2	A4S15B-1	A6J29-A2
A4S21B-11	A5J45-A2	A4S8A-1	A6J15-A1	A6J29-A4	A6J29-A2
A5J45-A4	A5J45-A2	A6J15-A3	A6J15-A1	A4S2A-1	A6J3-A1
A4S22A-11	A5J46-A1	A6J15-A4	A6J15-A2	A6J3-A3	A6J3-A1
A5J46-A3	A5J46-A1	A4S8B-1	A6J15-A2	A6J3-A4	A6J3-A2
A5J46-A2	A5J46-A2	A6J16-A3	A6J16-A1	A4S2B-1	A6J3-A2
A4S22B-11	A5J46-A2	A4S8A-5	A6J16-A1	A6J30-A3	A6J30-A1
A4S23A-11	A5J47-A1	A6J16-A4	A6J16-A2	A4S15A-5	A6J30-A1
A5J47-43	A5J47-A1	A4S8B-5	A6J16-A2	A6J30-A4	A6J30-A2
A5J47-A4	A5J47-A2	A6J17-A3	A6J17-A1	A4S15B-5	A6J30-A2
A4S23B-11	A5J47-A2	A4S9A-1	A6J17-A1	A4S16A-1	A6J31-A1
A5J48-A3	A5J48-A1	A6J17-A4	A6J17-A2	A6J31-A3	A6J31-A1
A4S24A-11	A5J48-A1	A4S9B-1	A6J17-A2	A6J34-A4	A6J34-A1
A5J48-A4	A5J48-A2	A6J18-A3	A6J18-A1	A4S16B-1	A6J31-A2
A4S24B-11	A5J48-A2	A4S9A-5	A6J18-A1	A6J31-A4	A6J31-A2
A4S5A-9	A5J5-A1	A6J18-A4	A6J18-A2	A6J32-A3	A6J32-A1
A5J5-A3	A5J5-A1	A4S9B-5	A6J18-A2	A4S16A-5	A6J32-A1
A5J5-A4	A5J5-A2	A6J19-A3	A6J19-A1	A6J32-A4	A6J32-A2
A4S5B-9	A5J5-A2	A4S10A-1	A6J19-A1	A4S16B-5	A6J32-A2
J11-31	A5J5-B2	A4S10B-1	A6J19-A2	A4S17A-1	A6J33-A1
A5J6-A3	A5J6-A1	A6J19-A4	A6J19-A2	A6J33-A3	A6J33-A1

Table 3-2. Wiring List for the VF Patch Panel- Continued

TO	FROM	TO	FROM	TO	FROM
A4S17B-1	A6J33-A2	A6J48-A4	A6J48-A2	A4S10A-3	A7J19-A1
A6J33-A4	A6J33-A2	A4S24B5	A6J48-A2	A7J19-A4	A7J19-A2
A4S17A-5	A6J34-A1	A6J5-A3	A6J5-A1	A4S100B-3	A7J19-A2
A6J34-A3	A6J34-A1	A4S3A-1	A6J5-A1	A7J2-A3	A7J2-A1
A4S17B-5	A6J34-A2	A4S3B-1	A6J5-A2	A4S1A-7	A7J2-A1
A4S18A-1	A6J35A1	A6J5-A4	A6J5-A2	A7J2-A4	A7J2-A2
A6J35-A3	A6J35-A1	A6J6-A3	A6J6-A1	A4S1B-7	A7J2-A2
A4S18B-1	A6J35-A2	A4S3A-5	A6J6-A1	A7J20-A3	A7J20-A1
A6J35-A4	A6J35-A2	A6J6-A4	A6J6-A2	A4S10A-7	A7J20-A1
A4S18A-5	A6J36-A1	A4S3B-5	A6J6-A2	A7J20-A4	A7J20-A2
A6J36-A3	A6J36-A1	A4S4A-1	A6J7-A1	A4S10B-7	A7J20-A2
A4S18B-5	A6J36-A2	A6J7-A3	A6J7-A1	A7J21-A3	A7J21-A1
A6J36-A4	A6J36-A2	A6J7-A4	A6J7-A2	A4S11A-3	A7J21-A1
A6J37-A3	A6J37-A1	A4S4B-1	A6J7-A2	A7J21-A4	A7J21-A2
A4S19A-1	A6J37-A1	A4S4A-5	A6J8-A1	A4S11B-3	A7J21-A2
A6J37-A4	A6J37-A2	A6J8-A3	A6J8-A1	A7J22-A3	A7J22-A1
A4S19B-1	A6J37-A2	A4S4B-5	A6J8-A2	A4S11A-7	A7J22-A1
A4S19A-5	A6J38-A1	A6J8-A4	A6J8-A2	A7J22-A4	A7J22-A2
A6J38-A3	A6J38-A1	A4S5A-1	A6J9-A1	A4S11B-7	A7J22-A2
A6J38-A4	A6J38-A2	A6J9-A3	A6J9-A1	A4S12A-3	A7J23-A1
A4S19B-5	A7J38-A2	A6J9-A4	A6J9-A2	A7J23-A3	A7J23-A1
A4S20A-1	A6J39-A1	A4S5B-1	A6J9-A2	A4S12B-3	A7J23-A2
A6J39-A3	A6J39-A1	A4S1A-3	A7J1-A1	A7J23-A4	A7J23-A2
A4S20B-1	A6J39-A2	A7J1-A3	A7J1-A1	A4S12A-7	A7J24-A1
A6J39-A4	A6J39-A2	A4S1B-3	A7J1-A2	A7J24-A3	A7J24-A1
A6J4-A3	A6J4-A1	A7J1-A4	A7J1-A2	A4S12B-7	A7J24-A2
A4S2A 5	A6J4-A1	A7J10-A3	A7J10-A1	A7J24-A4	A7J24-A2
A4S2B-5	A6J4-A2	A4S5A-7	A7J10-A1	A4S13A-3	A7J125-A1
A6J4-A4	A6J4-A2	A7J10-A4	A7J10-A2	A7J25-A3	A7J25-A1
A6J40-A3	A6J40-A1	A4S5B-7	A7J10-A2	A4S13B-3	A7J25-A2
A4S20A-5	A6J40-A1	A7J11-A3	A7J11-A1	A7J25-A4	A7J25-A2
A6J40-A4	A6J40-A2	A4S6A-3	A7J11-A1	A4S13A-7	A7J26-A1
A4S20B-5	A6J40-A2	A7J1-A4	A7J11-A2	A7J26-A3	A7J26-A1
A6J41-A3	A6J41-A1	A4SB-3	A7J41-A2	A4S4SB-7	A7J27-A2
A4S21A-1	A6J41-A1	A7J12-A3	A7J12-A1	A7J26-A4	A7J26-A2
A6J41-A4	A6J41-A2	A4S6A-7	A7J12-A1	A4S14A-3	A7J27-A1
A6J47-A4	A6J47-A2	A7J12-A4	A7J12-A2	A7J27-A3	A7J27-A1
A4S21B-1	A6J41-A2	A4S6B-7	A7J12-A2	A4S14B-3	A7J27-A2
A6J42-A3	A6J42-A1	A7J13-A3	A7J13-A1	A7J27-A4	AJ127-A2
A4S21A-5	A6J42-A1	A4S7A-3	A7J13-A1	A4S14A-7	A7J28-A1
A6J42-A4	A6J42-A2	A7J13-A4	A7J13-A2	A7J28-A3	A7J28-A1
A4S21B-5	A6J42-A2	A4S7B-3	A7J13-A2	A4S14B-7	A7J28-A2
A6J43-A3	A6J43-A1	A7J14-A3	A7J14-A1	A7J28-A4	A7J28-A2
A4S22A-1	A6J43-A1	A4S7A-7	A7J14-A1	A4S15A-3	A7J29-A1
A6J43-A4	A6J43-A2	A7J14-A4	A7J14-A2	A7J29-A3	A7J29-A1
A4S22B-1	A6J43-A2	A4S7B-7	A7J14-A2	A4S15B-3	A7J29-A2
A6J44-A3	A6J44-A1	A7J15-A3	A7J15-A1	A7J29-A4	A7J29-A2
A4S22A-5	A6J44-A1	A4S8A-3	A7J15-A1	A4S2A-3	A7J3-A1
A6J44-A4	A6J44-A2	A7J15-A4	A7J15-A2	A7J3-A3	A7J3-A1
A4S22B-5	A6J44-A2	A4S8B-3	A7J15-A2	A7J3-A4	A7J3-A2
A6J45-A3	A6J45-A1	A7J16-A3	A7J16-A1	A4S2B-3	A7J3-A2
A4S23A-1	A6J45-A1	A4S8A-7	A7J16-A1	A4S15A-7	A7J30-A1
A4S23B-1	A6J45-A2	A7J16-A4	A7J16-A2	A7J30-A3	A7J30-A1
A6J45-A4	A6J45-A2	A4S8B-7	A7J16-A2	AAS15B-7	A7J30-A2
A6J46-A3	A6J46-A1	A7J17-A3	A7J17-A1	A7J30-A4	A7J30-A2
A4S23A-5	A6J46-A1	A4S9A-3	A7J17-A1	A4S16A-3	A7J31-A1
A6J46-A4	A6J46-A2	A7J17-A4	A7J17-A2	A7J31-A3	A7J31-A1
A4S23B-5	A6J46-A1	A4S9B-3	A7J17-A2	A4S16B-3	A7J31-A2
A4S24A-1	A6J47-A1	A7J18-A3	A7J18-A1	A7J31-A4	A7J31-A2
A6J47-A3	A6J47-A1	A4S9A-7	A7J18-A1	A4S16A-7	A7J32-A1
A4S24B-1	A6J47-A2	A7J118-A4	A7J18-A2	A7J32-A3	A7J32-A1
A6J48-A3	A6J48-A1	A4S9B-7	A7J18-A2	A4S16B-7	A7J32-A2
A4S24A-5	A6J48-A1	A7J19-A3	A7J19-A1	A7J32-A4	A7J32-A2

Table 3-2. Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
A4S17A-3	A7J33-A1	A4S24B-3	A7J47-A2	A1J15-A1	J1-22
A7J33-A3	A7J33-A1	A4S24A-7	A7J48-A1	A1J15-A2	J1-23
A4S17B-3	A7J33-A2	A7J48-A3	A7J48-A1	A1J17-A1	J1-25
A7J33-A4	A7J33-A2	A4S24B-7	A7J48-A2	A1J17-A2	J1-26
A4S17A-7	A7J34-A1	A7J48-A4	A7J48-A2	A1J19-A1	J1-28
A7J34-A3	A7J34-A1	A4S3A-3	A7J5-A1	A1J19-A2	J1-29
A4S17B-7	A7J34-A2	A7J5-A3	A7J5-A1	A1J21-A1	J1-31
A7J34-A4	A7J34-A2	A7J5-A4	A7J5-A2	A1J21-A2	J1-32
A4S18A-3	A7J35-A1	A4S3B-3	A7J5-A2	A1J23-A1	J1-34
A7J35-A3	A7J35-A1	A4S3A-7	A7J6-A1	A1J23-A2	J1-35
A4S18B-3	A7J35-A2	A7J6-A3	A7J6-A1	A1J25-A1	J1-37
A7J35-A4	A7J35-A2	A4S3B-7	A7J6-A2	A1J25-A2	J1-38
A4S18A-7	A7J36-A1	A7J6-A4	A7J6-A2	A1J3-A1	J1-4
A7J36-A3	A7J36-A1	A4S4A-3	A7J7-A1	A1J27-A1	J1-40
A4S18B-7	A7J36-A2	A7J7-A3	A7J7-A1	A1J27-A2	J1-41
A7J36-A4	A7J36-A2	A4S4B-3	A7J7-A2	A1J29-A1	J1-43
A4S19A-3	A7J37-A1	A7J7-A4	A7J7-A2	A1J29-A2	J1-44
A7J37-A3	A7J37-A1	A4S4A-7	A7J8-A1	A1J31-A1	J1-46
A4S19B-3	A7J37-A2	A7J8-A3	A7J8-A1	A1J31-A2	J1-47
A7J37-A4	A7J37-A2	A4S4B-7	A7J8-A2	A1J33-A1	J1-49
A4S19A-7	A7J38-A1	A7J8-A4	A7J8-A2	A1J3-A2	J1-5
A7J38-A3	A7J38-A1	A4S5A-3	A7J9-A1	A1J33-A2	J1-50
A4S19B-7	A7J38-A2	A7J9-A3	A7J9-A1	A1J35-A1	J1-52
A7J38-A4	A7J38-A2	A4S5B-3	A7J9-A2	A1J35-A2	J1-53
A4S20A-3	A7J39-A1	A7J9-A4	A7J9-A2	A1J37-A1	J1-55
A7J39-A3	A7J39-A1	A2J59-B1	FL1-1N-1	A1J37-A2	J1-56
A4S20B-3	A7J39-A2	A2J60-B2	FL1-OUT-4	A1J39-A1	J1-58
A7J39-A4	A7J39-A2	A2J60-B1	FL1-OUT-3	A1J39-A2	J1-59
A4S2A-7	A7J4-A1	A2J47-B1	FL2-1N-1	A1J41-A1	J1-61
A7J4-A3	A7J4-A1	A2J47-B2	FL2-1N-2	A1J41-A2	J1-62
A4S2B-7	A7J4-A2	A2J48-B2	FL2-OUT-4	A1J43-A1	J1-64
A7J4-A4	A7J4-A2	A2J48-B1	FL2-OUT-3	A1J43-A2	J1-65
A4S20A-7	A7J40-A1	A1J1-A1	J1-1	A1J45-A1	J1-67
A7J40-A3	A7J40-A1	A1J7-A1	Ji-10	A1J45-A2	J1-68
A4S20B-7	A7J40-A2	A1J19-B1	Ji-100	A1J5-A1	J1-7
A7J40-A4	A7J40-A2	A1J19-B2	J1-101	A1J47-A1	J1-70
A4S21A-3	A7J41-A1	J1-30	J1-102	A1J47-A2	J1-71
A7J41-A3	A7J41-A1	A1J21-B1	J1-103	A1J1-B1	J1-73
A4S21B-3	A7J41-A2	A1J21-B2	J1-104	A1J1-B2	J1-74
A7J47-A4	A7J47-A2	J1-33	J1-105	J1-3	J1-75
A7J41-A4	A7J41-A2	A1J23-B1	J1-106	A1J3-B1	J1-76
A4S21A-7	A7J42-A1	A1J23-B2	J1-107	A1J3-B2	J1-77
A7J42-A3	A7J42-A1	J1-36	J1-108	J1-6	J1-78
A4S21B-7	A7J42-A2	A1J7-A2	J1-1i	A1J5-B1	J1-79
A7J42-A4	A7J42-A2	A2J25-A1	J1-110	A1J5-A2	J1-8
A4S22A-3	A7J43-A1	A2J25-A2	J1-111	A1J5-B2	J1-80
A7J43-A3	A7J43-A1	A2J26-A1	J1-112	J1-9	J1-81
A4S22B-3	A7J43-A2	A2J26-A2	J1-113	A1J7-B1	J1-82
A7J43-A4	A7J43-A2	A2J27-A1	J1-114	A1J7-B2	J1-83
A4S22A-7	A7J44-A1	A2J27-A2	J1-115	J1-12	J1-84
A7J44-A3	A7J44-A1	A2J28-A1	J1-116	A1J9-B1	J1-85
A4S22B-7	A7J44-A2	A2J28-A2	J1-117	A1J9-B2	J1-86
A7J44-A4	A7J44-A2	A2J29-A1	J1-118	J1-15	J1-87
A4S23A-3	A7J45-A1	A2J29-A2	J1-119	A1J11-B1	J1-88
A7J45-A3	A7J45-A1	A2J30-A1	J1-120	A1J11-B2	J1-89
A4S23B-3	A7J45-A2	A2J30-A2	J1-121	J1-18	J1-90
A7J45-A4	A7J45-A2	A1J9-A1	J1-13	A1J13-B1	J1-91
A4S23A-7	A7J46-A1	A1J9-A2	J1-14	A1J13-B2	J1-92
A7J46-A3	A7J46-A1	A1J11-A1	J1-16	J1-21	J1-93
A4S23B-7	A7J46-A2	A1J11-A2	J1-17	A1J15-B1	J1-94
A7J46-A4	A7J46-A2	A1J13-A1	J1-19	A1J15-B2	J1-95
A4S24A-3	A7J47-A1	A1J1-A2	J1-2	J1-24	J1-96
A7J47-A3	A7J47-A1	A1J13-A2	J1-20	A1J17-B1	J1-97

Table 3-2 Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
A1J17-B2	J1-98	A5J25-B2	J11-52	A5J40-B1	J12-67
J1-27	J1-99	A5J26-B2	J11-53	A5J41-B1	J12-68
A3J26-A1	J100-A	A5J27-B2	J11-54	A5J42-B1	J12-69
A2J31-B1	J10-AA	A5J28-B2	J11-55	A5J43-B1	J12-70
A3J42-A1	J10-b	A5J29-B2	J11-56	A5J44-B1	J12-71
A3J26-A2	J10-B	A5J30-B2	J11-57	A5J45-B1	J12-72
A2J32-B1	J10-BB	A5J31-B2	J11-58	A5J46-B1	J12-73
A3J42-A2	J10-c	A5J32-B2	J11-59	A5J47-B1	J12-74
A2J33-B1	J10-CC	A5J33-B2	J11-60	A5J48-B1	J12-75
A3J28-A1	J10-D	A5J34-B2	J11-61	A1J2-A1	J2-1
A2J34-B1	J10-DD	A5J35-B2	J11-62	A1J8-A1	J2-10
A3J44-A1	J10-e	A5J36-B2	J11-63	A1J20-B1	J2-100
A3J28-A2	J10-E	A5J37-B2	J11-64	A1J20-B2	J2-101
A2J35-B1	J10-EE	A5J38-B2	J11-65	J2-30	J2-102
A3J44-A2	J10-f	A5J39-B2	J11-66	A1J22-B1	J2-103
A2J36-B1	J10-FF	A5J40-B2	J11-67	A1J22-B2	J2-104
A3J30-A1	J10-G	A5J41-B2	J11-68	J2-33	J2-105
A3J46-A1	J10-h	A5J42-B2	J11-69	A1J24-B1	J2-106
A3J30-A2	J10-H	A5J43-B2	J11-70	A1J24-B2	J2-107
A2J36-A2	J10-HH	A5J44-B2	J11-71	J2-36	J2-108
A3J46-A2	J10-i	A5J45-B2	J11-72	A1J8-A2	J2-11
A3J32-A1	J10-K	A5J46-B2	J11-73	A2J31-A1	J2-110
A3J48-A1	J10-k	A5J47-B2	J11-74	A2J31-A2	J2-111
A3J32-A2	J10-L	A5J48-B2	J11-75	A2J32-A1	J2-112
A3J48-A2	J10-m	A5J1-B1	J12-27	A2J32-A2	J2-113
A3J34-A1	J10-N	A5J2-B1	J12-28	A2J33-A1	J2-114
A3J34-A2	J10-P	A5J3-B1	J12-29	A2J33-A2	J2-115
A3J36-A1	J10-S	A5J4-B1	J12-30	A2J34-A1	J2-116
A3J36-A2	J10-T	A5J5-B1	J12-31	A2J34-A2	J2-117
A2J25-B1	J10-u	A5J6-B1	J12-32	A2J35-A1	J2-118
A3J38-A1	J10-V	A5J7-B1	J12-33	A2J35-A2	J2-119
A2J26-B1	J10-v	A5J8-B1	J12-34	A2J36-A1	J2-120
A3J38-A2	J10-W	A5J9-B1	J12-35	A2J36-A2	J2-121
A2J27-B1	J10-w	A5J10-B1	J12-36	A1J10-A1	J2-13
A2J28-B1	J10-x	A5J11-B1	J12-37	A1J10-A2	J2-14
A3J40-A1	J10-Y	A5J12-B1	J12-38	A1J12-A1	J2-16
A2J29-B1	J10-y	A5J13-B1	J12-39	A1J12-A2	J2-17
A2J30-B1	J10-z	A5J14-B1	J12-40	A1J14-A1	J2-19
A3J40-A2	J10-Z	A5J15-B1	J12-41	A1J2-A2	J2-2
A5J1-B2	J11-27	A5J16-B1	J12-42	A1J14-A2	J2-20
A5J2-B2	J11-28	A5J17-B1	J12-43	A1J16-A1	J2-22
A5J3-B2	J11-29	A5J18-B1	J12-44	A1J16-A2	J2-23
A5J4-B2	J11-30	A5J19-B1	J12-45	A1J18-A1	J2-25
A5J5-B2	J11-31	A5J20-B1	J12-46	A1J18-A2	J2-26
A5J6-B2	J11-32	A5J21-B1	J12-47	A1J20-A1	J2-28
A5J7-B2	J11-33	A5J22-B1	J12-48	A1J20-A2	J2-29
A5J8-B2	J11-34	A5J23-B1	J12-49	A1J22-A1	J2-31
A5J9-B2	J11-35	A5J24-B1	J12-50	A1J22-A2	J2-32
A5J10-B2	J11-36	A5J25-B1	J12-52	A1J24-A1	J2-34
A5J11-B2	J11-37	A5J26-B1	J12-53	A1J24-A2	J2-35
A5J12-B2	J11-38	A5J27-B1	J12-54	A1J26-A1	J2-37
A5J13-B2	J11-39	A5J28-B1	J12-55	A1J26-A2	J2-38
A5J14-B2	J11-40	A5J29-B1	J12-56	A1J4-A1	J2-4
A5J15-B2	J11-41	A5J30-B1	J12-57	A1J28-A1	J2-40
A5J16-B2	J11-42	A5J31-B1	J12-58	A1J28-A2	J2-41
A5J17-B2	J11-43	A5J32-B1	J12-59	A1J30-A1	J2-43
A5J18-B2	J11-44	A5J33-B1	J12-60	A1J30-A2	J2-44
A5J19-B2	J11-45	A5J34-B1	J12-61	A1J32-A1	J2-46
A5J20-B2	J11-46	A5J35-B1	J12-62	A1J32-A2	J2-47
A5J21-B2	J11-47	A5J36-B1	J12-63	A1J34-A1	J2-49
A5J22-B2	J11-48	A5J37-B1	J12-64	A1J4-A2	J2-5
A5J23-B2	J11-49	A5J38-B1	J12-65	A1J34-A2	J2-50
A5J24-B2	J11-50	A5J39-B1	J12-66	A1J36-A1	J2-52

Table 3-2 Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
A1J36-A2	J2-53	A2J19-A2	J3-29	A2J2-A1	J4-1
A1J38-A1	J2-55	A2J21-A1	J3-31	A2J8-A1	J4-10
A1J38-A2	J2-56	A2J21-A2	J3-32	A3J20-A1	J4-100
A1J40-A1	J1-58	A2J23-A1	J3-34	A3J20-A2	J4-101
A1J40-A2	J2-59	A2J23-A2	J3-35	A3J22-A1	J4-103
A1J42-A1	J2-61	A2J-B1	J3-37	A3J22-A2	J4-104
A1J42-A2	J2-62	A2J1-B2	J3-38	A3J24-A1	J4-106
A1J44-A1	J2-64	J3-3	J3-39	A3J24-A2	J4-107
A1J44-A2	J2-65	A2J3-A1	J3-4	A2J8-A2	J4-11
A1J46-A1	J2-67	A2J3-B1	J3-40	A2J10-A1	J4-13
A1J46-A2	J2-68	A23-B2	J3-41	A2J10-A2	J4-14
A1J6-A1	J2-7	J3-6	J3-42	A2J12-A1	J4-16
A1J48-A1	J2-70	A2J5-B1	J3-43	A2J12-A2	J4-17
A1J48-A2	J2-71	A2J5-B2	J3-44	A2J14-A1	J4-19
A1J2-B1	J2-73	J3-9	J3-45	A2J2-A2	J4-2
A1J2-B2	J2-74	A2J7-B1	J3-46	A2J14-A2	J4-20
J2-3	J2-75	A27-B2	J3-47	A2J16-A1	J4-22
A1J4-B1	J2-76	J3-12	J3-48	A2J16-A2	J4-23
A1J4-B2	J2-77	A2J9-B1	J3-49	A2J18-A1	J4-25
J2-6	J2-78	A23-A2	J3-5	A2J18-A2	J4-26
A1J6-B1	J2-79	A2J9-B2	J3-50	A2J20-A1	J4-28
A1J6-A2	J2-8	J3-15	J3-51	A2J20-A2	J4-29
A1J6-B2	J2-80	A2J11-B1	J3-52	A2J22-A1	J4-31
J2-9	J2-81	A21 1-B2	J3-53	A2J22-A2	J4-32
A1J8-B1	J2-82	J3-18	J3-54	A2J24-A1	J4-34
A1J8-B2	J2-83	AW13-B1	J3-55	A2J24-A2	J4-35
J2-12	J2-84	AW13-B2	J3-56	A2J2-B1	J4-37
A1J10-B1	J2-85	J3-21	J3-57	A2J2-B2	J4-38
A1J10-B2	J2-86	A2J15-B1	J3-58	J4-3	J4-39
J2-15	J2-87	A2J15-B2	J3-59	A2J4-A1	J4-4
A1J12-B1	J2-88	J3-24	J3-60	A2J4-B1	J4-40
A1J12-B2	J2-89	A217-B1	J3-61	A2J4-B2	J4-41
J2-18	J2-90	A2J17-B2	J3-62	J4-6	J4-42
A1J14-B1	J2-91	J3-27	J3-63	A2J6-B1	J4-43
A1J14-B2	J2-92	A2J19-B1	J3-64	A2J6-B2	J4-44
J2-21	J2-93	A2J19-B2	J3-65	J4-9	J4-45
A1J16-B1	J2-94	J3-30	J3-66	A2J8-B1	J4-46
A1J16-B2	J2-95	A2J21-B1	J3-67	A2J8-B2	J4-47
J2-24	J2-96	A2J21-B2	J3-68	J4-12	J4-48
A1J18-B1	J2-97	J3-33	J3-69	A2J10-B1	J4-49
A1J18-B2	J2-98	A2J5-A1	J3-7	A2J4-A2	J4-5
J2-27	J2-99	A2J23-B1	J3-70	A2J10-B2	J4-50
A2J1-A1	J3-1	A2J23-B2	J3-71	J4-15	J4-51
A2J7-A1	J3-10	J3-36	J3-72	A2J12-B1	J4-52
A3J19-A1	J3-100	A3J1-A1	J3-73	A2J12-B2	J4-53
A3J19-A2	J3-101	A3J1-A2	J3-74	J4-18	J4-54
A3J21-A1	J3-103	A3J3-A1	J3-76	A2J14-B1	J4-55
A3J21-A2	J3-104	A3J3-A2	J3-77	A2J14-B2	J4-56
A3J23-A1	J3-106	A3J5-A1	J3-79	J4-21	J4-57
A3J23-A2	J3-107	A2J5-A2	J3-8	A2J16-B1	J4-58
A2J7-A2	J3-11	A3J5-A2	J3-80	A2J16-B2	J4-59
A2J9-A1	J3-13	A3J7-A1	J3-82	J4-24	J4-60
A2J9-A2	J3-14	A3J7-A2	J3-83	A2J18-B1	J4-61
A2J11-A1	J3-16	A3J9-A1	J3-85	A218-B2	J4-62
A2J11-A2	J3-17	A3J9-A2	J3-86	J4-27	J4-63
AW13-A1	J3-19	A3J11-A1	J3-88	A2J20-B1	J4-64
AW1-A2	J3-2	A3J11-A2	J3-89	A2J20-B2	J4-65
AW13-A2	J3-20	A3J13-A1	J3-91	J4-30	J4-66
A2J15-A1	J3-22	A3J13-A2	J3-92	A222-B1	J4-67
A2J15-A2	J3-23	A3J15-A1	J3-94	A222-B2	J4-68
A2J17-A1	J3-25	A3J15-A2	J3-95	J4-33	J4-69
A2J17-A2	J3-26	A3J17-A1	J3-97	A2J6-A1	J4-7
A2J19-A1	J3-28	A3J17-A2	J3-98	A2J24-B1	J4-70

Table 3-2. Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
A2J24-B2	J4-71	A6J3-B1	J5-76	A3J24-B1	J6-34
J4-36	J4-72	A6J3-B2	J5-77	A6J24-B1	J6-34
A3J2-A1	J4-73	A6J5-B1	J5-79	A6J24-B2	J6-35
A3J2-A2	J4-74	A3J5-B2	J5-8	A3J24-B2	J6-35
A3J4-A1	J4-76	A6J5-B2	J5-80	J4-108	J6-36
A3J4-A2	J4-77	A6J7-B1	J5-82	A3J4-B1	J6-4
A3J6-A1	J4-79	A6J7-B2	J5-83	A6J4-B1	J6-4
A2J6-A2	J4-8	A6J9-B1	J5-85	A6J4-B2	J6-5
A3J6-A2	J4-80	A6J9-B2	J5-86	A3J4-B2	J6-5
A3J8-A1	J4-82	A6J11-B1	J5-88	J4-78	J6-6
A3J8-A2	J4-83	A6J11-B2	J5-89	A3J6-B1	J6-7
A3J10-A1	J4-85	J3-81	J5-9	A6J6-B1	J6-7
A3J10-A2	J4-86	A6J13-B1	J5-91	A3J6-B2	J6-8
A3J12-A1	J4-88	A6J13-B2	J5-92	A6J6-B2	J6-8
A3J12-A2	J4-89	A6J15-B1	J5-94	J4-81	J6-9
A3J14-A1	J4-91	A6J15-B2	J5-95	A6J25-B1	J7-1
A3J14-A2	J4-92	A6J17-B1	J5-97	A6J31-B1	J7-10
A3J16-A1	J4-94	A6J17-B2	J5-98	A7J43-B1	J7-100
A3J16-A2	J4-95	A3J2-B1	J6-1	A7J43-B2	J7-101
A3J18-A1	J4-97	A6J2-B1	J6-1	A7J45-B1	J7-103
A3J18-A2	J4-98	A3J8-B1	J6-10	A7J45-B2	J7-104
A3J1-B1	J5-1	A6J8-B1	J6-10	A7J47-B1	J7-106
A3J7-B1	J5-10	A6J8-B2	J6-11	A7J47-B2	J7-107
A6319-B1	J5-100	A3J8-B2	J6-11	A6J31-B2	J7-11
A6J19-B2	J5-101	J4-84	J6-12	A6J33-B1	J7-13
A6J21-B1	J5-103	A3J10-B1	J6-13	A6J33-B2	J7-14
A6J21-B2	J5-104	A6J10-B1	J6-13	A6J35-B1	J7-16
A6J23-B1	J5-106	A3J10-B2	J6-14	A6J35-B2	J7-17
A6J23-B2	J5-107	A6J10-B2	J6-14	A6J37-B1	J7-19
A3J7-B2	J5-11	J4-87	J6-15	A6J25-B2	J7-2
J3-84	J5-12	A3J12-B1	J6-16	A6J37-B2	J7-20
A3J9-B1	J5-13	A6J12-B1	J6-16	A6J39-B1	J7-22
A3J9-B2	J5-14	A6J12-B2	J6-17	A6J39-B2	J7-23
J3-87	J5-15	A3J12-B2	J6-17	A6J41-B1	J7-25
A3J11-B1	J5-16	J4-90	J6-18	A6J41-B2	J7-26
A3J1 1-B2	J5-17	A6J14-B1	J6-19	A6J43-B1	J7-28
J3-90	J5-18	A3J14-B1	J6-19	A6J43-B2	J7-29
A3J13-B1	J5-19	A6J2-B2	J6-2	A6J45-B1	J7-31
A3J1-B2	J5-2	A3J2-B2	J6-2	A6J45-B2	J7-32
A3J13-B2	J5-20	A3J14-B2	J6-20	A6J47-B1	J7-34
J3-93	J5-21	A6J14-B2	J6-20	A6J47-B2	J7-35
A3J15-B1	J5-22	J4-93	J6-21	A7J1-B1	J7-37
A3J15-B2	J5-23	A6J16-B1	J6-22	A7J1-B2	J7-38
J3-96	J5-24	A3J16-B1	J6-22	A6J27-B1	J7-4
A3J17-B1	J5-25	A6J16-B2	J6-23	A7J3-B1	J7-40
A3J17-B2	J5-26	A3J16-B2	J6-23	A7J3-B2	J7-41
J3-99	J5-27	J4-96	J6-24	A7J5-B1	J7-43
A3J19-B1	J5-28	A3J18-B1	J6-25	A7J5-B2	J7-44
A3J19-B2	J5-29	A6J18-B1	J6-25	A7J7-B1	J7-46
J3-75	J5-3	A3J18-B2	J6-26	A7J7-B2	J7-47
J3-102	J5-30	A6J18-B2	J6-26	A7J9-B1	J7-49
A3J21-B1	J5-31	J4-99	J6-27	A6J27-B2	J7-5
A3J21-B2	J5-32	A6J20-B1	J6-28	A7J9-B2	J7-50
J3-105	J5-33	A3J20-B1	J6-28	A7J111-B1	J7-52
A3J23-B1	J5-34	A3J20-B2	J6-29	A7J11-B2	J7-53
A3J23-B2	J5-35	A6J20-B2	J6-29	A7J13-B1	J7-55
J3-108	J5-36	J4-75	J6-3	A7J13-B2	J7-56
A3J3-B1	J5-4	J4-102	J6-30	A7J15-B1	J7-58
A3J3-B2	J5-5	A3J22-B1	J6-31	A7J15-B2	J7-59
J3-78	J5-6	A6J22-B1	J6-31	A7J17-B1	J7-61
A3J5-B1	J5-7	A3J22-B2	J6-32	A7J17-B2	J7-62
A6J1-B1	J5-73	A6J22-B2	J6-32	A7J19-B1	37-64
A6J1-B2	J5-74	J4-105	J6-33	A7J19-B2	J7-65

Table 3-2. Wiring List for the VF Patch Panel- Continued

TO	FROM	TO	FROM	TO	FROM
A7J21-B1	J7-67	A7J12-B2	J8-53	J5-69	TB1-11
A7J21-B2	J7-68	A7J14-B1	J8-55	J7-69	TB1-11
A6J29-B1	J7-7	A7J14-B2	J8-56	J5-105	TB1-11
A7J23-B1	J7-70	A7J16-B1	J8-58	J5-72	TB1-12
A7J23-B2	J7-71	A7J16-B2	J8-59	J5-108	TB1-12
A7J25-B1	J7-73	A7J18-B1	J8-61	J7-72	TB1-12
A7J25-B2	J7-74	A7J18-B2	J8-62	J1-39	TB1-13
A7J27-B1	J7-76	A7J20-B1	J8-64	J1-42	TB1-14
A7J27-B2	J7-77	A7J20-B2	J8-65	J1-45	TB1-15
A7J29-B1	J7-79	A7J22-B1	J8-67	J1-48	TB1-16
A6J29-B2	J7-8	A7J22-B2	J8-68	J1-51	TB1-17
A7J29-B2	J7-80	A6J30-B1	J8-7	J1-54	TB1-18
A7J31-B1	J7-82	A7J24-B1	J8-70	J1-57	TB1-19
A7J31-B2	J7-83	A7J24-B2	J8-71	J5-42	TB1-2
A7J33-B1	J7-85	A7J26-B1	J8-73	J5-78	TB1-2
A7J33-B2	J7-86	A7J26-B2	J8-74	J7-42	TB1-2
A7J35-B1	J7-88	A7J28-B1	J8-76	J1-60	TB1-20
A7J35-B2	J7-89	A7J28-B2	J8-77	J1-63	TB1-21
A7J37-B1	J7-91	A7J30-B1	J8-79	J1-66	TB1-22
A7J37-B2	J7-92	A6J30-B2	J8-8	J5-81	TB1-3
A7J39-B1	J7-94	A7J30-B2	J8-80	J7-45	TB1-3
A7J39-B2	J7-95	A7J32-B1	J8-82	J5-45	TB1-3
A7J41-B1	J7-97	A7J32-B2	J8-83	J7-48	TB1-4
A7J41-B2	J7-98	A7J34-B1	J8-85	J5-48	TB1-4
A6J26-B1	J8-1	A7J34-B2	J8-86	J5-84	TB1-4
A6J32-B1	J8-10	A7J36-B1	J8-88	J5-51	TB1-5
A7J44-B1	J8-100	A7J36-B2	J8-89	J5-87	TB1-5
A7J44-B2	J8-101	A7J38-B1	J8-91	J7-51	TB1-5
A7J46-B1	J8-103	A7J38-B2	J8-92	J5-87	TB1-5
A7J46-B2	J8-104	A7J40-B1	J8-94	J7-51	TB1-5
A7J48-B1	J8-106	A7J40-B2	J8-95	J5-90	TB1-6
A7J48-B2	J8-107	A7J42-B1	J8-97	J5-54	TB1-6
A6J32-B2	J8-11	A7J42-B2	J8-98	J7-54	TB1-6
A6J34-B1	J8-13	A3J25-A1	J9-A	J5-93	TB1-7
A6J34-B2	J8-14	A3J25-A2	J9-B	J5-57	TB1-7
A6J36-B1	J8-16	A3J41-A1	J9-b	J7-57	TB1-7
A6J36-B2	J8-17	A3J41-A2	J9-c	J7-60	TB1-8
A6J38-B1	J8-19	A3J27-A1	J9-D	J5-60	TB1-8
A6J26-B2	J8-2	A3J27-A2	J9-E	J5-96	TB1-8
A6J38-B2	J8-20	A3J43-A1	J9-e	J5-99	TB1-9
A6J40-B1	J8-22	A3J43-A2	J9-f	J7-63	TB1-9
A6J40-B2	J8-23	A3J29-A1	J9-G	J5-63	TB1-9
A6J42-B1	J8-25	A3J29-A2	J9-H	A4S13B-2	TB10-1
A6J42-B2	J8-26	A3J45-A1	J9-h	A4S1B-2	TB10-1
A6J44-B1	J8-28	A3J45-A2	J9-i	J5-38	TB10-1
A6J44-B2	J8-29	A3J31-A1	J9-K	J5-65	TB10-10
A6J46-B1	J8-31	A3J47-A1	J9-k	A4S100B-2	TB10-10
A6J46-B2	J8-32	A3J31-A2	J9-L	A4S22B-2	TB10-10
A6J48-B1	J8-34	A3J47-A2	J9-m	A4S11B-2	TB10-11
A6J48-B2	J8-35	A3J33-A1	J9-N	A4S23B-2	TB10-11
A7J2-B1	J8-37	A3J33-A2	J9-P	J5-68	TB10-11
A7J2-B2	J8-38	A3J35-A1	J9-S	J5-71	TB10-12
A6J28-B1	J8-4	A3J35-A2	J9-T	A4S24B-2	TB10-12
A7J4-B1	J8-40	TB4-18	J9-t	A4S12B-2	TB10-12
A7J4-B2	J8-41	A3J37-A1	J9-V	A4S14B-2	TB10-2
A7J6-B1	J8-43	A3J37-A2	J9-W	J5-41	TB10-2
A7J6-B2	J8-44	A3J39-A1	J9-Y	A4S2B-2	TB10-2
A7J8-B1	J8-46	A3J39-A2	J9-Z	A4S15B-2	TB10-3
A7J8-B2	J8-47	J7-39	TTB1-1	A4S3B-2	TB10-3
A7J10-B1	J8-49	J5-39	TB1-1	J5-44	TB10-3
A6J28-B2	J8-5	J5-75	TB1-1	A4S4B-2	TB10-4
A7J10-B2	J8-50	J5-102	TB1-10	A4S16B-2	TB10-4
A7J12-B1	J8-52	J7-66	TB1-10	J5-47	TB10-4
		J5-66	TB1-10	A4S5B-2	TB10-5

Table 3-2. Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
J5-50	TB10-5	A4S14B-6	TB12-2	TB3-10	TB3-11
A4S17B-2	TB10--5	J6-41	TB12-2	J8-69	TB3-11
A4S18B-2	TB10-6	J6-44	TB12-3	J6-105	TB3-11
A4S6B-2	TB10-6	A4S3B-6	TB12-3	J6-72	TB3-12
J5-53	TB10-6	A4S15B-6	TB12-3	TB3-11	TB3-12
A4S7B-2	TB10-7	A4S4B-6	TB12-4	J8-72	TB3-12
J5-56	TB10-7	J6-47	TB12-4	TB3-12	TB3-13
A4S19B-2	TB10-7	A4S16B-6	TB12-4	J2-39	TB3-13
A4S8B-2	TB 10-8	A4S17B-6	TB12-5	TB3-13	TB3-14
A4S20B-2	TB10-8	J6-50	TB12-5	J2-42	TB3-14
J5-59	TB10-8	A4S5B-6	TB12-5	TB3-14	TB3-15
A4S21B-2	TB10-9	J6-53	TB12-6	J2-45	TB3-15
J5-62	TB10-9	A4S18B-6	TB12-6	J2-48	TB3-16
A4S9B-2	TB10-9	A4S6B-6	TB12-6	TB3-15	TB3-16
A4S1A-6	TB11-1	J6-56	TB12-7	J2-51	TB3-17
A4S13A-6	TB11-1	A4S7B-6	TB12-7	TB3-16	TB3-17
J6-37	TB11-1	A4S19B-6	TB12-7	TB3-17	TB3-18
A4S100A-6	TB11-10	J6-59	TB12-8	J2-54	TB3-18
A4S22A-6	TB11-10	A4S8B-6	TB12-8	TB3-18	TB3-19
J6-64	TB11-10	A4S20B-6	TB12-8	J2-57	TB3-19
A4S23A-6	TB11-11	J6-62	TB12-9	TB3-1	TB3-2
J6-67	TB11-11	A4S21B-6	TB12-9	J6-42	TB3-2
A4S11A-6	TB111-11	A4S9B-6	TB12-9	J8-42	TB3-2
J6-70	TB11-12	J7-3	TB2-1	J6-78	TB3-2
A4S24A-6	TB11-12	J7-75	TB2-1	J2-60	TB3-20
A4S12A-6	TB11-12	J7-102	TB2-10	TB3-19	TB3-20
J6-40	TB11-2	J7-30	TB2-10	J2-63	TB3-21
A4S14A-6	TB11-2	J7-33	TB2-11	TB3-22	TB3-21
A4S2A-6	TB11-2	J7-105	TB2-11	TB3-20	TB3-21
A4S15A-6	TB11-3	J7-108	TB2-12	TB3-21	TB3-22
J6-43	TB11-3	J6-108	TB2-12	J2-66	TB3-22
A4S3A-6	TB 11-3	J7-36	TB2-12	J8-45	TB3-3
A4S4A-6	TB11-4	J9-C	TB2-13	TB3-2	TB3-3
A4S16A-6	TB11-4	J9-F	TB2-14	J6-81	TB3-3
J6-46	TB11-4	J9-J	TB2-15	J6-45	TB3-3
A4S17A-6	TB11-5	J9-M	TB2-16	J6-84	TB3-4
J6-49	TB11-5	J1-69	TB2-17	TB3-3	TB3-4
A4S5A-6	TB11-5	J1-72	TB2-17	J8-48	TB3-4
A1S6A-6	TB11-6	J9-q	TB2-18	J6-48	TB3-4
A4S18A-6	TB11-6	J7-6	TB2-2	TB3-4	TB3-5
J6-52	TB11-6	J7-78	TB2-2	J8-51	TB3-5
A4S19A-6	TB11-7	J7-81	TB2-3	J6-87	TB3-5
J6-55	TB11-7	J7-9	TB2-3	J6-51	TB3-5
A4S7A-6	TB11-7	J7-12	TB2-4	J6-90	TB3-6
A4S8A-6	TB11-8	J7-84	TB2-4	TB3-5	TB3-6
J6-58	TB11-8	J7-87	TB2-5	J8-54	TB3-6
A4S20A-6	TB11-8	J7-15	TB2-5	J6-54	TB3-6
A4S21A-6	TB11-9	J7-18	TB2-6	TB3-6	TB3-7
A4S9A-6	TB 11-9	J7-90	TB2-6	J8-57	TB3-7
J6-61	TB11-9	J7-93	TB2-7	J6-93	TB3-7
A4S1B-6	TB12-1	J7-21	TB2-7	J6-57	TB3-7
J6-38	TB12-1	J7-96	TB2-8	J6-60	TB3-8
A4S13B-6	TB12-1	J7-24	TB2-8	J6-96	TB3-8
J6-65	TB12-10	J7-27	TB2-9	J8-60	TB3-8
A4S10B-6	TB12-10	J7-99	TB2-9	TB3-7	TB3-8
A4S22B-6	TB12-10	J8-39	TB3-1	J6-63	TB3-9
A4S23B-6	TB12-11	J6-75	TB3-1	TB3-8	TB3-9
J6-68	TB12-11	J6-39	TB3-1	J8-63	TB3-9
A4S11B-6	TB12-11	J6-102	TB3-10	J6-99	TB3-9
J6-71	TB12-12	J6-66	TB3-10	J8-3	TB4-1
A4S12B-6	TB12-12	J8-66	TB3-10	TB3-22	TB4-1
A4S24B-6	TB12-12	TB3-9	TB3-10	J8-75	TB4-1
A4S2B-6	TB12-2	J6-69	TB3-11	J8-102	TB4-10

Table 3-2. Wiring List for the VF Patch Panel--Continued

TO	FROM	TO	FROM	TO	FROM
J8-30	TB4-10	TB5-20	TB5-19	J12-4	TB7-4
TB4-9	TB4-10	J9-U	TB5-2	J12-17	TB7-4
TB4-10	TB4-11	J9-S	TB5-20	J12-18	TB7-5
J8-33	TB4-11	TB5-19	TB5-20	A4S17A-10	TB7-5
J8-105	TB4-11	J9-X	TB5-3	A4S5A-10	TB7-5
J8-36	TB4-12	J9-a	TB5-4	J12-5	TB7-5
TB4-11	TB4-12	J9-d	TB5-5	A4S18A-10	TB7-6
J8-108	TB4-12	J9-g	TB5-6	J12-6	TB7-6
J10-C	TB4-13	J9-j	TB5-7	J12-19	TB7-6
TB4-12	TB4-13	J9-n	TB5-8	A4S6A-10	TB7-6
TB4-13	TB4-14	J10-R	TB6-1	A4S7A-10	TB7-7
J10-F	TB4-14	TB6-9	TB6-10	J12-20	TB7-7
TB4-14	TB4-15	J9-r	TB6-10	A4S19A-10	TB7-7
J10-J	TB4-15	J10-HH	TB6-12	J12-7	TB7-7
J10-M	TB4-16	TB6-12	TB6-13	A4S20A-10	TB7-8
TB4-15	TB4-16	J10-GG	TB6-13	J12-8	TB7-8
TB4-18	TB4-17	*1B6-13	TB6-14	J12-21	TB7-8
TB4-16	TB4-17	J1-122	TB6-14	A4S8A-10	TB7-8
J2-72	TB4-17	TB6-16	TB6-15	A4S9A-10	TB7-9
J2-69	TB4-17	J2-122	TB6-15	J12-22	TB7-9
TB4-17	TB4-18	TB6-14	TB6-15	A4S21A-10	TB7-9
J9-t	TB4-18	TB6-15	TB6-16	J12-9	TB7-9
J8-78	TB4-2	TB6-1	TB6-2	A4S13B-10	TB8-1
J8-6	TB4-2	J10-U	TB6-2	J11-14	TB8-1
TB4-1	TB4-2	TB6-2	TB6-3	J11-1	TB8-1
TB4-2	TB4-3	J10-X	TB6-3	A4S1B-10	TB8-1
J8-9	TB4-3	TB6-3	TB6-4	A4S22B-10	TB8-10
J8-81	TB4-3	J10-a	TB6-4	J11-10	TB8-10
J8-12	TB4-4	J10-d	TB6-5	A4S10B-10	TB8-10
J8-84	TB4-4	TB6-4	TB6-5	J11-23	TB8-10
TB4-3	TB4-4	J10-g	TB6-6	J11-11	TB8-11
J8-87	TB4-5	TB6-5	TB6-6	A4S23B-10	TB8-11
J8-15	TB4-5	TB6-6	TB6-7	J11-24	TB8-11
TB4-4	TB4-5	J1o-j	TB6-7	A4S11B-10	TB8-11
TB4-5	TB4-6	J10-n	TB6-8	A4S24B-10	TB8-12
J8-18	TB4-6	TB6-7	TB6-8	J11-25	TB8-12
J8-90	TB4-6	TB6-8	TB6-9	J11-12	TB8-12
J8-93	TB4-7	TB6-10	TB6-9	A4S12B-10	TB8-12
J8-21	TB4-7	J12-14	TB7-1	J11-2	TB8-2
TB4-6	TB4-7	A4S1A-10	TB7-1	A4S14B-10	TB8-2
J8-24	TB4-8	J12-1	TB7-1	J11-15	TB8-2
J8-96	TB4-8	A4S13A-10	TB7-1	A4S2B-10	TB8-2
TB4-7	TB4-8	A4S10A-10	TB7-10	J11-3	TB8-3
J8-99	TB4-9	J12-10	TB7-10	A4S15B-10	TB8-3
J8-27	TB4-9	A4S22-A10	TB7-10	J11-16	TB8-3
TB4-8	TB4-9	J12-23	TB7-10	A4S3B-10	TB8-3
J9-R	TB5-1	J12-24	TB7-11	A4S16B-10	TB8-4
J12-13	TB5-11	A4S23A-10	TB7-11	J11-4	TB8-4
J12-26	TB5-12	A4S11A-10	TB7-11	J11-17	TB8-4
TB5-11	TB5-12	J12-11	TB7-11	A4S4B-10	TB8-4
TB5-12	TB5-13	A4S12A-10	TB7-12	J11-18	TB8-5
J12-51	TB5-13	J12-12	TB7-12	A4S17B-10	TB8-5
TB5-13	TB5-14	A4S24A-10	TB7-12	J11-5	TB8-5
J12-76	TB5-14	J12-25	TB7-12	A4S5B-10	TB8-5
TB5-14	TB5-15	A4S2A-10	TB7-2	J11-19	TB8-6
J11-13	TB5-16	A4S14A-10	TB7-2	A4S6B-10	TB8-6
TB5-15	TB5-16	J12-2	TB7-2	A4S18B-10	TB8-6
J11-26	TB5-17	J12-15	TB7-2	J11-6	TB8-6
TB5-16	TB5-17	A4S15A-10	TB7-3	J11-20	TB8-7
TB5-17	TB5-18	A4S3A-10	TB7-3	A4S19B-10	TB8-7
J11-51	TB5-18	J12-16	TB7-3	A4S7B-10	TB8-7
TB5-18	TB5-19	J12-3	TB7-3	J11-7	TB8-7
J11-76	TB5-19	A4S4A-10	TB7-4	A4S20B-10	TB8-8
		A4S16A-10	TB7-4		

Table 3-2. Wiring List for the VF Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
J11-21	TB8-8	A4S16A-2	TB9-4	J6-74	A6J2-B2
J11-8	TB8-8	J5-46	TB9-4	J6-76	A6J4-B1
A4S8B-10	TB8-8	A4S4A-2	TB9-4	J6-77	A6J4-B2
A4S9B-10	TB8-9	A4S17A-2	TB9-5	J6-79	A6J6-B1
A4S21B-10	TB8-9	J5-49	TB9-5	J6-80	A6J6-B2
J11-9	TB8-9	A4S5A-2	TB9-5	J6-82	A6J8-B1
J11-22	TBS-9	J5-52	TB9-6	J6-83	A6J8-B2
J5-37	TB9-1	A4S6A-2	TB9-6	J6-85	A6J10-B1
A4S1A-2	TB9-1	A4S18A-2	TB9-6	J6-86	A6J10-B2
A4S13A-2	TB9-1	J5-55	TB9-7	J6-88	A6J12-B1
A4S22A-2	TB9-10	A4S19A-2	TB9-7	J6-89	A6J12-B2
J5-64	TB9-10	A4S7A-2	TB9-7	J6-91	A6J14-B1
A4S10A-2	TB9-10	J5-58	TB9-8	J6-92	A6J14-B2
A4S11A-2	TB9-11	A4S20A-2	TB9-8	J6-94	A6J16-B1
J5-67	TB9-11	A4S8A-2	TB9-8	J6-95	A6J16-B2
A4S23A-2	TB9-11	A4S9A-2	TB9-9	J6-97	A6J18-B1
A4S12A-2	TB9-12	A4S21A-2	TB9-9	J6-98	A6J18-B2
J5-70	TB9-12	J5-61	TB9-9	J6-100	A6J20-B1
A4S24A-2	TB9-12	A2J59-B2	FL1-1N-2	J6-101	A6J20-B2
J5-40	TB9-2	A2J42-B2	600	J6-103	A6J22-B1
A4S2A-2	TB9-2	A2J43-B1	600	J6-104	A6J22-B2
A4S14A-2	TB9-2	A2J42-B1	600	J6-106	A6J24-B1
J5-43	TB9-3	A2J43-B2	600	J6-107	A6J24-B2
A4S15A-2	TB9-3	J6-73	A6J2-B1	TB6-16	A2J36-B2
A4S3A-2	TB9-3				

Table 3-3. Wiring List for TY/Low Level Patch Panel

FROM	TO	FROM	TO	FROM	TO
A1J1-A1	A1J1-A3	A1J17-A1	A1J17-A3	A1J8-A1	A1J8-A3
A1J1-A2	A1J1-A4	A1J17-A2	A1J17-A4	A1J8-A2	A1J8-A4
A1J1-Bi	A3S1-A1	A1J17-B1	A3S17-A1	A1J8-B1	A3S8-A1
A1J1-B2	A3S1-A6	A1J17-B2	A3S17-A6	A1J8-B2	A3S8-A6
A1J10-A1	A1J10-A3	A1J18-A1	A1J18-A3	A1J9-A1	A1J9-A3
A1J10-A2	A1J10-A4	A1J18-A2	A1J18-A4	A1J9-A2	A1J9-A4
A1J10-B1	A3S10-A1	A1J18-B1	A3S18-A1	A1J9-B1	A3S9-A1
A1J10-B2	A3S10-A6	A1J18-B2	A3S18-A6	A1J9-B2	A3S9-A6
A1J11-A1	A1J11-A3	A1J2-A1	A1J2-A3	A2J1-B1	A2J2-B2
A1J11-A2	A1J11-A4	A1J2-A2	A1J2-A4	A2J1-B2	A22-B1
A1J11-B1	A3S11-A1	A1J2-B1	A3S2-A1	A2J11-B1	A2JW12-B2
A1J11-B2	A3S11-A6	A1J2-B2	A3S2-A6	A2J11-B2	A212-B1
A1J12-A1	A1J12-A3	A1J3-A1	A1J3-A3	A2J13-B1	A2J14-B2
A1J12-A2	A1J12-A4	A1J3-A2	A1J3-A4	A2J13-B2	A2J14-B1
A1J12-B1	A3S12-A1	A1J3-B1	A3S3-A1	A2J15-B1	AW16-B2
A1J12-B2	A3S12-A6	A1J3-B2	A3S3-A6	A2J15-B2	AW16-B1
A1J13-A1	A1J13-A3	A1J4-A1	A1J4-A3	A2J17-B1	A2J18-B2
A1J13-A2	A1J13-A4	A1J4-A2	A1J4-A4	A2J17-B2	A2J18-B1
A1J13-B1	A3S13-A1	A1J4-B1	A3S4-A1	A2J19-B1	A2J21-B1
A1J13-B2	A3S13-A6	A1J4-B2	A3S4-A6	A2J20-B1	A222-B1
A1J14-A1	A1J14-A3	A1J5-A1	A1J5-A3	A2J21-B1	A2J19-B1
A1J14-A2	A1J14-A4	A1J5-A2	A1J5-A4	A2J22-B1	A2J24-B1
A1J14-B1	A3S14-A1	A1J5-B1	A3S5-A1	A2J23-B1	A2J25-B1
A1J14-B2	A3S14-A6	A1J5-B2	A3S5-A6	A224-B1	A2J26-B1
A1J15-A1	A1J15-A3	A1J6-A1	A1J6-A3	A2J25-B1	A6-44
A1J15-A2	A1J15-A4	A1J6-A2	A1J6-A4	A226-B1	A6-45
A1J15-B1	A3S15-A1	A1J6-B1	A3S6-A1	A227-A1	A2J27-A2
A1J15-B2	A3J15-A6	A1J6-B2	A3S6-A6	A227-A2	A227-A1
A1J16-A1	A1J16-A3	A1J7-A1	A1J7-A3	A2J27-B1	A2J33-B1
A1J16-A2	A1J16-A4	A1J7-A2	A1J7-A4	A2J27-B2	A2J29-B2
A1J16-B1	A3S16-A1	A1J7-B1	A3S7-A1	A2J28-B1	A2J30-B1
A1J16-B2	A3S16-A6	A1J7-B2	A3S7-A6	A2J28-B2	A2J30-B1
A2J29-A1	A2J29-A2				

Table 3-3. Wiring List for TTY/Low Level Patch Panel-Continued

FROM	TO	FROM	TO	FROM	TO
A2J29-B1	A2J31-B2	A3S10-B6	A3XDS10-1	A3S5-B6	A3XDS5-1
A2J3-B1	A2J4-B2	A3S11-A2	A4J11-43	A3S6-A2	A4J6-A3
A2J3-B2	A2J4-B1	A3S11-A6	A4J11-A4	A3S6-A6	A4J6-A4
A2J30-B1	A2J32-B 1	A3S11-B6	A3XDS11-1	A3S6-B6	A3XDS6-1
A2J30-B2	A2J32-B2	A3S12-A2	A4J12-A3	A3S7-A2	A4J7-A3
A2J31-A1	A2J31-A2	A3S12-A6	A4J12-A4	A3S7-A6	A4J7-A4
A2J31-B1	A2J33-B2	A3S12-B6	A3XDS12-1	A3S7-B6	A3XDS7-1
A2J32-B1	A2J34-B1	A3S13-A2	A4J13-A3	A3S8-A2	A4J8-A3
A2J32-B2	A2J34-B2	A3S13-A6	A4J13-A4	A3S8-A6	A4J8-A4
A2J33-A1	A2J33-A2	A3S13-B6	A3XDS13-1	A3S8-B6	A3XDS8-1
A2J35-A1	A2J35-A2	A3S14-A2	A4J14-A3	A3S9-A2	A4J9-A3
A2J35-B1	A2J41-B1	A3S14-A6	A4J14-A4	A3S9-A6	A4J9-A4
A2J35-B2	A2J37-B2	A3S14-B6	A3XDS14-1	A3S9-B6	A3XDS9-1
A2J36-B1	A2J38-B1	A3S15-A2	A4J15-A3	A3XDS1-2	A3XDS2-2
A2J36-B2	A2J38-B2	A3S15-A6	A4J15-A4	A3XDS10-2	A3XDS11-2
A2J37-A1	A2J37-A2	A3S15-B6	A3XDS15-1	A3XDS11-2	A3XDS12-2
A2J37-B1	A2J39-B2	A3S16-A2	A4J16-A3	A3XDS12-2	A3XDS13-2
A2J38-B1	A2J40-B1	A3S16-A6	A4J16-A4	A3XDS13-2	A3XDS14-2
A2J38-B2	A2J40-B2	A3S16-B6	A3XDS16-1	A3XDS14-2	A3XDS15-2
A2J39-A1	A2J39-A2	A3S17-A2	A4J17-A3	A3XDS15-2	A3XDS16-2
A2J39-B1	A2J41-B2	A3S17-A6	A4J17-A4	A3XDS16-2	A3XDS17-2
A2J41-A1	A2J41-A2	A3S17-B6	A3XDS17-1	A3XDS17-2	A3XDS18-2
A2J43-B1	A6-19	A3S18-A2	A4J18-A3	A3XDS18-2	TB1-16
A2J46-B1	A2J48-B2	A3S18-A6	A4J18-A4	A3XDS2-2	A3XDS3-2
A2J47-B1	A6-23	A3S18-B6	A3XDS18-1	A3XDS3-2	A3XDS4-2
A2J48-B2	J3-Y	A3S2-A2	A4J2-A3	A3XDS4-2	A3XDS5-2
A2J5-B1	A2J6-B2	A3S2-A6	A4J2-A4	A3XDS5-2	A3XDS6-2
A2J5-B2	A2J6-B1	A3S2-B6	A3XDS2-1	A3XDS6-2	A3XDS7-2
AW7-B1	A2J8-B2	A3S3-A2	A4J3-A3	A3XDS7-2	A3XDS8-2
A2J7-B2	A2J8-B1	A3S3-A6	A4J3-A4	A3XDS8-2	A3XDS9-2
A2J9-B1	A2J10-B2	A3S3-B6	A3XDS3-1	A3XDS9-2	A3XDS100-2
A2J9-B2	A2J10-B1	A3S4-A2	A4J4-A3	A4J1-A1	A4J1-A3
A3S1-A2	A4J1-A3	A3S4-A6	A4J4-A4	A4J1-A2	A4J1-A4
A3S1-B6	A3XDS1-1	A3S4-B6	A3XDS4-1	A4J1-B1	J1-A
A3S10-A2	A4J10-A3	A3S5-A2	A4J5-A3	A4J1-B2	J1-B
A3S10-A6	A4J10-A4	A3S5-A6	A4J5-A4		

TO	FROM	TO	FROM	TO	FROM
A1J1-A1	A1J1-A3	A1J2-A2	A1J2-A4	A2J11-B1	A2J12-B2
A1J1-A2	A1J1-A4	A1J3-A1	A1J3-A3	A2J13-B2	A2J14-B1
A1J10-A1	A1J10-A3	A1J3-A2	A1J3-A4	A2J13-B1	A2J14-B2
A1J10-A2	A1J10-A4	A1J4-A1	A1J4-A3	A2J15-B2	A2J16-B1
A1J11-A1	A1J11-A3	A1J4-A2	A1J4-A4	A2J15-B1	A2J16-B2
A1J11-A2	A1J11-A4	A1J5-A1	A1J5-A3	A2J17-B2	A2J18-B1
A1J12-A1	A1J12-A3	A1J5-A2	A1J5-A4	A2J17-B1	A2J18-B2
A1J12-A2	A1J12-A4	A1J6-A1	A1J6-A3	A2J21-B1	A2J19-B1
A1J13-A1	A1J13-A3	A1J6-A2	A1J6-A4	A6-43	A2J19-B1
A1J13-A2	A1J13-A4	A1J7-A1	A1J7-A3	A2J1-B2	A2J2-B1
A1J14-A1	A1J14-A3	A1J7-A2	A1J7-A4	A2J1-B1	A2J2-B2
A1J14-A2	A1J14-A4	A1J8-A1	A1J8-A3	A2J19-B1	A2J21-B1
A1J15-A1	A1J15-A3	A1J8-A2	A1J8-A4	A2J20-B1	A2J22-B1
A1J15-A2	A1J15-A4	A1J9-A1	A1J9-A3	A2J22-B1	A2J24-B1
A1J16-A1	A1J16-A3	A1J9-A2	A1J9-A4	A2J23-B1	A2J25-B1
A1J16-A2	A1J16-A4	A2J43-B1	A6-19	A2J24-B1	A2J26-B1
A1J17-A1	A1J17-A3	A2J47-B1	A6-23	A2J27-A2	A2J27-A1
A1J17-A2	A1J17-A4	A2J25-B1	A6-44	A2J27-A1	A2J27-A2
A1J18-A1	A1J18-A3	A2J26-B1	A6-45	A2J29-A1	A2J29-A2
A1J18-A2	A1J18-A4	A2J9-B2	A2J10-B1	A2J27-B2	A2J29-B2
A6-45	A1J19-B1	A2J9-B1	A2J10-B2	A2J48-B2	J3-Y
A1J2-A1	A1J2-A3	A2J11-B2	A2J12-B1	A2J28-B2	A2J30-B2

Table 3-3. Wiring List for TTY/Low Level Patch Panel-Continued

TO	FROM	TO	FROM	TO	FROM
A2J28-B1	A2J30-B1	A6-38	A3S16-A6	A3S2-B6	A3XDS2-1
A2J31-A1	A2J31-A2	A1J16-B2	A3S16-A6	A3XDS1-2	A3XDS2-2
A2J29-B1	A2J31-B2	A1J17-B1	A3S17-A1	A3S3-B6	A3XDS3-1
A2J30-B1	A2J32-B1	A6-39	A3S17-A5	A3XDS2-2	A3XDS3-2
A2J30-B2	A2J32-B2	A1J17-B2	A3S17-A6	A3S4-B6	A3XDS4-1
A2J33-A1	A2J33-A2	A6-40	A3S17-A6	A3XDS3-2	A3XDS4-2
A2J27-B1	A2J33-B1	A1J18-B1	A3S18-A1	A3S5-B6	A3XDS5-1
A2J31-B1	A2J33-B2	A6-41	A3S18-A5	A3XDS4-2	A3XDS5-2
A2J32-B1	A2J34-B1	A6-42	A3S18-A6	A3S6-B6	A3XDS6-1
A2J32-B2	A2J34-B2	A1J18-B2	A3S18-A6	A3XDS5-2	A3XDS6-2
A2J35-A1	A2J35-A2	A1J2-B1	A3S2-A1	A3S7-B6	A3XDS7-1
A2J37-A1	A2J37-A2	A6-3	A3S2-A5	A3XDS6-2	A3XDS7-2
A2J35-B2	A2J37-B2	A6-4	A3S2-A6	A3SS-B6,	A3XDS8-1
A2J36-B1	A2J38-B1	A1J2-B2	A3S2-A6	A3XDS7-2	A3XDS8-2
A2J36-B2	A2J38-B2	A1J3-B1	A3S3-A1	A3S9-B6	A3XDS9-1
A2J39-A1	A2J39-A2	A6-5	A3S3-A5	A3XDS8-2	A3XDS9-2
A2J37-B1	A2J39-B2	A6-6	A3S3-A6	A3S1-A2	A4J1-A3
A2J3-B2	A2J4-B1	A1J3-B2	A3S3-A6	A4J1-A1	A4J1-A3
A2J3-B1	A2J4-B2	A1J4-B1	A3S4-A1	A4J1-A2	A4J1-A4
A2J38-B1	A2J40-B1	A6-7	A3S4-A5	A3S10-A2	A4J10-A3
A2J41-A1	A2J41-A2	A1J4-B2	A3S4-A6	A4J10-A1	A4J10-A3
A2J35-B1	A2J41-B1	A6-8	A3S4-A6	A4J10-A2	A4J10-A4
A2J39-B1	A2J41-B2	A1J5-B1	A3S5-A1	A3S10-A6	A4J10-A4
A2J38-B2	A2J40-B2	A6-9	A3S5-A5	A3S11-A2	A4J11-A3
A6-19	A2J43-B1	A1J5-B2	A3S5-A6	A4J11-A1	A4J11-A3
A6-21	A2J45-B1	A6-10	A3S5-A6	A4J11-A2	A4J11-A4
A6-23	A2J47-B1	A1J6-B1	A3S6-A1	A3J11-A6	A4J11-A4
A2J46-B1	A2J48-B2	A6-11	A3S6-A5	A4S12-A2	A4J12-A3
A2J5-B2	A2J6-B1	A6-12	A3S6-A6	A4J12-A1	A4J12-A3
A2J5-B1	A2J6-B2	A1J6-B2	A3S6-A6	A3S12-A6	A4J12-A4
A2J7-B2	A2J8-B1	A1J7-B1	A3S7-A1	A4J12-A2	A4J12-A4
A2J7-B1	A2J8-B2	A6-13	A3S7-A5	A4J13-A1	A4J13-A3
A1J1-B1	A3S1-A1	A6-14	A3S7-A6	A3S13-A2	A4J13-A3
A6-1	A3S1-A5	A1J7-B2	A3S7-A6	A3S13-A6	A4J13-A4
A6-2	A3S1-A6	A1J8-B1	A3SS-A1	A4J13-A2	A4J13-A4
A1J1-B2	A3S1-A6	A6-15	A3S8-A5	A3S14-A2	A4J14-A3
A1J10-B1	A3S10-A1	A1J8-B2	A3S8-A6	A4J14-A1	A4J14-A3
A6-25	A3S10-A5	A6-16	A3S8-A6	A3S14-A6	A4J14-A4
A1J10-B2	A3S10-A6	A1J9-B1	A3S9-A1	A4J14-A2	A4J14-A4
A6-26	A3S10-A6	A6-17	A3S9-A5	A3S15-A2	A4J15-A3
A1J11-B1	A3S11-A1	A6-18	A3S9-A6	A4J15-A1	A4Ji5-A3
A6-27	A3S11-A5	A1J9-B2	A3S9-A6	A4J15-A2	A4J15-A4
A6-28	A3S11-A6	A3XDS18-2	TB1-16	A3S15-A6	A4J15-A4
A1J11-B2	A3S11-A6	A3S1-B6	A3XDS1-1	A3S16-A2	A4J16-A3
A1J12-B1	A3S12-A1	A3S10-B6	A3XDS10-1	A4J16-A1	A4J16-A3
A6-29	A3S12-A5	A3XDS9-2	A3XDS10-2	A3S16-A6	A4J16-A4
A1J12-B2	A3S12-A6	A3S11-B6	A3XDS11-1	A4J16-A2	A4J16-A4
A6-30	A3S12-A6	A3XDS10-2	A3XDS11-2	A4J17-A1	A4J17-A3
A1J13-B1	A3S13-A1	A3S12-B6	A3XDS12-1	A3S17-A2	A4J17-A3
A6-31	A3S13-A5	A3XDS11-2	A3XDS12-2	A4J17-A2	A4J17-A4
A1J13-B2	A3J13-A6	A3S13-B6	A3XDS13-1	A3S17-A6	A4J17-A4
A6-32	A3S13-A6	A3XDS12-2	A3XDS13-2	A4J18-A1	A4J18-A3
A1J14-B1	A3S14-A1	A3S14-B6	A3XDS14-1	A3S18-A2	A4J18-A3
A6-33	A3S14-A5	A3XDS13-2	A3XDS14-2	A3S18-A6	A4J18-A4
A6-34	A3S14-A6	A3S15-B6	A3XDS15-1	A4J18-A2	A4J18-A4
A1J14-B2	A3S14-A6	A3XDS14-2	A3XDS15-2	A4J2-A1	A4J2-P.3
A1J15-B1	A3S15-A1	A3S16-B6	A3XDS16-1	A3S2-A2	A4J2-A3
A6-35	A3S15-A5	A3XDS15-2	A3XDS16-2	A3S2-A6	A4J2-A4
A1J15-B2	A3S15-A6	A3S17-B6	A3XDS17-1	A4J2-A2	A4J2-A4
A6-36	A3S15-A6	A3XDS16-2	A3XDS17-2	A3S-A2	A4J3-A3
A1J16-B1	A3S16-A1	A3S18-B6	A3XDS18-1	A4J3-A1	A4J3-A3
A6-37	A3S16-A5	A3XDS17-2	A3XDS18-2	A4J3-A2	A4J3-A4

Table 3-3. Wiring List for TTY/Low Level Patch Panel- Continued

TO	FROM	TO	FROM	TO	FROM
A3S3-A6	A4J3-A4	A4J1-B1	AJ1-A	TB1-12	TB1-13
A4J4-A1	A4J4-A3	A4J1-B2	J1-B	J2-g	TB1-13
A3S4-A2	A4J4-A3	A4J2-B1	J1-D	J2-n	TB1-14
A4J4-A2	A4J4-A4	A4J2-B2	J1-E	TB1-13	TB1-14
A3S4-A6	A4J4-A4	A4J3-B1	J1-G	A6-24	TB1-15
A3S5-A2	A4J5-A3	A4J3-B2	J1-H	TB1-14	TB1-15
A4J5-A1	A4J5-A3	A4J4-B1	J1-K	TB1-15	TB1-16
A3S5-A6	A4J5-A4	A4J4-B2	J1-L	TB1-16	TB1-17
A4J5-A2	A4J5-A4	A4J5-B1	J1-N	TB1-17	TB1-18
A3S6-A2	A4J6-A3	A4J5-B2	J1-P	TB1-18	TB1-19
A4J6-A1	A4J6-A3	A4J6-B1	J1-S	J1-M	TB1-2
A3S6-A6	A4J6-A4	A4J6-B2	J1-T	J3-u	TB1-2
A4J6-A2	A4J6-A4	A4J7-B1	J1-V	TB1-1	TB1-2
A4J7-A1	A4J7-A3	A4J7-B2	J1-W	TB1-19	TB1-20
A3S7-A2	A4J7-A3	A4J8-B1	J1-Y	J3-AA	TB1-3
A3S7-A6	A4J7-A4	A4J8-B2	J1-Z	J1-U	TB1-3
A4J7-A2	A4J7-A4	A5J1-B1	J2-A	TB1-2	TB1-3
A4J8-A1	A4J8-A3	A5J1-B2	J2-B	TB1-3	TB1-4
A3S8-A2	A4J8-A3	A5J9-B1	J2-b	J3-GG	TB1-4
A3S8-A6	A4J8-A4	A5J9-B2	J2-c	J1-a	TB1-4
A4J8-A2	A4J8-A4	A5J2-B1	J2-D	TB1-4	TB1-5
A3S9-A2	A4J9-A3	A5J2-B2	J2-E	J3-F	TB1-5
A4J9-A1	A4J9-A3	A5J10-B1	J2-e	TB1-5	TB1-6
A3S9-A6	A4J9-A4	A5J10-B2	J2-f	J3-M	TB1-6
A4J9-A2	A4J9-A4	A5J3-B1	J2-G	TB1-6	TB1-7
ASJ1-A1	A5J1-A3	A5J3-B2	J2-H	J3-U	TB1-7
A5J1-A2	A5J1-A4	A5J11-B1	J2-h	TB1-7	TB1-8
A5J10-A1	A5J10-A3	A5J11-B2	J2-i	J3-f	TB1-8
A5J10-A2	A5J10-A4	A5J12-B1	J2-k	TB1-8	TB1-9
ASJ11-A1	A5J11-A3	A5J4-B1	J2-K	J2-F	TB1-9
A5J11-A2	A5J11-A4	A5J4-B2	J2-L	J3-j	TB2-1
A5J12-A1	A5J12-A3	A5J12-B2	J2-m	J1-C	TB2-1
A5J12-A2	A5J12-A4	A5J5-B1	J2-N	J2-J	TB2-10
A5J2-A1	A5J2-A3	A5J5-B2	J2-P	J2-R	TB2-11
A5J2-A2	A5J2-A4	A5J6-B1	J2-S	J2-X	TB2-12
A5J3-A1	A5J3-A3	A5J6-B2	J2-T	J2-d	TB2-13
A5J3-A2	A5J3-A4	A5J7-B2	J2-W	J2-j	TB2-14
A5J4-A1	A5J4-A3	A5J7-B1	J2-V	J3-Z	TB2-15
A5J4-A2	A5J4-A4	A5J8-B1	J2-Y	J1-J	TB2-2
A5J5-A1	A5J5-A3	A5J8-B2	J2-Z	J3-r	TB2-2
A5J5-A2	A5J5-A4	A6-46	J3-V	J3-x	TB2-3
A5J6-A1	A5J6-A3	A6-44	J3-W	J1-R	TB2-3
A5J6-A2	A5J6-A4	J3-n	TB1-1	J1-X	TB2-4
A5J7-A1	A5J7-A3	J1-F	TB1-1	J3-DD	TB2-4
A5J7-A2	A5J7-A4	J2-M	TB1-10	J3-C	TB2-5
A5J8-A1	A5J8-A3	TB1-9	TB1-10	J3-J	TB2-6
A5J8-A2	A5J8-A4	TB1-10	TB1-11	J3-R	TB2-7
A5J9-A1	A5J9-A3	J2-U	TB1-11	J3-c	TB2-8
A5J9-A2	A5J9-A4	TB1-11	TB1-12	J2-C	TB2-9
A6-20	A6-22	J2-a	TB1-12		
A6-22	A6-24				

Table 3-4. Wiring List for Control Monitor -48 Volt20 Hz Assembly

FROM	TO	FROM	TO	FROM	TO
A1-1	S1-1	P1-M	NC	XDS2-3	XDS4-3
A1-10	P1-N	P1-N	A1-10	XDS3-1	E1-13
A1-11	S3-4	P1-P	A1-14	XDS3-2	P1-A
A1-14	J16-P	P1-R	XDS1-3	XDS3-3	XDS1-3
CB1-LINE	CB2-LINE	P1-S	M1 (+)	XDS3-3	XDS2-3
CB1-LOAD	XDS5-1	P1-T	XDS11-2	XDS4-1	E1-14
CB2-LINE	CB1-LINE	P1-U	XDS12-2	XDS4-2	P1-B
CB2-LINE	P2-A	P1-V	NC	XDS4-3	S3-10
CB2-LOAD	XDS6-1	P2-A	CB2-LINE	XDS4-3	XDS2-3
E1-1	LS1 (+)	P2-B	XDS5-2	XDS5-1	CB1-LO0AD
E1-2	S3-3	P2-C	XDS5-1	XDS5-1	P2-C
E1-5	M1{+)	P2-D	XDS6-1	XDS5-2	P2-B
E1-5	XDS13-3	P2-E	R12-1	XDS5-2	XDS6-2
E1-6	R12-2	P2-F	M1 (+)	XDS6-1	CB2-LOAD
R12-2	S3-10	P2-G	XDS6-2	XDS6-1	P2-D
E1-7	XDS1-2	P2-H	XDS6-2	XDS6-2	P2-G
E1-8	XDS2-2	R12-1	M1 (-)	XDS6-2	P2-H
E1-11	XDS1-1	R12-1	M2 (-0	XDS6-2	XDS5-2
E1-12	XDS2-1	R12-1	P2-E	XDS7-1	E1-15
E1-13	XDS3-1	R12-2	E1-6	XDS7-2	E1-18
E1-14	XDS4-1	R12-2	M2 (+)	XDS7-2	P1-G
E1-15	XDS7-1	R12-2	XDS7-3	XDS7-3	R12-2
E1-16	XDS13-1	S1-1	A1-1	XDS7-3	XDS9-3
E1-17	P1-J	S1-i	XDS 11-2	XDSS-1	E1-21
E1-18	XDS7-2	S1-2	NC	XDS8-2	E1-19
E1-19	XDS8-2	S1-3	XDS8-3	XDS8-2	P1-H
E1-20	S3-11	S1-3	XDS11-3	XDS8-3	S1-3
E1-21	XDS8-1	S2-1	XDS12-2	XDS8-3	XDS01-3
E1-22	XDS9-1	S2-2	NC	XDS9-1	E1-22
E1-23	XDS10-1	S2-3	XDS12-3	XDS9-2	P1-E
E1-24	XDS111-	S3-1	XDS13-2	XDS9-3	XDS7-3
E1-25	XDS12-1	S3-3	E1-2	XDS9-3	XDS11-3
LS1(+)	E1-1	S3-3	S3-5	XDS10-1	E1-23
LS1 (-	S3-11	S3-5	S3-3	XDS10-2	P1-F
M1 (+)	E1-5	S3-4	A1-11	XDS10-3	XDS8-3
M1 (+)	P1-S	S3-4	XDS13-3	XDS10-3	XDS12-3
M1(+)	P2-F	S3-7	NC	XDS11-1	E1-24
M1(-)	R12-1	S3-9	NC	XDS1 1-2	P1-T
M2 (+)	R12-2	S3-11	E1-20	XDS11-2	S1-1
M2(-)	R12-1	S3-11	LS1(-)	XDS11-3	S1-3
P1-A	XDS3-2	S3-10	R12-2	XDS11-3	XDS9-3
P1-B	XDS4-2	S3-10	XDS4-3	XDS12-1	E1-25
P1-C	XDS1-2	XDS1-1	E1-11	XDS12-2	P1-U
P1-D	XDS2-2	XDS1-2	E1-7	XDS12-2	S2-1
P1-E	XDS9-2	XDS1-2	P1-C	XDS12-3	S2-3
P1-F	XDS10-2	XDS1-3	P1-R	XDS12-3	XDS10-3
P1-G	XDS7-2	XDS1-3	XDS3-3	XDS13-1	E1-16
P1-H	XDSS-2	XDS2-1	E1-12	XDS13-2	S3-1
P1-J	E1-17	XDS2-2	E1-8	XDS13-3	E1-5
P1-K	NC	XDS2-2	P1-D	XDS13-3	S3-4
P1-L	NC	XDS2-3	XDS3-3		

Table 3-5. TTY Loop Monitor Wiring List

FROM	TO	FROM	TO	FROM	TO
A1-1	S1A-COM	J1-P	J2-P	J3-M	J3-R
A1-2	M1 +	J1-P	S1A-3	J3-N	S2D-15
A2-1	M2--	J1-Q	J2-Q	J3-P	S2F-6
A2-2	S2B-8	J1-Q	S1B-3	J3-R	J3-U
E2 (GND)	J3-U	J1-R	J2-R	J3-S	S2E-17
J1-A	J2-A	J1-S	J2-S	J3-T	S2F-16
J1-A	S1A-6	J1-S	S1A-14	J3-V	NC
J1-B	J2-B	J1-T	J2-T	M -	S1B-C0M
J1-B	S1B-6	J1-T	S1B-14	M2 +	XF1-1
J1-C	J2-C	J1-U	J2-U	S1A-ig	S1B-18
J1-D	J2-D	J1-V	J2-V	S2A-1	NC
J1-D	S1A-11	J1-V	S1A-4	S2A-2	S2A-3
J1-E	J2-E	J1-W	J2-W	S2A-3	S2A-4
J1-E	S1B-11	J1-W	S1B-4	S2A-4	S2A-5
J1-F	J2-F	J1-X	J2-X	S2A-5	S2A-6
J1-G	J2-G	J1-Y	J2-Y	S2A-6	S2A-7
J1-G	S1A-7	J1-Y	S1A-13	S2A-7	S2B-1
J1-H	J2-H	J1-Z	J2-Z	S2A-8	S2F-10
J1-H	S1B-7	J1-Z	S1B-13	S2A-9	NC
J1-J	J2-J	J1-AA	J2-AA	S2A-10	S2A-12
J1-K	J2-K	J1-BB	J2-BB	S2A-10	S2B-11
J1-K	S1A-10	J1-BB	S1A-5	S2A-11	NC
J1-L	J2-L	J1-CC	J2-CC	S2A-12	S2A-13
J1-L	S1B-10	J1-CC	S1B-5	S2A-13	S2A-14
J1-M	J2-M	J1-DD	J2-DD	S2A-14	S2A-15
J1-N	J2-N	J1-EE	J2-EE	S2A-15	S2A-16
J1-N	S1A-8	J1-EE	S1A-12	S2A-17	S2B-2
J1-P	J2-P	J1-FF	J2-FF	S2A-18	NC
J1-P	S1B-8	J1-FF	S1B-12	S2B-3	NC
J1-R	J2-R	J1-GG	J2-GG	S2B-4	S2B-13
J1-S	J2-S	J1-HH	J2-HH	S2B-5	NC
J1-S	S1A-9	J2-Z	J1-Z	S2B-6	NC
J1-T	J2-T	J2-A	J1-A	S2B-7	NC
J1-T	S1B-9	J2-B	J1-B	S2B-8	S2D-8
J1-U	J2-U	J2-C	J1-C	S2B-9	NC
J1-V	J2-V	J2-D	J1-D	S2B-10	NC
J1-W	J2-W	J2-E	J1-E	S2B-12	S2C-8
J1-X	J2-X	J2-F	J1-F	S2B-14	NC
J1-Y	J2-Y	J2-G	J1-G	S2B-15	NC
J1-Y	S1A-17	J2-H	J1-H	S2B-16	NC
J1-Z	J2-Z	J2-I	J1-I	S2B-17	S2D-17
J1-Z	S1B-17	J2-J	J1-J	S2B-17	XF1-2
J1-A	J2-A	J2-K	J1-K	S2B-18	NC
J1-A	S1A-1	J2-M	J1-M	S2C-1	S2C-2
J1-B	J2-B	J2-N	J1-N	S2C-2	S2C4
J1-B	S1B-1	J2-P	J1-P	S2C-3	NC
J1-C	J2-C	J2-Q	J1-Q	S2C-4	S2C-5
J1-D	J2-D	J2-R	J1-R	S2C-5	S2C-6
J1-D	S1A-16	J2-S	J1-S	S2C-6	S2C-7
J1-E	J2-E	J2-T	J1-T	S2C-7	S2D-3
J1-E	S1B-16	J2-U	J1-U	S2C-9	NC
J1-F	J2-F	J3-A	J3-F	S2C-10	S2C-1
J1-G	J2-G	J3-B	S2A-8	S2C-10	S2D-14
J1-H	J2-H	J3-C	S2B-1	S2C-11	S2C-12
J1-H	S1A-2	J3-D	S2A-17	S2C-12	S2C-13
J1-I	J2-1	J3-E	S2B-111	S2C-13	S2C-15
J1-I	S1B-2	J3-F	K3-J	S2C-14	NC
J1-J	J2-J	J3-G	S2B- 12	S2C-15	S2C-16
J1-K	J2-K	J3-H	S2D-3	S2C-17	S2D-5
J1-K	S1A-15	J3-J	J3-M	S2C-18	NC
J1-M	J2-M	J3-K	S2C-17	S2D-1	NC
J1-M	S1B-15	J3-L	S2D-14	S2D-2	NC
J1-N	J2-N				

Table 3-5. TTY Loop Monitor Wiring List-Continued

FROM	TO	FROM	TO	FROM	TO
S2D-4	NC	S2E-2	S2E-3	S2E-17	S2F-7
S2D-6	NC	S2E-3	S2E-4 ’	S2F-1	NC
S2D-7	NC	S2E-4	S2E-5	S2F-2	NC
S2D-8	S2F-8	S2E-5	S2E-7	S2F-3	NC
S2D-9	NC	S2E-6	NC	S2F-4	NC
S2D-10	NC	S2E-7	S2F-6	S2F-5	NC
S2D- 11	NC	S2E-9	NC	S2F-9	NC
S2D-12	NC	S2E-10	S2E-11	S2F-11	NC
S2D-13	NC	S2E-11	S2F-16	S2F-13	NC
S2D-15	S2E-8	S2E-1	S2E-12	S2F-13	NC
S2D-16	NC	S2E-12	S2E-13	S2F-14	NC
S2D- 17	S2F-17	S2E-13	S2E-14	S2F-15	NC
S2D-18	NC	S2E-14	S2E-15	S2F-18	NC
S2E-1	S2E-2	S2E-16	NC		

NOTE

In most cases, the cables involved in these procedures have identifying markers to indicate where they are to be connected. In example: THIS PART OF THE MARKING IS NOT SIGNIFICANT FOR THIS EXPLANATION (XXXXXXX J26). This marking indicates that the cable is to be connected to jack 26. When present, these markers may be used in lieu of tags where tagging is called for in disconnecting cables.

3-2. Test Equipment Required

Item No.	Qty	NSN OR Nomenclature	FSCM NO.
1		Multimeter AN/USM-223	6625-00-999-7465
2		Multimeter digital (FLUKE-8000A)	6625-99-322-8715

3-3. Tools Required

Item No.	Qty	Nomenclature	NSN OR FSCM NO.
3		Kit, tool (RCA-SM-A-777797)	
4		Kit, Tool Electronic Equipment TK-105/G	5180-00-610-8177
5		TPS tool, 12"	Trompeter RT-4L
6		TPS tool, 6"	Trompeter RT-4S
7		Screw starter	HJJ-3X-8

Section II. MAINTENANCE OF COMMUNICATIONS

TTY/FSK PATCH PANEL SM-A-935888

NOTE

The Transmission Test Set SM-F-935746 must be removed in order to remove the communications TTY/FSK patch panel.

3-4. Removal of Transmission Test Set SM-F-935746

a. Loosen the four captive screws on the front panel which holds the transmission test set to the rack.

b. Pull on the handles on the front panel to extend the unit from the rack sufficiently to allow access to the two line cords connected to rear of the unit.

c. Disconnect the two line cords from the rear of the test oscillator and voltmeter.

d. Continue to pull on the handles until the transmission test set is completely removed from the rack.

3-5. Removal of Communications TTY/FSK Patch Panel SM-A-935888

a. Remove the transmission test set as outlined in paragraph 3-4 above.

b. Remove the four screws on the outside corners

which hold the communications/TTY/FSK patch panel (TTY/FSK panel) to the rack.

c. Extend the TTYIFSK panel forward in the rack to allow access to the five cable connectors on the rear frame of the unit.

d. Tag and disconnect the five cables.

e. Continue to pull forward on the unit until it is completely removed from the rack.

3-6. Maintenance of Communication TTY/FSK Patch Panel SM-A-935888

a. Removal and Replacement of Jack Sets.

CAUTION

Jack sets should only be handled by the main body.

(1) Remove the communication TTY/FSK patch panel as outlined in paragraph 3-5 above.

(2) Remove the two flathead Phillips screws from the center of the patch panel to loosen the cable support bar on the rear.

(3) Remove the two screws holding the jack set to the rear of the panel.

(4) Pull rearward on the jack set until the tubes clear the sleeves on the face of the patch panel.

(5) Twist the jack set outward from the rear of the patch panel.

(6) Tag the wires on the rear terminal connectors of the jack set.

(7) If the wires on the rear terminal connectors are wire wrapped, cut the wires as close as possible to the terminal connectors. If the wires are soldered, unsolder them.

(8) Prepare the wires for soldering and using good soldering practices, solder the wires to the replacement jack set.

(9) Twist the replacement jack set inward and insert the jack tubes into the sleeves on the rear of the front panel.

(10) Insert and tighten the two mounting screws to the rear of the patch panel to secure the jack set in place.

(11) Insert and tighten the two screws through the holes in the center of the front panel and secure the cable support bar into place.

(12) Replace the communication TTY/FSK patch panel back into the rack as outlined in paragraph 3-7 below.

(13) Insert and tighten the two screws through the holes in the center of the front panel and secure the cable support bar back into place.

b. Replacement of Rear Multipin Connectors.

NOTE

If pins are bent, straighten them. If they are broken or otherwise defective, replace the connector as outlined below.

This procedure can be used for all rear mounted multipin connectors in any unit providing the unit is first removed from the rack as per the appropriate removal procedures.

(1) Unscrew the hexagon locking nut holding the defective connector to the rear panel.

(2) Remove the connector from the rear of the frame.

(3) Grasp the connector by the main body and unscrew the knurled retaining ring on the wire entrance side of the connector.

(4) Slide the retaining ring back from the connector along the wires.

(5) Carefully pry out the plastic collar from in side the connector.

CAUTION

When removing the soft rubber insulating wire separator in the next step, use extreme care not to damage it. If it is damaged, each wire must be threaded through its proper hole on a replacement unit.

(6) Using extreme care, slowly work the soft rubber insulating wire separator back along the wires until adequate clearance is obtained to remove the wires from their pins.

(7) Tag the wires and remove them from the connector pins.

(8) Using good soldering practices, solder the wires to the pin on the replacement connector.

CAUTION

Once again extreme care must be taken as not to damage the soft rubber insulating wire separator when performing the next step.

(9) Using extreme care, slowly work the soft rubber insulating wire separator back along the wires until it is seated in place in the connector.

(10) Slide the plastic collar back along the wires into the connector.

(11) Slide the knurled retaining ring back along the wire and screw it into the connector.

(12) Insert the connector back into the frame, and secure it by screwing on the hexagonal locking nut.

3-7. Replacement of Communications TTY/FSK Patch Panel SM-A-935888

NOTE

If the transmission test set is not removed from the rack, perform the procedure in paragraph 3-4 above.

a. Connect the five cables to the connectors on the rear frame of the patch panel.

b. Push the patch panel into the rack.

c. Secure the patch panel to the rack by inserting and tightening the four mounting screws.

d. Replace the transmission test set as outlined in paragraph 3-8 below.

3-8. Replacement of the Transmission Test Set SM-F-935746

a. Position the transmission test set in front of the rack and push it to allow for the connection of the two lines to the rear of the unit.

b. Connect the two line cords to the rear of the test oscillator and voltmeter.

c. Push the transmission test set completely into the rack and tighten the four captive screws on its front panel to secure it to the rack.

Section III. MAINTENANCE OF IF PATCH PANEL

SM-F-935727

NOTE

The C/N test set must be removed from the rack in order to remove and replace the IF patch panel.

3-9. Removal of the C/N Test Set TS-3580

WARNING

Two persons are required to perform the procedure below due to the weight of the unit.

a. Turn ac power off to rack five.

b. At the front panel, remove the four screws which hold the test set to the rack frame.

c. Pull the test set forward until it is fully extended from the rack.

d. Release the slide latches and remove the test set from the slides.

e. Push the slides back into the rack.

f. Rest the test set on the top of the modem rack extension.

g. Tag the two coaxial cables at the rear of the test set and remove them by unscrewing the TNC connectors.

h. Snip the nylon tie wrap which holds the ac power cable to the cable retractor arm.

i. Unplug the ac power cable from the outlet in the rear of the rack and completely remove the test set.

3-10. Removal of IF Patch Panel SM-F-935727

a. Remove the C/N test set using the procedure in paragraph 3-9 above.

b. Loosen the four captive screws on the front panel that hold the IF patch panel to the rack.

c. Pull on the two handles to extend the IF patch panel from the rack.

d. Release the slide latches and remove the IF patch panel from the slides.

e. Push the slides back into the rack.

f. Rest the IF patch panel on the modem rack extension.

g. Remove the ground lug from the wing nut ground stud on the rear frame of the panel.

h. Remove the multipin connector.

i. Tag, if necessary, and remove the 24 cables from the rear frame by releasing the bayonet connectors.

j. Completely remove the IF patch panel.

3-11. Maintenance of IF Patch Panel SM-F-935727

a. Replacement of Xmit IF Patch/Receive IF Patch/IF Monitor Subpanels.

NOTE

Individual jacks and connectors on the front panel cannot be replaced. Therefore, the entire subpanel on which the defective unit is located must be replaced.

(1) Remove the IF patch panel from its rack as outlined in paragraph 3-10 above.

(2) Tag the cables and remove them from the rear of the jacks on the subpanel by releasing the BNC connectors.

(3) Remove the six screws holding the subpanel to the front of the patch panel by turning them counterclockwise while holding the nuts on the inward side to prevent their rotation.

(4) Remove the subpanel from the frame.

(5) Insert the replacement subpanel back into the frame and secure it to the front panel with the six mounting screws.

(6) Reconnect the cables to the rear of the jacks.

(7) Place the patch panel back into the rack by following the procedures in paragraph 3-12 below.

b. Replacement of a Directional Coupler (DC)

(1) Remove the IF patch panel from the rack by using the procedures in paragraph 3-10 above.

(2) Tag and remove the two coaxial connectors from the defective directional coupler.

(3) Tag and remove from the rear panel the two BNC through-panel connectors that are above the

mounting nuts of the defective directional coupler. These connectors are removed by unscrewing the hexagonal retaining nuts on the rear frame of the patch panel assembly.

(4) Unscrew the nuts from the studs that fasten the directional coupler mounting bracket to the bottom of the patch panel frame.

(5) Remove the nuts, washers, and plastic grommets.

(6) Lift the directional coupler and its mounting bracket out of the patch panel frame.

(7) Remove the four screws that retain the coupler to the mounting bracket.

NOTE

When replacing the directional couplers, DC 1 through DC 4 should be mounted with the J1 terminal protruding through the rear of the patch panel frame and DC 5 through DC 9 should have J2 protruding.

(8) Mount the replacement directional coupler to the outside of the mounting bracket and secure it by inserting and tightening the four mounting screws.

(9) Set the directional coupler with the mounting bracket back into the patch panel frame.

(10) Reinsert the plastic grommet over the screws into the mounting bracket holes.

(11) Insert the washers and tighten down the mounting nuts to secure the mounting bracket to the bottom of the frame.

(12) Remount the two jacks to the rear of the patch panel frame and secure them by tightening their hexagonal retaining nuts.

(13) Reconnect to the directional coupler the two cables with BNC connectors.

(14) Place the patch panel back into the rack as outlined in paragraph 3-12 below.

c. Replacement of Rear Panel BNC Jacks.

(1) Remove the IF patch panel from the rack as outlined in paragraph 3-10 above.

(2) Remove the hexagonal retaining nut holding the defective BNC jack to the rear of the panel.

(3) Push the connector inward to free it from the frame.

(4) Replace the BNC jack using standard practices.

(5) Insert the replacement BNC jack back through the hole in the rear frame of the patch panel.

(6) Secure it to the frame by tightening its hexagonal retaining nut.

(7) Place the patch panel into the rack as outlined in paragraph 3-12 below.

d. Replacement of Multipin ConnectorJ16.

(1) Remove the IF patch panel from the rack as outlined in paragraph 3-10 above.

(2) Tag and remove the BNC connector from the top of the directional coupler on either side of the multipin connector J16.

(3) Follow the procedure for replacement of multipin connectors outlined in paragraph 3-6 above.

(4) Replace the BNC connections to the top of the directional coupler on either side of the multipin connector J 16.

(5) Place the patch panel into the rack as outlined in paragraph 3-12 below.

3-12. Replacement of IF Patch Panel SM-F-935727

NOTE

If the C/N test set is not removed from the rack; perform the removal procedure outlined in paragraph 3-9 above.

a. Rest the patch panel on the top of the modem rack extension.

b. Connect the 24 cables to the connectors on the rear frame of the patch panel.

c. Connect the multipin connector to the rear of the patch panel.

d. Connect the ground lug to the wing nut stud on the rear of the panel.

e. Fully extend the slides from the rack.

f. Mount the patch panel on the slides.

g. Release the slide latches and push the latch panel back into the rack.

h. Tighten the four captive screws on the front panel to secure the patch panel to the rack.

j. Replace the C/N test sets as outlined in paragraph 3-13 below.

3-13. Replacement of the C/N Test Set TS-3580

WARNING

Two persons are required to perform the procedure below due to the weight of the unit.

a. Turn ac power off to rack five.

b. Rest the test set on top of the modem rack extension.

c. Plug the ac line cord on the rear of the test set into the ac outlet in the back of the rack.

d. Secure the ac line cord to the cable retractor arm by using a nylon tie wrap.

e. Attach the two cables with the TNC connectors to rear of the test set.

f. Fully extend the slides from the rack and mount the test set onto the slides.

g. Release the slide latches and push the test set into the rack.

h. Insert and tighten the four screws into the holes provided to secure the test set to the rack.

i. Restore ac power to the rack.

Section IV. MAINTENANCE OF COMMUNICATIONS

DATA PATCH PANEL SM-A-936517

NOTE

The communications data patch panel does not have to be removed from the rack when performing normal maintenance. However, a removal and replacement procedure is provided in case of catastrophic failure of the equipment.

3-14. Removal of Communications Data Patch Panel SM-A-936517

a. Loosen the two captive screws on the right front side of the patch panel and swing it open.

b. Tag, if necessary, and remove the 230 cables going into the rear of the patch panel by releasing their bayonet connectors with the Trompeter RT-4S and RT-4I, tools.

c. Remove the four screws holding the patch panel to the frame of the rack and remove the patch panel.

3-15. Maintenance of Communication Data Patch Panel SM-A-936517

a. Replacement of Front Panel Jack.

NOTE

To replace defective jacks that are a part of a paralleling (PAR) or reversing (REV) network, see paragraphs 3-15b, 3-15c, and 3-15d below.

(1) Loosen the two captive screws on the right front of the communications data patch panel and swing it open from the rack.

(2) Using the Trompeter RT-4S or the RT-4L tool, remove the bayonet connector from the rear of the defective jack.

(3) Using the special screw-holding Phillips screwdriver, remove the screw holding the defective jack to the back of the front panel.

(4) Remove the defective jack and replace it with a new one.

(5) Reinsert the mounting screw and secure the replacement jack to the rear of the front panel.

(6) Using the Trompeter RT-4S or RT-4L tool, reconnect the bayonet connector to the rear of the jack.

(7) Swing the panel closed and tighten the two captive screws to secure it to the rack.

b. Replacement of Horizontal Paralleling (PAR) Networks and Paralleled Jacks.

(1) Loosen the two captive screws on the right front of the communications data patch panel and swing it open.

(2) Using the special screw-holding Phillips screwdriver, remove the three screws holding the three paralleled jacks to the rear of the front panel.

(3) Remove the paralleling network and interconnected jacks from the rear of the front of the patch panel.

(4) Remove the interconnected jacks from the paralleling network by twisting off the bayonet connectors.

(5) Connect the replacement jack or paralleling network by reconnecting the bayonet connectors on the jack to the paralleling network.

(6) Mount the paralleling network with the jacks to the rear of the front panel and secure it by inserting and tightening the three mounting screws through the three paralleled jacks.

(7) Swing the patch panel closed and tighten the two captive screws to secure it to the rack.

c. Replacement of Vertical Paralleling (PAR) Networks and Paralleled Jacks.

(1) Loosen the two captive screws on the right front of the communications data patch panel and swing it open.

(2) Using the special screw-holding Phillips screwdriver, remove the four screws holding the four paralleled jacks to the rear of the front panel.

(3) Remove the paralleling network with the jacks from the rear of the patch panel.

(4) Disassemble the paralleling network and jacks by twisting off the bayonet connectors.

(5) Replace the defective paralleling network or jack by reconnecting the bayonet connectors.

(6) Mount the paralleling network with the jacks to the rear of the front of the patch panel and secure it by inserting and tightening the four mounting screws on the four jacks.

(7) Swing the patch panel closed and tighten the two captive screws to secure it in place.

d. Replacement of Reversing (REV) Networks or Reversing Jacks.

(1) Loosen the two captive screws on the right front of the communications data patch panel and swing it open.

(2) Using the special screw-holding Phillips screwdriver, remove the two screws holding the two reversing jacks to the rear of the front panel.

(3) Remove the reversing network with the jacks from the rear of the patch panel.

(4) Disconnect the jacks from the reversing network by twisting off the bayonet connector.

(5) Replace the defective reversing network or reversing jack and reassemble the unit by reconnecting the jacks by twisting on the bayonet connectors.

(6) Mount the reversing network with the jacks to the rear of the front panel, and insert and tighten the two mounting screws through the jacks.

(7) Swing the patch panel closed and tighten the two captive screws to hold it in place.

3-16. Replacement of Communications Data Patch Panel SM-A-936517

a. Position the patch panel to the front of the rack, insert and tighten the four mounting screws to secure the patch panel to the rack.

b. Connect the 230 cables to the rear of the patch panel with the Trompeter RT-4S and RT-4L tools.

c. Close the patch panel and tighten the two captive screws to secure it to the rack.

Section V. MAINTENACE OF COMMUNICATIONS VF

PATCH PANEL SM-A-935851

3-17. Removal of Communications VF Patch Panel SM-A-935851

WARNING

Two persons are required to perform this procedure due to the weight of the unit.

CAUTION

The VF patch panel can only be extended two to four inches from the rack prior to disconnecting the 12 cables at the rear of the patch panel unit.

a. Loosen the eight captive screws on the front panel of the VF patch panel.

b. Pull slowly forward on the patch panel to the point where resistance is met.

c. Loosen the 14 captive screws and remove the panel covering access port located on the right side of rack 8 above the central distribution frame.

d. Refer to figure 3-1 to tag and remove the cables from the rear of the patch panel unit. Remove and tag the cables in reverse order (12 thru 1) by reaching through the access port.

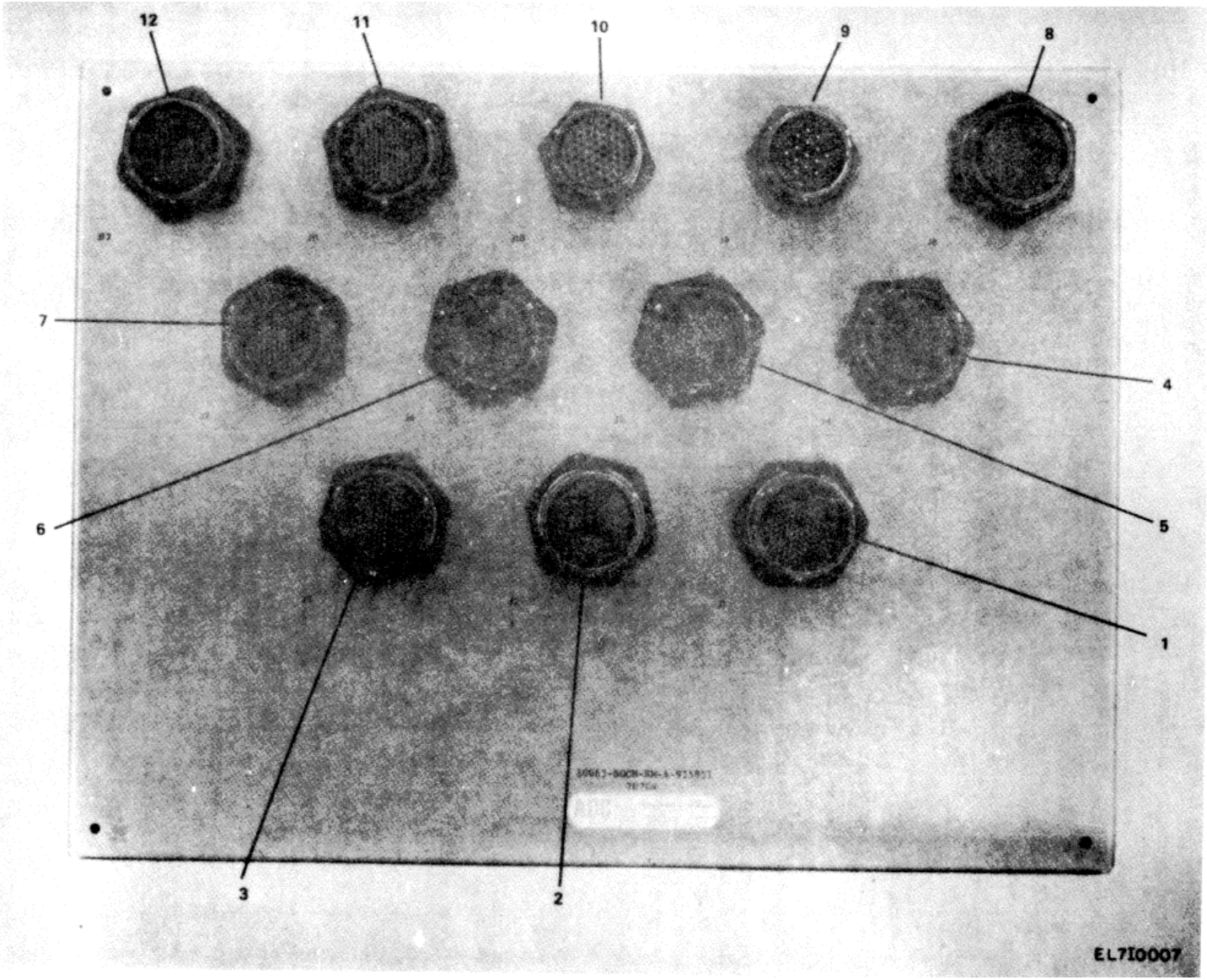


Figure 3-1. VF Patch Panel, Rear View.

e. Pull forward on the front of the patch panel to extend the unit from the rack.

f: Release the slide latches and remove the patch panel.

g. Push slides back into the rack.

3-18. Maintenance of Communications VF Patch Panel SM-A-935851

NOTE

If it is expected that the following repair procedures will require excessive time, remove the VF patch panel and replace it with a spare unit so that terminal operation may continue. If necessary, the defective panel may then be referred to higher level maintenance facilities for repair.

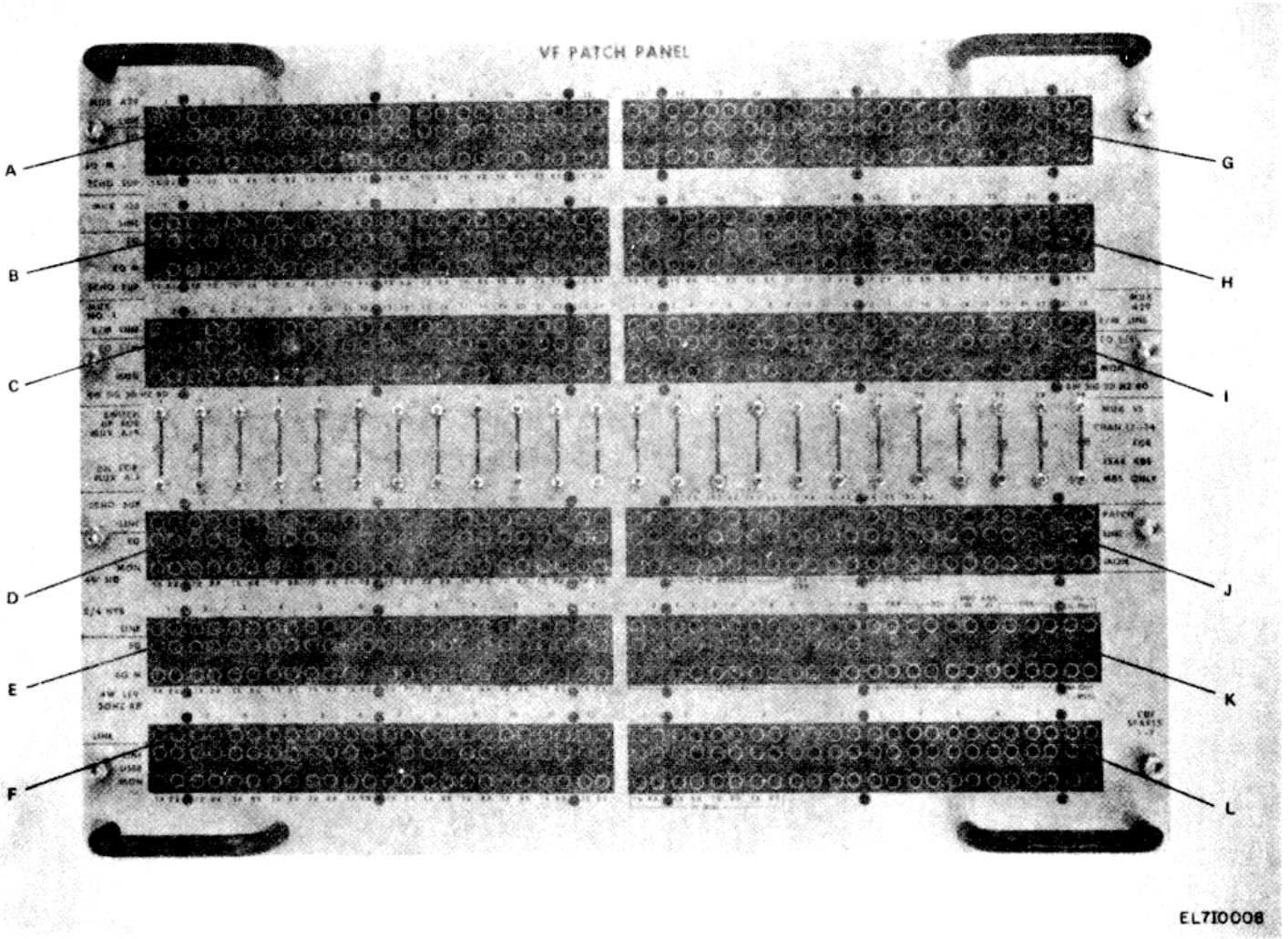


Figure 3-2. VF Patch Panel, Front View.

a. Replacement of Jack Sets on Subpanels A, E G, and L (fig. 3-2).

(1) Remove the communications VF patch panel from its rack as outlined in paragraph 317 above.

(2) Remove the eight nuts protruding through the rear of the rigid support bars which hold the face of the patch panel to the frame.

(3) Pull forward on the face of the patch panel until the mounting screws clear the holes in the rigid support bars on the frame.

(4) Ease the face of the patch panel forward and downward until it is lying flat, face down.

(5) Unscrew the two screws holding the defective jack set (set of three jacks) to the rear of the front panel.

(6) Lift upward on the defective jack set until the tubes clear the sleeves in the front panel and then twist the defective jack set outward from the patch panel.

(7) Tag the wires connected to the defective jack set.

(8) If the wires on the defective jack set are wire wrapped to the connectors, cut the wires as close as possible to the connectors. If the wires are soldered to the connectors, unsolder them.

(9) Prepare the wires for soldering and using good soldering practices, solder the wires to the connectors on the replacement jack set.

(10) Twist the jack set inward and push downward to seat the jack set tubes into the sleeves in the front panel.

(11) Insert and tighten the two mounting screws to secure the jack set to the patch panel.

(12) Lift the front of the patch panel off of its face and mount it on the patch panel frame.

(13) Mount and tighten the eight nuts on the rear of the rigid support bar.

(14) Place the patch panel back into its rack as outlined in paragraph 3-19 below.

b. Replacement of Jacks and Jack Sets on Subpanels B, C, D, E, H, I, J, and K (fig. 3-2)

NOTE

Depending on the physical location of the defective jack or jack set, varying degrees of disassembly are required. Basically, the subpanels on the outer side of the subpanel containing the defective jack must be removed from the front of the panel. For example, if a jack set must be replaced on subpanel B, subpanel A must be removed from the front panel. If the jack set is located on subpanel J, subpanels K and L must be removed from the front panel. An exception is that if the inward single jacks on subpanel K must be replaced, then both K and L subpanels must be removed to provide access.

(1) Remove the communications VF patch panel from the rack as outlined in paragraph 317 above.

(2) Remove the eight nuts protruding through the rear of the rigid support bars which hold the face of the patch panel to the frame.

(3) Pull forward on the face of the patch panel until the mounting screws clear the holes in the rigid support bars on the frame.

(4) While supporting the face of the patch panel in an upright position, remove the six screws from the front of the patch panel that hold each of the subpanels that must be removed.

(5) While supporting the loose subpanels in place, lower the face of the patch panel until it is face down.

(6) Reach beneath the face of the patch panel, and push upward on the loose subpanels to dislodge them from the panel.

(7) If necessary, cut the nylon tie wraps around the cables which greatly restrict separating the subpanels to gain access to the defective jack or jack set.

NOTE

In the next step, only one mounting screw is used to hold the single jacks on subpanel K in place.

(8) Remove the two mounting screws holding the defective jack set to the rear of the subpenel.

(9) Tag the wires connected to the defective jack or jack set.

(10) Pull upward on the defective jack or jack set until its tubes clear the sleeves in the front panel and then twist it outward away from the subpanel.

(11) If the wires are wire wrapped to the jack or jack set connectors, cut them as close as possible to the connectors. If they are soldered, unsolder them.

(12) Prepare the wires for soldering and using good soldering practices, solder them to the replacement jack or jack set.

(13) Twist the jack or jack set inward and push it down until the tubes are seated in the sleeves on the subpanel.

(14) Insert and tighten the two mounting screws (one screw in the case of a single jack) to secure the jack or jack set to the subpanel.

(15) Reinsert the subpanels into their holes in the face of the patch panel.

(16) While supporting the subpanels in place, raise the face of the patch panel to an upright position.

(17) Reinsert and tighten the six mounting screws into the front of the patch panel to secure the subpanels in place.

(18) Replace any nylon tie wraps that were removed from the cables.

(19) Mount the patch panel face on the patch panel frame.

(20) Mount and tighten the eight nuts on the screws protruding through the rear of the rigid support bar on the frame.

(21) Place the patch panel in its rack as outlined in paragraph 319 below.

c. Replacement of Switches.

(1) Remove the communication VF patch panel from the rack as outlined in paragraph 317 above.

(2) Remove the eight nuts protruding through the rear of the rigid support bars which hold the face of the patch panel to the frame.

(3) Pull forward on the face of the patch panel until the mounting screws clear the holes in the rigid support bars on the frame.

(4) With the face of the patch panel standing in the upright position, remove the 18 screws from the front panel that hold the three subpanels above the defective switch to the front panel.

(5) Put the lever on the defective switch in the down position.

(6) Remove the two screws from the front of the patch panel that hold the defective switch to the panel.

(7) Pull downward on the front of the patch panel and rest it face down.

(8) Reach beneath the front of the patch panel and push upward on the three loose subpanels to dislodge them from the panel.

(9) Remove the three loose subpanels from the patch panel to allow access to the defective switch.

(10) Lifting upward and twisting outward from the patch panel remove the defective switch.

(11) Tag the wires connected to the switch contacts and unsolder them from the switch.

(12) Prepare the wires for soldering and using good soldering practices, solder them to the replacement switch.

(13) Set the lever on the switch so that it is pointing toward its mounting slot on the patch panel.

(14) Pushing downward and twisting it inward towards the patch panel, mount the switch back in place on the rear of the patch panel.

(15) Seat the three subpanels back into their proper positions in the patch panel.

(16) While supporting the subpanels, lift the front of the patch panel to its upright position.

(17) Grasp the lever on the replacement switch and pull it towards the front of the panel.

(18) Insert and tighten the two mounting screws to secure the switch in place.

(19) Insert and tighten the 18 mounting screws to secure the three subpanels to the patch panel.

(20) Mount the patch panel face on the patch panel frame.

(21) Mount and tighten the eight nuts on the screws protruding through the rear of the rigid support bar on the frame.

(22) Place the patch panel in its rack as outlined in paragraph 319 below.

d. Upper or Lower Terminal Board Repair.

(1) Remove the communication VF patch panel from the rack as outlined in paragraph 317 above.

(2) Remove the 10 screws holding the wire mesh to the frame above the terminal board and remove the mesh.

(3) Perform the necessary repair.

(4) Replace the wire mesh on the frame and secure it with the 10 mounting screws.

(5) Place the patch panel in the rack as outlined in paragraph 319 below.

e. Replacement of the Noise Weighting Networks.

(1) Remove the communication VF patch panel from the rack as outlined in paragraph 317 above.

(2) Remove the eight nuts protruding through the rear of the rigid support bars which hold the face of the patch panel to the frame.

(3) Pull forward on the face of the patch panel until the mounting screws clear the holes in the rigid support bars on the frame.

(4) Rest the front of the patch panel face down in the front of the frame.

(5) Remove the two mounting screws from the outside of the side of the frame that hold the defective noise weighting network in place.

(6) Tag and unsolder the four wires connected to the top of the noise weighting network.

(7) Prepare the wires for soldering and using good soldering practices, solder the wires to the replacement noise weighting network.

(8) Mount the noise weighting network in place and secure it to the side of the frame with the two mounting screws.

(9) Lift the front of the patch panel to an upright position and mount it to the front of the patch panel frame.

(10) Mount and tighten the eight nuts on the mounting screws protruding through the rear of the rigid support bar on the frame and secure the front of the patch panel to the frame.

(11) Place the patch panel in its rack as outlined in paragraph 319 below.

f Replacement of Multiple Connectors on the Rear Frame.

(1) Remove the communications VF patch panel from the rack as outlined in paragraph 317 above.

(2) Remove the eight nuts protruding through the rear of the rigid support bars which hold the face of the patch panel to the frame.

(3) Pull forward on the face of the patch panel until the mounting screws clear the holes in the rigid support bars on the frame.

(4) Rest the front of the patch panel face down in front of the frame.

(5) Cut the nylon tie wraps on the cables that impede the removal of the defective multipin connector and if necessary remove other multipin connectors from the rear panel when performing (6) below.

(6) Perform the replacement procedure as outlined in 36b above.

(7) Remount all multipin connectors and replace the nylon tie wraps on the cables that were removed.

(8) Lift the front of the patch to an upright position and mount it on the front of the frame.

(9) Mount and tighten the eight nuts on the mounting screws protruding through the rear of the rigid support bars on the frame.

(10) Place the patch panel into it's rack as outlined in paragraph 319 below.

3-19. Replacement of Communications VF Patch Panel SM-A-935851

WARNING

Two persons are required to perform this procedure due to the weight of the unit.

a. Fully extend the slides out of the rack.

b. Mount the patch panel on the slides, release the slide latches and push the patch panel into the rack until it only protrudes two or three inches from the rack.

c. If necessary, loosen the 14 captive screws on the access panel located on the right side of rack 8 above the central distribution frame and remove it.

d. Refer to figure 31 and connect the 12 cables in numerical order (1 through 12) to the rear frame of the patch panel by reaching through the access port.

e. Push the patch panel into the rack and tighten the eight captive screws on the front to secure it in position.

f. Position the access panel on the right side of rack 8, and tighten the 14 captive screws to secure it to the rack.

Section VI. MAINTENANCE OF COMMUNICATIONS

TTY/LOW LEVEL P ETCH PANEL SM-A-935861

3-20. Removal of Communications TTY/Low Level Patch Panel SM-A-935861

a. Loosen the four captive screws on the front of the patch panel which hold it to the rack.

b. Pull on the two handles on the front of the patch panel to extend it out of the rack.

c. Tug and remove the three cable connectors from the rear frame of the patch panel.

d. Release the slide latches and remove the patch panel.

3-21. Maintenance of Communications TTY/Low Level Patch Panel SM-A-935861

CAUTION

Jack sets should only be handled by the body.

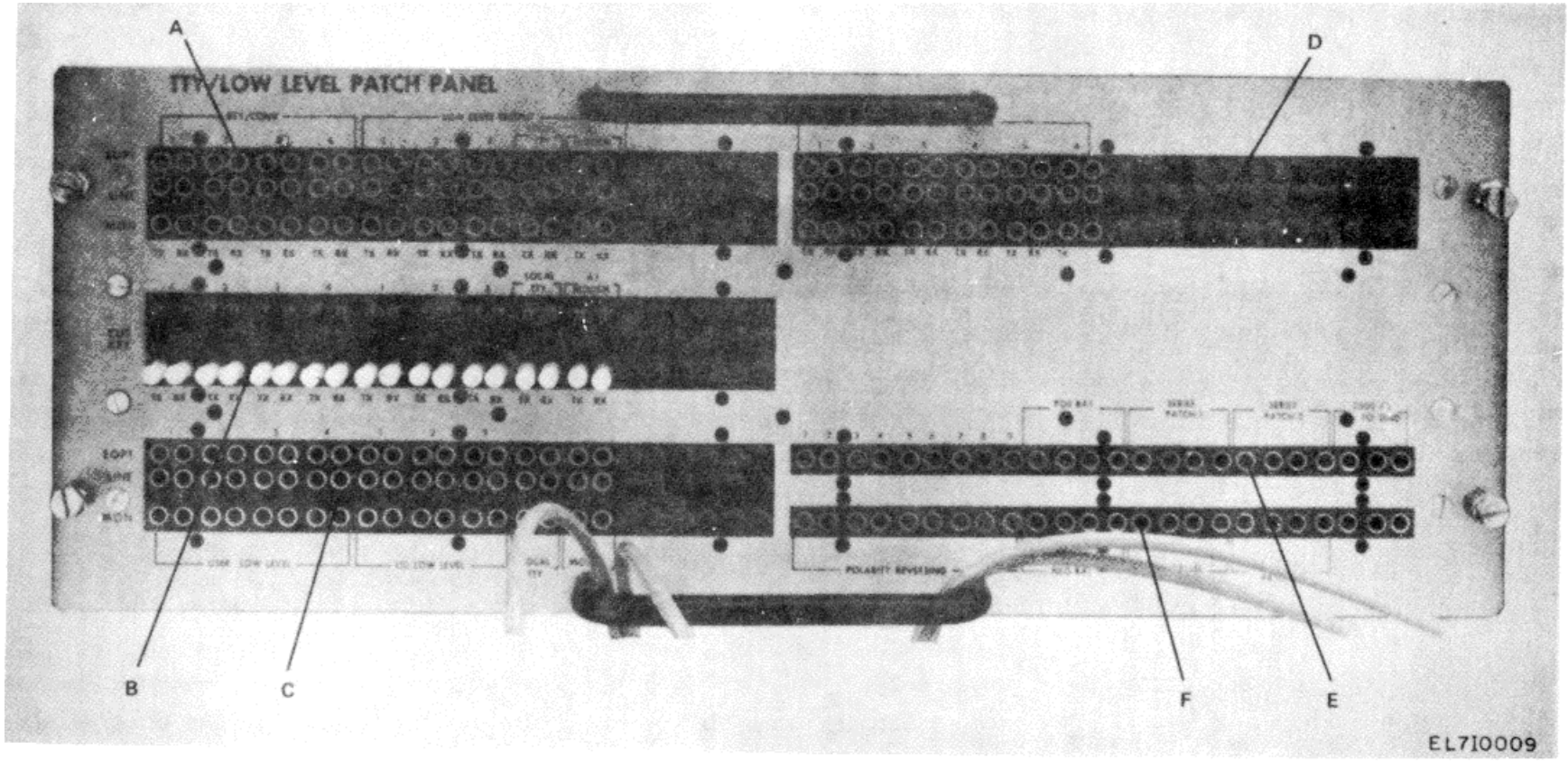


Figure 3-3. TTY/Low Level Patch Panel, Front View.

a. Replacement of Jack Sets on Subpanel D (fig. 3-3).

(1) Remove the TTY/low level patch panel (patch panel) as outlined in paragraph 320 above.

(2) Place the patch panel front down with subpanel D towards the front.

(3) Remove the two screws holding the defective jack set to the rear of the panel.

(4) Lift the defective jack set upward until the tubes clear the sleeves.

(5) Twist the jack set outward from the panel.

(6) Tag the wires connected to the jack set.

(7) If wires are wrapped to the connectors, cut the wires as close as possible to the connectors. If wires are soldered to the connectors, unsolder them.

(8) Prepare the wires for soldering and using good soldering practices, solder the wires to the connectors on the replacement jack set.

(9) Twist the jack set inward and lower the tubes into the sleeves.

(10) Insert and tighten the two mounting screws to secure the jack set to the rear of the panel.

(11) Place the patch panel back into the rack using replacement procedures in paragraph 322 below.

b. Replacement of Jack Panels on Subpanels E or F (fig. 3-3).

(1) Remove the communication TTY/low level patch panel from the rack by using the removal procedures in paragraph 320 above.

(2) Remove the 12 screws from the front of the patch panel that hold subpanels E and F to the frame.

(3) While holding the subpanels in place, turn the patch panel face down with the E and F subpanels towards the front.

(4) Reach under the front panel and push upwards on the E and F subpanels and free them from the patch panel and note which subpanel is E and which is F (5) If necessary, spread the two subpanels apart and remove the mounting screw holding the defective jack to the back of the subpanel.

(6) Lift the defective jack from the subpanel until the tube clears the sleeve and twist the jack outwards.

(7) Tag the wires connected to the jack connectors.

(8) If the wires are connected by wire wrapped connections, cut the wires as close as possible to the jack connectors. If the wires are soldered, unsolder them.

(9) Prepare the wires for soldering and, using good soldering practices, solder them to the replacement jack connectors.

(10) Twist the jack inward and slip the tube into the sleeve.

(11) Insert and tighten the mounting screw to secure the jack to the rear of the subpanel.

(12) Lift the E and F subpanels back into their position in the front frame of the patch panel.

(13) While supporting the E and F subpanels, set the patch panel upside down with its face forward.

(14) Replace the 12 mounting screws into the front of the patch panel and secure the subpanels into place.

(15) Replace the patch panel back in the rack by using the replacement procedures in paragraph 322 below.

c. Replacement of Jack Sets on Subpanels A and C (fig. 3-3).

(1) Remove the communications TTY/low level patch panel from the rack as outlined in paragraph 320 above.

(2) Remove the 24 screws on the front panel which hold subpanels A, B, C, and D to the patch panel frame.

(3) While providing support to the subpanels, set the patch panel face down with the A and D subpanels towards the front.

(4) Reach under the face of the patch panel and push the subpanels upward to release them from the frame.

(5) Gradually work the subpanels forward by inching the D, A, B, and C subpanels forward, in that order to free them from the drawer.

(6) If necessary, spread the A, B, and C subpanels apart, and remove the two mounting screws holding the defective jack set to the subpanel.

(7) Pull upward on the defective jack set until the tubes are out of the sleeves and then twist the jack set outward.

(8) Tag the wires connected to the rear connections of the jack set.

(9) If the wires are connected by wirewrap connections, cut the wires as close as possible to the connectors. If the wires are soldered to the jack set, unsolder them.

(10) Prepare the wires for soldering and using good soldering practices solder the wires to the connectors on the replacement jack set.

(11) Twist the jack set inward and push the tubes into the sleeves.

(12) Insert and tighten the two mounting screws to secure the jack set to the rear subpanel.

(13) Lift the subpanels back into the patch panel, and gradually work them back into their position in the frame.

(14) While providing the subpanels with sup

port, set the patch panel upside down with the face toward the front.

(15) Secure the subpanels to the patch panel, by inserting and tightening the 24 mounting screws to the face of the patch panel.

(16) Replace the patch panel back in the rack as outlined in paragraph 322 below.

d. Replacement of Light Emitting Diodes (LED).

CAUTION

When removing the LED's take notice of the lead positioning to ensure the replacement LED is inserted in the same manner.

(1) Grasp the defective LED by the plastic collar and pull forward until the LED clears the sleeve.

(2) Position the replacement LED so the leads are in the same axis as those on the LED just removed.

(3) Insert the replacement LED into the sleeve and push rearward until contacts are in place.

e. Replacement of LED Socket Connectors.

(1) Remove the communications TTY/low level patch panel from the rack as outlined in paragraph 320 above.

(2) Remove the LED as described in the paragraph above.

(3) Remove the 24 screws on the face of the patch panel that hold subpanels A, B, C, and D to the patch panel.

(4) While supporting the four subpanels, turn the patch panel face down with subpanels A and D towards the front.

(5) Reach underneath the front panel and push upward on subpanels A, B, C, and D to dislodge them from the frame.

(6) Gradually work the subpanels out of the patch panel, by inching subpanels D, C, B, and A (in that order) toward the front until they are out of the patch panel frame.

(7) Remove the screw holding the defective LED socket connector to the subpanel.

(8) Tag the wires connected to the LED socket connector.

(9) If the wires are wire wrapped to the connectors, cut the wires as close as possible to the connectors. If the wires are soldered, unsolder them.

(10) Remove the LED socket connector from the subpanel and replace it with the replacement LED socket connector.

(11) Prepare the wires for soldering and using good soldering practices, solder the wires back to the LED socket connectors.

(12) Insert and tighten the mounting screw into the rear of the subpanel to secure the LED socket connector in place.

(13) Gradually work the subpanels back into the frame by inching the C, B, A, and D (in that order) subpanels rearward until they are in their proper positions.

(14) While supporting the four subpanels, turn the patch panel right side up with the face of the patch panel toward the front.

(15) Insert and tighten the 24 mounting screws into the subpanels to secure them to the patch panel frame.

(16) Replace the patch panel in the rack as outlined in paragraph 322 below.

f. Test and Replacement of Resistors.

(1) Use the multimeter and measure resistance of the resistors indicated in table 36. One end of the resistor may have to be disconnected in order to get a correct measurement. If any resistor is defective, proceed to (2) below.

Table 3-6. Resistor Values

Resistor	Value	Resistor	Value	Resistor	Value
R1	10K + 1%	R9	10K ± 1%	R17	10K ± 1%
R2	10K + 1%	R10	2.49K + 1%	R18	10K ± 1%
R3	10K ± 1%	R11	2.49K ± 1%	R19	10K ± 1%
R4	10K ± 1%	R12	2.49K + 1%	R20	10K ± 1%
R5	10K ± 1%	R13	10K ± 1%	R21	10K + 1%
R6	10K ± 1%	R14	10K + 1%	R22	100 ± 1%
R7	10K + 1%	R15	10K ± 1%	R23	100 + 1%
R8	10K ± 1%	R16	10K ± 1%	SUB PANEL B Switch Resistors	ALL 680 ± 5%

(2) Remove the TTY/low level patch panel from its rack as outlined in paragraph 3-20 above.

(3) Unsolder the defective resistor.

(4) Using good soldering practices, solder a replacement resistor of the same value into its place.

(5) Place the patch panel in its rack as outlined in paragraph 3-22 below.

g. Replacement of Multipin Connectors.

(1) Remove the TTY/low level patch panel from the rack as outlined in paragraph 3-20 above.

(2) Follow the procedure outlined in paragraph

3-6b above to replace the defective multipin connector.

(3) Place the patch panel in the rack as outlined in paragraph 322 below.

h. Replacement of Switches on Subpanel B.

(1) Remove the TTY/low level patch panel from the rack as outlined in paragraph 320 above.

(2) Remove the 24 screws on the front panel which hold subpanels A, B, C, and D to the patch panel frame.

(3) While providing support to the subpanels, set the patch panel face down with the A and D subpanels toward the front.

(4) Reach under the face of the patch panel and push the subpanels upward to release them from the frame.

(5) Gradually work the subpanels forward by inching the D, A, B and C subpanels forward, in that order, to face them from the drawer.

(6) Spread the A, B, and C subpanels apart, and remove the mounting screw holding the defective switch to the subpanel.

(7) Tag and unsolder the wires connected to the defective switch.

(8) Pull the defective switch upward and outward to remove it from the subpanel.

(9) Insert the replacement switch into the subpanel by pushing it inward and downward into place.

(10) Prepare the wires for soldering and, using good soldering practices, solder the wires back to the switch connections.

NOTE

In the next step of this procedure, because of the location of the mounting screw, some bending of the contacts on the switch can be expected. This bending shall be kept to a minimum so that the contacts can be rebent into their proper positions.

(11) Secure the switch to the panel with the mounting screw.

(12) Lift the subpanels back into the patch panel, and gradually work them back into their positions in the frame.

(13) While providing the subpanels with support, set the patch panel upside down with the face towards the front.

(14) Secure the subpanels to the patch panel by inserting and tightening the 24 mounting screws to the face of the patch panel.

(15) Replace the patch panel in the rack as outlined in paragraph 322 below.

3-22. Replacement of Communications TTY/Low Level Patch Panel SMA935861 a. Mount the patch panel on the slides.

b. Connect the three cables to the connectors on the rear frame of the patch panel.

c. Release the slide latches and push the patch panel into the rack.

d. Tighten the four captive screws on the front panel to secure the patch panel to the rack.

Section VII. MAINTENANCE OF C/N TEST SET TS-3580

NOTE

Removal and replacement procedures for the C/N test set are covered in this section. Refer to the appropriate technical manual for further maintenance data.

3-23. Removal of C/N Test Set TS-3580 Refer to paragraph 3-9 above.

3-24. Replacement of C/N Test Set TS-3580 Refer to paragraph 3-13 above.

Section VII. MAINTENANCE OF CENTRAL DISTRIBUTION

Frame (CDF) SM-F-935726

3-25. Removal of the Central Distribution

WARNING

Two persons are required to perform this procedure due to the bulk of the unit.

a. Turn off the ac power to the CSS.

b. Tag, if necessary, and disconnect the four cables connected to the top of the CDF.

c. Tag, if necessary, and disconnect the four cables connected to the bottom of the CDF.

d. Loosen the five captive screws fastened along the bottom holding it to the rack frame.

e. While supporting the CDF, loosen the five captive screws along the top edge holding it to the rack frame.

f. Remove the CDF from the side of the rack.

3-26. Maintenance of Central Distribution Frame SM-F-935726

NOTE

Replacement of the matrix patch board does not become mandatory until the seven spare positions are fully utilized.

NOTE

Numbers in parentheses refer to figure 3-4.

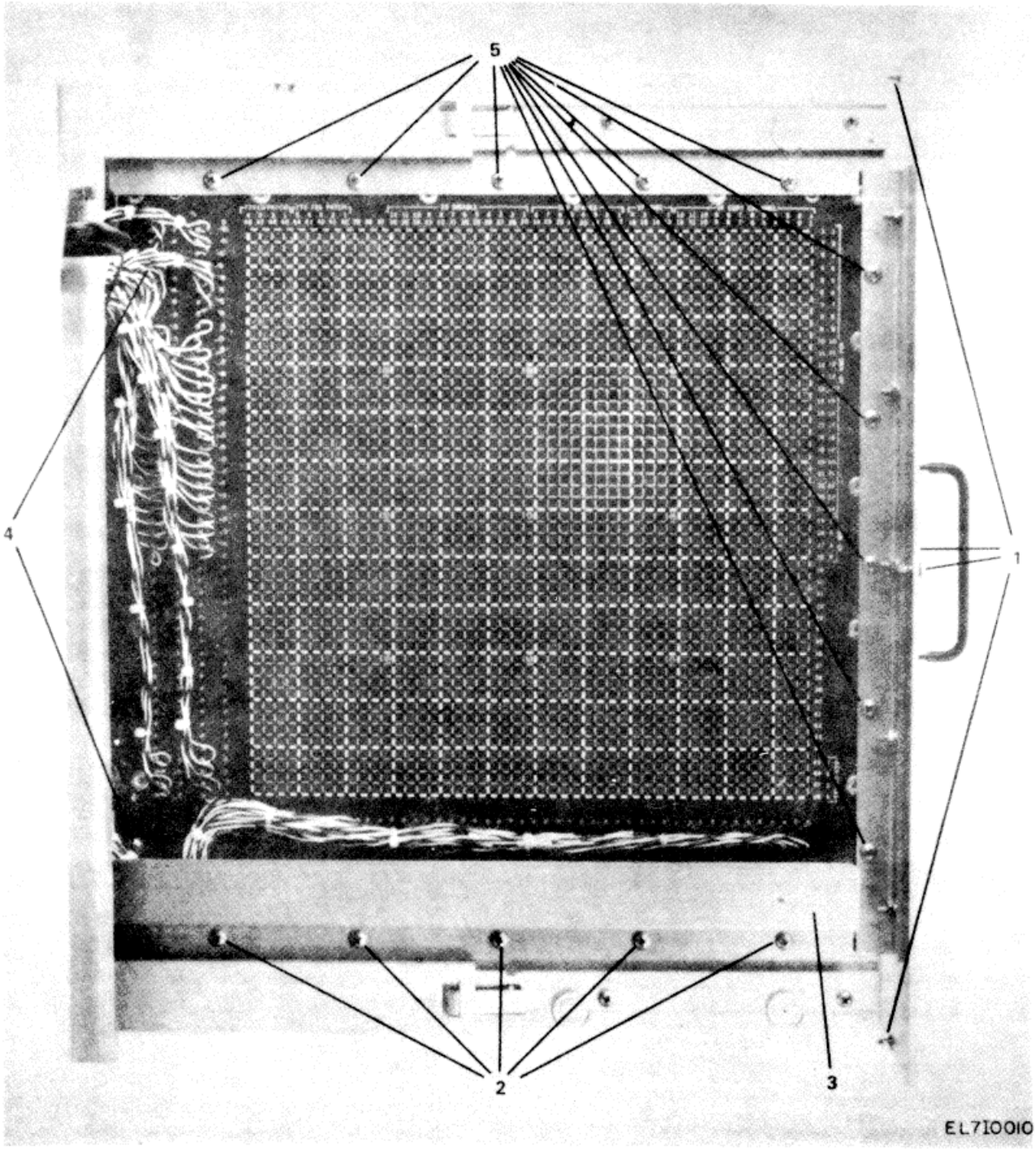


Figure 3-4. Central Distribution Frame, rear view.

a. Replacement of the Matrix Patch Board.

(1) Remove the Central Distribution Frame (CDF) from the side of rack as outlined in paragraph 325 above.

(2) Place the CDF front down on a working surface.

(3) Loosen the four captive quarterturn fasteners (1) holding the slide panel on the side of the CDF to the CDF.

(4) Pull on the slide panel handle and extend the slide panel from the CDF.

(5) Remove the five screws and nuts (2) which hold the frame of the bottom slide rail to the lower part of the matrix patch board.

(6) Remove the bottom slide rail and frame (3) from the CDF.

(7) Tag and unsolder the leads connected to the solder terminals on the matrix patch board.

(8) Remove the two bolts (4) which hold the two cable retractor arms to the matrix patch board.

(9) Remove the 10 mounting screws and nuts (5) that hold the matrix patch board to the slide panel frame and remove the matrix patch board from the CDF.

(10) Insert the replacement matrix patch board slide panel frame and secure it in place with the 10 mounting screws and nuts (5) on the top and right end of the matrix patch board. (Do not insert the bottom slide rail and frame).

(11) Attach the two cable retractor arms to the replacement matrix patch board by inserting and tightening the two bolts (4) into the mounting holes on the matrix patch board.

(12) Prepare the leads for soldering and using good soldering practices solder the leads to the appropriate solder terminal on the matrix patch board.

(13) Insert the bottom slide rail and frame (3) into the CDF and secure it in place with the five mounting screws and nuts (2).

(14) Release the latches on the slides and push the slide panel back into the CDF.

(15) Tighten the fourquarter turn fasteners (1) on the slide panel to secure in place in the CDF.

(16) Mount the CDF on the side of rack 8 as outlined in paragraph 327 below.

b. Replacement of Multipin Connectors.

(1) Remove the Central Distribution Frame (CDF) from the side of rack 8 as outlined in paragraph 325 above.

(2) Remove the four screws holding the clear plastic shield over the terminal boards and remove the shield.

(3) Remove the 26 screws holding the front panel to the CDF and remove the front panel.

(4) Loosen the four captive quarter turn fasteners on the side slide panel and extend the panel outwards.

(5) Follow the procedure for replacement of multipin connectors as outlined in paragraph 36b above.

(6) Release the slide latches and push the panel back into CDF and tighten the fourquarter turn fasteners to secure it in place.

(7) Mount the front panel on the CDF and secure it in place with the 26 mounting screws.

(8) Mount the clear plastic shield over the terminal boards and secure it in place with the four mounting screws.

(9) Mount the CDF on the side of rack 8 as outlined in paragraph 327 below.

3-27. Replacement of the Central Distribution Frame SMF935726

WARNING

Two persons are required to perform this procedure due to the bulk of the unit, a. Be sure the ac power to the CSS is off.

b. Position the CDF on the side of rack 8 and tighten the five captive screws along the top edge to secure it to the rack.

c. Tighten the five captive screws along the bottom edge of the CDF to secure them to the side of the rack.

d. Connect the four cables to the bottom connectors on the CDF.

e. Connect the four cables to the top connectors on the CDF.

f. Reenergize the ac power to the CSS.

Section IX. MAINTENANCE OF VOLTAGE REGULATOR

MONITOR PANEL SM-D-936692

NOTE

The voltage regulator monitor panel testing and repairing procedures require various degrees of removal; therefore it should only be completely removed when indicated in the procedures.

3-28. Removal of Voltage Regulator Monitor Panel (panel) SM-D-936692

a. At the power distribution panel, turn the ac power off to racks 4, 5, and 6.

b. Loosen the four captive screws holding the

panel to the rack and carefully pull the panel away from the rack.

c. Remove the four screws retaining the plastic protective cover on the rear of the panel to the support posts and remove the cover.

d. Tag and remove the six ring tongue terminals from the terminal board (TB1) which hold the wires going into the rack and remove the panel.

e. Reinstall the six screws to TB1 to prevent losing them.

3-29. Maintenance of Voltage Regulator Monitor Panel SMD936692

WARNING

Several tests and adjustments called for on the VR monitor panel are to be performed with the panel removed from the rack but the wiring still connected, as the panel must be energized for the tests and adjustments to be performed. Two persons should be present during this work, so that one person may firmly hold the panel to prevent it from moving around while in the energized condition. When energized, the VR monitor panel contains voltages dangerous to life.

a. Initial Conditions and Checks.

(1) Apply power to racks 4, 5, and 6.

(2) Alarm monitor panel in rack 4 must be turned on, as it is the source 24 volts for the Voltage Regulator (VR) monitor fault alarm circuit.

(3) Set red upper and lower limit cursors on the VR monitor meter to 120 and 110 volts, respectively.
These cursors are set by the upper two of the three screws which pass through the meter window.

NOTE

The lower screw at the meter window is the meter calibration adjustment. Access to this screw is limited by a cover plate to prevent accidental alteration of the meter calibration.

(4) Actuate the FAULT reset switch to clear any initial fault indication.

(5) If fault lamp has not been observed to illuminate, push to test. Replace bulb if necessary.

(6) The normal voltage indicated by the VR monitor meter is between 110 and 120 volts. The meter indicator needle should not be latched to either of the red voltagelimit cursors which are set to 110 and 120 volts.

(7) If the indicator needle is latched to either red limitcursor and the latching cannot be permanently broken by momentary actuation of the fault reset switch, use the Fluke 8000A Digital Multimeter (multimeter) to measure the voltage present at ac receptacle near the center of the VR monitor panel.
The multimeter function should be set to AC and the range to 200 for this measurement. If voltage is not present at the receptacle or is outside the range of 115 4.6 volts, check the voltage regulator unit which is mounted behind the data patch panel at location A8 in rack 6.

(8) If the voltage measured at the ac receptacle is normal and the VR monitor reading is not, follow the VR monitor meter-relay calibration procedure in paragraph 329c below.

b. VR Fault Indicator Circuit Check Out and Fault Isolation.

(1) Review and repeat the initial conditions and checks outlined in 329a above.

(2) To properly check out all aspects of the VR fault indicator circuits, normal regulated ac voltage should be indicated by the VR monitor.

(3) To check undervoltage fault sensing, turn the adjustment screw for the lower voltage limit cursor on the VR monitor clockwise until the cursor meets the black indicator needle. The indicator needle should electronically latch to the cursor contact and the FAULT lamp should illuminate.

(4) Return the lower limit cursor to the 110 volt position (or lower) and actuate the fault reset switch to break the latch. The black indicator needle should break free and resume indicating normal voltage.
The FAULT lamp should extinguish.

(5) Test the upper voltage limit sensor functions in the same manner as in (3) and (4) above except that the upper limit cursor adjustment screw is to be turned counterclockwise for the cursor to meet the indicator needle. Return the upper cursor to 120 volts after the test and actuate the FAULT reset to break the latch and extinguish the FAULT lamp.

(6) If the indicator needle fails to latch to both the cursors in the tests of (3) through (5) above, the problem probably lies in the 24 volt circuit to the VR monitor, but may be due to a defective meter-relay unit. If latch failure occurred at only one voltage limit, the most probable cause is a defective meter-relay unit, but may be in the 24volt wiring.

c. VR Monitor Meter Relay Calibration Procedure.

(1) To calibrate the VR monitor meter, normal output of the voltage regulator (115 +4.6 vac) must be present at the monitor meter. It is convenient to measure this voltage at the regulated 115 volt ac receptacle near the center of the VR monitor panel.
Use the Fluke 8000A Digital Multimeter for the measurement and make note of the reading.

(2) If the VR monitor voltage indication is within 2 volts of the Fluke 8000A multimeter reading, recalibration should not be attempted.

(3) If it is determined that the monitor meter requires calibration, or if it is desired to attempt

calibration to determine if the meter is faulty, proceed as follows.

(4) By use of the two adjustment screws at the meter window, swing the red limit cursors away from the 115 volt position so that the lower limit cursor lies at 90 volts and the upper at 140 volts. These wide settings are to prevent unwanted fault latchups when the calibration screw is adjusted later on.

(5) Turn off the power to racks 4, 5, and 6 at the power distribution panel.

(6) Loosen the four captive screws retaining the panel to the rack and carefully pull the panel away from the rack.

(7) Remove the four screws retaining the plastic protective cover to the support posts at the rear of the panel and remove the protective cover.

(8) Slightly loosen the two lower mounting screws for the monitor meter and swing the calibration screw cover away to permit access to the screw.

NOTE

The adjustment cover is slotted on one side so that it may be pivoted about the other mounting screw, thus making it unnecessary to entirely remove the mounting screws.

(9) Temporarily remount the VR monitor panel to the rack and tighten the four captive mounting screws sufficiently to hold the panel in place.

(10) Reapply power to racks 4, 5, and 6.

(11) Actuate the fault reset switch.

(12) Insert the Fluke 8000A Digital Multimeter test probes into the regulated 115 vac receptacle and observe the reading.

(13) Adjust the monitor meter calibration screw so that the indicated voltage is the same as that of the 8000A multimeter.

(14) If the monitor meter reading cannot be set to duplicate the multimeter indication, the monitor meter or its wiring is defective. See the monitor meterrelay replacement procedure in paragraph 329e below.

(15) If the meter calibration of step 13 was successful, turn off the power to racks 4, 5, and 6 and remove the panel from the rack.

(16) Return the monitor meter calibration screw cover to its normal position and tighten the meter mounting screws.

(17) Reinstall the protective plastic cover and secure it to the mounting posts with the four screws.

(18) Position the panel on the front of the rack and tighten the four captive screws to secure it to the rack.

(19) After power has been reapplied to racks 4, 5, and 6, actuate the fault reset switch.

(20) Return the lower and upper voltage limit cursors to 110 and 120 volt settings, respectively.

d. Replacement of Meter-Relay, M1.

(1) Remove the VR monitor panel from its rack as outlined in paragraph 328 above.

(2) Tag the leads according to their destinations at the rear of the meterrelay unit.

(3) Slide the protective sleeves back along the leads to expose the solder joints and unsolder the leads from the meter pins.

(4) Remove the three mounting screws and dismount the meter and the zero adjust protective cover from the panel.

(5) Secure the replacement meterrelay unit to the front panel with a screw, lockwasher and nut at the topmost of the three mounting holes.

CAUTION

Do not alter the setting of the meter zeroadjust screw. This screw is the lower one of the three adjustment screws passing through the meter window, and can be properly set only by using a highly accurate voltage standard as described in paragraph 329c below.

(6) Place the zeroadjust protective cover over the lower part of the meter face and align the mounting holes. Install the remaining two mounting screws.

(7) Set the lower and upper voltage limit cursors to 110 and 120 volts, respectively, using the two exposed adjustment screws at the meter face.

(8) Solder the leads to the five pins at the rear of the replacement meter.

(9) Remove the lead tags and slip sleeving back over the soldered pin connections.

(10) Mount the VR monitor panel on the rack as outlined in paragraph 330 below.

e. Replacement of Switch S1.

(1) Remove the VR monitor panel from the rack as outlined in paragraph 328 above.

(2) Remove the two leads one at a time from the screw terminals at the rear of the switch and connect to new switch.

(3) Remove the switch retaining nut at the front of the panel taking care not to mar the panel finish.

(4) Remove switch.

(5) Insert replacement switch in panel hole taking care that the tab on the antirotation washer is seated in the small recess hole at the rear of the panel.

(6) Install switch retaining nut and tighten.

(7) Mount the VR monitor panel on its rack as outlined in paragraph 330 below.

f. Replacement of Indicator Lamp DS1.

(1) Remove lens assembly from lamp socket by

turning knurled portion counterclockwise. The lamp is retained by a pushfit within the threaded portion at rear of the lens assembly.

(2) Grasp the lamp flange at the rear of the lens assembly with fingernails or pliers and pull rearward to remove lamp.

(3) Insert replacement lamp in lens assembly.

(4) Reinstall lens assembly to lamp socket.

g. Replacement of Lamp Socket XDS1.

(1) Remove the VR monitor panel from the rack as outlined in paragraph 328 above.

(2) Remove the lens assembly from the lamp socket by turning the knurled portion counterclockwise.

(3) Slide insulation sleeving back over wires at rear of socket to expose solder joints. Tag leads according to terminal destination.

(4) Unsolder leads from terminals.

(5) Using a 9/16inch open end wrench, loosen nut at rear of lamp socket by turning counterclockwise.

(6) At front of panel, turn retaining collar counterclockwise and unscrew from socket. Use pliers if necessary.

(7) Remove rubber washer at front of panel.

(8) Remove lamp socket from panel.

(9) On replacement socket, install retaining nut, metal flat washer, and velotex washer (soft, lightcolored washer) in that sequence, so that the velotex washer will be next to the panel surface.

(10) Insert replacement socket in panel and install rubber washer at front of panel.

(11) Face the flat side of the retaining collar toward the front panel and screw clockwise onto the socket until finger tight.

CAUTION

Do not apply excessive force to the retaining nut, as excessive force will severely deform the velotex washer.

(12) At rear of panel, tighten retaining nut by turning clockwise with wrench.

(13) Install new lamp in lens assembly, if necessary, and reinstall lens assembly to lamp socket.

(14) Replace the VR monitor panel on the rack as outlined in paragraph 330 below.

h. Replacement of ac Receptacle J1.

(1) Remove VR monitor panel from the rack as outlined in paragraph 328 above.

(2) Tag leads and remove the three terminal screws.

(3) Remove the two screws which mount the receptacle to the panel.

(4) Install replacement receptacle with the ground terminal oriented toward the top of the panel and secure to the panel with the two mounting screws.

(5) Reconnect leads to the three terminals.

(6) Place the VR monitor panel on the rack as outlined in paragraph 330 below.

i. Replacement of Terminal Board TBI.

(1) Turn the ac power off to racks 4, 5, and 6.

(2) Loosen the four captive screws holding the panel to the rack and carefully pull the panel away from the rack.

(3) Remove the four screws retaining the plastic protective cover on the rear of the panel to the support posts and remove the cover.

(4) Transfer lead connections one at a time to replacement terminal board.

(5) Remove nuts and lockwashers from the four mounting studs and remove old terminal board.
Leave the marker strip in place against the panel.

(6) Install replacement terminal strip on mounting studs.

(7) Reinstall the four sets of lockwashers and nuts.

(8) Mount the plastic protective cover on the rear panel and use the four screws to secure it in place.

(9) Set the VR monitor panel in place on the front of the rack and secure it in place with the four captive screws.

(10) Reenergize the power to racks 4, 5, and 6.

330. Replacement of Voltage Regulator Monitor Panel SMD936692

a. Be sure the ac power is off to racks 4, 5, and 6.

b. Connect the six wires to the terminal board (TB 1)

c. Reinstall the protective plastic cover and secure it to the mounting posts with the four screws.

d. Position the panel on the front of the rack and tighten the four captive screws to secure it to the rack.

e. Reenergize the ac power.

Section X. MAINTENANCE OF TTY LOOP MONITOR

ASSEMBLY SM-D-936640

3-31. Removal of TTY Loop Monitor Assembly SMD936640 a. Loosen the four captive screws on the front of the TTY loop monitor assembly.

b. Pull the TTY loop monitor assembly forward, and remove the three cables from the three rear panel connectors, J1 through J3.

e. Disconnect the grounding cable from E 1 on the rear panel of the loop monitor assembly.

3-32. Maintenance of TTY Loop Monitor Assembly SMD936640 a. Replacement of Rotary Switches SI and S2.

(1) On the defective switch, tag and unsolder the wires or clip off the wires. If the wires are clipped off, leave a piece of wire long enough so that the color code is readable.

(2) Loosen the screw holding the knob and then remove the knob.

(3) Remove the hexnut securing the switch shaft to the rear of the monitor assembly front panel.

(4) Install the replacement switch on the monitor assembly and secure it to the front panel.

(5) Prepare the wires for soldering. Solder the wires to the rotary switch terminals.

(6) Replace and secure the knob.

b. Replacement of the LOOP CURRENT Meter (M2)and the LOW LEVEL TTY VOLTAGE Meter (M1).

(1) Tag and remove the wires connected to the rear of the meter.

(2) Unsolder and remove the capacitor terminals (C1 or C2) connected across the meter. Check the capacitor; if good, save. If the capacitor is defective, replace it.

(3) Remove the four screws and nuts securing the meter to the monitor assembly front panel. Remove the meter.

(4) Install the new meter; secure it to the monitor assembly front panel using the hardware of b(3) above.

(5) Connect the capacitor across the meter terminals.

(6) Connect the wires removed in b(l) above to the meter terminals and solder.

c. Replacement of Rear Panel Connectors J1, J2, and J3.

(1) Remove the hexjam nut securing the connector to the monitor assembly rear panel. Remove the connector.

(2) Transfer the wires, one at a time, from the defective connector to the replacement connector.

(3) Mount the connector on the rear panel and secure it to the panel using the hex-jam nut removed in c(1) above.

d. Replacement of Terminal Boards A1and A2.

(1) Remove the screws, nuts, and spacers from the defective terminal board. Remove the terminal board.

(2) Install the replacement terminal board using the screws, nuts, and spacers removed in (1) above.

(3) Transfer the wires, one at a time, to the replacement terminal board.

3-33. Replacement of TTY Loop Monitor Assembly SMD936640.

(1) Connect the external cables to the rear panel connectors J1, J2, and J3. Also connect the ground lead to E 1.

(2) Insert the TTY Loop Monitor Assembly into the rack and tighten the four captive screws securing the panel to the rack.

Section XI. MAINTENANCE OF CONTROL MONITOR -48V/20Hz ASSEMBLY

3-34. Removal of Control Monitor -48V/20 Hz Assembly

The control monitor assembly is not secured to the equipment rack using hardware. It is a force fit. To remove the control monitor assembly, grasp two of the front panel toggle switches and pull forward. If the control monitor assembly will not come out, remove the 1600 Hz ringing supply next to it and then pull the assembly forward. When the assembly is clear of the rack, reach in and disconnect the two cable connectors.

3-35. Maintenance of Control Monitor 48V/20 Hz Assembly ac Replacement of Circuit Breakers CB1 and CB2.

(1) Remove the cover over the defective circuit

breaker by removing the two screws and nuts securing the cover to the front plate.

(2) Tag and unsolder the wires connected to the circuit breaker.

(3) Remove the nut securing the circuit breaker to the front panel.

(4) Install the replacement circuit breaker and secure it to the front panel using the nut supplied or the one removed in a(3) above.

(5) Connect and solder the wires to the circuit breaker that were removed in a(2) above.

(6) Replace the cover over the circuit breaker and secure it to the front plate.

b. Replacement of DC POWER Switches S1 and S2. The procedure for replacing switches S1 and S2 are identical to the procedure for replacing the circuit breakers CB1 and CB2 except for the removal and replacement of the protective covers, in a(l) above.

c. Replacement of Meters M1 and M2.

(1) Tag and unsolder the wires connected to the defective meter.

(2) Remove the hardware securing the meter to the front panel. Remove the meter.

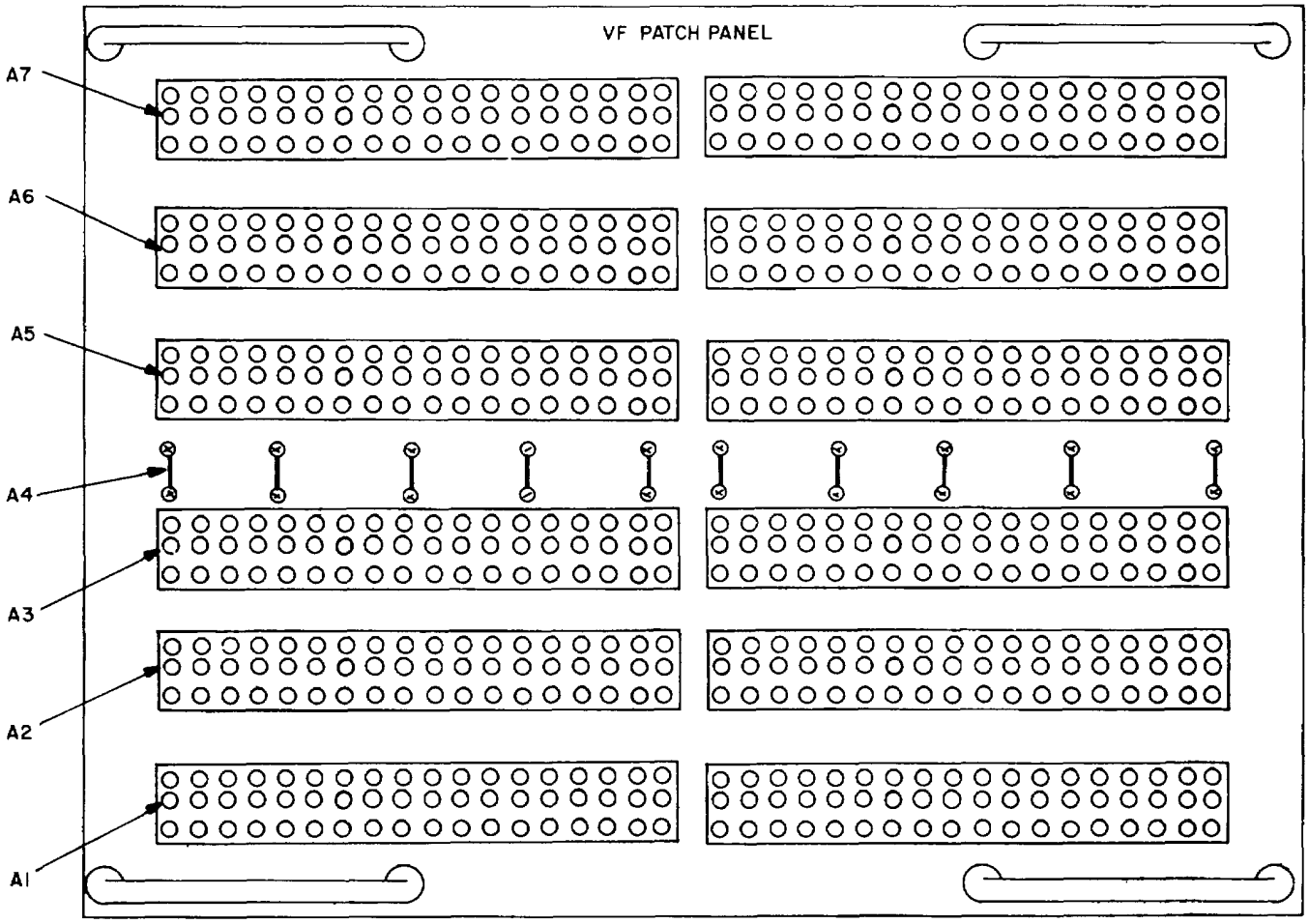
(3) Install the new meter and secure it with the hardware from c(2) above.

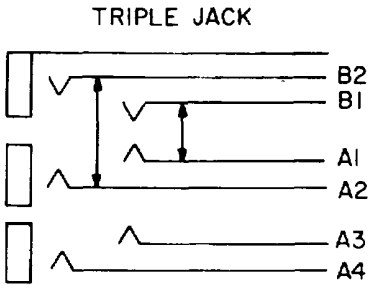
(4) Connect and solder the wires, to the meter, that were removed in c(1) above.

3-36. Replacement of Control Monitor 48V/20 Hz Assembly

a. Connect connectors P1 and P2 on the control monitor assembly to the respective connectors in the rack.

b. Align the control monitor assembly with the opening in the rack and push back into place.





EL7I0999

Figure 3-5. VF Patch Panel Reference Designations.

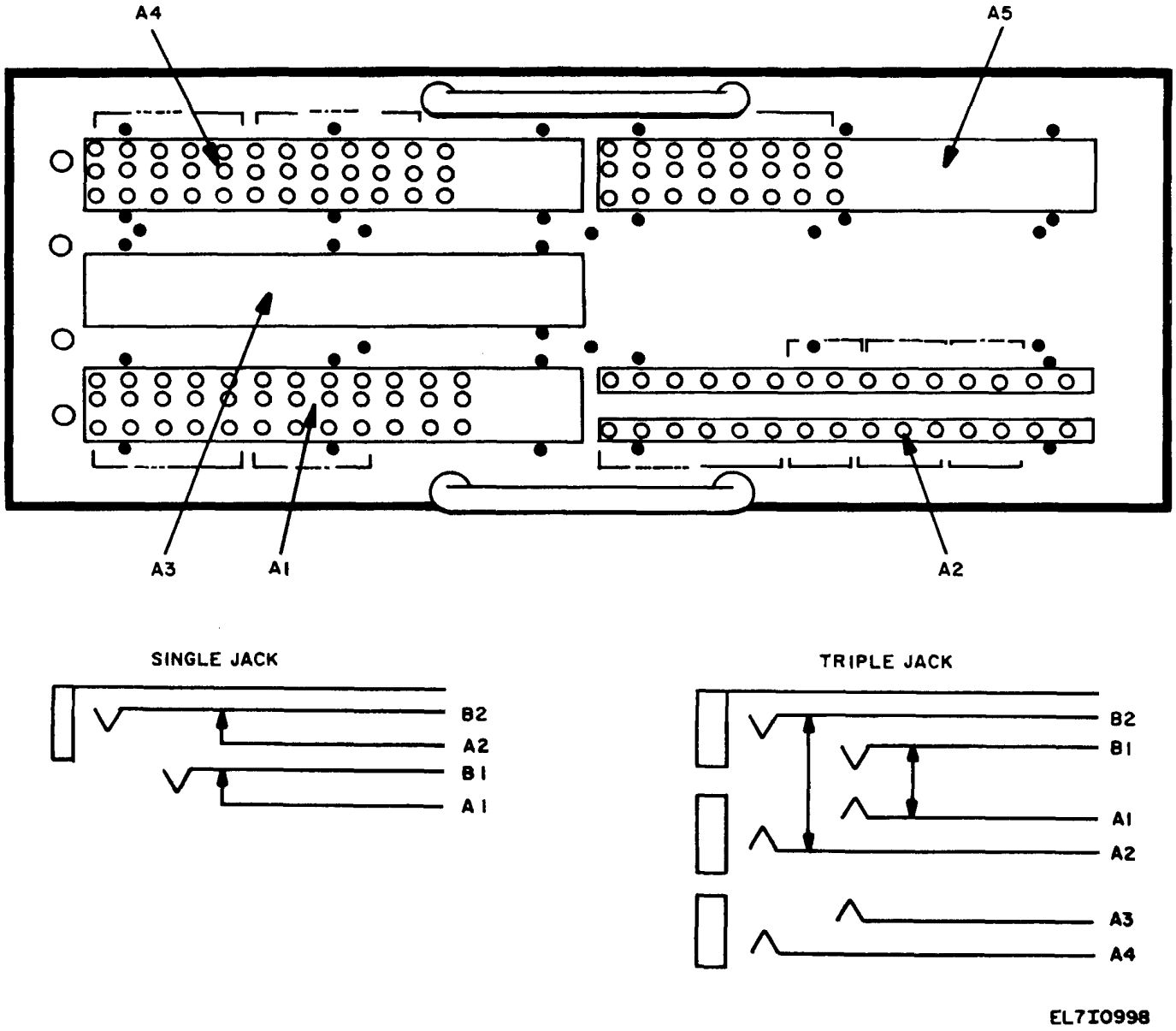


Figure 3-6. TTY/Low Level Patch Panel References Designations.

CHAPTER 4
GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. TOOLS AND TEST EQUIPMENT

4-1. General
This chapter contains information necessary for testing and troubleshooting the assemblies and subassemblies in the AN/TSC-86 communications subsystem not covered at lower levels of maintenance or in other technical manuals.

4-2. Tools and Test Equipment Required
Table 4-1 presents a list of tools and test equipment required to perform the maintenance procedures in this chapter.

Table 4-1. Tools And Test Equipment

Item No	Nomenclature	NSN or FSCM Number
1	Variac (GR-3060-5110)	5950-00-948-6988
2	Digital Multimeter-Quantity 2 (FLUKE-8000A)	6625-00-322-8715
3	Oscilloscope OS-261/U (TEKTRONIX-475)	6625-00-127-0079
4	-48 VDC Power Supply Test Fixture RCA A1547908	
5	Tool Kit, Electronic Equipment, TK-105G	5180-00-610-8177
6	Power Supply (Sorensen DCR300-3B)	
7	RMS Voltmeter AN/USM-224 (Hewlett-Packard-3400A)	6625-00-727-4706
8	Frequency Counter CP-772A/U(Hewlett-Packard-5245L)	6625-00-973-4837
9	AC Current Probe (Hewlett-Packard-456A)	6625-00-076-0806
10	20-Hz Ringing Supply Test Fixture RCA A1547910	
11	Multimeter AN/USM-223	6625-00-999-7465
12	Test Fixture, Control, Monitor assembly RCA-A-1547912	
13	Kit PCB Repair MK-772/U	5999-00-757-5042

4-3. Test Fixtures
Table 4-2 provides the necessary parts information to fabricate the 48 vdc power supply test fixture A1547908. The chassis layout and marking diagram and schematic diagram are shown in figures 4-1 and 4-2. Table 4-3 provides the necessary parts information to fabricate the 20Hz ringing supply test fixture A1547910. The chassis layout and marking diagram and schematic diagram are shown in figures 4-3 and 4-4. Table 4-4 provides the necessary parts information to fabricate the control monitor 48V/ 20 Hz assembly test fixture A1547912. The chassis layout and marking diagram and the schematic diagram are shown in figures 4-5 and 4-6.

Table 4-2. -48 Vdc Power Supply Test Fixture A1547908 Parts List

Ref Des	Description	Mfg code	Part number	Qty
R1-R4	Resistors, 15 ohms 250 watts	91637	RH-250	4
P1	Connector	71468	KPTOGB-12-35	1
P2	Connector	71468	KPTOGB-14-12P	1
P3	Connector	83315	J965-VY	1
S1-S2	Switch-SPST	86022	8803KG	2
J1-J3	Pin Jack (GRN)	83330	1506-104	3
J4	Pin Jack (RED)	83330	1506-102	1
J5	Pin Jack (BLK)	83330	1506-103	1
J6-J7	Pin Jack (YLO)	83330	1506-107	2
XF-1	Fuse Holder	71400	HKP	1
F1	Fuse	71400	AGC-$2^1/_2$	1

Table 4-3. 20-Hz Ringing Supply Test Fixture A1547910 Parts List

Ref Des	Description	Mfg code	Part number	Qty
S1	Switch-Push Button	09353	8121	1
S2-S4	Switch-SPST	86022	8803K6	3
S1	Color Cap	09353	7089 (RED)	1
R1	Resistor, Variable, 250 ohms, 25 watts	44655	0154	1
R2	Resistor, 400 ohms, 50 watts	44655	0568C	1
R3-R4	Resistor, 680 ohms, 2 watts	96906	RCR42681J	2
R5-R6	Resistor, 500 ohms, 50 watts	44655	0402	2
J1, J4, J5, J8, J9, J12	Pin Jack (RED)	83330	1506-102	6
J2, J3, J6, J7, J10, J11	Pin Jack (BLK)	83330	1506-103	6
J13	Dual Binding Post	83330	269-RB	1
P1	Connector	71468	KPT06B-14	1
DS1-DS2	Lampholder	72619	LH 7311	2
DS1-DS2	Lamp		327	2
J13-J16	Pin Jack (GRN)	83330	1506-104	4
Knob		96906	MS91528-IF2B	1

Table 4-4. Control Monitor -48V/20 Hz Assembly Test Fixture A 1547912 Parts List

Ref Des	Description	Mfg code	Part number	Qty
F1	Fuse, Buss	71400	AGC-1	1
XF1	Fuse Holder, Buss	71400	HKP	1
J1, J3, J5, J7, J9, J12, J14, J19, J21, J23	Pin Jack, Red	83330	1506-102	10
J2, J4, J6, J8, J13, J15, J20, J22, J24	Pin Jack, Black	83330	1506-103	9
J10, J11	Feed thru Jack, Green	83330	1507-104	2
J16	Connector	71468	KPT02A-19P	1
J17	Connector	71468	KPT02A-16-8P	1
J18	Dual Binding Post	83330	269-RB	1
P1	Connector		5965-VY	1
R1	Resistor 10K, 5%, 1/2 watt			1
S1 thru S11	Switch, SPST		7101	11
S12	Switch, SPST	86022	8803KG	1
	Cable Clamp			1
	Power Cable, 3 wire No 18			1

Table 4-5. Federal Supply Code for Manufacturers (FSCM), Code-to-Name Sequence

Code	Manufacturer
09353	C and K Components, Inc. 103 Morse Street Watertown, MA 02172
44655	Ohmite Manufacturing Co. 3601 W. Howard St. Skokie, IL 60076
71400	Bussman Manufacturing Division McGraw Edison Co. 502 Earth City Plaza P.O. Box 14460 St. Louis, MO 63178
71468	ITT Cannon Electric 666 East Dryer Rd. Santa Anna, CA 92705
72619	Dialight Division Amperex Electronics Corp. 203 Harrison Place Brooklyn, NY 11237

Table 4-5. Federal Supply Code for Manufacturers (FSCM), Code-to-Name Sequence-Continued

Code	Manufacturer
83315	Hubbell Corporation 407 East Hawly Street Mundelein, IL 60060
83330	Smith, H. Herman Inc. 812 Snediker Avenue Brooklyn, NY 11207
86022	C and H Electric Co. 1352 NE 1st Avenue Miami, FL 33132
91637	Dale Electronics Inc. P.O. Box 609 Columbus, NE 68601
96906	Military Standards Promulgated by Standardization Division Directorate of Logistics Services DSA.

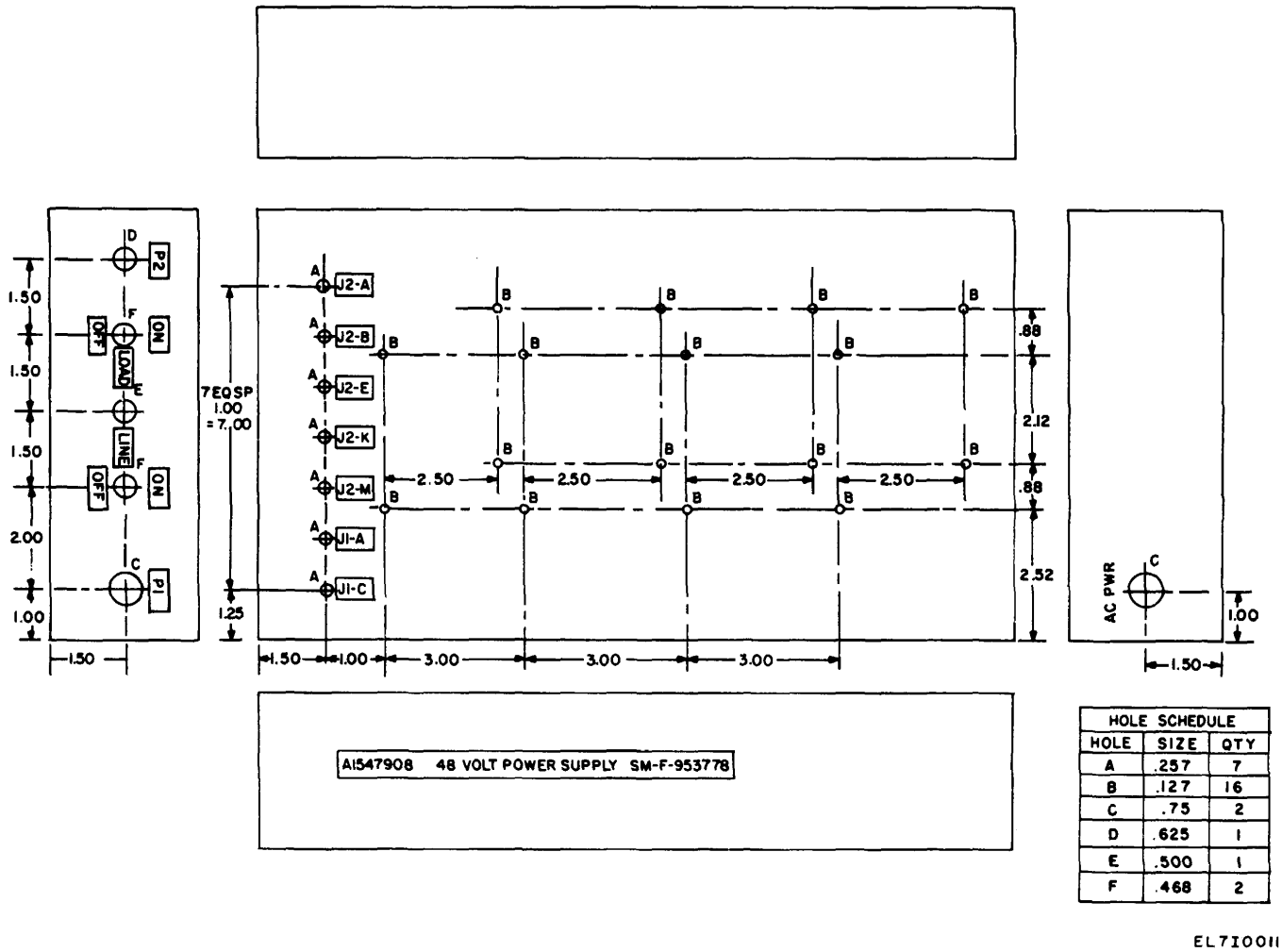


Figure 4-1. -48 Vdc Power Supply Test Fixture, Chassis Layout and Marking Diagram.

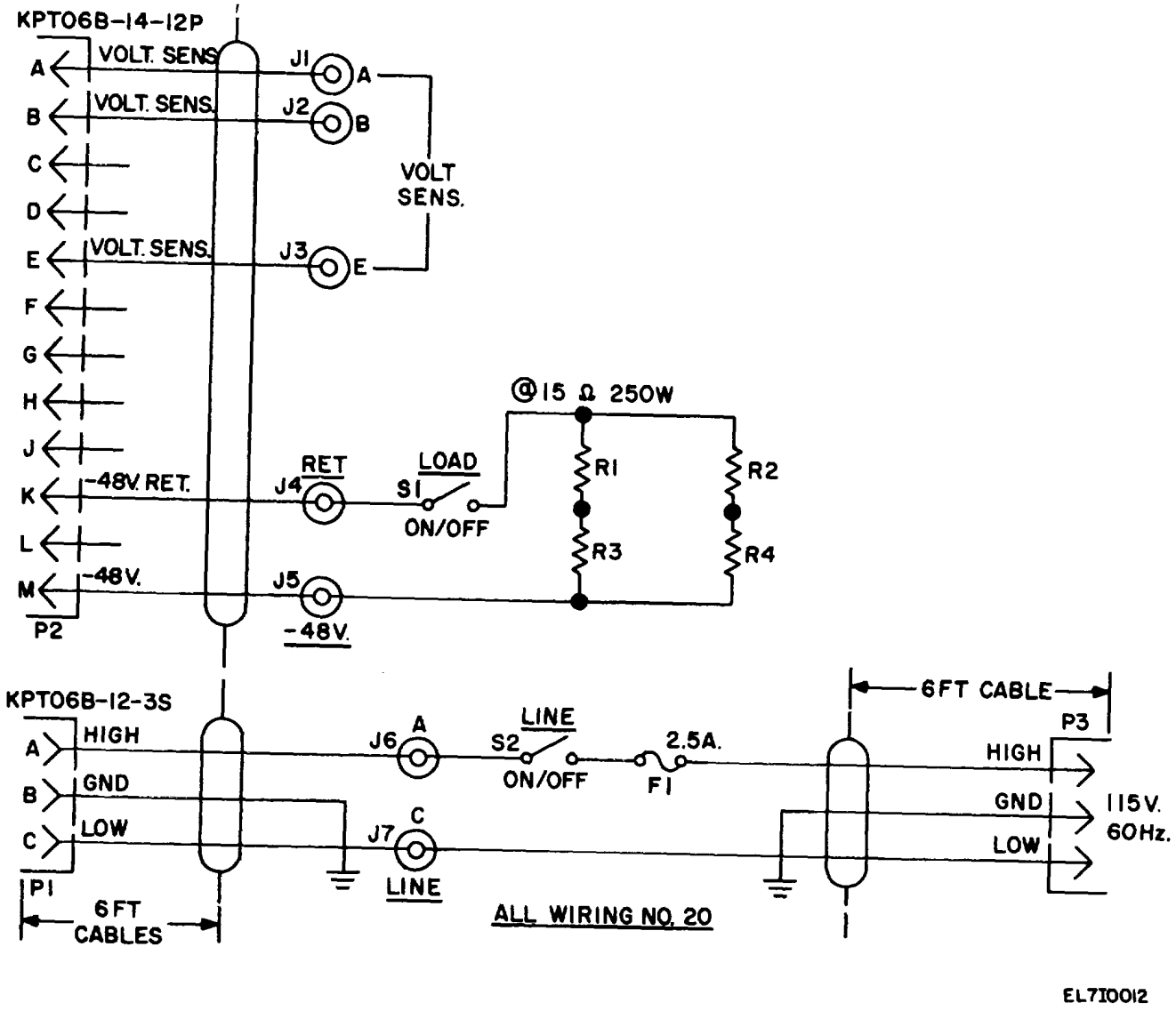


Figure 4-2. -48 Vdc Power Supply Test Fixture, Schematic Diagram

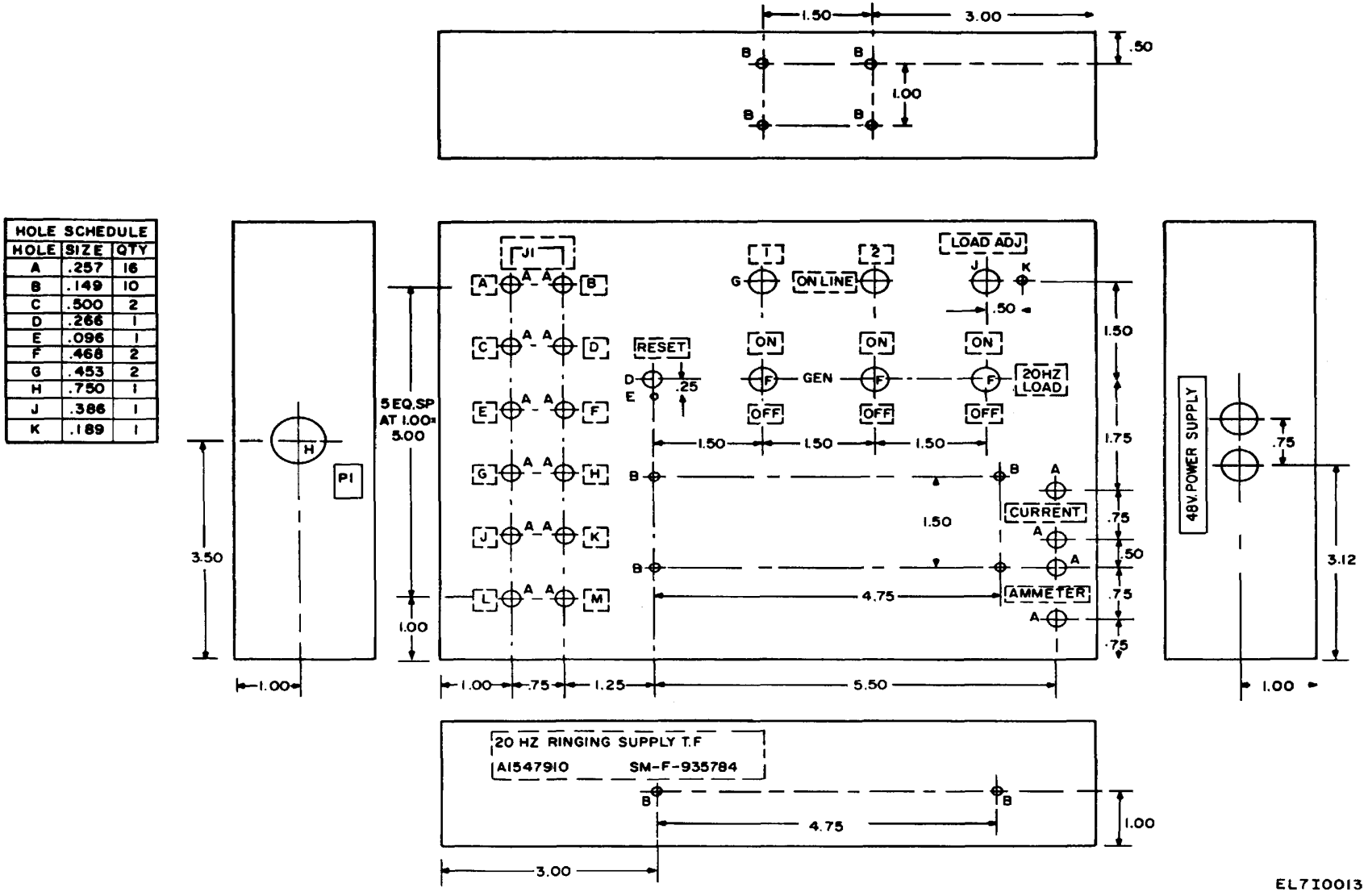


Figure 4-3. 20-Hz Ringing Supply Test Fixture, Chassis Layout and Marking Diagram.

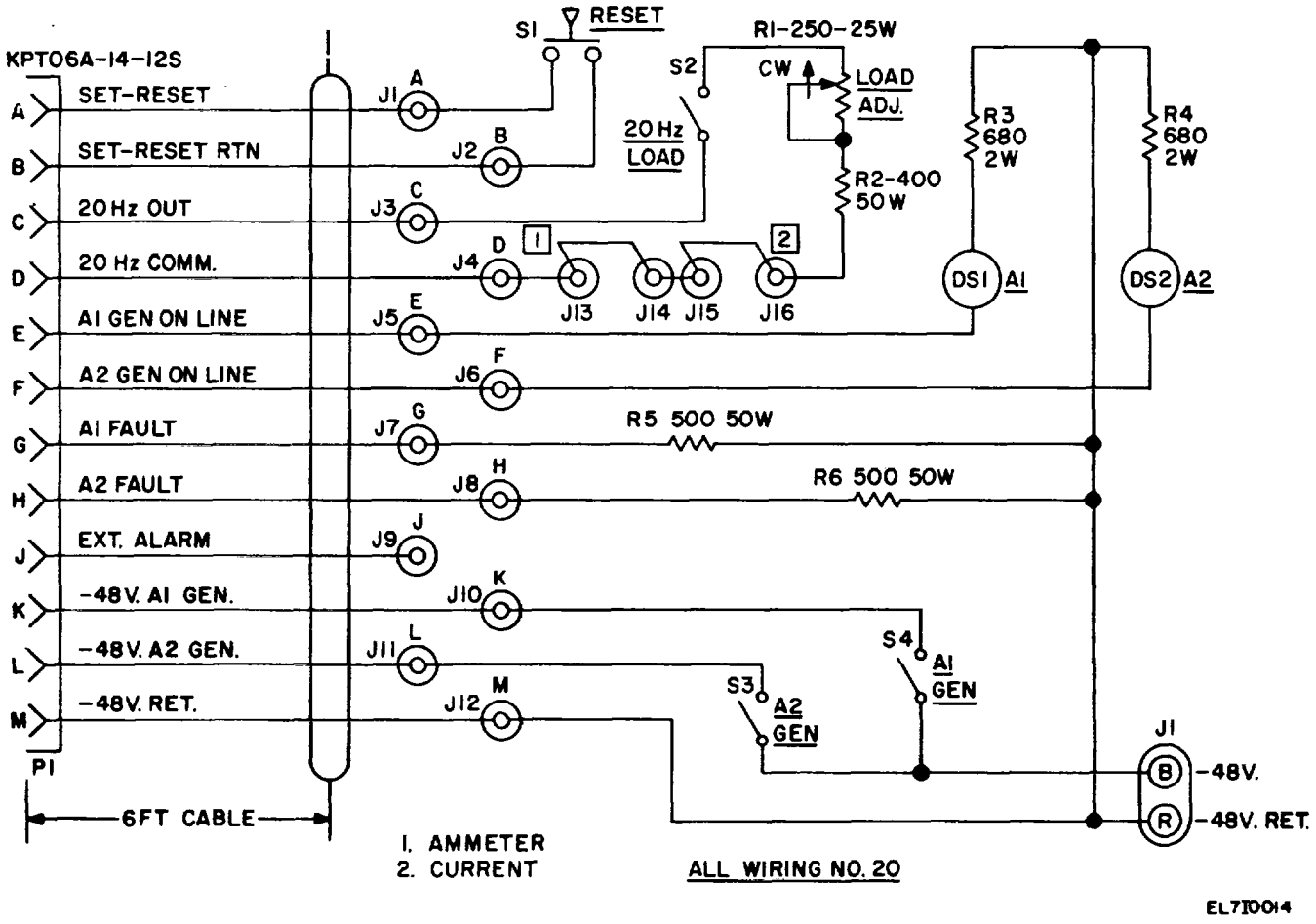
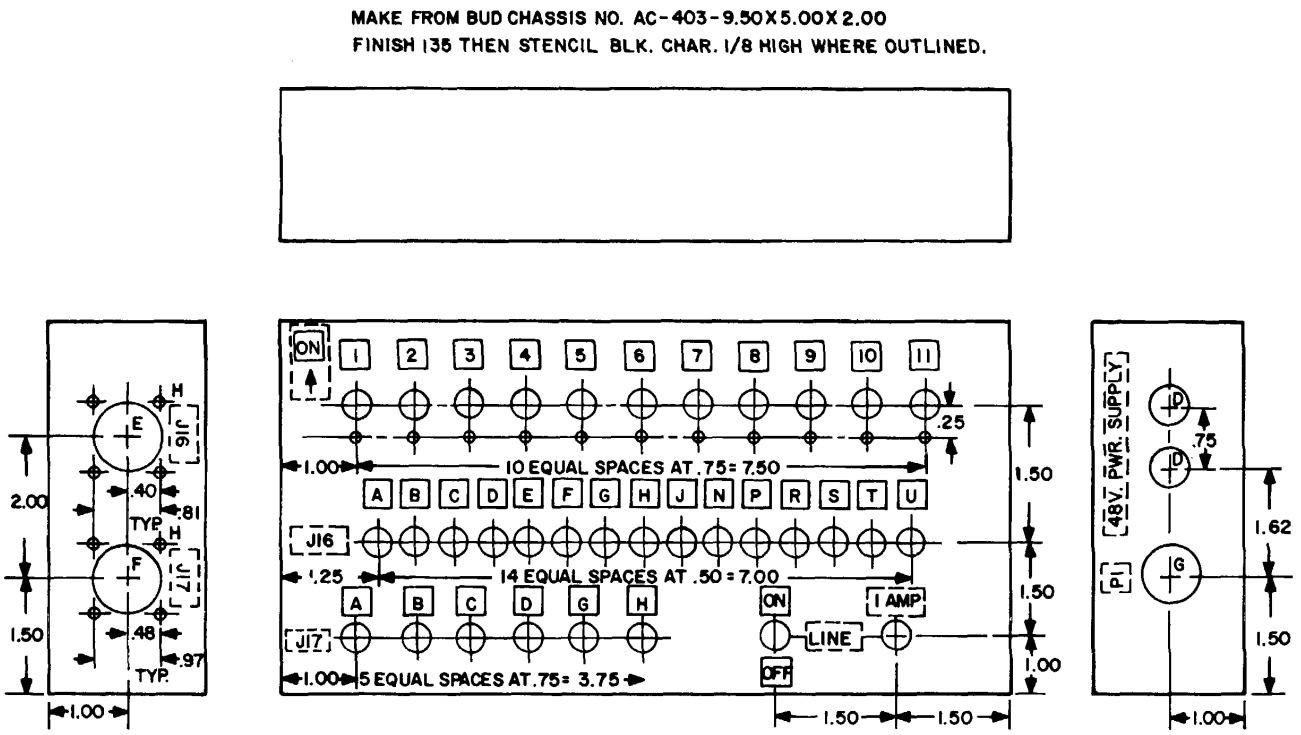


Figure 4-4. 20-Hz Ringing Supply Test Fixture, Schematic Diagram.



HOLE SCHEDULE		
HOLE	SIZE	QTY.
A	.257	32
B	.096	11
C	.468	1
D	.500	3
E	.812	1
F	1.062	1
G	.75	1
H	.128	8

Figure 4-5. Control Monitor -48 V/20 Hz Test Fixture, Chassis Layout and Marking Diagram.

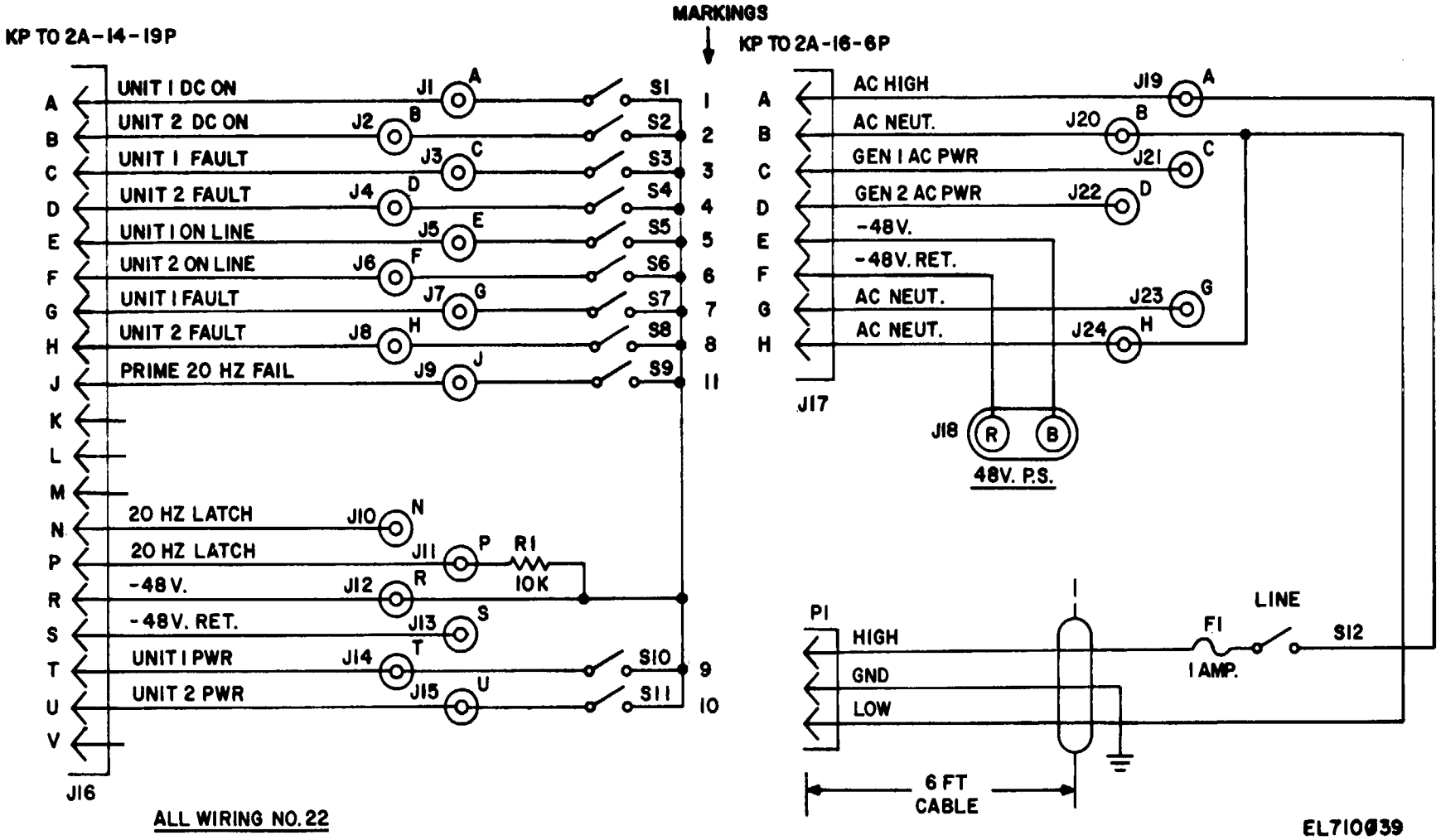


Figure 4-6. Control Monitor - 48V20 Hz Test Fixture, Schematic Diagram.

Section II. TROUBLESHOOTING

4-4. General

This section contains test and adjustment procedures, minimum performance standards, and troubleshooting guides for the modules of the -48 vdc power supply, the 20 Hz ringing supply assembly, and the control monitor -48V/20 Hz assembly.

4-5. Performance Test and Schematic Diagram Locations

a. Table 46 contains the minimum performance standards to be used in testing, adjusting, and troubleshooting the -48 vdc power supply. Refer to figure FO-5 for a schematic diagram, and figure 4-7 for test setup.

b. Table 4-7 contains the minimum performance standards to be used in testing, adjusting, and troubleshooting the 20-Hz ringing supply assembly. Refer to figure FO6 for a schematic diagram, and figure 4-8 for test setup.

c. Table 4-8 contains the minimum performance standards to be used in testing and troubleshooting the control monitor 48V/20 Hz assembly. Refer to figure FO-7 for a schematic diagram and figure 4-10 for test setup.

d. Removal and replacement procedures for the individual modules or components are covered in Section III of this chapter.

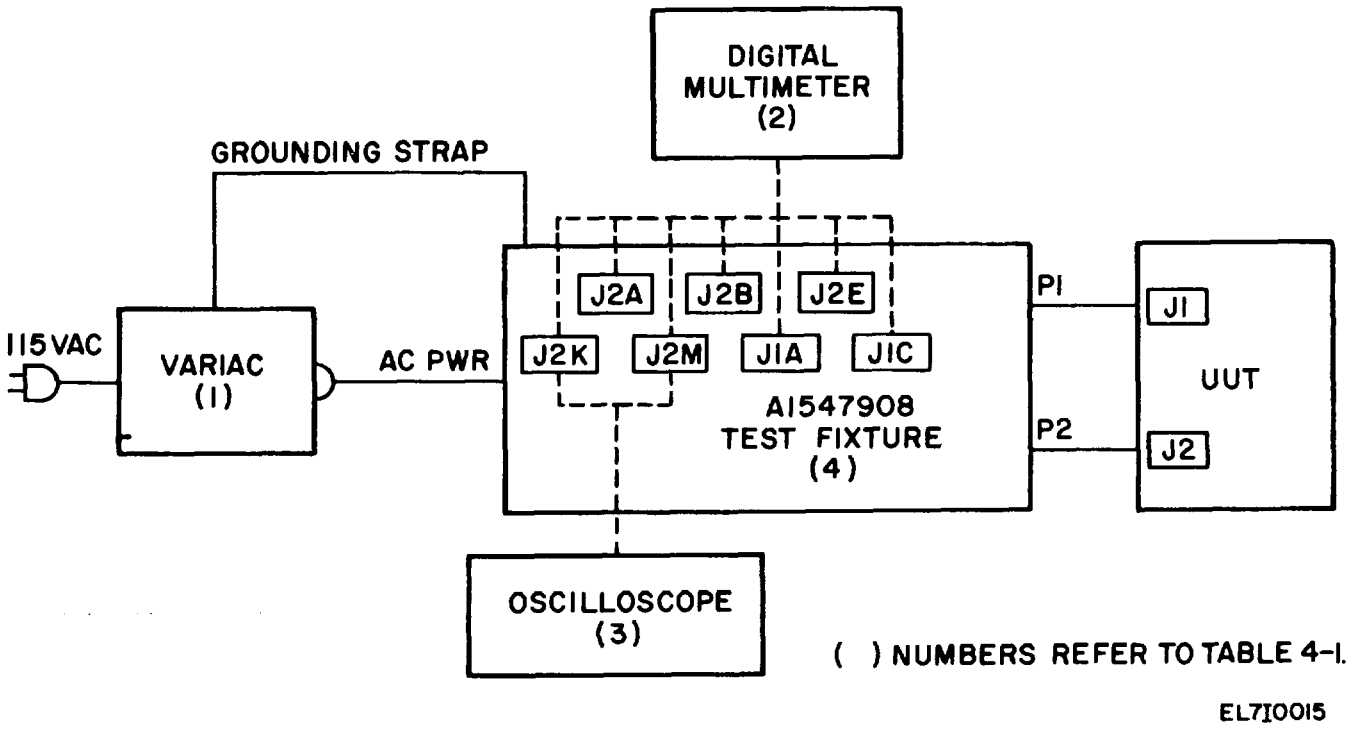


Figure 4- 7. Test Setup for -48 Vdc Power Supply.

Table 4-6. Performance and Troubleshooting Test for the -48 Vdc Power Supply SM-F-935778

Step	Test setup instructions	Normal indications	If indication is abnormal
	WARNING Voltages dangerous to life are present on the -48 vdc power supply (UUT) during this procedure; therefore the ac line voltage should be turned off when bodily contact must be made with connections on the UUT. **NOTE** Each test in this procedure is dependent upon the others; therefore all tests should be performed in the order that they are presented.		

Table 4-6. Performance and Troubleshooting Test for the -48 Vdc Power Supply SM-F-935778-Continued

Step	Test setup instructions	Normal indication	If indication is abnormal
	Counterclockwise and clockwise directions are indicated in terms of the UUT being set upside down with the adjustment screws on the potentiometers facing upward.		
1	Overvoltage Adjustment: a. Connect the equipment as shown in figure 4-7. b. Set the control on variac fully counterclockwise. c. On the side of the test fixture, set both the LOAD and LINE switches to the ON position. d. Connect the equipment to a 115±5 vac source and turn on the equipment. e. On the -48 vdc power supply (UUT), adjust the TRIP SET potentiometer fully clockwise. f. On the digital multimeter, set the controls as follows: FUNCTION ACV RANGE 200 g. Connect the digital multimeter across J1A and J1C on the test fixture.		
	h Adjust the variac for 115±1 vac as indicated on the digital multimeter.	115 1 vac	Replace A1 on the UUT.
	i On the test fixture, remove the digital multimeter leads from J1A and J1C. j. On the digital multimeter, set the controls as follows: FUNCTION DCV RANGE 200		
	k. On the test fixture, connect the positive lead of the digital multimeter to J2M and ground lead to J2K and observe the reading on the digital multimeter. If indication is normal, proceed to n below.	-40 to -60 vdc	Proceed to 1 below.
	l. On TB 1 of the UUT, connect the digital multimeter terminals	-40 to -60 vdc	Remove the leads from
	positive lead to terminal 3 and ground lead to terminal 6. If indication is normal:		2 and 5 on TB1 of the UUT and observe for normal
	indication.		
	(1) Check and replace, if necessary, CR1 and return to a above.		If indications return to normal, replace A2 on the UUT and return to a above. If indication remains abnormal, proceed to m below.
	(2) Check and correct, if necessary, shorted or opened leads and pin connectors on the UUT between pin K on J2 and terminal 6 on TB1 and also between pin M of J2 and terminal 3 of TB1 (through CR1). Then return to a above.		
	m. On the digital multimeter, set thecontrolsasfollows: FUNCTION ACV RANGE 200 Measure the voltage across the IN terminals 1 and 2 on A1of the UUT. If indication is normal, replace A1 on the UUT and return to a above.	115+1 vac	Check and correct, if necessary, shorted or open pin connectors and wiring on the UUT between pin A of J1 and IN terminal 2 of A1and also between pin C of J1 and IN terminal 1 of A1. Then return to a above.
	n. On the UUT, loosen the locknut on the VOLTAGE ADJUST on A1and adjust it for -50 +0, -0.2 vdc indication on the digital multimeter.	-50, +0, -0.2 vdc	On the UUT, remove the connections from terminals 2 and 5 on TB1 and adjust the VOLTAGE ADJUST on A1while observing for normal indications. If normal indications appear, replace A2 and then return to a above. If indications remain abnormal, replace A1 and then return to a above.
	o. While observing the digital multimeter, adjust the TRIP SET potentiometer on the UUT until the power supply just trips out. p. On the UUT, turn the VOLTAGE ADJUST fully counterclockwise.	Digital multimeter reads less than -1 volt.	Replace A2.

Table 4-6. Performance and Troubleshooting Test for the -48 Vdc Power Supply SM-F-935778-Continued

Step	Test setup instructions	Normal indication	If indication is abnormal
	q. On the test fixture, momentarily turn the LINE switch to the OFF position and then back to ON and observe the reading on the digital multimeter.	Minimum -40 vdc, that is, -41, -42, are acceptable.	Replace A2.
	r. On the UUT, adjust the VOLTAGE ADJUST for - 48.5 + .1 vdc as indicated on the digital multimeter.	-48.5 ±.1 vdc	Replace A2.
2	Voltage Sensor Tests:		
	a. On the UUT adjust the VOLTAGE ADJUST for a -44 ±.1 vdc as indicated on the digital voltmeter.	-44 +.1 vdc	Replace A1.
	b. On the test fixture, remove the digital multimeter lead from J2M and connect it to J2A and observe the reading on the digital multimeter.	-44 ±.2 vdc	Replace A3.
	c. On the test fixture, remove the digital multimeter lead from J2A and connect to J2E and observe the reading on the digital multimeter.	-44 +.2 vdc	Replace A3.
	d On the test fixture, remove the digital multimeter lead from J2E and connect it to J2B and observe the reading on the digital multimeter.	Less than - 1 vdc	Replace A3.
	e. On the UUT, slowly adjust theVOLTAGE ADJUST in a clockwise direction to the point where a voltage greater than -1 volt appears on the digital multimeter and read the voltage.	-45 to -46 vdc	Replace A3.
	NOTE Step 2f below is used to adjust the UUT to its final dc setting.		
	f On the UUT, adjust the VOLTAGE ADJUST for a -48 + .1 vdc indication on the digital multimeter and tighten the lockout on the adjustment screw.		
3	LineS.oad Regulation Test:		
	a. Remove the digital multimeter leads from the test fixture and set the controls on the digital multimeter as follows: FUNCTION ACV RANGE 200		
	b. On the test fixture, connect the leads from the digital multimeter across J1A and J1C and adjust the variac for an indication of 127 t 1 vac as indicated on the digital multimeter.		
	c. Remove the digital multimeter leads from the test fixture and set the controls on the digital multimeter as follows: FUNCTION DCV RANGE 200		
	d. On the test fixture, connect the positive lead from the digital multimeter to J2M and the ground lead to J2K and observe the indication on the digital multimeter.	-49 vdc maximum; that is, -47, -48, etc., is acceptable.	Replace A1.
	e. Remove the digital multimeter leads from the test fixture and set the controls on the digital multimeter as follows: FUNCTION ACV RANGE 200		
	f On the test fixture connect the leads from the digital multimeter across J1A and JIC and adjust the variac for an indication of 103 ± 1 vac as indicated on the digital multimeter.		
	g. Remove the digital multimeter leads from the test fixture and set the controls on the digital multimeter as follows: FUNCTIONDCV RANGE200		

Table 4-6. Performance and Troubleshooting Test for the -48 Vdc Power Supply SM-F-935778-Continued

Step	Test setup instructions	Normal indication	If indication is abnorma
	h. On the test fixture, connect the positive lead on the digital multimeter to J2M and the ground lead to J2K and observe the indication on the digital multimeter. i. Remove the digital multimeter leads from the test fixture and set the controls on the digital multimeter as follows: FUNCTION ACV RANGE 200 j. On the test fixture, connect the leads from the digital multimeter across J1A and JIC and adjust the variac for an indication of 115 + 1 vac as indicated on the digital multimeter. k. Remove the digital multimeter leads from the test fixture and set the controls on the digital multimeter as follows: FUNCTION DCV RANGE 200 i. On the test fixture, connect the positive lead from the digital multimeter to J2M and the ground lead to J2K.	-47 vdc minimum -48, -49, etc., are acceptable.	Replace A1.
	m. On the test fixture, set the LOAD switch to the OFF position and observe the reading on the digital multimeter.	-49.5 vdc maximum, that is, -49.3, -49.4, etc., are acceptable.	Replace A1.
4	Ripple Test: a. On the test fixture, set the LOAD switch to the ON position. b. On the oscilloscope, set the controls as follows: VERT MODE CH1 AC GND DC AC CHI VOLTS/DIV 20 m (with lox probe) HORIZ DISPLAY A A and B TIME/DIV 5ms A TRIGGER TRIG -MODE AUTO A TRIGGER COUPLING AC A TRIGGER SOURCE NORM A TRIG HOLDOFF NORM		
	c. On the test fixture, connect the oscilloscope probe to J2K and ground lead to J2M and measure the ripple voltage (if any) as displayed on the oscilloscope.	0.05 volts peak-to-pealk maximum	(1) Check and replace, if necessary, A2. (2) Replace A1.

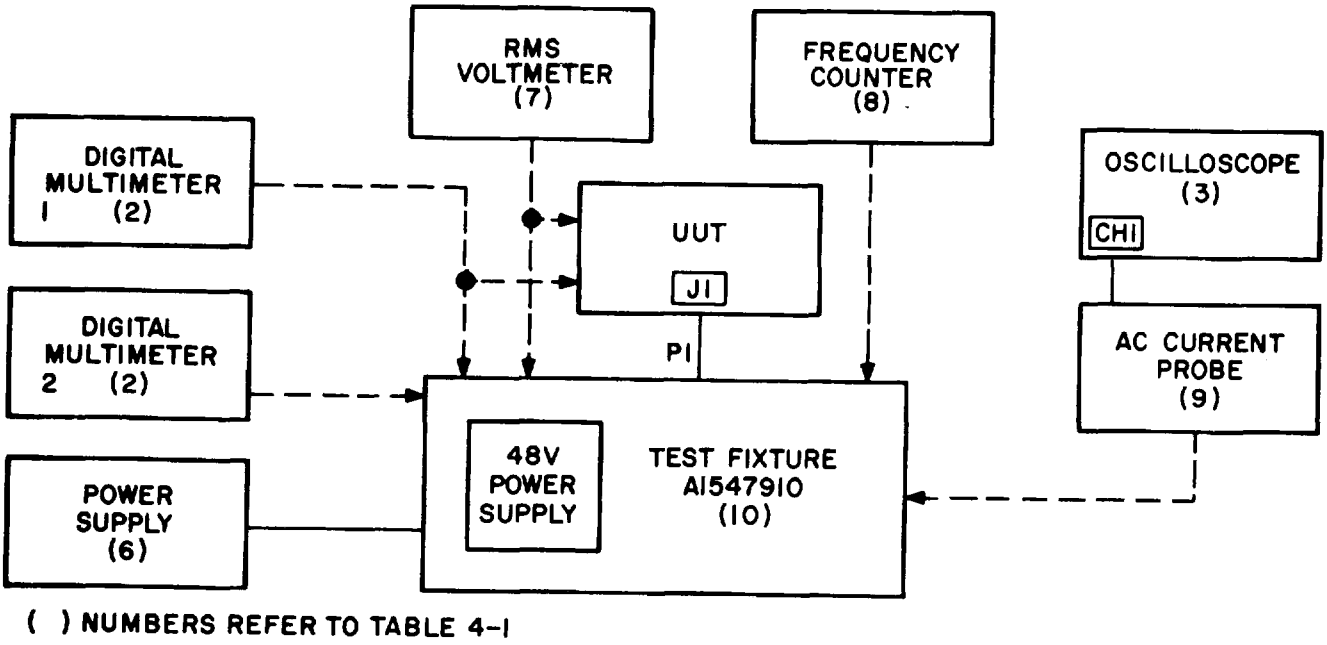


Figure 4-8. Test Setup for 20-Hz Ringing Supply.

Table 4-7 Performance and Toubleshooting Test for the 20-Hz Ring Supply Assembly A36 SM-F-935784

Step	Test setup instructions	Normal indication	If indication is abnormal
	WARNING Voltages dangerous to life are present on the 20-Hz ringing supply assembly A36 (UUT) when dc power is applied. NOTE Steps 1, 2, and 3 are directly dependent on each other; therefore, they should be performed in the sequence given below. Step 4 should only be performed if directed to do so in 1, 2, or 3 below.		
1	Isolation Diodes A36 CRI and A36 CR2: a. Connect the equipment as shown in figure 4-8, but do not apply power. b. On the power supply, adjust the controls fully counter-clockwise for a O volt output. c. Connect the equipment to a 115 ± 5 vac source and turn on the equipment. d. On the test fixture, set both GEN switches and the 20 Hz LOAD switch to the ON position e. Connect the negative lead from digital multimeter to J1M and the positive lead to JIL on the test fixture. f. Set the controls on digital multimeter 1 as follows: FUNCTION DCV RANGE 200 g. On the test fixture remove the wire jumper connected across the AMMETER test points. h. Connect the leads from digital multimeter 2 across the AMMETER test points on the test fixture. i. On digital multimeter 2 set the controls as follows: FUNCTION AC MA RANGE 2000 MA j. Turn on the power supply and adjust it for a -48 volts ± 0.5 volt indication on digital multimeter 1.		

Table 4-7 Performance and Troubleshooting Test for the 20-Hz Ring Supply Assembly A36 SM-F-935784-Continued

Step	Test setup instructions	Normal indication	If indication is abnormal
	k. On the test fixture, adjust the LOAD ADJ control for a 160 ma + 5 ma indication on digital multimeter 2.		
	I. Readjust the power supply, if necessary, for a -48 volts + 0.5 volt indication on digital multimeter 1.		
	m. On the test fixture set the GEN switch for generator 2 (right-most GEN switch) to the ON position and GEN switch for generator 1 (leftmost GEN switch) to the OFF position.		
	n. Connect the positive lead of digital multimeter 1 to terminal 8 of TB1 on the UUT and measure the voltage.	-46.5 to -48 vac	Check and replace, if necessary, CR2 and module A3 on the UUT (fig. FO-6).
	o. On the UUT, remove the positive lead of digital multimeter 1 from terminal 8 of TB 1 and connect it to terminal 7 and measure the voltage.	OV to -1 vdc	Check and replace, if necessary, CR1 on the UUT (fig. FO-6).
	p. On the test fixture, set the GEN switch for generator 1 (leftmost GEN switch) to the ON position and the GEN switch for generator 2 (rightmost GEN switch) to the OFF position and push the RESET button.		
	q Disconnect the positive lead of digital multimeter 1 from J1L on the test fixture and connect it to terminal 8 on TBI of the UUT and measure the voltage.	-46.5 to - 48 vdc	Check and replace, if necessary, CR1 and module A3 on the UUT (fig. FO-6).
	r. On the UUT, remove the positive lead of digital multimeter 1 from terminal 8 on TB1 and connect it to terminal 9 on TB 1 and measure the voltage.	0 to -1 vdc	Check and replace, if necessary, CR2 on the UUT (fig. FO-6).
2	Ring Generator A36A I Online.		
	a. On the test fixture, set the GEN switch for generator 2 (rightmost GEN switch) to the ON position.		
	b. Turn the power supply off for about 10 seconds and then back on again.		
	c. On the test fixture, push the RESET button and observe the ONLINE lamps. If indications are normal, - proceed to f below.	ONLINE lamp 1 is on and 2 is off.	Proceed to d below.
	d. On the UUT, loosen the two-quarter turn fastening screws on the A3 module circuit card retainer and remove the card retainer and module A3.		
replace	e. On the UUT, connect the RMS voltmeter across terminals 2 and 3 on TB I and measure the voltage. If indications are normal, check and replace A3 on the UUT (fig. FO-6).	100 + 15 VRMS	(1) If voltage is absent, Al on the UUT (fig. FO-6 2) If voltage is present but not Within tolerance, proceed to 4 below and perform the realignment procedures for ring generator A36A1.
	f. On the test fixture, connect the leads from the RMS voltmeter across J1C and J1D and record the voltage.	100 -+15 VRMS	Perform d and e above.
	g. On the test fixture, set the 20-Hz LOAD switch to the OFF position and observe the reading on the rms voltmeter.	Within _ 15% of the voltage recorded in step 1f above and not to and not to exceed 125 VRMS.	Proceed to 4 below to realignment procedures for ring generator A36A1
	h. On the frequency counter, set the controls as follows: SENSITIVITY (VOLTS RMS) 10 TIME BASE 1s FUNCTION FREQUENCY		
	i. On the test fixture, set the 20-Hz LOAD switch back to the ON position.		

Table 4-7 Performance and Toubleshooting Test for the 20-Hz Ring Supply Assembly A36 SM- F-935784-Continued

Step	Test setup instructions	Normal indication	If indication is abnormal
	j. On the test fixture, disconnect the leads coming from the rms voltmeter, and connect the frequency counter across J1C and J1D and measure the frequency.	20 Hz + 1 Hz	Proceed to 4 below and perform the realignment procedures for ring generator A36A1
	k. On the oscilloscope, set the controls as follows: VERT MODE — CH1 CH1 VOLTS/DIV — .1 AC GND DC — AC HORIZ DISPLAY — A LOCK KNOBS A TRIGGER TRIG MODE — AUTO A TRIGGER SOURCE — NORM A TRIGGER COUPLING — AC A TRIGGER HOLDOFF — NORM A and B TIME/DIV — 5 ms		
	l On the test fixture, attach the clip-on current probe to the CURRENT loop and observe the waveform on the oscilloscope.	Unclipped sinewave without spikes.	Proceed to 4 below to perform the realignment procedures for ring generator A36A 1.
3	Ring Generator A36A2 Online:		
	a On the test fixture, set the GEN switch for generator 1 (leftmost GEN switch) to OFF position and observe the ONLINE lamps. Readjust the LOAD ADJ, if necessary for 160 ma ±5 ma indication on digital multimeter 2. If indications are normal, proceed to d below.	ONLINE lamp 1 is off and 2 is on.	Proceed to b below.
	b. On the UUT, loosen the two quarter-turn fastening screws on the A3 module circuit card retainer and remove the card retainer and module A3.		
	c On the UUT, connect the RMS voltmeter across terminals 3 and 5 on TB1 and measure the voltage. If indications are normal, check and replace A3 on the UUT (fig. FO-6).	100 - 15VRMS	(1) If voltage is absent, replace A2 on the UUT (fig. FO-6). (2) If voltage is present but not within tolerance, proceed to 4 below and perform the realignment procedures for ring generator A36A2.
	d. On the test fixture, disconnect the leads coming from the frequency counter, and connect the RMS voltmeter across J1C and J1D and record the voltage.	100 + 15 VRMS	Perform b and c above.
	e. On the test fixture, set the 20Hz LOAD switch to the OFF position and observe the reading on the RMS voltmeters.	Within + 15% of the voltage recorded in d above and not to exceed 125 VRMS.	Proceed to 4 below to perform the realignment procedures for ring generator A36A2.
	f. On the test fixture, set the 20 Hz LOAD switch back on the ON position.		
	g. On the test fixture, disconnect the leads coming from the RMS voltmeter and connect the frequency counter across J1C and J1D and measure the frequency.	20 Hz + 1Hz	Proceed to 4 below to perform the realignment procedures for ring generator A36A2.
	h. Observe the waveform on the oscilloscope.	Unclipped sinewave without spikes.	Proceed to 4 below to perform the realignment procedures for ring generator A36A2.

Table 4- 7. Performance and Troubleshooting Test for the 20-Hz Ring Supply Assembly A36 SM-F-935784-Continued

Step	Operation	Normal indication	If indication is abnormal
4	Realignment of Ring Generator I or 2: **NOTE** This step should only be performed if directed to do so in 2 or 3 above. a Loosen the two quarter-turn fastening screws on the circuit card retainer of the RG101 circuit card of the ring generator to be realigned (UUT) and re move the retainer. b. On the RG101 circuit card of the UUT, adjust the R406 +C.1. ADJ and R411 -C.1. ADJ potentiometers 15 turns clockwise. c. On the test fixture, set both GEN switches and the 20-HZ LOAD switch to the ON positions. d. On the test fixture, connect the negative lead of digi-tal multimeter 1 to JIM and the positive lead to J1L. e. Adjust the power supply for a -50 VDC +0.5 indica-tion on digital multimeter 1. f. On the test fixture, if: (1) Ring generator 1 is the UUT, press the RESET button and observe that ONLINE lamp 1 is on. (2) Ring generator 2 is the UUT, set the GEN switch for ring generator 1 (leftmost GEN switch) to the OFF position and observe that ONLINE lamp 2 is on. g. Readjust, if necessary, the LOAD ADJ control on the test fixture for a 160 +5 ma indication on digital multimeter 2. h. Allow the UUT to warm up for a minimum of 5 minutes. i. Set the controls on the frequency counter as follows: SENSITIVITY (VOLTS RMS) 10 TIME BASE 1S FUNCTION FREQUENCY j. On the test fixture, set the 20-Hz LOAD switch to the OFF position and connect the frequency counter across J1C and JID. k. On the RG101 circuit card of the UUT, adjust R403 FREQ ADJ for a 20 HZ + 1 HZ indication on the frequency counter. l. Apply a modified alkyd cement compound to R403 to lock the screw adjust in place. m. On the test fixture, remove the frequency counter leads and connect the RMS voltmeter across J1C and J1D. n. On the RG101 circuit card of the UUT, adjust R415 VOLT ADJ for a 100 volt, +5, -0 VRMS indication on the RMS voltmeter. o. Apply a modified alkyd cement compound to R415 to lock the screw adjust in place. p. On the test fixture, set the 20-Hz LOAD switch to the ON position and adjust the LOAD ADJ control for a 200 + 10 ma indication on digital multimeter 2.	20 HZ +1 HZ indication on the frequency counter. 100 volts, +5, -0 VRMS in-dication on the RMS voltmeter.	Replace UUT. Replace UUT.

Table 4-7 Performance and Troubleshooting Test for the 20-Hz Ring Supply Assembly A36 SM-F-935784-Continued

Step	Operation	Normal indication	If indication is abnormal
	q. On the oscilloscope, set the controls as follows! VERT MODE CH1 CH1 VOLTS/DIV .1 AC GND DC AC HORIZ DISPLAY A LOCKS KNOBS A TRIGGER SOURCE NORM A TRIGGER MODE AUTO A TRIGGER COUPLING AC A TRIGGER HOLDOFF NORM A and B TIME/DIV 5 ms		
	r. On the test fixture, attach the clip-on current probe to the CURRENT loop and observe the waveform on the oscilloscope.	Unclipped sinewave without spikes.	Replace UUT.
	s. While observing the oscilloscope, adjust potentiomer R406 +C.1. ADJ, on the RG101 circuit card of the UUT, in a counterclockwise direction to the point just before the positive half cycle of the waveform just begins to flatten or clip or spikes begin to appear on the waveform.	R406 +C.1. ADJ adjustable as described in the test setup instruction in the left column.	Replace UUT.
	t. While observing the oscilloscope, adjust potentiomer R411 -C.1. ADJ, on the RG101 circuit card of the UUT, in a counterclockwise direction to the point just before the negative half cycle of the waveform just begins to flatten or clip or spikes begin to appear on the waveform.	R411 -C.1. ADJ adjust-able as described in the test setup instruction in the left column	Replace UUT
	u. Apply a modified alkyd cement compound to R406 and R411 to lock the screw in place.		
	v. If ring generator 1 was the UUT, repeat 2 above or if ring generator 2 was the UUT, repeat 3 above. If indications are still abnormal, replace the UUT.		

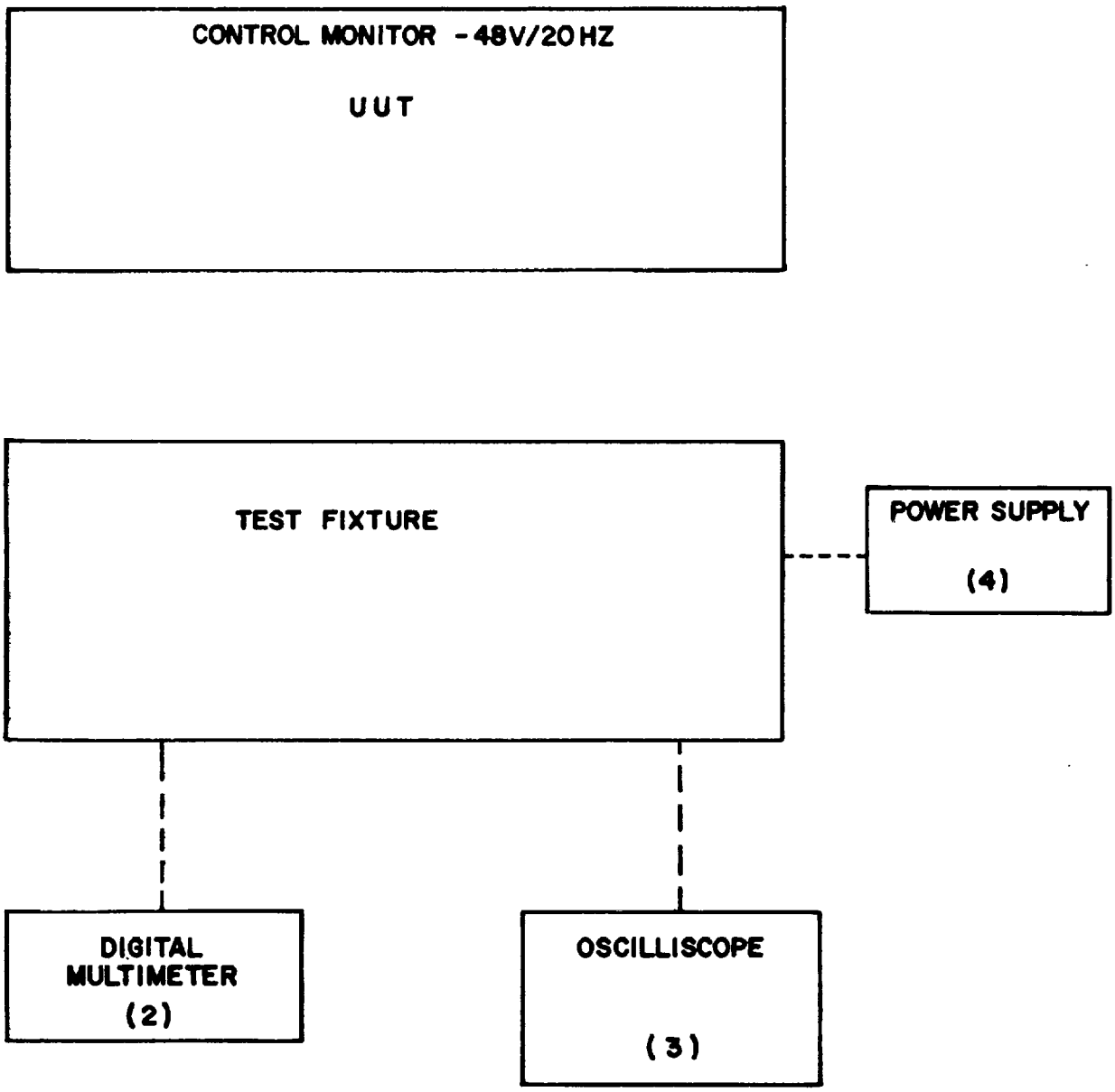


Figure 4-9. Test Setup for Control Monitor -48V/20 Hz Assembly.

Table 4-8. Performance and Troubleshooting Test for the Control Monitor Assembly -48V20 Hz Assembly

Step	Operation	Normal indication	If indication abnormal
1	Initial Conditions: a. On the test fixture, place all switches in the OFF position. b. On the test fixture, connect the external power supply to the 48 volt power supply connector. c. Connect the digital multimeter across the output terminals of the power supply. Adjust multimeter to indicate dc volts.		

Table 4-8. Performance and T7oubleshooting Test for the Control Monitor Assembly -48V/20 Hz Assembly--Continued

Step	Operation	Normal indication	If indication abnormal
	d. On the test fixture, plug connector P1 into a source of 115 volts 60-Hz power.		
	e. Connect the UUT to the test fixture as shown in figure 4-9.		
2	Dc Meter Test		
	a. On the UUT, set the AUDIBLE ALARM switch (S3) to the DISABLE position.		
	b. Apply power to the external power supply, and adjust the power supply output to obtain 48 volts as indicated by the digital multimeter.	-48 VDC MONITOR meters: 48 ± 3.0 VDC 0 AMPS	
	c. On the UUT, place the 20-Hz POWER switches to ON.	The 20-Hz GEN POWER ON indicators should light and the -48 VDC MONITOR ammeter should indicate lamp current.	Check indicator lamps DS11 and DS12.
	d. On the UUT, place the 20-Hz POWER switches to OFF		
	e. On the UUT, place the AUDIBLE ALARM switch to ON.		
3	Ac Voltage Test:		
	a. On the test fixture, place the LINE switch (S12) to the ON position.		
	b. On the UUT, place the -48 VDC POWER circuit breaker (CB1) to ON.	The POWER ON indicator should light.	Check DS5.
	c. Adjust the digital multimeter to indicate AC volts. Voltage range 200 volts.		
	d. On the test fixture, connect the digital multimeter between J21 (J17-c) and J24 (J17-h).	115 ± 5.0 vac	
	e. On the UUT, place the POWER circuit breaker CB1 in the OFF position.		
	f. On the UUT, place the -48 VDC POWER circuit breaker CB2 in the ON position.	The POWER ON indicator should light.	
	g. On the test fixture, connect the digital multimeter between J22 (J17-D) and J28 (J17-H).	115 ± 5.0 vac	
	k. On the UUT, place the POWER circuit breaker CB2 in the OFF position.		
4	Fault Test:		
	a. On the test fixture, set switch1l(S1) to ON and then to OFF	On the UUT,UNIT 1 POWER ON indicator lights.	Replace DS5.
	b. Set switch 2 (S2) to ON and then to OFF	UNIT 2 POWER ON indicator lights.	Replace DS6.
	c. Set switch 3 (S3) to ON and then to OFF	UNIT 1 FAULT indicator lights and AUDIBLE ALARM sounds.	Replace DS1.
	d. Set switch 4 (S4) to ON and then to OFF	UNIT 2 FAULT indicators lights and audible alarm sounds.	Replace DS2.

Table 4-8. Performance and Troubleshooting Test for the Control Monitor Assembly -48V/20 Hz Assembly-Continued

Step	Operation	Normal indication	If indication abnormal
	e. Set switch 5 (S5) to ON and then to OFF	UNIT 1 ON LINE indicator lights.	Replace DS3.
	f. Set switch 6 (S6) to ON and then to OFF	UNIT 2 ON LINE indicator lights.	Replace DS4.
	g. Set switch 7 to ON and then OFF	20-Hz GEN PRIME FAULT indicator lights and AUDIBLE ALARM sounds.	Check DS7. Check CR4.
	h Set switch 8 (S8) to ON and then to OFF	20-Hz GEN STBY FAULT indicator lights and AUDIBLE ALARM sounds.	Check DSS8. Check CR5.
	i. Set switch 9 (S10) to ON and then to OFF	20-Hz GEN PRIME POWER ON indicator lights.	Check DSI 1. Check R9.
	j. Set switch 10 (S11) to ON and then to OFF	20-Hz GEN STBY POWER ON indicator lights.	Check DS12. Check R10.
	k. .Set switch 11(S9) to ON.	AUDIBLE ALARM sounds.	Check LS1. Check R13. Check S3.
	l. Set switch 11 to OFF.	AUDIBLE ALARM is silent.	
	m. On the UUT, set AUDIBLE ALARM switch to TEST.	AUDIBLE ALARM sounds.	Check LS1. Check R13. Check S3.
	o. Set AUDIBLE ALARM switch to ON.		
	p. Press each indicator lamp.	Each indicator lamp should light when pressed.	Check lamp and circuitry that does not light.
5	Control Monitor Timer Test:		
	a. On the UUT set the 20-Hz GEN POWER switches to OFF.		
	b. On the test fixture, connect a cable from the oscilloscope CH-1 INPUT to test jack J11 (J16 P).		
	e. On the oscilloscope, set the controls as follows: CHANNEL 1 INPUT VOLTSIDIV 10/cm (DC) TIMEIDIV TRIGGER SOURCE EXT 2 SEC.		
	d. On the UUT, set the 20-Hz GEN POWER switches to ON.	The oscilloscope sweep starts across the screen at a level of 0 to -2 vdc. It should remain at that level for 10 seconds minimum and then fold to a level -14 to -20 vdc	Refer to figure 4-10.
	e. On the UUT, set the 20-Hz GEN POWER switches to OFF.		
	f. Set the AUDIBLEALARM switch to DISABLE.	UUT, the AUDIBLE ALARM lamp lights.	
	g. Set the AUDIBLE ALARM switch to ON	UUT, the AUDIBLE ALARM lamp goes out.	
	k. Disconnect UUT from test fixture.		

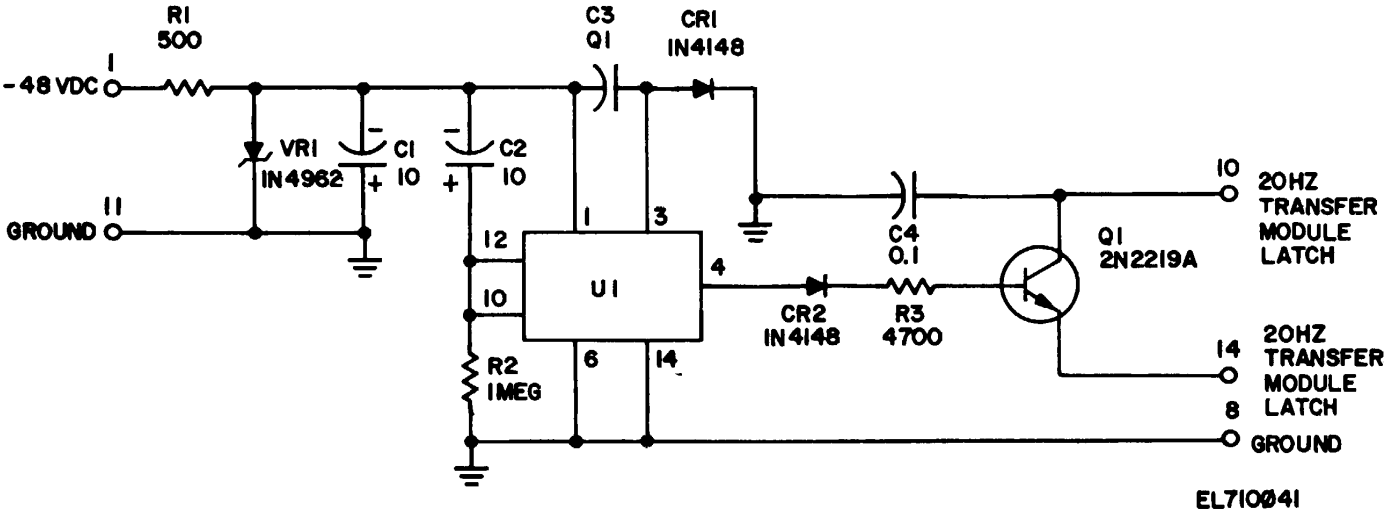


Figure 4-10. Control Monitor Timer, Schematic Diagram.

Section III. MAINTENANCE

4-6. General

The following paragraphs contain those disassembly procedures necessary for troubleshooting and repairing the -48 vdc power supply and 20-Hz ringing supply assembly.

4-7. Removal and Replacement of -48 Vdc Power Supply Module A1

a. Remove the four nuts and washers on the bottom of the power supply chassis which hold A1 to the frame.

b. Tag and unsolder the four wires connected to Al OUT -, +, and IN 1 and 2.

c. Lift the power supply chassis off A1

d. Set the power supply chassis on the replacement Al module.

e. Prepare the wires for soldering, and using good soldering practices, solder the four wires back to Al OUT, -, + and IN 1 and 2.

f Remount the four washers and nuts on the mounting bolts protruding through the bottom of the power supply chassis and tighten them to secure Al.

4-8. Removal and Replacement of -48 Vdc Power Supply Module A2

a. Tag and unsolder the two wires connected to A2 + and dc terminals on the bottom of power supply chassis.

b. Remove the four screws and washers from the bottom of the power supply chassis which hold A2 in place and remove the defective A2.

c. Hold the replacement A2 module in place and secure it to the power supply chassis with the four washers and mounting screws.

d. Prepare the two wires for soldering and using good soldering practices solder them to A2 + and dc terminals.

4-9. Removal and Replacement of -48 Vdc Power Supply Module A3

a. Cut the tie-wraps holding the wires going into A3 together and slide the plastic insulating sleeves back along the wires to expose the solder connections on the pin contacts of A3.

b. Tag and unsolder the wires from the bottom of A3.

NOTE

Do not remove A3 in the next step.

c. Hold the defective A3 in place and remove the four nuts and washers which hold A3 to the power supply chassis.

NOTE

In the next step it is extremely important to note the position of the pin on the bottom of A3 that is protruding through an off-white bead at its base to ensure the replacement A3 module is inserted back in the same way.

d. Pull straight down on the defective A3 ensuring not to change its position and note the relative position of the pin that is protruding through an off-white bead at its base.

e. On the replacement A3 module, observe the position of the pin protruding through the off-white bead at its base and be sure to align it in the same position that it was in on the A3 module that was defective.

f. Set the replacement A3 module in place on the power supply chassis and secure it in place with the four mounting washers and nuts.

g. Prepare the wires for soldering and, using good soldering practices, solder the wires back to their appropriate pins on the bottom of A3.

h. Slide the plastic insulating sleeve back over the solder connections.

i. Replace the tie-wraps that were removed from the wires going into A3.

4-10. Removal and Replacement of --48 Vdc Power Supply CR1

a. Unsolder the two leads connected to the top of CRI.

b. Remove the nut, two washers, and insulating disk from the bottom of CR1 which holds it to the power supply frame.

c. Remove CR1 from the power supply chassis and remove the nylon insulating washer, insulating disk, and the cathode washer from the mounting stud.

d. Assemble the cathode washer, insulating disk, and nylon washer (in that order) on the mounting stud of the replacement CR1 and insert it back into the hole in the power supply chassis.

e. On the CR1 mounting and protruding through the bottom of the power supply chassis, assemble the insulating disk, two washers and nut, and secure CR1 to the power supply chassis.

f. Prepare the two leads for soldering and using good soldering practices, solder them back to CR1.

4-11. Removal and Replacement of -48 Vdc Power Supply Multipin Connectors

a. The procedure outlined in paragraph 3-6b above should be followed, except in this case the

metal cable clamps must also be removed from around the wires in order to separate the individual wires going into the connector, and the clamp mounts must be unscrewed from the rear of the connector to obtain access to the inside of connectors.

4-12. Removal and Replacement of 20-Hz Ringing Assembly Modules Al or A2

a. Remove the four screws which hold the card retainer support frame to the generator mounting chassis and remove the retainer support frame.

b. Remove the two mounting screws from the front panel of the Al or A2 Ring Generator module which hold the module to the rear of mounting chassis.

c. If the A2 module is to be removed, remove the two screws which hold the plastic protective cover on TB 1 and remove the cover.

d. Remove the four screws which hold the two retaining clamps on top of the module in place and remove the retaining clamps.

e. Pull forward on the module and remove it from the mounting chassis.

f. Insert the replacement module and push it rearward until it is plugged into the rear connector on the mounting chassis.

g. Set the two retaining clamps in place and secure them to the generator mounting chassis with the four screws.

h. Insert the two mounting screws through the front of the module and tighten them to secure the module to the rear of the mounting chassis.

i. Remount the retainer card support frame on the front of the generator mounting chassis and secure it in place with the four screws.

j. If the protective cover on TB 1 was removed, put it in place and secure it with the two screws.

4-13. Removal and Replacement of 20-Hz Ringing Assembly Module A3

a. Loosen the two quarter-turn retaining screws which hold the circuit card retainer in place in front of the A3 module and remove the circuit card retainer.

b. Pull forward on the A3 module and remove it from the generator mounting chassis.

c. Slide the replacement A3 module into the generator mounting chassis and push rearward until it is seated in rear connector.

d. Set the circuit card retainer in place and tighten the two quarter-turn retaining screws to secure it in place.

4-14. Removal and Replacement of 20-Hz Ringing Assembly Multipin Connector

a. Perform the removal procedure for module A2 as outlined in paragraph 4-12 above.

b. Perform the procedure outlined in paragraph 3-6b above, except the screws must be removed from the clamp mounts on the rear of the connector to obtain access to the inner parts of the connector.

c. Perform the replacement procedure for module A2 as outlined in paragraph 4-12 above.

APPENDIX A

REFERENCES

AR 55-38	Reporting of Transportation Discrepancies in Shipments.
AR 385-11	Ionizing Radiation Protection (Licensing, Control, Transportation, Disposal, and Radiation Safety).
AR 735-11-2	Reporting of Item and Packaging Discrepancies.
DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army.
TB SIB 291	Safety Measure to be Observed When Installing and Using Whip Antennas, Field-Type Masts, Towers, Antennas, and Metal Poles that are Used with Communications, Radar, and Direction Finder Equipment.
TB 43-0116	Identification of Radioactive Items in the Army Supply System.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelter
TM 11-5805-601-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tools List: Receiver-Transmitter, Orderwire RT-964(V)3/GRC.
TM 11-5805-667-14&P	Operator's, Organizational, Direct Support, and General Support Maintenance Manual: Plug-in Units, Frequency Signaling TA-941/FTC (STELMA Model SFSU-1600-U/B) (NSN 6625-00-602-5128), TA-942/FTC (STELMA Model SFSU-2600-U/B) (6625-00-602-5127), TA-943/FTC (STELMA Model SSU-3/1600) (6625-00-602-5149), TA-944/FTC (STELMA SSU-3/ 2600) (6625-00-602-5148); Extender, Printed Wiring Board, MX-9664/FTC (6625-00-602-5151) and Universal Shelf, 90409000-000 (Line Conditioning Equipment).
TM 11-5805-668-14&P	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Plug-in Unit, Terminating Set TA-946/FTC (STELMA 4TS-2) (NSN 6625-00-602-5125) and TA-945/FTC (STELMA 4TS-2B) (6625-00-602-5124); Extender, Printed Wiring Board, MX-9664/FTC (6625-00-602-5151) and Universal Shelf, 90409000-000 (Line Conditioning Equipment).
TM 11-5805-672-14&P	Operator's, Organizational, Direct Support and General Support Maintenance Manual for Plug-in Unit, Line Signal Attenuator CN-1449/FTC (STELMA AT-2P) (NSN 6625-00-602-5120); Plug-in Unit, Carrier Board MT-4722/ FTC (STELMA CB-1) (5820-00-593-4790); Extender, Printed Wiring Board, MX-9664/FTC (6625-00-602-5151) and Universal Shelf, 90409000-000 (Line Conditioning Equipment).
TM 11-5805-675-14&P	Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) for Plug-in Unit, Line Amplifier AM-6745/FTC (STELMA LA-3) (NSN 5820-00-557-1671); Plug-in Unit, Line Amplifier AM-6746/FTC (STELMA DLA-3) (6625-00-602-5119); Plug-in Unit, Carrier Board MT-4722/FTC (STELMA CB-1) (5820-00-593-4790); Extender, Printed Wiring Board, MX-9664/ FTC (6625-00-602-5151) and Universal Shelf 90409000-000 (Line Conditioning Equipment).
TM 11-5805-676-14&P	Operator's, Organizational, Direct Support and General Support Maintenance Manual for Plug-in Unit, Ringdown Converter, CV-3250/FTC (STELMA RDC-4A) (NSN 6625-00-602-5159); Extender, Printed Wiring Board, MX-9964/FTC (6625-00-602-5151) and Universal Shelf, 90409000-000 (Line Conditioning Equipment).

TM 11-5805-711-13	Operator's, Organizational and Direct Support Maintenance Manual: Multiplexer Sets, AN/FCC-98(V)1 (NSN 5820-01-072-0560) and AN/FCC-98(V)1X (5820-01-086-6217).
TM 11-5815-602-12	Operator's and Organizational Maintenance Manual for Terminal, Communications, AN/UGC-74A(V)3 (NSN 5815-01-062-8194).
TM 11-5820-847-12	Operator's and Organizational Maintenance Manual: Modem, Digital Data MD-1002/G (NSN 5820-01-043-7646).
TM 11-5895-797-14	Operator's, Organizational, Direct Support, and General Support Maintenance Manual: Analog-Digital Converter CV-3034A/G (NSN 5805-01-018-0668).
TM 11-5895-807-13	Operator's, Organizational, and Direct Support Maintenance Manual: Encoder-Decoder, KY-8011GSC (NSN 5895-01-034-1061), KY-801A/GSC (5895-01-058-4585) and KY-801B/GSC (5805-01-099-5011).
TM 11-5895-846-14	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Satellite Communications Termihal AN/TSC-86 (NSN 5895-01-083-6891) (to be printed).
TM 11-5895-846-24P	Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Satellite Communications Terminals AN/TSC-86 (NSN 5895-01-083-6891) (to be printed).
TM 11-6625-602-12-1	Operator's and Organizational Maintenance Manual: Test Set, Telephone AN/USM-181B.
TM 11-6625-2737-14	Operator's, Organizational, Direct Support and General Support Maintenance Manual for Dual Trace Amplifier AM-6785 (Tektronix 7A26) (to be printed).
TM 11-6625-2772-12	Operator's and Organizational Maintenance Manual for TS-3580 (to be printed).
TM 11-6625-2781-14-1	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Plug-in Unit, Electronic Test Equipment PL-1388/U (Hewlett-Packard Model 8552B) (NSN 6625-00-431-9939).
TM 11-6625-2781-14-4	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Plug-in Unit, Electronic Test Equipment PL-1400/U (Hewlett-Packard Model 8555A) (NSN 6625-00-422-4314).
TM 11-6625-2781-14-6	Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Filter, Variable F-1414/U (HP-8445B) (NSN 6625-00-253-4833).
TM 11-6625-2781-14&P	Operator's, Organizational, Direct Support and General Support Maintenance Manual Including Repair Parts and Special Tools Lists for Spectrum Analyzer RF Section PL-1399/U (NSN 6625-00-432-5055).
TM 11-6625-2839-14	Operator's, Organizational, Direct Support and General Support Maintenance Manual for TS-3642 (Harris 7003) (to be printed).
TM 11-6625-2922-14&P	Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) for Oscilloscope, Tektronix Model R7704 (NSN 6625-00-007-8487).
TM 11-6625-2924-14&P	Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) for Universal Counter/Timer, Tektronix Model 7D15 (NSN 6625-00-392-2604).
TM 11-6625-2925-10	Operator's Manual for Dual Time Base, Tektronix Model 7B92A (NSN 6625-01-027-0265).
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).
*TO 31W2-2T-102	Service Instructions, Circuit Diagrams, and Illustrated Parts Breakdown for Frequency Shift Converter Type CV-2543(P)/T and Frequency Shift Keyer Type KY-664(P)/T (STELMA).
*TO 31W4-2T-102	Service Instructions, Circuit Diagrams, and Illustrated Parts Breakdown for Telegraph Line Isolator, Type CU-1819/T (STELMA).

*Sacramento ALC/DAPW, Bldg. 347D, McClellan AFB, Sacramento, CA 95652

By Order of the Secretary of the Army:

E. C. MEYER
General,. United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with Special Mailing List.

U. S. PRINTING OFFICE: 1992 - 311-831 (61008)

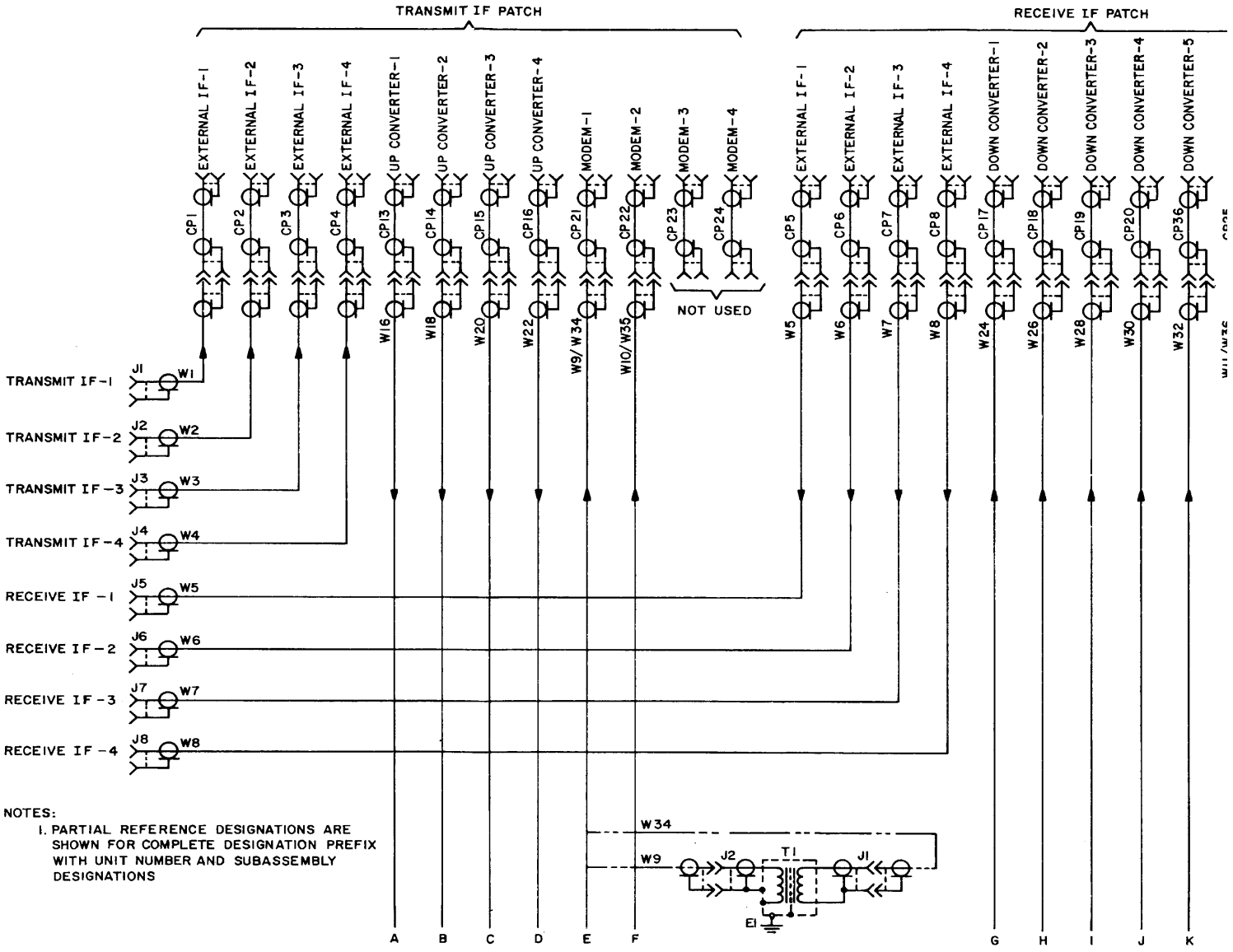


Figure FO-1 (1). IF Patch Panel Schematic Diagram (Sheet 1 of 2)

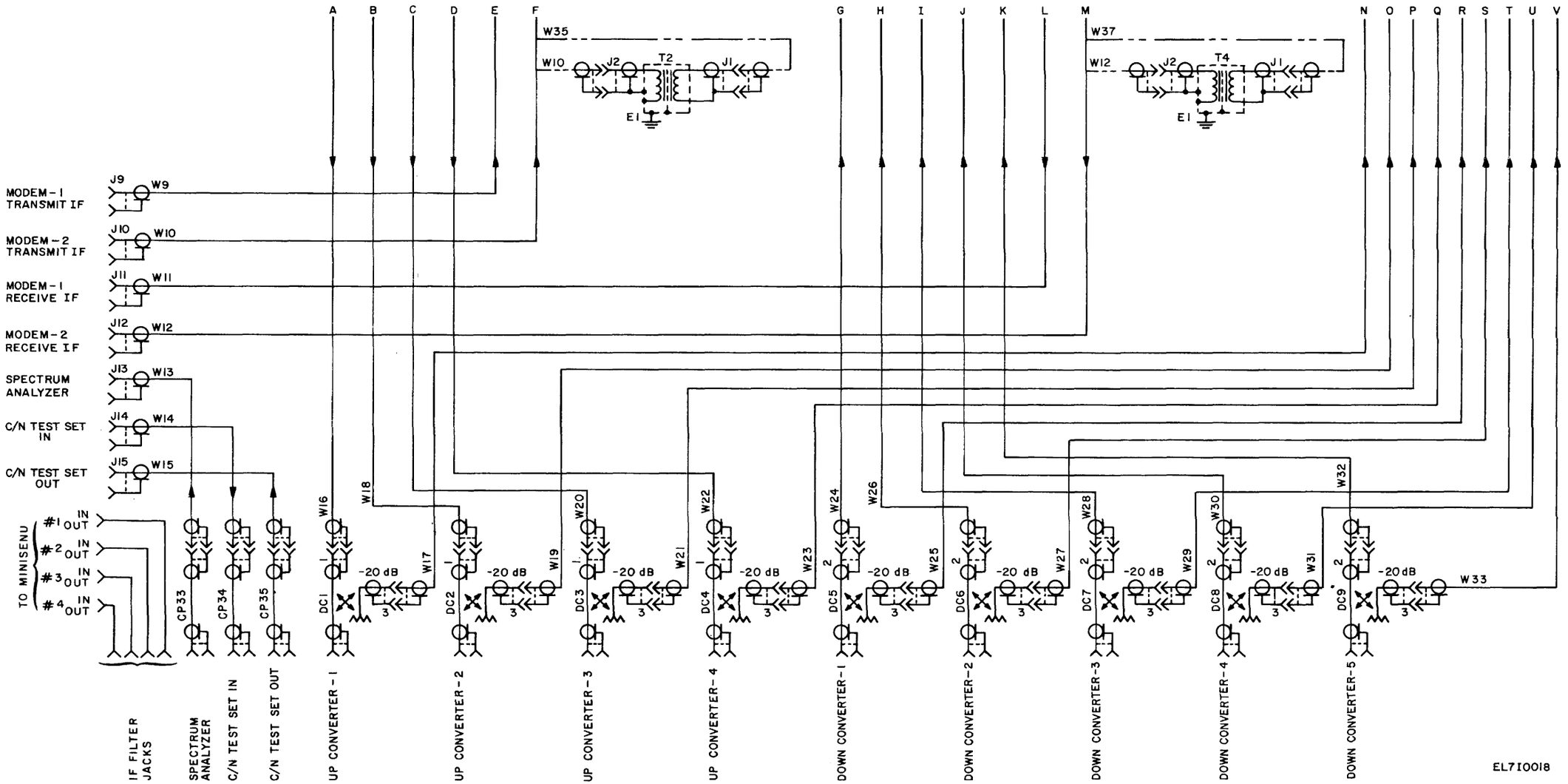


Figure FO-1 (2). IF Patch Panel Schematic Diagram (Sheet 2 of 2)

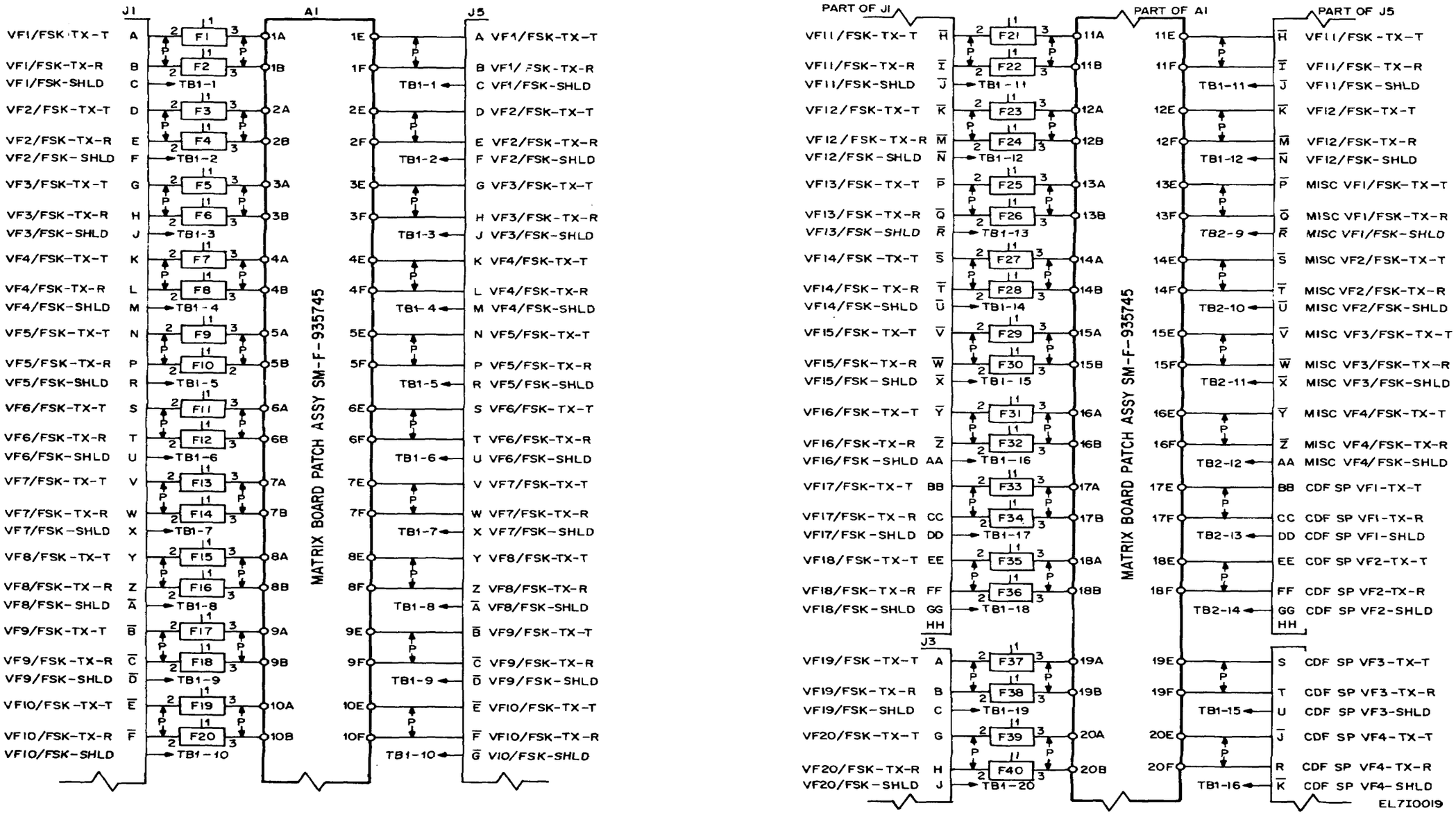


Figure FO-2 (1). Central Distribution Frame Interconnection Diagram (Sheet 1 of 4))

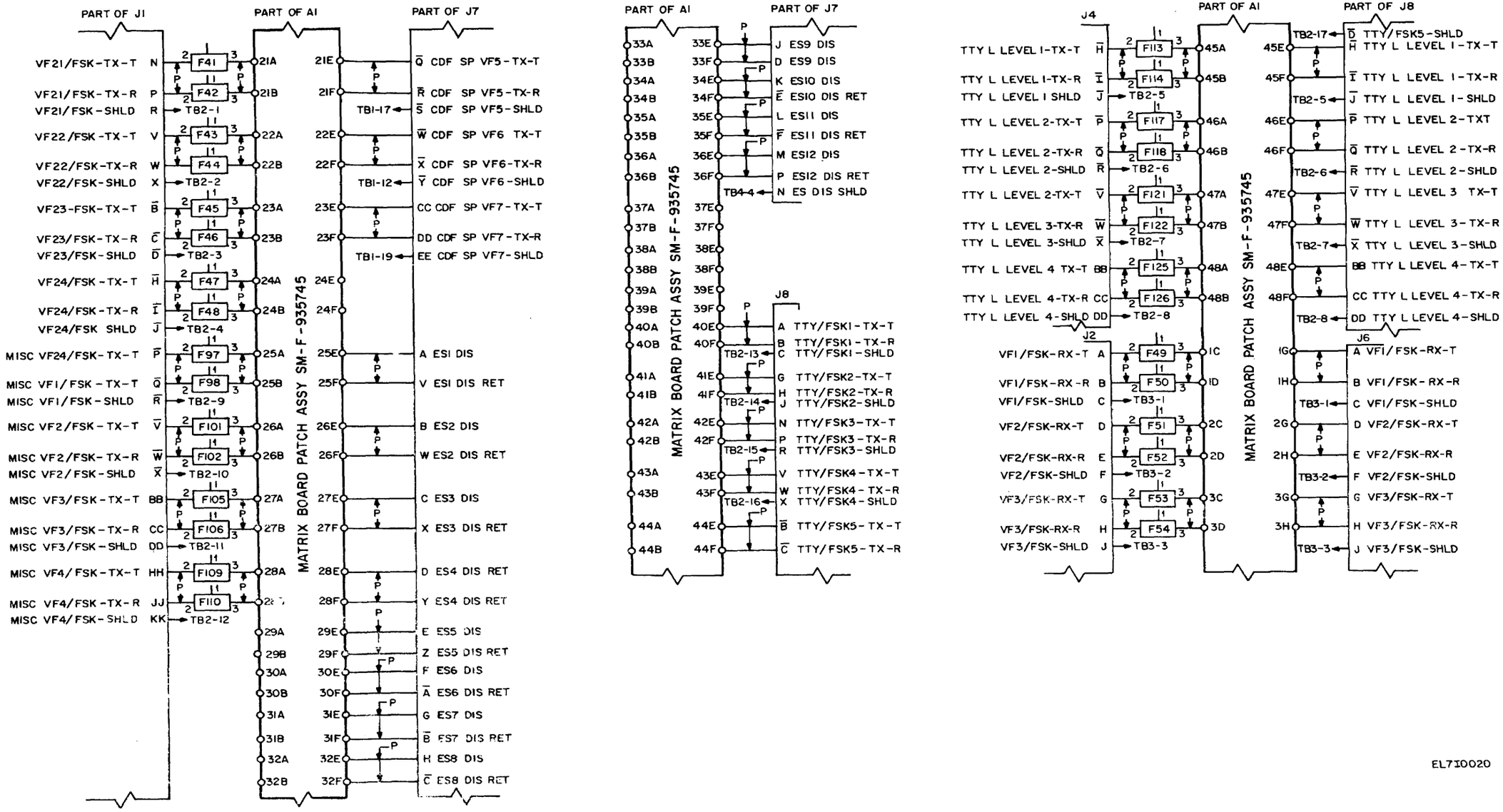


Figure FO-2 (2). Central Distribution Frame Interconnection Diagram (Sheet 2 of 4)

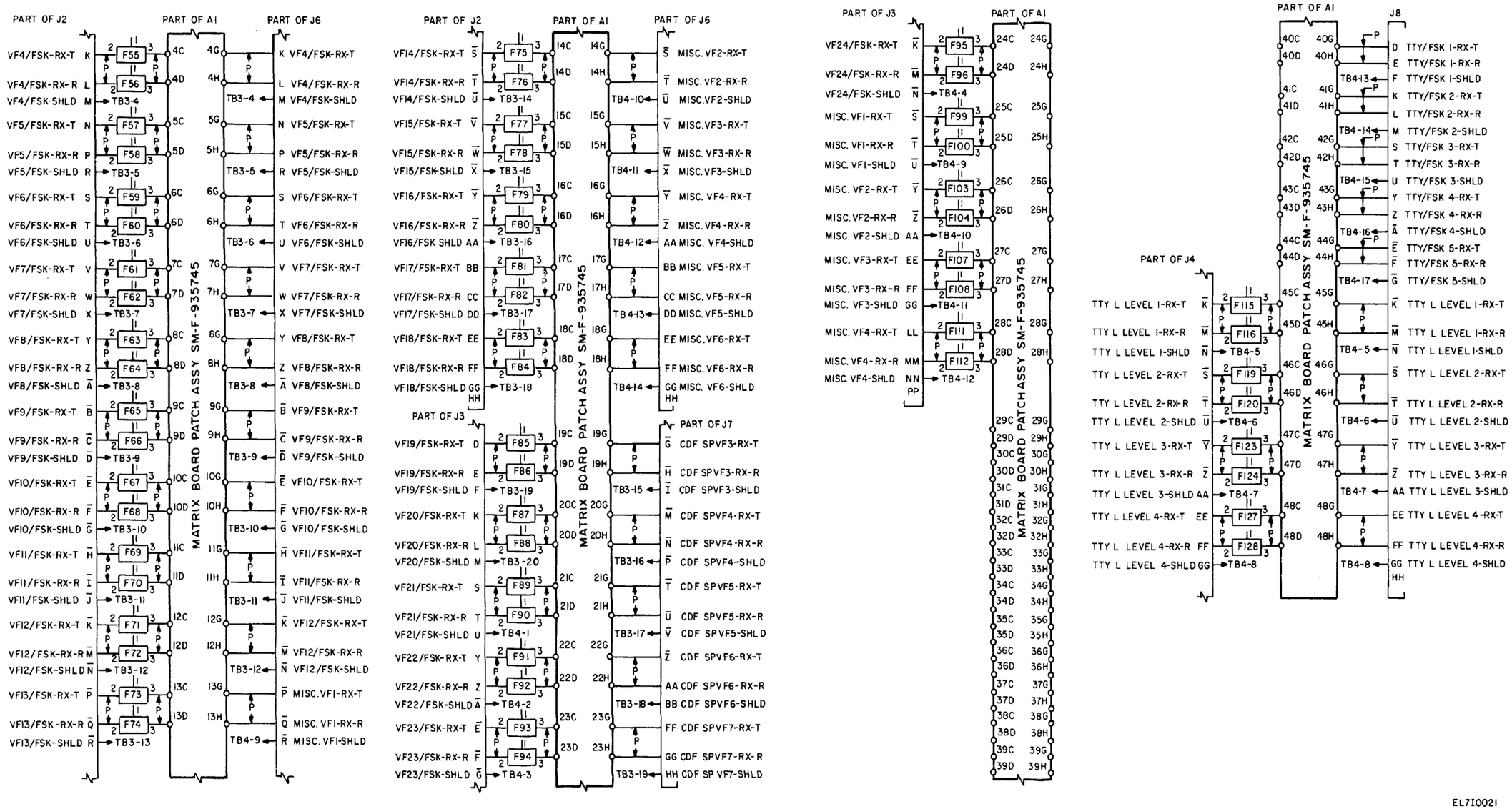


Figure FO-2 (3). Central Distribution Frame Interconnection Diagram (Sheet 3 of 4)

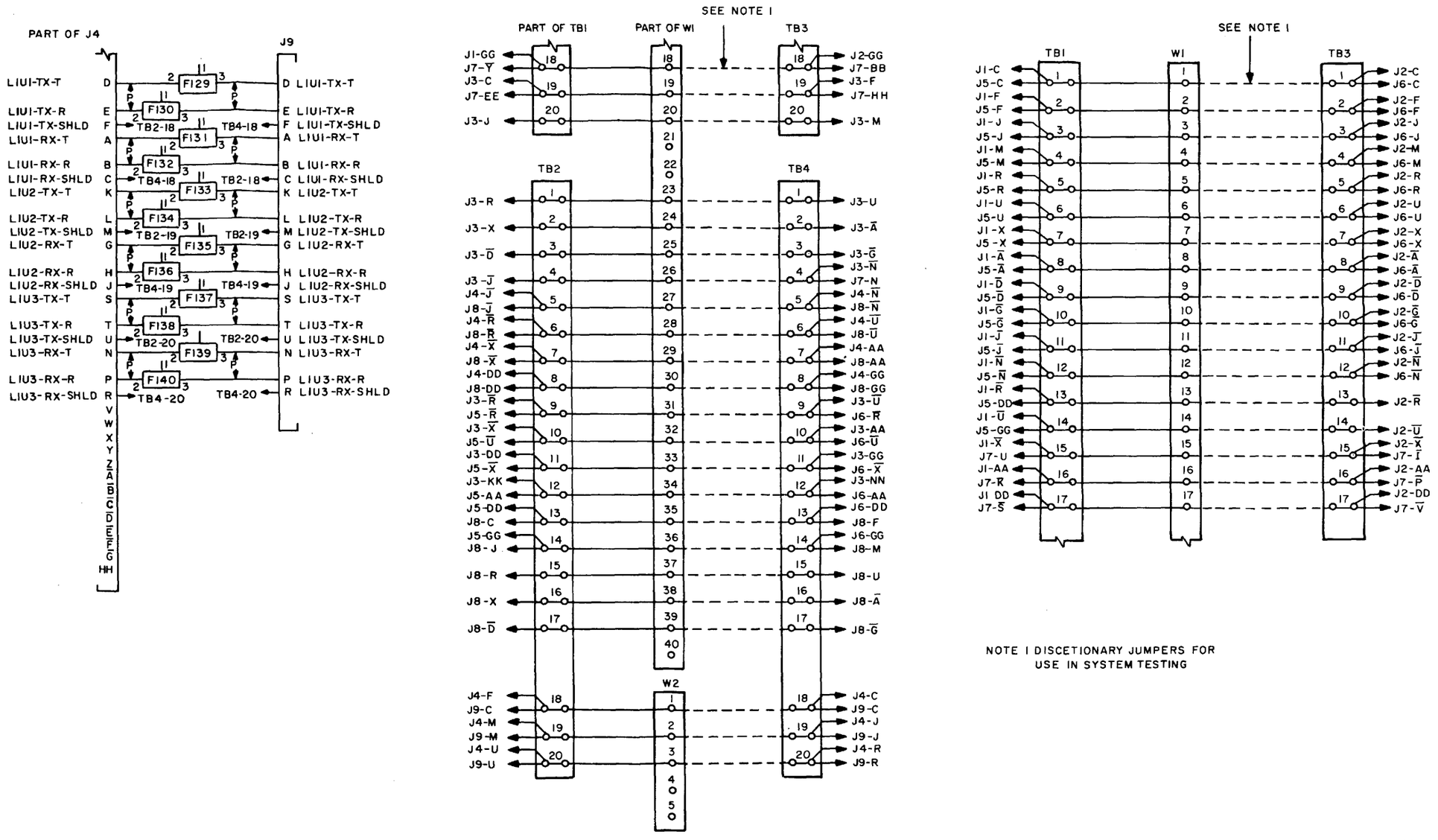
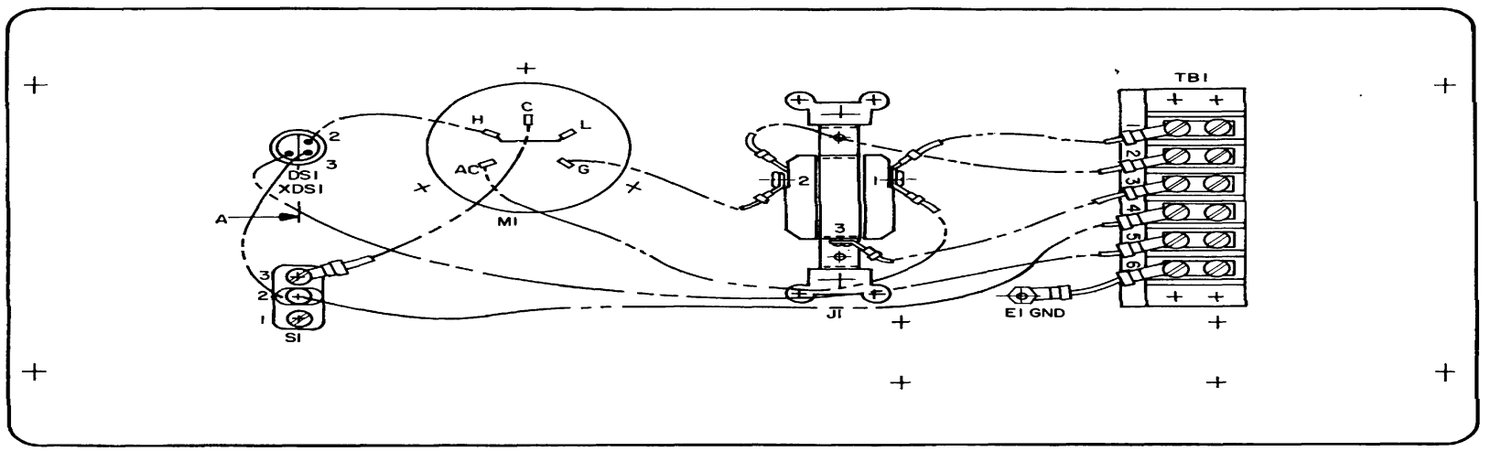
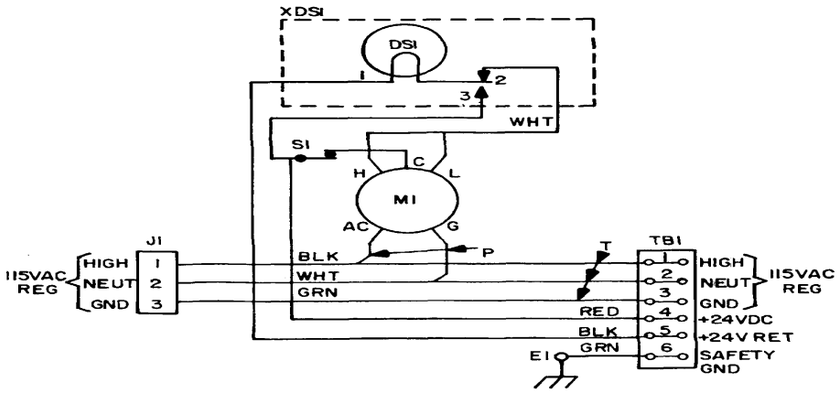


Figure FO-2 (4). Central Distribution Frame Interconnection Diagram (Sheet 4 of 4)





WIRE CONNECTION LIST				
FROM	TO	WIRE COLOR CODE	WIRE FIND NO.	TERM FIND NO.
E1	TB1-6	GRN	22	32,32
J1-1	M1-AC	BLK	27	31
J1-1	TB1-1	BLK	28	31,31
J1-2	M1-G	WHT	27	31
J1-2	TB1-2	WHT	28	31,31
J1-3	TB1-3	GRN	28	31,31
S1-1	XDS1-3	RED	23	32
M1-C	S1-3	RED	23	29
M1-H	M1-L	WHT	25	—
M1-H	XDS1-2	WHT	25	—
S1-1	TB1-4	RED	23	29,32
TB1-5	XDS1-1	BLK	24	32

EL 710023

Figure FO-3. Voltage Regulator Monitor Panel Schematic Diagram

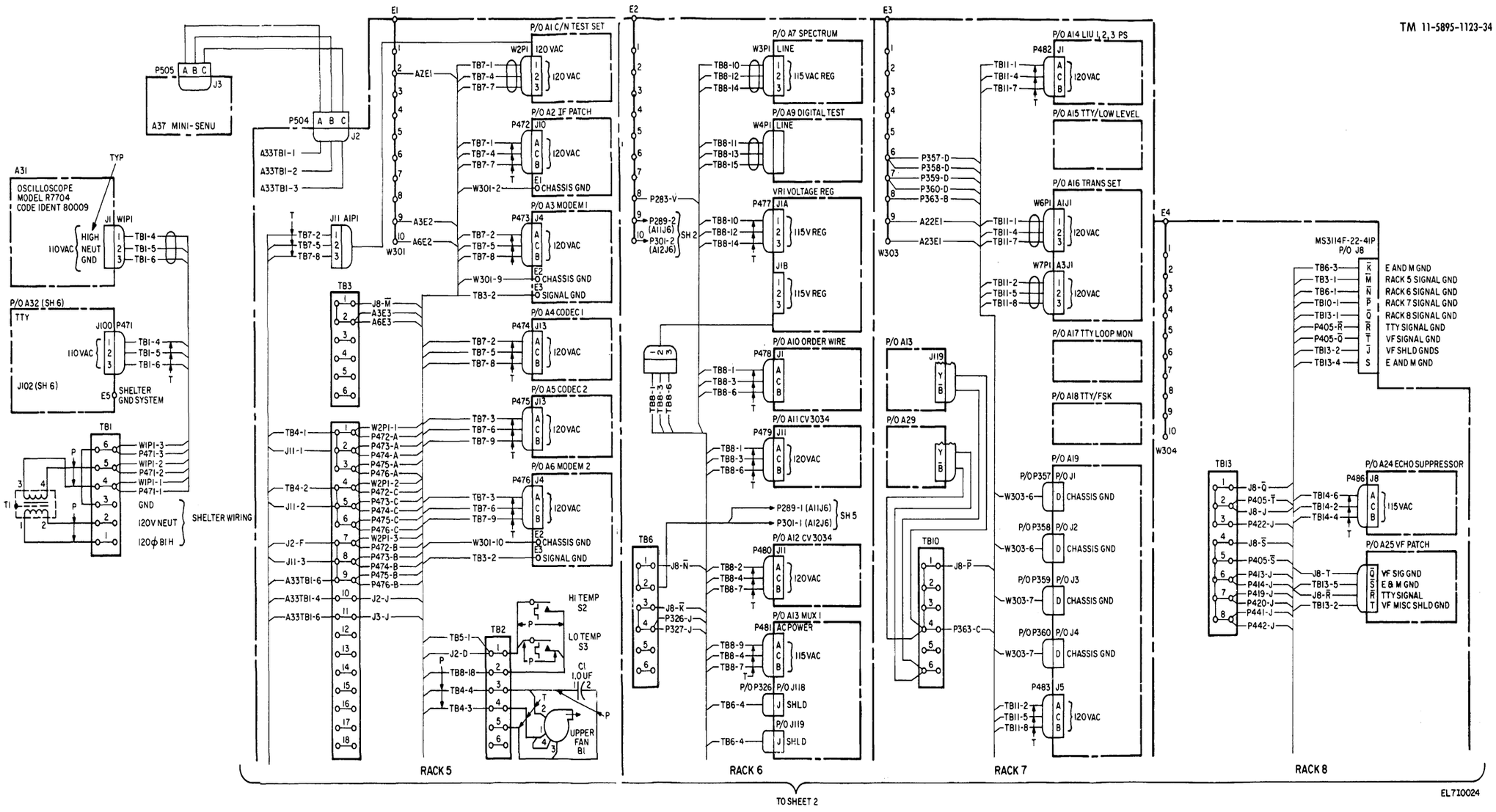


Figure FO-4(1). Communications Subsystem Interconnection Diagram (Sheet 1 of 12).

Figure FO-4(1). Communications Subsystem Interconnection Diagram (Sheet 1 of 12)

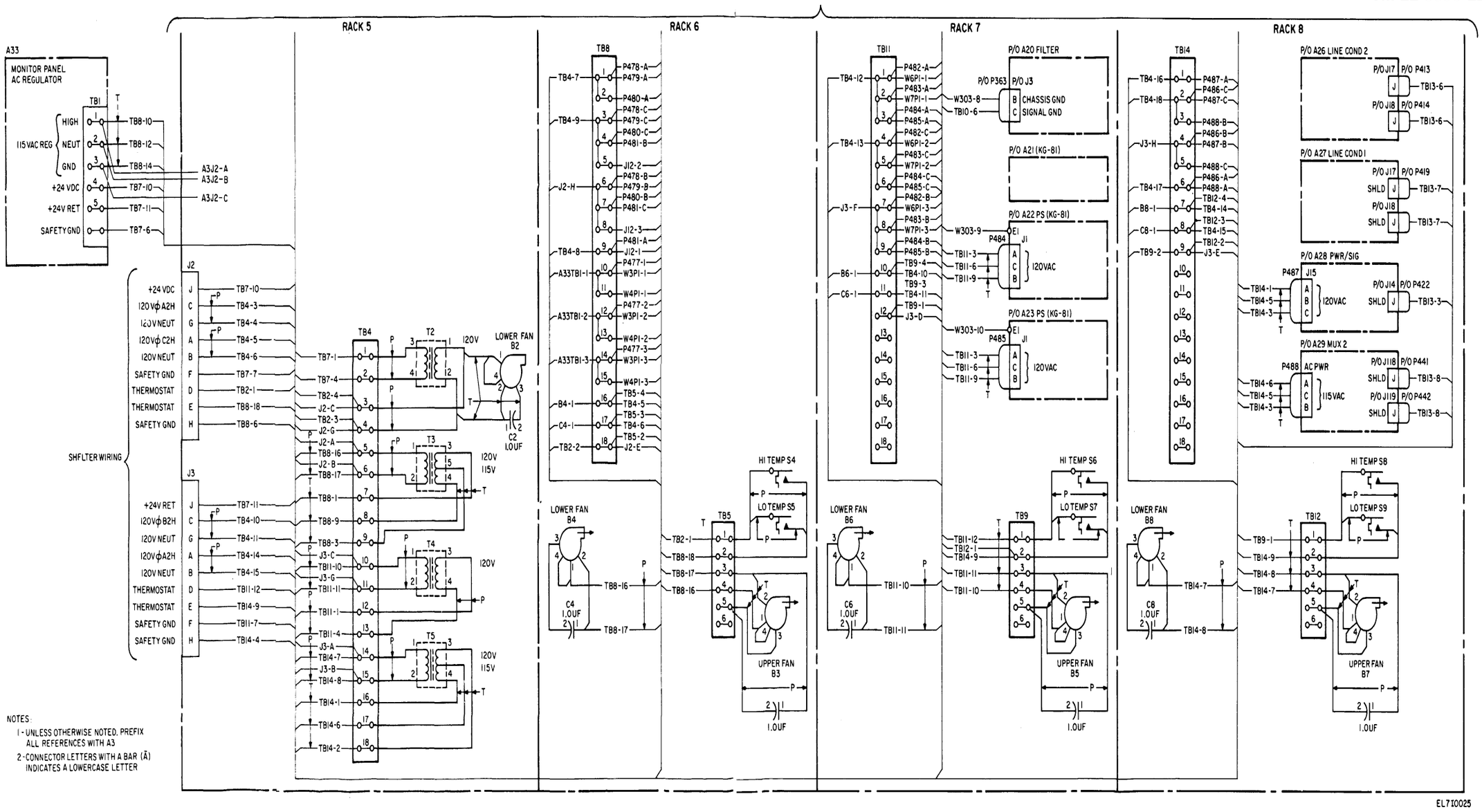


Figure FO-4(2). Communications Subsystem Interconnection Diagram (Sheet 2 of 12)

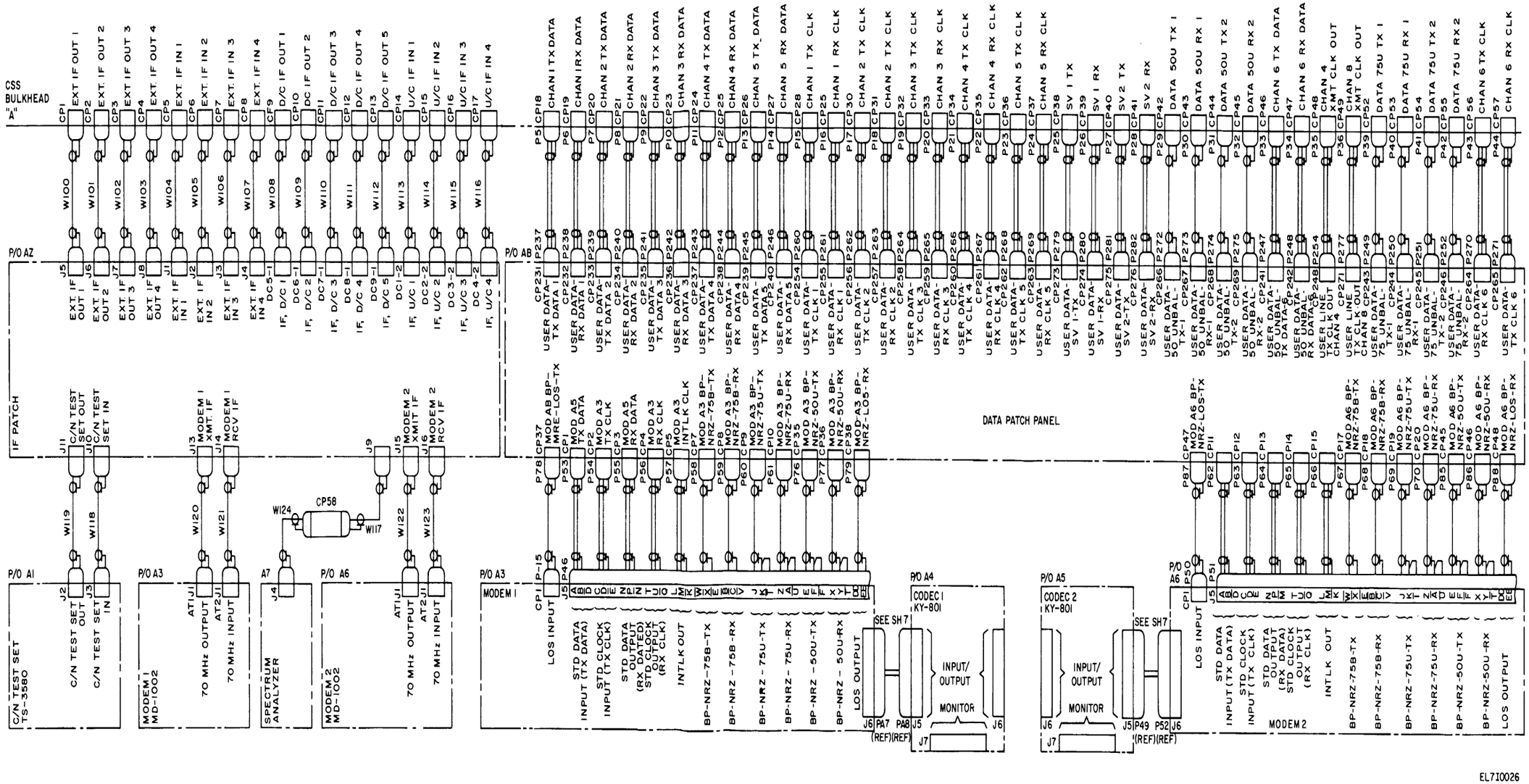


Figure FO-4(3). Communications Subsystem Interconnection Diagram (Sheet 3 of 12)

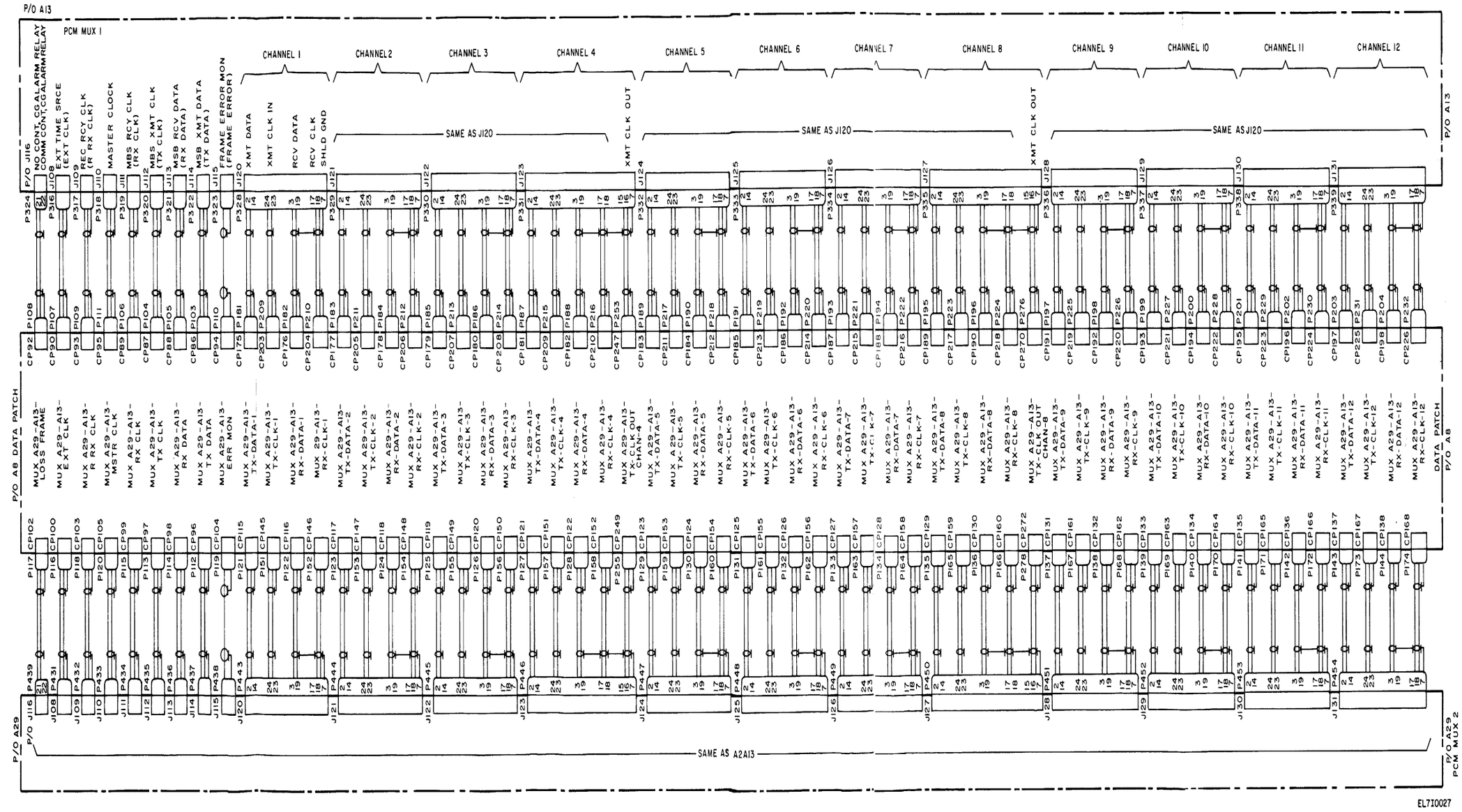


Figure FO-4(4). Communications Subsystem Interconnection Diagram (Sheet 4 of 12)

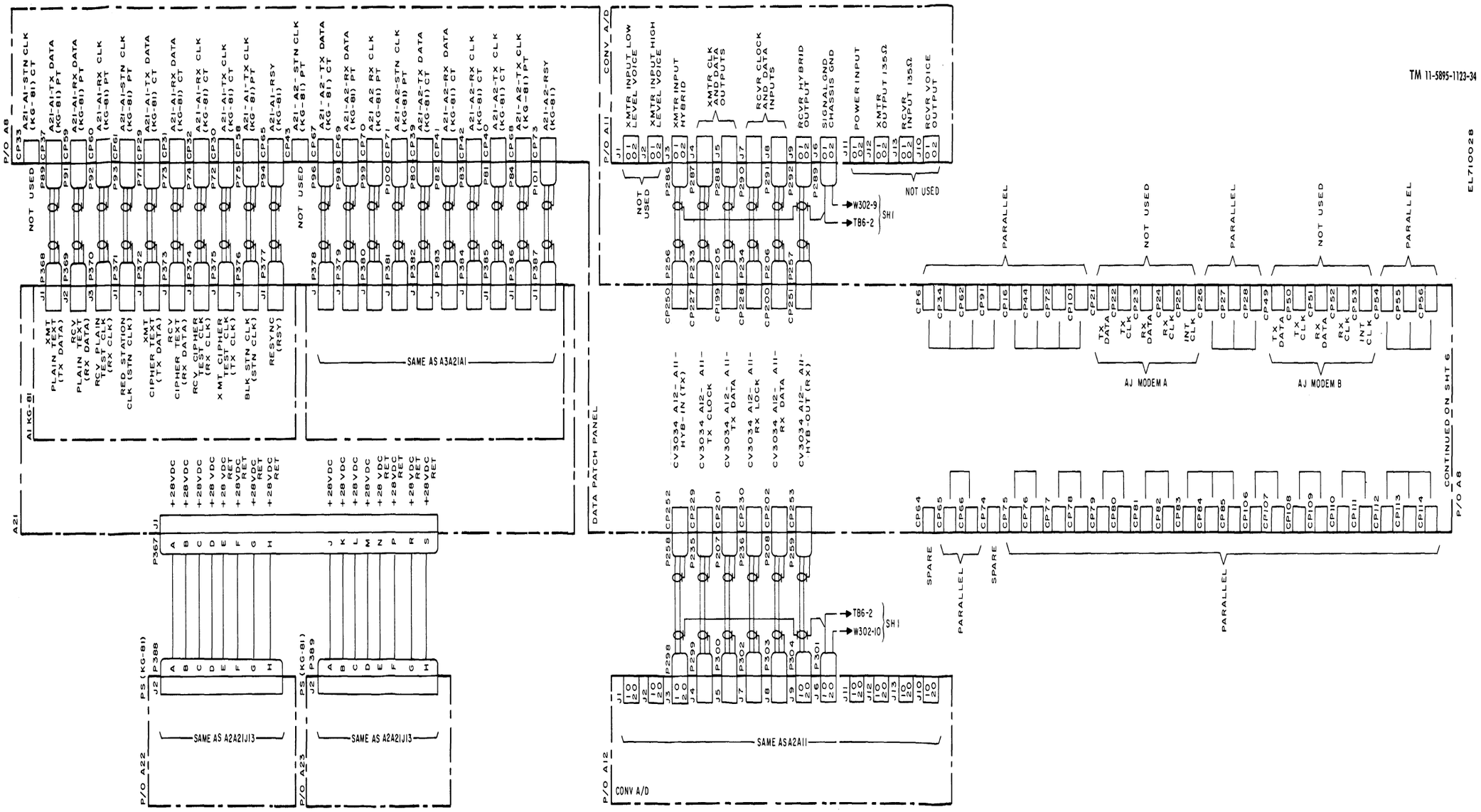


Figure FO-4(5). Communications Subsystem Interconnection Diagram (Sheet 5 of 12)

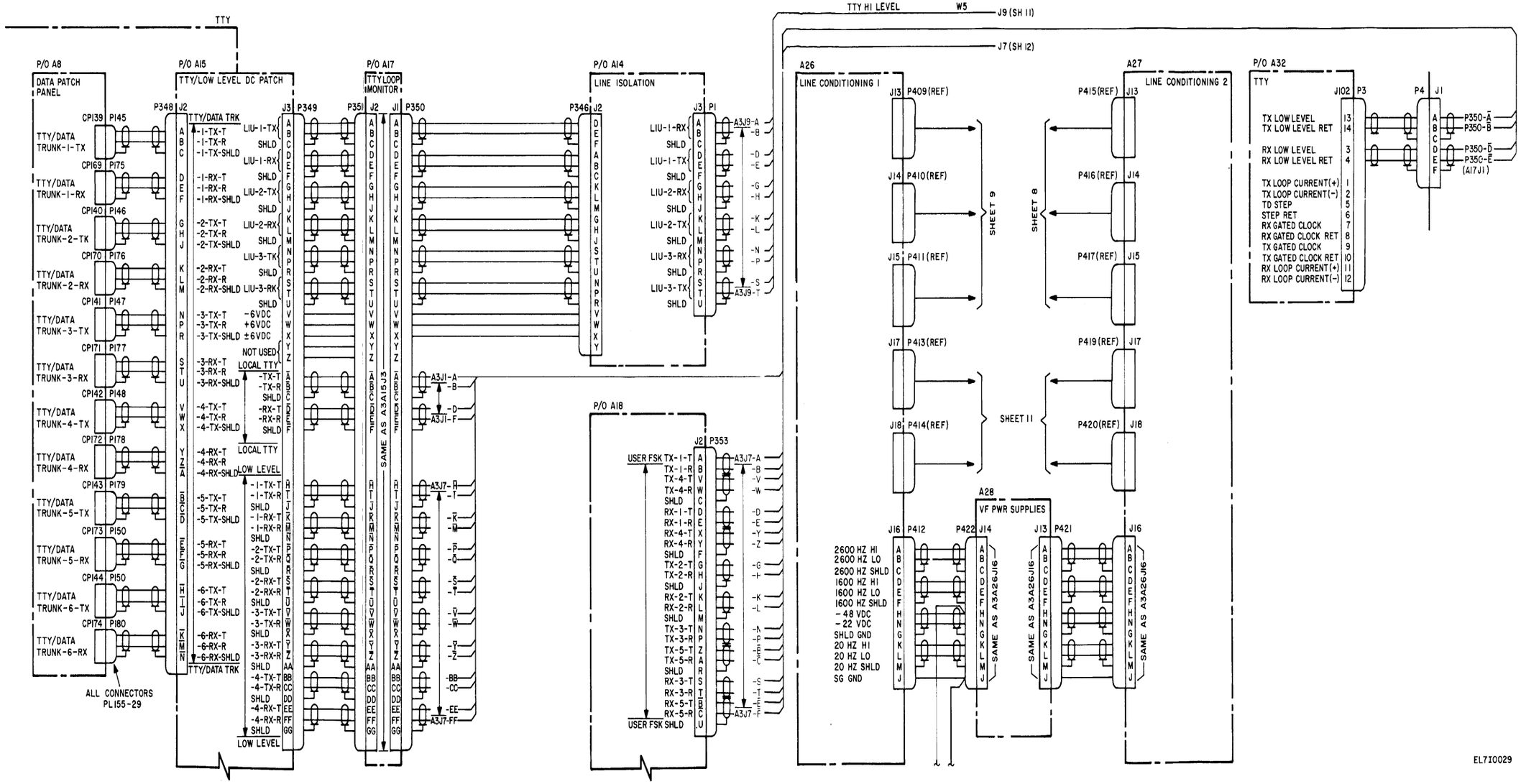


Figure FO-4(7). Communications Subsystem Interconnection Diagram (Sheet 7 of 12)

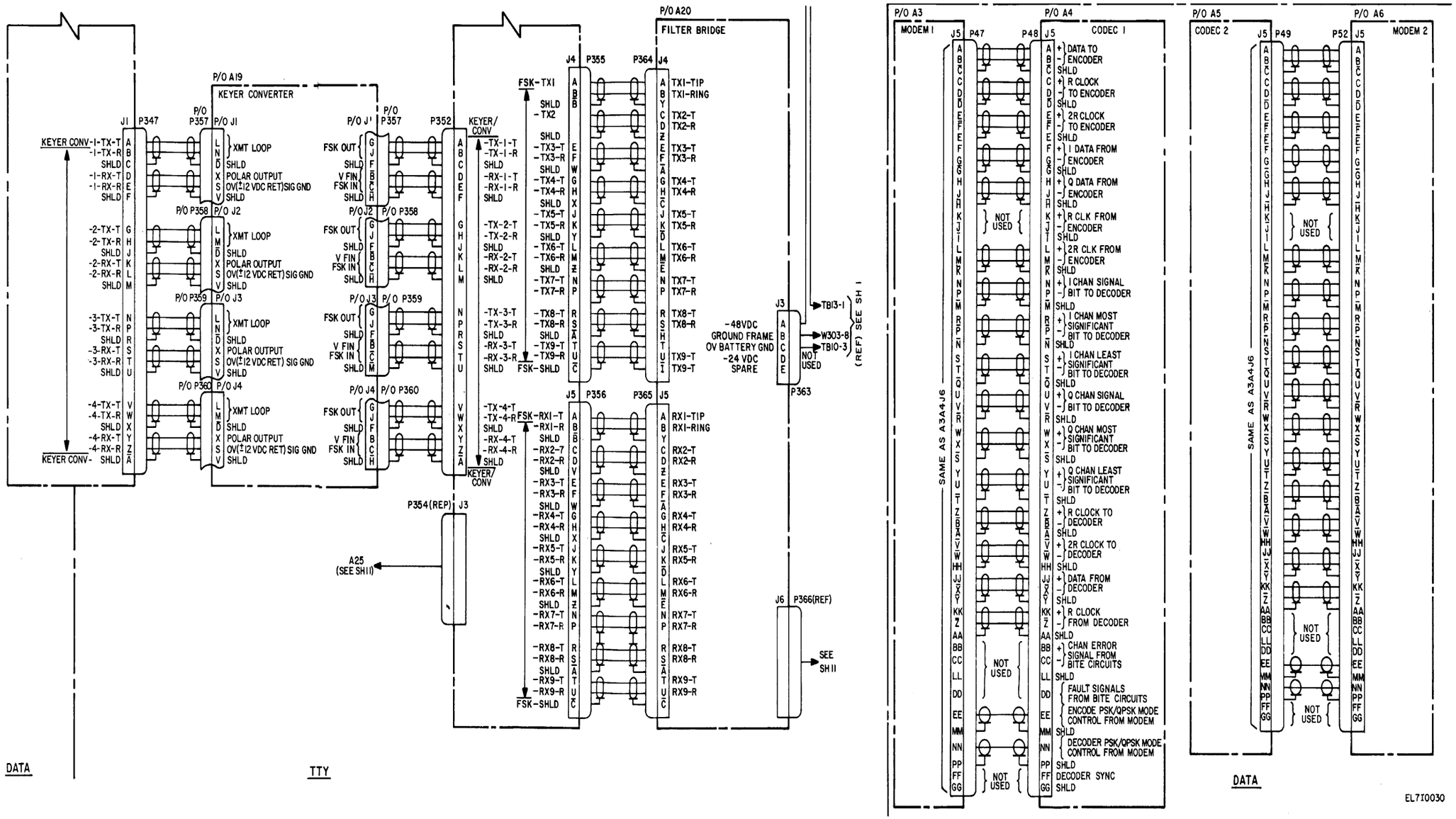


Figure FO-4(8). Communications Subsystem Interconnection Diagram (Sheet 8 of 12)

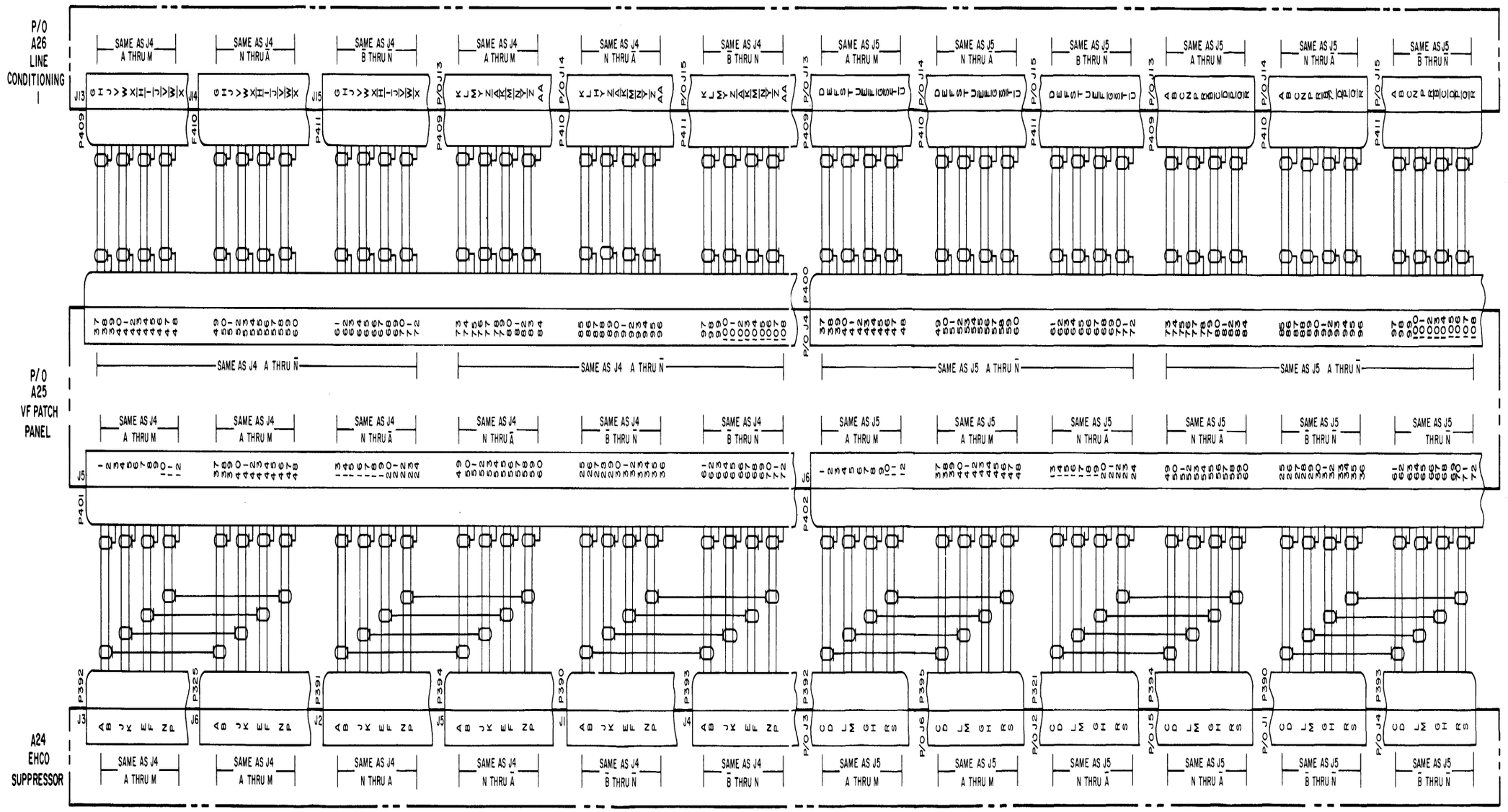


Figure FO-4(9). Communications Subsystem Interconnection Diagram (Sheet 9 of 12)

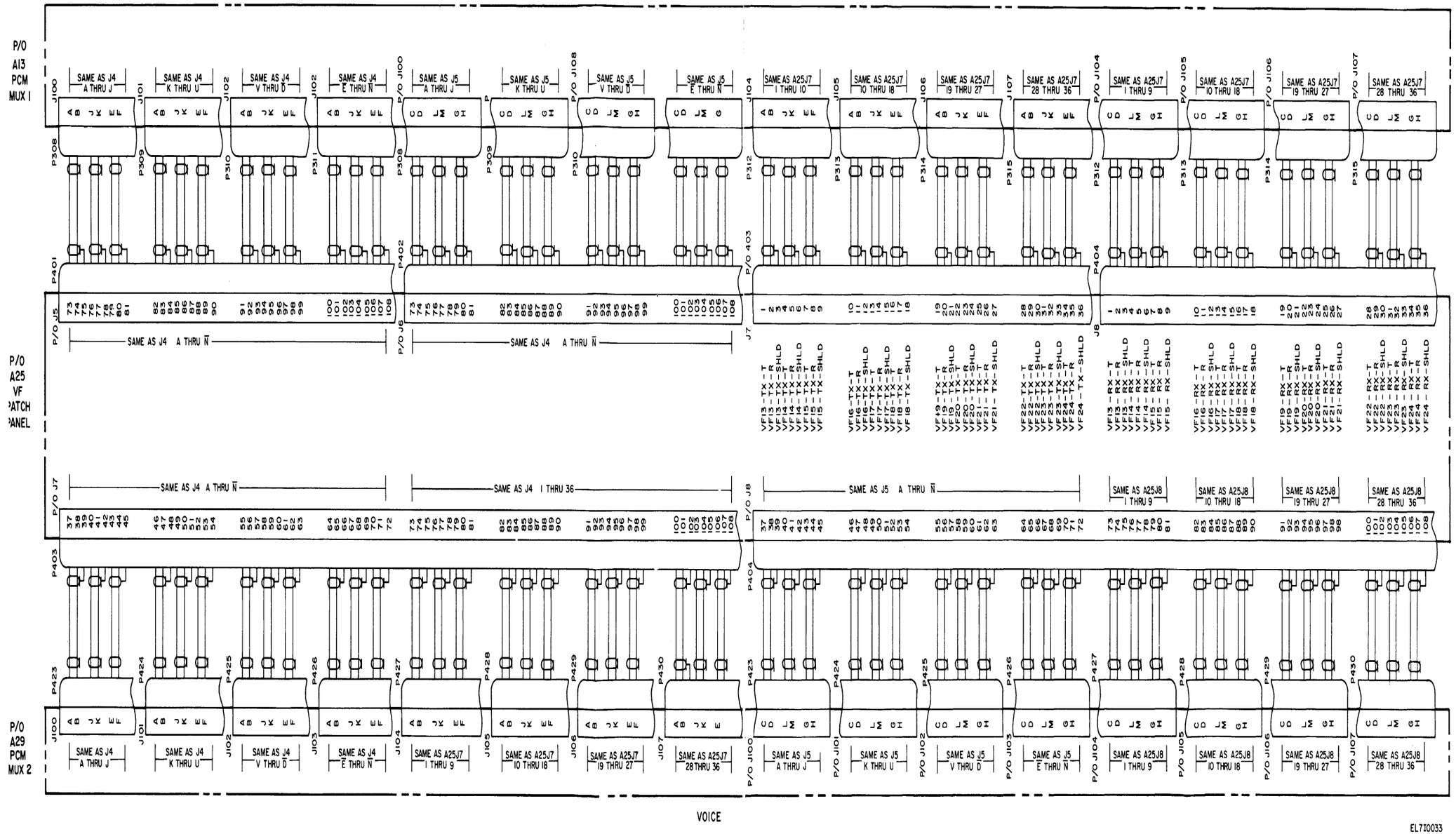


Figure FO-4(10). Communications Subsystem Interconnection Diagram (Sheet 10 of 12)

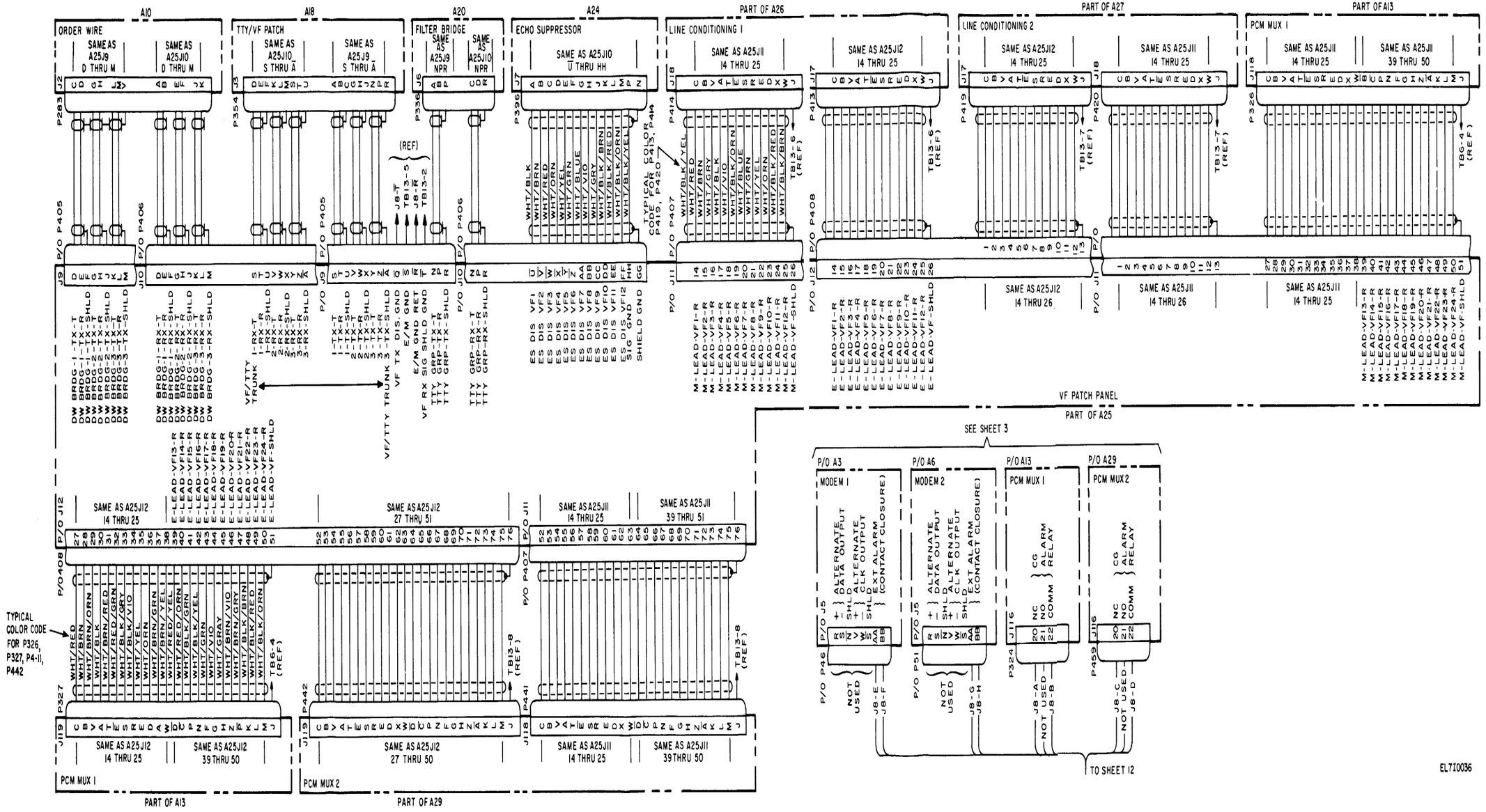


Figure FO-4(5). Communications Subsystem Interconnection Diagram (Sheet 5 of 12)

TM 11-5895-1123-34

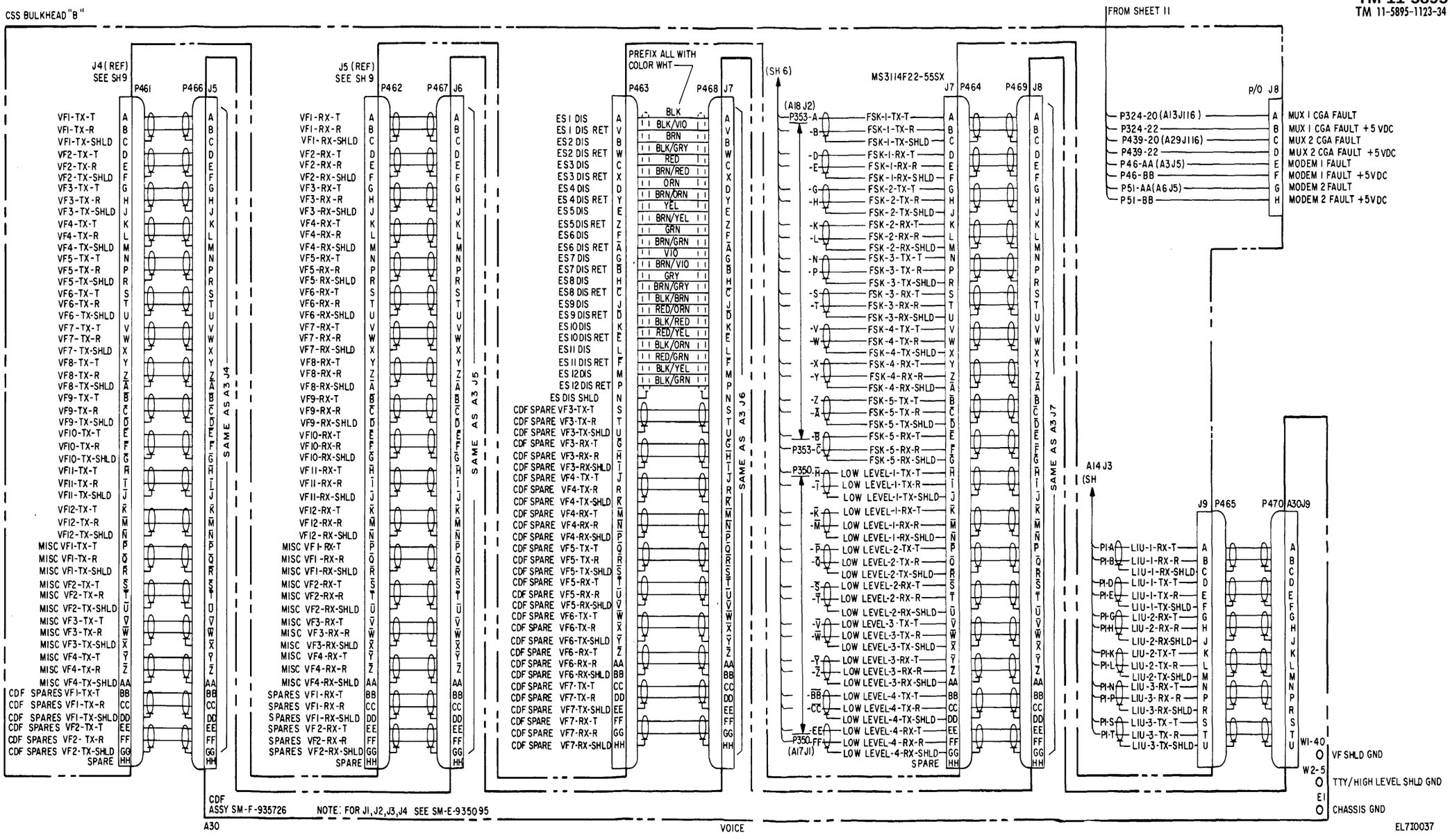


Figure FO-4(12). Communications Subsystem Interconnection Diagram (Sheet 12 of 12)

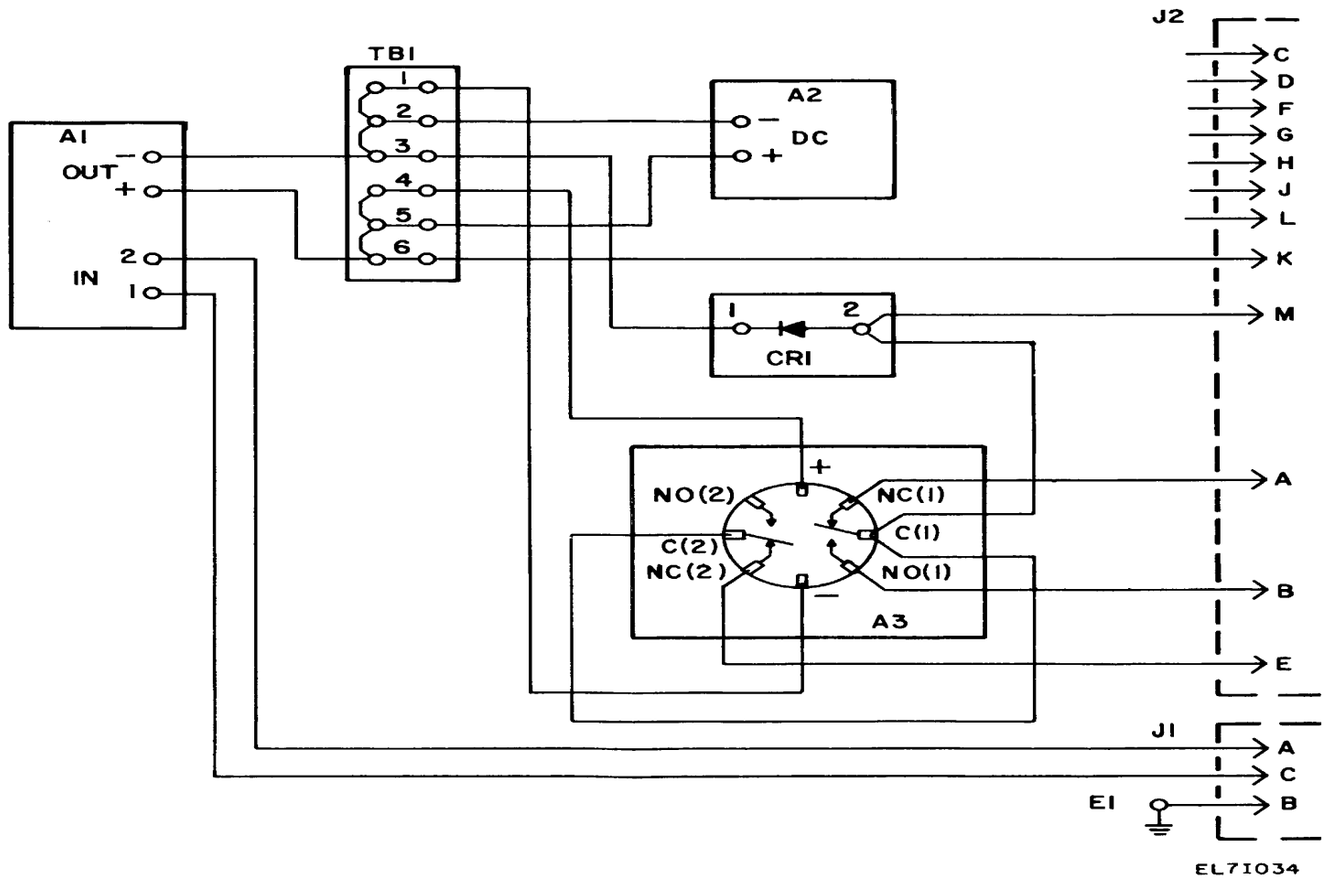


Figure FO-5. -48 Vdc Power Supply Wiring Diagram

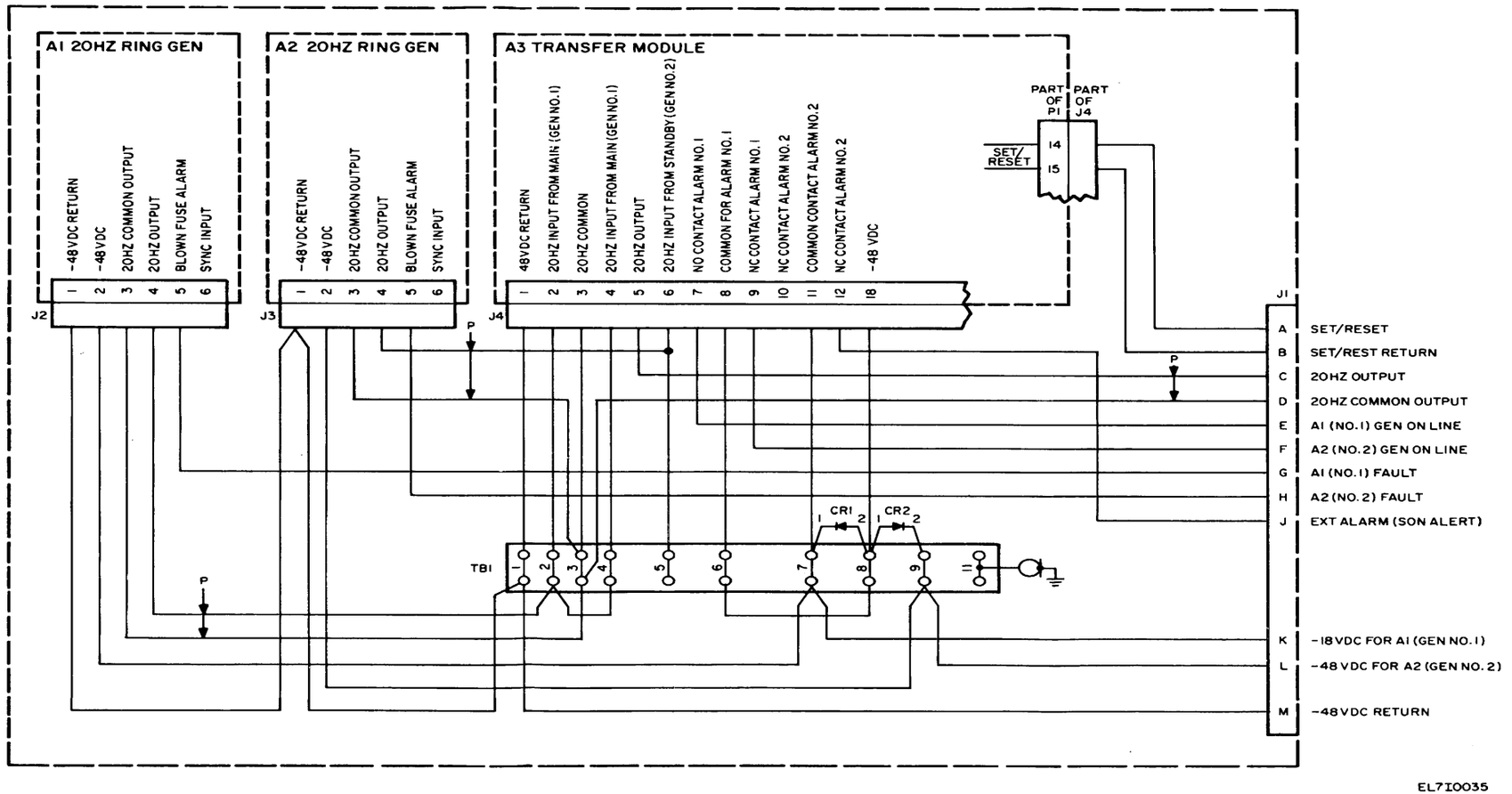


Figure FO-6. 20-Hz Ringing Supply Connection Diagram.

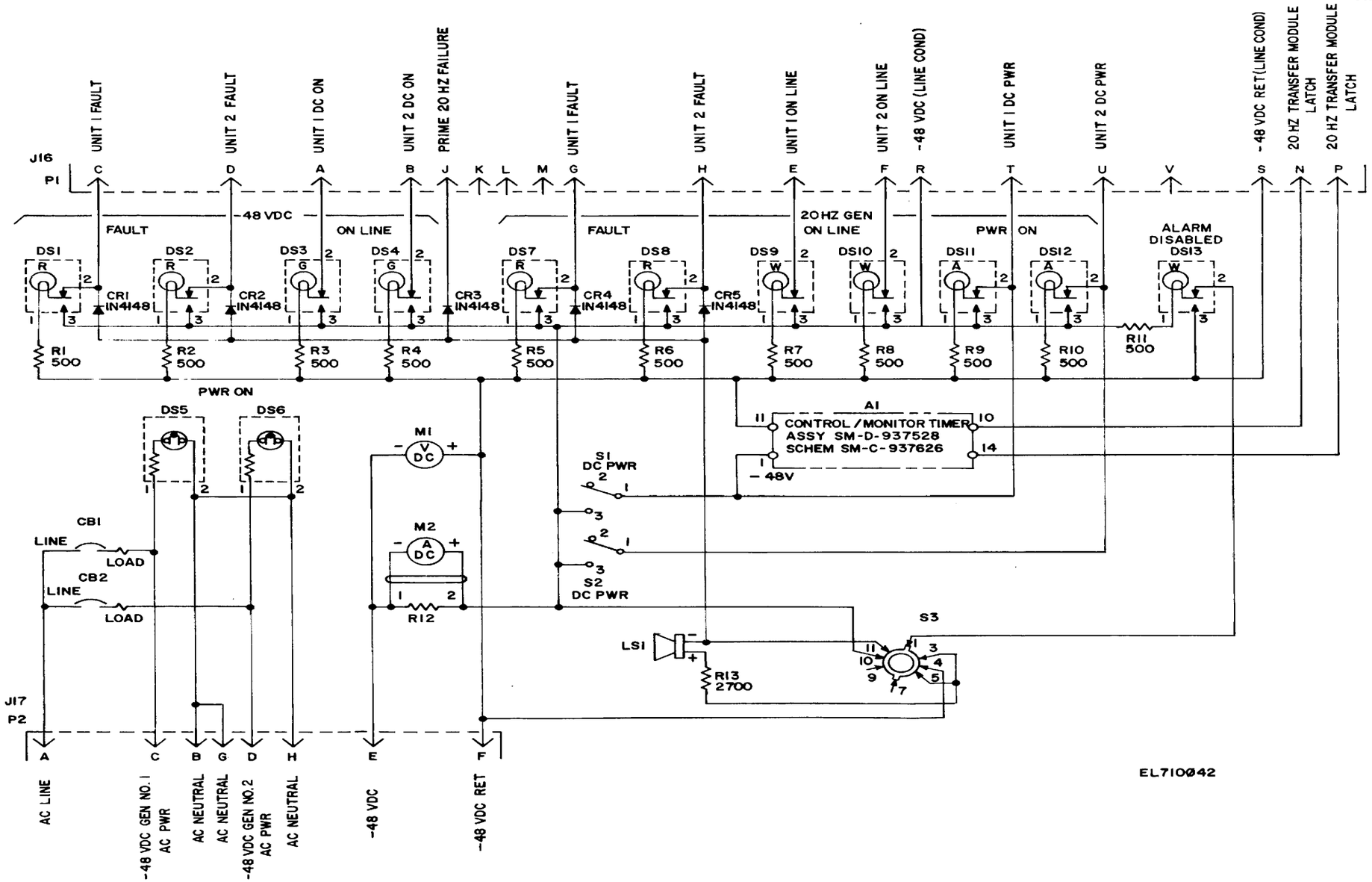


Figure FO-7. Control Monitor-48v/20 Assembly.

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS • ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

PIN 052858-000