ARMY
NAVY
AIR FORCE

TM 11-5895-907-34
NAVELEX 0967-LP-546-6240
TO 31R5-2G-162

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

STATUS AND ALARM EQUIPMENT
INCLUDING:
POWER SUPPLY ASSEMBLY PP-6958/G (NSN 5820-00-134-1447);
CONTROL-MONITOR C-9861/G (NSN 5895-01-017-9299);
CONTROL-MONITOR C-9854/G (NSN 5895-01-020-2837);
INDICATOR CHANNEL FREQUENCY ID-2030/G (NSN 5895-01-020-2842);
CONTROL-INDICATOR ID-2028/G (NSN 5895-01-007-9449); AND
CONTROL-INDICATOR ID-2033/G (NSN 5895-01-011-7333)
SATELLITE COMMUNICATION TERMINALS
AN/FSC-78(V) AND AN/FSC-79

This copy is a reprint which includes current pages from Changes 1 through 4.

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
AUGUST 1978

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. Front panel circuit breakers do not completely isolate the 120 V ac, this voltage still exists as a potential hazard at the circuit breaker input terminals. Do not take chances.

TM 11-5895-907-34
NAVELEX 0967-LP-546-6244
TO 31R5-2G-162
C4

Change No. 4

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
Washington, DC, 1 August 1992

Direct Support and General Support Maintenance Manual

STATUS AND ALARM EQUIPMENT, INCLUDING:

POWER SUPPLY ASSEMBLY PP-6958/G (NSN 5820-00-134-1447) (EIC: N/A)
CONTROL-MONITOR C-9861/G (NSN 5895-01-017-9299) (EIC: N/A)
CONTROL-MONITOR C-9854/G (NSN 5895-01-020-2837) (EIC: N/A)
INDICATOR CHANNEL FREQUENCY ID-2330/G (NSN 5895-01-020-2842) (EIC: N/A)
CONTROL-INDICATOR ID-2028/G (NSN 5895-01-007-9449) (EIC: N/A)
CONTROL-INDICATOR ID-2033/G (NSN 5895-01-011-7333) (EIC: N/A)
INTERFACE BUS EXTENDER (NSN 5999-01-178-5095) (EIC: N/A)
MULTIPROGRAMMER 6942A (NSN 5895-01-169-9224) (EIC: N/A)
SATELLITE COMMUNICATION TERMINAL
AN/FSC-78(VO, AN/FSC-78A(VO, AN/FSC-79, AN/GSC-39(V)1,
AN/GSC-39A(V)1, AN/GSC-39(V), AN/GSC-39A(V)2

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None	1-16.1/(1-16.2 blank)
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2-9 and 2-10	2-9 and 2-10
None	2-10.1 and 2-10.2
2-11 through 2-14	2-11 through 2-14
2-19 through 2-22	2-19 through 2-22
3-1 and 3-2	3-1 and 3-2
None	3-161 through 3-172
Index 3 through Index 15/(lndex 16 blank)	Index 3 through Index 15/(lndex 16 blank)
None	FO-2.1

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Change No. 3

DEPARTMENTS OF THE ARMY,
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Washington, DC, 15 January 1986

Direct Support and General Support
Maintenance Manual
STATUS AND ALARM EQUIPMENT
INCLUDING:
POWER SUPPLY ASSEMBLY PP-6958/G; (NSN 5820-00-134-1447)
CONTROL-MONITOR C-9861/G; (NSN 5895-01-017-9299)
CONTROL-MONITOR C-9854/G; (NSN 5895-01-020-2837)
INDICATOR CHANNEL FREQUENCY ID-2030/G; (NSN 5895-01-020-2842)
CONTROL-INDICATOR ID-2028/G; (NSN 5895-01-007-9449)
CONTROL-INDICATOR ID-2033/G; (NSN 5895-01-011-7333)
FOR
SATELLITE COMMUNICATION TERMINALS
AN/FSC-78(V), AN/FSC-78A(V), AN/FSC-79, AN/GSC-39(V)1, AN/GSC-39A(V)1,
AN/GSC-39(V)2 AND AN/GSC-39A(V)2

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1-i through 14	1-1 through 1-4
2-1 and 2-2	2-1, 2-2, and 2-2.1/(2-2.2 blank)
3-41 and 3-42	3-41, 3-42, and 3-42.1/(3-42.2 blank)
3-45 through 3-48	3-45 through 3-48, and 3-48.1/3-48.2 blank)
FO-2	FO-2
FO-8 (sheets 9 of 13, 11 of 13, and 12 of 13)	FO-8 (sheets 9 of 13, 11 of 13, and 12 of 13)
FO-9 (sheet 4 of 12)	FO-9 (sheet 4 of 12)

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CHANGE }
No. 2

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE
Washington, DC, Aug. 20,1984

Direct Support and General Support
Maintenance Manual
STATUS AND ALARM EQUIPMENT
INCLUDING:
POWER SUPPLY ASSEMBLY PP-6958/G; (NSN 5820-00-134-1447)
CONTROL-MONITOR C-9861/G; (NSN 5895-01-017-9299)
CONTROL-MONITOR C-9854/G; (NSN 5895-01-020-2837)
INDICATOR CHANNEL FREQUENCY ID-2030/G; (NSN 5895-01-020-2842)
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CONTROL-INDICATOR ID-2033/G; (NSN 5895-01-011-7333)
FOR
SATELLITE COMMUNICATION TERMINALS
AN/FSC-78(V), AN/FSC-79 AND AN/FSC-39(V)

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2-13 and 2-14	2-13 and 2-14
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2-45 through 2-48	2-45 through 2-48
2-55/(2-56 blank)	2-55/(2-56 blank)
3-117 and 3-118	3-117 and 3-118
3-155 and 3-156	3-155 and 3-156
Index 1 and 2	Index I and 2
Index 5 and 6	Index 5 and 6
Index 11 and 12	Index 11 and 12
Index 15/(16 blank)	Index 15/(16 blank)
FO-2	FO-2
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FO-7	FO-7
FO-8 (Sheet 3 of 13)	FO-8 (Sheet 3 of 13)
FO-8 (Sheet 4 of 13)	FO-8 (Sheet 4 of 13)
FO-8 (Sheet 10 of 13)	FO-8 (Sheet 10 of 13)
FO-8 (Sheet 13 of 13)	FO-8 (Sheet 13 of 13)
FO-9 (Sheet 2 of 121	FO-9 (Sheet 2 of 12)
FO-9 (Sheet 3 of 12)	FO-9 (Sheet 3 of 12)
FO-9 (Sheet 5 of 12)	FO-9 (Sheet 5 of 12)
FO-11 (Sheet 5 of 61	FO-11 (Sheet 5 of 6)
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FO-18	FO-18

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CHANGE NO. 1

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
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DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
STATUS AND ALARM EQUIPMENT
INCLUDING:
POWER SUPPLY ASSEMBLY PP6958/0: (NSN 5820-00-13-1447)
CONTROL-MONITOR C-.961/G; (NSN 5895-01-017-9299)
CONTROL-MONITOR C-9854/G; (NSN 5895-01-020-2837)
INDICATOR CHANNEL FREQUENCY ID.2030/G; (NSN 5895-01-020-2842)
CONTROL-INDICATOR ID-2028/1: (NSN 5895-01-007-9449)
CONTROL-INDICATOR ID-2033/G; (NSN 5895-01-011-7333)
FOR
SATELLITE COMMUNICATION TERMINALS
AN/FSC-78(V), AN/FSC-79 AND AN/GSC-39(V)

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Technical Manual
No. 11-5895-907-34
Technical Manual
NAVELEX 0967-LP-546-6240
Technical Order
No. 31R5-2G-162

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE

Washington, DC, 11 August 1978

Direct Support and General Support Maintenance Manual

STATUS AND ALARM EQUIPMENT, INCLUDING:

POWER SUPPLY ASSEMBLY PP-6958/G (NSN 5820-00-134-1447) (EIC: N/A)
CONTROL-MONITOR C-9861/G (NSN 5895-01-017-9299) (EIC: N/A)
CONTROL-MONITOR C-9854/G (NSN 5895-01-020-2837) (EIC: N/A)
INDICATOR CHANNEL FREQUENCY ID-2330/G (NSN 5895-01-020-2842) (EIC: N/A)
CONTROL-INDICATOR ID-2028/G (NSN 5895-01-007-9449) (EIC: N/A)
CONTROL-INDICATOR ID-2033/G (NSN 5895-01-011-7333) (EIC: N/A)
INTERFACE BUS EXTENDER (NSN 5999-01-178-5095) (EIC: N/A)
MULTIPROGRAMMER 6942A (NSN 5895-01-169-9224) (EIC: N/A)
SATELLITE COMMUNICATION TERMINAL
AN/FSC-78(VO, AN/FSC-78A(VO, AN/FSC-79, AN/GSC-39(V)1,
AN/GSC-39A(V)1, AN/GSC-39(V), AN/GSC-39A(V)2

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 back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LM-LT, Fort Monmouth, New Jersey 07703-5007

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, TO 00-5-1. Forward direct to prime ALC/MST.

For Navy, mail comments to the Commander, Space and Naval Warfare Systems Command, ATTN: SPAWAR 8122, Washington, DC 20363-5100.

In either case a reply will be furnished direct to you.

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CHAPTER 1
INTRODUCTION
SECTION I. GENERAL

1-1. Scope. This manual contains direct and general support instructions for the status and alarm equipment in Satellite Communication Terminals AN/FSC-78(V) AN/FSC-79, AN/GSC-39(V)1, AN/GSC-39(V)2 AN/FSC-78A(V), AN/GSC-39A(V)1, and AN/GSC-39A(V)2. Information for the AN/FSC-78(V) AN/GSC-39(V)1, and AN/GSC-39(V)2 is identical. Information for the AN/FSC-78A(V), AN/GSC-39A(V)1 and AN/GSC-39A(V)2 is identical. Except when specified information for the AN/FSC-78A(V) is the same as for the AN/FSC-78(V). Included are discussions on how the equipment functions and procedures for troubleshooting testing, and adjusting the equipment. Maintenance instructions are included for repairing the equipment and for replacing specified maintenance parts. Also included are list of tools, materials, and test equipment required for direct and general support maintenance.

1-2. Consolidated Index of Army Publications and Blank Forms. Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-3. Maintenance Forms, Records, and Reports.

a. Report of Maintenance and Unsatisfactory Equipment Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update. Air Force personnel will use AFR 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting. Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) IAW OPNAVINST 4790.2, Vol 3 and unsatisfactory material/conditions (UR) IAW OPNAVINST 4790.2, Vol 2, chapter 17.

b. Reporting of Item and Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/SECNAVINST 4355.18/AFR 400-54/MCO 4430.3J.

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

1-4. Reporting Equipment Improvement Recommendations (EIR).

a. Army. 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 or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ED-PH, Fort Monmouth, New Jersey 07703-5007. We'll send you a reply.

b. Air Force. Air Force personnel are encouraged to submit EIR's in accordance with AFR 900-4.

c. Navy. Navy personnel are encouraged to submit EIR's through their local Beneficial Suggestion Program.

1-4.1.Administrative Storage. Administrative storage of equipment issued to and used by Army activities will have Preventive Maintenance Checks and Services (PMCS) performed before storing. When removing the equipment from administrative storage, the PMCS checks should be performed to assure operational readiness.

1-4.2.Destruction of Army Electronics Materiel. Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

SECTION II. DESCRIPTION OF DATA

1-5. General Description. The status and alarm equipment is part of the monitoring and switching function described in the following technical manuals:

TM 11-5895-898-12-2	Operator and Organizational Maintenance Manual for Satellite Communication Terminal AN/FSC-78(V) (NSN 5895-01-007-9401)
TM 11-5895-898-12-1	Operator and Organizational Maintenance Manual for Satellite Communication Terminal AN/FSC-78(V) (NSN 5895-01-007-9401).
TM 11-5895-899-12	Operator and Organizational Maintenance Manual for Satellite Communication

	Terminal AN/FSC-79 commands to (NSN-5895-01-007-9403).
TM 11-5895-1043-12	Operator and Organizational manual For Satellite Communication Terminal AN/GSC-39(V)2 (NSN-5895-01-070-6249)
TM 11-5895-1050-12	Operator and Organizational Maintenance Manual For Satellite Communications Terminal AN/GSC-39(V) (NSN-5895-10-070-5686)
TM 11-5895-358-14	Operator, Organizational, Direct Support and General Support Maintenance manual for Antenna Group OE-222/G OE-222/G (NSN-5895-01-076-9947)

***a. Purpose and Use**.* Status and alarm equipment recieves status signals from operational equipment, processes the signals, and provides a status display, visible alarms of subsystem malfunctions. The status and alarm equipment generates auto and manual selection commands to transmit and receive equipment for AN/FSC-79. The status alarm equipment generates auto and manual selection commands to transmit and receive equipment for AN/FSC-79. The status and alarm equipment generates auto and manual selection commands to transmit equipment and manual commands to receive equipment for AN/FSC-78(V). These commands switch standby equipment into operation and remove malfunctioning equipment from operation.

b. Status and Alarm Equipment for Satellite Communication Terminal AN/FSC-78(V). The status and alarm equipment for the AN/FSC-78(V) configuration is shown in figure 1-1, 1-1.1, and identified in table 1-1. Common names and reference designations listed are used throughout this manual. Descriptions of the assemblies included in the status and alarm equipment for the AN/FSC-78(V) configuration are provided in paragraphs 1-6 through 1-15 and paragraphs 1-10 and 1-18.

***c. Status and Alarm Equipment for Satellite Communication Terminal AN/FSC-79**.* The status and alarm equipment for the AN/FSC-79 configuration is shown in figure 1-1 and identified in table 1-2. Common names and reference designations listed are used throughout this manual. Assembly descriptions are provided in paragraphs 1-6 through 1-14 and paragraph 1-16.

Table 1-1. Status and Alarm Equipment for AN/FSC-78(V)

Ref des	Official nomenclature	Common name
Unit 15	Control-Monitor	System status logic unit rack
15A1	Electrical Equipment Rack	Rack
15A2	Connector Panel Assembly	Connector panel
15A3	Connector Panel Assembly	Connector panel
15A4	Power Supply Assembly PP-6958/G	Logic unit power supply
15A5	Control Monitor C-9861/G	System status logic unit
15A6, 15A9, 15A10	Channel Frequency Indicator ID-2030/G	Channel frequency indicator
15A7	Filter Assembly Panel	Filter
15A8	Interface Panel Assembly	Interface panel
15A11	Multiprogrammer Assembly HP6942A	Multiprogrammer
15A12	HP-IB Extender HP37203A	Interface bus extender
14A16	Fault and system staus panel	Control-indicator ID-2028/G
HTA-3A7	Waveguide switch control	Relay assembly
HTA-3S1	Waveguide switch	
HTA-3S2	Waveguide switch	

Table 1-2. Status and Alarm Equipment for AN/FSC-79

Ref des	Official nomenclature	Common name
Unit 15	Control-Monitor	System status logic unit rack
15A1	Electrical Equipment Rack	Rack
15A2	Connector Panel Assembly	Connector panel
15A3	Connector Panel Assembly	Connector panel
15A4	Power Supply Assembly PP-6958/G	Logic unit power supply
15A5	Control Monitor C-9854/G	System status logic unit
15A6	Channel Frequency Indicator ID-2030/G	Channel frequency indicator
15A7	Filter Assembly Panel	Filter
15A8	Interface Panel Assembly	Interface panel
15A9	Blank Panel	Blank panel
15A10	Blank Panel	Blank panel
14A16	Control-Indicator ID-2033/G	Fault and system status panel

1-6. System Status Logic Unit Rack, Unit 15 (fig 1-1). The system status logic unit rack consists of an electrical equipment rack, connector panels, power supplies logic unit, and channel frequency indicators. The rack receives and processes operational equipment status sign; that are sent to the fault and system status panel. The rack also receives equipment selection command signals from the fault and system status panel that are sent to the operational equipment.

1-7. Rack 15A1 (fig. 1-1). The rack houses assemblies of the system status logic unit rack.

1-8. Connector Panel 15A2 (fig. 1-2 and 1-2.1). The connector panel provides the interface between external signal cabling and equipment contained within the system status logic unit rack.

1-9. Connector Panel 15A3 (fig. 1-3). The connectors panel an interface for 120 V ac that enters the system status logic unit rack.

1-10. Logic Unit Power Supply 15A4 (fig. 1-4). The logic unit power supply provides power for biasing and logic operation to system status logic unit 15A5. The logic unit power supply assembly is mounted on slide rails and can be pulled out from the rack. Connector receptacles on the rear panel provide for connection of 120 V ac input and output cables. The logic unit power supply contains the power supply modules (PS1 and PS2). Front panel mounted voltmeters monitor the output of each power supply and lighted indicator lamps verify that the power supplies are operational.

1-11. System Status Logic Unit 15A5 (fig. 1-5). The system status logic unit of an AN/FSC-78(V) and an AN/FSC-79 are physically similar. The logic unit is mount Ed on slide rails and can be pulled out from the rack. Connector receptacles on the rear panel of the logic unit chassis provide for connection of power and signal input and signal output cables. The logic unit contains five plug-in logic circuit cards, two plug-in relay circuit cards, and a backplane (interface) assembly located behind the front panel. Access to the cards is provided by a swing-down, hinged door in the front panel. Each of the five circuit cards is marked with a letter to identify it. To simplify replacement, the extractor levers on each card are color coded to match the color coded circuit card guides of the circuit card assembly. Circuit cards D and E and also F and G are mounted together in pairs and interconnected with jumper cables near the front edge (extractor end) of the circuit cards. The circuit cards are arranged, from left to right, in the circuit card assembly as shown in table 1-3. The system status logic unit processes operational equipment status signals to produce status and alarm signals. These status signals are sent to fault and system panel 14A16. Equipment selection signals are also received from the fault and system status panel and sent to the operational equipment.

Table 1-3. System Status Logic Unit 15A5 Circuit Cards

Ref des	Position	Letter	Color
15A5A1	2	A	Black
15A5A2A1	3	D	Blue
15A5A2A2-	4	E	Orange
15A3A1	5	F	Gray
15A5A3A2	6	G	Yellow
15A5A4	7	Relay card R1	Red
15A5A5	8	Relay card R2	Red

1-12. Channel Frequency Indicator 15A6, 15A9, 15A10 (fig. 1-6). The system status logic unit rack, for the AN/FSC-78(V) terminal, contains three channel frequency indicator panels (15A6, 15A9, 15A10). The system status logic unit rack, for the AN/FSC-79 terminal, has only on channel frequency indicator panel (15A6). In the AN/FSC-79 configuration blank panels are installed is unused locations A9 and A10. Channel frequency indicator panels in both terminals are identical. Each panel has three separate, seven-segment, thumbwheel switches. Each seven segment switch is used to select a seven numeral channel frequency. The numerals displayed on the switch indicate the channel frequency directly in kilohertz. The electrical output from each segment, however, is a parallel, four bit binary coded decimal (bcd) word. The seven bcd words representing the channel frequency, are presently routed only to the interface panel, ut are intended for use by scanner formatter unit to be installed at a future date. Connector receptacles on the rear of each seven segment switch provide for connection of power input and signal output cables. The channel frequency indicator panel is secured to the electrical equipment rack by four front panel fastening; screws. To access the rear panel connectors and cables, these, screws are loosened and the panel assembly is lifted out.

1-13. Filter 15A7 (fig. 1-3). The filter allows air ventilation within system status logic unit rack. The filter has two honeycomb type cleanable air filters fastened to the panel by mounting bolts.

1-14. interface Panel 15A8 (fig. 1-7). The interface panel provides electrical interconnections between equip-ment mounted in the system status unit rack and a future scanner formatter. Access to the interface panel is through the hinged door on the right-hand side of the system status logic unit rack.

1-14.1. Multiprogrammer 15A11 (fig. 1-1.1). The multiprogrammer of an AN/FSC-78(V) contains an HP-IB interface board, transmission system board, CPU/ROM board, ROM board, relay output card, analog-to-digital converter card, three digital input/analog comparator cards, and five internal power supplies. The ac power module, transmission system board, HP-IB interface board, and the I/O cards can be accessed from the back panel of the multiprogrammer. The multiprogrammer is a computer.controlled scanner for integrating the status of station equipments and detecting various alarm conditions for a user interface. The multiprogrammer also obtains the power amplifier 1 and 2 power status, and antenna power status at the feed.

1-14.2 Interface Bus Extender Assembly 15A12 (fig. 1-1.1). The interface bus extender assembly of an AN/FSC-78(V) provides the data bus interface between the multiprogrammer and a user interface. The interface bus extender also provides for the conversion of parallel-to.serial and serial-to-parallel data, and amplification of the signal between the multiprogrammer and a user interface. The interface bus extender converts the parallel data into a serial bit stream and transmits this data (maximum distance 1000 meters) to the user where it is received by use of another interface bus extender and converted back to parallel format for processing by the user.

1-15. Fault and System Panel 14A16, for AN/FSC-78(V) (fig. 1-8). The fault and system status panel for the AN/FSC 78(V) is mounted in Communication Control Console OJ-356/G (control console, unit 14). The chassis of the fault and system status panel is mounted on slide rails and can be pulled outward from the front of the control console. Connector receptacles on the rear of the chassis provide for connection of power and signal input and signal output cables. The front panel is characterized by rows of push switch assemblies and lighted indicators. Internal 28 V dc power supply PS 1 furnishes lamp operating power. The fault and system status panel provides visual display of operational equipment status, audible fault alarms, and manual switch selection of transmit and receive equipment. Visual status of monitored equipment is indicated by the color of the lighted indicator. The major fault STATUS SUMMARY indicator lights red and the minor fault STATUS SUMMARY indicator lights amber. Status of an individual transmit or receive operational unit is sig-nified by the color of the lighted indicator, for the following conditions:

Status	Indicator color
Online	Green
Standby	Amber
Fault	Red
Maintenance	Blue

Major and minor fault visual indications are accompanied by an audible alarm; minor audible alarm is a steady tone, major audible alarm is a pulsating tone. Table 1-4 lists fault and system status indicators and the color(s) of each indicator.

Table 1-4. Fault and System Status Indicators for AN/FSC-78(V)

Indicator	Color(s)
POWER AMPLIFIER MINOR	Amber
RECEIVER GAIN ALERT	Amber
WAVEGUIDE PRESSURE	Amber
SYSTEM NOISE TEMP	Amber
IPA CROSS PATCH	Amber
RGMU	Amber
TRANSMIT DISABLE	Red
OUTPUT POWER ALERT	Red
CLM	Red
UP CONVERTER	Red
DOWN CONVERTER	Red
FULLY AVAILABLE	Green
MAJOR FAULT/MINOR FAULT	Red, amber
AUTOTRACK DROPOUT/DISABLE	Red, amber
ANTENNA	Red, amber
FREQUENCY STANDARDS	Red, amber
CARRIER LEVEL ALERT	Red, amber
TRACKING RECEIVERS	Red, amber
CONVERTER POWER SUPPLIES	Red, amber
UNIT 13	Red
TRANSMIT IFLA 1, 2	Green, amber, red, blue
POWER AMPLIFIERS PA1, PA2	Green, amber, red, blue
RECEIVE IFLA 1, 2	Green, amber, red, blue
PARAMPS 1, 2	Green, amber, red, blue
AUTO/MANUAL	White
COMBINE	White

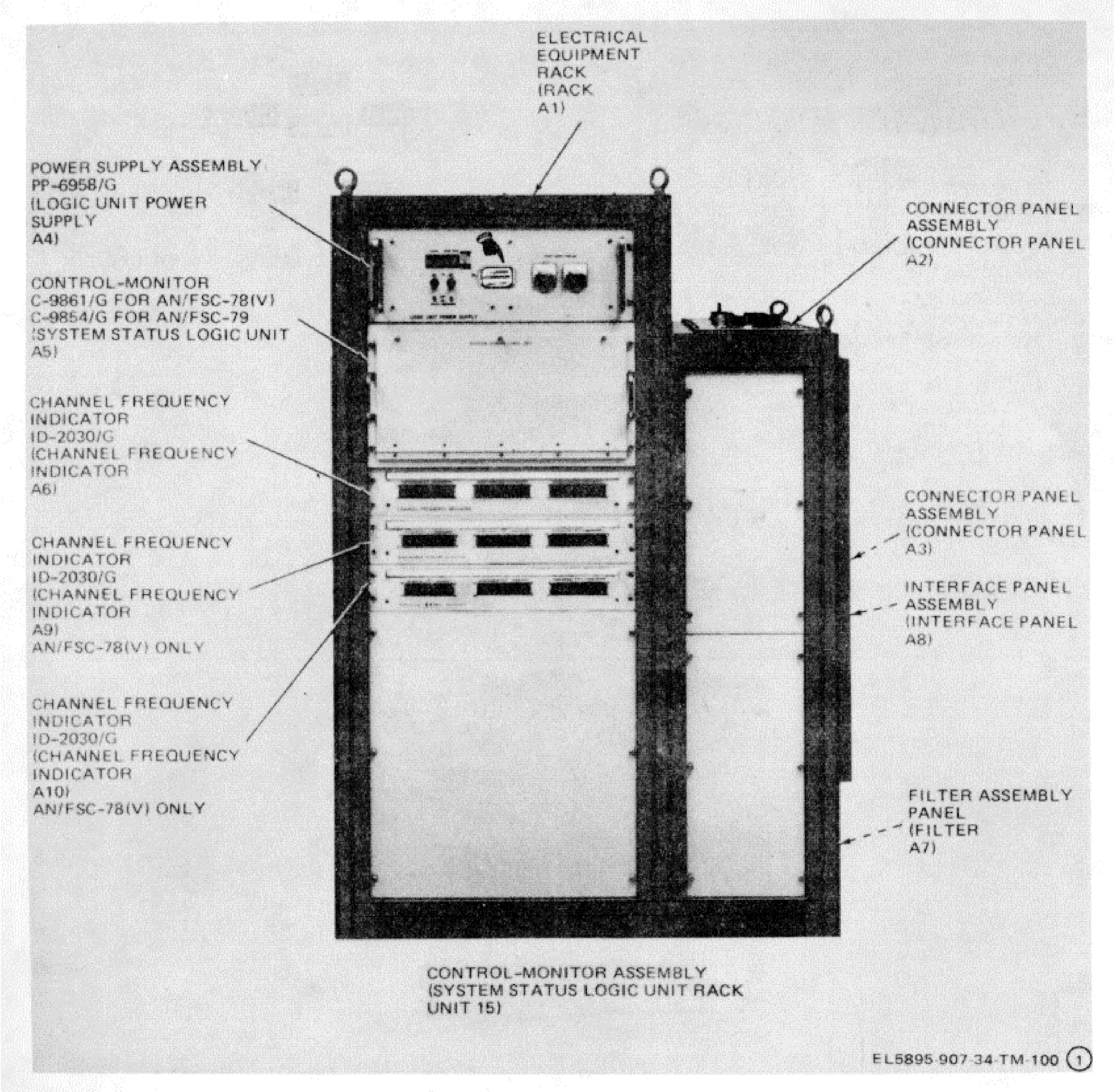
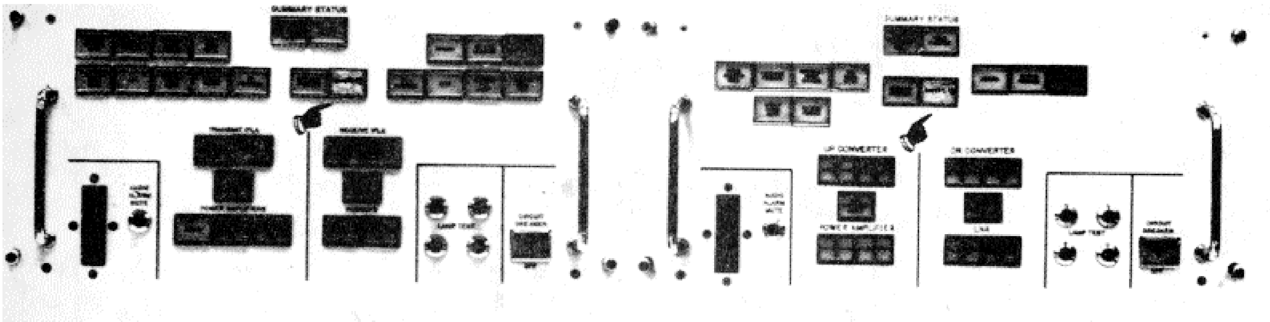


Figure 1-1. Status and alarm equipment (sheet 1 of 2).



CONTROL INDICATOR ID-2028/G
(FAULT AND SYSTEM STATUS PANEL 14A16)
FOR AN/FSC-78(V)

CONTROL INDICATOR ID-2033/G
(FAULT AND SYSTEM STATUS PANEL 15A16
FOR AN/FSC-79

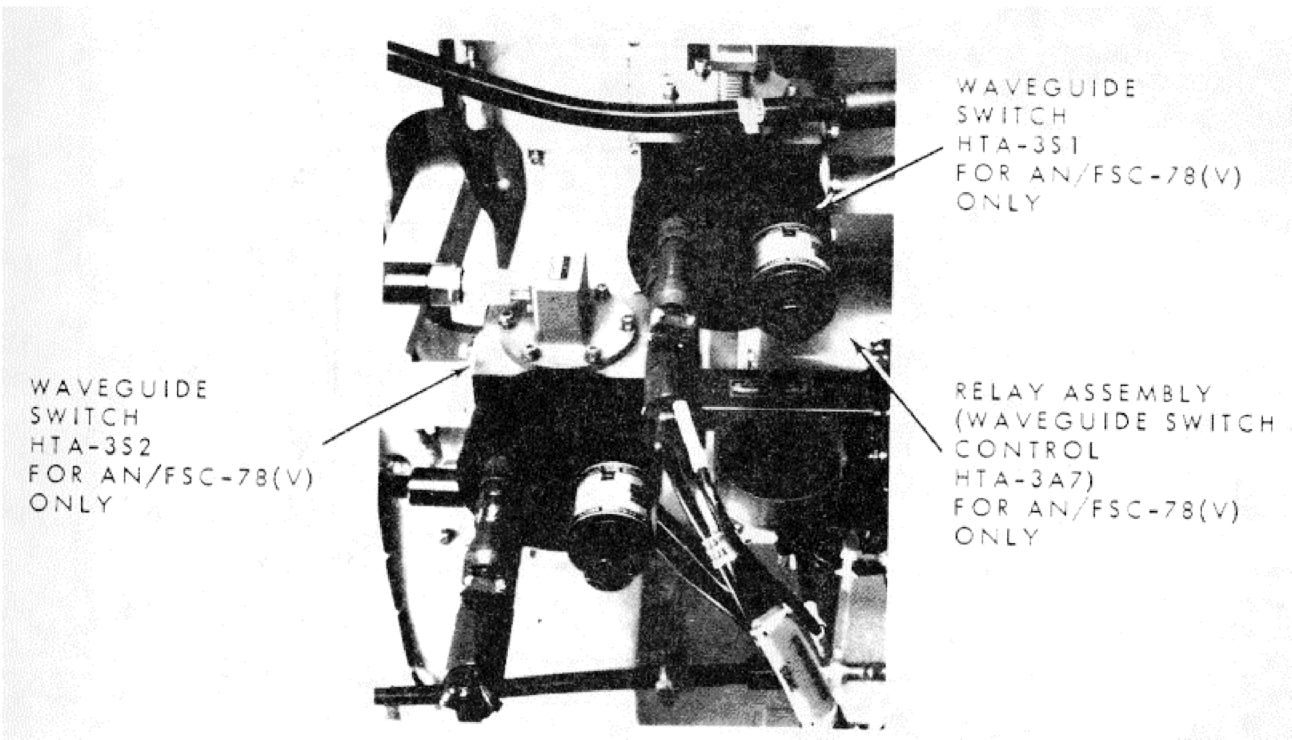
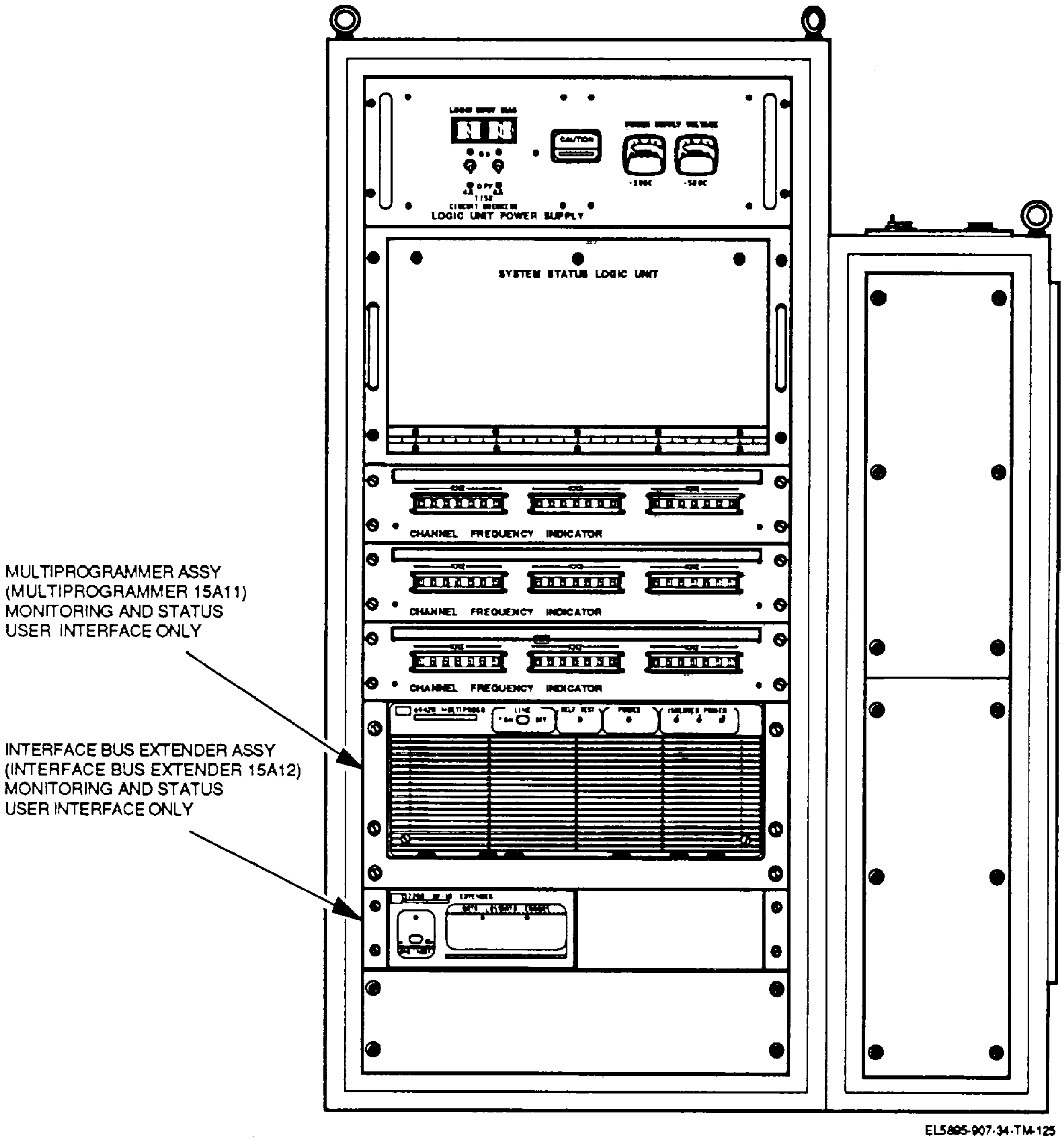
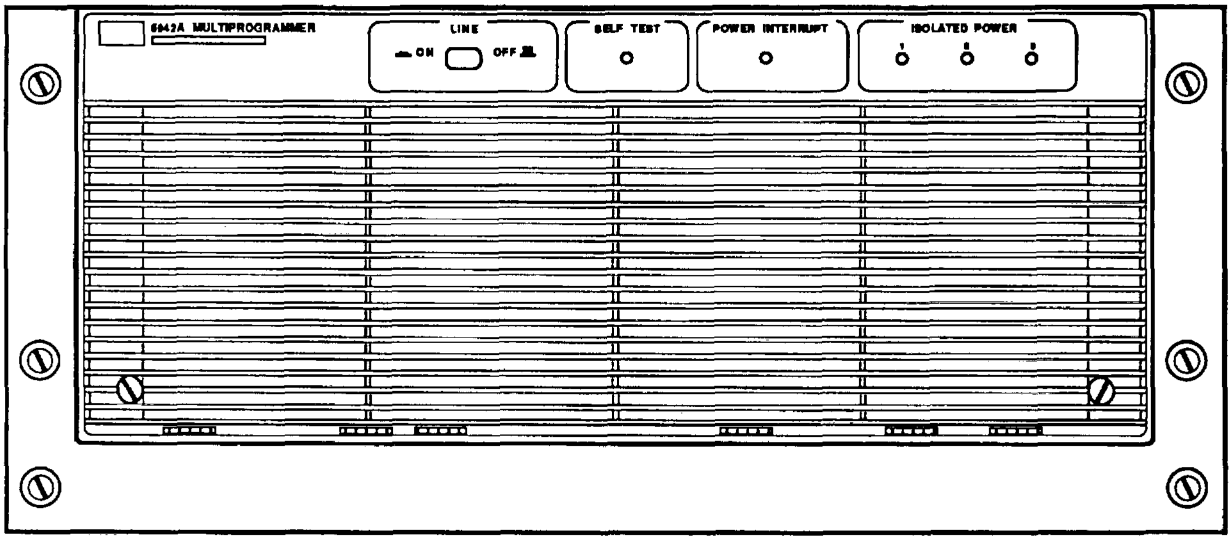


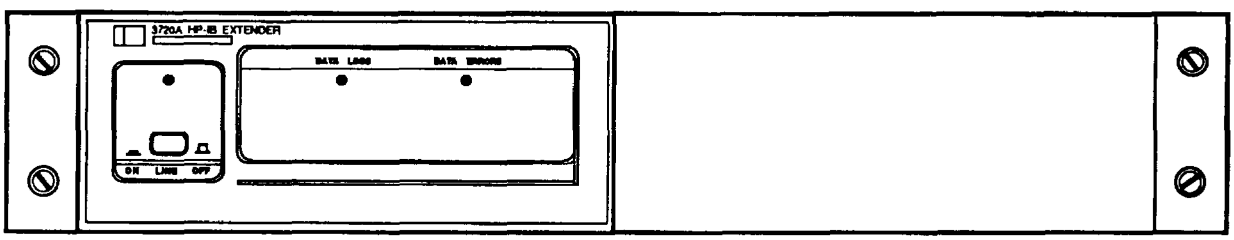
Figure 1-1. Status and alarm equipment (sheet 2 of 2).



■ *Figure 1-1.1. Status and Alarm Equipment for a monitoring and status user interface(sheet 1of 2)*



MULTIPROGRAMMER ASSEMBLY (MULTIPROGRAMMER 15A11) FOR
MONITORING AND STATUS USER INTERFACE



INTERFACE BUS EXTENDER (INTERFACE BUS EXTENDER ASSEMBLY 15A12)
FOR A MONITORING AND STATUS USER INTERFACE

EL5895-907-34-TM-126

Figure 1-1.1 Status and alarm equipment for a monitoring and status user interface(sheet 2 of 2) ■

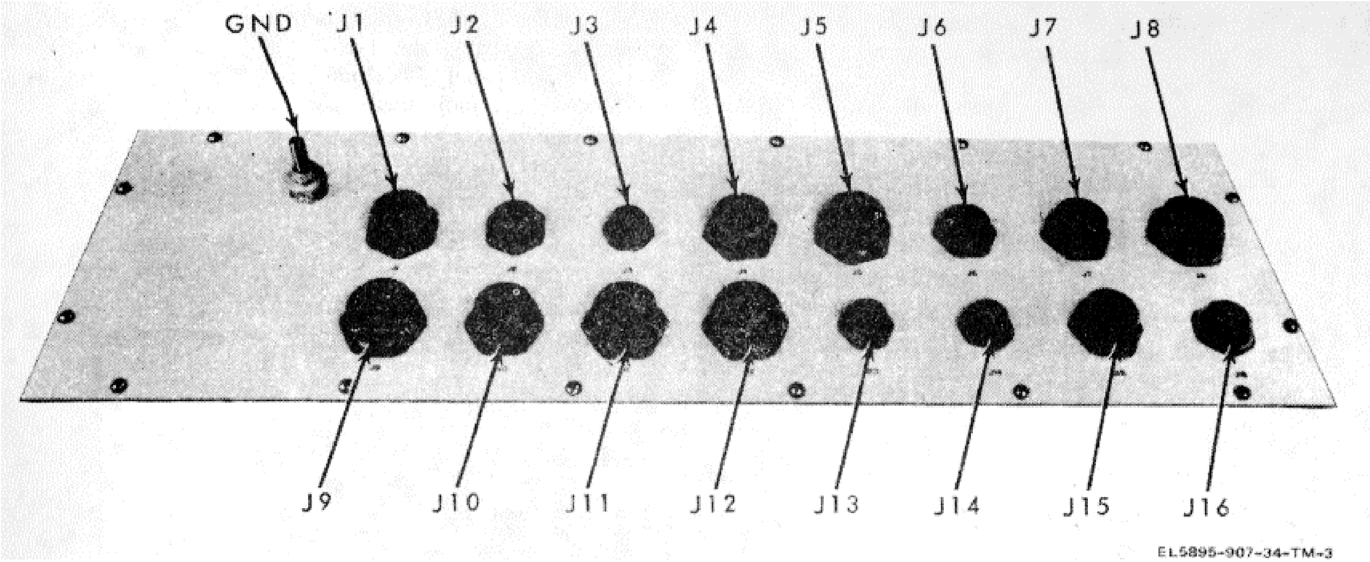
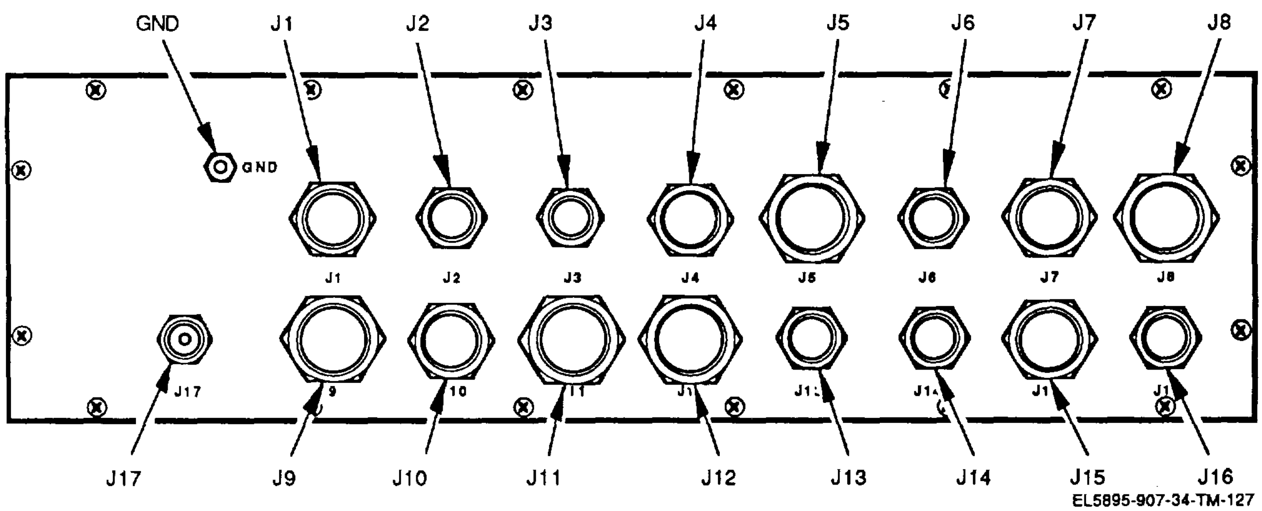


Figure 1-2. Connector panel 15A2



■ *Figure 1-2.1. Connector panel 15A2 for a monitoring and status user interface.*

1-16. Fault and System Status Panel 14A16 for AN/FSC-79 (fig. 1-9). AN/FSC-78(V) fault and system status panel for AN/FSC-79 is mounted in Communication Control Console OF-356/G(control console, unit 14) and is descriptively similar to AN/FSC-78(V) fault and system panel (described in paragraph 1-15). Table 1-5 lists fault and system status panel indicators for the AN/FSC-79 and the color(s) of each indicator.

Table 1-5. Fault and System Status Indicators for AN/FSC-79

Indicator	Color(s)
POWER AMPLIFIER MINOR	Amber
WAVEGUIDE PRESSURE	Amber
IPA CROSS PATCH	Amber
OUTPUT POWER ALERT	Red
TRANSMIT DISABLE	Red
FULLY AVAILABLE	Green
MAJOR FAULT/MINOR FAULT	Red, amber
AUTOTRACK DROPOUT/DISABLE	Red, amber
ANTENNA	Red, amber
FREQUENCY STANDARDS	Red, amber
TRACKING RECEIVERS	Red, amber
CONVERTER POWER SUPPLIES	Red, amber
FREQUENCY STANDARDS	
PWR SUPPLY	Red, amber
DN CONVERTER 1, 2	Green, amber, red, blue
UP CONVERTER 1, 2	Green, amber, red, blue
POWER AMPLIFIER 1, 2	Green, amber, red, blue
LNA 1, 2	Green, amber, red, blue
AUTO/MANUAL	White

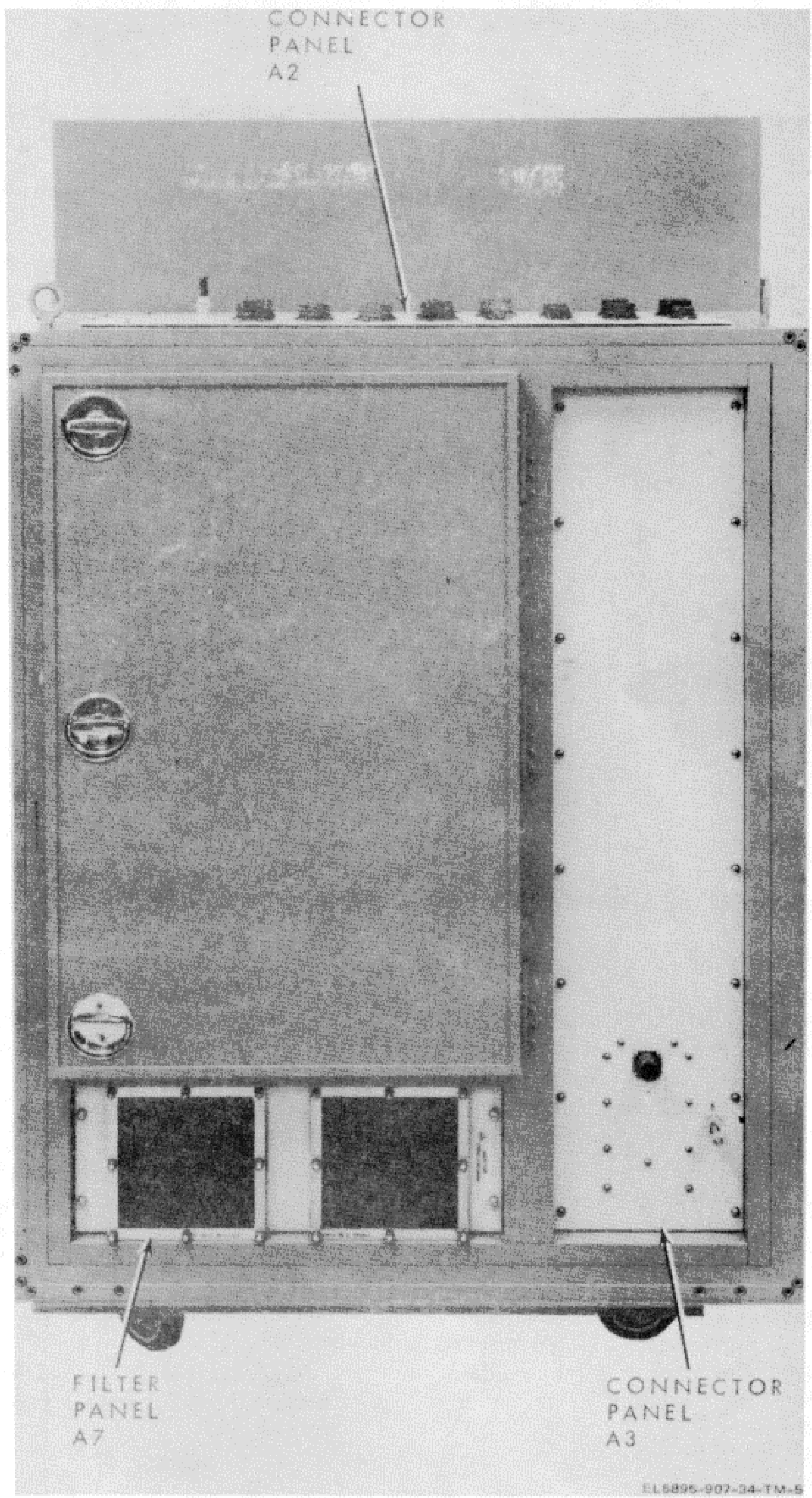


Figure 1-3. Connector panel 15A3 and filter panel 15A7.

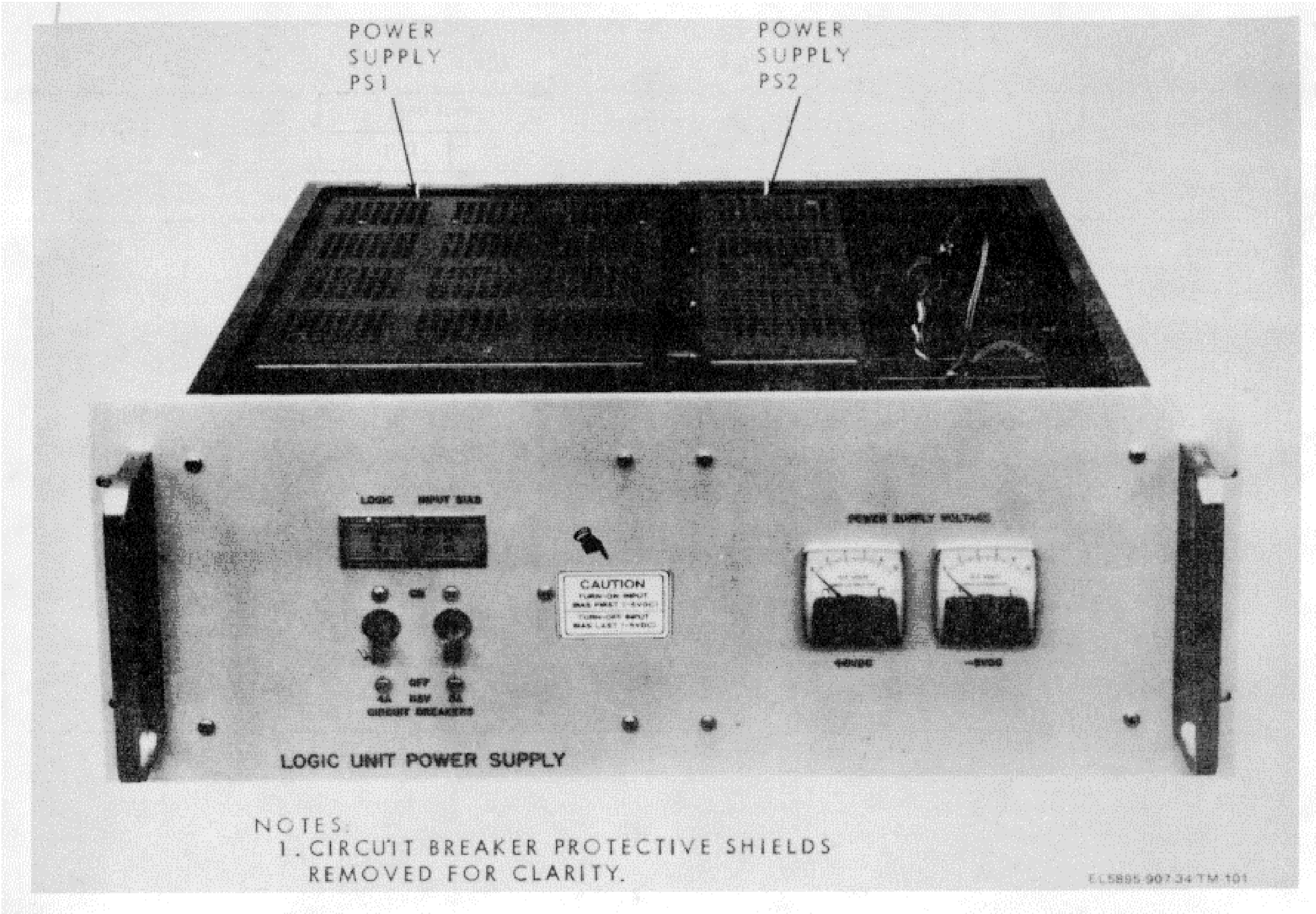


Figure 1-4. Logic unit power supply 15A4.

1-17. Waveguide Switch Control HTA-3A7 (fig. 1-10). The waveguide switch control contains an electronic component assembly. The assembly consists of a bridge circuit and four relays. The bridge circuit applies control voltage to the relays, which control the position of wax guide switches HTA-3SI and HTA-3S2.

1-18. Waveguide Switches HTA-3S1, 3S2 (fig. 1-11). Two waveguide switches are mounted on RF Equipment Group rf plate HTA-3. The switches control routing of the downlink rf signals in and out of parametric amplifiers HTA-3A2 and HTA-3A3. Each switch is aluminum enclosure with a square base (stator) that has a rectangular opening (port) on each of the four side Each port has provisions for mounting a waveguide flange. A circuit structure (rotor) extends into the stator and has openings that correspond to and mate with the ports in the stator. A mechanical positioner, with connectors on one side, is mounted on the rotor. Port identifying symbols are marked on top of the positioner.

1-19. Tabulated Data. This paragraph provides a tabulation of technical characteristics and a cross-reference index for the status and alarm equipment. The technical characteristics include physical data and electrical characteristics. The cross-reference index relates equipment reference designators to functional group numbers.

a. Physical Data. Table 1-6 lists the physical characteristics for the status and alarm equipment assemblies.

Table 1-6. Dimensions and weights

Ref des	Equipment	Qty	Dimension (inches)			Weight (pounds)
			Height	Width	Depth	
			System status logic unit rack AN/FSC-78 (V)			
15A1	Rack	1	54.0	36.0	35.0	
15A2	Connector panel	1		8.3	29.3	10
15A3	Connector panel	1	38.5		8.5	10
15A4	Logic unit power supply	1	7.0	19.0	15.6	40
15A5	System status logic unit	1	10.5	19.0	17.5	25
15A6, 15A9, 15A1O	Channel frequency indicator	1	3.5	19.0	7.9	10
15A7	Filter	1	7.0	19.0	1.0	1
15A8	Interface panel	1	16.7	19.3		15
15A11	Multiprogrammer assembly	1	6.9	16.8	23.5	62
15A12	Interface bus extender assembly	1	3.5	8.4	14.0	7.7
			System status logic unit rack AN/FSC-79			
15A1	Rack	1	54.0	36.0	35.0	10
15A2	Connector panel	1		8.3	29.3	10
15A3	Connector panel	1	38.5		8.5	40
15A4	Logic unit power supply	1	7.0	19.0	15.6	25
15A5	System status logic unit	1	10.5	19.0	17.5	10
15A6	Channel frequency indicator	1	3.5	19.0	7.9	1
15A7	Filter	1	7.0	19.0	1.0	15
15A8	Interface panel	1	16.7	19.5		
			Communication control console AN/FSC-78(V)			
14A16	Fault and system status panel	1	10.5	19.0	17.5	40
			Communication control console AN/FSC-79			
14A16	Fault and system status	1	10.5	19.0	17.5	40
			Rf plate HTA-3 (AN/FSC-78(V)			
A7	Waveguide switch control	1	4.0	4.0	3.8	
S1	Waveguide switch	1	4.5	4.5	7.8	
S2	Waveguide switch	1	4.5	4.5	7.8	

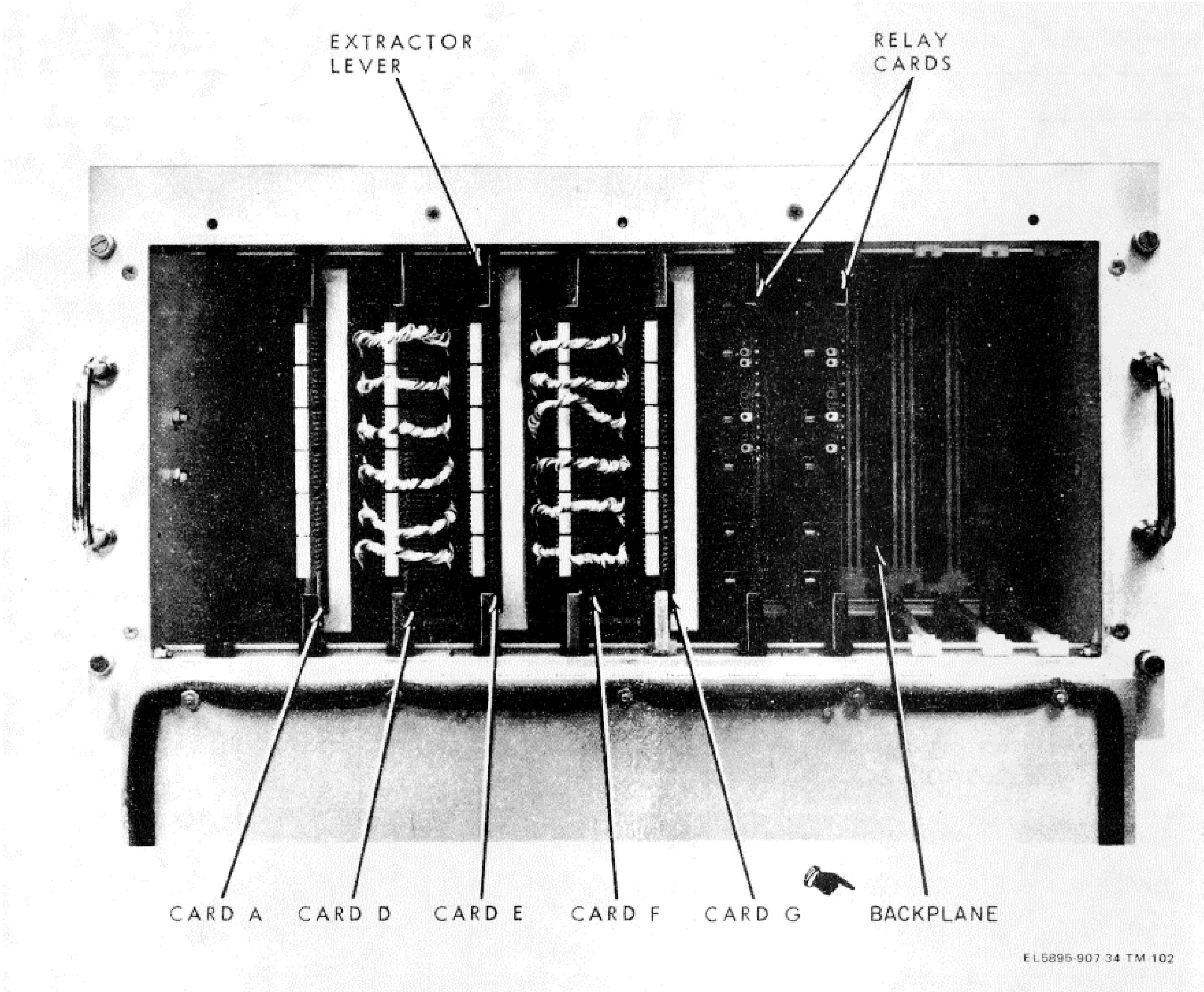


Figure 1-5. System status logic unit 15A5.

b. Electrical Characteristics. Table 1-7 lists electrical characteristics for major assemblies of the status and alarm equipment. The characteristics include power requirements, operating levels, and other pertinent data.

Table 1-7. Electrical Characteristics

Characteristic	Specification
	Logic unit power supply 15A4
Input power:	
Line voltage	120 ±12 V ac
Frequency	50 to 60 Hz
Power supply output:	
+5 V supply	5 ’0.25 V dc
Current	12.6 A (at 40 "C)
-5 V supply	5 ±0.25 V dc
Current	5.1 A (at 40 "C)
Overload protection:	
+5 V supply	120 V ac, 4 A
-5 V supply	120 V ac,3 A
Current consumption:	
-5 V supply	2.4 to 5.1 A
+5 V supply	6.1 to 12.6 A
	System status logic unit 15A5
Logic levels:	
Fault and status	Logic 1 = ± 5 ±1.5 V dc Logic 0 = -5 ±1.5 V dc
Input and output signals	
Input status signals	Contact closures or openings from operational equipment units indicate: (1) fault, (2) alarm, (3) equipment status, (4) completion of switching that places redundant equipment online, after command from system status logic unit.
Output signals	
Equipment selection commands	Contact closure commands routes +28 V de from fault systems status panel through relays to switches that place redundant equipment online and place malfunctioning equipment offline.
	Channel frequency Indicator 15A6,15A9, 15A10
Input level	+5 V dc Rtn
	Open or +5 V dc Rtn
Output levels	
	Multiprogrammer 15A11
Input power	
Line voltage	120 10 V ac
Frequency	47 to 63 Hz
Power consumption	600 W
	Interface Bus Extender 15A12
Input power	
Line voltage	120 (+5, -10) V ac
Frequency	48 to 66 Hz
Power consumption	25 W

Table 1-7. Electrical Characteristics - Continued

Characteristic	Specification
	Fault and system status panel 14A16
Input power:	
Line voltage	120 ±12 V ac
Frequency	50 to 60 Hz
Current	5 A max
Signal levels:	
Active	ground
Inactive	28 ±1.5 V dc
Power supply:	
Input voltage range	120 ±12 V ac
Input frequency range	50 to 60 Hz
Output voltage range	28 ±1.5 V dc
Maximum output current	10 A (40 3C)
Ripple	1 mV rms, 3 mV peak-to-peak
Regulation:	
Line	Less than 0.05 pct plus 4.0 mV for input variations from 108 to 132 V ac.
Load	Less than 0.03 pct plus 3.0 mV for load variations from 0 to full load.
Waveguide switch control HTA-3A7 and waveguide switches HTA-3S1, -3S2	
Waveguide switch control HTA-3A7	
Operating voltage	120 V ac
Control voltage	28 V dc
Waveguide switches HTA-3S1, 3S2	
Frequency	7.25 to 7.75 GHz
Vswr	1.08:1, max
Insertion loss	0.02 dB, max
Isolation	80 dB. min
Voltage	120 V ac
Current	1 A
Switching time	100 ms, max
Rf power capacity	10 kW cw, max

c. Cross-Reference Index. Tables 1-8 and 1-9 provide a cross-reference index between equipment reference designations and functional group number (FGN) assignments as they apply to Maintenance Allocation Charts (MAC) and Repair Parts and Special Tools Lists (RPSTL).

Table 1-8. Cross-Reference Index for AN/FSC-78(V)

Ref des	Common name	FGN
Unit 15	System status logic unit rack	0901
15A1	Rack	09010
15A2	Connector panel	090102
15A3	Connector panel	090103
15A4	Logic unit power supply	0904
15A4PS1	+5 V dc power supply	090402
15A4PS2	-5 V dc power supply	090401
15A5	System status logic unit	0906
15A5A1	Status logic A circuit card assembly	090601
15A5A2	Logic components assembly	090602
15A5A2A1	Status logic D circuit card assembly	09060201
15A5A2A2	Status logic E circuit card assembly	09060202
15A5A3	Logic components assembly	090603
15A5A3A1	Status logic F circuit card assembly	09060301
15A5A3A2	Status logic G circuit card assembly	09060302
15A5A4, A5A5	Relay driver/relay circuit card	090604
15A5A6	Backplane assembly	090605
15A6, 15A9, 15A10	Channel frequency indicator	0905
15A8	Interface panel	090104
15A11	Multiprogrammer assembly	090105
15A12	Interface bus extender assembly	090106
14A16	Fault and system status panel	0907
14A16PS1	28 V dc power supply	090701
HTA-3A7	Waveguide switch control	0902
HTA-3A7A1	Electronics component assembly	090201
HTA-3S1, 3S2	Waveguide switch	0903

Table 1-9. Cross-Reference Index for AN/FSC-79

Ref des	Common name	FGN
Unit 15	System status logic unit rack	0901
15A1	Rack	09010
15A2	Connector panel	090102
15A3	Connector panel	090103
15A4	Logic unit power supply	0904
15A4PS1	+5 V dc power supply	090402
15A4PS2	-5 V dc power supply	090401
15AS	System status logic unit	0909
15A5A1	Status logic A circuit card assembly	090901
15A5A2	Logic components assembly	090902
15ASA2A1	Status logic D circuit card assembly	09090201

Table 1-9. Cross-Reference Index for AN/FSC-79 -Continued

Ref des	Common name	FGN
15A5A2A2	Status logic E circuit card assembly	09090202
15A5A3	Logic components assembly	090903
1A5AA3A1	Status logic F circuit card assembly	09090301
15A5A3A2	Status logic G circuit card assembly	09090302
15A5A4, A5A5	Relay driver/relay circuit card	090904
15A5A6	Back plane assembly	090905
15A6	Channel frequency indicator	0905
15A8	Interface panel	090104
14A16	Fault and system status panel	0908
14A16PS1	28 V dc power supply	090801

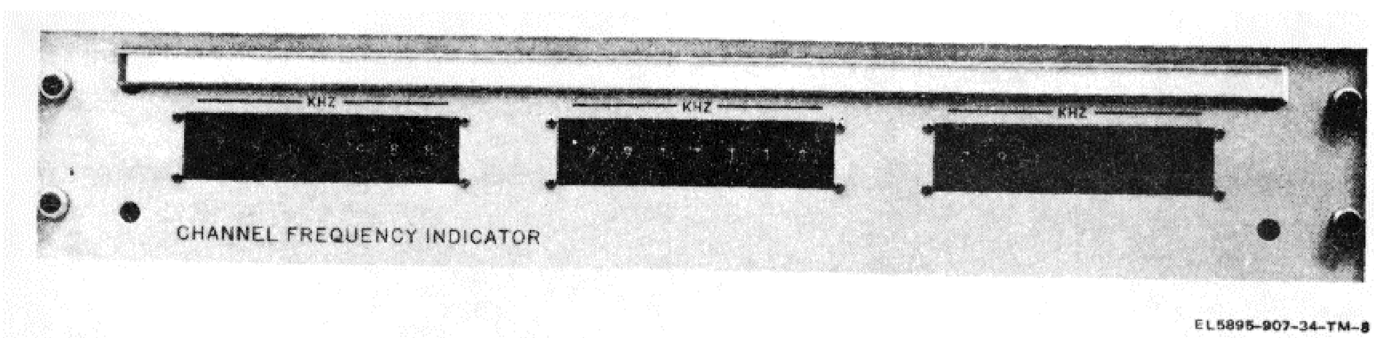


Figure 1-6. Channel frequency indicator 15A6,15A9,15A10.

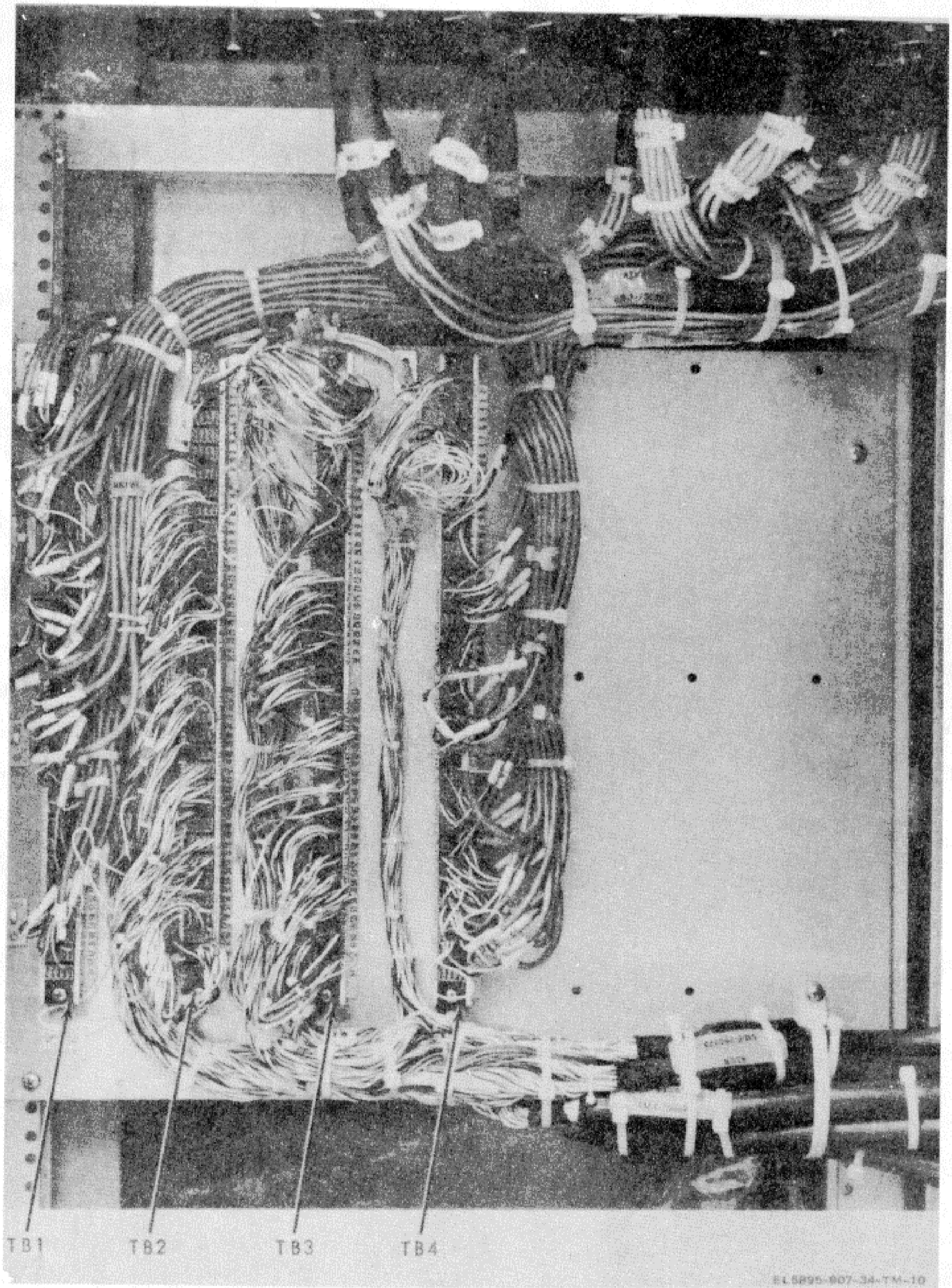


Figure 1-7. Interface panel 15A8

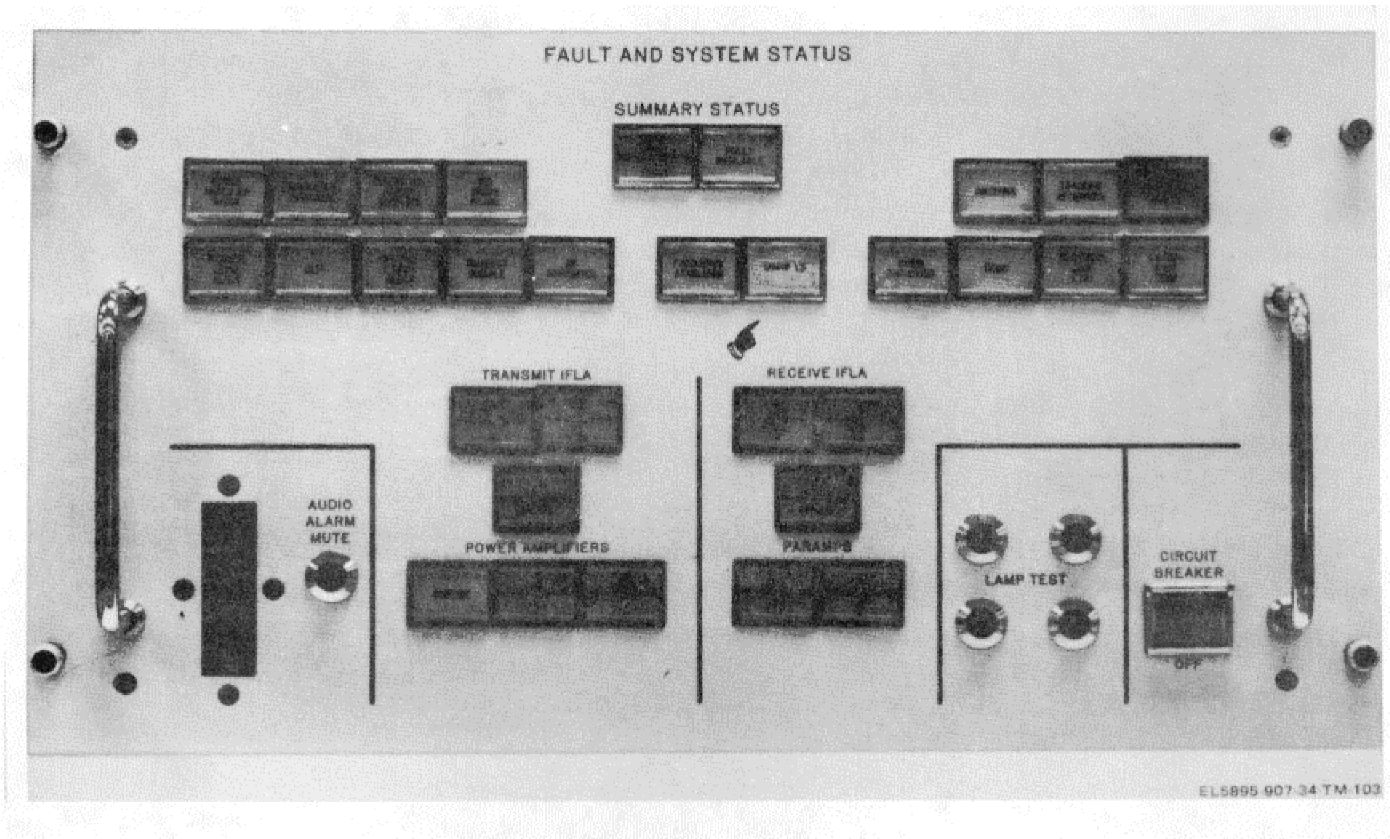


Figure 1-8. Fault and system status panel 14A16 for AN/FSC-78(V).

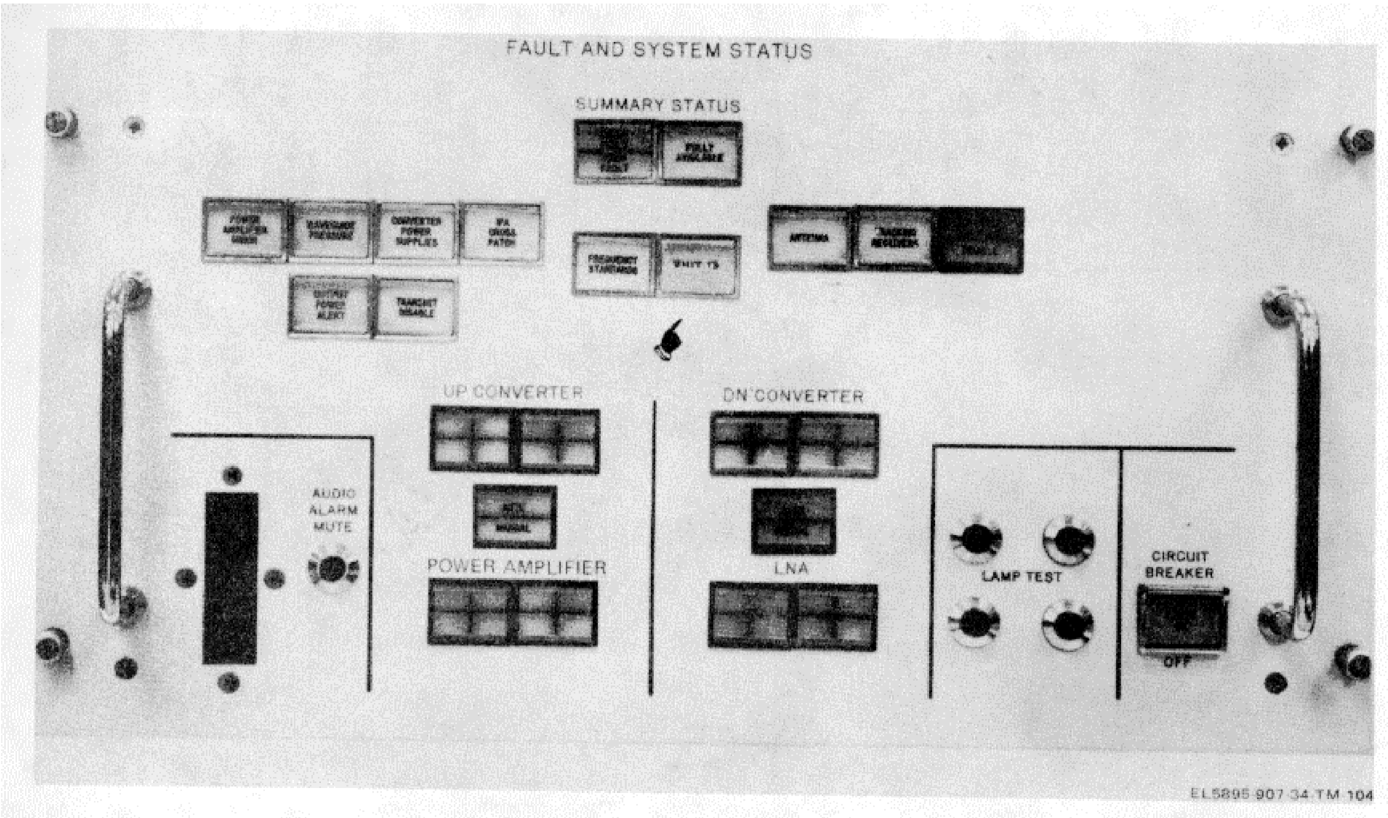


Figure 1-9. Fault and system status panel 14A16 for AN/FSC-79.

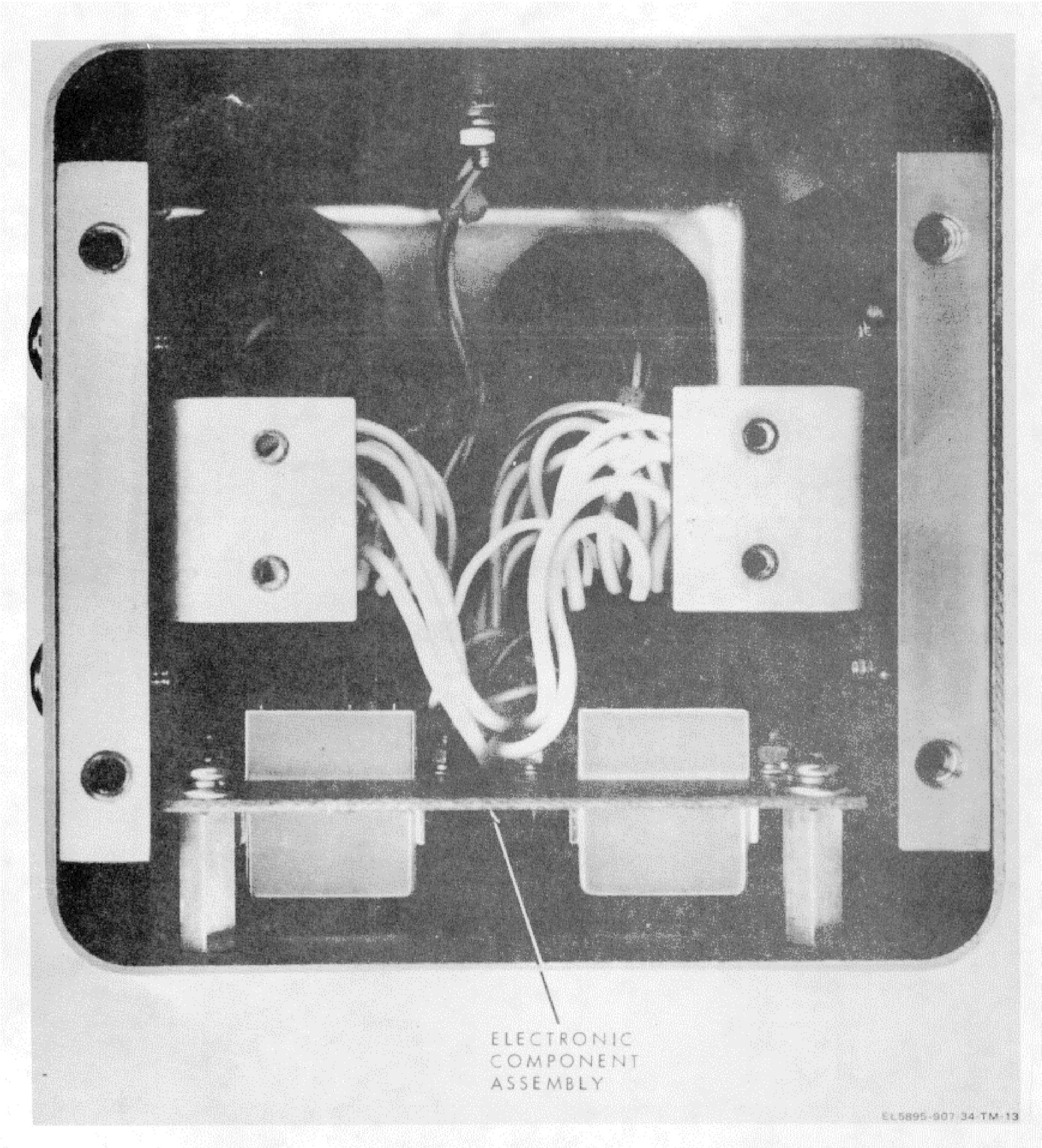


Figure 1-10. Waveguide switch control HTA-3A7, AN/FSC-78(V).

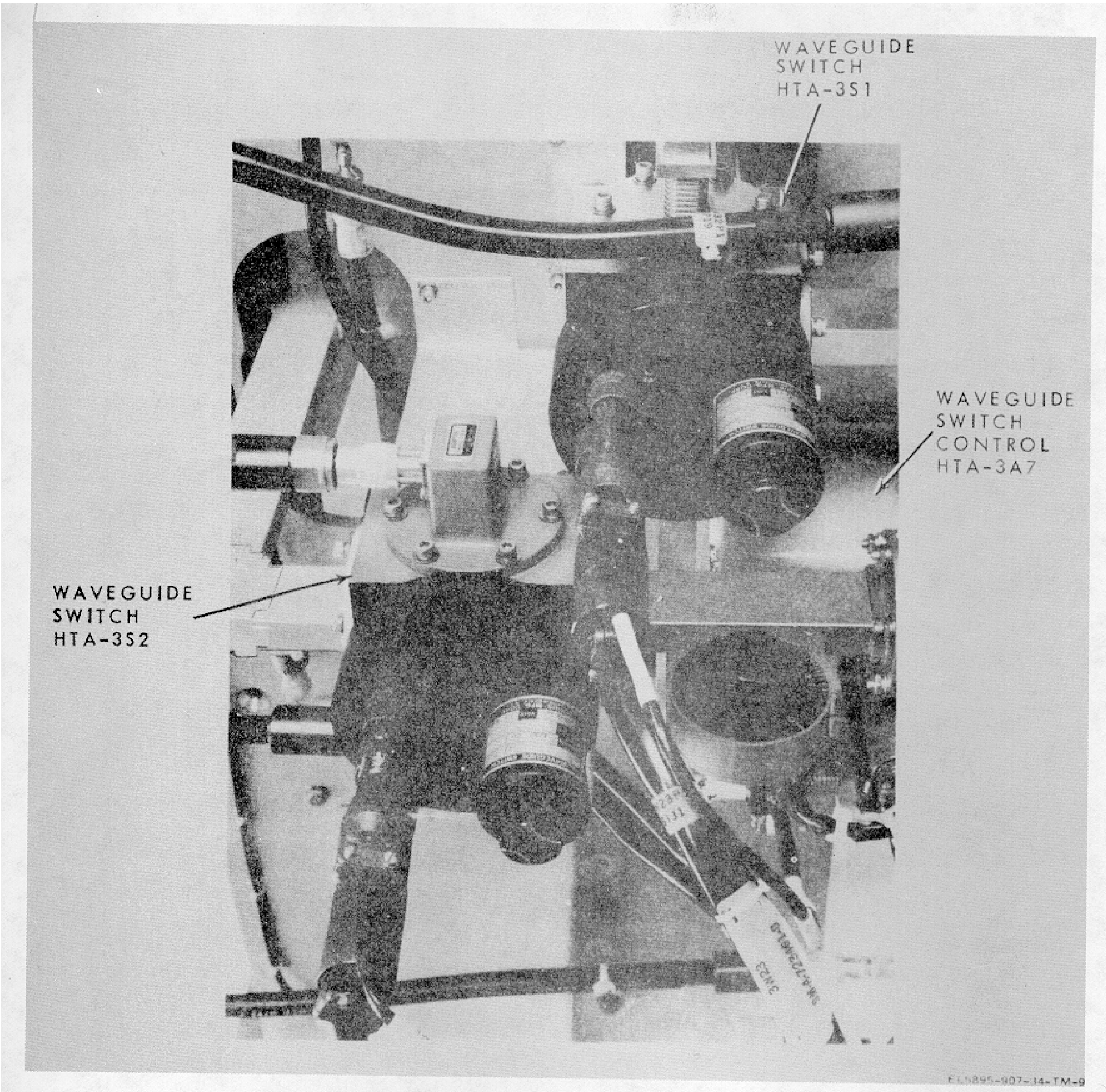


Figure 1-11. Waveguide switches HTA-3S1, 3S2 (AN/FSC - 78(V) only).

CHAPTER 2
FUNCTION OF EQUIPMENT

SECTION I. FUNCTIONAL ANALYSIS OF AN/FSC-78(V) STATUS AND ALARM EQUIPMENT

2-1. Introduction. This chapter explains the functioning of the status and alarm equipment as an aid to understanding the maintenance instructions described in chapter 3. Section I provides a functional analysis of Satellite Communication Terminal AN/FSC-78(V) status and alarm equipment and is supported by block diagrams. Section II provides a circuit analysis of Satellite Communication Terminal AN/FSC-78(V) status and alarm equipment. Section III provides a functional analysis of Satellite Communication Terminal AN/FSC-79 status and alarm equipment and is supported by block diagrams Section IV provides a circuit analysis of Satellite Communication Terminal AN/FSC-79 status and alarm equipment

2-2. Overall Functional Analysis (fig. FO-2). The status and alarm equipment in the AN/FSC-78(V) consists of a system status logic unit rack, unit 1 5, a fault and system status panel 14A16, a waveguide switch control HTA-3/A7, and two waveguide switches, HTA-3S1 and HTA-3S2 The system status logic unit rack monitor operational status of AN/FSC-78(V) uplink equipment Logic operations are performed in the system status logic unit 15A5, based on the status of uplink transmit equipment. When a fault occurs, these logic operations turn on an audible alarm and warning lights on the fault and system status panel. In addition. if automatic switching has been selected on the fault and system status panel 14A 16, command signals are generated to switch redundant transmit circuits on line. Similarly, when a fault occurs in the downlink equipment, redundant receive circuits are automatically switched by Radio Frequency Monitor ID-1935/G (receiver gain monitor HTA-3A6) (Receiver gain monitor operation is discussed in TM 11-5895-903-34) When manual switching has been selected on the fault and system status panel 14A16, fault correction requires operator action. When a visual and/or audible alarm condition occurs, the operator press pushbutton switches on the fault and system status panel that generate selection commands to the system status logic unit 15A5. System status logic unit circuits process selection commands into switching signals to reconfigure redundant transmit and/or receive circuits on line. Receive equipment wavequide switch position status signal are routed through distribution box assembly HTA-3A to status input circuits of both the receiver gain monitor HTA-3A6 and the system status logic unit 15A5. These units each monitor the switch position status of receive waveguide switches HTA-3S1, HTA-3S2, and HTA-3A8A4S1, the operational status of the parametric amplifier (antenna units HTA-3A2 and HTA-3A3), and the operational status of the Radio Frequency Amplifier AM-6644/G (receive interfacility link amplifier HTA-3A8). The system status logic unit also monitors receiver gain monitor HTA-3A6 fault and maintenance status. The system status logic unit circuit normally senses the absence of a receiver gain monitor fault or maintenance signal and performs logic operations that result in lighting the AUTO selection of the receive AUTO/MANUAL indication on the fault and system status panel 14A16; this indicates that the receiver gain monitor unit (RG MU) HTA-3A6 is functioning automatically. In addition to no RGMU fault and no RGMU maintenance, the alternate action receive AUTO/MANUAL switch on the fault and system status panel must be in the AUTO position before AUTO is selected. When a receiver gain monitor fault or maintenance condition is sensed by the system status logic unit 15A5, logic circuits within the system status logic unit perform logic operations that extinguish the AUTO indicator on the fault and system status panel and light the MANUAL indicator. If the alternate action receive AUTO/MANUAL switch is in MANUAL, manual mode is also selected regardless of the condition of the RGMU. Operator action is now required to select redundant receive equipment, to correct the fault. The operator presses pushbutton selector switches on the fault and system status panel. These switches generate receive equipment selection commands to the system status logic unit. The system status logic unit circuits produce receive waveguide switch position commands that are routed through the distribution box assembly HTA-3A1 to operate receive waveguide switches 1 and 2, position 1 or 2 relays, in waveguide switch relay control HTA-3A7. Drive power is then applied to HTA-3S1 or HTA-3S2 waveguide switch sector motors. The sector motors position waveguide switches HTA-3S1 and HTA-3S2 to connect the selected parametric amplifier HTA-3A2 or HTA-3A3 on line. A receive waveguide switch 3, position 1 or 2 command from distribution box assembly HTA-3A1 operates the position 1 or position 2 relay in the receive interfacility link amplifier HTA-3A8A4; this positions switch HTA-3A8A4S1, thereby placing selected amplifier 1 or amplifier 2 on line.

System status logic unit circuits also route status signals to interface panel 15A8 for future use by scanner formatter. The channel frequency indicators 15A6 15A9, or 15A10 include thumbwheel switches for manually inserting channel frequency data for use by the scanner formatter. Thumbwheel switch data in bed format is routed to the interface panel 15A8. Logic unit power supply 15A, provides +5 V dc and -5 V dc for system status logic unit circuits. Fault and system status panel 14A16 contains an internal 28 V dc power supply that provides operating power for fault and system status panel alarms and indicators Status and alarm equipment is part of the monitoring and switching function described in TM 11-5895-898-12.

a. Logic Unit Power Supply 15A4. Logic unit power supply 15A4 contains a +5 V dc power supply (PS1) and a -5 V dc power supply (PS2). These voltages are used by the system status logic unit 15A5 for biasing and logic operations. The +5 V dc also goes to the fault and system status panel 14A16 for power tum-on control. The -5 V do is also used as logic common for the status and alarm circuits in equipment being monitored. Use of -5 V dc for logic common ensures correct functioning of the system status logic unit input gating circuits.

b. System Status Logic Unit 15A5. The system statue logic unit monitors status signals (fig. FO-3) from operational equipment representing any or all of the following conditions: fault, alarm, drop-out, alert, and power level Transmit and receive operational equipment status signals represent that the equipment is in one of the following states online, standby, fault, or maintenance. Figures FO-3 and FO-4 show typical circuits between the monitoring switch or relay contacts and the system status logic unit. An individual circuit is connected between each monitored operational equipment unit and the system status logic unit of each condition or state. Relay or switch contacts, at the operational equipment unit, provide either a closed or an open circuit to the -5 V dc logic common for the system status logic unit. Table 2-1 lists the sources of signals to the system status logic unit, signal names, and the type of relay or switch contact position. Each signal circuit of the system status logic unit 15A5 is connected as an input to logic gating that produces signals sent to the fault and system status panel 14A16. An individual circuit is also connected between the fault and system status panel and the system status logic unit for each equipment selection command (fig. FO-3). Pushbutton switch contacts provide a closed circuit to the system status logic unit. The system status logic unit end of the circuit is connected as an input to logic gating that produces selection command signals sent to the operational equipment. Table 2-2 lists status signals and control signals sent from the system status logic unit. When AUTO is selected on the fault and system status panel, a fault signal from an operational (online) unit is processed to automatically place the standby unit on line and the faulty unit off line. Status signals are also sent to interface panel 15A8 and terminated (fig. FO-2). These signals are intended for use by a scanner formatter in a future installation. Table 2-3 lists the signals intended for use by the scanner formatter. Backplane assembly 15A5A6 (fig. 2-1) provides the required interface between the plug-in logic and relay circuit cards, logic unit power supply 15A4, and the input/output connectors on the rear panel of system status logic unit 15A5. Multiprogrammer 15A11 (fig. FO-2.1) receives the AN/FSC-78(V) equipment alarm and power status. The Multiprogrammer converts serial input data into a parallel data format, collects the alarm and status information, and transmits the data via the interface bus extender to a user interface.

Table 2-1. Status, Alarm, and Control Signals to System Status Logic Unit 15A5 (AN/FSC-78 (V))

Source	Signal Name	Type
Up-converter interconnecting assembly 9A3 through 11A3 (AN/FSC-78(V)) or RF output test and control assembly 9A3 through 11A3 (AN/FSC-78A(V))*	Up-converter fault summary	Continuity
	Converter power supply minor fault summary	Continuity
	Up-converter alarm summary	Continuity
	Converter power supply major fault	Continuity
	Up-converter power supply alarm summary	Continuity
Down-converter interconnecting assembly 3A3 through 7A3 (AN/FSC-78(V)) or IF test assembly 3A3 through 7A3 (AN/FSC-78A(V))	Down-converter fault summary	Continuity
	Down-converter alarm summary	Continuity
Frequency distribution unit 13A7	Frequency standard no. 1 fault	Open
	Frequency standard no.1 maintenance	Open
	Frequency standard no.2 fault	Open
	Frequency standard no.2 maintenance	Open
Frequency distribution unit power supply 13A11	Frequency standard power supply major fault	Open
	Frequency standard power supply minor fault	Open
	Frequency standard power supply alarm	Open

*Not applicable for terminals with up-converter interface controllers installed.

Table 2-1. Status, Alarm, and Control Signals to System Status Logic Unit 15A5 (AN/FSC-78(V)) (Continued)

Source	Signal Name	Type
Transmit IFLA control panel 8A4	Transmit IFLA 1 fault	Open
	Transmit IFLA 2 fault	Open
	Transmit IFLA 1 maintenance	Open
	Transmit IFLA 2 maintenance	Open
Remote amplifier monitor unit 8A5, 8A6	Paramp 1 fault	Open
	Paramp 2 fault	Open
	Paramp 1 maintenance	Open
	Paramp 2 maintenance	Open
Tracking receiver control and status panel 14A6	Tracking receiver major fault	Continuity
	Tracking receiver minor fault	Continuity
	Tracking receiver alarm	Continuity
Antenna position and status panel 14A7	Antenna major fault	Open
	Antenna major maintenance	Open
	Autotrack dropout	Open
Stow pin control/minor fault	Antenna minor fault	Open
Antenna minor	maintenance	Open
Synchro assembly, elevation, HTA-6A6	Low elevation cutoff	Open
Carrier level control panel	Carrier level monitor power supply fault	Open
14A17, 14A28	Carrier level monitor power supply alarm	Continuity
	Carrier level major alert	Open
	Carrier level minor alert	Open
	Carrier level alarm	Continuity
Noise temperature monitor 14A25	System noise temperature high	Continuity
	Online/offline noise temperature	Continuity
	Level/manual status	Continuity
	Auto measurement status	Continuity
Low pressure control panel 22A2	Waveguide pressure low status	Open

Table 2-1. Status, Alarm, and Control Signals to System Status Logic Unit 15A5 (AN/FSC-78(V)) (Continued)

Source	Signal Name	Type
Transmit waveguide switches (continued)		
Switch 5 (22A3A3S5)	Transmit switch 5 position 1 status	Continuity
	Transmit switch 5 position 2 status	Continuity
Switch 6 (22A3A2S6)	Transmit switch 6 position 1 status	Continuity
	Transmit switch 6 position 2 status	Continuity
Switch 8 (22A3A2S8)	Transmit switch 8 position 1 status	Continuity
	Transmit switch 8 position 2 status	Continuity
Receiver gain monitor HTA-3A6	Receiver gain monitor maintenance	Open
	Receiver gain monitor fault	Open
	Online receiver gain fault	Continuity
	Online receiver gain alert	Continuity
	Offline receiver gain fault	Continuity
Receiver waveguide switches		
Switch 1 (HTA-3S1)	Receive switch 1 position 1 status	Continuity
	Receive switch 1 position 2 status	Continuity
Switch 2 (HTA-3S2)	Receive switch 2 position 1 status	Continuity
	Receive switch 2 position 2 status	Continuity
Switch 3 (HTA-3A8A4S1)	Receive switch 3 position 1 status	Continuity
	Receive switch 3 position 2 status	Continuity
Receive interfacility link amplifier HTA-3A8	Receive IFLA 1 fault	Open
	Receive IFLA 2 fault	Open
	Receive IFLA 1 maintenance	Open
	Receive IFLA 2 maintenance	Open
Emergency transmitter disable switch HTA-4A8	Transmit operate disable	Open
Fault and system status panel 14A16	Audio alarm disable	Open
	Audio alarm mute	Momentary continuity
	Transmit IFLA 1 pushbutton	Momentary continuity
	Transmit IFLA 2 pushbutton	Momentary continuity

Table 2-1. Status, Alarm, and Control Signals to System Status Logic Unit 15A5 (AN/FSC-78(V)) (Continued)

Source	Signal Name	Type
Fault and system status panel 14A16(continued)	Power amplifier 1 pushbutton	Momentary continuity
	Power amplifier 2 pushbutton	Momentary continuity
	Receive IFLA 1 pushbutton	Momentary continuity
	Receive IFLA 2 pushbutton	Momentary continuity
	Paramp 1 pushbutton	Momentary continuity
	Paramp 2 pushbutton	Momentary continuity
	Transmit auto-manual	Momentary continuity
	Receive manual enable pushbutton	Momentary continuity
	Combine pushbutton	Momentary continuity
Remote facility interface	IPA 1 fault	Open
	IPA 2 fault	Open
31A26,32A26	Power amplifier 1 maintenance	Open
	Power amplifier 2 maintenance	Open
	Power amplifier 1 beam-on	Continuity
	Power amplifier 2 beam-on	Continuity
	Power amplifier minor fault	Open
	Power amplifier 1 final tube fault	Open
	Power amplifier 2 final tube fault	Open
Transmitter power monitor	Power status ranging signals	Open
panel 14A27	Transmitter power	Analog
	Output power alert	Continuity
Transmit waveguide switches		
Switch 1 (31A21S2)	Transmit switch 1 position status	Continuity
	Transmit switch 1 position 2 status	Continuity
Switch 1A (22A3A4S1)	Transmit switch 1A position 1 status	Continuity
	Transmit switch 1A position 2 status	Continuity
Switch 3 (32A21S2)	Transmit switch 3 position 1 status	Continuity
	Transmit switch 3 position 2 status	Continuity
Switch 3A (22A3A4S2)	Transmit switch 3A position 1 status	Continuity
	Transmit switch 3A position 2 status	Continuity
Switch 4 (22A3A2S4)	Transmit switch 4 position 1 status	Continuity
	Transmit switch 4 position 2 status	Continuity

Table 2-2. Status, Alarm, and Control Signals From System Status Logic Unit 15A5 (AN/FSC-78(V))

Destination	Signal name	Level
Fault and system status panel 14A16	Power amplifier minor fault	28 V dc
	Waveguide pressure low	28 V dc
	Antenna major fault	28 V dc
	Antenna minor fault	28 V dc
	IPA cross patch	28 V dc
	Carrier level major alert	28 V dc
	Carrier level minor alert	28 V dc
	CLM fault	28 V dc
	Output power alert	28 V dc
	Frequency standard major fault	28 V dc
	Frequency standard minor fault	28 V dc
	Unit 13 fault	28 V dc
	Tracking receiver major fault	28 V dc
	Tracking receiver minor fault	28 V dc
	Autotrack dropout	28 V dc
	Major fault	28 V dc
	Minor fault	28 V dc
	Fully available	28 V dc
	RGMU fault	28 V dc
	Receiver gain alert	28 V dc
	System noise temperature high	28 V dc
	Converter power supplies major fault	28 V dc
	Converter power supplies minor fault	28 V dc
	Up-converter fault	28 V dc
	Down-converter fault	28 V dc
	Transmit IFLA online	28 V dc
	Transmit IFLA standby	28 V dc
	Transmit IFLA fault	28 V dc
	Transmit IFLA maintenance	28 V dc
	Receive IFLA online	28 V dc
	Receive IFLA standby	28 V dc

Table 2-2. Status, Alarm, and Control Signals From System Status Logic Unit 15A5 (AN/FSC-78(V)) (Continued)

Destination	Signal name	Level
Fault and system status panel 14A16	Receive IFLA fault	28 V dc
(continued)	Receive IFLA maintenance	28 V dc
	Power amplifier online	28 V dc
	Power amplifier standby	28 V dc
	Power amplifier fault	28 V dc
	Power amplifier maintenance	28 V dc
	Paramp online	28 V dc
	Paramp standby	28 V dc
	Paramp fault	28 V dc
	Paramp maintenance	28 V dc
	Receive auto/manual	28 V dc
	Transmit auto/manual	28 V dc
	Major audio alarm	28 V dc
	Minor audio alarm	28 V dc
	Transmit disable	28 V dc
	Combine	28 V dc
Carrier level control panel 14A17, 14A28	CLM Inhibit	28 V de
Rf amplifier assembly 31A21, 32A21	Power amplifier 1 and 2 diode switch inhibit	Continuity
	Low elevation cutoff	Open
Transmit waveguide switches		
Switch 1 (31A21S2)	Transmit waveguide switch 1 position 1 control	28 V dc
	Transmit waveguide switch 1 position 2 control	28 V dc
Switch 1A (22A3A4S1)	Transmit waveguide switch 1A position 1 control	28 V dc
	Transmit waveguide switch 1A position 2 control	28 V dc
Switch 3 (32A21S2)	Transmit waveguide switch 3 position 1 control	28 V dc
	Transmit waveguide switch 3 position 2 control	28 V dc
Switch 3A (22A3A4S2)	Transmit waveguide switch 3A position 1 control	28 V dc
	Transmit waveguide switch 3A position 2 control	28 V dc
Switch 4 (22A3A2S4)	Transmit waveguide switch 4 position 1 control	28 V dc
	Transmit waveguide switch 4 position 2 control	28 V dc
Receiver gain monitor HTA-3A6	Auto control	Continuity

Table 2-2. Status, Alarm, and Control Signals From System Status Logic Unit 15A5 (AN/FSC-78(V)) (Continued)

Destination	Signal name	Level
Receiver waveguide switches		
Switch 1 (HTA-3S1)	Receive switch 1 position 1 control	28 V dc
	Receive switch 1 position 2 control	28 V dc
Switch 2 (HTA-3S2)	Receive switch 2 position 1 control	28 V dc
	Receive switch 2 position 2 control	28 V dc
Switch 3 (HTA-3A8A4S1)	Receive switch 3 position 1 control	28 V dc
	Receive switch 3 position 2 control	28 V dc
Distribution box HTA-8A25	Major alarm	28 V dc
	Minor alarm	28 V dc

Table 2-3. Signals to Scanner Formatter Interface Panel 15A8

Status signal	Signal level
Up-converter fault*	5 V dc
Down-converter Converter fault	5 V dc
Transmit IFLA online/standby/fault/maintenance	5 V dc
Receive IFLA online/standby/fault/maintenance	5 V dc
Paramp online/standby/maintenance	5 V dc
Autotrack dropout	5 V dc
Transmit manual	5 V dc
Receive manual	5 V dc
Feed power status	Analog 0 to 5 V dc
Power amplifier output power status	Analog 0 to 5 V dc
Power status ranging	5 V dc
Carrier output level*	Analog 0 to 5 V dc
System noise temperature	Analog 0 to 5 V dc
Tracking receiver	Analog 0 to 5 V dc
Transmit carrier frequency	Bcd logic levels, open or 5 V dc rtn
Power amplifier online/standby/fault/maintenance	5 V dc
Noise status online/offline	5 V dc
Level/manual status	5 V dc
Auto measurement status	5 V dc
Unit 13 status	5 V dc

*Not applicable for terminals with up-converter interface controllers installed.

c. Fault and System Status Panel 14A16 (fig. FO-3). The fault and system status panel receives processed state and alarm signals from the system status logic unit. Each of the processed signals is sent through an individual circuit between a signal output point in the system status logic unit and an individual status indicator lamp, alarm indicate lamp, and/or the audible alarm unit in the fault and system status panel. The fault indicated by each lamp, when lit, discussed in chapter 1 (para 1-16). Each lamp is activate by an individual signal from the system status logic unit A transmit manual/auto and equipment selector command signal from the fault and system status panel is initiated by pressing a selector command pushbutton switch. The sign is sent through an individual circuit to the system state logic unit as an input to one or more logic gates in the system status logic unit.

d. Channel Frequency Indicator 15A6, 15A9, or 15A10 (fig. 1-1). The channel frequency indicator front panel supports three 7-segment thumbheel switches. Each switch is used to set in one channel frequency. An individual segment can be set to any number from zero to 9. The highest frequency that can be set in is 9999999 kHz. The output of each digit segment is a binary coded decimal, 4bit, parallel word representing the displayed segment number. The seven 4-bit words are then sent in parallel to terminals on interface panel 15A8.

e. Waveguide Switch Control Assembly HTA-3A 7 (fig. FO-2). The waveguide switch control assembly HTA-3A7 controls operation of receive waveguide switches HTA-3S and HTA-3S2. Circuits in the control assembly receive waveguide switch position signals from receiver gain monitor HTA-3A6 or system status logic unit 15A5. Each circuit when energized by its respective waveguide switch position command signal, applies 120 V ac to a sector motor on it respective waveguide switch. The motor then drives the waveguide switch to the selected position.

f. Multiprogrammer 15A11 (fig. FO-2.1). The equipment status signals are routed to three digital input/compactor cards. Table 2-3.1 lists the status and control signals from interface panel 15A8 to the Multiprogrammer. Each digital input/compactor card has 16 digital data inputs which represent the status of station equipment. The relay output card routes voltages to be used in the power calculations to the A/D converter card. The A/D converter measures bipolar dc voltages and converts them to 12-bit digital words. This voltage is representative of the feed power and power from power amplifiers 1 and 2 Control/RAM board A11A2 has two separate function blocks: a 2K X 16 RAM and backplane control circuits Backplane and RAM data are connected to the bidirectional data bus lines through tri-state bus transceivers. Part of the RAM is used by the system (instruction context blocks, etc. and the rest is used as a buffer for temporary storage of I/O instructions and data. The backplane control circuits decode I/O card addresses, encode frame and I/O interrupts, control up to 16 functions (8 read, 8 write) on each I/O card, and process the return clock and power fail interrupts. Data is transferred to and from the I/O cards via the backplane control circuits. CPU/RAM board A11A1 has two separate function blocks: a 12K X 16-bit ROM and the CPU. The CPU includes the microprocessor (Texas Instrument TM59900), interrupt encoder, and board level diagnostics self-test/signature analysis support circuitry. The microprocessor decodes and executes all instructions and controls all data transfers. Six prioritized interrupt levels direct the microprocessor to execute appropriate programs residing in ROM. The self-test signature analysis programs reside in ROM. The self-test diagnostic programs check 80 percent of the mainframe circuitry. The programs, required to process the instructions received from the parallel interface bus, are stored in the 12K ROM. The microprocessor executes the programs in ROM according to prioritized interrupts. The CPU circuitry also provides gate and clock signals for signature analysis troubleshooting, and LED indicators to identify self-test error codes. The interface bus interface board A11A5 provides the communication interface between the Multiprogrammer and the interface bus extender. The interface board provides a high speed interface between the parallel interface bus and the microprocessor on the CPU/ROM board. The board also contains data and control bus transceivers, Multiprogrammer data bus and write buffers, numeric/extended talk address detectors, communications register unit (CRU), decoder/encoder, and control circuitry.

Table 2-3.1. Interface Panel 15A8 Signals to Multiprogrammer 15A11

Status signal	Signal level
Down-converter summary fault	5 V dc
Auto track drop out	5 V dc
Transmit power 1 status (1 W to 10 kW range)	5 V dc
Transmit power 2 status (1 W to 10 kW range)	5 V dc
Power amplifier online/standby/fault/maintenance	5 V dc
Power amplifier 2 online/standby/fault/maintenance	5 V dc
Paramp 1 online/standby/fault/maintenance	5 V dc
Paramp 2 online/standby/fault/maintenance	5 V dc
Transmit IFLA 1 online/standby/fault/maintenance	5 V dc
Transmit IFLA 2 online/standby/fault/maintenance	5 V dc
Receive IFLA 1 online/standby/fault/maintenance	5 V dc
Receive IFLA 2 online/standby/fault/maintenance	5 V dc

Table 2-3.1. Interface Panel 15A8 Signals to Multiprogrammer 15A11 - Continued

Status signal	Signal level
Power amplifier no. 1 power status	Analog 0 to 5 V dc
Power amplifier no. 2 power status	Analog 0 to 5 V dc
Feed power status	Analog 0 to 5 V dc

g. Interface Bus Extender 15A12 (Fig. FO-2.1). The interface bus extender enables the distance between groups of devices interfaced to be extended beyond the limits imposed by direct cabling. Operation of a system will usual be identical, with or without the extender, except that due to the transmission delay in an extended system the parallel poll response time will increase slightly. There is no restriction in passing control between devices. The extender has a maximum data-byte transfer rate of 50 kbytes. The actual data-byte transfer rate is governed by the speed of the slowest local or remote device. By using the extenders, transmission distance of up to 1000 meters is attainable.

One extender converts the parallel protocol into a serial bit stream that is transmitted for distances of up to 1000 meters. The extender at the other end of the serial link performs a conversion from serial to parallel at the us interface. This conversion process is used to pass data and from the user.

A pair of extenders communicate with each other using 22 bit frames. These data frames are passed continuous back and forth between extenders, continually updating each extender with the current state of the devices and extend at the other end. Any errors which are detected will cause the erroneous frame to be rejected and one extender will restart the data frame shuttle.

The extenders provide a transparent interface. For example, it is usually possible to insert two extenders at any point in the interface bus path without altering the controller-programming.

2-3. Detailed Functional Analysis. The gating by the system status logic unit circuit cards of all operational equipment status input signals and control signals that are present at any moment determines the equipment visual status is dications displayed on the fault and system status panel and the online equipment configuration.

a. System Status Logic Unit (fig. FO-3). Input signal to the system status logic unit are routed to circuit card Logic circuits and relays on logic circuit cards A, D, E, F and G and relay circuit cards R1 and R2 perform all log and switching functions required to process signals through the system status logic unit.

(**1**) Circuit card A receives status and alarm signal from operational equipment and summed fault and alarm signals from circuit cards D, E, F, G. Circuit card A logic circuits process these signals and produce fault indicate and alarm signals that are sent to the fault and system status panel. Circuit card A also provides autotrack dropout indicator signals that are routed to the fault and system status panel.

(**2**) Circuit card D receives status signals and transmit waveguide switch position signals from operational equipment. Circuit card D processes these signals and produces summed fault and alarm signals that are routed to circuit card A and fault and status indicator signals that are sent to the fault and system status panel. Transmit waveguide switch position status signals are routed to circuit card E.

(**3**) Circuit card E receives the low elevation cutoff signal, transmit manual/auto and equipment selection command signals, and transmit waveguide switch position status signals from circuit card D. Circuit card E processes these signals and produces fault and status indicator signals that are sent to the fault and status panel. Circuit card E also provides transmit waveguide switch position relay signals and carrier level monitor (CLM) inhibit signals that are routed to relay circuit card R1. Circuit card E routes the low elevation cutoff signal to relay circuit card R2. Summed fault and alarm signals are routed to circuit card A.

(**4**) Circuit card F receives operational equipment status signals and receive waveguide switch position signals. Circuit card F processes these signals and produces fault and status indicator signals that are sent to the fault and system status panel. Circuit card F also produces receive manual enable and receive waveguide switch position signals that are routed to circuit card G. Circuit card F also provides summed fault and alarm signals that are sent to circuit card A.

(**5**) Circuit card G receives operational equipment status signals and manual receive equipment selection command signals from the fault and system status panel. Circuit card G accepts receive manual enable and receive waveguide switch position signals from circuit card F. Circuit card G processes these signals and produces fault and status panel. Circuit card G also produces the receive manual enable and receive waveguide switch position command signals that are routed to relay card R2, and it also produces summed fault and alarm signals that are sent to circuit card A.

(**6**) Relay circuit card R1 receives transmit waveguide switch position relay signals, PA1 and PA2 diode switch inhibit signals, and CLM inhibit signals from circuit card E. Relay circuit card R1 uses these signals to operate relays that route transmit waveguide switch position command signals and CLM, PA1, and PA2 diode switch inhibit command signals to operational equipment.

(**7**) Relay circuit card R2 accepts receive manual enable and receive waveguide switch position comma signals from circuit card G, and also a low elevation cutoff signal from circuit card E. Relay circuit card R2 process these signals to operate relays that route receive waveguide switch position command signals and a low elevation cutoff command to operational equipment.

b. Fault and System Status Panel Equipment Status Indication. Fault and alarm status signals are processed and summed by the system status logic unit. The fault system status panel processes these signals and displays status by lighting indicators and/or sounding audible alarms. Table 2-4 lists fault and system status panel indicators and controls. The table also includes a brief description of the condition that causes an indicator to or indicates destination of a switch-generated control signal. Table 2-4 is keyed to figure 1-8. The SUMMARY STATUS indicator group on the fault and system status panel provides a visual indication of overall equip status. This group indicates presence of a major or minor fault, or that all operational equipment units are available. Figure FO-4 shows typical equipment status and alarm signal processing sequences.

(**1**) Major fault, minor fault, or alarm signals originate by closure of relay contacts. These signal sent to system status logic unit circuit card A 15A5A1. A major fault signal turns on a lamp driver circuit lamp driver circuit drives an equipment major fault indicator lamp signal to light the EQUIPMENT STATUS indicator lamp red on the fault and system status 14A16. The summary major fault signal is also gating major fault summing logic. The summed major fault signals inhibit the fully available gating logic signal turns on a lamp driver circuit to light the SUMMARY STATUS MAJOR FAULT indicator lamp red. In addition, the major fault signal enables major alarm gating logic to produce a summed major alarm signal summed major alarm signals are gated by major summing logic circuitry to assure that all major signals are processed. Any major alarm signal inhibits minor alarm gating. The major alarm signal also turns on an audio driver alarm that sounds the major audible alarm on the fault and system status panel.

(**2**) A minor fault signal from an operational unit is gated by minor fault gating logic and minor alarm gating logic. Minor fault summing logic gates all minor fault signals to produce a summary minor fault signal. The summary minor fault signal inhibits fully available gating logic and turns on a lamp driver that lights the SUMMARY STATUS MINOR FAULT indicator lamp. The summary minor fault signal also turns on a lamp driver that lights the equipment status MINOR FAULT indicator lamp amber. A minor fault signal produces a minor alarm signal via the minor alarm gating logic. The minor alarm signal turns on an audio driver alarm in the absence of a major alarm signal.

(**3**) Fully available gating logic is enabled when there is no major or minor fault. The resulting signal turns on a lamp driver which sends a summary status fully available indicator lamp signal to light the FULLY AVAILABLE indicator lamp green on the fault and system status panel.

(**4**) Pressing AUDIO ALARM MUTE sets a latching circuit. This latching circuit inhibits both major alarm and minor alarm enable gates, and it enables the major alarm and minor alarm mute gates. A 10 kilohm resistor is inserted in series with each alarm to lower the audible level of the alarm signal. When the fault causing the alarm is corrected, the fully available indicator signal resets the latch, so that the next alarm will be at normal audible level.

Table 2-4. AN/FSC-78(V) Equipment Status Condition and Fault and System Status Panel 14A16 Indications

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
POWER AMPLIFIER MINOR	Amber	X				Minor fault in one or more power amplifiers.
WAVEGUIDE PRESSURE	Amber	X				Waveguide pressure low.
ANTENNA	Red		X			Antenna major fault with antenna in maintenance.
			X		X	Antenna major fault with no antenna in maintenance.
	Amber	X				Antenna minor fault with antenna in maintenance
		X		X		Antenna minor fault with no antenna in maintenance.

Table 2-4. AN/FSC-78(V) Equipment Status Condition and Fault and System Status Panel 14A16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
IPA CROSS PATCH	Amber	X				Reminds operator crosspatch is in use.
CARRIER LEVEL ALERT*			X		X	Carrier level ±3 dB out of Limit with carrier level alarm signal generated.
Red						
			X			Carrier level ±3 dB out of limit and alarm is disabled.
		X		X		Carrier level ±1 dB out of limit with carrier level alarm signal generated.
		X				Carrier level ±1 dB out of limit and alarm disabled power supply output voltage loss and alarm signal generated.
CLM*	Red		X		X	Carrier level detector or carrier level control
			X			power supply output voltage loss and alarm disabled.
OUTPUT POWER ALERT	Red		X		X	Output power alert signal. 1 fault and 1 maintenance.
FREQUENCY STANDARDS	Red		X		X	Both frequency standards in maintenance, or
			X			Both frequency standards in maintenance.
	Amber	X		X		One frequency standard faulted and not in maintenance.
		X				One frequency standard in maintenance.
TRACKING RECEIVERS	Red		X		X	Tracking receivers major fault with tracking receiver alarm signal generated.
			X			Tracking receiver major fault and alarm disabled
	Amber	X		X		Tracking receiver minor fault with tracking receiver alarm signal generated.
		X				Tracking receiver minor fault and alarm disabled

*Not applicable for terminals with up-converter interface controllers installed.

Table 2-4. AN/FSC-78(V) Equipment Status Condition and Fault and System Status Panel 14A16 Indications (Continued)

Equipment status indicator	Color	Summary status indication: Minor fault	Summary status indication: Major fault	Audio alarm indication: Minor fault	Audio alarm indication: Major fault	Equipment status condition
AUTOTRACK DROPOUT/DISABLE	Red	X				Autotrack dropout signal with no alarm disable from fault and system panel.
			X		X	Autotrack dropout signal with no alarm disable signal from fault and system status panel.
UNIT 13	Red		X		X	Major fault in one or more frequency distribution amplifiers.
RGMU	Amber	X		X		Receiver gain monitor fault signal with receiver gain monitor maintenance signal disabled.
		X				Receiver gain monitor maintenance signal generated.
RECEIVER GAIN ALERT	Amber	X				Online receiver gain level out of limit.
SYSTEM NOISE TEMPERATURE	Amber	X		X		System noise temperature high.
CONVERTER POWER SUPPLIES *	Red		X		X	Major fault in one or more up-converter power supplies with up-converter alarm signal generated.
			X			Major fault in one or more up-converter power supplies and up-converter alarm disabled.
	Amber	X		X		Minor fault in one or more up-converter power supplies with up-converter alarm signal generated.
	Amber	X				Minor fault in one or more up converter power supplies and up-converter alarm disabled.
SUMMARY STATUS FULLY AVAILABLE	Green					All monitored equipment online or available for use and no indicated fault in monitored equipment.
MAJOR FAULT	Red		X			Major fault in one or more monitored equip
MINOR FAULT	Amber	X				Minor fault and no major fault in monitored equipment
UP CONVERTER *			X		X	Major fault in one or more up-converters. with up-converter alarm signal generated.
			X			Major fault in one or more up-converters, and up-converter alarm disabled.
DOWN CONVERTER	Red		X		X	Major fault in one or more down-converters, with down-converter alarm signal generated
			X			Major fault in one or more down-converters, and down-converter alarm signal disabled.

*Not applicable for terminals with up-converter interface controllers installed.

Table 2-4. AN/FSC-78(V) Equipment Status Condition and Fault and System Status Panel 14A16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
TRANSMIT IFLA						
	Green					Transmit IFLA 1 online signal generated.
	Red		X		X	Transmit IFLA 1 faulted with IFLA 1 online signal generated.
		X		X		Transmit IFLA 1 faulted with IFLA 1 online signaled disabled.
	Amber					Transmit IFLA 1 standby signal generated. IFLA 1 not faulted and IFLA I online signal and maintenance signal disabled.
	Blue					Transmit IFLA 1 maintenance signal generated.
2	Green					Transmit IFLA 2 online signal generated.
	Amber					Transmit IFLA 2 standby signal generated. Transmit IFLA 2 not faulted and IFLA online signal and maintenance signal disabled.
	Red		X		X	Transmit IFLA 2 faulted with IFLA 2 online signal generated.

Table 2-4. AN/FSC-78(V) Equipment Status Condition and Fault and System Status Panel 14A 16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
TRANSMIT IFLA (continued)						
		X		X		Transmit IFLA 2 faulted with IFLA 2 online signal disabled.
	Blue					Transmit IFLA 2 maintenance signal is generated.
POWER AMPLIFIERS PA 1	Green					PA 1 online signal generated.
	Amber					PA 1 standby signal is generated. PA 1 beam power on, PA 1 not faulted and PA 1 online signal and maintenance signal disabled.
	Red		X		X	PA 1 faulted by PA 1 final tube fault or online IPA fault with PA 1 online signal generated.
			X		X	Offline IPA fault.
			X		X	PA 1 faulted by PA 1 final tube fault or online IPA fault with PA 1 online signal disabled.
	Blue					PA 1 maintenance signal is generated.
PA 2	Green					PA 2 online signal is generated.
	Amber					PA 2 standby signal generated. PA 2 beam power on, PA 2 is not faulted and PA 2 online signal and maintenance signal are disabled.
	Red		X		X	PA 2 faulted by PA 2 final tube fault or online IPA fault with PA 2 online signal generated.
		X	X			PA 2 faulted by PA 2 final tube fault or online IPA fault with PA 2 online signal disabled.
		X		X		Offline IPA fault.
	Blue					PA 2 maintenance signal generated.
COMBINE	White					PA 1 and PA 2 online signals generated and combined outputs of both PA 1 and PA 2 connected through hybrid to antenna feed.
RECEIVE IFLA 1	Green					Receive IFLA 1 online signal generated.
	Amber					Receive IFLA 1 standby signal generated. Receive IFLA 1 not faulted, and receive IFLA 1 online signal and maintenance signal disabled.

Table 2-4. AN/FSC-78(V) Equipment Status Condition and Fault and System Status Panel 14A16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
RECEIVE IFLA (continued)						
	Red		X		X	Receive IFLA 1 is faulted and receive IFLA 1 online signal generated.
		X		X		Receive IFLA 1 faulted and receive IFLA 1 online signal disabled.
			X		X	Receive IFLA 1 online signal generated with paramp 1 or 2 online signal generated and online receiver gain fault generated by receiver gain monitor.
		X		X		Receive IFLA 1 online signal generated with paramp 1 or 2 online signal generated and offline receiver gain fault generated by receiver gain monitor.
	Blue					Receive IFLA 1 maintenance signal generated.
2	Green					Receive IFLA 2 online signal generated.
	Amber					Receive IFLA 2 standby signal generated. Receive IFLA 2 not faulted, and receive IFLA 2 online signal and maintenance signal disabled.
	Red		X		X	Receive IFLA 2 faulted and receive IFLA 2 online signal generated.
		X		X		Receive IFLA 2 faulted and receive IFLA 2 online signal disabled.
			X		X	Receive IFLA 2 online signal generated with paramp 1 or 2 online signal generated and online receiver gain fault generated by receiver gain monitor.
		X		X		Receive IFLA 2 online signal generated, with paramp 1 or 2 online signal generated, and offline receiver gain fault generated by receiver gain monitor.
	Blue					Receive IFLA 2 maintenance signal generated.
PARAMPS						
1	Green					Paramp 1 online signal generated.
	Amber					Paramp 1 standby signal generated. Paramp 1 is not faulted and paramp 1 online signal and maintenance signal disabled.

Table 2-4. AN/FSC- 78(V) Equipment Status Condition and Fault and System Status Panel 14A 16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
PARAMPS (continued)						
	Red		X		X	Paramp 1 is faulted and paramp 1online signal is generated.
		X		X		Paramp 1 is faulted and paramp 1 online signal is disabled.
			X		X	Paramp 1 online signal generated with receive IFLA 1 or 2 online signal generated and online receiver gain fault generated by receiver gain monitor.
		X		X		Paramp 1 online signal generated with receive IFLA 1 or 2 online signal generated and offline receiver gain fault generated by receiver gain monitor.
	Blue					Paramp 1 maintenance signal generated.
2	Green					Paramp 2 online signal generated.
	Amber					Paramp 2 standby signal generated. Paramp 2 is not faulted and paramp 2 online signal and maintenance signal are disabled.
	Red		X		X	Paramp 2 is faulted and paramp 2 online signal is generated.
		X		X		Paramp 2 is faulted and paramp 2 online signal disabled.
			X		X	Paramp 2 online signal generated with receive IFLA 1 or 2 online signal generated and online receiver gain fault generated by receiver gain monitor.
		X		X		Paramp 2 online signal generated with IFLA I or 2 online signal generated, and offline receiver gain fault generated by receiver gain monitor.
	Blue					Paramp 2 maintenance signal generated.
TRANSMIT DISABLE	Red					XMT/OPR DISABLE pushbutton switch pressed by transmitter operator, or PA 1 and PA 2 diode switch inhibit signal generated.

Table 2-4.AN/FSC-78(V) Equipment Status Condition and Fault and System Status Panel 14A16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
RECEIVE						
AUTO/MANUAL						
MANUAL	White					AUTO/MANUAL switch pressed to MANUAL, or RGMU fault signal or RGMU maintenance signal generated.
AUTO	White					AUTO/MANUAL switch pressed to AUTO, and RGMU fault signal or RGMU maintenance signal not generated.
TRANSMIT						
AUTO/MANUAL						
MANUAL	White					AUTO/MANUAL switch pressed to MANUAL XMT/OPR DISABLE not generated, and CF11 not generated.
AUTO	White					AUTO/MANUAL switch pressed to AUTO and low elevation cut off signal, XMT/OPR DISABLE, CF11 not generated, and system in one of allowable configurations.

SECTION II. CIRCUIT ANALYSIS OF AN/FSC-78(V) STATUS AND ALARM EQUIPMENT

2-4. Logic Unit Power Supply 15A4. Logic unit power supply 15A4 contains a +5V (PS1) and a -5V(PS2) dc power supply (fig. FO-5). This power is applied to the system status logic unit for biasing and logic operations. The +5 V dc also goes the fault and system status panel for power supply turn on control. The -5 V dc is also used as a logic common for the status and alarm circuits in equipment being monitored. Use of -5 V dc for logic common ensures correct functioning of the system status logic unit input gating circuits. Single phase, 120 V ac input power is connected to the logic unit power supply at connector J1. The input power is routed through circuit breakers CB1 and CB2. Input power is applied to power supply terminal board TB1 pins 1 and 2. The output of each power supply is monitored at the front panel by an indicator light and a voltmeter. Sense voltage lines for both power supplies (PS1 and PS2) are extended to the system status logic unit backplane assembly 15A5A6. Regulation of power supplies PS1 and PS2 output voltages is therefore controlled by the voltages present at the input to the system status logic unit circuit cards as explained in paragraphs 2-4a(5) and 2-4b(5).

a. Power Supply PSI (fig. FO-6). Power Supply PS1 (-5 V dc power supply) provides regulated +5 V dc output at 12.6 A. It contains protective circuits for overcurrent conditions, a bias supply, and a series voltage regulator circuit.

(1) Single phase, 120 V ac input power is applied through fuse Fl and thermostat S1 to transformer T1. Thermostat S1 opens to protect the supply when overheating occurs and resets automatically when the overtemperature condition ceases. Transformer T1, which contains two secondary windings, steps down the input voltage for application to the main and auxiliary rectifiers.

(2) The bias supply, consisting of halfwave auxiliary rectifier CR7, filter capacitor C7, and zener diode regulator CR6, provides operating voltage for error amplifiers Q1 and Q2, and current limit amplifier Q3. Zener diode CR1 and resistor R5, which are connected across the bias supply, provide a regulated temperature compensated reference voltage. Resistor R4 compensates for input voltage variations.

(3) The main rectifer consists of rectifiers CR8, CR9, and filter capacitor C8. Rectifiers CR8 and CR9 perform full-wave rectification of the ac voltage from transformer T1. The rectified output is filtered by capacitor C8. The filtered dc voltage is applied to series regulators Q8 through Q13.

(4) The series voltage regulator circuit regulates the dc output voltage and provides overcurrent protection. The series voltage regulator circuit consists of error amplifiers Q1 and Q2, current limit amplifier Q3, drivers Q5 and Q6, and series regulators Q8 through Q13. Series regulators Q8 through Q13 present a variable impedance in series with the load. The regulated + 5 V dc output is taken across pins 6 and 4 of the terminal board TB1. The dc output voltage is adjustable from 4.75 to 5.25 V dc by potentiometer R1. Potentiometer R1 sets this output voltage level established by series regulators Q8 through Q13. The regulators are controlled by signals derived from error amplifiers Q1 and Q2 or current limit amplifier Q3. Error amplifiers Q1 and Q2 provide the control signal under normal load conditions, and current limit amplifier Q3 provides the control signal during overload conditions.

(5) Operation of the series regulator circuit is determined by changes in output voltage. The output voltage is sensed by divider resistors R2 and R3 and potentiometer R1. A +S reference voltage is established by zener diode CR1 and resistor R5. The output voltage is compared with the + S reference voltage to produce an error voltage at the junction of resistors R2 and R3. The error voltage is amplified by error amplifiers Q1 and Q2 and applied to drivers Q5 and Q6. The corresponding change in driver Q6 emitter current drives the emitter base junctions of series regulators Q8 through Q13. This action changes the emitter-to-collector voltage drop of series regulators Q8 through Q13. The output voltage decreases if the output voltage has tended to increase. If the output voltage has tended to decrease, the emitter-to-collector voltage drop decreases to increase the output voltage.

(6) Overcurrent conditions are detected by current limit amplifer Q3. Current limit amplifier Q3 samples load current through current sensing resistor R25. The voltage drop across R25 is compared with the preset voltage reference determined by potentiometer R17 and resistor R18. When the voltage at R25 exceeds the preset output current level, a difference voltage is developed that causes current limit amplifier Q3 to conduct. This decreases the current through drivers Q5 and Q6, increases the voltage drop across the series regulators, and decreases the output voltage. The output current is thus limited to a safe value. The current limiting value is a factory adjustment. If the output is short circuited, the following action takes place. The voltage sensed by potentiometer R17 and resistor R18 is decreased in proportion to the output voltage, which is lowered due to the short. Current limit amplifier Q3 is successively biased into turn on at lower and lower load currents as the output voltage decreases. This action continues until the output voltage decreases to zero and current decreases to predetermined low value.

b. Power Supply PS2 (fig. FO-7). Power supply (-5 V dc power supply) provides a regulated -5 V output at 5 A It contains protective circuits for overcurrent current.

conditions. The -5 V dc power supply consists of an ac circuit, a main rectifier, a bias supply, and a series voltage regulator circuit.

(1) Single phase 120 V ac input power is applied to transformer T1. Transformer T1, which contains two secondary windings, steps down the input voltage for application to the main and auxiliary rectifiers.

(2) The bias supply consists of half-wave auxiliary rectifier CR7, filter capacitor C7, and zener diode regulator CR6. It supplies operating voltage for error amplifiers Q1 and Q2 and current limit amplifier Q3. Zener diode CR1 and resistor R5 provide a regulated temperature compensated reference voltage. Resistor R4 compensates for input voltage variations.

(3) The main rectifier consists of CR8 and CR10 and filter capacitor C8. Rectifiers CR8 an CR10 perform full-wave rectification of the ac voltage from transformer T1. The rectified output voltage is filtered by capacitor C8. The filtered dc voltage is applied to series regulators Q8 and Q9.

(4) The series voltage regulator circuit regulates the dc output voltage and provides overcurrent protection. This circuit consists of error amplifiers Q1 and Q2, current limit amplifier Q3, driver Q5, and series regulators Q8 and Q9. Series regulators Q8 and Q9 present a variable impedance in series with the load. The regulated -5 V dc output is taken across pins 4 and 6 of terminal board TB1. Potentiometer R1 controls series regulators Q8 and Q9 to set the dc output voltage within the range from -4.75 to -5.25 V dc. Q8 and Q9 are also controlled by signals derived from error amplifiers Q1 and Q2 or current limit amplifier Q3. Error amplifiers Q1 and Q2 provide the control signal under normal load conditions, and current limit amplifier Q3 provides the control signal during overload conditions.

(5) Operation of the series regulator circuit is determined by changes in output voltage. The output voltage is sensed by divider resistors R2 and R3 and potentiometer R1. A+S reference voltage is established by zener diode CRI and resistor R5. The output voltage is compared with the +S reference voltage to produce an error voltage at the junction of resistors R2 and R3. The error voltage is amplified by error amplifiers Q 1 and Q2 and is applied to driver Q5. The corresponding change in driver Q5 emitter current drives the emitter base junctions of series regulators Q8 Q9. This action changes the emitter-to-collector voltage drop. The output voltage decreases if the output voltage tended to increase. If the output voltage has tended to decrease, the emitter-to-collector voltage drop decreases to increase the output voltage.

(6) Overcurrent conditions are detected by cu limit amplifier Q3. Current limit amplifier Q3 samples current through current-sensing resistor R28. The voltage drop across R28 is compared with the preset voltage reference determined by potentiometer R17 and resistor R18. When the voltage at R28 exceeds the preset output current level, a difference voltage is developed that causes current limit amplifier Q3 to conduct. This decreases the current through driver Q5, increases the voltage drop across series regulators Q8 and Q9, and decreases the output voltage. The output current is thus limited to a safe value. The current limit value is determined by the factory setting of current limit potentiometer R17. When operating conditions approach short circuit, the output voltage decreases. Since the voltage determined by potentiometer R17 and resistor R18 is proportional to the output voltage, current limit amplifier Q3 is successively biased into turn on at lower and lower load currents as the output voltage decreases. This action continues until the output voltage decreases to zero and current decreases to a predetermined low value.

2-5. System Status Logic Unit. Equipment status and control signals received by the system status logic unit originate from closure or opening of relay contacts that establish or interrupt the -5 V dc common logic return circuit. Status and control signals received by the system status logic unit are routed via the backplane (interface) assembly (fig. 2-1) to circuit cards that process, gate, and sum these signals to produce equipment status and alarm signals. These signals light indicators and sound alarms at the fault and system status panel. The circuit cards also produce control signals to configure transmit and receive waveguide switch positions. The open or continuity to ground signal received by the circuit cards is converted by an inverting amplifier or gating input circuit to an operational logic level of 0 or 4 +1 V dc. In the Network Terminals these status and alarm signals are also routed to multiprogrammer 15A11 for processing to provide status and alarm data to a user interface. Operational descriptions of the system status logic unit circuit cards are included in the following paragraphs.

a. Circuit Card A (fig. FO-8). Circuit card A receives operational equipment status signals. The card processes these signals to produce control signals, and it lights status indicator lamps on the fault and system status panel. Circuit card A also receives summed major fault and major alarm signals from circuit cards E, D, F, and G and summed minor fault and minor alarm signals from circuit cards E, D, and F.

(1) Equipment operational status signals are processed to turn on lamp driver modules. A turned-on lamp driver module supplies 28 V dc return to ground through a transistor to light a status indicator lamp at the fault and system status panel. Fault and alarm signals processed by circuit card A are summed by NOR gates 10D4A, 10C4A, 10D7A, and 10C7A (fig. FO-8, sh 10) to produce minor and major fault and alarm summed signals.

(2) Summed major fault signals of circuit card A and circuit cards E, D, F, and G are group-summed by NOR gate 3C6A (fig. FO-8, sh 3) to produce a major fault signal. The major fault signal turns on lamp driver module A11, lighting the major fault lamp on the fault and system status, panel. The major fault signal is also routed to NAND gate 3B5A to inhibit a fully available signal.

(3) Summed minor fault signals of circuit card A and circuit cards E, D, and F are group-summed by NOR gate 3A6A to produce a minor fault signal. The minor fault signal turns on lamp driver module A12, lighting the minor fault lamp on the fault and system status panel. The minor fault signal is also routed to NAND gate 3B5A to inhibit a fully available signal.

(4) Summed minor alarm signals of circuit card A and circuit cards E, D, and F are group-summed by NOR gate 4D7A (fig. FO-8, sh 4). The summed minor alarm signal is passed by NAND gate 4C7B when there is no major alarm signal. (A major alarm signal inhibits a minor alarm signal.) The signal is delayed 500 milliseconds by monostable multivibrator module 4C6B to eliminate false alarms due to transient pulses. The summed minor fault signal NAND-gates with the delayed version of itself at 4C5A and then enables NAND gate 4C4A if there is no audible alarm mute signal. Enabled NAND gate 4C4A turns on audio alarm driver A27 to activate a minor audio alarm.

(5) Summed major alarm signals are NOR-gated by 4C7A. The summed major alarm signal inhibits NAND gate 4C7B, prohibiting summed minor alarm signals, and NAND-gates with itself at NAND gate 4C5C after one version of the signal is delayed 500 milliseconds by monostable multivibrator module 4C6C. The summed major alarm signal then NAND gates at 4B4A, and audio alarm driver A28 is turned on.

(6) An audio alarm mute signal switches the active signal output of NOR latching circuit 4B6A/4B6B from 4B6B to 4B6A, to enable NAND gates 4C4B and 4B4B. The signal is NANDed with summed minor alarm or summed major alarm signal. A NAND-gated, summed minor alarm signal and audio mute signal at 4C4B turns on audio alarm driver A13. Audio alarm driver A13 supplies current through A48R1 to reduce the volume of the major audio alarm. A NAND-gated, summed major alarm signal and audio mute signal at 4B4B turns on audio alarm driver A29. Audio alarm driver A29 supplies current through A48R2 to reduce the volume of the major audible alarm.

(7) A tracking receiver major fault status signal and a tracking receiver alarm signal are NAND-gated at NAND gate 5B4D (fig. FO-8, sh 5) to provide a tracking receiver major alarm signal. A tracking receiver major fault signal inhibits NAND gate 5B4A, prohibiting a tracking receiver minor fault indication, and turns on lamp driver A7, which drives a tracking receiver major fault status signal to light the MAJOR FAULT indicator lamps on the fault and system status panel. An autotrack dropout signal turns on lamp driver module A8 (fig. FO-8, sh 2), to light the autotrack dropout indicator lamp on the fault and system status panel. A major fault signal goes to NOR gate 3C6A (fig. FO-8 sh 3) and a circuit card A major alarm summary status signal goes to NOR gate 4C7A (fig. FO-8, sh 4). An audible alarm disable status signal inhibits NAND gate 2C5B (fig. FO-8 sh 2) to interrupt the audible alarm signal.

(8) An antenna major fault status signal turns on lamp driver module A16 (fig. FO-8, sh 6), which drives an antenna major fault status signal to light the major fault indicator lamp on the fault and system status panel. The antenna major fault signal inhibits NAND gate 6C4A to prevent lamp driver module A17 from turn on. Antenna major fault signal and/or antenna major maintenance signal enables NAND gate 6B5B to produce an antenna major alarm signal An antenna major maintenance signal inhibits NAND gate 6B5B so that there will be no antenna major alarm signal during an antenna major fault. NAND gate 6C4A (antenna minor fault) is enabled by antenna major fault to turn on lamp driver A17, lighting the antenna minor fault indicator lamp on the fault and system status panel. NAND gate 6A5B (antenna minor alarm) is enabled by antenna minor fault and/or antenna minor maintenance and no antenna major fault to produce an antenna minor alarm.

(9) A carrier level major alert signal and a carrier level alarm signal enable NAND gate 7B4B to produce a carrier level major alarm signal. A carrier level major alert signal without a carrier level alarm signal inhibits NAND gate 7B4B, thereby turning on lamp driver A23, lighting the carrier level major alert lamp, but producing no major alarm signal. A carrier level minor alert signal and/or carrier level major alert signal turns on lamp driver A18 to light the carrier level minor alert lamp. A carrier level minor alert signal inhibits NAND gate 7A4A (fig. FO-8, sh 7), turning on lamp driver A 18 and lighting the carrier level minor alert lamp, but producing no minor alarm signal.

(10) A carrier level monitor fault signal and a carrier level monitor alarm signal enable NAND gate 8C5A (fig. FO-8, sh 8), producing a carrier level monitor alarm signal. A carrier level monitor fault signal without a carrier level monitor alarm signal inhibits NAND gate 8C5A.

(11) A fault and no maintenance in frequency standard 1, or a fault and no maintenance in frequency standard 2, enables NOR gate 9C5A (fig. FO-8, sh 9). NAND gate 9D3A is enabled (frequency standard major alarm) when there is a fault or maintenance from one frequency standard and a fault and no maintenance from the other frequency standard. NAND gate 9B5B is enabled when there is a fault or maintenance in frequency standard 1 and fault or maintenance in frequency standard 2. NAND gate 9B5B turns on lamp driver A4 (frequency standard major fault). Lamp driver A3 (frequency standard minor fault) is turned on by: Fault or no maintenance from one standard, and no fault and no maintenance from the other standard. NAND gate 9C3B is enabled (frequency standard minor alarm) when there is a fault and no maintenance from one standard and no fault and no maintenance from the other standard.

(12) A receive gain monitor unit fault signal, applied through 10OB6A and NOR gate 10D3A (fig. FO-8, sh 10), produces a minor fault summary logic A signal. The fault signal enables NAND gate 10B5C to turn on lamp driver module A20, which lights the fault and system status panel receiver gain monitor unit fault lamp. The receiver gain monitor unit fault signal is also routed to circuit card G. A receiver gain monitor unit fault plus a maintenance signal inhibits NAND gate 10BSC (fig. FO-8, sh 10), prohibiting a minor alarm input to 10C4A. The receiver gain monitor unit maintenance signal is also routed out to circuit card G.

NOTE

Step (13) is not applicable to terminals with up-converter interface controllers installed.

(13) A converter power supply major fault signal turns on lamp driver A10 (fig. FO-8, sh 12) to light the fault and system status panel converter power supply major fault lamp. The major fault signal also produces a major fault summary signal and inhibits NAND gate 12B5A, prohibiting a minor fault indication. A converter power supply major fault signal plus a converter power supply alarm sign NAND 12B5B produces a major alarm signal. A converter power supply alarm signal plus a converter power supply minor fault signal at NAND gate 12A5A produces a minor alarm signal. A converter power supply minor fault signal without a converter power supply major fault signal enables NAND gate 12B5A, turning on lamp driver module A25, to light the fault and system status panel converter power supply minor fault lamp, and producing a minor fault signal.

(14) A unit 13 frequency standard major fault signal turns on lamp driver module A14 (fig. FO-8, sh 13 and FO-15, sh 1), lighting the fault and system status panel UNIT 13 major fault lamp. The unit 13 major fault signal also produces a major fault summary signal and inhibits NAND gate 13B5B, prohibiting a signal to the scanner formatter (when installed). A unit 13 major fault alarm signal NAND gate 13B5C produces a unit 13 major alarm signal. NAND gate 13A5A is provided as a spare for future use.

b. Circuit Card D (fig. FO-9). Circuit card D receives transmit waveguide position signals and transmit equipment status signals. Circuit card D also receives the combine switch activated signal from circuit card E. These signals are processed to provide signals to light fault and system status panel equipment status indicator lamps and to generate transmit equipment status and configuration signals for circuit card E. Circuit card D also generates major fault summary, major alarm summary signals that are route to circuit card A.

NOTE

Connectors P5 through P10 are front-mounted connectors that transfer signals between circuit cards D and E.

(1) Transmit waveguide switch position signals are NANDed (fig. FO-9, sh 5) to generate waveguide configuration signals. Waveguide configuration signals CF1, CF2, CF4, and CF5 are gated at NOR gate 6C7A (fig. FO-9, sh 6) to produce the transmit IFLA1 online signal. The IFLA1 online signal turns on lamp driver module A3, lighting the fault and system status panel IFLA2 online lamp. Waveguide configuration signals CF6, CF7, CF8, CF9, and CFIO are gated at NOR gate 9C6A (fig. FO-9, sh 9) to produce the transmit IFLA2 online signal. The IFLA2 online signal turns on lamp driver A2, lighting the fault and system status panel IFLA2 online lamp. Waveguide configuration signals CF1, CF2, CF6, CF7, and CF1 are routed to circuit card E for processing.

(2) A transmit IFLA1 standby signal is generated by enabling NAND gate 6C5C (fig. FO-9, sh 6). NAND gate 6C5C is enabled when there are no transmit IFLA1 online, no transmit IFLA1 fault, and no transmit IFLA1 maintenance signals. The transmit IFLA1 standby signal turns on lamp driver module A13, lighting the fault and system status panel IFLA1 standby lamp. The transmit IFLA1 standby signal is also routed to circuit card E for processing.

(3) A transmit IFLA1 fault signal is generated by enabling NAND gate 6B6A. NAND gate 6B6A is enabled when there is a transmit IFLA1 fault signal and no IFLA1 maintenance signal. The transmit IFLA1 fault signal turns on lamp driver module A4, lighting the fault and system status panel IFLA1 fault lamp. The IFLA1 fault signal is also routed to circuit card E for processing.

(4) A PA2 online signal is generated by enabling NAND gate 7D7A (fig. FO-9, sh 7). NAND gate 7D7A is enabled when transmit waveguide switch 3 is in position 1 and switch 3A is in position 1. The PA2 online signal turns on lamp driver module A6, lighting the fault and system status panel PA2 online lamp. The PA2 online signal is also sent to circuit card E for processing.

(5) A PA2 standby signal is generated by enabling NAND gate 7C5A. NAND gate 7C5A is enabled when there is no PA2 fault signal, no PA2 maintenance signal, no PA2 online signal, and there is a PA2 beam on signal. The PA2 standby signal turns on lamp driver module A16, lighting the fault and system status panel PA:2 standby lamp. The PA2 standby signal is also sent to circuit card E for processing.

(6) A PA2 fault signal is generated by enabling NAND gate 7B5A. NAND gate 7B5A is enabled when there is a PA2 final tube fault signal or the IPA that is connected to PA2 is faulted and there is no PA2 maintenance signal. The PA2 fault signal turns on lamp driver module A12, lighting the fault and system status panel PA2 fault lamp. The PA2 fault signal is also sent to circuit card E for processing.

(7) A PA1 online signal is generated by enabling NAND gate 8D7A (fig. FO-9, sh 8). NAND gate 8D7A is enabled when transmit waveguide switch 1 is in position 1 and switch 1A is in position 1. The PA1 online signal turns on lamp driver module A9, lighting the fault and status panel PA1 online lamp. The PA1 online signal is also sent to circuit card E for processing.

(8) A PA1 standby signal is generated by enabling NAND gate 8C5A. NAND gate 8C5A is enabled when there is no PA1 online, no PA1 maintenance, no PA1 fault, and there is a PA1 beam on signal. The PA1 standby signal turns on lamp driver module A1, lighting the fault and system status panel PA1 standby lamp. The PA1 standby signal is also sent to circuit card E for processing.

(9) A PA1 fault signal is generated by enabling NAND gate 8B5A. NAND gate 8B5A is enabled when there is a PA1 final tube fault or when the IPA is connected to PA1 fault signal and there is no PA1 maintenance signal. The PA1 fault signal turns on lamp driver module A8, lighting the fault and system status panel PA1 fault lamp. The PA1 fault signal is also sent to circuit card E for processing.

(10) A transmit IFLA2 standby signal is generated by enabling NAND gate 9C5A (fig. FO-9, sh 9). NAND gate 9C5A is enabled when there are no IFLA2 online no IFLA2 maintenance, and no IFLA2 fault signals. The transmit IFLA2 standby signal turns on lamp driver module A5, lighting the fault and system status panel IFLA2 standby lamp. The transmit IFLA2 standby signal is also sent to circuit card E for processing.

(11) A transmit IFLA2 fault signal is generated by enabling NAND gate 9A6A. NAND gate 9A6A is enabled when there is a transmit IFLA2 fault signal and no transmit IFLA2 maintenance signal. The transmit IFLA2 fault signal turns on IFLA2 lamp driver module A15, lighting the fault and system status panel transmit IFLA2 fault lamp. The transmit IFLA2 fault signal is also sent to circuit card E for processing.

(12) A PA1 maintenance signal is generated (fig FO-9, sh 10) when PA1 is in maintenance, or transmit waveguide switch 5 is in position 1 and transmit wave guide switch 6 is in position 2 (status signals NANDed at 10D6A), or transmit waveguide switch 5 is in position 2 and transmit waveguide switch 8 is in position 1 (status signals NANDed at 10D6B). The PA1 maintenance signal turns on lamp driver module A10, lighting the fault and system status panel PA1 maintenance lamp. The PA1 maintenance signal is also sent to circuit card E for processing.

(13) A PA2 maintenance signal is generated (fig. FO-9, sh 11) when PA2 is in maintenance, or transmit waveguide switch 5 is in position 1 and transmit wave-guide switch 8 is in position 1 (status signals NANDed at 11D6A), or transmit waveguide switch 5 is in position 2 and transmit waveguide switch 6 is in position 2 (status signals NANDed at 11D6B). The PA2 maintenance signal turns on lamp driver module A7, lighting the fault and system status panel PA2 maintenance lamp. The PA2 maintenance signal is also sent to circuit card E.

(14) Major faults, major alarms, minor faults, and minor alarms are summed by NOR gates 12D4A, 12C4A, 12B4A, and 12A4A (fig. FO-9, sh 12). The summed fault and alarm signals are sent to circuit card A. A transmit waveguide switch 5 position 2 operational equipment status signal turns on lamp driver A17 to light the IPA CROSS PATCH indicator on the fault and system status panel.

c. Circuit Card E (fig. FO-10) Circuit card E processes fault and system status panel transmit push button select command signals for IFLA1, IFLA2, PA1, PA2, combine mode, and transmit manual/automatic mode enable. Circuit card E receives operational equipment status, transmit operate/disable, and low elevation cutoff signals. Circuit card E also receives transmit waveguide switch position status signals, and transmit equipment status signals from circuit card D. Circuit card E processes these signals to provide transmit waveguide switch position control to relay cards.

NOTE

Connectors P5 through P10 are front-mounted connectors that transfer signals between circuit cards D and E.

(1) In the transmit automatic mode, transmit waveguide configuration signal inputs (fig. FO-10, sh 8 and 9) from circuit card D are NANDed with transmit equipment status signals. The NANDed waveguide configuration and status signals produce transmit waveguide switch position command signals which are routed to set-reset flip-flops that function as latching circuits (fig. FO-10, sh 4, 5, and 6). The latching circuits for transmit automatic mode are similar, therefore the operation of only one will be described. NAND gate 4C6A (fig. FO-10, sh 4) is enabled by the transmit waveguide switch 1 position 1 command signal from NOR gate 8C3A (fig. FO-10, sh 8) when the manual mode has not been selected. The enabled signal from 4C6A sets latching circuit 4C5A/4C5B (fig. FO-10, sh 4), to initiate a 0.5 second pulse from single-shot 4D4A. The 0.5 second pulse configures transmit waveguide switch I to position 1. When transmit waveguide switch 1 is in position 1, a verification signal is sent from the waveguide switch to the reset input of latch 4C5A/4CSB, resetting the latch.

(2) The transmit manual mode signal is generated by NAND-gate 2D4A (fig. FO-10, sh 2) when the transmit AUTO/MANUAL switch of the fault and system status panel is pressed to MANUAL. The manual mode signal is generated if the transmit/operate disable switch has not been pressed to disable operation and both PA's are not in dummy load. If both PA's are in dummy load a CFI I signal is generated to inhibit generation of the manual mode signal. The transmit manual mode signal is sent to the set-reset flip-flops and latching circuit (fig. FO-1O, sh 4, 5, and 6) Latching circuits for transmit manual mode are similar, therefore only one will be described. NAND gate 4D6A (fig. FO-10, sh 4) is enabled by the transmit waveguide switch 1 position 1 manual selection signal and transmit manual mode. The enabled signal from 4D6A sets latching circuit 4C5A/4C to initiate a 0.5 second pulse from single-shot 4D4A. The 0.5 second pulse configures transmit waveguide switch 1 to position 1. When transmit waveguide switch 1 is in position 1, a verification signal is sent from the waveguide switch to the reset input of latch 4C5A/4C5B, resetting the latch.

(3) Selection of the combine mode switches both power amplifiers online. If both power amplifiers are in standby or if one is in standby and the other online, the one in standby will be switched to online with no change to the one already online. The combine mode is activated by pushbutton contact closure at the fault and system status panel. The resulting combine select signal is NANDed at NAND gate 3B5A (fig. FO-10, sh 3) when switch 6 is not in test, power amplifier I is in standby or online, transmit manual mode has been selected, PA2 is in online or standby, and SW 8 is not in test, enabling NAND gate 3B5A. The enabled output of NAND gate 3B5A sets set-reset flip-flop 3C2C/3B2A, sending; a combine switch activate signal to circuit card D and to the input of NAND gate 3B3A. The enabled output of NAND gate 3B5A also enables NOR gates 3D2A and 3C2A, which send manual position selection signals to 4D6A, 4B6B, 5C6A and 6D7A and transmit waveguide switches 1, 1A, 3, and 3A to configure them to position 1. When transmit waveguide switches 1, 1A, 3, and 3A have changed to position 1, verification signals are received at NAND 3B3A which, with the combine switched activated signal from set-reset flip-flop 3C2C/3B2A, enable NAND gate 3B3A. The enabled signal from NAND gate 3B3A turns on lamp driver module A3, lighting the fault and system status panel combine lamp. The combine enable signal from NAND gate 3B3A is also NADed at NAND gate 7D6A (fig. FO-10, sh 7) to produce a PA1 and PA2 diode switch inhibit signal and a carrier level monitor inhibit signal. During the switching function (0.5 second), the fault and system status panel transmit disable indicator lamp is momentarily lighted.

(4) The transmit AUTO/MANUAL pushbutton AUTO signal is NANDed at NAND gate 2B4A with transmit CF signals 1, 2, 6, and 7 when there is no low elevation cutoff, CF11, or transmit disable signals. The enable signal from 2B4A turns on lamp driver module A2 (fig. FO-10, sh 2), lighting the fault and system status panel transmit auto indicator lamp.

d. Circuit Card F (figure FO-11). Circuit card F receives operational equipment status input signals and waveguide switch position signals. These inputs are processed to provide equipment status signals for the fault and system status panel and interface panel. Circuit card F also produces fault and alarm summary signals that are sent to circuit card A, receive manual enable signals that are sent to circuit card G, and equipment status and waveguide switch position signals that are sent to circuit card G.

NOTE

Connectors P5 through P10 are front-mounted connectors that transfer signals between circuit cards F and G.

(1) A receive IFLA2 maintenance signal (fig. FO-11, sh 1) turns on lamp driver module A3, lighting the fault and system status receive IFLA2 maintenance lamp. The signal is also NANDed at NAND gate IC5B. NAND gate 1C5B is enabled when IFLA 2 is not online, not faulted, and not in maintenance. The enabled signal from NAND gate IC5B turns on lamp driver module A11, lighting the fault and system status panel RECEIVE IFLA2 standby lamp. When receive IFLA2 is in online, NAND gate IC6B or IC6C, depending on waveguide switch configuration, is enabled, producing an online signal. The online signal inhibits NAND gate IC5B and turns on lamp driver module A4, lighting the fault and system status panel receive IFLA online lamp. The receive IFLA2 online signal is also sent to circuit card G for processing.

(2) A receive IFLA2 fault signal is gated by NAND gate 2C5B or 2C5D (fig. FO-11, sh 2) for processing. NAND gate 2C5B is enabled when receive IFLA2 is in online and not in maintenance, receive IFLA2 is not faulted, or online gain is not faulted, and online paramp is not faulted. Enabled NAND gate 2C5B produces a major fault signal sent through 3A5A and 3A5B to circuit card A, and a major alarm signal that is sent through 3A5C and 3A5D to circuit card A. Enabled NAND gate 2C5B also turns on lamp driver module A 12. NAND gate 2C5D is enabled when receive IFLA2 is not online, not in maintenance, and indicating a fault or standby gain fault and the standby paramp is not in fault and not in maintenance. Enabled NAND gate 2CSD produces a minor fault and minor alarm signal that is sent to circuit card A. Enabled NAND gate 2C5D also turns on lamp driver module A12, lighting the fault and system status panel receive IFLA2 fault lamp.

(3) A paramp 2 fault signal is gated by NAND gate 2B5B or 2A5B for processing. NAND gate 2B5B is enabled when paramp 2 is online, not in maintenance, and indicating a fault or online gain fault and online IFLA is not in fault and not in maintenance. Enabled NAND gate 2BSB produces a major fault that is sent to 3A5A circuit card A and a major alarm signal that is sent to 3A5A circuit card A. Enabled NAND gate 2B5B also turns on lamp driver A16. NAND gate 2A5B is enabled when paramp 2 is not in maintenance, not online, and indicating a fault or standby gain fault and offline IFLA is not in fault and not in maintenance. Enabled NAND gate 2A5B produces a minor fault signal sent to 4A5A circuit card A and minor alarm signal that is sent to 4A5C circuit card A. Enabled NAND gate 2A5B also turns on lamp driver module A16, lighting the fault and system status panel paramp 2 fault lamp.

(4) A paramp I standby signal is produced enabling NAND gate 3D4A (fig. FO- 11, sh 3). NAND gate 3D4A is enabled when paramp 1 is not online, not in fault, and not in maintenance. The paramp 1 standby signal turns on lamp driver module A5, lighting the fault and system status panel paramp 1 standby lamp. A paralamp 1 maintenance signal turns on lamp driver module A13, lighting the fault and system status panel paralamp 1 maintenance lamp. NAND gate 3B5A is enabled when paramp 1 is online, not in maintenance, and is indicating a fault, or when online gain fault and online IFLA is not in fault and not in maintenance. Enabled NAND gate 3B5A produces a major fault that is sent to 3A5A card A and a major alarm signal that is sent to 3A5C circuit card A. Enabled NAND gate 3BSA also turns on lamp driver module A14, lighting the fault and system status panel paramp 1 fault lamp. NAND gate 3BSB is enabled when paramp 1 is not in maintenance, not online, and indicates a fault, or when standby gain fault and offline IFLA is not in fault and not in maintenance. Enabled NAND gate 3B5B produces a minor fault signal sent to 4A5A card A and minor alarm signals that are sent to 4A5C circuit card A. Enabled NAND gate 3B5B also turns on lamp driver module A14.

(5) A paramp 2 standby signal is produced by enabling NAND gate 4D4A (fig. FO-11, sh 4). NAND gate 4D4A is enabled when paramp 2 is not online, not in fault, and not in maintenance. The paramp 2 standby signal turns on lamp driver module A 15, lighting the fault and system status panel paramp 2 standby lamp. A paralamp 2 maintenance signal turns on lamp driver module A7, lighting the fault and system status panel paramlamp 2 maintenance lamp. NAND gate 4B6B is enabled when paramp 2 is online, not in maintenance, and is indicating a fault, or online gain fault and online paramp is not in fault and not in maintenance. Enabled NAND gate 4B6B produces a major fault that is sent to 3A5A card A and a major alarm signal that is sent to 3A5C circuit card A; Enabled NAND gate 4B6B also turns on lamp driver module A10, lighting the fault and system status panel receive IFLA1 fault lamp. NAND gate 4B6D is enabled when paramp is not in maintenance, not online, and indicates a fault, or when standby gain fault and offline paramp is not in fault and not in maintenance. Enabled NAND gate 4B6D produces a minor fault signal that is sent to 4A5A card A and minor alarm signals that are sent to 4A5C circuit card A. Enabled NAND gate 4B6D also turns on lamp driver module A10.

(6) A receive IFLA1 online signal is generated by enabling NAND gate 5A5A or NAND gate SASB (fig. FO-I1, sh 5). NAND gate 5A5A is enabled when receive waveguide switches 1, 2, and 3 are in position 1. NAND gate 5A5B is enabled when receive waveguide switch 1 is in position 2, receive waveguide switch 2 is in position 2, and receive waveguide switch 3 is in position 1. The receive IFLA1 online signal turns on lamp driver module A1, lighting the fault and system status panel receive IFLA1 online lamp. The receive IFLA1 standby signal is generated when NAND gate 5C4A is enabled. NAND gate 5C4A is enabled when receive IFLA1 is not in fault, not in maintenance, and not online. The receive IFLA1 standby signal turns on lamp driver module A2, lighting the fault and system status panel receive IFLA1 standby lamp. The receive waveguide switch position signals are sent to circuit card G for processing.

e. Circuit Card G (fig. FO-12) Circuit card G receives operational equipment status input signals, receive waveguide switch position signals, the receive manual enable signal, and fault and system status panel pushbutton select command signals for receive IFLA 1 and 2 and paramps 1 and 2. Circuit card G processes these signals to provide receive waveguide switch position control signals to relay cards and operational equipment status signals to the interface panel.

NOTE

Connectors P5 through P10 are front-mounted connectors that transfer signals between circuit cards F and G.

(1) A receive manual enable signal (fig. FO-12, sh 1) is generated when there is a receive manual enable signal from the fault and system status panel, or when the receive gain monitor unit is indicating a fault or is in maintenance. The receive manual enable signal turns on lamp driver module A2, lighting the fault and system status panel receive manual enable lamp. The receive manual enable signal inhibits inverter amplifier IB3A, prohibiting a turn on of lamp driver module AI during receive manual mode.

(2) Equipment status signals, indicating that IFLA1 and IFLA2 and paramps 1 and 2 are not online and not in maintenance, enable NAND gate 2D4A (FO-12, sh 2), producing a major fault and major alarm signal that is sent to circuit card A.

(3) Discrete contact closure signal inputs for online/offline noise status, level manual status, auto measurement status, and power status ranging (PSR) (fig. FO-12, sh 2, 3, and 4) are converted to discrete voltage levels by input circuit assemblies A3 through A6 and A12 through A 5. These discrete voltage levels are terminated at the interface panel for future use.

(4) Receive equipment status input signals ANDed with receive equipment pushbutton select signals from the fault and system status panel, provide inputs to latching circuits to produce a receive waveguide switch position signal (fig. FO-12, sh 5). Once a latching circuit is in the latched state, it will stay latched until the particular receive waveguide switch that the latching circuit controls has switched to its opposite position and has returned a signal confirming its new position.

f. Relay Direr/Relay Circuit Cards R1, R2 (g. FO-13, FO-14.Relay circuit cards receive transmit and receive waveguide switch position control signals from circuit cards E, F, and G. The energized relays route waveguide switch position control signals to the waveguide switches. The two relay circuit cards are the same. However the relay cards receive different waveguide switch position control signals. Table 2-5 identifies the circuit cards from which waveguide switch position control signals originate, the relay circuit card (R1 or R2 as referenced to their mounting position left or right) that receives the signal, the relay on the circuit card controlling the signal, and the control signal name.

Table 2-5. Relay Circuit Cards R1 15A5A4 and R2 15A5A5 Control Signals (AN/FSC-78(V)

From circuit card	To relay circuit card	Relay	Control signal
E	R1	K1	Transmit waveguide switch 1 position 1
E	R1	K2	Transmit waveguide switch 1A position 1
E	R1	K3	Transmit waveguide switch 3 position 1
E	R1	K4	Transmit waveguide switch 3A position 1
E	R1	K5	Transmit waveguide switch 4 position 1
E	R1	K6	Transmit waveguide switch 1 position 2
E	R1	K7	Transmit waveguide switch 1A position 2
E	R1	K8	Transmit waveguide switch 3 position 2
E	R1	K9	Transmit waveguide switch 3A position 2
E	R1	K10	Transmit waveguide switch 4 position 2
E	R1	K11	PA 1 and PA 2 diode switch inhibit
E	R1	K12	CLM inhibit
G	R2	K1	Receive waveguide switch 1 position 1
G	R2	K2	Receive waveguide switch 1 position 2

Table 2-5. Relay Circuit Cards R1 15A5A4 and R2 15A5A5 Control Signals (AN/FSC-78(V) (Continued)

From circuit card	To relay circuit card	Relay	Control signal
G	R2	K3	Receive waveguide switch 2 position 1
G	R2	K4	Receive waveguide switch 2 position 2
G	R2	K5	Receive waveguide switch 3 position 1
G	R2	K6	Receive waveguide switch 3 position 2
E	R2	K7	Low elevation cutoff
G	R2	K10, K11, K12	Receive manual enable

2-6. Fault and System Status Panel (fig. FO-15)
The fault and system status panel analysis is divided into the following circuit operations: Status and alarm displays, lamp test, transmit and receive status displays ant equipment selection switches, audio alarm, and power supply PS1. These operations are described in the subparagraphs that follow.

a. Status and Alarm Displays*.* Status and alarm signals from system status logic unit 15A5 enter fault and system status panel 14A16 through connectors J3 and J4 (fig. FO-15, sh 1 through 3). These signals supply a ground return through the indicator lamp to the fault and system status panel 28 V dc power supply. The positive side of the power supply is connected to the lamp; when the ground return is completed, the indicator lights. Table 2-2 lists the status and alarm signals to the fault and system status panel from the system status logic unit.

b. Lamp Test*.* Four pushbutton switches (fig. FO-15, sh 3) on the fault and system status panel are provided for lamp testing. Switch S6, when pressed, lights the red indicators on the fault and system status panel. Switch S7, when pressed, lights the green indicators on the fault and system status panel. Switch S10, when pressed, lights the blue indicators on the fault and system status panel Switch S11, when pressed, lights the amber indicators on the fault and system status panel. The switches are interconnected so that only one color can be tested at a time. Steering diodes in each lamp test circuit prevent interaction between individual circuits (fig. FO-15, sh 1 through 3). The test switches and lamp test circuits are interface connected through terminal board TB5 (fig. FO-15, sh 3).

c. Transmit and Receive Status Displays and Equipment Selection Switches. Transmit and receive status signals from the system status logic unit enter the fault and system status panel through connectors J3 and J4 (fig FO- 15, sh 2 and 3). These signals are applied to denote the standby, online, fault, and maintenance status of receive IFLA1 and IFLA2, and parametric amplifiers 1 and 2 (fig. FO-15, sh 3), transmit IFLA1 and IFLA2, and power amplifiers 1 and 2 (fig. FO-15, sh 2). With transmit IFLA1 in standby and transmit IFLA2 online, a ground return is applied to connector J4 pins B and E. This ground is applied to pins D and A of TRANSMIT IFLA1 and TRANSMIT IFLA2 indicators, respectively, lighting their amber (standby) and green (online) lamps. Should a fault occur in transmit IFLA2 (online), system status logic unit circuits automatically transfer the ground return at fault and system status panel connector J4 pin E to pin G. This action causes the TRANSMIT IFLA2 green (online) indicator to go out and the fault (red) indicator to light. At this time, if the uplink function is operating in the manual mode, the operator presses the TRANSMIT IFLA1 pushbutton to close switch S5 contacts (one common and one normally open). This action completes the transmit IFLA1 select circuit through connector J2, pins D and E. Completing the transmit IFLA1 select circuit enables the system status logic unit to reconfigure the uplink function, to transfer transmit IFLA1 online. Uplink function reconfiguration transfers the ground return from connector J4 pin B to pin A, lighting the TRANSMIT IFLA1 green (online) indicator, and causes the amber (standby) indicator to go out. Selection switch signals are routed through fault and system status panel logic unit. Transmit and receive AUTO/MANUAL switch signals are routed through connector J3.

d. Audio Alarm*.* Major and minor fault audio alarm signals from the system status logic unit enter the fault and system status panel through connector J2 (fig. FO-15, sh 4). The alarm signals supply +28 V dc to major fault audio alarm DS21 or minor fault audio alarm DS22. Pressing AUDIO ALARM MUTE pushbutton switch S17 completes the audio alarm mute signal path for system status logic unit circuits.

e. 28 V dc Power Supply PS1*.* Input power for the 28 V dc power supply enters the fault and system status panel at connector J1 (fig. FO-15, sh 4). Relay K1 and CIRCUIT BREAKER CB1 control power supply PS1 turnon.

Relay K1 is operated when logic unit power supply 15A4 provides 5 V dc control power through connector J2. Relay K1 incorporates a 1 second delay for logic unit power supply stabilization. Pressing CIRCUIT BREAKER DS20 closes the CB1 contacts applying 120 V ac through relay K1 contacts to power supply PS1. Power supply PS1 provides +28 V dc to terminal board TB1 for distribution. Terminal box TB1 through TB4 provide distribution of 28 , dc power for fault and system status panel indicators and through connector J2 to the system control logic unit for control signals. The following subparagraph discuss the operation of power supply PS1 FO-16).

(1) Single phase, 120 V ac input power is applied thorough fuse F1 and thermostat S1 to transformer T1. Thermostat S1 opens to protect the supply when overheating occurs and resets automatically when the overtemperature condition is eliminated. Transformer T1, which contains two secondary windings steps down the input voltage for application to the main and auxiliary rectifiers.

(2) The bias supply, consisting of half-wave auxiliary rectifier CR7, filter capacitor C7, and zener diode regulator CR6, provides operating voltage for error amplifiers Q1 and Q2 and current limit amplifier Q3. Zener diode CR1 and resistor R5, which are connected across the bias supply, provide a regulated, temperature-compensated reference voltage. Resistor R4 compensates for input voltage variations.

(3) The main rectifier consists of bridge rectifiers CR8 through CR11 and filter capacitor C8. Bridge rectifiers CR8 through CR11 perform fullwave rectification of the ac voltage from transformer T1 to provide a dc voltage which is filtered by capacitor C8. The filtered dc voltage is applied to series regulators and Q9.

(4) The voltage regulator circuit regulates the dc output voltage and provides overcurrent protection. The series voltage regulator circuit is composed of error amplifiers Q1 and Q2, current limit amplifier drivers Q5 and Q6, and series regulators Q8 through Q12. Series regulators Q8 through Q12 receive the dc voltage from the main rectifier and control the output by presenting a variable impedance in series with the load. The regulated, 28 V dc output is taken across pins 6 and 4 of terminal board TB1. The dc output voltage is adjustable from 26.6 V to 29.4 V by potentiometer R1. Series regulators Q8 and Q12, which regulate the dc output voltage to the adjustable value established by potentiometer R1, are controlled signals derived from error amplifiers Q1 and Q2 or current limit amplifier Q3. Error amplifiers Q1 and Q2 provide the control signal under normal load conditions, and current limit Q3 provides the control signal during overload conditions.

(5) Operations of the series regulator circuit is determined by changes in the output voltage and is sensed by the sensing divider resistors R2 and R3 and potentiometer R1, which compare output voltage with the +S reference voltage. The +S reference voltage is established by zener diode CR1 and resistor R5. Comparison of the output voltage with the +S reference voltage produces an error voltage at the junction of resistors R2 and R3, which is amplified by error amplifiers Q1 and Q2 and is current amplified by drivers Q5 and Q6. The corresponding change in driver Q5 emitter current drives the emitter base junctions of series regulators Q8 through Q12. This action increases the emitter-to-collector voltage drop of series regulators Q8 through Q12 to decrease the output voltage if the output voltage has increased, and it decreases the emitter-to-collector voltage drop to increase the output voltage if the output voltage has decreased.

(6) Overcurrent conditions are detected by current limit amplifier Q3. Current limit amplifier Q3 samples load current through current-sensing resistor R25A. When the voltage drop across R25A increases, compared with the preset voltage reference determined by potentiometer R17 and resistor R18, current limit amplifier Q3 conducts. Thus, when the output current rating of the unit is exceeded, current limit amplifier Q3 conducts, decreasing the current through drivers Q5 and Q6, resulting in an increase of voltage across the series regulators and a decrease of the output voltage, effectively limiting the output current to a safe value. The current limit value is determined by the factory setting of current limit potentiometer R17. When operating conditions approach short circuit, the output voltage decreases. Since the voltage determined by potentiometer R17 and resistor R18 is proportional to the output voltage, current limit amplifier Q3 is successively biased into turn on at lower and lower load currents as the output voltage decreases. This action continues until the output voltage decreases to zero and current decreases to a predetermined low value.

2-7. Channel Frequency Indicator 15A6, 15A9, 15A10 (fig. 2-2). The channel frequency indicator is seven-segment thumbwheel setting switch of the type commonly used to manually set decimal numbers into binary equipment. The schematic diagram shows a common (c) wire and four binary complement (1, 2, 4, and 8) wires between the connector and each switch segment. To determine which wires are connected to common for a given switch setting, add up the complement of lines that are in logic 1 state.

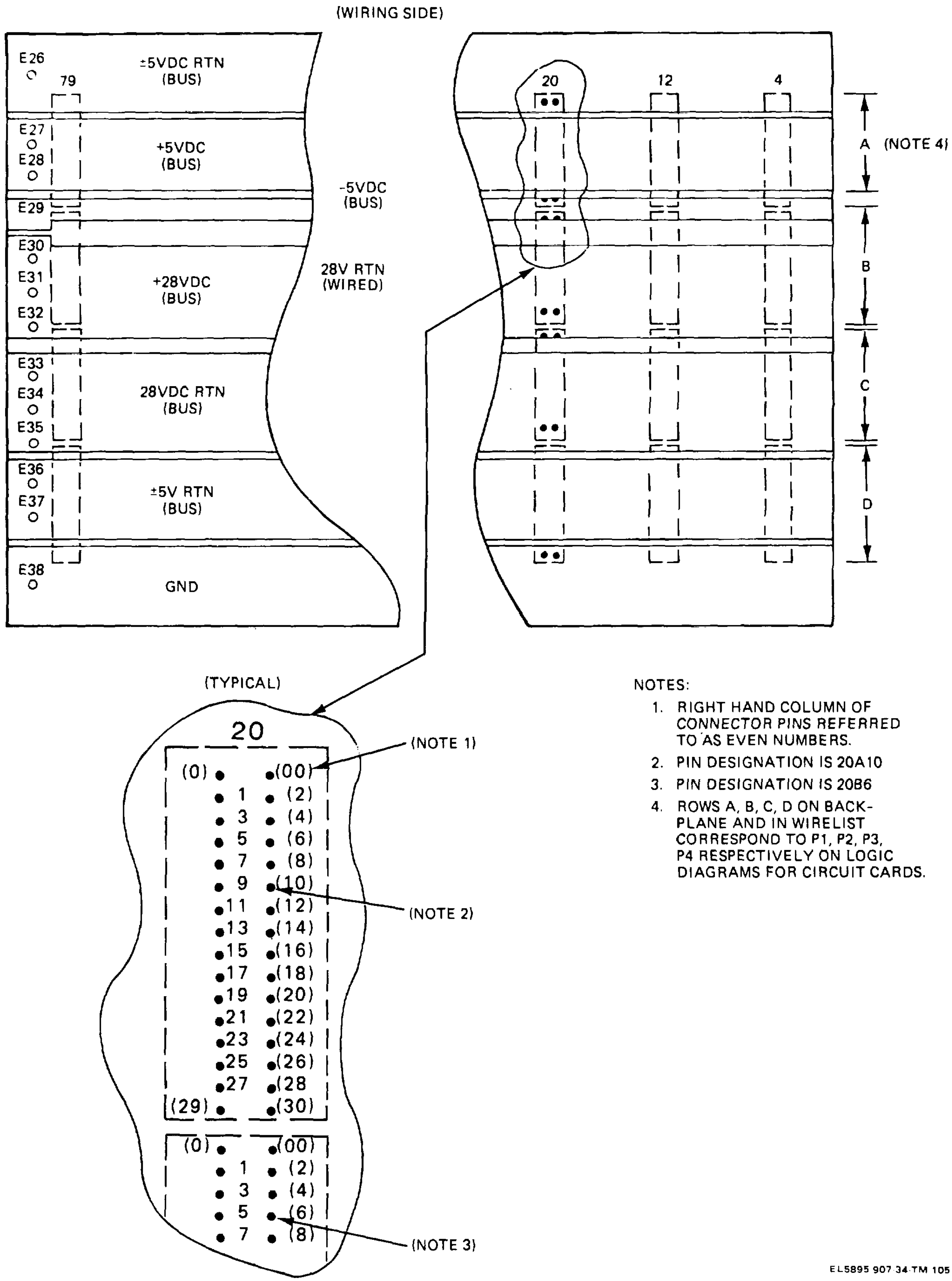


Figure 2-1. Backplane assembly 15A5A6

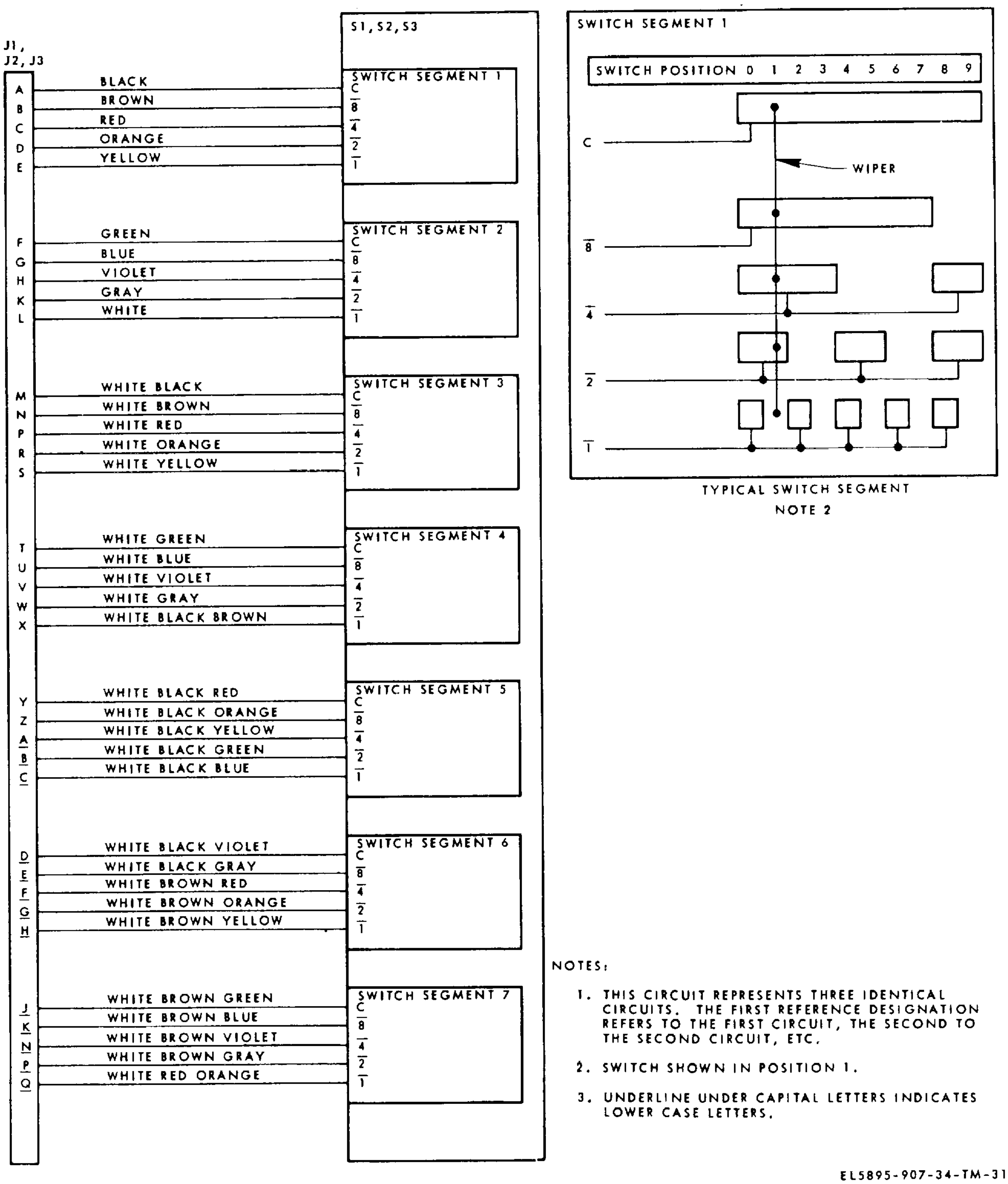


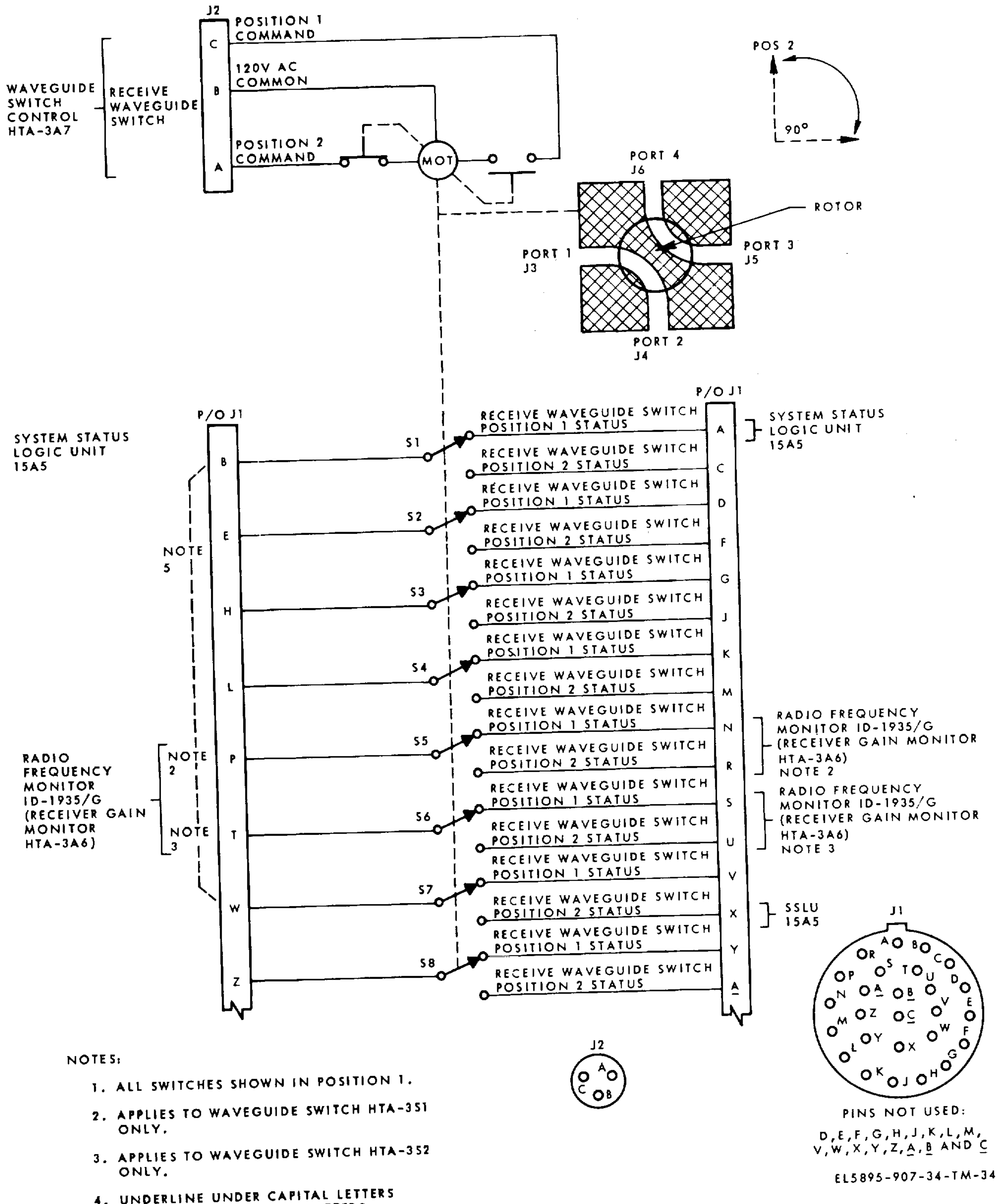
Figure 2-2. Channel frequency indicator 15A6, 15A9, 15A10 schematic diagram

For example: for a switch setting of 7, total the complement of wires 1, 2, and 4. These wires are internally connected to common by the switch.

2-8. Waveguide Switch Control HTA-3A7 and Woveguide Switches HTA-3S1 and HTA-3S2 Circuit Analysis. Waveguide switch control HTA-3A7 controls the operation of waveguide switches HTA-3S1 and HTA-3S2. The following subparagraphs describe the waveguide switch control and waveguide switches.

a. Waveguide Switch Control HTA-3A7 (fig FO-17). Waveguide switch control HTA-3A7 receives waveguide switch position command signals through connector J2. When a waveguide switch 1 position 1 command signal originates from receiver gain monitor HTA-3A6, -28 V dc is applied to connector J2 pin H. This -28 V dc command is applied through steering diode CR5 to operate relay K1 and returned through steering diode CR10 to waveguide switch 1 position 1 command common at connector J2 pin K Operating relay K1 applies 120 V ac from connector J1 through the closed A2/A1 relay contacts to transfer waveguide switch HTA-3S1 to position 1. Connector J3 pins A and B route the 120 V ac position transfer signal to waveguide switch HTA-3S1. When a waveguide switch 1 position 1 command signal originates from system status logic unit 15A5, +28 V dc is applied to connector J2 pin H. Waveguide switch 1 position 1 command common is applied through steering diode CR6 to operate relay K1 and returned through steering diode CR9 to connector J2 pin H. This operates polarized relay K1 in the same manner as a -28 V dc command signal from receiver gain monitor HTA-3A6. Waveguide switch 2 position 2 command signals and waveguide switch 2 position 1 and 2 command signals operate in the same manner.

b. Waveguide Switches HTA-3S1and HTA-3S2 (fig. 2-3). Each waveguide switch consists of an rf section, eight status switches, and a sector motor. The rf section, under sector motor control, routes rf energy from ports 1 and 3 to ports 2 and 4, respectively, in position 1. In position 2, rf energy is routed from ports 1 and 3 to ports 4 and 2, respectively. The eight status switches provide position status signals to receiver gain monitor HTA-3A6 and system status logic unit 15A5. Figure 2-2 shows the waveguide switch in position 1. Application of 120 V ac position 2 command signal to connector J2 pins B and C operates the sector motor. The sector motor rotates the rf section to position 2. At this time the sector motor switch closes between connector J2 pins A and the motor and opens between connector J2 pin C and the motor. This action prevents the sector motor from rotating the rf section past the mechanical limits and connects the motor circuit for returning to position 1. The eight status switches also transfer from position 1 to position 2 at this time, notifying the monitoring equipment of switch position transfer.



NOTES:

1. ALL SWITCHES SHOWN IN POSITION 1.
2. APPLIES TO WAVEGUIDE SWITCH HTA-3S1 ONLY.
3. APPLIES TO WAVEGUIDE SWITCH HTA-3S2 ONLY.
4. UNDERLINE UNDER CAPITAL LETTERS INDICATES LOWER CASE LETTERS.
5. JUMPER IN CABLE 3W23 AND 3W24.

Figure 2-3. Waveguide switch HTA-3S1, 3S2, schematic diagram

SECTION III. FUNCTIONAL ANALYSIS OF AN/FSC-79 STATUS AND ALARM EQUIPMENT

2-9. Overall Functional Analysis (fig FO-8). Status and alarm equipment in the AN/FSC-79 consists of system status logic unit rack unit 15 and a fault and system status panel 14A16 Circuits of the system status logic unit rack monitor the operational status of AN/FSC-79 equipment. Within system status logic unit 15A5, logic operations , based on the incoming operational equipment status signals, are performed. These logic operations generate signals that result in visual and aural indications on the fault and system status panel. When a fault is sensed by system status logic unit circuits and automatic switching is selected by the transmit or receive AUTO/MANUAL pushbutton switch on fault and system status panel 14A16, system status logic unit circuits generate selection command signals to switch redundant transmit or receive circuits online. When manual switching is selected by the AUTO/MANUAL pushbutton switch on fault and system status logic unit circuits, the system status logic unit circuits generate signals that result in visual and/or audible indications on the fault and system status panel. In response, the operator presses pushbutton switches on the fault and system status panel that generate selection commands to the system status logic unit. System status logic unit circuits process selection commands into switching signals to reconfigure redundant transmit or receive circuits online. System status logic unit circuits also route status signals to interface panel 15A8 for future use by a scanner formatter. Channel frequency indicator 15A6 thumbwheel switches allow for manually inserting channel frequency data for future use by the scanner formatter. Thumbwheel switch data in bed format is routed to interface panel 15A8. Logic unit power supply 15A4 provides + 5V dc and - 5 V dc for system status logic unit circuits. Fault and system status panel 14A16 contains and internal 28 V dc power supply that provides operating power for fault and system status panel alarms and indicators and waveguide switching. Status and alarm equipment is part of the monitoring and switching function described in.

a. Logic Unit Power Supply 15A4. Logic unit power supply 15A4 contains a +5 V dc power supply (PS1) and a -5 V dc power supply (PS2). These voltages are used by the system status logic unit 15A5 for biasing and logic operations. The +5 V dc also goes to the fault and system status panel 14A16 for power turn-on control. The -5 V dc is also used as logic common for the status and alarm circuits in equipment being monitored. Use of - 5 V dc for logic common ensures correct functioning of the system status logic unit input gating circuits.

b. System Status Logic Unit 15A5. The system status logic unit monitors status signals (fig. FO-18) from operational equipment, representing any or all of the following conditions: Fault, alarm, drop-out, alert, and power level. Transmit and receive operational equipment status signals (fig. FO-19) represent that the operational unit is in one of the following states: Online, in maintenance, in standby, or in fault. An individual circuit is connected between each monitored operational equipment unit and the system status logic unit for each condition or state. Relay or switch contacts, at the operational equipment unit, provide either a closed or open circuit to the -5 V dc logic common for the system status logic unit. Table 2-6 lists the sources of signals to the system status logic unit, signal names, and the type of relay or switch contact position. The system status logic unit end of each signal circuit is connected as an input to logic gating that produces signals sent to the fault and system status panel. An individual circuit is also connected between the fault and system status panel and the system logic unit for each equipment selection command (fig. FO-19). Pushbutton switch contacts present a closed circuit to the system status logic unit when a switch is pressed. The system status logic unit end of the circuit is connected as an input to logic gating that produces selection command signals sent to the operational equipment. Table 2-7 lists status, alarm, and control signals sent from the system status indication signals is prevented at the system status logic unit by ensuring that one logic input to each logic gate that enables a status indication or command signal is always supplied by the complement of its alternate signal(s). Automatic selection command generation (when AUTO is selected on the fault and system status panel) is provided by the above logic interconnections. Thereby a received or transmit functional unit that is in standby condition is automatically commanded (when AUTO has been previously selected) to be switched online as a result of a status signal indicating that the original transmit or receive unit is in fault condition. Status signals and selection command signals are also sent to the interface panel 15A8 and terminated. These signals are intended for future use by a scanner formatter when it is installed. Table 2-8 lists the signals sent to the scanner formatter. Backplane assembly 15A5A6 (fig. 2-1) provides the required interface between the plug-in logic and relay circuit cards, logic unit power supply 15A4, and the input/output connectors on the rear panel of system status logic unit 15A5.

Table 2-6. Status and Control Signals to System Status Logic Unit 15A5 (AN/FSC-79)

Source	Signal-name	Type
Up-converter interconnecting assembly 9A3	Up-converter I maintenance	Open
	Up-converter 2 maintenance	Open
	Converter power supply minor fault	Continuity
	Up-converter I fault	Open
	Up-converter 2 fault	Open
	Converter power supply major fault	Continuity
	Up-converter power supply alarm	Continuity
Down-converter interconnecting assembly 3A3	Down-converter I fault	Open
	Down-converter 2 fault	Open
	Down-converter 2 maintenance	Open
Frequency distribution unit 13A7	Frequency standard no 1 fault	Open
	Frequency standard no. 1 maintenance	Open
	Frequency standard no. 2 fault	Open
	Frequency standard no. 2 maintenance	Open
5 MHz frequency distribution amplifiers 13A4, A5, A6, and 1 and 5 MHz amplifier 13A9	Unit 13 major fault	Continuity
Low noise amplifier HTA-3A8	Low noise amplifier 1 fault	Continuity
	Low noise amplifier 2 fault	Continuity
	Low noise amplifier I maintenance	Open
	Low noise amplifier 2 maintenance	Open
Tracking receiver control and status panel 14A6	Tracking receiver major fault	Continuity
	Tracking receiver minor fault	Continuity
	Tracking receiver alarm	Continuity
Antenna position and status panel 14A7	Antenna major fault	Open
	Antenna major maintenance	Open
	Autotrack dropout	Open
Transmitter power monitor panel 14A27	Output power alert	Continuity
	Power status ranging signals	Continuity
	Xmt power level	Analog
Low pressure control panel 22A2	Waveguide pressure low status	Open

Table 2-6. Status and Control Signals to System Status Logic Unit 15A5 (AN/FSC-79) (Continued)

Source	Signal name	Type
Remote facility interface 31A26, 32A26	Power amplifier minor fault	Open
	Power amplifier 1 power high/low fault	Open
	Power amplifier 2 power high, /low Fault	Open
	1PA 1 fault	Open
	1PA 2 fault	Open
	Power amplifier 1 maintenance	Open
	Power amplifier 2 maintenance	Open
	Power amplifier 1 beam-on	Continuity
	Power amplifier 2 beam-no	Continuity
Transmit waveguide switches		
Switch 1 (31A21S2)	Transmit switch 1 position 1 status	Continuity
	Transmit, switch 1 position 2 status	Continuity
Switch 3 (32A21S2)	Transmit switch 3 position 1 status	Continuity
	Transmit switch 3 position 2 status	Continuity
Switch 4 (22A3S1)	Transmit switch 4 position 1 status	Continuity
	Transmit switch 4 position 2 status	Continuity
Switch 5 (31A21S3)	Transmit switch 5 position 1 status	Continuity
	Transmit switch 5 position 2 status	Continuity
Receive waveguide switches		
Switch 1 (HTA-3A8S1)	Receive switch 1 position 1 status	Continuity
	Receive switch 1 position 2 status	Continuity
Switch 3 (1A5S1)	Receive switch 3 position 1 status	Continuity
	Receive switch 3 position 2 status	Continuity
Emergency transmitter disable switch H2TA-4A8	Transmit disable	Open
Stow pin control/minor fault summary panel HTA-8A24	Antenna minor fault summery	Open
	Antenna minor maintenance	Open
Synchro assembly, elevation HTA 6A6	Low elevation cutoff	Open
Fault and system panel 14A16	Audible alarm disable	Open
	Audible alarm mute	Momentary continuity
	Up-converter 1 pushbutton	Momentary continuity

Table 2-6. Status and Control Signals to System Status Logic Unit 15A5 (AN/FSC-79) (Continued)

Source	Signal name	Type
Fault and system panel 14A16 (continued)	Up-converter 2 pushbutton	Momentary continuity
	Power amplifier 1 pushbutton	Momentary continuity
	Power amplifier 2 pushbutton	Momentary continuity
	Transmit manual/auto pushbutton	Momentary continuity
	Receive manual/auto pushbutton	Momentary continuity
	Low noise amplifier 1 pushbutton	Momentary continuity
	Low noise amplifier 2 pushbutton	Momentary continuity

Table 2-7. Status, Alarm, and Control Signals From System Status Logic Unit 15A5 (AN/FSC-79)

Destination	Signal name	Level
Fault and system status panel 14A16	Power amplifier minor fault	28 V dc
	Waveguide pressure low	28 V dc
	Antenna major fault	28 V dc
	Antenna minor fault	28 V dc
	IPA cross patch	28 V dc
	Output power alert	28 V dc
	Frequency standard major fault	28 V dc
	Frequency standard minor fault	28 V dc
	Unit 13 major fault	28 Vdc
	Tracking receiver major fault	28 V dc
	Tracking receiver minor fault	28 V dc
	Autotrack dropout	28 V dc
	Major fault	28 V dc
	Minor fault	28 V dc
	Fully available	28 V dc
	Converter power supplies major fault	28 V dc
	Converter power supplies minor fault	28 V dc
	Up-converter online	28 V dc
	Up-converter standby	28 V dc
	Up-converter fault	28 V dc
	Up-converter maintenance	28 V dc
	Down-converter online	28 V dc
	Down-converter standby	28 V dc
	Down-converter fault	28 V dc
	Down-converter maintenance	28 V dc
	Power amplifier online	28 V dc
	Power amplifier standby	28 V dc
	Power amplifier fault	28 V dc
	Power amplifier maintenance	28 V dc
	Low noise amplifier online	28 V dc
	Low noise amplifier standby	28 V dc

Table 2-7. Status, Alarm, and Control Signals From System Status Logic Unit 15A5; (AN/FSC-79) (Continued)

Destination	Signal name	Level
Fault and system status panel 14A16 (continued)	Low noise amplifier fault	28 V dc
	Low noise amplifier maintenance	28Vdc
	Receive auto/manual	28 V dc
	Transmit auto/manual	28 V dc
	Major audio alarm	28Vdc
	Minor audio alarm	28Vdc
	Transmit disable	28 V dc
Intermediate power amplifier 31A23, 32A23	Power amplifier I and 2 diode switch inhibit	Continuity
	Low elevation cutoff	Open
Receive waveguide switches		
Switch 1 (HTA-3A8S1)	Receive switch 1 position 1 control	28 V dc
	Receive switch 1 position 2 control	28 V dc
Switch 3 (1A5S1)	Receive switch 3 position 1 control	28 V dc
	Receive switch 3 position 2 control	28 V dc
Transmit waveguide switches		
Switch 1 (31A21S2)	Transmit switch 1 position 1 control	28 V dc
	Transmit switch 1 position 2 control	28 V dc
Switch 3 (32A21S2)	Transmit switch 3 position I control	28 V dc
	Transmit switch 3 position 2 control	28 V dc
Switch 4 (22A3S1)	Transmit switch 4 position I control	28 V dc
	Transmit switch 4 position 2 control	28 V dc
Distribution box HTA-8A25	Major alarm	28 V dc
	Minor alarm	28 V dc

Table 2-8. Signals to Scanner Formatter Interface Panel 15A8

Status signal	Signal level
Up-converter online/standby/fault/maintenance	5 V dc
Down-converter online/standby/fault/maintenance	5 V dc
Power amplifier online/standby/fault/maintenance	5 V dc
Low noise amplifier online/standby/fault/maintenance	5 V dc
Autotrack dropout	5 V dc
Transmit manual	5 V dc
Receive manual	5 V dc
Feed power status	Analog O to 5 V dc
Power amplifier output power status	Analog O to 5 V dc
Power status ranging	5 V dc
Tracking receiver C/N	Analog O to 5 V dc
Transmit carrier frequency	7 decades bed logic levels, open or 5 V dc rtn
Converter power supply major fault	5 V dc
Converter power supply minor fault	5 V dc
Unit 13 major fault	5 V dc

c. Fault and System Status Panel 14A16 (fig FO-18). The fault and system status panel receives processed status and alarm signals from the system status logic unit. Each of the processed signals is sent through an individual circuit between a signal output point in the system status logic unit and an individual status indicator lamp, alarm indicator lamp, and/or the audible alarm unit in the fault and system status panel. The fault indicated by each lamp, when lit, is discussed chapter 1 (para 1-16). Each lamp is activated by an individual signal from the system status logic unit. A selector command signal from the fault and system status panel is initiated by depressing a selector command pushbutton switch. The signal from each pushbutton switch is sent through an individual circuit to the system status logic unit and is an input to one or more logic gates in the system status logic unit.

d. Channel Frequency Indicator 15A6 (fig 1-1). The channel frequency indicator front panel supports three seven-segment thumbwheel switches Each switch is used to set in one channel frequency An individual segment can be set to any number from zero to 9. The highest frequency that can be set in is 9999999 kHz. The output of each digit segment is a binary coded decimal, 4-bit, parallel word representing the displayed segment number (digit). The seven 4-bit words are sent in parallel to terminals on interface panel 15A8.

2-10. Detailed Functional Analysis. Equipment status and control input signals are fed into the system status logic unit. The processing and gating of these signals by the logic unit determines indications displayed on the fault and system status panel. The logic unit also processes command signals for changing equipment configuration.

a. System Status Logic Unit (fig. FO-19). Input signals to the system status logic unit are routed to circuit cards. Logic circuits and relays on logic circuits cards A, D, E, F, G, and relay circuits cards R1 and R2, perform all logic and switching functions required to process signals through the system status logic unit.

(1) Circuit card A receives status signals from system equipment and summed fault and alarm signals from circuit cards D, E, F, and G. Circuit card A logic circuits process these signals and produce fault indicator and alarm signals sent to the fault and system status panel. Circuit card A also provides autotrack dropout signals and status to circuit card G for further processing.

(2) Circuit card D receives status signals from system equipment and waveguide switch position status signals. Circuit card D processes these signals and produces summed fault and alarm signals that are routed to circuit card A and fault and status indicator signals that are sent to the fault and system status panel. Transmit waveguide switch status position signals are routed to circuit card E.

(3) Circuit card E receives the antenna low elevation cutoff signal, fault system status panel transmit manual/auto and equipment selection command signals, and transmit waveguide switch position status signals from circuit card D. Circuit card E processes these signals and produces fault and status indicator signals sent to the fault and system status panel. Circuit card E also provides transmit waveguide switch position relay signals and PA1 and PA2 diode switch inhibit signals that are routed to relay circuit card R1. Circuit card E also routes the transmit disable and low elevation cutoff signals to relay circuit card R2.

(4) Circuit card F receives equipment status signals and waveguide switch position signals. Circuit card F processes these signals and produces fault and status indicator signals that are sent to the fault and system status panel. Circuit card F also produces receive waveguide switch position signals which are routed to circuit card G. Circuit card G also provides summed fault and alarm signals which are sent to circuit card A.

(5) Circuit card G receives equipment status signals and manual/auto selection command signals from the fault and system status panel. Circuit card G accepts receive manual waveguide switch position signals from circuit card F. Circuit card G processes these signals and produces status indicator signals that are sent to the fault and system status panel. Circuit card G also produces receive manual enable signals and receive waveguide switch position relay signals which are routed to relay card R2, and it produces summed fault and alarm signals which are sent to circuit card A.

(6) Relay circuit card RI receives transmit waveguide switch position relay signals and PA1 and PA2 diode switch inhibit signals from circuit card E. Relay circuit card RI uses these signals to operate relays that route transmit waveguide switch position command signals and power amplifier diode switch inhibit signals to operational equipment.

(7) Relay circuit card R2 accepts receive waveguide switch position relay signals and receive manual enable signals from circuit card G and transmit disable and low elevation cutoff signals from circuit card E. Relay circuit card R2 processes these signals to operate relays that route receive waveguide switch position command signals, low elevation cutoff command signals, and transmit disable command signals to operational equipment.

b. Fault and System Status Panel Equipment Status Indications (fig. FO-4). Equipment status signals are processed and summed by the system status logic unit. The fault and system status panel processes these signals and displays status by lighting equipment status indicators and/or sounding audible alarms. Table 2-9 lists fault and system status panel indicators and controls. The table also includes a brief description of the condition that causes an indicator to light, or indicates destination of a switch-control signal. Table 2-9 is keyed to figure 1-9. The SUMMARY STATUS indicator group on the fault and system status panel provides a visual indication of overall equipment status. This group indicates the presence of a MAJOR FAULT or MINOR FAULT in operational equipment, or that all operational equipment units are FULLY AVAILABLE.

(1) A major fault, minor fault, or alarm signal originates by closure of relay contacts. The signal is sent to the system status logic unit circuit card A. A major fault signal turns on a lamp driver circuit. The lamp driver lights the equipment status indicator major fault section lamp (red) on the fault and system status panel. The major fault signal also is gated by major fault summing logic. The summary major fault signal inhibits the fully available gating logic signal, and turns on a lamp driver circuit to light the SUMMARY STATUS MAJOR FAULT indicator lamp. The major fault signal also inhibits minor fault gating logic and enables major alarm gating logic to produce a major alarm signal when there is an alarm signal. All major alarm signals are gated by major alarm summing logic circuitry to assure that all major alarm signals are processed. Any major alarm signal inhibits minor alarm gating and turns on an audio alarm driver that sounds the major audible alarm.

(2) A minor fault signal is gated by minor fault gating logic and minor alarm gating logic, when there is no major fault. The minor fault signal is gated by minor fault summing logic that gates all minor fault signals to produce a summary minor fault signal. The summary minor fault signal inhibits fully available gating logic and turns on a lamp driver that lights the SUMMARY STATUS MINOR FAULT indicator lamp. The minor fault signal also turns on a lamp driver that lights the equipment status indicator minor fault section lamp (amber). A minor fault signal enables the minor alarm gating logic to produce a minor alarm signal, when there is an alarm signal. The minor alarm signal is gated by minor alarm summing logic that gates all minor alarm signals and minor alarm only gating (no major alarm signal) to turn on an audio alarm driver. The audio alarm driver completes a path to the fault and system status panel 28 V dc power supply to sound the minor audible alarm.

(3) Fully available gating logic is enabled when there is no major or minor fault. The resulting signal turns on a lamp driver to light the SUMMARY STATUS FULLY AVAILABLE indicator lamp (green).

(4) Pressing AUDIO ALARM MUTE sets a latching circuit. This latching circuit inhibits both major alarm enable gate and minor alarm enable gates, and enables the major alarm and minor alarm enable mute gates. A 10 kilohm resistor is inserted in series with each alarm signal to lower the audible level of the alarm signal. When the fault causing the alarm is corrected, the fully available indicator signal resets the latch, so that the next alarm will be at normal audible level.

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
POWER AMPLIFIER MINOR	Amber	X				Minor fault in one or more power
WAVEGUIDE Pressure	Amber	X				Waveguide pressure low.
ANTENNA	Red		X			Antenna major fault with antenna in maintenance.
			X		X	Antenna major fault with antenna not in maintenance.
	Amber	X				Antenna minor fault with antenna in maintenance.
		X		X		Antenna minor fault with antenna not in maintenance
IPA CROSS-PATCH	Amber	X				Reminds operator crosspatch is in use.
OUTPUT POWER ALERT	Red		X		X	Output power alert signal.
UNIT 13	Red		X		X	Major fault in one or more frequency distribution amplifiers.
FREQUENCY STANDARDS	Red		X	X		One frequency standard faulted and not in maintenance, the other faulted or in maintenance.
			X			Both frequency standards in maintenance.
	Amber	X		X		One frequency standard faulted and not in maintenance.
		X				One frequency standard in maintenance, the other no fault and no maintenance.

Table 2-9. AN/FSC-79 Equipment Status Condition and Fault and System Status Panel 14A 16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
TRACKING RECEIVERS	Red		X		X	Tracking receivers major fault with tracking receiver alarm generated.
			X			Tracking receivers major fault and alarm is disabled.
	Amber	X		X		Tracking receivers minor fault with tracking receiver alarm generated.
		X				Tracking receivers minor fault and alarm is disabled.
AUTOTRACK DROPOUT/ DISABLE	Red		X			Autotrack dropout signal with alarm disable from fault and system status panel.
			X		X	Autotrack dropout signal with no alarm disable signal from fault and system status panel.
CONVERTER POWER SUPPLIES	Red		X		X	Major fault in one or more up-convert power supplies with up-converter alarm signal generated.
			X			Major fault in one or more up-converter power supplies and up-converter
	Amber	X		X		Minor fault in one or more up-converter power supplies with up-converter alarm signal generated.
		X				Minor fault in one or more up-converter power supplies and up-converter alarm signal disabled.
SUMMARY STATUS FULLY AVAILABLE	Green					All monitored equipment is online or is available for use and there is no indicated fault in the monitored equipment.
MAJOR FAULT	Red		X			Major fault in one or more of monitored equipment units.
MINOR FAULT	Amber	X				Minor fault and no major fault in monitored equipment
UP CONVERTER 1	Green					Up-converter 1 online signal generated.
	Amber					Up-converter 1 standby signal generated. Up-converter 1 not faulted and up-converter 1 online signal and maintenance signal disabled.

Table 2-9. AN/FSC-79 Equipment Status Condition and Fault and System Status Panel 14A 16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
	Red		X		X	Up-converter 1 faulted and up-converter 1 online signal generated.
		X		X		Up-converter 1 faulted and up-converter 1 online signal disabled.
	Blue					Up-converter 1 maintenance signal generated
2	Green					Up-converter 2 online signal generated.
	Amber					Up-converter 2 standby signal generated. Up-converter 2 not faulted and up-converter 2 online signal and maintenance signal disabled.
	Red		X		X	Up-converter 2 faulted and up-converter 2 online signal generated.
		X		X		Up-converter 2 faulted and up-converter 2 online signal disabled.
	Blue					Up-converter 2 maintenance signal generated.
POWER AMPLIFIER						
1	Green					Power amplifier 1 online signal generated.
	Amber					Power amplifier 1 standby signal generated. Power amplifier 1 not faulted and power amplifier 1 online signal and maintenance signal disabled, and beam on.
		X				Offline IPA fault.
	Red		X		X	Power amplifier 1 faulted by power amplifier 1 power high/low fault, or online IPA fault, and power amplifier 1 online signal generated.
		X		X		Power amplifier 1 faulted by power amplifier 1 power high/low fault, or online IPA fault, and power amplifier 1 online signal disabled.
	Blue					Power amplifier 1 maintenance signal generated.
2	Green					Power amplifier 2 online signal generated.
	Amber					Power amplifier 2 standby signal generated. Power amplifier 2 not faulted and power amplifier 2 online signal and maintenance signal disabled, and beam on.
		X				Offline IPA fault.

Table 2-9. AN/FSC-79 Equipment Status Condition and Fault and System Status Panel 14A16 Indications (Continued)

Equipment status indicator	Color	Summary status indication: Minor fault	Summary status indication: Major fault	Audio alarm indication: Minor fault	Audio alarm indication: Major fault	Equipment status condition
	Red		X		X	Power amplifier 2 faulted by power amplifier 2 power high/low fault, or online IPA fault, and power amplifier 2 online signal generated.
		X		X		Power amplifier 2 faulted by power amplifier 2 power high/low fault, or online IPA fault, and power amplifier 2 online signal disabled.
	Blue					Power amplifier 2 maintenance signal generated.
DN CONVERTER						
1	Green					Down-converter 1 online signal generated.
	Amber					Down-converter 1 standby signal generated. Down-converter 1 not faulted and down-converter 1 online signal and maintenance signal disabled.
	Red		X		X	Down-converter 1 faulted and down-converter 1 online signal generated.
		X			X	Down-converter 1 faulted and down-converter 1 online signal disabled.
	Blue					Down-converter 1 maintenance signal generated.
2	Green					Down-converter 2 online signal generated.
	Amber					Down-converter 2 not faulted and down-converter 2 online signal and maintenance signal disabled.
	Red		X		X	Down-converter 2 faulted and down-converter 2 online signal generated.
		X		X		Down-converter 2 faulted and down-converter 2 online signal disabled.
	Blue					Down-converter 2 maintenance signal generated.
LNA						
1	Green					Low-noise amplifier 1 online signal generated.
	Amber					Low-noise amplifier 1 standby signal generated. Low noise amplifier 1 not faulted and low noise amplifier online signal and maintenance signal disabled.
	Red		X		X	Low-noise amplifier 1 faulted and low-noise amplifier 1 online signal generated.

Table 2-9. AN/FSC- 79 Equipment Status Condition and Fault and System Status Panel 14A16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor	Major	Minor	Major	
		X		X		Low-noise amplifier I faulted and low-noise amplifier online signal disabled.
	Blue					Low-noise amplifier 1 maintenance signal generated.
2	Green					Low-noise amplifier 2 online signal generated.
	Amber					Low-noise amplifier 2 standby signal generated. Low-noise amplifier 2 not faulted and low-noise amplifier online signal and maintenance signal disabled.
	Red		X		X	Low-noise amplifier 2 faulted and low-noise amplifier 2 online signal generated.
		X		X		Low-noise amplifier 2 faulted and low-noise amplifier 2 online signal disabled.
	Blue					Low-noise amplifier 2 maintenance signal generated.
TRANSMIT DISABLE	Red					XMT/OPR DISABLE pushbutton switch pressed by transmitter operator, or PA 1 and PA 2 diode switch inhibit signal generated.
RECEIVE AUTO/MANUAL						
MANUAL	White					AUTO/MANUAL pushbutton pressed to MANUAL, or after one automatic switchover, automatic equipment selection logic circuit manual signal generated by receive equipment fault condition or autotrack dropout.
AUTO	White					AUTO/MANUAL pushbutton switch pressed to AUTO and automatic equipment selection logic circuit manual signal disabled.

Table 2-9. AN/FSC-79 Equipment Status Condition and Fault and System Status Panel 14A16 Indications (Continued)

Equipment status indicator	Color	Summary status indication		Audio alarm indication		Equipment status condition
		Minor fault	Major fault	Minor fault	Major fault	
TRANSMIT AUTO/MANUAL						
MANUAL	White					AUTO/MANUAL pushbutton switch pressed to MANUAL or transmit manual reset signal generated.
AUTO	White					AUTO/MANUAL pushbutton switch pressed to AUTO and transmit manual reset signal disabled.

SECTION IV. CIRCUIT ANALYSIS OF AN/FSC-79 STATUS AND ALARM EQUIPMENT

2-11. Logic Unit Power Supply 15A4. Logic unit power supply 15A4 contains a +5 V (PS1) and a -5 V (PS2) dc power supply (fig. FO-5). The logic unit power supply provides +5 V dc and -5 V dc to the system status logic unit for biasing and logic operations and +5 V dc to the fault and system panel for power supply turn on control. The -5 V dc is also used as logic common for the status and alarm circuits in equipment being monitored. Use of -5 V for logic common ensures correct functioning of the system status logic unit input gating circuits. Single phase, 120 V ac input power is connected to the logic unit at connector J1. Input power is connected to power supplies PS1 and PS2 through circuit breakers CB1 and CB2. Input power is terminated at power supply terminal board TB1 pins 1 and 2. The output of each power supply is monitored at the front panel by an indicator light and a voltmeter. Sense voltage lines for both power supplies (PS1 and PS2) are extended to the system status logic unit backplane assembly 15A5A6. Regulation of power supplies PS1 and PS2 output voltages is therefore controlled by the voltages present at the input to the system status logic unit circuit cards as explained in paragraphs 2-4*a*(5) and 2-4*b*(5).

a. ***Power Supply PS1 (fig. FO-6)***. Power supply PS1 (+5 V dc power supply) provides regulated +5 V dc output at 12.6 A. It contains protective circuits for overcurrent conditions, a bias supply, and series voltage regulator circuit.

(1) Single phase, 120 V ac input power is applied through fuse F1 and thermostat S1 to transformer T1. Thermostat S1 opens to protect the supply when overheating occurs and resets automatically when the over temperature condition ceases. Transformer T1, which contains two secondary windings, steps down the input voltage for application to the main and auxiliary rectifiers.

(2) The bias supply, consisting of half-wave auxiliary rectifier CR7, filter capacitor C7, and zener diode regulator CR6, provides operating voltage for error amplifiers Q1 and Q2 and current limit amplifier Q3. Zener diode CR1 and resistor R5, which are connected across the bias supply, provide a regulated temperature compensated reference voltage. Resistor R4 compensates for input voltage variations.

(3) The main rectifier consists of rectifiers CR8 and CR9 and filter capacitor C8. Rectifiers CR8 and CR9 perform full-wave rectification of the ac voltage from transformer T1. The rectified output is filtered by capacitor C8. The filtered dc voltage is applied to series regulators Q8 and Q13.

(4) The series voltage regulator circuit regulates the dc output voltage and provides overcurrent protection. The series voltage regulator circuit consists of error amplifiers Q1 and Q2, current limit amplifier Q3, drivers Q5.

and Q6, and series regulators Q8 through Q13. Series regulators Q8 through Q1 3 present a variable impedence in series with the load. The regulated +5 V dc output is taken across pins 6 and 4 of terminal board TB1. The dc output voltage is adjustable from 4.75 to 5.25 V dc by potentiometer R1. Potentiometer R1 sets this output volt age level established by series regulators Q8 through Q13 The regulators are controlled by signals derived from error amplifiers Q1 and Q2 or current limit amplifier Q3 Error amplifiers Q1 and Q2 provide the control signal under normal load conditions, and current limit amplifier Q3 provides the control signal during overload conditions

(5) Operation of the series regulator circuit is determined by changes in output voltage. The output voltage is sensed by divider resistors R2 and R3 and potentiometer R1. A +S reference voltage is established by zener diode CR1 and resistor R5. The output voltage is compared with the +S reference voltage to produce an error voltage at the junction of resistors R2 and R3. The error voltage is amplified by error amplifiers Q1 and A2 and applied to drivers Q5 and Q6. The corresponding change in driver Q6 emitter current drives the emitter base junctions of series regulators Q8 through Q13. This action changes the emitter-to-collector voltage drop of series regulators Q8 through Q13. The output voltage decreases if the output voltage has tended to increase. If the output voltage has tended to decrease, the emitter-to- collector voltage drop decreases to increase the output voltage.

(6) Overcurrent conditions are detected by current limit amplifier Q3. Current limit amplifier Q3 samples load current through current sensing resistor R25. The voltage drop across R25 is compared with the preset voltage reference determined by potentiometer R17 and resistor R18. When the voltage at R25 exceeds the preset output current level, a difference voltage is developed that causes current limit amplifier Q3 to con- duct. This decreases the current through drivers Q5 and Q6, increases the voltage drop across the series regulators, and decreases the output voltage. The output current is thus limited to a safe value. The current limiting value is a factory adjustment. If the output is short circuited, the following action takes place. The voltage sensed by potentiometer R17 and resistor R18 is decreased in proportion to the output voltage, which is lowered due to the short. Current limit amplifier Q3 is successively biased into turnon at lower and lower load currents as the output voltage decreases. This action continues until the output voltage decreases to zero and current decreases to a predetermined low value.

b. ***Power Supply PS2*** **(*fig. FO-7*)**. Power supply PS2 (-5 V dc power supply) provides a regulated -5 V dc output at 5 A. It contains protective circuits for overcurrent conditions. The -5 V dc power supply consists of an ac input circuit, a main rectifier, a bias supply, and a series voltage regulator circuit.

(1) Single phase 120 V ac input power is applied to transformer T1. Transformer T1, which contains two secondary windings, steps down the input voltage for application to the main and auxiliary rectifiers.

(2) The bias supply consists of half-wave auxiliary rectifier CR7, filter capacitor C7, and zener diode regulator CR6. It supplies operating voltage for error amplifiers Q1 and Q2 and current limit amplifier Q3. Zener diode CRI and resistor R5 provide a regulated temperature-compensated reference voltage. Resistor R4 compensates for input voltage variations.

(3) The main rectifier consists of rectifiers CR8 and CR10 and filter capacitor C8. Rectifiers CR8 and CR10 perform full-wave rectification of the ac voltage from transformer T1. The rectified dc voltage is applied to series regulators Q8 and Q9.

(4) The series voltage regulator circuit regulates the dc output voltage and provides overcurrent protection. This circuit consists of error amplifiers Q1 and Q2, current limit amplifier Q3, driver Q5, and series regulators Q8 and Q9. Series regulators Q8 and Q9 present a variable impedance in series with the load. The regulated 5 V dc output is taken across pins 4 and 6 of terminal board TB1. Potentiometer R1 controls series regulators Q8 and Q9 to set the dc output voltage within the range from 4.75 to 5.25 V dc. Q8 and Q9 are also controlled by signals derived from error amplifiers Q1 and Q2 or current limit amplifier Q3. Error amplifiers Q1 and Q2 provide the control signal under normal load conditions, and current limit amplifier Q3 provides the control signal during overload conditions.

(5) Operation of the series regulator circuit is determined by changes in output voltage. The output voltage is sensed by divider resistors R2 and R3 and potentiometer R1. A +S reference voltage is established by zener diode CR1 and resistor R5. The output voltage is compared with the +S reference voltage to produce an error voltage at the junction of resistors R2 and R3. The error voltage is amplified by error amplifiers Q1 and Q2 and is applied to driver Q5. The corresponding change in driver Q5 emitter current-drives the emitter base junctions of series regulators Q8 and Q9. This action changes the emitter-to-collector voltage drop. The output voltage decreases if the output voltage has tended to increase. If the output voltage has tended to decrease, the emitter-to-collector voltage drop decreases to increase the output voltage.

(6) Overcurrent conditions are detected by current limit amplifier Q3. Current limit amplifier Q3 samples load current through current-sensing resistor R28. The voltage drop across R28 is compared with the preset voltage reference determined by potentiometer R17 and resistor R18. When the voltage at R28 exceeds the preset output current level, a difference voltage is developed that causes current limit amplifier Q3 to conduct. This decreases the current through driver Q5, increases the voltage drop across series regulators Q8 and Q9 and decreases the output voltage. The output cur-rent is thus limited to a safe value. The current limit value is determined by the factory setting of current limit potentiometer R17. When operating conditions approach short circuit, the output voltage decreases. 'Since the voltage determined by potentiometer R17 and resistor R18 is proportional to the output voltage, current limit amplifier Q3 is successively biased into turn on at lower and lower load currents as the output voltage decreases. This action continues until the output voltage decreases to zero and current decreases to a predetermined low value.

2-12 System Status Logic Unit. Equipment status and control signals received by the system status logic unit originate from closure or opening of relay or switch contacts that establish or interrupt the -5 V dc common logic return circuit. Status and control signals received by the system status logic unit are routed via the backplane (interface) assembly (fig. 2-1) to circuit cards which process, gate, and sum these signals to produce equipment status and alarm signals. These signals light indicators and sound alarms at the fault and system status panel. The circuit cards also produce control signals to configure transmit and receive waveguide switch positions. The open or continuity to ground signal received by the circuit cards is converted by an inverting amplifier or gating input circuit to an operational logic level of 0 or 4 +1 V dc. Operational description of the system status logic unit circuit cards is included in the following paragraphs.

a. Circuit Card A (fig. FO-8). Circuit card A receives operational equipment status signals and processes these signals to provide control signals, and it lights fault and system status panel status indicator lamps. Circuit card A also receives summed major fault and major alarm signals from circuit card E, D, F, and G and summed minor fault and minor alarm signals from circuit cards, E, D, F.

(1) Equipment operational status signals received by circuit card A are processed to turn on lamp driver modules. A turned-on lamp driver module applies a 28 V dc return through a transistor to light the respective status indicator lamp at the fault and system status panel. Fault and alarm signals processed by circuit card A are summed by NOR gates, 10C4A, 10D7A, and 10C7A (fig. FO-8, sh 10) to produce minor and major fault and alarm summed signals.

(2) Summed major fault signals of circuit card A and circuit cards E, D, F, and G ar group-summed by NOR gate 3C6A (fig. FO-8, sh 3) to produce a major fault signal. The major fault signal turns on lamp drive module A11, lighting the fault and system panel major fault lamp. The major fault signal is also routed to NAND gate 3B5A, inhibiting a fully available signal.

(3) Summed minor fault signals of circuit cards A, E, D, and F are group-summed by NOR gate 3A6A to produce a minor fault signal. The minor fault signal turns on lamp driver module A12, lighting the fault and system status panel minor fault lamp. The minor fault signal is also routed to NAND gate 3B5A to inhibit a fully available signal.

(4) Summed minor alarm signals of circuit card A and circuit card E, D, and F are group-summed by NOR gate 4D7A (fig. FO-8, sh 4). The summed minor alarm signal is passed by NAND gate 4C7B when there is no major alarm signal. (A major alarm signal inhibits a minor alarm signal.) The signal is delayed 500 milliseconds by monostable multivibrator module 4C6B to eliminate false alarms due to transient pulses. The summed minor fault signal NAND-gates with the delayed version of itself at 4C5A and then enables NAND gate 4C4A if there is no audio alarm mute signal. Enabled NAND gate 4C4A turns on audio alarm driver A27 to activate a minor audio alarm.

(5) Summed major alarm signals are NOR-gated by 4C7A. The summed major alarm signal inhibits NAND gate 4C7B, prohibiting summed minor alarm signals, and NAND-gates NAND gate 4C5C after one version of the signal is delayed 500 milliseconds by monostable multivibrator module 4C6C. The summed major alarm signal then NAND gates at 4B4A, and audio alarm driver A28 is turned on.

(6) An audio alarm mute signal switches the active signal output of NOR latching circuit 4B6A/4B6B from 4B6B to 4B6A to enable NAND gates 4C4B and 4B4B. The signal is NANDed with a summed minor alarm or summed major alarm signal. A NAND-gated, summed minor alarm signal and audio mute signal at 4C4B turns on audio alarm driver A13. Audio alarm driver A13 supplies current through A48R1 to reduce the volume of the minor audio alarm. A NAND-gated, summed major alarm signal and audio mute signal at 4B4B turns on audio alarm driver A29. Audio alarm driver A29 supplies current through A48R2 to reduce the volume of the major audio alarm.

(7) A tracking receiver major fault signal and a tracking receiver alarm signal are NAND-gated at NAND gate 5B4D (fig. FO-8, sh 5) to provide a major alarm signal. A tracking receiver major fault signal inhibits NAND gate 5B4A, prohibiting a tracking receiver minor fault indication, and turns on lamp driver A7 to light the major fault lamps on the fault and system status panel tracking receiver indicator. An autotrack dropout signal turns on lamp driver module A8 (fig. (FO-8, sh 2), to light the autotrack dropout indicator lamp on the fault and system status panel. A major fault signal goes to NOR gate 3C6A (fig. FO-8, sh 3) and a major alarm signal goes to NOR gate 4C7A (fig FO-8, sh 4). An audible alarm disable signal inhibits NAND gate 2C5B (fig. FO-8, sh 2) to interrupt the audio alarm signal.

(8) An antenna major fault signal turns on lamp driver module A16 (fig. FO-8, sh 6), lighting the fault and system status panel antenna major fault indicator lamp. The antenna major fault signal inhibits NAND gate 6C4A to prevent lamp driver module A17 from turnon. An antenna major fault signal antenna and no antenna major maintenance signal enable NAND gate 6B5B, producing a major audio alarm signal. An antenna major maintenance signal inhibits NAND gate 6B5B so that there will be no major audio alarm signal during an antenna major fault. NAND gate 6C4A (antenna minor fault) is enabled by antenna minor fault or antenna minor maintenance and no antenna major fault to turn on lamp driver A1, lighting the antenna minor fault lamp on the fault lamp and system status panel. NAND gate 6A5B (antenna minor alarm) is enabled by antenna minor fault and no antenna minor maintenance and no antenna major fault to produce an antenna minor audio alarm

(9) Carrier level alert, alarm, and fault circuits (fig. FO-8, sh 7 and 8) located on circuit card A are not used in the AN/FSC-79 configuration.

(10) A fault and no maintenance in frequency standard 1, or a fault and no maintenance in frequency standard 2, enables NOR gate 9C5A (fig. FO-8, sh 9). NAND gate 9D3A is enabled (frequency standard major alarm) when there is a fault or maintenance from one frequency standard and fault and no maintenance from the other frequency standard. NAND gate 9B5B is enabled when there is a fault or maintenance in frequency standard 1 and a fault or maintenance in frequency standard 2. NAND gate 9B5B turns on lamp driver A4 (frequency standard major fault). Lamp driver A3 (frequency standard minor fault) is turned on by: Fault or no maintenance from one standard, and no fault and no maintenance from the other standard. NAND gate 9C3B is enabled (frequency standard minor alarm) when there is a fault and no maintenance from one standard and no fault and no maintenance from the other standard.

(11) Receiver gain monitor circuits (fig. FO-8, sh 10) and up and down converter status (fig. FO-8, sh 1) located on circuit card A are not used in the AN/FSC-79 configuration.

(12) A converter power supply major fault signal turns on lamp driver module A10 (fig. FO-8, sh 12), to light the fault and system status panel converter power supply major fault lamp. The major fault signal also produces a major fault summary signal and inhibits NAND gate 12B5A, prohibiting a minor fault indication. A converter power supply major fault signal plus a converter power supply alarm signs at NAND gate 12B5B produces a major alarm signal. A converter power supply alarm signal plus a converter power supply minor fault signal at NAND gate 12A5A produces a minor alarm signal. A converter power supply minor fault signal without a converter power supply major fault signal enables NAND gate 12B5A, turning on lamp driver module A25, to light the fault and system status panel converter power supply minor fault lamp, and producing a minor fault signal.

(13) A major fault in one or more frequency distribution amplifiers (13A4, A5, A6, or A9) turns on lamp driver module A14 (fig. FO-8, sh 13 and FO-15, sh 1), UNIT 13 major fault lamp. A unit 13 major fault at NAND gate 13B5C, produces a unit 13 major alarm signal.

b. Circuit Card D (fig. FO-20). Circuit card D receives transmit waveguide position signals and transmit equipment status signals. These signals are processed to provide signals to light fault and system status panel equipment status indicator lamps and to generate equipment status and configuration signals for circuit card E. Circuit card D also generates major fault summary, major alarm summary, minor fault summary, and minor alarm summary signals that are routed to circuit card A.

NOTE

Connectors P5 through P10 are frontmounted connectors that transfer signals between circuit cards D and E.

(1) Transmit waveguide switch position signals are NANDed (fig. FO-20, sh 5) to generate waveguide configuration signals. Transmit waveguide switch position signals and waveguide configuration signals CF1 through CF4, CF6 through 9, and CF11 are sent to circuit card E to produce transmit waveguide switch position control signals.

(2) A PA1 online signal is generated by a transmit waveguide switch 1 position 1 signal (fig. FO-20, sh 2 and 6). The PA1 online signal turns on lamp drive module A4 (fig. FO-20, sh 6), The PA1 online signal is also routed to circuit card E for processing.

(3) A PA1 standby signal is generated by enabling NAND gate 6C5A. NAND gate 6C5A is enabled when PA1 is not online, not faulted, not in maintenance, and the beam on signal is present. The PA1 standby signal turns on lamp driver module A1, lighting the fault and system status panel PA1 standby lamp. The PA1 standby signal is also routed to circuit card E for processing.

(4) A PA1 fault signal is generated by enabling NAND gate 6B5A. NAND gate 6B5A is enabled when waveguide switch 5 is in position 1 and IPA1 is faulted, or waveguide switch 5 is in position 2 and IPA2 is faulted, or PA1 high/low is faulted. The PA1 fault signal turns on lamp drive module A8, lighting the fault and system status panel PA1 fault lamp. The PA1 fault signal is also routed to circuit card E for processing.

(5) A PA2 online signal is generated by a transmit waveguide switch 3 position 1 signal (fig. FO-20, sh 2 and 4).

The PA2 online signal turns on lamp driver module A6 (fig. FO-20, sh 4), lighting the fault and system status panel PA2 online lamp. The PA2 online signal is also sent to circuit card E for processing.

(6) A PA2 standby signal is generated by enabling NAND gate 4C5A. NAND gate 4C5A is enabled when there is no PA2 fault signal, no PA2 maintenance signal, no PA2 online signal, and there is a PA2 beam on signal. The PA2 standby signal turns on lamp driver module A3, lighting the fault and system status panel PA2 standby lamp. The PA2 standby signal is also sent to circuit card E for processing.

(7) A PA2 fault signal is generated by enabling NAND gate 4B5A. NAND gate 4B5A is enabled when there is a PA2 power high/low fault signal and no PA2 maintenance signal, or waveguide switch 5 is in position 1 and IPA2 is faulted, or waveguide switch 5 is in position 2 and IPA1 is faulted. The PA2 fault signal turns on lamp driver module A2, lighting the fault and system status panel PA2 fault lamp. The PA2 fault signal is also sent to circuit card E for processing.

(8) A PA1 maintenance signal is generated (fig. FO-20, sh 7) when PAI is in maintenance. The PA1 maintenance signal turns on lamp driver module A7 lighting the fault and system status panel PA1 maintenance lamp.

(9) A PA2 maintenance signal is generated (fig. FO-20, sheet 8) when PA2 is in maintenance. The P A2 maintenance signal turns on lamp driver module A7 lighting the fault and system status panel PA2 maintenance lamp.

(10) Up-converters 1 and 2 maintenance and fault signals (fig. FO-20, sh 7) are inverted and sent to circuit card E for processing.

(11) Major faults, major alarms, minor faults, and minor alarms are summed by NOR gates 3C3B, 3B3A, and 3A3A (fig. FO-20, sh 3). Major fault/alarm signals (online and fault) are sent to 4B4B and 6B4A card A. Minor fault/alarm signals (not online and fault) are sent to 4B4A and 6B4A card A.

(12) Waveguide switch 5 in position 2 enables lamp driver A9 to light the IPA crosspatch indicator and produces a minor fault summary signal.

(13) Both waveguide switches SW1 and SW2 in position 1 at the same time produces a major fault/alarm.

c. Circuit Card E (fig. FO-21). Circuit card E receives fault and system status transmit pushbutton select command signals for UC1, UC2, PA1, PA2, and the transmit manual mode enable; the transmit automatic mode is selected by pushing AUTO on the fault and system status panel. Circuit card E receives operational equipment status signals, the transmit operate/disable signal, and the low elevation cutoff signal. A low elevation cutoff signal inhibits the transmit automatic mode. Circuit card E also receives transmit waveguide switch position control signals, waveguide configuration signals, a transmit equipment status signals from circuit card D. These signals are processed to provide transmit waveguide switch position control signals to relay cards.

NOTE

Connectors P5 through P10 are front-mounted connectors that transfer signals between circuit cards D and E.

(1) In the transmit automatic mode, transmit waveguide configuration signal inputs from circuit card D (fig. FO-21, sh 2) are NANDed with transmit equipment status signals at NAND gates 4D6A and 4C6A (fig. FO-21, sh 4). The NANDed waveguide configuration and status signals produce transmit waveguide switch position signals which are routed to set-reset flip-flops (fig. FO-21, sh 5 and 6) which function as latching circuits. The latching circuits for transmit automatic mode are similar, therefore the operation of only one will be described. NAND gate 5C6A (fig. FO-21, sh 5) is enabled by transmit waveguide switch 1 position 1 signal from inverter 4C4B (fig. FO-21, sh 4) when the manual mode has not been selected. The enabled signal sets latching circuit 5C6B/5C6C (fig. FO-21, sh 5), initiating a 0.5 second pulse from single-shot 5C4A. The 0.5 second pulse configures transmit waveguide switch 1 to position 1. When transmit waveguide switch 1 is in position 1, a verification signal is sent from the waveguide switch to the reset input of latch 5C6B, 5C6C, resetting the latch.

(2) The transmit MANUAL/AUTO pushbutton on fault and system status panel is a momentary contact switch. Pushing the transmit MANUAL/AUTO pushbutton changes the state of flip-flop 2B6A, 2B6B, 2B6C, 2B6D, 2B4A, 2B4B, 2B4C and 2B4D (fig. FO-21, sh 2). If the flip-flop is in auto, pushing the MANUAL/AUTO switch changes it to manual. If the state is in manual, pushing the switch changes it to auto. When the state is in auto and switch action takes place, the signal from 2B3C to NAND gate 4C5B enables OR gate 2B6A which changes the state to manual. When the flip-flop is in manual, OR gate 2B4D output is low; the low is inverted and applied to MANUAL lamp driver A2 to light the manual portion of the AUTO/MANUAL indicator. Manual operation (2C3A) is allowed only when manual mode is selected and the system is not in configuration 11 (both PA1 and PA2 in dummy load), and the XMT/OPR DISABLE is not disabled. The transmit AUTO indicator (lamp driver Al) and automatic operation (3B3C) are enabled when the flip-flop is in auto state (2B4D high) and the system is not in configuration 11, or XMT/OPR disable is not disabled, and the equipment is in one of two allowable configurations (CF1 or CF7), and there is no low elevation cutoff signal. Manual selection of transmit equipment units are similar, therefore only the generation of PA1 manual control signal will be described. If PA1 selection pushbutton is pressed (fig. FO-21, sh 3) while PA1 is in standby, NAND gate 3D6B is enabled to generate TXWGSW1 position 1 and TXWGSW3 position 2 manual control signals.

These control signals are NANDed at 5D6A and 6B6A (fig. FO-21, sh 5 and 6) with the manual signal from inverter 2C3B to enable the following logic that generates the equipment switching commands.

(3) The output of inverter 2B3C (fig. FO-21, sh 2) is sent to NAND gates 5C6A and 5B6B (fig. FO-21, sh 5), 6C6A and 6B6B (fig. FO-21, sh 6), to inhibit automatic selection of waveguide switch positions. The low elevation cutoff signal from inverter 2B3C is also sent to 4C5B (fig. FO-21, sh 4) to inhibit generation of the transmit manual reset signal.

(4) Waveguide configuration signal 1 (fig. FO-21, sh 2), and 2, 3, and 4 from circuit card D (fig. FO-21, sh 8) are NOR-gated at 8C7B to produce an up-converter 1 online signal, turning on lamp driver module A7 and lighting the fault and system status panel up-converter 1 on line lamp. NAND gate 8D7A is enabled when up-converter 1 is faulted and not in maintenance. The resultant fault signal turns on lamp driver A4 to light the up-converter fault lamp. The up-converter 1 fault signal inhibits NAND gate 8B5A to prevent generation of an up-converter 1 standby signal. The fault signal also enables NAND gate 8C6A when there is a waveguide configuration 1, 2, 3, or 4 signal to produce an up-converter 1 major fault/alarm signal. An up-converter 1 fault signal, when there is no waveguide configuration signal1, 2, 3, or 4, enables NAND gate 8B6A, producing an up-converter 1 minor fault/alarm signal. An up-converter 1 maintenance signal inhibits NAND gate 8B5A and turns on lamp driver module A5, lighting the fault and system status panel up-converter 1 maintenance lamp. NAND gate 8B5A is enabled when there is no up-converter 1 signal and waveguide switches are not in configurations 1, 2, 3, or 4. Enabled NAND gate 8B5A turns on lamp driver module A6, lighting fault and system status panel up-converter 1 standby lamp.

(5) Waveguide configuration signals 6, 7, 8, and 9 are NOR-gated at 9C7B (fig. FO-21, sh 9) to produce an up-converter 2 online signal, turning on lamp driver module A11 and lighting fault and system status panel up-converter 2 online lamp. NAND gate 9D7A is enabled when up-converter 2 is faulted and not in maintenance. The resultant signal turns on lamp driver A8 to light the up-converter 2 fault lamp. The up-converter 2 fault signal inhibits NAND gate NAND gate 9C6A when there is a waveguide configuration signal 6, 7, 8, or 9 to produce an up-converter 2 major fault/alarm signal. An up-converter 2 fault signal, when there is no waveguide configuration signal 6, 7, 8, or 9, enables NAND gate 9B6A, producing an up-converter 2 minor fault/alarm signal. An up-converter 2 maintenance signal inhibits NAND gate 9B5A and turns on lamp driver module A9, lighting the fault and system status paramp up-converter 2 maintenance lamp. NAND gate 9B5A is enabled when there is no up-converter 2 fault signal or maintenance signal and waveguide switches are not in configuration 6, 7, 8, or 9. Enabled NAND gate 9BSA turns on lamp driver module A 10, lighting fault and system status panel up-converter 2 standby lamp.

(6) Latching circuits 5C6B/5C6C and 5B6C/5B6D (fig. FO-21, sh 5), 6C6B/6B6C and 6B6C/6B6D (fig. FO-21, sh 6) send reset outputs to NOR gate 4B6A (fig. FO-21, sh 4). During latch set time the reset output is gated through NOR gates 4B6A and 4B5B, turning on lamp driver module A3 and lighting the fault and system status panel transmit disable indicator lamp. The output of NOR gate 4B6A is also sent out as a PA1 and PA2 diode switch inhibit signal to relay circuit card R1.

(7) Up-converter 1 and 2 major fault signals are gated by NOR gate 4B7A to produce a summed major fault signal. Up-converters 1 and 2 minor fault signals are gated by NOR gate 4B7B to produce a summed minor fault signal. Up-converters 1 and 2 major alarm signals are gated by NOR gate 4A7A to produce a summed major alarm signal. Up-converters 1 and 2 minor alarm signals are gated by NOR gate 4A7B to produce a summed minor alarm signal. Summed major and minor fault signals and minor alarm signals are sent to circuit card A.

d. ***Circuit Card F (Fig. FO-22).*** Circuit card F receives down-converter and low noise amplifier status in- put signals and receive waveguide switch position signals. Circuit card F processes these inputs to provide equipment status signals for the fault and system status panel and interface panel. Circuit card F also processes these inputs to provide fault and alarm summed signals to be sent to circuit card A and equipment status and wave- guide switch position signals to be sent to circuit card G for processing.

NOTE

Connector P5 through P10 are frontmounted connectors that transfer signals between circuit cards F and G.

(1) A down-converter 1 maintenance signal (fig. FO-22, sh 2) turns on lamp driver module A8, lighting the fault and system status panel down-converter 1 maintenance lamp. A down-converter 1 fault signal enables NAND gate 2D6B when there is no down-converter 1 maintenance signal. Enabled NAND gate 2D6B turns on lamp driver module A7, 1 lighting the fault and system status panel down-converter 1 fault lamp. NAND gate 2C6B is enabled when receive waveguide switch 1 is in position 2 and receive waveguide switch 3 is in position 1. The signal from 2C6B is inverted and NANDed at 2C5B with a down-converter 1 fault signal to produce a major fault/major alarm signal. A down-converter 1 fault signal is NANDed at NAND gate 2B5A when NAND gate 2C6B is not enabled to produce a minor fault/minor alarm signal.

NAND gate 2B4A is enabled when there is no down converter 1 fault signal down--converter 1 fault signal or down-converter 1 maintenance signal and down-converter 1 is not on line (receive waveguide switch 1 is not in position 2 and/or receive waveguide switch 3 is not in position 1). Enabled NAND gate 2B4A turns on lamp driver module A9 lighting the fault and system status panel down-converter 1 standby lamp. A down-converter 1 online signal is generated when NAND gate 2C6B is enabled. The online signal turns on lamp driver module A10 lighting the fault and system status panel down-converter 1 online lamp.

(2) A down-converter 2 maintenance signal (fig. FO-22, sh 3) turns on lamp driver module A12, lighting the fault and system status panel down-converter 2 maintenance lamp. A down-converter 2 fault signal enables NAND gate 3D6B when there is no down-converter 2 maintenance signal. Enabled NAND gate 3D6B turns on lamp driver module A11, lighting the fault and system status panel down-converter 2 fault lamp. NAND gate 3C6B is enabled when receive waveguide switch 1 is in position 1 and receive waveguide switch 3 is in position 2. The signal from enabled NAND gate 3C6B is NANDed at 3C5B with a down-converter 2 fault signal to produce a major fault/major alarm signal. A down converter 2 fault signal is NANDed at NAND gate 3B5A when NAND gate 3C6B is not enabled to produce a minor fault/minor alarm signal. NAND gate 3B4A is enabled when there is no down-converter 2 fault signal or maintenance signal and down-converter 1 is not on line (receive waveguide switch 1 is not in position 1 and/or receive waveguide switch 3 is not in position 2). Enabled NAND gate 3B4A turns on lamp driver module A13, lighting the fault system status panel down-converter 2 standby lamp. A down-converter 2 online signal is generated when NAND gate 3C6B is enabled. The online signal turns on lamp driver module A14, lighting the fault and system status panel down-converter 2 online lamp.

(3) A low noise amplifier 1 maintenance sign (fig. FO-22, sh 4) turns on lamp driver module A1 lighting the fault and system status panel low noise amplifier 1 maintenance lamp. A low noise amplifier 1 fault signal enables NAND gate 4D6B when there is no low noise amplifier 1 maintenance signal. Enabled NAND gate 4D6B turns on lamp driver module A15, lighting the fault and system status panel low noise amplifier 1 fault indicator lamp. NAND gate 4C6B is enabled when receive waveguide switch 1 is in position 2 and receive waveguide switch 3 is in position 1. With the receive waveguide switches in these positions, low noise amplifier 1 is on line. The online signal from enabled NAND gate 4C6B is NANDed at 4C5B with a low noise amplifier 1 fault signal to produce a major fault/major alarm signal. A low noise amplifier 1 fault signal is NANDed at NAND gate 4B5A when NAND gate 4C6B is not enabled produces a minor fault/minor alarm signal. NAND gate 4B4A is enabled when there is no amplifier 1 fault signal or maintenance signal, and low noise amplifier 1 is not online. (Receive waveguide switch 1 is not in position and/or receive waveguide switch 3 is not in position 1.) Enabled NAND gate 4B4A turns on lamp driver module A17, lighting the fault and receive waveguide switch 1 is in position 2 and receive waveguide switch 3 is in position 1. With the receive waveguide switches in these positions, low noise amplifier 1 is online. The online signal from enabled NAND gate 4C6B is NANDed at 4C5B with a low noise amplifier 1 fault signal to produce a major fault/major alarm signal. A low noise amplifier 1 fault signal NANDed at NAND gate 4B5A when NAND gate 4C6B is not enabled produces a minor fault/minor alarm signal. NAND gate 4B4A is enabled when there is no low noise amplifier 1 fault signal or maintenance signal, and low noise amplifier 1 is not online. (Receive waveguide switch 1 is not in position 2 and/or receive waveguide switch 3 is not in position 1.) Enabled NAND gate 4B4A turns on lamp driver module A17, lighting the fault and system status panel low noise amplifier 1 standby lamp. A low noise amplifier 1 online signal is generated when NAND gate 4C6B is enabled. The online signal turns on lamp driver module A18, lighting the fault and system status panel low noise amplifier 1 online lamp.

(4) A low noise amplifier 2 maintenance signal (sheet 5) turns on lamp driver module A20, lighting the fault and system status panel low noise amplifier 2 maintenance lamp. A low noise amplifier 2 fault signal enables NAND gate 5D6B when there is no low noise amplifier 2 maintenance signal. Enabled NAND gate 5D6B turns on lamp driver module A 19, lighting the fault and system status panel low noise amplifier 2 fault lamp. NAND gate 5C6B is enabled when receive waveguide switch 1 is in position 1 and receive waveguide switch 3 is in position 2. With the receive waveguide switches in these positions, low noise amplifier 2 is online. The online signal from enabled NAND gate 5C6B is NANDed at 5C5B with a low noise amplifier 2 fault signal to produce a major fault/major alarm signal. A low noise amplifier 2 fault signal is NANDed at NAND gate 5B5A when NAND gate 5C6B is not enabled to produce a minor fault/minor alarm signal. NAND gate 5B6A is enabled when there is no low noise amplifier 2 fault signal or low noise amplifier 2 maintenance signal and low noise amplifier 2 is not online (receive waveguide switch 1 is not in position 1 and/or receive waveguide switch 3 is not in position 2). Enabled NAND gate 5B4A turns on lamp driver module A21, lighting the fault and system status panel low noise amplifier 2 standby lamp. A low noise amplifier 2 online signal is generated when NAND gate 5C6B is enabled. The online signal turns on lamp driver module A22, lighting the fault and system status panel low noise amplifier 2 online indicator lamp.

(5) Major faults and major alarms of circuit card F are gated at NOR gate 2B6A (fig. FO-22, sh 2) and sent to circuit card A for summing. Minor faults and minor alarms of circuit card F are gated at NOR gate 2A6A and sent to circuit card A for summing.

e. Circuit Card G (fig. FO-23) Circuit card G receives operational equipment status input signals, receive waveguide switch position signals, the receive manual enable signal, and fault and system status panel pushbutton select command signals for receive LNA1 and 2. Circuit card G processes these signals to provide receive waveguide switch position control signals to relay cards and operational equipment status signals to the fault and system status panel and interface panel.

NOTE

Connectors P5 through P10 are front-mounted connectors that transfer signals between circuit cards F and G.

(1) A receive auto/manual enable signal originates from the fault and system status panel as a momentary pushbutton contact closure (fig. FO-23, sh 4). The momentary contact closure switches the receive mode to the opposite state (automatic switches to manual and manual switches to automatic). The receive automatic mode is also switched to manual mode by certain equipment status conditions. Assuming the circuit is operating in automatic mode which enables NAND gate 4D4F (fig. FO-23, sh 4), with receive waveguide switch 1 in position 2 and receive waveguide switch 3 in position 1, the output of NAND gate 4D4A turns on lamp driver A1 through NOR gate 4D4D, NAND gate 4D4F, and inverter 4D3B, lighting the fault and system status panel receive automatic indicator lamp. At the same time the signal from NOR gate 4C4D inhibits turnon of lamp driver module A2. Latching circuit 4CSA/4C5B is in a set state holding operational mode in automatic. A momentary pushbutton contact closure to select manual mode inhibits turnon of lamp driver module A1, turns on lamp driver module A2 to light the fault and system status panel receive manual indicator lamp, and changes the state of latch circuit 4C5A/4CSB to hold operational mode in manual.

(2) During automatic mode operation, latch circuit 4C5A/4CSB is set to manual after automatic switchover takes place. Automatic switchover command signals are generated when there is an online down-converter fault, or when there is no autotrack dropout and loss of signal (no signal acquired for more than 100 ms) and the offline down-converter and low noise amplifier are in standby.

(3) Receive equipment status input signals NANDed with receive equipment pushbutton select signals from the fault and system status panel (fig. FO-23, sh 6) provide inputs to latching circuits (fig. FO-23, sh 5) to produce a receive waveguide switch position signal. Monostable multivibrators associated with waveguide switch position latching circuits maintain the waveguide switch position signal for a 0.5 second duration. Once a latching circuit is in the latched state it will stay latched until the particular receive waveguide switch that the latching circuit controls has switched to its opposite position and has returned a signal confirming its new position.

(4) Contact closure inputs for power status ranging (fig. FO-23, sh 2 and 3) are converted to voltage levels by input circuit assemblies A3, A4, A6, A12, A14, and A15. These voltage levels are terminated at the interface panel for future use.

f. Relay Driver/Relay Circuit Cards R1, R2 (fig. FO-24, FO-25) Relay circuit cards receive transmit and receive waveguide switch position control signals from circuit cards E, F, and G. The energized relays route waveguide switch position control signals to the waveguide switches. The two relay circuit cards are the same. However, the relay cards receive different waveguide switch position control signals. Table 2-10 identifies circuit cards from which waveguide switch position control signals originate, the relay circuit card (1 or 2 as referenced to their mounting position left or right) that receive the signal, the relay on the circuit card controlling the signal, and the control signal.

Table 2-10. Relay Circuit Cards R1 15A5A4 and R2 15A5A5S Control Signals (AN/FSC-79)

From circuit card	To relay circuit card	Relay	Control signal
E	R1	K1	Transmit waveguide switch 1 position 1
E	R1	K3	Transmit waveguide switch 3 position 1
E	R1	K5	Transmit waveguide switch 4 position 1
E	R1	K6	Transmit waveguide switch 1 position 2
E	R1	K8	Transmit waveguide switch 3 position 2
E	R1	K10	Transmit waveguide switch 4 position 2
E	R1	K11	PA 1 and PA 2 diode switch inhibit
G	R2	K1	Receive waveguide switch 1 position 1
G	R2	K2	Receive waveguide switch 1 position 2
G	R2	K3	Minor fault
G	R2	K4	Major fault
G	R2	K5	Receive waveguide switch 3 position 1
G	R2	K6	Receive waveguide switch 3 position 2
E	R2	K7	Low elevation cut off

2-13. Circuit Analysis of Fault and System Status Panel (fig. FO-26). The fault and system status panel analysis is divided into the following circuit operations: Status and displays, lamp test, transmit and receive status displays and equipment selection switches, audio alarm, and power supply PS1. These operations are described in the subparagraphs that follow.

a. Status and Alarm Displays. Status and alarm signals, from system status logic unit 15A5 enter fault and system status panel 14A16 through connectors J3 and J4 (fig. FO-26. sh 1 through 3). These signals supply a ground return through the indicator lamp to the fault and system status panel 28 V dc power supply. The positive side of the power supply is connected to the lamp and when the ground return completes the circuit the indicator lights. Table 2-6 lists the status and alarm signals to the fault and system status panel from the system status logic unit.

b. Lamp Test. Four pushbutton switches on the fault and system status panel are provided for lamp testing (fig. FO-26, sh 1). Switch S6, when pressed, lights the red indicators on the fault and system status panel. Switch S7, when pressed, lights the green indicators on the fault and system status panel. Switch S10, when pressed, lights the blue indicators on the fault and system status panel. Switch S11, when pressed, lights the amber indicators on the fault and system status panel. The switches are inter-connected so that only one color can be tested at a time. Steering diodes in each lamp test circuit prevent interaction between individual circuits (fig. FO-26, sh 1 through 4).

The test switches and lamp test circuits are interface connected through terminal board TB5 (fig. FO-26 sh 1).

c. Transmit and Receive Status Display and Equipment Selection Switches. Transmit and receive status signals from the system status logic unit enter the fault and system status panel through connectors J3 and J4 (fig. FO-26, sh 2 and 3). These signals are applied to denote the standby, online, fault, and maintenance status of down-converters 1 and 2, low noise amplifiers 1 and 2 (fig. FO-26, sh 2), up-converters 1 and 2, and power amplifiers 1 and 2 (fig. FO-26, sh 3). With up-converter 1 in standby and up-converter 2 online a ground return is applied to connector J4 pins B and E. This ground is applied to pins D and A of UP CONVERTER 1 and UP CONVERTER 2 indicators, respectively, lighting their amber (standby) and green (online) lamps. Should a fault occur in up-converter 2 (online), system status logic unit circuits automatically connect the ground return to fault and system status panel connector J4 pin G. This action causes the UP CONVERTER 2 fault (red) indicator to light. At this time, if the uplink function is operating in the manual mode, the operator presses the UP CONVERTER 1 pushbutton, closing the switch S3 1 common and 1 normally open contacts. This action completes the up-converter 1 select circuit through connector J2 pins D and E. Completing the up-converter I select circuit enables the system status logic unit to generate switch command signals that reconfigure the uplink function to transfer up-converter 1 online. Uplink function reconfiguration connects the ground return to connector J4 pin A lighting the UP CONVERTER 1 green (online) indicator and the UP CONVERTER 2 green (online) indicator to go out. The preceding functions are also typical of LNA 1 and 2, paramps 1 and 2, power amplifiers 1 and 2, and DN converters 1 and 2. Selection switch signals are routed through fault and system status panel connector J2 to the system status logic unit, Transmit and receive AUTO/MANUAL switch signals are routed through connector J3.

d. Audio Alarm. Major and minor fault audio alarm signals from the system status logic unit enter the fault and system status panel through connector J2 (fig. FO-26, sh 4). The alarm signals supply +28 V dc to major fault audio alarm DS 16 or minor fault audio alarm DS17. Pressing AUDIO ALARM MUTE pushbutton switch S14 completes the audio alarm mute signal path for system status logic unit circuit.

e. Power Supply PS1. Input power for the 28 V power supply enters the fault and system status panel at connector J1 (fig. FO-26, sh 4). Relay K 1 and CIRCUIT BREAKER CB1 control power supply PS1 turn on. Relay K1 is operated when logic unit power supply 15A4 provides 5 V dc control power through connector J2. Relay K1 incorporates a 1 second delay for logic unit power supply stabilization. Pressing CIRCUIT BREAKER DS15 closes the CB1 contacts applying 120 V ac through relay K1 contacts to power supply PS1. Power supply PS1 provides +28 V dc to terminal board TB2 (fig. FO-26, sh 4) and -28 V dc to terminal board TB1 for distribution. Terminal boards TB1 through TB4 provide distribution of 28 V power for fault and system status panel indicators and through connector J2 to the system status logic unit for switch control signals. The following subparagraphs discuss the operation of power supply PS1 (fig. FO-16).

(1) Single phase 120 V ac input power is applied through fuse F1 and thermostat S1 to transformer T1. Thermostat S1 open to protect the supply when overheating occurs and resets automatically when the overtemperature condition is eliminated. Transformer T1, which contains two secondary windings, steps down the input voltage for application to the main and auxiliary rectifiers.

(2) The bias supply, consisting of half-wave auxiliary rectifier CR7, filter capacitor C7, and zener diode regulator CR6, provides operating voltage for error amplifiers Q1 and Q2 and current limit amplifier Q3. Zener diode CR1 and resistor R5, which are connected across the bias supply, provide a regulated temperature compensated reference voltage. Resistor R4 compensates for input voltage variations.

(3) The main rectifier consists of bridge rectifiers CR8 through CR11 and filter capacitor C8. Bridge rectifiers CR8 through CR11 perform full-wave rectification of the ac voltage from transformer T1 to provide a dc voltage which is filtered by capacitor C8. The filtered dc voltage is applied to series regulators Q8 and Q9.

(4) The voltage regulator circuit regulates the dc output voltage and provides overcurrent protection. The series voltage regulator circuit is composed or error amplifiers Q1 and Q2, current limit amplifier Q3, drivers Q5 and Q6, and series regulators Q8 through Q12. Series regulators Q8 through Q12 receive the dc voltage from the main rectifier and control the output by presenting a variable impedance in series with the load. The regulated 28 V dc output is taken across pins 6 and 4 of terminal board TB1. The dc output voltage is adjustable from 29.6 to 29.4 by potentiometer R1. Series regulators Q8 and Q12, which regulate the dc output voltage to the adjustable value established by potentiometer R1, are controlled by signals derived from error amplifiers Q1 and Q2 or current limit amplifier Q3. Error amplifiers Q1 and Q2 provide the control signal under normal load conditions, and current limit amplifier Q3 provides the control signal under overload conditions.

(5) Operation of the series regulator circuit is determined by changes in the output voltage. A change in output voltage is sensed by the sensing divider resistors R2 and R3 and potentiometer R1, which compare output voltage with the +S reference voltage. The +S reference voltage is established by zener diode CR 1 and resistor R5. Comparison of the output voltage with the +S reference voltage produces an error voltage at the junction of resistors R2 and R3, which is amplified by error amplifiers Q1 and Q2 and is current-amplified by drivers Q5 and Q6. The corresponding change in driver Q5 emitter current drives the emitter base junctions of series regulators Q8 through Q12. This action increases the emitter-to-collector voltage drop of series regulators Q8 through Q12 to decrease the output voltage if the output voltage has increased, and it decreases the emitter-to-collector drop to increase the output voltage if the output voltage has decreased.

(6) Overcurrent conditions are detected by current limit amplifier Q3. Current limit amplifier Q3 samples load current through current sensing resistor R25A. When the voltage drop across R25A increases, compared with the present voltage reference determined by potentiometer R17 and resistor R18, current limit amplifier Q3 conducts. Thus, when the output current rating of the unit is exceeded, current limit amplifier Q3 conducts, decreasing the current through drivers Q5 and Q6, resulting in an increase of voltage across the series regulators and a decrease of the output voltage, effectively limiting the output current to a safe value. The current limit value is determined by the factory setting of current limit potentiometer R17. When operating conditions approach short circuit, the output voltage decreases. Since the voltage determined by potentiometer R17 and resistor R18 is proportional to the output voltage, current limit amplifier Q3 is successively biased into turnon at lower and lower load currents as the output voltage decreases. This action continues until the output voltage decreases to zero and current decreases to a predetermined low value.

2-14. Channel Frequency Indicator 15A6 (fig. 2-2). The channel frequency indicator is a seven segment thumbwheel setting switch of the type commonly used to manually set decimal numbers into binary equipment. The schematic diagram shows a common (c) wire and four binary weighted (1, 2, 3 and 8) wires between the connector and each switch segment. To determine which wires are connected to common for a given switch setting, add the weight of lines that are in logic 1 state. For example: for a switch setting of 7, total wires 1, 2, and 4. These wires are internally connected to common by the switch.

CHAPTER 3

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

SECTION I. GENERAL

3-1. Voltage and Resistance Measurements. The voltage and resistance measurements required to perform direct support maintenance on the status and alarm equipment are contained in the troubleshooting and performance test tables of this chapter. General procedures for making voltages and resistance measurements are provided in paragraph 3-3.

3-2. Tools and Test Equipment. Tools and test equipment required for direct support maintenance are described in TM 11-5895-907-34P. Tools and test equipment required for direct support maintenance discussed in this chapter are listed in table 3-1.

Table 3-1. Tools and Test Equipment for Maintenance

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449	1	Belden
Adapter, AC, 3-Wire to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Size 16 Female Connector	3562	3	Pomona
Adapter, Banana Jack to Size 16 Male Connector	3563	8	Pomona
Adapter, Banana Jack to Size 20 Female Connector	3560	2	Pomona
Adapter, Banana Jack to Size 20 Male Connector	3561	2	Pomona
Adapter, Banana Jack to Spade Lug	3744	7	Pomona
Adapter, BNC Jack to Double Banana Plug	1269	1	Pomona
Adapter, Single Banana Plug to Binding Post	2894	3	Pomona
Ammeter, Clamp On	749-2091001	1	Weston Instruments
Extender Board, Circuit Card	SM-3-724007	2	Aeronutronic Ford
Meter, Amp, Multirange, DC	931-2902001	1	Weston Instruments
Meter, Multifunction	3450B OPT 001, 002	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual-Trace	475	1	Tektronix
Power Supply, 0-80/0-40V	LPD-422A-FM	1	Lambda
Rheostate, Carbon Compression	82905	1	Central Scientific
Test Lead, Banana Plug to Alligator Clip	1166-36-B	1	Pomona
Test Lead, Banana Plug to Alligator Clip	1166-36-R	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-12	4	Pomona

Table 3-1. Tools and Test Equipment for Maintenance-Continued

Common name	Part/model no.	Qty	Manufacturer
Test Lead, Banana Plug to Banana Plug	B-48(B)	3	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	2	Pomona
Test Lead, Banana Plug to Test Probe	1986-36-B	1	Pomona
Test Lead, Banana Plug to Test Probe	198636-R	1	Pomona
Test Lead, BNC Plug to Double Banana (44 inches)	11001A	1	Hewlett-Packard
Test Lead, Spade Lug to Banana Plug	1370-24-B	1	Pomona
Test Lead, Spade Lug to Banana Plug	1370-24-R	1	Pomona
Test Lead, Spade Lug to Spade Lug	1743-36-R	1	Pomona
Transformer, Variable	3PN2210	1	Staco
Tool Kit, Electronic Equipment	TK-105/G	1	
Multimeter	ME-450/U	1	Fluke

3-3. General Troubleshooting Instructions. This paragraph contains general procedures for voltage and resistance measurements as an aid for troubleshooting.

a. Voltage Measurements. In-circuit voltage measurements are useful in isolating a defective component or stage. Transistors can be easily checked by measuring the base to emitter bias. A transistor functioning as an amplifier is always forward biased. The base to emitter voltage of any turned-on silicon transistor is approximately 0.8 V; that of a germanium-type transistor approximately 0.4 V. A non-conducting transistor shows the full supply voltage at the collector.

(1) A quick method to check whether a forward biased transistor functions as an amplifier is to remove the forward bias by shorting the emitter to base. The collector voltage in this case should rise to the approximate level of the supply voltage.

(2) Incorrect or absent supply voltage is usually caused by defective zener diodes. check for the correct operating voltage across the zener diode. Refer to the appropriate schematic, troubleshooting procedure, and/or semiconductor reference books.

(3) Pin diodes, normally used as switching diodes, are semiconductor devices with very low resistance when forward-biased and high resistance when reverse-biased. A large voltage drop across the pin diode when forward-biased indicates a defective diode.

(4) Field effect transistors (fet) can be checked by varying the voltage at the gate and observing the voltage change appearing at drain and source.

(5) Operational amplifiers can be checked by measuring and recording the voltage level at both the (inverting) terminal pin 2 and the + (noninverting) terminal pin 3. The level should not differ by more than approximately 10 mV. If the voltage level is not within approximately 10 mV, check the external circuitry and components. If the external circuitry (input signal, operating voltages, feedback resistors) is normal, replace the operational amplifier.

CAUTION

Be careful when using a vtvm or oscilloscope to measure voltages within an operating module. The measuring instrument may upset the characteristics of some circuits, and false indications may be obtained. Refer to the appropriate module troubleshooting procedure for correct use of measuring instruments.

(6) Checking signal voltages within an operating module is, in most cases, an effective way of troubleshooting a module. Signal voltages can be checked using a vtvm or oscilloscope.

(7) Peak-to-peak voltages of pulse and square waves can be measured with an oscilloscope.

(8) When measuring voltages, use the test points provided, rather than break the conformal coating to get to connections.

b. In-Circuit Resistance Measurements. In-circuit checking of components should be carried out as much as possible. Most components can be checked for open or shorted conditions using the allocated multimeter. Use the Rx100 or Rx10K scale when there is possibility of damaging the components.

Loss of signal or supply voltage in a module may be caused by shorts, poor connections at plugs, broken wires, etc. Continuity checks using the allocated multimeter will usually indicate the source of trouble; use the appropriate schematic diagram and interconnecting diagram for guidance. In-circuit resistance checking will usually provide adequate indication of a faulty transistor or diode. The following is a suggested method.

(1) Npn transistors. With the red (+) lead of the multimeter on the base and the black (-) lead first on the collector and then on the emitter, the multimeter should normally indicate several hundred ohms (Rx100 scale). With reverse leads black (-) on base the resistance to collector should be very high or infinity, while the resistance to the emitter should be several megohoms (depending on the other components in the circuit).

(2) Pnp transistors. Reverse connections and indications in (1) above.

(3) Diodes. With diodes of type 1N914 or similar, place the black (-) lead of the multimeter on the cathode, the red (+) on the anode; the meter should indicate several hundred ohms. Reverse the leads and a very high or infinite resistance should be obtained, depending on the circuit configuration.

c. Out-of-Circuit Resistance Measurements. Under certain conditions, due to circuit configurations, it may not be possible to check a transistor or other component in circuit; in this case the component must be disconnected. Remove the suspected faulty component using the proper procedure (para 3-4b) and check as described in b above. Only one end needs to be disconnected in order to check diodes, varicaps, and some types of zener diodes. An additional test for an npn transistor consists of connecting the black (-) lead of the multimeter to the emitter and the red (+) to the collector, which should give an infinite resistance indication. Next connect the red (+) lead to base and note the resistance reading; then short the base lead to collector to ‘turn on’ the transistor; this should produce a slightly lower reading on the meter. Reverse multimeter leads for pnp transistor.

CAUTION

Do not check field effect transistors with the multimeter; static charge from hands to gate when the transistor is out of circuit, and when leads are not shorted, can damage the component.

3-4. General Repair Instructions. This paragraph provides for soldering and unsoldering, component replacement and connector repair.

a. Soldering and Unsoldering Procedures. To ensure high reliability of electrical connections, certain procedures for hand soldering must be adhered to as follows:

(1) Use low wattage or temperature controlled soldering irons and thermal (heat) sinks to prevent damage to heat-sensitive components, such as semiconductors, glass bead capacitors, and insulating materials.

(2) Use appropriate soldering iron tips and solder quickly to prevent long period of excessive heat during soldering and unsoldering on printed circuit boards covered with conformal coating.

(3) Do not use transformer-type solder guns.

(4) Check the condition of soldering tips. Do not allow oxidation scale to accumulate on the tip. Maintain a bright, thin, but continuous tinned tip surface.

(5) Use a 60/40 type solder for tinning and general use. Use a low-melting point 63/37 type solder on printed circuit boards and when soldering heat sensitive components.

(6) Remove excess flux, grease, or oil from soldering points, using ethyl or isopropyl alcohol.

(7) Remove conformal coating from joint to be soldered with a broad knife or soldering iron.

(8) Use a heated copper braid to absorb the melted solder when unsoldering. Avoid using a solder sucker to remove solder from printed circuit boards; this method may damage the joint and/or the printed circuit board.

(9) Avoid excessive temperatures to prevent unreliable joints and damage to parts. Use heat sinks, such as long-nose pliers, to protect the components.

(10) Allow solder to cool at room temperature. Do not use liquids to cool a soldered connection.

NOTE

Never use any abrasive cleaning agents on solder areas.

(11) Remove all visible flux and impurities from a cool solder joint using a medium stiff material or synthetic bristle brush and approved solvent. The soldered connection should be clean and have a smooth, undisturbed appearance.

(12) Use a wire brush to remove oxide, paint, and any other foreign matter from terminals before attaching wires and leads for soldering.

Use a special type white eraser to remove gold plating from solder areas.

b. Replacement of Components. The following subparagraphs provide general instructions for replacement of chassis mounted components.

(1) Tag electrical wires connected to component for identification. Unsolder leads from component by following approved unsoldering procedures (paragraph 3-4a).

(2) Remove component and repair or dispose of component.

(3) Check and clean all replacement component leads prior to soldering, regardless of visual appearance.

(4) Observe polarity of replacement diodes, transistors, and electrolytic and tantalum capacitors.

(5) Position replacement component in the same place as the removed component. Do not mount components on top of other components. Position replacement components so that any identification mark, such as the part number, symbol, value, etc., is readily visible.

(6) When components are mounted on standoff terminals, allow sufficient slack in leads to components to allow for vibration and temperature changes.

(7) When wires are attached to terminals, sufficient insulation should be stripped off the wire to avoid contact between the insulation and the solder connection. Use proper stripping tools to avoid nicking, damaging, or breaking wires.

(8) The ends of wires soldered to terminals should be wrapped around the terminals 1/2 to 3/4 turn (wires larger than 26 AWG) or 3/4 to 1-1/2 turns (wires smaller than 26 AWG). All portions of stranded wire and component leads to be soldered must be properly tinned before attachment.

(9) Use the correct type of insulated heat-shrinkable sleeving when replacing a circuit breaker. Use a thermo-gun for shrinking the sleeving.

c. Component Replacement Procedure. Component replacement procedures are as follows:

(1) ***Air-core coil***. Install replacement air-core coil using approved soldering techniques, without changing 1 the contour of the coil, and maintaining the same board-to-board distance. A complete realignment of the module will be required.

(2) ***Ferrite tuned coil***. To replace a ferrite tuned coil, proceed as instructed in (1) above, observing polarity, start, and finish of the coil. Realignment is required after replacement.

(3) ***Relay.*** Mark relay pin numbers on individual connecting wires with masking tape before removing faulty relay. Replace relay using approved soldering techniques (para 3-4a).

(4) ***Pin diode.*** A pin diode is either soldered to the board or mechanically mounted in a special holder. Press replacement pin diode into position, observing polarity.

(5) ***Small components.*** Small fixed capacitors, chokes, fixed resistors, varicaps, and diodes are all replaced following the general procedures described in b above. Observe polarity on all types of diodes, varicaps, and electrolytic capacitors. Figure FO-1 explains color code markings for small components.

(6) ***Potentiometer.*** Replace potentiometer following general procedures in b above; refer to applicable paragraph for alignment procedures.

(7) **Transformer.** Identify all connecting wires before removing a defective transformer to facilitate installation of replacement transformer.

d. Multipin Connector Repair Procedures. A multipin connector is repaired as follows:

(1) Tag and disconnect cable to faulty connector.

(2) Tag and unsolder wires to connector pins.

(3) Remove screws, washers, and nuts securing connector to panel and remove connector.

(4) Clean all wires of solder and ensure that the wires are properly stripped.

(5) Fill pin cups on replacement connector with a small amount of solder.

(6) Identify wires by tag and insert and solder wire ends into pin cups.

(7) Allow solder to cool, pull wire to ensure that it is solidly attached, then slide insulating sleeve over the solder connection so that the sleeve fits snugly against the connector.

(8) Install connector on the panel and secure to panel with screws, washers, and nuts.

(9) Identify cables by tag and connect to connector.

e. Coaxial Connector Repair Procedure. Repair of a coaxial connector is provided as follows:

(1) Slide connector nut and gasket over the cable and remove 5/16 inch of outer covering of the cable.

(2) Comb braid and fold it out.

(3) Pull braid wires forward and taper to the center conductor.

(4) Fold back braid wires, trim to the proper length, and fold over cable.

(5) Cut back dielectric to correct length so that the contact pin fits snugly against the center conductor.

(6) Solder contact pin to center conductor through opening in contact pin.

(7) Insert cable end with soldered contact into the connector body.

(8) Ensure that contact pin is properly seated in the connector body. Tighten nut.

NOTE

In a plug, the end of contact pin should be flush with insulator. In a jack, there should be clearance of 0.10 inch between of the contact and top of the insulator.

SECTION II. TROUBLESHOOTING OF LOGIC UNIT POWER SUPPLY 15A4

3-5. General. This section contains preliminary procedures and troubleshooting procedures for fault localization to a malfunctioning piece part of the logic unit power supply 15A4 after referral by organization maintenance. Preliminary procedures consist of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in troubleshooting chart, must be made carefully to ensure accurate test results. When a troubleshooting procedure specifies replacement or adjustment of a malfunctioning component, refer to section XI in this chapter.

3-6. Test Equipment and Materials. Table 3-2 lists the test equipment required for troubleshooting the logic unit power supply.

Table 3-2. Test Equipment Required for Logic Unit Power Supply 15A4 Maintenance

Common name	Part/model no.	Qty	Manufacturer
Adapter. Banana Jack to Size 16, Male Connector	3563	8	Pomona
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Test Lead, Banana Plug to Banana Plug	B-12	4	Pomona

3-7. Test Connections and Conditions. Logic unit power supply troubleshooting is accomplished on the work bench. Test connections are illustrated in figure 3-1. Prior to performing the troubleshooting procedure, per-form the following steps to gain access to the equipment

a. Remove the four screws securing panel to electrical equipment rack.

b. Extend chassis fully, ensuring that the slides lock in the extended position.

c. Press locking lugs on logic unit power supply slides to release drawer, and slowly pull drawer forward to gain access to plugs attached at rear.

d. Disconnect AC INPUT and DC OUTPUT cables and ground lead. Remove power supply to work bench.

e. Attach ac cold and adapter as shown in figure 3-1.

3-8. Initial Control Settings. Plug the black test lead in the (-) COMMON jack and the red test lead in the (+) jack of the volt-ohm-milliamimmeter (vom) and position controls its follows:

Control	Position
Vom	
Function	NC
Range	250 v
Logic unit power supply	
+5 V CIRCUIT BREAKER	ON
-5 V CIRCUIT BREAKER	ON

3-9. Troubleshooting Procedure. After completing the preliminary procedures (para 3-6, 3-7, and 3-8), perform the necessary troubleshooting procedures in table 3-3 as specified by symptom/probable cause list below. Use the logic unit power supply schematic diagram (fig. FO-5) as an aid in locating trouble causes. After the faulty item has been replaced, perform the direct support testing procedure in section XIX of this chapter. Upon satisfactory completion of the performance test, the logic unit power supply can be returned to service.

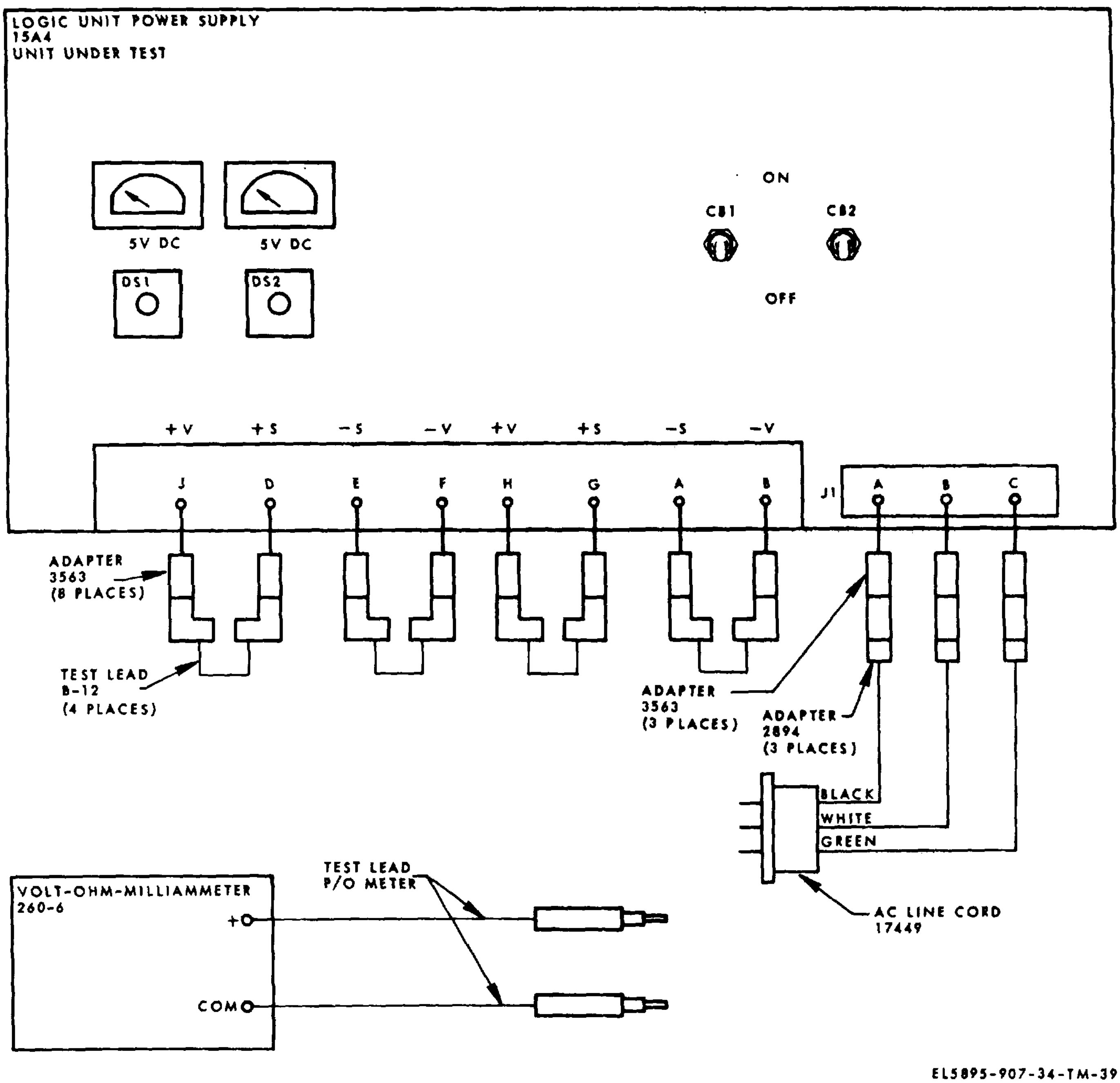


Figure 3-1. Logic unit power supply 15A4, troubleshooting, test setup diagram.

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. Front panel circuit breakers do not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker in-put terminals. Do not take chances.

Symptom	Probable cause
One of the 5 V power supply indicators not lighted, and its corresponding POWER SUPPLY VOLTAGE meter indicates incorrect voltage.	Malfunctioning circuit breaker-or power supply. Perform step2.
5 V DC PS ON indicator not lighted, but corres ponding POWER SUPPLY VOLTAGE meter indicates 5 V dc.	5 V DC PS ON indicator lamp defective. Perform step 6.
5 V DC PS ON indicator lighted, but POWER SUPPLY VOLTAGE meter indicates 0 V dc.	POWER SUPPLY VOLTAGE meter defective. Perform step 7.

Table 3-3. Logic Unit Power Supply 15A4 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	120 V ac input		On AC INPUT power cable disconnected from rear of power supply place vom black (-) test lead on pin B and red (+) lead on pin A.	120 V ac	a. If reading is abnormal, ensure power cable is connected to plugmold, or refer to TM 11-5895-898-12 for AN/FSC-78 (V) configuration or TM 11-58 95899-12 for AN/FSC-79 configuration and check in-put power to electrical equipment rack. b. If reading is normal proceed to step 2.
2	120 V ac input		Place vom black (-) lead on power supply terminal board pin 2, and red (+) lead on pin 1.	120 V ac	If reading abnormal, proceed to step 3. If reading normal, proceed to step 5.
3	120 V ac input	120 V ac not present at power supply terminal board pins 1 and 2.	Place vom black (-) lead on power supply terminal board pin 2, and red (+) lead on line terminal of circuit breaker.	120 V ac	a. If voltage at line terminal of circuit breaker is 120 V ac and voltage at load load terminal is 0 V ac, make certain that circuit breaker is in ON position. Replace circuit breaker if 120 V ac is not measured at both line and load terminals of circuit breaker. b. If 0 V is measured at both sides of circuit breaker, perform step 4.
4	Ac input lines	Circuit breakers in OFF position and AC IN-PUT cable removed at rear panel. On vom set range switch to RX1 and set function switch to + D.C. Zero the meter.	Make three checks: a. AC INPUT connector pin A to circuit breaker. b. AC INPUT connector pin B	0 ohms	Replace open line. Refer to paragraph 3-4a.

Table 3-3. Logic Unit Power Supply 15A4 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
			to power supply terminal board pin 2. c. Circuit breaker to power supply terminal board pin 1.		
5	Power supply	120 V ac present at power supply terminal board pins 1 and 2. On vom set function switch to +D.C. and set range switch to 10V.	Place vom black (-) lead power supply terminal board pin 4, and red (+) lead on pin 6.	5 +0.25 V dc	a. If reading normal, proceed to step 6. b. If reading is abnormal, adjust power supply as described in paragraph 3-57 step d. c. If indication is still abnormal, replace power supply as directed in paragraph 3-52.
6	5 V DC PS ON indicator lamps.	POWER SUPPLY VOLTAGE meter indicates 5 V dc.		5 V DC PS ON indicator lighted.	If 5 V DC PS ON indicator is not lighted, replace bulbs. Refer to paragraph 3-55.
7	POWER SUPPLY meter.	POWER SUPPLY VOLTAGE meter indicates other than 5 V dc.	Place vom black (-) test lead on (-) terminal of suspect meter and red (+) test lead on (G) terminal of meter.	+5 V dc.	Replace defective meter Refer to paragraph 3-54.

SECTION III. TROUBLESHOOTING OF 5 DC POWER SUPPLY 15A4PS1

3-10. General. This section contains preliminary procedures and troubleshooting procedures for localizing a fault to a malfunctioning piece part of the +5 volt power supply. The preliminary procedure consists of obtaining listed test equipment, making prescribed lest connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the troubleshooting chart, must be made carefully to ensure accurate test results. When a troubleshooting procedure specifies replacement or adjustment of a malfunctioning component, refer to section XII in this chapter.

3-11. Test Equipment and Materials. Table 3-4 lists the test equipment required for troubleshooting the +5 V dc power supply.

Table 3-4. Test Equipment Required for 5 V DC Power Supply 15A4PS1 Maintenance

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449-S	1	Belden
Adapter, AC, 3-Wire to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	3	Pomona
Adapter, BNC Plug to Dual Binding Post	103-0035-00	1	Tektronix
Adapter, Single Banana Plug to Binding Post	2894	2	Pomona
Meter, Multifunction	3450B	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual Track	475	1	Tektronix
Test Lead, Banana Plug to Alligator Clip	116636-B	2	Pomona
Test Lead, Banana Plug to Alligator Clip	1166-36-R	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(B)	2	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	1	Pomona
Test Lead, Banana Plug to Test Probe	1986-36-B	1	Pomona
Test Lead, Banana Plug to Test Probe	1986-36-R	1	Pomona
Transformer, Variable	3PN2210	1	Staco

3-12. Test Connections and Conditions. Power supply troubleshooting is accomplished in a bench test setup. Test connections are illustrated in figure 3-2. Prior to performing troubleshooting, prepare the equipment for test as follows:

a. Set vom function switch to AC and range switch to 250 V. Connect vom to variable transformer output plug.

b. Connect variable transformer to power source. Set power switch to on and observe that indicator lights. Adjust variable transformer for 115 volts ac indication on vom. Set power switch to off. Disconnect vom.

c. On +5 V dc power supply, verify jumper wires are connected between terminals 3 and 4, and between terminals 6 and 7.

d. Remove power supply cover (para 3-59).

e. Connect test equipment as shown in figure 3-2.

3-13. Initial Control Settings. Initial test equipment settings for the troubleshooting procedures are as follows:

Control	Position
Multifunction Meter	
LINE	On (up)
FUNCTION	AC
RANGE	AUTO
CONTROL	LOCAL
TRIGGER	INT
Oscilloscope	
POWER	On
VERT MODE	CH1
CH 1 VOLTS/DIV	As required to observe signal
CH 1 AC-GND-DC	AC
HORIZ DISPLAY	A
TRIG MODE	NORMAL
COUPLING	AC
SOURCE	NORM

Control	Position
Oscilloscope	
TIME/DIV	As required to observe signal
A TRIGGER - SLOPE and LEVEL	As required for stable display.
Power	On

3-14. Troubleshooting Procedure. Table 3-5 provides a step-by-step troubleshooting procedure to isolate a malfunction to a faulty part. Perform procedure in sequence given until malfunction is found. If a faulty part is found, replace part as directed and test power supply as specified in section XX of this chapter. Use the schematic diagram (fig. FO-6) as an aid to locating trouble causes and figure 3-3 for location of parts.

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. Front panel circuit breakers to not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker in-put terminals. Do not take chances.

Table 3-5. 5 V DC Power Supply 15A4PS1 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	Power transformer T1 auxiliary rectifier secondary.	As specified in paragraph 3-12.	As specified in para-Graph 3-12 with multifunction meter connected between terminals B13 and B17 on PC board B, observe meter indication	20.8 +2 V ac	a. Check C1 for a short: replace as necessary. b. If reading is 0 volts check thermostat S1 and fuse F1 with ohmmeter for open condition. Replace fuse if defective. c. If thermostat is open, allow unit to cool and recheck with ohmmeter. d. If S1 is still open, replace thermostat. e. If thermostat S1 is closed check T1 for open or shorted condition. f. Replace faulty item as directed in section XII of this chapter.
2	Power transformer T1 main rectifier secondary.		Connect multifunction meter between terminal B5 on PC board B and cathode of CR8, then between terminal B5 and cathode of CR9	11.5$\pm$1.1 V ac	Check T1, C9, C10, and CR9. Replace, if faulty, as directed in section XII of this chapter.
3	Main rectifier circuit.	Multifunction meter: press DC FUNCTION switch.	Connect multifunction meter leads to power Supply as follows: Test leads / Power supply -(blk) TB1-6 +(red) Term B5 on PC	$\pm$11.3$\pm$1.1Vdc	Check C9, C10, CR8, CR9, and C8 for a shorted or open condition Replace faulty item as directed in XIII of this chapter.

Table 3-5. 5 V DC Power Supply 15A4PS1 Troubleshooting Procedure-Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
			Bd B		
4	Bias supply.		Connect multifunction meter test leads to power supply as follows Test leads / Power supply -(blk) TB1-6 +(red) Junction of R10 and R6 (out board side of R10)	+9.1 +0.1 V dc	Check CR7, C7 and CR6 for a shorted or open condition. Replace faulty item as directed in section XII of this chapter.
5	Bias supply		Connect multifunction meter test leads to power supply as follows Test leads / Power supply -(blk) TB1-6 +(red) Junction of R3 and R4 (inboard side of R3)	6.1+0.5 V dc	Check CRI, R5, R4, and R3 for a shorted or open component. Replace faulty item as directed in section XII of this chapter.
6	Series voltage regulator circuit.		Connect multifunction meter test leads to Power supply as follows Meter leads / Power supply -(blk) TB1-4 +(red) TB1-6	5+0.05 V dc	a. If voltage is present but not within tolerance, ad-just VDC control R1. If voltage cannot be ad-justed with R1, check R1 with ohmmeter for shorted and/or open con-ditions. Replace if faulty as directed in section XII of this chapter. b. If R1 is not faulty power supply may be operating as constant current source at current limit value. Check adjust-ment of overcurrent control. R17 (refer to para 3-66) and check series regulator circuit with ohmmeter for shorted components. Replace faulty item as directed in section XII of this chapter. c. If output voltage is to high check R1 with ohmmeter for open con-dition. Replace, if faulty, as directed in section XII of this chapter Check Q8 then Q13, Q5, Q1 and Q6 for shorted cond-ition. Check CR1 for an open condition.

Table 3-5. 5 V DC Power Supply 15A4PS1 Troubleshooting Procedure-Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					d. If output voltage is too low check Q2 and Q3 with ohmmeter for shorted condition and check R25 and R17 for open condition. Replace faulty item as directed in section of this chapter.
7	Filter circuits.	Twist oscilloscope test leads to cancel external noise signals when measuring ripple voltage.	Connect oscilloscope test lead to power supply as follows: Oscillo scope leads — Power supply (blk) — TB1-3 (red) — TB1-7	Less than 3mV ripple.	a. If ripple is at line frequency or twice the line frequency, check CR7, CR8, and CR9 for a shorted or open condition. Check C1, C7, C8 for open conditions. Replace faulty items as directed in section XII of this chapter. b. If large spikes are present, check C2 and C3 for an open condition.

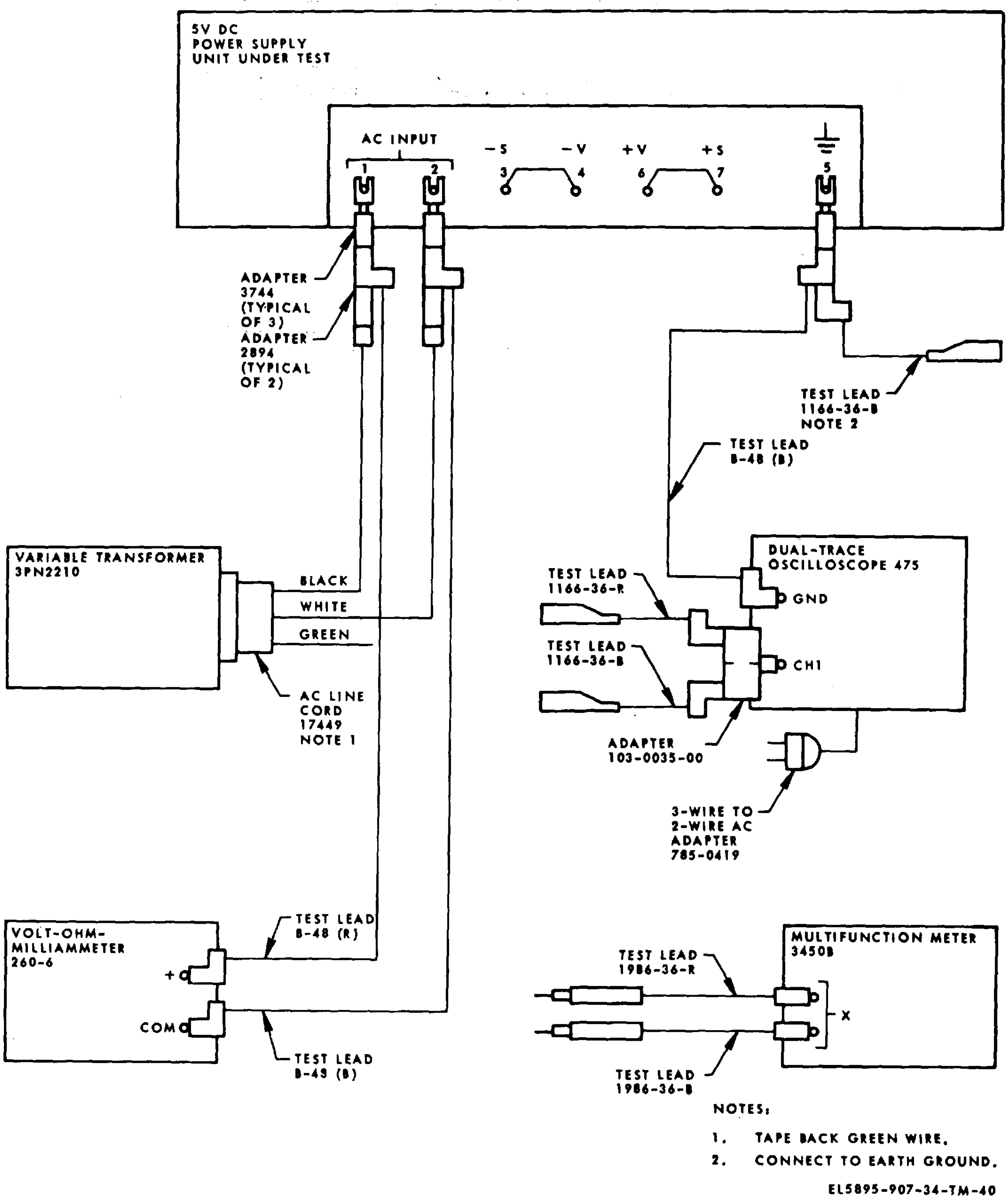


Figure 3-2. 5 V DC power supply 15A4PS1, troubleshooting, test setup diagram.

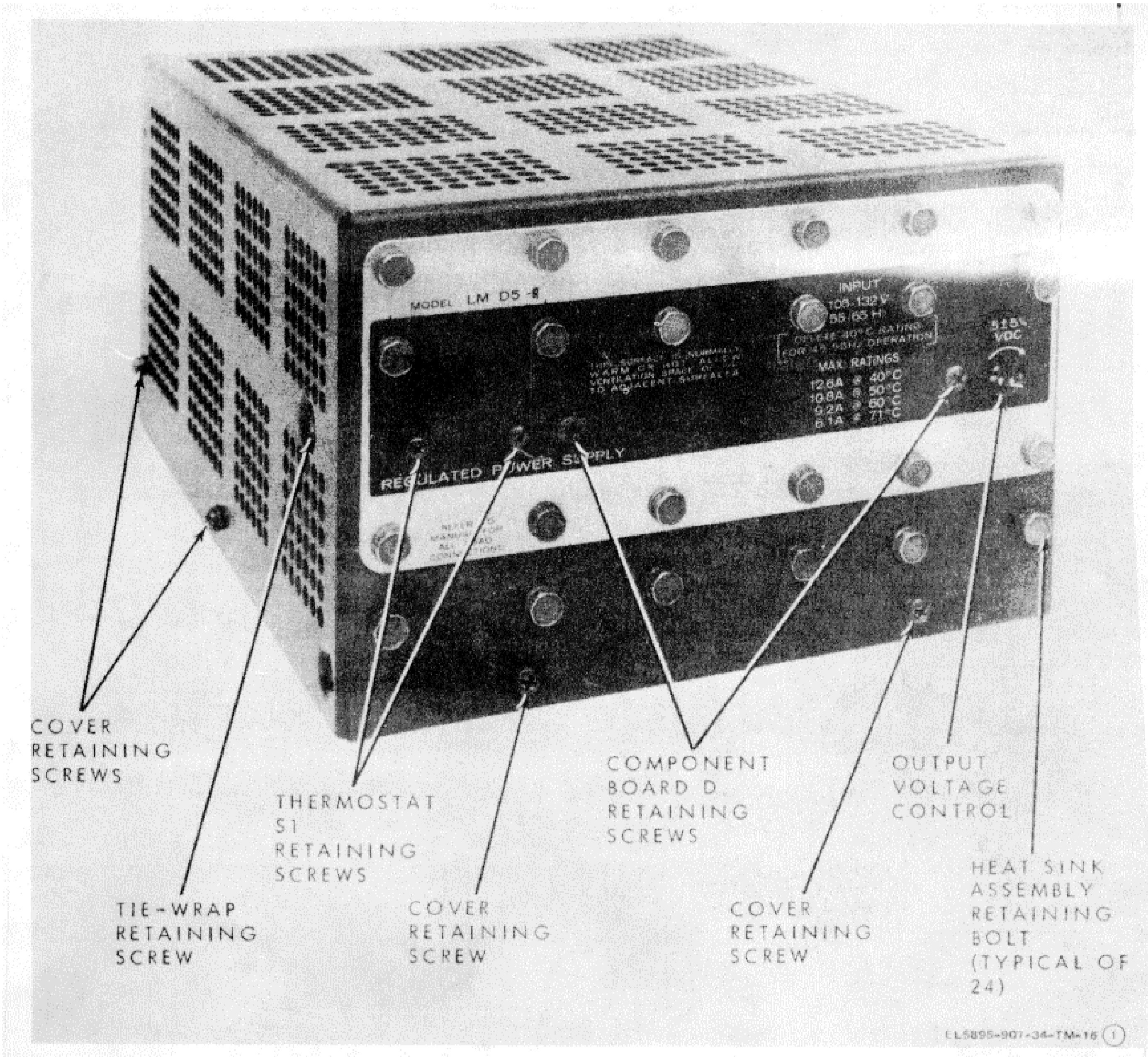


Figure 3-3. +5 V dc power supply 15A4PS1, parts location (sheet 1 of 5)

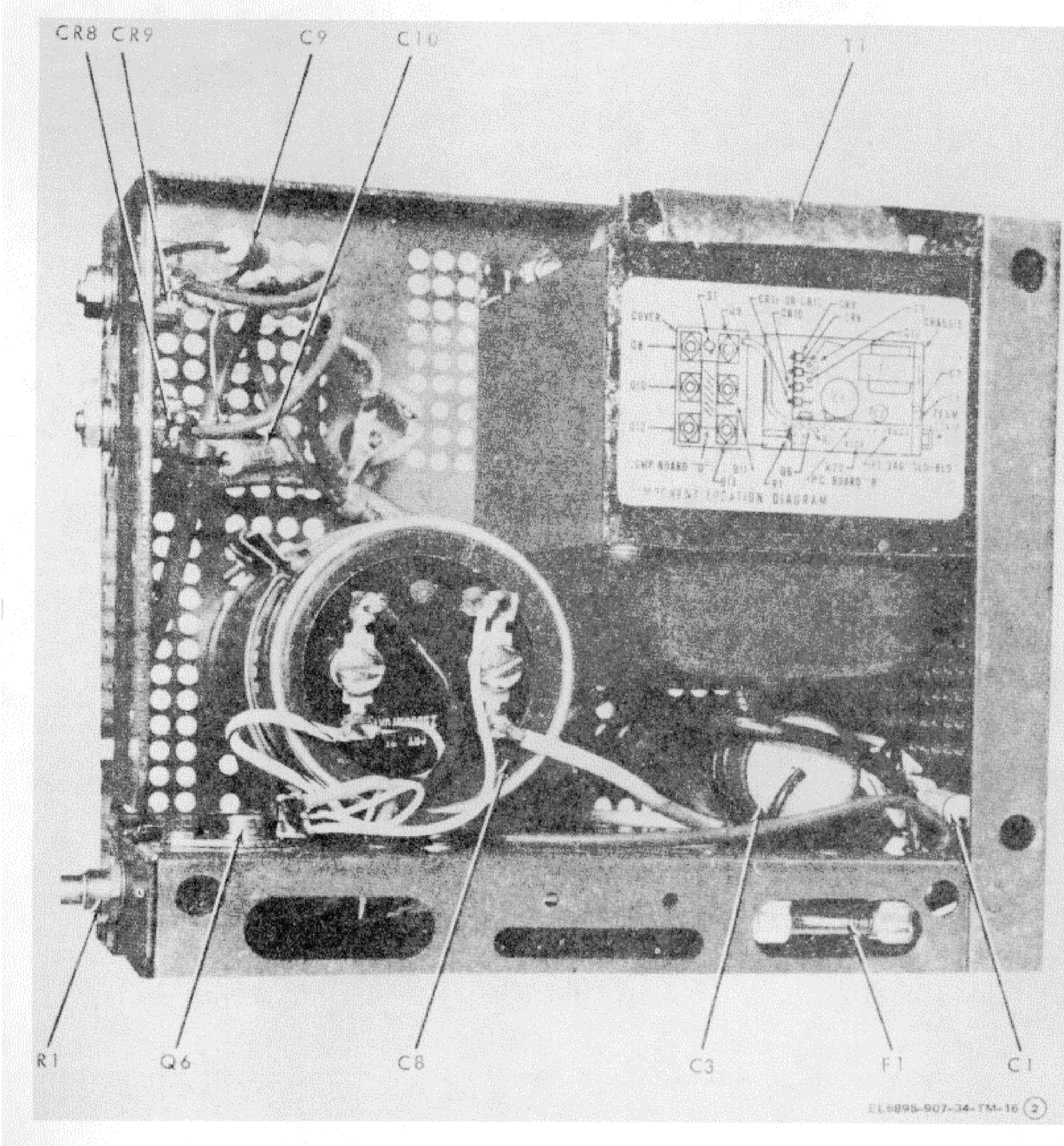


Figure 3-3. +5 V dc power supply 15A4PS1, parts location (sheet 2 of 5).

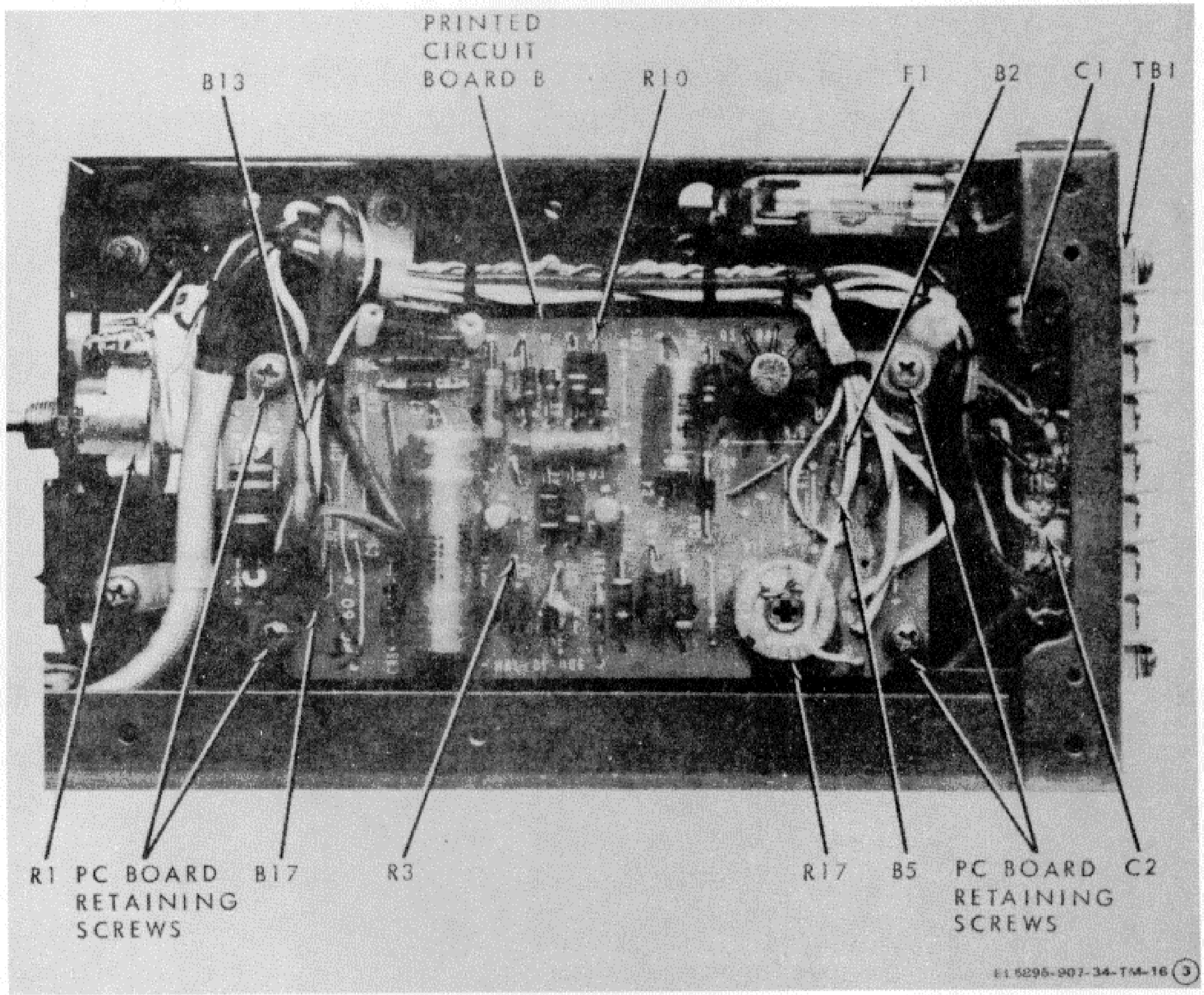


Figure 3-3. +5 V dc power supply 15A4PS1, parts location (sheet 3 of 5).

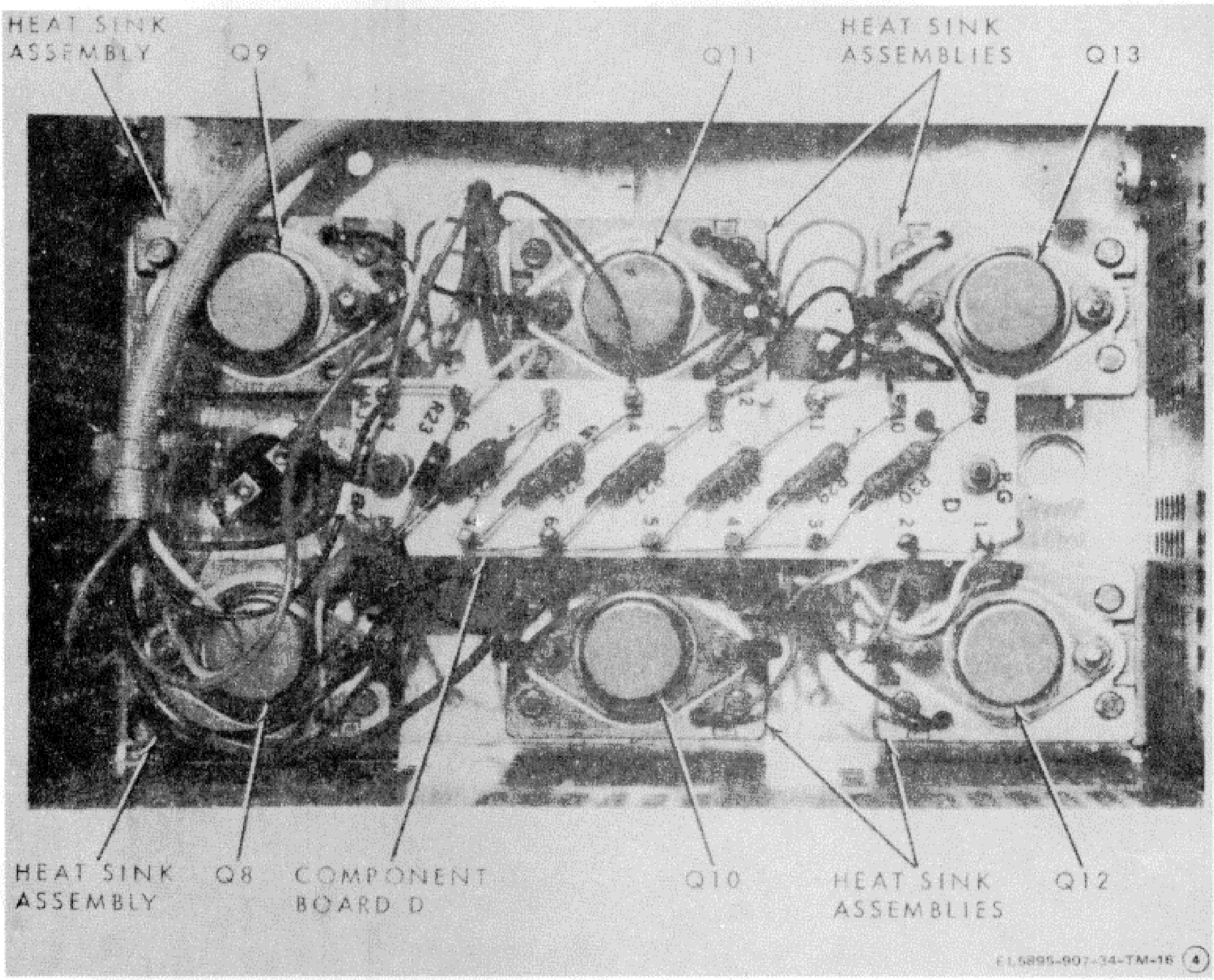


Figure 3-3. +5 V dc power supply 15A4PS1, parts location (sheet 4 of 5).

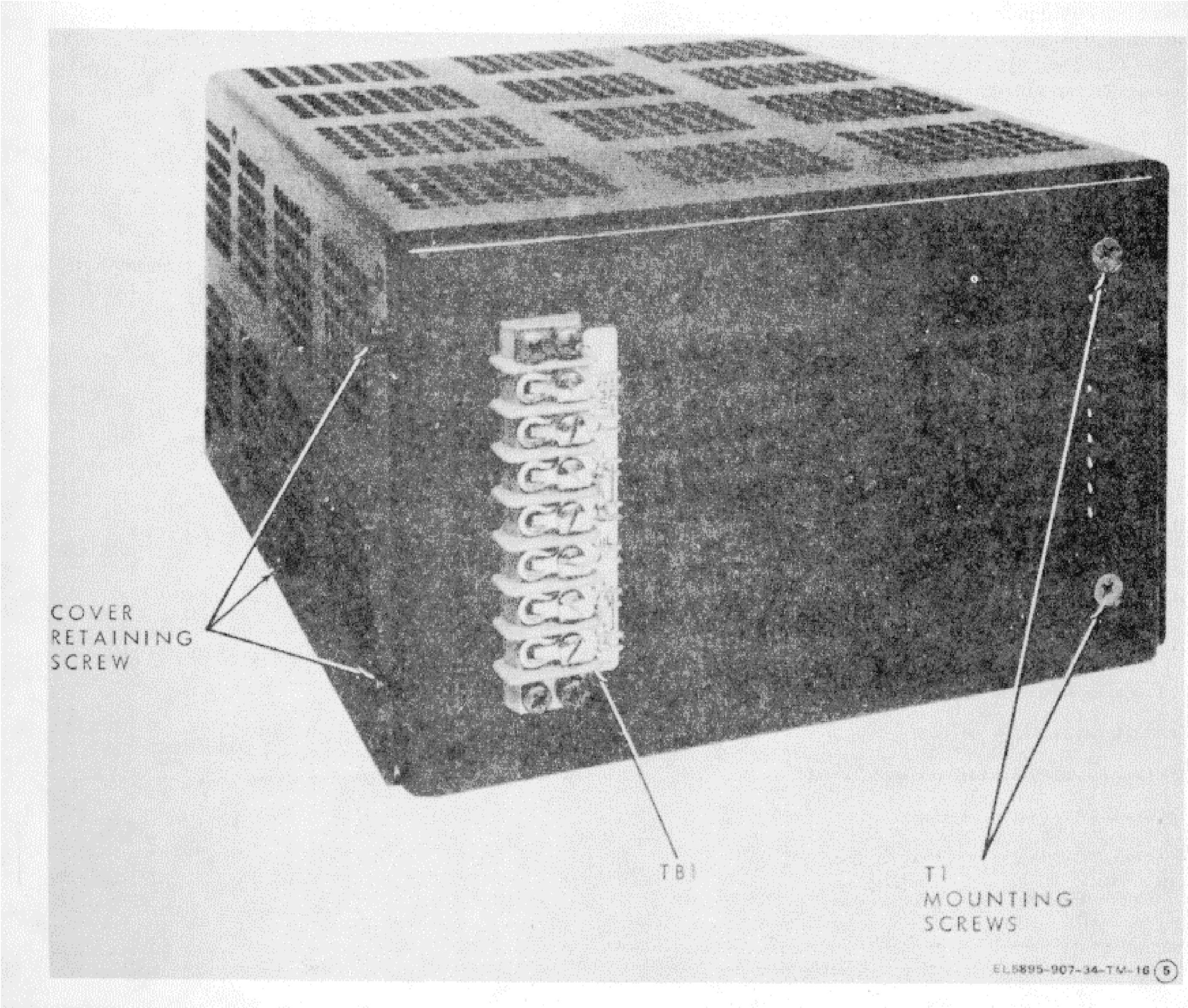


Figure 3-3. +5 V dc power supply 15A4PS1, parts location (sheet 5 of 5).

SECTION IV. TROUBLESHOOTING OF -5 V DC POWER SUPPLY 15A4PS2

3-15. General. This section contains preliminary procedures and troubleshooting procedures for localizing a fault to a malfunctioning piece part of the -5 V dc power supply. The preliminary procedure consists of obtaining listed test equipment, making prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the troubleshooting chart, must be made carefully to ensure accurate test results. When a troubleshooting procedure specifies replacement or adjustment of a malfunctioning component, refer to section XIII in this chapter.

3-16. Test Equipment and Materials. Table 3-6 lists the test equipment required for troubleshooting the -5 V dc power supply.

Table 3-6. Test Equipment Required for -5 V DC Power Supply 15A4PS2 Maintenance

Common name	Part/model no.	Qty	Manufacturer
Ac Line Cord	17449-S	1	Belden
Adapter, AC, 3-Wire to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	3	Pomona
Adapter, BNC Plug to Dual Binding Post	103-0035-00	1	Tektronix
Adapter, Single Banana Plug to Binding Post	2894	2	Pomona
Meter, Multifunction	3450B	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual Track	475	1	Tektronix
Test Lead, Banana Plug to Alligator Clip	1166-36-B	2	Pomona
Test Lead, Banana Plug to Alligator Clip	1166-36-R	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(B)	2	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	2	Pomona
Test Lead, Banana Plug to Test Probe	1986-36-B	1	Pomona
Test Lead, Banana Plug to Test Probe	1986-36-R	1	Pomona
Transformer, Variable	3PN2210	1	Staco

3-17. Test Connections and Conditions. Power supply troubleshooting is accomplished in a bench test setup. Test connections are illustrated in figure 3-2. Prior to performing troubleshooting, prepare the equipment for test as follows:

- **a.** Set vom function switch to AC and range switch to 250 V. Connect vom to variable transform output plug.
- **b.** Connect variable transformer to power source. Set power switch to on and observe that indicator lights. Adjust variable transformer for 115 V ac indication on vom. Set power switch to off. Disconnect vom.
- **c.** On -5 V dc power supply, verify jumper wires are connected between terminals 3 and 4, and between terminals 6 and 7.
- **d.** Remove power supply cover.
- **e.** Connect test equipment as shown in figure 3-2.

3-18. Initial Control Settings. Initial test equipment settings for the troubleshooting procedures are as follows:

Control	Position
Multifunction Meter	
LINE	On (up)
FUNCTION	AC
RANGE	AUTO
CONTROL	LOCAL
TRIGGER	INT
Oscilloscope	
POWER	On
VERT MODE	CHI
CH 1 VOLTS/DIV	As required to observe signal
CH 1 AC-GND-DC	AC
HORIZ DISPLAY	A
TRIG MODE	NORMAL
COUPLING	AC
SOURCE	NORM
TIME/DIV	As required to observe signal
A TRIGGER -	As required for stable
Oscilloscope	
SLOPE and LEVEL	display.

Control	Position
Variable Transformer	
Power	On

3-19. Troubleshooting Procedure. Table 3-7 provides a step-by-step troubleshooting procedure to isolate a malfunction to a faulty part. Perform procedure in sequence given until malfunction is found. If a faulty part is found, replace part as directed and test power supply as specified in section XXI of this chapter. Use the schematic diagram (fig. FO-7) as an aid to locating trouble causes and figure 3-4 for location of parts.

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. Front panel circuit breakers to not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker in- put terminals. Do not take chances.

Table 3-7. -5 V DC Power Supply 15A4PS2 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	Power transformer T1 auxiliary rectifier secondary.	As specified in paragraph 3-17.	As specified in paragraph 3-17.	21.8 ± 2 V ac	a. Check C1 for a short replace as necessary. b. Check TI for open or shorted condition. Replace faulty item as directed in section XIII of this chapter. c. Check C9 and C10 for shorted condition.
2	Power transformer T1 main rectifier sec- ondary.		Connect multimeter be- tween terminal B2 on PC board B and cathode of CR8, then between ter- minal B2 and cathode of CR10.	15 ± 1.5 V ac	Check TI for open or shorted condition. Replace faulty item as directed in section XIII of this chapter.
3	Main rectifier circuit	Multifunction meter: press DC FUNCTION switch.	Connect multifunction me- ter leads to power supply as follows: Test Power Leads Supply -(blk) TB1-6	16.3 ± 1.5 V ac	Check C9, CR8, CRIO , CIO0 and C8 for a shorted or open con- dition. Replace faulty item as directed in section XIII of this chapter.

Table 3-7. -5 V DC Power Supply ISA4PS2 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
			+(red) Term B5 on PC Bd B		
4.	Bias supply.		Connect multifunction meter test leads to power supply as follows: Test leads / Power supply: -(blk) TB1-6; +(red) Junction of R10 and R6 (outboard side of R10)	9.1 ± 0.1 V dc	Check CR7, C7 and CR6 for a shorted or open condition. place faulty item.
5	Bias supply		Connect multifunction meter test leads to power supply as follows: Test leads / Power supply: -(blk) TB1-6; +(red) Junction of R3 and R4 (inboard side of R3)	6.1 ± 0.5 V de	Check CR1, R5, R4, and R3 for a shorted or open component. Replace faulty item as directed in section XIII of this chapter.
6	Series voltage regulator circuit		Connect multifunction me ter test leads to power supply as follows: Test leads / Power supply: -(blk) TB1-4; +(red) TB1-6	+5 ± 0.25 V dc	a. If voltage is present but not within tolerance, adjust VDC control R1. If voltage cannot be adjusted with R1, check R1 with ohmmeter for shorted or open condition. Replace fault item as directed in section XIII of this chapter. b. If R1 is not faulty, power supply may be operating as constant current source at cur rent limit value. Check adjustment of overcurrent control R17 (para 3-74) and check series regulator circuit with ohmmeter for shorted components. Replace faulty item as directed in section XIII of this chapter. c. If output voltage is too high check RI with ohmmeter for faulty, as directed in section XIV of this chapter. Check QS, Q9 QS, Q6, and QI for shorted condition. Check CR1 for an open condition. Replace faulty item as directed in section

Table 3-7. -5 V DC Power Supply ISA4PS2 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					XIII of this chapter. d. If output voltage is too low, check Q2 and Q3 with ohm-meter for shorted condition, and check R28 and R17 for open condition. Replace faulty item a directed in section XIII of this chapter.
7	Filter circuits	Twist oscilloscope test leads to cancel external	Connect oscilloscope test lead to power supply as follows: Test leads / Power supply (blk) / TB1-3 (red) / TB1-7	Less than 3 mV ripple.	a. If ripple is at the frequency or twice the line frequency, check CR7, CR8 and CR10 for a shorted or open condition. Check C1, C7 and C8 for open conditions. Replace faulty item as directed in section XIII of this chapter. b. If large spikes are present, check C2, C9 and C10 for an open condition. Replace faulty item as directed in section XIII of this chapter.

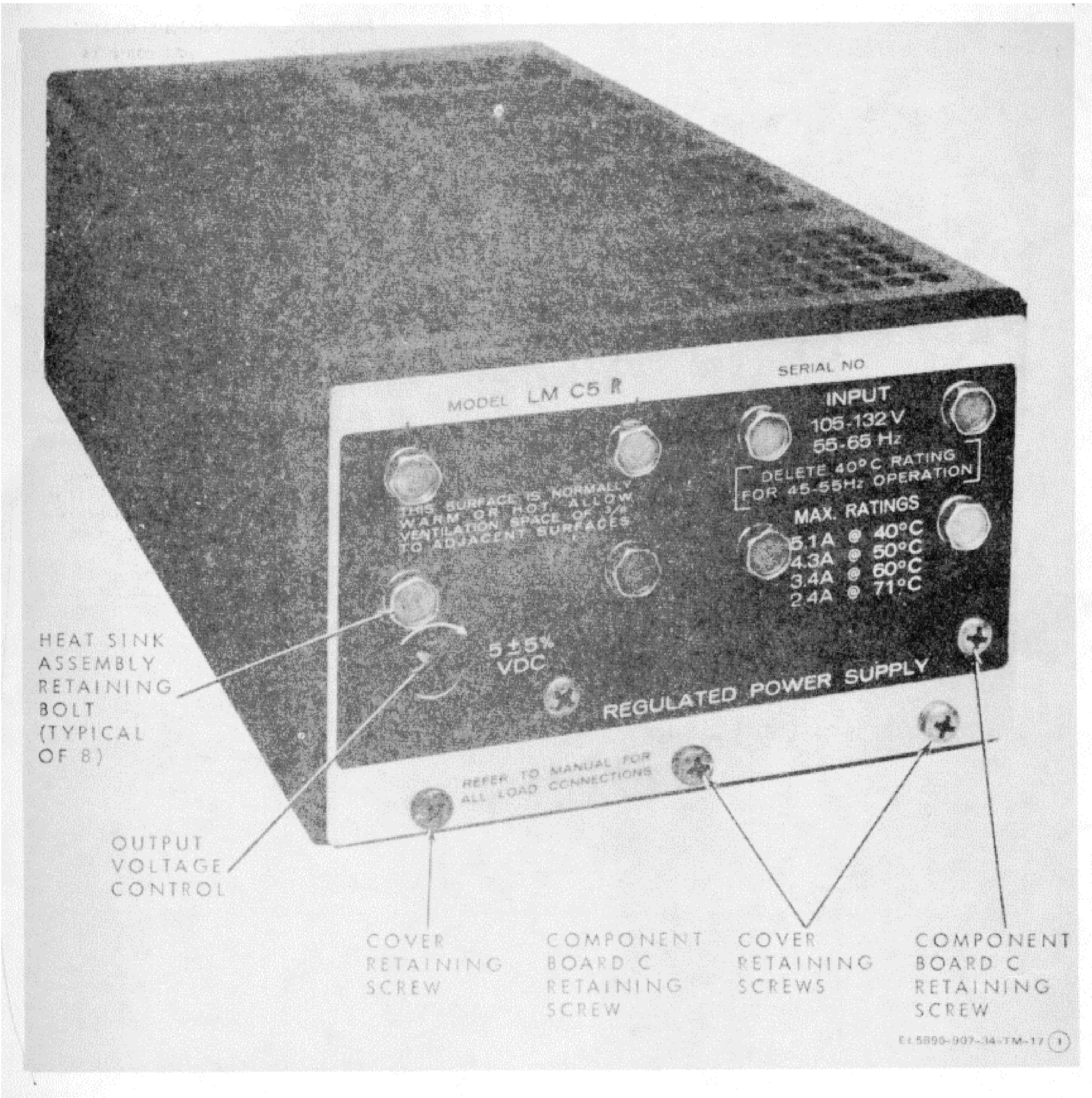


Figure 3-4. -5 V dc power supply 15A4PS2, parts location (sheet 1 of 6).

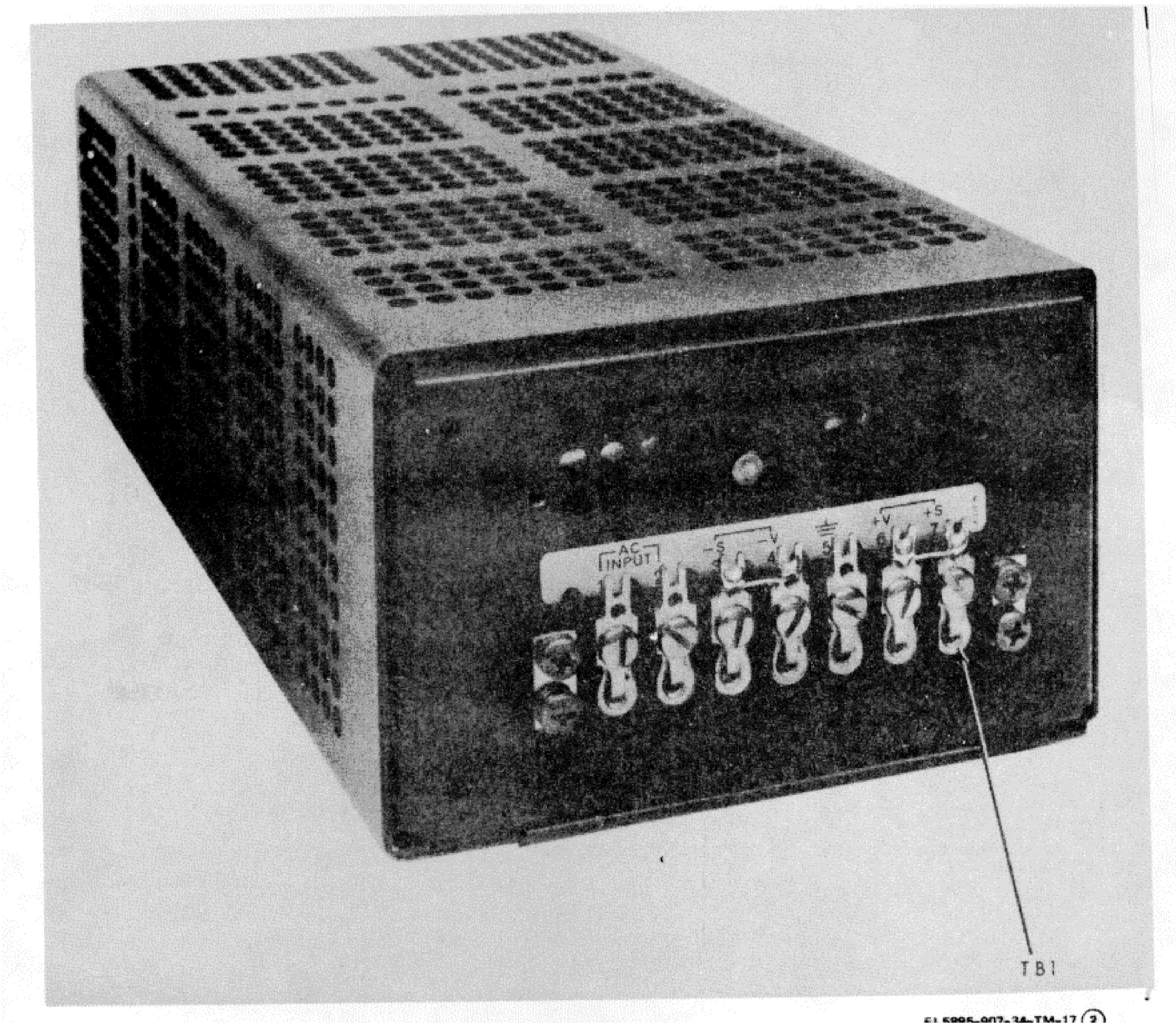


Figure 3-4. -5 V dc power supply 15A4PS2, parts location (sheet 2 of 6).

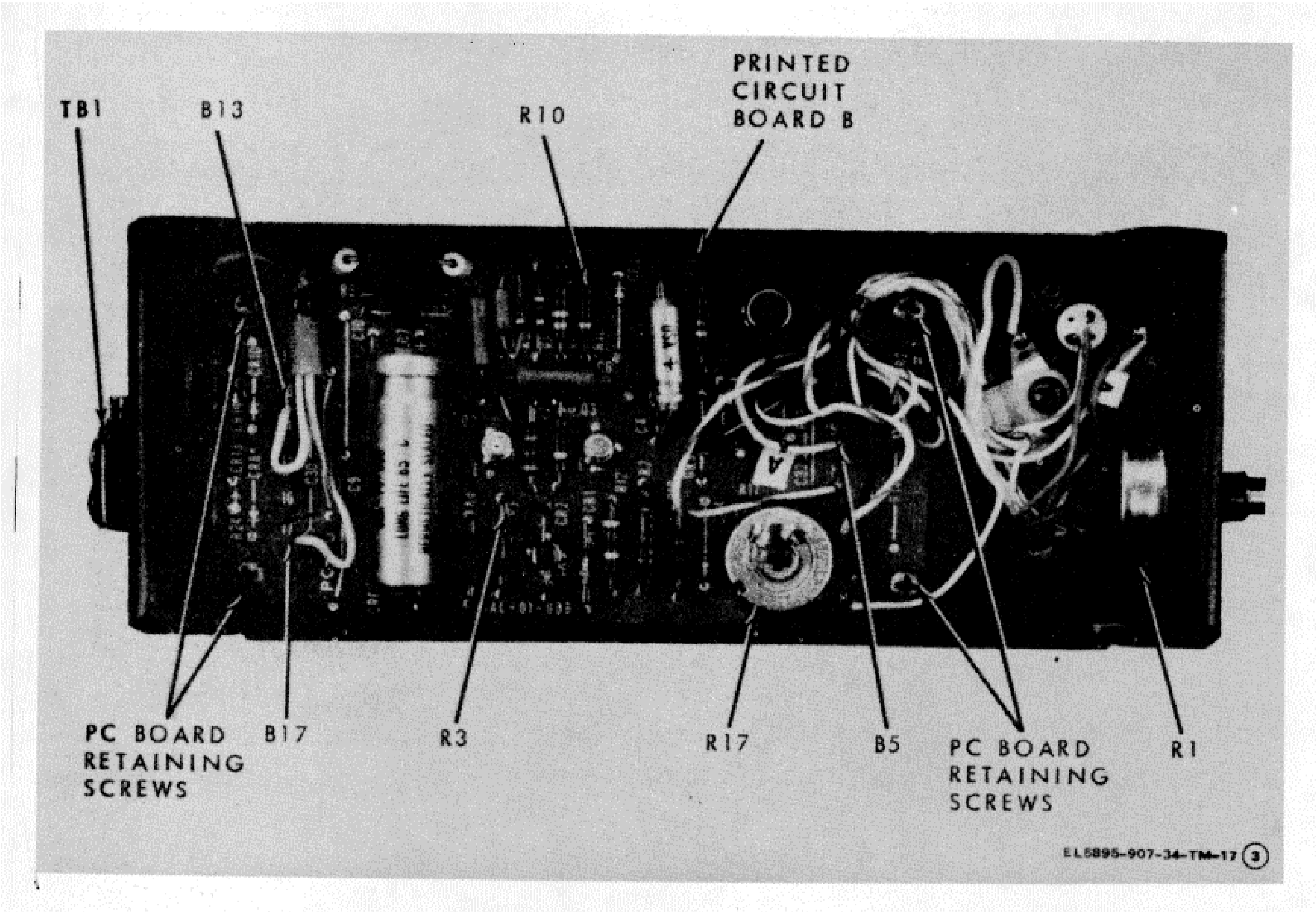


Figure 3-4. -5 V dc power supply 15A4PS2, parts location (sheet 3 of 6).

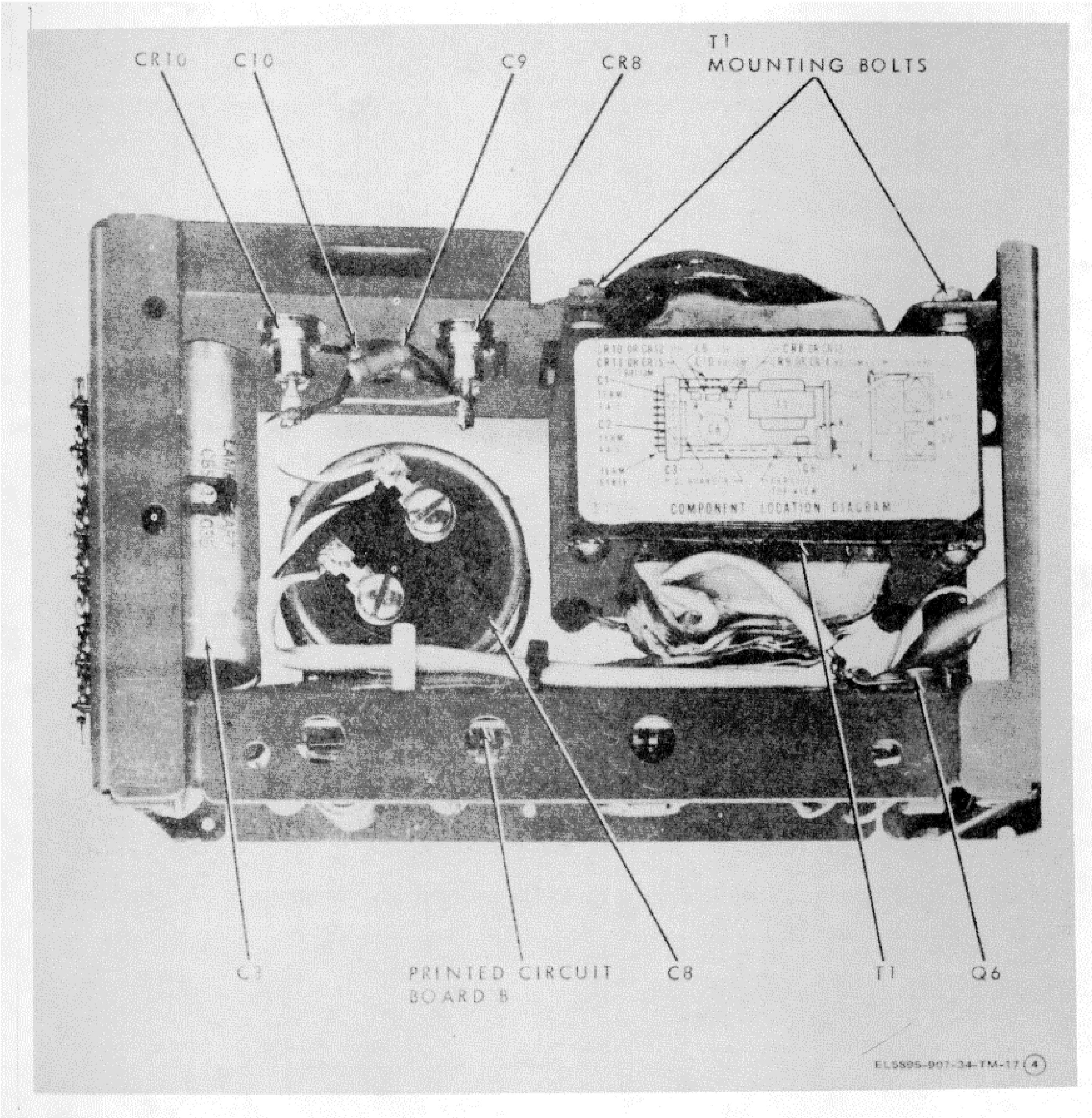


Figure 3-4. -5 V dc power supply 15A4PS2, parts location (sheet 4 of 6).

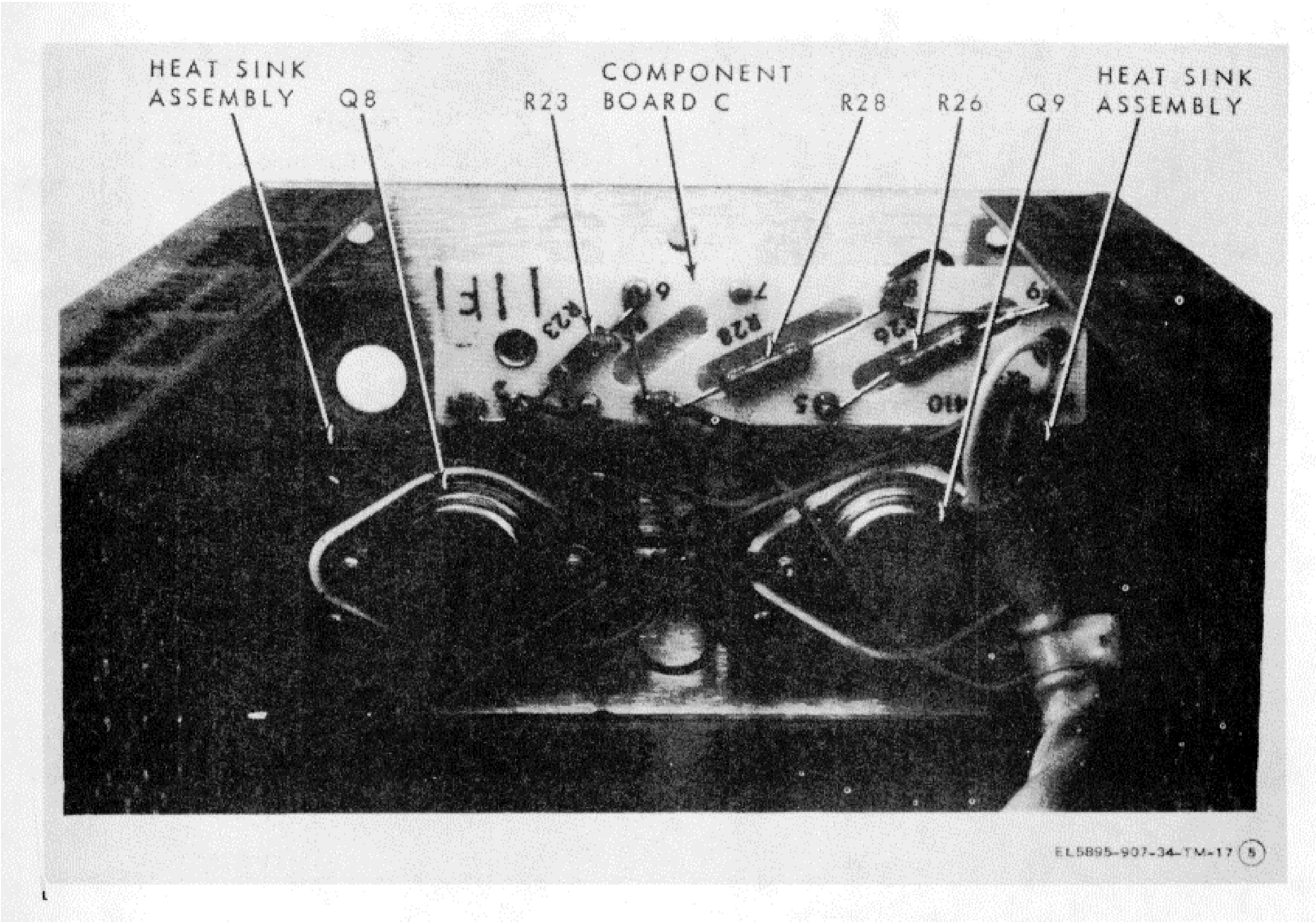


Figure 3-4. -5 V dc power supply 15A4PS2, parts location (sheet 5 of 6).

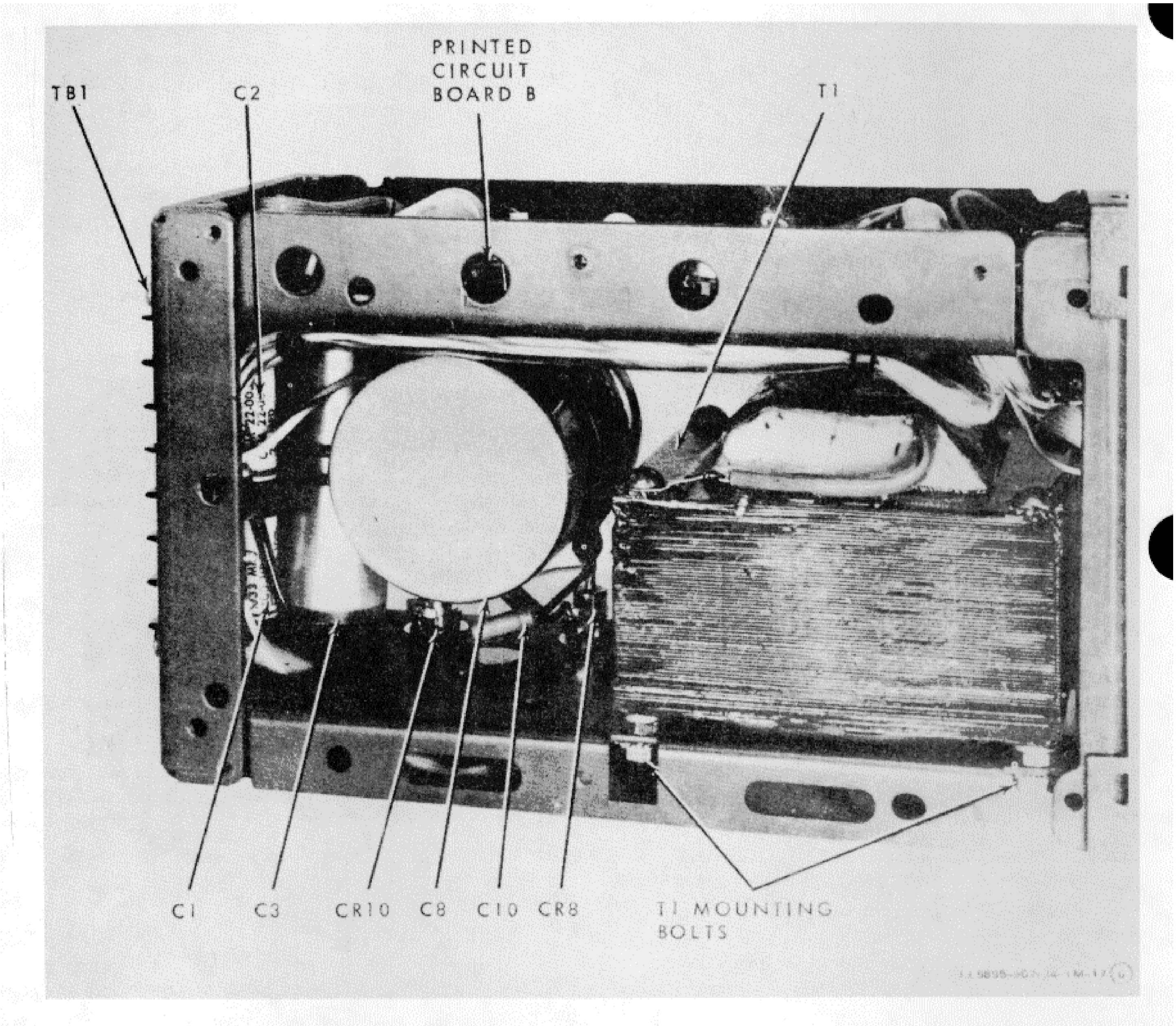


Figure 3-4. -5 V dc power supply 15A4PS2, parts location (sheet 6 of 6).

SECTION V. TROUBLESHOOTING OF AN/FCS-78(V) SYSTEM STATUS LOGIC UNIT 15A5

3-20. General. This section contains preliminary procedures and troubleshooting procedures for fault localization to a malfunctioning circuit card of the system status logic unit 15A5 after referral by organizational maintenance. Preliminary procedures consist of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the troubleshooting chart, must be made carefully to ensure accurate test results. When a troubleshooting procedure specifies replacement of a circuit card, refer to section XIV of this chapter.

3-21. Test Equipment and Materials. Table 3-8 lists test equipment required for troubleshooting the system status logic unit.

Table 3-8. Test Equipment Required for AN/FSC-78(V) System Status Logic Unit 15A5 Maintenance

Common name	Part/model no.	Qty	Manufacturer
Extender Board, Circuit Card	SM-D-724007	2	Aeronutronic Ford
Milliammeter, Volt-Ohm-	260-6	1	Simpson

3-22. Test Connections and Conditions. System status logic unit 15A5 troubleshooting is performed it electrical equipment rack. Troubleshooting is based on the referral by organizational maintenance when an equipment malfunction occurs and is not presented at the fault and system status panel 14A16 by an alarm or indication, or when a fault and system panel alarm or indication occurs and the indicated faulty equipment is functioning normally. To access the system status logic unit circuit cards, perform the following steps:

a. Set FSSP (14A16) front panel circuit breaker to off.

b. Set logic unit power supply 4A (+5 VDC), then 3A (-5 VDC) CIRCUIT BREAKERS to OFF.

c. Loosen three screws securing system status logic unit front panel to chassis and , sing panel down

d. loosen two screws on each retaining bar and remove each bar.

e. Remove suspected circuit card(s) from system status logic unit as described in section XIV of this chapter.

f. In, tall circuit card extender board(s) in system . status logic unit and install circuit card(s) in ex- tender board(s).

g. Set logic unit power supply 3A, (-5 VDC), then 4A (+5 VDC) CIRCUIT BREAKERS to ON position.

h. Set FSSP (14A16) front panel circuit breaker to ON.

3-23. Initial Control Settings. Set volt-ohm-milliammeter controls as follows:

Control	Position
Function switch	+DC.
Range switch	50 V.

3-24. Troubleshooting Procedure. After completing the preliminary procedures (para 3-21 through 3-23), perform the troubleshooting procedures in table 3-9 as specified by the card isolation procedures in the symptom/probable cause listing below. Use the circuit card logic diagrams (fig. FO-8 through FO-14) as an aid in locating the trouble cause.

Symptom	Probable cause
All units are available, but FULLLY AVAILABLE indicator is not lighted.	Logic card A. Replace logic card A. If symptom is not corrected refer to troubleshooting table and perform step 1.
One or more units faulted, but FULLY AVAILABLE indicator Is lighted.	Logic card A. Replace logic card A. If symptom is not corrected refer to troubleshooting table and perform step 2.

Symptom	Probable cause
No faults exist, but MAJOR FAULT or MINOR FAULT portion of indicator is lighted	Logic card A. Replace logic card A. If symptom is not corrected refer to trouble shooting table and perform step 3 for MAJOR FAULT indication. Perform step 5 for MINOR FAULT indication.
One or more units have a major or minor fault as indicated by an equipment indicator lamp lighted red or amber but MAJOR FAULT or MINOR FAULT indicator is not lighted and FULLY AVAILABLE indicator is lighted.	Replace logic card A as directed in section XIV of this chapter. If fault is not corrected. perform step 4 for major faults and step 6 for minor faults
Tracking receivers are not faulted, but TRACKING RECEIVERS major (red) or minor (amber) indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected perform step 7 for major fault indication. Perform step 9 for minor fault indication.
Tracking receivers faulted, but TRACKING RECEIVERS major or minor indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 8 for major fault indication. Perform step 10 for minor fault indication.
Antenna is not faulted, but ANTENNA major (red) or minor (amber) indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 11 for major fault indication. Perform step 13 for minor fault indication.
Antenna is faulted, but antenna major or minor indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 12 for major fault indication, perform step 14 for minor fault indication.
Transmit waveguide switch S5 in normal (pos 1) position, but IPA CROSS PATCH indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected perform step 15.
Transmit waveguide switch S5 is in cross patch (pos 2) position, but IPA CROSS PATCH indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 16.
Up-converter power supplies are not faulted, but CONVERTER POWER SUPPLIES major (red) or minor (amber) indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 17 for major fault indication. Perform step 19 for minor fault indication.
Up-converter power supplies are faulted but CONVERTER POWER SUPPLIES major or minor indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 18 for major fault indication. Perform step 20 for minor fault indication
Waveguide pressure is not low, but WAVEGUIDE PRESSURE indicator is lighted, MINOR	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 21.
Waveguide pressure is low, but WAVEGUIDE PRESSURE indicator is lighted, MINOR FAULT indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform

Symptom	Probable cause
	step 22
Power amplifier is not faulted, but POWER AMPLIFIER MINOR fault indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 23.
Power amplifier is faulted, but POWER AMPLIFIER MINOR indicator is not lighted	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 24.
Noise temperature monitor does not indicate high noise temperature, but SYSTEM NOISE TEMP indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 25.
Noise temperature monitor indicates high noise temperature, but SYSTEM NOISE TEMP indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. Perform step 26 for major fault indication.
Minor gain fault is not indicated for online amplifiers, but RECEIVER GAIN ALERT indicater is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 27.
Minor gain fault is indicated for online receivers, but RECEIVER GAIN ALERT indicator is not lighted	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 28.
Receiver gain monitor is not faulted, but RGMU indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 29.
Receiver gain monitor is faulted, but RGMU indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 30.
Down-converters are not faulted, but DOWN CONV indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 31.
Down-converters are faulted, but DOWN CONV indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 32.
Power supply assembly is not faulted, but FREQUENCY STANDARD PWR SUPPLY major (red) or minor (amber) indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 33 for major fault indication. Perform step 35 for minor fault indication.
Power supply assembly is faulted, but FREQUENCY STANDARD PWR SUPPLY major or minor indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 34 for major fault indication or step 36 for minor fault indication.
Neither frequency standard is faulted, but FREQUENCY STANDARDS major (red) or minor (amber) indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 37 for major fault indication. Perform step 39 for minor fault indication.
Either or both frequency standards is faulted, but FREQUENCY STANDARDS indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 38 for major fault indication and step 40 for minor fault indication.
No up-converter is faulted,	Logic card A. Replace as

Symptom	Probable cause
but UP CONV indicator is lighted.	directed in section XIV of this chapter. If fault is not corrected, perform step 41.
One or more up-converter are faulted, but UP CONV indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 42.
Emergency transmitter disable switch HTA-4AS is in XMTR OPR condition, but TRANSMIT DISABLE	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, indicator is lighted.
Emergency transmitter disable switch HTA-4A8 is in XMTR DSBL condition, but TRANSMIT DISABLE indicator is not lighted.	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 44.
Transmitter power monitor panel 14A27 does not indicate abnormal output power, but OUTPUT POWER ALERT indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 45.
Transmitter power monitor panel 14A27 indicates abnormal output power, but OUTPUT POWER ALERT indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 46.
Carrier level detector and carrier level control power supplies are not faulted, but CLM indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 47.
Carrier level detector and/or carrier level control power supply is faulted, but CLM indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 48.
Carrier level control panel ALERT indicators are not lighted and LOOP STRESS and POWER LEVEL meters indications are normal, but CARRIER LEVEL ALERT major (red) or minor (amber) indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 49 for major fault indication. Perform step 51 for minor fault indication.
Carrier level control panel ALERT indicators are lighted, LOOP STRESS and/or POWER LEVEL meter indication is abnormal, but CARRIER LEVEL ALERT indicator is not lighted. perform step 43.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 50 for major fault indication or step 52 for minor fault indication.
Antenna auto tracking normal and no faults exist at tracking receiver control and status panel 14A6, but AUTO TRACK DROPOUT lamp is lighted at fault and system status panel.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 53.
Tracking receiver control and status panel indicates antenna is not auto tracking, but AUTOTRACK DROPOUT indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 54.
Autotrack dropout has occured and AUTOTRACK DROPOUT portion of indicator is lighted. AUTO-TRACK DROPOUT/DISABLE switch has been pressed and DISABLE portion of indicator is lighted, but audible alarm is still sounding.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 55.
Receive interfacility link amplifier 2 is online, but RECEIVE IFLA 2 online	Logic card F. Replace as directed in section XIV of this chapter. If

Symptom	Probable cause
(green) indicator is not lighted	fault is not corrected, perform step 56.
Receive interfacility link amplifier 2 is not online, but RECEIVE IFLA 2 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 57.
Receive interfacility link amplifier 2 not faulted, but RECEIVE IFLA 2 fault (red) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 58.
Receive interfacility link amplifier 2 is faulted, but RECEIVE IFLA 2 fault (red) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 59.
Receive interfacility link amplifier 2 is in main-tenance. but RECEIVE IFLA 2 maintenance (blue) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 60.
Receive interfacility link amplifier 2 not in main-tenance. but RECEIVE IFLA 2 maintenance (blue) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 61.
Receive AUTO/MANUAL switch is pressed to select MANUAL, and RECEIVE IFLA 2 switch is pressed to change receive IFLA 2 (amber) to online (green) condition, but RECEIVE IFLA 2 remains in standby condition.	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 62.
Receive interfacility link amplifier I is online, but RECEIVE IFLA 1 online (green) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 63.
Receive interfacility link amplifier 1 is not online, but RECEIVE IFLA 1 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 64.
Receive interfacility link amplifier I not faulted, but RECEIVE IFLA I fault (red) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 65.
Receive interfacility link amplifier 1is faulted, but RECEIVE IFLA I fault (red) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 66.
Receive interfacility link amplifier 1 is in mainte-nance, but RECEIVE IFLA 1 maintenance (blue) indica-tor is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 67.
Receive interfacility link amplifier 1 is not in maintenance, but RECEIVE IFLA I maintenance (blue) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 68.
Receive AUTO/MANUAL switch is pressed to select MANUAL, and RECEIVE IFLA 1 switch is pressed to change receive interfacility link amplifier 1 from standby (amber) to online (green) condition, but RECEIVE IFLA 1 remains in standby condition.	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 69.
Transmit interfacility link amplifier 2 is online, but TRANSMIT IFLA 2 online (green) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 70.
Transmit interfacility link amplifier 2 is not online,	Logic card D. Replace as directed in section XIV

Symptom	Probable cause
but TRANSMIT IFLA 2 online (green) indicator is lighted.	of this chapter. If fault is not corrected, perform step 71.
Transmit interfacility link amplifier 2 not faulted but TRANSMIT IFLA 2 fault (red) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 72.
Transmit interfacility link amplifier 2 is faulted, but TRANSMIT IFLA 2 fault (red) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 73.
Transmit interfacility link amplifier 2 is in maintenance, but TRANSMIT IFLA 2 maintenance (blue) indicator is lighted	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 74.
Transmit interfacility link amplifier 2 is not in maintenance, but TRANSMIT IFLA 2 maintenance (blue) indicator is lighted	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 75.
Transmit AUTO/MANUAL switch is pressed to select MAN. UAL, and TRANSMIT IFLA 2 switch is pressed to change transmit IFLA 2 from standby (amber) to online (green) condition. but TRANSMIT IFLA 2 remains in standby condition	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 76.
Transmit AUTO/MANUAL switch is pressed to select AUTO; transmit interfacility link amplifier 2 is in standby (amber), fault occurs in on-lint transmit interfacility link amplifier 1, but transmit interfacility link amplifier 2 doss not automatically switch online.	Logic card D or E. Replace both cards as directed in section XIV of this chapter. If fault is not corrected, perform step 77.
Transmit interfacility link amplifier 1 is online, but TRANSMIT IFLA 1 online (green) indicator i not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 78.
Transmit interfacility link amplifier 1 is not online, but TRANSMIT IFLA 1 online (green) indicator is lighted.	Logic card D. Replace U directed in section XIV of this chapter. If fault is not corrected, perform step 79.
Transmit interfacility link amplifier 1 not faulted, but TRANSMIT IFLA 1 fault (red) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 80.
Transmit interfacility link amplifier 1 is faulted, but TRANSMIT IFLA 1 fault (red) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 81.
Transmit interfacility link amplifier 1 is in maintenance, but TRANSMIT IFLA 1 maintenance (blue) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 82.
Transmit interfacility link amplifier 1 is not in maintenance, but TRANSMIT IFLA 1 maintenance (blue) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 83.
Transmit AUTO/MANUAL switch is pressed to select MANUAL, and TRANSMIT IFLA 1 switch is pressed to change transmit IFLA 2 from standby (amber) to online (green) condition, but TRANSMIT IFLA 1 remains in standby condition.	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 84.
Transmit AUTO/MANUAL switch	Logic card D or E. Replace

Symptom	Probable cause
is pressed to select AUTO; transmit interfacility link amplifier 1 is in standby (amber); fault occurs in on-line transmit interfacility link amplifier 2, but transmit interfacility link amplifier 1 does not automatically switch online.	both, cards as directed in section XIV of this chapter. If fault is not corrected, perform step 85.
Receive AUTO/MANUAL switch is in AUTO condition, and fault or maintenance condition occurs at receiver gain monitor, but AUTO/MANUAL switch does not switch to MANUAL condition.	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 86 for fault condition and step 87 for maintenance condition.
Receive AUTO/MANUAL switch is in AUTO condition and is pressed to select MANUAL condition, but condition change does not occur.	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 88.
Receive AUTO/MANUAL switch is in MANUAL condition, receiver gain monitor is not faulted or in maintenance, and pressing AUTO/MANUAL switch does not select AUTO condition.	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 89.
Transmit AUTO/MANUAL switch is in AUTO condition and is pressed to select MANUAL condition, but condition change does not occur.	Logic card E. Replace a directed in section XIV of this chapter. If fault is not corrected, perform step 90.
Transmit AUTO/MANUAL switch is in MANUAL condition and is pressed to select AUTO condition, but condition change does not occur.	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 91.
Parametric amplifier 2 is on-line, but PARAMPS 2 online (green) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 92.
Parametric amplifier 2 is not online, but PARAMPS 2 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 93.
Parametric amplifier 2 is not faulted, but PARAMPS 2 fault (red) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 94.
Parametric amplifier 2 is faulted, but PARAMPS 2 fault (red) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 95.
Parametric amplifier 2 is in maintenance, but PARAMPS 2 maintenance (blue) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 96.
Parametric amplifier 2 is not in maintenance, but PARAMPS 2 maintenance (blue) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 97.
Receive AUTO/MANUAL switch is pressed to select MANUAL and PARAMPS 2 switch is pressed to change parametric amplifier 2 from standby (amber) to online (green) condition. but PARAMP 2 remains in standby condition.	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 98.
Parametric amplifier 1 is on-line, but PARAMPS 1 online (green) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected,

Symptom	Probable cause
	perform step 99.
Parametric amplifier 1 is not online, but PARAMPS 1 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 100.
Parametric amplifier 1 is not faulted, but PARAMPS 1 fault (red) indicator is lighted	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 101.
Parametric amplifier 1 is faulted, but PARAMPS 1 fault (red) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 102.
Parametric amplifier 1 is in maintenance, but PARAMPS 1 maintenance (blue) indicator is not lighted	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 103.
Parametric amplifier 1 is not in maintenance, but PARAMPS 1 maintenance (blue) indicator is lighted	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 104.
Receive AUTO/MANUAL switch is pressed to select MANUAL and PARAMPS 1 switch is pressed to change parametric amplifier 1 from standby (amber) to online green) condition, but PARAMPS 1 remains in standby condition	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 105.
Transmit low power amplifier 2 is online, but POWER AMPLIFIERS PA 2 online (green) indicator is not lighted	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 106.
Transmit low power amplifier 2 is not online, but POWER AMPLIFIERS PA 2 online (green) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 107.
Transmit low power amplifier 2 not faulted, but POWER AMPLIFIERS PA 2 fault (red) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 108.
Transmit low power amplifier 2 is faulted, but POWER AMPLIFIERS PA 2 fault (red) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 109.
Transmit low power amplifier 2 is not in maintenance, but POWER AMPLIFIERS PA 2 maintenance (blue) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 110.
Transmit low power amplifier 2 is not in maintenance, but POWER AMPLIFIERS PA 2 cator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 111.
Transmit AUTO/MANUAL switch is pressed to select MANUAL and POWER AMPLIFIERS PA 2 switch is pressed to change low power amplifier 2 from standby (amber) to online (green) condition, but POWER AMPLIFIERS PA 2 remains in standby condition.	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 112.
Transmit AUTO/MANUAL switch is pressed to select AUTO; POWER AMPLIFIERS PA 2 is in standby (amber); fault occurs in online low power amplifier 1, but low power amplifier 2 does not automatically switch online.	Logic card D or E. Replace as directed in section XIV of this chapter. If fault is not corrected. perform step 113.

Symptom	Probable cause
Transmit low power amplifier 1 is online, but POWER AMPLIFIERS PA 1 online (green) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, Perform step 114.
Transmit low power amplifier 1 is not online, but POWER AMPLIFIERS PA 1 online (green) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 115.
Transmit low power amplifier 1 is not faulted, but POWER AMPLIFIERS PA 1 fault (red) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 116.
Transmit low power amplifier 1 is faulted, but POWER AMPLIFIERS PA 1 fault (red) indicator is not lighted	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 117.
Transmit low power amplifier 1 is in maintenance, but POWER AMPLIFIERS PA 1 (blue) maintenance indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 118.
Transmit low power amplifier 1 is not in maintenance, but POWER AMPLIFIERS PA 1 maintenance (blue) indicator is lighted	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 119.
Transmit AUTO/MANUAL switch is pressed to select MANUAL, and POWER AMPLIFIERS PA 1 switch is pressed to change low power amplifier 1 from standby (amber) to online (green) condition, but POWER AMPLIFIERS PA 1 remains in standby condition.	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 120.
Transmit AUTO/MANUAL switch is pressed to select AUTO; POWER AMPLIFIERS PA 1 is in standby (amber); fault occurs in online low power amplifier 2, but low power amplifier 1 does not automatically switch online.	Logic card D or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 121.
Transmit interfacility link amplifier 1 or 2 is online, low power amplifier 1 is online and low power amplifier 2 is in standby, transmit AUTO/MANUAL switch is in MANUAL, COMBINE switch is pressed, but COMBINE indicator does not light and power amplifier 2 does not change to online condition.	Logic cards D and E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 122.
Transmit interfacility link Amplifier 1 or 2 is online low power amplifier 2 is online and low power amplifier 1 is in standby, transmit AUTO/MANUAL switch is in MANUAL, COMBINE switch is pressed, but COMBINE indicator does not light and power amplifier 1 does not change to online condition	Logic cards D and E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 123.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	FULLY AVAILABLE circuit	All equipment units available but FULLY AVAILABLE lamp on fault and system status panel not lighted. Circuit card A mounted on extender board.	Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P4-19.	Less than 5 V de reading on volt-ohm-milliammeter.	a. If normal reading is observed refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading not observed, review further symptoms (par 3-24) and replace logic card associated with equipment indicated, as direct- ed in section XIV of this chapter.
2	FULLY AVAILABLE circuit	a. Remove circuit card A and install extender board in its place.	a. Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P4-19 on extender board.	a. Greater than 25 V dc reading on volt-ohm-milliammeter.	a. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.
		b. Install circuit card A on extender board.	b. Same as a above.	b. Greater than 25 V dc reading on volt-ohm-milliammeter FULLY AVAILABLE light is out.	b. If normal reading is not observed, perform steps 4 and 6 as required to clear trouble.
3	MAJOR FAULT circuit	a. Remove circuit card A and-install extender board in its place.	a. Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P4-18 on extender board.	a. Greater than 25 V dc reading on volt-ohm-milliammeter.	a. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.
		b. Install circuit card A on extender	b. Same as a.	b. Greater than 25 V dc reading on volt-ohm-milliammeter MAJOR FAULT light is out.	b. If normal reading is not observed, perform step 4.
4	Major fault inputs	Volt-ohm-milliammeter range switch set to 10 V. Circuit card A mounted on extender	Connect volt-ohm-milliammeter as follows:		If normal reading is not observed proceed as follows:
	a. Online transmit IFLA or pa is faulted.		a. COMMON lead to P1-1 and + lead to P3-8.	a. Less than 0.8 V dc if online transmit IFLA or pa is faulted. Greater than 3 V dc if online transmit IFLA or pa is not	a. Replace circuit card D as directed in section XIV of this chapter. If fault is not corrected, refer to the wire list in TM 11-5895-898-12 and check wiring to XMTR interface assy 31A26 or 32A26.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
	b. Online receive IFLA or paramp is faulted.		b. COMMON lead to P1-1 and + lead to P3-9.	b. Less than 0 8 V de. If online receive IFLA or paramp is faulted; greater than 3 V dc is not faulted.	b. Replace circuit, card F as directed in section XIV of this chapter If fault is not arrested, refer to the wire list In TM 11-5895-898-12 and check wiring to HTA-3A7 or HTA-3A8.
in	c. No online receive IFLA or paramp.		c. COMMON lead to P1-1 and + lead to P3-10.	c. Less than 0.8 V dc if online receive IFLA or paramp is faulted; greater than 3 V dc if not faulted	c. Replace circuit card G as directed in section XIV of this chapter. If fault is not corrected. , refer to the wire list TM 11-5895-898-12 and check wiring to HTA-3A7 or HTA-3A8.
	d. Online up-converter is faulted.		d. COMMON lead to P1-1 and + lead to P2-17.	d. 5 ± 1 V dc	d. Replace circuit card E as directed in section XIV of this chapter If normal reading is observed in substeps a, b, c and d, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16
5	MINOR FAULT circuit	a. Remove circuit card A and install extender board in its place.	a. Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P420 on extender board.	a. Greater than 25 V dc	a. If normal reading is not ob served, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16
		b. Install circuit card A on extender board.	b. Same as a above.	b. Greater than 25 V dc. MINOR FAULT light is out.	b. If normal reading is not observed, perform step 6.
6	Minor fault inputs	Volt-ohm-milliammeter range switch set to 10 V. Circuit card A mounted on extender	Connect volt-ohm-milliammeter as follows:		If normal reading is not observed, proceed as follows-
	a. Offline XMT IFLA or PA is faulted.		a. COMMON lead to P1-1 and + lead to P3-15.	a. Less than 0.8 V dc with offline IFLA or PA faulted. Greater than 3 V dc if not faulted.	a. Replace circuit card D as dlrected in section XIV of this chapter If fault is not corrected refer to the wire list in TM 11-5895-898-12 and check wiring to transmitter interface assembly 31A26 or 32A26.
	b. Offline RCV IFLA or paramp is faulted.		b. COMMON lead to P1-1 and + lead to P3-16.	b. Less than 0. 8 V dc with offline receiver IFLA or paramp faulted. Greater than 3 V de if not faulted.	b. Replace circuit card F as directed in section XIV of this chapter. If fault not corrected refer to the wire list in TM 11-5895-898-12 and check wiring to HTA-3A7 or HTA-3A8
			c. COMMON lead to P1-1 and + lead to P2-18.	c. 5 ± 1 V dc	c. If normal reading is observed

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					ed in substeps a, b, and c, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.
7	Tracking receiver major fault input	Tracking receiver not faulted, but TRACKING RECEIVERS-major fault lamp on fault and system status panel lighted. Circuit card A on extender board. Volt-ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter + lead to P1-25 and COMMON lead to P1-1.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to TM 11-5895-898-12 and checking wiring to tracking receivers control and status panel 14A16.
8	Tracking receiver major fault input	Tracking receiver faulted, TRACKING RECEIVERS major fault lamp on fault and system status panel not lighted. cuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter lead to P1-25 and COMMON lead to P1-1.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list TM 11-5895-898-12 and check wiring to tracking receiver control and status panel 14A6.
9	Tracking receiver minor fault input	Tracking receiver not faulted, but TRACKING RECEIVERS minor fault lamp on fault and system status panel lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-+ 5V dc milliammeter + lead to P1-26 and COMMON lead to P1-1.		a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to tracking receiver control and status pane 14A6.
10	Tracking receiver minor fault input.	Tracking receiver faulted. TRACKING RECEIVERS minor fault lamp on fault and system status panel not lighted. Circuit card A on extender board. ohm-milliammeter range switch set to 10 V.	Connect volt-ohm--milliammeter + lead to P1-26 and COMMON lead to P1-1.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not o served, refer to the wire list in TM 11-5895-898-12 and check wiring to tracking receiver control and status panel 14A6.
11	Antenna major fault input	Antenna not faulted, but ANTENNA major fault lamp on fault and system status panel is	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead P1-11.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and chock wiring to fault and system

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.			status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to antenna position and status panel 14A7.
12	Antenna major fault input	Antenna faulted, but ANTENNA major fault lamp of fault and system status panel is not lighted. Circuit card A on extender board, Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead P1-11.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to antenna position and status panel 14A7.
13	Antenna minor fault input	Antenna not faulted, but ANTENNA minor fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-12.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to antenna position and status panel 14A7.
14	Antenna minor fault input	Antenna faulted, but ANTENNA minor fault lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-12.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to antenna position and status panel 14A7.
15	Transmit waveguide switch S5 position 2 status input	Transmit waveguide switch S5 in position 1 but IPA CROSS PATCH lamp on fault and system status panel lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-S *l V dc milliammeter COMMON lead to P1-1 and + lead to P1-14.		a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch assembly 22A3S5.
16	Transmit waveguide switch SS position 2 status input	Transmit waveguide switch S5 in position 2, but IPA CROSS PATCH lamp on fault	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-14.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		and system status panel is not lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V.			b. If normal reading is not observed refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch 22A3S5.
17	CONVERTER POWER SUPPLIES - major fault input	Up-converter power supplies not faulted, but CONVERTER POWER SUPPLIES major fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lad to P1-1 and + lad to P2-10.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to wire list in TM 11-5895-898-12 and check wiring to up-converter interconnect assembly 9A3, 10A3 or 11A3 (AN/FSC-78(V)) or RF output test and control assembly 9A3, 10A3 or 11A3 (AN/FSC-78A(V)).
18	CONVERTER POWER SUPPLIES - major fault input	Up-converter power supplies are faulted, but CONVERTER SUPPLIES major fault lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-10.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to up-converter interconnect assembly 9A3, 10A3 or 11A3 (AN/FSC-78A(V)) or RF output test and control assembly 9A3, 10A3 or 11A3 (AN/FSC-78A(V)).
19	CONVERTER POWER SUPPLIES minor fault input	Up-converter power supplies are not faulted but CONVERTER POWER SUPPLIES minor fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-11.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to up-converter interconnect assembly 9A3, 10A3 or 11A3 (AN/FSC-78(V)) or RF output test and control assembly 9A3, 10A3 or 11A3 (AN/FSC-78A(V)).

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
20	CONVERTER POWER SUPPLIES minor fault input	Up-converter power supplies are faulted, but CONVERTER POWER SUPPLIES minor fault lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-11.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to up-converter interconnect assembly 9A3, 10A3 or I11A3(AN/FSC-78(V)) or RF output test and control assembly 9A3, 10A3 or 11A3 (AN/FSC-78A(V)).

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
21	Waveguide pressure minor fault input	Waveguide pressure is not low, but WAVE.-GUIDE PRESSURE indicator is lighted. Circuit card A on extender board. Vom range switch is set to 10 V.	Connect vom COMMON lead to P1-1 and + lead P1-10.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed refer to the wire list in TM 11-5895-898-12 and check wiring to low pressure control panel 22A2.
22	Waveguide pressure minor fault input	Waveguide pressure is low, but WAVE-GUIDE PRESSURE indicator is not lighted. Circuit card A on extender board. Vom range switch is set to 10 V.	Connect vom COMMON lead to P1-1 and + lead P1-10.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to low pressure control panel 22A2.
23	POWER AMPLIFIER MINOR fault input	Power amplifier is not faulted, but POWER AMPLIFIER MINOR fault lamp on fault and system status panel is lighted. Circuit card A on extender board, Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-9.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring remote facility interface assembly 31A26 or 32A26.
24	POWER AMPLIFIER MINOR fault input	Power amplifier is faulted, but POWER AMPLIFIER MINOR fault lamp on fault and system status panel is lighted. Circuit card a on extender board. Volt-ohm-milliammeter range switch set to. 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-9.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring remote facility interface assembly 31A26 or 32A26.
25	SYSTEM NOISE TEMP fault input	Noise temperature monitor is not faulted, but SYSTEM NOISE TEMP fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P2-8.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to noise temp monitor 14A25.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
26	SYSTEM NOISE TEMP fault input	Noise temperature monitor is faulted, but SYSTEM NOISE TEMP fault lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt- - ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lad to P2-S.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and Check wiring to noise temp monitor 14A25
27	RECEIVER GAIN ALERT fault input	Receiver gain monitor HTA-3A6 does not indicate online amplifier minor gain fault, but RECEIVER GAIN ALERT lamp on fault and system status panel14A16 is lighted. Circuit card A on extender board. Volt- - ohm milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-7.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 4A 16 b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to receiver gain monitor HTA-3A6
28	RECEIVER GAIN ALERT fault input	Receiver pin monitor HTA-3A6 does indicate online amplifier minor gain fault, but - RECEIVER GAIN ALERT lamp on fault and system status panel 14A16 is not lighted. Circuit card - A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-7.	-5 ± 1 V dc	a. If normal reading is observed. refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A 16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to receiver gain monitor HTA-3A6
29	RGMU fault input	Receiver gain monitor is not faulted, but RGMU lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P3-6.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to receiver gain monitor HTA-3A6
30	RGMU fault input	Receiver pin monitor is faulted, but RGMU lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm- milliammeter COMMON lead to P1-1 and + lead to P3-6.	5 ± 1 V de	a. If normal reading is observed. refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal reading Is not observed. refer to the wire list in TM 11-5895-898-12 and check wiring to receiver gain

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					monitor HTA-3A6.
31	Down-converter fault input	Down-converters are not faulted, but DOWN CONV lamp on fault and system status panel is lighted. Circuit card Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-7.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to down-converter interconnecting assembly 3A3, 4A3, 5A3, 6A3 or 7A3 (AN/FSC-78(V)) or IF test assembly 3A3, 4A3, 5A3, 6A3 or 7A3 (AN/FSC-7 8A(V)).
32	Down-converter fault input	Down-converters are faulted, but DOWN CONV lamp on fault and system status panel is not lighted. Circuit board. Volt- -ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-7.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to down-converter interconnecting assembly 3A3, 4A3, 5A3, 6A3 or 7A3 (AN/FSC-78A(V)) or IF test assembly 3A3, 4A3, 5A3, 6A3 or 7A3 (AN/FSC-78A(V)).
33	Frequency standard power supply major fault input	Power supply is not faulted, but FREQUENCY STANDARD PWR SUPPLY major fault lamp on fault system status panel is lighted. Circuit card A on extender board. Volt- -ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-14.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to frequency distribution power supply 13A] I
34	Frequency standard power supply major fault input	Power supply is faulted, but FREQUENCY STANDARD PWR SUPPLY major fault lamp on fault system status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm—milliammeter COMMON lead to P1-1 and + lead to P2-14.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to frequency dis tribution power supply 13A II

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
35	Frequency standard power supply minor fault input	Power supply is not faulted, but FREQUENCY STANDARD PWR SUPPLY minor fault lamp on fault system status panel is lighted. Circuit card A on extender board. Volt- -ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-15.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ob served, refer to the wire list in TM 11-5895-898-12 and check wiring to frequency distribution power supply 13AI I
36	Frequency standard power supply minor fault input	Power supply is faulted, but FREQUENCY STANDARD PWR SUPPLY minor fault lamp on fault system lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-15.	-5± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-8P98-12 and check wiring to frequency distribution power supply 13A11.
37	Frequency standard major fault inputs	Neither frequency standard is faulted, but FREQUENCY STANDARDS major lamp on fault and system status panel is lighted. Circuit card A on extender board Volt- -ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21, then P1-23.	-5 ± 1 V dc at P1-21 and P1-23.	a. If normal readings are ob served, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal readings are not ob served, refer to the wire list in TM 11-5895-898-12 and check wiring to frequency distribution unit 13A7 (AN/FSC-78(V)) or 5 MHz distribution amplifier 3A 12 through 7A12 and 9A13 through 11A13 (AN/FSC-78A(V)).
38	Frequency standard major fault inputs	Both frequency standards are faulted, but FREQUENCY STANDARDS major lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COM MON lead to P1-1 and + lead to P1-21, then P1-23.	5 ± 1 V dc at P1-21 and P1-23.	a. If normal readings are ob served, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal readings are not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to frequency distribution unit 1 3A7 (AN FCS -78(V)) or 5 MHz distribution amplifier 3A12 through 7A12 and 9A13 through 11A13 (AN/FSC-78A(V)).
39	Frequency standard minor fault inputs	Neither frequency tandard is faulted, but FREQUENCY STANDARDS minor fault lamp on fault and system status panel is	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21, then P1-23.	5 ± 1 V dc at P1-21 or P1-23.	a. If normal readings are observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		lighted. Circuit card A on extender board. Volt-ohm- millammeter range switch it to 10 V.			b. If normal reading are not observed, refer to the wire list in TM 11-5895-898-12 and check wiring for that signal to frequency distribution unit 13A7 (AN/FSC-78(V)) or 5 MHz distribution amplifier 3A12 through 7A12 and 9A13 through 11A13 (AN/FSC-78A(V).
40	Frequency standard minor fault inputs	Either frequency standard is faulted, but FREQUENCY STANDARDS minor fault lamp on fault and system status panel is not lighted. Circuit card A on extender board Volt-o m-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21, then P1-23	5 ± 1 V dc P1-21 or P1-23.	a. If normal readings are ob served, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal readings are not observed, refer to the wire list in TM 11-5895-898-12 and check wiring for that signal to frequency distribution unit 13A7 (AN/FSC-78(V)) or 5 MHz distribution amplifier 3A12 through 7A12 and 9A13 through 11A13 (AN/FSC-78A(V)).
41	Upconverter fault input	Up-converters are not faulted, but UP CONV lamp on fault and system status panel is lighted. Circuit card A Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal reading Is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to up-converter interconnecting assembly 9A3 10A3 or 11A3 (AN/FSC-78A(V)) or RF output test and control assembly 9A3, 10A3 or 11A3 (AN/FSC-78A(V)).
42	Up-convertcr fault input	Up-converter(s) are faulted, but UP CONV lamp on fault and system status panel is not lighted. Circuit card A on extender. board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5.	-5 ± 1 V dc	a. If normal reading Is observed refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not observed, refer to the wire list ii TM 11-5895-898-12 and check wiring to up-converter interconnecting assembly 9A3. 10A3 or 11A3 (AN/FSC-78(V)) or RF output test and control assembly 9A3, 10A3 or 11A3 AN/FSC-78A(V)).

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
43	Transmitter disable fault input	Emergency transmitter disable switch HTA-4A8 Is in XMTR OPR condition, but TRANS-MIT DISABLE lamp on fault and system status panel is lighted Circuit card E on ex-tender board Vom range switch is set to 10 V	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-5	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 - b. If normal reading is not ob-served, replace circuit card D as directed in section XIV of this chapter If fault is still not corrected. refer to the wire list in TM 11-5895-898-12 and check wiring to emergency transmitter disable switch HTA-4A8
44	Transmitter disable fault input	Emergency transmitter disable switch HTA-4A8 is in XMTR DIS-ABLE condition, but TRANSMIT DIS-ABLE lamp on fault and system status panel is not lighted Circuit	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-5.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not ob-served. replace circuit card D

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		card E on extender board. Vom range switch is set to 10 V.			as directed in section XIV of this chapter. If fault is still not corrected, refer to the wire list in TM 11-5895-898-12 and check wiring to emergency transmitter disable switch HTA-4A8.
45	OUTPUT POWER ALERT fault input	Transmitter power monitor panel 14A27 does not indicate fault, but OUTPUT POWER ALERT lamp on fault and system status panel is lighted. Circuit card A on. extender board Volt-ohm-milliammeter range switch to set to 10 V.	Connect volt-ohm- milliammeter COMMON lad to P1-1 and + lead to P1-20.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmitter power monitor panel 14A27.
46	OUTPUT POWER ALERT fault input	Transmitter power monitor panel 14A27 does indicate fault, but OUTPUT POWER ALERT lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt-ohm milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lad to P1-1 and + lead to PI-20.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmitter power monitor panel 14A27.
47	CLM fault input	Carrier level detector and carrier level control power supplies are not faulted, but CLM lamp on fault and system status panel. is lighted Circuit card A on extender board. Vom range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-18.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to carrier level control panel 14A17 and/or 14A28.
48	CLM fault input	Carrier level detector or carrier level control power supplies are faulted, but CLM lamp on fault and system lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lad to P1-1 and + lad to P1-11.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A26. b. If normal reading is not ob served, refer to the wire list in TM 11-5895-898-12 and check wiring to carrier level control panel 14A17 and/or 14A28.
49	CARRIER LEVEL ALERT major fault input	Carrier level alert condition does not exist, but	Connect volt-ohm-milliammeter COMMON lead to P1-1 and	-5 ± 1 V dc	a. If normal reading observed, refer to the wire list in TM 11-5895-898-12 and check

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		CARRIER LEVEL ALERT major fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter rangeswitch is set to 10 V.	+ lead to P1-15		wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to carrier level control panel 14A17 and/or 14A28.
50	CARRIER LEVEL ALERT major fault input	Carrier level alert condition exits but CARRIER LEVEL ALERT major fault lamp on fault and system status panel is not. lighted Circuit card A - on extender board. - Volt ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-15.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading Is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to carrier level control panel 14A17 and/or
51	CARRIER LEVEL ALERT minor fault input	Carrier level alert condition does not exist, but CARRIER LEVEL ALERT minor fault lamp on fault and sys tem status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-16.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to carrier level control panel 14A17 and/or
52	CARRIER LEVEL ALERT minor fault input	Carrier level alert condition exists but CARRIER LEVEL ALERT minor fault lamp on fault and system status panel is not. lighted Circuit card A - on ex tender board. - Volt ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-16.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to carrier level control panel 14A17 and/or 14A28
53	AUTOTRACK DROPOUT fault input	Fault does not exist at tracking receiver control and status panel, but AUTOTRACK DROPOUT lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt- - ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lad to P2-4.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to tracking receiver control and status panel 14A16.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
54	AUTOTRACK DROPOUT fault input	Fault does exist at tracking receiver control and status panel, but - AUTOTRACK DROPOUT lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt- -ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-4.	5 ± V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not o served, refer to the wire list in TM 11-5895-898-12 and check wiring to tracking re ceiver control and status panel 14A16.
55	Autotrack disable input to audible alarm	Audible alarm is sounding with DISABLE portion of AUTOTRACK DROPOUT/DISABLE indicator lighted. Cir cuit card A on extender Board. Volt-ohm milliammeter range switch set to. 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-5.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check dis- able signal wiring from fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check alarm signal wiring to fault and system status panel 14A16.
56	RECEIVE IFLA 2 on-line input	Receive interfacility link amplifier 2 on line, but green lamp on fault and system status panel is not lighted Circuit board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P-10.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch 3 in receiver interfacility link amplifier HTA-3A8.
57	RECEIVE IFLA 2 on-line input	Receiver interfacility link amplifier 2 is not on-line, but green lamp on fault and system status panel is lighted Circuit card A on extender board Volt- -ohm milliammeter range switch , et to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P-10.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch 3 in receiver interfacility link amplifier HTA-3A8.
58	RECEIVE IFLA 2 fault input	Receiver interfacility link amplifier 2 is not faulted. but red lamp on fault and system status panel is lighted Circuit card F on extender board Volt-tender board. Volt-ohm-milliammeter	Connect volt-ohm- milliammeter COMMON lead to P1-1 and + lead to P1-16.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		range switch set to 10 V.			TM11-5895-898-12 and check wiring to receive inter-
59	RECEIVE IFLA 2 fault input	Receiver interfacility link amplifier 2 is faulted, but red lamp on fault and system status panel is not lighted. Circuit card F on extender board. - Volt-ohm milliam-meter range switch set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-16.	5 ± 1 V dc	a. If normal reading is observed refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ob-served, refer to the wire list in TM 11-5895-898-12 and check wiring to receive inter-facility link amplifier HTA-3A8.
60	RECEIVE IFLA 2 maintenance	Receive interfacility link amplifier 2 in mainte-nance, but blue lamp on fault and system status panel is not lighted. Circuit card F on extender board. Volt-ohm-milliam-meter range switch set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-15.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ob-served, refer to the wire list in TM 11-5895-898-12 and check wiring to receive inter-facility link amplifier HTA-3A8.
61	RECEIVE IFLA 2 maintenance input	Receive interfacility link amplifier 2 not in maintenance, but blue lamp on fault and sys-tem status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-l and + lead to P1-15.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ob-served, refer to the wire list in TM 11-5895-898-12 and check wiring to receive inter-facility link amplifier HTA-3A8.
62	Receive interfacility link amplifier 2 switch signal	Manual control selected and RECEIVE IFLA 2 pressed to change from standby to online - condition, but remains in standby. Circuit G card on extender. board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P2-4.	5 ± 1 V dc Changing to - 5 ± 1 V dc when RE-CEIVE IFLA 2 switch is pressed.	a. If normal reading is observed, replace relay card R2 as di-rected in section XIV of this chapter. b. If fault is not corrected, re-place circuit card F as direct-ed in section XIV of this chapter. c. If fault is still not corrected, refer to the wire list TM 11-5895-898-12 and check wiring to receive waveguide HTA-3A7 switch 2 and switch 3.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					d. If normal reading is not ob served, refer to the wire lit in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.
63	RECEIVE IFLA 1 on-line input	Receive interfacility link amplifier 1 online, but green lamp on fault and system status panel is not lighted. Circuit board. Volt- -ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-9.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch 3 in receive interfacility link amplifier HTA-3A8.
64	RECEIVE IFLA 1 on-line input	Receive interfacility link amplifier 1 is not on-line, but green lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm milliameter range switch. set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-9.	5 ± 1 V dc	a. If normal reading observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch 3 in receive interfacility link amplifier HTA-3A8.
65	RECEIVE IFLA 1 fault input	Receive interfacility link amplifier 1 not faulted, but red lamp on fault and system status panel is lighted. Circuit card F on extender board Volt- -ohm-milliammeter range switch set to. 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-12.	-5 ± 1 V dc	a. If normal reading observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to receive interfacility link amplifier HTA-3A8.
66	RECEIVE IFLA 1 fault input	Receive interfacility link amplifier I faulted, but red lamp on fault and system status panel is not lighted. Circuit Card F on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COM. MON lead to P1-1 and + lead to P1-12.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to receive interfacility link amplifier HTA-3A8.
67	RECEIVE IFLA 1	Receive interfacility link	Connect volt-ohm-	5 ± 1 V dc	a. If normal reading is observed,

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
	maintenance input	amplifier 1 is in maintenance, but blue lamp on fault and system status panel is not lighted. Circuit card F on extender board Volt-ohm-milliammeter range switch set to. 10V	milliammeter COMMON lead to P1-1 and + lead to P1-11.		refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM11-5895-898-12 and check wiring to receive interfacility link amplifier HTA-3A8.
68	RECEIVE IFLA 1 maintenance input	Receive interfacility link amplifier 1 not in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card F on extender board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-11.	-5 ± 1 V dc	a. If normal reading observed, refer to the wire list in I'M 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to receive interfacility link amplifier HTA-3A8.
69	Receive interfacility link amplifier 1 switch signal	Manual control selected and RECEIVE IFLA 1 pressed to change from standby to online - condition, but remains in standby Circuit card G on extender. board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-3.	5 ± 1 V dc Changing to - -5 ± 1V dc on pressing of RECEIVE IFLA 1 switch.	a. If normal reading observed, replace relay card R2 as directed in section XIV of this chapter. b. If fault is not corrected, replace circuit card F as directed in section XIV of this chapter. c. If fault is still not corrected refer to the wire list TM 11-5895-898-12 and check wiring to RX-WG SW 2 and RX WG SW S3 (HTA-3A7). d. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system panel 14A16.
70	TRANSMIT IFLA 2 on line input	Transmit interfacility link amplifier 2 online, but green lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt- - ohm milliammeter range switch set to. 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + led to P1-12.	-5 ± 1 V dc	a. If normal reading observed, refer to the wire list in TM 11-5895-898-12 and check wiring to status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switching assembly 22A3.
71	TRANSMIT IFLA 2	Transmit interfacility link	Connect volt-ohm-	5 ± 1 V dc	a. If normal reading is observed,

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
	on line input	amplifier 2 is not on-line, but green lamp on fault and system status panel is lighted Circuit card D on extender board. Volt-ohm milliammeter range switch set to 10 V	milliammeter COMMON lead to P1-1 and + lead to P1-12		refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch S4 in summing and switching assembly 22A3.
72	TRANSMIT IFLA 2 fault input	Transmit interfacility link amplifier 2 not faulted, but red lamp on fault and system status panel is lighted. Circuit card D on extender board Volt-ohm-milliammeter range switch set to. 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-23.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.
73	TRANSMIT IFLA 2 fault input	Transmit interfacility link amplifier 2 faulted, but red lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt-ohm milliammeter range switch set to. 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P123	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.
74	TRANSMIT IFLA 2 maintenance input	Transmit interfacility link amplifier 2 in maintenance, but blue lamp on fault and system status panel not. lighted Circuit card D - on extender board. - Volt ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-24.	5 ± 1 V dc	a. If normal reading observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.
75	TRANSMIT IFLA 2 maintenance input	Transmit interfacility link amplifier 2 not in maintenance but blue lamp on fault and system status panel is lighted. Circuit card D on extender board. Volt-ohm-milliammeterr range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-24.	-5± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check configuration of waveguide switch 8A13-S7 and/or then check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
76	TRANSMIT IFLA 2 switch signal	Manual control selected and TRANSMIT IFLA 2 pressed to change from standby to online condition, - but re mains in - standby Circuit card E on extender board. Volt-ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead P1-9	5 ±1 V dc changing to -5 ± 1 V dc when TRANSMIT IFLA 2 switch is pressed.	a. If normal reading is observed, replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. c. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch S4 in summing and switching assembly 22A3.
77	Transmit IFLA 2 switch signal	Transmit AUTO/ MANUAL switch is pressed to select AUTO; transmit IFLA 2 is in standby (amber); fault occurs in - on line transmit IFLA but transmit IFLA 2 does not automatically Switch to online. Circuit card D on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-23.	+5 ± 1 V dc	a. If normal reading is observed, replace relay card RI as directed in section XIV of this chapter. If fault is still not corrected, refer to the wire list TM 11-5895-898-12 and check wiring to waveguide switch S4 in summing and switching assembly 22A3. b. If normal reading is not observed, refer to the wire list TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.
78	TRANSMIT IFLA 1 on line input	Transmit interfacility link amplifier I online, but green lamp on fault and system status panel is not lighted. Circuit board. Volt- - ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-1.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to cult and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch S4 in summing and switching assembly 22A3.
79	TRANSMIT IFLA 1 on line input	Transmit interfacility link amplifier 1 is not online, but green lamp on fault and system status panel is lighted. Circuit card D on extender board. Volt-ohm milliammeter range switch is set to 10 V.	Common volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-11.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch S4 in summing and switching assembly 22A3.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
80	TRANSMIT IFLA 1 fault input	Transmit interfacility link amplifier 1 not faulted, but red lamp on fault and system status panel is lighted. Circuit card Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.
81	TRANSMIT IFLA 1 fault input.	Transmit interfacility link amplifier 1 faulted, but red lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5893-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.
82	TRANSMIT IFLA 1 maintenance input	Transmit interfacility link amplifier 1 is in maintenance, but blue lamp on fault and system status panel not lighted. Circuit card D on ex-tender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-22.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.
83	TRANSMIT IFLA 1 maintenance input	Transmit interfacility link amplifier 1 not in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-22.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check configuration of waveguide switch 8A12-S7 and/or then check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to transmit IFLA control panel 8A4.
84	TRANSMIT IFLA 1 switch signal	Manual control selected and TRANSMIT IFLA 1 is pressed to change from standby to online condition, - but re mains in standby. Circuit card E on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-8 IFLA 1 switch is pressed.	5 ± 1 V dc changing to -5 ± 1 V dc when TRANSMIT	a. If normal reading is observed, replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch S4 in summing and switching as-

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
85	Transmit IFLA 1 switch signal	Transmit AUTO/ MANUAL switch premed to select AUTO; transmit IFLA 1 is in standby (amber). A fault occurs in ONLINE transmit IFLA 2, but transmit IFLA 1 does not automatically switch ONLINE. Circuit card D on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21.	+5 ± 1 V dc	a. If normal reading is observed replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch S4 in summing and switching assembly 22A3. c. If normal reading is not observed refer to the wire list TM, 11-5895-898-12 and check wiring to XMT IFLA control panel 8A4.
86	Receive AUTO/ MANUAL fault switch input	AUTO/MANUAL switch in AUTO condition and a fault occurs in receive gain monitor, but AUTO/MANUAL switch does not switch to MANUAL condition. Circuit card G on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-6.	Less than 0.8 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to receiver gain monitor HTA-3A6.
87	Receive AUTO/ MANUAL maintenance switch input	AUTO/MANUAL switch in AUTO condition and maintenance condition occurs in receiver gain monitor, but switch does not switch to MANUAL condition. Circuit card G on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-7.	Less than 0.8 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to receiver gain monitor HTA-3A6.
88	Receive AUTO/ MANUAL switch input	AUTO/MANUAL switch is in AUTO position and pressing switch does not select MANUAL position. Circuit card G on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5.	5 ± 1 V dc changes as switch is pressed to -5 ± 1 V dc.	a. If normal reading ;s observed, refer to the wire list in TM 11-5895-898-12 and check indicator wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check switch wiring to fault and system status panel

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
89	Receive AUTO/ MANUAL switch input	AUTO/MANUAL switch is in MANUAL position, receiver gain monitor is not faulted or in maintenance, but pressing switch does not select AUTO. position Circuit card G on extender board. - Volt ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-l and + lead to P1-5.	-5 ± 1 V dc level changes as switch is pressed to +5 ± 1 V dc.	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check fault signal wiring at P-6 and maintenance signal wiring at P1-7 to receiver gain monitor HTA-3A6. b. If normal reading is not ob-served, refer to the wire list in TM 11-5895-898-12 and check switch signal wiring to fault and system status panel 14A16.
90	Transmit AUTO/ MANUAL switch input	AUTO/MANUAL switch is in AUTO po-sition and is pressed to select MANUAL - position, but change does not occur. Circuit card on extender board. Volt-ohm-milliammeter range switch is set. to 10 V	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-6.	5 ± 1 V dc level changes as switch is pressed to -5 ± 1 V dc.	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check lamp wiring to fault and sys-tem status panel 14A16. b. If normal reading is not ob served, refer to the wire list in TM 11-5895-898-12 and check switch signal wiring to fault and system status panel 14A16.
91	Transmit AUTO/ MANUAL switch input	AUTO/MANUAL switch is in MANUAL position and is pressed to select AUTO position, but change does not occur Circuit card E. on extender board Volt-ohm-milliam-meter range switch set to 10V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-6.	-5 ± 1 V dc level changes as switch is pressed to +5 ± 1 V dc.	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check lamp wiring to fault and sys-tem status panel 14A16. b. If normal reading is not ob-served, refer to the wire list in TM11-589-898-12 and check switch wiring to fault and system status panel 14A16.
92	PARAMP 2 on line in-put	Parametric amplifier 2 is online, but green lamp an fault and system status panel is not lighted Circuit card F on extender board Volt-ohm-milliam-meter range switch is set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-7.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ob-served, refer to the wire list in TM11-5895-898-12 and check wiring to waveguide switch HTA-3S1.
93	PARAMP 2 on line in-put	Parametric amplifier 2 is not online, but green lamp on fault and sys-	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		tem status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	+ lead to P1-7.		wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch HTA-3S1.
94	PARAMP 2 fault input	Parametric amplifier 2 is not faulted, but red lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-20.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote amplifier monitor unit 8A6.
95	PARAMP 2 fault input	Parametric amplifier 2 is faulted, but red lamp on fault and system status panel is not lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-20.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote amplifier monitor unit 8A6.
96	PARAMP 2 maintenance input	Parametric amplifier 2 is in maintenance, but blue lamp on fault and system status panel- not lighted. Circuit F card on extender. board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-19.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote amplifier monitor unit 8A6.
97	PARAMP 2 maintenance input	Parametric amplifier 2 is not in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-19.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote amplifier monitor unit 8A6.
98	Parametric amplifier 2 switch input	Manual control selected and PARAMP 2 switch pressed to change from standby to online condi-	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-6.	5 ± 1 V dc changes to -5 ± 1 V dc as	a. If normal reading is observed, replace relay card R2 as directed in section XIV of this chapter.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		tion, but remains in standby. Circuit card G on extender board. Volt-ohm-milliammeter range switch set to 10 V.		switch is pressed.	b. If fault is not corrected, replace circuit card F as directed in section XIV of this chapter. c. If fault is still not corrected refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch HTA-3S1. d. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.
99	PARAMP 1 on line input	Parametric amplifier 1 is online, but green lamp on fault and system status panel is not lighted. Circuit card F on extender board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch HTA-3S1.
100	PARAMP 1 on line input	Parametric amplifier 1 is not online, but green lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ohserved, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch HTA-3S1.
101	PARAMP 1 fault input	Parametric amplifier 1 is not faulted, but red lamp on fault and system status panel is lighted. Circuit card F on extender board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-18.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote amplifier monitor unit 8A5.
102	PARAMP 1 fault input	Parametric amplifier 1 is faulted, but red lamp on fault and system status panel is not lighted. Circuit card F	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-18.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		on extender board. Volt-ohm- milliam- meter range switch set to 10 V.			b. If normal reading is not ob- served, refer to the wire list in TM 1 1-5895-898-12 and check wiring to remote am- plifier monitor unit 8A5.
103	PARAMP 1 mainte- nance input	Parametric amplifier 1 is in maintenance, but, blue lamp on fault and system status panel not lighted. Circuit card F Volt-ohm- milliammeter range switch set to 10 V.	Connect volt-ohm- milliammeter COM- MON lead to P1-1 and + lead to P1-17.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. if normal reading is not ob- served, refer to the wire list in TM 11-5895-898-12 and check wiring to remote moni- tor unit 8AS.
104	PARAMP 1 mainte- nance input	Parametric amplifier 1 is not in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt -ohm-milliammeter range switch set to. 10 V.	Connect volt-ohm- milliammeter COM- MON lead to P1-1 and + lead to P1-17.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ob- served, refer to the wire list in TM 11-5895-898-12 and check wiring to remote am- plifier monitor unit 8A5.
105	Parametric amplifier 1 switch input	Manual control selected and PARAMP 1 switch pressed to change from standby to online condition, but remains it standby. Circuit card G on ext- ender board. Volt- ohm-milliammeter range switch set to 10 V.	Connect volt-ohm- milliammeter COM- MON lead to P1-1 and + lead to P2-5.	5 ± 1 V dc changes to -5 ± 1 V dc on pressing PAR- AMP 1 switch.	a. If normal reading is observed, replace relay card R2 as di- rected in section XIV of this chapter. b. If fault is not corrected, re- place circuit card F as direct- ed in section XIV of this chapter. c. If fault is not corrected refer to TM 11-5895-898-12 and check wiring to waveguide switch HTA-3S1. If normal reading is not observed, refer to the wire list in TM 11- 5895-898-12 and check wiring to fault and system status panel 14A16.
106	POWER AM- PLIFIERS PA2 on line input	Transmit low power am- plifier 2 online, but green lamp on fault and system status panel is not lighted. Circuit card D on extender board. - Volt-ohm-	Connect volt-ohm- milliammeter COM- MON lead to P1-1 and + lead to P1-9 for trans- mit waveguide switch 3, then to P1-17 for trans- mit waveguide switch 3A.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ob. served, refer to the wire list in

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		milliammeter range switch set to 10 V.			TM 11-5895-898-12 and check wiring to remote facility interface assembly 32A26 for switch 3 and/or to summing and switch assembly 22A3 for switch 3A.
107	POWER AMPLIFIERS PA2 online input	Transmit low power amplifier 2 is not online, but green lamp on fault and system status panel is lighted Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-9 for transmit waveguide switch 3, then to P1-17 for transmit waveguide switch 3A.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote facility interface assembly 32A26 for switch 3 and/or to summing and switching assembly 22A3 for switch 3A.
108	POWER AMPLIFIERS PA 2 fault input	Transmit low power ampli fier 2 is not faulted, but red lamp on fault and system status panel is lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter + lead to P1-25 then to P2-4 and COMMON lead to P1-1.	-5 ± 1 V dc	a. If normal reading is observed refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-6896-898-12 and check wiring to remote facility interface assembly 32A26.
109	POWER AMPLIFIERS PA 2 fault input	Transmit low power amplifier 2 faulted, but red lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter + lead to P1-25 and COMMON lead to P1-1.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-1 2 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 check wiring to remote facility interface assembly 32A26.
110	POWER AMPLIFIERS PA 2 maintenance input	Transmit low power amplifier 2 is in maintenance, but blue lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt- ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-26.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 1 1-5895-898-12 and check wiring to remote facility interface assembly 32A26.
111	POWER AMPLIFIERS PA 2	Transmit low power amplifier 2 is not in main-maintenance input	Connect volt-ohm-milliammeter COMMON lead to P1-1 and	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12; check wave-

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		tenance, but blue lamp on fault and system status panel. is lighted Circuit card D on extender board. -Volt ohm-milliammeter range switch is set to 10 V.	+ lead to P1-26.		guide switches 22A3-S6 and S8 for NORMAL configuration, and/or check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote facility interface assembly 32A26.
112	Low power amplifier 2 switch signal	Manual control selected and POWER AMPLIFIERS PA 2 switch pressed to change from standby to online condition, but remains in standby. Circuit card D on extender board. Volt -ohm-milliammeter range switch set to 10V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-10.	+5 ± 1 V dc changes to -5 ± 1 V dc when PA2 switch is pressed.	a. If normal reading is observed, replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switches S4 in summing and switching assembly 22A3 and to waveguide switches 1 and 3 in rf amplifier assemblies 31A21 and 32A21, respectively. c. If normal reading not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 for MANUAL and PA2 switch inputs.
113	Low power amplifier switch signal	Transmit AUTO/ MANUAL switch is pressed to select AUTO; power amplifier PA 2 is in standby (amber); a fault occurs in online low power amplifier 1, but low power amplifier 2 does not automatically switch online. Circuit card D on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-6.	+5 ± V dc	a. If normal reading is observed, replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch S4 in summing and switching assembly 22A3 and to waveguide switches 1 and 3 in rf amplifier assemblies 31A21 and 32A21 respectively. c. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 for MANUAL and PA2 switch inputs.
114	POWER AMPLIFIERS PA 1 on-	Transmit low power amplifier 1 online, but	Connect volt-ohm-milliammeter + lead to	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
	line input.	green lamp on fault and system status panel is not lighted. Circuit card D on extender board. - Volt-ohm milliammeter range switch set to 10 V.	P1-5 and COMMON lead to P1-1 for transmit waveguide switch 1, then to P1-7 for transmit waveguide switch S4.		11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote facility interface assembly 31A26 for switch 1 and/or to summing and switching assembly 22A3 for switch S4.
115	POWER AMPLIFIERS PA 1 online input	Transmit low power amplifier 1 is not online, but green lamp on fault and system status panel is lighted . Circuit card D extender board. Volt -ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5 for transmit waveguide switch 1, then to P1-7 for transmit waveguide switch S4.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote facility interface assembly 31A26 for switch 1 and/or to summing and switching assembly 22A3 for switch 4.
116	POWER AMFIERS PA 1 fault input	Transmit low power amplifier 1not faulted, but red lamp on fault and system status panel is lighted. Circuit card D on extender board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMON lead to P1-1 and + lead to P2-6, then P2-5.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote facility interface assembly 31A26.
117	POWER AMPLIFIERS PA 1 fault input	Transmit low power amplifier 1 faulted, but red lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-6.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to remote facility interface assembly 31A26.
118	POWER AM PLIFIERS PA 1 maintenance input	Transmit low power amplifier 1 is in maintenance, but blue lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt-ohm-milliammeter	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-7.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		range switch is set to 10 V.			check wiring to remote facility interface assembly 31A26.
119	POWER AM-PLIFIERS PA 1 maintenance input	Transmit low power amplifier 1 is not in maintenance, but blue lamp on fault and system status panel is. lighted Circuit card D -on ex tender board. - Volt ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P2-7.	-5 ± 1 V dc	a. If normal reading is observed. refer to the wire lit in TM 11-5895-898-12 and check XMT waveguide switches 22A3-S6 and SS for NOR-MAL configuration and/or check wiring to fault and system status panel 14A16. b. If normal reading is not observed. refer to the wire list in TM 11-5895-898-12 and check wiring to remote facility interface assembly 31A26.
120	Low power amplifier 1 switch signal	Manual control selected and POWER AM-PLIFIERS PA 1 switch is pressed to change from standby to online condition, but remains in standby Circuit card E on extender board. Volt-ohm-milliam-meter range switch is set to 10 V.	Connect volt-ohm-milliammeter COM-MON lead to P1-1 and + lead to P1-1.	5 ± 1 V dc changing to -5 ± 1 V dc when PA 1 switch is pressed.	a. If normal reading is observed. replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected. refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch 4 in summing and switching a sembly 22A3 and to waveguide switches 1 and 3 in rf amplifier assemblies 32A21 and 32A21, respectively c. If normal reading is not observed. refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16 for MANUAL and PAI switch inputs.
121	Low power amplifier 2 switch signal	Transmit AUTO/ MANUAL switch is pressed to select AUTO; power amplifier PA1 is in standby (amber); fault occurs in online low power amplifier 2, but low power amplifier 1 does not automatically switch to online Circuit card D is on extender board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COM-MON test lead to P1-1 and + lead to P1-25.	5 ± 1 V dc	a. If normal reading is observed. replace relay card R I as directed in section XIV of this chapter. b. If fault is not corrected, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide switch 4 in summing and switching assembly 22A3 and to waveguide switch 1 and 3 in rf amplifier assemblies 31A21 and 32A21 respectively. c. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and sys-

Table 3-9. AN/FSC-78(V) System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					tem status panel 14A16 for AUTO and PA2 switch inputs.
122	PA combiner switch input signal	Transmit interfacility link amplifier 1 or 2 is on-line, low power amplifier 2 is in standby, transmit, AUTO/ MANUAL switch is in MANUAL, COM BINE switch is, pressed but COMBINE indicator does not light and power amplifier 2 does not change to online condition. Circuit card E on extender board. Volt-ohm-milliammeter range switch set to 10V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-12.	5 ± 1 V dc changing to -5 ± 1 V dc when combine switch is pressed.	a. If normal reading is observed, replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide summing and switching assembly 22A3. c. If normal reading is not observed, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.
123	PA combiner switch in put signal	Transmit interfacility link amplifier 1 or 2 is on-line, low power am plifier 2 is in standby, transmit AUTO/ MANUAL switch is in MANUAL, COMBINE switch is pressed, but COMBINE indicator does not light and power amplifier 1 does not change to ONLINE condition.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-12.	5 ± 1 V dc changing to -5 ± 1 V dc when combine switch is pressed.	a. If normal reading is observed, replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected, refer to the wire list in TM 11-5895-898-12 and check wiring to waveguide summing and switching assembly 22A3. c. If normal reading is not ob served, refer to the wire list in TM 11-5895-898-12 and check wiring to fault and system status panel 14A16.

SECTION VI. TROUBLESHOOTING AN/FSC-79 SYSTEM STATUS LOGIC UNIT 15A5

3-25. General. This section contains preliminary procedures and troubleshooting procedures for fault localization to a malfunctioning circuit card of the system status logic unit 15A5 after referral by organizational maintenance Preliminary procedures consist of obtaining the listed test equipment. making the prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the troubleshooting chart, must be made carefully to ensure accurate test results. When a troubleshooting procedure specifies replacement of a circuit card, refer to section XIV of this chapter.

3-26. Test Equipment and Materials. Table 3-10 lists the test equipment required for troubleshooting the system status logic unit.

Table 3-10. Test Equipment Required for AN/FSC-79 System Status Logic Unit 15A5 Maintenance

Common name	Part/model no.	Qty	Manufacturer
Extender board, circuit card	SM-D-724007	2	Aeronutronic Ford
Milliammeter, Volt-Ohm-	260-6	1	Simpson

3-27. Test Connections and Conditions. Troubleshooting of the system status logic unit is performed in the electrical equipment rack. Troubleshooting is based on the referral by organizational maintenance when an equipment malfunction occurs and is not presented at the fault and system status panel 14A16 by an alarm or indication, or when a fault and system panel alarm or indication occurs and the indicated faulty equipment is functioning normally. To gain access to the system status logic unit circuit cards, perform the following steps:

a. Set FSSP (14A16) front panel circuit breaker to off.
b. Set logic unit power supply 4A (+5 V dc), then 3A (-5 V dc) CIRCUIT BREAKERS to the OFF position.
c. Loosen three screws securing system status logic unit front panel to chassis and swing panel down
d. Loosen two screws on each retaining bar and remove each bar.
e. Remove suspected circuit card(s) from system status logic unit as described in section XIV of this chapter.
f. Install circuit card extender board(s) in system status logic unit and install circuit card(s) in extender board(s).
g. Set logic unit power supply 3A (-5 V dc), then 4A (+5 V dc) CIRCUIT BREAKERS to ON position.
h. Set FSSP (14A16) front panel circuit breaker to on.

3-28. Initial Control Settings. Set vom controls as follows:

Control	Position
FUNCTION +	DC
RANGE	50V

3-29. Troubleshooting Procedure. After completing the preliminary procedures (para 3-26 through 3-28) perform the troubleshooting procedures in table 3-11 as specified by the card isolation procedures in the symptom/probable cause listing below. Use the circuit card logic diagrams (fig. FO-8 and 20 through FO-25) as an aid in locating the trouble cause.

Symptom	Probable cause
All units are available, but FULLY AVAILABLE indicator is not lighted.	Logic card A. Replace logic card A. If symptom is not corrected refer to troubleshooting table and perform step 1.
One or more units faulted, but FULLY AVAILABLE indicator is lighted.	Logic card A. Replace logic card A. If symptom is not corrected refer to troubleshooting table and perform step 2.
No faults exist, but MAJOR FAULT or MINOR FAULT portion of indicator is lighted.	Logic card A. Replace logic card A. If symptom is not corrected refer to troubleshooting table and perform step 3 for MAJOR FAULT indication. Perform step 5 for MINOR FAULT indication.
One or more units have a major or minor fault as indicated by an equipment indicator lamp lighted red or amber but MAJOR FAULT or MINOR FAULT indicator is not lighted, and FULLY AVAILABLE indicator is lighted.	Replace logic card A as directed in section XIV of this chapter. If fault is not corrected, perform step 4 for major faults and step 6 for minor faults.
Tracking receivers are not	Logic card A. Replace as

Symptom	Probable cause
faulted, but TRACKING RECEIVERS major (red) or minor (amber) indicator is lighted.	directed in section XIV of this chapter. If fault is not corrected, perform step 7 for major fault indication. Perform step 9 for minor fault indication.
Tracking receivers are faulted, but TRACKING RECEIVERS major or minor indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 8 for major fault indication. Perform step 10 for minor fault indication.
Antenna is not faulted, but ANTENNA major (red) or minor (amber) indicator is lighted.	Logic card A. Replace directed in section XIV of this chapter. If fault is not corrected, perform step II for major fault indication. Perform step 13 for minor fault indication.
Antenna is faulted, but antenna major or minor indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 12 for major fault indication. Perform step 14 for minor fault indication.
Transmit waveguide switch SS is in normal (pos 1) position, but IPA CROSS PATCH indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected perform step 15.
Transmit waveguide switch S5 is in cross patch (pos 2) position, but IPA CROSS PATCH indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected perform step 16.

Symptom	Probable cause
Up-converter power supplies are not faulted, but CONVERTER POWER SUPPLIES major (red) or minor (amber) indicator is lighted.	Logic card A. Replace u directed in section XIV of this chapter. If fault is not corrected, perform step 17 for major fault indication. Perform step 19 or minor fault indication.
Up-converter power supplies are faulted, but CONVERTER POWER SUPPLIES major or minor indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 18 for major fault indication. Perform step 20 for minor fault indication.
Waveguide pressure is not low, but WAVEGUIDE PRESSURE indicator is lighted, and MINOR FAULT indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. I fault is not corrected, perform step 21-
Waveguide pressure is low, but WAVEGUIDE PRESSURE indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 22.
Power amplifier is not faulted, but POWER AMPLIFIER MINOR indicater is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 23.
Power amplifier is faulted, but POWER AMPLIFIER MINOR indicater is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. I fault is not corrected, perform step 24,
Power supply assembly is not faulted, but FREQUENCY STANDARD PWR SUPPLY major (red) or minor (amber) indicator	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 25 for major fault

Symptom	Probable cause
is lighted.	indication. Perform step 27 for minor fault indication.
Power supply assembly is faulted, but FREQUENCY STANDARD PWR SUPPLY major or minor indicator is not lighted	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 26 for major fault indication, perform 2g for a minor fault indication.
Neither frequency standard is faulted, but FREQUENCY STANDARDS major (red) or minor (amber) indicator is lighted.	Logic card A. Replace au directed in action XIV of this chapter. If fault is not corrected, perform step 29 for major fault indication. Perform step 31 for minor fault indication.
Either or both frequency standards are faulted, but FREQUENCY indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 30 for major fault indication, perform step 32 for minor fault indication.
Emergency transmitter disable switch HTA-4A8 is in XMTR OPR condition, but TRANSMIT DISABLE indicator is lighted.	Logic card E. Replace a directed in section XIV of this chapter. If fault is not corrected, perform step 33.
Emergency transmitter disable switch HTA-4A8 is in XMTR DSBIL condition, but TRANSMIT DISABLE indicator is not lighted	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 34.
Transmitter power monitor panel 14A27 does not indicate abnormal output power, but OUTPUT POWER ALERT indicator is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 35.
Transmitter power monitor panel 14A27 indicates abnormal output power, but OUTPUT POWER ALERT indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 36.
Antenna is autotracking normally and no faults exist at antenna control panel 14A8, but AUTOTRACK DROPOUT lamp at fault and system panel is lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 37.
Antenna control panel indicates antenna is not autotracking, but AUTOTRACK DROPOUT indicator is not lighted.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 39.
Autotrack dropout has occured and AUTOTRACK DROPOUT portion of indicator is lighted. AUTOTRACK DROPOUT/ DISABLE switch has been pressed and DISABLE portion of indicator is lighted, but audible alarm is still sounding.	Logic card A. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 39.
Down-converter 2 is online, but DN-CONVERTER 2 online (green) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 40.
Down-converter 2 is not online, but DN-CONVERTER 2 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected. perform step 41.
Down-converter 2 is not faulted, but DN-CONVERTER 2 fault (red) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. I fault is not corrected, perform step 42.

Symptom	Probable cause
Down-converter 2 is faulted, but DN-CONVERTER 2 fault (red) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 43.
Down-converter 2 is in maintenance, but DN-CONVERTER 2 maintenance (blue) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 44.
Down-converter 2 is not in maintenance, but DN-CONVERTER 2 maintenance (blue) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 45.
Down-converter 1 is online, but DN-CONVERTER 1 online (green) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 46.
Down-converter 1 is not on-line, but DN-CONVERTER 1 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault not corrected, perform step 47.
Down-converter 1 is not faulted, but DN-CONVERTER 1 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 4.
Down-converter 1 is faulted, but DN-CONVERTER 1 fault (red) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 49.
Down-converter 1 is in maintenance, but DN-CONVERTER 1 maintenance (blue) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 50.
Down-converter 1 is not in maintenance, but DN-CONVERTER 1 maintenance (blue) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 51.
U-converter 2 is online, but UP-CONVERTER 2 on-line (green) indicator is not lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 52.
Up-converter 2 is not on-line, but UP-CONVERTER 2 online (green) indicator is lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 53.
Up-converter 2 not faulted, but UP-CONVERTER 2 fault (red) indicator is lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 54.
Up-converter 2 is faulted, but UP-CONVERTER 2 fault (red) indicator is not lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 55.
Up-converter 2 is in maintenance, but UP-CONVERTER 2 maintenance (blue) indicator is not lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 56.
Up-converter 2 is not in maintenance, but UP-CONVERTER 2 maintenance (blue) indicator is lighted.	Logic card D and/or Ed Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 57.
Up-converter 1 is online,	Logic card D and/or E.

Symptom	Probable cause
but UP-CONVERTER 1 on-line (green) indicator is not lighted.	Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 58.
Up-converter 1 is not on-line, but UP-CONVERTER 1 online (green) indicator is lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 59.
Up-converter 1 is not faulted, but UP-CONVERTER 1 fault (red) indicator is lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 60.
Up-converter 1 is faulted, but UP-CONVERTER 1 fault (red) indicator is not lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 61.
Up-converter 1 is in main-tenance, but UP-CONVERTER 1 maintenance (blue) indi-cator is not lighted. not corrected, perform step 62.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is is not lighted.
Up-converter 1 not in main-tenance, but UP-CONVERTER 1 maintenance (blue) indi-cator is lighted.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 63.
Receive AUTO/MANUAL switch is pressed to select opposite condition, but condition change does not occur.	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 64.
Transmit AUTO/MANUAL switch is pressed to select opposite condition, but condition changes does not occur.	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 65.
Low noise amplifier 2 is on-line, but LNA 2 online (green) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 66.
Low noise amplifier 2 is not online, but LNA 2 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 67.
Low noise amplifier 2 is not faulted, but LNA 2 fault (red) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 68.
Low noise amplifier 2 is faulted, but LNA 2 fault (red) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 69.
Low noise amplifier 2 is in maintenance, but LNA 2 maintenance (blue) indicator is not corrected, perform step 70.	Logic card F. Replace as directed in section XIV of this chapter. If fault
Low noise amplifier 2 is not in maintenance, but LNA 2 maintenance (blue) indi-cator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 71.
Receive AUTO/MANUAL switch is pressed to select MANUAL and LNA 2 switch is pressed to change LNA 2 from standby (amber) to online (green) condition, but LNA 2 remains in stand-	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 72.

Symptom	Probable cause
by condition.	
Low noise amplifier 1 is on-line, but LNA I online (green) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 73.
LNA 1 is not online, but LNA 1 online (green) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 74.
LNA 1 is not faulted, but LNA 1 fault (red) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 75.
Low noise amplifier 1 is faulted, but LNA 1 fault (red) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 76.
Low noise amplifier 1 is in maintenance, but LNA 1 maintenance (blue) indicator is not lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 77.
Low noise amplifier 1 is not in maintenance, but LNA 1 maintenance (blue) indicator is lighted.	Logic card F. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 78.
Receive AUTO/MANUAL switch is pressed to select MANUAL and LNA 1 switch is pressed to change low noise amplifier 1 from standby (amber) to online (green) condition, but LNA I remains in standby condition.	Logic card G. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 79.
Transmit power amplifier 2 is online, but POWER AMPLIFIER 2 online (green) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected. perform step 80.
Transmit power amplifier 2 is not online, but POWER AMPLIFIER 2 online (green) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 81.
Transmit power amplifier 2 is not faulted, but POWER AMPLIFIER 2 fault (red) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 82.
Transmit power amplifier 2 is faulted, but POWER AMPLIFIER 2 fault (red) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 83.
Transmit power amplifier 2 is in maintenance, but POWER AMPLIFIER 2 (blue) maintenance indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected. perform step 84.
Transmit power amplifier 2 is not in maintenance, but POWER AMPLIFIER 2 maintenance (blue) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 85.
Transmit AUTO/MANUAL switch is pressed to select MANUAL and POWER AMPLIFIER 2 switch is pressed to change transmit power amplifier 2 from standby (amber) to online (green) condition, but POWER AMPLIFIER 2 remains in standby condition.	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 86.
Transmit AUTO/MANUAL switch is pressed to select AUTO; POWER AMPLIFIER 2 is in standby (amber); fault	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is

Symptom	Probable cause
occurs in online power amplifier 1- but power amplifier 2 does not auto matically switch online	not corrected, perform step 87.
Transmit power amplifier 1 is online, but POWER AMPLIFIER 1 online (green) indicator is not lighted	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 88
Transmit power amplifier 1 is not online, but POWER AMPLIFIER 1 online (green) indicator is lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 89.
Transmit power amplifier 1 is not faulted, but POWER AMPLIFIER 1 fault (red) in standby condition indicator is lighted	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected. perform step 90.
Transmit power amplifier 1 is faulted, but POWER AMPLIFIER 1 fault (red) indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 91.
Transmit power amplifier 1 is in maintenance, but POWER AMPLIFIER (blue) maintenance indicator is not lighted.	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 92.
Transmit power amplifier 1 is not in maintenance, but POWER AMPLIFIER 1 maintenance (blue) indicator is lighted	Logic card D. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 93
Transmit AUTO/MANUAL switch is pressed to select MANUAL, and POWER AMPLIFIER 1 switch is pressed to change power amplifier 1 from standby (amber) to online (green) condition, but POWER AMPLIFIER 1 remains in stand by condition.	Logic card E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 94.
Transmit AUTO/MANUAL switch is pressed to select AUTO; POWER AMPLIFIER 1 is in standby (amber); fault occurs in online power amplifier 2, but power amplifier 1 does not automatically switch online.	Logic card D and/or E. Replace as directed in section XIV of this chapter. If fault is not corrected, perform step 95.

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	FULLY AVAIL ABLE circuit	All equipment units available, but FULLY AVAILABLE lamp on fault and system status panel not lighted Circuit card A mounted on extender	Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P4-19	Less than 5 V dc.	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, review further symptoms and replace logic card associated with equipment indicated, as directed in section XIV of this chapter.
2	FULLY AVAILABLE circuit	One or more equipment units faulted, but	Connect volt-ohm- $ Greater milliammeter COM-	a. Greater than 25 V dc.	a. If normal reading is observed, refer to

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		FULLY AVAILABLE lamp on fault and symptom status panel is lighted. Circuit card A mounted on extender board.	MON lead to P3-28 and + lead to P419.		wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, review further symptoms and replace logic card associated with equipment as directed in section XIV of this chapter.
3	MAJOR FAULT circuit	No equipment fault exists, MAJOR FAULT lamp on fault and system panel is lighted. Circuit card A mounted on extender board.	Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P4-18.	Greater than 25 V dc.	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, perform step 4.
4	Major fault inputs	Volt-ohm-milliammeter range switch set to 10	Connect volt-ohm-milliammeter as follows:		If normal reading is observed replace:
	a. Online PA FAULTED.		a. COMMON lead to P1-1 and + lead to P3-8.	a. Less than 0.8 V dc if online PA is faulted Greater than dc if online PA is not faulted.	a. Circuit card D as directed in section XIV of this chapter. If fault is not corrected, refer to the wire list in TM 11-5895-899-12 and check wiring to transmitter interface assembly 31A26 or 32A26.
	b. Online down-converter/LNA faulted.		b. COMMON lead to P1-1 and + lead to P3-9.	b. Less than 0.8 V dc if online down-converter/ LNA is not faulted.	b. Circuit card F as directed in section XIV of this chapter.
	c. No online down-converter/LNA.		c. COMMON lead to P1-1 and + lead to P3-10.	c. Less than 0.8 V dc if no down-converter LNA is online; greater than 3 V dc if down-link system is online.	c. Circuit card G as directed in section XIV of this chapter. If fault is not corrected, refer to the wire list in TM 11-5895-899-12 and check wiring to 1A5, HTA-3A8, or 14A16.
	d. Online up-converter faulted.	d.	COMMON lead to P1-1 and + lead to P2-17.	d. 5 i V dc	d. If normal reading is observed in substeps a, b, c, and d, re-

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					fer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16.
5	MINOR FAULT circuit.	No equipment fault exists, MINOR FAULT lamp on fault and system status panel is lighted. Circuit card A on extender hoard.	Connect volt-ohm- milliammeter COMMON lead to P3-28 and + lead to P4-20,	Greater than 25 V dc.	a. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is observed, perform step 6.
6	Minor fault inputs.	Volt-ohm-milliammeter range switch set to 10	Connect volt-ohm- milliammeter as follows:		If normal reading is not observed, replace:
	a. OFF-LINE XMTR FAULTED.		a. COMMON lead to P1-1 and + lead to P3-15.	a. Less than 0. 8 V dc if OFF-LINE XMTR FAULTED. Greater than 3 V dc if not faulted.	a. Circuit card D as directed in section XIV of this chapter.
	b. OFF-LINE down-converter/LNA FAULTED.		b. COMMON lead to P1-l and + lead to P3-16.	b. Less than 0.8 V dc if OFF-LINE down-converter/ LNA FAULTED. Greater than 3 V dc if not faulted.	b. Circuit card F as directed in section XIV of this chapter.
	c. OFF-LINE up-converter FAULTED.		c. COMMON lead to P1-1 and + lead to P2-18.	c. Less than 0.8 V dc if OFF-LINE up converter FAULTED. Greater than 3 V dc if not faulted.	c. Circuit card E as directed in section XIV of this chapter If normal reading is observed in substeps a, b, and c, refer to the wire list in TM- 11-5895-899-12 and check wiring to fault and system status panel 14A16.
7	Tracking receiver major fault input	Tracking receiver not faulted, but TRACKING RECEIVERS major fault lamp on fault and system status panel lighted. Circuit card A on extender board. Volt- -ohm milliammeter range switch set to. 10 V.	Connect volt-ohm-milliammeter + lead to P1-1 and COMMON lead to P1-25.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to tracking receiver control and status panel 14A16.
8	Tracking receiver major fault input	Tracking receiver faulted, TRACKING RECEIVERS major fault lamp on fault and system status panel not	Connect volt-ohm-milliammeter + lead to P1-1 and COMMON lead to PI-25.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16.

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.			b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to tracking receiver control and status panel 14A6.
9	Tracking receiver minor fault input	Tracking receiver not faulted, but TRACKING RECEIVERS minor fault lamp on fault and system status panel lighted. Circuit. card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter + lead to P1-1 and COMMON lead to PI-26.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in: TM 11-5895-899-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring tracking receiver control and status panel 14A6
10	Tracking receiver minor fault input	Tracking receiver is faulted, but TRACKING RECEIVERS minor fault lamp on fault and system status panel not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter + lead to P1-1 and COMMON lead to P1-26.	-5 ± V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring tracking receiver control and status panel 14A6
11	Antenna major fault input	Antenna not faulted, but ANTENNA major fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead P-I 1.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not ob served, refer to the wire list in TM 11-5895-899-12 and check wiring to antenna position and status panel 14A7.
12	Antenna major fault input	Antenna faulted, but ANTENNA major fault lamp on fault and system status panel is not lighted. Circuit card A on extender board Volt-ohm-r milliammeter range switch set to 10V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and +lead to P1-11	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 1 1-5895-199-12 and check wiring to antenna position and status panel 14A7.
13	Antenna minor fault input	Antenna is not faulted, but ANTENNA minor fault lamp on fault and system status panel is	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead P1-12.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.			status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to antenna position and status panel 14A7.
14	Antenna minor fault input	Antenna faulted, but ANTENNA minor fault lamp on fault and system status panel is not lighted. Circuit card A on extender. board Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead P1-12.	+5 ± 1 V dc b.	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to antenna position and status panel 14A7.
15	Transmit waveguide switch 5 position 2 status input	Transmit waveguide switch 5 in position 1, but IPA CROSS PATCH lamp on fault and system status panel lighted. Circuit D card on extender. board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-14.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assemblies 31A26 and 32A26.
16	Transmit waveguide switch 5 position 2 status input	Transmit waveguide switch 5 in position 2, but IPA CROSS PATCH lamp on fault and system status panel card D on extender board. -Volt-ohm milliammeter range switch let to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-14.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assemblies 31 A26 and 32A26.
17	CONVERTER POWER SUPPLIES - ma jor fault input	Up-converter power supplies not faulted, but CONVERTER POWER SUPPLIES major fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt - -ohm milliammeter range switch set to. 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-10.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to up-converter interconnection assembly 9A3.
18	CONVERTER POWER SUPPLIES - major	Up-converter power supplies faulted, but	Connect volt-ohm-milliammeter COMMON	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
	fault input	CONVERTER POWER SUPPLIES major fault lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	lead to P1-1 and + lead to P2-10.		11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-589-899-12 and check wiring to up-converter interconnection assembly 9A3.
19	CONVERTER POWER SUPPLIES minor fault input	Upconverter power supplies not faulted, but CONVERTER POWER SUPPLIES minor fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm milliammeter range switch set to. 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-11.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to converter interconnection assembly 9A3.
20	CONVERTER POWER SUPPLIES minor fault input	Up-converter power supplies faulted, but CONVERTER POWER SUPPLIES minor fault lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-11.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to converter interconnection assembly 9A3.
21	Waveguide pressure minor fault input	Waveguide pressure is not low, but WAVEGUIDE PRESSURE indicator is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter common lead to P1-1and + lead P1-10.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A6 b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to low pressure control panel 22A2.
22	Waveguide pressure minor fault input	Waveguide pressure is low, but WAVEGUIDE PRESSURE indicator is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter common lead to P1-1 and + lead P1-10.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A6 b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to low pressure control panel 22A2.
23	POWER AMPLIFIER	Power amplifier is not	Connect volt-ohm-	-5 ± 1 V dc	a. If normal reading is observed,

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
	MINOR fault input	faulted, but POWER AMPLIFIER MINOR fault and system status panel is lighted Circuit card A on extender board Volt- -ohm-milliammeter range switch set to 10 V.	milliammeter COMMON lead to P1-1 and + lead to P1-9.		refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26
24	POWER AMPLIFIER MINOR fault input	Power amplifier is faulted, but POWER AMPLIFIER MINOR fault lamp on fault and system status panel is not lighted. Circuit card A on extender board. Volt -ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-9.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14AI6. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26.
25	Frequency standard power supply major fault input	Power supply is not faulted, but FREQUENCY STANDARD PWR SUPPLY major fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter set to. 10V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-14.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to frequency distribution power supply 13AIn.
26	Frequency standard power supply major fault input	Power supply is faulted but FREQUENCY STANDARD PWR SUPPLY major fault lamp on fault and system status panel is not lighted. Circuit card A on extender. board Volt-ohm-milliammeter set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-14.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to frequency distribution power supply 13A11.
27	Frequency standard power supply minor fault input	Power supply is not faulted, but FREQUENCY STANDARD PWR SUPPLY minor fault lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter set to. 10V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-15,	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to frequency distribution power supply 13A II. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to frequency distribution power supply 13A 11.

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
28	Frequency standard power supply minor fault input	Power supply is faulted, but FREQUENCY STANDARD PWR SUPPLY minor fault lamp on fault and system status panel is not lighted. Circuit card A on extender. board Volt-ohm-milliammeter set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-15.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to frequency distribution power supply 13A II. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16.
29	Frequency standard major fault inputs	Neither frequency standard is faulted, but FREQUENCY STANDARDS major fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to. 10 V.	Connect volt-ohm- milliammeter COMMON lead to P1-1 and + lead to P1-21 and then to PI-23.	-5 ± 1 V dc at P1-21 and P1-23	a. If normal readings are observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal readings are not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to frequency distribution unit 13A7.
30	Frequency standard major fault inputs	Both frequency standard are faulted, but FREQUENCY STANDARDS major fault lamp on fault and system status panel is not lighted. Circuit card A is on extender. board Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21 and then to P1-23.	+5 ± 1 V dc at P1-21 and P1-23	a. If normal readings are observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and sys-tern status panel 14A16. b. If normal readings are not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to frequency distribution unit 13A7.
31	Frequency standard minor fault inputs	Neither frequency standard is faulted, but FREQUENCY STANDARDS minor fault lamp on fault and sys tem status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21 and then to P1-23.	-5 ± 1 V dc at P1-21 and P1-23	a. If normal readings are observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and sys-tern status panel 14A16. b. If normal readings are not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to frequency distribution unit 13A7.
32	Frequency standard minor fault inputs	A frequency standard is faulted, but FREQUENCY STANDARDS minor fault lamp on fault and system status panel is not lighted. Circuit card A on extender. board Volt-ohm-milliammeter range switch set to 10	Connect volt-ohm- milliammeter COMMON lead to P1-1 and + lead to P1-21 and PI-23.	+5 ± 1 V dc at P1-21 and P1-23	a. If normal readings are observed, refer to the wire list in TM 11-5895-899-12 and check wiring for that signal to fault and system status panel 14A6. b. If normal readings are not observed, refer to the wire list in

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		V.			TM 11-5895-899-12 and check wiring to frequency distribution unit 13A7
33	Transmitter disable fault input	Emergency transmitter disable switch HTA-4A8 is in XMTR OPR condition, but TRANSMIT DISABLE lamp on fault and status - panel is lighted. Circuit card E on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switches and fault and system status panel 14A16. b. If normal reading is not observed. replace circuit card E as directed in section XIV of this chapter or refer to the wire list in TM 1 1-5895-899-12 and check wiring to emergency transmitter disable switch HTA-4A8.
34	Transmitter disable fault input	Emergency transmitter disable switch HTA-4A8 is in XMTR DSBL condition, but TRANSMIT DISABLE lamp on fault and status panel is not lighted. Circuit card E on extender board Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5.	+5 ± 1 V dc	a. If normal reading is observe, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switches and fault and system status panel 14A16. b. If normal reading is not observed, replace circuit card E as directed in section XIV of this chapter or refer to the wire list in TM 11-5895-898-12 and check wiring to emergency transmitter disable switch HTA-4A8.
35	OUTPUT POWER ALERT fault input	Transmitter power monitor panel 14A27 does not indicate fault, but OUTPUT POWER ALERT lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-20 and + lead to P1-1.	+5 ± 1 V dc	a. If normal reading is observed. refer to the wire list in TM 11 -5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to transmitter power monitor panel 14A27.
36	OUTPUT POWER ALERT fault input	Transmitter power monitor panel 14A27 does indicate fault, but OUTPUT POWER ALERT lamp on fault and system status panel not lighted. Circuit card A is mounted on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-20.	-5 ± 1 V dc	a. If normal reading is observed. refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16 b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to transmitter power monitor panel 14A27.

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
37	AUTOTRACK DROPOUT fault input	Fault does not exist at antenna control panel, but AUTOTRACK - DROP OUT lamp on fault and system status panel is lighted. Circuit card A on extender board. Volt -ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-4.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A6. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to antenna con-
38	AUTOTRACK DROPOUT fault input	Fault does exist at antenna control panel, but AUTOTRACK DROPOUT lamp on fault status panel is not lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch set to 10 range switch is set to V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-4.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A6. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to antenna control panel 14A8.
39	Autotrack disable input to audible alarm	Audible alarm is sounding with DISABLE portion of AUTOTRACK DROPOUT/DISABLE indicator lighted. Circuit card A on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-5.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check alarm signal wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check disable signal wiring from fault and system status panel 14A16.
40	DN-CONVERTER 2 online input	DN-CONVERTER 2 online. but green lamp on fault and system status panel is not. lighted Circuit card F on ex-Tender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1, and + lead P1-5, and P1-10.	-5 ± 1 V dc	a. If normal readings are ob served, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and systern status panel 14A16. b. If normal readings are not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide if patch panel 1 A5 and waveguide switch for low noise amplifiers HTA-3A8.
41	DN-CONVERTER 2 online input	DN-CONVERTER 2 is not online, but green lamp on fault and system status panel is lighted Circuit card F On extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-10, then to P1-5.	5 ± 1 V dc	a. If normal readings are observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and systern status panel 14A16. b. If normal readings are not observed, refer to the wire list in TM 11-5895-899-12 and

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					check wiring to waveguide switch 3 in if patch panel 1A5 and waveguide switch for low noise amplifiers HTA-3A8.
42	DN-CONVERTER 2 fault input	Down-converter 2 not faulted, but red lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-24.	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to down-converter interconnecting assembly 3A3.
43	DN-CONVERTER 2 fault input	Down-converter 2 is faulted, but red lamp on fault and system status panel is not lighted. Circuit card F On extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-24.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to down-converter interconnecting assembly 3A3.
44	DN-CONVERTER maintenance input	Down-converter 2 is in maintenance, but blue lamp on fault and system status panel not lighted. Circuit card F Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON load to P1-1 and + lead to P1-25.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, re fer to the wire list in TM 11-5895-899-12 and check wiring to down converter interconnecting as sembly.
45	DN-CONVERTER maintenance input	Down-converter 2 not in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COM MON lead to P1-1 and + lead to P1-25.	-5 ± 1 V dc	a. If normal reading is observed, refer to wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16 b. f normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to down-converter interconnecting assembly 3A3.
46	DN-CONVERTER 1 online input	Down-converter 1 online, but green lamp on fault and system status panel	Connect volt-ohm-milliammeter to P1-1 COMMON and + lead	-5 ± 1 V dc	a. If normal readings are observed, refer to the wire list in TM 11-5895-899-12 and

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		is not lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	to P1-6, then to P1-9.		check wiring to fault and system status panel 14A16. b. If normal readings are not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide if patch panel 1A5 and switch 3 in waveguide switch 1 for low noise amplifier HTA-3A8.
47	DN-CONVERTER 1 online input	Down-converter 1 is not online, but green lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm- milliammeter COMMON lead to P1-1 and + lead to P1-6, then to P1-9.	5 ± 1 V dc	a. If normal readings are observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A 16. b. If normal readings are not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switch 3 for if patch panel 1A5 and waveguide switch I for low noise amplifier HTA-3A8.
48	DN-CONVERTER 1 fault input	Down-converter 1 not faulted, but red lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to down converter interconnecting assembly 3A3.
49	DN-CONVERTER 1 fault input	Down-converter 1 is faulted, but red lamp on fault and system status panel is not lighted. Circuit card F On extender board. Volt- ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-21.	-5 ± 1 V dc	a. If normal reading is ob- refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to down-converter interconnecting assembly 3A3.
50	DN-CONVERTER 1 maintenance input	Down-converter 1 in maintenance, but blue lamp on fault and system status panel not lighted. Circuit card F On extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-22	+5 ± 1V dc	a. If normal reading is observed, refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and

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Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					check wiring to down-converter interconnecting assembly 3A3.
51	DN-CONVERTER 1 maintenance input	Down-converter 1 in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch is set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-22.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and converter interconnecting assembly 3A3.
52	UP-CONVERTER 2 online input	Up-converter 2 online, but green lamp on fault and system status panel is not lighted. Circuit card E on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P3-18.	Less than 5 V dc	a. If normal reading is observed, refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switches 1, 2, and 5 in PA 1 and 2 and waveguide switch 4 in PA waveguide input assem- bly 22S4.
53	UP-CONVERTER 2 online input	Up-converter 2 not online, but green lamp on fault and system status panel is lighted. Circuit card E on extender board. Volt-ohm-milliammeter range switch set to 50 V.	Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P3-18.	28 ± 1.5 V dc	a. If normal reading is observed, refer to the wire list in TM-11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switches 1, 2, and 5 in PA 1 and 2 and waveguide switch S4 in PA waveguide input assembly 22S4.
54	UP-CONVERTER 2 fault input.	Up-converter 2 not faulted, but red lamp on fault and system status panel is lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-13.	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to up-converter interconnecting assembly 9A3.
55	UP-CONVERTER 2 fault input	Up-converter 2 faulted. but red lamp on fault	Connect volt-ohm-milliammeter COM-	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		and system status - panel is not lighted Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V.	MON lead to P1-1 and + lead to P2-13.		11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to up-converter interconnecting assembly 9A3.
56	UP-CONVERTER 2 maintenance input	Up-converter 2 in maintenance but blue lamp on fault and system status panel not - lighted. Circuit card D on extender board . Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 1-5895-899-12 and check wiring to up-converter interconnecting assembly 9A3.
57	UP-CONVERTER 2 maintenance input	Up-converter 2 not in maintenance, but UP-CONVERTER 2 - maintenance (blue) indicator is lighted. Circuit card D on. - extender board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-14.	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to up-converter interconnecting assembly 9A3.
58	UP-CONVERTER 1 online input	UP-CONVERTER 1 on-line, but green lamp on fault and system status panel is not. lighted Circuit card E on ex-tender board. - Volt ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P3-10.	Less than 5 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switches 1, 2 and 5 in PA1 and 2, and waveguide switch S4 in PA waveguide input assembly 22S4.
59	UP-CONVERTER 1 online input	Up-converter 1 is not on-line, but green lamp on fault and system status panel is lighted. Circuit card E on extender board. Volt -ohm-milliammeter range switch set to 50 V.	Connect volt-ohm-milliammeter COMMON lead to P3-28 and + lead to P3-10.	28 ± 1.5 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switches 1, 2 and 5 in PA1 and 2, and waveguide switch

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					S4 in PA input Assembly 22S4.
60	UP-CONVERTER 1 fault input	Up-converter 1 not faulted, but red lamp on fault and system status panel is lighted, Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-10	5 ± 1 V dc	a. If normal reading is observed. refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to up-converter interconnecting assembly 9A3.
61	UP-CONVERTER 1 fault input	Up-converter 1 is faulted, but red lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-10	5 ± V dc	a. f normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to up-converter interconnecting assembly 9A3.
62	UP-CONVERTER 1 maintenance input	Up-converter 1 is in maintenance, but blue lamp on fault and system status panel not lighted Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-11	5 ± V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to up-converter interconnecting assembly 9A3.
63	UP-CONVERTER 1 maintenance input	Up-converter 1 not in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2- 1	5 ± V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to up-converter interconnecting assembly 9A3.
64	Receive AUTO/ MANUAL switch input	AUTO/MANUAL switch is pressed to select opposite condition but change does not occur. Circuit card C on extender board. Volt-ohm-milliammeter range switch to 10 V	Connect volt-ohm- milliammeter COMMON lead to P1-1 and + lead to	5 A1 V dc level changes to -5 1 V dc as PI-5 switch pressed	a If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check indicator wiring to fault and system status panel 14A16. b. If normal reading is not obs served, refer to the wire list in TM 11-5895-899-12 and

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					check switch ring to fault and system status panel 14A16.
65	TRANSMIT AUTO/ MANUAL switch input	AUTO/MANUAL switch is pressed to select opposite condition but change does not occur. Circuit card E on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and lead to P1-6	5 ± 1 V dc level changes to -5 ± 1 V de as switch is pressed	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check lamp wiring to fault and systern status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check switch wiring to fault and system status panel 14A16.
66	NA 2 online input	Low noise amplifier 2 is online, but green lamp on fault and system status panel is not lighted. Circuit card F on extender board Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5 and P1-10.	-5 ± 1 V dc	a. is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide
67	LNA 2 online input	Low noise amplifier is not online, but green lamp on fault and system status panel is lighted Circuit card F on extender board. Volt ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5 and P1-10	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switch HTA-38AS1
68	LNA Fault input	Low noise amplifier is not not faulted, but red lamp on fault and system status panel is lighted. Circuit card F Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-20	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 1l-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-. and check wiring to low raise amplifier HTA-3A8.
69	LNA 2 fault input	Low noise amplifier 2 is faulted, but red lamp on fault and system status panel is not lighted. circuit card F on extender board. Volt-ohm-milliammeter range switch is set to	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-20	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		10 V			TM 11-5895-899-12 and heck wiring to low noise amplifier HTA-3A8.
70	LNA 2 maintenance input	Low noise amplifier 2 is in maintenance, but blue lamp on fault and system status panel not lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-19	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to low noise amplifier HTA-3A8.
71	LNA 2 maintenance input	Low noise amplifier 2 is not in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-19	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to low noise amplifier HTA-3A8.
72	LNA 2 switch input	Manual control selected and LNA 2 switch pressed to change from standby to online condition, but remains in standby. Circuit card G on extender board Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-6	5 ± 1 V dc changes to -5 ± 1 V dc when LNA 2 pushbutton switch is pressed	a. If normal reading is observed, replace relay card R2 as directed in section XIV of this chapter. b. If fault is still not corrected replace circuit card F as directed in section XIV of this chapter. c. If fault is still not corrected refer to the wire list in TM 11-5895-899-12 and check wiring to RX WG SW3 (1A5) and to RX WG SW1 (HTA-3A8). d. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16.
73	LNA 1-online input	Low noise amplifier 1 is online, but green lamp on fault and system panel is not lighted Circuit card F on ex-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead P1-9	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					check wiring to waveguide switch HTA-3A8S1 and RX WG SW3 (IAS).
74	LNA 1 online input	Low noise amplifier 1 is not online, but green lamp on fault and system status panel is lighted. Circuit card F On extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-6, and P1-9 in turn	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to waveguide switch HTA-3A8S1 and RX W6 SW3 (IAS).
75	LNA 1 fault input	Low noise amplifier I is not faulted, but red lamp on fault and system status panel is lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-l and + lead to P1-18	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not ohserved, refer to the wire list in TM 11-5895-899-12 and check wiring to low noise amplifier HTA-3A8.
76	LNA 1 fault input	Low noise amplifier 1 is faulted, but red lamp on fault and syspanel is not lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-18	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to low noise amplifier HTA-3A8.
77	LNA 1 maintenance input	Low noise amplifier 1 is in maintenance, but blue lamp on fault and system status panel not lighted. Circuit card F on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 to + lead to P1-17	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to low noise amplifier HTA-3A8.
78	LNA 1 maintenance input	Low noise amplifier 1 is not in maintenance but blue lamp on fault and system status panel is card F on extender board. Volt-ohm-milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-17	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					check wiring to low noise amplifier HTA-3A8.
79	LNA switch input	Manual control is selected and LNA 1 switch pressed to change from standby to online condilion, but remains in standby. Circuit card G on extender board Volt-ohm-milliammeter range switch set to 10	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-5	+5 ± 1 V dc changes to -5 ± 1 V dc when LNA 1 switch is pressed	a. If normal reading is ohserved, replace relay card R2 as directed in section XIV of this chapter. b. If fault is still not corrected replace circuit card F as directed in section XIV of this chapter. c. If fault is still not corrected refer to the wire list in TM 11-5895-899-12 and check wiring to RX WG SW3 (IAS) and to RX WG SW1 (HTA-3A8). d. If normal reading is ohserved, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16.
80	Transmit POWER AMPLIFIER 2 on line input	Transmit power amplifier 2 online, but green lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch is set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-9	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 32A26 for switch 3.
81	Transmit POWER AMPLIFIER 2 on line input	Transmit power amplifier 2 is not online, but green lamp on fault and system status panel is lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-9	5 ± 1 V dc	a. If normal reading is observed. refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the as ire list in TM 1 1-5895-X99-12 and check wiring to remote facility interface assembly 32A26 for switch 3.
82	Transmit POWER AMPLIFIER 2 fault input	Transmit power amplifier 2 not faulted, but red	Connect volt-ohm-milliammeter COMMON lead to P1-1 and	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
		lamp on fault and system status panel is lighted. Cirextender board. Volt-ohm-milliammeter range switch set to 10 V	+ lead P1-25, P2-4 and P2-5		wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 32A26.
83	Transmit POWER AMPLIFIER 2 fault input	Transmit power amplifier 2 is faulted, but red lamp on fault and system status not lighted Circuit card D on ex-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-25	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 32A26.
84	Transmit POWER AMPLIFIER 2 input	Transmit power amplifier 2 is in maintenance, but blue lamp fault and system status panel is not lighted. Circuit board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-26	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 32A26.
85	Transmit POWER AMPLIFIER 2 maintenance input	Transmit power amplifier 2 is not in maintenance, but blue lamp on fault and system status panel is lighted Circuit Card D on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-26	-5 ± 1 V dc	a. If normal reading is observed. refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 32A26.
86	Transmit power amplifier 2 switch signal	Manual control selected and POWER AMPLIFIER 2 switch pressed to change from standby to on line condition, but remains in standby. Circuit card E on extender board Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P-10.	+5 ± 1 V dc changing to -5 ± 1 V dc when PA2 pushbutton is pressed	a. If normal reading is observed, replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected, refer to the wire list in TM 11 -5895-899-12 and check wiring to waveguide switch 1 in remote facility interface assembly 31A26 and 32A26 c. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					check wiring to fault and system status panel 14A16.
87	Transmit Power AMPLIFIER PA-1 FAULT INPUT	Transmit power amplifier no. 1 ON LINE, AUTOMATIC MODE selected. POWER AMPLIFIER no. 2 in standby. Automatic switching does not occur with a fault on PA-1. Circuit card D on extender board. Volt-ohm-milliammeter meter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-6 chapter.	+5 ± 1 V dc	a. If normal reading is observed replace relay card R1 as directed in section XIV of this b. If fault is still not corrected refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26 or 32A16 for waveguide switches. c. If normal reading is not observed refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26
and					32A26 for fault circuitry.
88	Transmit POWER AMPLIFIER 1 on-line input	Transmit power amplifier 1 online, but green lamp on fault and system status panel is not lighted Circuit card D Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5	-5 ± 1 V dc	a. If normal reading observed. refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26 for switch 1.
89	Transmit POWER AMPLIFIER 1 on-line input	Transmit power amplifier 1 is not online, but green lamp on fault and system status panel is lighted Circuit card D on extender board Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-5	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26 for switch 1.
90	Transmit POWER AMPLIFIER 1 fault input	Transmit power amplifier 1 not faulted, but red lamp on fault and systen status panel is lighted. Circuit card D on extender board Volt-ohm-milliammeter range switch set to 10	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-4, P2-6 and P2-5	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26
91	Transmit POWER AMPLIFIER 1 fault	Transmit power amplifier 1 is faulted, but red	Connect volt-ohm- milliammeter COMMON lead	+5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
	input	lamp on fault and system, status panel is not lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V	to P1-1 and + lead to P2-6		11 -5895-899-12 and check wiring to fault and system status panel 4A16 b. If normal reading not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26.
92	Transmit POWER AMPLIFIER 1 maintenance input	Transmit power amplifier 1 is in maintenance, but blue lamp on fault and system status panel is not lighted. Circuit card D on extender board. Volt-ohm milliammeter range switch set to 10 V.	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-7	5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26.
93	Transmit POWER AMPLIFIER 1 maintenance input	Transmit power amplifier 1 is not in maintenance, but blue lamp on fault and system status panel is lighted. Circuit card D on extender board. Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P2-7	-5 ± 1 V dc	a. If normal reading is observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16. b. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26.
94	Transmit power amplifier 1 switch signal	Manual control selected and POWER AMPLIFIER 1 switch pressed to change from standby to online condilion, but remains in standby. Circuit card E on extender board Volt-ohm-milliammeter range switch set to 10 V	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + lead to P1-11.	+5 ± 1 V dc changing to -5 ± 1 V dc when PA-1 pushbutton reading is pressed	a. If normal reading is observed, replace relay card R1 as directed in section XIV of this chapter. b. If fault is not corrected, refer to the wire list in TM 11 5895-899-12 and check wiring to waveguide switch 1 in remote facility inter face assembly 31A26 and 32A26. c. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to fault and system status panel 14A16.
95	Transmit power AMPLIFIER 2 FAULT INPUT	Transmit power amplifier no. 2 is ON LINE, AUTOMATIC MODE selected. POWER AMPLIFIER no. 1 in standby. Automatic switching does not oc-	Connect volt-ohm-milliammeter COMMON lead to P1-1 and + to P1-25	+5 ± 1 V dc	a. If normal reading is observed replace relay card R1 as directed in section XIV of this chapter. b. If fault is still not corrected refer to the wire list in TM 11-5895-899-12 and check

Table 3-11. AN/FSC-79 System Status Logic Unit 15A5 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
	cur with a fault on PA-2. Circuit card D on extender board Vom meter range switch set to 10 V				wiring to remote facility interface assembly 31A26 or 32A26 for waveguide switches. c. If normal reading is not observed, refer to the wire list in TM 11-5895-899-12 and check wiring to remote facility interface assembly 31A26 and 32A26 for fault circuitry.

SECTION VII. TROUBLESHOOTING OF CHANNEL FREQUENCY INDICATOR 15A6

3-30. General. This section contains preliminary procedures and troubleshooting procedures necessary for fault localization to a malfunctioning piece part of the channel frequency indicator 15A6 after referral by organizational maintenance. Preliminary procedures consist of obtaining the listed test equipment, making the pre- scribed test connections, and initially setting equipment controls to specified settings. These settings and all subsequent settings given in the troubleshooting chart must be made carefully to assure accurate test results. When a troubleshooting procedure specifies replacement or adjustment of a malfunctioning component, refer to section XV in this chapter.

3-31. Test Equipment and Materials. Table 3-12 lists test equipment required for the channel frequency indicator troubleshooting.

Table 3-12. Test Equipment Required for Channel Frequency Indicator 15A6 Maintenance

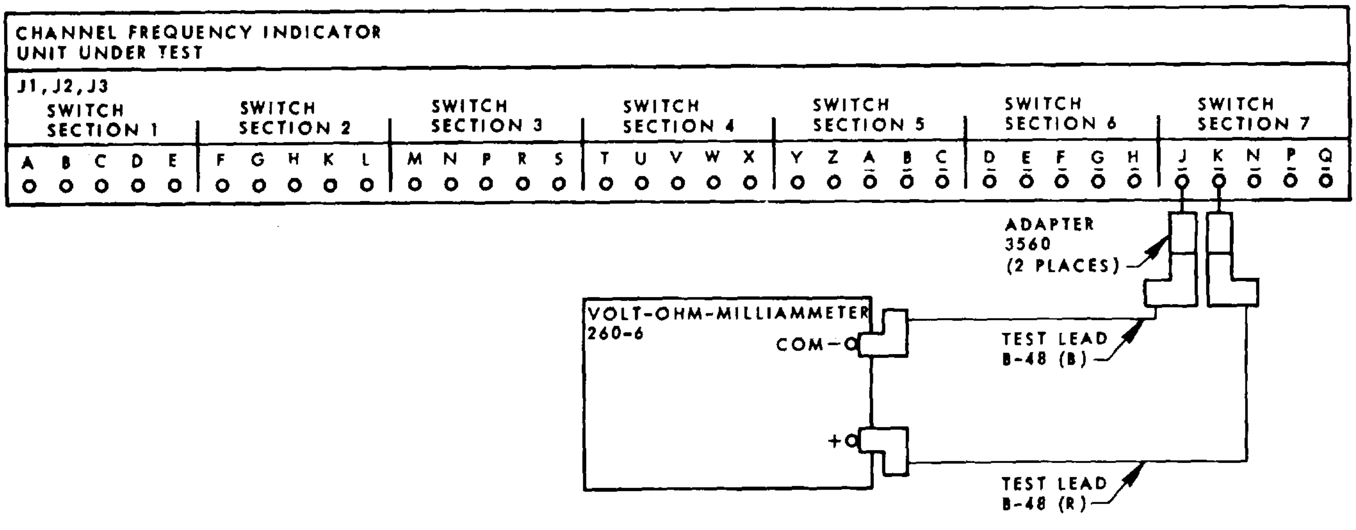
Common name	Part/model no.	Qty	Manufacturer
Adapter, Banana Jack to Size 20 Female Connector	3560	2	Pomona
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Test Lead, Banana Plug to Banana Plug	B-48-B	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48-R	1	Pomona

3-32. Test Connections and Conditions (fig. 3-5). Channel frequency indicator troubleshooting is accomplished after the channel frequency indicator is removed from the electrical equipment rack. Prior to making the test connections illustrated in figure 3-5, perform the following steps to gain access to the equipment.

a. Loosen four captive screws securing channel frequency indicator to electrical equipment rack.

b. Pull channel frequency indicator forward, being careful not to stress connecting cables.

c. Tag and disconnect cables from three connectors at rear of channel frequency indicator.



TABLE

SWITCH SECTION 1		2		3		4		5		6		7		NUMBER INDICATED NOTE 1									
MEASURE FROM	TO	MEASURE FROM	TO	MEASURE FROM	TO	MEASURE FROM	TO	MEASURE FROM	TO	MEASURE FROM	TO	MEASURE FROM	TO	0	1	2	3	4	5	6	7	8	9
A	B	F	G	M	N	T	U	Y	Z	$\underline{D}$	$\underline{E}$	$\underline{J}$	$\underline{K}$	0	0	0	0	0	0	0	0	1	1
	C		H		P		V		A		$\underline{F}$		$\underline{N}$	0	0	0	0	1	1	1	1	0	0
	D		K		R		W		$\underline{B}$		$\underline{G}$		$\underline{P}$	0	0	1	1	0	0	1	1	0	0
	E		L		S		X		$\underline{C}$		$\underline{H}$		$\underline{Q}$	0	1	0	1	0	1	0	1	0	1

NOTES:
1. 0≤1 OHM, 1≥100K OHM.
2. UNDERLINE UNDER CAPITAL LETTERS INDICATES LOWER CASE LETTERS.

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Figure 3-5. Channel frequency indicator 15A6, troubleshooting test setup diagram.

d. Complete removal of channel frequency indicator to work bench.

e. Connect black test lead to (-) COMMON jack on vom and red test lead on (+) jack. Attach adapter 3560 to test leads.

3-33. Initial Control Settings. Initial control settings for the troubleshooting procedures consists of setting vom controls as follows:

Control	**Position**
Function	+DC
Range	Rx1
ZERO OHMS	0 ohms with test leads shorted

3-34. Troubleshooting Procedure. Table 3-13 provides a step-by-step troubleshooting procedure to isolate a malfunction to a faulty part. Perform the procedures in the given sequence until the malfunctioning part is found. When a faulty part is found, replace the part as directed in section XV of this chapter. Use the schematic diagram in figure 2-1 as an aid to locating trouble causes.

Table 3-13. Channel Frequency Indicator 15A6 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	Switch section 7	Select position O	Connect vom test leads between J1-j and J1-k	Continuity	a. If normal reading is observed, proceed to step 3. b. If normal reading is not observed, proceed to step 2.
2			Connect vom test leads be tween C and 8 terminal of switch section 7. (8 terminal being laterally adjacent to 8 foil strip)	Continuity	a. If normal reading is observed, repair or replace multipin connector as described in section XV of this chapter. b. If normal reading is not observed, replace switch as described in section XV of this chapter.
3		Sequentially select positions 1 through 9		Positions 1 through 7 read continuity, positions 8 and 9 read infinity	a. If normal reading is observed proceed to step 5. b. If normal reading is not observed, proceed to step 4.
4		Sequentially select positions 1 through 9	Connect vom test leads between C and 8 terminal of switch section 7. (8 terminal being laterally adjacent to 8 foil strip)	Positions 1 through 7 read continuity positions 8 and 9 read infinity.	a. If normal reading is observed, repair or replace multipin connector as described in section XV of this chapter. b. If normal reading is not observed, replace switch as described in section XV of this chapter.
5		Select position 0.	Connect vom test leads between J1-j and J1-n	Continuity	a. If normal reading is observed, proceed to step 7. b. If normal reading is not observed, proceed to step 6.
6			Connect vom test leads between C and 4 terminal of switch section 7 XV of this chapter.	Continuity	a. If normal reading is observed, repair or replace multipin connector as described in section
7		Sequentially select positions 1 through 9		Positions 1, 2, 3, 8, and 9 read continuity, positions 4, 5, 6, and 7 read infinity.	a. If normal reading is observed proceed to step 9. b. If normal reading is not observed, proceed to step 8
8		Sequentially select posi tions 1 through 9 of switch section 7	Connect vom test leads between C and 4 terminal continuity, po	Positions 1, 2, 3, 8, and 9 read sitions 4, 5, 6 and 7 read infinity.	a. If normal reading is observed, repair or replace multipin connector as described in section XV of this chapter b. If normal reading is not observed, replace switch as described in section XV of this

Table 3-13. Channel Frequency Indicator 15A6 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					chapter.
9		Select position 0.	Connect vom test leads between J1-j and J1-p	Continuity	a. If normal reading is observed, proceed to step II. b. If normal reading is not observed, proceed to step 10.
10			Connect vom test leads between C and 2 terminal of switch section 7 XV of this chapter.	Continuity	a. If normal reading is observed, repair or replace multipin connector as described in section
11		Sequentially select positions 1 through 9		Position 1, 4, 5, 8, and 9 read continuity, position 2, 3, 6, and 7 read infinity.	a. If normal reading is observed, proceed to step 13. b. If normal reading is not observed, proceed to step 12.
12		Sequentially select positions 1 through 9	Connect vom test leads between C and 2 terminal of switch section 7	Position 1, 4, 5, 8, and 9 read continuity, positions 2, 3, 6, and 7 read infinity.	a. If normal reading is observed, repair or replace multipin connector as described in section XV of this chapter. b. If normal reading is not observed, replace switch as described in section XV of this chapter.
13		Select position 0.	Connect vom test leads be tween leads between J1j and J1q.	Continuity	a. If normal reading is observed, proceed to step 15. b. If normal reading is not observed, proceed to step 14.
14			Connect vom test leads between C and 1 terminal of switch section 7	Continuity	a. If normal reading is observed, repair or replace multipin connector as described in section XV of this chapter.
15		Sequentially select positions 1 through 9		Positions 2, 4, 6, and 8 read continuity, po. sitions 1, 3, 5, 7, and 9 read infinity.	a. If normal reading is observed, proceed to step 17. b. If normal reading is not observed, proceed to step 16.
16		Sequentially select positions 1 through 9	Connect vom test leads between C and 1 terminal of switch section 7	Positions 2, 4, 6, and 8 read continuity, positions 1, 3, 5, 7, and 9 read infinity.	a. If normal reading is observed, repair or replace multipin connector as described in section XV of this chapter. b. If normal reading is not observed replace switch as described in section XV of this chapter.
17	Switch section 6	As specified in steps 1-16.	Using table in channel fre-	As specified in	As specified in steps 1-16.

Table 3-13. Channel Frequency Indicator 15A6 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
			quency indicator, test setup diagram (fig. 3-5), determine connector pin numbers for switch section 6.	steps 1-16.	
18	Switch section 5	As Specified in steps 1-16.	Using table in channel frequency setup diagram (fig. 3-5), determine connector pin numbers for switch section 5.	As specified in steps 1-16.	As specified in steps 1-16.
19	Switch Section 4	As specified in steps 1-16.	Using table in channel frequency indicator test set-up diagram (fig. 3-5), determine connector pin numbers for switch section 4.	As specified in steps 1-16.	As specified in steps 1-16.
20	Switch section 3	As specified in steps 1-16.	Using table in channel frequency indicator test set-up diagram (fig. 3-5), deter mine connector pin numbers for switch section 3.	As specified in step 1-16.	As specified in steps 1-16.
21	Switch section 2	As specified in steps 1-16 (Only positions 9, 0, 1, 2, 3, and 4 are available)	Using table in channel frequency indicator test set-up diagram (fig. 3-5), determine connector pin numbers for switch section 2.	As specified in steps 1-16.	As specified in steps 1-16.
22	Switch section 1	As specified in steps 1-16 (Only positions 7 and 8 are available).	Using table in channel frequency indicator test set-up diagram (fig. 3-5), determine connector pin numbers for switch section 1.	As specified in steps 1-16.	As specified in steps 1-16.

SECTION VIII. TROUBLESHOOTING OF FAULT AND SYSTEM STATUS PANEL 14A16

3-35. General. This section contains preliminary procedures and troubleshooting procedures necessary for fault localization to a malfunctioning part of the fault ant system status panel 14A 16 after referral by organization al maintenance. Preliminary procedures consist of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the troubleshooting chart, must be made carefully to assure accurate test results. When a troubleshooting procedure specifies replacement or adjustment of a malfunctioning component, refer to section XVI in this chapter.

3-36. Test Equipment and Materials. Table 3-14 lists the test equipment required for troubleshooting the fault and system status panel.

Table 3-14. Test Equipment Required For Fault and System Status Panel 14A16 Maintenance

Common name	Part/model no.	Qty	Manufacturer
Adapter, Banana Jack to Size 20 Male Connector	3561	4	Pomana
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Test Lead, Banana Plug to Alligator Clip	1166-36B	1	Pomona
Test Lead, Banana Plug to Alligator Clip	1166-36R	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(B)	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	1	Pomona

3-37. Test Connections and Conditions (fig. 3-6). Fault and system status panel troubleshooting is accomplished in the control console. Prior to making the test connections illustrated in figure 3-6, perform the following steps to gain access to the equipment.

a. Loosen four captive screws securing fault and system status panel to control console and withdraw chassis until slides lock in extended position.

b. Remove 10 screws and washers securing access cover and remove access cover.

c. Remove two screws securing protective cover to power supply terminal board TB1 and remove cover.

d. Verify that logic unit power supply S5A4 is turned on. Relay KI in the fault and system status panel it operated by +5 V dc supplied by the logic unit power supply

e. Connect test leads B-48(B) and B-48(R) to vom as shown in figure 3-6.

3-38. Initial Control Settings. Set equipment controls as follows:

Control	Position
Vom	
FUNCTION	AC
RANGE	250 V

Control	Position
Vom	
Fault and system status panel	
CIRCUIT BREAKER/ POWER ON	ON (pram)

3-39. Troubleshooting Procedure. After completing the preliminary procedures (para 3-37 and 3-38), perform the troubleshooting procedures in table 3-15 in the given sequence until the malfunctioning item is found. The fault and system status panel schematic (fig. FO-15 for AN/FSC-78(V) or fig. FO-26 for AN/FSC-79) will assist in performing the troubleshooting procedures. After the faulty item has been replaced, perform the direct support testing procedures in section XXIII of this chapter. Upon satisfactory completion of the performance test, the fault and system status panel can be returned to service.

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. Front panel circuit breakers do not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker input terminals. Do not take chances.

Table 3-15. Fault and System Status Panel 14A16 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	Ac input power	As specified in paragraph 3-37	Connect vom test leads between power supply terminals TB1-1 and TB2	120 ± 12 V ac	If input ac power is not present, verify power is present at control console plugmold and that the fault and system status power ac power cable is plugged in.
2	DC power supply output	On vom, set function switch to +DC and range to 50 V	Using vom measure dc voltage between power supply terminal board TB1-6 (+) and TB1-4 (-)	±28 ±1.4 V dc	If vom indicates zero or incorrect voltage, refer to section IX of this chapter for troubleshooting procedures.
3	Minor alarm unit DS17 (DS21) DS17 negative terminal.	At power supply TB1 pin 4 connect jumper to		Audible alarm	If audible alarm DS21 fails to sound, replace as directed in section XVI of this chapter.
4	Major alarm unit DS16 (DS22)	At power supply TB-1 pin 4 connect jumper to DS16 negative terminal.		Audible alarm	If audible alarm DS22 fails to sound, replace as directed in section XVI of this chapter
5	Indicator lamps	Press each LAMP TEST switch in turn		All lamps of same color will light when each switch is pushed	If a lamp fails to light and replacement lamp does not remove symptom, refer to section XVI of this chapter for indicator lamp assembly replacement

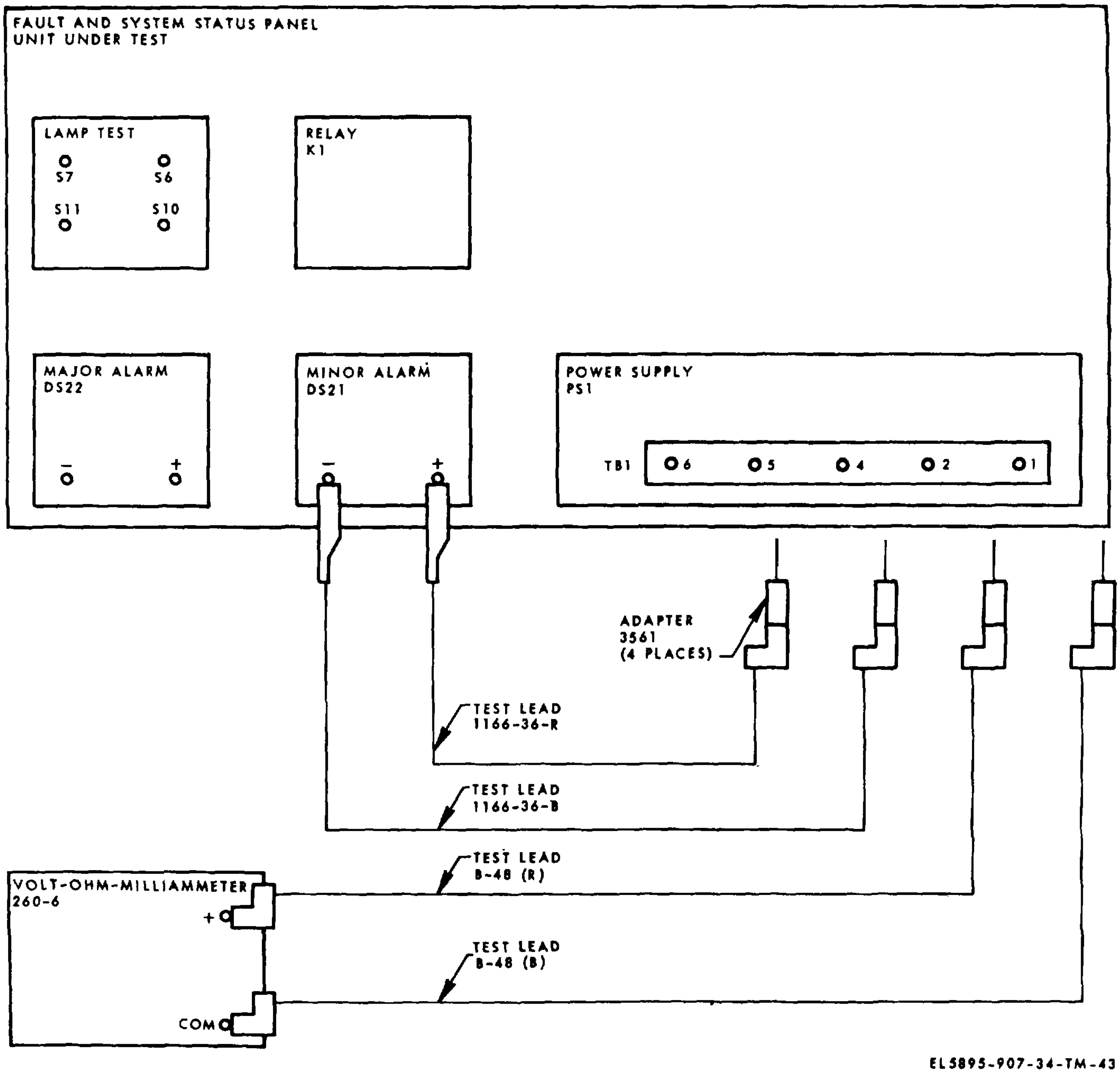


Figure 3-6. Fault and system status panel 14A16, troubleshooting setup diagram

SECTION IX. TROUBLESHOOTING OF 28 V DC POWER SUPPLY 14A16PS1

3-40. General. This section contains preliminary procedures and troubleshooting procedures for localizing a fault to a malfunctioning piece part of the 28 V dc power supply. The preliminary procedure consists of obtaining listed test equipment, making prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the troubleshooting chart, must be made carefully to ensure accurate test results. When a troubleshooting procedure specifies replacement or adjustment of a malfunctioning component, refer to section XVII in this chapter.

3-41. Teat Equipment and Materials. Table 3-16 lists the test equipment required for troubleshooting the 28 V dc power supply.

Table 3-16. Test Equipment Required for 28 V DC Power Supply 14A16PS1 Maintenance

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449-S	1	Belden
Adapter, AC, 3-Wire to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	3	Pomona
Adapter, BNC Plug to Dual Binding Post	103-0035-00	1	Tektronix
Adapter, Single Banana Plug to Binding Post	2894	2	Pomona
Meter, Multifunction	3450B	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual Track	475	1	Tektronix
Test Lead, Banana Plug to Alligator Clip	1166-36-B	2	Pomona
Test Lead, Banana Plug to Alligator Clip	1166-36-R	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(B)	2	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	1	Pomona
Test Lead, Banana Plug to Test Probe	196-36-B	1	Pomona
Test Lead, Banana Plug to Test Probe	198636-R	1	Pomona
Transformer, Variable	3PN2210	1	Staco

3-42. Test Connections and Conditions. 28 V dc power supply troubleshooting is accomplished in a bench test setup. Test connections are illustrated in figure 3-7 Prior to performing the troubleshooting procedure, pre pare the equipment for test as follows:

a. Set vom function switch to AC and range switch to 250 V. Connect vom to variable transformer output plug.

b. Connect variable transformer to power source. Set power switch to on position and observe that indicator lights. Adjust variable transformer for 115 V ac indication on vom. Set variable transformer power switch to off. Disconnect vom.

c. On 28 V dc power supply, verify jumper wires are connected between terminals 3 and 4 and between terminals 6 and 7.

d. Remove power supply cover (para 3-94).

e. Connect test equipment as shown in figure 3-7

3-43. Initial Control Settings. Initial test equipment settings for the troubleshooting procedures are as follows:

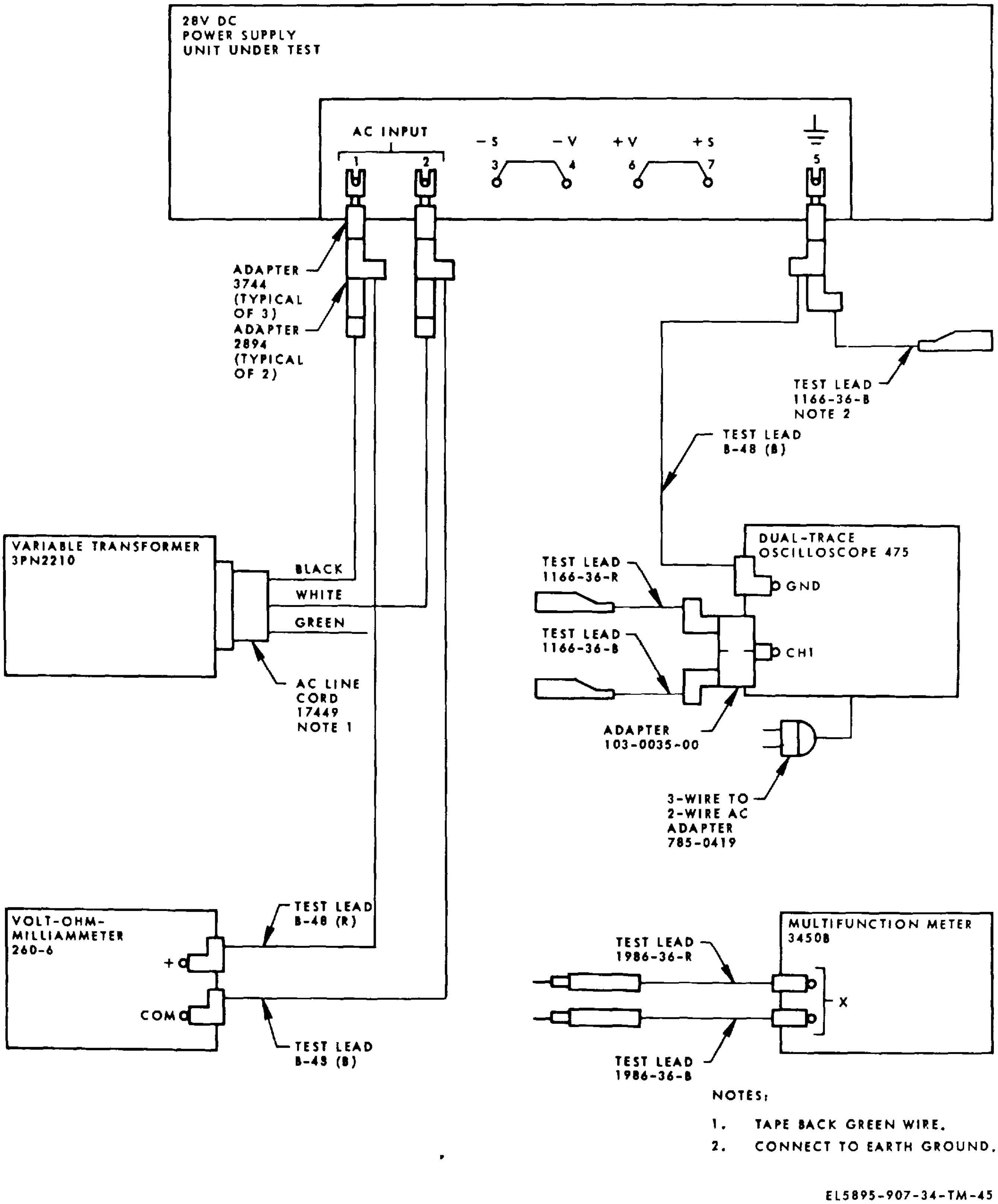


Figure 3-7. 28 V dc power supply 14A16PS1, troubleshooting test setup diagram.

Control	Position
Multifunction Meter	
LINE	On (up)
FUNCTION	AC
RANGE	AUTO
CONTROL	LOCAL
TRIGGER	INT
Oscilloscope	
POWER	On
VERT MODE	CH 1
CH 1 VOLTS/DIV	As required to observe signal
CH 1 AC-GND-DC	AC
HORIZ DISPLAY	A
TRIG MODE	NORMAL
COUPLING	AC
SOURCE	NORM
TIME/DIV	As required to observe signal
Oscilloscope	
A TRIGGER SLOPE and LEVEL	As required for stable display

Control	Position
Variable Transformer	
POWER	On

3-44. Troubleshooting Procedure. Table 3-17 provides a step-by-step troubleshooting procedure to isolate a malfunction to a faulty part. Perform procedure in sequence given until the malfunction is found. If a faulty part is found, replace part as directed and test power supply as specified in section XXIV of this chapter. Use the schematic diagram (fig. FO-16) as an aid to locating trouble causes and figure 3-8 for location of parts.

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. Front panel circuit breakers do not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker input terminals. Do not take chances.

Table 3-17. 28 DC Power Supply 14A16PS1 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	Power transformer T1 auxiliary rectifier secondary	As specified in paragraph 3-42	As specified in paragraph 3-42 with multifunction meter connected between terminals B13 and B17 on PC board B	20. 8 :2 V ac	a. Check C1 for short: replace as necessary. b. If reading is 0 volts check thermostat S1 with ohmmeter for open condition c. If thermostat is open allow unit to cool and recheck with ohmmeter. d. If S1 is still open replace thermostat. e. If thermostat S1 is closed check T1 for open or shorted condition. f. Replace Faulty item as directed in section XVII of this chapter
2	Power transformer T1 main rectifier secondary		Connect multifunction meter between anode of CR9 and anode of CR11.	32.5 ±3 2 V ac	a. Check C11 for shorted condition. b. Check TI for open or shorted condition.

Table 3-17. 28 V DC Power Supply 14A16PS1 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					c. Replace faulty item as directed in section XVII of this chapter.
3	Main rectifier circuit	Multifunction meter: press DC FUNCTION	Connect multifunction meter leads to power supply Test leads / Power supply -(blk) / TB1-6 +(red) / Term B5 on PC Bd B.	16.4 ± 1.6 V dc	a Check C11, CR8 thru CR11, C18 and C19 for a shorted or b. Replace faulty as directed in section XVII of this chapter.
4	Bias supply		Connect multifunction meter-test leads to power supply as follows Test leads / Power supply -(blk) / TB 1-6 +(red) / Junction of R10 and R6 (outboard side of R10).	9.1 ±:0.1 V dc	a. Check CR7, C107, and CR6 for a shorted or open component b Replace faulty item as directed in section XVII of this chapter.
5	Bias supply		Connect multifunction meter test leads to power supply as follows: Test leads / Power supply -(blk) / TB1-6 +(red) / Junction of R3 and R4 (in board side of R3).	6.1 ± 0.5 V dc	a Check CRI, R5, R4, and R3 for a shorted or open component. b Replace faulty item as directed in section XVII of this chapter.
6	Series voltage regulator circuit		Connect multifunction meter test leads to power supply as follows: Test leads / Power supply -(blk) / TB1-4 +(red) / TB1-6	28 ±0.28 V dc	a If voltage is pre sent but not within tolerance, adjust VDC control R1 b. If voltage cannot be adjusted with R1, check R1 with ohmmeter for shorted and/or open conditions. Replace, if faulty as directed in section XVII of this chapter. c. If R1 is not faulty, power supply may be operating as constant current source at current limit value Check adjustment of overcurrent control, R17 (refer to paragraph 3-02) and check series regulator circuit with ohmmeter for

Table 317. 28 V DC Power Supply 14A16PS1 Troubleshooting Procedure -Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
					shorted components. d. Replace faulty item as directed in section XVII of this chapter. e. If output voltage is too high, check RI with ohmmeter for open condition. f. Replace, if faulty, as directed in section XVII of this chapter. g. Check QB thru Q12, Q5, Q1, and Q6 for shorted condition. h. Check CRI for an open condition. i. If output voltage is too low check Q2 and Q3 with ohmmeter for shorted condition and check R25A and R17 for open condition. j. Replace faulty item as directed in section XVII of this chapter.
7	Filter circuits	Twist oscilloscope test leads to cancel external noise signals when measuring ripple voltage	Connect oscilloscope test leads to power supply as follows: Oscilloscope Test leads (red) Power supply TBI-7	Equal to or less than 1.5 mV ripple	a. If ripple is at the line frequency or twice the line frequency, check CR7. CR8 thru CR11 for a shorted or open condition. b. Check C1, C7, C18 and C19 for open conditions. c. Replace faulty item as directed in section XVII of this chapter. d. If large spikes are present, check C2 and C3 for an open condition.

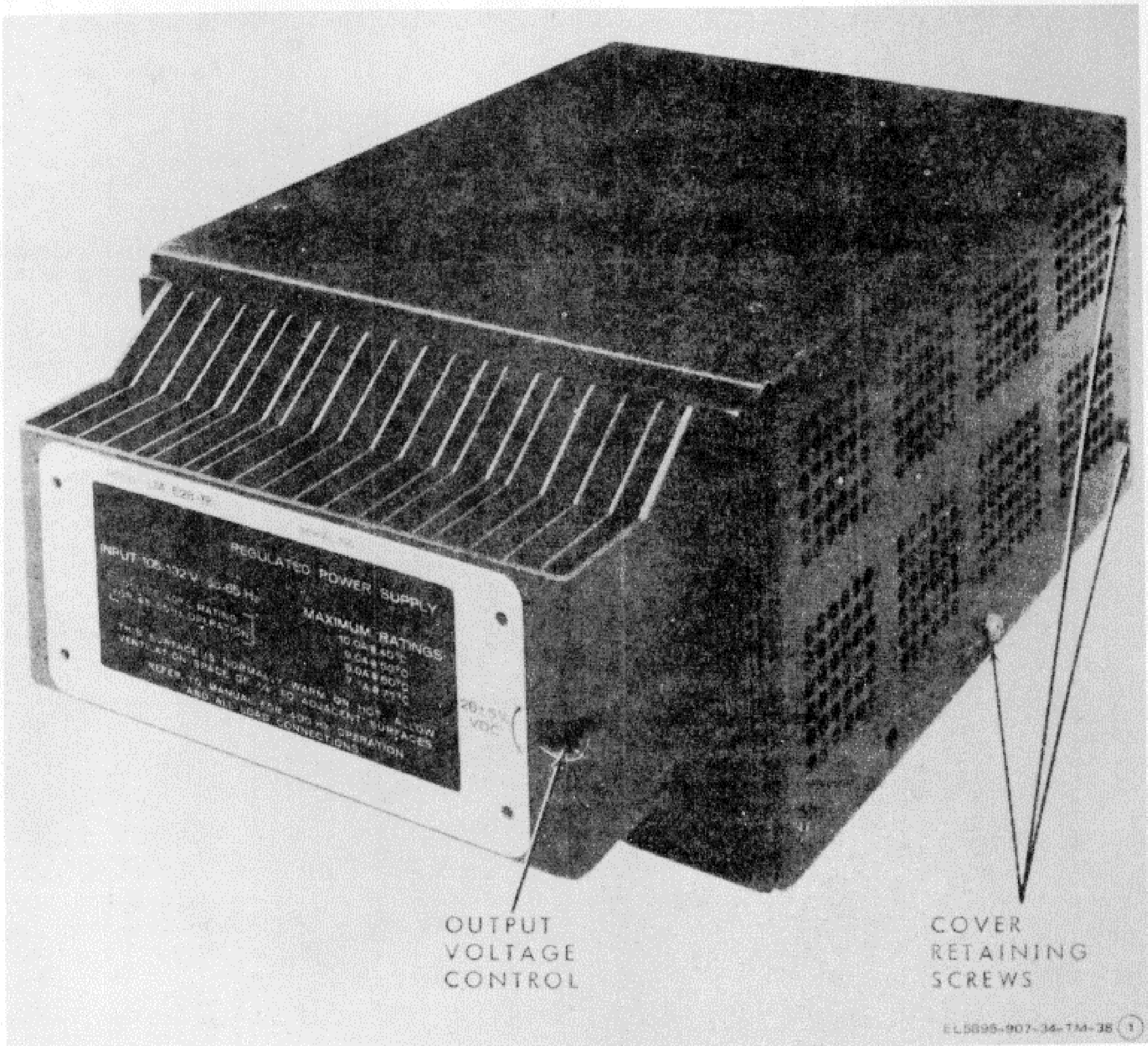


Figure 3-8. 28 V dc power supply 14A16PS1, parts location (sheet 1 of 5).

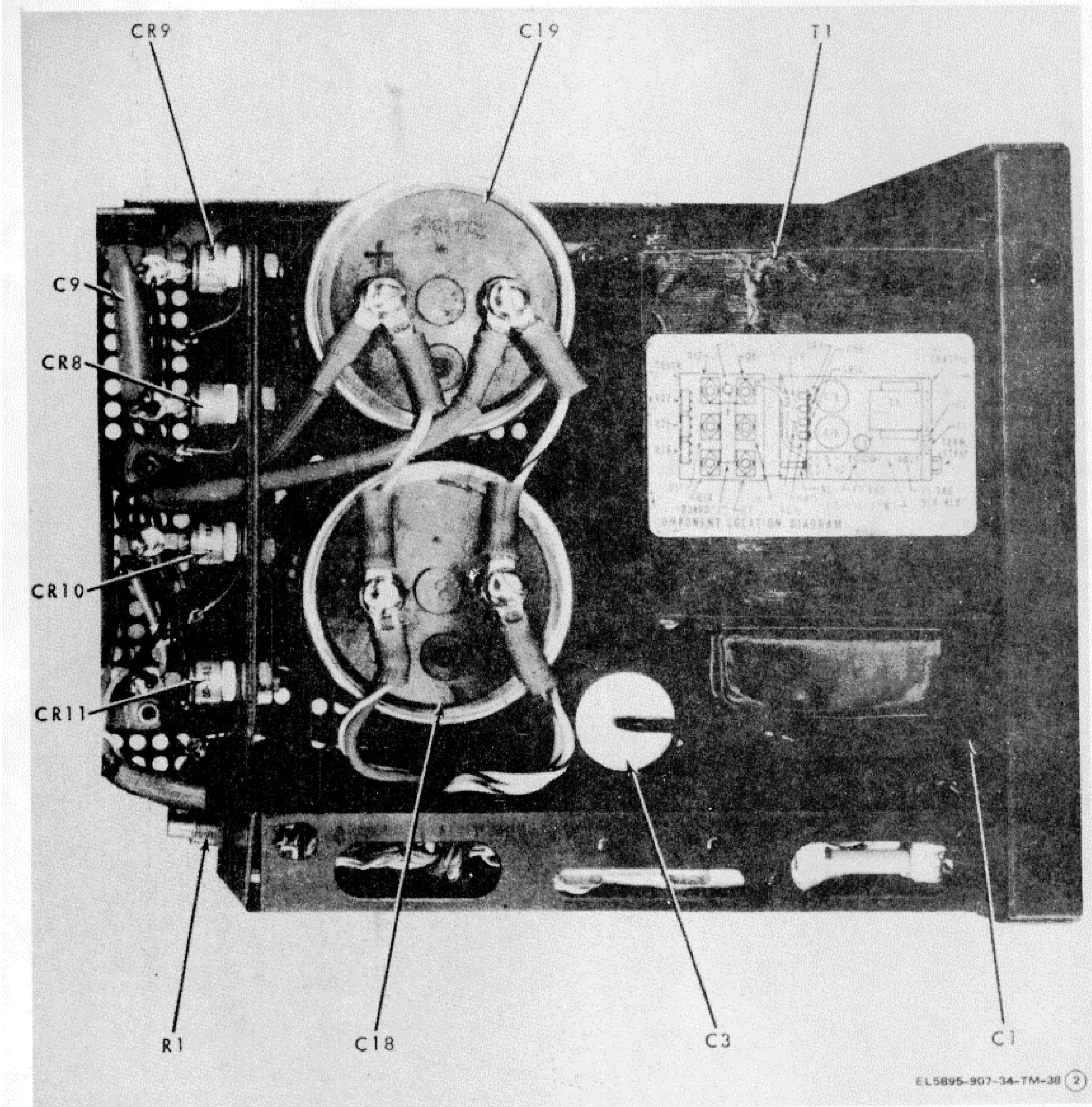


Figure 3-8. 28 V dc power supply 14A16PS1, parts location (sheet 2 of 5).

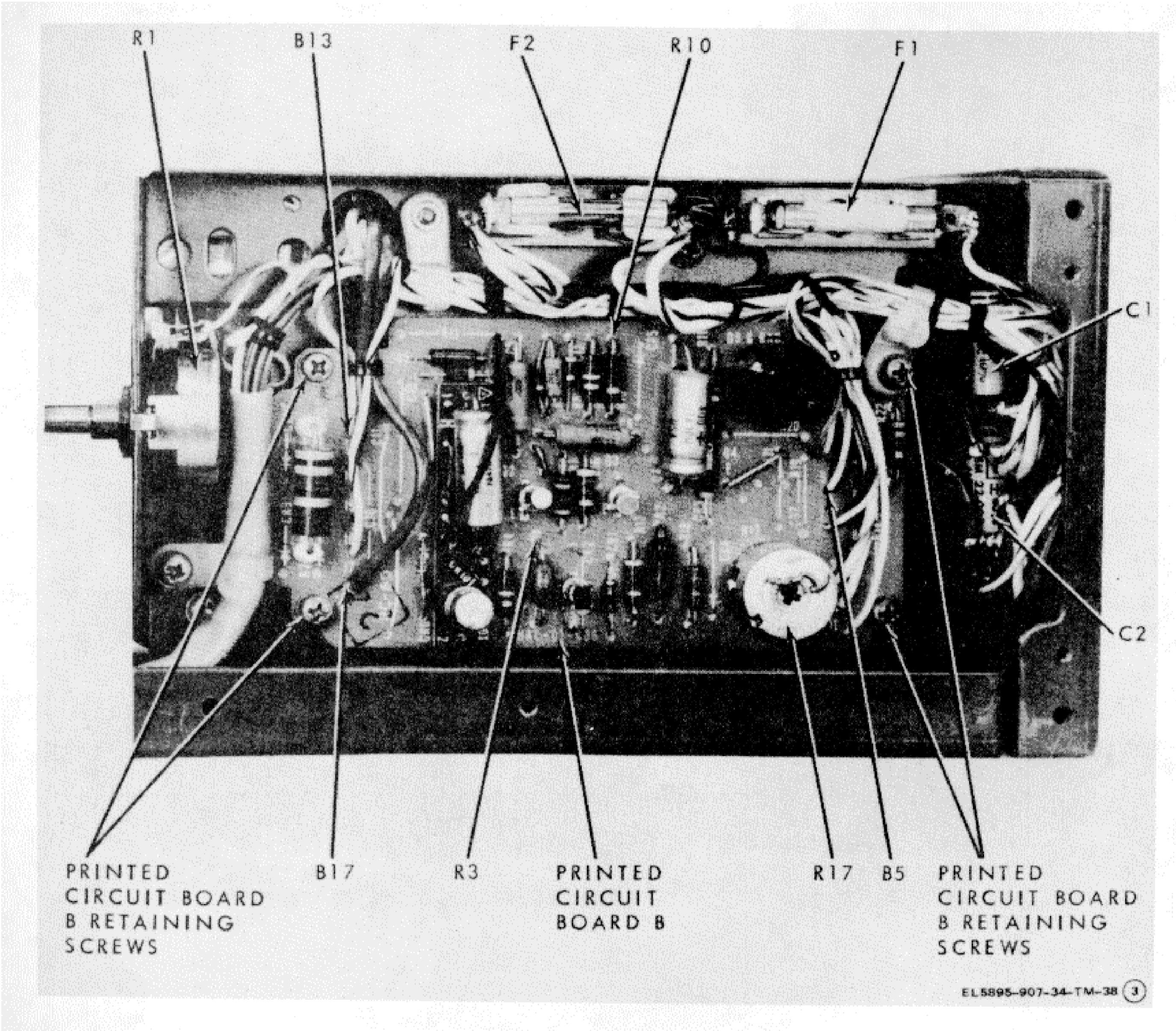


Figure 3-8. 28 V dc power supply 14A16PS1, parts location (sheet 3 of 5).

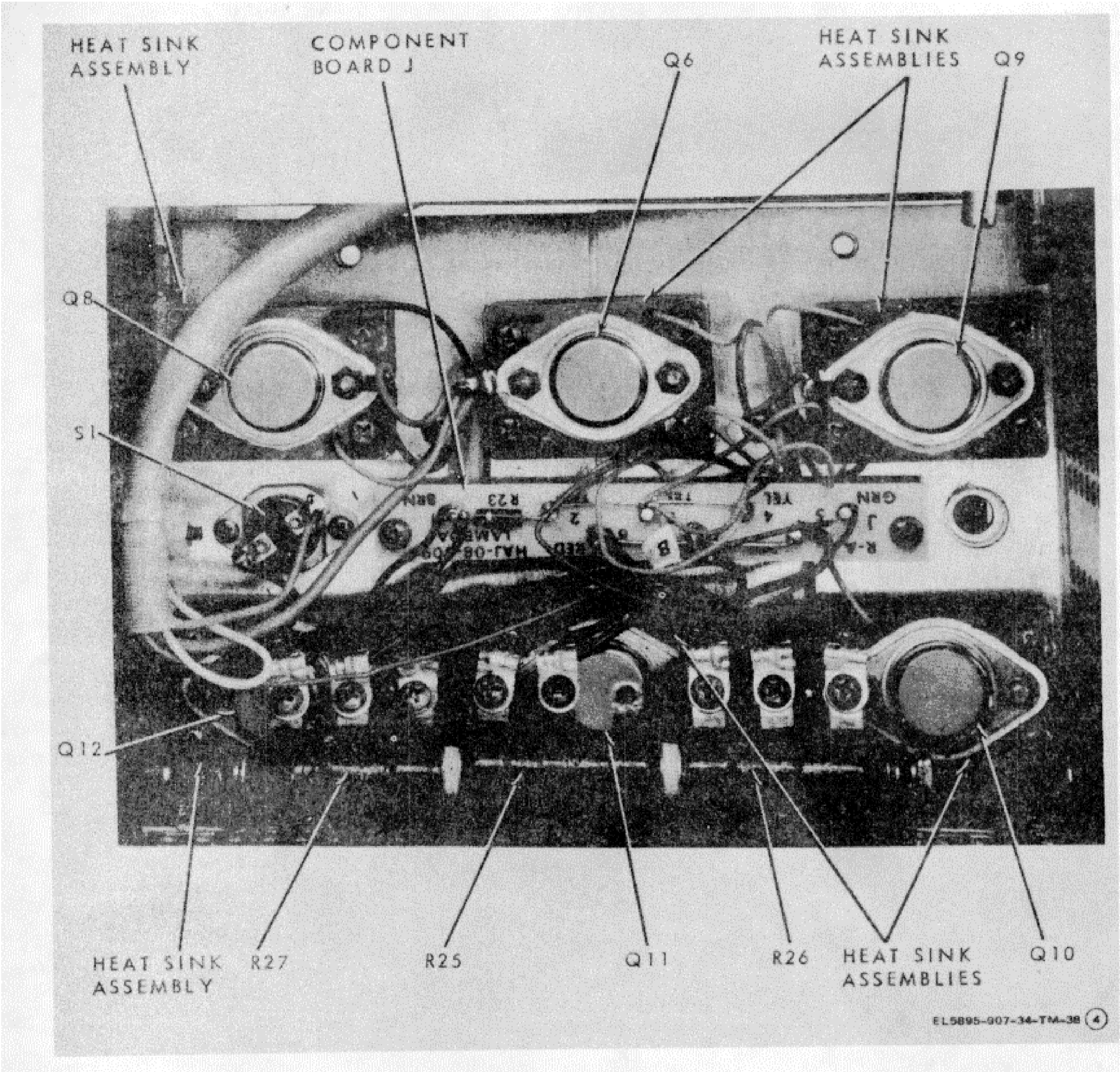


Figure 3-8. 28 V dc power supply 14A16PS1, parts location (sheet 4 of 5).

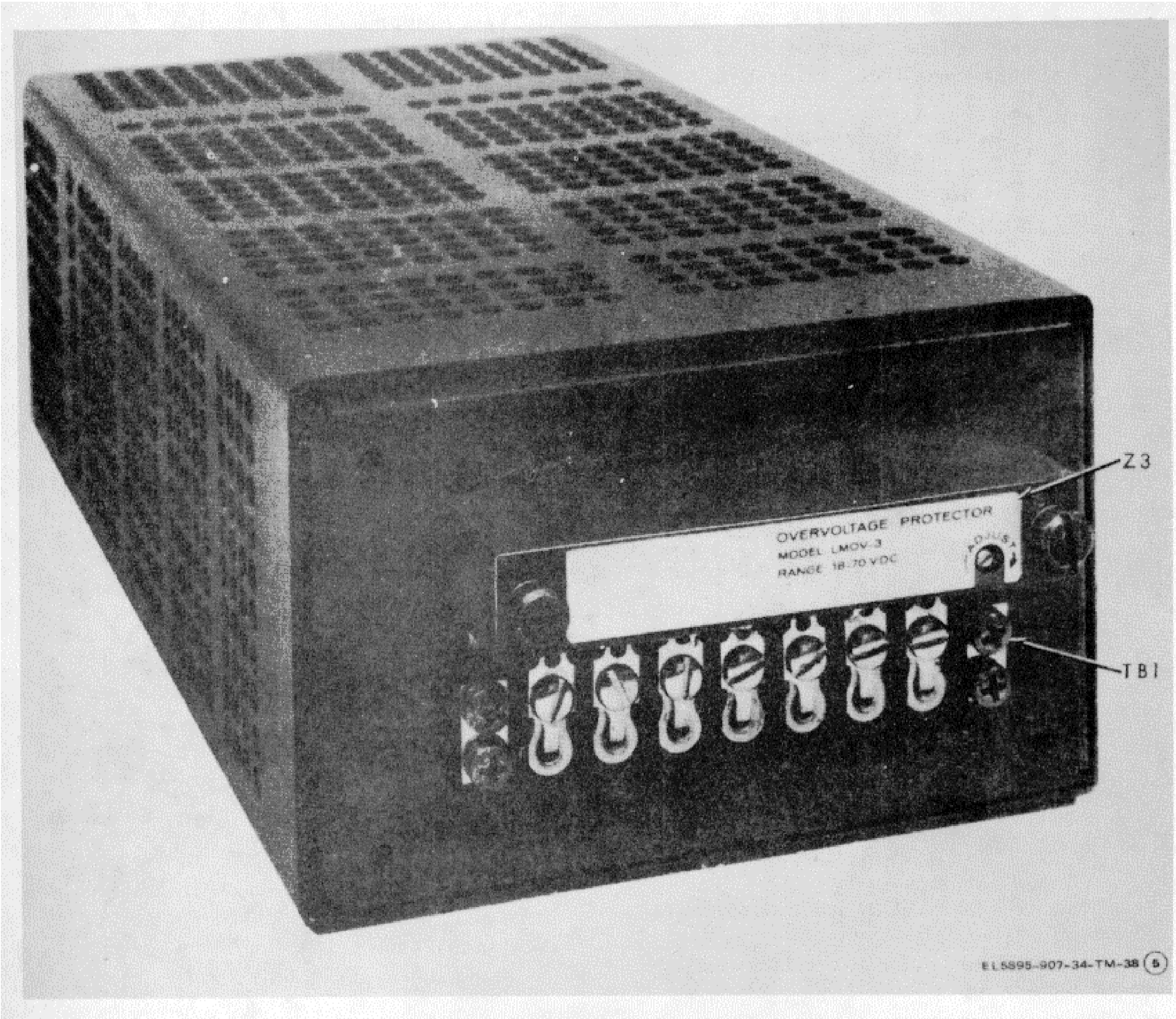


Figure 3-8. 28 V dc power supply 14A16PS1, parts location (sheet 5 of 5).

SECTION X. TROUBLESHOOTING OF WAVEGUIDE SWITCH CONTROL HTA-3A7

3**-45. General**. This section contains preliminary procedures and troubleshooting procedure necessary for fault localization to a malfunctioning piece of the wave-guide switch control HTA-3A7 after referral by organizational maintenance. Preliminary procedures consist of obtaining the listed test equipment, making the pre- scribed test connections, and initially setting equipment controls to specified settings. These settings and all subsequent settings given in the troubleshooting chart must be made carefully to assure accurate test results. When a troubleshooting procedure specifies replacement of a malfunctioning component, refer to section XVIII in this chapter.

3-48. Test Equipment and Materials. Table 3-18 lists the test equipment and materials required for troubleshooting the waveguide switch control.

Table 3-18. Test Equipment Required for Waveguide Switch control HTA-3A7 Maintenance

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449	1	Belden
Adapter, Banana Jack to Size 16 Female Connector	3562	3	Pomona
Adapter, Banana Jack to Size 20 Female Connector	3560 ’	2	Pomona
Adapter, Single Banana Plug to Binding Post	2894	3	Pomona
Adapter, Banana Jack to Size 20 Male Connector	3561	2	Pomona
Milliammeter, Volt-Ohm-	260-6	I	Simpson
Power Supply, 0-80/0-40 V DC	LPD-422A-FM	I	Lambda
Test Lead, Banana Plug to Banana Plug	B-48(B)	2	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	2	Pomona

3-47. Test Connections and Conditions. Troubleshooting of the waveguide switch control is accomplished in its operational location. Test connections are illustrated in figure 3-9. Prior to performing the troubleshooting procedure, prepare the equipment for test follows:

a. Disconnect all cables from the waveguide switch control connectors.
b. Connect test leads and adapters to test equipment as shown in figure 3-9.

3-48. Initial Control Settings. Initial control settings for the troubleshooting procedures are as follow

a. Set vom function switch to AC and range to 250 V.
b. Connect test lead 17449 to 120 V ac outlet 50/60 Hz.
c. Set power supply LPD-422A-FM to +28. 0 volts and then position power switch to OFF.

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. Front panel circuit breakers do not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker in- put terminals. Do not take chances.

3-49. Troubleshooting Procedure. Table 3-19 provides a step-by-step troubleshooting procedure to isolate a malfunction to a faulty part. Perform the procedures in the given sequence until the malfunction is found. If a faulty part is found, replace the part as directed in section XVIII of this chapter. Use the schematic diagram figure in FO-17 as an aid to locating trouble causes.

Table 3-19. Waveguide Switch Control HTA-3A7 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	Relay K1			0 volts	a. If normal reading is observed, proceed to step 2. b. If normal reading is not on served, replace relay K1 as described in section XVIII of this chapter.
2	Relay KI and diodes CR1, CR5, CR6, CR9, and CR10	Power supply, set ON/ OFF switch to ON position.		120 V ac	a. If normal reading is observed, proceed to step 3. b. If normal reading is not observed replace diodes CR6, CR9 and/or relay K1.
3	Relay K1 and diodes CR 1, CR5, CR6, CR9, and CR10		Reverse test leads at power supply so that black test lead is connected to (+) red power supply output terminal, and red test lead is connected to (-) black terminal.	120 V ac	a. If normal reading is observed, proceed to step 4. b. If normal reading is not observed, replace diodes CR5, CR10 and/or relay K1.
4	Connectors J1, J2.J3 relay K. , diodes CR2, CR7, CR8, CR11 and CR12	Using test setup diagram (fig. 3-9) and waveguide switch control schematic diagram (fig. FO-17) check second circuit as in steps 1 through 3	As indicated in steps 1 through 3	As indicated in steps 1 through 3.	As indicated in steps 1 through 3.
5	Connectors J1, 2.J14 relay K3, diodes CR3, CR13, CR14, CR17, And CR18	Using test setup diagram (fig. 3-9) and waveguide switch control schematic diagram (fig. FO- 17) check third circuit as in steps 1 through 3.	As indicated in steps 1 through 3	As indicated in steps through 3.	As indicated in steps 1 through 3.
6	Connectors J1, J2, J4, relay K4. diodes CR4, CR15, CR16, CR19, and CR 20	Using test setup diagram (fig. 3-9) and waveguide switch control schematic diagram (fig FO-17) check fourth circuit as in step 1 through 3.	As indicated in steps 1 through 3	As indicated in steps 1 through 3.	As indicated in steps 1 through 3.

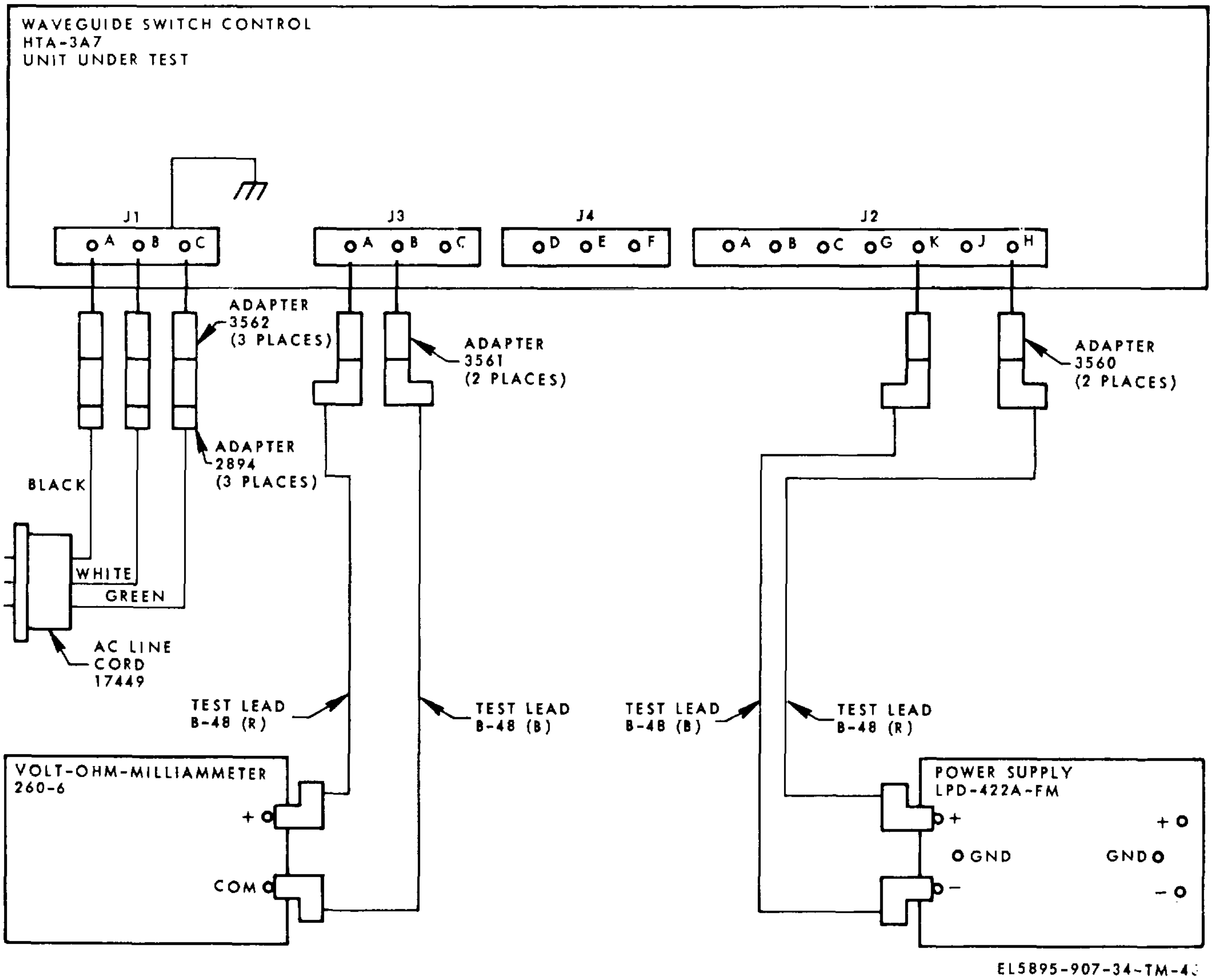


Figure 3-9. Waveguide switch control HTA-3A7, troubleshooting, test setup diagram.

SECTION XI. MAINTENANCE OF LOGIC UNIT POWER SUPPLY 15A4

3-50. General. This section provides instructions for replacing the logic unit power supply 15A4 assembly, and its line replaceable components such as individual +5 V dc and -5 V dc power supplies, and chassis mounted components, during direct support maintenance. This section also provides instructions for adjusting the output voltage of the 5 V dc power supplies.

3-51. Logic Unit Power Supply 15A4 (fig. 3-10), Removal and Replacement. To remove and replace the logic unit power supply 15A4, perform the following steps:

a. Set fault and system status panel power ON circuit breaker to OFF.

b. Set logic unit power supply CIRCUIT BREAKERS to OFF.

c. Remove four screws and washers holding logic unit power supply. Pull forward until slides lock in extended position.

d. Press locking lugs on logic unit power supply slides to release drawer and slowly pull drawer forward to gain access to plugs attached at rear.

e. Disconnect the AC INPUT and DC OUTPUT cables, and ground lead.

f. Remove logic unit power supply and place on workbench.

g. To replace the logic unit power supply, remove from workbench and place in electrical equipment rack; insert slide rail rollers into guide rail until locking lugs engage.

h. Reconnect ground lead, and DC OUTPUT and AC INPUT cables to rear of logic unit power supply.

i. Press slide rail locking lugs and push logic unit power supply fully into electrical equipment rack. Secure logic unit power supply into rack with screws and washers removed in step c.

j. Set -5 V dc circuit breaker to ON.

k. Set +5 V dc circuit breaker to ON. Set fault and system status panel +28 V dc circuit breaker to ON.

3-52. 5 VDC Power Supplies 15A4PS1 or 15A4PS2 Removal and Replacement. To remove and replace either of the two 5 V dc power supplies in the logic unit power supply 1 5A4, perform the following steps:

a. Set fault and system status panel power ON circuit breaker to OFF.

b. Set both circuit breakers to OFF position.

c. Remove four screws and washers holding logic unit power supply in electrical equipment rack and pull logic unit power supply forward until slides lock in extended position.

d. At rear panel of logic unit power supply disconnect power cable at AC INPUT connector.

e. Remove four cross-slotted screws holding 5 V dc power supply to the two supporting rails.

f. Tip up front end of power supply enough to gain access to the terminal block. Remove two cross- slotted screws securing protective cover on terminal block. Tag and remove wires from terminal block.

g. Remove power supply from logic unit power supply for repair.

h. Return replacement power supply to logic unit power supply. Identify by tag and replace wires on power supply terminal block.

i. Replace cover on terminal block and secure with two cross-slotted screws removed in step f above

j. Align power supply on supporting rails and replace with four screws removed in step e.

k. Connect power cable to AC INPUT connector

l. Adjust replacement power supply using instructions in paragraph 3-57.

m. Refer to section XIX for performance test of logic unit power supply.

n. Push in on the two slide rail locking lugs and push logic unit power supply into electrical equipment rack. Secure front panel to rack with four screws and washers removed in step c.

o. Set -5 V dc circuit breaker to ON.

p. Set +5 V dc circuit breaker to ON.

q. Set fault and system status panel +28 V dc circuit breaker to ON.

3-53. Circuit Breakers Removal and Replacement. To remove and replace one of the logic unit power supply 15A4 circuit breakers, perform the following steps:

a. Set fault and system status panel +28 V dc circuit breaker to OFF.

b. Set both circuit breakers to OFF position.

c. Remove four screws and washers holding logic unit power supply in electrical equipment rack and pull forward until slides lock in extended position.

d. At rear of logic unit power supply, remove power cable from AC INPUT connector.

e. At rear of circuit breaker to be replaced, tag and unsolder leads to circuit breaker.

f. Remove two phillips head screws securing circuit breaker to front panel.

g. Install replacement circuit breaker in front panel with hardware removed in step f, ensuring that switch action corresponds to ON/OFF placards on front panel.

h. Identify wires removed in step e. , and solder to circuit breaker.

i. At rear of logic unit power supply, connect power cable to AC INPUT connector.

j. Set -5 V dc circuit breaker to ON.

k. Set +5 V dc circuit breaker to ON.

l. Set fault and system status panel +28 V dc circuit breaker to ON.

m. Press locking lugs and push logic unit power supply fully into electrical equipment rack and secure with hardware removed in step d.

3-54. POWER SUPPLY VOLTAGE Meters Removal and Replacement. To remove and replace one of the POWER SUPPLY VOLTAGE meters in the logic unit power supply 15A4, perform the following steps:

a. Set fault and system status panel +28 V dc circuit breaker to OFF.

b. Set both circuit breakers to OFF position.

c. Remove four screws and washers securing logic unit power supply. Pull power supply forward until slides lock in extended position.

d. At meter to be replaced, tag wires and disconnect from meter.

e. Remove nuts securing meter to front panel, and remove meter from logic unit power supply.

f. Secure replacement meter to logic unit power supply with nuts removed in step e.

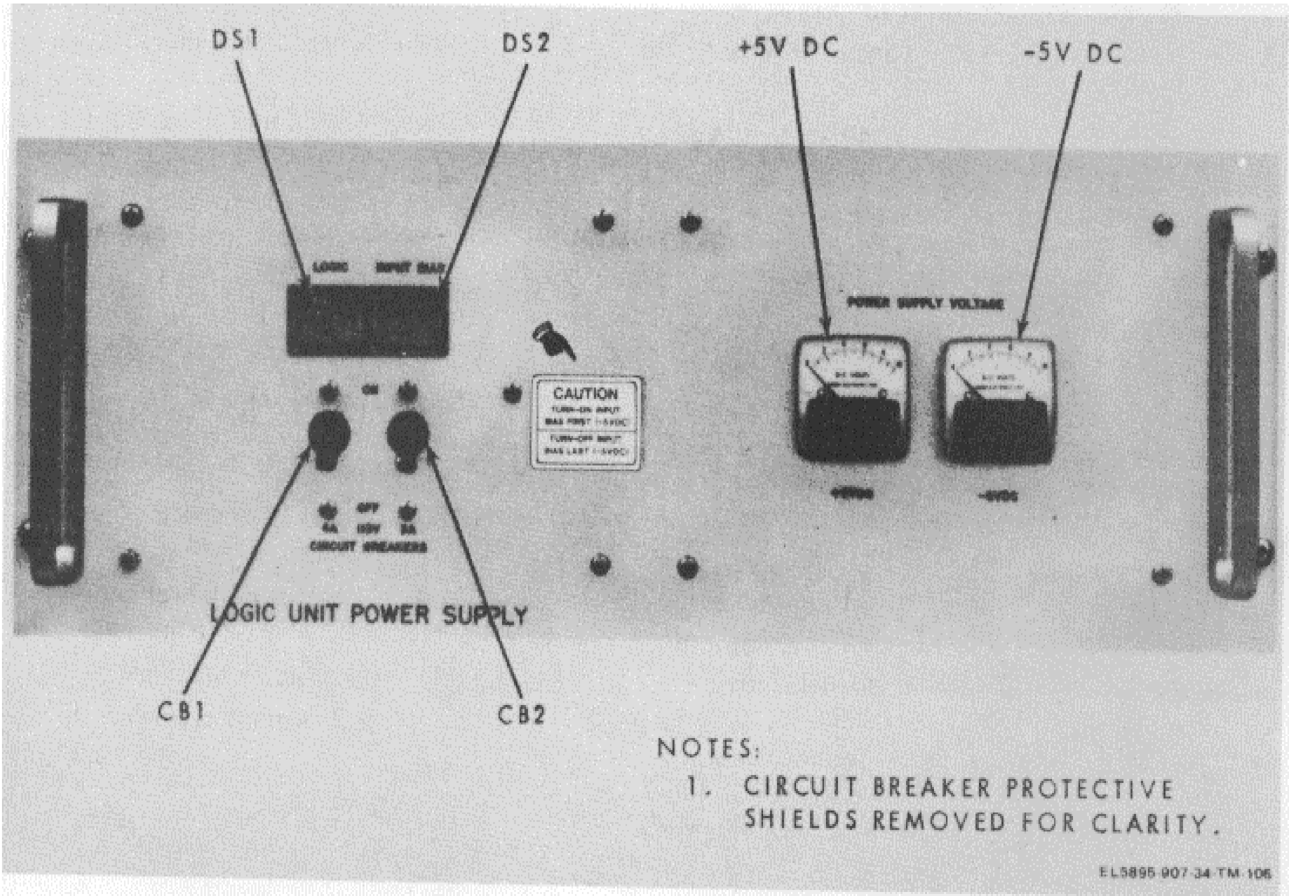


Figure 3-10. Logic unit power supply 15A4 parts location (sheet 1 of 2)

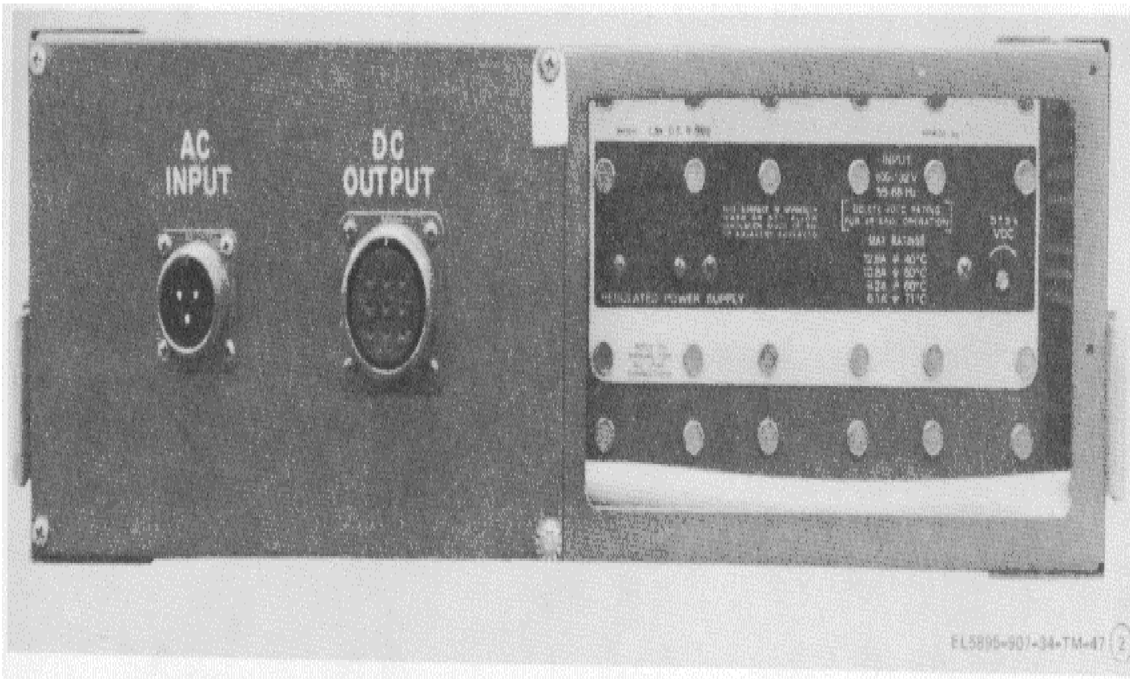


Figure 3-10. Logic unit power supply 15A4 parts location (sheet 2 of 2).

g. Identify by tag and connect wires removed in step ***d.***

h. Set -5 V dc circuit breaker to ON.

i. Set +5 V dc circuit breaker to ON.

j. Set fault and system status panel power ON circuit breaker to ON.

k. Press locking lugs and push logic unit power supply fully into electrical equipment rack and secure with hardware removed in step c.

3-55. Indicator Lamp Assembly Removal and Replacement (fig. 3-11). To remove and replace one of the 5 VDC PS ON indicators from the logic unit power supply 15A4, perform the following steps:

a. Set fault and system status panel power ON circuit breaker to OFF.

b. Set both circuit breakers to OFF position.

c. Remove four screws and washers securing logic unit power supply in electrical equipment rack, and pull forward until slides lock in extended position.

d. Remove ac input connector at rear of power supply chassis.

e. Pull 5 VDC PS ON lens forward to stop.

f. Rotate lens one-quarter turn counterclockwise to release bulb board. Push, then pull lens and bulb board from housing.

g. Tag and unsolder wires from housing.

h. Rotate mounting screws (revealed by removal of bulb board) until locking cams rotate to interior of housing.

i. Push housing from rear through sleeve until free of front panel.

j. Insert replacement switch assembly into opening in front panel and press sleeve tight to back of panel.

k. Rotate mounting screws inside housing clockwise until locking cams are tight against sleeve.

l. Identify wires by tags, and solder to switch assembly.

m. Align notch in bulb board with metal tab on side of housing, then push lens and bulb board into housing.

n. Rotate lens one-quarter turn clockwise to horizontal position and press lens into final position.

o. Set -5 V dc circuit breaker to ON.

p. Set +5 V dc circuit breaker to ON.

q. Set fault and system status panel power ON circuit breaker to ON.

r. Replace AC INPUT connector removed in step ***d.*** above.

s. Press locking lugs and push logic unit power supply fully into electrical equipment rack, and secure with hardware removed in step ***c.***

3-56. Multipin Connector Removal and Replacement. To remove and replace a multipin connector in the logic unit power supply 15A4, perform the following steps:

a. Refer to paragraph 3-51 for instructions for removing logic unit power supply to work bench.

b. Refer to paragraph 3-4***d*** for instructions for repair of multipin connectors.

c. Refer to paragraph 3-51 for instructions to restore logic unit power supply to electrical equipment rack.

d. Refer to section XIX for performance test of logic unit power supply.

3-57. 5 V DC Power Supplies Adjustment. The following subparagraphs describe the test equipment required, connections and conditions, initial control settings, and procedure for adjusting the output voltage of either 5 V dc power supply.

a. Test Equipment*.* Test equipment required for adjusting either 5 V dc power supply consists of a vom and two alligator clips to stacking banana plug test leads (one red lead and one black lead), Pomona number 1166-36.

b. Connections and Conditions*.* The 5 V dc power supply may be adjusted on the workbench or in the electrical equipment rack while connected to the load. If logic unit power supply is on the test bench, jumper DC OUT-PUT connector pins at rear of logic unit power supply as indicated in figure 3-1. If power supply is to be adjusted in the rack, remove four screws and washers securing logic unit power supply and pull power supply forward until slides lock in extended position. To adjust +5 V dc power supply, connect black (-) test lead between (-) COMMON jack of vom and power supply terminal board pin 4. Connect red (+) test lead between (+) jack of vom and power supply terminal board pin 6. Perform initial control settings in the following subparagraph.

c. Initial Control Settings*.* Initial control settings for adjusting logic unit power supply 15A4 are as follows:

Control	Position
Vom	
Function	+DC
Range	10 V
Power supply	
Circuit breaker	ON

d. Adjustment Procedure*.* At rear of logic unit power supply, adjust VDC control for vom reading of +5 ±0.25 V dc. If the -5 V dc power supply is to be adjusted, remove four cross-slotted screws securing power supply to drawer. Lift and turn rear of power supply to gain access to voltage adjust control. Connect (-) COMMON test lead of vom to terminal 4 and red (+) test lead to terminal.

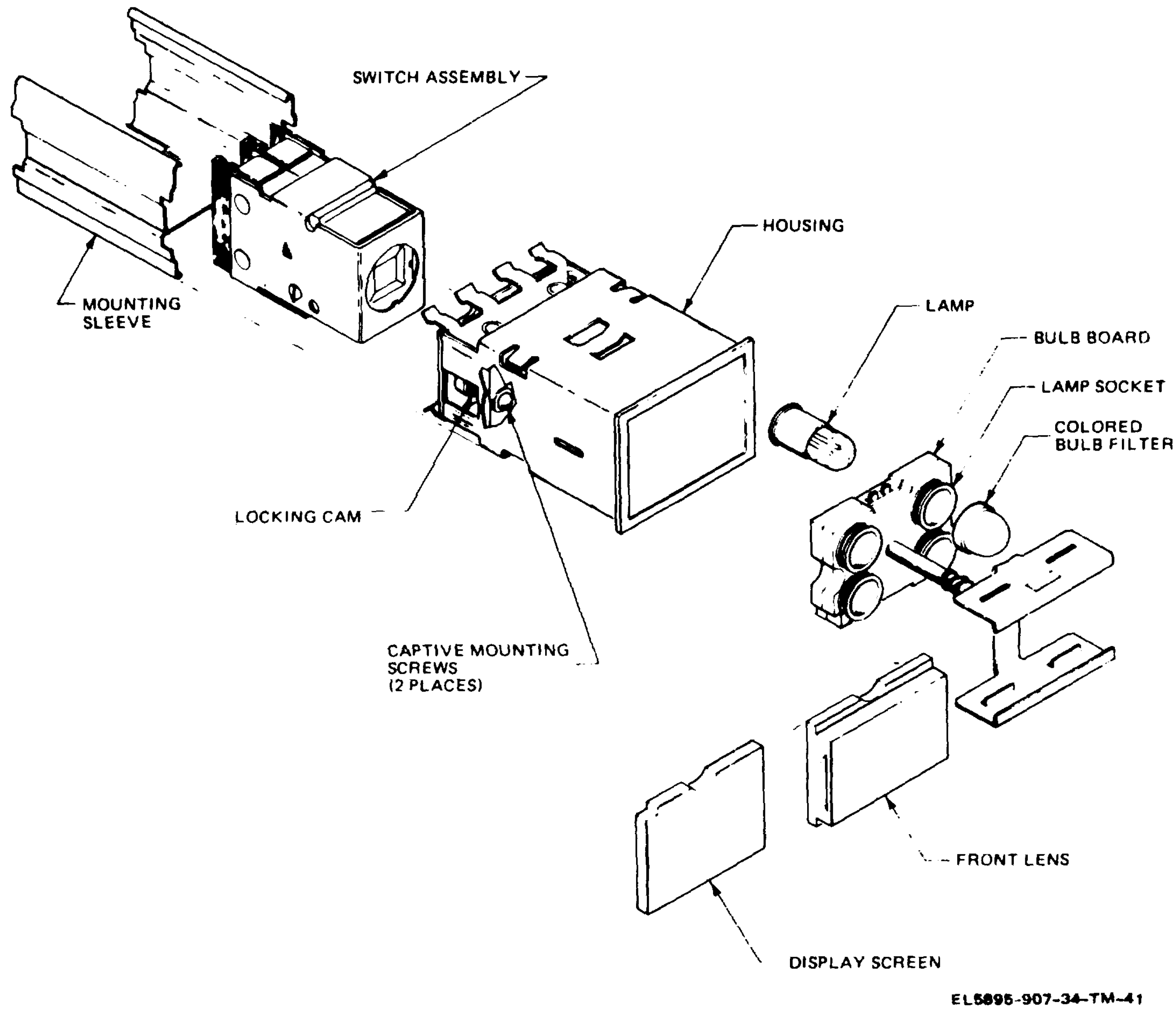


Figure 3-11. Push switch/indicator lamp, exploded view.

SECTION XII. MAINTENANCE F +5 V DC POWER SUPPLY 15A4PS1

3-58. General This section provides instructions replacing chassis mounted components in +5 V dc power supply 15A4PS1 during direct support maintenance

3-59. Power Supply Cover Removal and Replacement (fig. 3-3, sh 1). To gain access to the internal power supply parts, the power supply cover must be moved. Remove and replace supply cover as follows:

- ***a.*** On power supply, remove three phillips head screws on right side, two on left side and two lower front.
- ***b.*** For access to power supply components, tilt rear of power supply cover upward from chassis.
- ***c.*** To replace power supply cover, lower cover over power supply chassis. Secure cover to supply with three phillips head screws on right side, and on left side and two on lower front of power supply.

3-60. Power Transformer T1 Removal and Replacement (fig. 3-3, sh 2). To remove and replace pot transformer T1, proceed as follows:

- ***a.*** Remove power supply cover. (Refer to paragraph 3-59, steps ***a*** and ***b.***)
- ***b.*** Tag destination points of wires connected to power transformer TI for identification.
- ***c.*** Remove power transformer T1 cable tie-wrap retaining screw.
- ***d.*** Remove four corner screws that secure printed circuit (pc) board B. Fold pc board B over access to transformer connections.
- ***e.*** Unsolder and disconnect wires connected to power transformer T1
- ***f.*** Remove one screw from bottom of power supply and two screws from rear that secure power transformer T1.
- ***g***. Remove power transformer T1.
- ***h***. Install and secure replacement power transformer T1 in power supply chassis with one screw bottom and two on rear of chassis.
- ***i.*** Solder transformer wires to applicable tagged destination points.
- ***j.*** Secure pc board B with four corner screws.
- ***k***. Secure power transformer T1 cable tie-wrap power supply chassis.
- ***l.*** Replace cover on power supply. (Refer to paragraph 3-59***c.***)
- ***m.*** Perform direct support testing procedures described in section XX of this chapter.

3-61. Filter Capacitor C8 Removal and Replacement (fig. 3-3, sh 2). To remove and replace the filter capacitor C8, proceed as follows:

- ***a.*** Remove power supply cover. (Refer to paragraph 3-59, steps a and b).
- ***b.*** Place power supply chassis top side up on bench.
- ***c.*** Tag wires connected to filter capacitor C8 for identification. Remove two screws that secure wires to capacitor.
- ***d.*** Loosen capacitor clamp screw.
- ***e.*** Remove capacitor C8.
- ***f.*** Install replacement filter capacitor C8 in power supply capacitor mounting clamp. Tighten mounting clamp screw.
- ***g.*** Connect tagged wires to applicable terminals on filter capacitor C8. Install screw in each terminal to secure wires.
- ***h.*** Install cover on power supply. (Refer to paragraph 3-59, step ***c.***)
- ***i.*** Perform direct support testing procedures described in section XX of this chapter.

3-62. Series Regulator Transistors Q8 through Q13 Removal and Replacement (fig. 3-3, sh 4). To remove and replace the series regulator transistors QS through Q 13, proceed as follows:

- ***a.*** Remove power supply cover. (Refer to paragraph 3-59, steps ***a*** and ***b.***)
- ***b.*** On front cover of power supply, remove 24 hex head bolts that secure transistors Q8 through 13 heat sink assemblies and two phillips head screws that secure component board D.
- ***c.*** Remove cable tie-wrap screw.
- ***d.*** Remove transistor Q8 through Q13 heat sink assemblies along with component board D.
- ***e.*** Tag for identification and unsolder electrical wires on bottom side of defective series regulator as applicable.
- ***f.*** Remove hex nut from back of the two mounting screws that secure series regulator transistor to the heat sink.
- ***g***. Remove series regulator transistor from mounting screws. Remove and inspect insulating wafer. Replace if cracked.
- ***h***. Coat both sides of insulating wafer with heat sink compound (Dow Corning No. 343 silicone grease, or equivalent)
- ***i.*** Install insulating wafer and replacement series regulator transistor on heat sink mounting screws.

j. Install hex nut on each mounting screw to series regulator transistor to heat sink assembly

k. Solder tagged electrical wires to applicable on bottom side of series regulator transistor.

l. Install component board with two screws and sink assemblies with series regulator transistors Q8 through Q13 on interior side of front with 24 hex head bolts.

m. Secure cable tie-wrap screw to cover.

n. Install cover on power supply. (Refer to part 3-59, step ***c.***)

o. Perform direct support testing procedure described in section XX of this chapter.

3-63. Printed Circuit Board Components Removal and Replacement (fig. 3-3, sh 3). When a defective component on the printed circuit board is to be replaced, observe the following maintenance techniques.

a. When unsoldering a component, never force it loose; unsolder the component by using the wicking process described below:

(1) Select a 3/16-inclh tinned copper braid 1 as a wick; if braid is not available, AWG No. 17 or No. 16 stranded wire with 1/2 inch insulation removed.

(2) Dip wick in liquid resin flux.

(3) Place wick onto soldered connection and apply soldering iron onto wick.

(4) When sufficient amount of solder flows onto wick, freeing the component, simultaneously remove iron and wick.

b. If foil is intact, but not covered with solder good contact. Do not attempt to cover with solder.

c. When soldering semiconductor devices, hold the lead being soldered with a pair of pliers or place commercial heat sink device between the component and the solder joint.

d. Always use a heat sink when soldering transistors; a transistor pad with mounting feet is an effective heat sink.

e. broken or damaged printed wiring is usually the result of an imperfection, strain, or careless soldering. To repair small breaks, tin a short piece of hook-up wire to bridge the break, and holding the wire in place flow solder along the length of wire so that it becomes part of the circuitry.

f. Check and clean all replacement component leads prior to soldering, regardless of visual appearance.

g. Use smooth finished tools for bending leads; avoid use of any sharp-edged tool that may pinch or break the lead. Leave a distance of at least twice the diameter of the lead from the end seal of the component to the start of the bend. This rule also applies to all components with soldered leads, such as tantalum capacitors.

h. Position replacement component in the same place as the removed component. Do not mount component on top of another component. Position replacement component so that any identification mark, such as the part number, symbol, value, etc., is readily visible.

i. Observe polarity of replacement diodes, transistors, and electrolytic and tantalum capacitors.

j. Perform direct support testing procedures described in section XX of this chapter.

3-64. Fuse F1 Removal and Replacement (fig. 3-3, sh 2). To remove and replace the fuse Fl, perform the following steps:

a. Remove power supply cover. (Refer to para 3-59, steps ***a*** and ***b.***)

b. Remove fuse F1 from fuse holder.

c. Insert replacement fuse F1 in fuse holder.

d. Replace power supply cover. (Refer to para 3-59, step ***c.***)

3-65. Thermostat S1 Removal and Replacement (fig. 3-3, sh 1). To remove and replace thermostat S1 perform the following steps:

a. Remove power supply cover. (Refer to para 3-59, steps ***a*** and ***b.***)

b. On power supply front cover, remove two phillips head screws that secure thermostat S1.

c. Slide thermostat S1outward from power supply cover for access to electrical wires.

d. Unsolder electrical wires that are connected to thermostat S1. Remove thermostat S1.

e. Solder electrical wires to replacement thermostat S1.

f. Install thermostat S1 on interior of front cover. Secure with two phillips head screws.

g. Install cover on power supply (para 3-59, step ***c***).

3-66. +5 V dc Power Supply 15A4PS1 Overcurrent Control R17 Adjustment. Adjustment of overcurrent control R17 on printed circuit board B is required when transistor Q3, resistor R25, or overcurrent potentiometer R17 is replaced and voltage and current indications do not reflect maximum ratings.

a. Test Equipment and Materials. Table 3-20 lists the test equipment for the adjustment of overcurrent control R17.

b. Test Connections and Conditions. The overcurrent control is adjusted in a bench test setup. Prior to performing adjustment, prepare equipment as follows:

(1) Set vom function switch to AC and range switch to 250 V. Connect vom to variable transformer output plug.

(2) Connect variable transformer to power source. Set power switch on and observe that indicator light lights. Adjust variable transformer for 115 V ac indication on vom. Set variable transformer power switch to off. Disconnect vom.

(3) Remove power supply cover. (Refer to paragraph 3-59, steps ***a*** and ***b.***)

(4) Locate potentiometer R17 on printed circuit board B (fig. 3-3, sh 3). The adjustable (inner) section of R17 is solder-sealed to the outer casing. This seal prevents inadvertent movement of the wiper following factory adjustment. Unsolder the seal and adjust R17 to full cw position.

(5) Connect equipment as shown in figure 3-12.

Table 3-20. Test Equipment Required for 5 V DC Power Supply 15A4PS1 Overcurrent Control R17 Adjustment

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449-S	1	Belden
Adapter, AC, 3-Wire to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	7	Pomona
Adapter, Binding Post to Banana Plug	2894	2	Pomona
Meter, Amp, Multirange, DC	931-2902001	1	Weston Instruments
Meter, Multifunction	450B	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual Trace	475	1	Tektronix
Rheostat, Carbon Compression	82905	1	Central Scientific
Test Lead, Banana Plug to Alligator Clip	1166-36-B	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (B)	3	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (R)	2	Pomona
Test Lead, BNC Plug to Double Banana (44 inches)	11001A	1	Hewlett-Packard
Test Lead, Spade Lug to Banana Plug	370-24-B	1	Pomona
Test Lead, Spade Lug to Banana Plug	1370-24-R	1	Pomona
Test Lead, Spade Lug to Spade Lug	1743-36-R	1	Pomona
Transformer, Variable	3PN2210	1	Staco

c. Initial Test Equipment Settings. Initial test equipment settings for the adjustment procedure are as follows:

Control	Position
Multifunction Meter	
LINE	On (up)
FUNCTION	DC
RANGE	AUTO
CONTROL	LOCAL
TRIGGER	INT

Control	Position
Oscilloscope	
POWER	ON
VERT MODE	CHI
CH1 VOLTS/DIV	As required to observe signal
AC-GND-DC	AC
HORIZ DISPLAY	A
TRIG MODE	NORMAL
COUPLING	AC

Control	Position
Oscilloscope	
SOURCE	NORM
TIME/DIV	As required to observe signal
A TRIGGER - SLOPE and LEVEL	As required for stable display.
Variable Transformer	
Power	On

d. Adjustment Procedure. Perform adjustment as follows:

(1) Disconnect load from power supply by disconnecting test lead from positive terminal of dc ammeter.

(2) On front side of power supply (fig. 3-3, sh 1), adjust VDC control for an indication of 4.75 V dc on the multifunction meter.

(3) Reconnect test lead to positive terminal of dc ammeter as shown in figure 3-12.

(4) Adjust rheostat for 13.9 A (110 percent of 40 deg C rating for unit) indication on dc ammeter.

(5) Observe oscilloscope and adjust R17 (fig.3-3, sh 3) on circuit card in ccw direction until output ripple increases sharply and oscilloscope pattern changes.

(6) On variable transformer, set power switch to off.

(7) On power supply printed circuit board B, solder seal the adjustable (inner) section of R 17 to the outer casing to prevent any further movement of the wiper, and increase resistance of carbon compression rheostat (rotate ccw).

(8) After soldering, check setting of R17 by placing variable transformer power switch to the on position. Adjust carbon compression rheostat to produce a load current of 13.9 A while observing the oscilloscope and current meter. When load current indication on current meter reaches 13.9 A, verify that output ripple increases sharply and oscilloscope pattern changes. If indications on oscilloscope are not as specified, place variable power transformer power switch to the off position, unsolder seal of R17, place variable power transformer to the on position, and repeat steps (1) through (8).

(9) Adjust rheostat to reduce load current to 12.6 A.

(10) On front of power supply, adjust VDC control for indication of 5 $\pm$0.05 V dc on multifunction meter.

(11) On variable transformer, set power switch to off.

(12) Disconnect test equipment and replace cover on power supply (refer to paragraph 3-59, step ***c***).

(13) Perform direct support testing described in section XX of this chapter procedures.

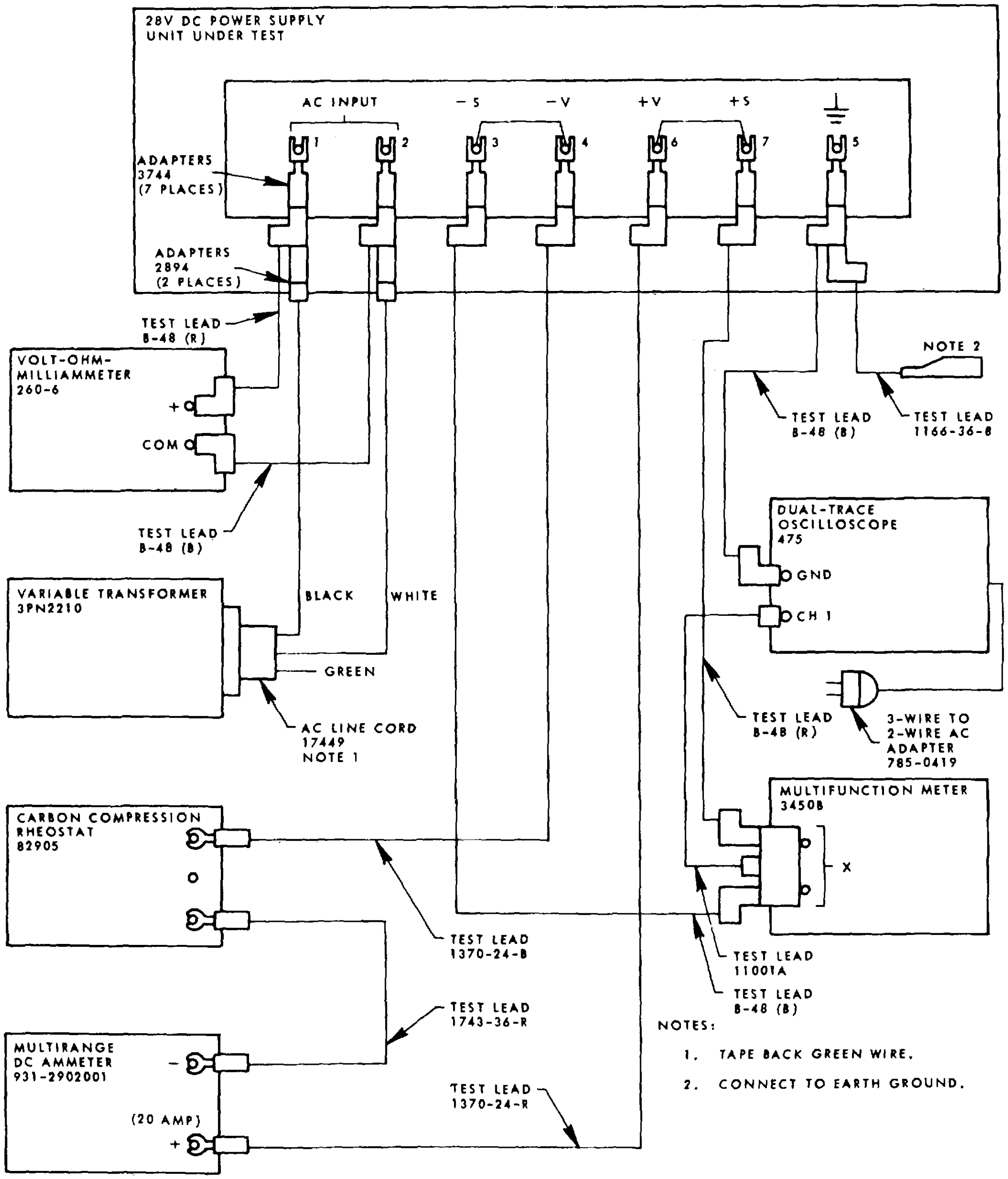


Figure 3-12. 5 V dc power supply 15A4PSL, A4PS2 performance test setup diagram.

SECTION XIII. MAINTENANCE OF -5 V DC POWER SUPPLY 15A4PS2

3-67. General. This section provides instructions for replacing chassis mounted components in -5 V dc power supply 15A4PS2 during direct support maintenance. This section also provides adjustment procedures for overcurrent control R17.

3-68. Power Supply Cover Removal and Replacement (fig. 3-4, sh 1). To gain access to the internal power supply parts, the power supply cover must be removed. Remove and replace the cover as follows:

- ***a.*** On front of power supply, remove bottom three phillips head screws.
- ***b.*** Place power supply bottom side up on bench. Remove six phillips head screws on bottom side and remove cover.
- ***c.*** For access to power supply components, careful slide power supply cover away from chassis until extended to length of cable.
- ***d.*** To replace power supply cover, align with mounting holes on front and bottom of supply. Secure cover to supply with six phillips head screws on bottom and three on lower front of power supply.

3-69. Power Transformer T1 Removal and Replacement (fig. 3-4, sh 4 and 6). To remove and replace power transformer T1, proceed as follows:

- ***a.*** Remove power supply cover. (Refer to paragraph 3-68).
- ***b.*** Tag destination points of wires connected to power transformer for identification.
- ***c.*** Remove power transformer T1 cable tie-wraps
- ***d.*** Remove four corner screws that secure printer circuit (pc) board B. Fold pc board B over for access to transformer connections.
- ***e.*** Unsolder and disconnect wires connected to power transformer T1
- ***f.*** Remove nut and lock washer from each of the four transformer TI mounting bolts.
- ***g.*** Remove power transformer T1.
- ***h.*** Install replacement power transformer T1 in power supply chassis so that mounting holes are aligned with mounting holes on chassis.
- ***i.*** Install lock washer and nut on each power transformer T1 mounting bolt and secure to chassis
- ***j.*** Solder transformer wires to applicable tagged destination points.
- ***k***. Secure pc board B with corner screws. Replace cover on power supply. (Refer to paragraph 3-68).
- ***m***. Perform direct support testing procedures described in section XX1 of this chapter.

3-70. Filter Capacitor C8 Removal and Replacement (fig. 3-4, sh 4 and 6). To remove and replace filter capacitor C8, proceed as follows:

- ***a.*** Remove power supply cover. (Refer to paragraph 3-68).
- ***b.*** Place power supply chassis top side up on bench.
- ***c.*** Noting polarity, tag destination points of wires connected to filter capacitor C8 for identification. Remove two screws that secure wires to capacitor.
- ***d.*** Remove capacitor C8 from mounting clamp.
- ***e.*** Install replacement filter capacitor C8 in power supply capacitor mounting clamp.
- ***f*** Noting polarity, connect tagged wires to applicable terminals on filter capacitor C8 with screws removed in step c.
- ***g.*** install cover on power supply. (Refer to paragraph 3-68).
- ***h.*** Perform direct support testing procedures described in section XXI of this chapter.

3-71. Series Regulator Transistors Q8 and Q9, Removal and Replacement (fig. 3-4, sh 5). To remove and replace series regulator transistors Q8 and Q9, proceed as follows:

- ***a.*** Remove power supply cover. (Refer to paragraph 3-68).
- ***b.*** Place power supply bottom side up on bench.
- ***c.*** On front cover of power supply, remove eight hex head bolts that secure transistors Q8 and Q9 heat sink assemblies and two phillips head screws that secure component board C.
- ***d.*** Removed cable tie-wrap screw.
- ***e.*** Remove transistor Q8 and Q9 and heat sink assemblies along with component board C.
- ***f.*** Tag for identification and unsolder two wires on bottom side of transistor Q8 or Q9, as applicable.
- ***g***. Remove hex nut from back of the two mounting screws that secure transistor Q8 or Q9 to the heat sink assembly.
- ***h.*** Remove transistor Q8 or Q9 from mounting screws. Remove and inspect insulating wafer. Replace if cracked.
- ***i.*** Coat both sides of insulating wafer with heat sink compound (Dow Corning No. 340 silicone grease, or equivalent).
- ***j.*** Install insulating wafer and replacement transistor Q8 or Q9 on heat sink mounting screws.
- ***k.*** Install hex nut on each mounting screw to secure transistor Q8 or Q9 to heat sink assembly.
- ***l.*** Solder tagged wires to applicable pins on bottom of transistor Q8 or Q9.
- ***m.*** Install component board C and heat sink assemblies with transistors Q8 and Q9 or, interior side of front cover, so that heat sink mounting holes are aligned with mounting holes on front cover. Replace retaining screws on component board C.

- ***n.*** Secure heat sink assemblies to front cover with eight hex head mounting bolts.
- ***o.*** Secure cable lie-wrap screw to cover.
- ***p.*** Install cover on power supply. (Refer to para graph 3-68).
- ***q.*** Perform direct support testing procedures described in section XX1 of this chapter.

3-72. Rectifiers CR8 and CR10 Removal and Replacement (fig. 3-4, sh 4). To remove and replace a rectifier, proceed as follows:

- ***a.*** Remove power supply cover (para 3-68).
- ***b.*** Place power supply top side up on bench.
- ***c.*** Identify and unsolder wire connected to rectifier anode.
- ***d.*** Identify wires connected to rectifier cathode.
- ***e.*** Remove hext nut and electrical wire from rectifier stud. Remove rectifier from power supply.
- ***f.*** Remove and inspect mica insulating washer. Replace if cracked.
- ***g.*** Place mica insulating washer over rectifier stud and insert rectifier stud through mounting hole power supply chassis.
- ***h.*** Install identified wire and hex nut on rectifier stud.
- ***i.*** Solder identified wire to rectifier anode.
- ***j.*** Replace power supply cover (para 3-68).
- ***k.*** Perform direct support testing procedures described in section XXI of this chapter.

3-73. Printed Circuit Board Components Removal and Replacement (fig. 3-4, sh 3). When a defective component on the printed circuit board is to be replaced observe following maintenance techniques.

- ***a.*** When unsoldering components from board, never pry or force it loose; unsolder component by using wicking process described below:
  - **(1)** Select a 3/I 6-inch tinned copper braid for as a wick; if braid is not available, se AWG No. 17 or No. 16 stranded wire M 1/2 inch insulation removed.
  - **(2)** Dip wick in liquid rosin flux.
  - **(3)** Place wick onto soldered connection apply soldering iron onto wick.
  - **(4)** When sufficient amount of solder flows onto wick, freeing component, simultaneously remove iron and wick.
- ***b.*** If foil is intact, but not covered with solder, it is a good contact. Do not attempt to cover with solder.
- ***c.*** When soldering semiconductor devices, hold lead being soldered with a pair of pliers, or place a commercial heat -.sink, device between the component and the solder joint.
- ***d.*** Always use a heat sink when soldering transistors; a transistor pad with mounting feet is an effective heat sink.
- ***e.*** Broken or damaged printed wiring is usually the result of an imperfection, strain, or careless soldering. To repair small breaks, tin a short piece of hook-up wire to bridge the break, hold wire in place, and flow solder along length of wire so that it becomes part of circuitry.
- ***f.*** Check and clean all replacement component leads prior to soldering, regardless of visual appearance.
- ***g.*** Use smooth finished tools for bending leads; avoid use of any sharp-edged tool that may pinch or break lead. Leave a distance of at least twice the diameter of the lead from end seal of component to start of bend. This rule also applies to all components with soldered leads, such as tantalum capacitors.
- ***h.*** Position replacement component in the same place as removed component. Do not mount a component on top of another component. Position replacement component so that any identification mark, such as the part number, symbol, value, etc., is readily visible.
- ***i.*** Observe polarity of replacement diodes, transistors, and electrolytic and tantalum capacitors.
- ***j.*** Perform direct support testing procedures described in section XXI of this chapter.

3-74. -5 V dc Power Supply 15A4PS2 Overcurrent Control R17 Adjustment (fig. 3-4, sh 3). Adjustment of overcurrent control R17 on printed circuit board B is required when transistor Q3, resistor R28, or overcurrent potentiometer R17 is replaced, and voltage and current indications do not reflect maximum ratings.

- ***a.*** ***Test Equipment and Materials.*** Tables 3-21 lists the test equipment required for adjustment.

Table 3-21. Test Equipment Required for -5 V DC Power Supply 15A4PS2 Overcurrent Control R17 Adjustment

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449-S	1	Belden
Adapter, AC, 3-Wire to 2-Wire	7B5-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	7	Pomona
Adapter, Binding Post to Banana Plug	2894	2	Pomona
Meter, Amp, Multirange, DC	931-2902001	1	Weston Instruments
Meter, Multifunction	3450B	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual Trace	475	1	Tektronix
Rheostat, Carbon Compression	82905	1	Central Scientific
Test Lead, Banana Plug to Alligator Clip	1166-36-B	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (B)	3	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (R)	2	Pomona
Test Lead, BNC Plug to Double Banana (44 inches)	1101A	1	Hewlett-Packard
Test Lead, Spade Lug to Banana Plug	1370-24-B	1	Pomona
Test Lead, Spade Lug to Banana Plug	1370-24-R	1	Pomona
Test Lead, Spade Lug to Spade Lug	1743-36-R	1	Pomona
Transformer, Variable	3PN2210	1	Staco

b. Test Connections and Conditions. The overcurrent control is adjusted in a bench test setup. Prior to performing adjustment, prepare equipment as follows:

(1) Set vom function switch to ac and range switch to 250 V. Connect vom to variable transformer output plug.

(2) Connect variable transformer to power source. Set power switch to on and observe that indicator lights. Adjust variable transformer for 115 V ac indication on vom. Set variable transformer power switch to off. Disconnect vom.

(3) Remove power supply cover. (Refer to paragraph 3-68.)

(4) Locate potentiometer R17 on printed circuit board B (fig. 3-4, sh 3). The adjustable (inner) section of RI7 is solder-sealed to the outer casing. This seal prevents inadvertent movement of the wiper following factory adjustment. Unsolder the seal and adjust R1 7 to full cw position.

(5) Connect equipment as shown in figure 3-12.

(6) Adjust rheostat for maximum resistance (fully ccw).

c. Initial Test Equipment Settings. Initial test equipment settings for the adjustment procedure are as follows:

Control	Position
Multifunction meter	
LINE	On (up)
FUNCTION	DC
RANGE	AUTO
CONTROL	LOCAL
TRIGGER	INT
Oscilloscope	
POWER	On

Control	Position
Oscilloscope	
VERT MODE	CH 1
CH I VOLTS/DIV	As required to observe signal
CH I AC-GND-DC	AC
HORIZ DISPLAY	A
TRIG MODE	NORMAL
COUPLING	AC
SOURCE	NORM
TIME/DIV	As required to observe signal
A TRIGGER - SLOPE and LEVEL	As required for stable display
Variable transformer	
Power	On

d. Adjustment Procedure. Perform adjustment as follows:

(1) Disconnect load from power supply by disconnecting test lead from negative terminal of dc ammeter.

(2) On front side of power supply (fig. 3-4, sh 1) adjust VDC control for an indication of 4.75 V dc on multifunction meter.

(3) Reconnect test lead to negative terminal of dc ammeter as shown in figure 3-12.

(4) Adjust rheostat for 5.6 A (110 percent of 40 deg C rating for unit) indication on dc ammeter.

(5) Observe oscilloscope and adjust R17 (fig. 3-4, sh 3) on circuit card in a ccw direction until output ripple increases sharply and oscilloscope pattern changes.

(6) On variable transformer, set power switch to off.

(7) On power supply printed circuit board B, solder seal the adjustable (inner) section of R17 to the outer casing to prevent any further movement of the wiper, and increase resistance of carbon compression rheostat (rotate ccw).

(8) After soldering, check setting of R17 by placing variable transformer power switch to the on position. Adjust carbon compression rheostat to produce a load current of 5.6 A while observing the oscilloscope and current meter. When load current indication on current meter reaches 5.6 A, verify that output ripple increases sharply and oscilloscope pattern changes. If indications on oscilloscope are not as specified, place variable power transformer power switch to the off position, unsolder seal of R17, place variable power transformer to the on position, and repeat steps (1) through (8).

(9) Adjust rheostat to reduce load current to 5.1 A.

(10) On front of power supply, adjust VDC control for indication of -5 $\pm$0.05 volts on multifunction meter.

(11) On variable transformer, set power switch to off.

(12) Disconnect test equipment and replace cover on power supply. (Refer to paragraph 3-68.)

(13) Perform direct support testing procedures described in section XXI of this chapter.

SECTION XIV. MAINTENANCE SYSTEM EM STATUS LOGIC UNIT 15A5

3-75. General. This section provides instructions for replacing single circuit cards A, R1, and R2, dual circuit cards D and E, and F and G during direct support maintenance.

3-76. System-Status Logic Unit Access Procedure for Maintenance (fig. 3-13). Prior to performing removal and replacement of the circuit cards, perform the following steps:

a. Set fault and system status panel power on circuit breaker to OFF.

b. On front panel of logic unit power supply 15A4, position +5 V dc and -5 V dc power supply circuit breakers to OFF.

c. On front panel of system status logic unit, loosen three front panel fastening screws that secure hinged access door and swing access door down.

d. Loosen two screws on each retaining bar and remove both bars.

e. After performing direct support maintenance, replace retaining bars and secure with two screws.

f. To secure access door, swing door up and secure with fastening screws.

g. Set -5 V dc circuit breaker to ON.

h. Set +5 V dc circuit breaker to ON.

i. Set fault and system status panel power ON circuit breaker to ON.

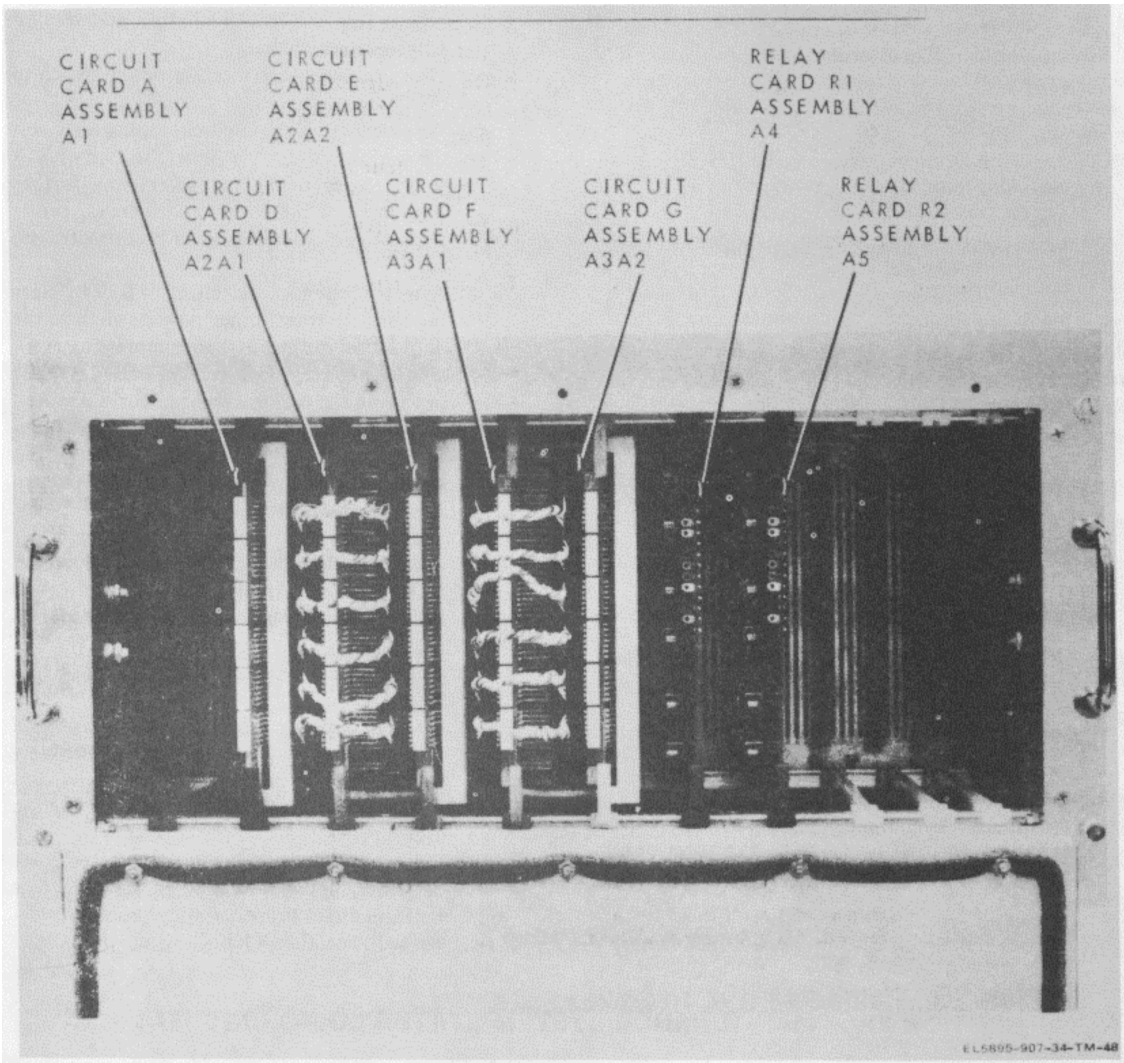


Figure 3-13. System status logic unit 15A5 parts location.

3-77. Single Circuit Cards A, R1 and R2 Removal and Replacement. To remove and replace the single circuit cards A, R1 and R2, perform following steps

- ***a.*** Access system status logic unit. (Refer to paragraph 3-76.)
- ***b.*** Using circuit card extractor levers, loosen circuit card. Grasp front edge of circuit card with finger and pull forward to remove.
- ***c.*** Insert replacement circuit card into card guide and press into jack until circuit card and jack is completely mated.
- ***d.*** Secure equipment. (Refer to paragraph 3-76)

3-78. Dual Circuit Cards D and E, and F and G Removal and Replacement. To remove and replace the dual circuit cards, perform the following steps:

- ***a.*** Access system status logic unit. (Refer to paragraph 3-76).
- ***b.*** Using circuit card extractor levers of both circuit cards of the dual assembly, loosen circuit cards. Grasp front edge of both circuit cards with fingers and pull forward to remove.
- ***c.*** On front edge of dual circuit card assembly, disconnect jumper cables from circuit card to be replaced.
- ***d.*** Remove four assembly screws, spacers, washers and nuts at corners of dual circuit card assembly.
- ***e.*** Separate circuit cards and remove circuit card to be replaced.
- ***f.*** Position replacement circuit card t remaining circuit card with spacers and fasten together with screws, washers and nuts.
- ***g.*** Connect jumper cables to replacement circuit card.
- ***h.*** Insert dual circuit card assembly into card guides and press into jacks until circuit card and jack is completely mated.
- ***i.*** Secure equipment. (Refer to paragraph 3-76).

Section XV. MAINTENANCE OF CHANNEL FREQUENCY INDICATOR 15A6

3-79. General. This section provides instructions for replacing line replaceable units of the channel frequency indicator 15A6, such as switches and connectors, during direct support maintenance.

3-80. Channel Frequency Indicator 15A6 Removal and Replacement (fig. 3-14). To gain access to replaceable parts, the channel frequency indicator must be removed from the electrical equipment rack. To remove and replace the channel frequency indicator, perform the following steps:

- ***a.*** On front panel of channel frequency indicator loosen four captive screws securing panel to electrical equipment rack.
- ***b.*** Pull channel frequency indicator forward until rear mounted connectors are accessible, being careful not to overextend connecting cables. At rear of channel frequency indicator, tag the three cables and disconnect from connectors.
- ***d.*** Remove channel frequency indicator and place on workbench.
- ***e.*** To replace channel frequency indicator into electrical rack, identify and reconnect cables remove in step c.
- ***f.*** Position channel frequency indicator panel it electrical equipment rack and secure with captivy screws.

3-81. Thumbwheel Switch Removal and Replacement To remove and replace a thumbwheel switch, perform the following steps:

- ***a.*** Refer to paragraph 3-80 for instructions for removing channel frequency indicator from electrical equipment rack.
- ***b.*** At rear of thumbwheel switch assembly, tag and unsolder wires at printed circuit board.
- ***c.*** Remove four phillips head screws, nuts, flat washers and lock washers securing thumbwheel switch assembly to front panel, and remove from front panel.
- ***d.*** Remove two nuts and associated hardware securing switch sections.
- ***e.*** Mount replacement switch in channel frequency indicator and secure with hardware removed in step ***d.***
- ***f.*** Identify by tag and reso!der wires removed in step ***b.***
- ***g.*** Mount replacement switch assembly in channel frequency indicator front panel, and secure with hardware removed in step ***c*** above.
- ***h.*** Execute performance test as outlined in section XXII of this chapter.
- ***i.*** Refer to paragraph 3-80 for instructions for replacing channel frequency indicator in electrical equipment rack.

3-82. Multipin Connector Removal and Replacement. To remove and replace one of the multipin connectors, perform the following steps:

- ***a***. Refer to paragraph 3-80 for instructions for removing channel frequency indicator from electrical equipment rack.

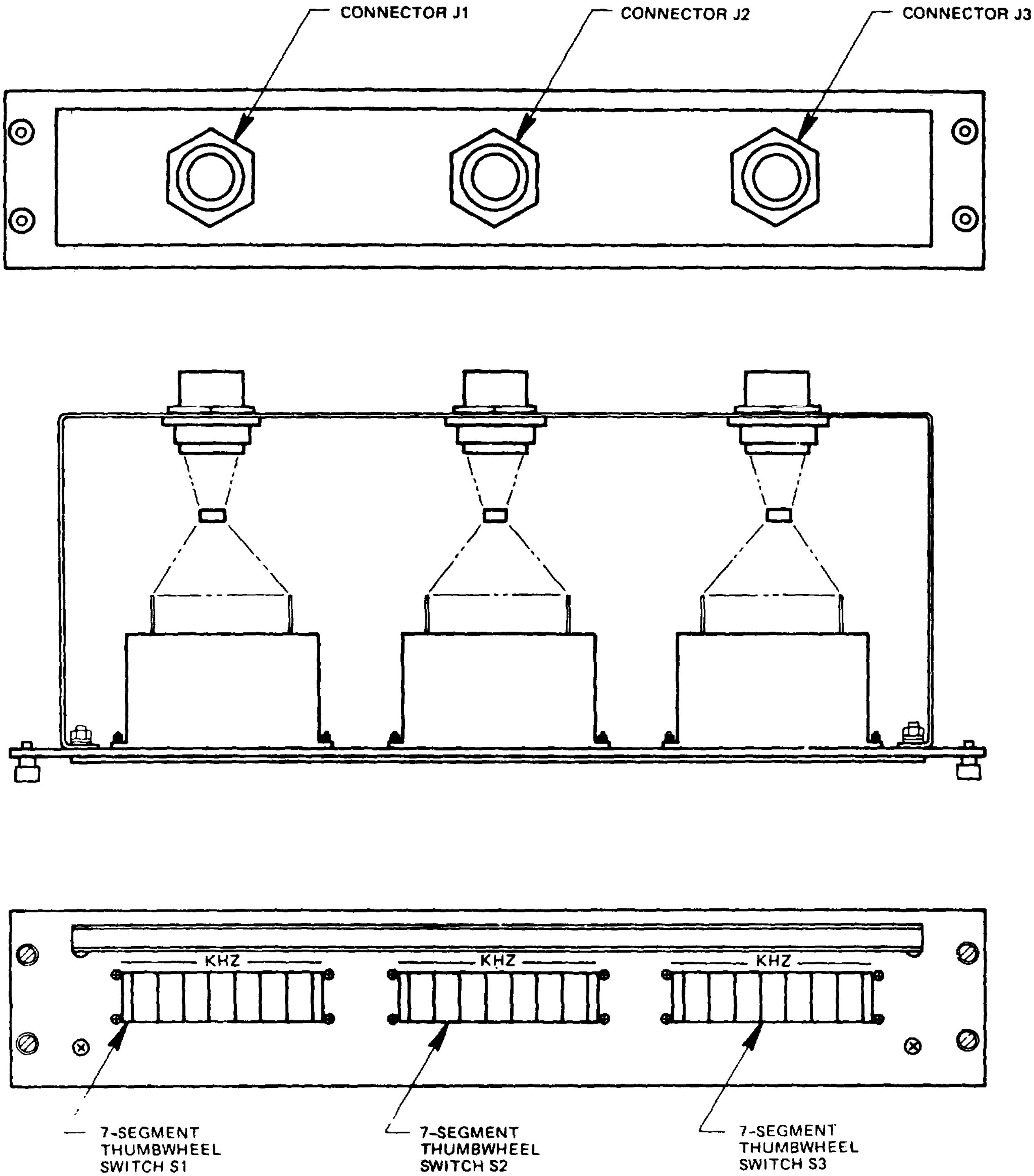


Figure 3-14. Channel frequency indicator 15A6 parts location

b. Repair or replace multipin connector as directed in paragraph 3-4***d.***

c. Execute performance test as outlined in section XXII of this chapter.

d. Refer to paragraph 3-80 for instructions for replacing channel frequency indicator in electrical equipment rack.

SECTION XVI. MAINTENANCE OF FAULT AND SYSTEM STATUS PANEL 14A16

3-83. General. This section provides instructions replacing line replaceable units of the fault and system status panel 14A16 for AN/FSC-78(V) or AN/FSC 79, such as switches, circuit breakers, indicators, multipin connectors, and the power supply during direct supply maintenance. Removal and replacement procedures based on the assumption that line replaceable units located in the control console.

3-84. Fault and System Status Panel 14A16 Removal and Replacement (fig. 3-15). To remove 4 replace the fault and system status panel 14A16, perform the following steps:

a. On front panel of fault and system status panel press CIRCUIT BREAKER/POWER ON to off; observe that POWER ON indicator light out.

b. Loosen four front-panel captive screws and withdraw chassis until slides lock in extended position

c. At rear chassis of fault and system status panel tag cables for identification and disconnect from connectors J1, J2, J3, and J4.

d. Remove nut and washer from GND terminal remove ground lead.

e. Release chassis slide locks and remove fault system status panel from control console.

f. To install replacement fault and system status panel, position chassis to engage slide mechanism and slide inward until slides lock in extended position.

g. At rear chassis of fault and system status panel, connect ground lead to GND terminal and section with nut and washer.

h. Identify cables by tag and connect to connect J1 J2, J3 and J4.

i. Release chassis slide locks and push fault and system status panel into console.

j. Tighten four captive screws securing fault system status panel in control console.

k. On front panel of fault and system status panel, press CIRCUIT BREAKER/POWER ON to observe that POWER ON indicator light lights (Refer to paragraph 3-84 step a.)

3-85. Power Supply 14A16PS1 Removal and Replacement (fig. 3-15). To remove and replace the power supply 14A16PS1, perform the following steps:

a. Perform steps ***a, b*** and ***c*** of paragraph 3-84 removing connector J1 only.

b. Remove 10 screws and washers securing fault system status panel access cover and remove access cover.

c. Remove four screws and attaching hardware securing power supply PS1 to fault and system status panel chassis and position to gain access to TB-1.

d. Remove two screws securing power supply terminal board TB1 protective cover and remove terminal board cover.

e. At terminal board TB1, tag wires for identification and disconnect.

f. Remove power supply from fault and system status panel chassis.

g. To install replacement power supply PS1, position in fault and system status panel to gain access to TB-1.

h. Identify wires by tag and connect to power supply terminal board TB1

i. Replace terminal board TB1 cover and secure with two mounting screws. Position PS1 in chassis and secure with four mounting screws.

j. Position access cover on fault and system status panel chassis and secure with 10 screws and washers.

k. Mount fault and system status panel in control console and restore ac power (refer to paragraph 3-84, steps ***h, i, j,*** and ***k.***

3-86. Relay K1 Removal and Replacement (fig. 3-15). To remove and replace the relay K , perform the following steps:

a. Remove ac power from fault and system status panel and place in extended position of chassis slides. (Refer to paragraph 3-84, steps ***a, b*** and ***c***).

b. Remove 10 screws and washers that secure fault and system status panel access cover, and remove cover.

c. Grasp relay K1 and pull upward to withdraw from relay socket.

d. To install replacement relay K1, position over relay socket and carefully press into place.

e. Secure fault and system status panel access cover in place with 10 screws and washers.

f. Mount fault and system status panel in control console and restore ac power (refer to paragraph 3-84, steps ***h, i ,j,*** and ***k***)

3-87. Audible Alarm Removal and Replacement. To remove and replace the audible alarm, perform the following steps:

a. Remove ac power from fault and system status panel and place in extended position of chassis slides. (Refer to paragraph 3-84, steps *b* and ***c***).

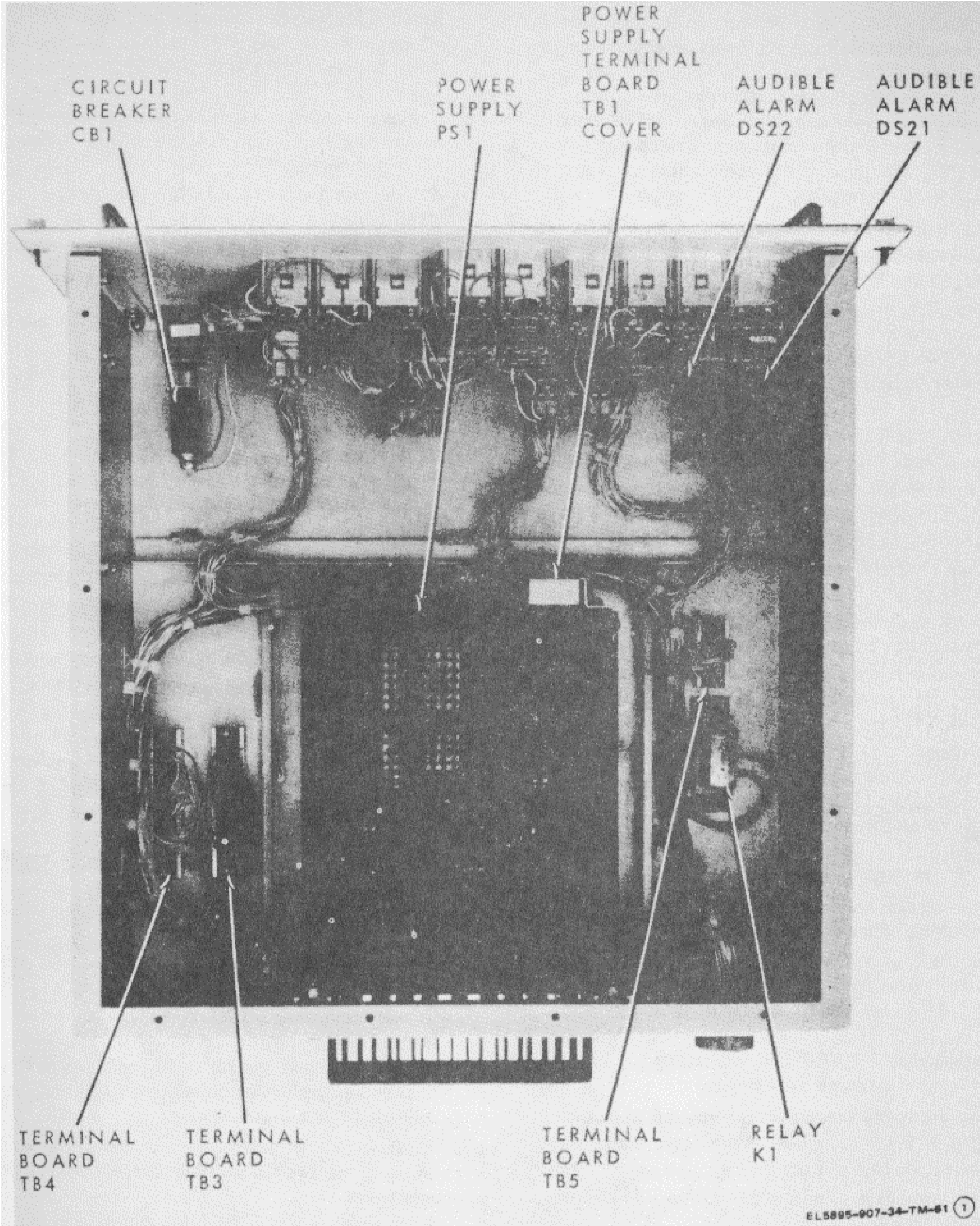


Figure 3-15. Fault and system status panel 14A16, parts location (sheet 1 of 2).

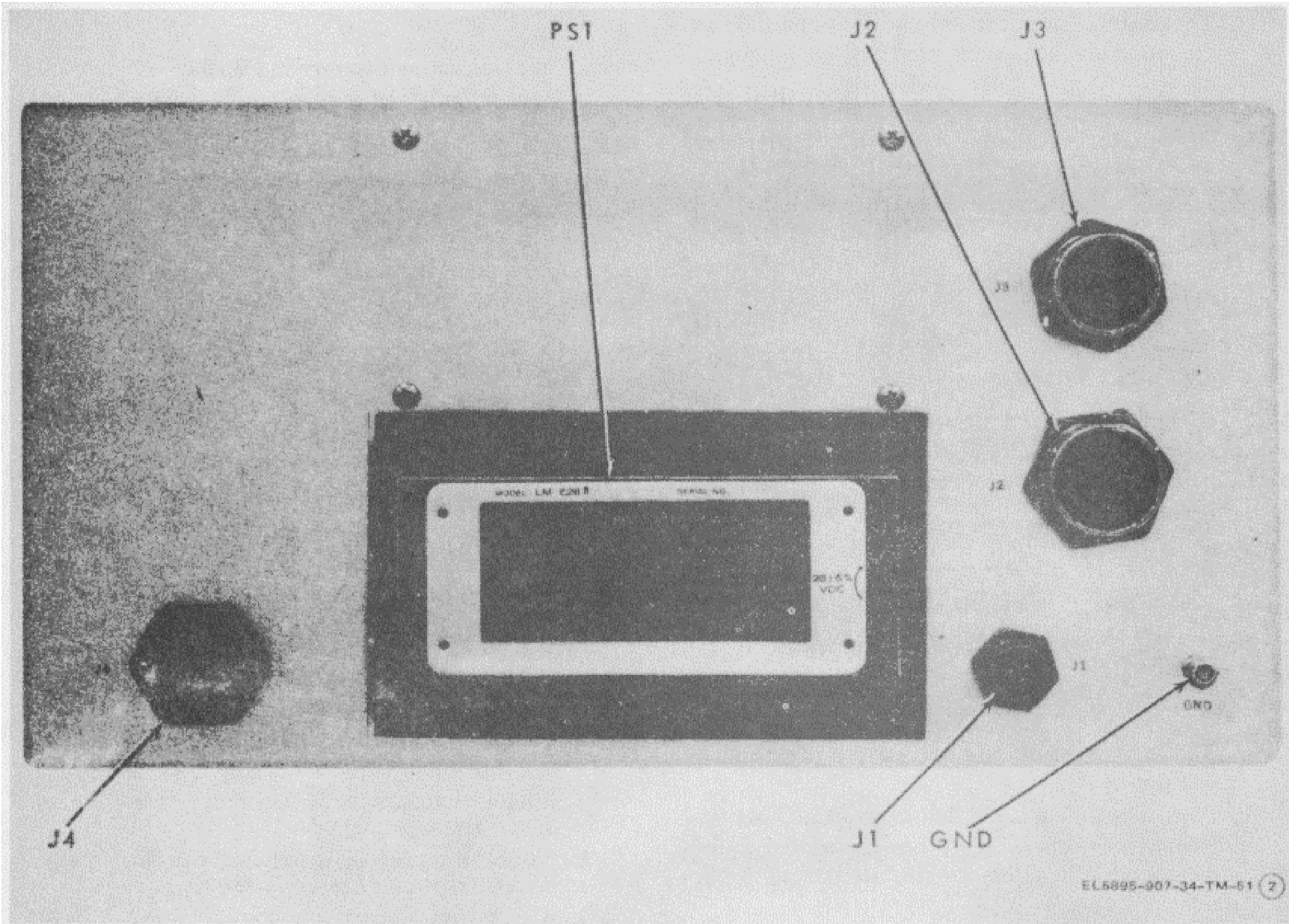


Figure 3-15. Fault and system status panel 14A16, parts location (sheet 2 of 2).

b. Remove 10 screws and washers securing fault and system status panel access cover and remove access cover.

c. Identify wires by tag and disconnect from screw terminals at audible alarm.

d. Remove four mounting screws with hex nuts and washers securing audible alarm bracket to chassis

e. Remove mounting nut that secures audible alarm to mounting bracket and remove audible alarm

f. To install replacement audible alarm, position or mounting bracket, install mounting nut, and tighten.

g. Position audible alarm mounting bracket on chassis; install four mounting screws with hex nuts and washers and tighten.

h. Identify wires by tag and connect to audible alarm screw terminals.

i. Secure fault and system status panel access cover in place with 10 screws and washers.

j. Mount fault and system status panel in control console and restore ac power. (Refer to paragraph 3-84, steps ***h, i, j*** and ***k***).

3-88. Switch Indicator Lamp Removal and Replacement (fig. 3-11). To remove and replace a switch indicator lamp perform the following steps:

a. Remove ac power from fault and system status panel and place in extended position of chassis slides. (Refer to paragraph 3-84).

b. Remove 10 screws and washers that secure fault and system status panel access cover, and remove access cover.

c. Pull switch indicator lamp lens forward to stop (fig. 3-11).

d. Rotate lens one-quarter turn ccw to release bulb board.

e. Push, then pull lens and bulb board from housing

f. Remove control capsule (if one is mounted on in indicator switch assembly) by unsnapping from holder.

g. Tag and unsolder wires from housing and switch assembly as required.

h. Rotate mounting screws inside housing ccw until housing is loose.

i. Push assembly from rear through sleeve until free of chassis panel (fig. 3-11).

j. Clean all wires of solder and ensure they are properly stripped.

k. To replace switch indicator lamp, insert assembly) into opening in chassis panel and press sleeve tight to back of panel.

l. Rotate mounting screws inside housing clockwise until housing is tight.

m. Identify wires by tag and solder to replacement switch indicator lamp assembly.

n. Align notch in bulb board with metal tab on side of housing, then push lens and bulb board into housing.

o. Rotate lens one-quarter turn clockwise to horizontal position.

p. Press lens into final position.

q. Snap control capsule (removed in step 1) back into holder.

r. Secure fault and system status panel access cover in place with 10 screws and washers.

s. Mount fault and system status panel in control console and restore ac power (refer to paragraph 3-84, steps ***h, i, j,*** and ***k***).

3-89. Circuit Breaker Indicator Lamp Assembly Removal and Replacement (fig. 3-16). To remove and replace a circuit breaker indicator lamp assembly, perform the following steps:

a. Remove ac power from fault and system status panel and place in extended position of chassis slides. (Refer to paragraph 3-84, steps ***a, b,*** and ***c***).

b. Remove 10 screws and washers securing fault and system status panel access cover and remove access cover.

c. Pull lens and lamp assembly forward to stop.

d. Press lens and lamp assembly back one click.

e. Pull lens and lamp assembly forward and remove.

f. Remove circuit breaker from housing.

g. Tag and unsolder wires from housing and switch assembly as required.

h. Turn center slotted captive mounting screw ccw and pull housing forward from panel.

i. To replace circuit breaker indicator lamp assembly, insert housing into opening in chassis panel.

j. Rotate slotted captive mounting screw cw to mount housing to chassis.

k. Solder all tagged wires previously removed to replacement circuit breaker assembly.

l. Attach circuit breaker to housing.

m. Press lens and lamp assembly into position.

n. Secure fault and system status panel access cover in place with 10 screws and washers.

o. Mount fault and system status panel in control console and restore ac power (refer to paragraph 3-84, steps *b* and ***k***).

3-90. K1 Relay Socket Removal and Replacement (fig. 3-15). To remove and replace the K1 relay socket, perform the following steps:

a. Remove ac power from fault and system status panel and place in extended position of chassis slides. (Refer to paragraph 3-84, steps ***a, b*** and ***c***).

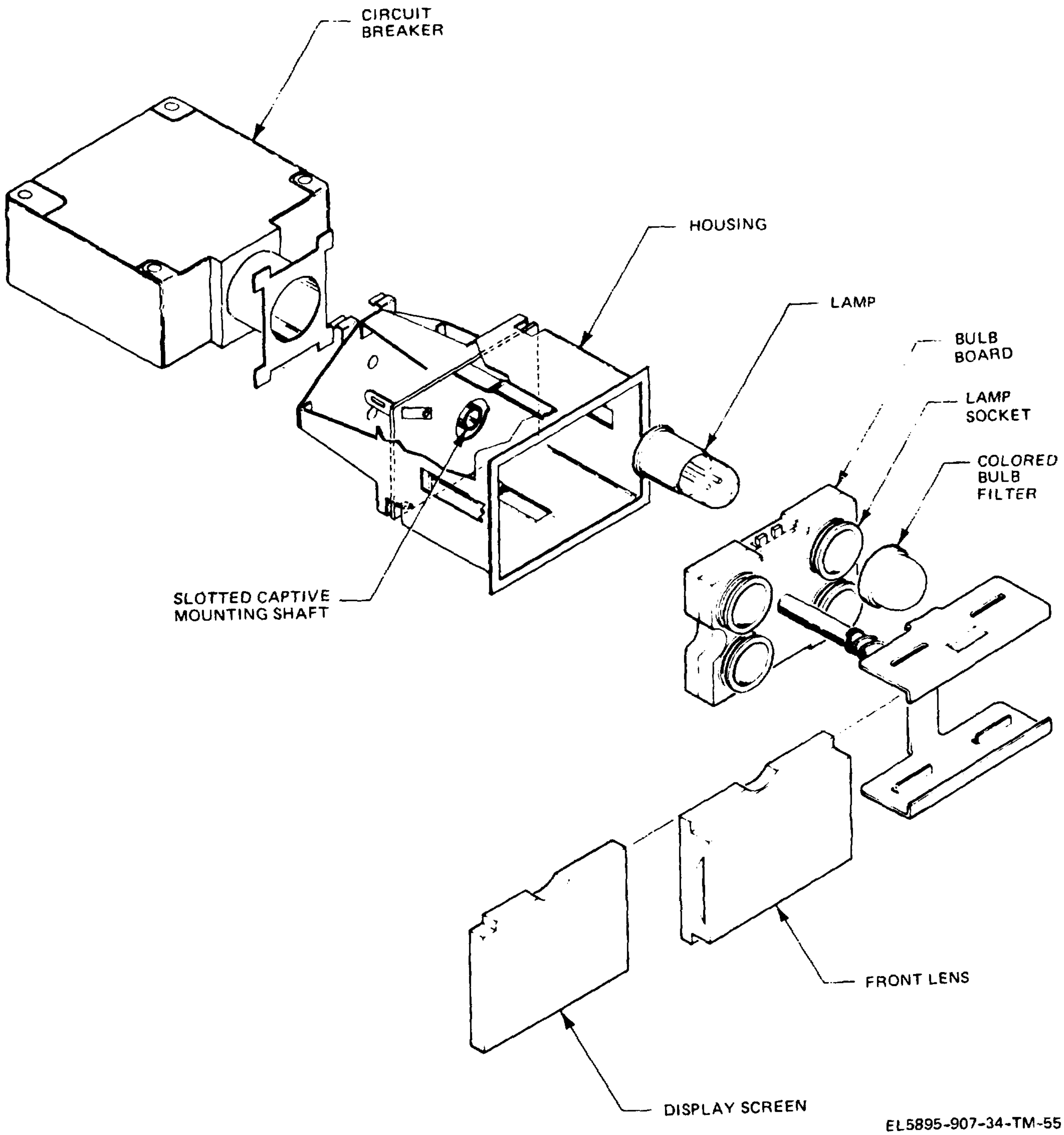


Figure 3-16. Circuit breaker indicator lamp assembly, exploded view.

b. Turn off LOGIC unit power supply (15A4) circuit breakers.

c. Remove 10 screws and washers securing fault al system status panel access cover and remove access cover.

d. Remove relay K1 from its socket.

e. Remove two screws with hex nuts and washer securing relay mounting bracket to fault and system status panel chassis.

f. Tag wires for identification and unsolder from relay socket terminals.

g. Remove retainer from relay socket and remove socket from mounting bracket.

h. To install replacement relay socket, position mounting bracket and secure with retainer.

i. Identify wires by tag and solder to socket terminals.

j. Position relay bracket on chassis, install two screws with hex nuts and washers and tighten

k. Install relay K 1 in relay socket.

l. Secure access cover on fault and system status panel with 10 screws and washers.

m. Turn on LOGIC unit power supply (15A4) -5 dc circuit breaker and then +5 V dc circuit breaker.

n. Mount fault and system status panel in control console and restore ac power (refer to paragraph 3-84, steps ***h, i, j*** and ***k***).

3-91. Multipin Connector Removal and Replacement To remove and replace a multipin connector, perform the following steps:

a. Remove ac power from fault and system status panel and place in extended position of chassis slides (refer to paragraph 3-84, steps ***a, b, c, d,*** and ***e***)

b. Remove 10 screws and washers that secure fault and system status panel access cover

c. Repair or replace multipin connector as directed in paragraph 3-4***d***.

d. Secure access cover on fault and system status panel with 10 screws and washers.

e. Mount fault and system status panel in control console and restore ac power (refer to paragraph 3-84, steps ***h, i, j,*** and ***k***).

3-92. TB1, TB2, TB3, TB4 or TBS Removal and Replacement. To remove or replace any terminal board TB1 through TB5, perform the following steps:

a. Remove ac power from fault and system status panel and place in extended position of chassis slides (refer to paragraph 3, 8, steps ***a, b,*** and ***c.***)

b. Remove 10 screws and washers securing fault and system status panel access cover and remove chassis cover.

c. Using proper Deutsch pin extractor tool remove wires to section of terminal board to be replaced.

d. Remove two hexnuts, washers and screws securing terminal board to chassis.

e. Remove four screws nearest end of section to be replaced and slide section out.

f. Insert replacement section into position and replace four screws removed in step ***e*** above.

g. Secure terminal board to chassis with two hex- nuts, washers and screws removed in step d above.

h. Using proper Deutsch pin insertion tool install wires removed in step c above.

i. Secure access cover on fault and system status panel with 10 screws and washers.

j. Mount fault and system status panel in control console and restore ac power (refer to paragraph 3-84, steps ***h, i, j,*** and ***k***).

Section XVII. MAINTENANCE 28 V DC POWER SUPPLY 14A16PS1

3-93. General. This section provides instructions for replacing chassis mounted components in 28 V dc power supply 14A16PSI during direct support maintenance

3-94. Power Supply Cover Removal and Replacement (fig. 3-8, sh 1). For access to the internal power supply parts, the power supply cover must be removed. Remove and replace power supply cover, as follows:

a. On power supply, remove three phillips head screws on right side, two on left side, and two on lower front.

b. For access to power supply components, tilt rear of power supply cover upward from chassis.

c. To secure power supply cover, lower cover over power supply chassis. Secure cover to supply with three phillips head screws on right side, two on left side, and two on lower front of power supply.

3-95. Power Transformer T1 Removal and Replacement (fig. 3-8, sh 2). To .Remove and replace the power transformer T1, proceed a; follows:

a. Remove power supply cover. (Refer to paragraph step ***a*** and ***b***)

b. Tag destination points of wires connected to power transformer for identification.

c. Remove power transformer T1 cable tie-wraps.

d. Remove four corner screws that secure printed circuit (pc) board B. Fold pc board B over for access to transformer connections.

e. Unsolder and disconnect wires connected to power transformer T1.

f. Remove one screw from bottom of power supply and two screws from rear that secure power transformer T1.

g. Remove power transformer T1.

h. Install and secure replacement power transformer T1 in power supply chassis with one screw on bottom and two on rear of chassis.

i. Solder transformer wires to applicable tagged destination points.

j. Secure pc board B with four corner screws.

k. Secure power transformer TI cable tie-wraps to power supply chassis.

l. Replace cover on power supply. (Refer to paragraph 3-94, step c).

m. Perform direct support testing procedures described in section XXIV of this chapter.

3-96. Filter Capacitor C18 and C19 Removal and Replacement (fig. 3-8, sh 2). To remove and replace filter capacitors C18 or C19, proceed as follows:

a. Remove power supply cover. (Refer to paragraph 3-94, steps ***a*** and ***b***).

b. Place power supply chassis top side up on bench.

c. Tag wires connected to filter capacitors C18 or C19 for identification. Remove two screws that secure wires to each capacitor.

d. Loosen capacitor clamp screws.

e. Remove capacitor C18 or C19.

f. Install replacement filter capacitor C18 or C19 in power supply capacitor mounting clamp. Tighten mounting clamp screw.

g. Connect tagged wires to applicable terminals on filter capacitor C18 or C19. Install screw in each terminal to secure wires.

h. Install cover on power supply. (Refer to paragraph 3-94, step ***c***).

i. Perform direct support testing procedures described in section XXIV of this chapter.

3-97. Series Regulator Transistors 08 through 012 and Driver 06 Removal and Replacement (fig. 3-8, sh 4). To remove and replace a series regulator transistor, Q8 through Q12, or driver Q6, proceed as follows:

a. Remove power supply cover. (Refer to paragraph 3-94, steps ***a*** and ***b***).

b. On interior side of power supply front cover, remove four phillips head screws that secure transistor and heat sink assembly.

c. Tag for identification and unsolder electrical wires on bottom side of transistor.

d. Remove hex nut from back of the two mounting screws that secure transistor to the heat sink assembly.

e. Remove transistor from mounting screws. Remove and inspect insulating wafer. Replace if cracked.

f. Coat both sides of insulating wafer with heat sink compound (Dow Corning No. 340 silicone grease, or equivalent).

g. Install insulating wafer and replacement transistor on heat sink mounting screws.

h. Install hex nut on each mounting screw to secure transistor to heat sink assembly.

i. Solder tagged electrical wires to applicable pins on bottom side of transistor.

j. Install heat sink assembly with transistor on interior side of front cover.

k. Install four phillips head screws that secure heat sink assembly and transistor to interior side of power supply front cover.

l. Install cover on power supply. (Refer to paragraph 3-94, step ***c***).

m. Perform direct support testing procedures described in section XXIV of this chapter.

3-98. Printed Circuit Board Components Removal and Replacement (fig. 3-8, sh 3). When a defective component on the printed circuit board is to be replaced, observe the following maintenance techniques.

a. When unsoldering a component, never pry or force it loose; unsolder the component by using the wicking process described below:

(1) Select a 3/16-inch tinned copper braid for use as a wick; if braid is not available, select AWG No. 17 or No. 16 stranded wire with 1/2 inch insulation removed.

(2) Dip wick in liquid rosin flux.

(3) Place wick onto soldered connection and apply soldering iron onto wick

(4) When sufficient amount of solder flows onto wick, freeing the component, simultaneously remove iron and wick.

b. If foil is intact, but not covered with solder, it is a good contact. Do not attempt to cover with solder.

c. When soldering semiconductor device, hold the lead being soldered with a pair of pliers or place a commercial heat sink device between the component and the solder joint.

d. Always use a heat sink when soldering transistors; a transistor pad with mounting feet is an effective heat sink.

e. Broken or damaged printed wiring is usually result of an imperfection, strain, or careless soldering. To repair small breaks, tin a short piece hook-up wire to bridge the break, and holding wire in place, flow solder along the length of wire so that it becomes part of the circuitry.

f. Check and clean all replacement component leads prior to soldering, regardless of visual appearance

g. Use smooth-finished tools for bending leads; avoid use of any sharp-edged tool that may pinch break the lead. Leave a distance of at least twice the diameter of the lead from the end seal of component to the start of the bend. This rule applies to all components with soldered leads, such as tantalum capacitors.

h. Position replacement component in the same place as the removed component. Do not mount component on top of another component. Position replacement component so that any identification mark, such as the part number, symbol, value etc., is readily visible.

i. Observe the polarity of replacement diodes, transistors, and electrolytic and tantalum capacitors

j. Perform direct support testing procedures described in section XXIV of this chapter.

3-99. Fuse F1 or F2 Removal and Replacement (3-8, sh 3). To remove and replace fuse F1or F2, form the following steps:

a. Remove power supply cover. (Refer to paragraph 3-94, steps ***a*** and ***b***).

b. Remove fuse from fuse holder.

c. Insert replacement fuse in applicable fuse hole

d. Replace power supply cover. (Refer to paragraph 3-94, step ***c***).

3-100. Thermostat S1 Removal and Replacement (fig. 3-8, sh 4). To remove and replace the thermostat S1, perform the following steps:

a. Remove power supply cover. (Refer to paragraph 3-94, steps ***a*** and ***b***).

b. Place power supply bottom side up on bench.

c. Tag for identification and unsolder electrical wires connected to thermostat S1.

d. On interior front side of power supply cover, re move two phillips head screws which secure thermostat S1.

e. Remove thermostat S1 from power supply.

f. Solder tagged electrical wires to replacement thermostat S1.

g. Install thermostat S1on interior side of front cover. Secure with two phillips head screws. install cover on power supply. (Refer to paragraph 3-94, step ***c***).

3-101. Current Sensing Resistor R25A Removal and Replacement (fig. 3-8). To remove and replace the current sensing resistor R25A, perform the following steps:

a. Remove power supply cover. (Refer to paragraph 3-94, steps ***a*** and ***b***.)

b. Place power supply cover bottom side up on bench.

c. Tag for identification and disconnect electrical wires connected to resistor R25A.

d. On top side of power supply cover, remove two lock nuts and screws which secure resistor R25A to cover.

e. Remove resistor R25A.

f. Install replacement resistor R25A on interior side of power supply front cover. Secure with two phillips head screws and lock nuts.

g. Connect tagged electrical wires to resistor R25A.

h. Perform overcurrent control R17 adjustment described in paragraph 3-102 and direct support testing procedures described in section XXIV of this chapter.

i Replace power supply cover. (Refer to paragraph 3-94, step ***c***).

3-102. 28 V DC Power Supply 14A16P81 Overcurrent Control R17. Adjustment of the overcurrent control R17 on the printed circuit board B is required when transistor Q3, resistor R25A, or overcurrent potentiometer R17 is replaced and voltage and cur- rent indications do not reflect maximum ratings.

a. Test Equipment and Materials. Table 3-22 lists the test equipment required for the adjustment.

Table 3-22. Test Equipment Required for 28 V DC Power Supply 14A16PS1 Overcurrent Control R17 Adjustment

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449-S	1	Belden
Adapter, AC, 3-Wirc to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	7	Pomona
Adapter, Binding Post to Banana Plug	2894	2	Pomona
Meter, Amp, Multirange, DC	931-2902001	1	Weston Instruments
Meter, Multifunction	3450B	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual Trace	475	1	Tektronix
Rheostat, Carbon Compression	82905	1	Central Scientific
Test Lead, Banana Plug to Alligator Clip	1166-36B	1	Pomona
Tat Lead, Banana Plug to Banana Plu4	B-48 (b)	3	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (R)	2	Pomona
Test Lead, BNC Plug to Double Banana (44 inches)	11001A	1	Hewlett-Packard
Test Lead, Spade Lug to Banana Plug	1370-24	1	Pomona
Test Lead, Spade Lug to Banana Plug	1370-24R	1	Pomona
Test Lead, Spade Lug to Spade Lug	1743-36R	1	Pomona
Transformer, Variable	3PN2210	1	Staco

b. Test Connections and Conditions. Adjustment of the overcurrent control is accomplished in a bench test setup. Prior to performing the adjustment, prepare the equipment as follows:

(1) Set vom function switch to AC and range switch to 250 V, Connect vom to variable transformer output plug.

(2) Connect variable transformer to power source. Place power switch to the on position and observe that indicator lights. Adjust variable transformer for 115 V ac indication on vom. Place variable transformer power switch to the off position. Disconnect vom.

(3) Remove power supply cover. (Refer to paragraph 3-94.)

(4) Locate potentiometer R17 on printed circuit board B (fig. 3-8, sh 3). The adjustable (inner) section of R 17 is solder-sealed to the outer casing. This seal prevents inadvertent movement of the wiper following factory adjustment. Unsolder the seal and adjust R 17 to full cw position.

(5) Connect equipment as shown in figure 3-17.

(6) Adjust thermostat for maximum resistance (fully ccw).

c. Initial Test Equipment Setting. Initial test equipment settings for the adjustment procedure are as follows:

Control	Position
Multifunction meter	
LINE	On (up)
FUNCTION	DC
RANGE	AUTO
CONTROL	LOCAL
TRIGGER	INT
Oscilloscope	
POWER	On

Control	Position
Oscilloscope	
VERT MODE CH I	
CH 1 VOLTS/DIV	As required to observe signal
CH 1 AC-GND-DC	AC
HORIZ DISPLAY	A
TRIG MODE	NORMAL
COUPLING	AC
SOURCE NORM	
TIME/DIV	As required to observe signal
A TRIGGER SLOPE and LEVEL	As required for stable display.
Variable transformer	
Power	On

d. Adjustment Procedure. Perform adjustment a follows:

(1) Disconnect load from power supply by disconnecting test lead from positive terminal of dc ammeter.

(2) On front side of power supply) (fig. 3-8) adjust VDC control for an indication of 26.6 V dc on the multifunction meter.

(3) Reconnect test lead to positive terminal of dc ammeter supply as shown in figure 3-17.

(4) Adjust rheostat for 11 amperes (110 percent of 40 deg C rating for unit) indication on dc ammeter.

(5) Observe oscilloscope and adjust R17 (fig. 3-8 on circuit card in a ccw direction until output ripple increases sharply and oscilloscope pattern changes.

(6) On variable transformer, set power switch to the off position.

(7) On power supply printed circuit board B, solder seal the adjustable (inner) section of R17 to the outer casing to prevent any further movement of the wiper, and increase resistance of carbon compression rheostat (rotate ccw).

(8) After soldering, check setting of R17 by placing variable transformer power switch to the on position. Adjust carbon compression rheostat to produce a load current of 11 A while observing the oscilloscope and current meter. When load current indication on current meter reaches 11 A. verify that output ripple increases sharply and oscilloscope pattern changes. If indications on oscilloscope are not as specified, place variable power transformer power switch to the off position, unsolder seal of R17, place variable power transformer to the on position, and repeat steps (1) through (8).

(9) Adjust rheostat to reduce load current to 10 amperes.

(10) On front of power supply, adjust VDC control for indication of 28 -0.28 V dc on multifunction meter.

(11) On variable transformer, set power switch to the off position.

(12) Disconnect test equipment and replace cover on power supply. (Refer to paragraph 3-94).

(13) Perform direct support testing procedures described in section XXIV of this chapter.

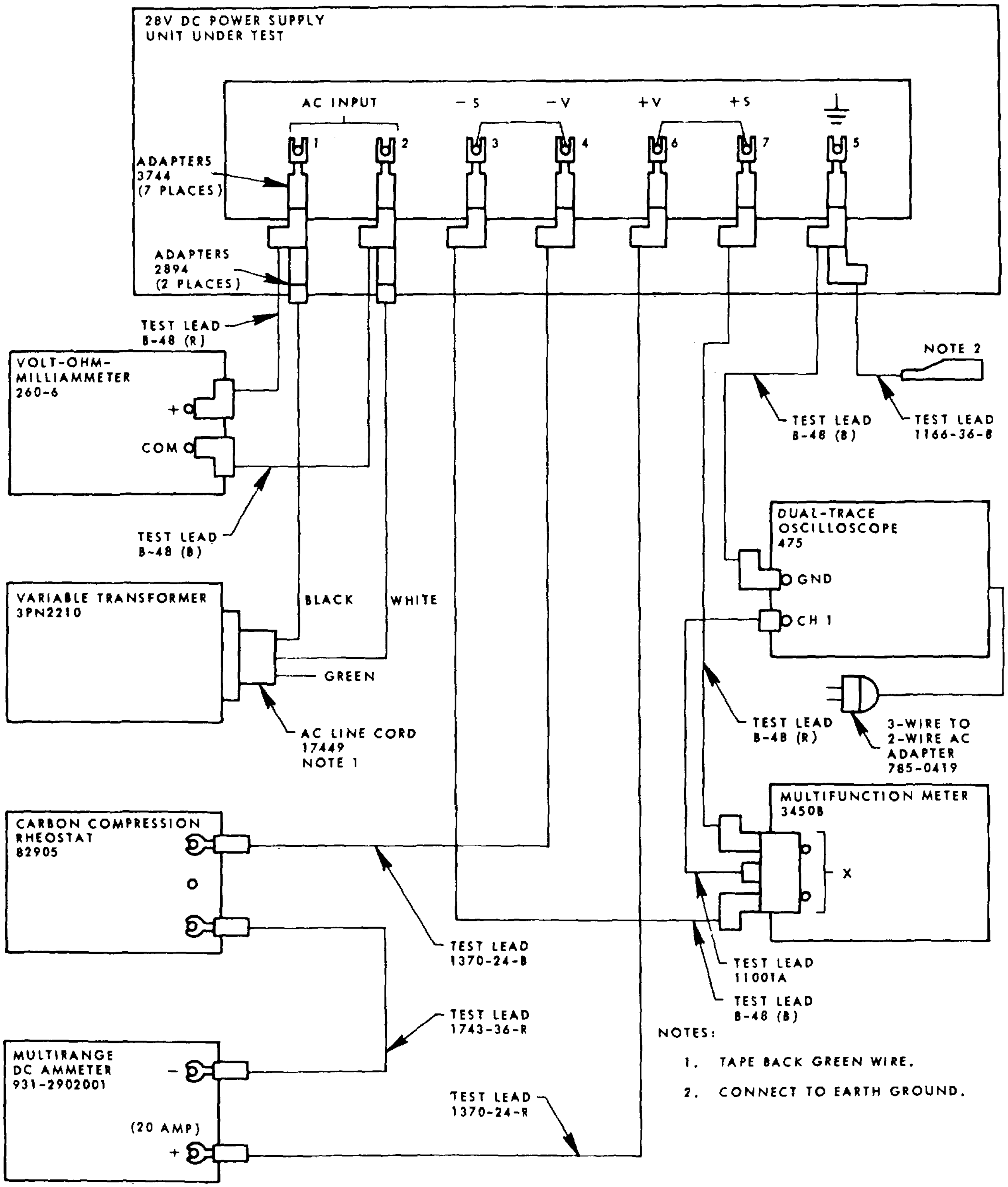


Figure 3-17. 28 V dc power supply 14A16PS1 performance test setup.

SECTION XVIII. MAINTENANCE OF WAVEQUIDE SWITCH CONTROL HTA-3A7

3-103. General. This section provides instructions for replacing chassis mounted components and connectors the waveguide switch control HTA-3A7 during direct support maintenance.

3-104. Mounting Plate and Mounting Plate Blocks (fig. 3-18), Waveguide 8witch Control HTA-3A7 Removal and Replacement. For access to internal part the mounting plate and mounting plate blocks must be removed. To remove and replace the mounting plate and mounting plate blocks, perform the following steps:

a. Remove four cross-slotted screws and associate hardware securing unit back mounting plate.

b. Remove four cross-slotted screws and associate hardware securing instruction plate.

c. Remove four cross-slotted screws on each side unit securing the two mounting blocks, and remove mounting blocks from the waveguide switching unit.

d. Remove four cross-slotted screws and associate hardware securing relay mounting board to the waveguide switching unit.

e. Remove all four receptacles J1 through J4 from the front face of the waveguide switching unit, tag and identify.

f. Remove four cross-slotted screws and associate hardware securing diode terminal board.

g. Connect test leads and adapters to test equipment as shown in figure 3-9.

3-105. Relay K1, K2, K3 and K4 Removal and Replacement. To remove and replace relay K1, K2, K3, or K4 perform the following steps:

a. Remove mounting plate and mounting plate blocks (refer to paragraph 3-104, steps ***a, b,*** and ***c***).

b. Remove relay mounting board (refer to paragraph 3-104, step ***d***).

c. Tag wires for identification and disconnect from affected relay (refer to paragraph 3-4***a***).

d. Remove relay mounting screws, washers and nuts.

e. Install replacement relay and secure with screws, washers and nuts.

f. Connect tagged wires to relay terminals (refer to paragraph 3-4***a***).

g. Replace relay mounting board.

h. Replace mounting blocks and rear mounting plate.

3-106. Diode CR5 through CR20 Removal and Replacement. To remove and replace a diode, perform the following steps:

a. Remove mounting plate and mounting plate blocks (refer to paragraph 3-104, steps ***a, b,*** and ***c***).

b. Remove relay mounting board (refer to paragraph 3-104***a***).

c. Note position of cathode terminal of diode and remove diode from relay mounting board (refer to paragraph 3-4***a***).

d. Note position of cathode terminal of replacement diode and install diode on relay mounting board.

e. Replace relay mounting board.

f. Replace mounting plate block and mounting plate.

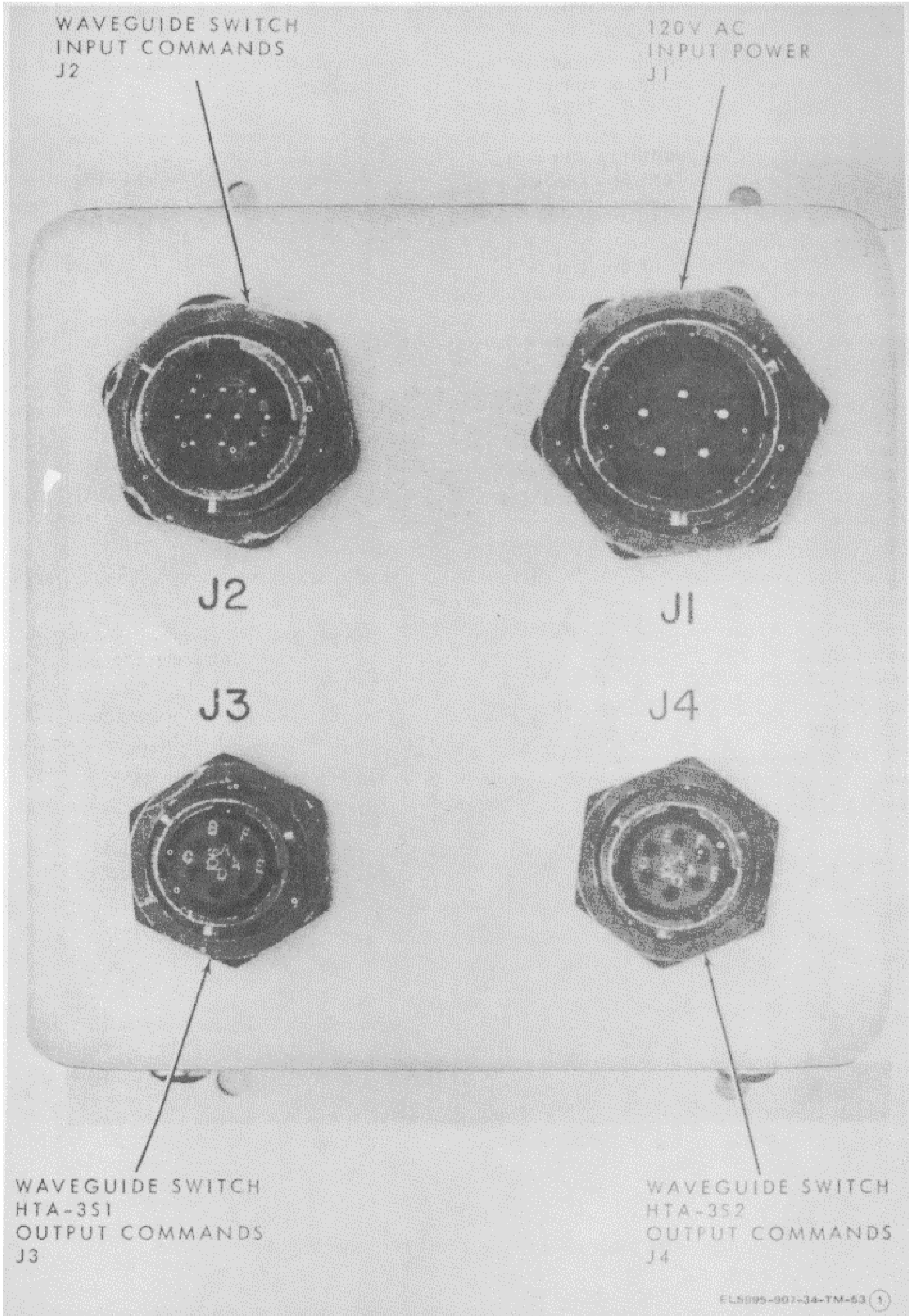


Figure 3-18. Waveguide switch control HTA-3A 7 parts location (sheet 1 of 2)

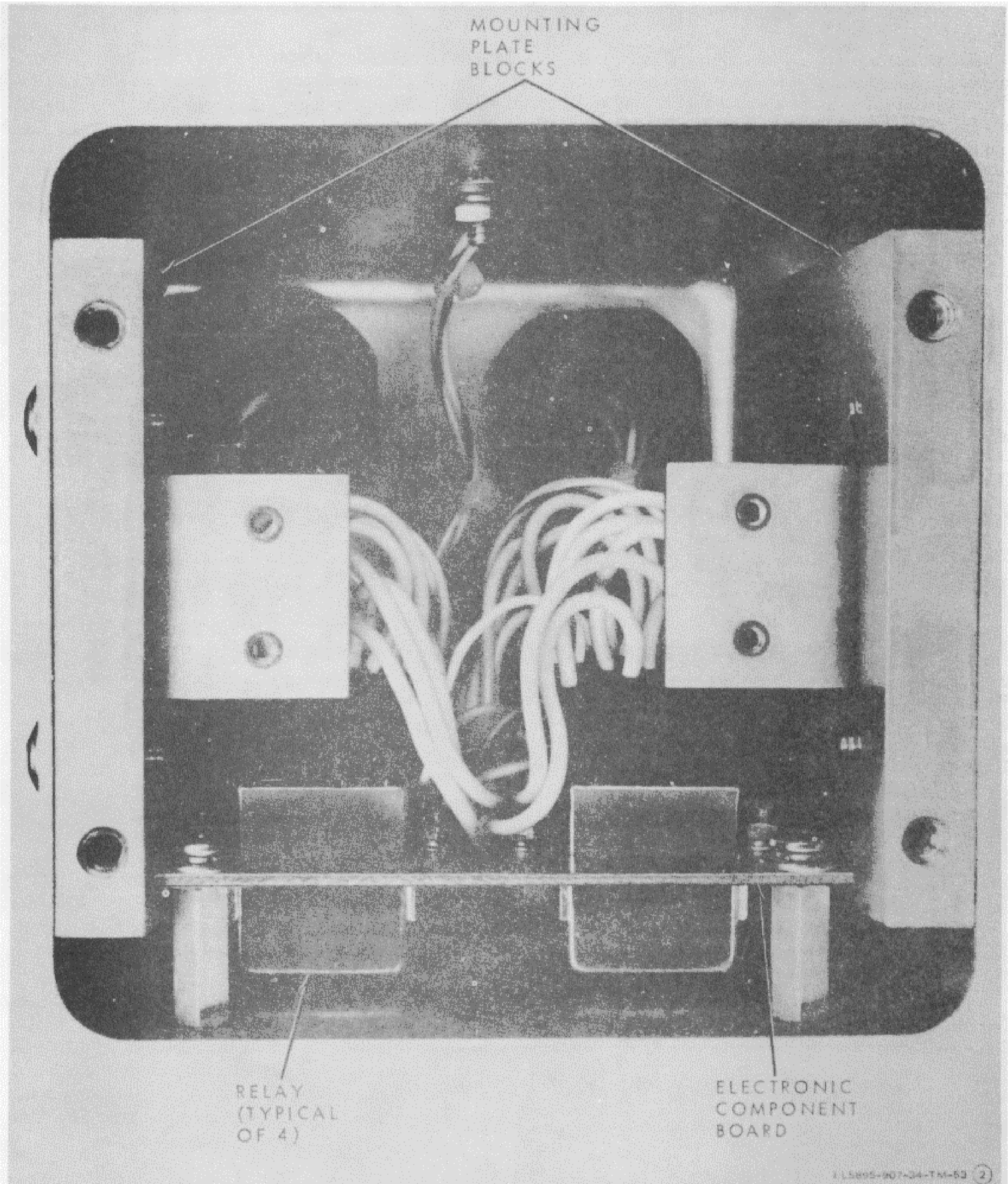


Figure 3-18. Waveguide switch control HTA-3A 7 parts location (sheet 2 of 2).

SECTION XIX. TESTING OF LOGIC UNIT POSER SUPPLY 15A4

3-107. General. This section contains the procedure for performance testing the logic unit power supply 15A4 after replacement of line replaceable units following the troubleshooting procedure. Each preliminary procedure and the performance test must be performed in the giver sequence. The preliminary procedures consist of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the performance test table, must be made carefully to ensure accurate test conditions. If the procedures result in the logic unit power supply meeting all performance standards specified in the performance test, the equipment can be returned to service.

3-108. Test Equipment and Materials. Test equipment required for direct support testing of the logic unit power supply is listed in table 3-23.

Table 3-23. Test Equipment Required for Logic Unit Power Supply 15A4 Performance Test

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449	1	Belden
Adapter, Banana Jack to Size 16 Male Connector	3563	11	Pomona
Adapter, Banana Jack to Spade Lug	3744	3	Pomona
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Test Lead, Banana Plug to Banana Plug	B12	4	Pomona

3-109. Test Connections and Conditions. Performance testing of the logic unit power supply accomplished in the electrical equipment rack. Prior performing the performance test, prepare the equipment for test as follows:

a. On fault and system status panel, press power ON circuit breaker to OFF.

b. Set both 5 V dc circuit breakers to OFF position.

c. Loosen four screws securing panel to electric equipment rack and extend chassis fully, ensuring the slides lock in the extended position.

d. Press locking lugs on logic unit power supply slid to release drawer and slowly pull drawer forward to gain access to plugs attached at rear. Remove to bench.

3-110. Initial Control Settings. Initial control settings are as follows:

Control	Position
Vom	
Function	+DC

Control	Position
Vom	
Range	10 V
Logic unit power supply	
-5 V dc cb	ON
+5 V dc cb	ON

3-111. Performance Test Procedure. Table 3-24 contains the test procedures for the logic unit power supply. Proceed sequentially through the table in accordance with the numbered steps. Set the test equipment controls and equipment under test controls exactly as given in the table and perform the prescribed test procedure. If the result is within the specified performance standard limits, proceed to the next step in the table. If the result is not as specified, perform the troubleshooting procedure in section 11 of this chapter. After any fault correction, repeat the performance test.

Table 3-24. Logic Unit Power Supply 15A4 Performance Test

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1			Observe reading on front panel POWER SUPPLY VOLTAGE meters	+5 V dc meter -5 V de meter
2	On vom set function switch to dc and range to 10 V.		Connect vom (-) test lead to DC OUTPUT connector pin B and (+) lead to pin H. Observe vom.	5 ± 0.25 V dc
3			Move (-) test lead to pin F of DC OUTPUT connector and (+) lead to pin J.	5 +0.25 V de
4			Observe vom. Observe: +5 V dc	Lighted
			PS ON indicator or -5 V dc PS ON indicator.	Lighted

SECTION XX. TESTING OF +5 V DC POWER SUPPLY 15A4PS1

3-112. General. This section contains the procedures for performance testing +5 V dc power supply 15A4PS1 after replacement of line replaceable units following the troubleshooting procedure. Each preliminary procedure and performance test must be performed in the given sequence. The preliminary procedure consists of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the performance test table, must be made carefully to ensure accurate test conditions. If the procedures result in the +5 V dc power supply meeting all performance standards specified in the performance test, the equipment can be returned to service.

3-113. Test Equipment and Material. Test equipment required for direct support testing of the +5 V dc power supply is listed in table 3-25.

Table 3-25. Test Equipment Required for 5 V DC Power Supply 15A4PS1 Performance Test

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449-S	1	Belden
Adapter, AC, 3-Wire to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	7	Pomona
Adapter, Binding Post to Banana Plug	2894	2	Pomona
Meter, Amp, Multirange, DC	931-2902001	1	Weston Instruments

Table 3-25. Test Equipment Required for 5 V DC Power Supply 15A4PS1 Performance Test -Continued

Common name	Part/model no.	Qty	Manufacturer
Meter, Multifunction	3450B	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual Trace	475	1	Tektronix
Rheostat, Carbon Compression	82905	1	Central Scientific
Test Lead, Banana Plug to Alligator Clip	1166-36B	1	Pomona
Test Lead, Banana Plug to Banana Plug	B48 (B)	3	Pomona
Test Lead, Banana Plug to Banana Plug	B48 (R)	2	Pomona
Test Lead, BNC Plug to Double Banana (44 inches)	11001A	1	Hewlett-Packard
Test Lead, Spade Lug to Banana Plug	137024-B	1	Pomona
Test Lead, Spade Lug to Banana Plug	1370-24R	1	Pomona
Test Lead, Spade Lug to Spade Lug	1743-36-R	1	Pomona
Transformer, Variable	3PN2210	1	Staco

3-114. Test Connections and Conditions. Performance testing of the power supply is accomplished in a bench test setup. Prior to performing the performance test, prepare equipment as follows:

a. Set vom function switch to AC and range switch to 250 V. Connect vom to variable transformer output plug.

b. Connect variable power transformer to power source. Set power switch to ON and observe that indicator lights. Adjust variable power transformer for 115 V ac indication on vom. Disconnect vom.

c. Adjust rheostat for maximum resistance (fully ccw).

d. Connect test equipment as shown in figure 3-12.

NOTE

Twist test leads on multifunction meter, rheostat, and ammeter that connect to power supply to cancel external noise signals.

3-115. Initial Control Settings. The initial test equipment settings for the performance test are the same as those specified in paragraph 3-66***c.***

3-116. Performance Test Procedures. Table 3-26 contains the test procedure for the +5 V dc power supply. Proceed sequentially through the table in accordance with numbered steps. Set test equipment controls and equipment under test controls exactly as directed in the table and perform the prescribed test procedure. If result is within the specified performance standard limits, proceed to the next step in the table. If result is not as specified, perform troubleshooting procedure in section Ill of this chapter. After any fault correction, repeat performance test.

Table 3-26. 5 V DC Power Supply 15A4PS1 Performance Test

Step	Control settings			
No.	Test equipment	Equipment under test	Test procedure	Performance standard
1			Observe the ammeter and adjust the rheostat for the value specified in the performance standard column.	12.6 amps
2			Disconnect the test lead from the positive post of the ammeter.	
3			Adjust the power supply VDC control to obtain the specified output voltage indication on the multifunction meter.	5 ±0.05 V dc
4			Record the multifunction meter indication as V1.	
			Reconnect the test lead to the ammeter and record the multifunction meter indication as V2.	
			Load regulation is the difference between VI and V2. Calculate this difference.	Equal to or less than 4.5 mV dc
5			Set the multifunction meter power switch off.	
			Observe the oscilloscope display and measure the ripple voltage and noise.	Equal to or less than 3 mV peak-to- peak (p-p)
6			Set multifunction meter power switch on.	
7			Adjust the variable transformer for a 132 V ac indication on the vom.	
			Record the multifunction meter indication as V3.	
8			Repeat step 7 above for 105 V ac indication on the vom and record the multifunction meter reading as V4.	
			Calculate the line regulation as the difference between V3 and V4.	Equal to or less than 6.5 mV dc

SECTION XXI. TESTING OF -5 V DC POWER SUPPLY 15A4PS2

3-117. General. This section contains the procedures for performance testing -5 V dc power supply 15A4PS2 after replacement of line replaceable units following the troubleshooting procedure. Each preliminary procedure and the performance test must be performed in the given sequence. The preliminary procedure consists of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the performance test table, must be made carefully to ensure accurate test conditions. If the procedures result in the -5 V dc power supply meeting all performance standards specified in the performance test, the equipment can be returned to service.

3-118. Test Equipment and Materials. Test equipment required for direct support testing of the -5 V dc power supply is listed in table 3-27.

Table 3-27. Test Equipment Required for -5 V DC Power Supply 15A5PS2 Performance Test

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449	1	Belden
Adapter, AC, 3-Wire to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	7	Pomona
Adapter, Binding Post to Banana Plug	2894	2	Pomona
Ammeter, Clamp On	749-2091001	1	Weston Instruments
Meter, Multifunction	3450B	1	Hewlett-Packard
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Oscilloscope, Dual Trace	475	1	Tektronix
Rheostat, Carbon Compression	82905	1	Central Scientific
Test Lead, Banana Plug to Alligator Clip	1166-36-B	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (B)	3	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (R)	2	Pomona
Test Lead, BNC Plug to Double Banana (44 inches)	1101A	1	Hewlett-Packard
Test Lead, Spade Lug to Banana Plug	137024-B	1	Pomona
Test Lead, Spade Lug to Banana Plug	1370-24-R	1	Pomona
Test Lead, Spade Lug to Spade Lug	1743-36-R	1	Pomona
Transformer, Variable	3PN2210	1	Staco

3-119. Test Connections and Conditions. Performance testing of the power supply is accomplished in a bench test setup. Prior to performing the performance test, prepare equipment as follows:

a. Set vom function switch to AC and range switch to 250 V. Connect vom to variable transformer output plug.

b. Connect variable power transformer to power source. Set power switch to ON and observe that indicator lights. Adjust variable power transformer for 115 V ac indication on vom. Disconnect vom.

c. Adjust rheostat for maximum resistance (fully ccw).

d. Connect test equipment as shown in figure 3-1

NOTE

Twist test leads on multifunction meter, rheostat, and ammeter that connect to power supply to cancel external noise signals.

3-120. Initial Control Settings. The initial test equipment settings for the performance test are the same as those specified in paragraph 3-74***c.***

3-121. Performance Test Procedures. Table 3-28 contains test procedures for the -5 V dc power supply. Proceed sequentially through the table in accordance with numbered steps. Set test equipment controls and equipment under test controls exactly as given in the table and perform the prescribed test procedure. If result is within the specified performance standard limits, proceed to the next step in the table. If result is not as specified, perform the troubleshooting procedure in section IV of this chapter. After fault correction, repeat the performance test.

Table 3-28. -5 V DC Power Supply 15A4PS2 Performance Test

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1			Observe ammeter and adjust the rheostat for value specified in performance standard column.	5.1 A
2			Disconnect test lead from positive post of ammeter.	
3			Adjust power supply VDC control to obtain specified output voltage indication on multifunction meter.	5 ± 0.25 V de
4			Record multifunction meter indication as V1. Reconnect test lead to ammeter and record multifunction meter indication as V2. Load regulation is difference between V1 and V2. Calculate this difference.	Equal to or less than 4.5 mV dc
5			Set multifunction meter power switch off. Observe oscilloscope display and measure ripple voltage and noise.	Equal to or less than 3 mV pp
6			Set multifunction meter power switch on.	
7			Adjust variable transformer for a 132 V ac indication on vom. Record-multifunction meter indication as V3.	
8			Repeat step 7 above for 105 V ac indication on vom and record multifunction meter reading as V4. Calculate line regulation as difference between V3 and V4.	Equal to or less than 6.5 mV dc

SECTION XXII. TESTING OF CHANNEL FREQUENCY INDICATOR 15A6

3-122. General. This section contains the procedure for performance testing the channel frequency indicator 15A6 after replacement of line replaceable units. Each preliminary procedure and the performance test must performed in the given sequence. The preliminary procedures consist of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified settings. These settings and all settings given in the performance test table must be made carefully to ensure accurate test conditions. If the procedures result in the channel frequency indicator meeting all performance standards specified in the performance test, the equipment can be returned to service.

3-123. Test Equipment and Materials. Test equipment required for direct support testing of the channel frequency indicator is listed in table 3-29.

Table 3-29. Test Equipment Required for Channel Frequency Indicator 15A6 Performance Test

Common name	Part/model no.	Qty	Manufacturer
Adapter, Banana Jack to Size 20 Female Connector	3560	2	Pomona
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Test Lead, Banana Plug to Banana Plug	B-48(B)	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	1	Pomona

3-124. Test Connections and Conditions. Performance testing of the channel frequency indicator is accomplished after the indicator is removed from the electrical equipment rack. Prior to making the test connections illustrated in figure 3-5, perform the following steps to gain access to the equipment:

- ***a.*** Loosen four captive screws securing channel frequency indicator to electrical equipment rack
- ***b***. Pull channel frequency indicator forward, being careful not to stress connecting cables.
- ***c***. Tag and disconnect cables from three connector at rear of channel frequency indicator.
- ***d***. Remove channel frequency indicator and place on work bench.
- ***e.*** Connect black test lead to (-) COMMON jack on vom, and red lead to (+) jack. Attach adapters to test leads.

3-125. Initial Control Settings. Initial control settings for the performance test are as follows:

a. Set vom function switch to +DC and range switch to RX1.

b. Connect test leads together and adjust vom ZERO OHMS control for 0 ohms reading on meter.

3-126. Performance Test Procedures. Table 3-30 contains the test procedures for the channel frequency indicator. Proceed sequentially through the table in accordance with the numbered steps. Set the test equipment controls and equipment under test controls exactly as given in the table and perform the prescribed test procedure. If the result is within the specified performance standard limits, proceed to the next step in the table. If the result is not as specified, perform the troubleshooting procedure in section VII of this chapter. After any fault correction, repeat the performance test. Upon successful completion of the performance test, the equipment can be certified for a return to service.

Table 3-30. Channel Frequency Indicator 15A6 Performance Test

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	Vom Function switch + DC Range switch - RX1		Connect vom test leads between connector pins j and k.	
2		Sequentially set switch section 7 positions 0 through 9		Positions 0 through 7 to continuity, positions 8 and 9 read infinity.
3			Connect vom lest leads between connector pins j and n.	
4		Sequentially set switch 7 to position 0 through 9.		Position 0, 1, 2, 3, 8, and 9 read continuity, positions 4, 5, 6, 7 read infinity
5			Connect vom test leads between connector pins j and p.	
6		Sequentially set switch section 7 and to positions 0 through 9.		Positions 0, 1, 4, 5, 8, 9 read continuity, positions 2, 3, 6 and 7 read infinity.
7			Connect vom test leads between connector pins j and g.	
8		Sequentially set switch section 7 to positions 0 through 9.		Positions 0, 2, 4, 6, and 8 read continuity, positions 1, 3, 5, 7, and 9 read infinity.
9		As specified in steps 1 through 8.	Using table in channel frequency indicator test setup diagram (fig. 3-5), determine connector pin numbers for switch section 6	As specified in steps 1 through 8.
10		As specified in steps 1 through 8.	Using table in channel frequency indicator (fig. 3-5), determine connector pin numbers for switch section 5.	As specified in steps 1 through 8.
11		As specified in steps 1 through 8.	Using table in channel frequency indicator test setup diagram (fig. 3-5), determine connector pin numbers for switch section 4.	As specified in steps 1 through 8.
12		As specified in steps 1 through 8.	Using table in channel frequency indicator test setup diagram (fig. 3-5), determine connector pin numbers for switch section 3.	As specified in steps 1 through 8.
13		As specified in steps 1 through 8, (note: switch section 2, only po sitions 9, 0, 1, 2, 3, and 4 are available).	Using table in channel frequency indicator test setup diagram (fig. 3-5), determine connector pin numbers for switch section 2.	As specified in steps 1 through 8.
14		As specified in steps 1 through 8, (note. switch section 1, only po sitions 7 and 8 are available).	Using table in channel frequency indicator test setup diagram (fig. 3-5), determine connector pin numbers for switch section 1.	As specified in steps 1 through 8.

SECTION XXIII. TESTING OF FAULT AND SYSTEM STATUS PANEL 14A16

3-127. General. This section contains the procedure for performance testing the fault and system status pane 14A 16 at AN/FSC-78(V) or AN/FSC-79 after replacement of line replaceable units following the troubleshooting procedure. Each preliminary procedure ant performance test must be performed in the given sequence. The preliminary procedures consist of obtaining the listed test equipment, making prescribed test connections, and initially setting equipment controls to specified settings. These settings, and all subsequent settings given in the performance test table, must be made carefully to ensure accurate test conditions. If procedures result in the fault and system status panel meeting all performance standards specified in the performance test, the equipment can be returned to service.

3-128. Test Equipment and Materials. Test equipment for direct support testing of the fault and system status panel is listed in table 3-31.

Table 3-31. Test Equipment Required for fault and System Status Panel 14A16 Performance Test

Common name	Part/model no.	Qty	Manufacturer
Adapter, Banana Jack to Size 20 Male Connector	3561	4	Pomona
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Test Lead, Banana Plug to Alligator Clip	1166-36-B	1	Pomona
Test Lead, Banana Plug to Alligator Clip	1166-36-R	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(B)	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	1	Pomona

3-129. Test Connections and Conditions. Direct support testing of the fault and system status panel is accomplished in the control console. Prior to making the test connections illustrated in figure 3-6, perform the following steps to gain access to the equipment.

- ***a.*** Loosen four captive screws securing panel to control console and withdraw chassis until slides lock in extended position.
- ***b.*** Remove 10 screws and washers securing access cover and remove cover.
- ***c.*** Set fault and system status panel power ON circuit breaker to OFF.
- ***d.*** Remove connector at J1 from rear of chassis.
- ***e.*** Remove four screws securing power supply to chassis and position power supply to access TB-1 protective cover.
- ***f.*** Remove two screws securing power supply terminal board TB1 protective cover and remove.
- ***g.*** Verify that logic unit power supply 15A4 is turned on. Relay K1 in the fault and system status panel is operated by +5 V dc from logic unit power supply.
- ***h.*** Connect test leads B-48(B) and B-48(R) with adapter 3561 to vom as shown in figure 3-6.

3-130. Initial Control Settings. Replace the connector J1 at the rear of the fault and system status panel, and position the controls as follows:

Control	**Position**
Vom	
Function	AC
Range	250 V
Fault and system status panel	
CIRCUIT BREAKER/ POWER ON	On (press)

3-131. Performance Test Procedures. Table 3-32 contains performance test procedures for the fault and system status panel.

Proceed sequentially through the table in accordance with the numbered steps. Set the test equipment controls and equipment under test, controls exactly as given in the table and perform the prescribed test procedure. If the result is within the specified performance standard limits, proceed to the next step in the table. If the result is not as specified perform the troubleshooting procedure in section VIII of this chapter. After any fault correction, repeat the performance test.

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. Front panel circuits do not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker input terminals. Do not take chances.

Table 3-32. Fault and System Panel 14A16 Performance Test

Step	Control settings			
No.	Test equipment	Equipment under test	Test procedure	Performance standard
1			Using vom, measure ac voltage between power supply terminal board pins TB-1 and TB-2.	120 ± 12 V ac
2	On vom, set function switch to + DC and range to 50 V.		Using vom, measure dc voltage between power supply terminal board TB1-4(-) and TB1-6(+).	+28 ±1.4 V dc
3		Minor alarm DS21	Connect Touch (-) test lead 1166-36 between audible alarm unit (-) terminal and power supply board TB1-4.	Audible alarm sounds.
4		Major alarm DS22	Connect black (-) test lead 1166-36 between audible alarm unit (-) terminal and power supply terminal board TB1-4.	Audible alarm sounds. (pulsating)
5			At fault and system status panel LAMP TEST switches, press end switch in turn and observe indicators.	All lamps of same color will light when each switch is pressed.

SECTION XXIV. TESTING OF 28 V DC POWER SUPPLY 14A16PS1

3-132. General This section contains the pro cedures for performance testing 28 V dc power sup ply 14A16PS1 after replacement of line replaceable units following the troubleshooting procedure. Each preliminary procedure and performance test must be performed in the given sequence. The preliminary procedure consists of obtaining the listed test equipment, making the prescribed test connections, and in itially setting equipment controls to specified settings. These settings, and all subsequent settings given in the performance test table, must be made carefully to ensure accurate test conditions. If the procedures result in the 28 V dc power supply meeting all performance standards specified in the performance test, the equipment can be returned to service.

3-133. Test Equipment and Materials. Test equipment required for direct support testing of the 28 V dc power supply is listed in table 3-33.

Table 3-33. Test Equipment Required for 28 V DC Power Supply 14A16PS1 Performance Test

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449	1	Belden
Adapter, AC, 3-Wire to 2-Wire	785-0419	1	Allied
Adapter, Banana Jack to Spade Lug	3744	7	Pomona
Adapter, Binding Post to Banana Plug	2894	2	Pomona
Meter, Amp, Multirange, DC	931-2902001	1	Weston Instruments
Meter, Multifunction	3450B	1	Hewlett-Packard
Milliammeler, Volt-Ohm-	2606	1	Simpson
Oscilloscope, Dual Trace	475	1	Tektronix
Rheostat, Carbon Compression	82905	1	Central Scientific
Test Lead, Banana Plug to Alligator Clip	1166-36-B	1	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (B)	3	Pomona
Test Lead, Banana Plug to Banana Plug	B-48 (R)	2	Pomona
Test Lead, BNC Plug to Double Banana (44 inches)	11001A	1	Hewlett-Packard
Test Lead, Spade Lug to Banana Plug	1370-24-B	1	Pomona
Test Lead, Spade Lug to Banana Plug	137024-R	1	Pomona
Test Lead, Spade Lug to Spade Lug	1743-36-R	1	Pomona
Transformer, Variable	3PN22101	1	Staco

3-134. Test Connections and Conditions. Performance testing of the power supply is accomplished in a bench test setup. Prior to performing the performance test, prepare the equipment as follows:

a. Set vom function switch to AC and range switch to 250 V. Connect vom to variable transformer output plug.

b. Connect variable power transformer to pot source. Set power switch to ON and observe that indicator lights. Adjust variable power transformer for 115 V ac indication on vom. Disconnect vom.

c. Adjust rheostat for maximum resistance (ft ccw).

d. Connect test equipment as shown in figure 3-17.

NOTE

Twist test leads on multifunction meter, rheostat and ammeter that connect to power supply to cancel external noise signals.

3-135. InitialControl Settings. The initial test equipment settings for the performance test are the same as those specified in paragraph 3-102***c.***

3-136. Performance Test Procedures. Table 3-34 contains the test procedure for the 28 V dc power supply. Proceed sequentially through the table in accordance with numbered steps. Set test equipment controls and equipment under test controls exactly as directed in table and perform the prescribed test procedure. If result is within the specified performance standard limits, proceed to the next step in the table. If result is not as specified, perform the troubleshooting procedure in section IX of this chapter. After any fault correction, repeat the performance test.

Table 3-34. 28 V DC Power Supply 14A16PS1 Performance Test

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1			Observe ammeter and adjust rheostat for value specified as performance standard.	10 amps
2			Disconnect test lead from positive post of ammeter.	
3			Adjust power supply VDC control to obtain the specified output voltage indication on multifunction meter.	28 ± 0.28 V dc
4			Record multifunction meter indication as V1.	Equal to or less than 7.6 mV dc
			Reconnect test lead to ammeter and record multifunction meter indication as V2. Load regulation as difference between V1 and V2. Calculate this difference	
5			Set multifunction meter power switch off. Observe oscilloscope display and measure ripple voltage and noise	Equal to 1.5 mV pp
6			Set multifunction meter power switch on.	
7			Adjust variable trans former for a 132 V ac indication on vom. Record multifunction meter indication as V3.	
8			Repeat step 7 above for 105 V ac indication on vom and record multifunction meter reading as V4. Calculate line regulation as difference between V3 and V4.	Equal to or less than 3.8 mV dc

SECTION XXV. TESTING OF WAVEGUIDE SWITCH CONTROL HTA-3A7

3-137. General. This section contains the procedure for performance testing the waveguide switch control HTA-3A7 after the replacement of line replaceable unit Each preliminary procedure and the performance test must be performed in the given sequence. The preliminary procedures consist of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified setting These settings, and all subsequent settings given in the performance test table, must be made carefully to ensure accurate test conditions. If the procedures result in the waveguide switch control meeting all performance standards specified in the performance test, the equipment can be certified for return to service.

3-138. Test Equipment and Materials. Table 3-35 lists test equipment and materials required for direct support testing of the waveguide switch control.

Table 3-35. Test Equipment Required for Waveguide Switch Control HTA-3A7 Performance Testing

Common name	Part/model no.	Qty	Manufacturer
AC Line Cord	17449	1	Belden
Adapter, Banana Jack to Size 16 Female Connector	3562	3	Pomona
Adapter, Banana Jack to Size 20 Female Connector	3560	2	Pomona
Adapter, Banana Jack to Size 20 Male Connector	3561	2	Pomona
Adapter, Single Banana Plug to Binding Post	2894	3	Pomona
Milliammeter, Volt-Ohm-	260-6	1	Simpson
Power Supply, 0-80/040 V	LPD-422A-FM	1	Lambda
Test Lead, Banana Plug to Banana Plug	B-48(B)	2	Pomona
Test Lead, Banana Plug to Banana Plug	B-48(R)	2	Pomona

3-139. Test Connections and Conditions. Direct support testing of the waveguide switch control is accomplished on the workbench. Prior to making the test connections illustrated in figure 3-9, perform the following steps to gain access to the equipment.

a. Set circuit breaker CB4 at distribution box assembly HTA-3A 10 to off.

b. Remove cables from connectors J1 through J4 of waveguide switch control assembly.

c. Remove four phillips head screws securing waveguide switch control assembly mounting plate.

d. Remove waveguide switch control and place on workbench.

3-140. Initial Control Settings. Initial control settings are as follows:

Control	Position
Vom	
Function	AC
Range	250 V
Dual power supply	
Output voltage	+28.0 V dc
Power	Off

3-141. Performance Test Procedures. Table 3-36 contains test procedures for the waveguide switch control.

Proceed sequentially through the table in accordance with the numbered steps. Set the test equipment controls at equipment under test controls exactly as given in the tab and perform the prescribed test procedure. If the result within the specified performance standard limits, proceed the next step in the table. If the result is not as specified, per form the troubleshooting procedures in section X in the chapter. After any fault correction, repeat the performance test.

WARNING

120 V ac is present in this equipment. Serious injury or death may result if nor- mal precautions are not observed. Front panel circuit breakers do not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker input terminals. Do not take chances.

Table 3-36. Waveguide Switch Control HTA-3A7 Performance Test

Step	Control settings			
No.	Test equipment	Equipment under test	Test procedure	Performance standard
1			Observe vom.	0 V
2	Set power supply ON/ OFF switch to ON.		Observe vom.	120 ± 12 V ac
3	Reserve test leads at power supply (+) and (-) output terminals.		Observe vom.	120 12 V ac
4	Set power supply ON/ OFF switch to OFF .	Move test lead at connector J2-1 and J2-G and test lead at J3-A to J3-C.	Observe vom	0 V
5	Set power supply ON/ OFF switch to ON.		Observe vom.	120 ± 12 V ac
6	Reverse test leads at power supply (+) and (-) output terminals.		Observe vom.	120 :12 V ac
7	Set power supply ON/ OFF switch to OFF.,	Move test lead at connector J2-G to J2-B test lead at connector J2-K to J2-J, test lead at connector J3-C to J4-D, and test lead at connector J3-B to J4-F.	Observe vom.	0 V
8	Set power supply ON/ OFF switch to ON.		Observe vom.	120 ± 12 V ac
9	Turn power supply to OFF at completion of step. Reverse test leads at power supply (+) and (-) output terminals.		Observe vom.	120 ± 12 V ac
10	Turn power supply to ON. Set power lead at connector supply ON/OFF switch to OFF	Move test lead at connector J2-B to J2-C, and test. J4-D to 14-E.	Observe vom	0 V
11	Set power supply ON/OFF switch to ON.		Observe vom.	120 ± 12 V ac
12	Reverse test leads at power supply (+) and (-)output terminals.		Observe vom.	120 ±12 V ac

SECTION XXVI. TROUBLESHOOTING OF MULTIPROGRAMMER 15A11

3-142. General. This section contains preliminary procedures and troubleshooting procedures necessary for fau localization to a malfunctioning piece part of the multiprogrammer 15A11 after referral by organizational maintenance. Preliminary procedures consist of obtaining the listed test equipment, making the prescribed test connections, an initially setting equipment controls to specified setting, These settings and all subsequent settings given in the troubleshooting chart must be made carefully to assure accurate test results. When a troubleshooting procedure specifies replacement or adjustment of a malfunctioning component, refer to section XVIII in this chapter.

3-143. Test Equipment and Materials. Table 3-37 lists test equipment required for the multiprogrammer troubleshooting.

Table 3-37. Test Equipment Required for Multiprogrammer 15A11 Maintenance

Common name	Part/model no.	Qty	Manufacturer
Tool kit, electronic equipment	TK-105/G	1	
Multimeter	ME-450/U (or equivalent)	1	Fluke

3-144. Test Connections and Conditions. Mulitprogrammer troubleshooting is accomplished in the rack. The test connections are illustrated in Figure 3-19. Connect black test lead to (-) common jack on DMM and red test lead on (+) JACK.

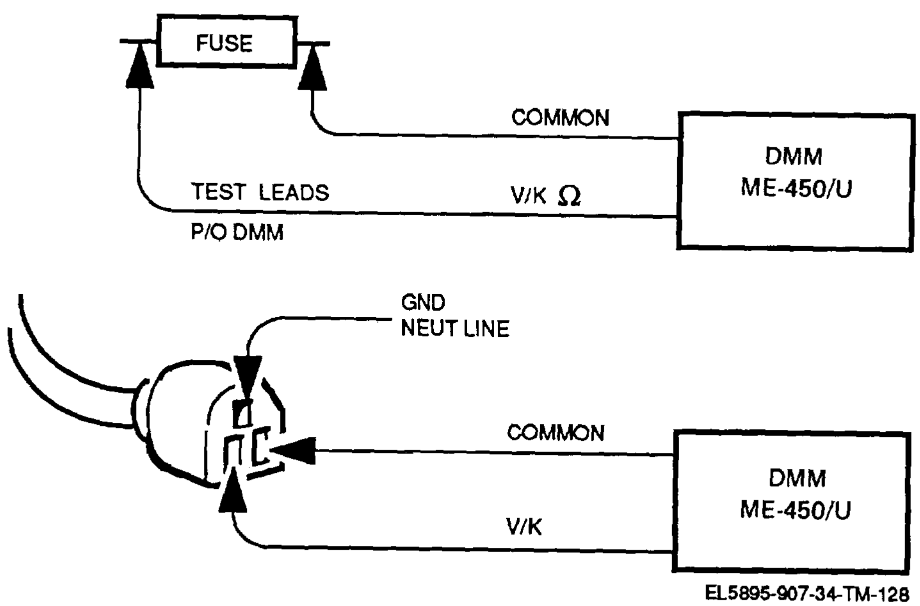


Figure 3-19. Multiprogrammer 15A11, troubleshooting test setup diagram.

3-145. Initial Control Settings. Initial control settings for the troubleshooting procedures consists of setting DMM controls as follows:

Control	Position
Function	+DC
Range	200K
ZERO OHMS	0 ohms with test leads shorted

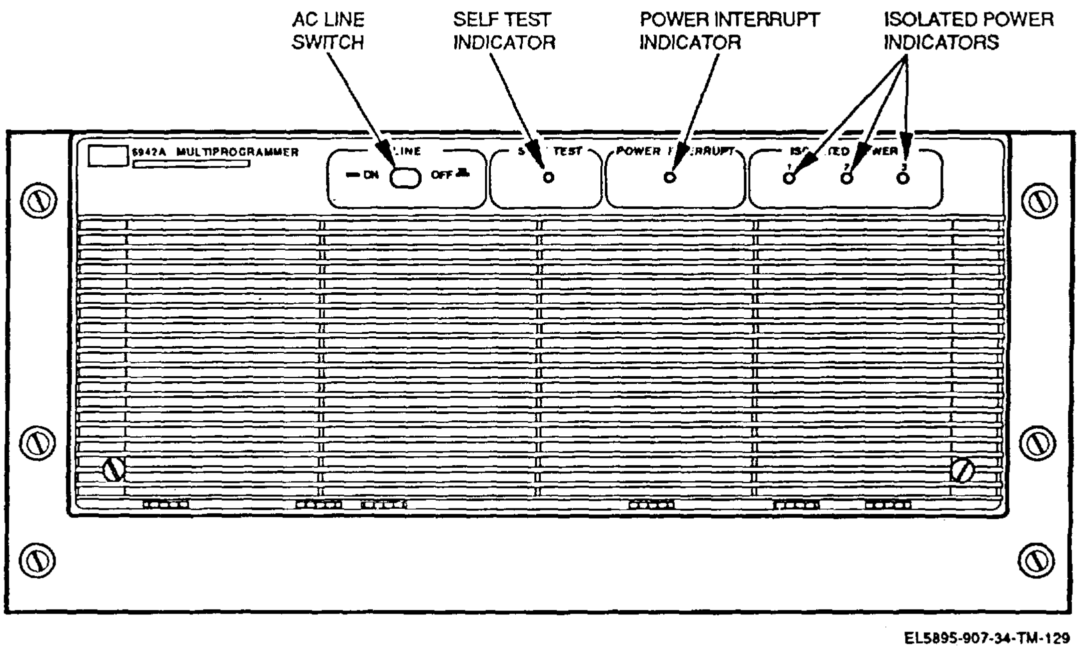
3-146. Troubleshooting Procedure. Table 3-38 provides a step-by-step troubleshooting procedure to isolate a malfunction to a faulty part. Perform the procedures in the given sequence until the malfunctioning part is found. When a faulty part is found, replace the part as directed in section XVIII of this chapter. Use figure 3-20 as an aid to locating controls and indicators.

Table 3-38. Multit-programmer 15A11 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	Multiprogrammer	Set line switch OFF, then to ON position		SELF TEST indicator lights in 4 seconds ISOLATED POWER supply 1,2, and 3 indicat-ors light POWER INTERRUPT indicator is not lighted.	a. If normal indication is to observed, end test (IPS) b. If normal indication is not observed and self test and IPS indicators are not lighted, proceed to step 2. c. If any of the ISOLATED POWER supply indicators 1, 2, or 3 are not lighted proceed to step 4. d. If POWER INTERRUPT indicator is lighted red, replace multi-programmer as described in section XXVIII e. If SELF TEST indicator does not light after 4 seconds, replace multi-programmer as described in section XXVII
2	Power cable	Remove ac power cable from multi-programmer. On DMM set function ac line cord proceed to 200 V. Refer to paragraph 3-153 a through d.	Connect one DMM lead to line and the other lead to neutral of line cable plug Connect lead to other line input	115 ±11.5 V ac	a. If normal indication is observed, proceed to step 3. b. If normal indication is not observed, replace ac line cord, proceed to step 1.
3	Ac line fuse	Remove line fuse as as described in section XXVIII. On DMM set function to +dc And range to 200 K. Refer to paragraph 3-154	Connect DMM to one side of fuse and common lead and common lead to other side.		a. If normal indication is observed, replace multi-programmer as described in Section XXVIII. b. If normal indication is not observed, replace bad fuse, reinstall ac line cord, proceed to step 1. c. After replacing fuse, if normal indication is not observed, repeat step 3 (check fuse) if the line fuse is open, replace Multiprogrammer as described in section XXVIII.

Table 3-38. Multiprogrammer 15A11 Troubleshooting Procedure - Continued

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
4	Fuse board All.	Remove fuses F1 through F6, as described in section XXVIII. On DMM set func-- tion to dc and range to 200K. Refer to paragraph 3-155	Check F1 through F6. Connect DMM + lead to one side of fuse and corm- mon lead to other side.	0 ohm	a. If normal indication is observed, replace multi- programmer as described in section XXVII. b. If normal indication is not observed, replace fuse as described in paragraph 3-155, proceed to step 1. c. After replacing the open fuse, as described in paragraph 3-155, and if normal indication is not observed, replace multi- programmer as described in section XXVIII



FRONT

Figure 3-20. Multiprogrammer 15A11 controls and indicators location diagram.

SECTION XXVII. TROUBLESHOOTING OF INTERFACE BUS EXTENDER 15A12

3-147. General. This section contains preliminary procedures and troubleshooting procedures necessary for fault localization to a malfunctioning piece part of interface bus extender 15A12 after referral by organizational maintenance. Preliminary procedures consist of obtaining the listed test equipment, making the prescribed test connections, and initially setting equipment controls to specified setting These settings and all subsequent settings given in the troubleshooting chart must be made carefully to assure accurate test results. When a troubleshooting procedure specifies re- placement or adjustment of a malfunctioning component, refer to section XXIV in this chapter.

3-148. Test Equipment and Materials. Table 3-39 lists test equipment required for the channel frequency indicator troubleshooting.

Table 3-39. Test Equipment Required for Interface Bus Extender 15A12

Common name	Part/model no.	Qty	Manufacturer
Multimeter	ME-450/U (or equivalent)	1	Fluke
Tool kit, electronic equipment	TK-105/G	1	

3-149. Test Connections and Conditions. Interface bus extender troubleshooting is accomplished in the rack. The test connections are illustrated in figure 3-21. Connect black test lead to (-) common jack on DMM and red test lead on (+) jack.

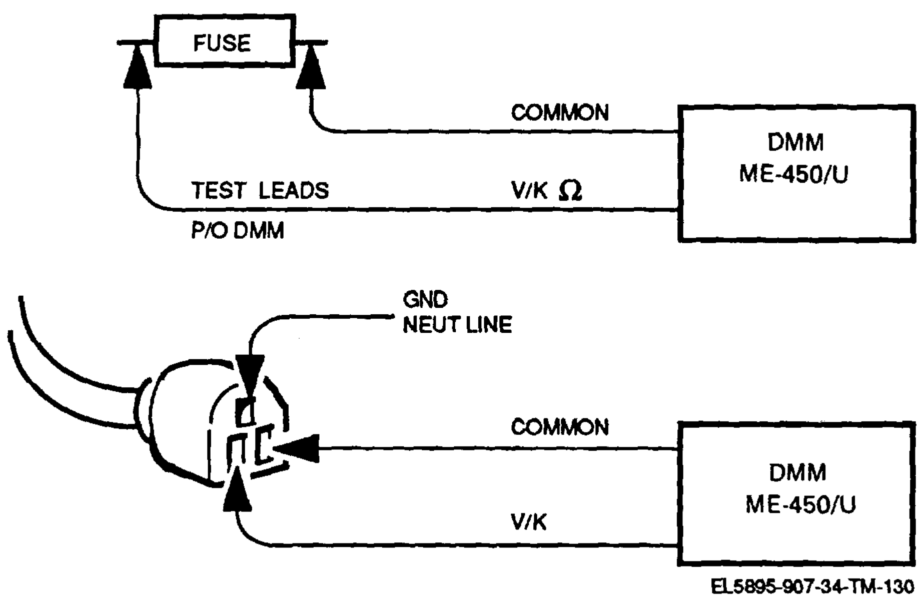


Figure 3-21. Interface bus extender 15A12, troubleshooting test setup diagram

3-150. Initial Control Settings. Initial control settings for the troubleshooting procedures consist of setting DMM controls as follows:

Control	Position
Function	+DC
Range	200 K
ZERO OHMS	0 ohms with test leads shorted

WARNING

120 V ac is present in this equipment. Serious injury or death may result if normal precautions are not observed. front panel circuit breakers do not completely isolate the 120 V ac; this voltage still exists as a potential hazard at the circuit breaker input terminals. Do not take chances.

3-151. Troubleshooting Procedure. Table 3-40 provides a step-by-step troubleshooting procedure to isolate malfunction to a faulty part. Perform the procedures in the given sequence until the malfunctioning part is found. When a faulty part is found, replace the part as directed in section XXIX of this chapter. Use figure 3-22 as an aid to locating controls and indicators.

Table 3-40. Interface Bus Extender 15A12 Troubleshooting Procedure

Step	Item of check	Test conditions	Test connections	Normal indication	Additional checks and remarks
1	Interface bus extender	Set LINE switch to OFF, then to ON position.		Ac LINE indicator is lighted. DATA LOSS and DATA ERRORS indicators are not lighted.	a. If normal indication is observed, end test. b. If LINE indicator is not lighted green. proceed to step 2. c. If DATA LOSS or DATA ERRORS indicators are lighted red, proceed as follows: (1) Perform computer and peripheral self tests, refer to TM 11 1-5895-1358-13-2. (2) If computer and peripheral self test ok, replace interface bus extender as described in section XXIX.
2	Fuse	Set LINE switch to OFF position. Remove ac power cable and ac line fuse as described in section XXY Set DMM to + dc, 200 K. Refer to para 3-157 a. through d.	Connect + lead to one end of fuse and common lead to other end of fuse.	0 ohm	a. If normal indication is observed, reinstall fuse, proceed to step 3. b. If normal indication is not observed, replace fuse as described in section XXIX. reinstall ac power cable, and proceed to step 1. c. After replacing fuse, if normal indication is not observed, repeat step 2 (check fuse). If the line fuse is open, replace interface bus extender as described in section XXIX.
3	Ac power cable	Remove ac power cable from interface bus extender. Set DMM to ac, range to 200 V. para 3-157 a. through d. the ac power cable, and proceed to step 1.	See figure 3-21.	115 ±11.5	a. If a normal indication is observed, replace interface bus extender as described in section XXIX b. If a normal indication is not observed, replace

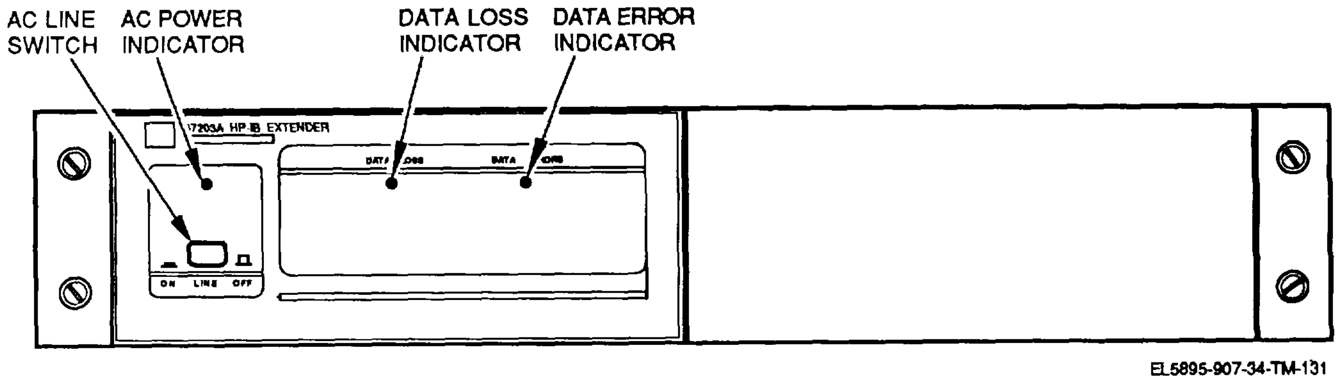


Figure 3-22. Interface bus extender 15A12 controls and indicators location diagram.

SECTION XXVIII. MAINTENANCE OF MULTIPROGRAMMER 15A11

3-152. General. This section provides instructions for replacing multiprogrammer 15A11 during direct support maintenance.

3-153. Multiprogrammer 15A11 Removal and Replacement (fig. 3-23). To remove and replace the multiprogrammer, perform the following steps:

WARNING

Remove electrical power from converter control ler prior to any removal/installation procedure. Failure to observe this warning could result in serious injury or death to personnel from high voltage.

a. On front panel of multiprogrammer, set LINE ON/OFF switch to OFF position, and verify ISO LATED POWER indicators, 1, 2, and 3 are no lighted.

b. On front panel of multiprogrammer, loosen four captive screws securing panel to electrical equipment rack.

c. Pull multiprogramnmer forward until rear mounted connectors are accessible, being careful not to over extend connecting cables.

d. At rear of multiprogrammer, remove the ac power cable, loosen four captive screws on rear cover, an(tag and remove six cables.

WARNING

Weight is 62 lbs (28 kg). To minimize possible injury to personnel or damage to equipment, two persons are required to remove and install equipment from rack.

***e*.** Release slide locks, remove multiprogrammer and set on workbench.

f. To install replacement multiprogrammer, position chassis to engage slide mechanism and slide in until slide locks in extended position.

g. At front of multiprogrammer, ensure that LINE ON/OFF switch is in the OFF position.

h. At rear of multiprogrammer, identify and reconnect cables, and reconnect ac power cable removed in step ***d.***

i. Release slide locks, slide multiprogrammer into electrical equipment rack, and secure with four captive screws.

3-154. AC Line Fuse (FL1) Removal and Replacement. To remove and replace ac line fuse, perform following steps:

a. On front panel of multiprogrammer, set LINE ON/OFF switch to OFF position, and verify ISO- LATED POWER indicators 1, 2, and 3 are not lighted.

b. On front panel of multiprogrammer, loosen four captive screws securing panel to electrical equipment rack. Remove two front cover screws at bottom of cover to grasp front of multiprogrammer.

c. Pull multiprogrammer forward on slides until slide locks are engaged, being careful not to overextend connecting cables.

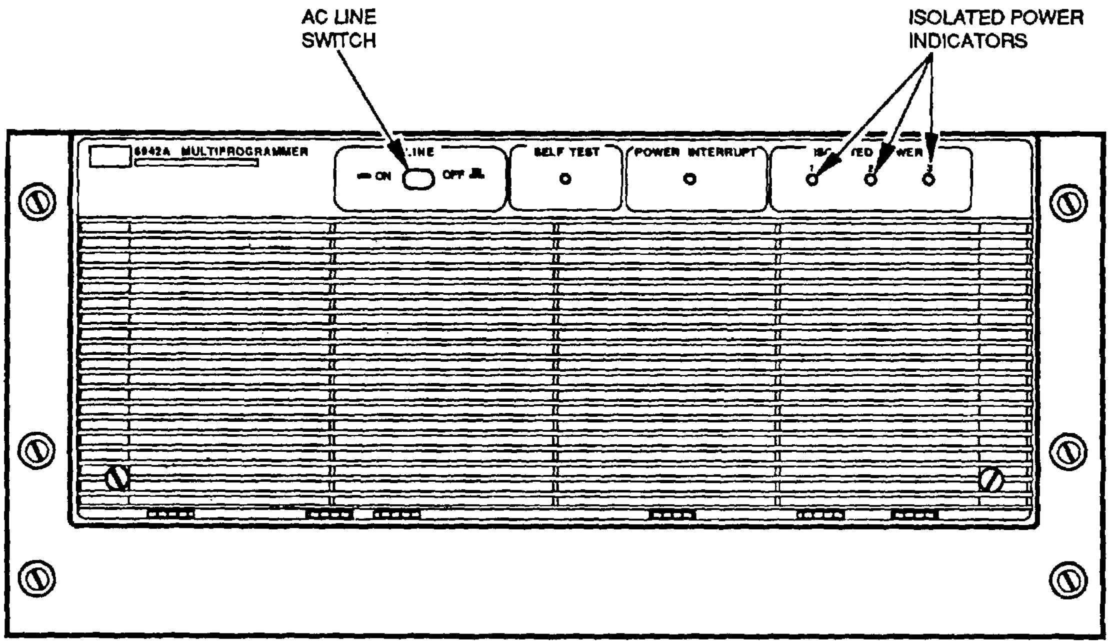
d. At rear of multiprogrammer, remove ac power cable and slide plastic cover down to gain access to fuse (FL1).

e. Remove fuse from fuse holder by pulling down on black lever marked FUSE/PULL (fig. 3-23).

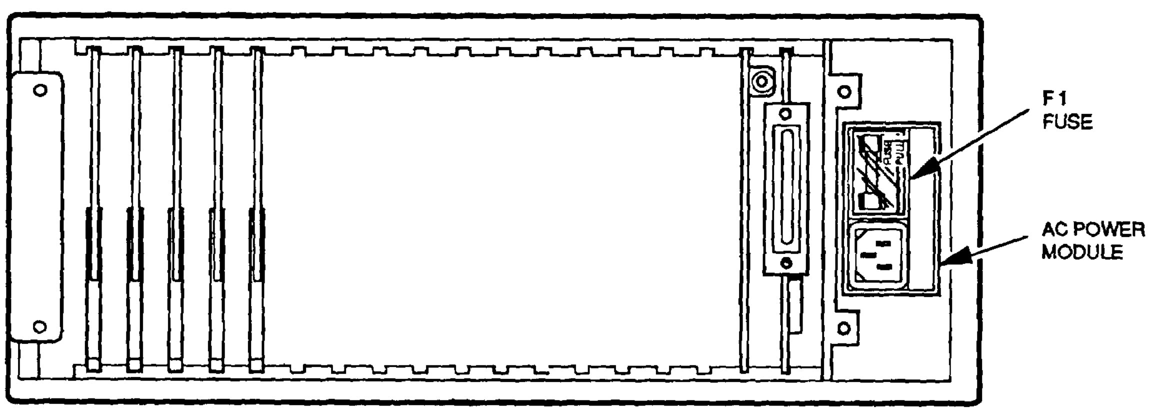
f. Insert replacement fuse in fuse holder.

***g*.** Slide plastic cover up and install ac power cable.

***h*.** Release slide locks, slide multiprogrammer into electrical equipment rack, and secure with four captive screws. Replace two front cover screws.



FRONT VIEW



REAR VIEW

EL5895-907-34-TM-132

Figure 3-23. Multiprogrammer 15A11 parts location (sheet 1 of 2).

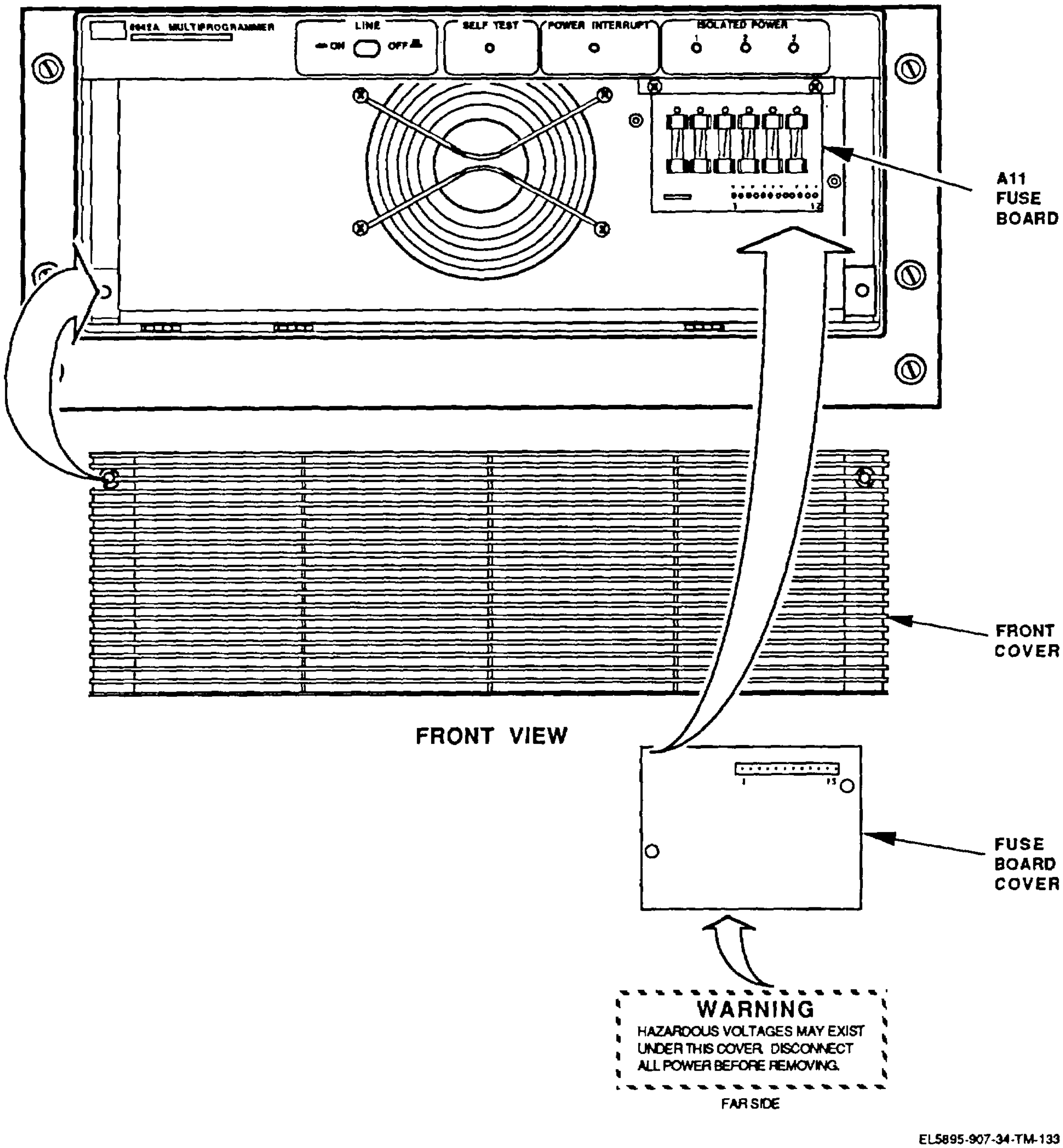


Figure 3-23. Multiprogrammer 15A11 parts location (sheet 2 of 2).

3-155. Fuse Board All, Fuses F1 through F6 (fig 3-23, sh 2) Removal and Replacement. To remove and replace fuses F1 through F6, perform the following steps:

a. On front panel of multiprogrammer, set LINE ON/OFF switch to OFF position, and verify ISOLATED POWER indicators 1, 2, and 3 are not lighted.

b. On front panel of multiprogrammer, loosen four captive screws securing panel to electrical equipment rack.

c. Pull multiprogrammer forward on slides until slide locks are engaged, being careful not to overextend connecting cables.

d. At rear of multiprogrammer, remove ac power cable.

e. Remove front cover by loosening two captive screws and gently pulling bottom of front cover forward approximately 1 inch down.

NOTE

The fuse board cover is an interlock that disconnects dc power from the fuses when removed.

f. Remove two screws securing the fuse board cover.

WARNING

Hazardous voltages may exist under fuse board cover. Disconnect all ac power before removing.

g. Pull fuse board cover straight back, being careful not to bend connector pins, and remove cover from unit. Connector pins are on lower right side of fuse board cover. Grasp cover by upper left side and bottom right side and apply greatest pull to bottom right when removing.

h. Remove fuse from applicable fuse holder.

i. Insert replacement fuse in applicable fuse holder.

j. Install fuse board cover removed in step ***d*** careful not to bend connector pins. Align connector pins with corresponding holes in fuse board. Press board in with greatest pressure on bottom right of cover. Press until fuse cover is seated firmly against standoffs.

k. Secure fuse board cover with two screws removed in step ***c.***

l. Install front cover and secure with two captive screws.

m. At rear of multiprogrammer, install ac power cable.

CAUTION

When sliding multiprogrammer into rack possible damage to interface cables may occur. Insert multiprogrammer slowly and observe interface cables.

n. Release slide locks, slide multiprogrammer into electrical equipment rack, and secure with four captive screw.

SECTION XXIX. MAINTENANCE OF INTERFACE BUS EXTENDER 15A12

3-156. General. This section provides instructions for replacing interface bus extender 15A 12 during direct support maintenance.

3-157. Interface Bus Extender 15A12 Removal and Replacement (fig. 3-24). To remove and replace the interface bus extender, perform the following steps:

a. On front panel of interface bus extender (fig. 3-22), set line ON/OFF switch to OFF position, and verify line indicator is not lighted.

b. On front panel of interface bus extender, loosen four captive screws securing panel to electrical equipment rack.

c. Pull interface bus extender forward until rear mounted connectors are accessible, being careful not to overextend connecting cables.

d. At rear of interface bus extender, remove ac power cable, tag the two cables, and disconnect them from connectors.

e. Release slide locks. Remove interface bus extender special purpose chassis assembly and set on workbench.

f. On special purpose chassis assembly, remove the three screw securing interface bus extender to back of special purpose chassis and set extender on workbench.

g. On replacement interface bus extender, remove top cover.

h. Set A1S1 (fig. 3-24) to R, DIP switches A1S2 to ON position, and A1S5 to COAX.

i. At rear of interface bus extender, set MASTER/SLAVE switch to SLAVE (right side position) and SERIAL DATA RATE switch to NORMAL (left position).

j. Reinstall top cover to interface bus extender.

k. Install interface bus extender into special purpose chassis assembly using the three screws removed in step e.

l. At front of interface bus extender, ensure that LINE ON/OFF switch is in OFF position.

m. To install interface bus extender special purpose chassis, position chassis to engage slide mechanism and slide in until slide locks are engaged.

n. At rear of interface bus extender, identify and reconnect cables, and reconnect ac power cable removed in step ***d.***

o. Release slide locks, slide interface bus extender special purpose chassis assembly into electrical equipment rack, and secure with four captive screws.

3-158. AC Line Fuse FL1 Removal and Replacement. To remove and replace ac line fuse, perform the following steps:

a. On front panel of interface bus extender, set LINE ON/OFF switch to OFF position, and verify line indicator is not lighted.

b. On front panel of interface bus extender, loosen four captive screws securing panel to electrical equipment rack.

c. Pull interface bus extender forward on slides until slide locks are engaged, being careful not to overextend connecting cables.

d. At rear of interface bus extender, remove ac power cable and slide plastic cover down to gain access to fuse (FL1).

e. Remove fuse from fuse holder by gently pulling out and to the right on the lever marked FUSE/PULL (fig. 3-24).

f. Insert replacement fuse in fuse holder.

g. Slide plastic cover over fuse and install ac power cable.

h. Release slide locks on inner slide rails, gently slide interface bus extender into electrical equipment rack, and secure with four captive screws. See figure 3-25.

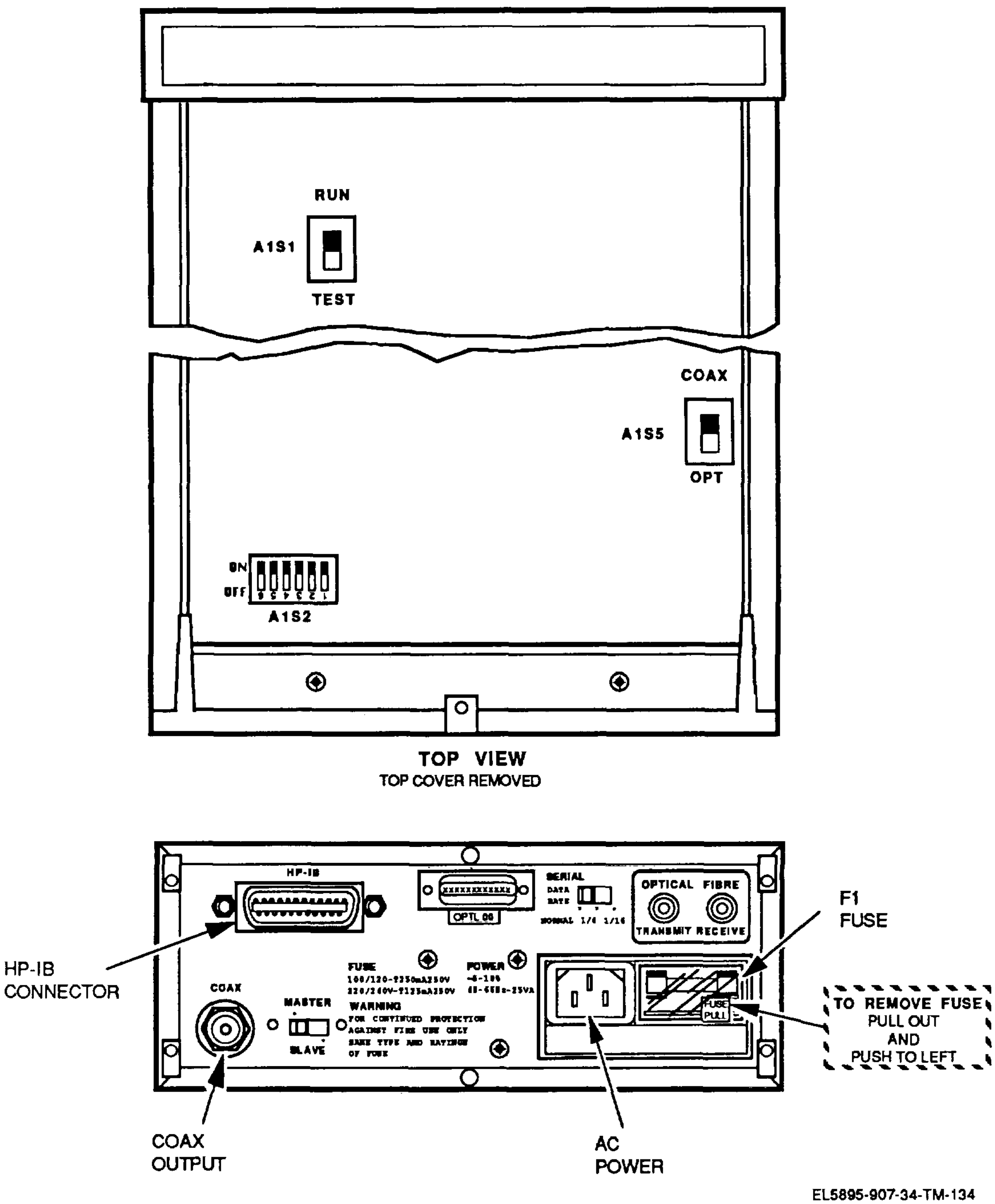


Figure 3-24. Interface bus extender 15A12 parts location.

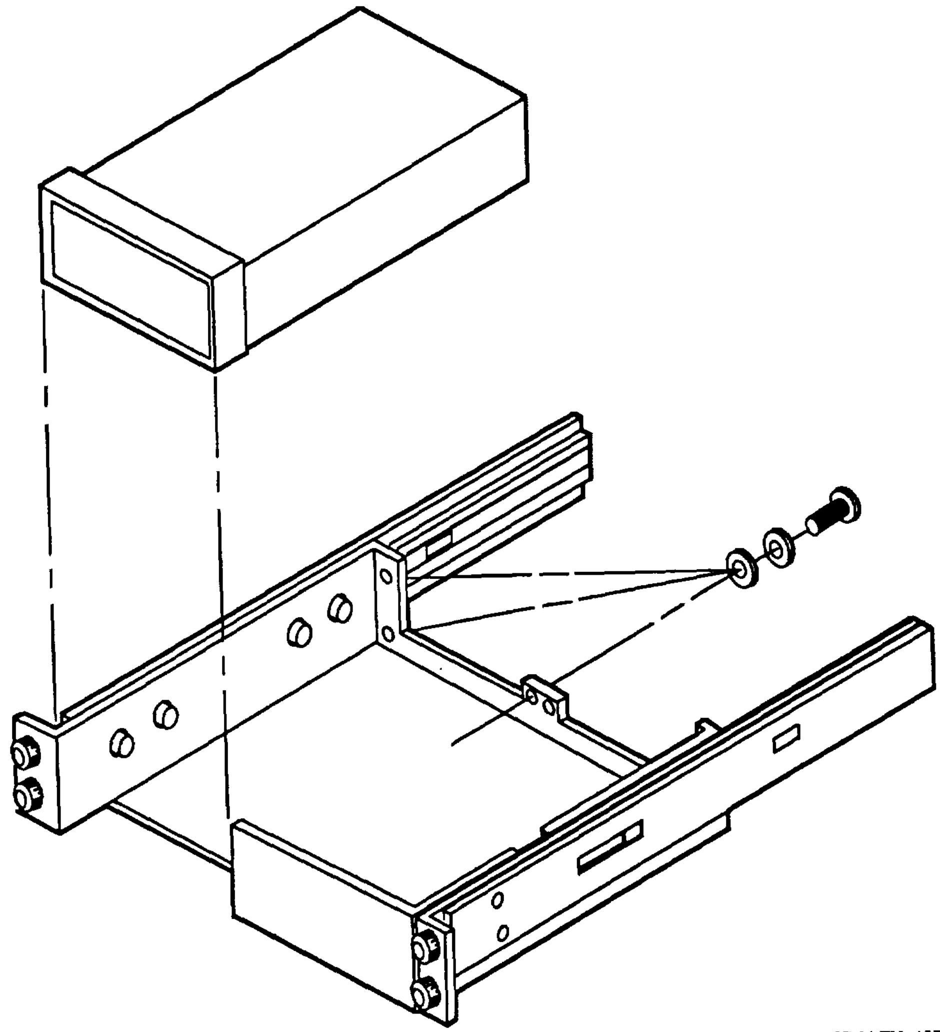


Figure 3-25. Interface bus extender 15A12 rack assembly.

APPENDIX

REFERENCES

The following is a list of applicable references that are available to the repairman of Status and Alarm Equipment.

DA Pam 310-4.	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Index of Modification Work Orders.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army.
SC 5180-91-CL-RO7	Tool Kit Electronics Equipment TK-105/G.
SM 11-4-5180-SOS	Tool Equipment TE-SOB.
TB 291	Safety Measures to be Observed When Installing and Using Whip Antennas, Field Type Masts, Towers. Antennas, and Metal Poles That are Used with Communication, Radar, and Direction Finder Equipment (TO 31P5-1-1).
TB 746- 10	Field Instructions for: Painting and Preserving Electronics Command Equipment.
TM 9-213	Painting Instructions for Field Use.
TM 8-750	The Army Maintenance Management System (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Material to Prevent Enemy Use (Electronics Command).
TM 5-4120-343-14	MOAC 336 Air Conditioner, Operation and Service Manual.
TM 5-4120-343-24P	MOAC 336 Air Conditioner, Repair Parts Manual.
TM 11-5895-898-12 NAVELEX 0967-LP-546-6010 TO 31R5-2FSC78-1	Operator and Organizational Maintenance Manual for Satellite Communication Terminal ANIFSC-78(V).
TM 11-5895-898-20P NAVELEX 0967-LP-546-6020 TO 31R5-2FSC78-4	Organizational Maintenance Repair Parts, and Special Tools .is for Satellite Communication Terminal AN/FSC-78(V).
TM 11-5895-899-12 NAVELEX 0967-LP-546-5010 TO 31 R5-2FSC79-1	Operator and Organizational Maintenance Manual for Satellite Communication Terminal AN/FSC-79.
TM 11-5895-899-20P NAVELEX 0967-LP-546-5020 TO 31R5-2FSC79-4	Organizational Maintenance Repair Parts, and Special Tools List for Satellite Communication Terminal AN/FSC-79.
TM 11-5895-900-34 NAVELEX 0967-LP-546-6030 TO 31R5-2-102	Direct and General Support Maintenance Manual for Antenna and Microwave Equipment including: Feed Assembly AS-2941/FSC; Feed Assembly AS-2941A/FSC; Dehumidifier, Desiccant, Electric HD-988/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.

TM 11-5895-900-34P .... NAVELEX 0967-LP-546-6040 TO 31R5-2-104	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Antenna and Microwave Equipment including: Feed Assembly AS-2941/FSC; Dehumidifier, Desiccant, Electric HD-988/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-901-34................................. NAVELEX 0967-LP-546-6060 TO 31R5-2G-1 12	Direct and General Support Maintenance Manual for Up- and Down-Converter Racks including: Rack, Electrical Equipment MT-4773/G; Rack, Electrical Equipment MT-4774/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-901-34P .... NAVELEX 0967-LP-546-6070 TO 31R5-2G-1 14	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Up- and Down-Converter Racks including: Rack, Electrical Equipment MT-4773/G; Rack, Electrical Equipment MT-4774/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-902-34................................. NAVELEX 0967-LP-546-6090 TO 31R5-2G-122	Direct and General Support Maintenance Manual for Tracking Receiver Equipment including: Scanner, Signal TD-1104/GSC; Power Supply PP-6976/G; Converter, Frequency, Electronic CV-3131/G; Demodulator MD-922/G; Control-Indicator ID-191 1/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-902-34P .... NAVELEX 0967-LP-546-6100 TO 31R5-2G-124	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Tracking Receiver Equipment including: Scanner, Signal TD-1104/GSC; Power Supply PP-6976/G; Converter, Frequency, Electronic CV-3131/G; Demodulator MD-922/G; Control-Indicator ID-1911/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-903-34................................. NAVELEX 0967-LP-546-6120 TO 31R5-2G-132	Direct and General Support Maintenance Manual for Parametric Amplifier Group OG-133/G for Satellite Communication Terminal AN/FSC-78(V).
TM 11-5895-903-34P .... NAVELEX 0967-LP-546-6130 TO 31R5-2G-134	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Parametric Amplifier Group OG-133/G for Satellite Communication Terminal AN/FSC-78(V).
TM 11-5895-904-34................................. NAVELEX 0967-LP-546-6150 TO 31R5-2G-142	Direct and General Support Maintenance Manual for Interfaculty Link Amplifier Equipment including: Amplifier, Radio Frequency AM-6628/G; Amplifier, Radio Frequency AM-6629/G; Amplifier, Radio Frequency AM-6644/G; Amplifier, Radio Frequency AM-6788/FSC-79; Control-Monitor C-9400/G; Amplifier-Monitor OG-150/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-904-34P .... NAVELEX 0967-LP-54&66160 TO 31R5-2G-144	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Interfacility Link Amplifier including: Amplifier. Radio Frequency AM-6628/G; Amplifier. Radio Frequency AM-6629/G; Amplifier, Radio Frequency AM-6644/G; Amplifier. Radio Frequency AM-6788/FSC-79; Control-Monitor C-9400/G; Amplifier, Monitor Group OG-150/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.

TM 11-5895-90,-34................................. NAVELEX 0967-LP-546-6180 TO 31R5-2G-152	Direct and General Support Maintenance Manual for Frequency Generation Equipment including: Generator Group, Signal OV-64/G; Amplifier Group OG-151/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-905-34P .... NAVELEX 0967-LP-546-6190 TO 31R5-2G-154	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Frequency Generation Equipment including: Generator Group, Signal OV-64/G; Amplifier Group OG-151/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-906-34................................. NAVELEX 0967-LP-546-6210 TO 31R5-2-112	Direct and General Support Maintenance Manual for Radio Frequency Amplifier Equipment including: Amplifier, Radio Frequency OG-131A/MSC; Amplifier, Radio Frequency OG-132A/MSC; Cooler, Liquid, Electron Tube HD-955A/GR for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-906-34P .... NAVELEX 0967-LP-546-6220 TO 31R5-2-114	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Radio Frequency Amplifier Equipment including: Amplifier, Radio Frequency OG-131A/MSC: Amplifier, Radio Frequency OG-132A/MSC; Cooler, Liquid, Electron Tube HD-955A/GR for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-907-34P .... NAVELEX 0967-LP-546-6250 TO 31R5-2G-164	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Status and Alarm Equipment including: Power Supply Assembly PP-6958/G; Control-Monitor C-9861/G; Control-Monitor C-9854/G; Indicator, Channel Frequency ID-2030/G; Control-Indicator ID-2028/G; Control-Indicator ID-2033/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-90-34.................................. NAVELEX 0967-LP-546-6270 TO 31R5-2G-172	Direct and General Support Maintenance Manual for Radio Frequency Monitor and Test Group including: Interconnecting Group ON-1481G; Interconnecting Group ON-149/G; Amplifier Assembly AM-6625/G; Monitor Test Group OA-8836/G; Control-Indicator C-9404/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-908-34P .... NAVELEX 0967-LP-546-6280 TO 31R5-2G-174	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Radio Frequency Monitor and Test Group including: Interconnecting Group ON-148/G; Interconnecting Group ON-149/G; Amplifier Assembly AM-6625/G; Monitor Test Group OA-8836/G; Control Indicator C-9404/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-909-34................................. NAVELEX 0967-LP-546-6300 TO 31R5-2G-182	Direct and General Support Maintenance Manual for Receiver Gain Monitor Equipment including: Monitor, Radio Frequency ID-1935/G; Monitor, Pilot Carriers ID-1916/G for Satellite Communication Terminal ·AN/FSC-78(V).
TM 11-5895-909-34P .... NAVELEX 0967-LP-5466310 TO 31R5-2G-184	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Receiver Gain Monitor Equipment including: Monitor, Radio Frequency ID-1935/G; Monitor, Pilot Carriers ID-1916/G for Satellite Communication Terminal AN/FSC-78(V).

TM 11-5895-91034................................. NAVELEX 0967-LP-546-6330 TO 31R5-2CG-192	Direct and General Support Maintenance Manual for Receiver Radio Frequency Noise Measurement Equipment including: Test Set, Radio Frequency Noise TS-3376/G; Monitor, Noise Temperature ID-1915/G for Satellite Communication Terminal AN/FSC-78(V).
TM 11-5895-910-34P .... NAVELEX 0967-LP-546-6340 TO 31R5-2G-194	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Receiver Radio Frequency Noise Measurement Equipment including: Test Set, Radio Frequency Noise TS-3376/G; Monitor, Noise Temperature ID-1915/G for Satellite Communication Terminal AN/FSC- 78(V).
TM 11-5895-911-34................................. NAVELEX 0967-LP-546-6360 TO 31R5-2G-202	Direct and General Support Maintenance Manual for Carrier Level Control and Monitor Equipment including: Control-Monitor Group OK-299/G; Control-Monitor C-9851/G; Power Supply Assembly PP-6960/G; Detector, Radio Frequency CV-3288/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-911-34P .... NAVELEX 0967-LP-546-6370 TO 31R5-2G-204	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Carrier Level Control and Monitor Equipment including: Control-Monitor Group OK-299/G; Control-Monitor C-9851/G; Power Supply Assembly PP-6960/G; Detector, Radio Frequency CV-3288/G for Satellite Communication Terminals AN/FSC-78(V) and AN/ FSC-79.
TM 11-5895-91-34.................................. NAVELEX 0967-LP-546-6390 TO 31R5-2G-212	Direct and General Support Maintenance Manual for Transmitter Power Monitor Equipment including: Monitor, Radio Frequency MX-9472/G; Control-Indicator C-9841/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.
TM 11-5895-912-34P .... NAVELEX 0967-LP-546-6400 TO 31R5-2G-214	Direct Support, General Support Maintenance Repair Parts and Special Tools Listing (Including Depot Maintenance Repair Parts and Special Tools) for Transmitter Power Monitor Equipment including: Monitor, Radio Frequency MX-9472/G; Control-Indicator C-9841/G for Satellite Communication Terminals AN/FSC-78(V) and AN/ FSC-79.
TM 11-5.895-913-34................................ NAVELEX 0967-LP-546-6420 TO 31R5-2G-222	Direct and General Support Maintenance Manual for Translator, Signal Data CV-3098/G for Satellite Communication Terminal AN/FSC-78(V).
TM 11-5895-913-34P .... NAVELEX 0967-LP-546-6430 TO 31R5-2G-224	Direct Support, General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools for Translator. Signal Data CV-3098/G for Satellite Communication Terminal AN/FSC-78(V).
TM 11-5895-914-34................................. NAVELEX 0967-LP-546-6450 TO 31R5-2G-232	Direct and General Support Maintenance Manual for Ancillary Equipment including: Control-Monitor ID-1914/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79.

TM 11 5895-912-34................................Direct Support and General Support Maintenance Manual: Transmitter Power Monitor Equipment Including: Monitor, Radio Frequency, MX-9472/G (NSN 5895-00-239-4788); Control-Indicator, C-9841/G (5895-O1007-9450) for Satellite Communication Terminals, AN/FSC-78(V) and AN/FSC-79 [NAVELEX 0967-LP-546-6390; TO 31R5-2G-212].

TM 11-5895-912-34P ....Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Transmitter Power Monitor Equipment Including: Monitor, Radio Frequency MX-9742/G (NSN 5895-00- 239-4788) and Control-Indicator C-9841/G (5895-01-007-9450) for Satellite Communica- tion Terminals AN/FSC-78(V) and AN/FSC-79 [NAVELEX 0967-LP-546-6400; TO 31R5-2G-214].

TM 11-5895-913-34................................Direct Support and General Support Maintenance Manual: Translator, Signal Data CV- 3098/0G (NSN 5895-00-237-2472) for Satellite Communication Terminal AN/FSC-78(V) [NAVELEX 0967-LP-546-6420; TO 31R5-2G-222].

TM 11-5895-913-34P ....Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Translator, Signal Data CV-3098/G (NSN 5895-00-237-2472) for Satellite Communication Terminal, AN/FSC-78(V) and AN/GSC-39(V) [NAVELEX 0967-LP-546-6431; TO 31R5-2G-224].

TM 11-5895-9l4-34.................................Direct Support and General Support Maintenance Manual: Ancillary Equipment In-cluding: Control Monitor ID-1914/G (NSN 5895-00-279-8483) for Satellite Communica- tion Terminals AN/FSC-78(V) and AN/FSC-79 [NAVELEX 0967-LP-546-6450; TO 31R5-2G-232].

TM 11-5895-914-34P ....Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Ancillary Equipment Including: Control-Monitor ID-1914/G for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79 [NAVELEX 0967-LP-546-6460; TO 31R5-2G-234].

TM 11-589-915-34..................................Direct Support and General Support Maintenance Manual: Servo and Control Equipment Including: Control, Antenna, C-9402/G (NSN 5895-00-257-8168); Indicator, Antenna, Position-Status, ID-1912/G (5895-00-251-8071); Power Supply Assembly, PP-6959/G (5895-W0-251-8106); Control, Direct Current, C-9849/FSC (5895-01-020-2825); Drive Assembly, Electromechanical, Antenna, TG-232/FSC (5895-01-007-9402); Synchro, Antenna, SN-498/FSC (5990-01-007-9483) and SN-482/FSC (5895-00-237-2453) and Control-Indicator, ID-1936/G (5895-00-241-9369) for Satellite Communication Ter- minals, AN/FSC-78(V) and AN/FSC-79.

TM 11-5895-915-34P ....Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Servo and Control Equipment Including: Control, Antenna C-9402/G (5895-00-257-6168); Indicator, Anten- na, Position-Status ID-1912/G (5895-00-251-8071); Power Supply Assembly PP-6959/G (895-00251-8106); Control, Direct Current C-9849/GSC (5895-01-020-2825); Drive Assembly, Electromechanical, Antenna TG-232/FSC (5895-01-007-9402); Synchro, Antenna SN498/FSC (5990-01-)07-9483) and SN-482/FSC (5895-00-237-2453); Control- Indicator ID-1936/G (5895-00-241-9369) for Satellite Communication Terminals AN/FSC-78(V) and AN/FSC-79 INAVELEX 0967-LP-546-6490; TO 31R5-2-124].

TM 11 5895-1043-12..............................Operator’s and Organizational Maintenance Manual for Satellite Communication Ter- minal AN/GSC-39(V)2 (NSN 5895-01-077-6249) [NAVELEX 0967-LP-625-3010; TO 31R5-2GSC39-11]

TM 11-5895-1043-20P	Organizational Maintenance Repair Parts and Special Tool List for Satellite Communica-tion Terminal AN/GSC-39(V)2 (NSN 5895-01-077-6249) [NAVELEX 0967-LP-625-3020; TO 31R5-2GSC39-14].
TM 11-5895-1050-12...............................	Operator's and Organizational Maintenance Manual: Satellite Communication Terminal AN/GSC-39(V)1 (NSN 5895-01-070-5685) [NAVELEX 0967-LP-643-9010; TO 31R5-2GSC39-1].
TM 11-5895-100-20P	Organizational Maintenance Repair Parts and Special Tools List for Satellite Com- munications Terminal, AN/GSC-39(V)1 (NSN 5895-01-070-5685) [NAVELEX 0967-LP-643-9020; TO 31R5-2GSC39-4].
TM 11-5895-358-14................................	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Antenna Group OE-222/G (NSN 5985-01-076-9947).
TM 11--5895-358-24P	Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools List) for Antenna Group OE-222/G (NSN 5985-01-076-9947).
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 43-0139	Painting Instruction for Field Use.
TM 740-90-1..	Administrative Storage of Equipment.
TM 750-236	Calibration.
TM 750-244-2..	Procedures for Destruction of Electronics Material to Prevent Enemy Use (Electronics Command).

GLOSSARY

A

ACQ .... Acquisition. The condition in which tracking equipment is locked to the satellite beacon and the antenna is following satellite movement.

AFSCF .... Air Force Satellite Control Facility. The DOD element satellite programs that include tracking, monitoring and commanding satellites.

ALC .... Automatic Level Control.

ANGLE MODULATION .... The modulation process in which the angle of a sine wave carrier is varied from the normal value.

B

BASEBAND .... The composite information signal modulated on a chosen carrier.

BITE .... Built In Test Equipment. The test equipment in the operating equipment rack for ongoing monitoring and test use.

C

CHANNEL .... In electronic communication, a channel is:

a. A path for transmitting electric signals, usually in distinction from other parallel paths, not necessarily a pair of metallic conductors.
b. The number of independent channels on a system (or trunk) is measured by the number of separate communications facilities that it can provide.
c. The smallest subdivision of a trunk by which a single type of communications service is provided, i.e., voice channel, teletypewriter channel, or data channel.

CIRCUIT .... The complete electrical path over which telecommunications are provided between end terminal instruments comprising send and receive channels.

CMA .... Control Monitor and Alarm. The equipment that provides alarm circuits and controls signal paths throughout the AN/FSC-78(V) and AN/FSC-79.

D

DCA .... Defense Communications Agency. The cognizant DOD agency responsible for exercising operational control over DOD communication service.

DOD .... Department of Defense.

DSCS .... Defense Satellite Communications System. The elements of the defense communications system which support:

a. Requirements of the worldwide military command and control system.
b. Establishing, extending, and upgrading communications in direct sup- port of combat forces.
c. Communications requirements resulting from changes in deployment and mission of forces.
d. Long-distance trunking networks.

E

EER .... Elevated Equipment Room. The enclosure located at the elevation yoke that houses the rf plate and associated equipment.

ERP .... Effective Radiated Power. The power radiated from the antenna, that is, the antenna power input multiplied by the gain of the antenna.

F

FB .... Fleet Broadcast. The operating portion of the Navy fleet satellite program that provides simplex transmit functions to selected naval sea and air forces.

FET .... Field Effect Transistor. A semiconductor in which the resistance between two terminals, the source and the drain, depend upon a field produced by a voltage applied to the third terminal, the gate.

FPA. .... Final Power Amplifier. The final stage of amplification in the uplink-a traveling wave tube (TWT) for the AN/FSC-78(V) and a klystron tube for the AN/FSC-79.

FULL-DUPLEX OPERATION .... A type of operation in which simultaneous two-way conversations, messages, or information may be passed between two or more points.

H

HALF-DUPLEX OPERATION .... A circuit in which signals are transmitted alternately in either direction, usually because of limitations of the terminal equipment.

I

IC. .... Integrated Circuit. A combination of interconnected circuit elements within a continuous substrate.

IF. .... Intermediate Frequency. The 70 or 700 MHz baseband signal utilized in satellite communications systems.

IFLA .... Interfacility Link Amplifier. A solid state amplifier which provides power gain to overcome cable and interconnect losses between major equipment elements within the AN/FSC-78(V) terminal.

ISOTROPIC RADIATOR .... A hypothetical antenna radiating or receiving equally in all directions.

IPA .... Intermediate Power Amplifier. The equipment that provides required power gain to the uplink signal for application to the final power amplifier (FPA).

L

LINK .... A link is:

a. A portion of a communication circuit.
b. A channel or circuit designed to be connected in tandem with other channels or circuits.
c. A radio path between two points, called a radio link; the resultant circuit may be unidirectional, half duplex, or duplex.

LNA .... Low Noise Amplifier. An amplifier that operates with an inherently higher signal-to-noise ratio than is usually available from a standard amplifier.

M

MONOSCAN .... A tracking antenna feed containing five-horns; all tracking functions are handled by the four outer horns and communications is handled by the center horn.

N

NARROWBAND .... Any 40 MHz rf segment of the military satellite communication frequency band.

P

PA..Power Amplifier. The equipment within the AN/FSC-78(V) and AN/FSC-79 that provides high power amplification to the uplink carrier.

PBI...Push Button Indicator. An indicator switch; i.e., a switch that contains an indicator that displays the position in which the switch is placed.

PCB ....Printed Circuit Board. An insulated board that contains a circuit in which wires connecting discrete components have been replaced by conductive printed, painted, or etched strips.

PIN ....P (positive donor) I (intrinsic) N (negative donor). A diode made by diffusing the semiconductor with P material from one side and N material from the other side, so controlled that this region separates the P and N region. The storage time of the diode is too long to rectify at microwave frequencies, consequently it acts as an attenuator at these frequencies.

PS..Power Supply. A unit that changes ac to dc and maintains a constant preset voltage or current output.

R

RCVR .... Receiver. The portion of a communication system that converts a high frequency into a lower frequency.

RGMU ....Receiver Gain Monitor Unit. A unit unique to the AN/FSC-78(V) that automatically switches the standby receiver into operation when a receiver gain fault occurs.

S

SCR ....Silicon Controlled Rectifier.

SONALERT ....A device that emits an audible alarm in response to a system fault condition.

SSLU ....System Status Logic Unit. Equipment located in unit 15 which performs system logic processing and provides command interface between the FSSP and the various terminal equipment.

T

TWT..Traveling Wave Tube. An electron tube in which a beam of electrons interact repeatedly with a guided E-H wave moving in sync with it and in such a way that a net transfer of energy occurs between the beam and the traveling wave.

U

UJT...Unijunction Transistor.

V

VCO ....Voltage Controlled Oscillator.

W

WIG ....Waveguide. A transmission line comprising a hollow conducting tube within which electromagnetic waves are propagated.

WIDEBAND ....The full 500 MHz rf bandwidth of the DSCS system between the frequencies of 7.9 to 8.4 GHz.

X

X-BAPJD ....The military SATCOM band of radio frequencies, from 7.25 to 8.4 GHz.

XMTR ....Transmitter. Equipment used to generate and amplify an rf carrier, modulate the carrier, and radiate the modulated rf carrier from an antenna.

D

O

P

S

T

V

By Order of the Secretaries of the Army, the Navy, and the Air Force:

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Chief of Staff

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Brigadier General, United States Army
The Adjutant General

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LBAD (14)
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SHAD (3)
USA Dep (1)
Sig Sec USA Dep (1)
Ft Richardson (CERCOM Ofc) (2)
MAAG (1)
USARMIS (1)
USAERDAA (1)
USAERDAW (1)
Units org under fol TOE:
29-207 (2)
29-610 (2)

ARNG & USAR: None.
For explanation of abbreviations used, see AR 310-50.

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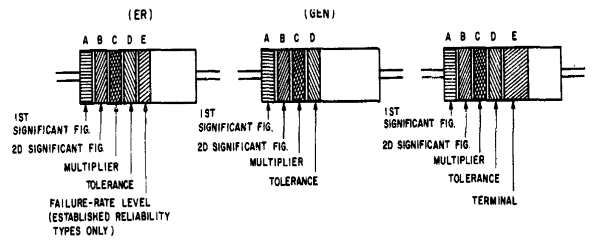


COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS.

COLOR-CODE MARKING FOR FILM-TYPE RESISTORS.

TABLE I
COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

BAND A		BAND B		BAND C		BAND D		BAND E		
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL	TERM.
BLACK.....	0	BLACK	0	BLACK.....	1			BROWN...	M=1.0	
BROWN.....	1	BROWN.....	1	BROWN....	10			RED......	P=0.1	
RED.......	2	RED........	2	RED........	100			ORANGE..	R=0.01	
ORANGE....	3	ORANGE....	3	ORANGE...	1,000			YELLOW..	S=0.001	
YELLOW....	4	YELLOW...	4	YELLOW...	10,000	SILVER.	±10 (COMP. TYPE ONLY)	WHITE...	....	SOLD-ERABLE
GREEN.....	5	GREEN.....	5	GREEN....	100,000	GOLD...	±5			
BLUE......	6	BLUE......	6	BLUE.....	1,000,000	RED....	±2 (NOT APPLICABLE TO ESTABLISHED RELIABILITY).			
PURPLE.... (VIOLET)	7	PURPLE.... (VIOLET)	7							
GRAY......	8	GRAY......	8	SILVER...	0.01					
WHITE....	9	WHITE.....	9	GOLD	0.1					

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH.)

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL RESISTANCE VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE-RATE LEVEL (PERCENT FAILURE PER 1,000 HOURS). ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1-1/2 TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

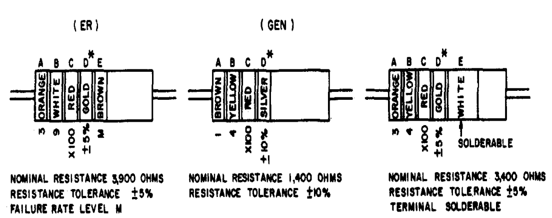
RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS
(THESE ARE NOT COLOR CODED)

SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHA NUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE

2R7 = 2.7 OHMS 10R0 = 10.0 OHMS

FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED, IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.

EXAMPLES OF COLOR CODING

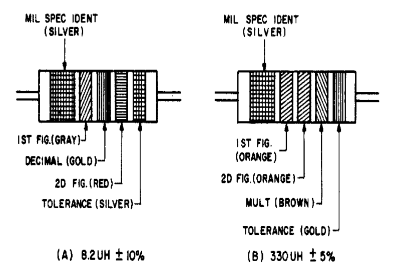


COMPOSITION-TYPE RESISTORS

FILM-TYPE RESISTORS

* IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ±20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.



COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF THE CODING FOR AN 8.2UH CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR A 330UH INDUCTOR ARE ILLUSTRATED.

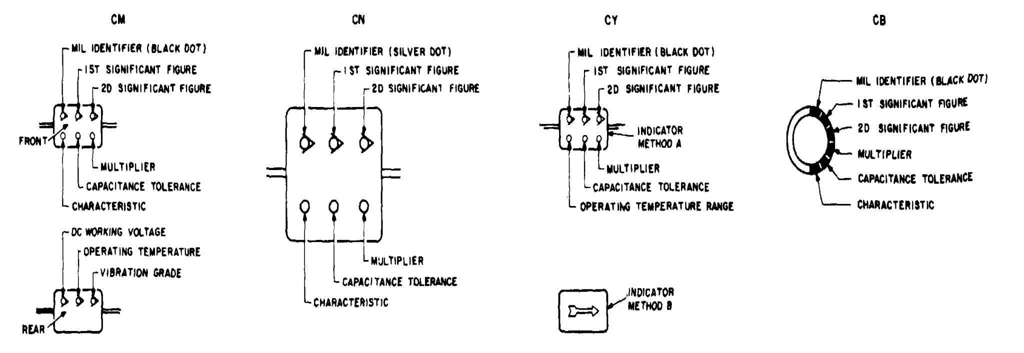
TABLE 2
COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		
NONE			20
SILVER			10
GOLD	DECIMAL POINT		5

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

CAPACITORS, FIXED, VARIOUS-DIELECTRICS, STYLES CM, CN, CY, AND CB.

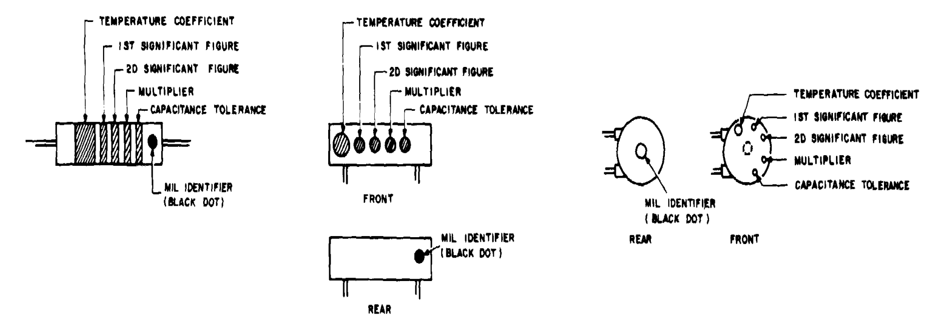


MICA-DIELECTRIC

PAPER-DIELECTRIC

GLASS-DIELECTRIC, GLASS CASE

MICA, BUTTON TYPE



AXIAL LEAD

RADIAL LEAD

DISK-TYPE

C. COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS.

TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	MIL ID	1ST SIG FIG.	2D SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]			DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CM	CM
BLACK	CM, CY CB	0	0	1			±20%	±20%		A			-55° TO +70°C	10-55 Hz
BROWN		1	1	10					B	E	B			
RED		2	2	100	±2%		±2%	±2%	C				-55° TO +85°C	
ORANGE		3	3	1,000		±30%			D		D	300		
YELLOW		4	4	10,000					E				-55° TO +125°C	10-2,000Hz
GREEN		5	5		±5%				F			500		
BLUE		6	6										-55° TO +150°C	
PURPLE (VIOLET)		7	7											
GRAY		8	8											
WHITE		9	9											
GOLD				0.1			±5%	±5%						
SILVER	CN			0.01	±10%	±10%	±10%	±10%						

TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

COLOR	TEMPERATURE COEFFICIENT[4]	1ST SIG FIG.	2D SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		±2.0 UUF	CC
BROWN	-30	1	1	10	±1%		
RED	-80	2	2	100	±2%	±0.25 UUF	
ORANGE	-150	3	3	1,000			
YELLOW	-220	4	4				
GREEN	-330	5	5		±5%	±0.5 UUF	
BLUE	-470	6	6				
PURPLE (VIOLET)	-750	7	7				
GRAY		8	8	0.01*			
WHITE		9	9	0.1*	±10%		
GOLD	+100			0.1		±1.0 UUF	
SILVER				0.01			

1. THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.

2. LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS: MIL-C-5, MIL-C-25D, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.

3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.

4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE.

* OPTIONAL CODING WHERE METALLIC PIGMENTS ARE UNDESIRABLE.

ESC-FM 913-73

Figure FO-1. Color code marking for MIL-STD resistors, inductors, and capacitors.

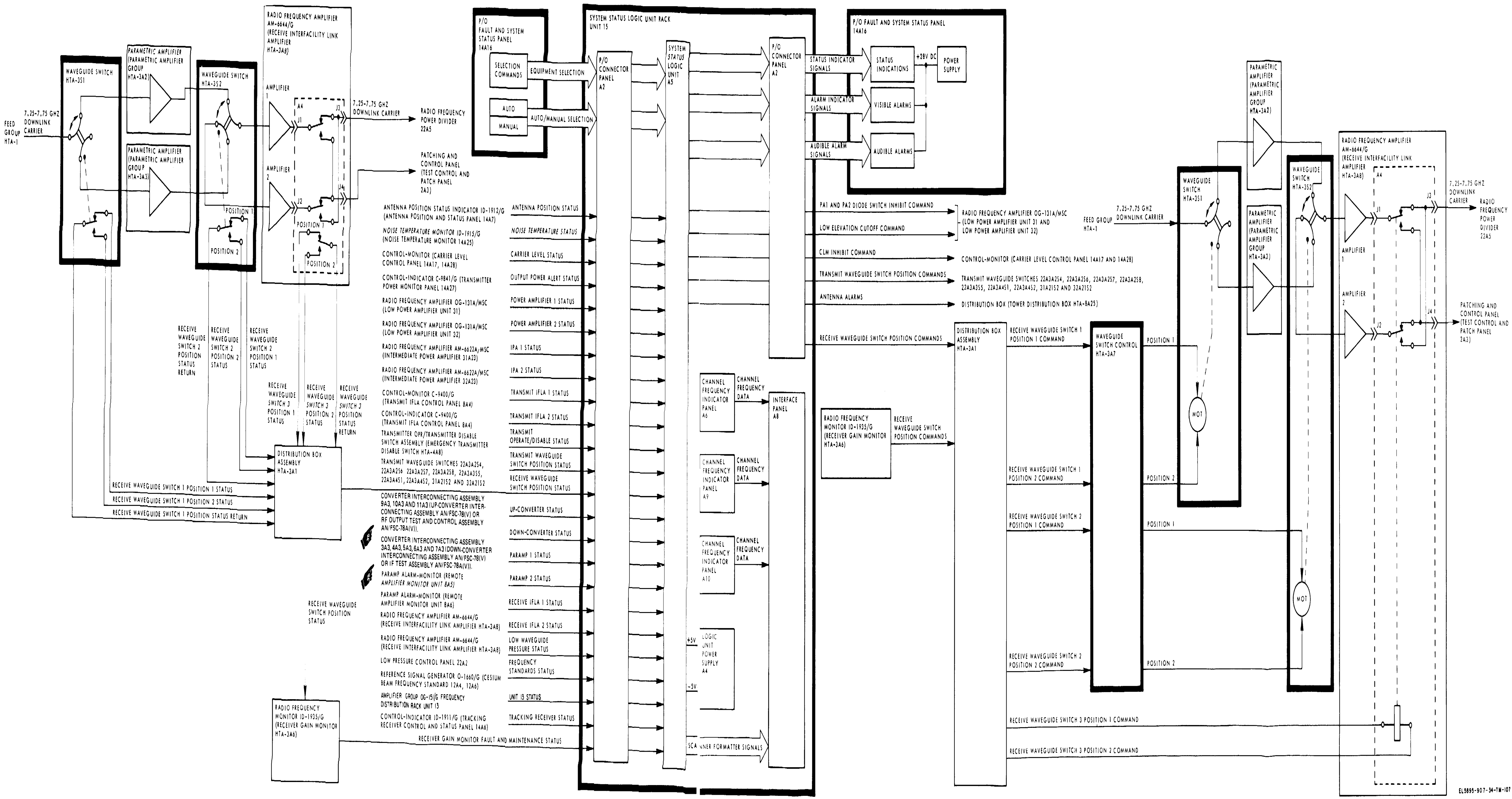


Figure FO-2. Status and alarm equipment, functional block diagram, AN/FSC-78(V).

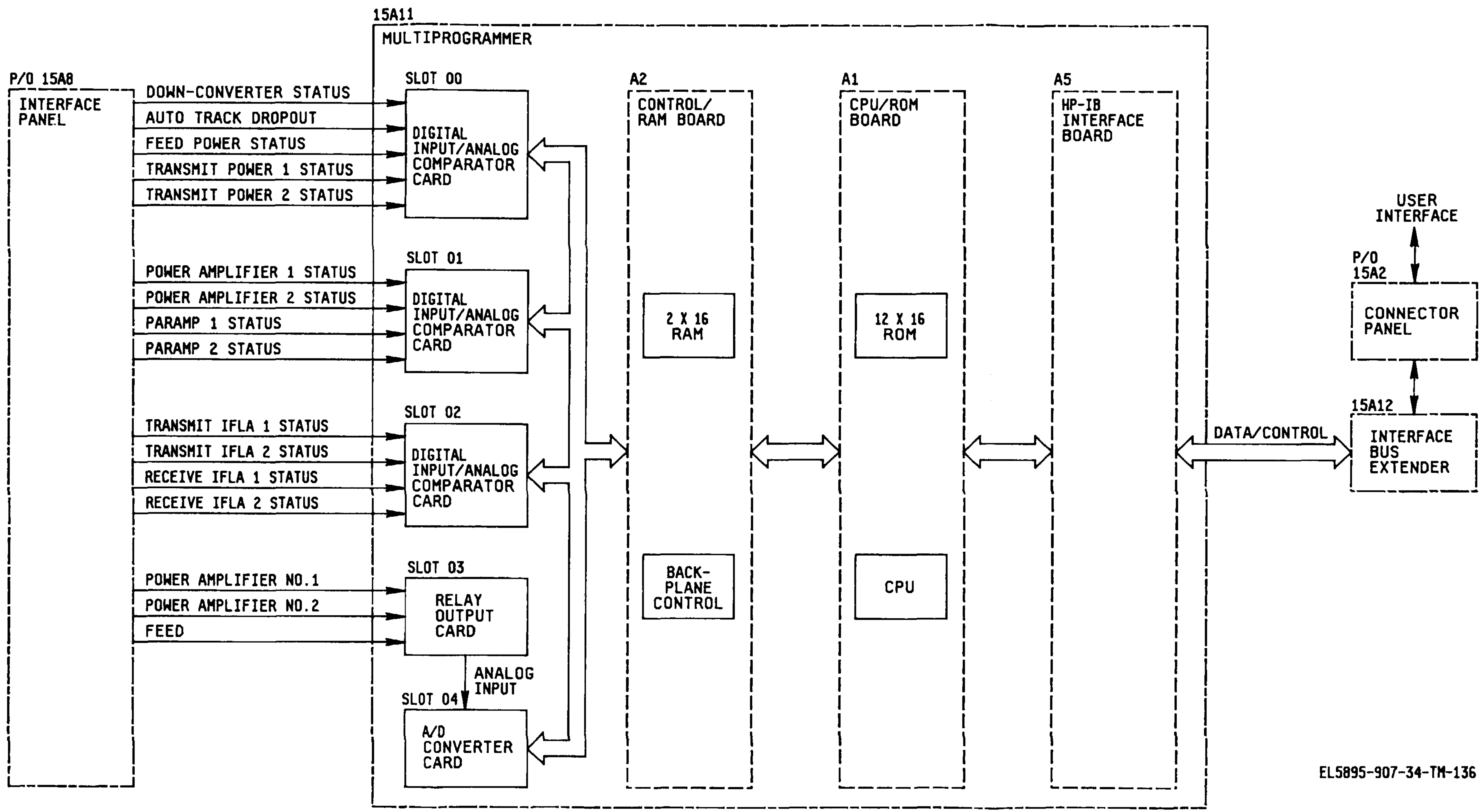


Figure FO-2.1. Status and Alarm Equipment Monitoring and Status User Interface, Functional Block Diagram, AN/FSC-78(V).

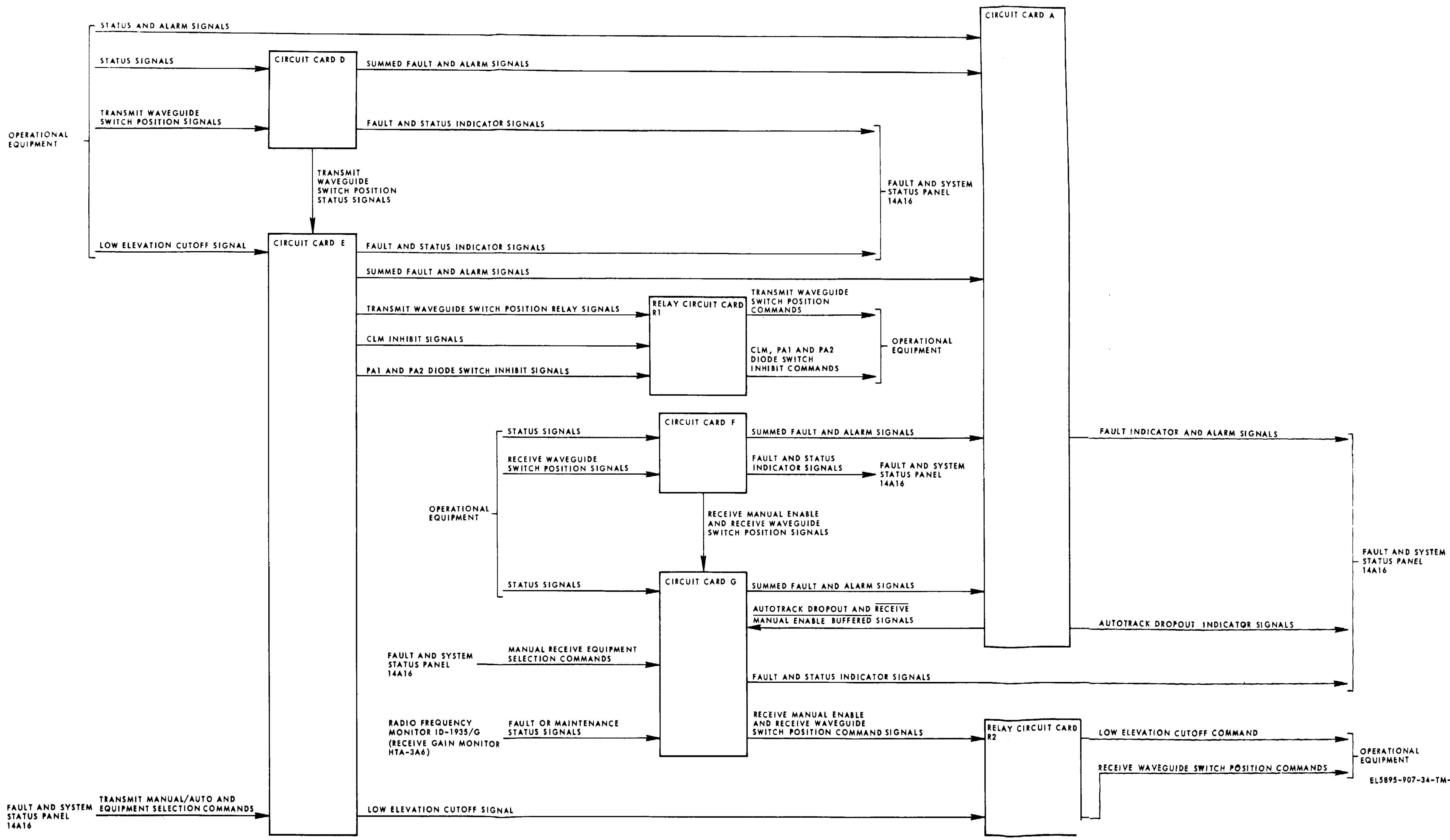


Figure FO-3. System status logic unit circuit card 1545 signal processing and routing, AN/FSC-78(V)

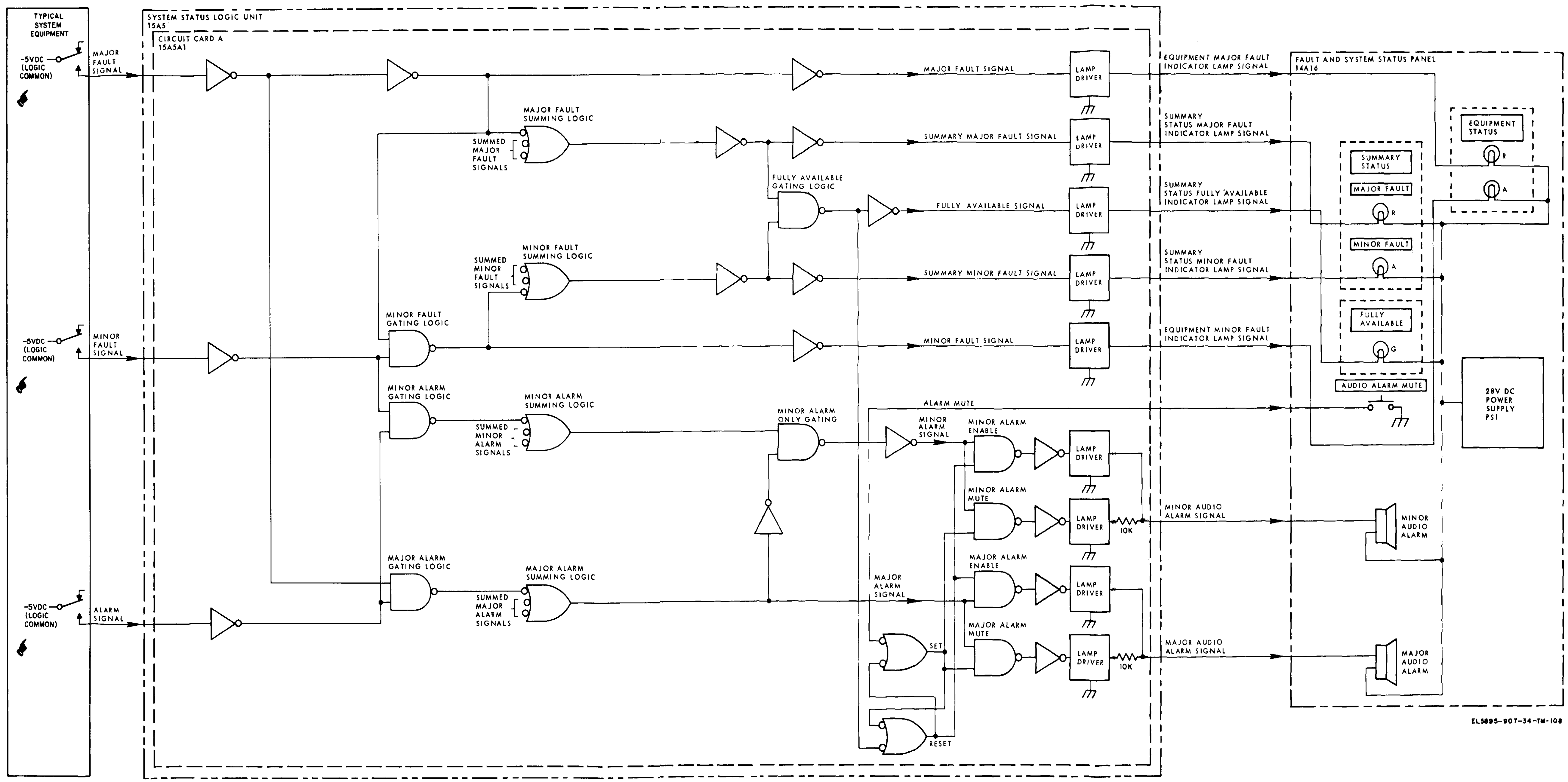


Figure FO-4. Typical equipment status and alarm signal processing.

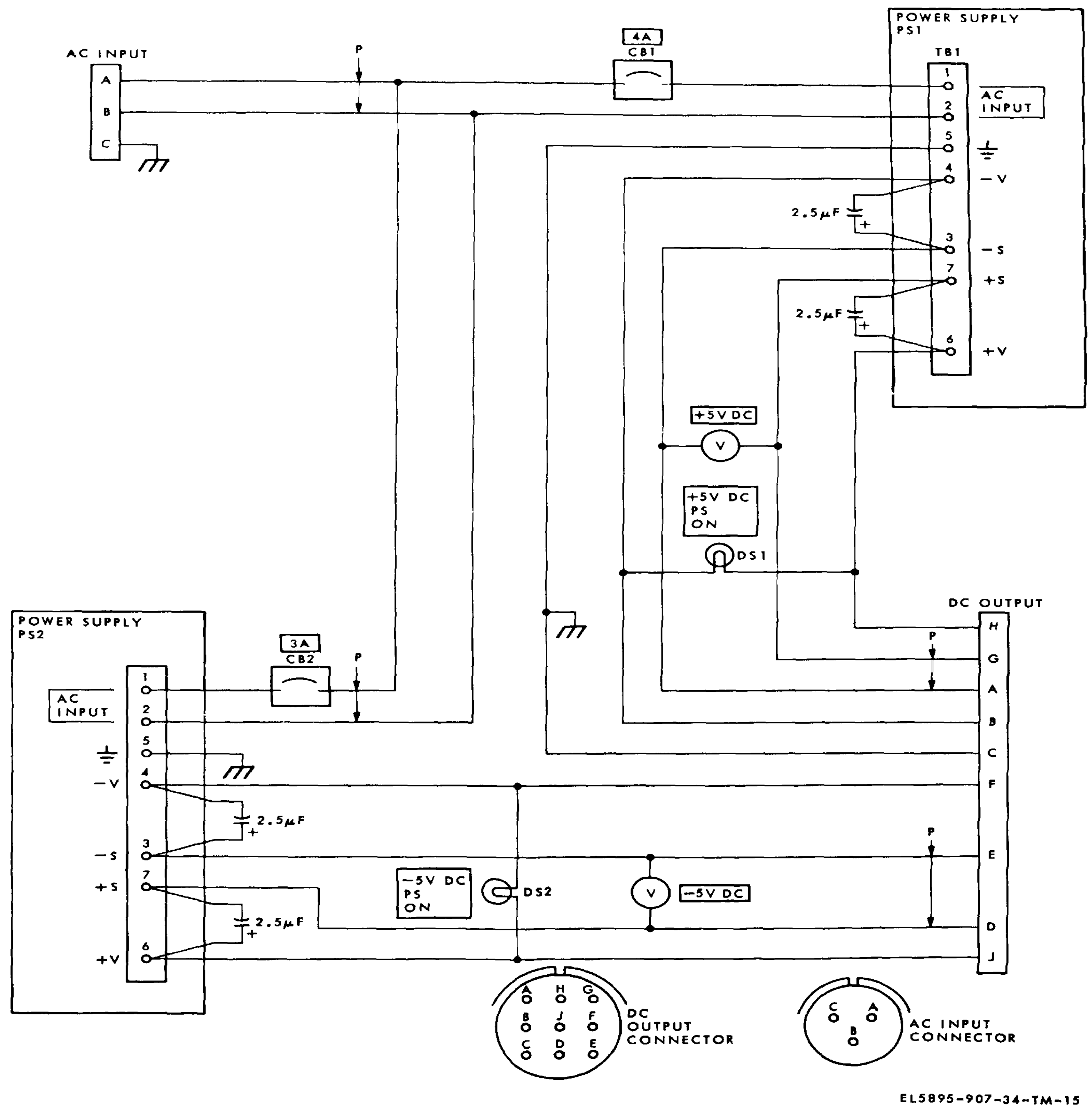


Figure FO-5. Logic unit power supply 15A4, schematic diagram.

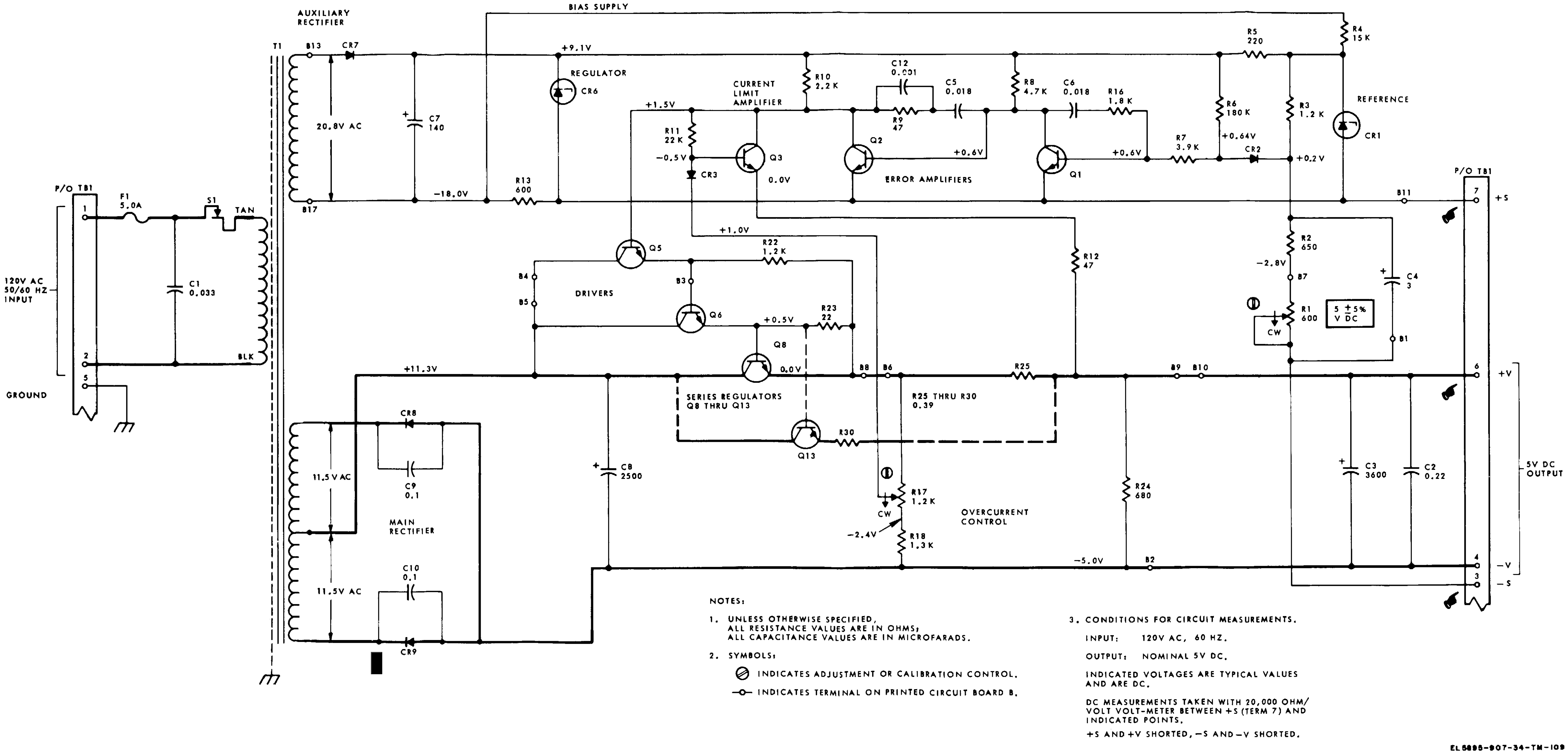


Figure FO-6. +5 V dc power supply 15A4PS1 schematic diagram

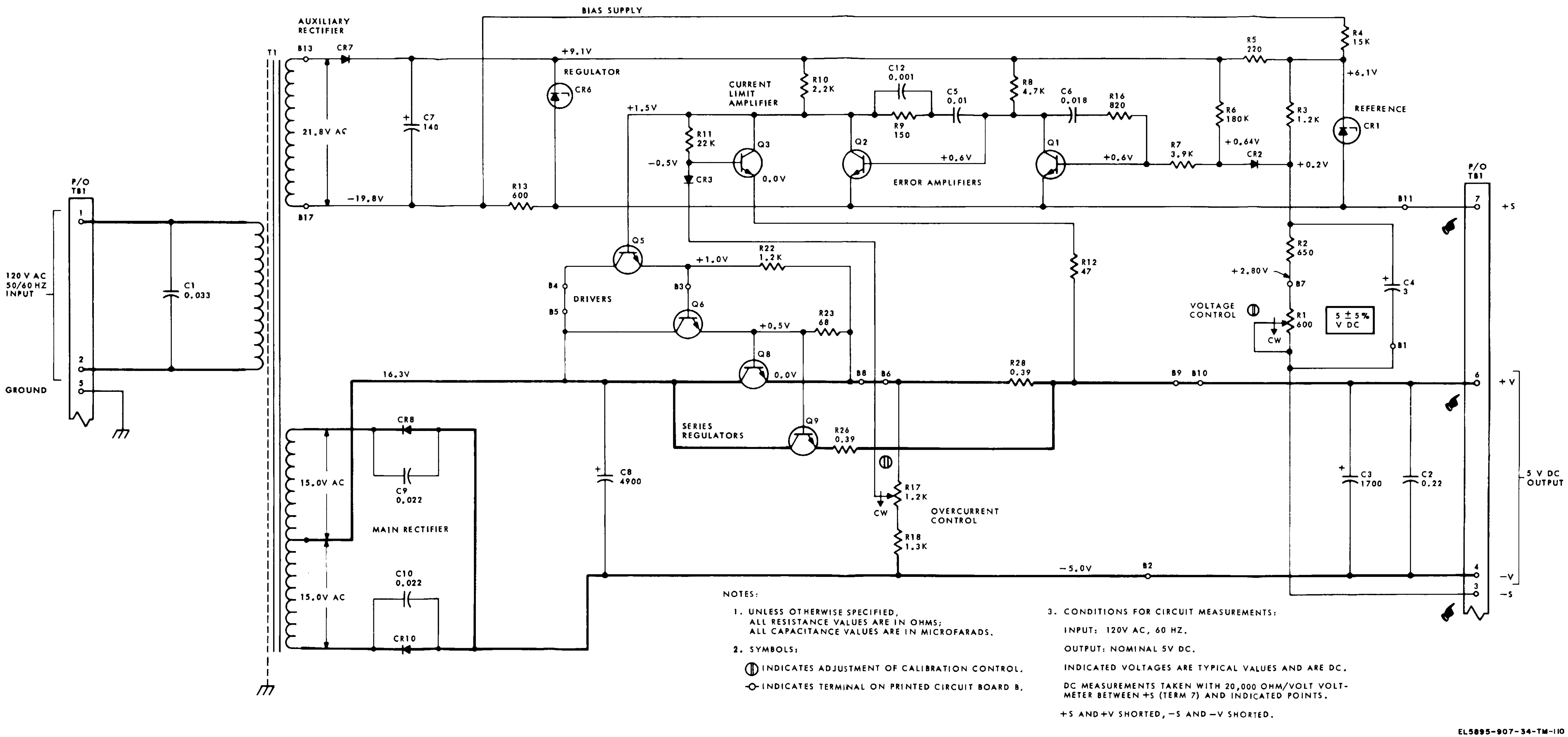


Figure FO-7. -5 V dc power supply 15A4PS2 schematic diagram.

Change 2

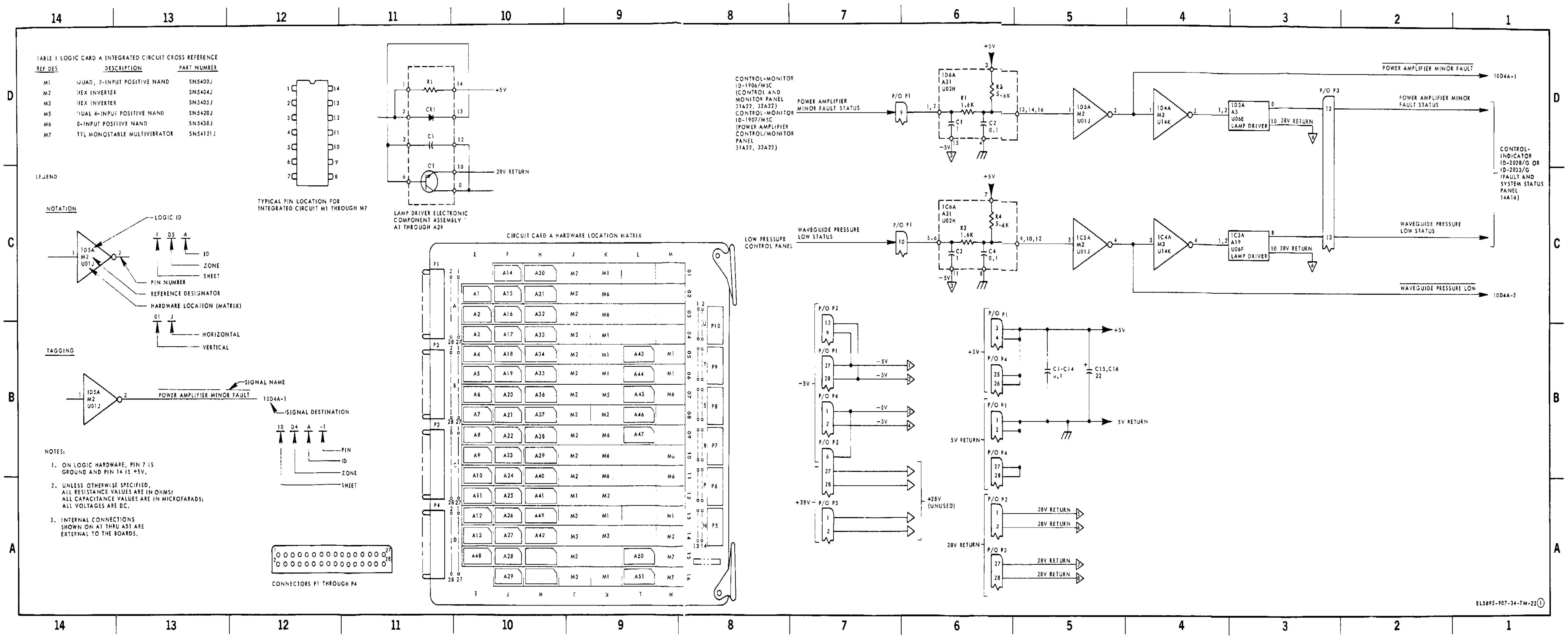


Figure FO-8. Circuit card A 15A5A1, logic diagram (sheet 1 of 13).

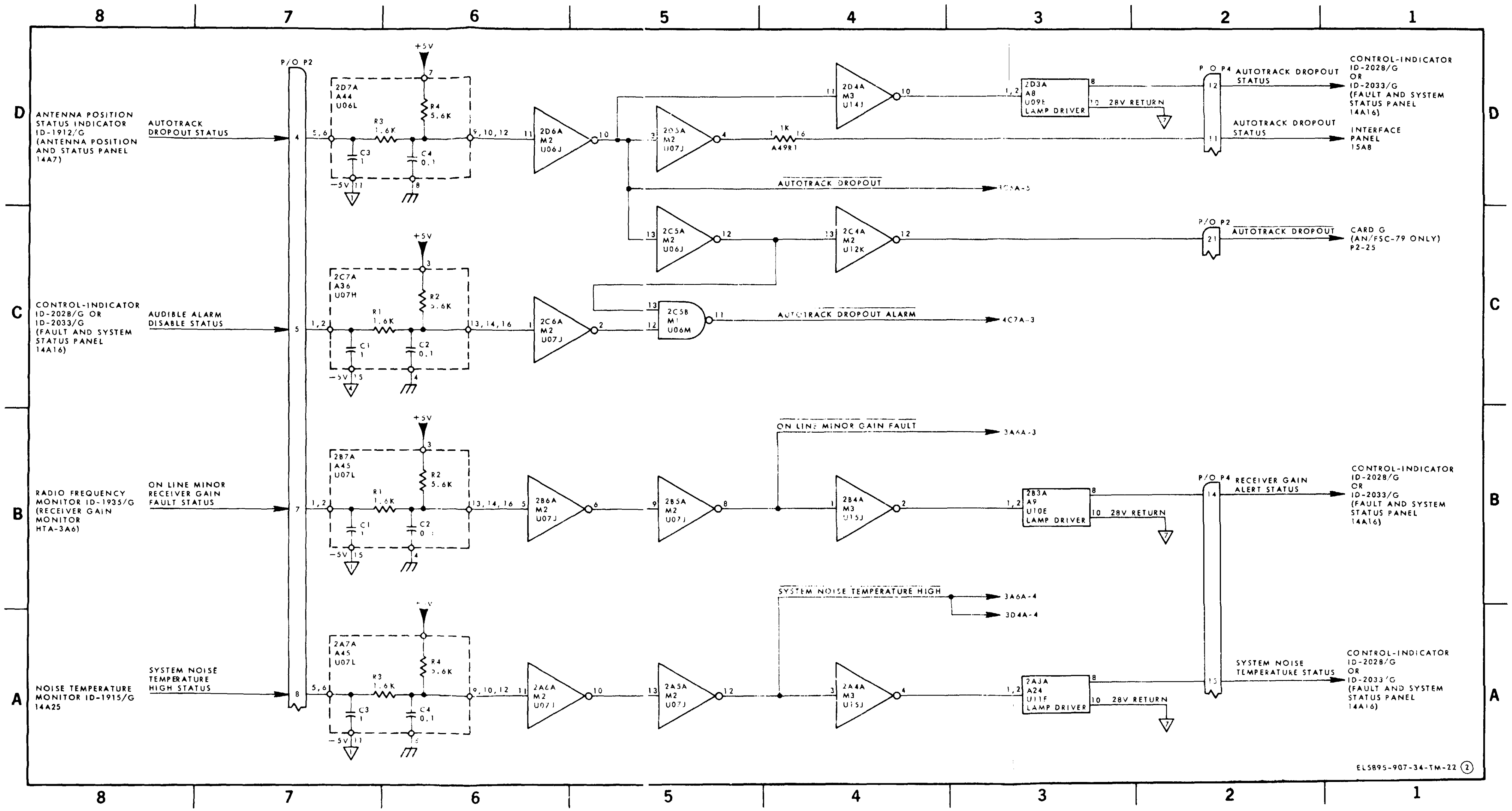


Figure FO-8. Circuit card A 15A5A1, logic diagram (sheet 2 of 13).

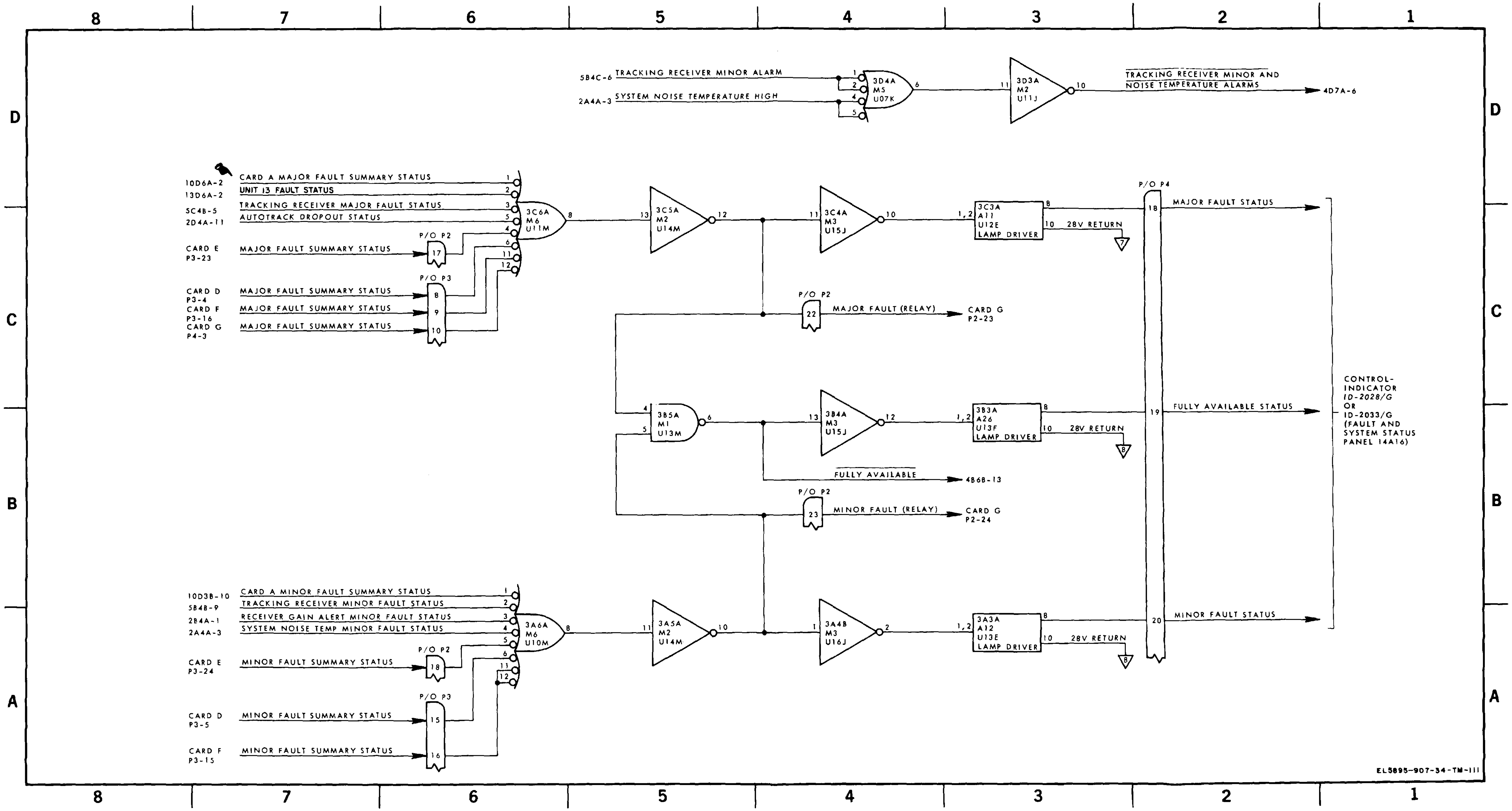


Figure FO-8. Circuit card A15A5A1, logic diagram (sheet 3 of 13)

Change 2

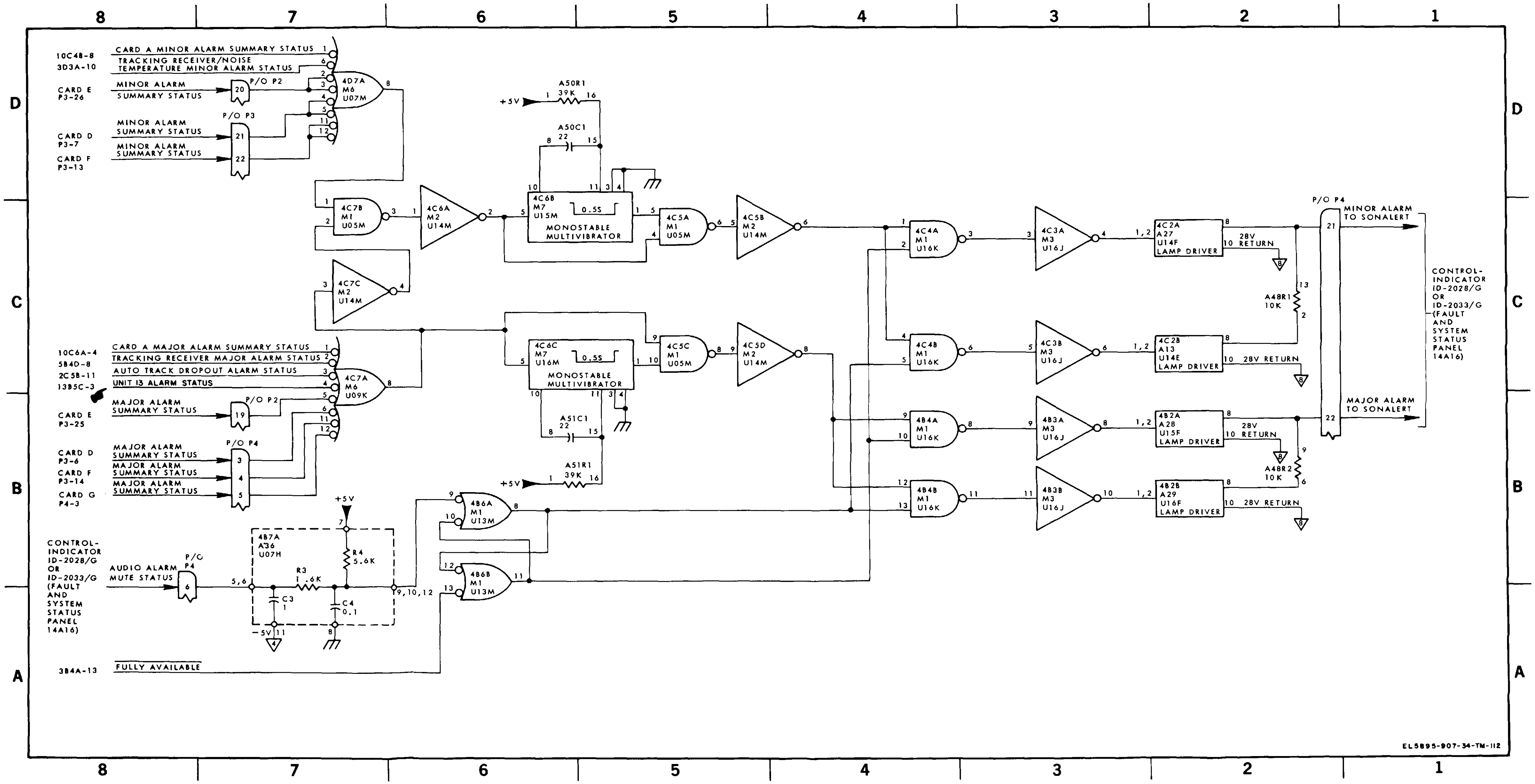


Figure FO-8. Circuit card A15A5A1, logic diagram (sheet 4 of 13)

Change 2

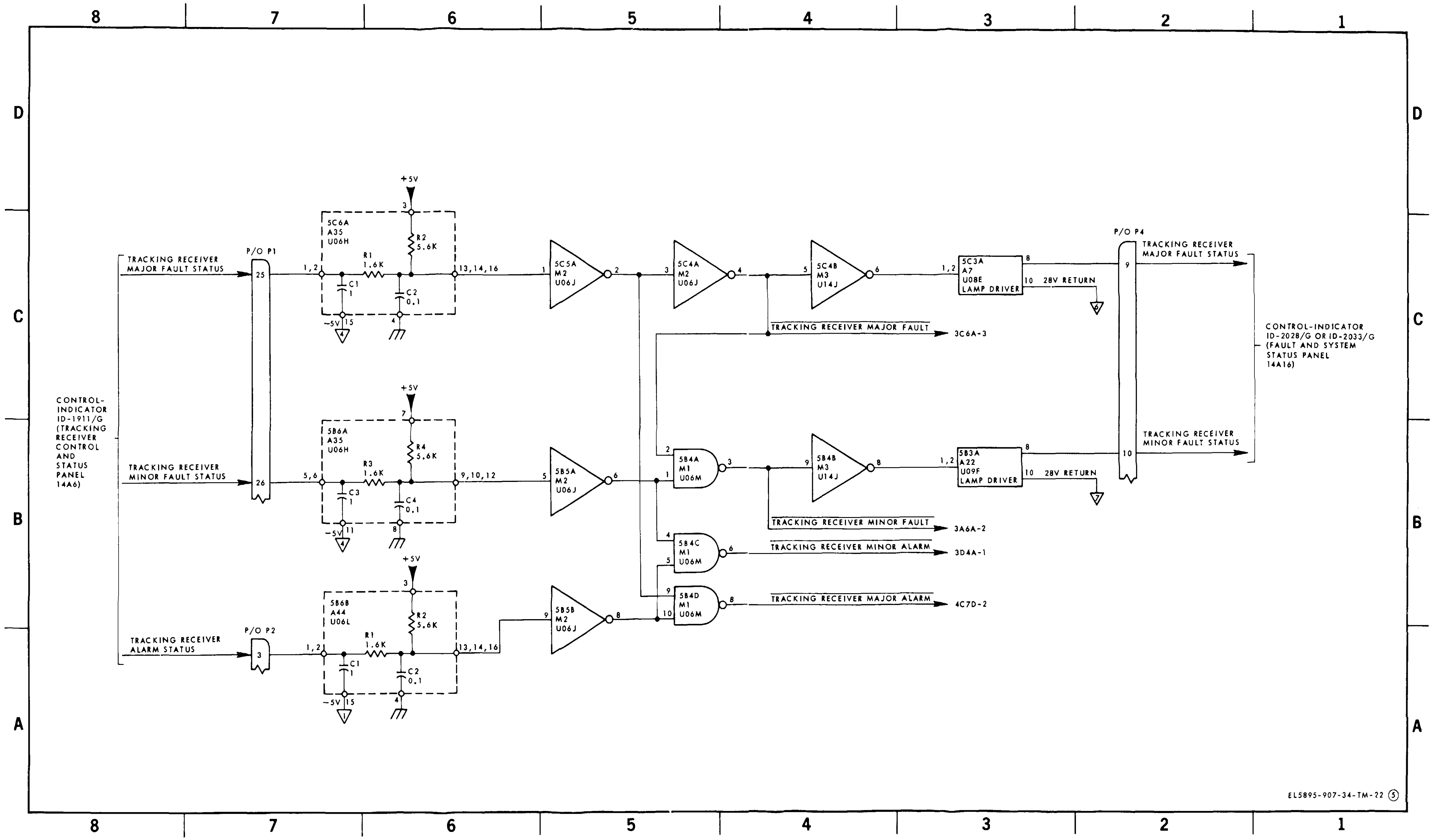


Figure FO-8. Circuit card A 15A5A1, logic diagram (sheet 5 of 13)

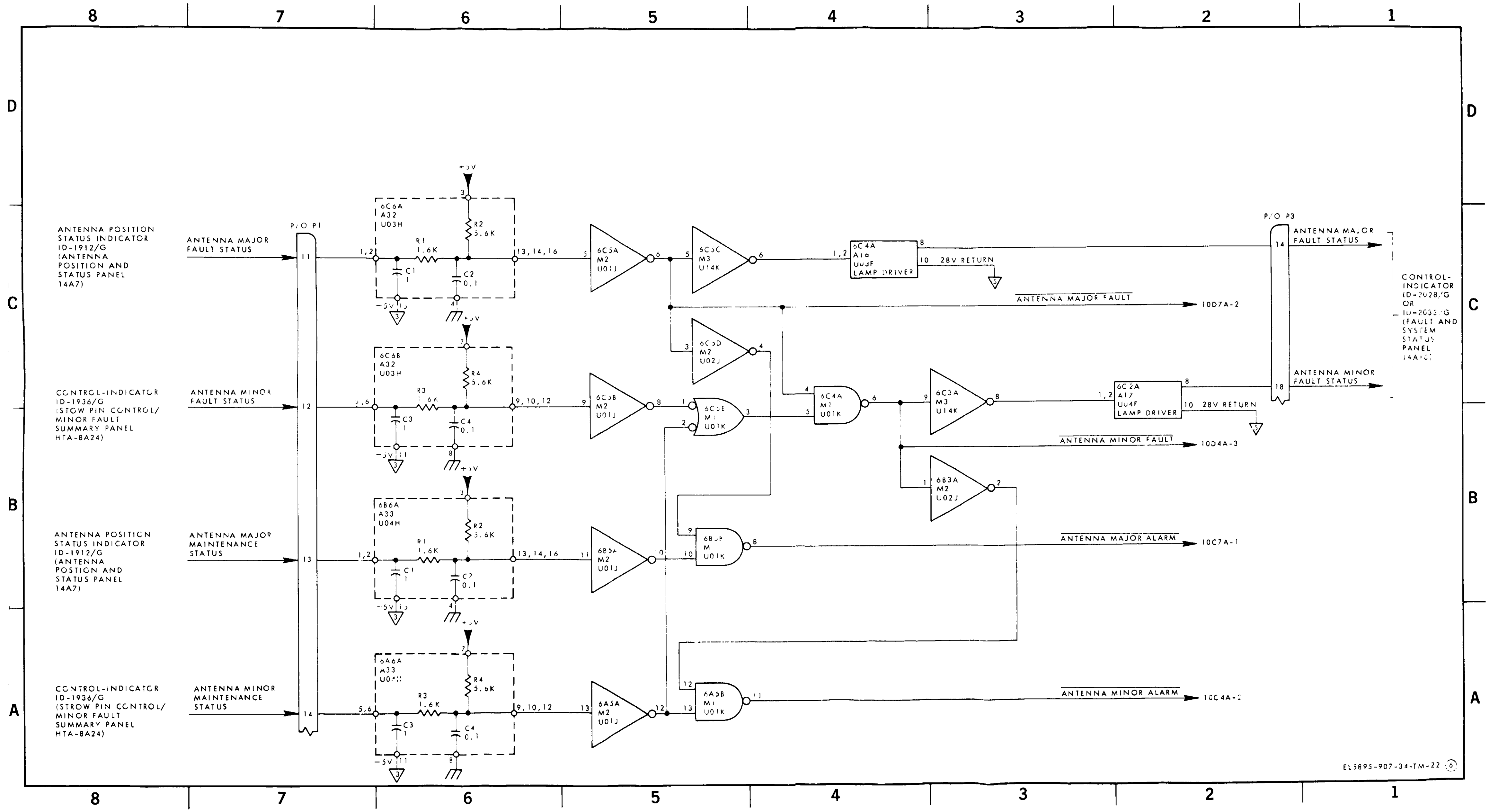


Figure FO-8. Circuit card A 15A5A1, logic diagram (sheet 6 of 13).

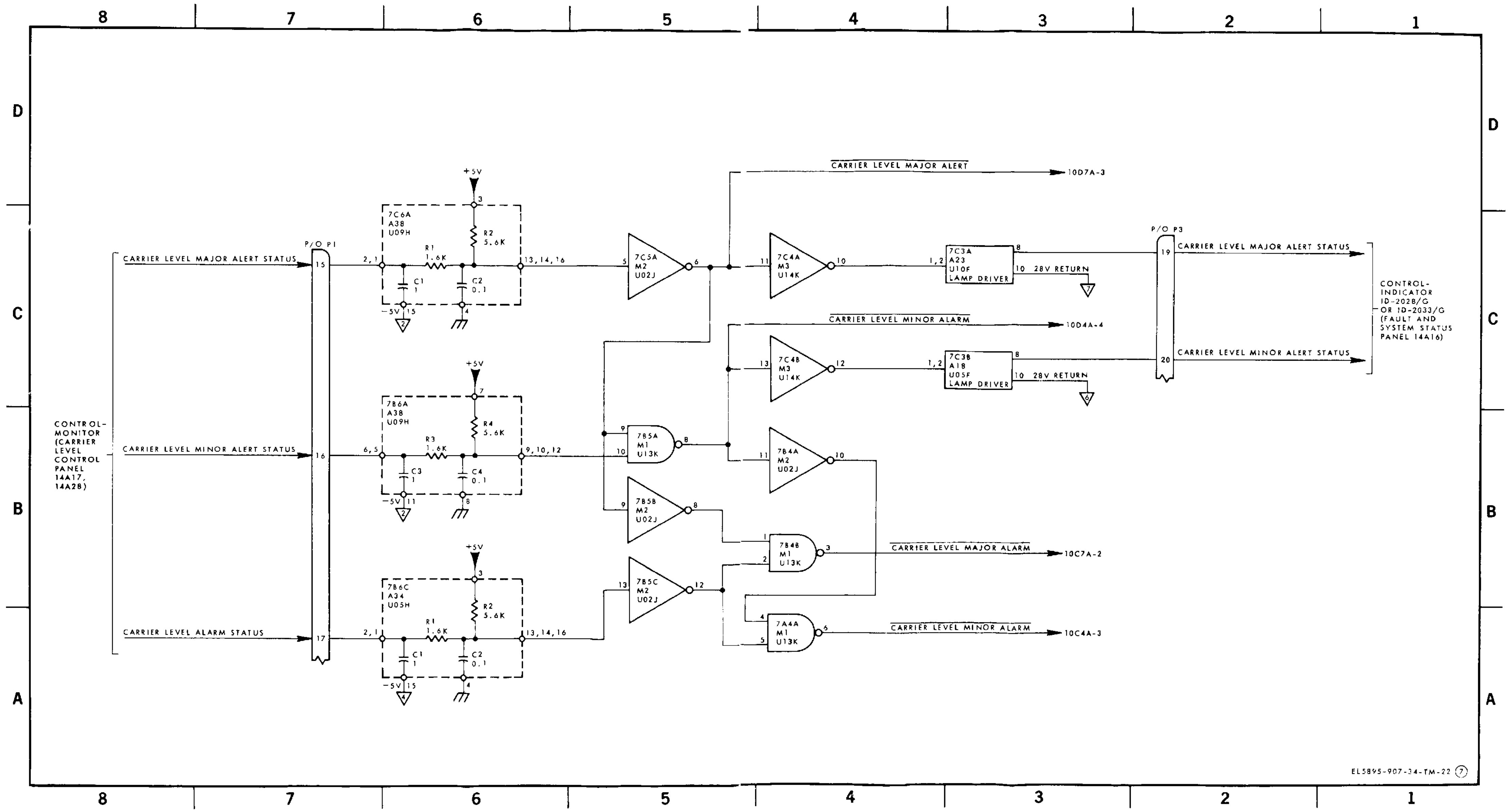


Figure FO-8. Circuit card A 15A54A1, logic diagram (sheet 7 of 13).

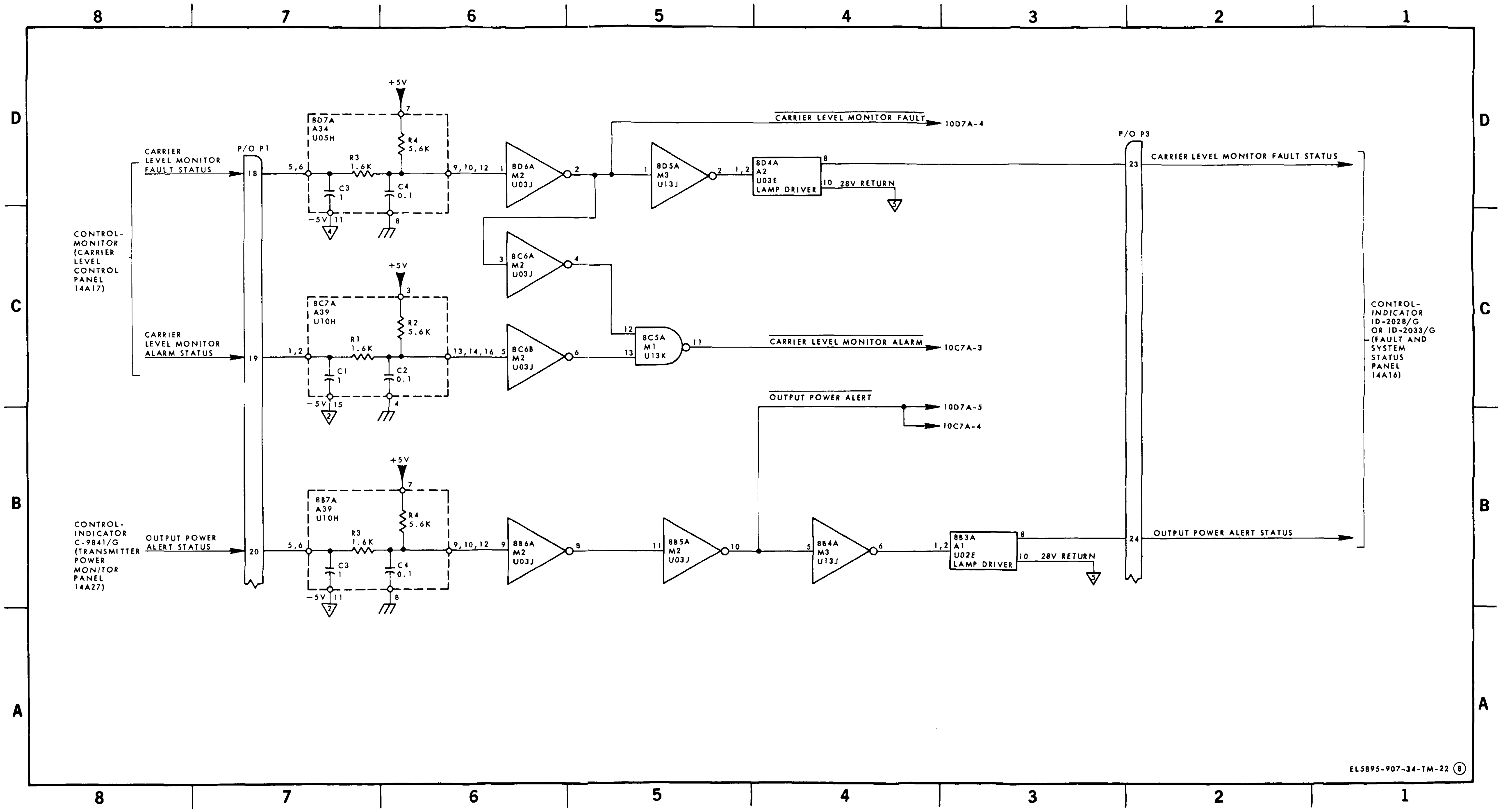


Figure FO-8. Circuit card A15!5A1, logic diagram (sheet 8 of 13).

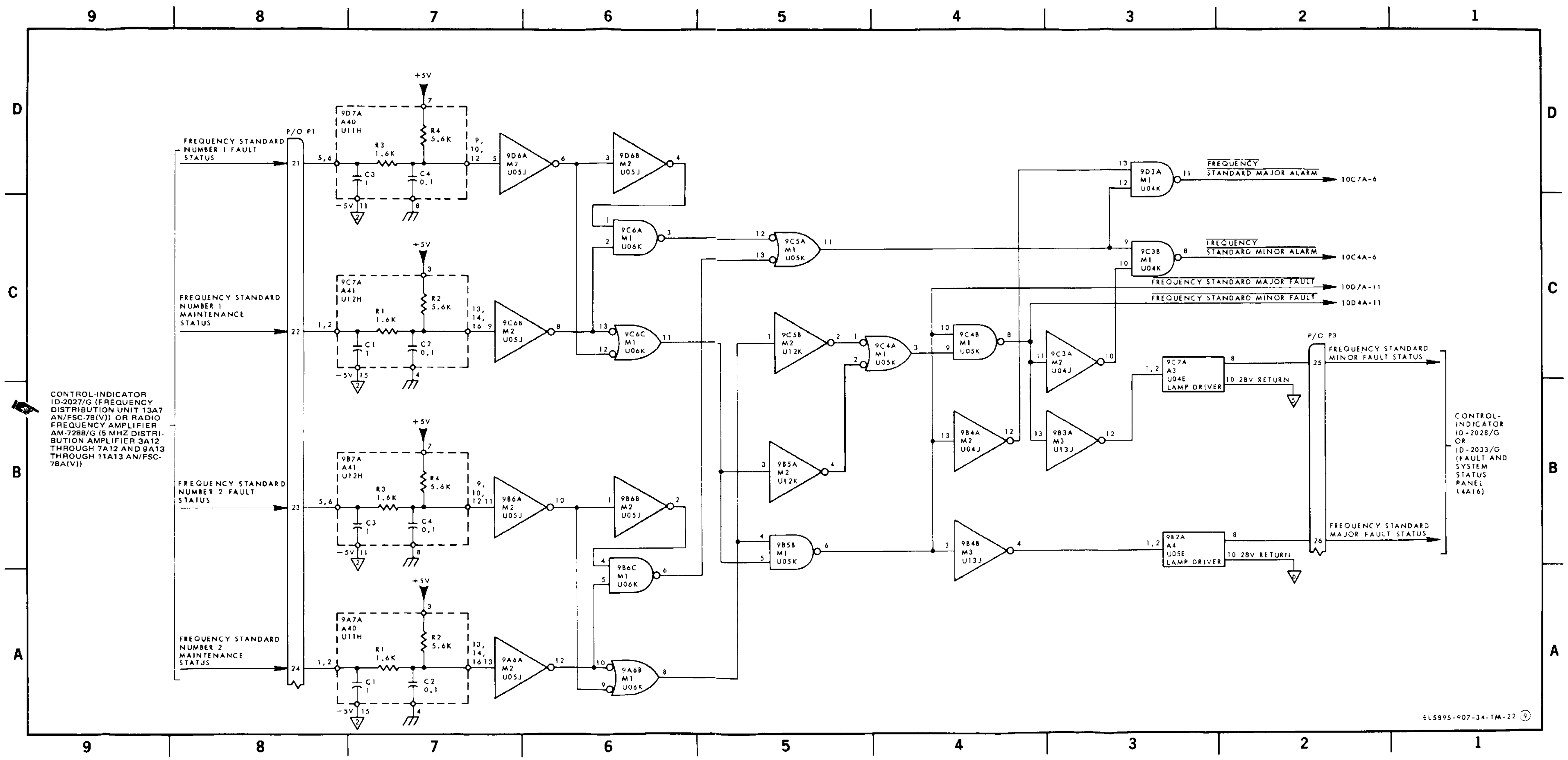


Figure FO-8. Circuit card A 15A5A1, logic diagram (sheet 9 of 13).

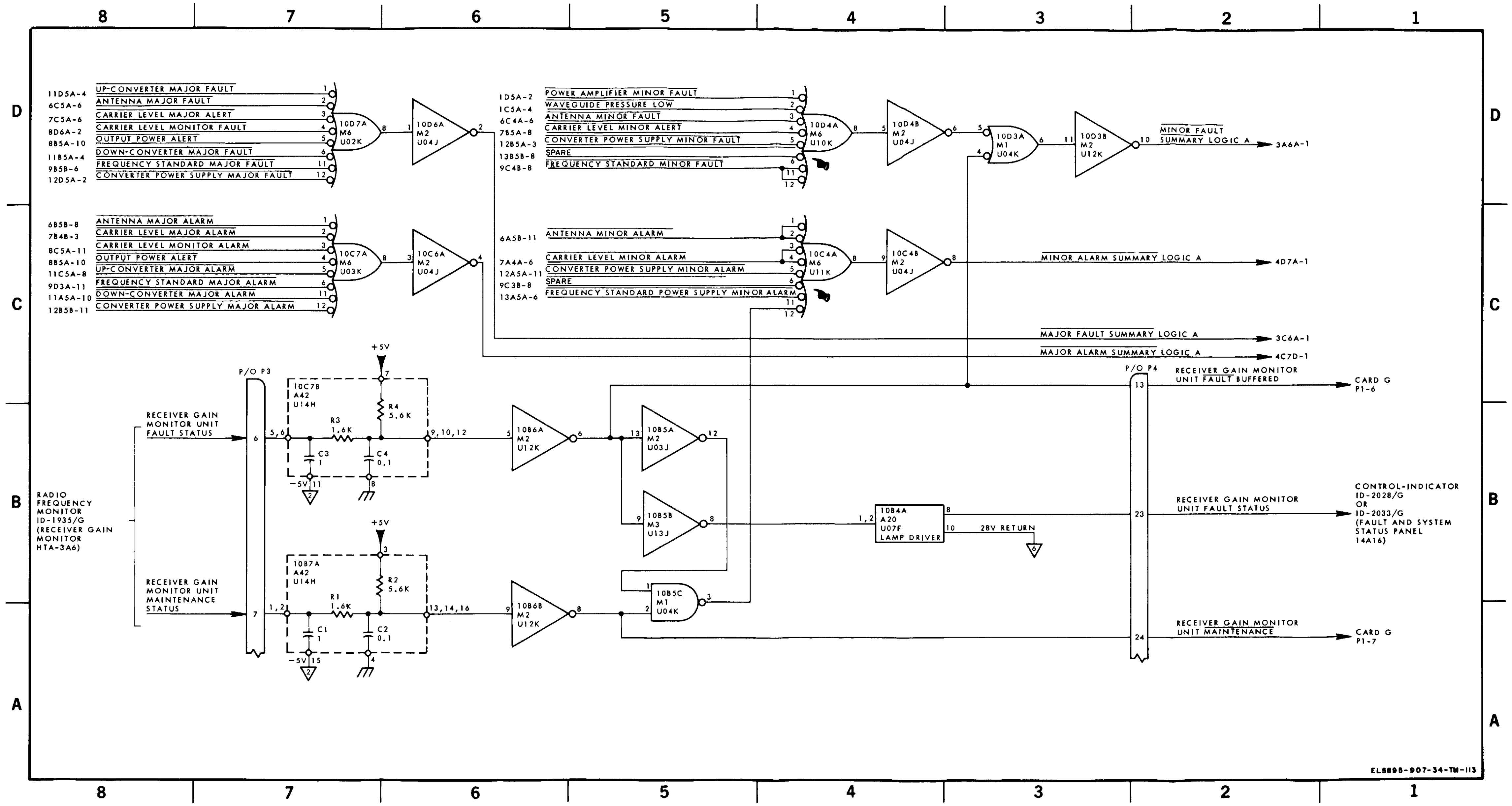


Figure FO-8. Circuit card A15A5A1, logic diagram (sheet 10 of 13)

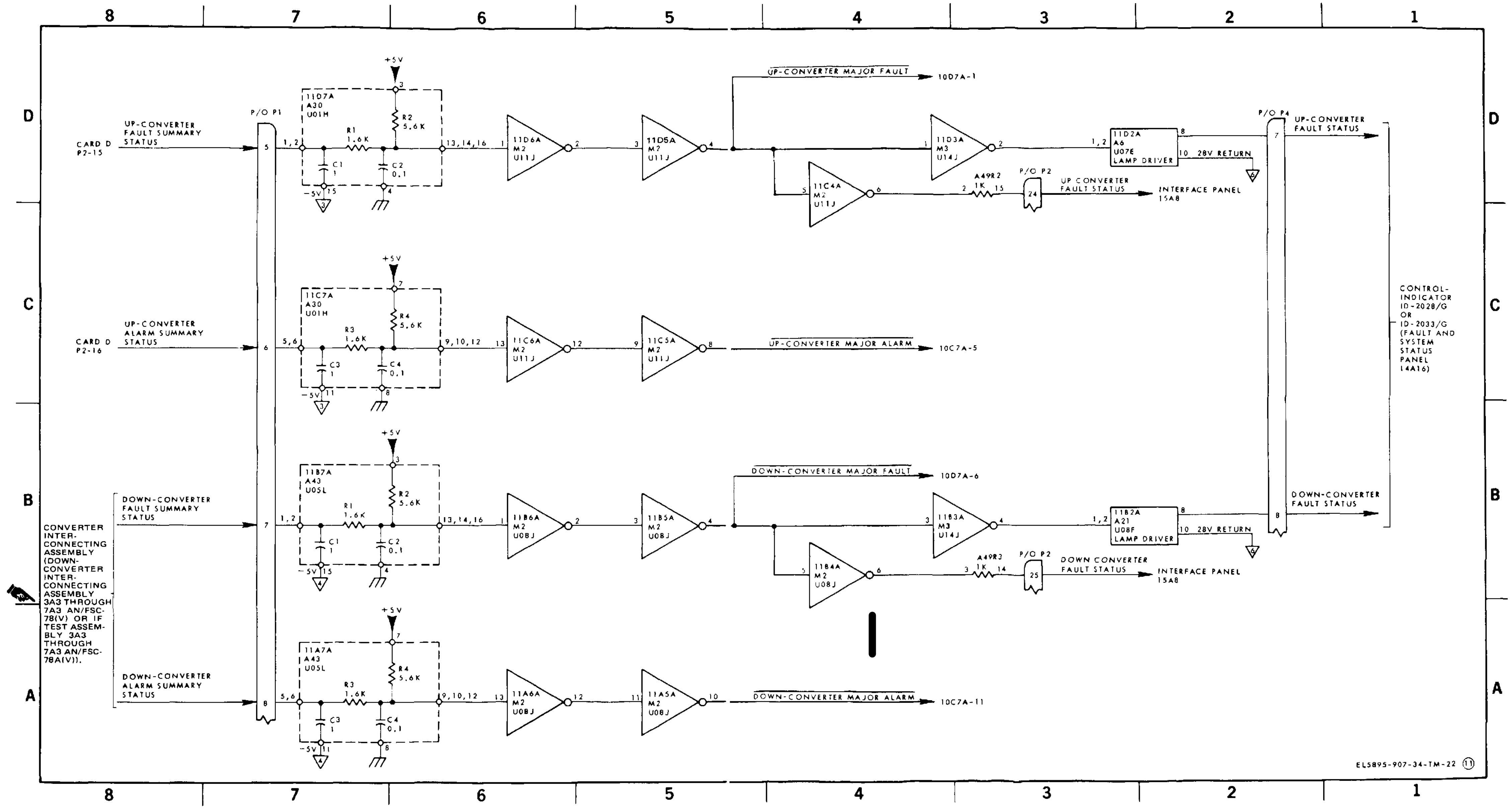


Figure FO-8. Circuit card A15A5A1, logic diagram (sheet 11 of 13)

Change 3

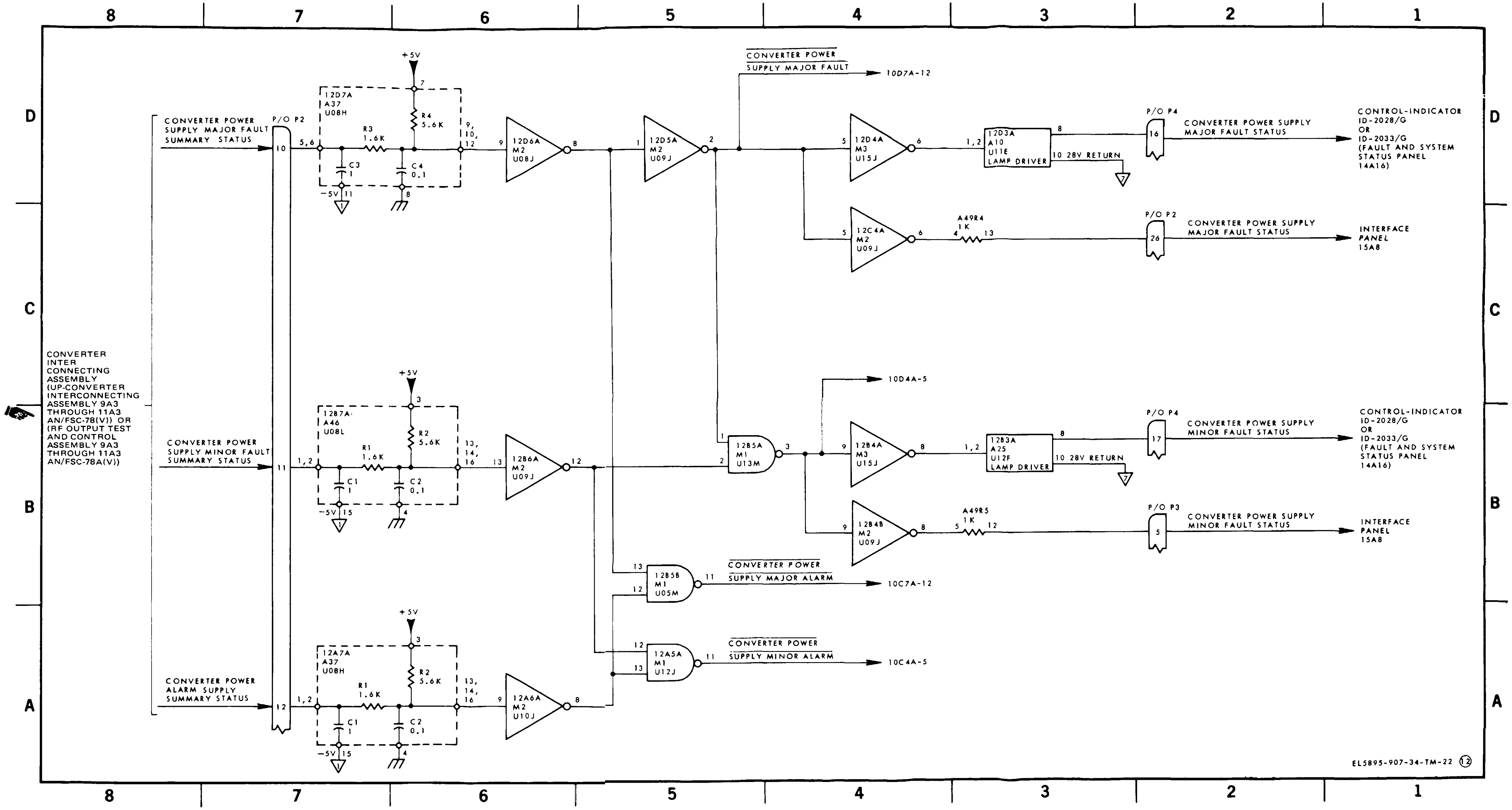


Figure FO-8. Circuit card A15A5A1, logic diagram (sheet 12 of 13)

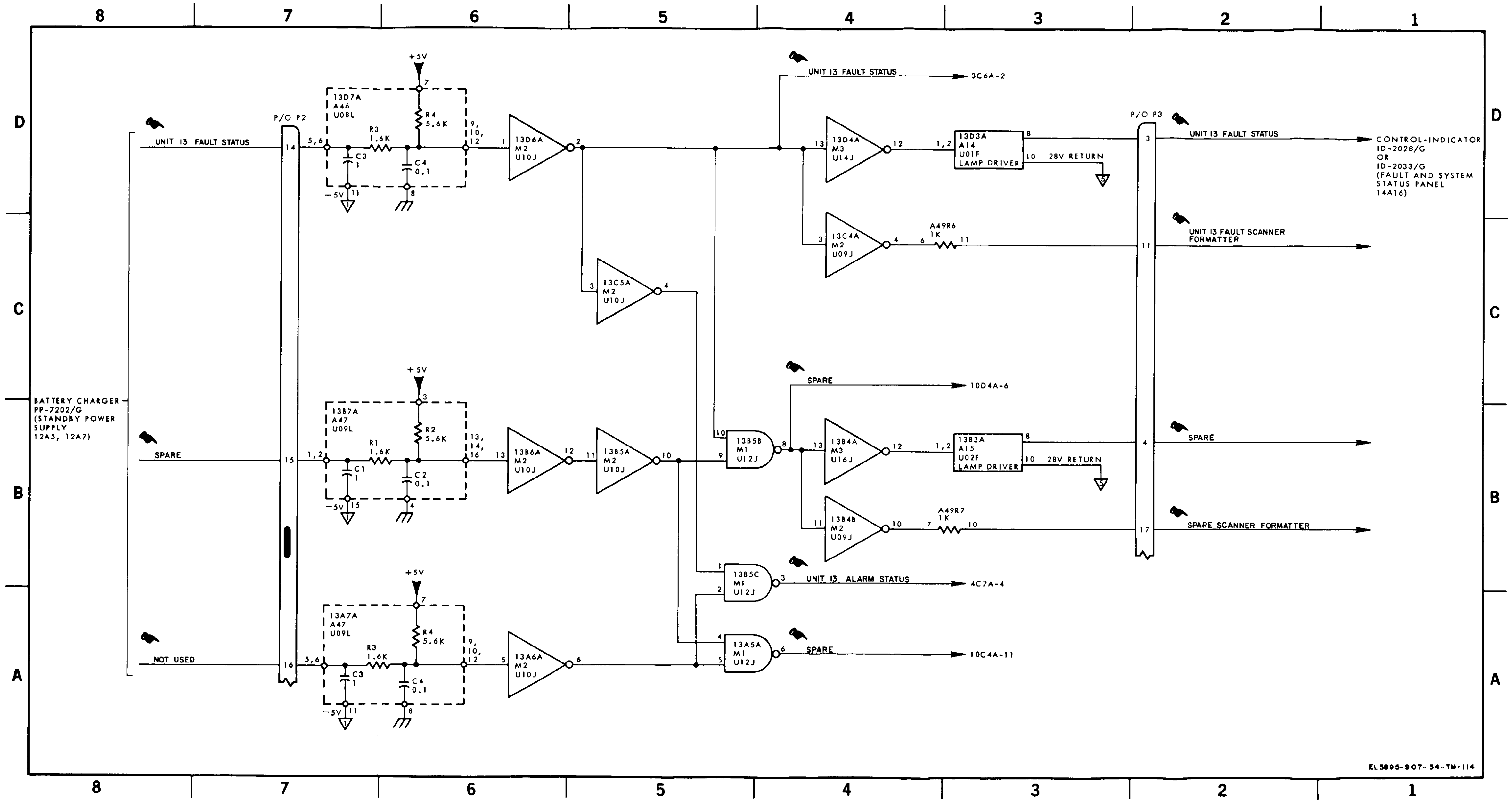


Figure FO-8. Circuit card A15A5A1, logic diagram (sheet 13 of 13)

Change 2

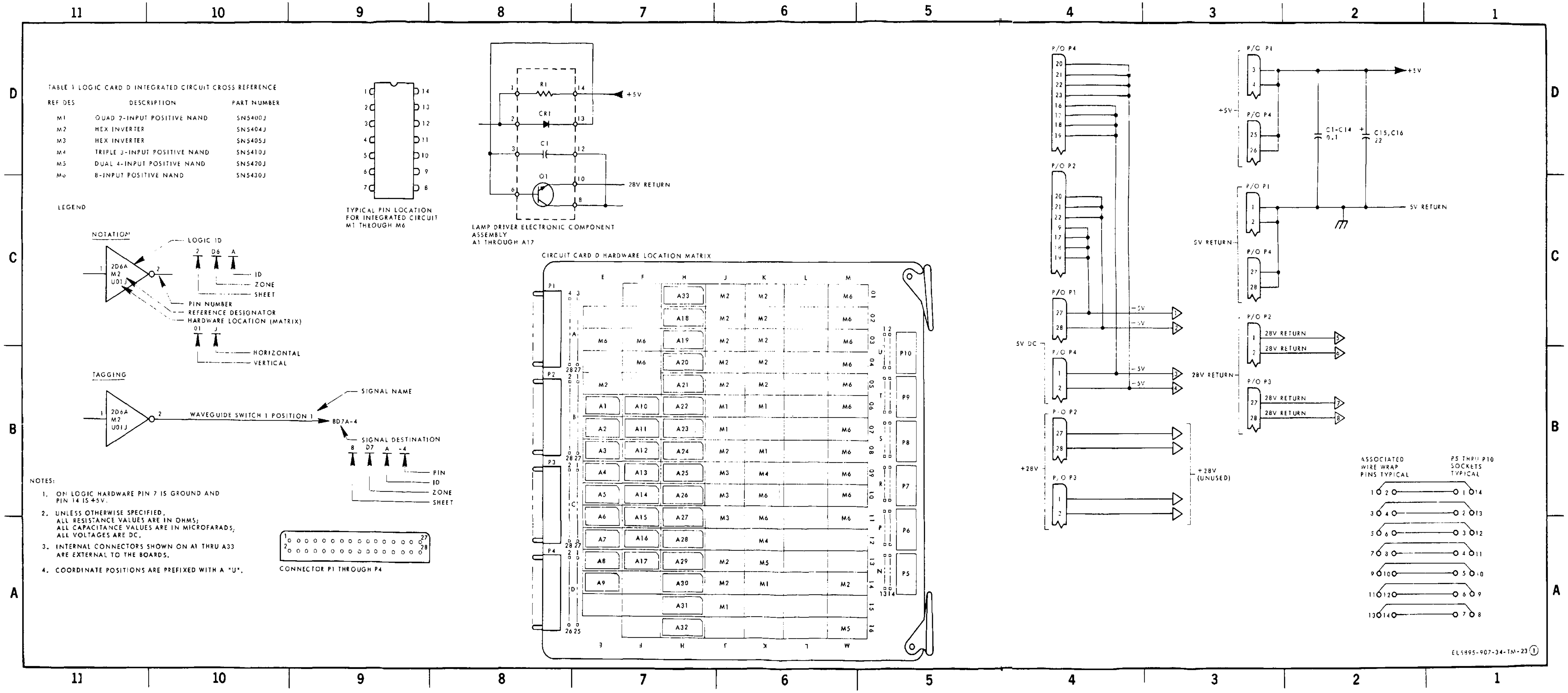


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 1 of 12).

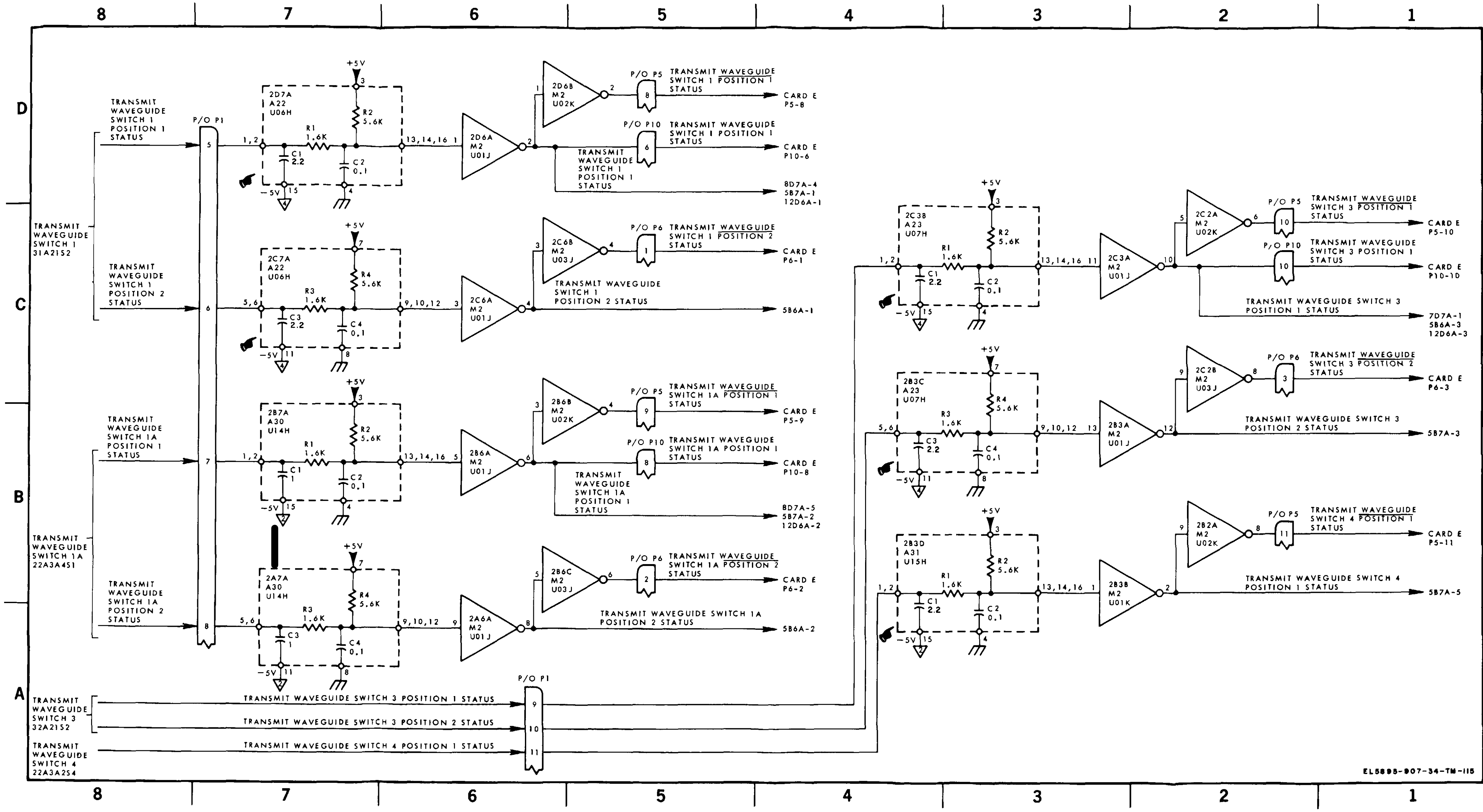


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 2 of 12)

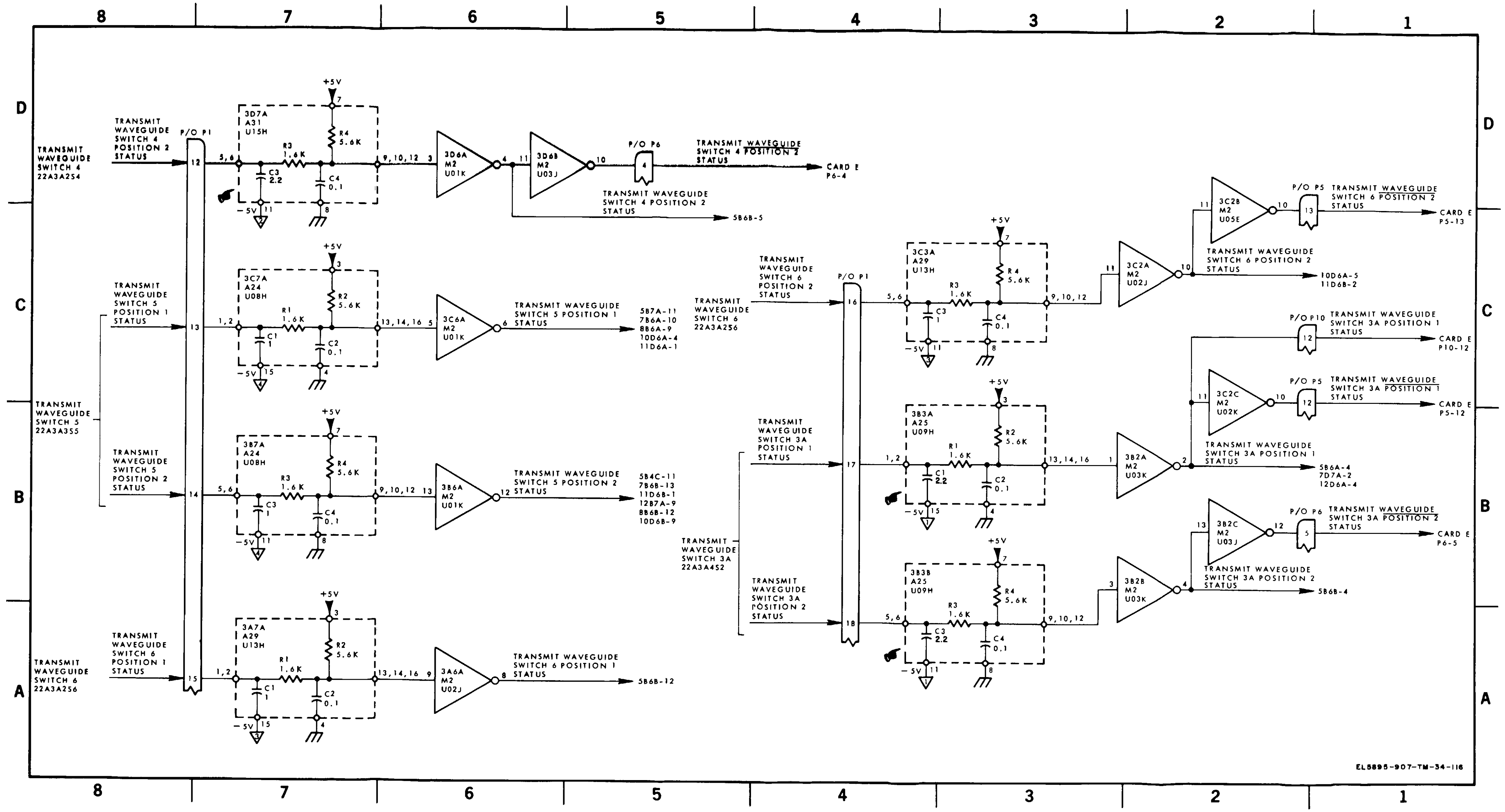


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 3 of 12).

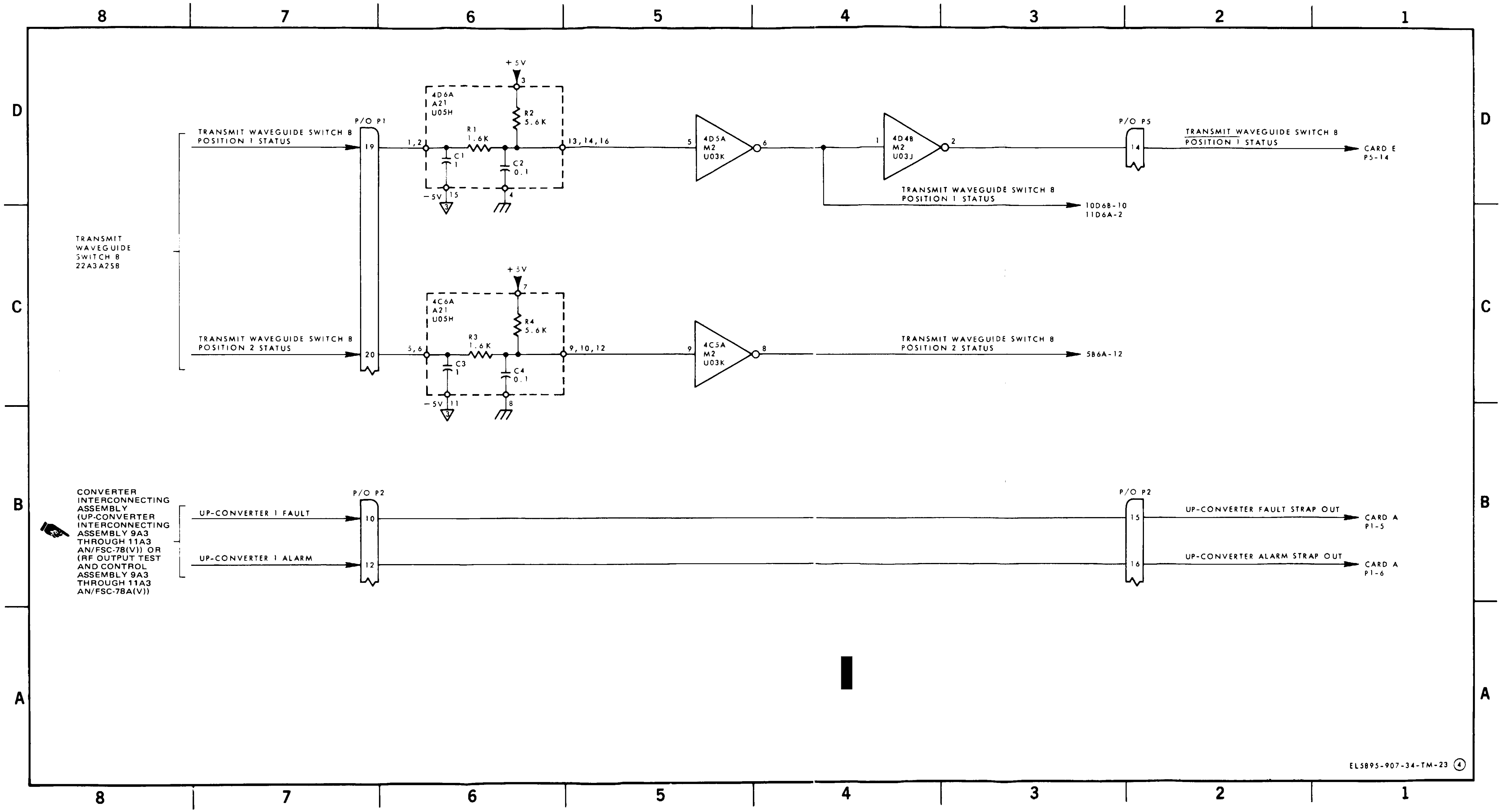


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 4 of 12)

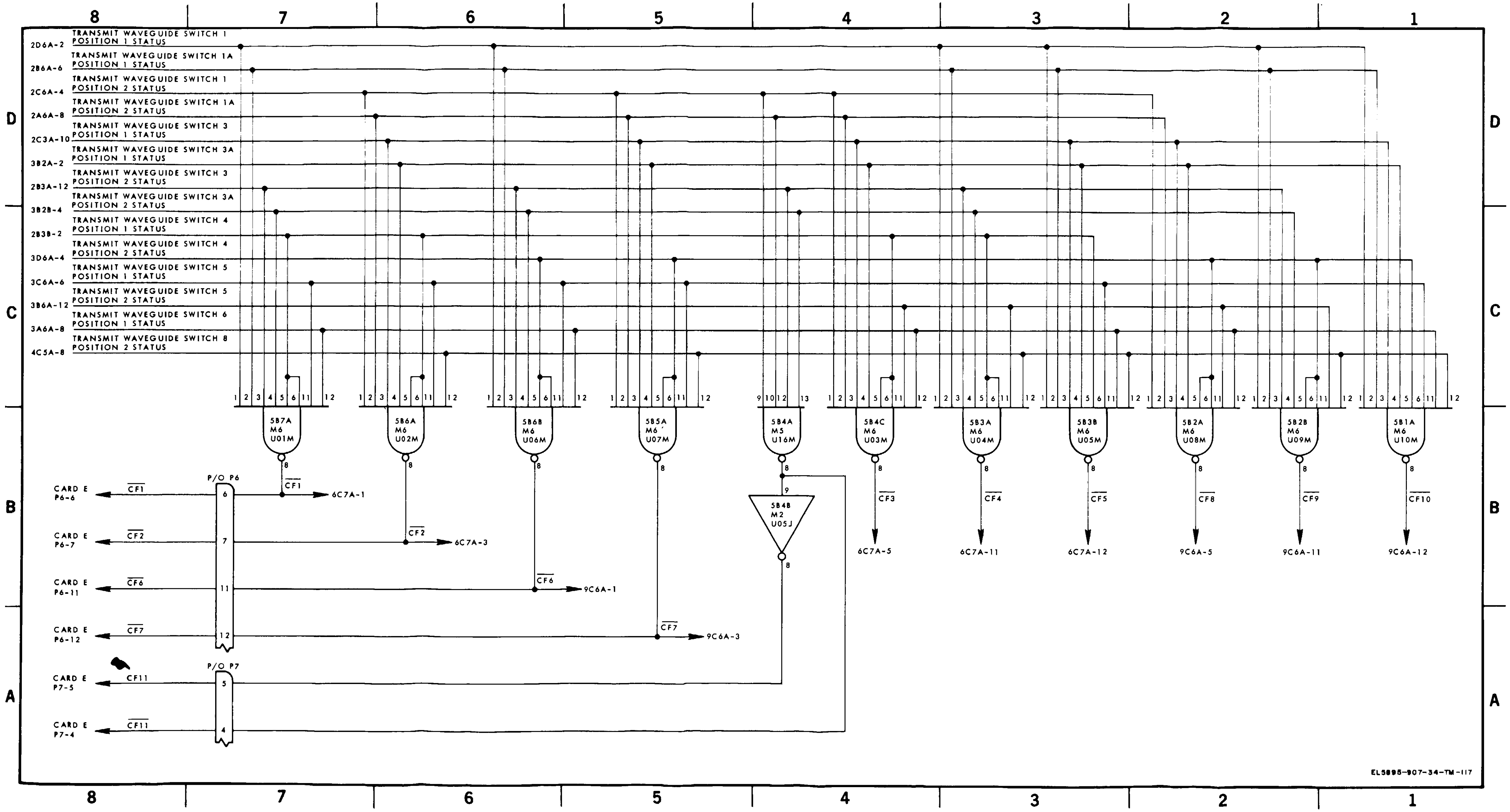


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 5 of 12).

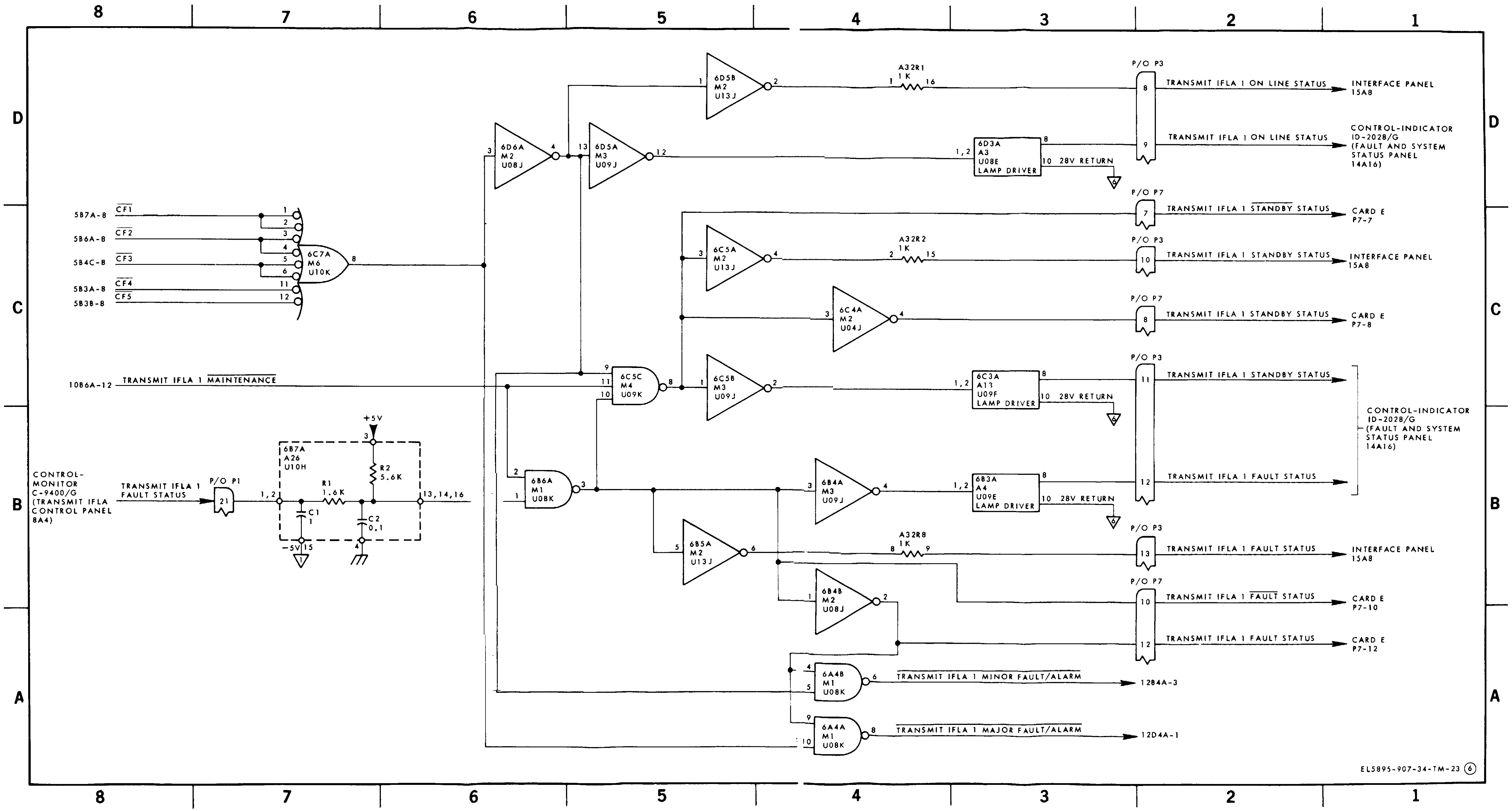


Figure FO-9. Circuit card D 15A5A2A1, logic diagram, (sheet 6 of 12).

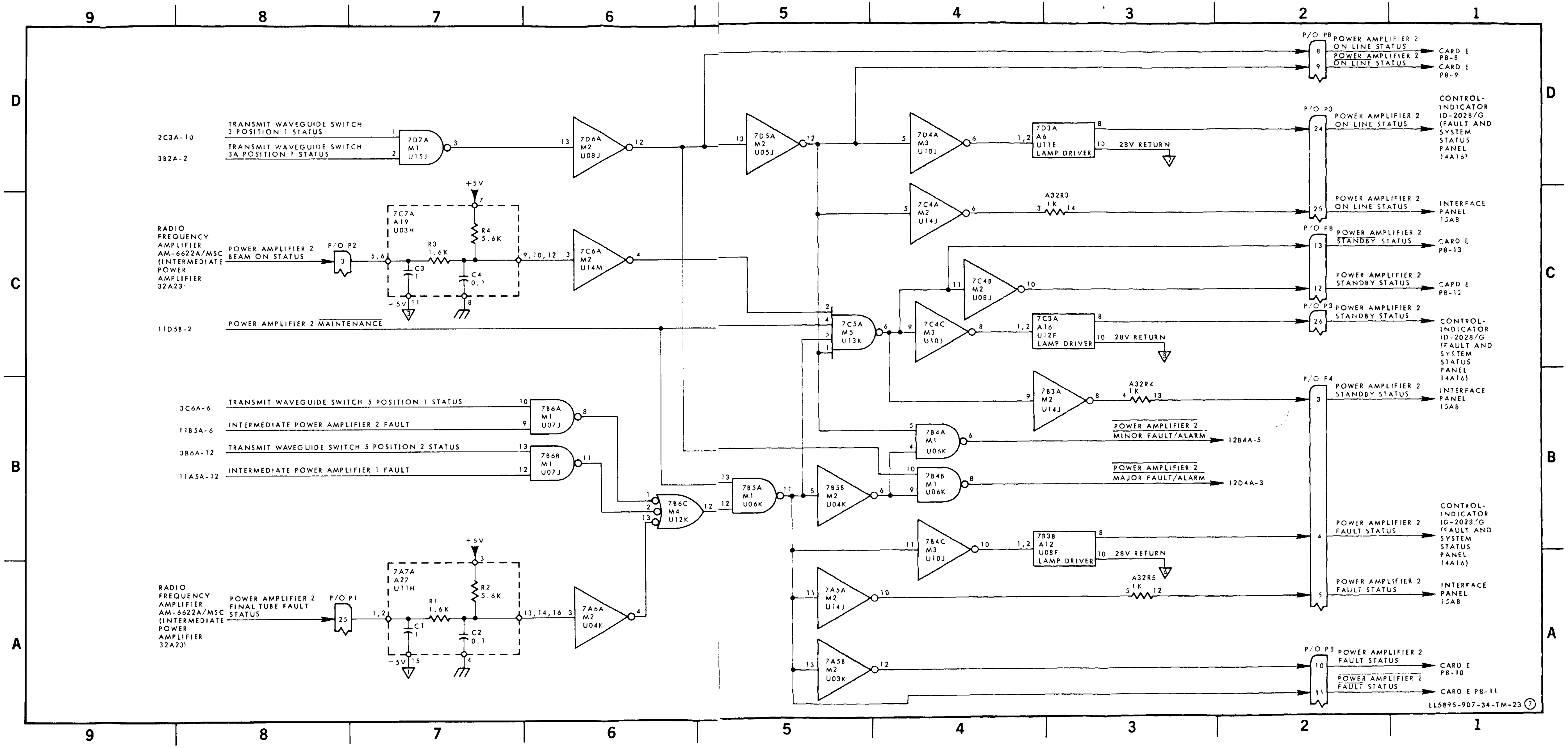


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 7 of 12).

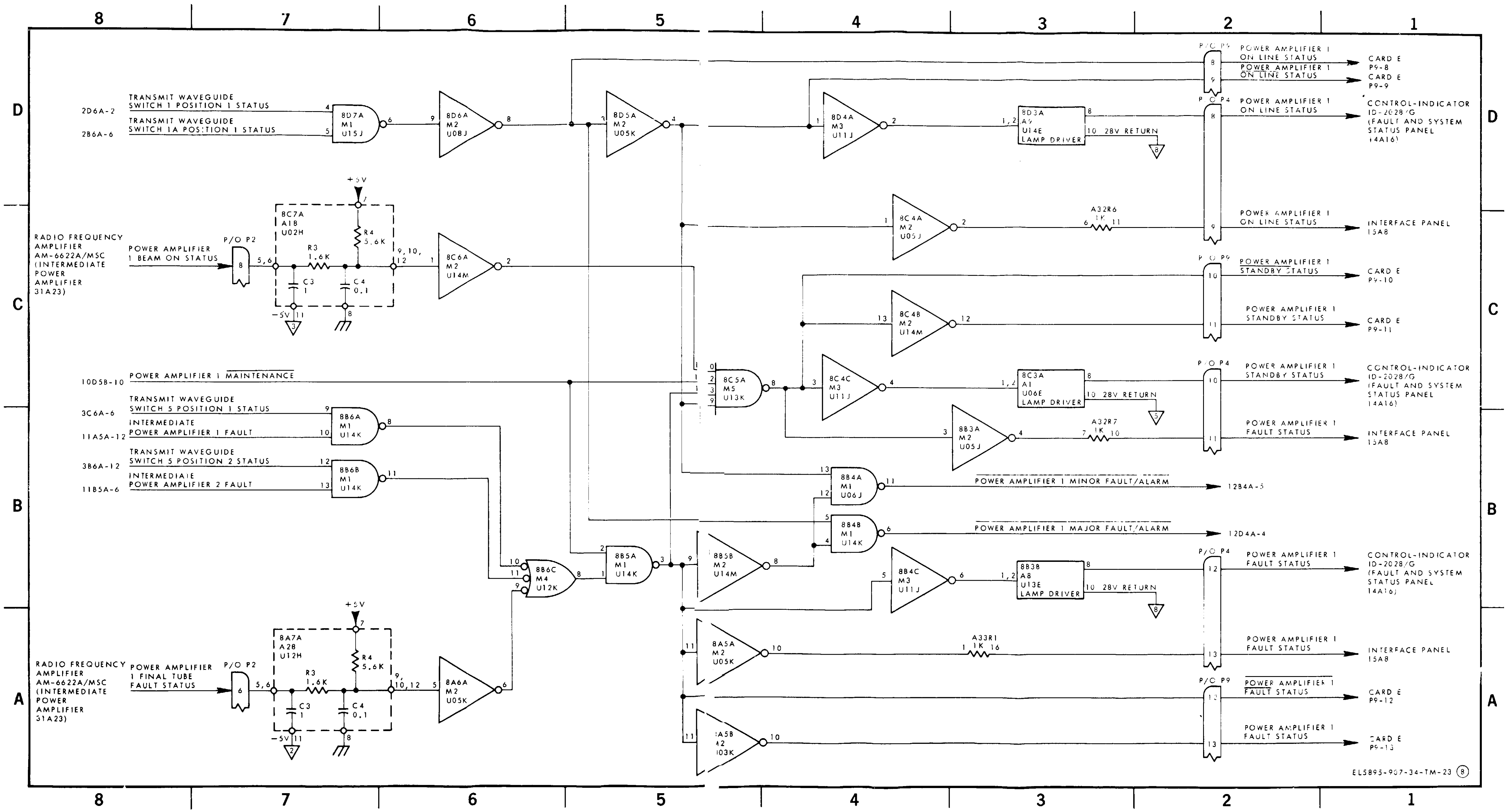


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 8 of 12).

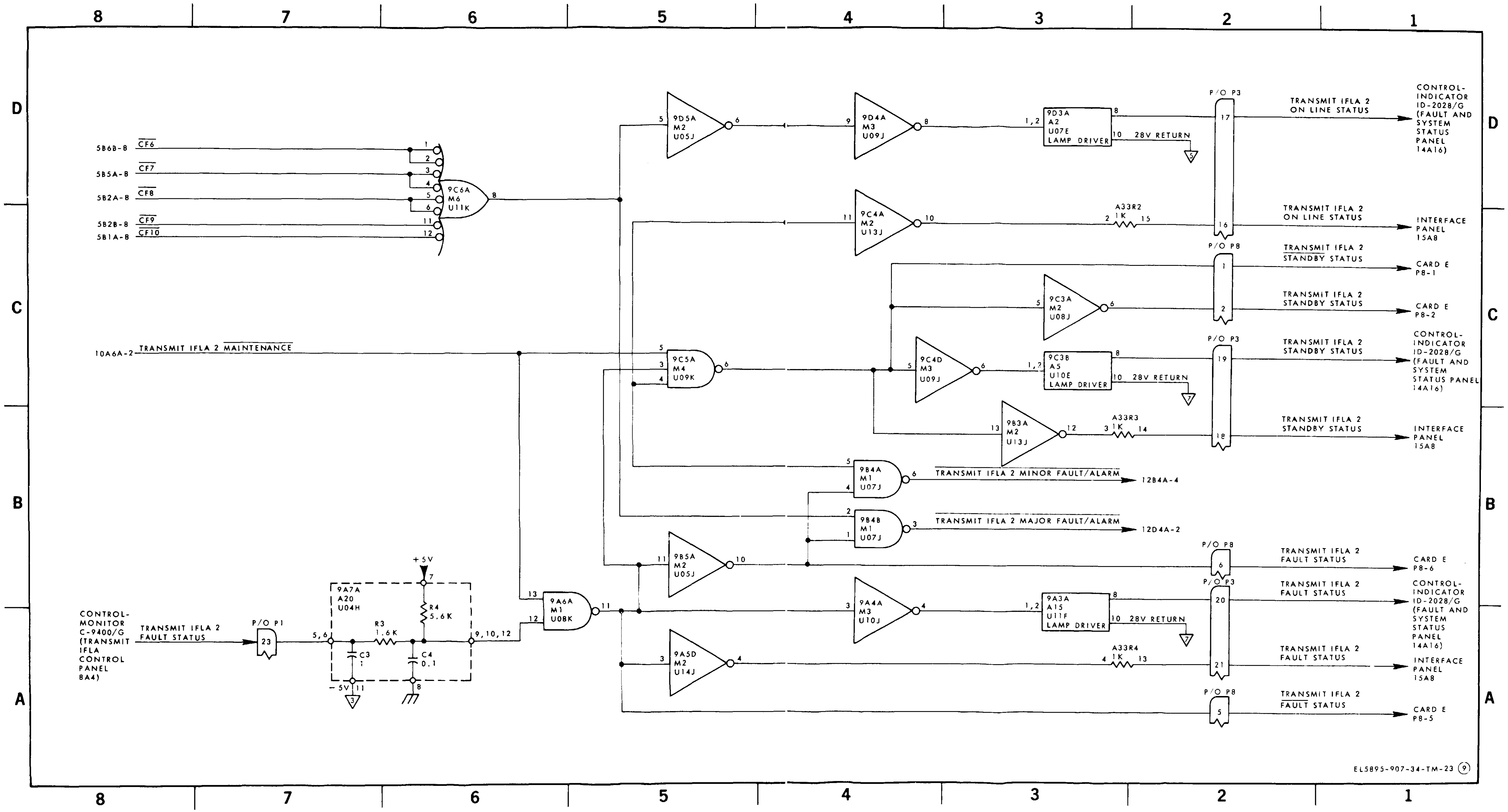


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 9 of 12).

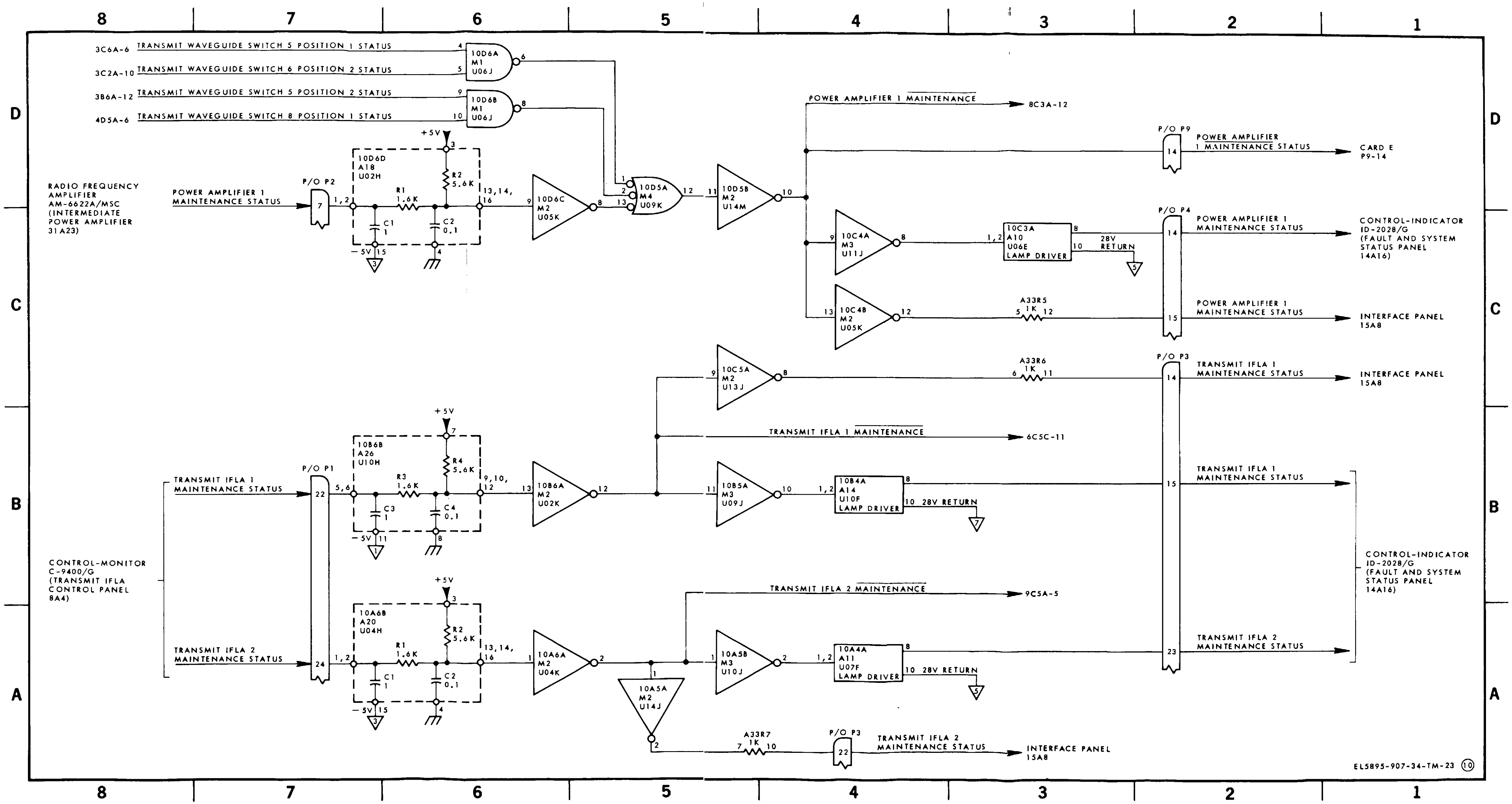


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 10 of 12).

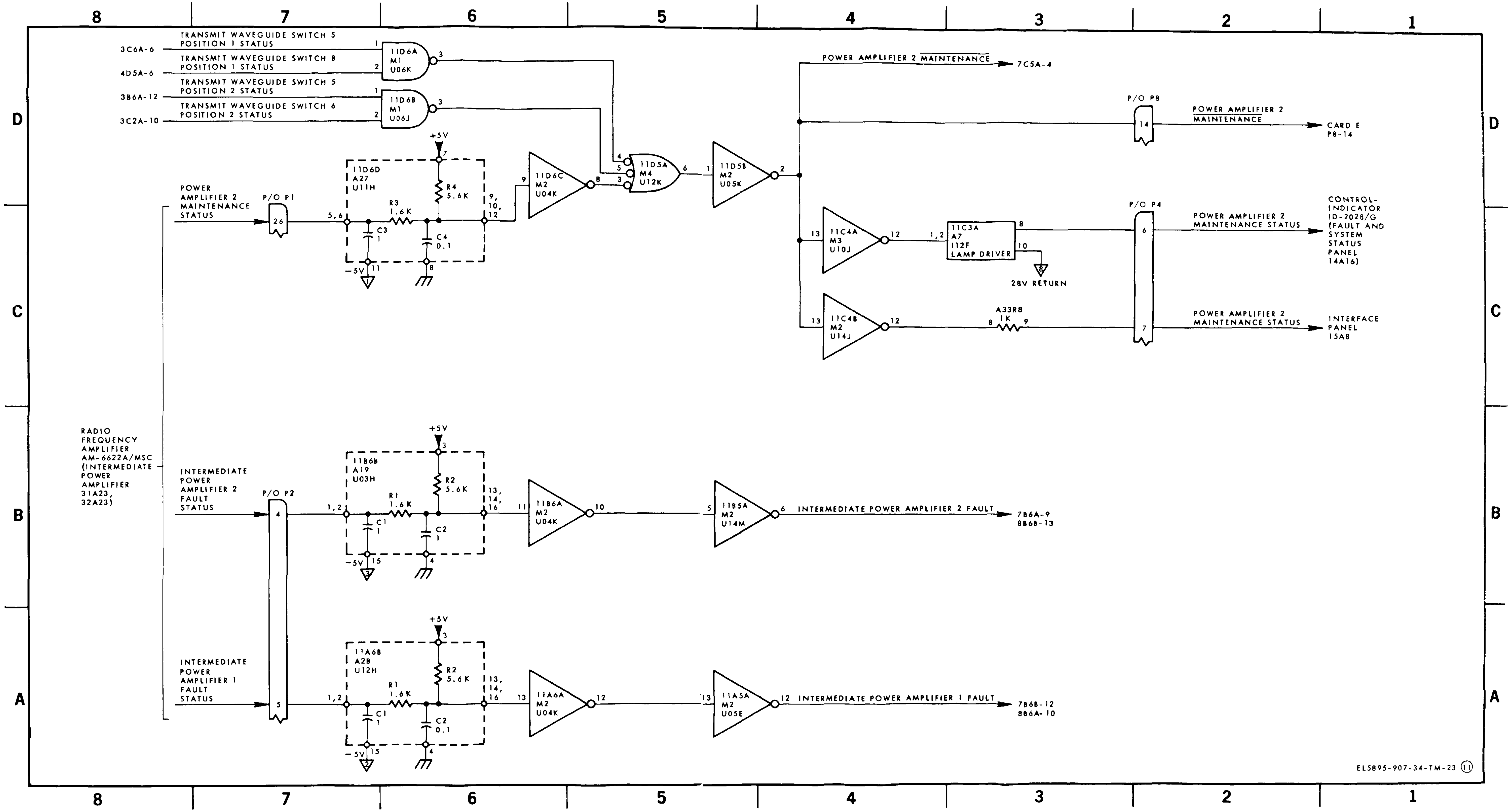


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 11 of 12).

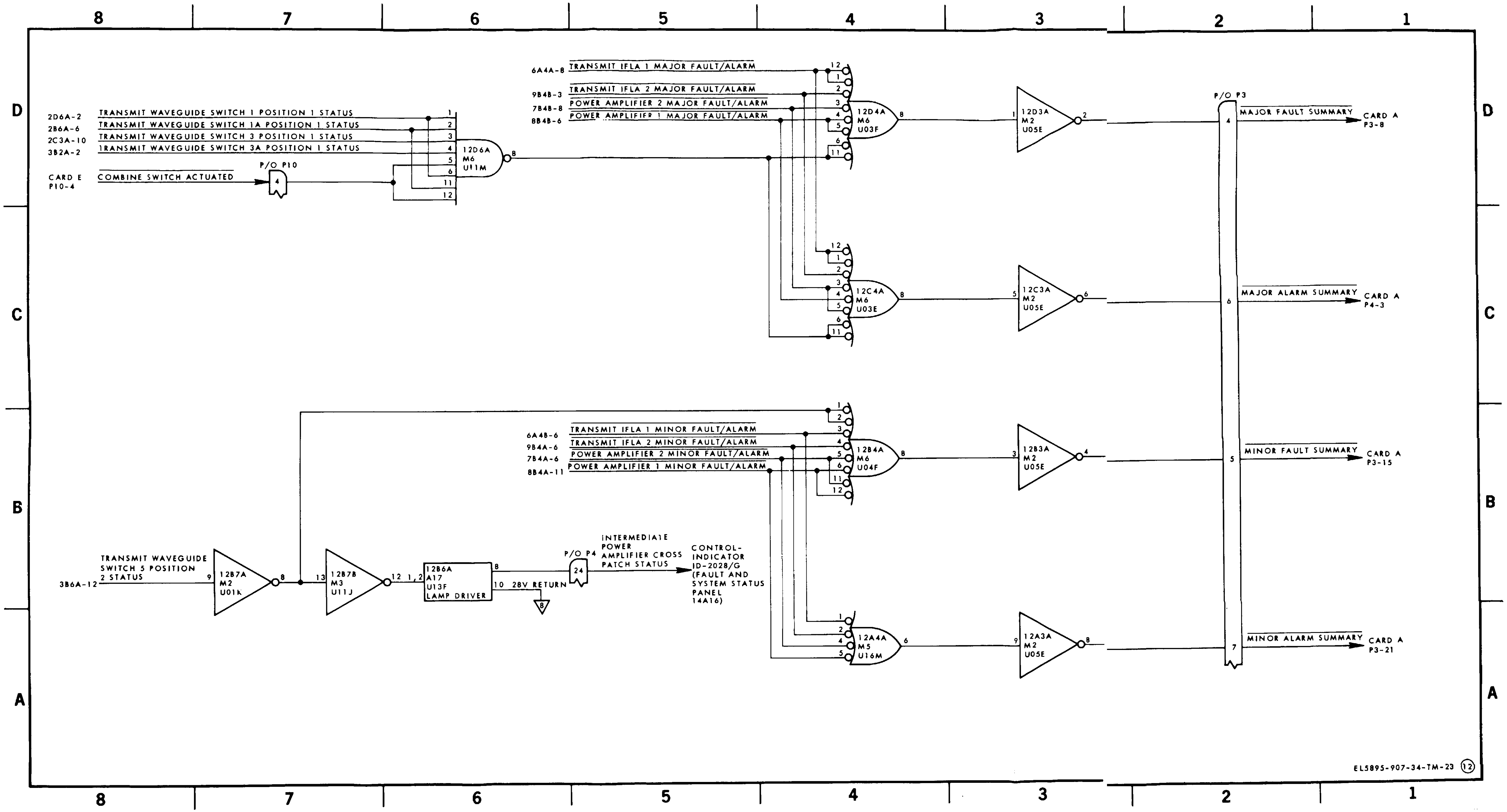


Figure FO-9. Circuit card D 15A5A2A1, logic diagram (sheet 12 of 12).

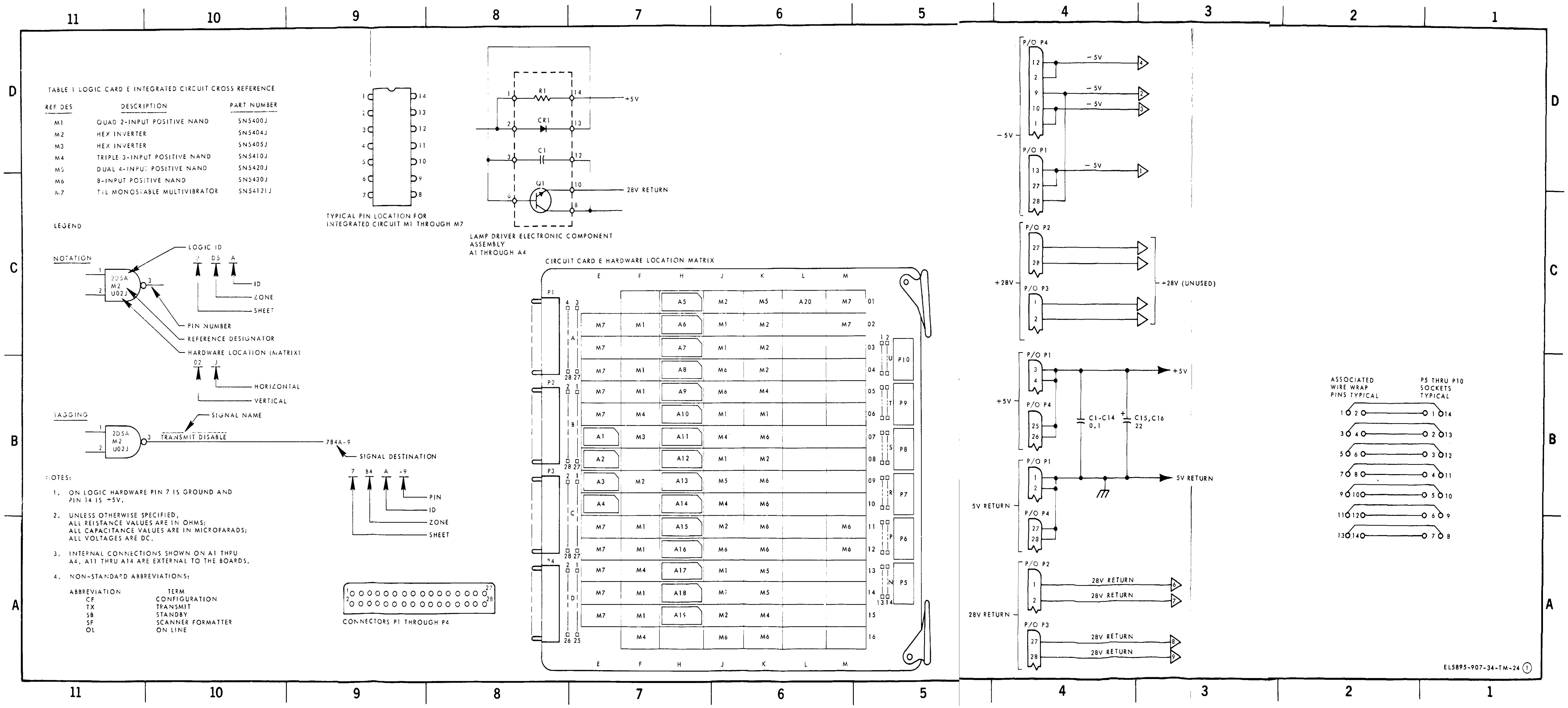


Figure FO-10. Circuit card E 15A5A2A2, logic diagram (sheet 1 of 9)

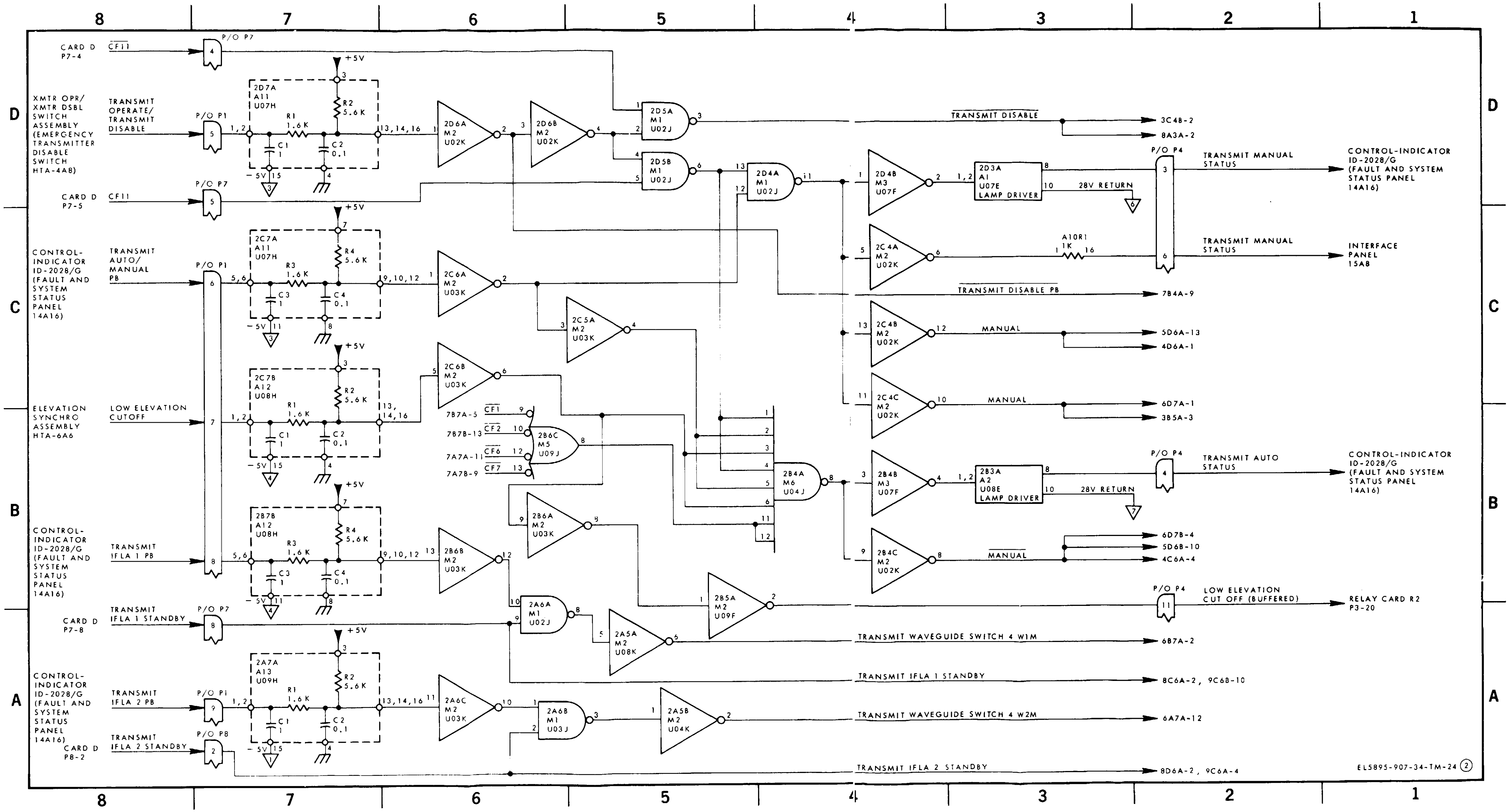


Figure FO-10. Circuit card E 15A5A2A2, logic diagram (sheet 2 of 9)

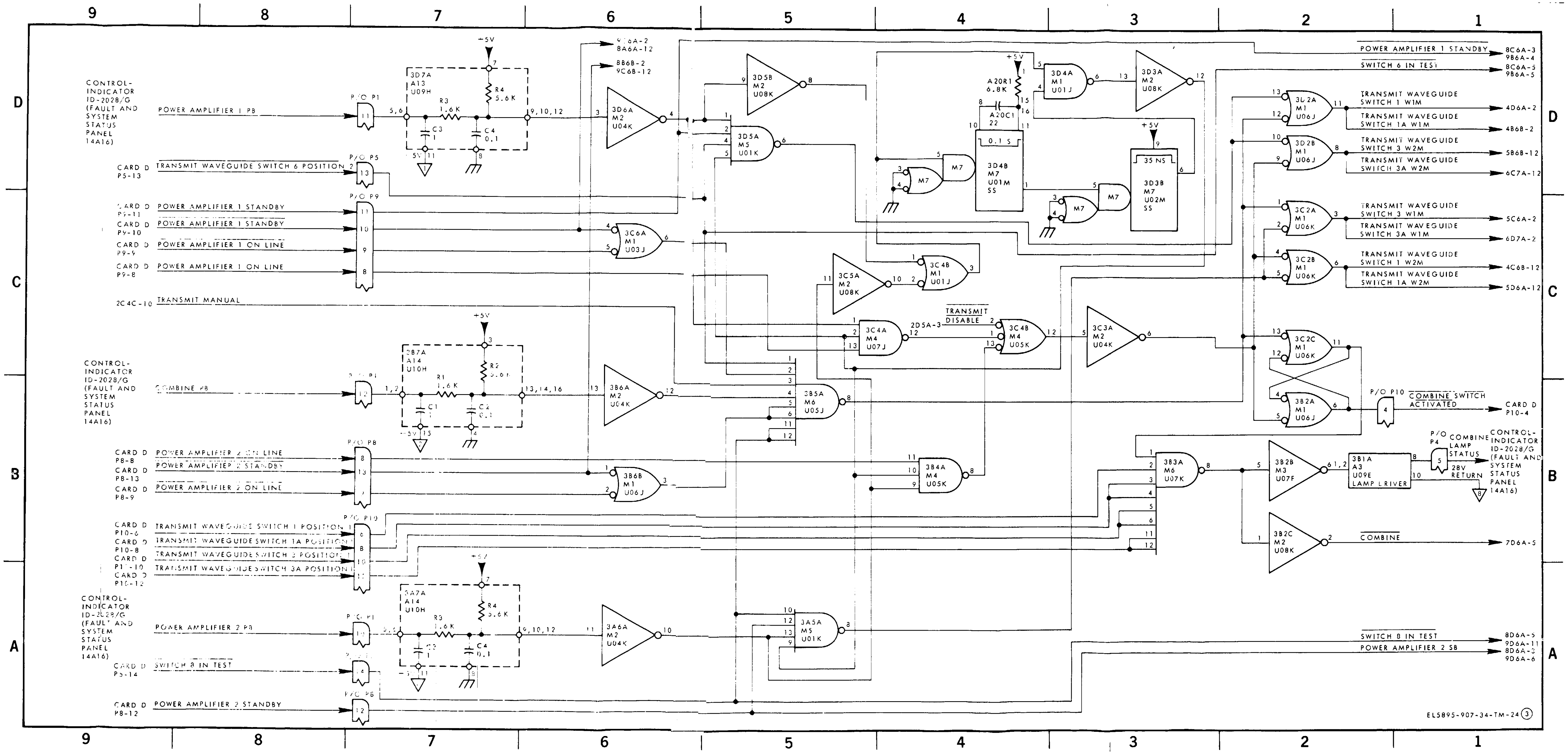


Figure FO-10. Circuit card E 15A5A2A2, logic diagram (sheet 3 of 9)

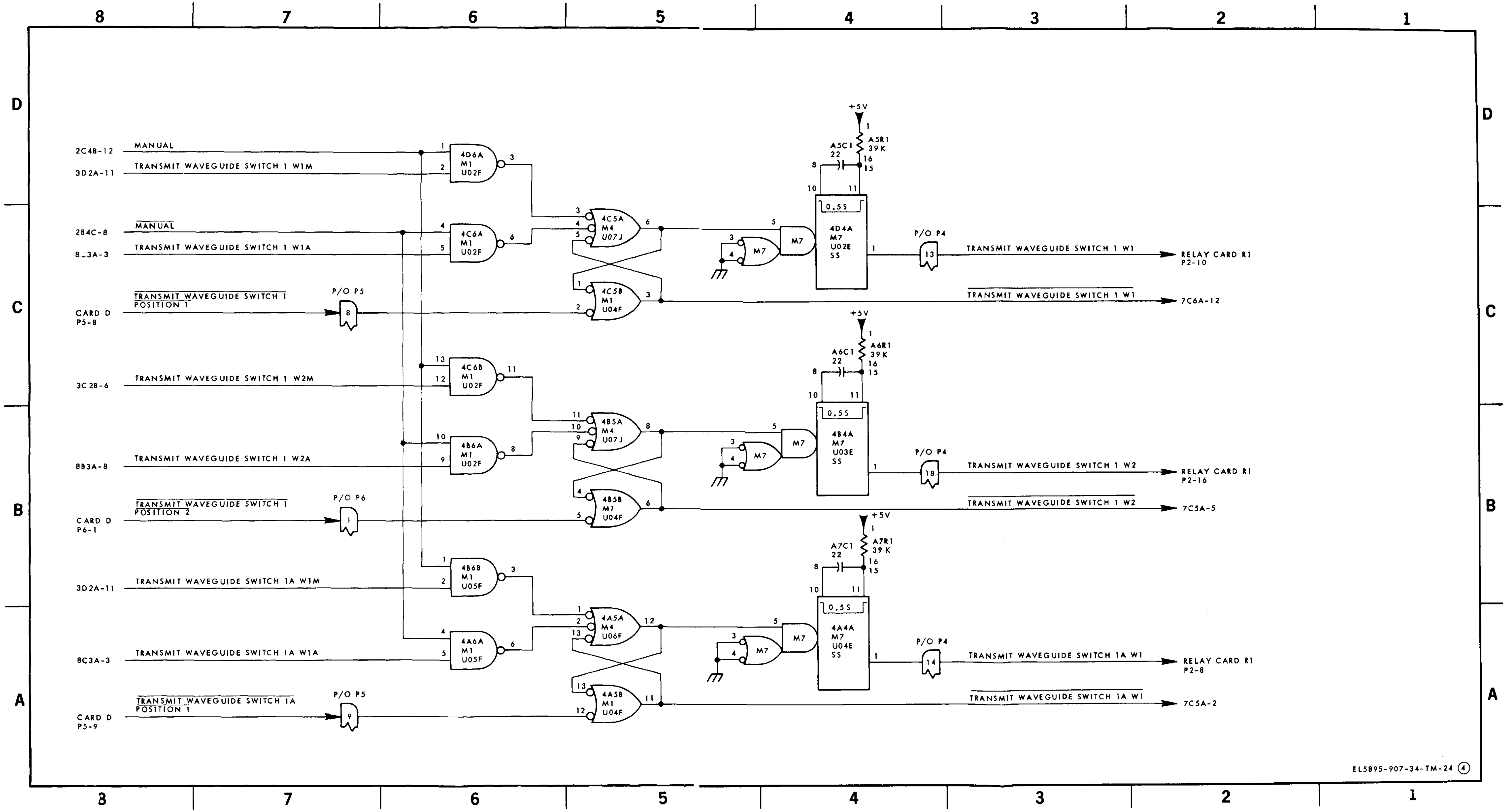


Figure FO-10. Circuit card E 15A5A2A2, logic diagram (sheet 4 of 9)

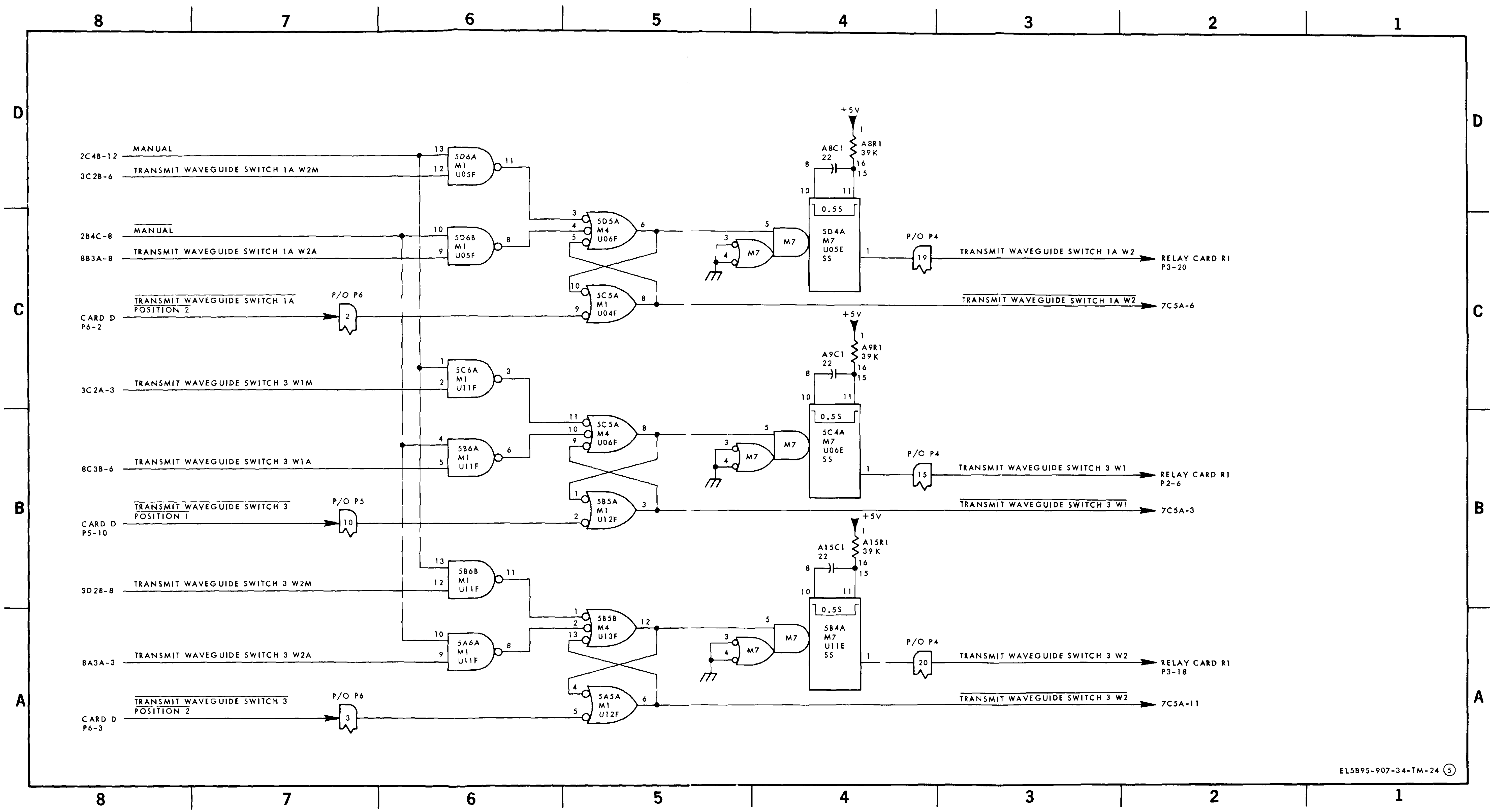


Figure FO-10 Circuit card E 15A5A2A2, logic diagram (sheet 5 of 9)

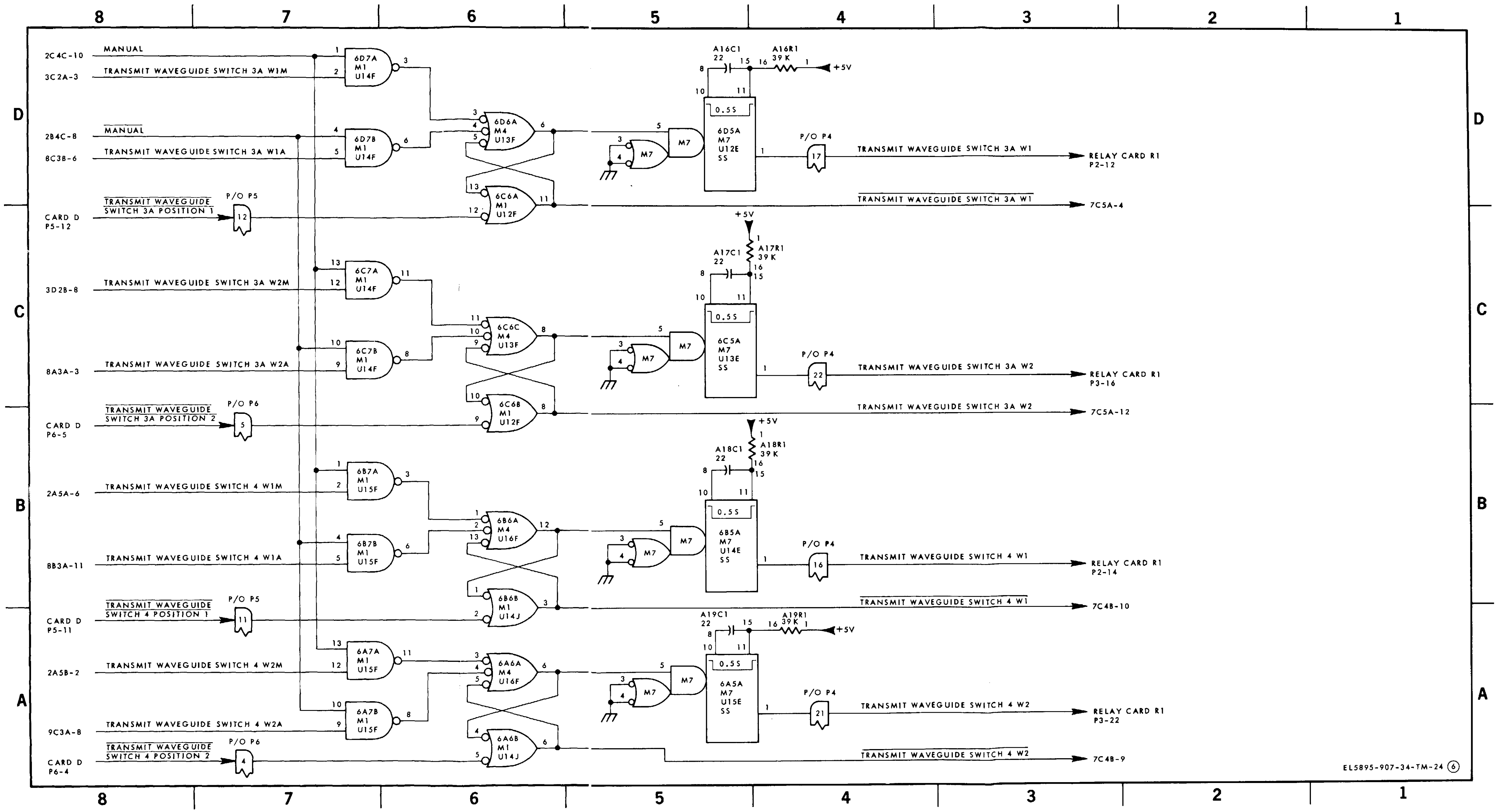


Figure FO-10 Circuit card E 15A5A2A2, logic diagram (sheet 6 of 9)

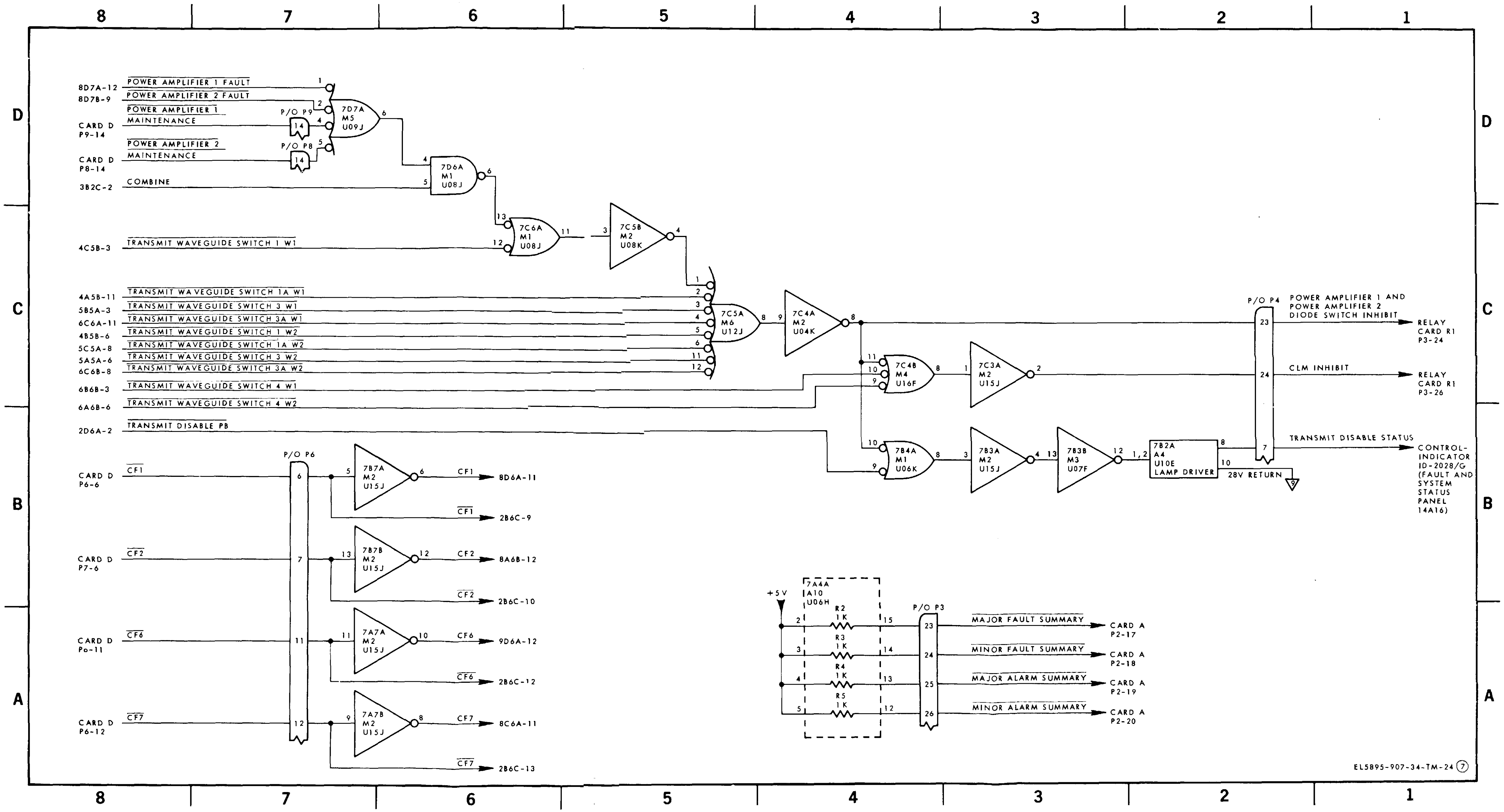


Figure FO-10 . Circuit card E 15A5A2A2, logic diagram (sheet 7 of 9)

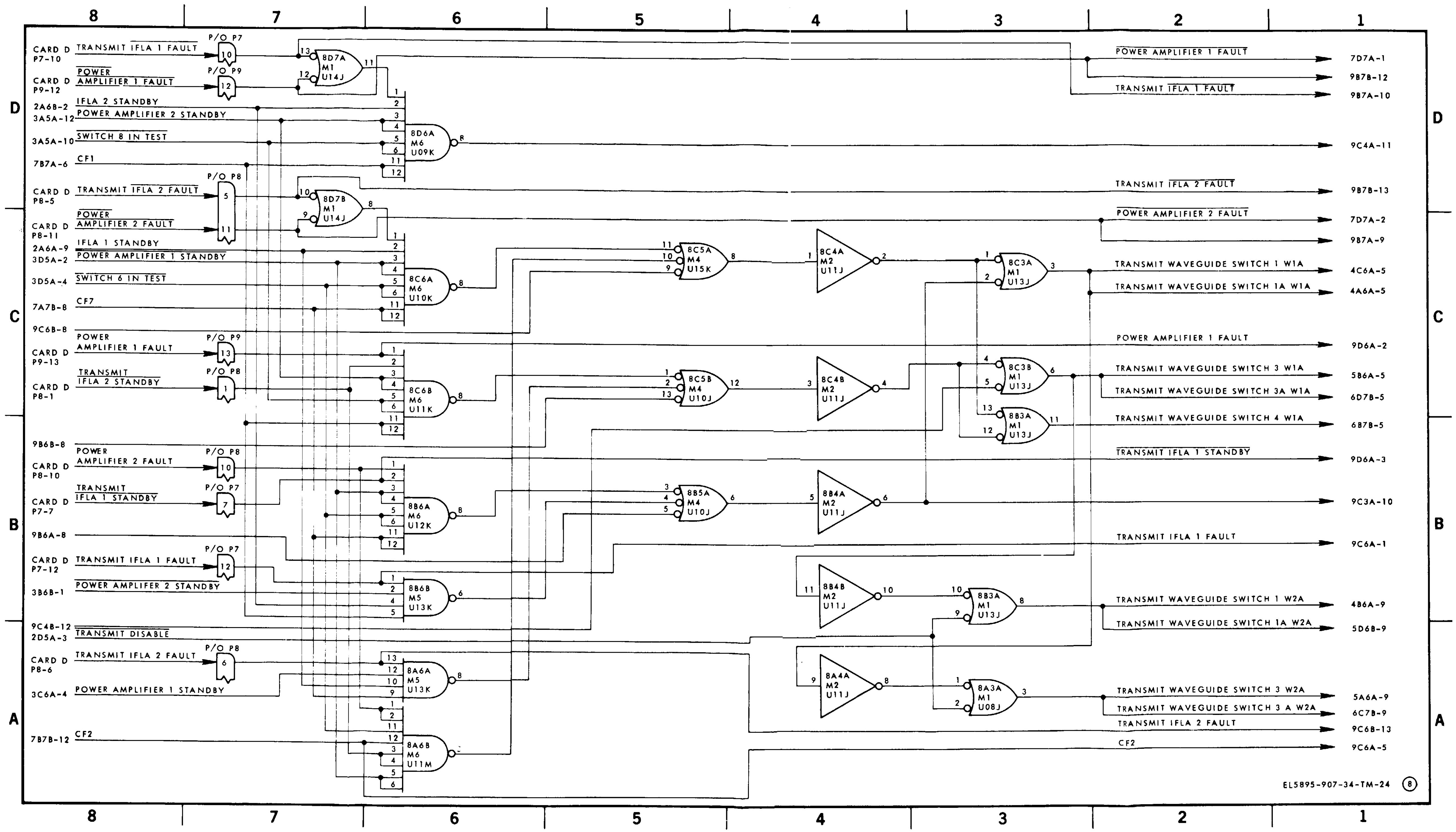


Figure FO-10 Circuit card E 15A5A2A2, logic diagram (sheet 8 of 9)

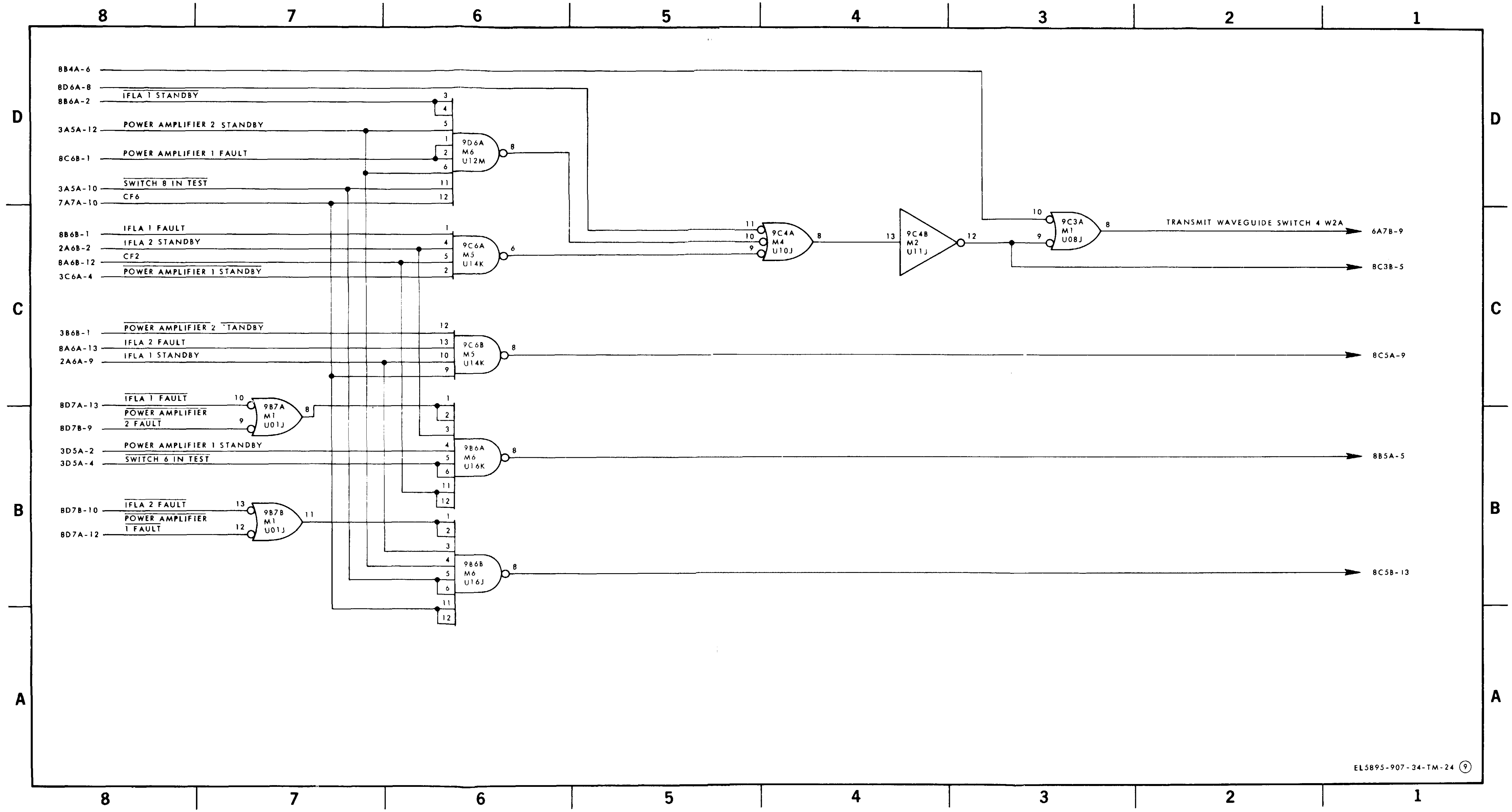


Figure FO-10. Circuit card E 15A5A2A2, logic diagram (sheet 9 of 9)

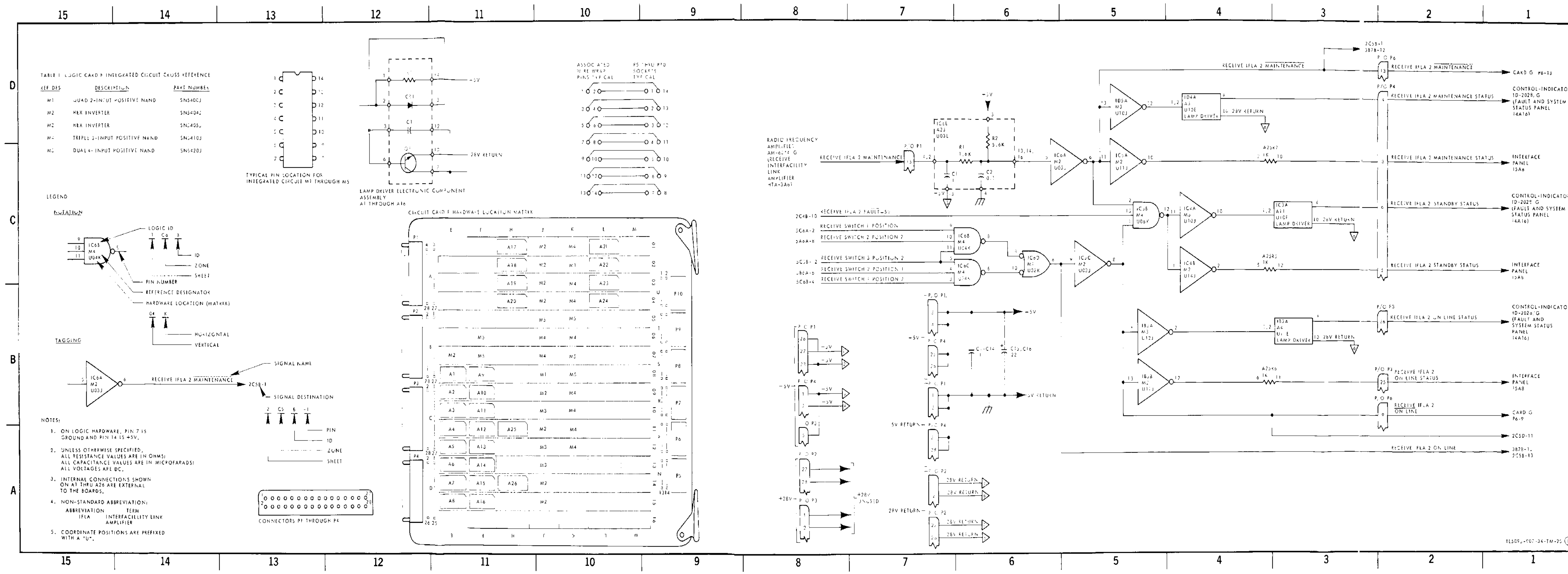


Figure FO-11. Circuit Card F 15A5A3A1, logic diagram (sheet 1 of 6)

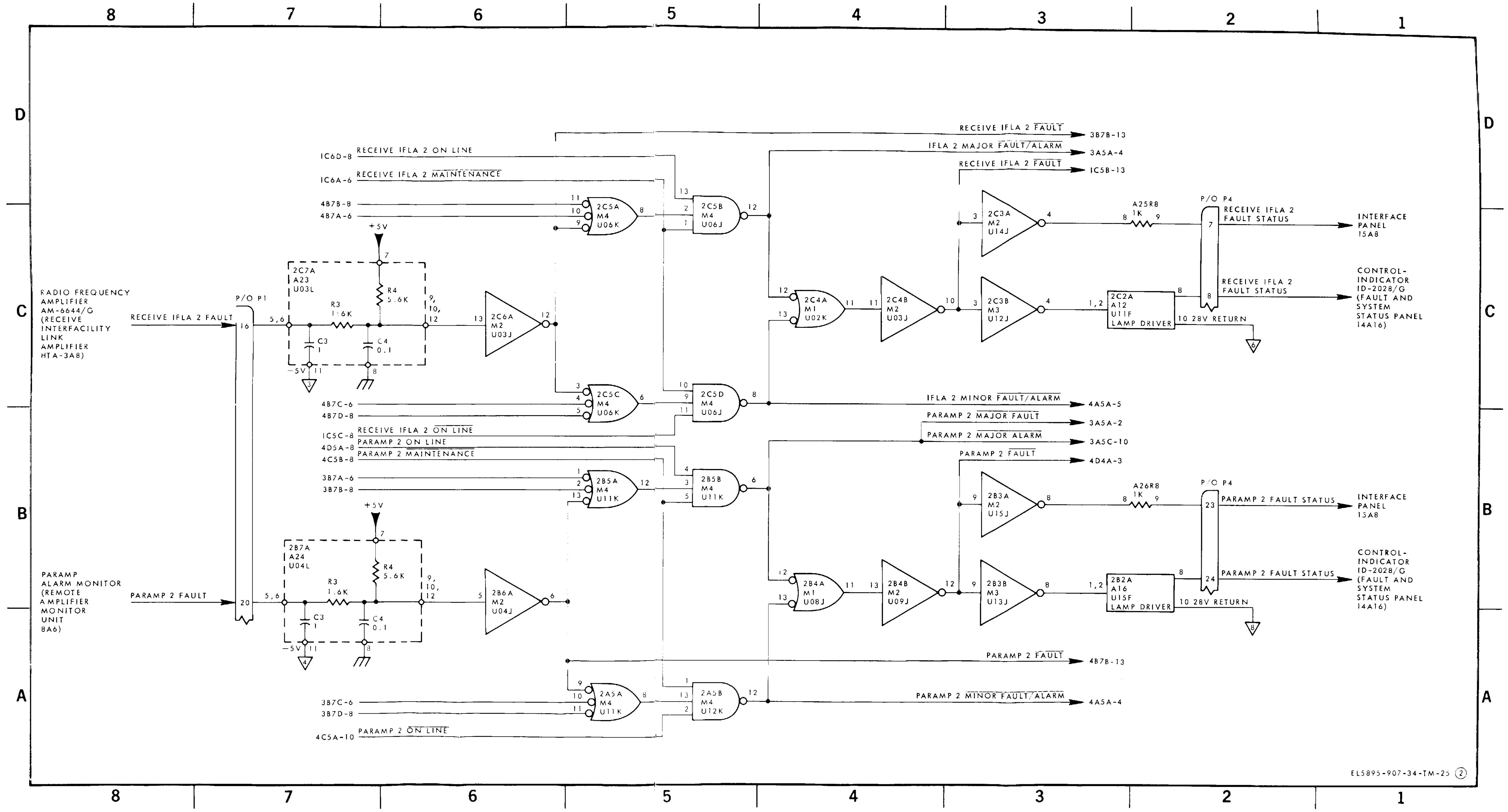


Figure FO-11. Circuit Card F 15A5A3A1, logic diagram (sheet 2 of 6)

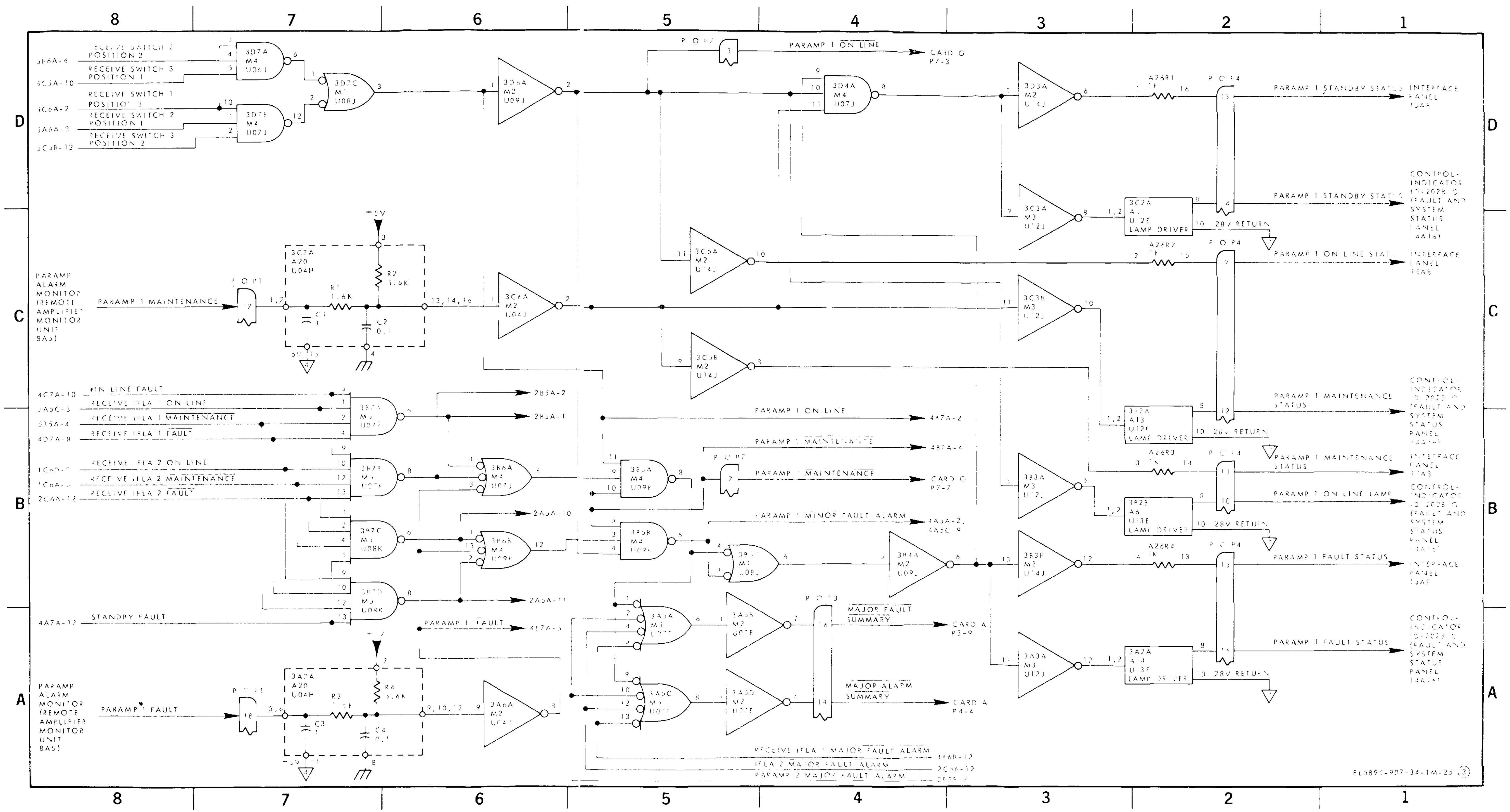


Figure FO-11. Circuit Card F 15A5A3A1, logic diagram (sheet 3 of 6)

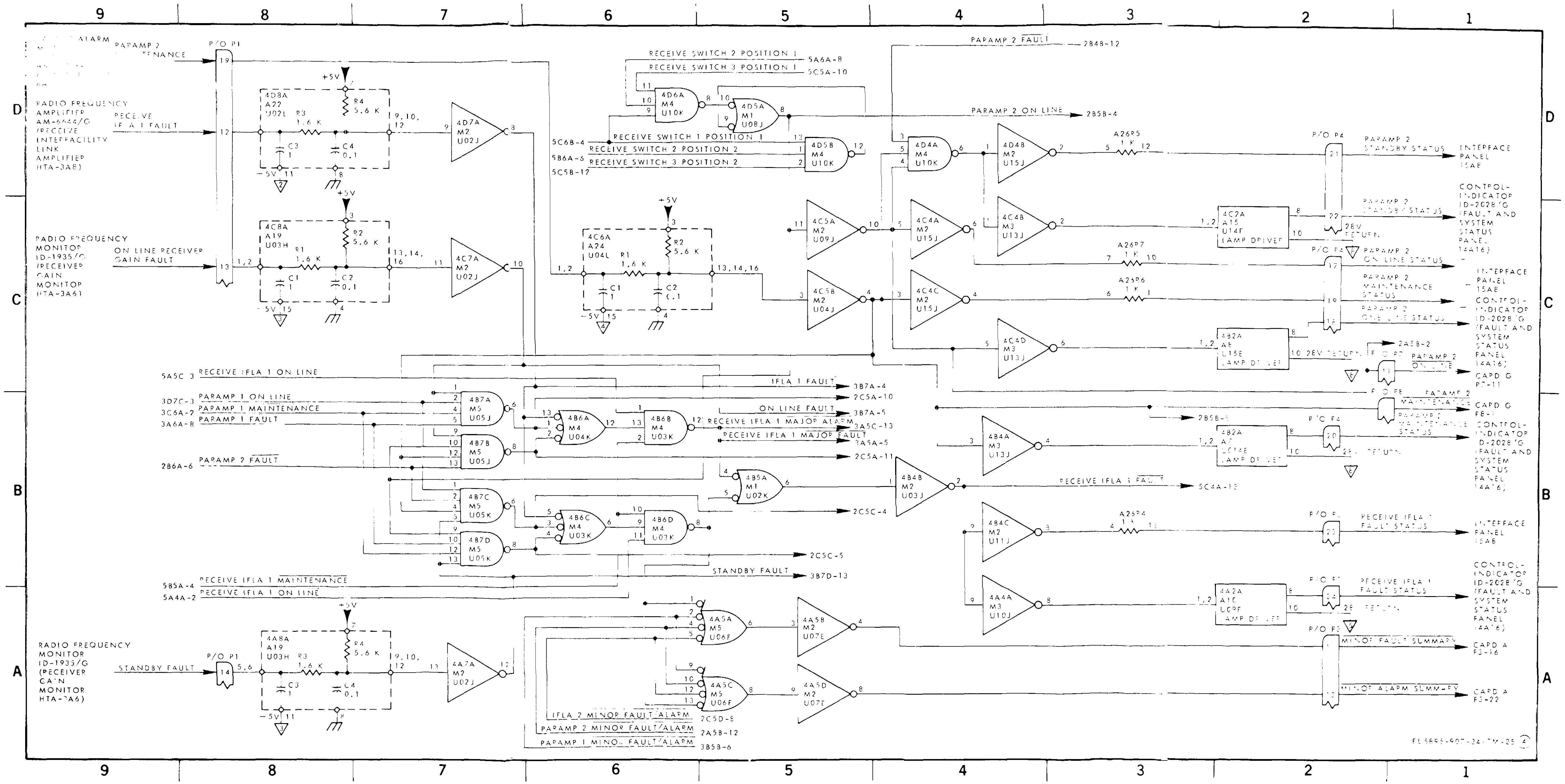


Figure FO-11. Circuit Card F 15A5A3A1, logic diagram (sheet 4 of 6).

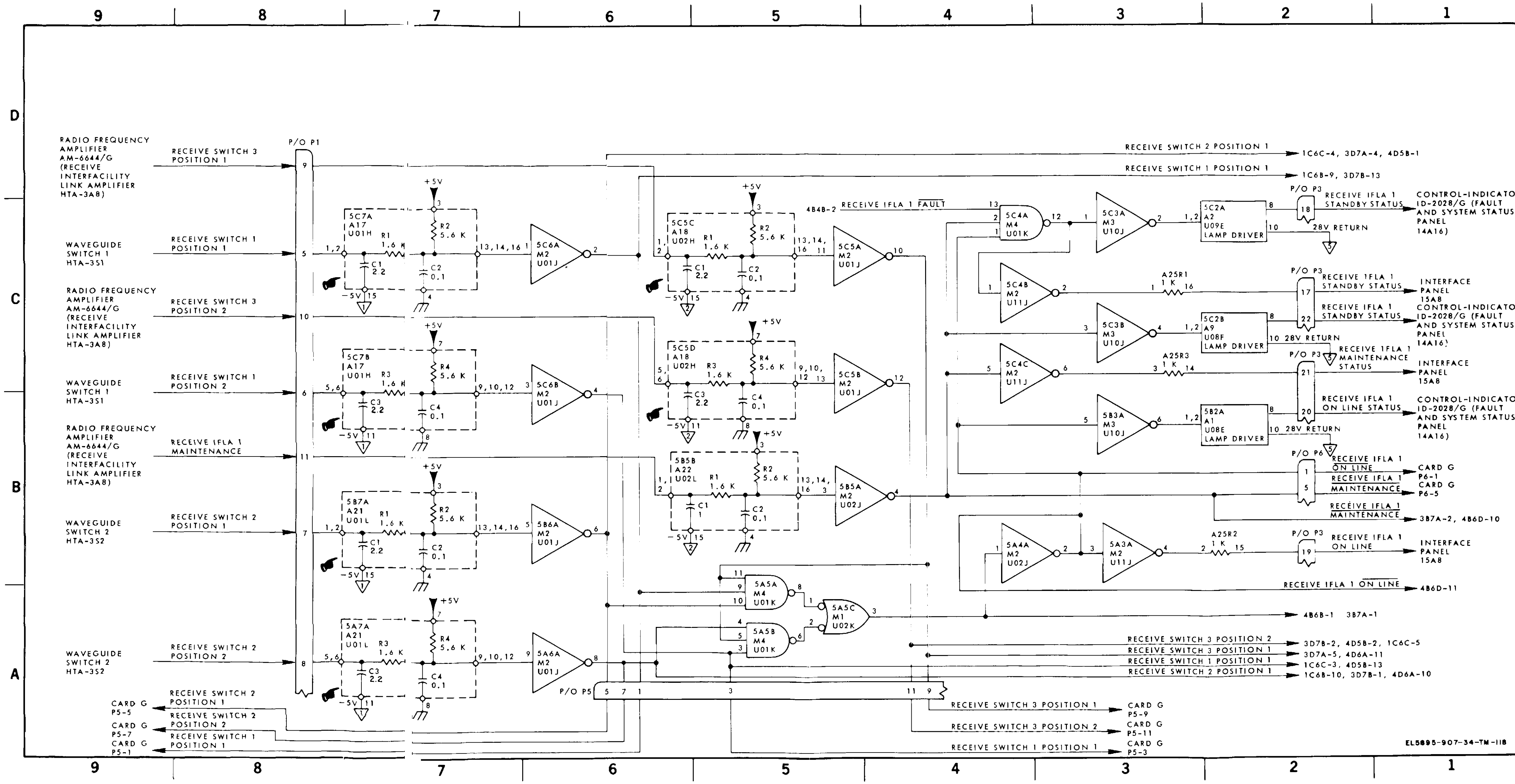


Figure FO-11. Circuit Card F 15A5A3A1, logic diagram (sheet 5 of 6)

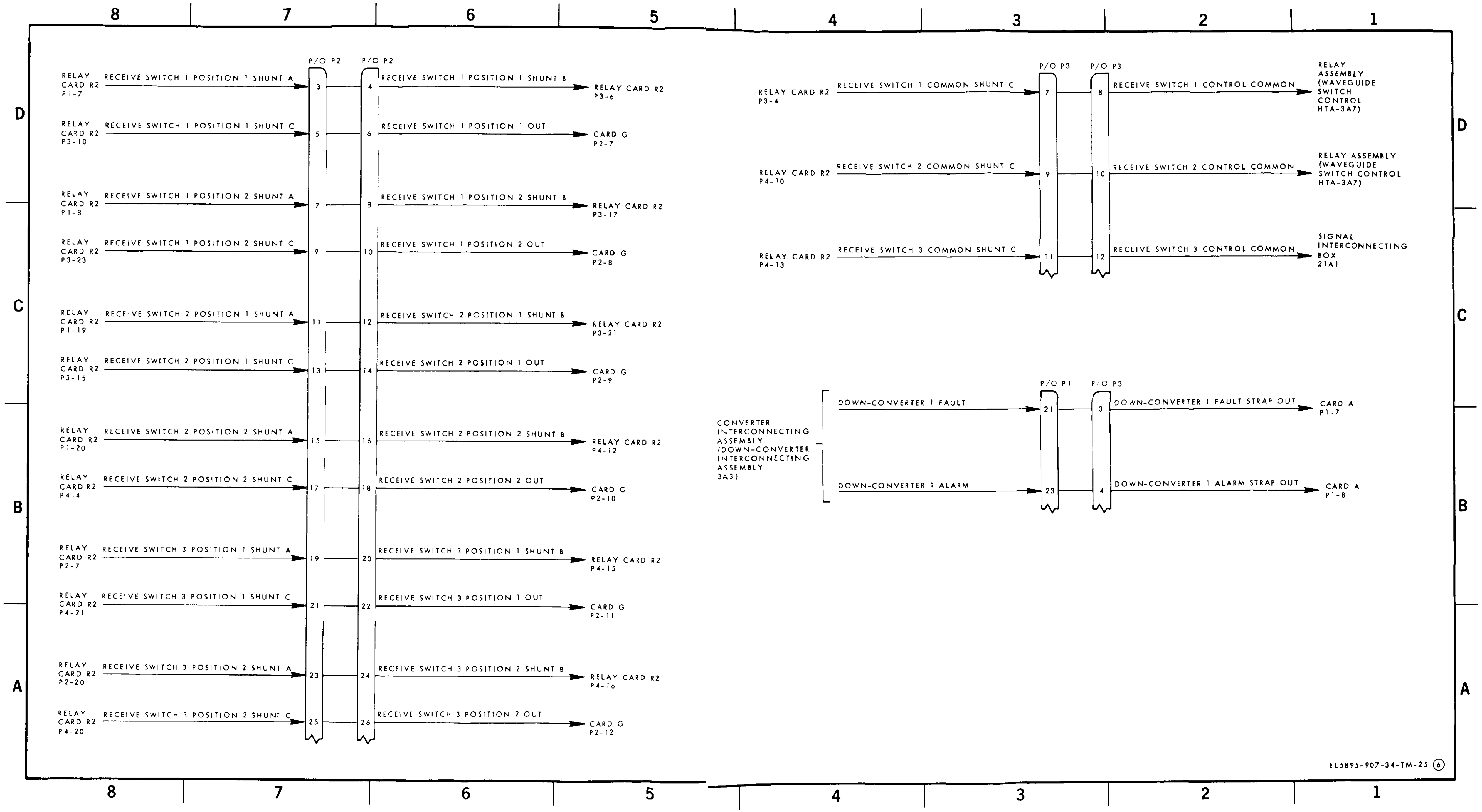


Figure FO-11. Circuit Card F 15A5A3A1, logic diagram (sheet 6 of 6).

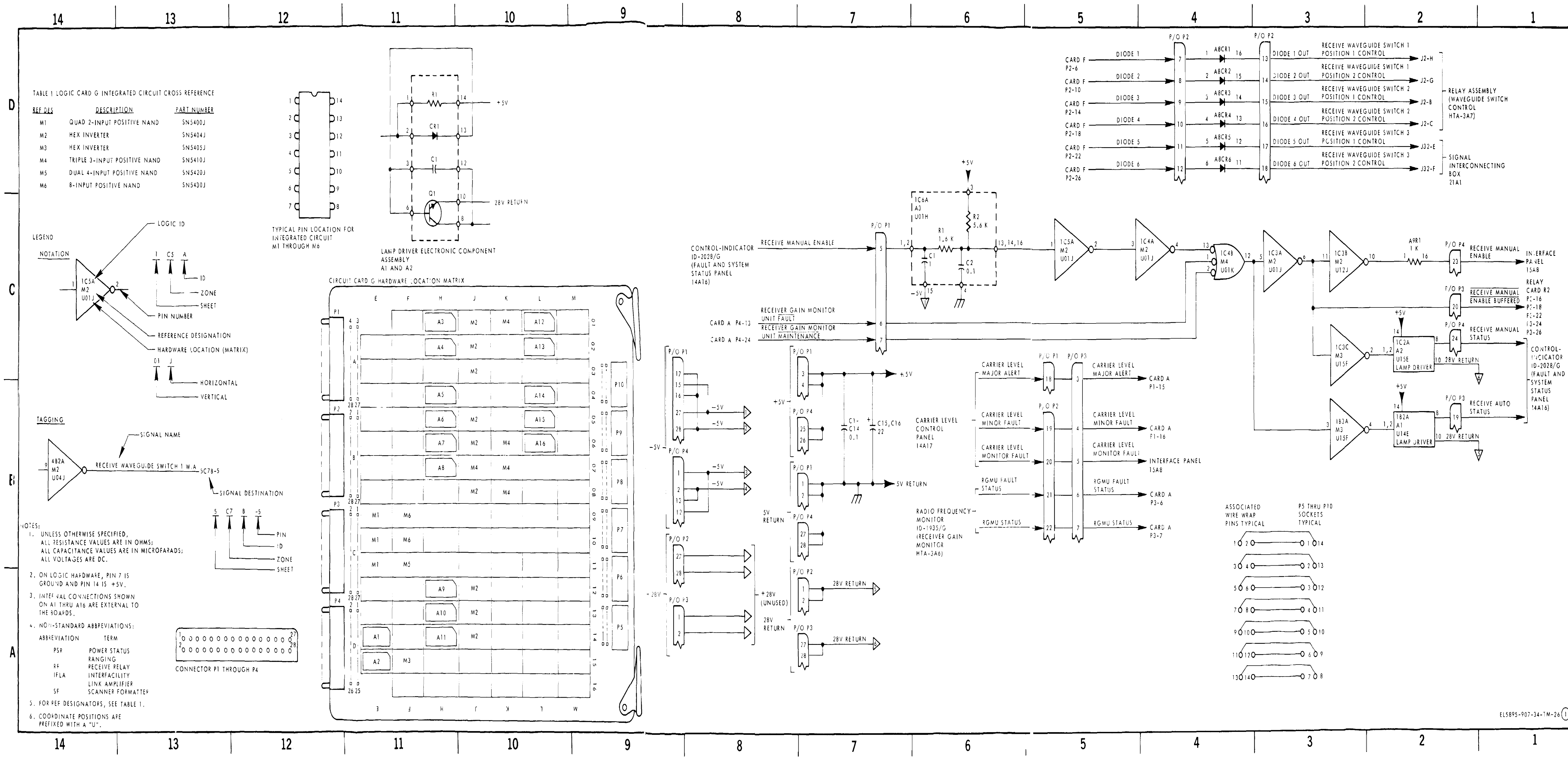


Figure FO-12. Circuit card G 15A5A3A2, logic diagram (sheet 1 of 5).

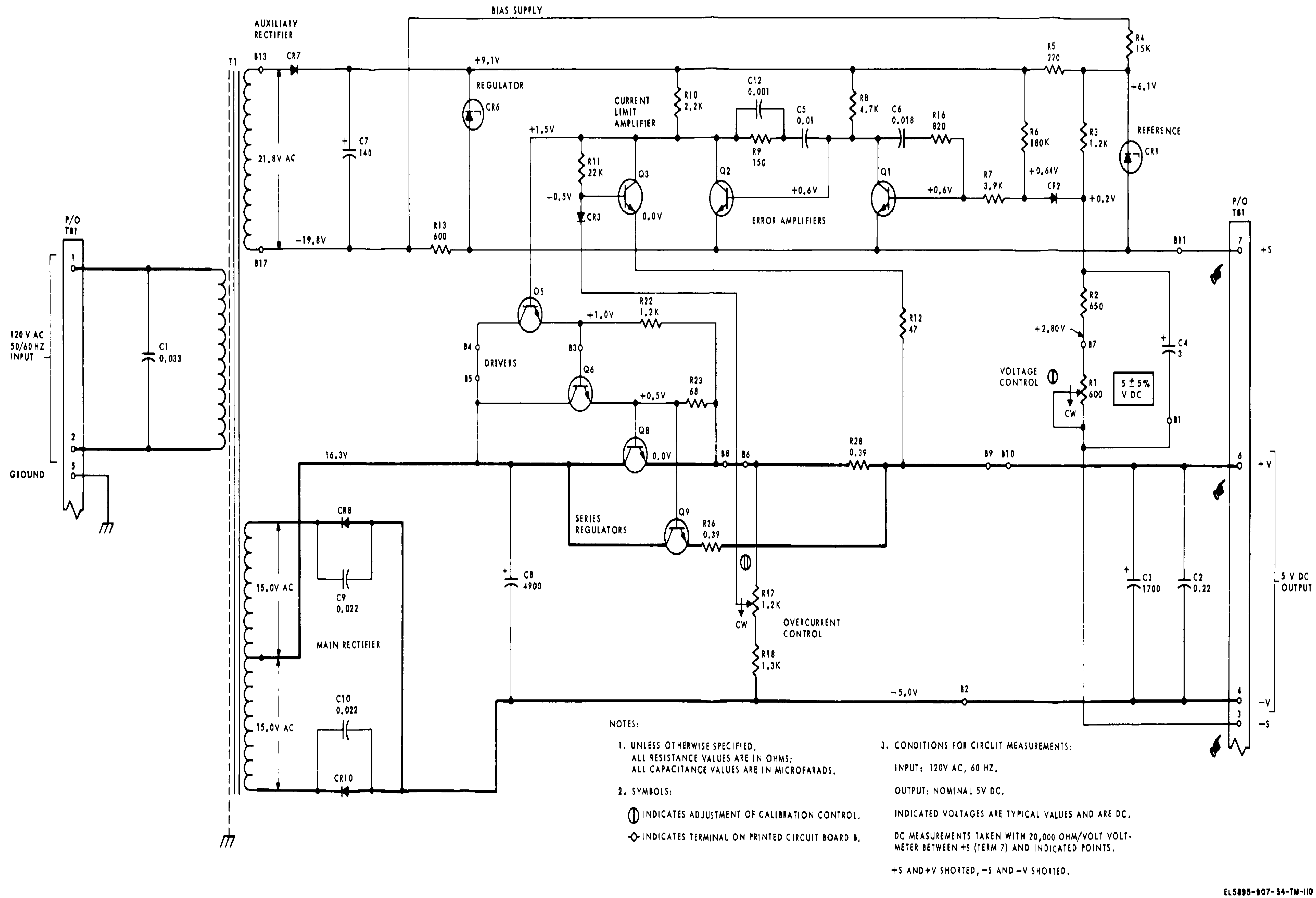


Figure FO-12. Circuit card G 15A5A3A2, logic diagram (sheet 2 of 5).

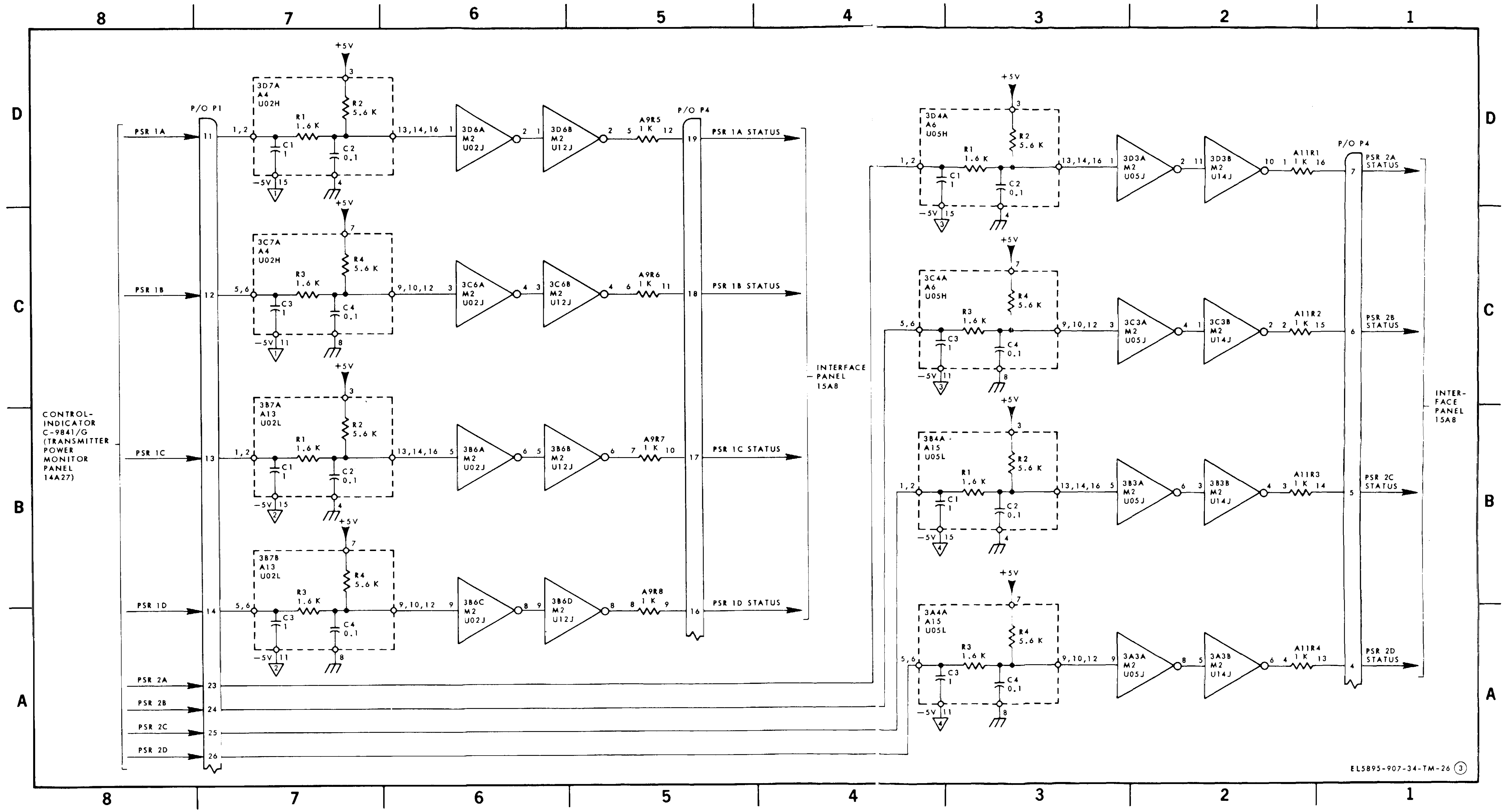


Figure FO-12. Circuit card G 15A5A3A2, logic diagram (sheet 3 of 5).

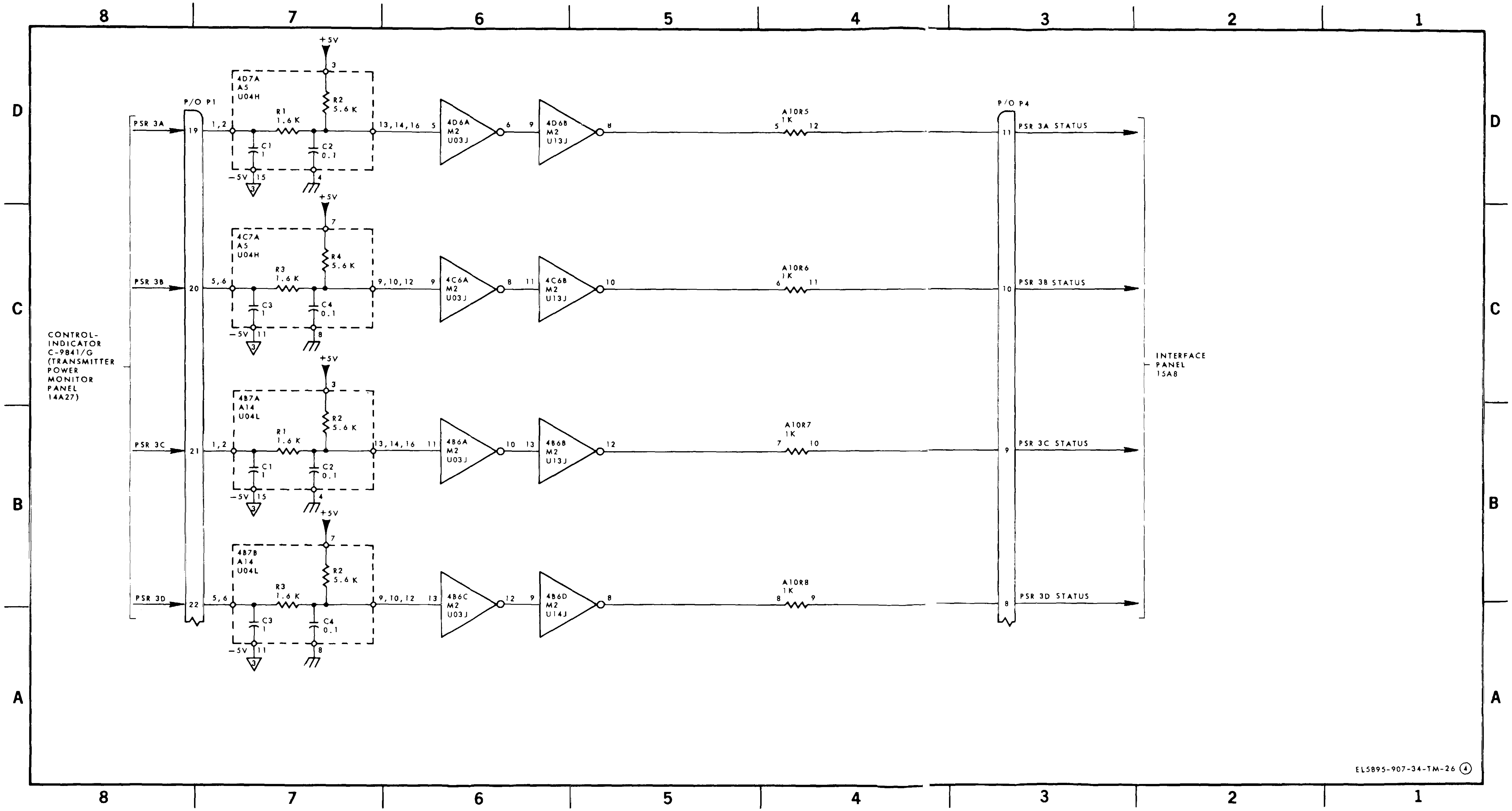


Figure FO-12. Circuit card G 15A5A3A2, logic diagram (sheet 4 of 5).

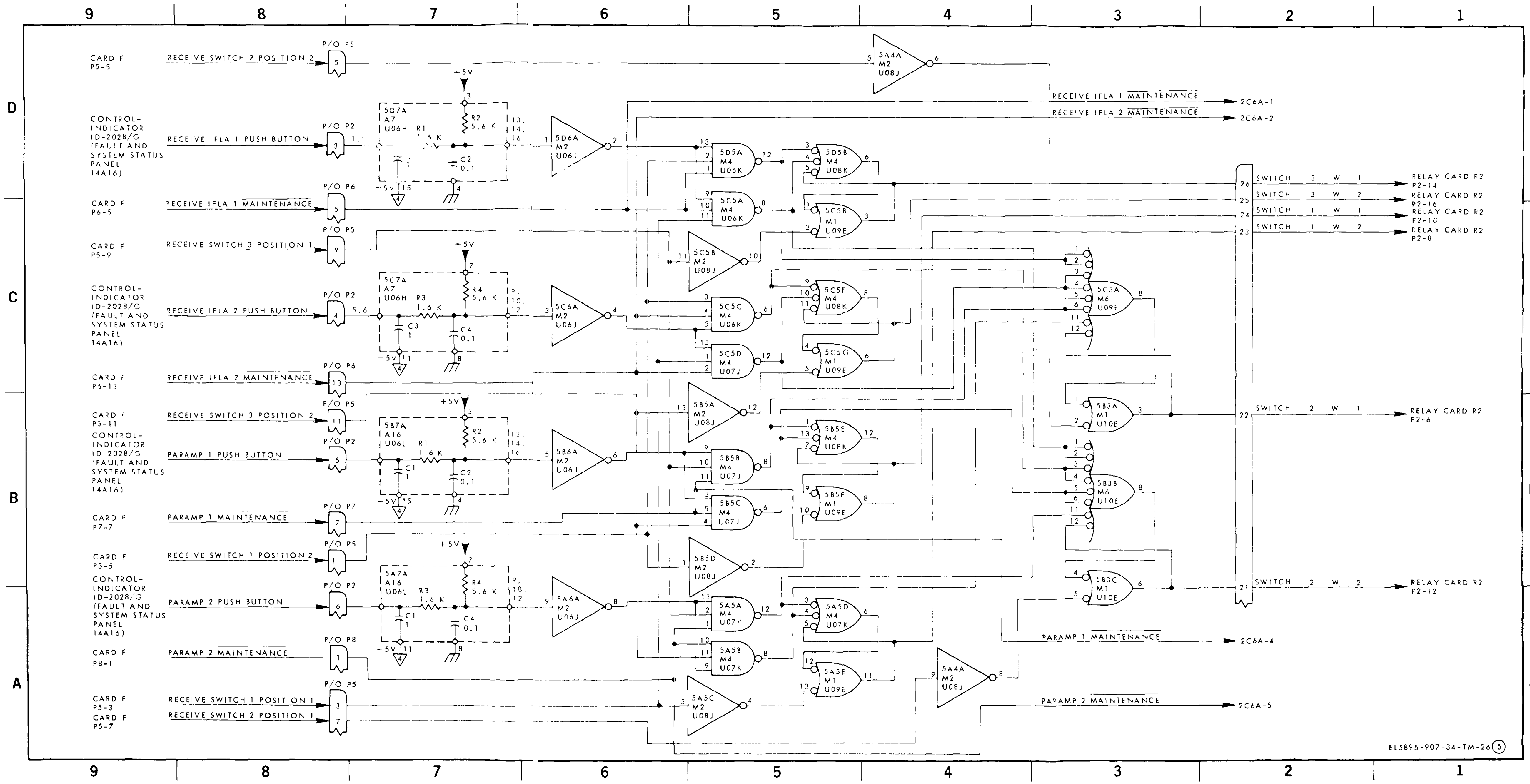
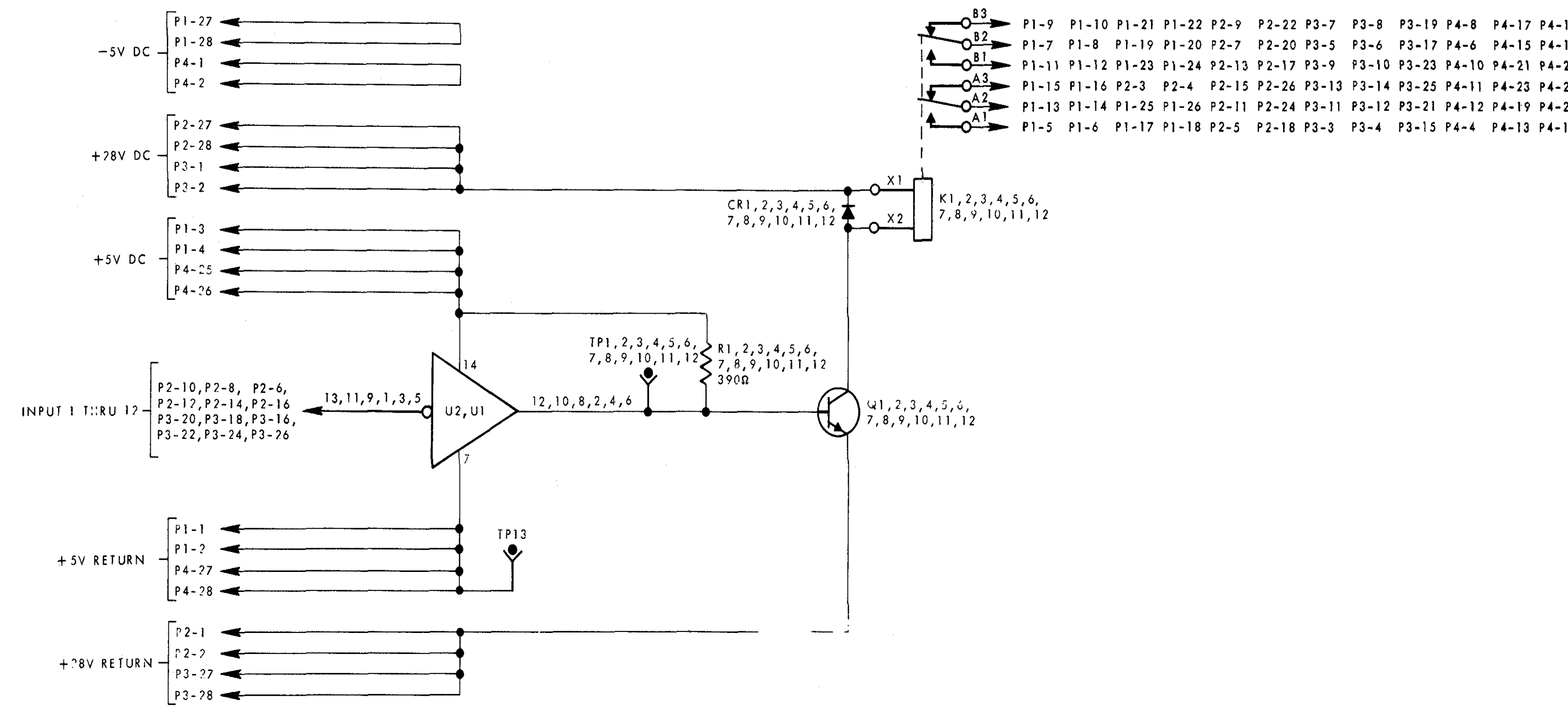


Figure FO-12. Circuit card G 15A5A3A2, logic diagram (sheet 5 of 5).

INPUT SIGNAL	FROM	TO	THROUGH RELAY	OUTPUT PINS	OUTPUT SIGNAL	TO
TX WG SW1 W1	CARD E P4-13	CARD R1 P2-10	K1	P1-7	TX WG SW1 POSN 1	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 31A26)
				P1-11	+ 28V DC	CARD D P3-2
TX WG SW1A W1	CARD E P4-14	CARD R1 P2-8	K2	P1-8 P1-14	TX WG SW1A POSN 1	SUMMING AND SWITCHING WAVEGUIDE (SUMMING AND SWITCHING ASSEMBLY 22A3)
				P1-12	+ 28V DC	CARD E P2-27
TX WG SW3 W1	CARD E P4-15	CARD R1 P2-6	K3	P1-19	TX WG SW3 POSN 1	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 32A26)
				P1-23	+ 28V DC	CARD E P3-1
TX WG SW3A W1	CARD E P4-17	CARD R1 P2-12	K4	P1-20	TX WG SW3A POSN 1	SUMMING AND SWITCHING WAVEGUIDE (SUMMING AND SWITCHING ASSEMBLY 22A3)
				P1-24	+ 28V DC	CARD E P3-2
TX WG SW4 W1	CARD E P4-16	CARD R1 P2-14	K5	P2-7 P2-11	TX WG SW4 POSN 1	SUMMING AND SWITCHING WAVEGUIDE (SUMMING AND SWITCHING ASSEMBLY 22A3)
				P2-13	+ 28V DC	CARD F P2-28
TX WG SW1 W2	CARD E P4-18	CARD R1 P2-16	K6	P2-20	TX WG SW1 POSN 2	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 31A26)
				P2-17	+ 28V DC	CARD F P3-1
TX WG SW1A W2	CARD E P4-19	CARD R1 P3-20	K7	P3-5 P3-11	TX WG SW1A POSN 2	SUMMING AND SWITCHING WAVEGUIDE (SUMMING AND SWITCHING ASSEMBLY 22A3)
				P3-9	+ 28V DC	CARD G P2-27
TX WG SW3 W2	CARD E P4-20	CARD R1 P3-18	K8	P3-6	TX WG SW3 POSN 2	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 32A26)
				P3-10	+ 28V DC	CARD G P2-28
TX WG SW3A W2	CARD F P4-22	CARD R1 P3-16	K9	P3-17	TX WG SW3A POSN 2	SUMMING AND SWITCHING WAVEGUIDE (SUMMING AND SWITCHING ASSEMBLY 22A3)
				P3-23	+ 28V DC	CARD G P3-2
TX WG SW4 W2	CARD E P4-21	CARD R1 P3-22	K10	P4-6 P4-12	TX WG SW4 POSN 2	SUMMING AND SWITCHING WAVEGUIDE (SUMMING AND SWITCHING ASSEMBLY 22A3)
				P4-10	+ 28V DC	CARD R1 P2-28
PA1 AND PA2 DIODE SWITCH INHIBIT	CARD E P4-23	CARD R1 P3-24	K11	P4-15 P4-21	PA1 AND PA2 DIODE SWITCH INHIBIT	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 31A26)
				P4-19 P4-13	PA1 AND PA2 DIODE SWITCH INHIBIT	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 32A26)
CLM INHIBIT	CARD E P4-24	CARD R1 P3-26	K12	P4-16	CLM INHIBIT	CONTROL-MONITOR (CARRIER LEVEL CONTROL PANEL 14A17)
				P4-18	CLM INHIBIT RTN	



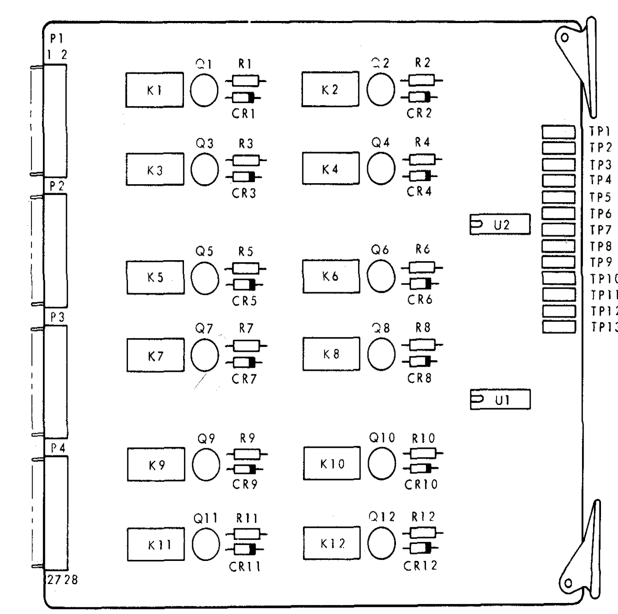
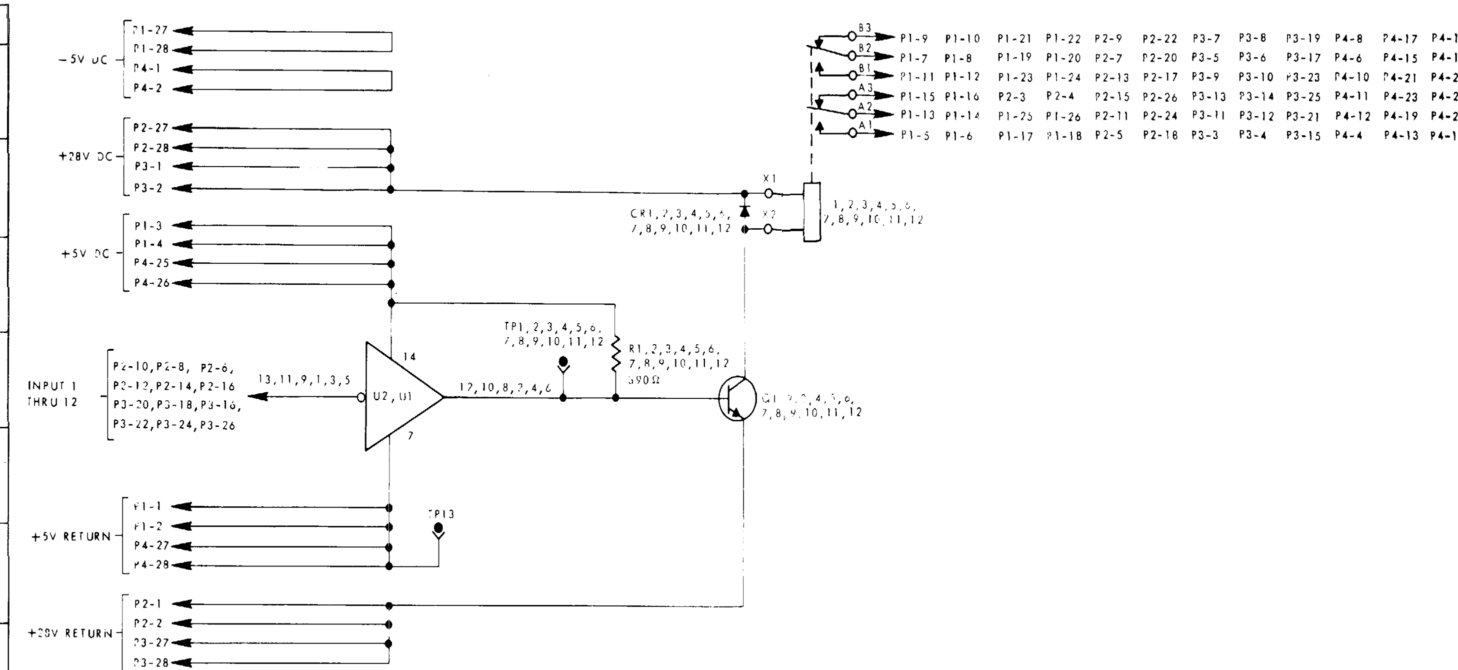


Figure FO-13. Relay circuit card R1 15A5A4, schematic diagram.

INPUT SIGNAL	FROM	TO	THROUGH RELAY	OUTPUT PINS	OUTPUT SIGNAL	TO	TO	TO	TO	TO
RWG SW1 W1	CARD G P3-24	CARD R2 P2-10	K1	P1-7	RCV WG SW1 POSN 1	CARD F P2-3 TO P2-4	CARD R2 P3-6 TO P3-10 (K8)	CARD F P2-5 TO P2-6	CARD G P2-7 TO P2-13	WAVEGUIDE SWITCH CONTROL HTA-3A7
				P1-11	+28V DC CARD D P3-1					
RWG SW1 W2	CARD G P3-23	CARD R2 P2-8	K2	P1-8	RCV WG SW1 POSN 2	CARD F P2-7 TO P2-8	CARD R2 P3-17 TO P3-23 (K9)	CARD F P2-9 TO P2-10	CARD G P2-8 TO P2-14	WAVEGUIDE SWITCH CONTROL HTA-3A7
				P1-12	+28V DC CARD R1 P3-2					
RWG SW2 W1	CARD G P3-22	CARD R2 P2-6	K3	P1-19	RCV WG SW2 POSN 1	CARD F P2-11 TO P2-12	CARD R2 P3-21 TO P3-15 (K9)	CARD F P2-13 TO P2-14	CARD G P2-9 TO P2-15	WAVEGUIDE SWITCH CONTROL HTA-3A7
				P1-23	+28V DC CARD R2 P2-27					
RWG SW2 W2	CARD G P3-21	CARD R2 P2-12	K4	P1-20	RCV WG SW2 POSN 2	CARD F P2-15 TO P2-16	CARD R2 P4-12 TO P4-4 (K10)	CARD F P2-17 TO P2-18	CARD G P2-10 TO P2-16	WAVEGUIDE SWITCH CONTROL HTA-3A7
				P1-24	+28V DC CARD R2 P2-28					
RWG SW3 W1	CARD G P3-26	CARD R2 P2-14	K5	P2-7	RCV WG SW3 POSN 1	CARD F P2-19 TO P2-20	CARD R2 P4-15 TO P4-21 (K11)	CARD F P2-21 TO P2-22	CARD G P2-11 TO P2-17	RADIO FREQUENCY AMPLIFIER AM-6644/G (RECEIVE INTERFACILITY LINK AMPLIFIER HTA-3A8)
				P2-13	+28V DC CARD R2 P3-1					
RWG SW3 W2	CARD G P3-25	CARD R2 P2-16	K6	P2-20	RCV WG SW3 POSN 2	CARD F P2-23 TO P2-24	CARD R2 P4-16 TO P4-20 (K12)	CARD F P2-25 TO P2-26	CARD G P2-12 TO P2-18	RADIO FREQUENCY AMPLIFIER AM-6644/G (RECEIVE INTERFACILITY LINK AMPLIFIER HTA-3A8)
				P2-17	+28V DC CARD R2 P3-2					
LOW ELEVATION CUTOFF	CARD E P4-11	CARD R2 P3-20	K7	P3-5	LOW ELEVATION CUTOFF	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 31A26 32A26)				
				P3-9	LOW ELEVATION CUTOFF RTN					
RCV MNL ENABLE	CARD G P3-20	CARD R2 P3-18	K8	P3-6	MANUAL ENABLE RCV WG SW1 POSN 1	CARD F P2-4				
				P3-10		CARD F P2-5				
		CARD R2 P3-16	K9	P3-17	MANUAL ENABLE RCV WG SW1 POSN 2	CARD F P2-8				
				P3-23		CARD F P2-9				
				P3-21	MANUAL ENABLE RCV WG SW2 POSN 1	CARD F P2-12				
				P3-15		CARD F P2-13				
		CARD R2 P3-22	K10	P4-12	MANUAL ENABLE RCV WG SW2 POSN 2	CARD F P2-16				
				P4-4		CARD F P2-17				
		CARD R2 P3-24	K11	P4-15	MANUAL ENABLE RCV WG SW3 POSN 1	CARD F P2-20				
				P4-21		CARD F P2-21				
		CARD R2 P3-26	K12	P4-22	RGM AUTO CONTROL	RADIO FREQUENCY MONITOR (RECEIVER GAIN MONITOR HTA-3A6)				
				P4-14	RGM AUTO CONTROL RTN					
				P4-16	MANUAL ENABLE RCV WG SW3 POSN 2	CARD F P2-24				
				P4-20		CARD F P2-25				



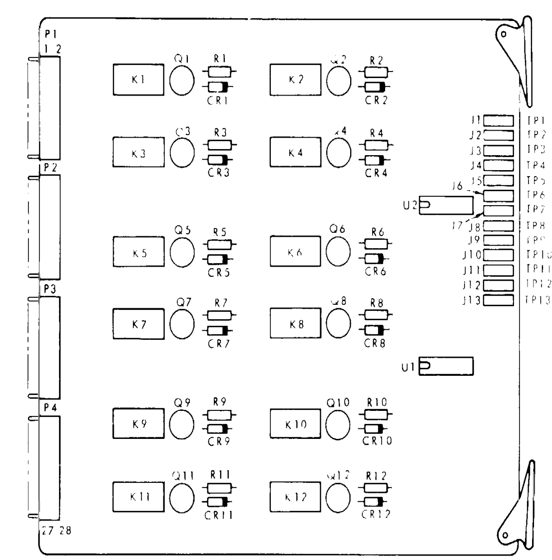


Figure FO-14. Relay circuit card R2 15A5A5, schematic diagram.

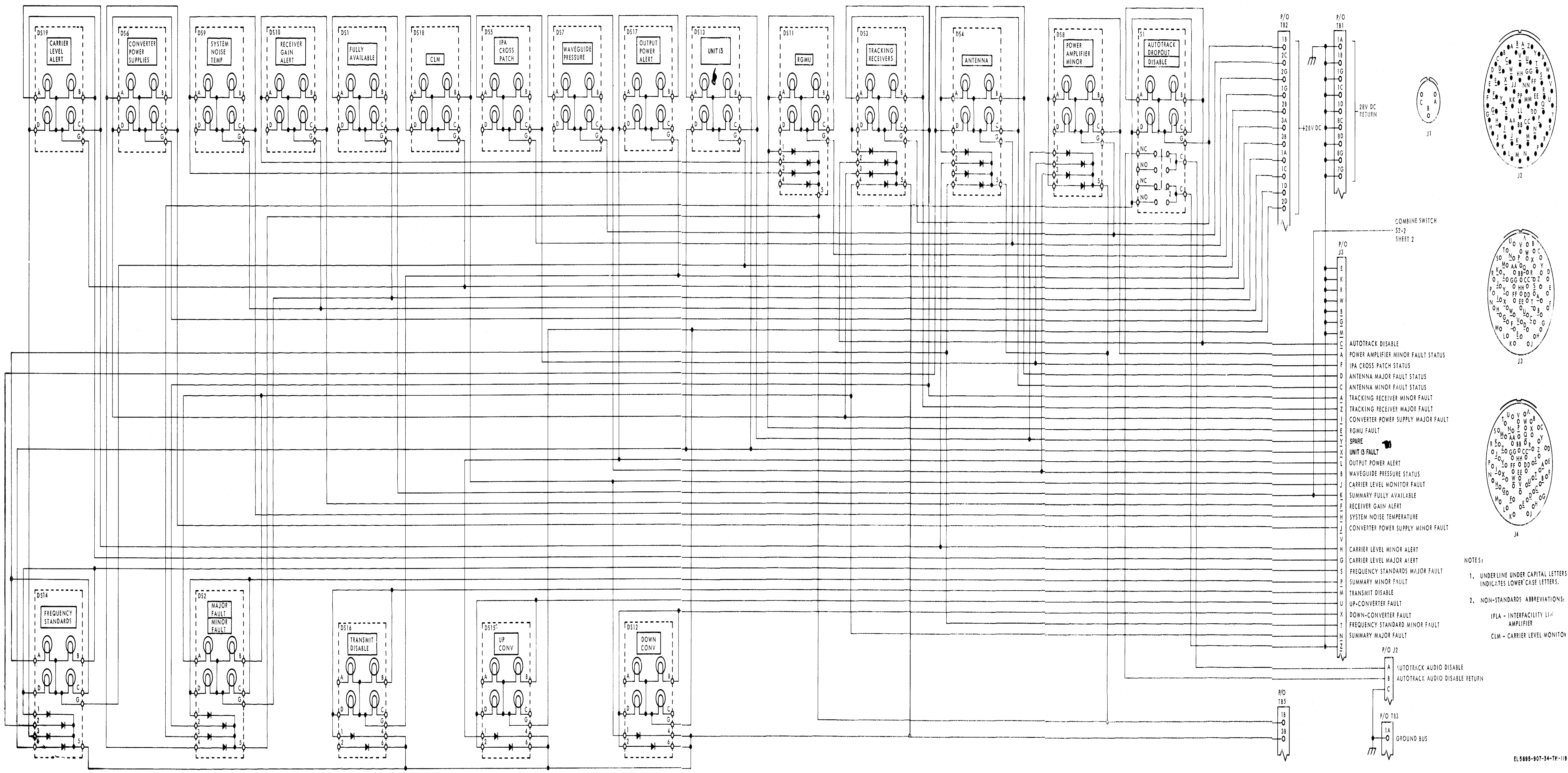


Figure FO-15. Fault and system status panel 14A16, schematic diagram AN/FSC-78(V) (sheet 1 of 4)

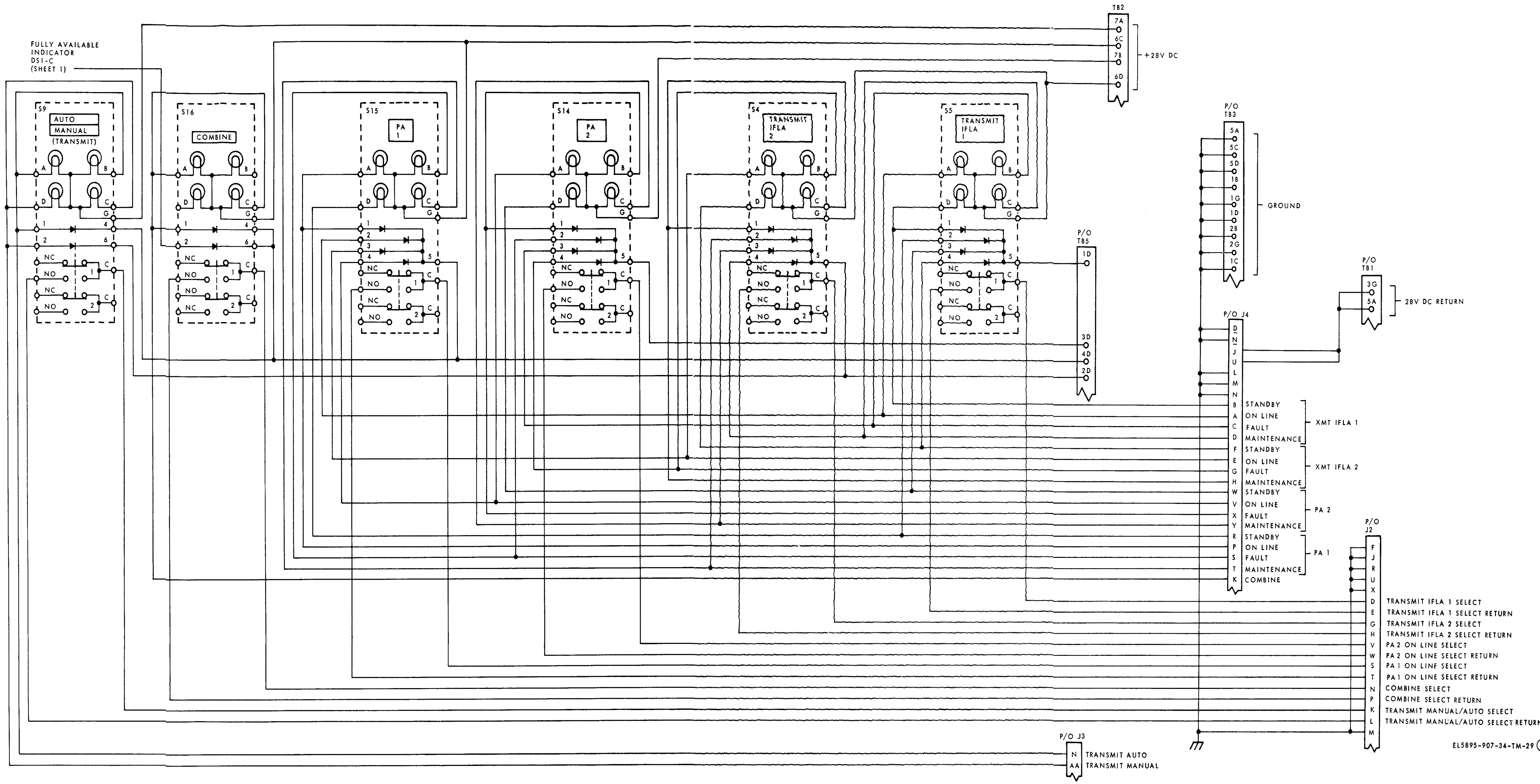


Figure FO-15. Fault and system status panel 14A16, schematic diagram, AN/FSC-78(V) (sheet 2 of 4).

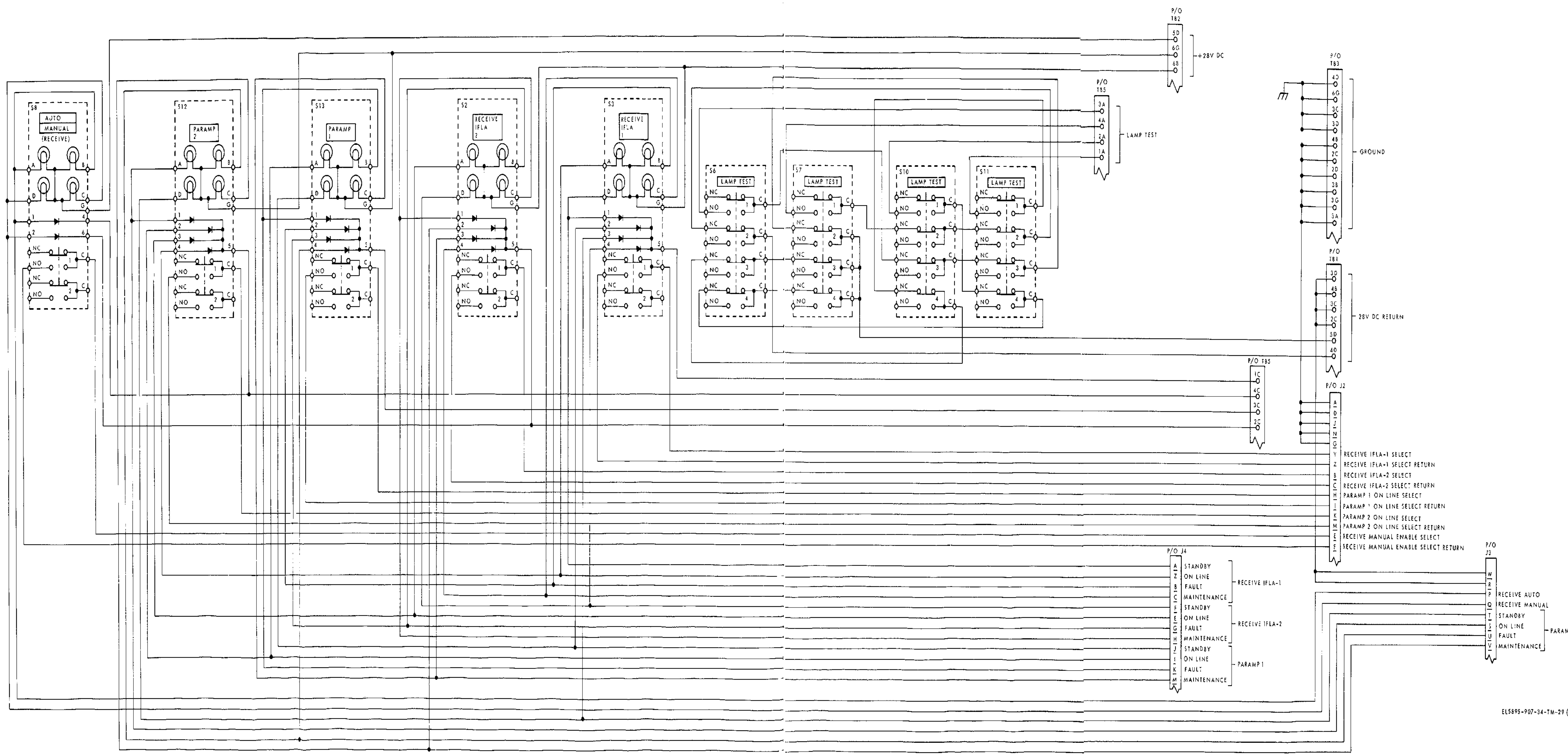


Figure FO-15. Fault and system status panel 14A16, schematic diagram, AN/FSC-78(V) (sheet 3 of 4).

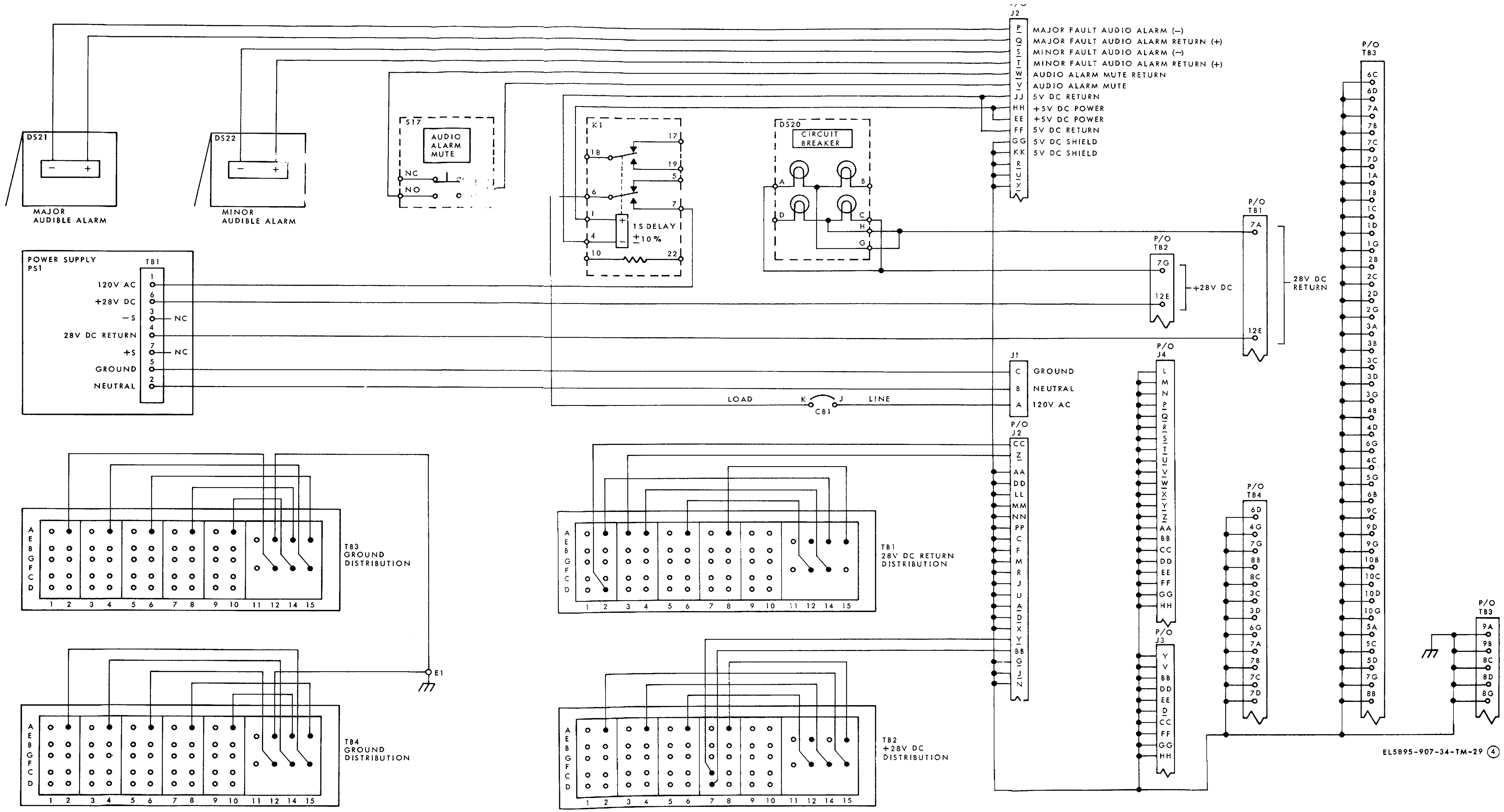
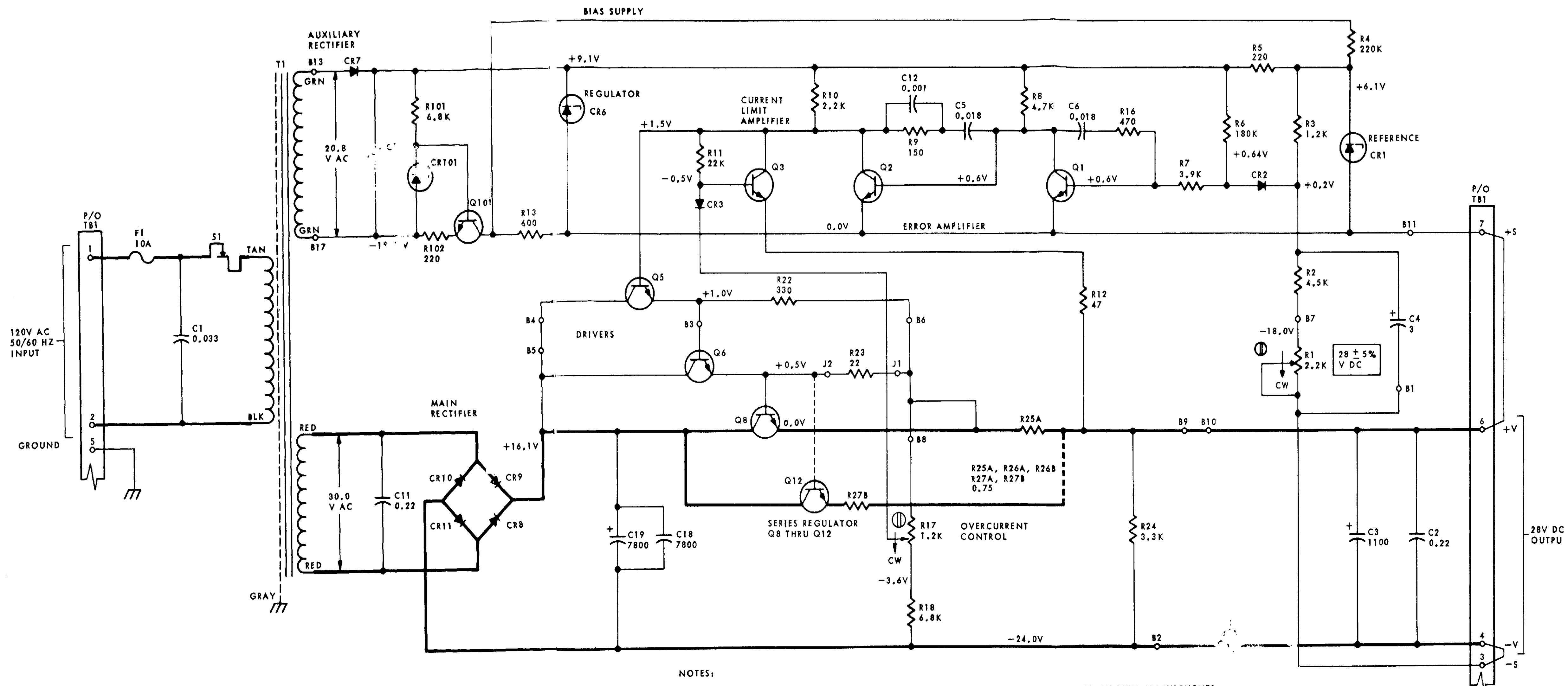


Figure FO-15. Fault and system status panel 14A16, schematic diagram, AN/FSC-78(V) (sheet 4 of 4)



NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCE VALUES ARE IN OHMS; ALL CAPACITANCE VALUES ARE IN MICROFARADS.
2. SYMBOLS:
   INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   INDICATES TERMINAL ON PRINTED CIRCUIT BOARD B OR TERMINAL BOARD J.
3. CONDITIONS FOR CIRCUIT MEASUREMENTS:
   INPUT 120V AC, 60 HZ.
   OUTPUT: NOMINAL 28V DC.
   INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC.
   DC MEASUREMENTS TAKEN WITH 20,000 OHM/VOLT VOLTMETER BETWEEN +S (TERM 7) AND INDICATED POINTS.
   +S AND +V SHORTED, −S AND −V SHORTED.

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Figure FO-16. 28 V dc power supply 14A16PS1, schematic diagram.

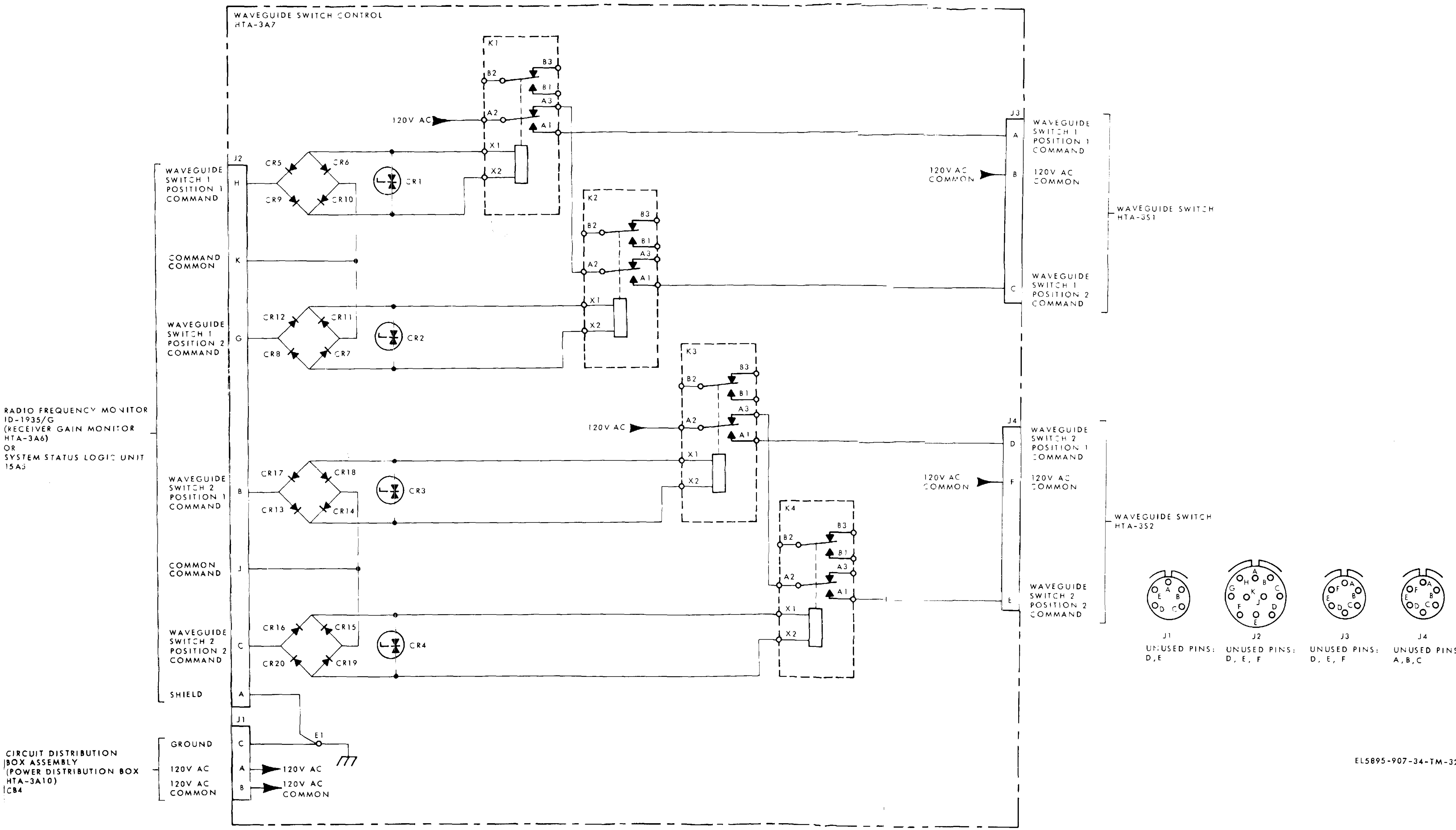

Figure FO-17. Waveguide switch control HTA-3A7, schematic diagram.

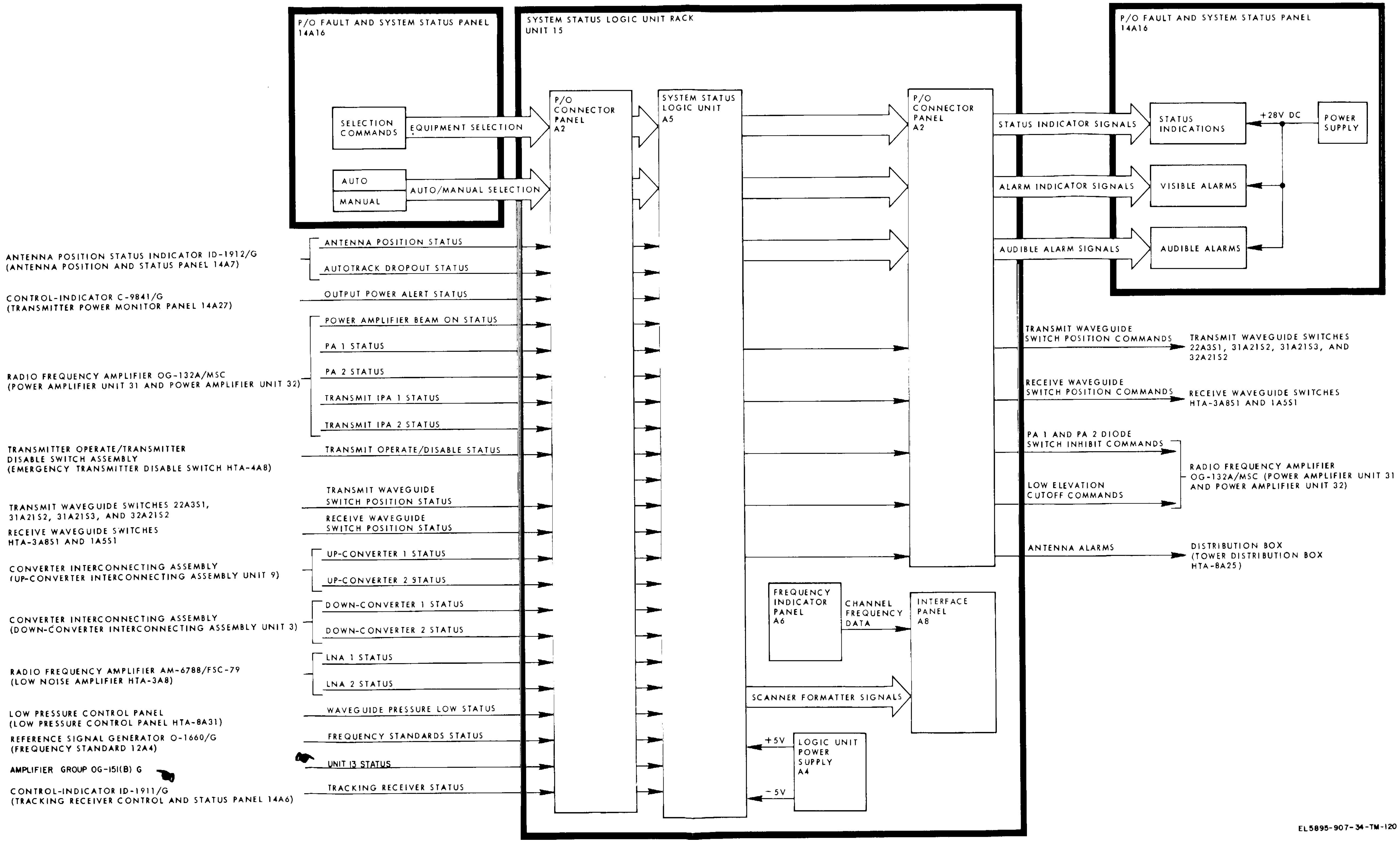

Figure FO-18. Status and alarm equipment, functional block diagram AN/FSC-79.

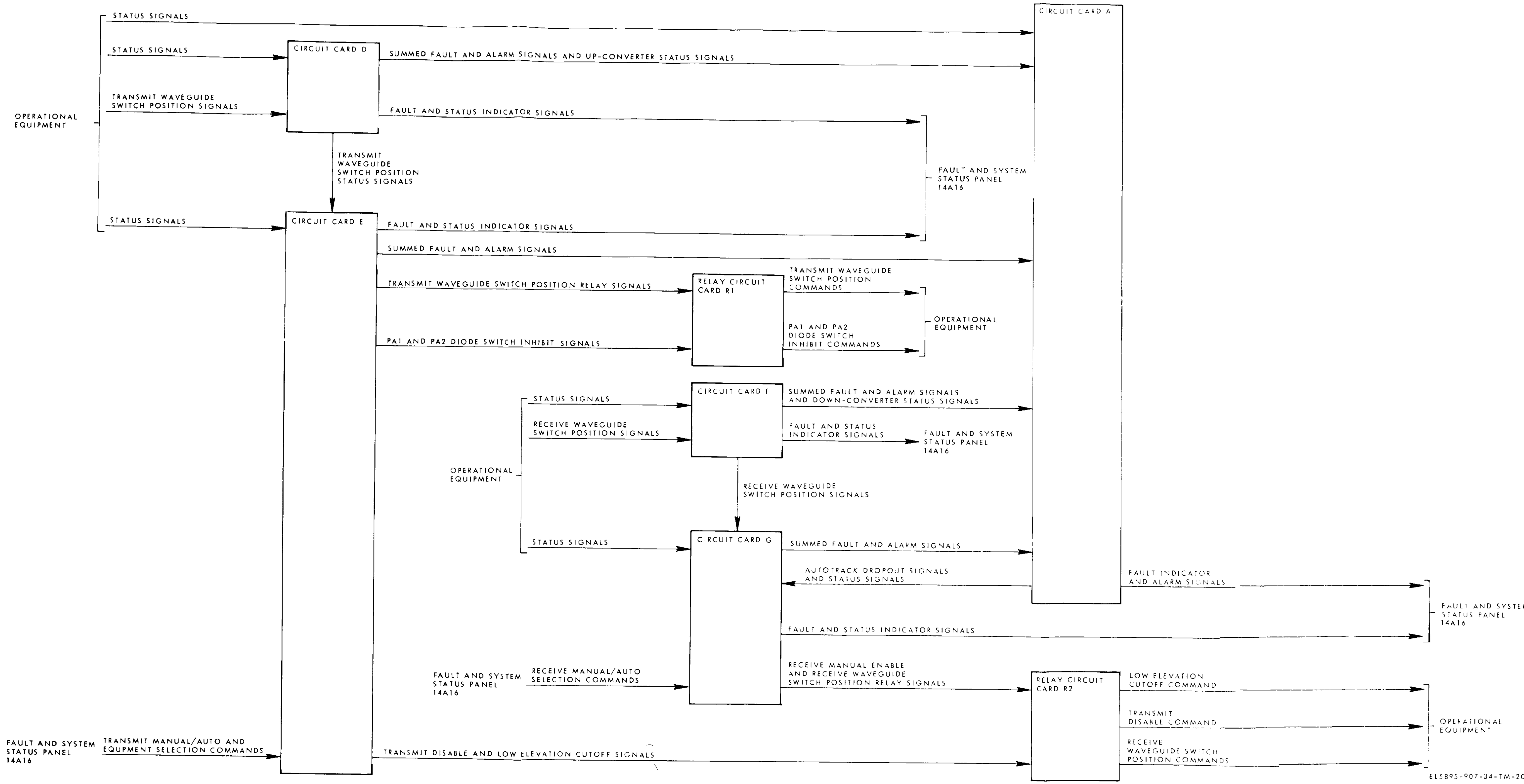

Figure FO-19. System status logic unit 15A5 circuit card signal processing and routing AN/FSC-79

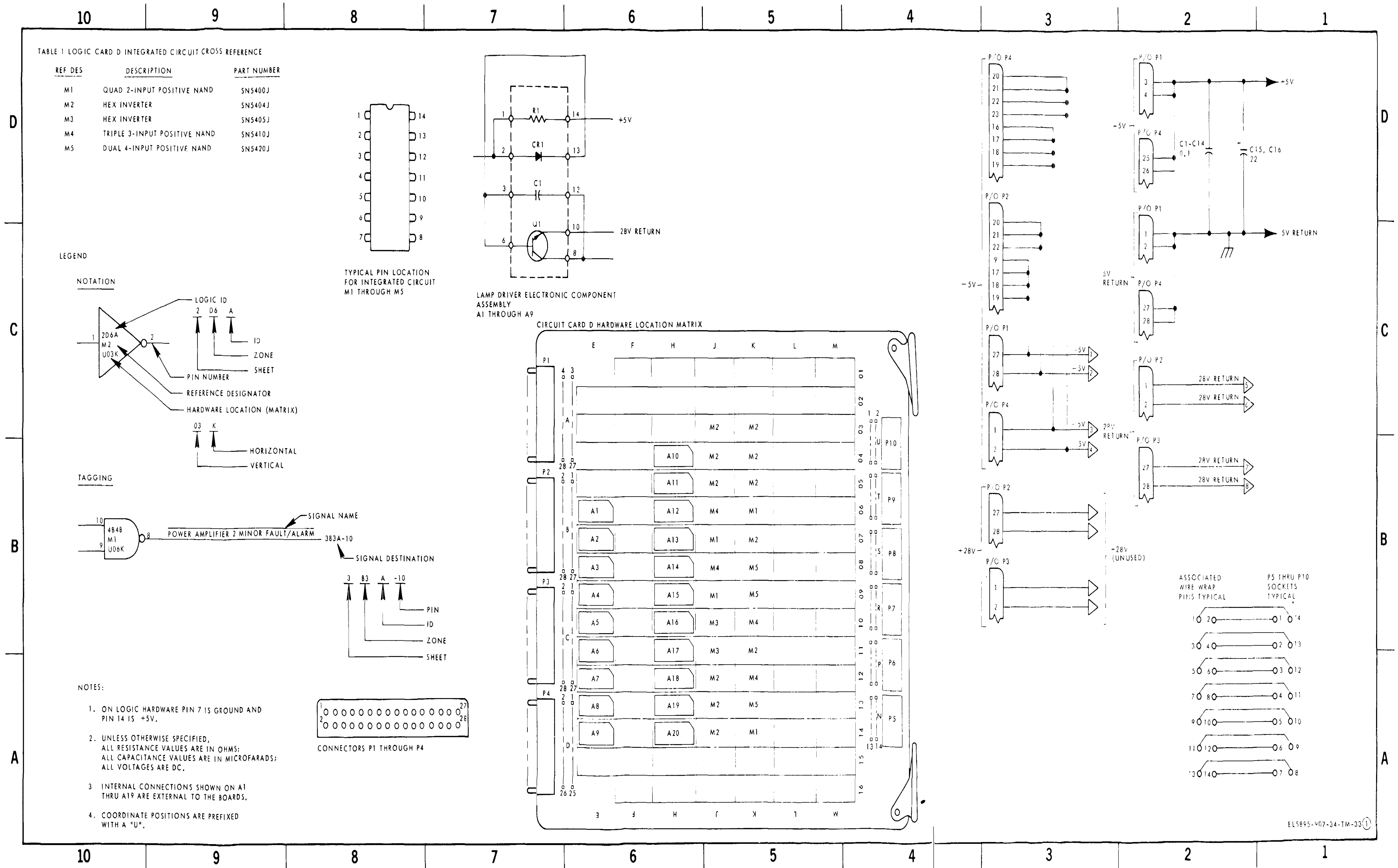

Figure FO-20. Circuit Card D 15A5A2A1, logic diagram (sheet 1 of 8).

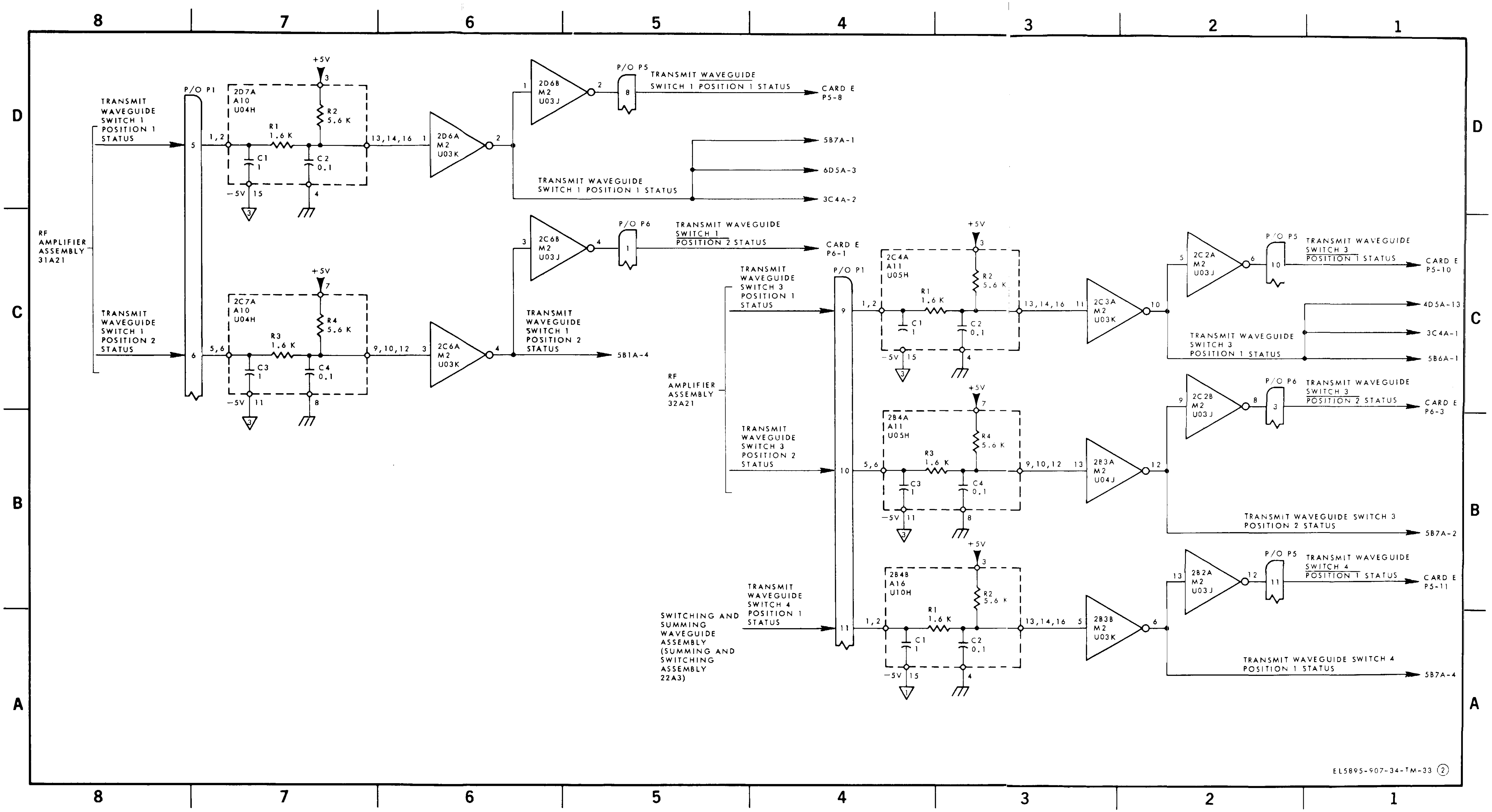

Figure FO-20. Circuit Card D 15A5A2A1, logic diagram (sheet 2 of 8).

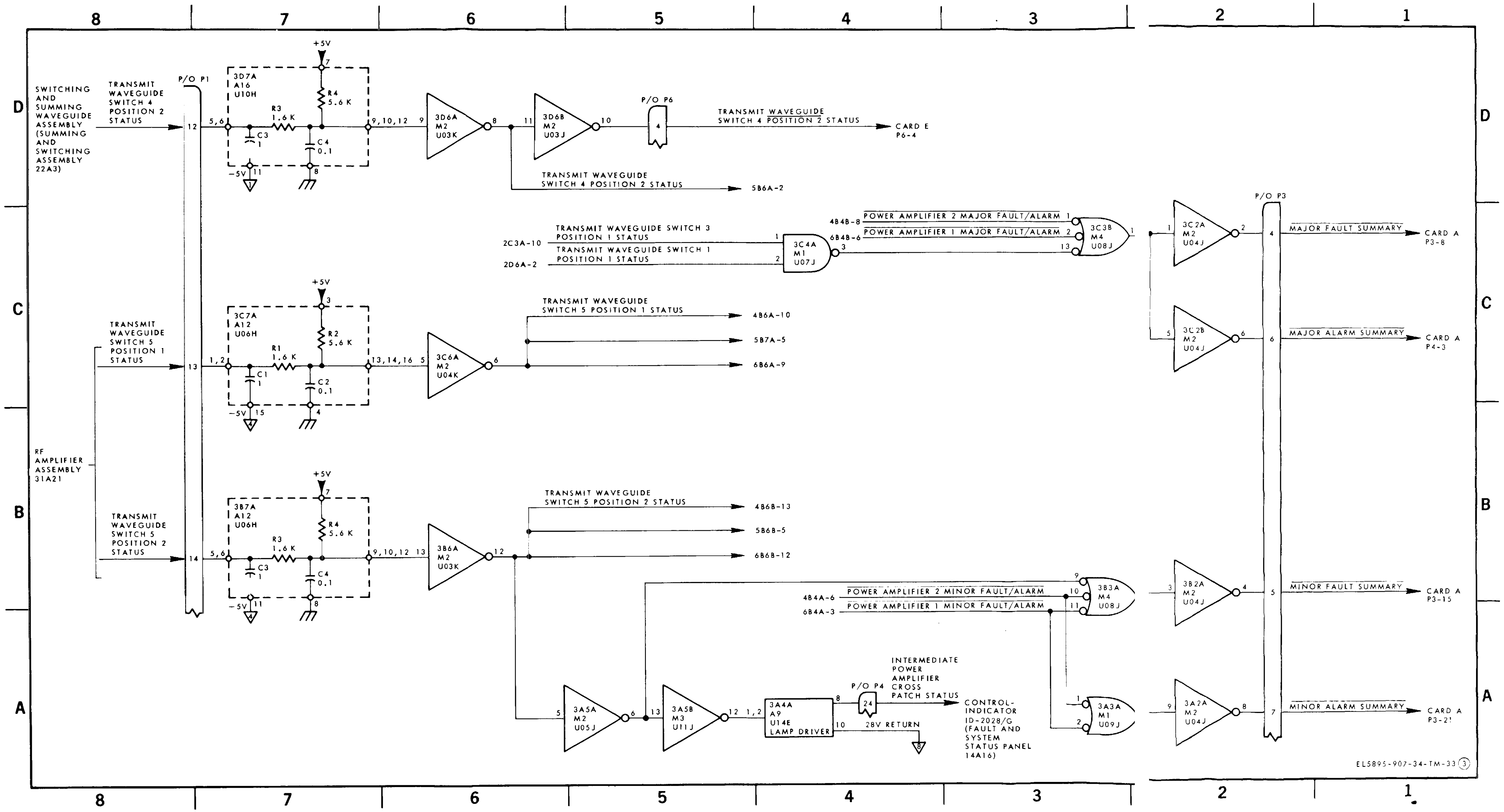

Figure FO-20. Circuit Card D 15A5A2A1, logic diagram (sheet 3 of 8).

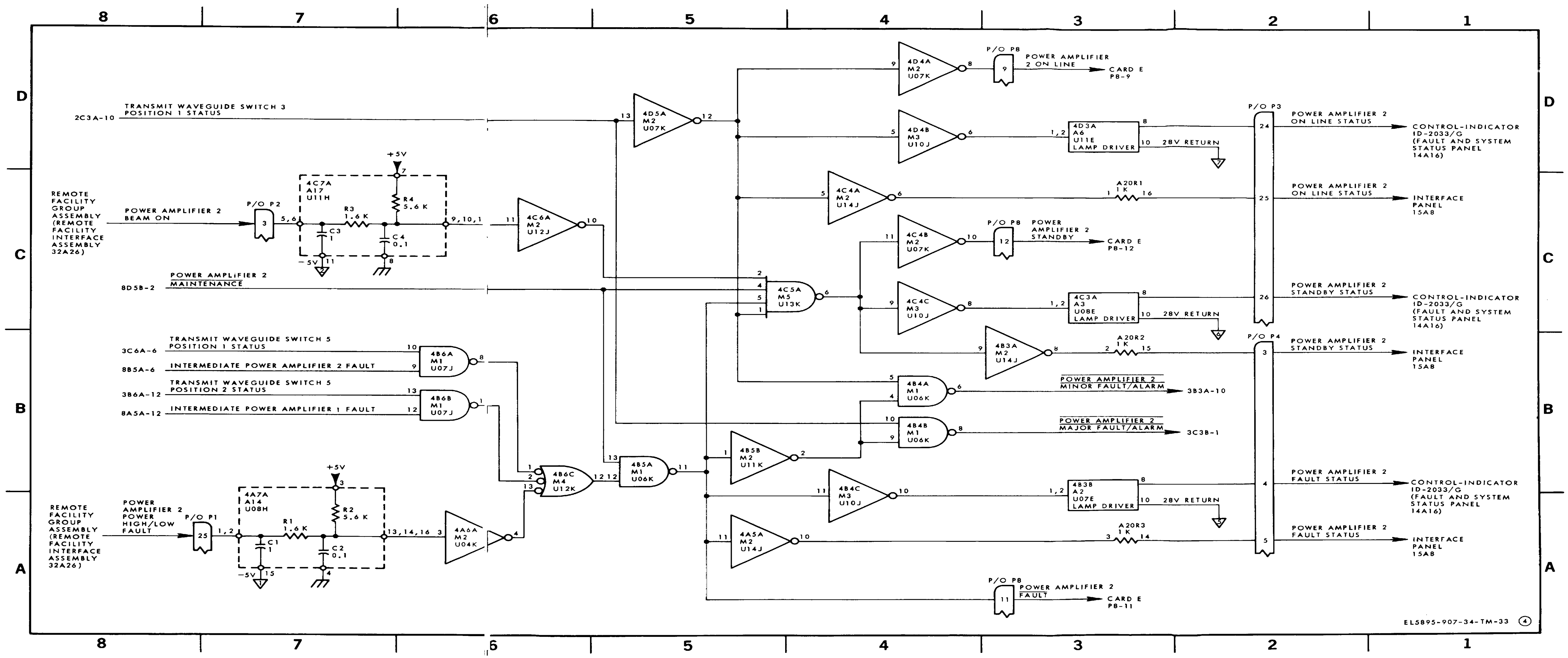

Figure FO-20. Circuit card D 15A5A2A1, logic diagram (sheet 4 of 8).

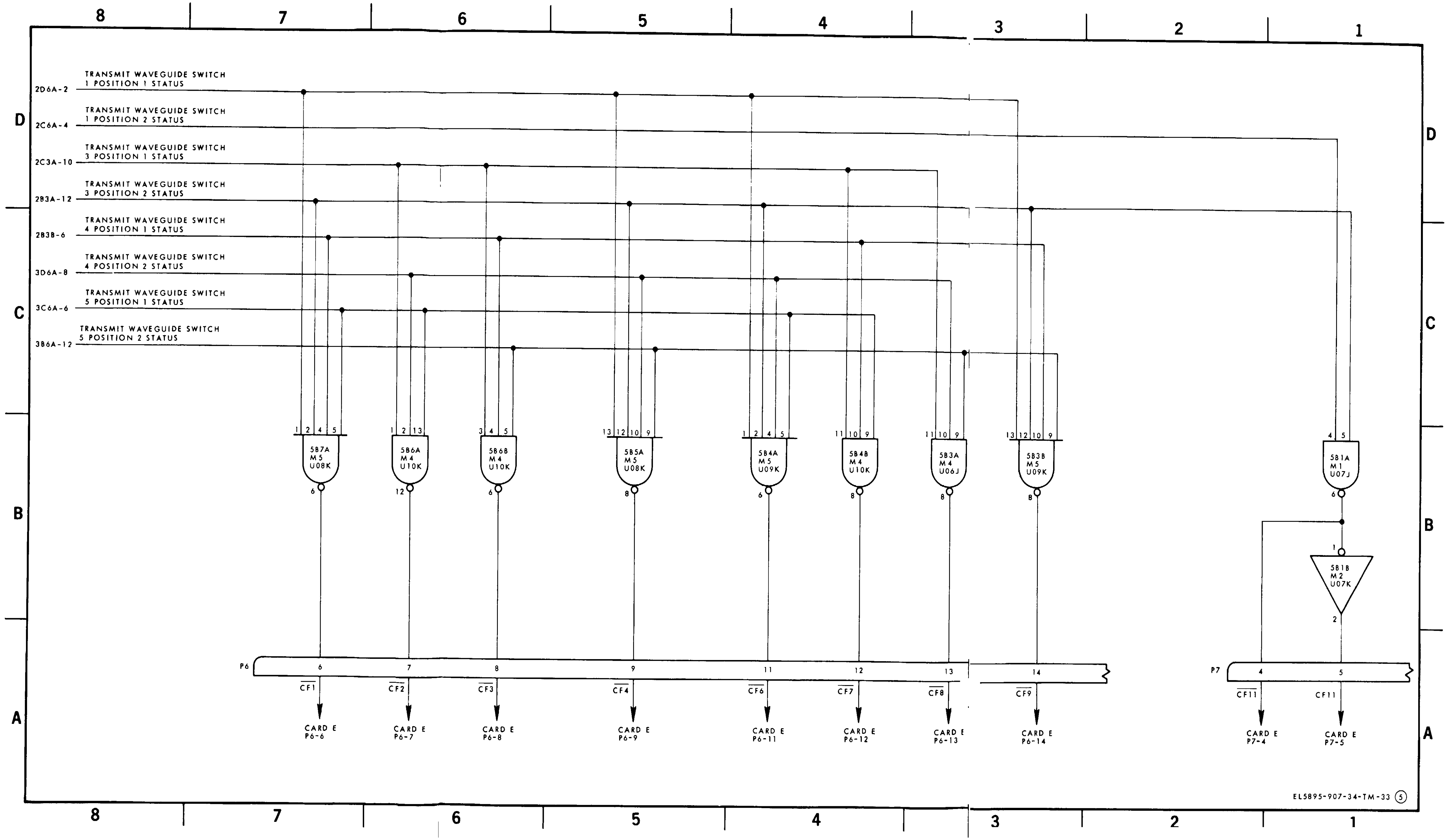

Figure FO-20. Circuit card D 15A5A2A1, logic diagram (sheet 5 of 8)

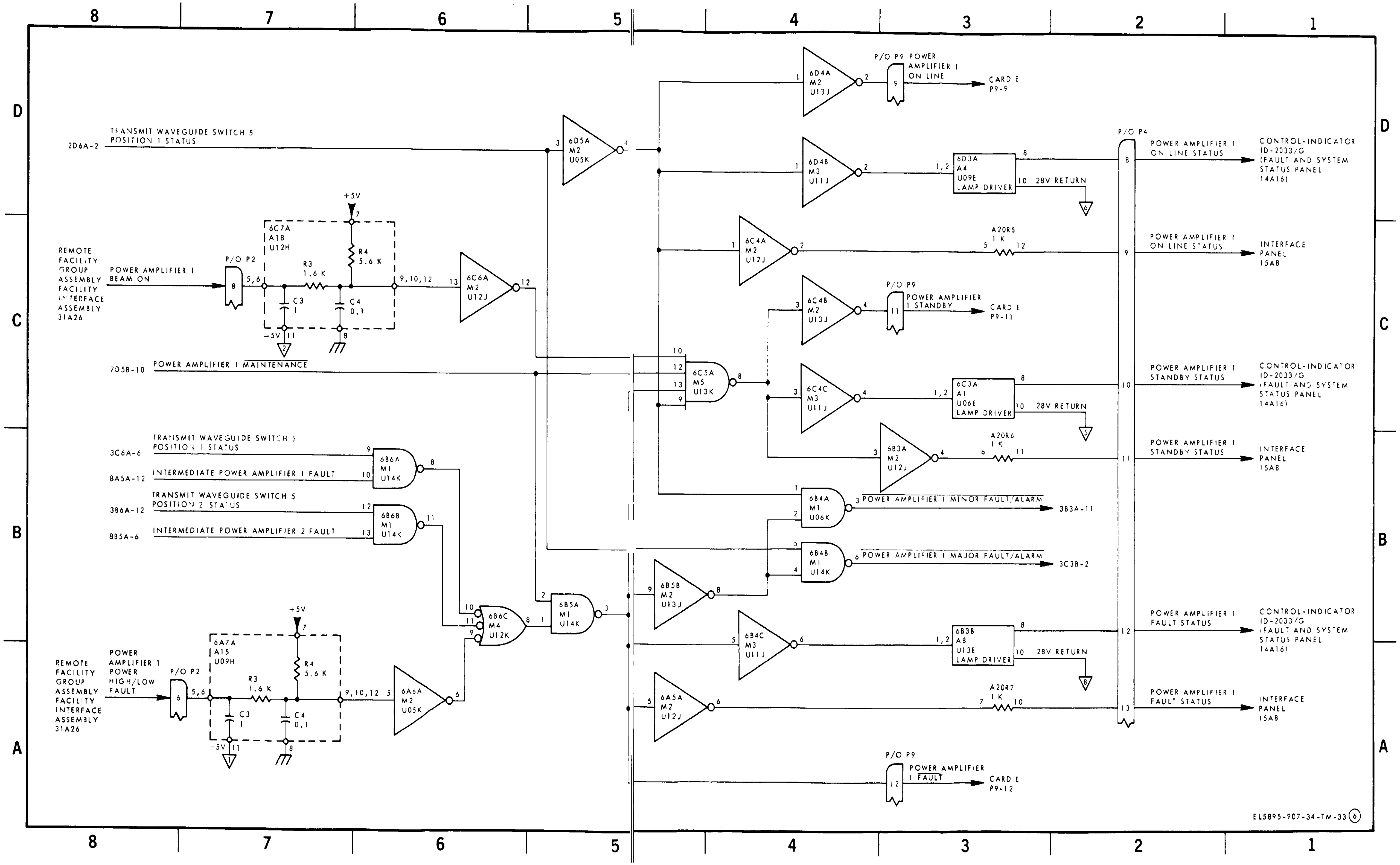

Figure FO-20. Circuit card D 15A5A2A1, logic diagram (sheet 6 of 8).

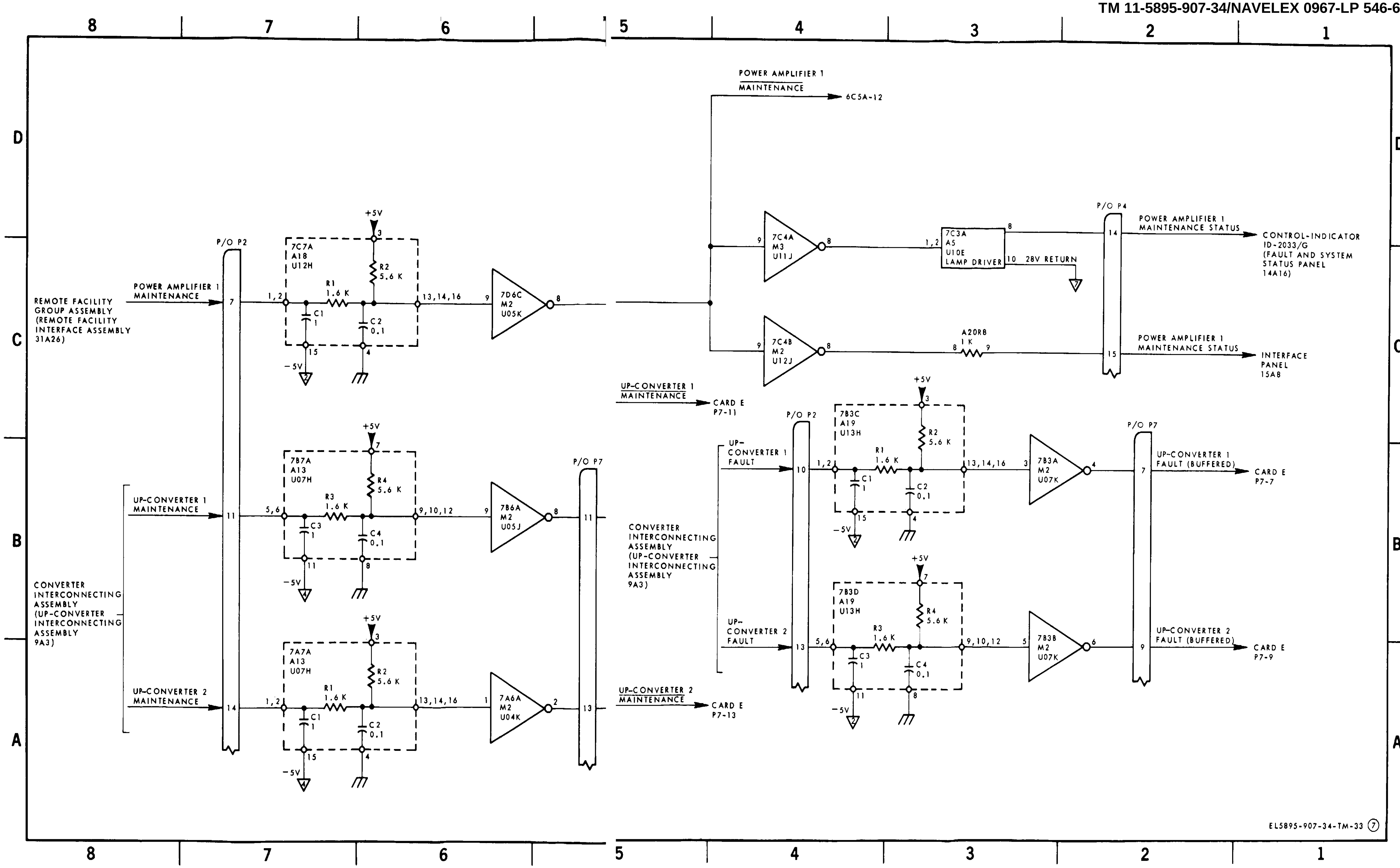

Figure FO-20. Circuit card D 15A5A2A1, logic diagram (sheet 7 of 8).

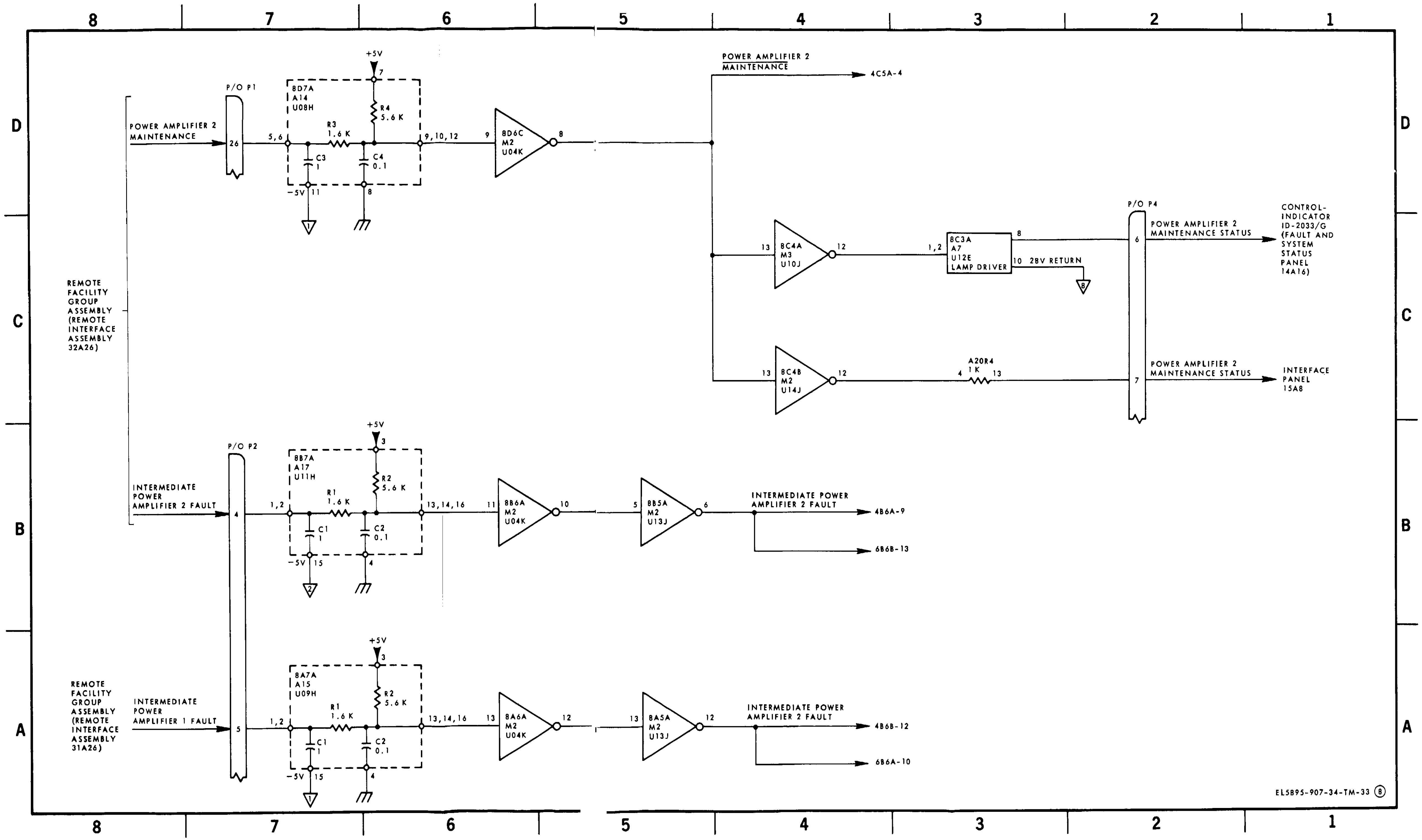

Figure FO-20. Circuit card D 15A5A2A1, logic diagram (sheet 8 of 8).

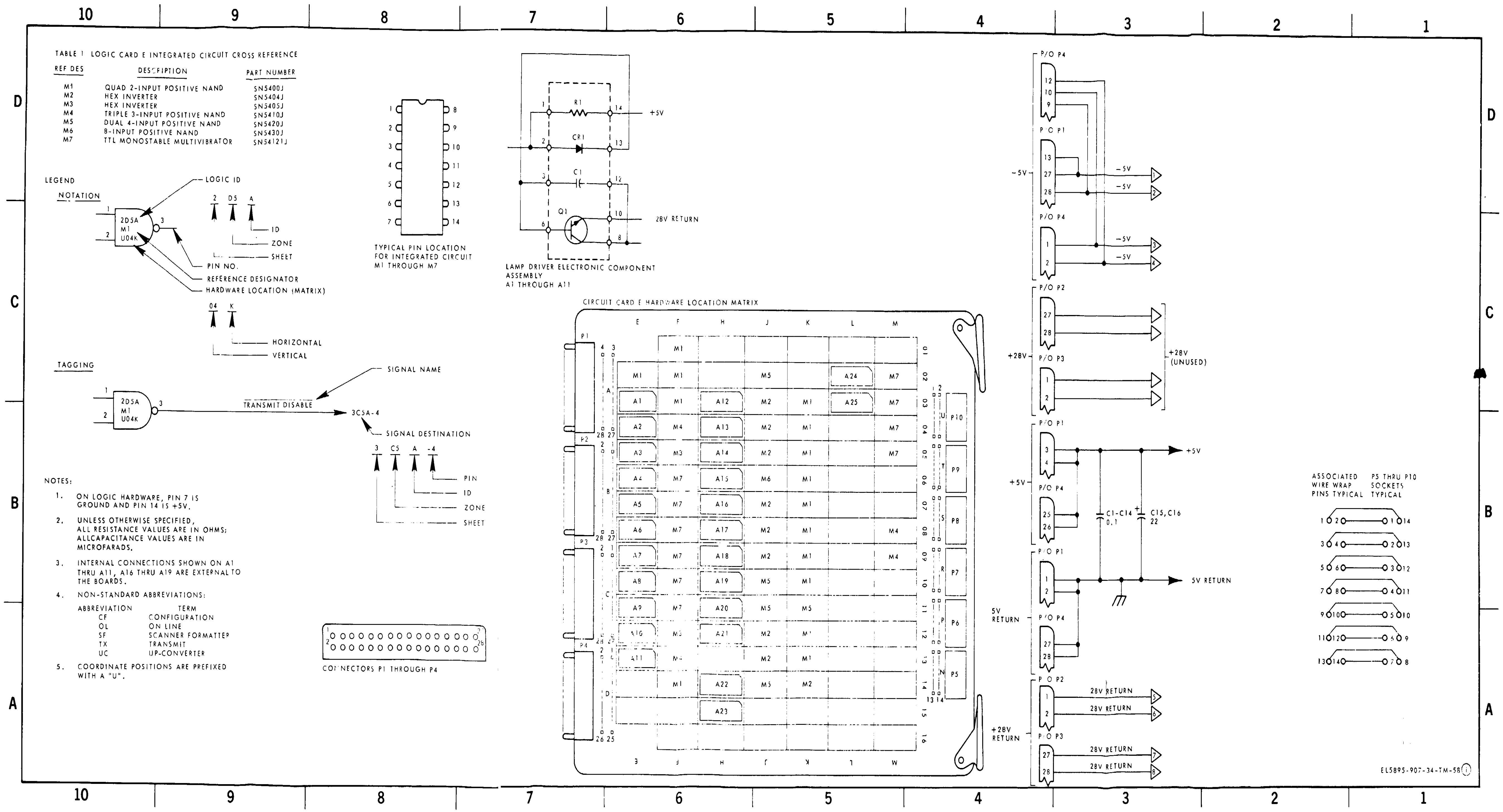

Figure FO-21. Circuit card E 15A5A2A2, logic diagram (sheet 1 of 9)

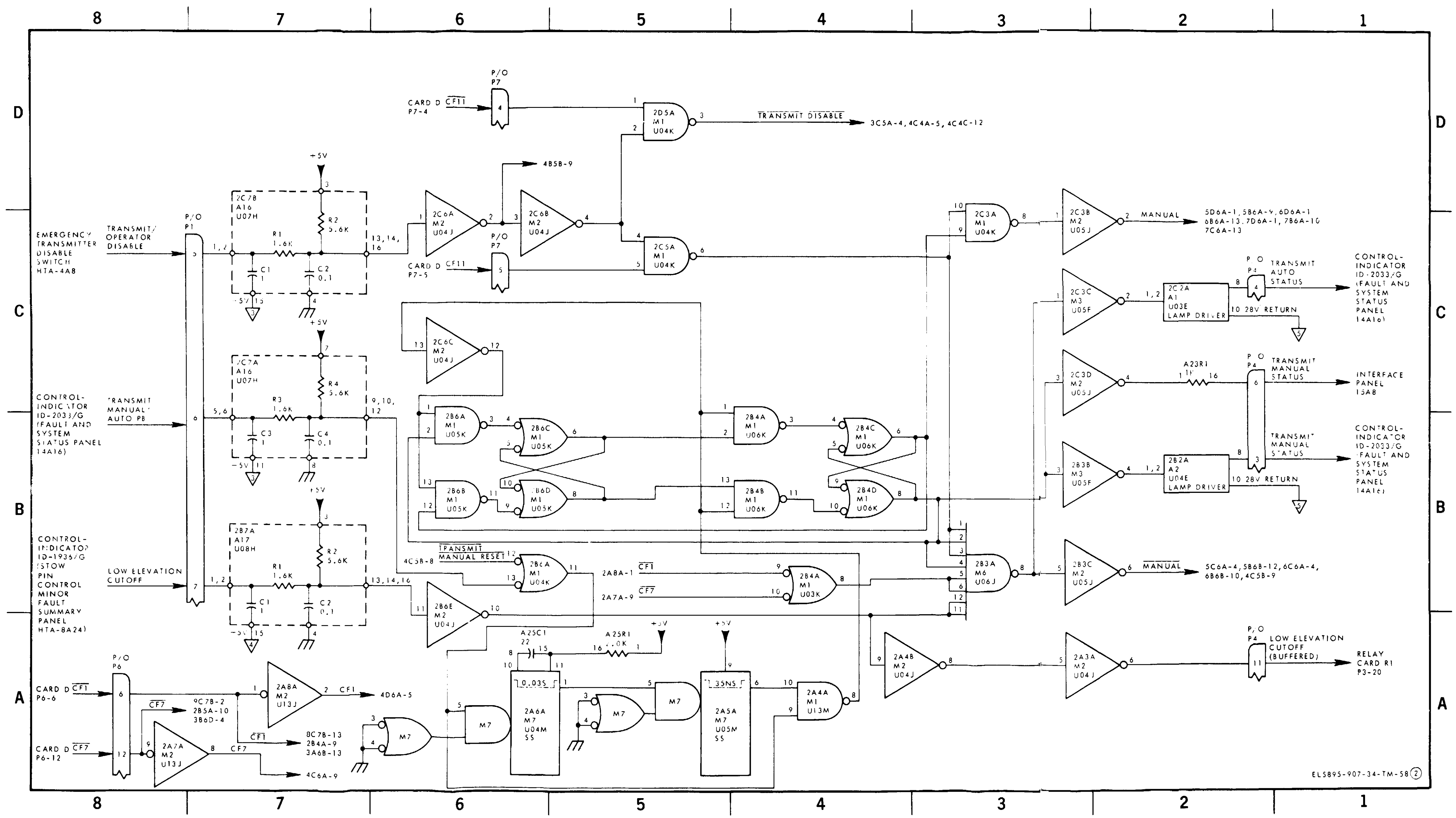

Figure F0-21. Circuit card E 15A5A2A2, logic diagram (sheet 2 of 9).

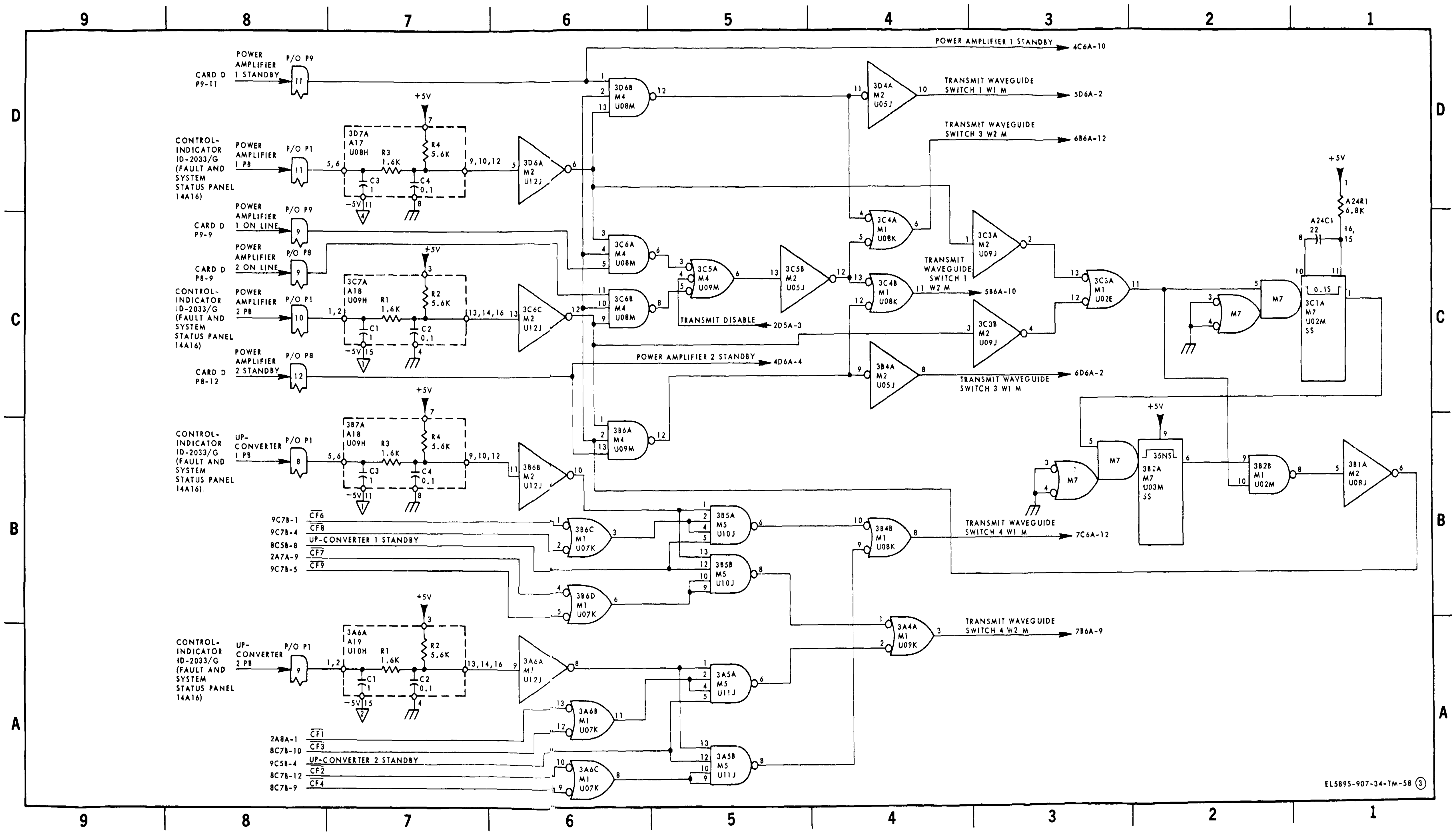

Figure F0-21. Circuit card E 15A5A2A2, logic diagram (sheet 3 of 9)

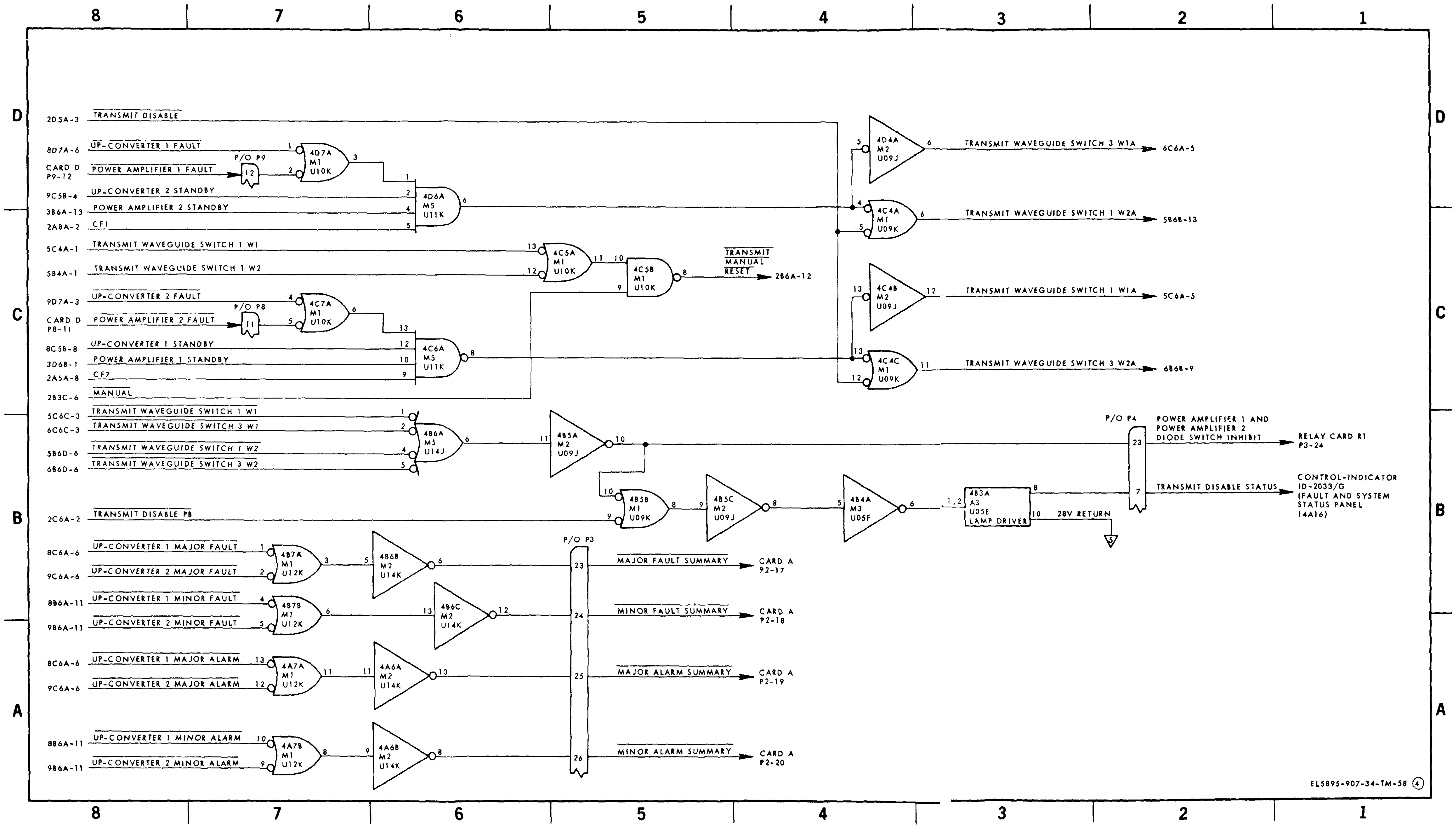

Figure F0-21. Circuit card E 15A5A2A2, logic diagram (sheet 4 of 9).

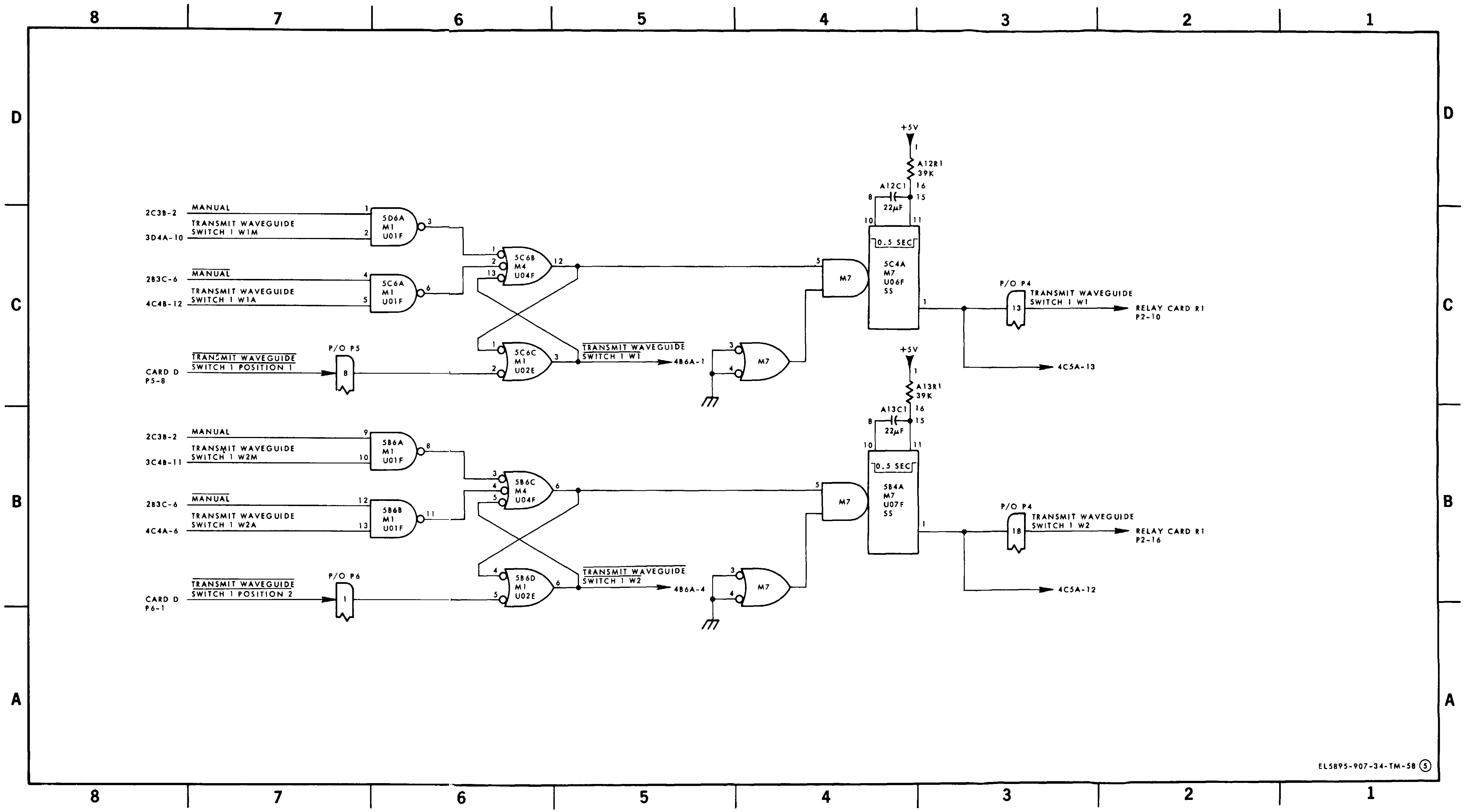

Figure F0-21. Circuit card E 15A5A2A2, logic diagram (sheet 5 of 9).

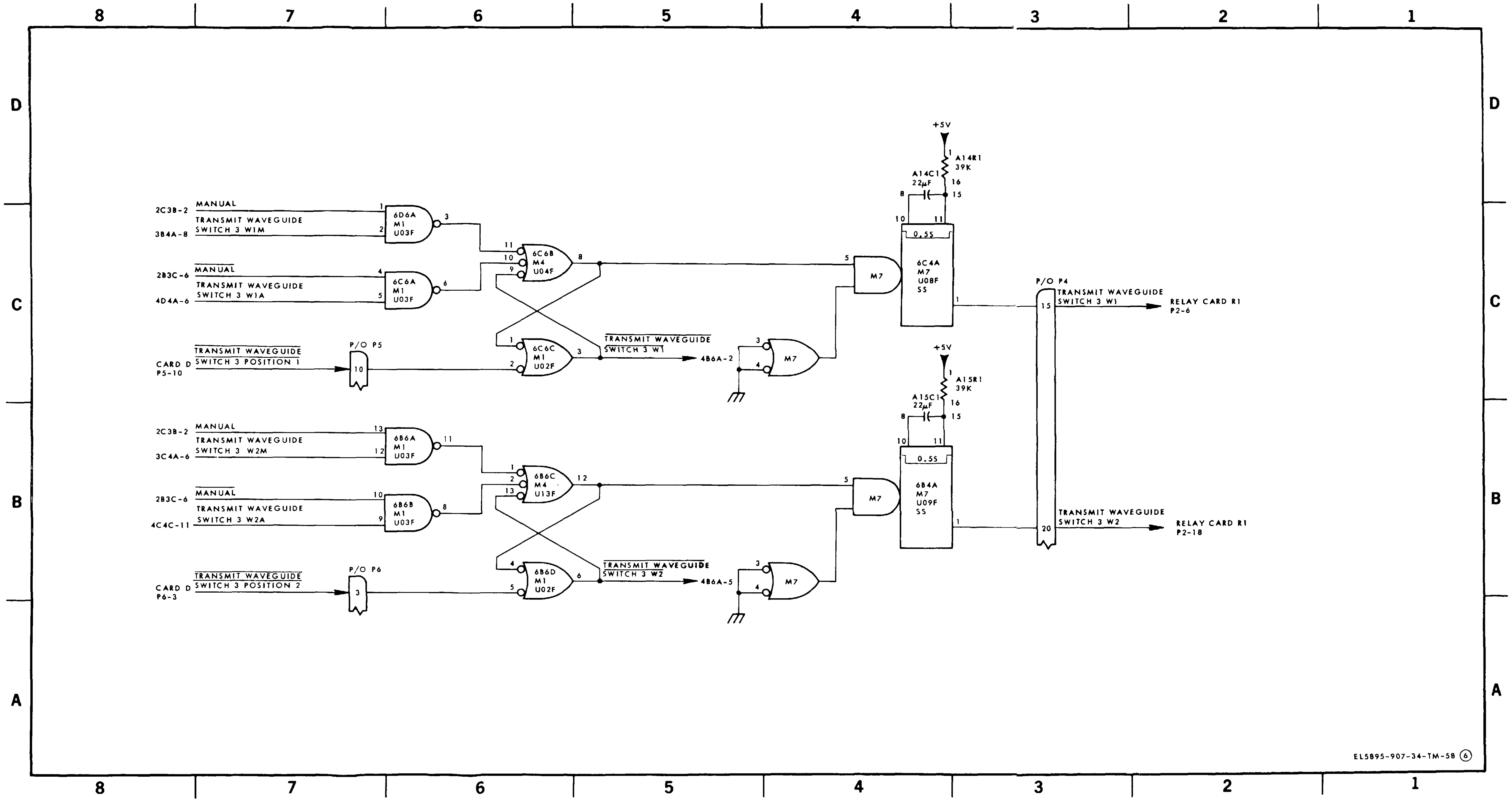

Figure F0-21. Circuit card E 15A5A2A2, logic diagram (sheet 6 of 9)

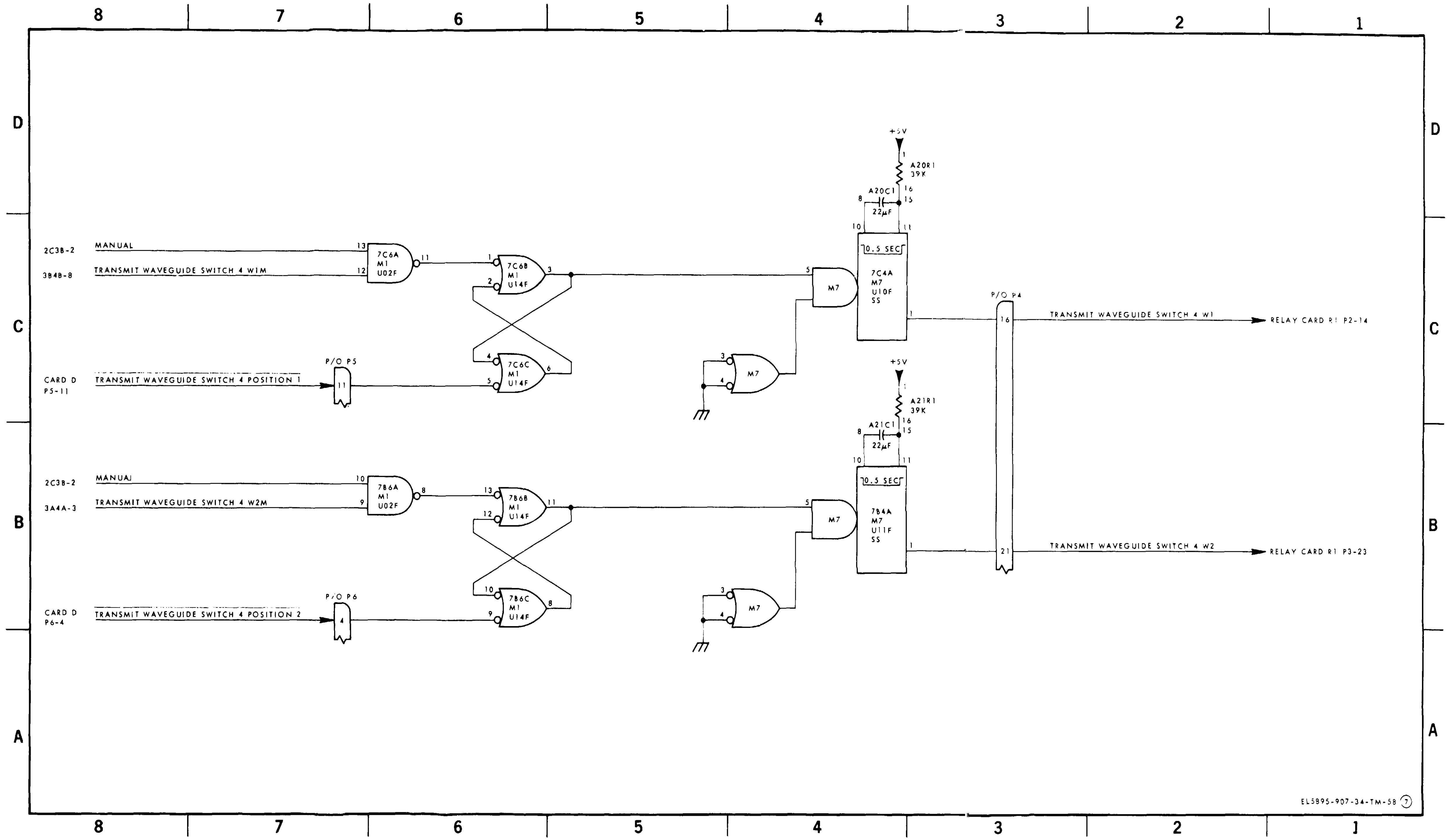

Figure F0-21. Circuit card E 15A5A2A2 logic diagram (sheet 7 of 9).

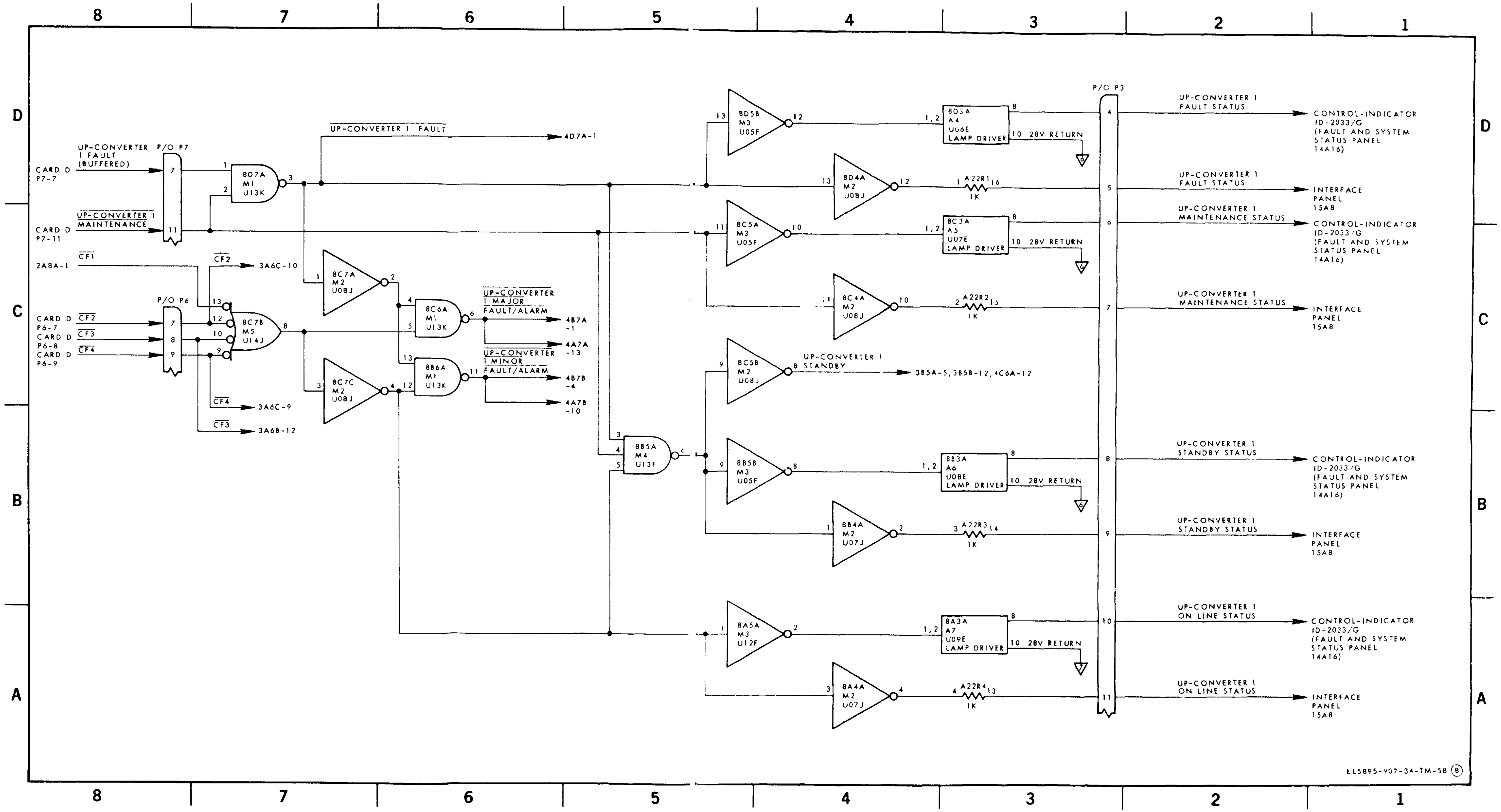

Figure FO-21. Circuit card E 15A5A2A2, logic diagram (sheet 8 of 9).

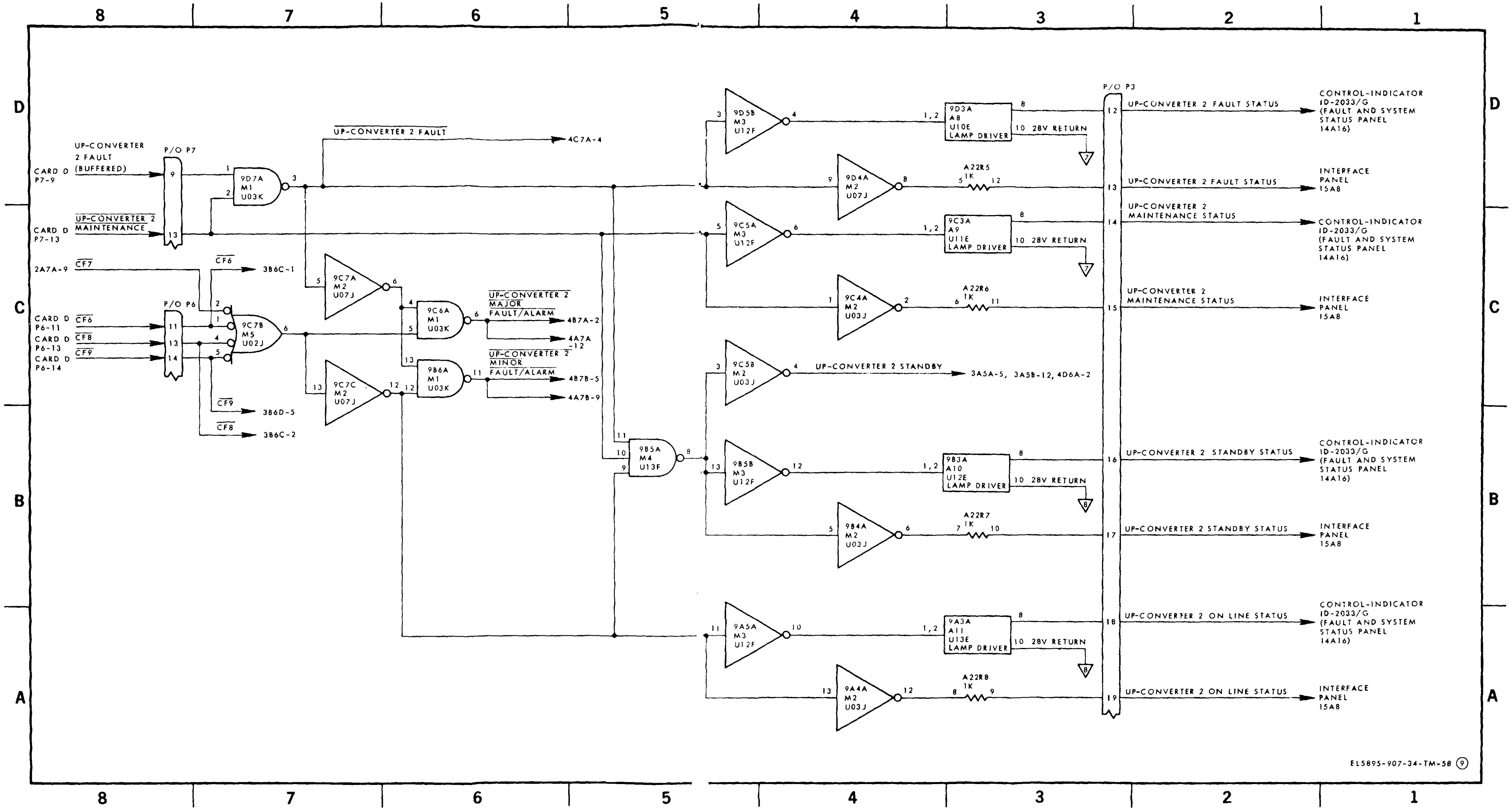

Figure FO-21. Circuit card E 15A5A2A2, logic diagram (sheet 9 of 9).

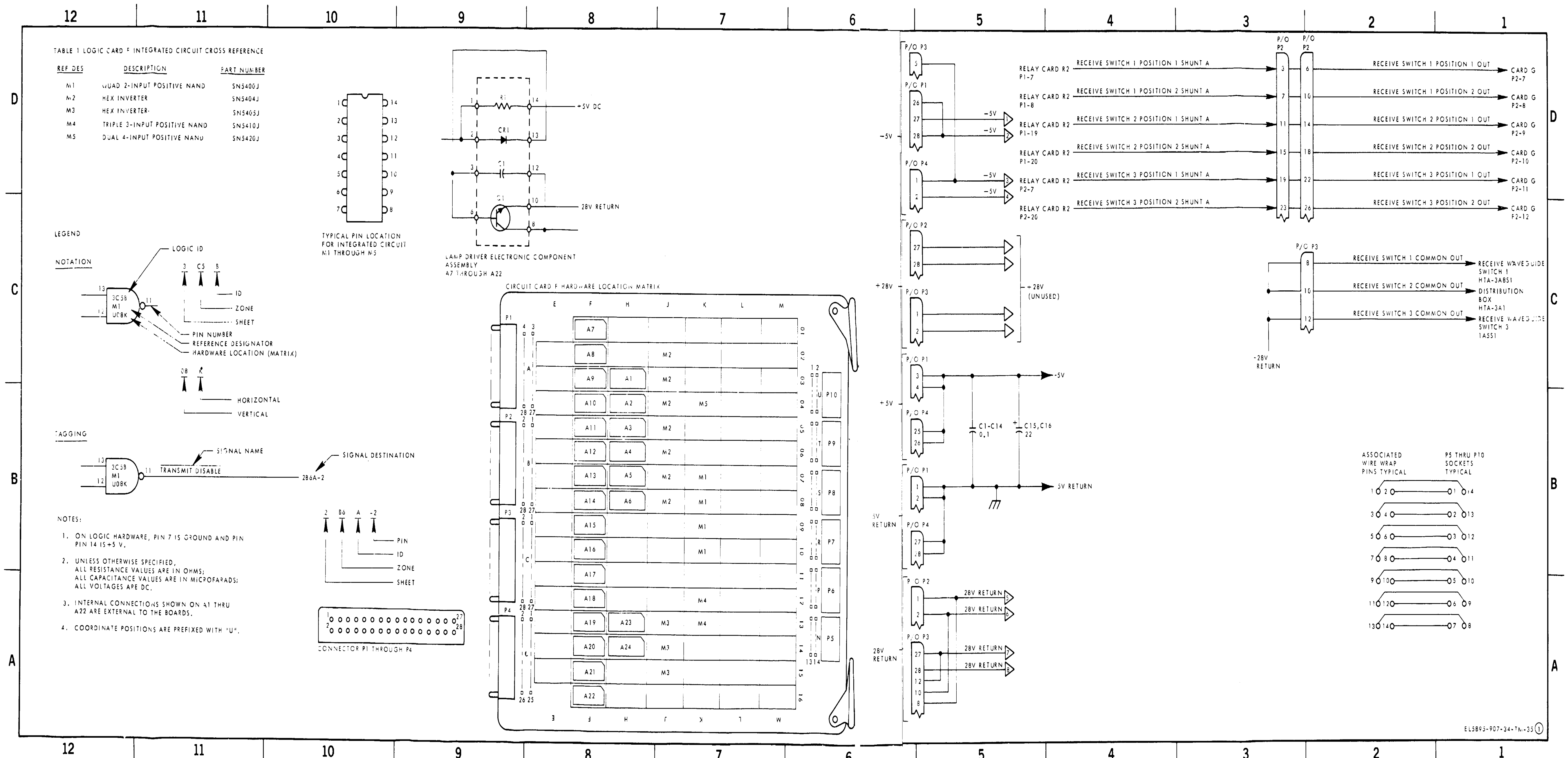

Figure FO-22. Circuit card F 15A5A3A1, logic diagram (sheet 1 of 6).

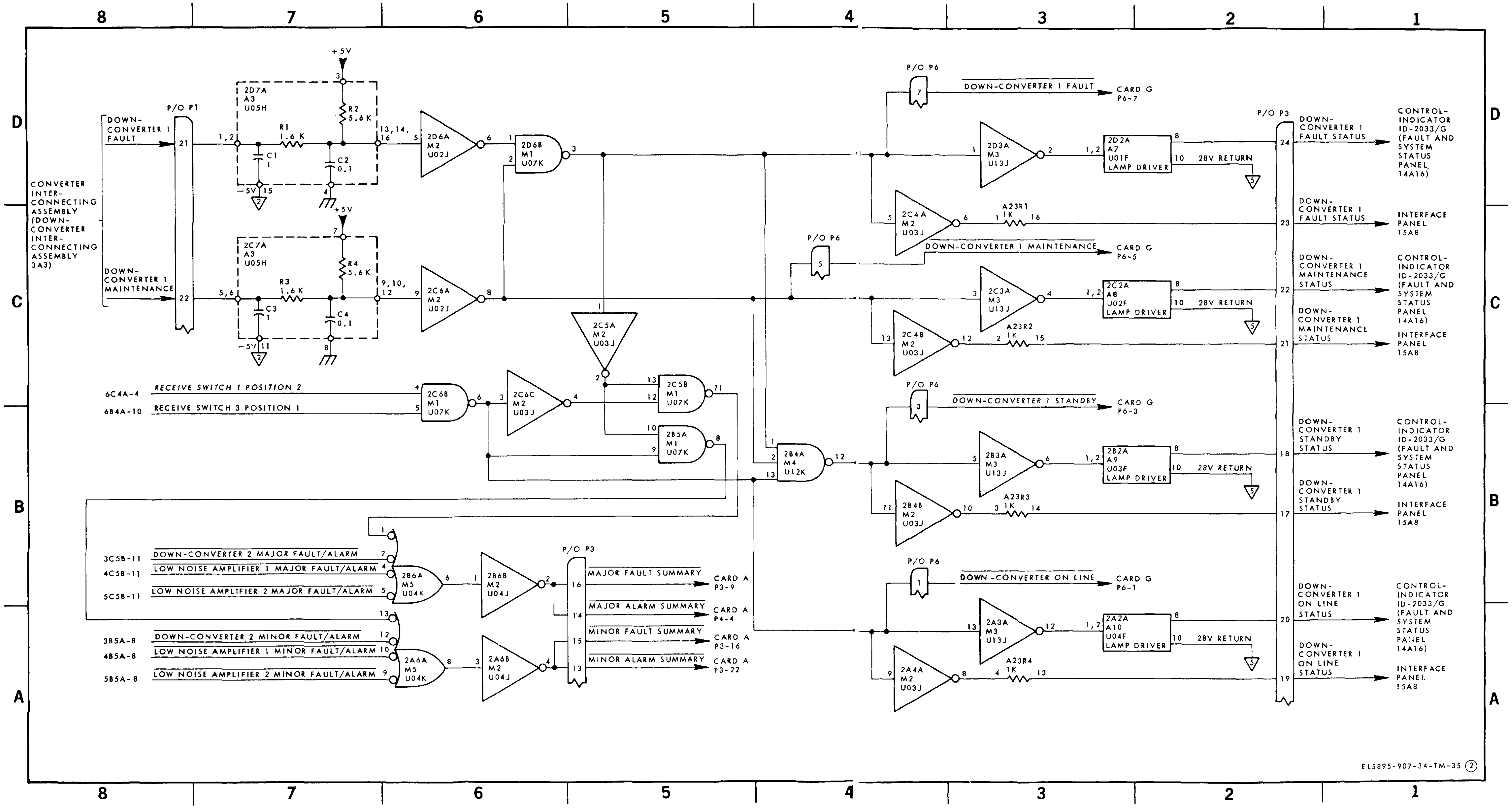

Figure FO-22. Circuit card F 15A5A3A1, logic diagram (sheet 2 of 6).

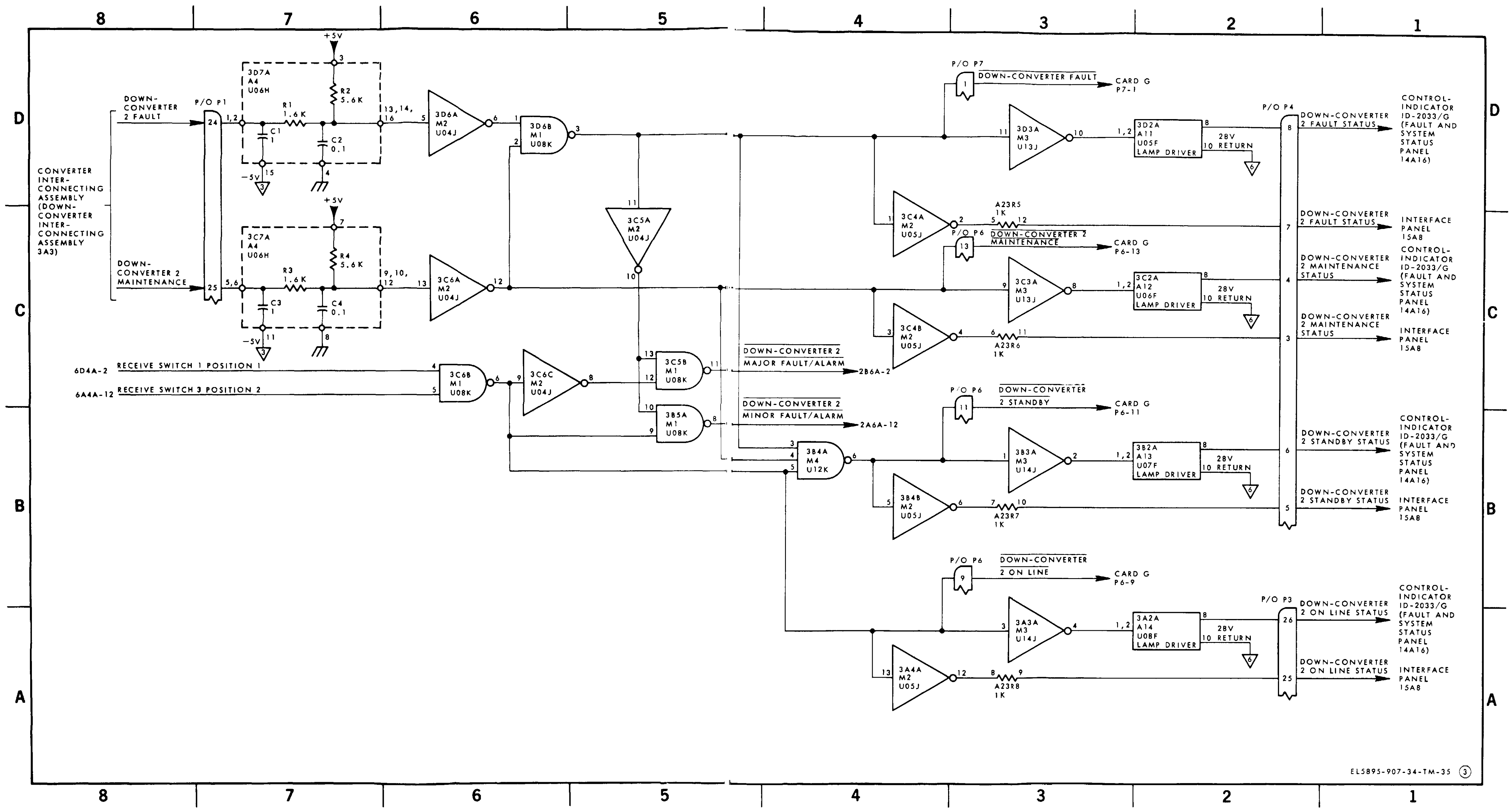

Figure FO-22. Circuit card F 15A5A3A1, logic diagram (sheet 3 of 6).

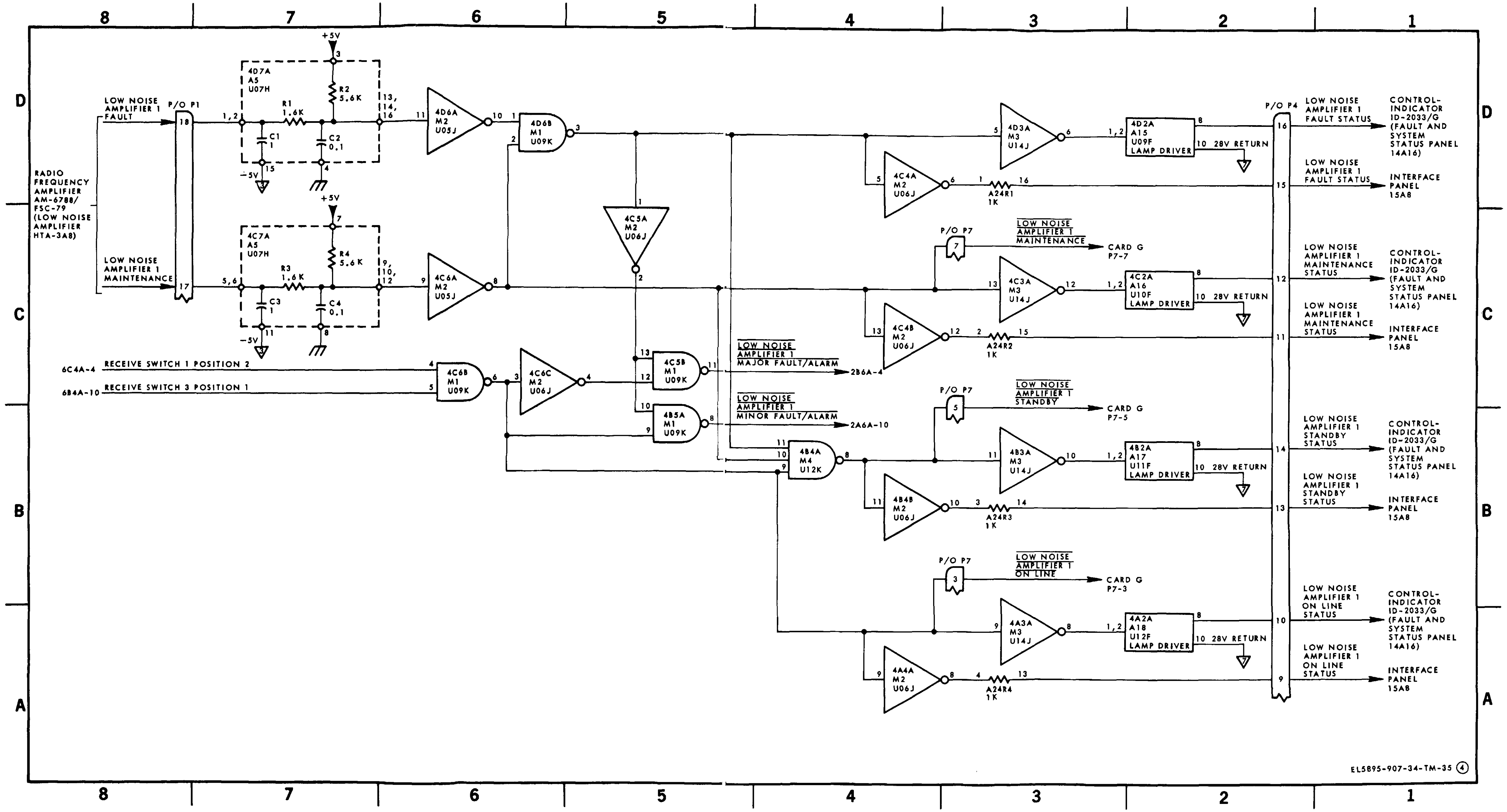

Figure FO-22. Circuit card F 15A5A3A1, logic diagram (sheet 4 of 6).

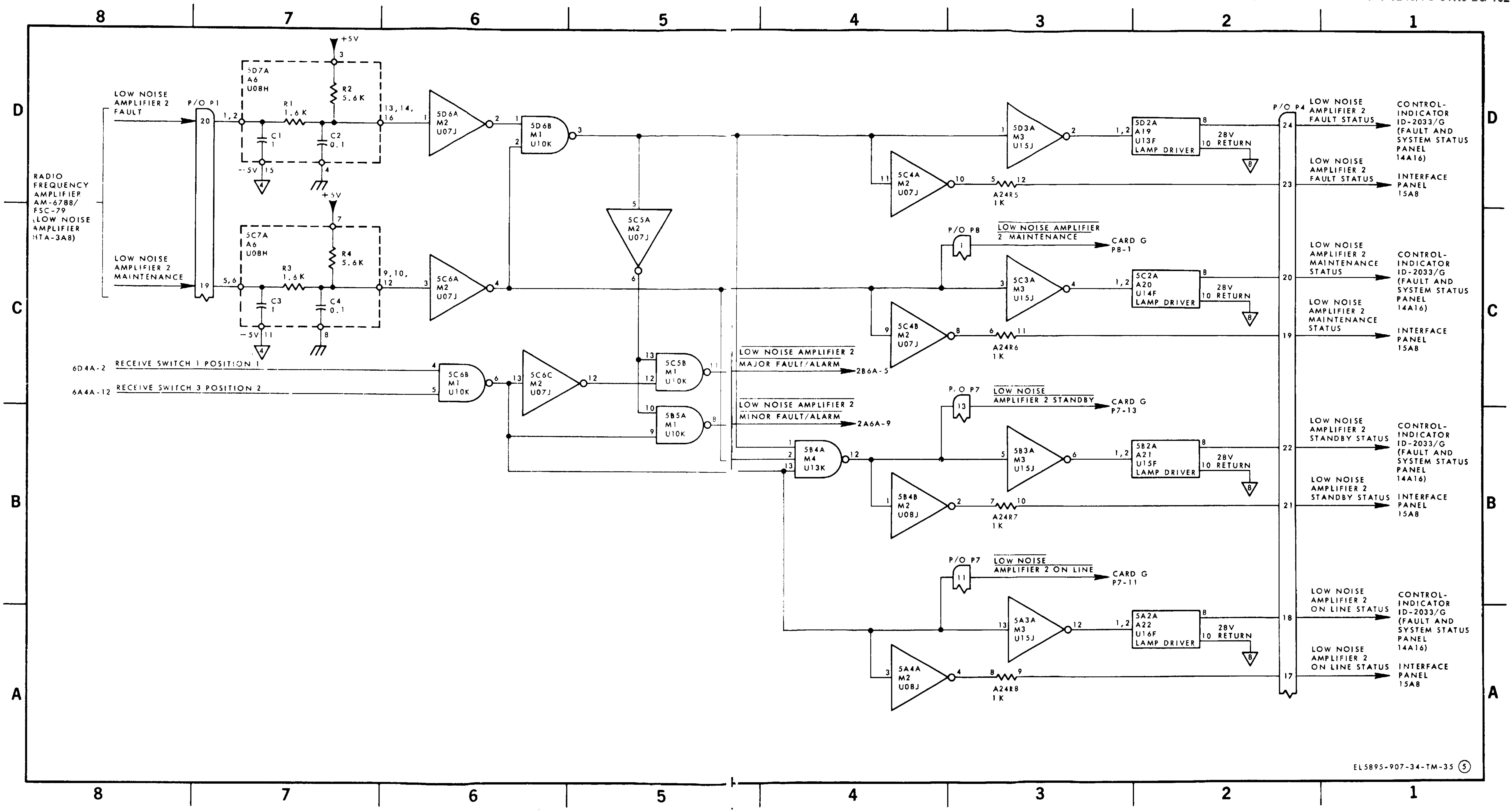

Figure FO-22. Circuit Card F 15A5A3A1, logic diagram (sheet 5 of 6).

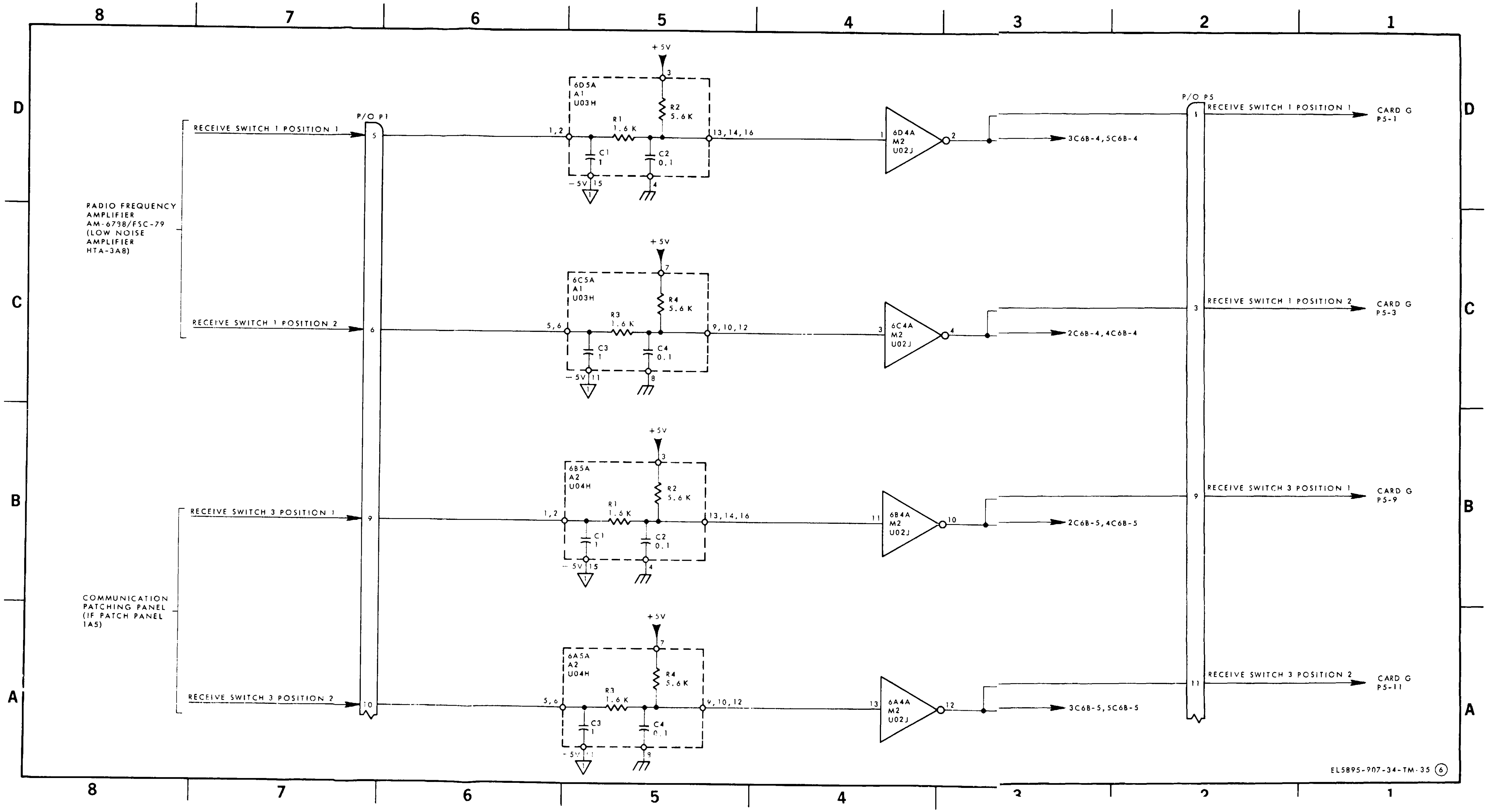

Figure FO-22. Circuit Card F 15A5A3A1, logic diagram (sheet 6 of 6).

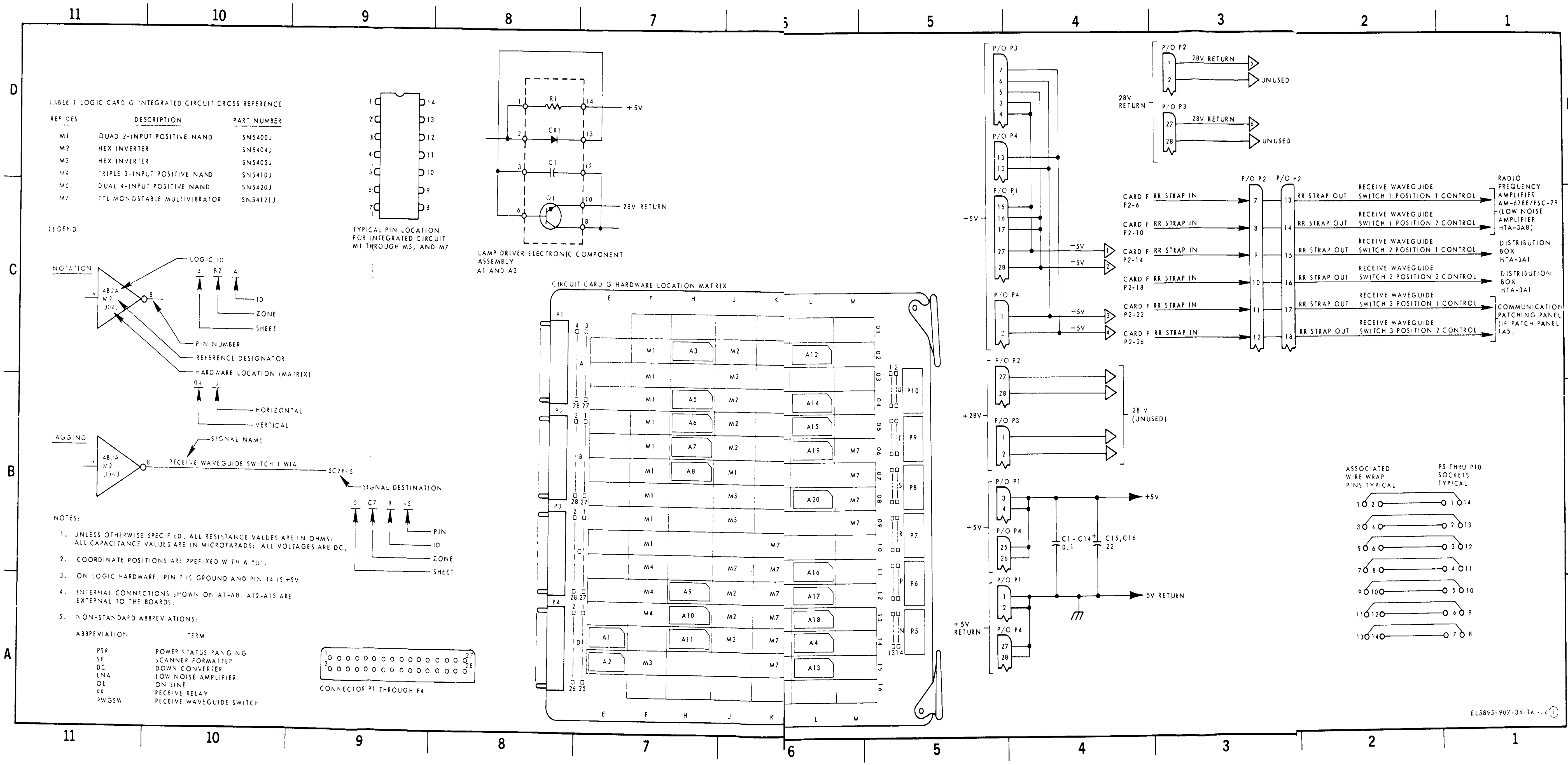

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Figure FO-23. Circuit Card G 15A5A3A2, logic diagram (sheet 1 of 6).

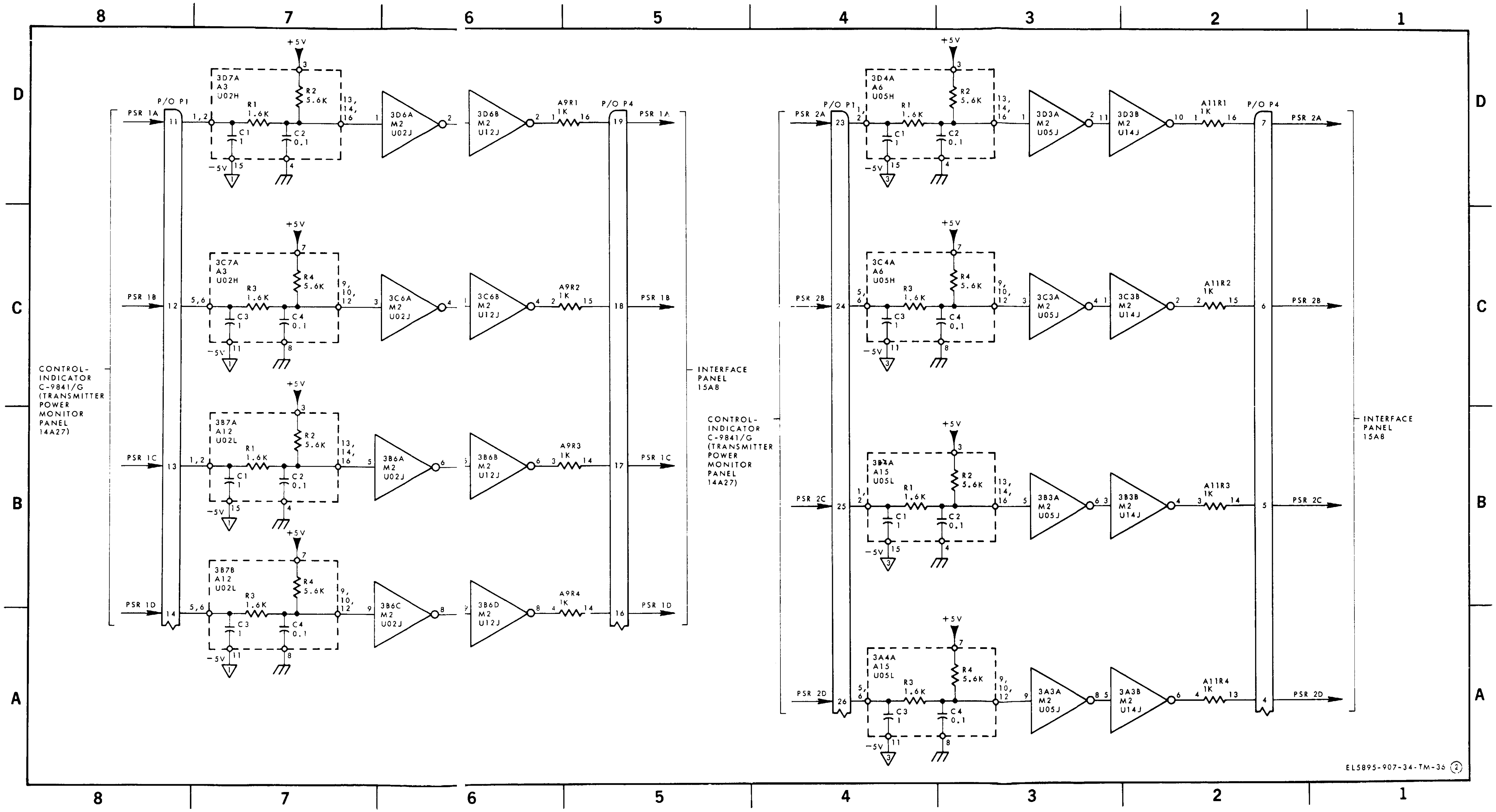


Figure FO-23. Circuit Card G 15A5A3A2, logic diagram (sheet 2 of 6).

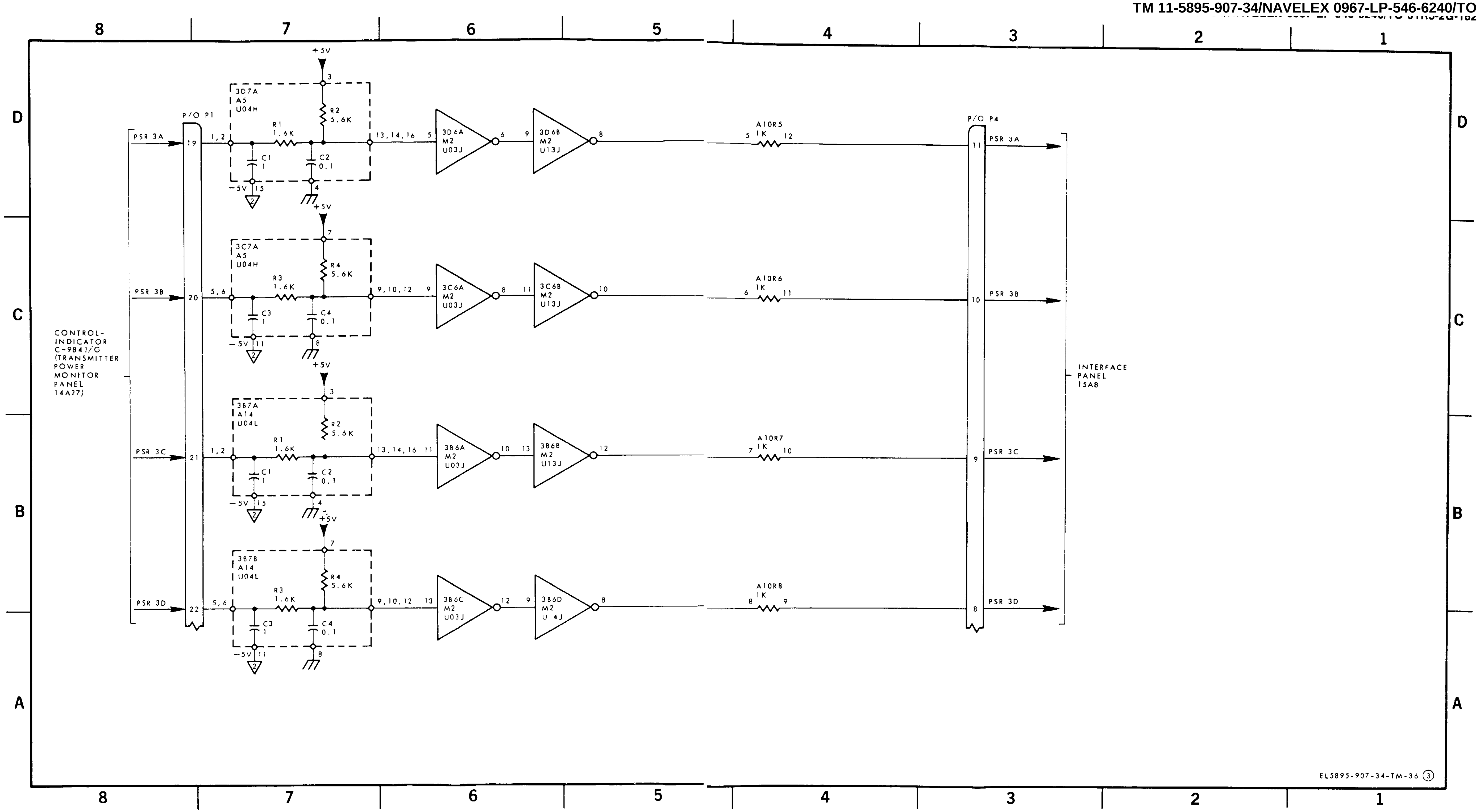


Figure FO-23. Circuit Card G 15A5A3A2, logic diagram (sheet 3 of 6).

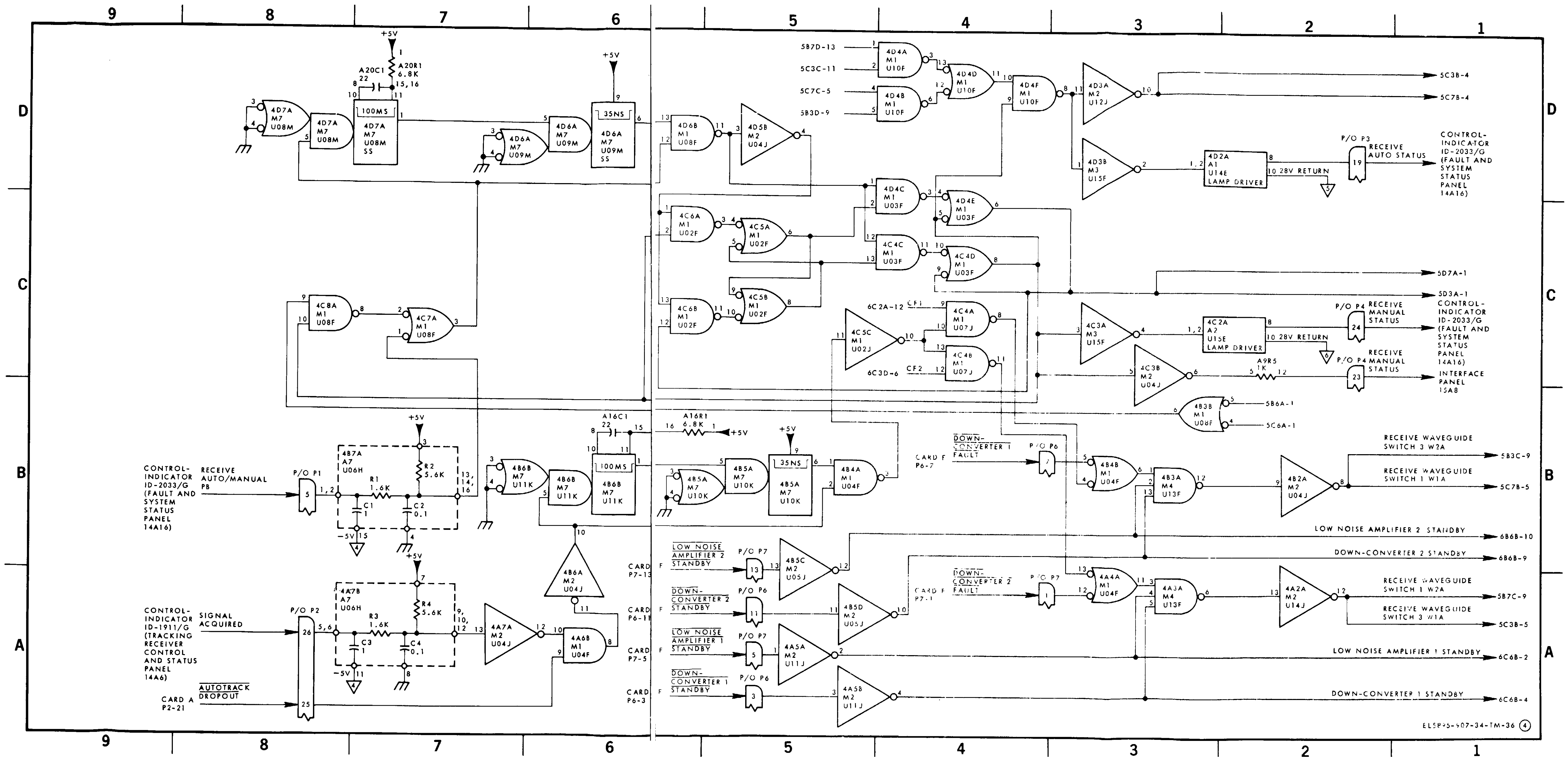


Figure FO-23. Circuit Card G 15A5A3A2, logic diagram (sheet 4 of 6).

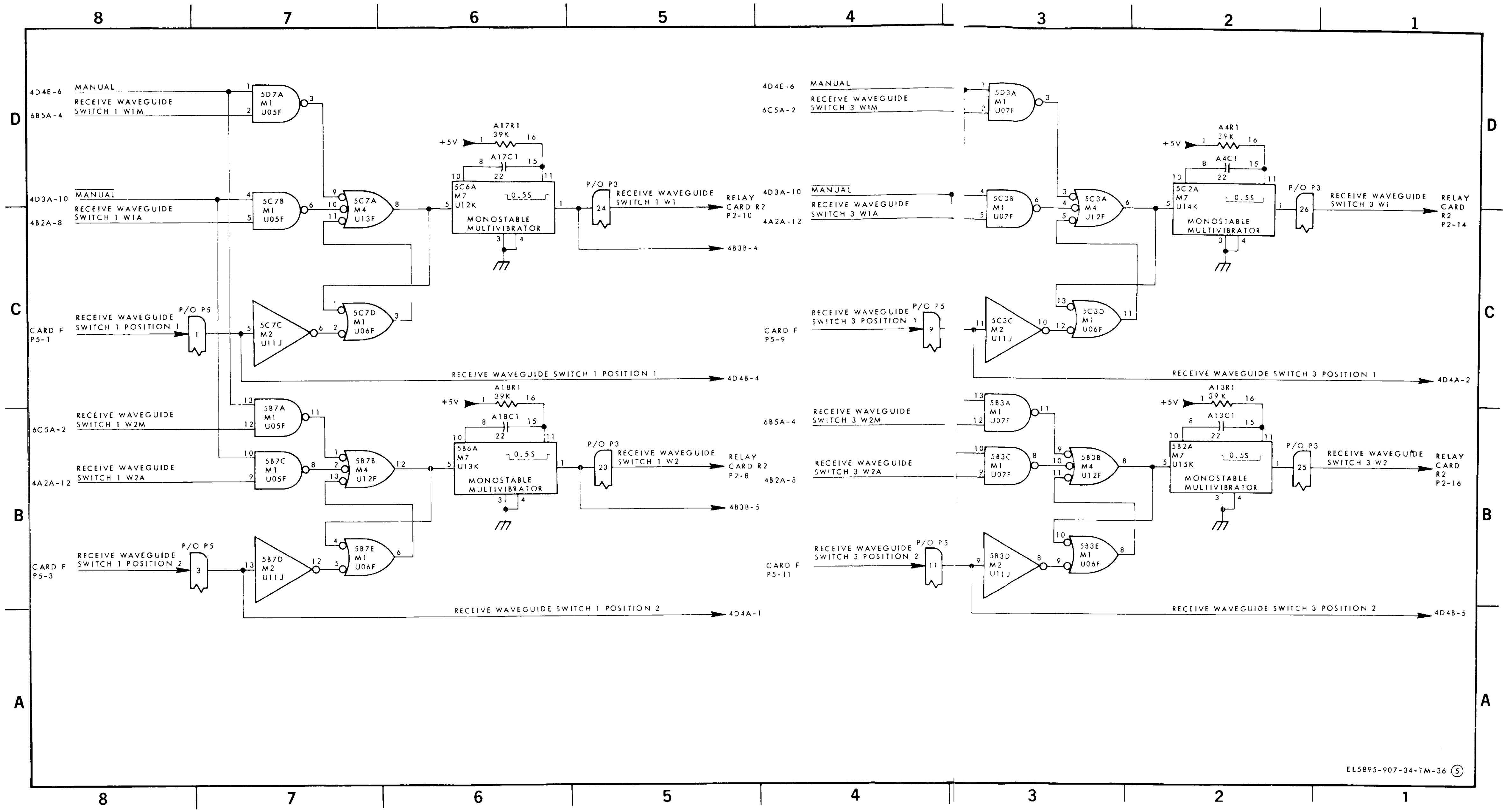


Figure F0-23. Circuit card G 15A5A3A2, logic diagram (sheet 5 of 6).

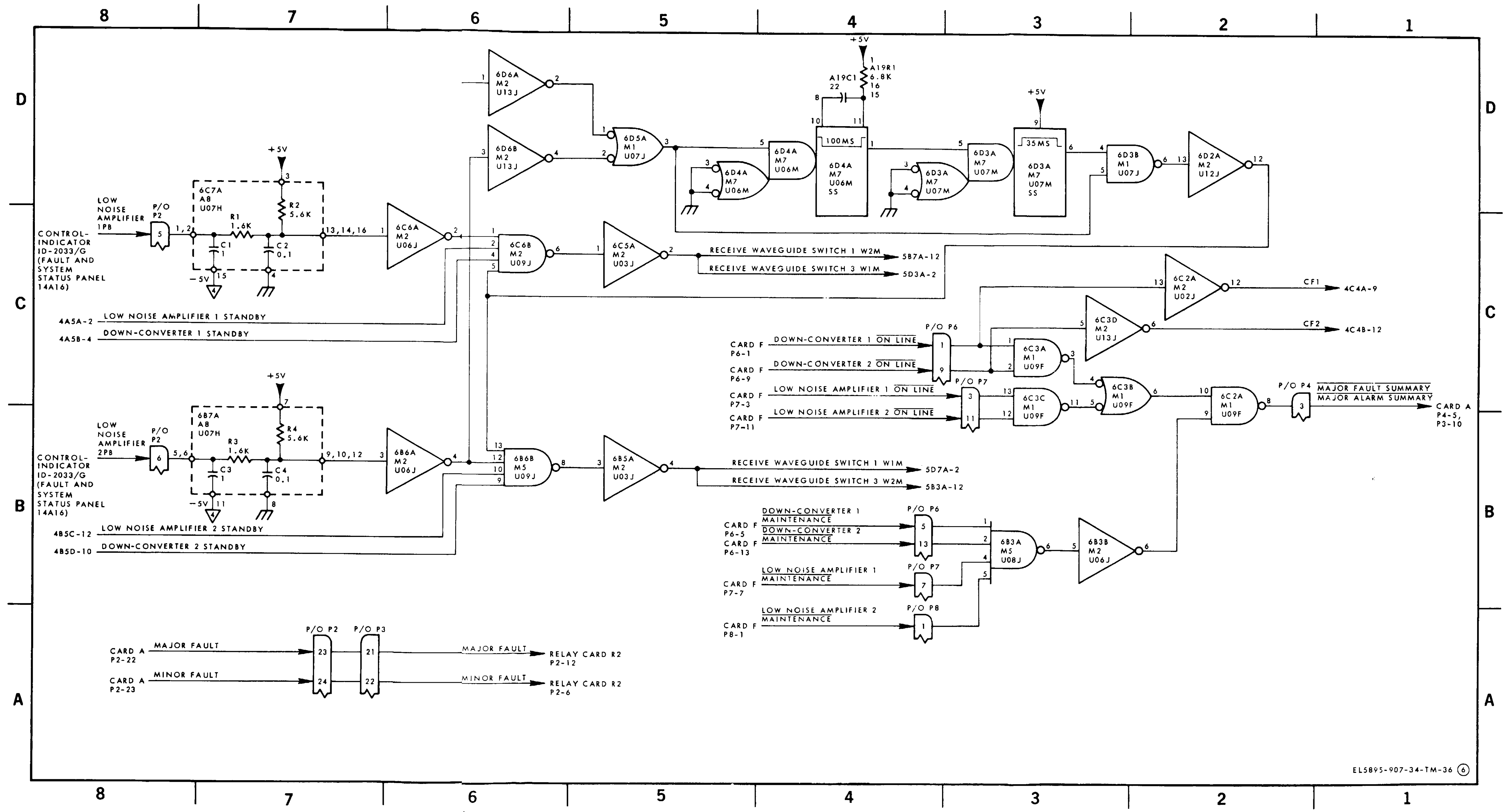
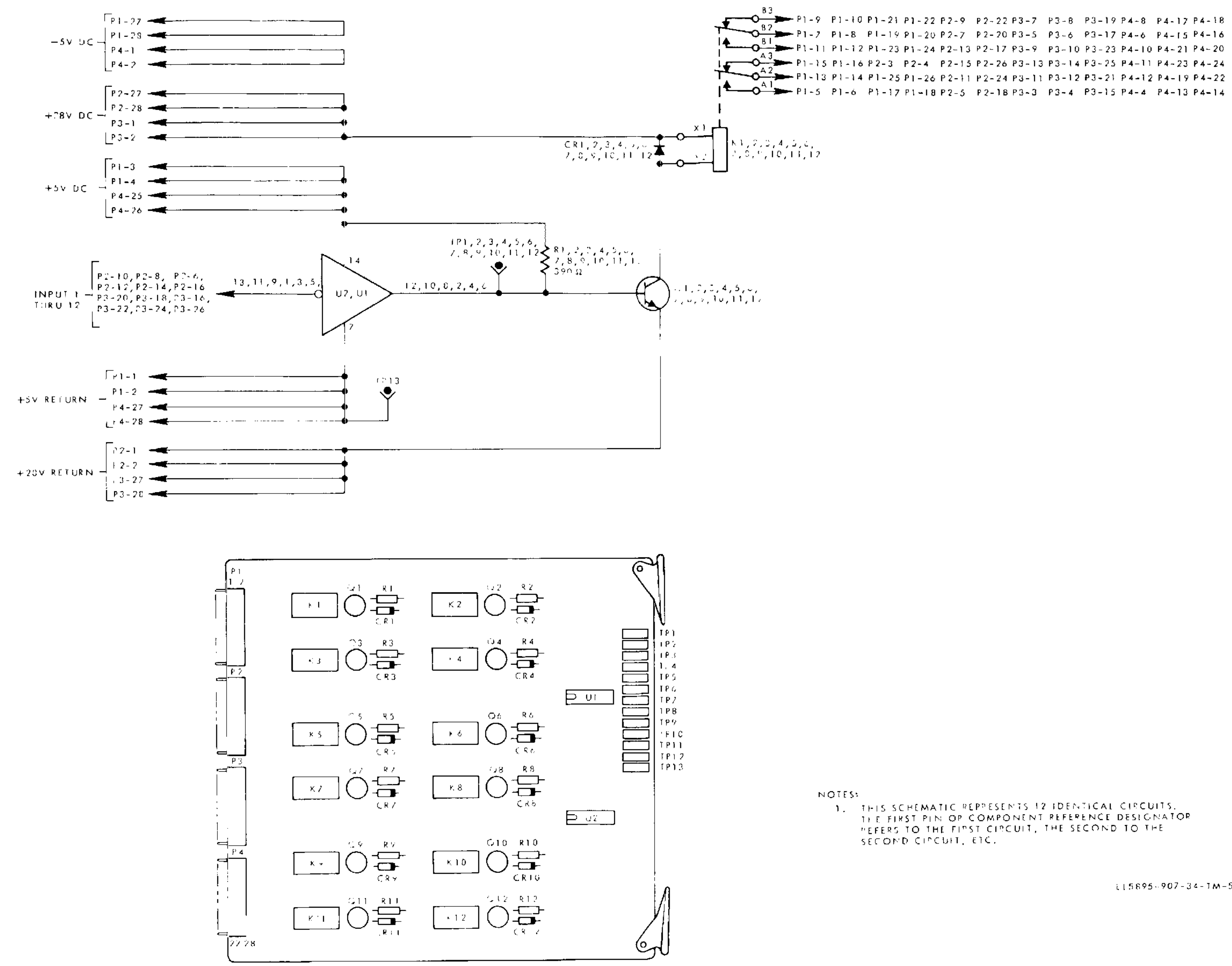


Figure F0-23. Circuit card G 15A5A3A2, logic diagram (sheet 6 of 6).

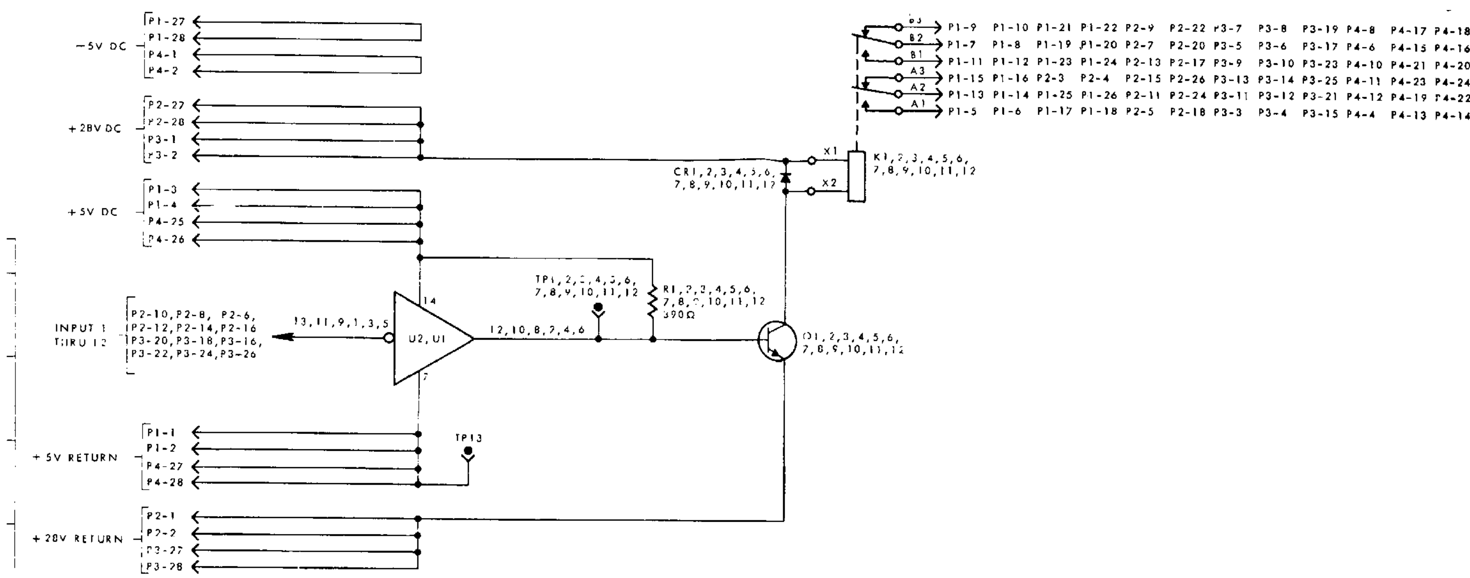


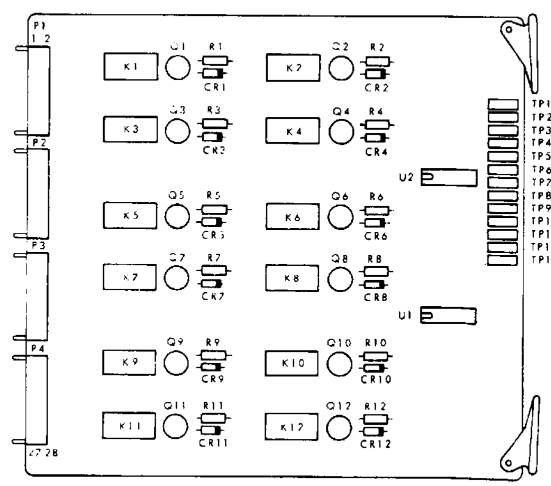
INPUT SIGNAL	FROM	TO	THROUGH RELAY	OUTPUT PINS	OUTPUT SIGNAL	TO
TX WG SW1 W1	CARD E P4-13	CARD R1 P2-10	K1	P1-7	TX WG SW1 POSN 1	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 31A26)
				P1-11	+28V DC	CARD D P3-2
TX WG SW3 W1	CARD E P4-15	CARD R1 P2-6	K3	P1-19	TX WG SW3 POSN 1	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 32A26)
				P1-23	+28V DC	CARD E P3-1
TX WG SW4 W1	CARD E P4-16	CARD R1 P2-14	K5	P2-7	TX WG SW4 POSN 1	WAVEGUIDE SWITCH 22A3
				P2-13	+28V DC	CARD E P2-28
TX WG SW1 W2	CARD E P4-18	CARD R1 P2-16	K6	P2-20	TX WG SW1 POSN 2	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 31A26)
				P2-17	+28V DC	CARD F P3-1
TX WG SW3 W2	CARD E P4-20	CARD R1 P3-18	K8	P3-6	TX WG SW3 POSN 2	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 32A26)
				P3-10	+28V DC	CARD C P2-28
TX WG SW4 W2	CARD E P4-21	CARD R1 P3-22	K10	P4-6	TX WG SW4 POSN 2	WAVEGUIDE SWITCH 22A3
				P4-10	+28V DC	CARD R1 P2-28
PA1 AND PA2 DIODE SWITCH INHIBIT	CARD E P4-23	CARD R1 P3-16	K11	P4-15 P4-21	PA1 AND PA2 DIODE SWITCH INHIBIT	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 31A26)
				P4-19 P4-13	PA1 AND PA2 DIODE SWITCH INHIBIT	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 32A26)

Figure FO-24. Relay circuit card R1 15A5A4.

Figure FO-24. Relay circuit card R1 15A5A4, schematic diagram.

INPUT SIGNAL	FROM	TO	THROUGH RELAY	OUTPUT PINS	OUTPUT SIGNAL	TO	TO	TO
RWG SW1 W1	CARD G P3-24	CARD R2 P2-10	K1	P1-7	RCV WG SW1 POSN 1	CARD F P2-3 TO P2-6	CARD G P2-7 TO P2-13	RADIO FREQUENCY AMPLIFIER AM-6788/FSC-79 (LOW NOISE AMPLIFIER HTA-3A8)
				P1-11	+ 28V DC CARD R1 P3-1			
RWG SW1 W2	CARD G P3-23	CARD R2 P2-8	K2	P1-8	RCV WG SW1 POSN 2	CARD F P2-7 TO P2-10	CARD G P2-8 TO P2-14	RADIO FREQUENCY AMPLIFIER AM-6788/FSC-79 (LOW NOISE AMPLIFIER HTA-3A8)
				P1-12	+ 28V DC CARD R1 P3-1			
MINOR FAULT	CARD G P3-22	CARD R2 P2-6	K3	P1-19	MINOR FAULT	CARD F P2-11 TO P2-14	CARD G P2-9 TO P2-15	DISTRIBUTION BOX ASSEMBLY HTA-3A1
				P1-23	+ 28V DC CARD R1 P3-2			
MAJOR FAULT	CARD G P3-21	CARD R2 P2-12	K4	P1-20	MAJOR FAULT	CARD F P2-15 TO P2-18	CARD G P2-10 TO P2-16	DISTRIBUTION BOX ASSEMBLY HTA-3A1
				P1-24	+ 28V DC CARD R2 P2-27			
RWG SW3 W1	CARD G P3-26	CARD R2 P2-14	K5	P2-7	RCV WG SW3 POSN 1	CARD F P2-19 TO P2-22	CARD G P2-11 TO P2-17	DISTRIBUTION BOX ASSEMBLY HTA-3A1
				P2-13	+ 28V DC CARD R2 P2-28			
RWG SW3 W2	CARD G P3-25	CARD R2 P2-16	K6	P2-20	RCV WG SW3 POSN 2	CARD F P2-23 TO P2-26	CARD G P2-12 TO P2-18	DISTRIBUTION BOX ASSEMBLY HTA-3A1
				P2-17	+ 28V DC CARD R2 P3-1			
LOW ELEVATION CUTOFF	CARD E P4-11	CARD R2 P3-20	K7	P3-5	LOW ELEVATION CUTOFF	REMOTE FACILITY GROUP ASSEMBLY (REMOTE FACILITY INTERFACE ASSEMBLY 31A26, 32A26)		
				P3-9	LOW ELEVATION CUTOFF RTN			





NOTES:

1. THIS SCHEMATIC REPRESENTS 12 IDENTICAL CIRCUITS. THE FIRST PIN OR COMPONENT REFERENCE DESIGNATOR REFERS TO THE FIRST CIRCUIT, THE SECOND TO THE SECOND CIRCUIT, ETC.

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Figure FO-25. Relay circuit card R2 15A5A5, schematic diagram.

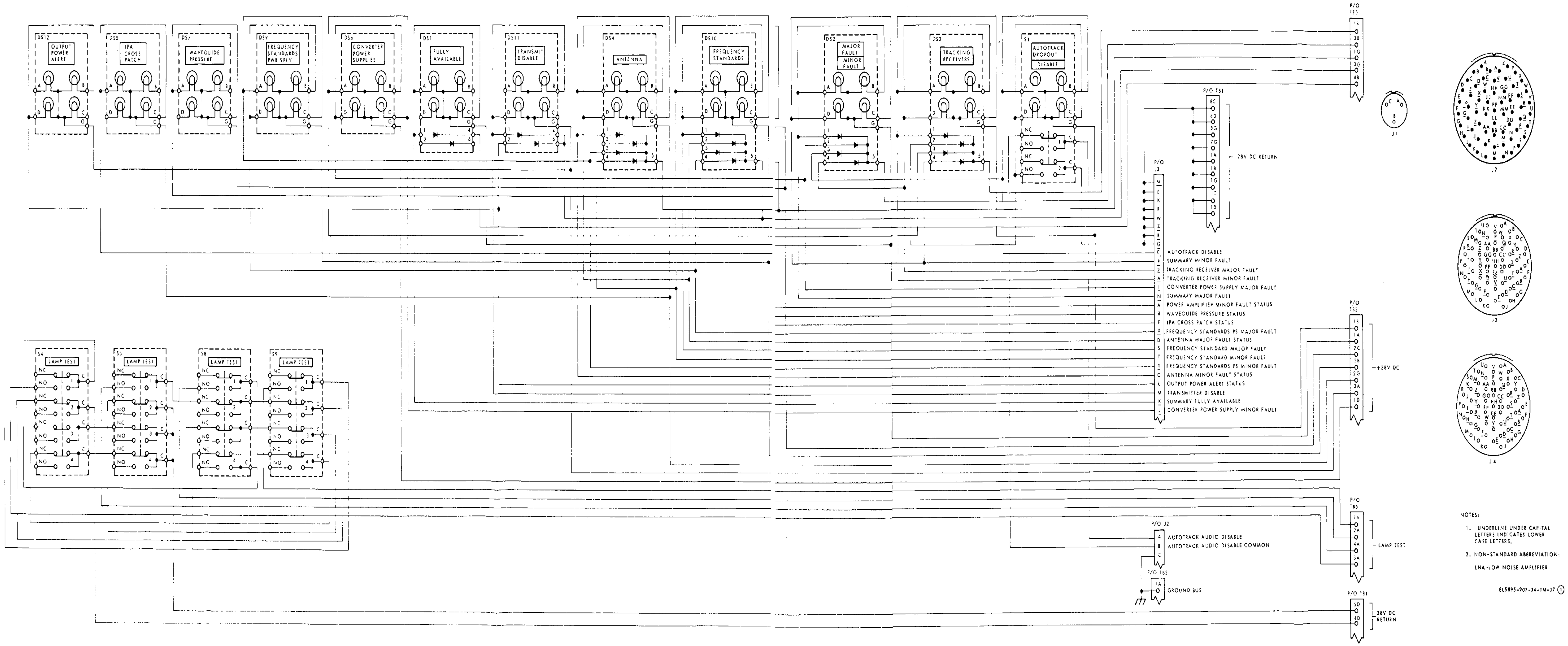

Figure FO-26. Fault and system status panel 14A16, schematic diagram, AN/FCS-79 (sheet 1 of 4).

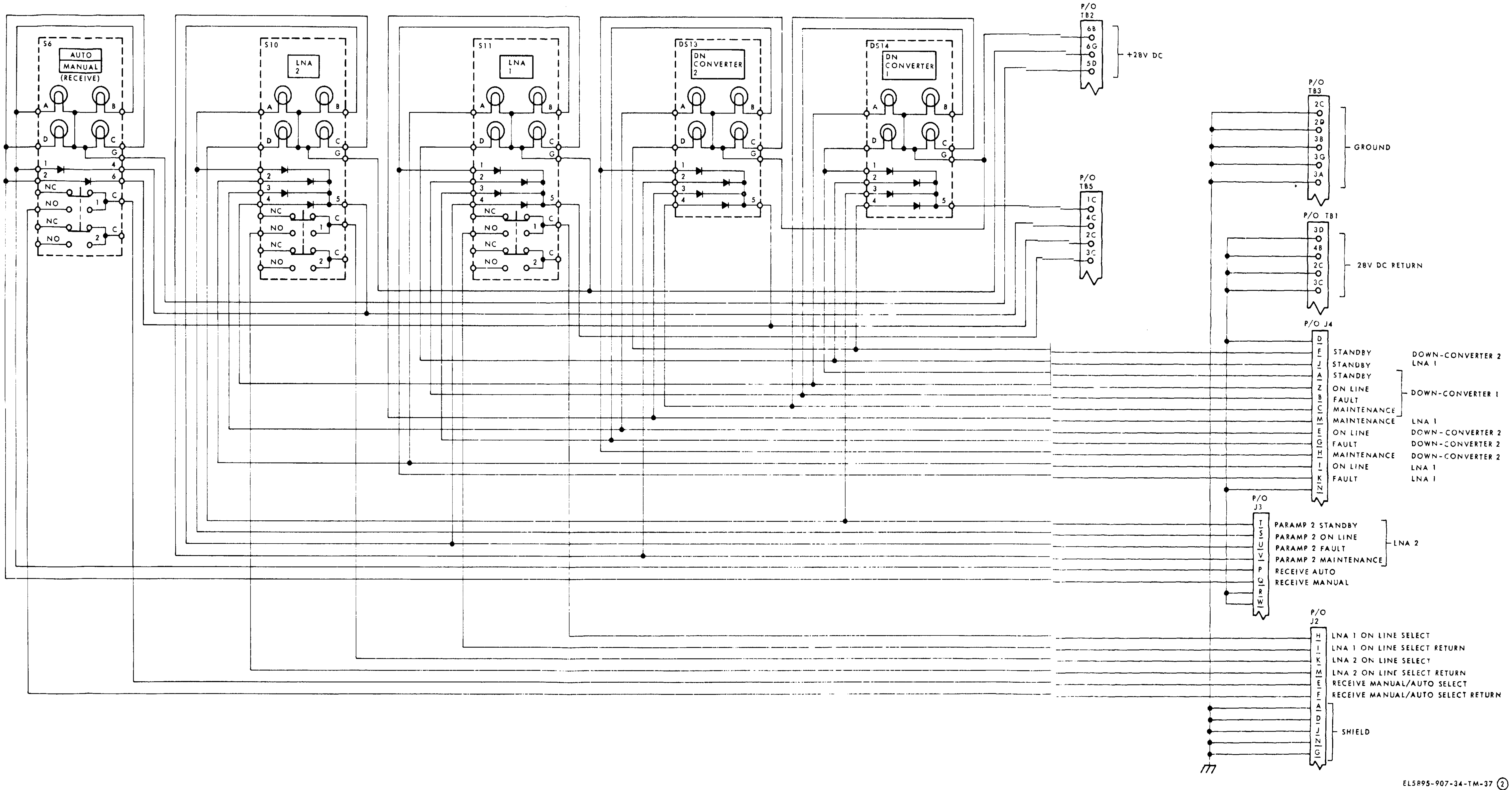

Figure FO-26. Fault and system status panel 14A16, schematic diagram, AN/FSC -79 (sheet 2 of 4).

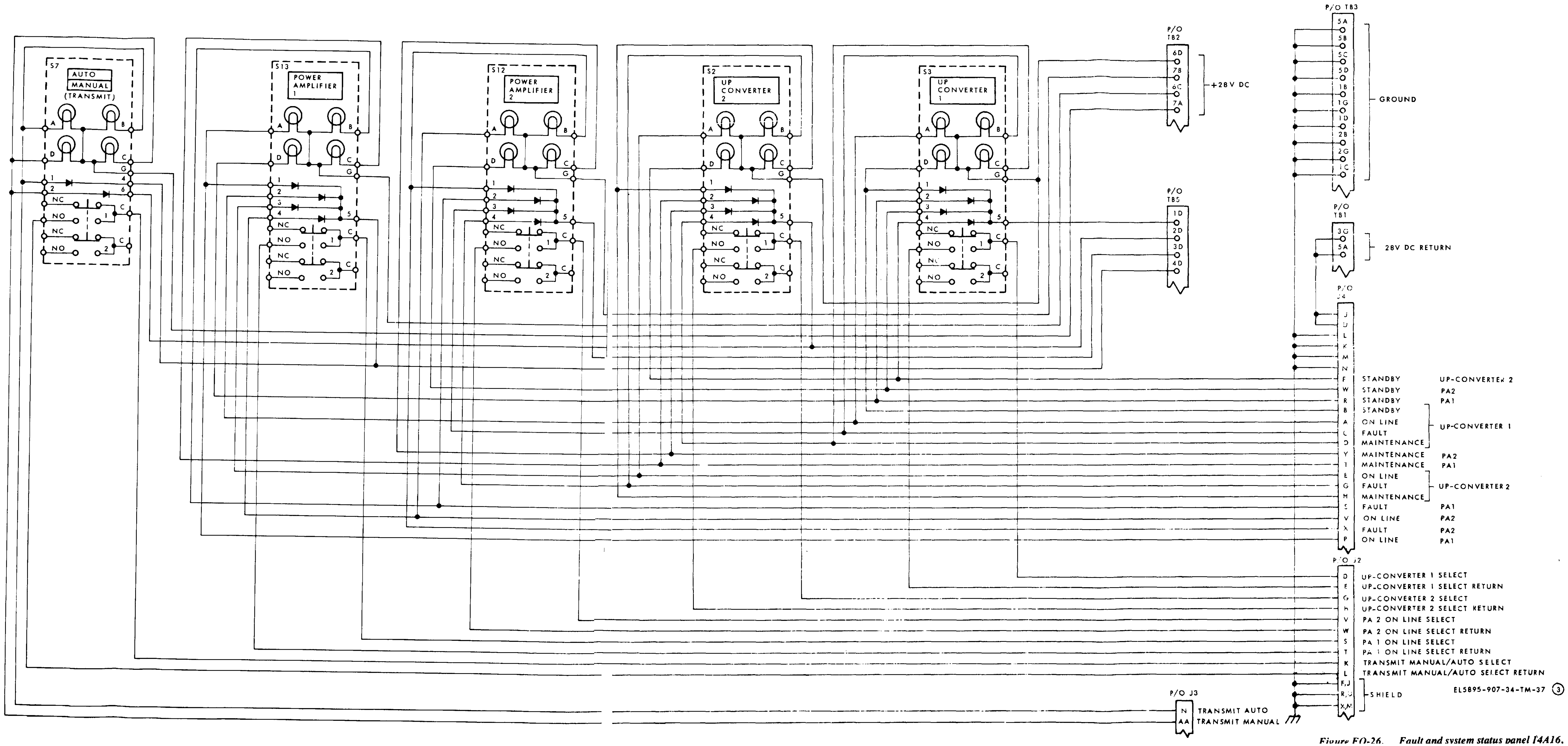

Figure FO-26. Fault and system status panel 14A16, schematic diagram, AN/FSC-79 (sheet 3 of 4).

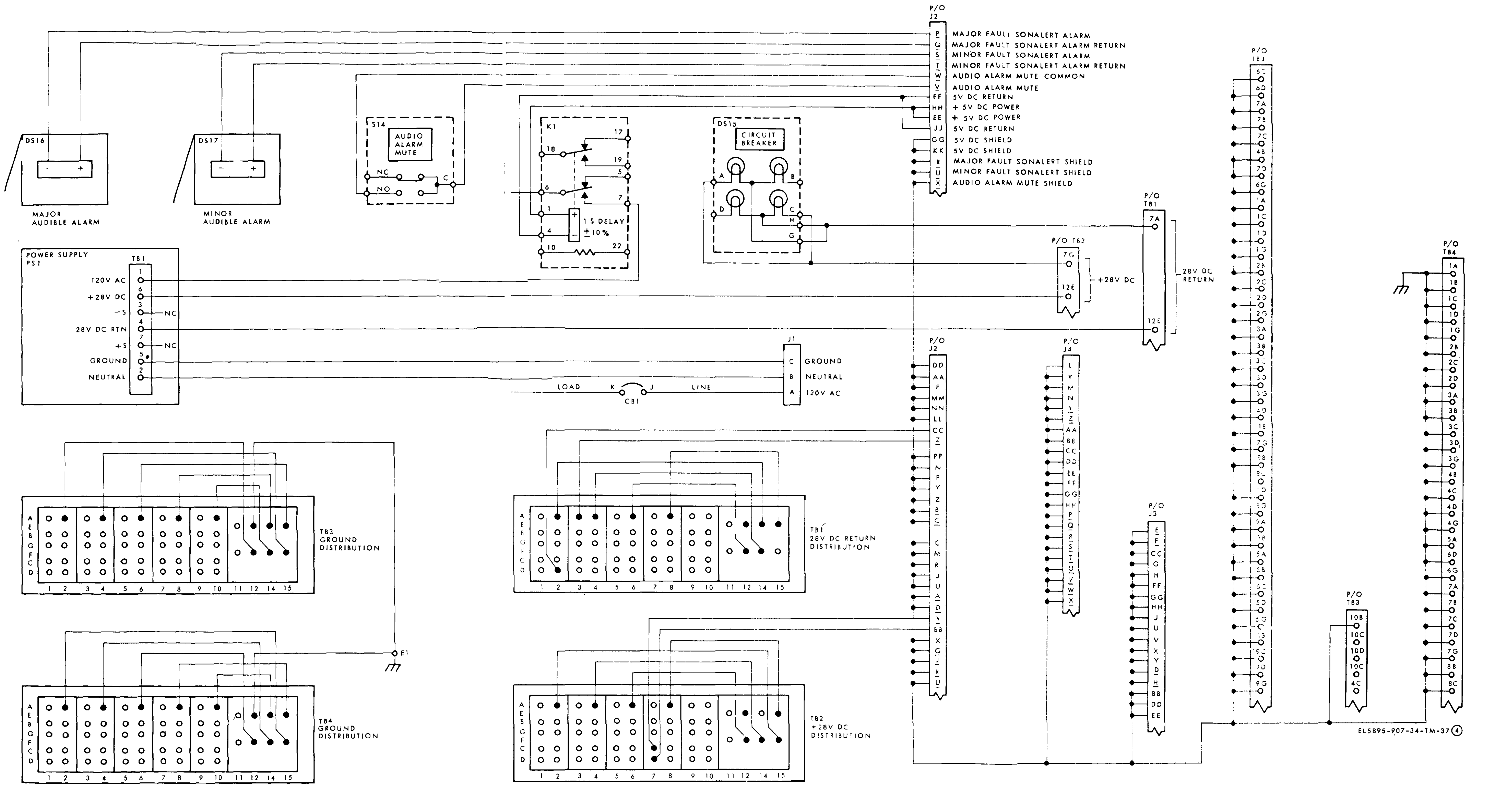

Figure FO-26. Fault and system status panel 14A16, schematic design, AN/FSC-79 (sheet 4 of 4).

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