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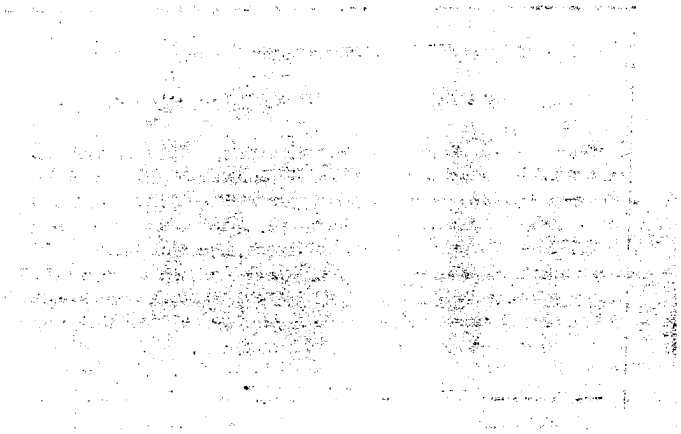

Rockwell International

instruction book

HF-80 Solid-State 1-kW Power Amplifier-Power Supply

Intermediate Maintenance

Collins Defense Communications
Rockwell International Corporation
Cedar Rapids, Iowa 52498

Printed in the United States of America

NOTICE: This instruction book replaces first edition dated 15 September 1982.

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LIST OF EFFECTIVE PAGES

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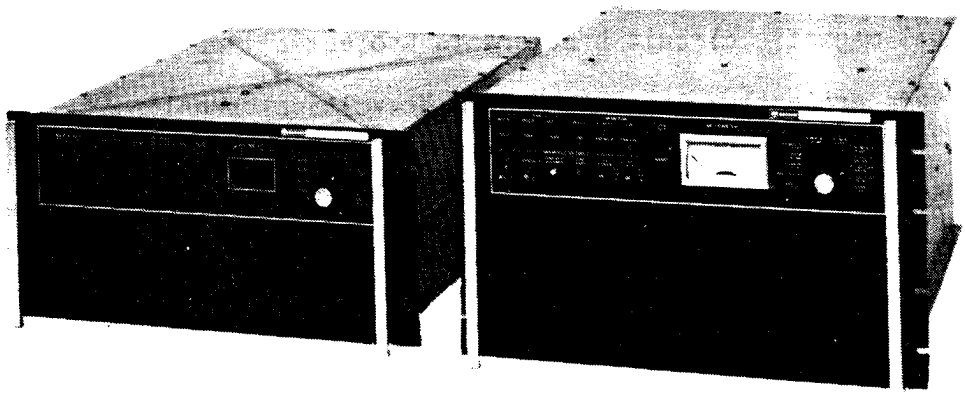
DESIGN FEATURES

The HF-80 Solid-State 1-kW Power Amplifier-Power Supply is a highly reliable hf power amplifier-power supply that operates in the frequency range of 1.600 to 29.999 MHz. The operating frequencies are selectable across the frequency range in any increment as determined by the associated exciter. 1-kW Power Amplifier HF-8023 and Power Supply HF-8031 or HF-8032 are designed for rack mounting and are completely solid-state.

The HF-80 Solid-State 1-kW Power Amplifier-Power Supply includes the following additional features:

- Total operational capability from simple operator-attended installation to fully automated remote communications stations.



HF-8031/HF-8032
POWER SUPPLY

HF-8023
1-kW POWER AMPLIFIER

TPA-4664-017

1-kW Power Amplifier HF-8023 and Power Supply HF-8031 or HF-8032

- Built-in blower systems that provide abundant cooling air.

- Plug-in circuit cards with easily accessible test points, and spacious internal layout for easy access to discrete components and modules. This reduces downtime if repair should become necessary.

1-kW Power Amplifier HF-8023 features:

- Full 1-kilowatt rated power output, pep or average, throughout the usual component aging period.

- Low-power operation capability; 500 watts nominal power output, pep or average.

- Full operational capability with any antenna system presenting a 1.3:1 vswr or less.

- Automatic tune cycle featuring 350 ms between frequency changes.

- Fault indicators (8), status monitors (4), digital displays (2), and a multimeter located on the front panel for easy operator monitoring.

- Operation with Power Supply HF-8031 or HF-8032, depending on the prime power source.

Power Supply HF-8031 and HF-8032 features:

- A single ganged multipole magnetic circuit breaker that interrupts all input power.

- Individual magnetic circuit breakers to protect all power supply circuits.

- Overvoltage protection circuits on all dc voltages supplied to the power amplifier.

- Operation on 208, 220, 230, or 240 V ac ±10%. 47 to 63 Hz, single-phase power (HF-8031). 47 to 63 Hz 3-phase power (HF-8032 part no 622-3512-001 and -004). 47 to 63 Hz and 380 to 420 Hz 3-phase power (HF-8032 part no 622-3512-002 and -005).

INSTRUCTION BOOK

This instruction book includes all instructions on the basic unit and supports repair of the basic unit to card/module replacement and/or replacement of components at the unit level. Included in this book are options instructions which include a brief description of the option and provide for its installation.

To support repair of cards and modules it will be necessary to procure the HF-80 Solid-State Power Amplifiers and Power Supplies Depot Maintenance instruction book, part number 523-0772715.

PART NUMBERS

Unless otherwise specified, all part numbers used in this instruction book (except for the parts list) are Rockwell International, Collins Defense Communications, part numbers.

SERVICE BULLETINS/SERVICE INFORMATION LETTERS

The following listed service bulletins (SB) and service information letters (SIL) are those that are applicable to 1-kW Power Amplifier HF-8023 and Power Supply HF-8031 and HF-8032 and are included in the text of this instruction book. Other applicable SB/SIL released before the instruction book was shipped are included in the front of the instruction book.

NOTE

Service bulletins/service information letters are written in numerical sequence against the whole HF-80 family; therefore, all SB/SIL numbers are not included in the listing. Service bulletins are numbered in sequence for the life of the equipment. Service information letters are numbered in sequence starting at 1 for each calendar year.

SB/ SIL	DESCRIPTION	ISSUE DATE
HF-8023 SB 89	Adds jumper wire to 1-kW Power Amplifier HF-8023 predriver card A2A1 to improve performance of the input step attenuator.	6-15-82
HF-8023 SB 90	Deletes two capacitors and replaces three coils and four capacitors on low-pass filter card A8A1 of 1-kW Power Amplifier HF-8023 to reduce intermodulation distortion at 8 MHz.	2-15-83
HF-8023 SB 97	Change routing of antenna interlock to prevent possible damage to external tuning units in the event of a strapping error being made. Changed wiring harness A1W1.	9-15-82
HF-8023 SB 99	Eliminate EMI on current analog lines. Added bypass capacitors on rf backplane A1A3A1.	9-15-82
HF-8023 SB 100	Prevent transients on VSWR analog line from producing VSWR fault. Added capacitor on analog control card A10.	9-15-82
HF-8031 HF-8032 SB 101	Prevent relay contact failure. Changed value of charging impedance by using smaller R1 and removing R2.	9-15-82

SB/ SIL	DESCRIPTION	ISSUE DATE
HF-8032 SB 102	Eliminate possible driver spurious oscillation when used with an external tuning device. Replaced power amplifier output modules A3, A4, A5, A6 with ones that have an rf feedback circuit.	9-15-82
HF-8023 SB 106	Replaces U18 and incorporates cuts and jumpers to prevent crowbar effect (causing power amplifier circuit breakers to trip) when power is removed from HF-8023.	12-15-82
HF-8023 SB 109	Moves one jumper wire on 1-kW Power Amplifier HF-8023 HF-80 interface card to establish the correct threshold level for the TGC monitor circuit. The revised circuit assures that the power amplifier output is not more than 1.0 dB below the adjusted TGC level before permitting the tune cycle to advance from tune step 4 to tune step 5.	3-15-83
HF-8023 HF-8031 HF-8032 SB 113	Optional service bulletin improves transmitted noise spectrum of 1-kW Power Amplifier HF-8023. Equipment is within specification, but this modification further reduces transmitted noise by approximately 30 dB. The change adds a relay/filter assembly to A1A5 of 1-kW Power Amplifier HF-8023 and adds filter assembly A1A1 to Power Supply HF-8031 or HF-8032.	10/1-83
HF-8031 HF-8032 SB 119	Gives new method for mounting and insulating transistors Q1 through Q4 in the 1000-watt converter and Q1 and Q2 in the 500-watt converter of Power Supplies HF-8031 and HF-8032 to make assembly easier and eliminate a source of arcing problems. The change consists of removing one transistor shield on module A4 and two shields each from modules A2 and A3. Insulator bushings are added to two transistors on module A4 and four transistors each on modules A2 and A3. This service bulletin should not be installed until the transistors need to be replaced.	3-1-84
HF-8023 SB 124	This change corrects 1-kW Power Amplifier HF-8023 tune cycle advance discrepancies by removing one resistor, making circuit cuts, and adding jumper wires and one diode.	11-1-84
HF-8023 SB 128	This change ensures that TGC will set up correctly by increasing the speed of TGC circuits and limiting the gain of 1-kW Power Amplifier HF-8023.	12-1-84
HF-8023 SB 129	When used in a system where TGC is not set up correctly, 1-kW Power Amplifier HF-8023 may go into IGC. A high error rate of transmitted data may occur due to excessive distortion caused by IGC. This service bulletin changes the power amplifier IGC attack time to improved data operation.	3-15-85

SB/ SIL	DESCRIPTION	ISSUE DATE
HF-8023 SIL 2-86	This SIL provides procedures to readjust 1-kW Power Amplifier HF-8023 vswr sensor to allow the power amplifier to be used with a moderately high vswr wide-band antenna.	5-1-86
HF-8031 HF-8032 SIL 4-86	This SIL provides information to allow customers to return their 1000-watt converter modules, A2 and A3, 500-watt converter module, A4, and base driver cards, A2A2, A3A2, and A4A2, for a modification circuit to be added. This modification circuit provides better noise immunity from externally generated signals that could otherwise turn the base driver card power transistors on. This product improvement is suggested for any module that has had power device failures.	8-15-86
HF-8031 HF-8032 SB 157	Changed value of A1A1L8 from 30 microhenries to 0.1 microhenries to prevent ringing on the line resulting in tune steps 3 and 4 being skipped.	1-1-89

SECTION 1
DESCRIPTION

1.1 GENERAL

The HF-80 Solid-State 1-kW Power Amplifier-Power Supply consists of 1-kW Power Amplifier HF-8023 (hereafter called power amplifier) and Power Supply HF-8031 or HF-8032. It provides a full 1-kW rf power output over the frequency range of 1.600 to 29.999 MHz.

NOTE

When referring to both Power Supply HF-8031 and Power Supply HF-8032, power supply will be used as a common name.

The HF-80 Solid-State 1-kW Power Amplifier-Power Supply is totally compatible with operator-attended installations or fully automated remote communications stations. It is normally used with Exciter HF-8010( ), Exciter HF-8014( ), or Receiver-Exciter HF-8070( ).

This equipment is intended for use in attended or unattended fixed ground or transportable stations, but may also be used in controlled environment shipboard installations.

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

1.2 EQUIPMENT SUPPLIED

Equipment supplied in the HF-80 Solid-State 1-kW Power Amplifier-Power Supply is listed and described in table 1-1. The HF-80 Solid-State 1-kW Power Amplifier-Power Supply includes either Power Supply HF-8031 or Power Supply HF-8032.

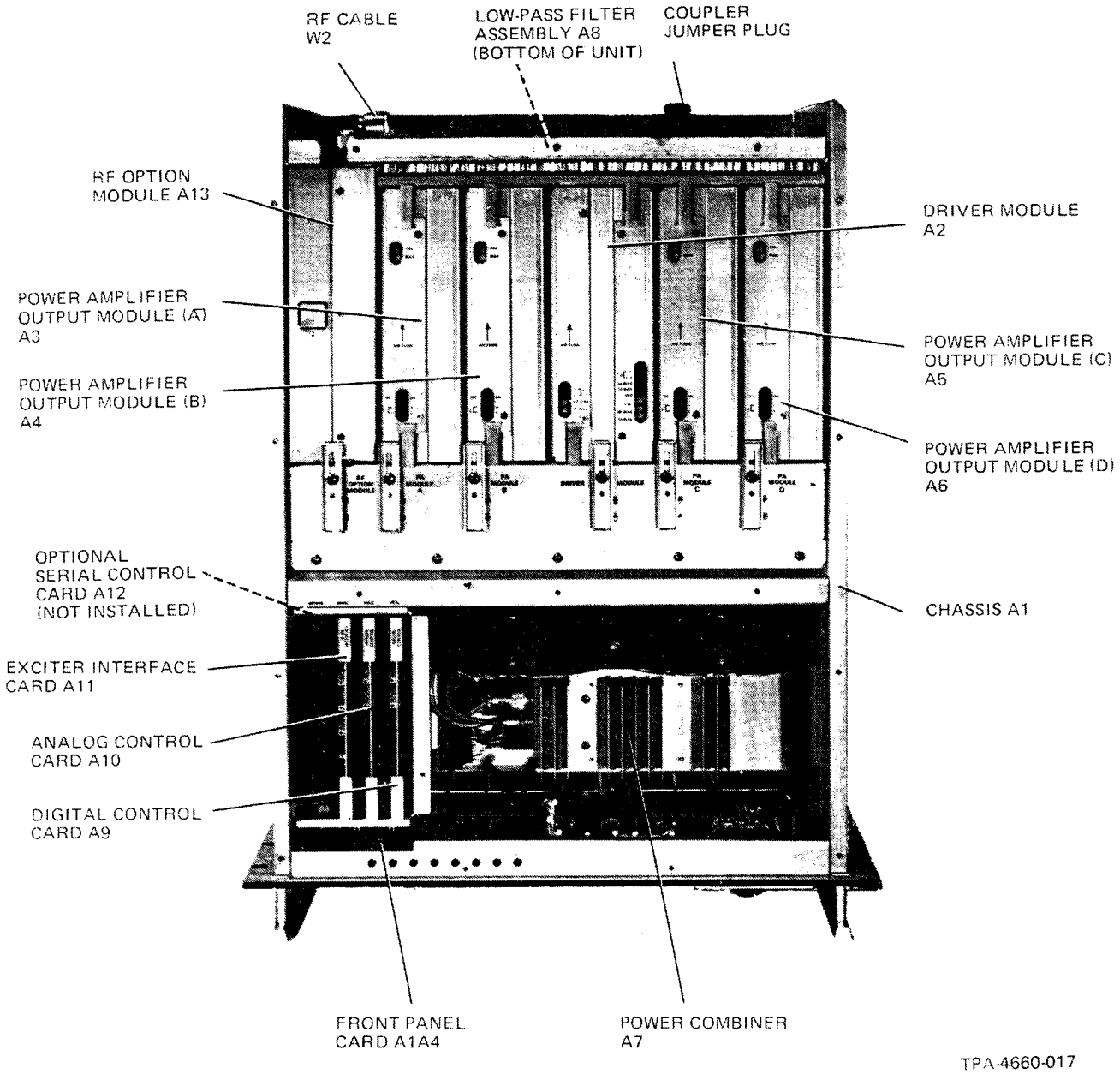
Equipment supplied in the power amplifier is displayed in figure 1-1 and listed and described in table 1-2. Equipment supplied in the power supply is displayed in figure 1-2 and listed and described in table 1-3.

Table 1-1. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Equipment Supplied.

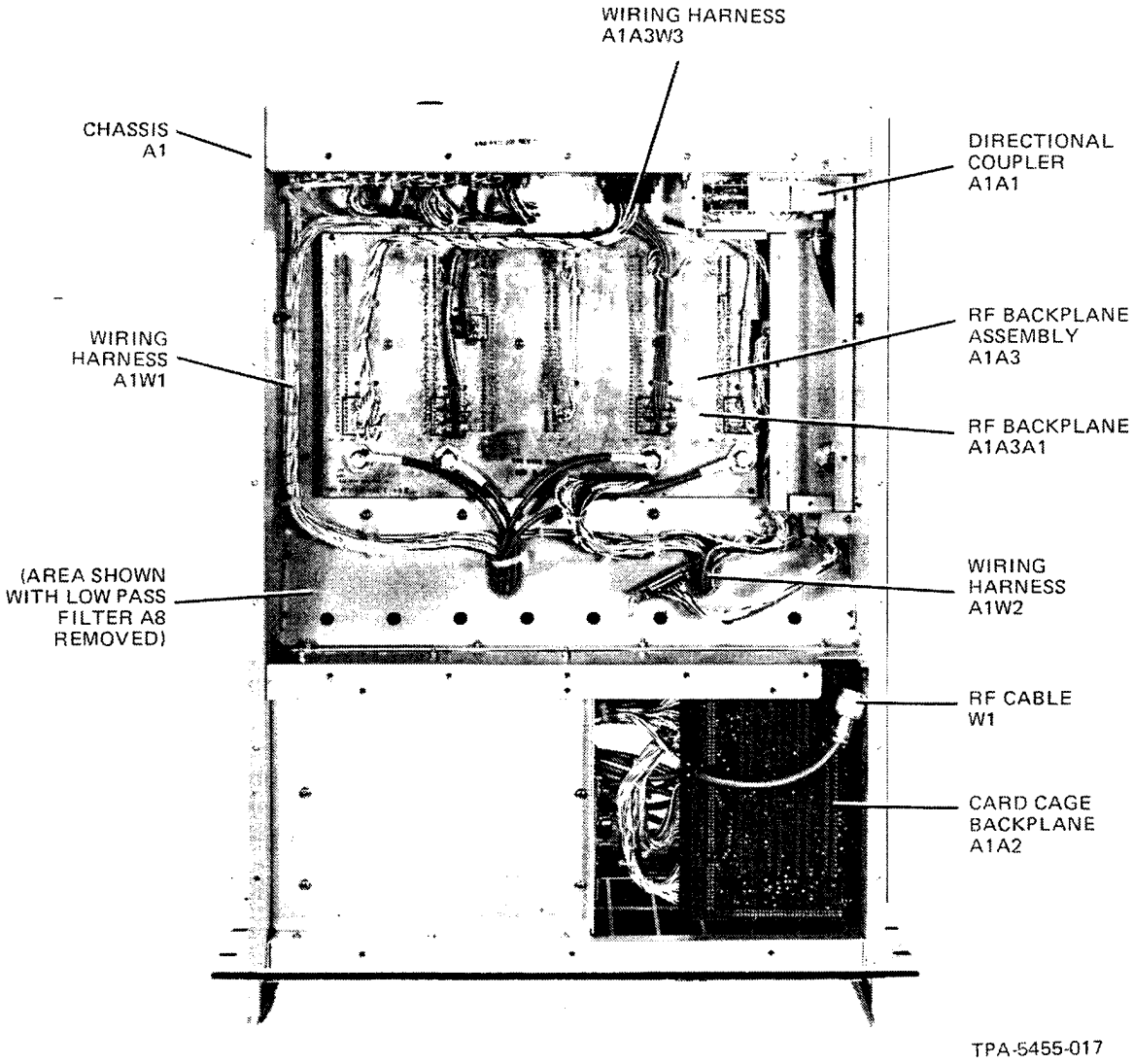
NOMENCLATURE	PART NUMBER	DESCRIPTION/FUNCTION
1-kW Power Amplifier HF-8023	622-3490-001	Solid-state 1-kW power amplifier. Operates from 1.600 to 29.999 MHz. Tr relay not installed.
	622-3490-002	Similar to pn 622-3490-001, except includes tr relay.
	622-3490-006	Similar to pn 622-3490-002, except operates at a different tune power level, and allows external monitoring of forward and reflected power.
Power Supply HF-8031	622-3491-001	Capable of supplying all voltages required by the power amplifier. Operates from 208-, 220-, 230-, 240-V ac, single-phase, 43- to 67-Hz input power.
	622-3491-003	Similar to pn 622-3491-001, except includes filter assembly A1A1 to reduce transmitted power amplifier noise.
Power Supply HF-8032	622-3512-001	Capable of supplying all voltages required by the power amplifier. Operates from 208-, 220-, 230-, 240-V ac, 3-phase, 43- to 67-Hz input power.
	622-3215-002	Capable of supplying all voltages required by the power amplifier. Operates from 208-, 220-, 230-, 240-V ac, 3-phase, 43- to 67-Hz or 380- to 420-Hz input power. The power supply provides automatic changeover between 47 to 63 Hz and 380 to 420 Hz, with no operator or installation changes required.
(Cont)		

Table 1-1. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Equipment Supplied (Cont).

NOMENCLATURE	PART NUMBER	DESCRIPTION/FUNCTION
Power Supply HF-8032 (Cont)	622-3512-004	Similar to pn 622-3512-001, except includes filter assembly A1A1 to reduce transmitted power amplifier noise.
	622-3512-005	Similar to pn 622-3512-002, except includes filter assembly A1A1 to reduce transmitted power amplifier noise.



1-kW Power Amplifier HF-8023, Assembly and Subassembly Locations
Figure 1-1 (Sheet 1 of 2)



1-kW Power Amplifier HF-8023, Assembly and Subassembly Locations
Figure 1-1 (Sheet 2)

Table 1-2. 1-kW Power Amplifier HF-8023, Equipment Supplied.

ASSEMBLY/SUBASSEMBLY NOMENCLATURE	PART NUMBER	1-kW POWER AMPLIFIER HF-8023 622-3490-( ) -001	-002	-006	DESCRIPTION/FUNCTION
Chassis A1	646-6433-001	X	X		Contains subassemblies not considered plug-in cards or modules.
	646-6433-005			X	
Directional coupler A1A1	642-2634-002	X	X	X	Measures forward and reflected power at rf output connector.
Card cage backplane A1A2	642-3588-001	X	X		Provides mount and interconnect for digital control A9, analog control A10, exciter interface A11, and optional processor interface A12. Provides additional interconnect to the front panel (J5), rf backplane (J6), rear chassis (J7), and low-pass filter and options (J8).
	642-3588-003			X	
Rf backplane assembly A1A3	646-6435-001	X	X	X	Provides mount and interconnect for driver module A2, and pa output module A3, A4, A5, A6.
Rf backplane A1A3A1	642-3295-001	X	X	X	Printed circuit card used in rf backplane assembly A1A3.
Wiring harness A1A3W3	646-6438-001	X	X	X	Provides additional interconnect to the rear chassis (W3J5), card cage backplane (J11), and power combiner (J7, J8, J9, J10).
Front panel card A1A4	642-3586-001	X	X		Contains front panel indicators, controls, and adjustments.
	642-3586-002			X	

Table 1-2. 1-kW Power Amplifier HF-8023, Equipment Supplied (Cont).

ASSEMBLY/SUBASSEMBLY NOMENCLATURE	PART NUMBER	1-kW POWER AMPLIFIER HF-8023 622-3490-( ) -001	-002	-006	DESCRIPTION/FUNCTION
Wiring harness A1W1	646-6436-001	X	X		Interconnects chassis A1 with connectors J1, J2, J3, J4, P8, and terminal board TB1.
	646-6436-004			X	
Wiring harness A1W2	646-6437-001	X	X	X	Interconnects chassis A1 with connectors P1, P2, P3, P9, and P10.
Driver module A2	646-6407-001	X	X	X	Amplifies 100-mW exciter rf to four equal amplitude 20-W signals for input to the power amplifier output module.
Power amplifier output module A3	646-6406-001	Note 1	Note 1		Amplifies nominal 20-W rf input to a nominal 280-W level. Includes pa module card part no 642-3116-001.
	646-6406-002	Note 2	Note 2	X	Amplifies nominal 20-W rf input to a nominal 280-W level. Includes pa module card part no 642-3116-002.
Power amplifier output module A4	646-6406-001	Note 1	Note 1		Same as A3
	646-6406-002	Note 2	Note 2	X	
Power amplifier output module A5	646-6406-001	Note 1	Note 1		Same as A3
	646-6406-002	Note 2	Note 2	X	
Power amplifier output module A6	646-6406-001	Note 1	Note 1		Same as A3
	646-6406-002	Note 2	Note 2	X	

Table 1-2. 1-kW Power Amplifier HF-8023, Equipment Supplied (Cont).

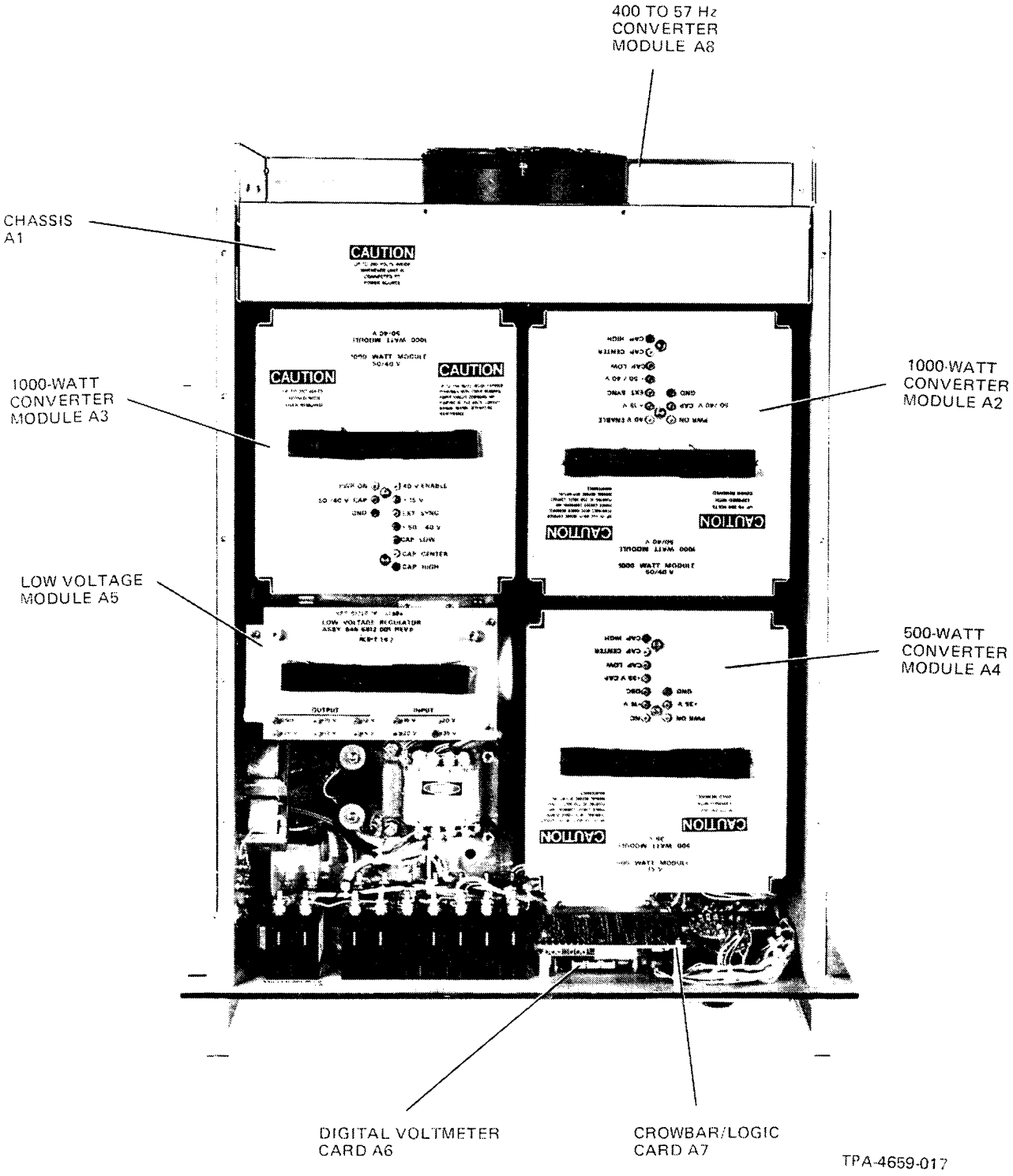
ASSEMBLY/SUBASSEMBLY NOMENCLATURE	PART NUMBER	1-kW POWER AMPLIFIER HF-8023 622-3490-( ) -001	-002	-006	DESCRIPTION/FUNCTION
Power combiner A7	646-7120-001	X	X	X	Combines outputs from four power amplifier modules into one output.
Low-pass filter assembly A8	646-6400-002	X	X	X	Attenuates harmonics of the four combined power amplifier modules.
Digital control card A9	642-3592-001	X	X	X	Tune cycle, faults, and monitoring logic circuits.
Analog control card A10	642-3593-001	X	X	X	Pa protection circuits.
HF-80 interface card A11	635-0745-001	X	X	X	Provides interface between the power amplifier and HF-80 type exciters or receiver-exciters.
671U-4 interface card A11	637-2798-001				Provides interface between the power amplifier and Receiver-Exciter 671U-4( ).
671U-9 interface card A11	637-2799-001				Provides interface between the power amplifier and Receiver-Exciter 671U-9( ).
Coaxial jumper module A13	646-6430-001	X			Provides rf connection from directional coupler A1A1 rf output to ANT RF (J8).

Table 1-2. 1-kW Power Amplifier HF-8023, Equipment Supplied (Cont).

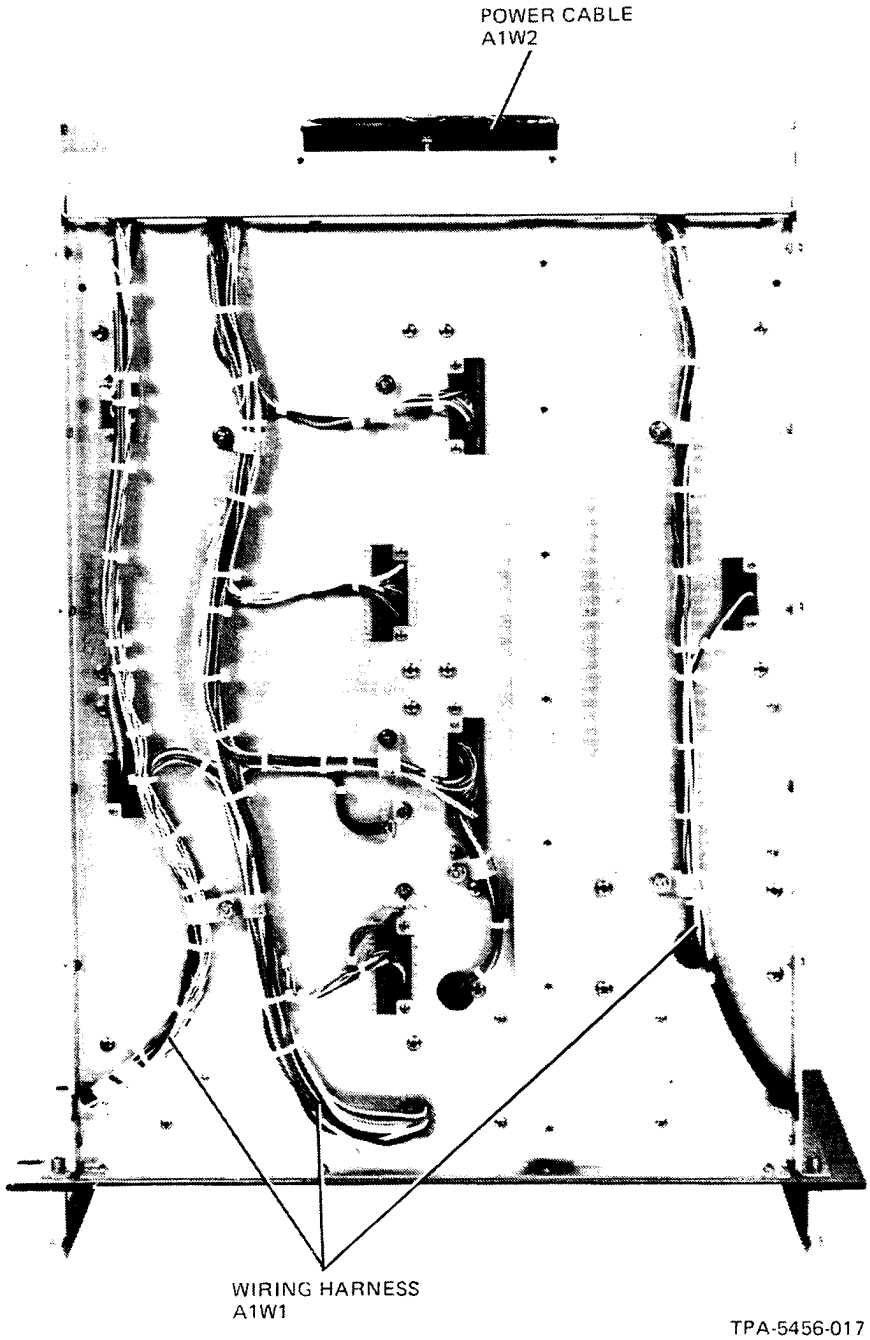
ASSEMBLY/SUBASSEMBLY		1-kW POWER AMPLIFIER HF-8023 622-3490-( )			DESCRIPTION/FUNCTION
NOMENCLATURE	PART NUMBER	-001	-002	-006	
Tr relay module A13	622-3505-001		X	X	Part of TR Relay Kit AC-8023 part no 622-3505-001. Provides antenna switching to allow transmit and receive capabilities using the same antenna. Used in place of coaxial jumper module part no 646-6430-001.
Rf cable W1	646-6439-001	X	X	X	Interconnects power combiner A7 rf output and low-pass filter assembly A8 RF INPUT.
Rf cable W2	651-4426-001	X	X	X	Interconnects directional coupler A8A2 RF OUTPUT and directional coupler A1A1 RF RETURN when an external tuning unit is not used.

Notes:

1. Effective through part no 622-3490-001, -002 REV G.
2. Effective part no 622-3490-001, -002 REV H and above.



Power Supply HF-8031 and HF-8032, Assembly and Subassembly Locations
Figure 1-2 (Sheet 1 of 2)



Power Supply HF-8031 and HF-8032, Assembly and Subassembly Locations
Figure 1-2 (Sheet 2)

Table 1-3. Power Supply HF-8031 and HF-8032, Equipment Supplied.

ASSEMBLY/SUBASSEMBLY TITLE	PART NUMBER	POWER SUPPLY HF-8031 622-3491-( ) -001	POWER SUPPLY HF-8031 622-3491-( ) -003	POWER SUPPLY HF-8032 622-3512-( ) -001	POWER SUPPLY HF-8032 622-3512-( ) -002	POWER SUPPLY HF-8032 622-3512-( ) -004	POWER SUPPLY HF-8032 622-3512-( ) -005	DESCRIPTION/ FUNCTION
Chassis A1	646-6884-001	X						Wired for single-phase, 43- to 67-Hz, 208-, 220-, 230-, or 240-V ac power.
	646-6884-005		X					
	646-6884-002			X				Wired for 3-phase, 43- to 67-Hz; 208-, 220-, 230-, or 240-V ac power.
	646-6884-006					X		
	646-6884-003				X			Wired for 3-phase, 43- to 67-Hz and 380- to 420-Hz, 208-, 220-, 230-, or 240-V ac power.
	646-6884-007						X	
Filter assembly A1A1	652-2255-001		X			X	X	Provides additional filtering to selected power and control lines to power amplifier to reduce transmitted power amplifier noise.
Wiring harness A1W1	646-7000-001	X						Wired for single-phase, 43- to 67-Hz, 208-, 220-, 230-, or 240-V ac power. Interconnects J1, J2, J3, J4, J5, J6, J7, J8, J9, J10, P1, and P2.
	646-7000-004		X					
(Cont)								

Table 1-3. Power Supply HF-8031 and HF-8032, Equipment Supplied (Cont).

ASSEMBLY/SUBASSEMBLY		POWER SUPPLY HF-8031 622-3491-( )		POWER SUPPLY HF-8032 622-3512-( )				DESCRIPTION/ FUNCTION
TITLE	PART NUMBER	-001	-003	-001	-002	-004	-005	
Wiring harness A1W1 (Cont)	646-7000-002			X	X			Wired for 3-phase, 43- to 67-Hz, or 380- to 420-Hz, 208-, 220-, 230-, or 240-V ac power. Interconnects J1, J2, J3, J4, J5, J6, J7, J8, J9, J10, P1, and P2.
	646-7000-005					X	X	
Power cable A1W2	009-1840-060	Note 1		Note 1	Note 1			Interconnects blower B1 to 230-V ac line.
	009-1801-060	Note 2	X	Note 2	Note 2	X	X	
1000-watt converter module A2	646-6883-001	X	X	X	X	X	X	Converts rectified ac power line voltage to programmable dc power (50/40 V).
1000-watt converter module A3	646-6883-001	X	X	X	X	X	X	Same as A2
500-watt converter module A4	646-6882-001	X	X	X	X	X	X	Converts rectified ac power line voltage to 35 V dc.

Table 1-3. Power Supply HF-8031 and HF-8032, Equipment Supplied (Cont).

ASSEMBLY/SUBASSEMBLY		POWER SUPPLY HF-8031 622-3491-( )		POWER SUPPLY HF-8032 622-3512-( )				DESCRIPTION/ FUNCTION
TITLE	PART NUMBER	-001	-003	-001	-002	-004	-005	
Low-voltage module A5	646-6812-001	X	X	X	X	X	X	Series regulators: +28 V, +5 V, +15 V, +12 V, and -12 V.
Digital volt-meter card A6	642-3197-001	X	X	X	X	X	X	Digital readout of dc voltages.
Crow-bar/ logic card A7	642-3579-001	X	X	X	X	X	X	Control logic for crowbars and monitors.
400- to 57-Hz con-verter module A8	651-4140-001				X		X	Converts 400-Hz input power to 57-Hz blower power.
Power line cable	647-2547-001	X	X					Wired for single-phase ac power. Includes strap for voltage selection.
	647-2547-002			X	X	X	X	Wired for 3-phase ac power. Includes strap for voltage selection.

Notes:

1. Effective through part no 646-6884-XXX, REV L.
2. Effective part no 646-6884-XXX REV M and above.

1.3 ASSOCIATED EQUIPMENT

Associated equipment required for operation of the HF-80 Solid-State 1-kW Power Amplifier-Power Supply, but not supplied as a part of it, is listed in table 1-4.

1.4 ACCESSORIES

Accessories available for use with the HF-80 Solid-State 1-kW Power Amplifier-Power Supply are listed in table 1-5.

NOTE

Part numbers shown with a -( ) for the part number suffix have two or more accessory types with different part number suffixes. Refer to the function and/or characteristics for the part number ending and associated differences and/or characteristics.

1.5 OPTIONS

Options available for the HF-80 Solid-State 1-kW Power Amplifier-Power Supply are listed in table 1-6.

1.6 EQUIPMENT SPECIFICATIONS

Specifications for the HF-80 Solid-State 1-kW Power Amplifier-Power Supply are listed in table 1-7.

Table 1-4. Associated Equipment.

EQUIPMENT	TYPE	FUNCTION	CHARACTERISTICS
Exciter	Rockwell International HF-8010( )	Transmit and control input signals to the HF-80 Solid-State 1-kW Power Amplifier-Power Supply.	Provides 100-mW, 2-channel ISB transmit input signal in the 1.6- to 29.999-MHz range. Provides control and monitor functions to the HF-80 Solid-State 1-kW Power Amplifier-Power Supply.
	Rockwell International HF-8014( )	Similar to Exciter HF-8010( ).	Similar to Exciter HF-8010( ), except 4-channel ISB.
Receiver-exciter	Rockwell International HF-8070( )	Similar to Exciter HF-8010( ).	Similar to Exciter HF-8010( ), except includes hf receiver circuits.
	Rockwell International 671U-4( )	Similar to Exciter HF-8010( ). Requires special power amplifier interface card (A11).	Similar to Exciter HF-8010( ), except includes hf receiver circuits.
	Rockwell International 671U-9( )	Similar to Exciter HF-8010( ). Requires special power amplifier interface card (A11).	Similar to Exciter HF-8010( ), except includes hf receiver circuits.
Antenna coupler	Rockwell International HF-8040( )	Automatic antenna coupler for matching power amplifier rf output to various whip and long-wire antennas.	Provides antenna matching for various whip or long-wire antennas to a 50-ohm unbalanced rf termination with vswr not exceeding 1.3:1.

Table 1-4. Associated Equipment (Cont).

EQUIPMENT	TYPE	FUNCTION	CHARACTERISTICS
Preselector	Rockwell International HF-8060 or equivalent	Automatically tuned bandpass filter for installation where transmit and receive antennas cannot be separated by large distances. (Used with exciters or receiver-exciters for improved transmit spurious signal and noise suppression.)	Provides front-end selectivity and overload protection for receivers, improving cross modulation and out-of-band intermodulation performance. Provides additional selectivity between the exciter rf output and the power amplifier rf input.
Bandpass filter	Rockwell International HF-8061 or equivalent	Automatically tuned bandpass filter used on power amplifier output in hf communications where several systems are operating simultaneously on nearby frequencies.	Capable of continuously handling rf power of up to 1500 watts at the tuned frequency.
	Rockwell International HF-8062 or equivalent	High-speed, digitally tuned low-pass filter to reduce undesirable transmitted noise from the output spectrum.	Contains eight automatically selected bandpass filters for the 1.6- to 30-MHz frequency range. Stopband attenuation of not less than 25 dB. Capable of handling an rf input power of 1100 W pep or average.
Antenna	Any	Transmit rf output signal, or transmit/receive rf output/rf input signals.	Less than 1.3:1 vswr for 50-ohm systems. (Other antenna types require Antenna Coupler HF-8040( ).)

Table 1-4. Associated Equipment (Cont).

EQUIPMENT	TYPE	FUNCTION	CHARACTERISTICS
Headphone	Any	Provide headphone monitoring of the audio signal (sidetone or received signal).	Standard 600-ohm headphones.
Microphone	Any	Provide audio input for voice transmissions.	200-ohm dynamic cardioid microphone.
CW key	Any	Key and modulate exciter for CW transmissions.	Hand-operated CW key.
FSK modem	Any	Provide FSK signals for RTTY operation.	Low-impedance audio input.

Table 1-5. Accessories.

EQUIPMENT	PART NUMBER	FUNCTION	CHARACTERISTICS
Preselector Control Cable AC-8060	622-3456-( )	Includes preselector cable 637-9286-( ), receive coaxial cable 638-4634-( ), and transmit coaxial cable 638-4635-( ).	Interconnects power amplifier, an HF-80 type preselector, and an HF-80 type exciter or receiver-exciter. -001, 1.5 m (5 ft) long -003, 3 m (10 ft) long -004, 4 m (13 ft) long -015, 15.2 m (50 ft) long -030, 30.5 m (100 ft) long

Table 1-5. Accessories (Cont).

EQUIPMENT	PART NUMBER	FUNCTION	CHARACTERISTICS
Cable Kit AC-8071A	622-3507-( )	Includes power amplifier-power supply power cable part no 647-2545-( ) and power amplifier-power supply control cable part no 647-2546-( ).	Interconnects power amplifier and power supply to form the HF-80 Solid-State 1-kW Power Amplifier-Power Supply. -001, 1.5 m (5 ft) long -002, 2.4 m (8 ft) long
Cable Kit AC-8072A	622-3508-( )	Includes power amplifier-exciter control cable part no 647-2225-( ) (W3), receive rf cable part no 647-2821-( ) (W4), and exciter rf cable part no 647-2820-( ) (W5).	Interconnects power amplifier and an HF-80 type exciter or receiver-exciter. -001, 2.3 m (7.5 ft) long -003, 3.0 m (10 ft) long -005, 6.1 m (20 ft) long -008, 7.6 m (25 ft) long -015, 15.2 m (50 ft) long -030, 30.5 m (100 ft) long
Cable Kit AC-8073A	622-3509-( )	Includes power amplifier-coupler control cable part no 647-2553-( ) and coupler rf cable part no 647-2554-( ).	Interconnects power amplifier and an HF-80 type antenna coupler. -001, 7.6 m (25 ft) long -006, 6.1 m (20 ft) long -015, 15.2 m (50 ft) long -030, 30.5 m (100 ft) long -060, 61 m (200 ft) long
Connector Kit AC-8130A	622-3510-( )	Includes connectors required to construct cable for the HF-80 solid-state 1-kW transmitter or transceiver systems. Part no 622-3510-002 includes preselector connectors; part no 622-3510-001 does not.	Includes mating connectors for each of the following HF-80 types of equipment: exciter or receiver-exciter, power supply, 1-kW power amplifier, exciter control or receiver-exciter control, antenna coupler, and preselector.

Table 1-5. Accessories (Cont).

EQUIPMENT	PART NUMBER	FUNCTION	CHARACTERISTICS
Crimp Tool Kit AC-8131	622-3492-001	Tool kit used with System Connector Kit AC-8130A part no 622-3510-001, -002.	Contains two crimp tools with positioner and four plastic insertion/extraction tools.
Cable Retractor CA-8011	622-3420-001	Cable retractor for power amplifier and power supply when installed in 19-inch equipment rack.	Provides automatic retraction of interconnecting cables for slide-mounted equipment.
Slide Mounting Kit CA-8031	622-3419-( )	Slide mounting kit for power amplifier and power supply when installed in Equipment Cabinet CA-8020 or CA-8020A.	Provides mounting support for power amplifier and power supply for easy access. -001, 610-mm (24-in) slide -002, 711-mm (28-in) slide
Slide Mounting Kit CA-8033	622-3527-002	Slide mounting kit for power amplifier and power supply when when installed in Equipment Cabinet CA-8020, CA-8020A, CA-8020B, and CA-8036.	Provides mounting support for power amplifier and power supply for easy accesss.
Transportable Cabinet CA-8035B	622-3501-( )	Watertight fiberglass case for power amplifier and power supply	Stackable case, watertight covers (front and back) with a built-in shock isolated mounting frame.

Table 1-5. Accessories (Cont).

EQUIPMENT	PART NUMBER	FUNCTION	CHARACTERISTICS
Equipment Cabinet CA-8020	622-3417-( )	Rack-mounting cabinet enclosure for HF-80 equipment with standard EIA mounting configurations.	Standard EIA gray cabinet, 1417.6-mm (55.81-in) high. Part no 622-3417-001 does not have floor anchors, part no 622-3417-002 includes floor anchors.
Equipment Cabinet CA-8020A	622-3437-( )	Rack-mounting cabinet enclosure for HF-80 equipment with standard EIA mounting configuration	Standard EIA gray cabinet, 1773.2 mm (69.81 in) high. Part no 622-3437-001 does not have floor anchors, part no 622-3437-002 includes floor anchors.
Extender Card TS-8022	622-3430-001	Extends A9, A10, A11, and A12 circuit cards from the power amplifier chassis for testing and troubleshooting.	Universal power amplifier extender card.

Table 1-6. Options.

EQUIPMENT	PART NUMBER	FUNCTION
Serial Control Card AC-8020	622-3482-001	Provides access to digital and analog monitor information, and control of the power amplifier, independent of the exciter, for diagnostic fault isolation when used with processor control.
TR Relay Kit AC-8023	622-3505-001	Permits transmit and receive capability with one antenna in a 1-kW transceiver installation.
CTD 500 Interface Card A11	638-6351-002	Provides interface between power amplifier and Standard Radio and Telefon AB CTD-500 Exciter.

Table 1-7. Equipment Specifications.

CHARACTERISTIC	SPECIFICATION
Electrical	
Frequency range	1.600 to 30.000 MHz
Rf output power	1000 watts pep ±0.5 dB with two or more equal amplitude tones. 1000 watts average ±0.5 dB with 1-tone continuous duty into a 50-ohm resistive load. Transient peak power output 2200 watts nominal when rf input drive is stepped from 0 volt to +10 dB of overdrive during power amplifier key on conditions in high-power mode. In low-power (500 W) mode, the transient peak power output is 1500 watts nominal under the same conditions.
Rf output load impedance	50-ohm unbalanced with a maximum vswr of 1.3:1 for full rated output power.
Rf input power	0.100 watt maximum required for rated rf output power. Capable of 2 watts average rf input power without damage.
Rf input impedance	50-ohm unbalanced, with a maximum vswr of 1.3:1
Tuning time for one complete tune sequence	350 ms (0.350 seconds) maximum (after receipt of key signal and rf drive). Does not include time required for external tuning units.
Tune fault	Indicated if power amplifier tune cycle (including external tuning units) is incomplete 10* seconds after receipt of key signal and rf drive. (*Can be strapped for up to 20 seconds if required.)
Key control time	
Keyline grounded	Output rf power level within ±1 dB of steady state level within 10 ms after system keyline is grounded.
Keyline ungrounded	Output rf power level reduced by at least 50 dB within 5 ms after system keyline is ungrounded.

Table 1-7. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Gain variation	The variation in overall rf power gain of the power amplifier between any two frequencies in the 1.600- to 30.000-MHz range shall not exceed 4.0 dB.
Rf output inter-modulation distortion	The odd order intermodulation distortion products of the rf output signal at rated peak envelope power shall be at least 30 dB below either tone of a 2-tone, equal amplitude test signal. (The intermodulation distortion and all spurious emissions of the 2-tone test signal generator shall be at least 50 dB below either tone.)
Rf output harmonic content	Second and higher order harmonic output shall be at least 55 dB below the fundamental power output measured into a 50-ohm resistive load at any output power level up to rated power.
Modulation products from the power supply in the power amplifier rf output	Modulation products in the power amplifier output signal are below the rated power output: By at least 65 dB when measured in a 10-Hz bandwidth at any frequency between 100 Hz and 6 kHz from the carrier frequency. By at least 70 dB when measured in a 10-Hz bandwidth at any frequency between 6 kHz and the power supply switching frequency (approximately 20 kHz) from the carrier frequency. By at least 65 dB when measured in a 3-kHz bandwidth at any frequency between the power supply switching frequency (approximately 20 kHz) and 200 kHz from the carrier frequency.
Rf output wide-band noise	Output noise measured in a 3-kHz bandwidth is at least -40 dBm with rf input of power amplifier keyed and terminated in 50 ohms.

Table 1-7. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Control and protection	
Internal gain control (IGC)	A fast acting internal gain control loop protects the rf amplifier circuits from damage in the event of any abnormal condition existing on the following inputs: a. Automatic level control b. Vswr sensors c. Collector dissipations d. Heat sink temperature e. Tune power controls The IGC circuit controls gain with an rf pin diode attenuator before the first amplifier stage.
Automatic level control (ALC)	ALC output operates from 10-kilohm source impedance with a no-load charge time constant less than 0.5 ms to the external load and shunt specified by the interface card (A11) used in the power amplifier. Source impedance to reverse polarity shall be not less than 1 megohm. ALC threshold is switched for high- and low-power levels. This threshold is defined as -0.1 volt (across specified ALC load) at 0.5 dB below rated rf output power. Low-power ALC threshold is defined as -0.1 volt (across specified ALC load) at 3.5 dB below rated rf output power. ALC output is only present during the operate step of the tune sequence. The following chart defines the ALC output characteristics.

INTERFACE CARD A11	EXTERNAL PARALLEL LOAD	MINIMUM ALC VOLTAGE AT +1 DB RF OUTPUT FROM ALC THRESHOLD	
		HIGH PWR	LOW PWR
635-0745-001 (HF-80)	27 kΩ, 6.8 µF	-4.7 V dc	-3.2 V dc
637-2798-001 (671U-4)	4.7 kΩ, 1.1 µF	-5.3 V dc	-3.6 V dc
637-2799-001 (671U-9)	100 kΩ, 2.2 µF	-5.8 V dc	-3.9 V dc

Table 1-7. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Transmitter gain control (TGC)	TGC output source impedance is not more than 1 kilohm and minimum load impedance is 48.7 kilohms. Source impedance to reverse polarity shall be not less than 1 megohm. TGC output switched for high- or low-power output, the TGC output level is adjustable from 0 to -8 V dc at rf output levels of 500 to 1000 watts. When switched for low-power output, the TGC output level is adjusted from 0 to -8 V dc at rf output levels of 100 to 500 watts. The TGC output level is linear with respect to rf output power above a silicon diode gate level.
Primary power requirements	1-kW Power Amplifier HF-8023 and Power Supply HF-8031: 208, 220, 230, or 240 V ac ±10%, single-phase, 47 to 63 Hz Equipment shall not be damaged when subjected to primary power line transients of: ±20% of nominal for a duration of 2 s max. ±50% of nominal for a duration of 50 ms max. Maximum power consumption and typical power consumption under various conditions are listed as follows.

CONDITION	INPUT POWER CONSUMED	POWER FACTOR
Maximum power consumption	3200 W	0.66
Standby (control voltages on)	135 W (typical)	0.75
Operate (unkeyed)	300 W (typical)	0.75
Operate (keyed, no rf drive)	470 W (typical)	0.66
Two-tone test at 1-kW pep	2150 W (typical)	0.66
Single-tone CW at 1-kW	3100 W (typical)	0.66

(Cont)

Table 1-7. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Primary power requirements (Cont)	1-kW Power Amplifier HF-8023 and Power Supply HF-8032: 208, 220, 230, or 240 V ac ±10%, 3-phase, 47 to 63 Hz or 380 to 420 Hz. Equipment shall not be damaged when subjected to primary power line transients of: ±20% of nominal for a duration of 2 s max. ±50% of nominal for a duration of 50 ms max. Maximum power consumption and typical power consumption under various conditions are listed below when operated on 60-Hz power (applicable to Power Supply HF-8032 part no 622-3512-001, -002, -004, and -005).

CONDITION	INPUT POWER CONSUMED	POWER FACTOR
Maximum power consumption	3200 W	0.75
Standby (control voltages on)	135 W (typical)	0.77
Operate (unkeyed)	300 W (typical)	0.78
Operate (keyed, no rf drive)	470 W (typical)	0.74
Two-tone test at 1-kW pep	2150 W (typical)	0.75
Single-tone CW at 1-kW	3100 W (typical)	0.77

(Cont)

Table 1-7. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Primary power requirements (Cont)	Maximum power consumption and typical power consumption under various conditions are listed below when operated on 400-Hz power (applicable only to Power Supply HF-8032 part no 622-3512-002 and -005).

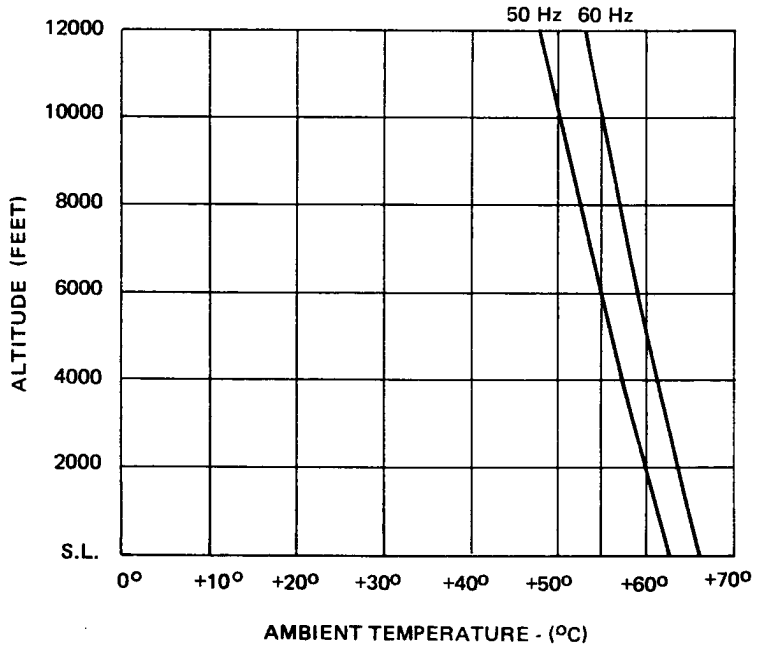
CONDITION	INPUT POWER CONSUMED	POWER FACTOR
Maximum power consumption	3200 W	0.75
Standby (control voltages on)	135 W (typical)	0.68
Operate (unkeyed)	300 W (typical)	0.69
Operate (keyed, no rf drive)	470 W (typical)	0.76
Two-tone test at 1-kW pep	2150 W (typical)	0.94
Single-tone CW at 1-kW	3100 W (typical)	0.94

Power supply protection	A single, gauged, multipole magnetic circuit breaker shall interrupt the main power line to the power supply. Power Supply HF-8031: 30 A, 2-pole Power Supply HF-8032: 25 A, 3-pole Individual power supply circuits shall be protected by front panel mounted, magnetic circuit breakers. Low voltage: 3.0 A, 2-pole Power Supply HF-8031 part no 622-3491-001 and -004, and Power Supply HF-8032 part no 622-3512-001 and -004 5.0 A, 2-pole Power Supply HF-8032 part no 622-3512-002 and -005
(Cont)	

Table 1-7. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Power supply protection (Cont)	50/40 V dc A: 15 A, 1-pole 50/40 V dc B: 15 A, 1-pole 50/40 V dc C: 15 A, 1-pole 50/40 V dc D: 15 A, 1-pole 35 V dc: 15 A, 1-pole Overvoltage protection circuits are incorporated in the power supply for all dc voltage supplies to the power amplifier.
Cooling	The power amplifier and power supply each contains internal blowers to supply adequate cooling of components and circuits. Air intake is filtered through an opening in the front panel and exhausted through an opening in the rear of the equipment. The air filter is 3/4-inch thick polyurethane foam.
Environmental	
Ambient temperature range	
Operating	-30 to +55 °C (-22 to +131 °F), continuous duty at rated output. See following charts for safe operating range of temperature versus altitude.
Nonoperating	-62 to +70 °C (-79 to +158 °F)
Altitude	
Operating	0 to 3048 m (0 to 10 000 ft) above sea level, continuous duty at rated output. See following charts for safe operating range of temperature versus altitude.
Nonoperating and storage	0 to 15 240 m (0 to 50 000 ft) above sea level

Table 1-7. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
50 to 60 Hz	

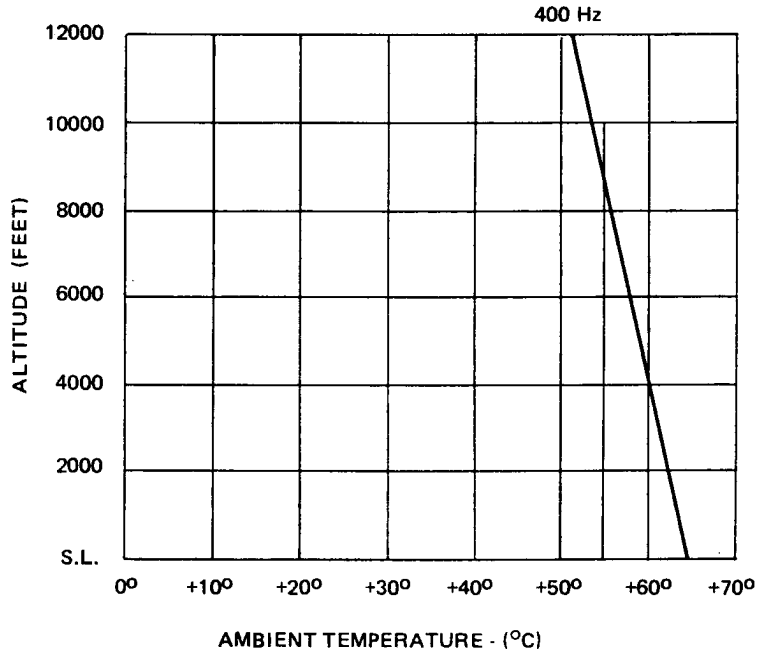
400 Hz	

Table 1-7. Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Ambient humidity range	0 to 95% relative humidity, no condensation
Vibration	Test performed with equipment energized and operational during test and shall be operational immediately following test. Unit vibrated from 5 to 55 Hz in discrete intervals of 1 Hz as follows. 5 to 15 Hz; 0.0762-cm (0.030-in) double amplitude sinusoidal input, 0.0762-cm (0.030-in) total excursion. 16 to 55 Hz; 0.0508-cm (0.020-in) double amplitude sinusoidal input, 0.0508-cm (0.020-in) total excursion or 1 g, whichever is less.
Shock	Test performed with equipment energized and operational during test and shall be operational immediately following test. Apply 3 impacts in each direction in 3 planes, except vertical from the top, for total of 15 impacts. Each impact 15 g average and 11 ms duration.
Physical	
1-kW Power Amplifier HF-8023	
Height	267 mm (10.50 in) max
Width	483 mm (19.00 in) max
Depth	630 mm (24.80 in) max
Weight	27.2 kg (60 lb) max
Power Supply HF-8031 or HF-8032	
Height	222 mm (8.75 in) max
Width	483 mm (19.00 in) max
Depth	648 mm (25.52 in) max
Weight	35.4 kg (78 lb) max 36.3 kg (80 lb) max, HF-8032 (622-3512-002, -005) only

SECTION 2
INSTALLATION

2.1 GENERAL

This section provides the information required to install the HF-80 Solid-State 1-kW Power Amplifier-Power Supply in a 19-inch rack, equipment cabinet, and desk-top cabinet. Preinstallation considerations describe the checks to be made before installation is started. These considerations include location, primary power requirements, antenna circuit strapping, and cooling. Cabling and wiring diagrams illustrate the interconnection requirements of the power amplifier-power supply.

The installation procedures provide unit preparation, power strapping to accommodate the facility power, and other environmental considerations.

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

Postinstallation checks are provided to ensure satisfactory performance of the unit.

WARNING

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

2.2 UNPACKING AND INSPECTING

WARNING

The power amplifier weighs 27.2 kilograms (60 pounds) and the power supply weighs 36.3 kilograms (80 pounds). Observe safety precautions applicable to handling heavy equipment.

1-kW Power Amplifier HF-8023 and Power Supply HF-8031 or HF-8032 should be unpacked and handled with care. Examine each equipment item for evidence of damage during shipping. If damage has occurred during shipping, notify the transportation company involved immediately. Save all packing containers and materials for use when the equipment is repacked for storage or shipment.

2.3 PREINSTALLATION CHECK/REQUIREMENTS

WARNING

The equipment installation personnel may be exposed to high voltage hazardous to health in performing the installation procedures. Observe the normal high-voltage safety precautions when installing the equipment.

2.3.1 Location

The power amplifier and power supply, mounted properly in a rack or equipment cabinet, should be located where the environmental limits specified in the description section of this instruction book will not be exceeded. The rack or equipment cabinet should be located so the flow of cooling air through the power amplifier and power supply will not be impeded. In new installations, the rack or equipment cabinet should be located for easy access to equipment adjustment points and for ease of replacement of equipment items/components.

2.3.2 Primary Power Requirements

2.3.2.1 Power Requirements

All power required to operate the power amplifier is provided by the power supply.

Power Supply HF-8031, part numbers 622-3491-001 and -003, operates from 208/220/230/240 V ac, single-phase, 47 to 63 Hz.

Power Supply HF-8032, part numbers 622-3512-001 and -004, operates from 208/220/230/240 V ac, 3-phase, 47 to 63 Hz.

Power Supply HF-8032, part numbers 622-3512-002 and -005, operates from 208/220/230/240 V ac, 3-phase, 47 to 63 Hz and 380 to 420 Hz.

All three power supplies are strappable for the 208/220/230/240-V ac facility inputs. Strapping is accomplished using jumpering pins supplied with the input power cable connector.

2.3.2.2 Power Strapping

The power supply cable, part numbers 647-2547-001 and -002, is strapped for compatibility with the system primary power source. Strapping of the power supply cable is performed as follows.

a. Determine what the normal range of facility power will be.
b. Using the following chart, determine if the power supply cable should be strapped for 208, 220, 230, or 240 V ac.

IF VOLTAGE IS BETWEEN (V AC)	STRAP FOR (V AC)	JUMPER
188 and 215	208	P1-5 to P1-2
208 and 230	220	P1-5 to P1-3
220 and 240	230	P1-5 to P1-16
230 and 264	240	P1-5 to P1-14

c. Using extractor tool 305183, part no 372-8055-000, supplied with power cable, make the jumper connection in P1 of the ac power cable as determined in step b.
d. The power cable is shipped with one end unterminated. A suitable connector or terminal lugs as required for your system should be installed at this time.

2.3.3 Antenna Circuit Strapping (Refer to figure 2-1)

The rf interlock input to the power amplifier is connected in accordance with the antenna circuit used in the system. The purpose of the rf interlock circuit is to allow external equipment to control the rf output from the power amplifier to prevent "hot switching" of relays, transients, impedance step changes, etc.

CAUTION

If an antenna coupler is used in the system and the antenna circuit strapping is incorrect, damage to the antenna coupler may result.

On the rear of the power amplifier, terminals 1, 2, and 3 of terminal board TB1 (figure 2-2) and the jumper plug connected to CPLR CONT jack J3 (figure 2-2) are used for strapping. The power amplifier is shipped from the factory with the jumper plug installed on the CPLR CONT jack J3 and a jumper connected between TB1-1 (RF INTLK (CPLR)) and TB1-2 (RF INTLK (LOGIC)).

Figure 2-1 illustrates the antenna circuit strapping options for proper operation as follows.

Detail A illustrates antenna circuit strapping when an antenna coupler is not used in the system and a jumper plug is available.

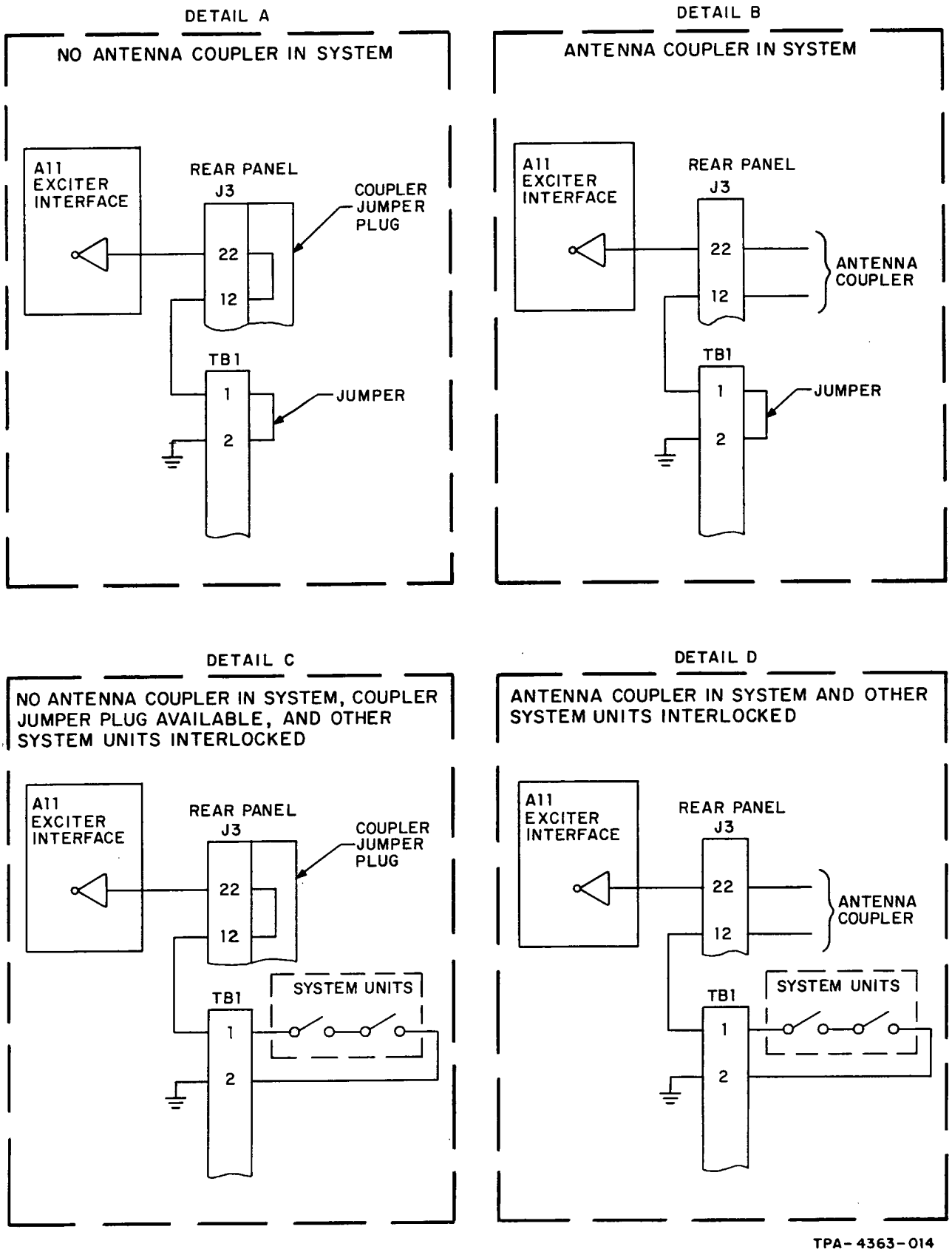
Detail B illustrates the antenna circuit strapping when an antenna coupler is used in the system.

Detail C illustrates antenna circuit strapping when an antenna coupler is not used in the system, a jumper plug is available, and other system units are interlocked by the rf interlock circuit.

Detail D illustrates antenna circuit strapping when an antenna coupler is used in the system and other system units are interlocked by the rf interlock circuit.

NOTE

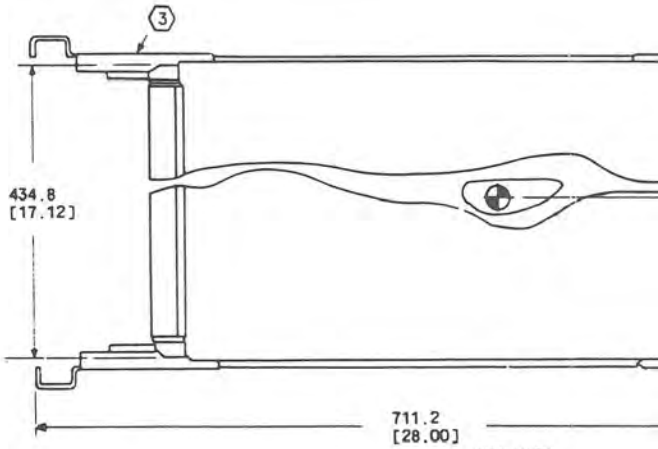
System units interlocked by the rf interlock circuit must be interlocked in series as illustrated in figure 2-1.

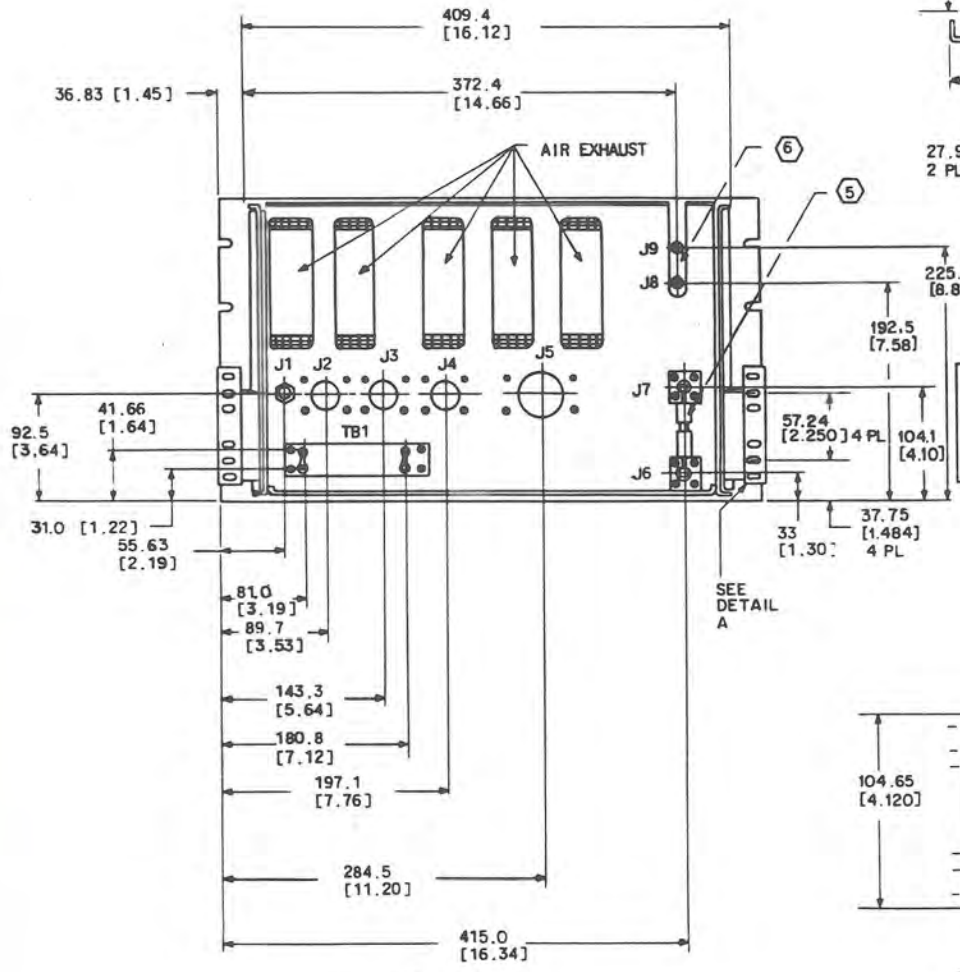


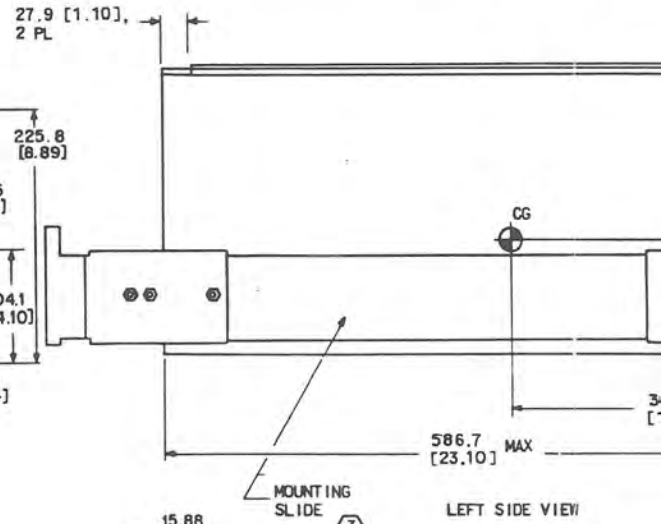
Antenna Circuit Strapping
Figure 2-1

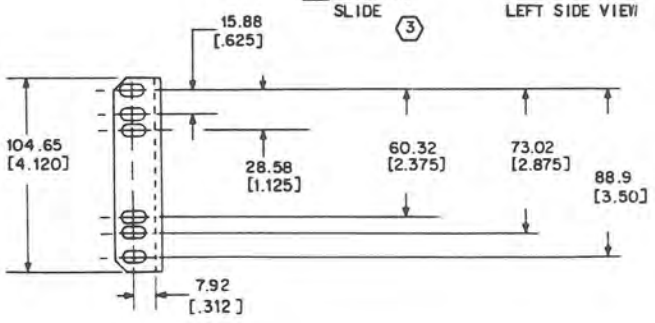
NOTES:

1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. WEIGHT: 27.2 kg [60 LB] WITHOUT MOUNTING SLIDES.
3. OPTIONAL MOUNTING SLIDES
4. CG INDICATES CENTER OF GRAVITY
5. RF COAXIAL JUMPER USED UNLESS EXTERNAL TUNING UNIT IS USED IN SYSTEM.
6. J9 IS ON AN OPTIONAL MODULE AND MAY NOT BE USED.
7. DIM AND TOLERANCING SHALL BE INTERPRETED IN ACCORDANCE WITH ANSI Y14.5.
8. PARENTHETICAL INFO IS FOR REF ONLY.



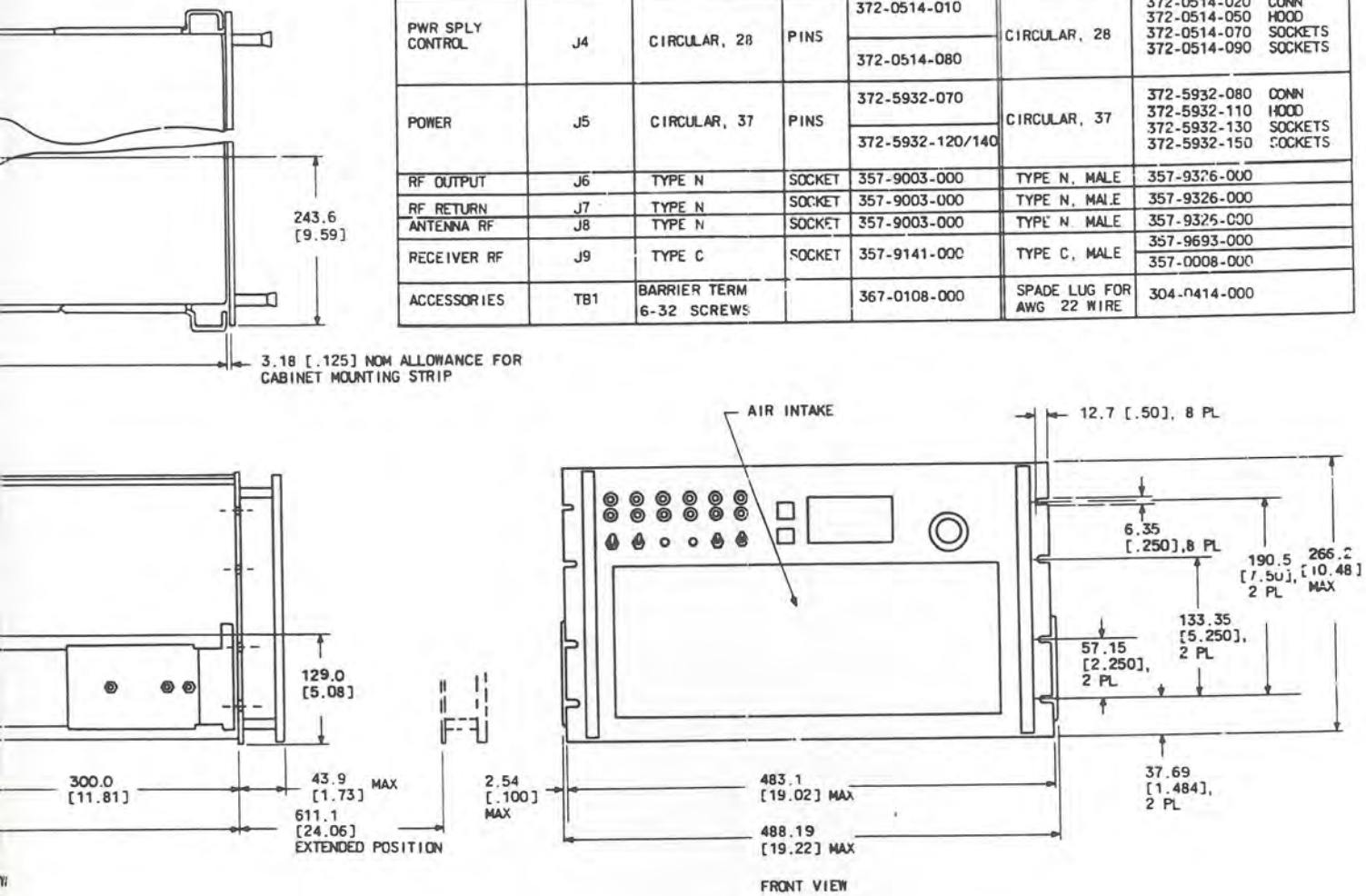






CONNECTOR INFORMATION

FUNCTION	CONNECTOR	TYPE	PLUG/ SOCKET	PART NUMBER	MATING CONNECTOR TYPE	PART NUMBER
RF INPUT	J1	TYPE BNC	SOCKET	357-7248-010	TYPE BNC, MALE	357-9292-000
EXCITER CONTROL	J2	CIRCULAR, 28	PINS	372-0514-010 372-0514-080	CIRCULAR, 28	372-0514-020 CONN 372-0514-050 HOOD 372-0514-090 SOCKETS
COUPLER CONTROL	J3	CIRCULAR, 28	SOCKET	372-0514-030 372-0514-090	CIRCULAR, 28	372-0514-040 CONN 372-0514-050 HOOD 372-0514-080 PINS 372-0514-060 PINS
PWR SPLY CONTROL	J4	CIRCULAR, 28	PINS	372-0514-010 372-0514-080	CIRCULAR, 28	372-0514-020 CONN 372-0514-050 HOOD 372-0514-070 SOCKETS 372-0514-090 SOCKETS
POWER	J5	CIRCULAR, 37	PINS	372-5932-070 372-5932-120/140	CIRCULAR, 37	372-5932-080 CONN 372-5932-110 HOOD 372-5932-130 SOCKETS 372-5932-150 SOCKETS
RF OUTPUT	J6	TYPE N	SOCKET	357-9003-000	TYPE N, MALE	357-9326-000
RF RETURN	J7	TYPE N	SOCKET	357-9003-000	TYPE N, MALE	357-9326-000
ANTENNA RF	J8	TYPE N	SOCKET	357-9003-000	TYPE N MALE	357-9326-000
RECEIVER RF	J9	TYPE C	SOCKET	357-9141-000	TYPE C, MALE	357-9693-000 357-0008-000
ACCESSORIES	TB1	BARRIER TERM 6-32 SCREWS		367-0108-000	SPADE LUG FOR AWG 22 WIRE	304-0414-000



TPB-3446-014

1-kW Power Amplifier HF-8023, Outline and Mounting Dimensions
Figure 2-2

2.3.4 Cooling

The power amplifier is cooled by a self-contained blower system consisting of two tube axial fans that force air from the front of the unit through the power amplifier modules and power combiner and out the rear of the unit.

The power supplies are cooled by negative airflow provided by a tube axial fan mounted on the rear of the unit. Cooling air is brought into the unit through the front filtered air intake and is exhausted at the rear of the unit.

Adequate cooling will be maintained if the airflow to the air intake and air exhaust ports is not impeded.

2.4 CABLING

Refer to figures 2-1 through 2-4 in this section and typical installation figures in the diagrams section of this instruction book for cabling requirements for the power amplifier-power supply. The cables required to make system interconnections are available as kits as described below.

a. Preselector Control Cable AC-8060 connects Exciter HF-8010( ), Exciter HF-8014( ), or Receiver-Exciter HF-8070( ) to Preselector HF-8060.
b. Cable Kit AC-8071A connects the power amplifier to the power supply.
c. Cable Kit AC-8072A connects the power amplifier to Exciter HF-8010( ), Exciter HF-8014( ), or Receiver-Exciter HF-8070( ).
d. Cable Kit AC-8073A connects the power amplifier to an HF-80 type antenna coupler.

These cables may also be fabricated by referring to the applicable kit instructions in the options section of this instruction book, and using connectors provided in Connector Kit AC-8130A.

Observe the following precautions when installing any interconnecting cables or wires to the power amplifier or power supply.

CAUTION

The rf output of the power amplifier must be connected to the antenna coupler, antenna, or rf load when power is applied, or damage to the power amplifier may result.

a. Leave slack in cable and wires to prevent movement damage and to provide for ease of disconnecting the wires and cables when removing the units.
b. Avoid sharp bends in all wires and cables.
c. Connect the safety ground strap to the GND stud provided on the rear of the power amplifier and power supply.

2.5 INSTALLATION PROCEDURES

The following installation procedures apply to the power amplifier and power supply. Installation procedures for associated equipment items (exciter, antenna coupler, etc) are contained in instruction books related to these items. Outline and mounting dimensions (figures 2-2 and 2-3) and a power amplifier-power supply interconnect (figure 2-4) are contained in this section. Schematic diagrams of the power amplifier and power supply and cabling diagrams of typical installations are contained in the diagrams sections of this instruction book.

2.5.1 Power Amplifier and Power Supply

a. If Slide Mount Kit CA-8031 is to be used, perform procedures in paragraph 2.5.2. If Slide Mounting Kit CA-8033 is to be used, refer to the instruction section in the options section of this instruction book and perform the installation procedures. If a slide mounting kit is not to be used, proceed to step b.
b. Lift the power amplifier-power supply into the rack or equipment cabinet.
c. Refer to paragraph 2.4 and make required cable connections.
d. Install the equipment ground straps from the GND terminal on the rear of the power amplifier-power supply to a suitable ground point in the equipment cabinet or rack.

NOTE

Be sure the rack/cabinet ground point is free of paint or foreign matter.

e. Using appropriate hardware, secure the front panel of the equipment to the equipment cabinet.

2.5.2 Installation of Slide Mounting Kit CA-8031

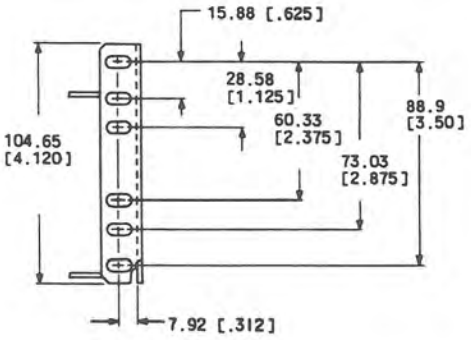
Refer to the appropriate outline and mounting dimensions for the equipment to be slide mounted and to the installation drawing of the slides (figure 2-5); then proceed as follows.

a. On the slide mounts, remove the release screw from the disconnect strip and remove the disconnect strip from each slide mount. (Mark each disconnect strip to designate right-hand and left-hand so that they may be reinstalled properly on the equipment.)

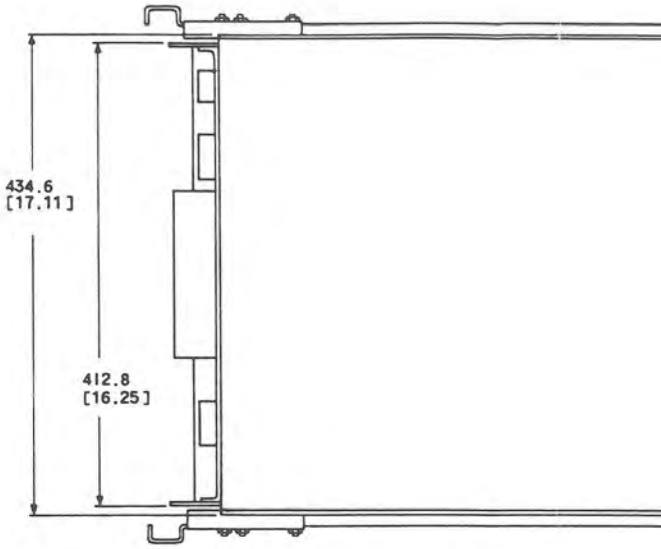
NOTE

Slides are furnished in pairs and marked R.H. and L.H. Right (R.H.) and left (L.H.) refer to the sides of the equipment as viewed from the front panel.

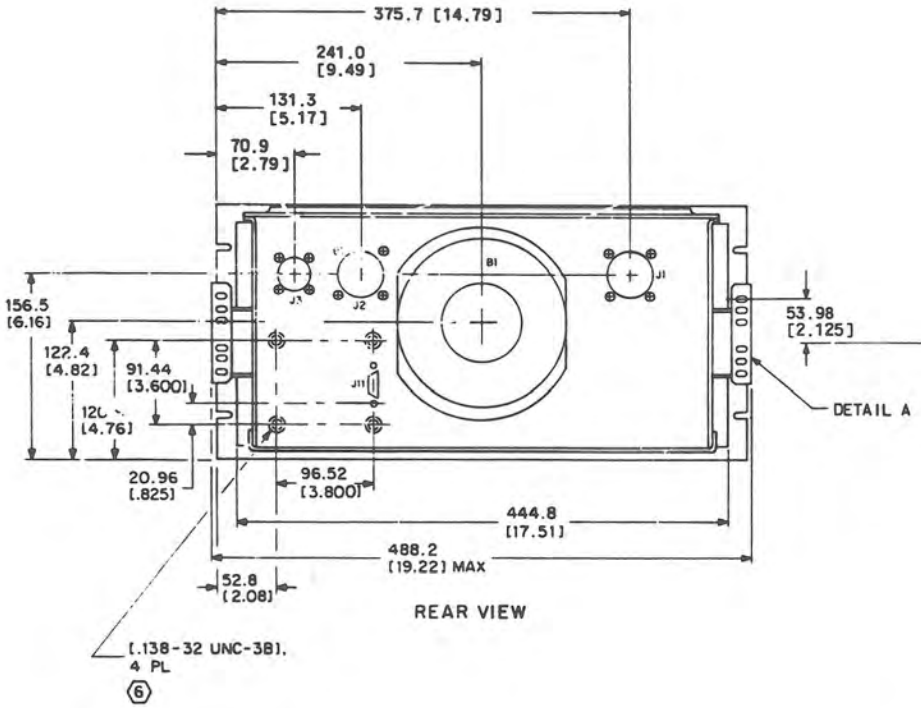
b. Using six 0.164-32 x 3/8 panhead screws, attach each disconnect strip to the sides of the equipment.



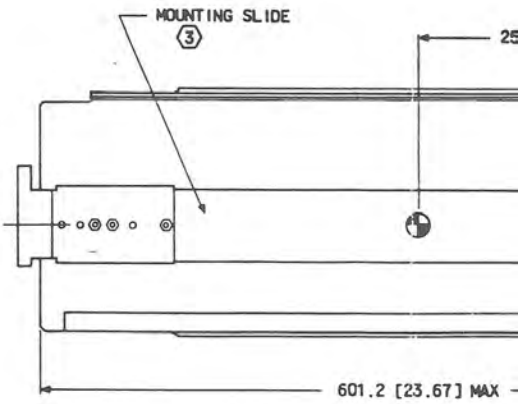
DETAIL A, 2 PL



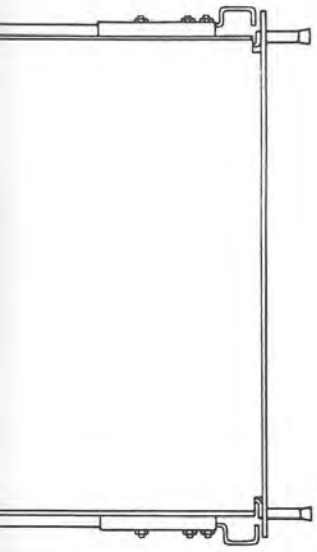
TOP VIEW



REAR VIEW



LEFT SIDE VIEW



NOTES:

(1) DIMENSIONS ARE IN MILLIMETRES [INCHES].

(2) WEIGHT: 35.3 kg [78 LB] WITHOUT MOUNTING SLIDES.

(3) OPTIONAL SLIDE MOUNTING KIT.

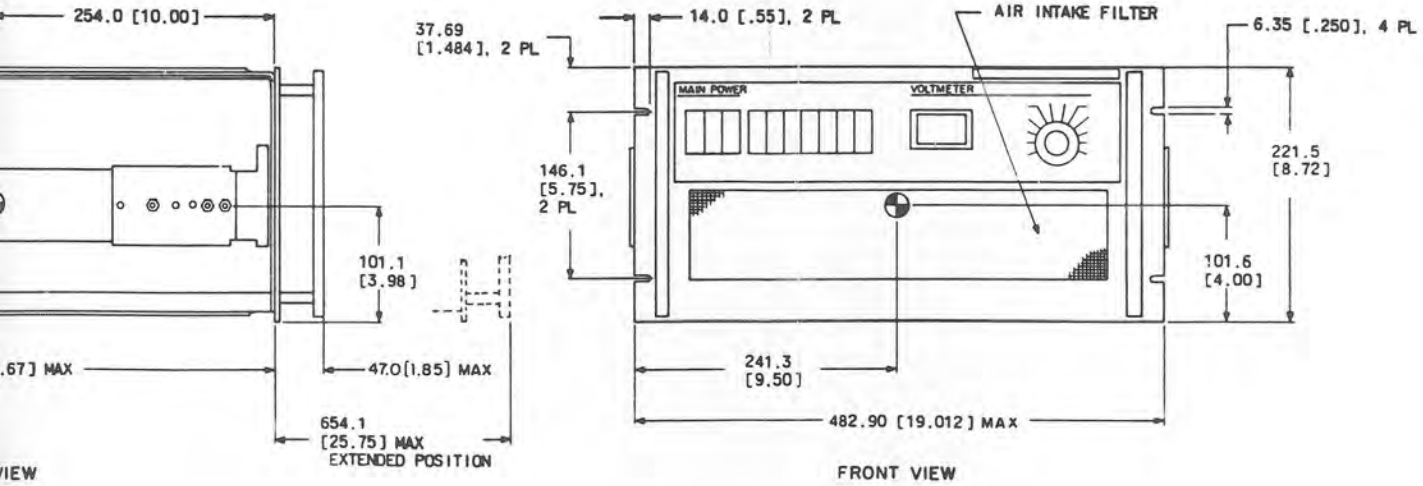
(4) ⊕ DENOTES CENTER OF GRAVITY.

(5) CONNECTOR INFORMATION:

(6) MOUNTING INFO FOR OPTION MODULE. (PART NO 651-4140-001)

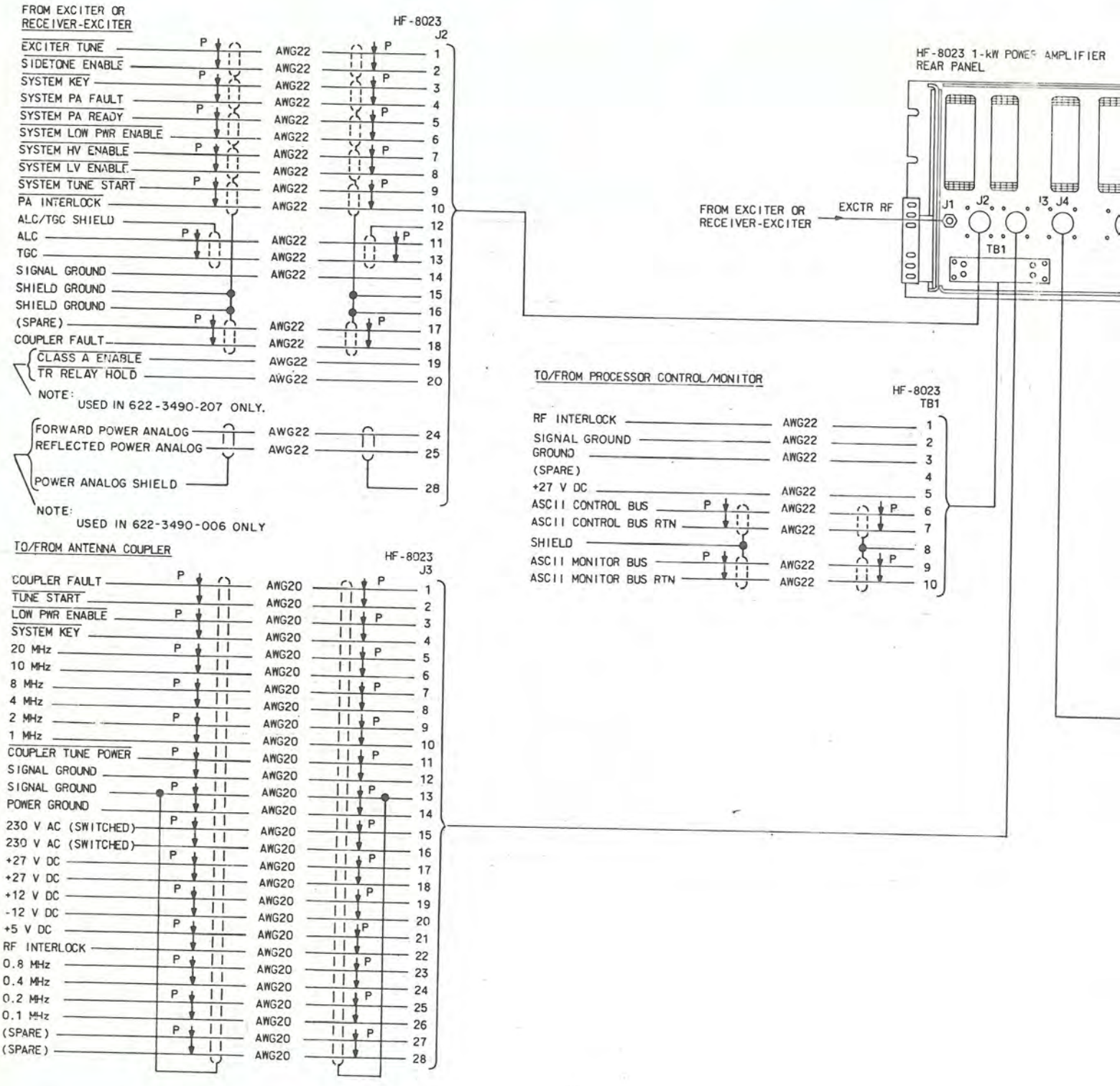
(7) J11 EXISTS ON HF-8032 WITH 400-57 Hz CONVERTER ONLY (622-3512-002 AND -005).

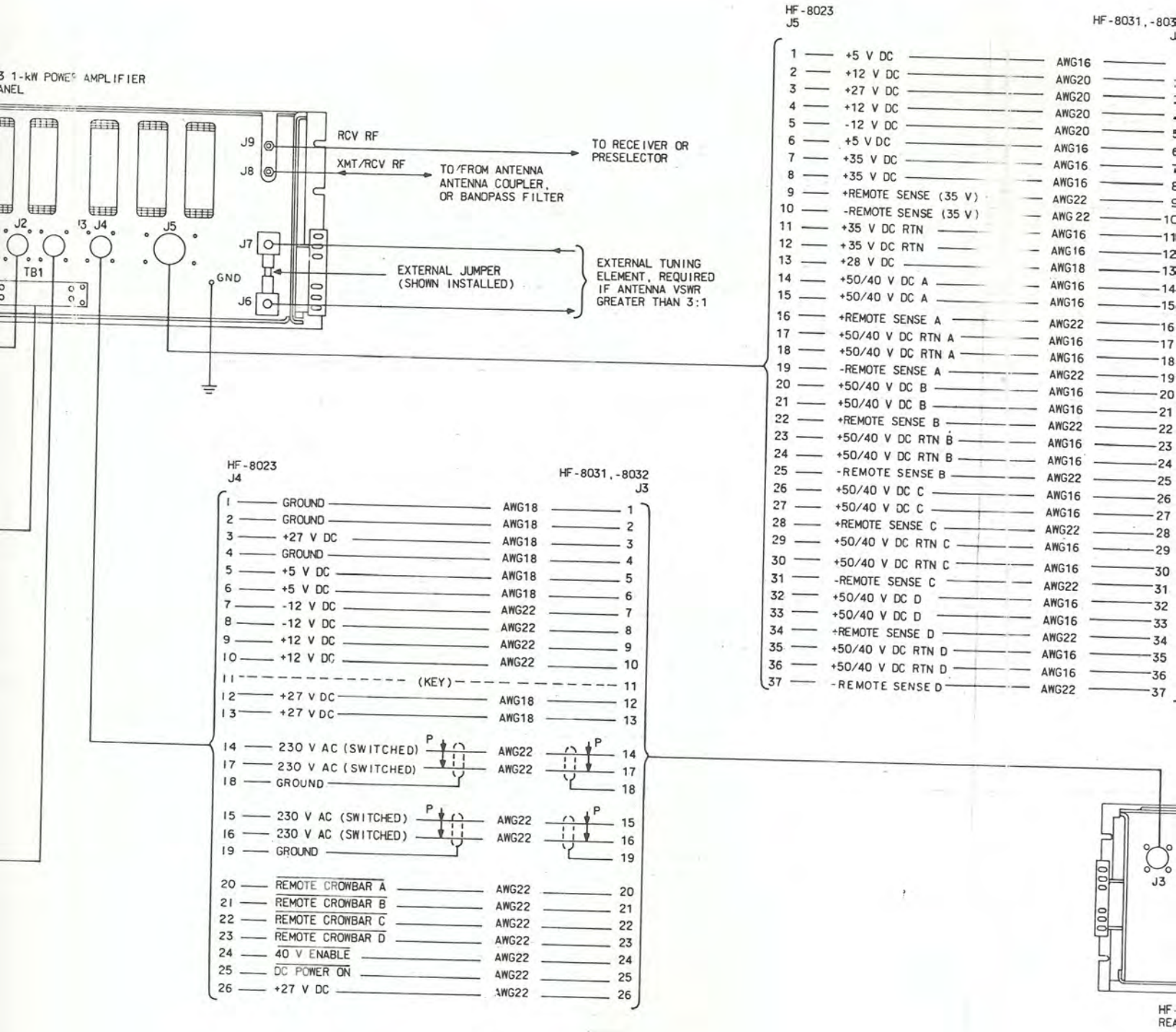
	FUNCTION	CONN	TYPE	PLUG/ SOCKET	PART NO	MATING CONN TYPE	PART NO
	AC POWER	J1	AMP 207486-1 CIRCULAR 23	PINS	372-0513-010	AMP 207485-1 AMP 206138-1 AMP 66258-3 AMP 66569-3	372-0513-020 CONN 372-5932-110 HOOD 372-5932-130 PINS 372-0513-040 PINS
	PA POWER	J2	AMP 206306-1 CIRCULAR 37	SOCKET	372-5932-090	AMP 206305-1 AMP 206138-1 AMP 66099-4 AMP 66103-4	372-5932-100 CONN 372-5932-110 HOOD 372-5932-120 PINS 372-5932-140 PINS
	PA CONTROL	J3	AMP 206038-1 CIRCULAR 28	SOCKET	372-0514-030	AMP 206039-1 AMP 206070-1 AMP 66570-3 AMP 66506-9	372-0514-040 CONN 372-0514-050 HOOD 372-0514-060 PINS 372-0514-080 PINS
(7)	–	J11	CANNON DEMF-9S	SOCKET	371-0164-000	CANNON DEM-9P	371-0168-000

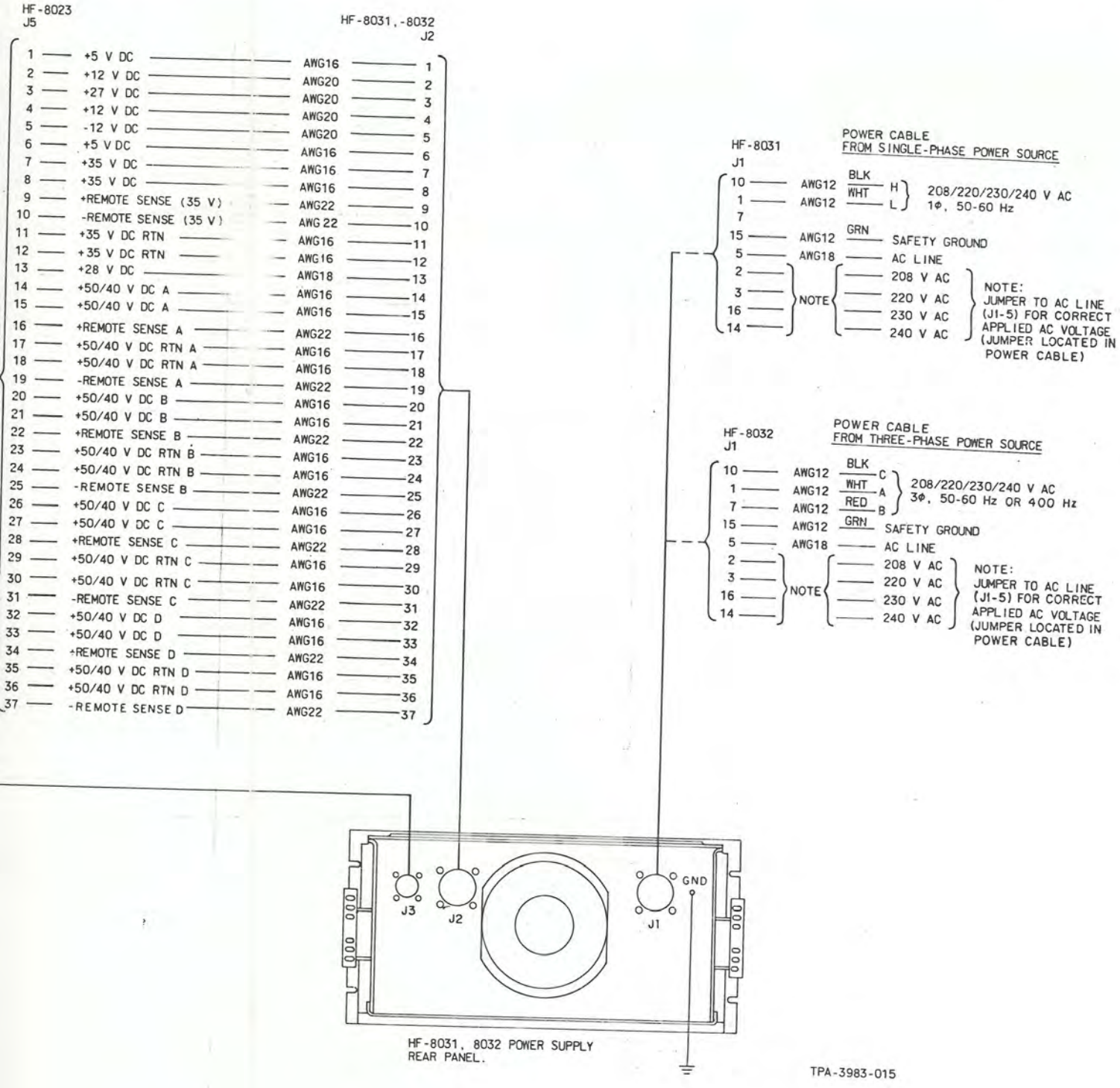


TPB-3445-014

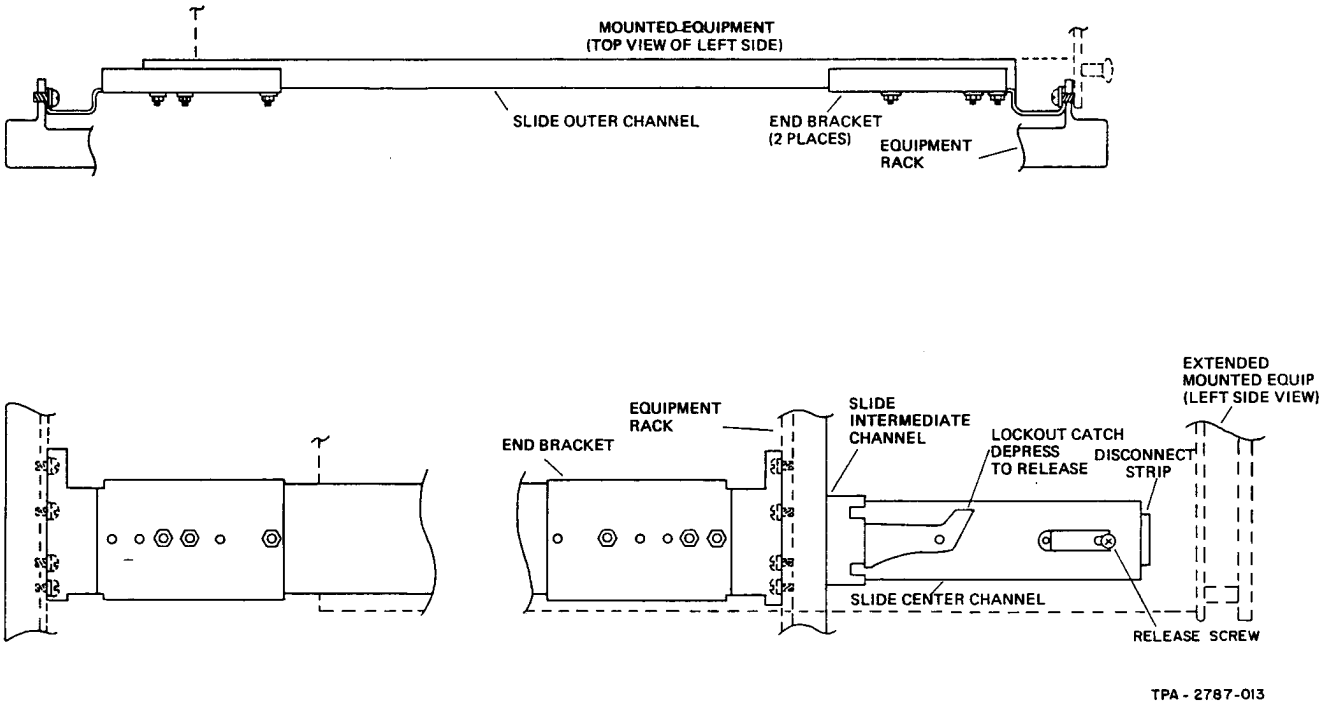
Power Supply HF-8031 and HF-8032, Outline and Mounting Dimensions
Figure 2-3


FROM EXCITER OR RECEIVER-EXCITER
HF-8023 J2
EXCITER TUNE
SIDETONE ENABLE
SYSTEM KEY
SYSTEM PA FAULT
SYSTEM PA READY
SYSTEM LOW PWR ENABLE
SYSTEM HV ENABLE
SYSTEM LV ENABLE
SYSTEM TUNE START
PA INTERLOCK
ALC/TGC SHIELD
ALC
TGC
SIGNAL GROUND
SHIELD GROUND
SHIELD GROUND
(SPARE)
COUPLER FAULT
CLASS A ENABLE
TR RELAY HOLD
AWG22
NOTE: USED IN 622-3490-207 ONLY.
FORWARD POWER ANALOG
REFLECTED POWER ANALOG
POWER ANALOG SHIELD
NOTE: USED IN 622-3490-006 ONLY
HF-8023 1-kW POWER AMPLIFIER REAR PANEL
FROM EXCITER OR RECEIVER-EXCITER
EXCTR RF
J1
J2
J3
J4
TB1
TO/FROM PROCESSOR CONTROL/MONITOR
HF-8023 TB1
RF INTERLOCK
SIGNAL GROUND
GROUND
(SPARE)
+27 V DC
ASCII CONTROL BUS
ASCII CONTROL BUS RTN
SHIELD
ASCII MONITOR BUS
ASCII MONITOR BUS RTN
TO/FROM ANTENNA COUPLER
HF-8023 J3
COUPLER FAULT
TUNE START
LOW PWR ENABLE
SYSTEM KEY
20 MHz
10 MHz
8 MHz
4 MHz
2 MHz
1 MHz
COUPLER TUNE POWER
SIGNAL GROUND
SIGNAL GROUND
POWER GROUND
230 V AC (SWITCHED)
230 V AC (SWITCHED)
+27 V DC
+27 V DC
+12 V DC
-12 V DC
+5 V DC
RF INTERLOCK
0.8 MHz
0.4 MHz
0.2 MHz
0.1 MHz
(SPARE)
(SPARE)
AWG20


3 1-kW POWER AMPLIFIER
ANEL
J9
J8
RCV RF
XMT/RCV RF
TO RECEIVER OR
PRESELECTOR
TO/FROM ANTENNA
ANTENNA COUPLER,
OR BANDPASS FILTER
J2
J3
J4
J5
J7
J6
TB1
GND
EXTERNAL JUMPER
(SHOWN INSTALLED)
EXTERNAL TUNING
ELEMENT, REQUIRED
IF ANTENNA VSWR
GREATER THAN 3:1
HF-8023
J5
HF-8031,-803
J
1 +5 V DC AWG16
2 +12 V DC AWG20
3 +27 V DC AWG20
4 +12 V DC AWG20
5 -12 V DC AWG20
6 +5 V DC AWG16
7 +35 V DC AWG16
8 +35 V DC AWG16
9 +REMOTE SENSE (35 V) AWG22
10 -REMOTE SENSE (35 V) AWG 22
11 +35 V DC RTN AWG16
12 +35 V DC RTN AWG16
13 +28 V DC AWG18
14 +50/40 V DC A AWG16
15 +50/40 V DC A AWG16
16 +REMOTE SENSE A AWG22
17 +50/40 V DC RTN A AWG16
18 +50/40 V DC RTN A AWG16
19 -REMOTE SENSE A AWG22
20 +50/40 V DC B AWG16
21 +50/40 V DC B AWG16
22 +REMOTE SENSE B AWG22
23 +50/40 V DC RTN B AWG16
24 +50/40 V DC RTN B AWG16
25 -REMOTE SENSE B AWG22
26 +50/40 V DC C AWG16
27 +50/40 V DC C AWG16
28 +REMOTE SENSE C AWG22
29 +50/40 V DC RTN C AWG16
30 +50/40 V DC RTN C AWG16
31 -REMOTE SENSE C AWG22
32 +50/40 V DC D AWG16
33 +50/40 V DC D AWG16
34 +REMOTE SENSE D AWG22
35 +50/40 V DC RTN D AWG16
36 +50/40 V DC RTN D AWG16
37 -REMOTE SENSE D AWG22
HF-8023
J4
HF-8031,-8032
J3
1 GROUND AWG18 1
2 GROUND AWG18 2
3 +27 V DC AWG18 3
4 GROUND AWG18 4
5 +5 V DC AWG18 5
6 +5 V DC AWG18 6
7 -12 V DC AWG22 7
8 -12 V DC AWG22 8
9 +12 V DC AWG22 9
10 +12 V DC AWG22 10
11 (KEY) 11
12 +27 V DC AWG18 12
13 +27 V DC AWG18 13
14 230 V AC (SWITCHED) AWG22 14
17 230 V AC (SWITCHED) AWG22 17
18 GROUND 18
15 230 V AC (SWITCHED) AWG22 15
16 230 V AC (SWITCHED) AWG22 16
19 GROUND 19
P
20 REMOTE CROWBAR A AWG22 20
21 REMOTE CROWBAR B AWG22 21
22 REMOTE CROWBAR C AWG22 22
23 REMOTE CROWBAR D AWG22 23
24 40 V ENABLE AWG22 24
25 DC POWER ON AWG22 25
26 +27 V DC AWG22 26
J3
HF-
REA



HF-80 Solid-State 1-kW Power Amplifier-
Power Supply, Interconnect Diagram
Figure 2-4



Installation of Slides in Rack Mounts
Figure 2-5

c. Using three 0.190-32 x 1/2 flathead screws, lockwashers, and nuts, attach each end (adapter) bracket to the ends of each slide outer channel.

NOTE

Select the end (adapter) brackets in pairs and mount with the heads of the screws inserted in the slide outer channel; then through the end brackets so that the lockwashers and nuts are outward away from the channel.

d. Using four 0.190-32 x 5/16 hexhead screws, flat washers, and lockwashers at each end bracket, secure the end bracket to the equipment cabinet with hardware on the inside (nearest the end bracket). Thread each screw into the tapped holes in the equipment.

NOTE

Do not use center hole in each hole grouping for attaching the slide assemblies to the cabinet. These holes are used later to secure the front panel of the equipment to the cabinet.

WARNING

Use heavy equipment transport aids to install the units in a rack or cabinet. Verify that the rack or cabinet is securely anchored before attempting installation of these units.

e. Fully extend the slide channels. Lift the equipment into position and square it properly with the equipment cabinet. Engage the disconnect strips into the extended center section of the slide outer channel and install the release screw removed in step a.
f. Refer to cabling paragraphs and make the required cable connections.
g. Install the equipment ground strap (#14 AWG or larger) from the GND terminal on the rear of the equipment to a suitable ground point in the equipment cabinet.

WARNING

When installing a power amplifier or power supply in an equipment rack with other equipment installed, grasp handles on the front panel in the middle of the handle. Grasping handles at the top or bottom may cause injuries to the hands and/or fingers.

CAUTION

Use care when sliding the units to the rear to prevent damage to the interconnecting cable.

NOTE

Be sure that the cabinet ground point is free from paint or foreign matter.

h. Press the lockout catch on each side of the extended center section and slide the equipment completely into the equipment cabinet.
i. Using appropriate hardware, secure the front panel of the equipment to the equipment cabinet.

2.6 POSTINSTALLATION CHECK/REQUIREMENTS

2.6.1 Mechanical Inspection

Perform the following inspection before operating the power amplifier or power supply.

a. Verify that all panels are in place and all attaching screws are secure.
b. Verify that unit ground straps are secured on rear of the units and on cabinet (or facility) ground terminal.

c. Verify that all system interconnect cables are connected securely to rear connectors of units.
d. Verify that front panel filter of unit is clean and not obstructed and that air inlet is entirely clear.
e. Verify that cooling air outlets on rear of the units are not obstructed and that air outlet is entirely clear.

2.6.2 Electrical Check

Perform the system ALC and TGC adjustments outlined in the maintenance section of this instruction book.

Perform the operational checks in the operation section of this instruction book before placing the power amplifier or power supply in service.

SECTION 3
OPERATION

3.1 GENERAL

Operation of the HF-80 Solid-State 1-kW Power Amplifier-Power Supply is controlled by the system exciter or receiver-exciter. Functionally, the operation of the power amplifier-power supply is identical for both fixed and remote station installations. During maintenance routines, the power amplifier and power supply may be operated manually from the power amplifier front panel.

NOTE

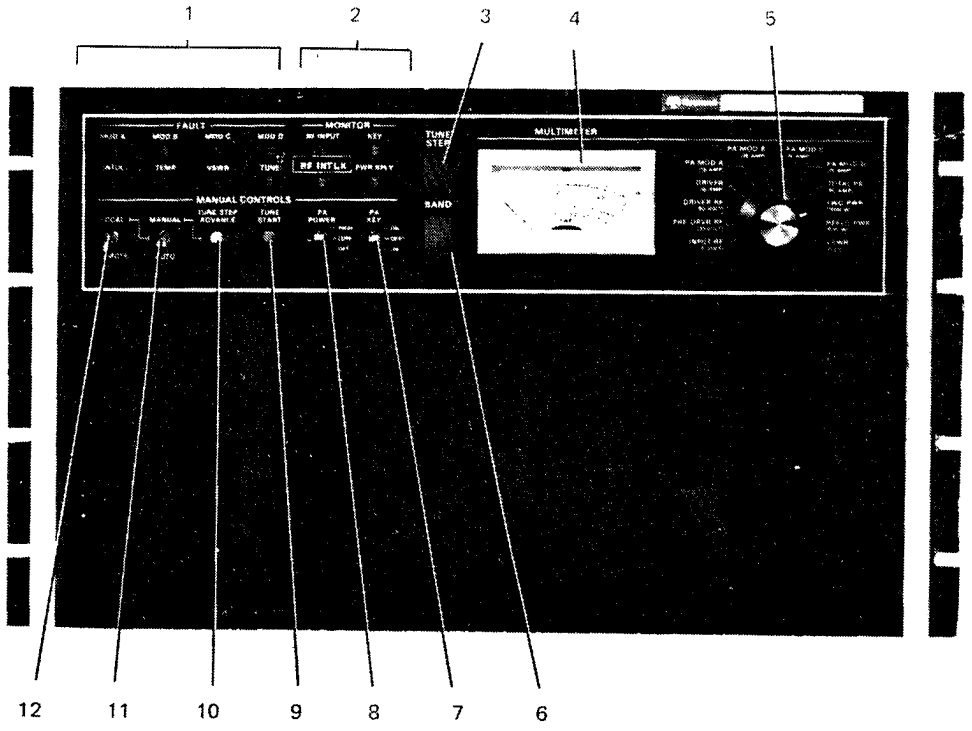
All references to operational modes of the power amplifier and power supply in this instruction book are defined as follows: remote operation is operational control from the system exciter (or receiver-exciter), local operation is operational control from the power amplifier front panel.

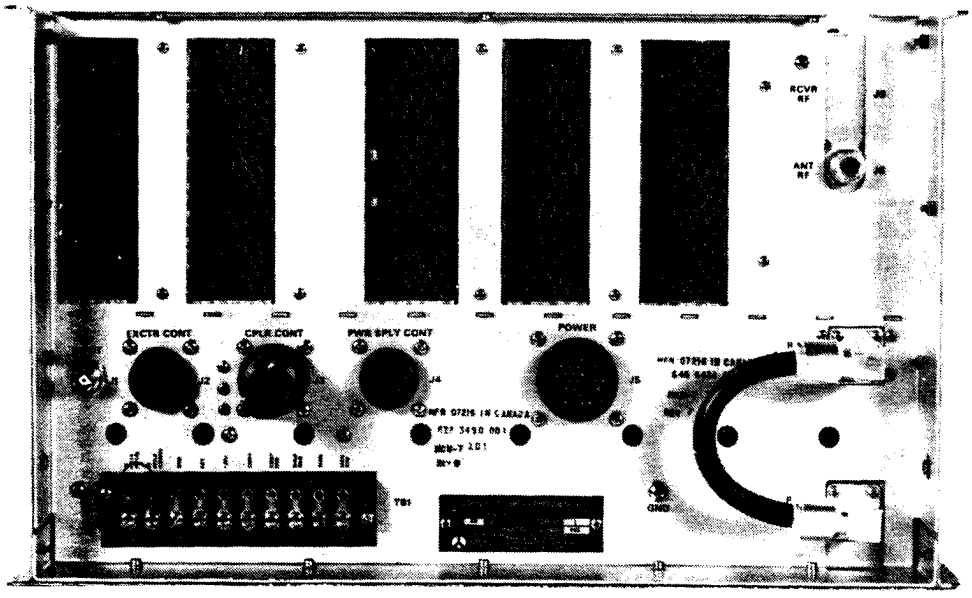
3.2 CONTROLS AND INDICATORS

Controls and indicators necessary for normal operation of the HF-80 Solid-State 1-kW Power Amplifier-Power Supply are located on the system exciter (or receiver-exciter). Refer to the associated equipment instruction book for a definition of these controls and indicators. Note that the power amplifier and power supply have no filaments; therefore, if your exciter (or receiver-exciter) has a power amplifier standby mode, it is not required.

All controls and indicators necessary to perform normal maintenance routines on the HF-80 Solid-State 1-kW Power Amplifier-Power Supply are located on the front panels of the power amplifier and power supply.

Controls and indicators for the power amplifier are displayed in figure 3-1 and listed in table 3-1. Controls and indicators for the power supply are displayed in figure 3-2 and listed in table 3-2.





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1-kW Power Amplifier HF-8023, Controls and Indicators
Figure 3-1

Table 3-1. 1-kW Power Amplifier HF-8023, Controls and Indicators.

INDEX NO	CONTROL OR INDICATOR	FUNCTION
1	FAULT indicators (red)	
	MOD A	Indicates power amplifier output module A (A3) is faulted or removed.
	MOD B	Indicates power amplifier output module B (A4) is faulted or removed.
	MOD C	Indicates power amplifier output module C (A5) is faulted or removed.
	MOD D	Indicates power amplifier output module D (A6) is faulted or removed.
	INTLK	Indicates a card or module not installed or connector not mated properly.
	TEMP	Indicates temperature upper limit of one or more heat sinks has been exceeded and has unkeyed the power amplifier.
	VSWR	Indicates vswr of load presented to power amplifier has exceeded 3:1 and has unkeyed the power amplifier.
	TUNE	Power amplifier failed to complete a tune cycle in 10* seconds or less (includes tune time of external tuned elements). (*Can be strapped for up to 20 seconds if required.)
2	MONITOR indicators (green)	
	RF INPUT	Indicates sufficient rf drive level for a tune cycle to be initiated.
	KEY	Indicates system key applied to/from exciter (key interlock is satisfied).
	RF INTLK	Indicates external control (antenna coupler, etc) interlock is satisfied.
	PWR SPLY	Indicates dc power supply voltages required for power amplifier operation are present.

Table 3-1. 1-kW Power Amplifier HF-8023, Controls and Indicators (Cont).

INDEX NO	CONTROL OR INDICATOR	FUNCTION
3	TUNE STEP indicator	Displays the number of the tune step. Should a fault occur during a tune step, that step number is held and further tuning ceases. Step 1 - Indicates receipt of tune start pulse and power amplifier is ready to tune upon application of a key. Step 2 - Senses the frequency of the rf input drive and switches in the appropriate low-pass filter. Step 3 - Applies tune power output for external tuning devices (antenna coupler, line flattener, or bandpass filter). Step 4 - Applies TGC (transmit gain control) to establish exciter-power amplifier system gain. Step 5 - Operates at selected power level (1000 W or 500 W).
	MULTIMETER	
4	Meter	Measures power amplifier parameters as selected by the MULTIMETER switch. Top scale (V/I scale) indicates voltage and current readings. Bottom scale (PWR scale) indicates power readings.
5	Switch	Selects the following power amplifier parameters (value in parenthesis is full-scale value).
	INPUT RF (5 VOLT)	Indicates voltage level of rf input drive signal.
	PRE-DRVR RF (15 VOLT)	Indicates voltage level of predriver stage rf output.
(Cont)	DRIVER RF (50 VOLT)	Indicates voltage level of driver stage rf output.

Table 3-1. 1-kW Power Amplifier HF-8023, Controls and Indicators (Cont).

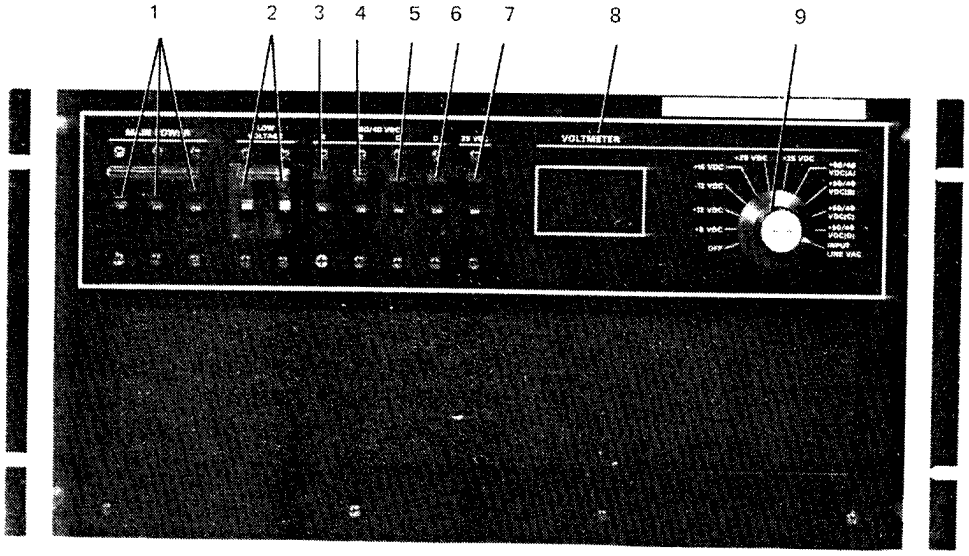
INDEX NO	CONTROL OR INDICATOR	FUNCTION
5 (Cont)	DRIVER (15 AMP)	Indicates dc current on driver output stage drains.
	PA MOD A (15 AMP)	Indicates dc current on module A (A3) collectors.
	PA MOD B (15 AMP)	Indicates dc current on module B (A4) collectors.
	PA MOD C (15 AMP)	Indicates dc current on module C (A5) collectors.
	PA MOD D (15 AMP)	Indicates dc current on module D (A6) collectors.
	TOTAL PA (50 AMP)	Indicates total dc current on all power amplifier module collectors (A3 through A6).
	FWD PWR (1500 W)	Indicates forward power at power amplifier output.
	REFLD PWR (500 W)	Indicates reflected power at power amplifier output.
	VSWR (5.0:1)	Displays actual vswr of load connected to the power amplifier output.
6	BAND indicator	Displays the number of the selected low-pass filter band.
	1	1.60 to 2.29 MHz
	2	2.30 to 3.39 MHz
	3	3.40 to 4.89 MHz
	4	4.90 to 6.99 MHz
	5	7.00 to 9.99 MHz
	6	10.00 to 14.49 MHz
	7	14.50 to 20.99 MHz
	8	21.00 to 29.99 MHz
	MANUAL CONTROLS	
7	PA KEY switch	Controls application of a local power amplifier key input.
(Cont)	ON (up)	Key applied in a locked condition.

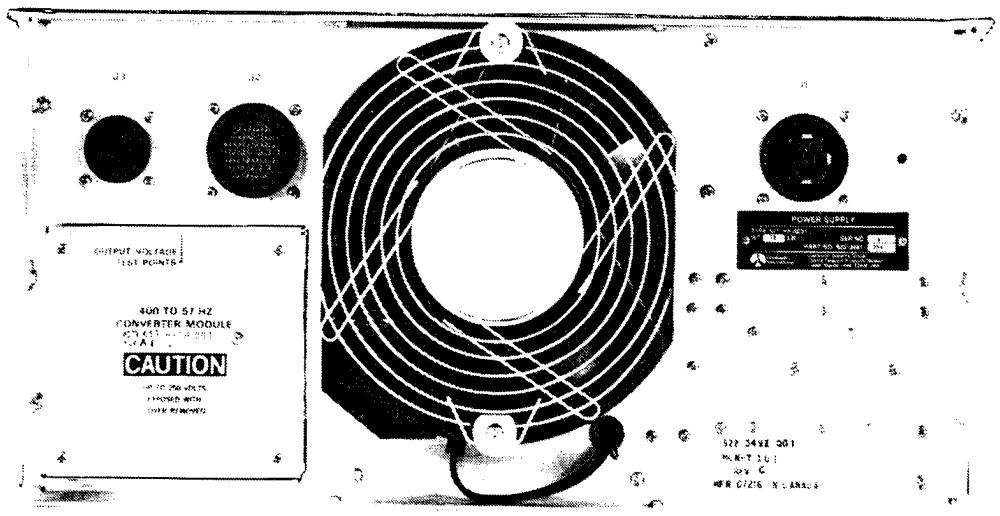
Table 3-1. 1-kW Power Amplifier HF-8023, Controls and Indicators (Cont).

INDEX NO	CONTROL OR INDICATOR	FUNCTION
7 (Cont)	OFF	No key applied.
	ON (down)	Key applied in a momentary condition.
8	PA POWER switch	Controls power amplifier output power level when the LOCAL/REMOTE switch is in the LOCAL position.
	HIGH	Allows the power amplifier to operate at high power (1000 W) when tune cycle complete and with sufficient input rf signal applied.
	LOW	Allows the power amplifier to operate at low power (500 W) when tune cycle complete and with sufficient input rf signal applied.
	OFF	Prevents power amplifier power from being applied.
9	TUNE START switch	Applies a tune start signal locally to initiate a tune cycle.
10	TUNE STEP ADVANCE switch	Advances tune cycle one step at a time when the LOCAL/REMOTE switch is in the LOCAL position and the MANUAL/AUTO switch is set to MANUAL.
11	MANUAL/AUTO switch	Controls the tune cycle of the power amplifier when the LOCAL/REMOTE switch is set to LOCAL.
	MANUAL	Allows the power amplifier to be stepped through its tune cycle one step at a time.
	AUTO	Allows the power amplifier to automatically cycle through all steps of the complete tune cycle.

Table 3-1. 1-kW Power Amplifier HF-8023, Controls and Indicators (Cont).

INDEX NO	CONTROL OR INDICATOR	FUNCTION
12	LOCAL/REMOTE switch	Sets the power amplifier for local or remote operation.
	LOCAL	Requires tune cycle control and operation of the power amplifier be accomplished locally.
	REMOTE	Requires both tune cycle control and the operation of the power amplifier be accomplished remotely, with a receiver-exciter or exciter.





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Power Supply HF-8031 and HF-8032, Controls and Indicators
Figure 3-2

Table 3-2. Power Supply HF-8031 and HF-8032, Controls and Indicators.

INDEX NO	CONTROL OR INDICATOR	FUNCTION
1	MAIN POWER circuit breaker A1CB1	(Power Supply HF-8031) 30 A, 2-pole main power line circuit breaker. (Power Supply HF-8032) 25 A, 3-pole main power line circuit breaker.
2	LOW VOLTAGE circuit breaker A1CB2	2-pole low-voltage line circuit breaker (inputs to low-voltage module A5 and blower power) 3 A for Power Supply HF-8031 part no 622-3491-001 and Power Supply HF-8032 part no 622-3512-001; 5 A for Power Supply HF-8032 part no 622-3512-002.
3	50/40 VDC-A circuit breaker A1CB3	15 A, single-pole output from 1000-watt converter module A2 (J7-A1). Paralleled with 50/40 VDC-B, A1CB4.
4	50/40 VDC-B circuit breaker A1CB4	15 A, single-pole output from 1000-watt converter module A2 (J7-A1). Paralleled with 50/40 VDC-A, A1CB3.
5	50/40 VDC-C circuit breaker A1CB5	15 A, single-pole output from 1000-watt converter module A3 (J6-A1). Paralleled with 50/40 VDC-D, A1CB6.
6	50/40 VDC-D circuit breaker A1CB6	15 A, single-pole output from 1000-watt converter module A3 (J6-A1). Paralleled with 50/40 VDC-C, A1CB5.
7	35 VDC circuit breaker A1CB7	15 A, single-pole output from 500-watt converter module A4 (J9-A1).
	VOLTMETER	
8	Meter A6	Digital voltmeter measures parameters as selected by the VOLTMETER switch.
9	Switch A1S1	Selects the following power supply parameters:
	OFF	Digital voltmeter not selected.
	+5 VDC	Indicates output voltage level at J10-27 (commoned with J10-24, 25, 26 in low-voltage module A5).
(Cont)		

Table 3-2. Power Supply HF-8031 and HF-8032, Controls and Indicators (Cont).

INDEX NO	CONTROL OR INDICATOR	FUNCTION
9 (Cont)	+12 VDC	Indicates output voltage level at J10-3 (commoned with J10-1, 2, 4 in low-voltage module A5).
	-12 VDC	Indicates output voltage level at J10-22 (commoned with J10-20, 21, 23 in low-voltage module A5).
	+15 VDC	Indicates output voltage level at J10-8 (commoned with J10-7 in low-voltage module A5).
	+28 VDC	Indicates output voltage level at J10-6 (commoned with J10-5 in low-voltage module A5).
	+35 VDC	Indicates output voltage level at J2-7, 8 (protected by 15-A circuit breaker, A1CB7).
	+50/40 VDC (A)	Indicates output voltage level at J2-14, 15 (protected by 15-A circuit breaker A1CB3).
	+50/40 VDC (B)	Indicates output voltage level at J2-20, 21 (protected by 15-A circuit breaker A1CB4).
	+50/40 VDC (C)	Indicates output voltage level at J2-26, 27 (protected by 15-A circuit breaker A1CB5).
	+50/40 VDC (D)	Indicates output voltage level at J2-32, 33 (protected by 15-A circuit breaker A1CB6).
	INPUT LINE VAC	Indicates input voltage to low-voltage module A5 (protected by 3.5-A circuit breaker A1CB2). Measured by isolation transformer T2 and indicates absolute line-to-line voltage supplied to power supply.

3.3 OPERATING PROCEDURES

3.3.1 Local Operation

CAUTION

The power amplifier must be connected to a dummy load or an antenna circuit that is tunable to the selected frequency. Failure to do so may result in damage to the power amplifier. It is recommended that a 50-ohm dummy load be used for initial installation tests.

NOTE

Normal operation of the power amplifier may be obtained over a wide range of internal parameters, therefore, a chart (table 3-3) is provided for documentation of operating characteristics of the power amplifier. This chart should be completed for each power amplifier when it is at its optimum performance. In the event of a failure, reference to the chart may be helpful in locating the failed part/module.

To operate the HF-80 Solid-State 1-kW Power Amplifier-Power Supply, proceed as follows.

NOTE

Exciter or receiver-exciter, preselector (if used), antenna coupler or tuned element (if used), antenna, and power sources for all equipments must be connected to provide normal operation.

Throughout operating procedures, the power supply VOLTMETER reads directly. The power amplifier MULTIMETER voltage and current indications are read from the top (V/I) scale and power indications are read from the bottom (PWR) scale.

a. Set facility power circuit breakers to OFF.
b. Set exciter or receiver-exciter controls as follows.
    1. PWR to off (if HF-80 equipment, switch in outward position)
    2. PA PWR to OFF
    3. KEY to NORM
    4. Pilot carrier to off
    5. MIC to OFF
    6. CONT to LCL
    7. MODE to USB or ISB
    8. FREQUENCY KHZ to 4000.00
c. Set power supply controls as follows.
    1. MAIN POWER to OFF
    2. All other circuit breakers to ON
    3. VOLTMETER to INPUT LINE VAC
d. Set power amplifier controls as follows.
    1. LOCAL/REMOTE to LOCAL
    2. MANUAL/AUTO to MANUAL

3. PA POWER to OFF
4. PA KEY to OFF
5. MULTIMETER to FWD PWR (1500 W)

e. If used, set preselector, bandpass filter, line flattener, and/or antenna coupler power to on.
f. Set facility power circuit breakers to ON.
g. Set exciter or receiver-exciter power to on. Exciter or receiver-exciter fault light should be on. Change any frequency digit on exciter or receiver-exciter. Fault should clear (light extinguished).
h. Set power supply MAIN POWER circuit breaker to ON. Power supply blower comes on.

NOTE

If power supply blower does not start, immediately set MAIN POWER circuit breaker OFF. Check power supply strapping, blowers, and 400 Hz to 57 Hz converter (if used).

i. Read line voltage on power supply VOLTMETER. If necessary, change strapping. 188 to 215 V ac should be strapped for 208 V ac, 208 to 230 V ac should be strapped for 220 V ac, 220 to 240 V ac should be strapped for 230 V ac, 230 to 264 V ac should be strapped for 240 V ac.

NOTE

The strapping should be based on the nominal supplied voltage. The following limits apply to strapping: 208 V ac - NLT 188 and NMT 228 V ac, 220 V ac - NLT 198 and NMT 242 V ac, 230 V ac - NLT 207 and NMT 253 V ac, 240 V ac - NLT 216 and NMT 264 V ac. The 220-V ac or 230-V ac positions should be used when their limits are not likely to be exceeded by surges and sags in voltage.

j. Check voltages on power supply VOLTMETER.
1. +5 VDC equals +4.8 to 5.4 volts.
2. +12 VDC equals +12 $\pm$0.6 volts.
3. -12 VDC equals -12 $\pm$0.6 volts.
4. +15 VDC equals +15 $\pm$1.2 volts.
5. All others (except INPUT LINE VAC) equals 0 $\pm$1.0 volt.

k. Check power amplifier front panel.
1. RF INTLK monitor is lighted.
2. TUNE STEP 1 lighted.
3. BAND 0 lighted.

l. Set power amplifier PA POWER switch to LOW. Check power amplifier.
1. Blowers come on.

NOTE

If blowers do not start, immediately set PA POWER switch to OFF. Check switching in power supply and power amplifier. Check cables between power supply and power amplifier.

2. Power amplifier MULTIMETER lights come on.
3. PWR SPLY monitor is lighted.

4. TUNE STEP 1 is lighted. If not lit, press TUNE START button.

m. Check voltages on power supply VOLTMETER.
   1. +5 VDC, +12 VDC, -12 VDC, +15 VDC same limits as step j.
   2. +28 VDC equals +28 ±0.8 volts.
   3. +35 VDC equals +35 ±1.0 volts.
   4. All +50/40 VDC positions equal +46 ±1.0 volts.

n. Set power amplifier PA KEY switch to ON (up).

o. Check power amplifier front panel.
   1. KEY monitor is lighted.
   2. RF INPUT monitor is lighted.

p. Exciter or receiver-exciter meter reads NMT +23 dBm (XMT OUT position).

q. Press power amplifier TUNE STEP ADVANCE switch once.

r. Check power amplifier front panel.
   1. TUNE STEP 2 lighted.
   2. BAND 3 lighted.

s. Check +50/40 VDC voltages on power supply VOLTMETER. All +50/40 V dc supplies equal +46 ±1.0 volts.

t. Press power amplifier TUNE STEP ADVANCE switch once.

u. Check power amplifier front panel.
   1. TUNE STEP 3 lighted.
   2. FWD PWR (1500 W) position on MULTIMETER indicates 200 ±10 watts (tune power mode). If not, adjust TUNE PWR A1A4R14 (located at top front under the dust cover on power amplifier) for 200 watts.

v. Check +50/40 VDC voltages on power supply VOLTMETER. All +50/40 V dc supplies equal +46 ±1.0 volts.

w. Press power amplifier TUNE STEP ADVANCE switch once.

x. Check power amplifier front panel.
   1. TUNE STEP 4 lighted.
   2. FWD PWR (1500 W) position on MULTIMETER indicates 250 ±15 watts. If not, adjust LOW TGC A1A4R16 (located at top front under the dust cover on power amplifier) for 250 watts.
   3. TOTAL PA (50 AMP) position on MULTIMETER indicates 20 to 35 amperes (NMT 35 amperes).

y. Check +50/40 VDC voltages on power supply VOLTMETER. All +50/40 V dc supplies equal +46 ±1.0 volts.

z. Press power amplifier TUNE STEP ADVANCE switch once.

aa. Check power amplifier front panel.
   1. TUNE STEP 5 lighted.
   2. RF INPUT monitor extinguishes.
   3. FWD PWR (1500 W) position on MULTIMETER indicates 0 watt.

ab. Check +50/40 VDC voltages on power supply VOLTMETER. All +50/40 V dc supplies equal +50 ±1.0 volts.

ac. Set exciter or receiver-exciter MODE to CW.

ad. Set KEY switch on exciter or receiver-exciter to LOCK position.

ae. Check indications on power amplifier MULTIMETER.
   1. FWD PWR (1500 W) indicates 480 ±25 watts. If not, adjust LOW ALC A1A4R10 (located at top front under the dust cover on power amplifier) for 480 watts.
   2. TOTAL PA (50 AMP) indicates 20 to 35 amperes. (Over 35 amperes indicates a problem, repair before operating unit.)
   3. PA MOD A (15 AMP) indicates 7.5 ±2.5 amperes.
   4. PA MOD B (15 AMP) indicates 7.5 ±2.5 amperes.
   5. PA MOD C (15 AMP) indicates 7.5 ±2.5 amperes.

6. PA MOD D (15 AMP) indicates 7.5 ±2.5 amperes.
7. DRIVER (15 AMP) indicates 1.0 to 4.0 amperes.
8. DRIVER RF (50 VOLT) indicates 5 to 25 volts.
9. PRE-DRVR RF (15 VOLT) indicates 0.5 to 4.0 volts.
10. INPUT RF (5 VOLT) indicates 0.8 ±0.5 volt.
11. VSWR (5.0:1) indicates approximately 1.0 (NMT 1.3).
12. REFLD PWR (500 W) indicates approximately 0 watt (NMT 5 watts if dummy load connected directly to power amplifier). Reading may be higher if external tuning units, antenna, or antenna coupler are used.

af. Set power amplifier MULTIMETER to FWD PWR (1500 W) position.
ag. Press power amplifier TUNE STEP ADVANCE switch once.
ah. Power amplifier TUNE STEP 4 lighted.
ai. Set power amplifier PA POWER switch to HIGH position.
aj. Power amplifier FWD PWR (1500 W) indicates approximately 500 ±25 watts (on MULTIMETER). If not, adjust HIGH TGC A1A4R17 (located at top front under the dust cover on power amplifier) for 500 watts.
ak. Press power amplifier TUNE STEP ADVANCE switch once.
al. Check power amplifier front panel.
1. TUNE STEP 5 lighted.
2. FWD PWR (1500 W) position on MULTIMETER indicates approximately 980 ±50 watts. If not, adjust HIGH ALC A1A4R7 (located at top front under the dust cover on power amplifier) for 980 watts.

am. Set KEY switch on exciter or receiver-exciter to NORM.
an. Set power amplifier PA KEY switch to OFF.

3.3.2 Remote (Normal) Operation

3.3.2.1 Setup

CAUTION

The power amplifier must be connected to a dummy load or an antenna circuit that is tunable to the selected frequency. Failure to do so may result in damage to the power amplifier. It is recommended that a 50-ohm dummy load be used for initial installation checks.

a. Set the power supply controls as follows.
1. MAIN POWER of OFF
2. All other circuit breakers to ON
3. VOLTMETER to INPUT LINE VAC

b. Set the power amplifier controls as follows.
1. LOCAL/REMOTE to REMOTE
2. MANUAL/AUTO to AUTO
3. PA POWER to OFF
4. PA KEY to OFF
5. MULTIMETER to FWD PWR (1500 W)

c. Set exciter or receiver-exciter controls as follows.
1. PWR to off (if HF-80 equipment, switch in outward position)
2. PA PWR to OFF
3. KEY to NORM

4. Pilot carrier to off
5. MIC to OFF
6. CONT to LCL
7. MODE to CW
8. FREQUENCY KHZ to 4000.00

d. Set facility circuit breakers to ON.
e. Set exciter or receiver-exciter power to on. Exciter or receiver-exciter fault light should be on. Change any frequency digit or exciter or receiver-exciter. Fault should clear (light extinguishes).
f. If used, set preselector, bandpass filter, line flattener, and/or antenna coupler power to on.
g. Set the power supply MAIN POWER circuit breaker to ON.
h. The power supply blower comes on.
i. Set exciter or receiver-exciter PA PWR switch to STBY.
j. On front panel of the power amplifier:
   1. RF INTLK monitor is lighted.
   2. TUNE STEP 1 is lighted.
   3. BAND 0 is lighted.
k. Check voltages on power supply VOLTMETER.
   1. +5 VDC equals +4.8 to +5.4 volts.
   2. +12 VDC equals +12 ±0.6 volts.
   3. -12 VDC equals -12 ±0.6 volts.
   4. +15 VDC equals +15 ±1.2 volts.
   5. All others (except INPUT LINE VAC) equals 0 ±1.0 volt.
l. Set exciter or receiver-exciter PA PWR switch to HIGH PWR.
m. Power amplifier blower comes on.
n. On front panel of the power amplifier:
   1. RF INTLK monitor is lighted.
   2. PWR SPLY monitor is lighted.
   3. TUNE STEP 1 is lighted.
   4. BAND 0 is lighted.
o. Check voltages on the power supply VOLTMETER.
   1. +5 VDC, +12 VDC, -12 VDC, +15 VDC same limits as step k.
   2. +28 VDC equals +28 ±0.8 volts.
   3. +35 VDC equals +35 ±1.0 volts.
   4. All +50/40 VDC positions equal +46 ±1.0 volts.
p. Set exciter or receiver-exciter KEY switch to LOCK.
q. Check front panel of the power amplifier.
   1. Power amplifier immediately advances through TUNE STEP 5 (not more than 10 seconds; 350 milliseconds if an external tuning equipment is not used).
   2. On MULTIMETER:
      (a) FWD PWR (1500 W) indicates 980 ±50 watts.
      (b) TOTAL PA (50 AMP) indicates 35 to 50 amperes. (Over 50 amperes indicates a problem. Immediately unkey the unit, select another frequency near 4.0 MHz, and rekey the unit.)
      (c) PA MOD A (15 AMP) indicates 10 ±2.5 amperes.
      (d) PA MOD B (15 AMP) indicates 10 ±2.5 amperes.
      (e) PA MOD C (15 AMP) indicates 10 ±2.5 amperes.
      (f) PA MOD D (15 AMP) indicates 10 ±2.5 amperes.
      (g) DRIVER (15 AMP) indicates 2.0 to 7.0 amperes.
      (h) DRIVER RF (50 VOLT) indicates 10 to 35 volts.
      (i) PRE-DRVR RF (15 VOLT) indicates 1.0 to 7.0 volts.

(j) INPUT RF (5 VOLT) indicates 0.5 ±2.2 volts.
(k) VSWR (5.0:1) indicates approximately 1.0 (NMT 1.3).
(l) REFLD PWR (500 W) indicates approximately 0 watt (NMT 10 watts).

r. Set power amplifier MULTIMETER to TOTAL PA (50 AMP) position.

NOTE

Local operation, paragraph 3.3.1, and remote (normal) operation setup, paragraph 3.3.2 are checkout procedures. Once checked out, the HF-80 Solid-State 1-kW Power Amplifier-Power Supply is ready for remote unattended operation, paragraph 3.3.2.2.

3.3.2.2 General

CAUTION

The power amplifier must be connected to a dummy load or an antenna circuit that is tunable to the selected frequency. Failure to do so may result in damage to the power amplifier.

a. Perform setup procedures in paragraph 3.3.2.1.
b. Set the exciter or receiver-exciter controls as follows.
   1. MODE switch to desired operating mode.
   2. FREQUENCY KHZ to desired operating frequency.
   3. MIC switch as required to use microphone or off if line audio inputs are being used.
   4. PHONES switch as required to monitor sidetone.
   5. Key transmitter or transceiver and apply audio signal or microphone input for modulation.
   6. Observe exciter or receiver-exciter meter indication. Reading should indicate audio in compression range. If meter reading is not in compression range, make transmit audio line adjustments as outlined in applicable exciter or receiver-exciter instruction book.
c. Normal mode operations may now be performed.

3.3.3 Operation With Reduced Capabilities

3.3.3.1 Operation With One or Two Power Amplifier Output Modules Off-Line

NOTE

Operation with less than four power amplifier output modules produces pep as follows.

	MODULES OFF-LINE	
MODE	1	2
High power	500 watts	250 watts
Low power	250 watts	125 watts

a. When a power amplifier output module is taken off-line for any reason, set the associated power supply circuit breaker to OFF.

CAUTION

Normal cooling must be maintained; the power amplifier output modules remaining on-line produce as much heat as always and the power combiner produces more heat due to the inactive input ports.

b. Perform normal operating procedures and maintain normal cooling.

3.3.3.2 Operation With One or Two Power Amplifier Output Modules Removed

NOTE

Available output power with power amplifier output modules removed is the same as noted in paragraph 3.3.3.1.

a. With power amplifier output module(s) removed, note the following.
   1. Associated power supply circuit breaker(s) are OFF.
   2. Check that the air gates of the removed module(s) are closed. (This is necessary to channel all cooling air through the modules that are installed.)
   3. After module is removed, position slide and retainer clip as if the module is installed. Secure slide and retainer in place. (This is necessary to prevent generation of a false crowbar if the associated circuit breaker is set on.)
   4. Check that all shields and covers are in place and secured.

CAUTION

Normal cooling must be maintained; the power amplifier output modules remaining on-line produce as much heat as always and the power combiner produces more heat due to the inactive input ports.

b. Perform normal operating procedures and maintain normal cooling.

3.3.3.3 Operation While Removing/Replacing One or Two Power Amplifier Output Modules

CAUTION

This is an emergency procedure and should only be used if transmissions are being made that cannot be interrupted and a repair must be made immediately. If time/usage permits, removal/replacement of power amplifier output modules should be made with all power off.

NOTE

Available output power with power amplifier output modules removed is the same as noted in paragraph 3.3.3.1.

CAUTION

The associated circuit breaker must remain off until the replacement module is in place and secured.

a. Set to OFF the power supply circuit breaker associated with power amplifier output module to be removed.
b. Slide power amplifier out from its rack-mounted position.
c. Remove power amplifier top dust cover.
d. Loosen the retainer clip and slide associated with the power amplifier output module to be removed.

NOTE

Use care to loosen only the slide associated with power amplifier output module that is to be removed. Loosening any other slides will activate a crowbar signal and could shut down the unit.

e. Carefully slide power amplifier output module from its position. (If power amplifier output module is not to be replaced immediately, check that associated air gates are closed.)
f. Install the replacement power amplifier output module in position.
g. Secure in place using retainer clip and slide.

NOTE

Be certain that the retainer slide is securely fastened in the appropriate position. If the slide is not properly in place when power is reapplied, a crowbar will be developed, disabling the replacement module.

h. Set the associated circuit breaker on the power supply to ON and continue operation.

NOTE

Unit can remain keyed while associated circuit breaker is set to on. When the associated circuit breaker is set to ON, an immediate increase in output power is to be expected.

i. Reinstall unit dust cover.
j. Slide power amplifier back into equipment rack and secure in place.

TUNE STEP	VOLTMETER SWITCH POSITION	FREQUENCY (MHz)									
		1.6	2.0	3.0	4.0	6.0	8.0	12.0	18.0	24.0	29.9
LOW POWER											
3	(BAND INDICATION)	1	1	2	3	4	5	6	7	8	8
	FWD PWR (1500 W)										
4	FWD PWR (1500 W)										
	TOTAL PA (50 AMP)										
5	(key not applied)										
	FWD PWR (1500 W)										
5	(key applied)										
	FWD PWR (1500 W)										
	TOTAL PA (50 AMP)										
	PA MOD A (15 AMP)										
	PA MOD B (15 AMP)										
	PA MOD C (15 AMP)										
	PA MOD D (15 AMP)										
	DRIVER (15 AMP)										
	DRIVER RF (50 VOLT)										
	PRE-DRVR RF (15 VOLT)										
	INPUT RF (5 VOLT)										
	VSWR (5.0:1)										
	REFLD PWR (500 W)										
HIGH POWER											
3	(BAND INDICATION)	1	1	2	3	4	5	6	7	8	8
	FWD PWR (1500 W)										
4	FWD PWR (1500 W)										
	TOTAL PA (50 A)										
5	(key not applied)										
	FWD PWR (1500 W)										
5	(key applied)										
	FWD PWR (1500 W)										
	TOTAL PA (50 AMP)										
	PA MOD A (15 AMP)										
	PA MOD B (15 AMP)										
	PA MOD C (15 AMP)										
	PA MOD D (15 AMP)										
	DRIVER (15 AMP)										
	DRIVER RF (50 VOLT)										
	PRE-DRVR RF (15 VOLT)										
	INPUT RF (5 VOLT)										
	VSWR (5.0:1)										
	REFLD PWR (500 W)										
CLASS A (NOTE)											
3	(BAND INDICATION)	1	1	2	3	4	5	6	7	8	8
	FWD PWR (150 W)										
4	FWD PWR (150 W)										
	TOTAL PA (50 A)										
5	(key not applied)										
	FWD PWR (150 W)										
5	(key applied)										
	FWD PWR (150 W)										
	TOTAL PA (50 AMP)										
	PA MOD A (15 AMP)										
	PA MOD B (15 AMP)										
	PA MOD C (15 AMP)										
	PA MOD D (15 AMP)										
	DRIVER (15 AMP)										
	DRIVER RF (50 VOLT)										
	PRE-DRVR RF (15 VOLT)										
	INPUT RF (5 VOLT)										
	VSWR (5.0:1)										
	REFLD PWR (500 W)										

NOTE: CLASS A OPERATION IS ONLY AVAILABLE WITH 1 kW POWER AMPLIFIER HF-8023, PART NUMBER 622-3490-207.

Table 3-3. 1-kW Power Amplifier HF-8023, Operating Characteristics.

	8.0	12.0	18.0	24.0	29.9
	5	6	7	8	8
	5	6	7	8	8
4	5	6	7	8	8

Power Supply HF-8031, serial no. ____

Power Supply HF-8032, serial no. ____

1 kW Power Amplifier HF-8023, serial no. ____

- Driver Module A2, MCN ____ REV ____
- Power Amplifier Output Module A3, MCN ____ REV ____
- Power Amplifier Output Module A4, MCN ____ REV ____
- Power Amplifier Output Module A5, MCN ____ REV ____
- Power Amplifier Output Module A6, MCN ____ REV ____
- Power Combiner A7, MCN ____ REV ____
- Low-Pass Filter Assembly A8, MCN ____ REV ____
- Digital Control Card A9, MCN ____ REV ____
- Analog Control Card A10, MCN ____ REV ____
- Interface Card A11, MCN ____ REV ____

Date ________ Characteristics Measured By __________

3, PART NUMBER 622-3490-207.

TPA-5452-014

SECTION 4
THEORY

4.1 GENERAL

This section contains information describing the operating principles of the HF-80 Solid-State 1-kW Power Amplifier-Power Supply on a functional level. The theory is divided into three parts: paragraph 4.2 provides power amplifier-power supply theory, paragraph 4.3 provides 1-kW Power Amplifier HF-8023 theory, and paragraph 4.4 provides Power Supply HF-8031 and HF-8032 theory.

4.2 POWER AMPLIFIER/POWER SUPPLY FUNCTIONAL THEORY

4.2.1 Typical System (Refer to figure 4-1)

The HF-80 Solid-State 1-kW Power Amplifier-Power Supply forms a complete general purpose, high-frequency, solid-state, 1-kW linear power amplifier. The power amplifier and power supply are companion units.

In addition to these two units, a typical 1-kW transceiver system includes the following units: an antenna coupler, a preselector, and a receiver-exciter. However, these units may not all be required. For instance, the preselector may not be required if the selectivity of your receiver is suitable for your system. The antenna coupler would not be required if the antenna presents a 50-ohm impedance that would keep the vswr below the 1.3:1 ratio.

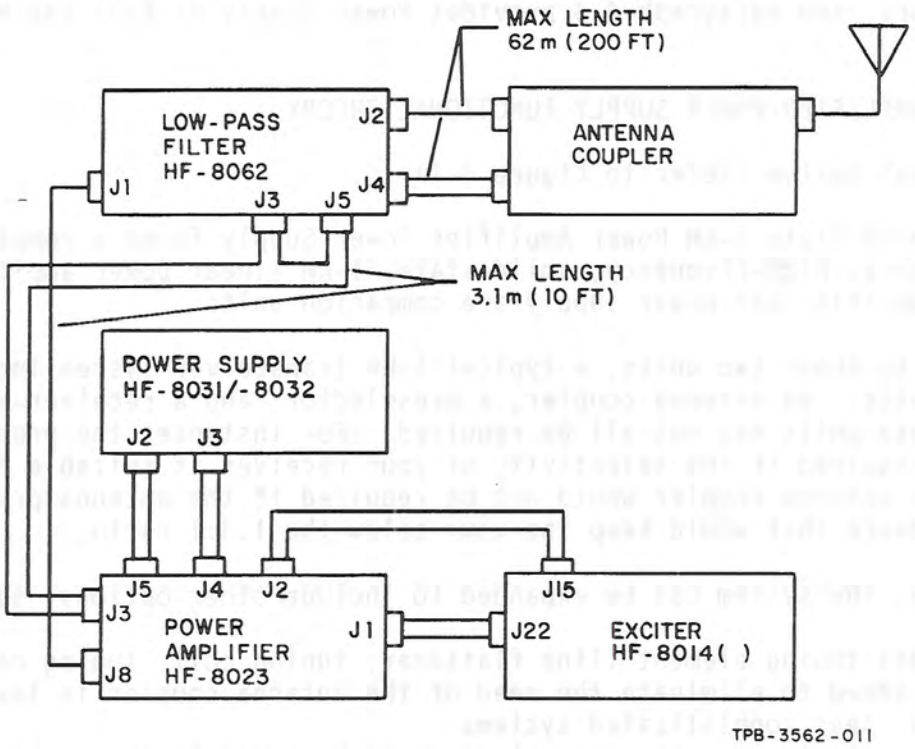
Additionally, the system can be expanded to include other options, such as:

a. An external tuning element (line flattener, tuning coil, tuning capacitor) could be added to eliminate the need of the antenna coupler in less expensive, less sophisticated systems.
b. A remote control or processor control could be added to the system. If a processor control is used, serial control monitor and test circuits are available at the power amplifier.
c. A low-pass filter could be used to reduce undesirable transmitted noise from the output spectrum.

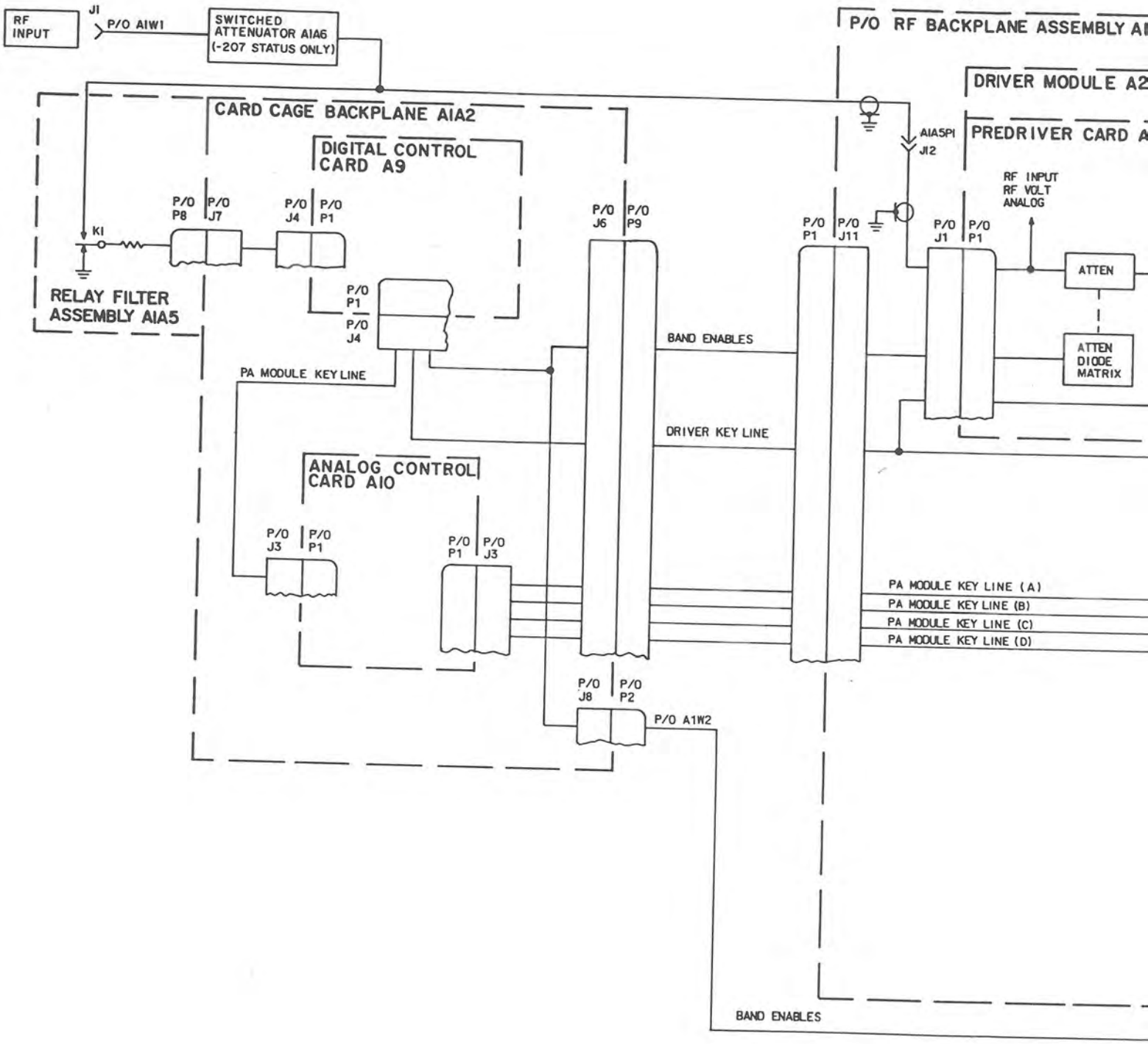
Refer to the diagrams section of this instruction book for typical system interconnect diagrams.

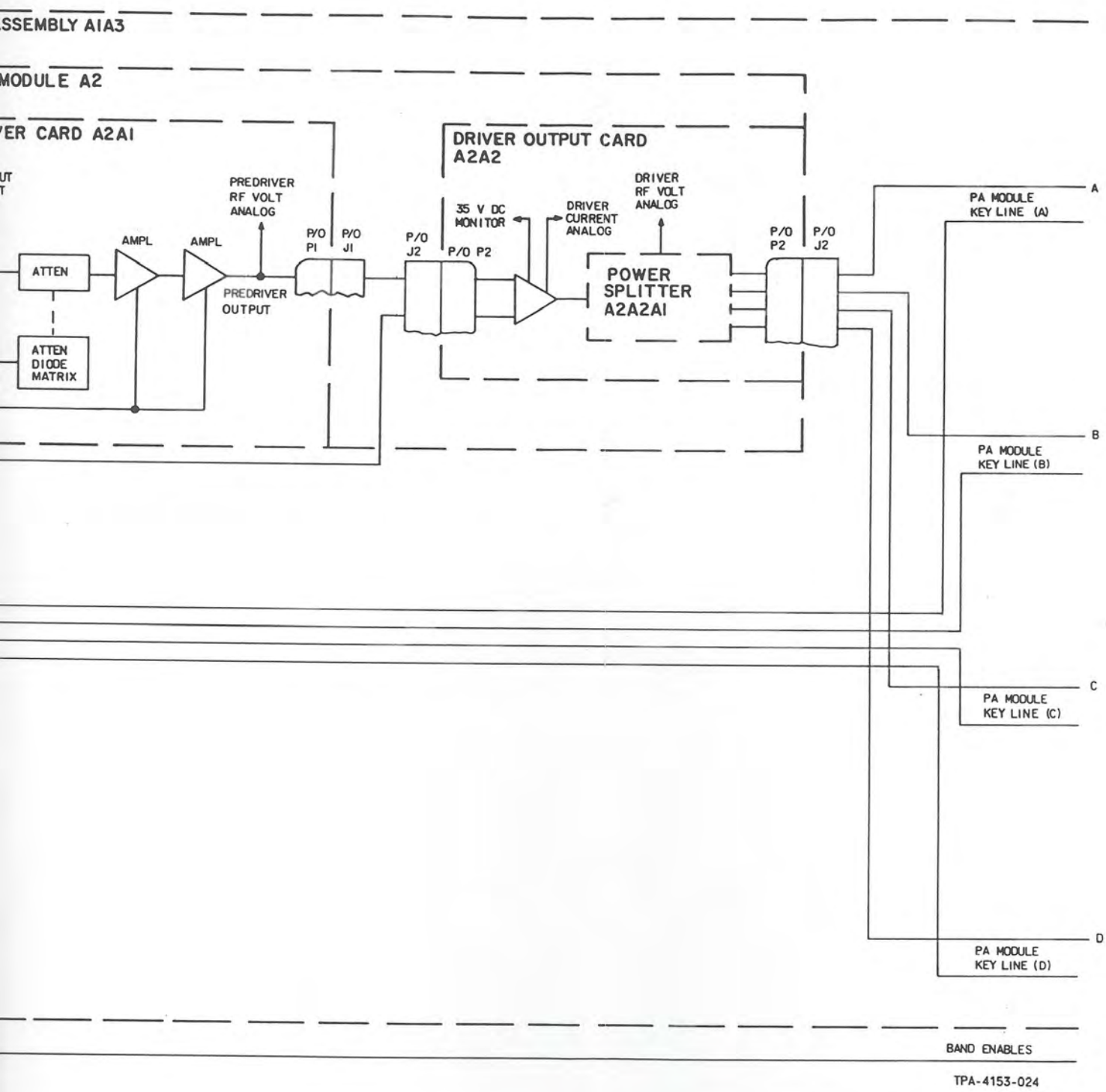
4.2.2 RF Signal Path (Refer to figure 4-2)

The power amplifier is normally used in a standard transmitter or transceiver system using any of the related HF-80 components. However, this power amplifier can be used in any basic system that can supply a maximum of 100-mW rf input into 50 ohms. The power amplifier does require Power Supply HF-8031 or HF-8032 (or equivalent) for operating voltages and current handling capabilities.

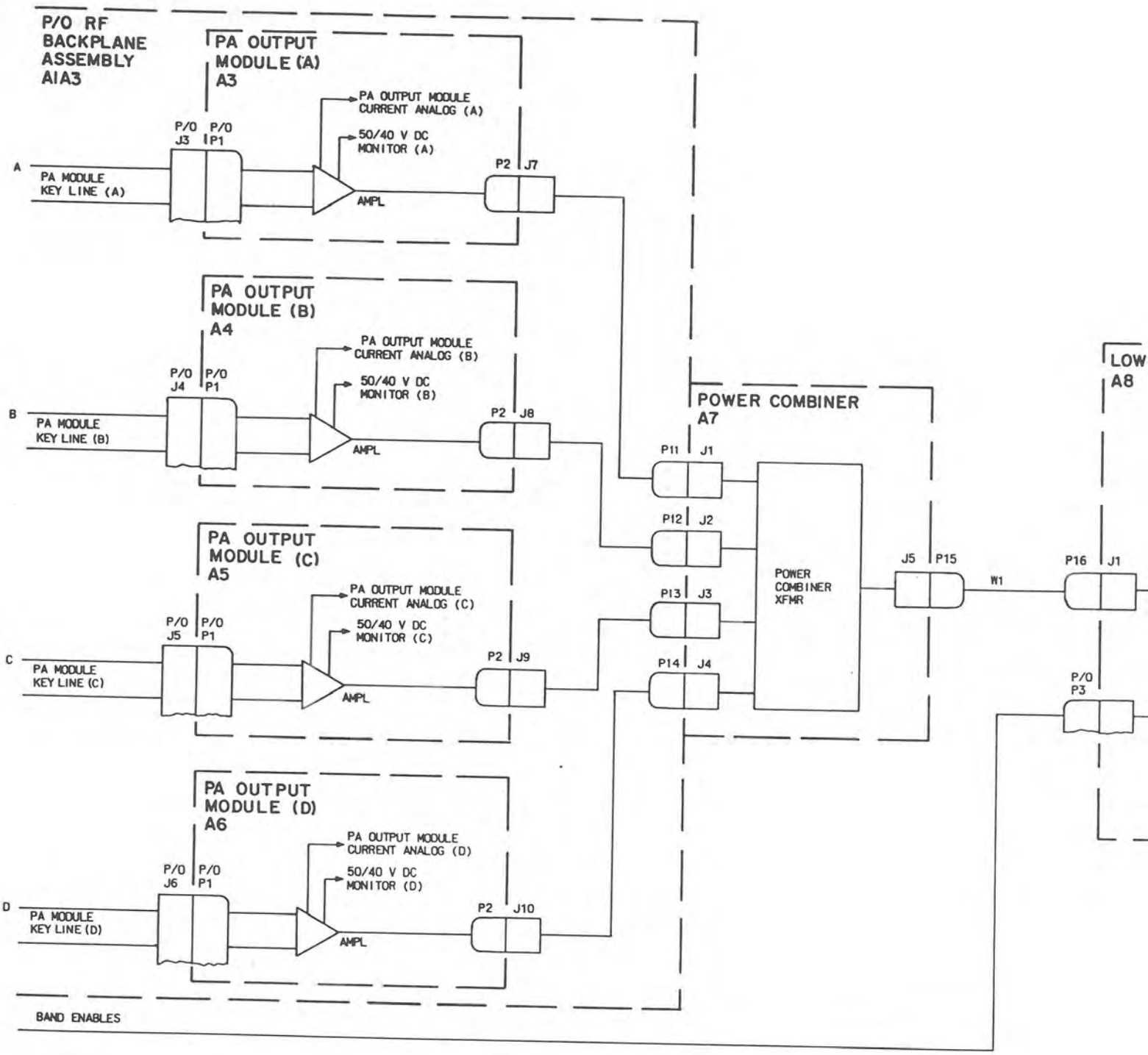


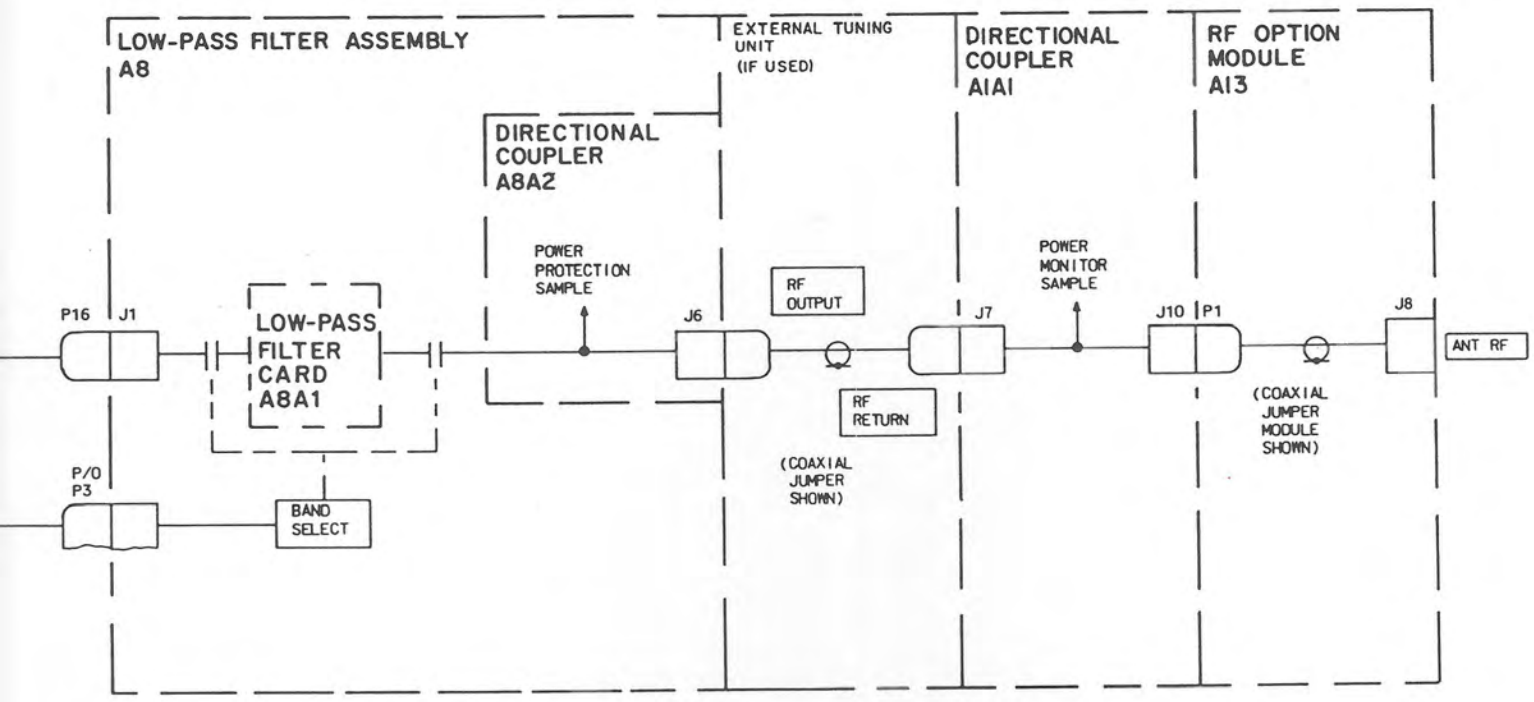
HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Typical System
Figure 4-1


RF INPUT
J1
P/O A1W1
SWITCHED ATTENUATOR A1A6 (-207 STATUS ONLY)
P/O RF BACKPLANE ASSEMBLY A
DRIVER MODULE A2
CARD CAGE BACKPLANE A1A2
DIGITAL CONTROL CARD A9
A1A5P1
J12
PREDRIVER CARD A
RF INPUT
RF VOLT
ANALOG
P/O P8
P/O J7
P/O J4
P/O P1
P/O J6
P/O P9
P/O P1
P/O J11
P/O J1
P/O P1
K1
ATTEN
RELAY FILTER ASSEMBLY A1A5
P/O P1
P/O J4
BAND ENABLES
ATTEN DIODE MATRIX
PA MODULE KEY LINE
DRIVER KEY LINE
ANALOG CONTROL CARD A10
P/O J3
P/O P1
P/O P1
P/O J3
PA MODULE KEY LINE (A)
PA MODULE KEY LINE (B)
PA MODULE KEY LINE (C)
PA MODULE KEY LINE (D)
P/O J8
P/O P2
P/O A1W2
BAND ENABLES



1-kW Power Amplifier HF-8023, RF Power,
Simplified Block Diagram
Figure 4-2 (Sheet 1 of 2)


P/O RF BACKPLANE ASSEMBLY AIA3
PA OUTPUT MODULE (A) A3
PA OUTPUT MODULE CURRENT ANALOG (A)
50/40 V DC MONITOR (A)
P/O J3
P/O P1
A
PA MODULE KEY LINE (A)
AMPL
P2 J7
PA OUTPUT MODULE (B) A4
PA OUTPUT MODULE CURRENT ANALOG (B)
50/40 V DC MONITOR (B)
P/O J4
P/O P1
B
PA MODULE KEY LINE (B)
AMPL
P2 J8
POWER COMBINER A7
P11 J1
P12 J2
P13 J3
P14 J4
POWER COMBINER XFMR
J5 P15
W1
P16 J1
LOW A8
PA OUTPUT MODULE (C) A5
PA OUTPUT MODULE CURRENT ANALOG (C)
50/40 V DC MONITOR (C)
P/O J5
P/O P1
C
PA MODULE KEY LINE (C)
AMPL
P2 J9
P/O P3
PA OUTPUT MODULE (D) A6
PA OUTPUT MODULE CURRENT ANALOG (D)
50/40 V DC MONITOR (D)
P/O J6
P/O P1
D
PA MODULE KEY LINE (D)
AMPL
P2 J10
BAND ENABLES



TPA-4153-024

1-kW Power Amplifier HF-8023, RF Power,
Simplified Block Diagram
Figure 4-2 (Sheet 2)

With appropriate dc power, rf power, and cooling air supplied, the power amplifier will supply a full-power output of 1000 watts (high-power mode) or 500 watts (low-power mode).

With rf input power applied at RF INPUT jack J1, the rf power is supplied through digital control card A9 where it is sampled to develop a band control signal. Band enable signals are generated and are supplied to predriver card A2A1 and low-pass filter assembly A8.

Rf power from digital control card A9 is supplied to predriver card A2A1 where the rf input level is adjusted across the frequency range by use of an attenuator network. This attenuator network is controlled by the band enable signals and a diode matrix, and achieves a near equal response to all rf input signals in the power amplifier range. The attenuated rf input is amplified by the predriver and supplied to driver output, where it is amplified again and supplied to power splitter A2A2A1. The four equal rf outputs from the power splitter are supplied in parallel to power amplifier output modules A, B, C, and D. These rf signals are amplified again and supplied to power combiner A7. These rf signals are combined to produce the full-power output. The output of the power combiner is supplied through low-pass filter A8, directional coupler A8A2, an external tuning element (if used), directional coupler A1A1, and rf option module A13 to the transmit antenna circuit (coupler or antenna) at J8.

4.2.3 AC/DC Power Distribution (Refer to figure 4-3)

The power supply provides the ac/dc power necessary for operation of the power amplifier.

The power supply receives 208/220/230/240 V ac, rectifies it, and supplies voltages for its own internal circuits as well as voltages for control and power output of the power amplifier.

Input to the low-voltage power circuit is supplied through strapping to the appropriate terminals of transformer T2 for the applied input voltage. This achieves the first stage of regulation. The output of T2 is supplied to low-voltage module A5 where the second stage of regulation takes place. The outputs of low-voltage module A5 are supplied to all power supply cards and modules as control power and to J3 of the power supply as power amplifier control power.

The outputs at control power connector J3 are supplied to the power amplifier at control power input J4.

Low-voltage power at control power input J4 is supplied only to TB1, connector J3 (antenna coupler control), the card cage backplane A1A2, and associated assemblies (A1A4, A8, A9, A10, A11, A12, and A13).

230-V ac switched power at control power input J4 is supplied to the power amplifier blower motors.

Input to the high-voltage power circuit is supplied through the high-voltage rectifier and step-start relay K2 to two 1000-watt converter modules A2 and A3 and 500-watt converter module A4. The outputs of these converters are supplied to the crowbar circuit of crowbar/logic card A7, the metering circuits, and output power connector J2. Low-voltage power from low-voltage module A5 is also supplied to output power connector J2.

The outputs at output power connector J2 are supplied to the power amplifier at power input J5.

Output power at power input J5 is supplied only to rf backplane assembly A1A3 and associated assemblies (A2, A3, A4, A5, and A6) in the power amplifier.

4.3 POWER AMPLIFIER FUNCTIONAL THEORY

This section contains information describing the operating principles of the power amplifier on a functional level. Operating principles of the plug-in circuit cards (subassemblies) are described only to the level necessary to make the overall description meaningful. Specific operating principles of the circuit cards are presented in the individual circuit card instruction sections of the HF-80 Solid-State Power Amplifiers and Power Supplies Depot Maintenance Instruction Book.

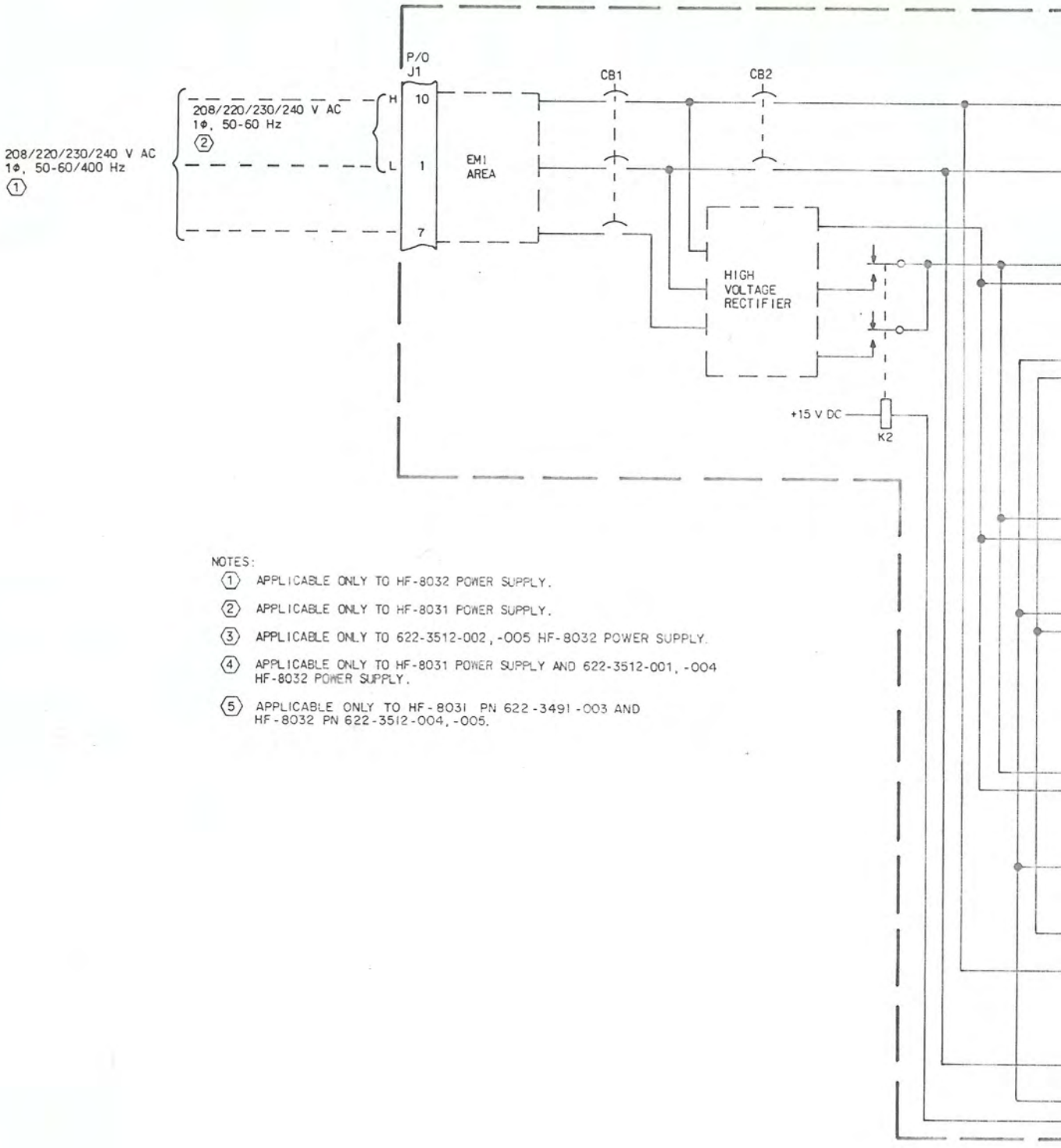
4.3.1 General

The power amplifier is a solid-state unit operating in the frequency range of 1.600 to 30.000 MHz. The unit requires external sources of rf excitation, control information, dc power, and ac blower power. The power amplifier tunes automatically to any rf input signal within its frequency range. The rf input signal is amplified from less than 100-mW rf input level to a rated rf output of 1 kW.

Refer to figure 4-4. The power amplifier consists of four 280-watt power amplifier modules connected in parallel. The primary circuits of the power amplifiers are as follows: rf amplifiers, protection circuits, monitors, and power distribution.

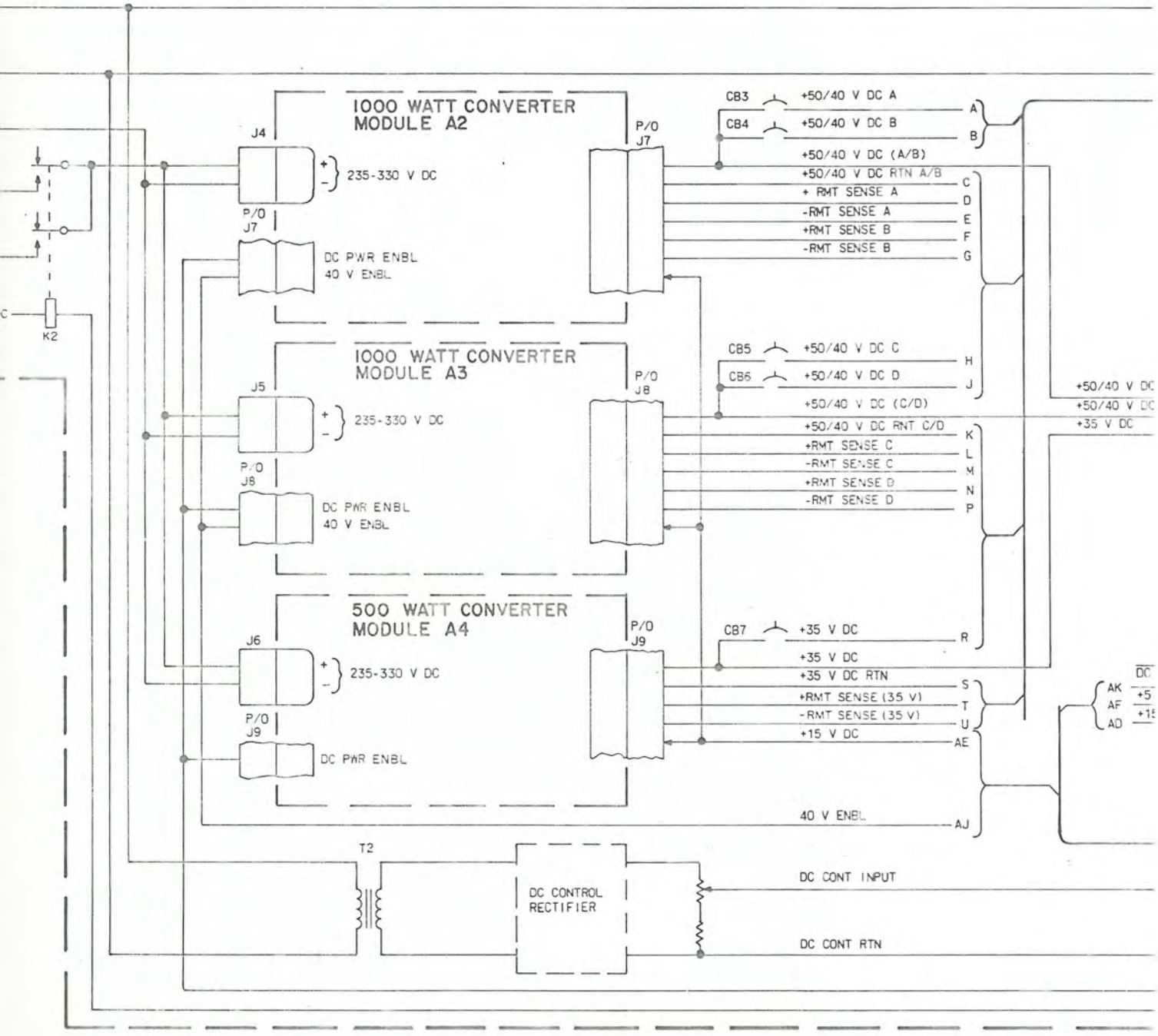
The rf input signal is amplified by the predriver and by the driver. At the output of the driver, the rf power is divided and supplied to each of the power amplifier output modules. The divided rf signal is amplified again and supplied to the power combiner. The combined rf output power signal is supplied through a low-pass filter, a power protection directional coupler, an external tuning unit (if used), and a directional coupler. Then it is supplied through an rf option module to the antenna or antenna coupler. (The rf option module may be either a coaxial jumper module or a transmit-receive (tr) relay module.)

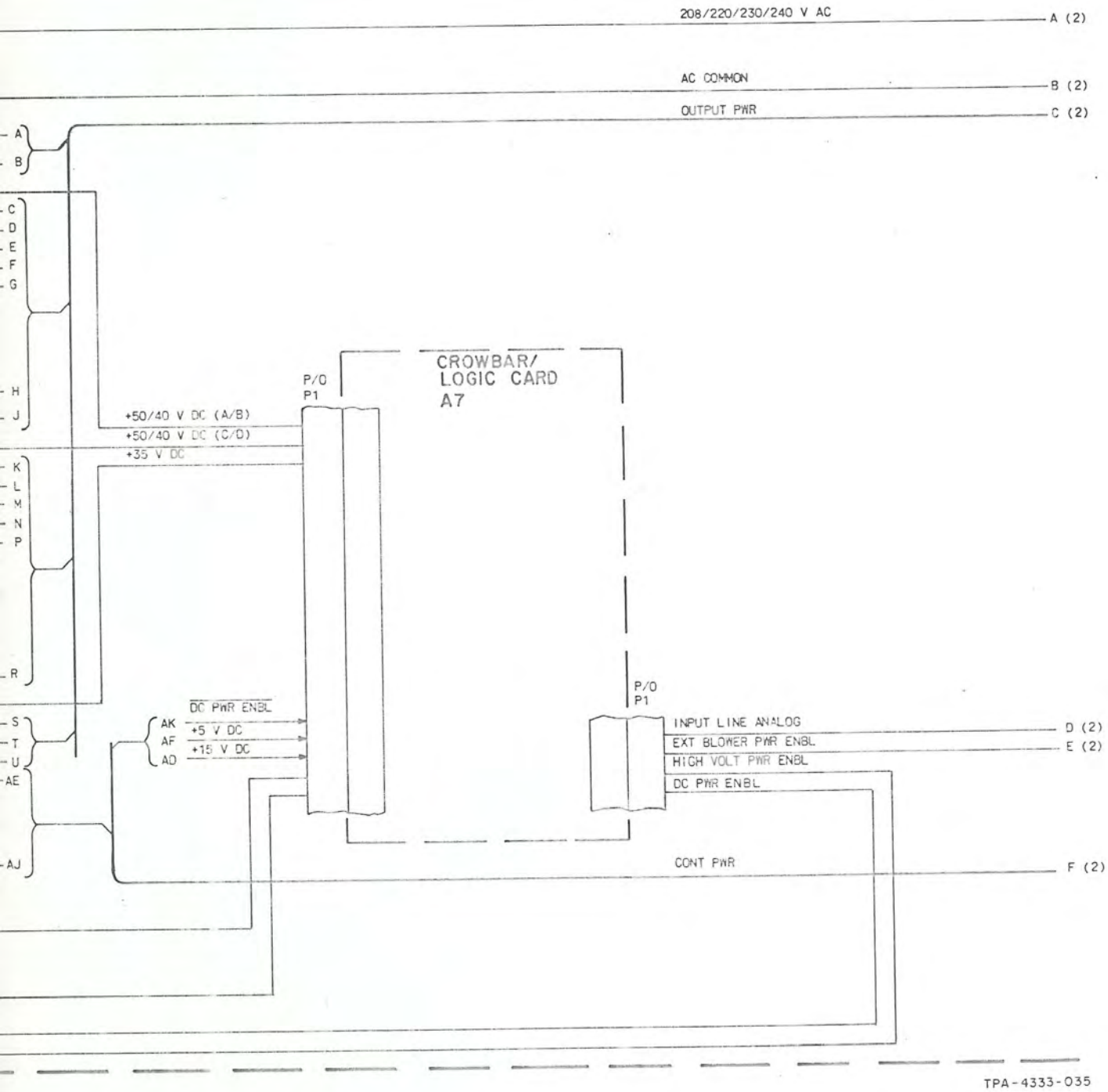
Interlocks are provided to enable/disable the power amplifier when any of the following conditions exist: antenna circuit not connected, antenna circuits will not properly tune, any internal control circuit not connected, and/or insufficient internal air flow or overheating.



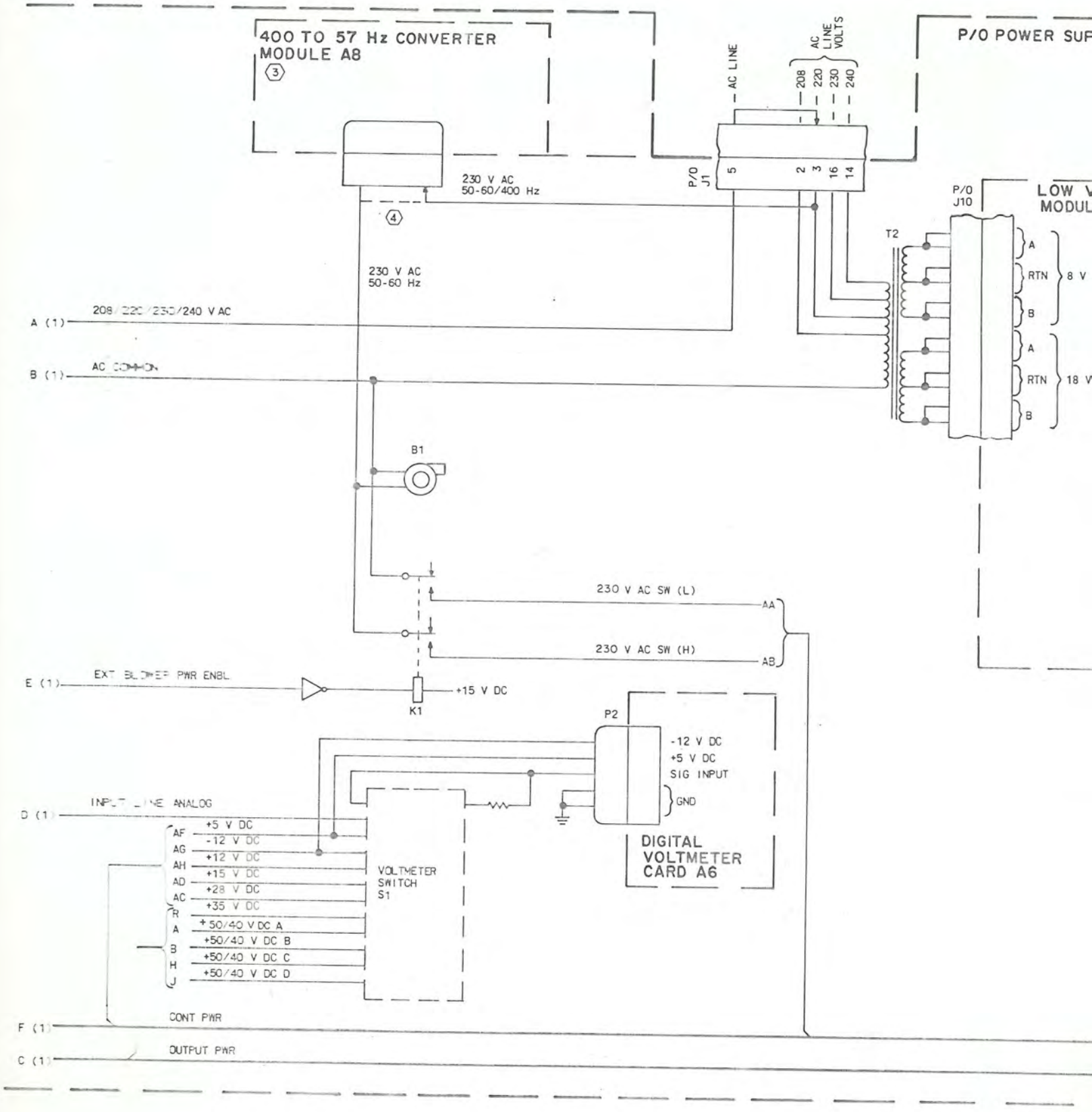
NOTES:

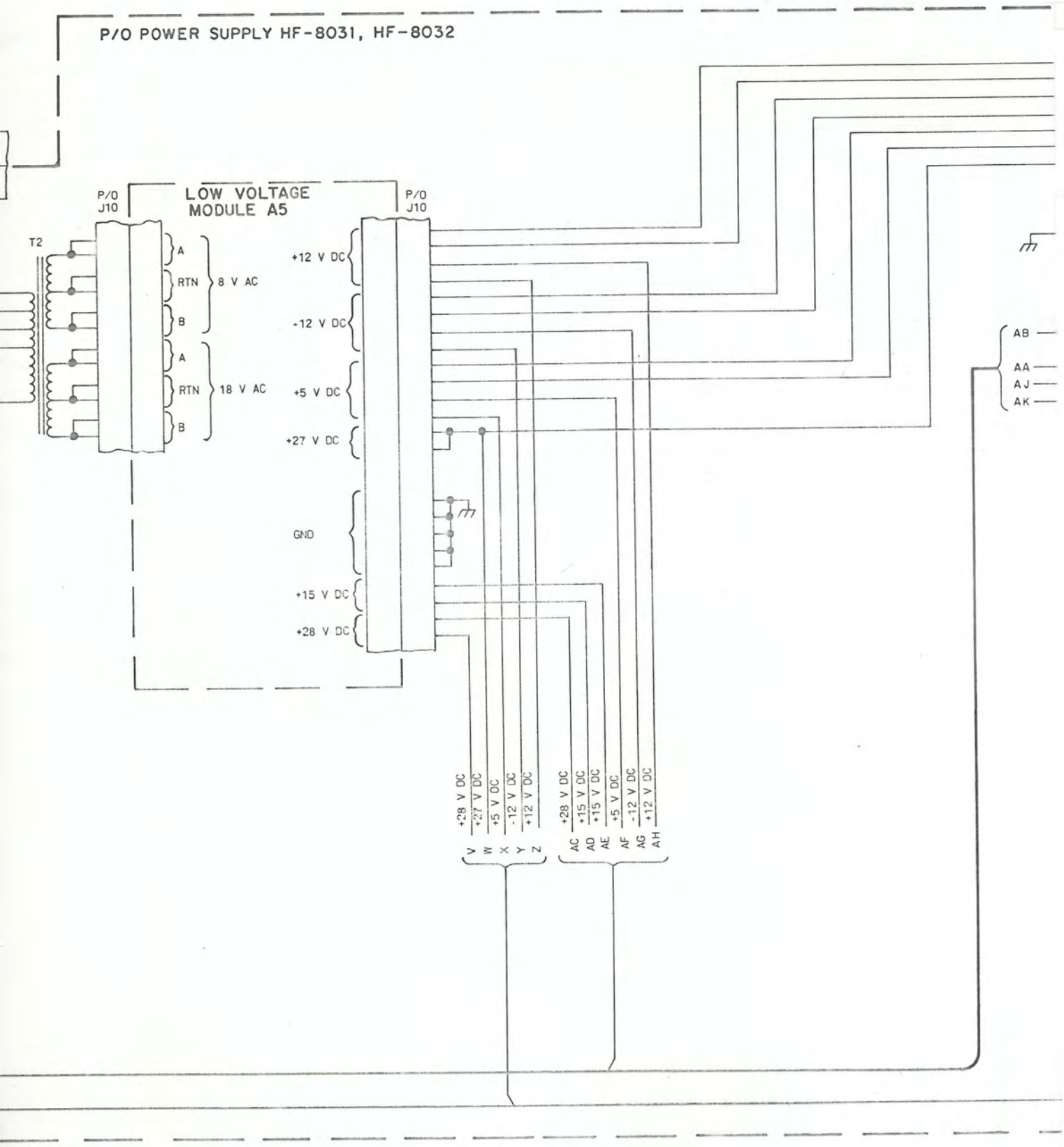
1. APPLICABLE ONLY TO HF-8032 POWER SUPPLY.
2. APPLICABLE ONLY TO HF-8031 POWER SUPPLY.
3. APPLICABLE ONLY TO 622-3512-002, -005 HF-8032 POWER SUPPLY.
4. APPLICABLE ONLY TO HF-8031 POWER SUPPLY AND 622-3512-001, -004 HF-8032 POWER SUPPLY.
5. APPLICABLE ONLY TO HF-8031 PN 622-3491-003 AND HF-8032 PN 622-3512-004, -005.

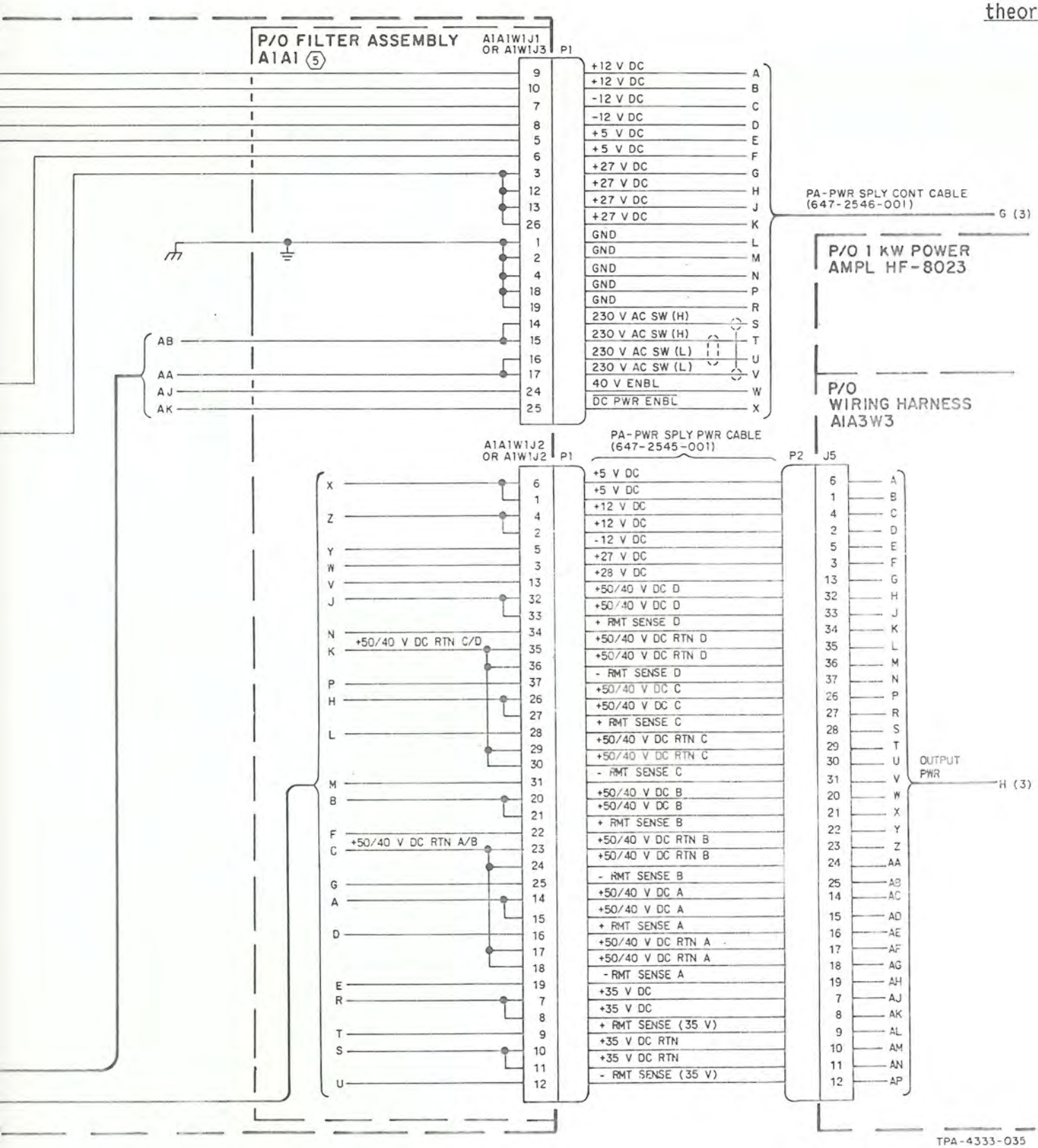

1000 WATT CONVERTER MODULE A2
J4
235-330 V DC
P/O J7
DC PWR ENBL
40 V ENBL
P/O J7
1000 WATT CONVERTER MODULE A3
J5
235-330 V DC
P/O J8
DC PWR ENBL
40 V ENBL
P/O J8
500 WATT CONVERTER MODULE A4
J6
235-330 V DC
P/O J9
DC PWR ENBL
P/O J9
K2
T2
DC CONTROL RECTIFIER
CB3
CB4
CB5
CB6
CB7
+50/40 V DC A
+50/40 V DC B
+50/40 V DC (A/B)
+50/40 V DC RTN A/B
+ RMT SENSE A
-RMT SENSE A
+RMT SENSE B
-RMT SENSE B
+50/40 V DC C
+50/40 V DC D
+50/40 V DC (C/D)
+50/40 V DC RNT C/D
+RMT SENSE C
-RMT SENSE C
+RMT SENSE D
-RMT SENSE D
+35 V DC
+35 V DC RTN
+RMT SENSE (35 V)
-RMT SENSE (35 V)
+15 V DC
40 V ENBL
A
B
C
D
E
F
G
H
J
K
L
M
N
P
R
S
T
U
AE
AJ
+50/40 V DC
+50/40 V DC
+35 V DC
AK
AF
AD
DC CONT INPUT
DC CONT RTN



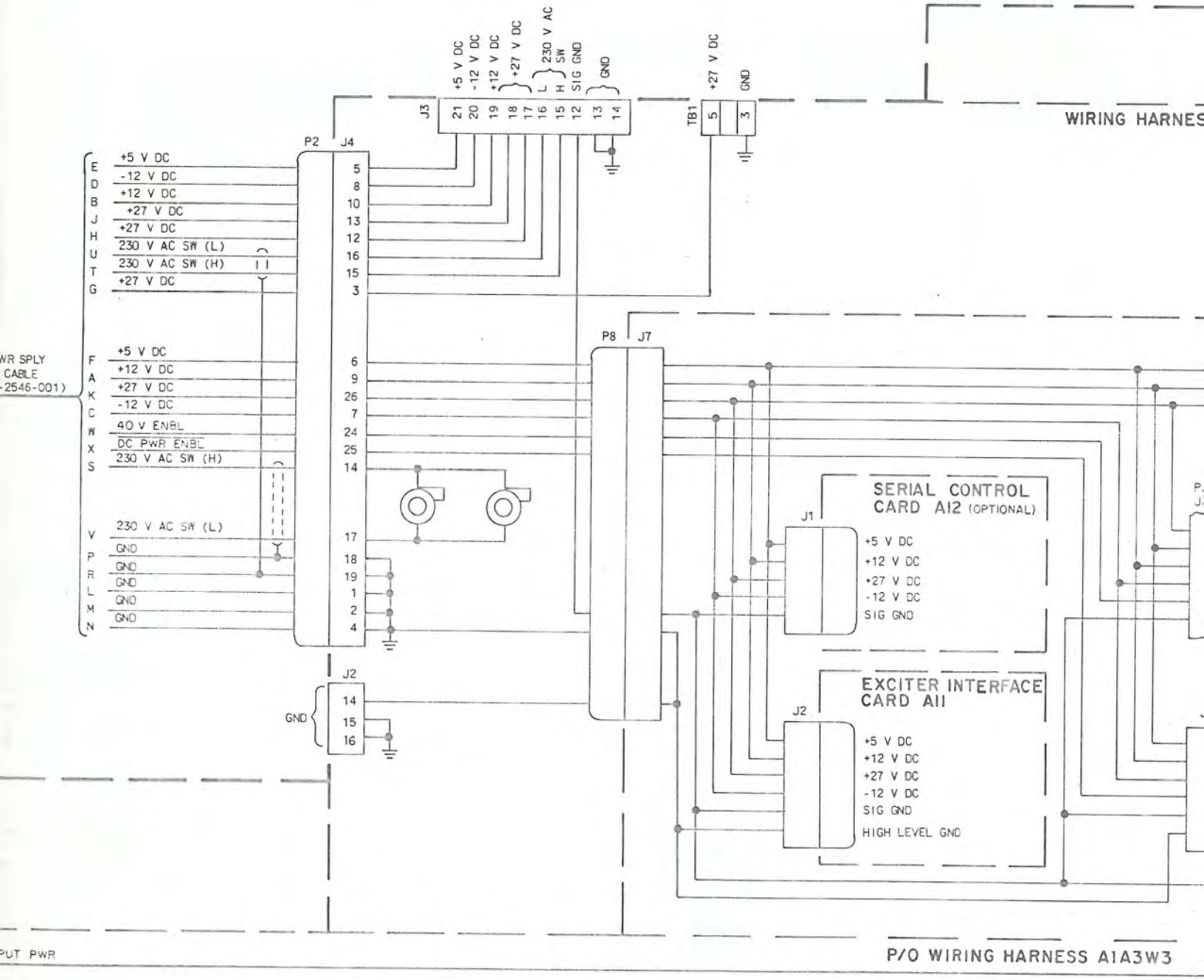
HF-80 Solid-State 1-kW Power Amplifier-
Power Supply, Power Distribution
Block Diagram
Figure 4-3 (Sheet 1 of 3)

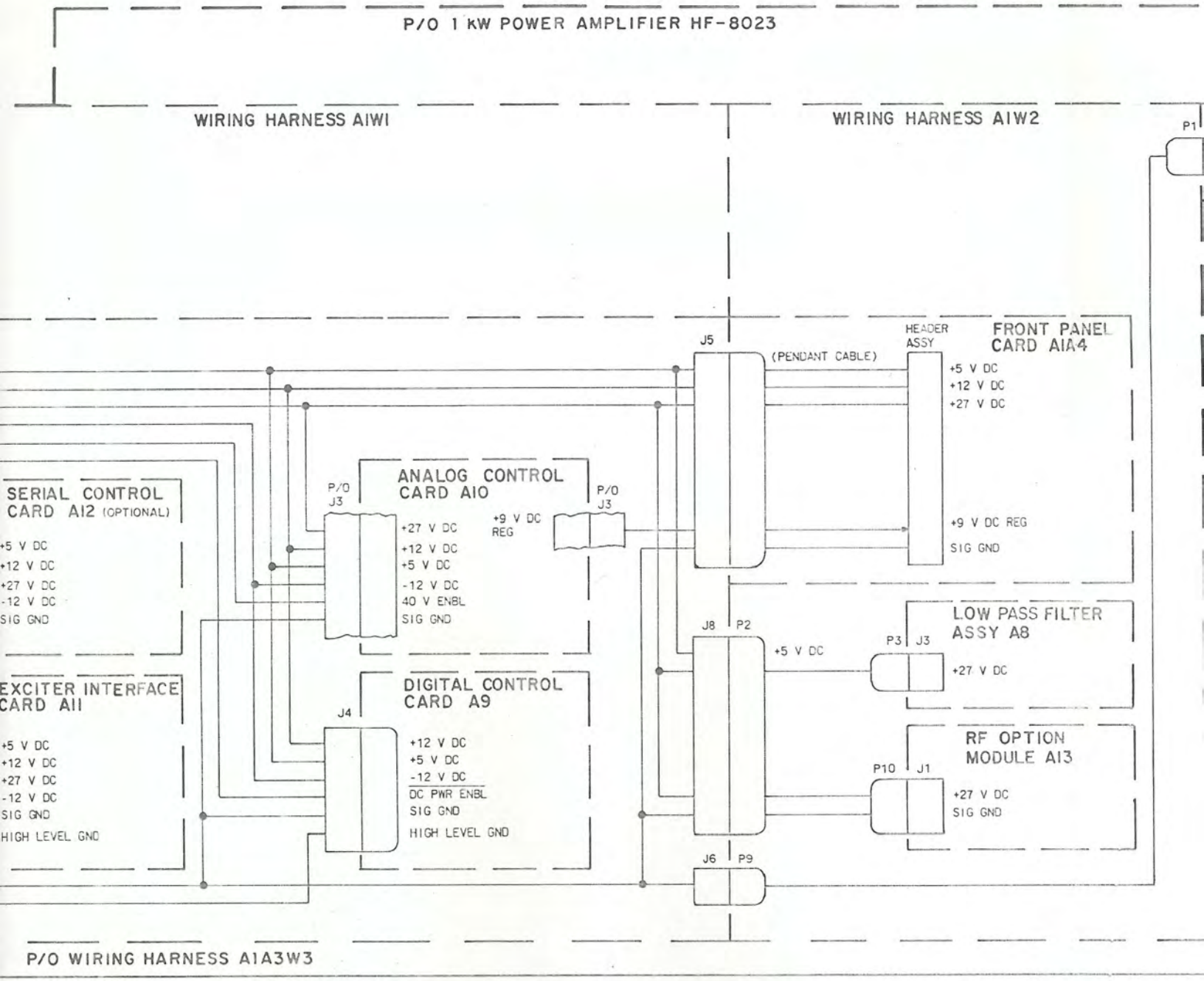

400 TO 57 Hz CONVERTER MODULE A8
3
P/O POWER SUP
AC LINE
AC LINE VOLTS
208
220
230
240
P/O J1
5
2
3
16
14
230 V AC 50-60/400 Hz
4
P/O J10
LOW V MODUL
T2
A
RTN
8 V
B
A
RTN
18 V
B
230 V AC 50-60 Hz
208/220/230/240 V AC
A (1)
AC COMMON
B (1)
B1
230 V AC SW (L)
AA
230 V AC SW (H)
AB
E (1)
EXT BLOWER PWR ENBL
+15 V DC
K1
P2
-12 V DC
+5 V DC
SIG INPUT
GND
DIGITAL VOLTMETER CARD A6
D (1)
INPUT LINE ANALOG
AF +5 V DC
AG -12 V DC
AH +12 V DC
AD +15 V DC
AC +28 V DC
+35 V DC
R
A +50/40 V DC A
B +50/40 V DC B
H +50/40 V DC C
J +50/40 V DC D
VOLTMETER SWITCH S1
F (1)
CONT PWR
C (1)
OUTPUT PWR

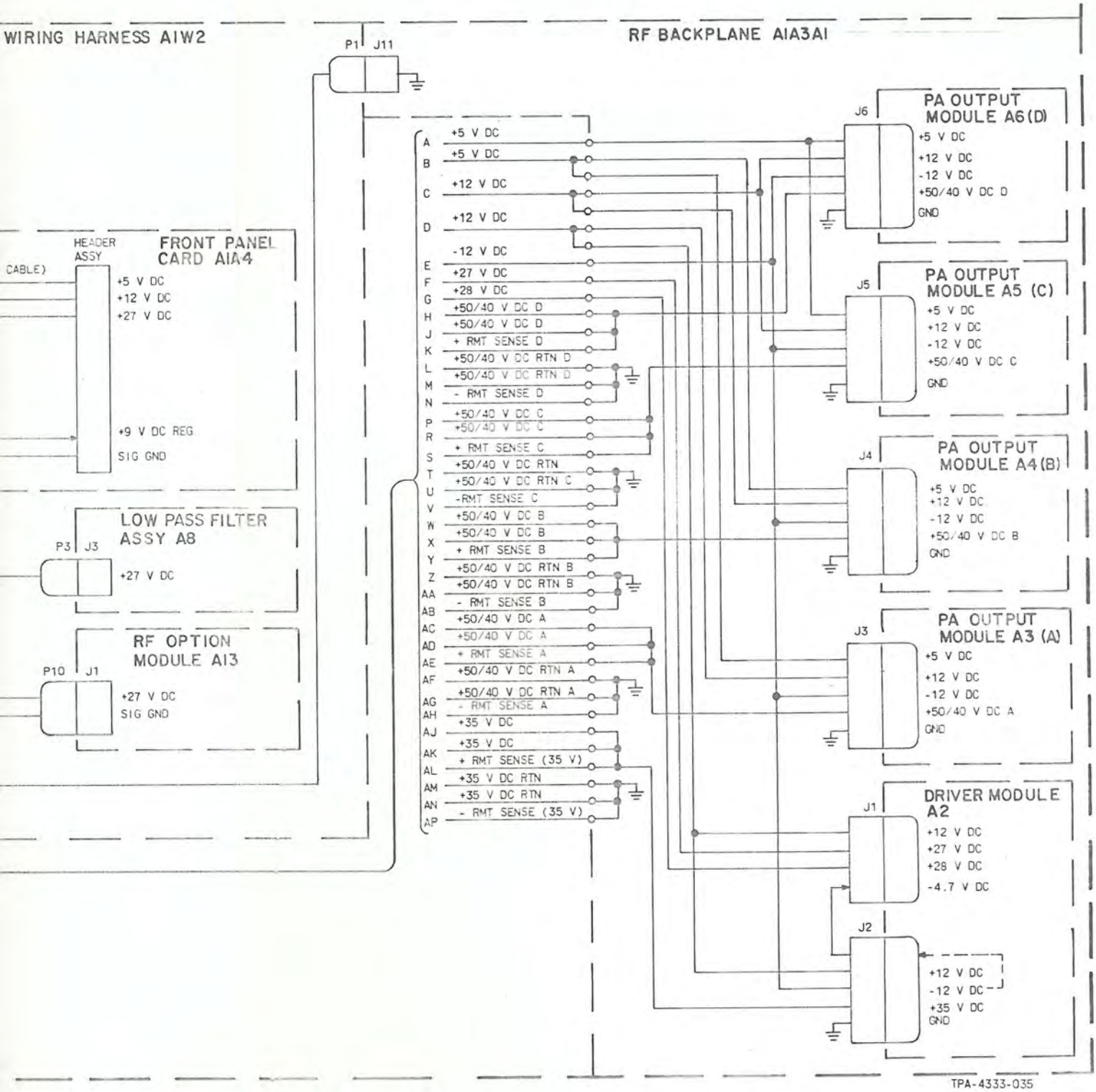

P/O POWER SUPPLY HF-8031, HF-8032
P/O J10
LOW VOLTAGE MODULE A5
P/O J10
T2
A
RTN
B
8 V AC
A
RTN
B
18 V AC
+12 V DC
-12 V DC
+5 V DC
+27 V DC
GND
+15 V DC
+28 V DC
AB
AA
AJ
AK
+28 V DC
+27 V DC
+5 V DC
-12 V DC
+12 V DC
V
W
X
Y
Z
+28 V DC
+15 V DC
+15 V DC
+5 V DC
-12 V DC
+12 V DC
AC
AD
AE
AF
AG
AH



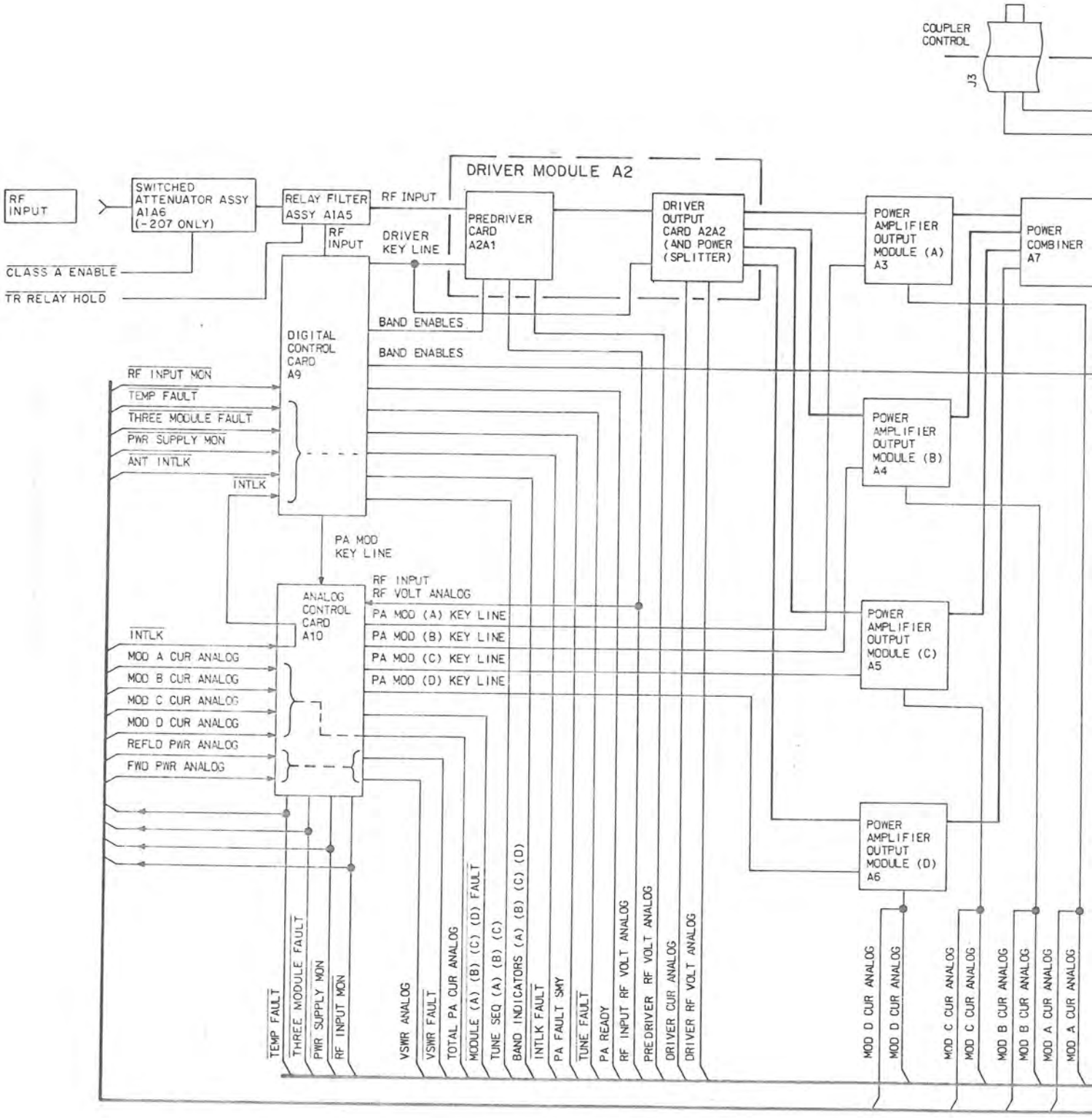
HF-80 Solid-State 1-kW Power Amplifier-
Power Supply, Power Distribution
Block Diagram
Figure 4-3 (Sheet 2)

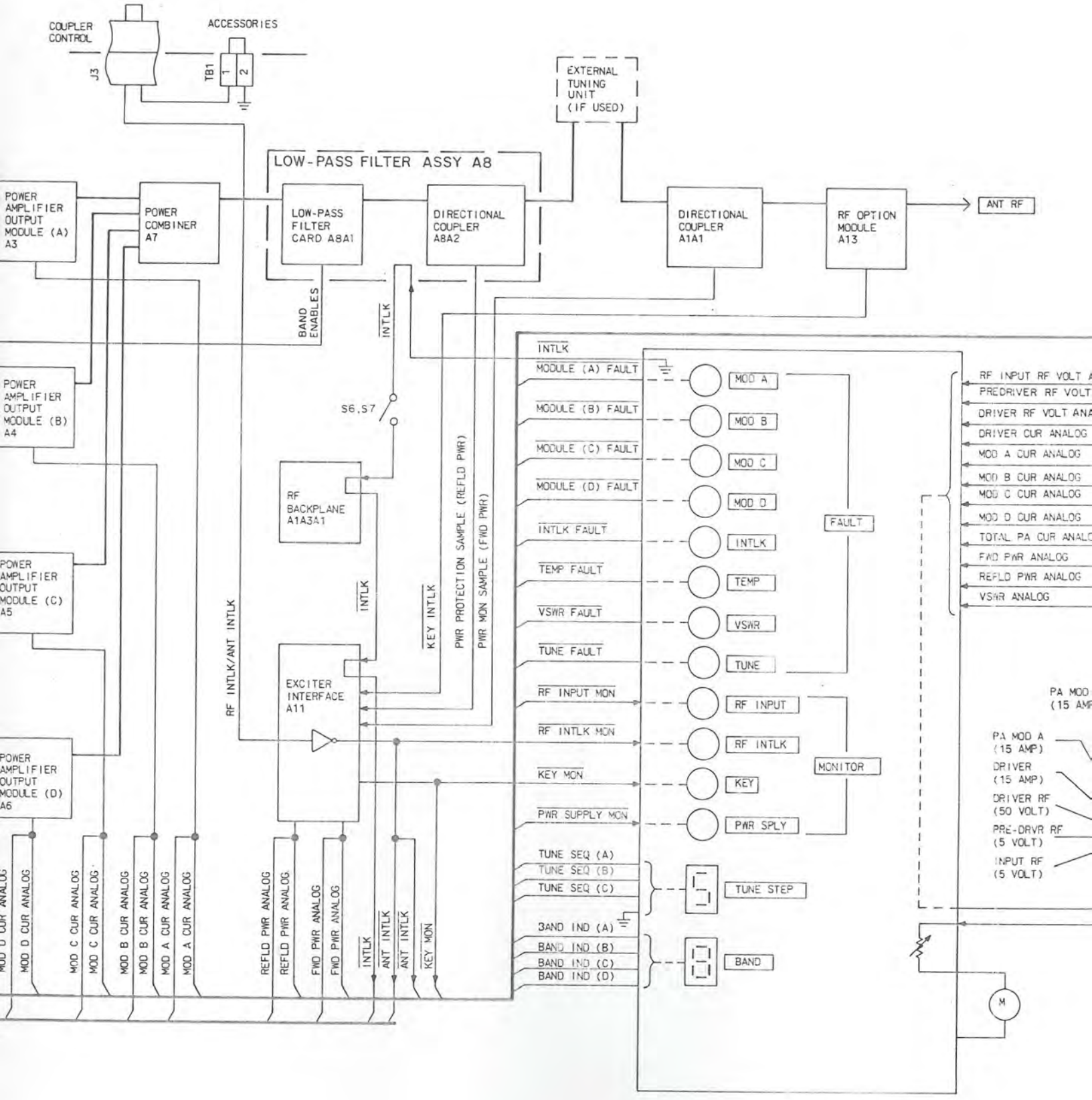

WIRING HARNES
J3
+5 V DC
-12 V DC
+12 V DC
+27 V DC
230 V AC SW L
230 V AC SW H
SIG GND
GND
21 20 19 18 17 16 15 12 13 14
TB1
+27 V DC
GND
5 3
P2
J4
E D B J H U T G
+5 V DC
-12 V DC
+12 V DC
+27 V DC
+27 V DC
230 V AC SW (L)
230 V AC SW (H)
+27 V DC
5 8 10 13 12 16 15 3
WR SPLY
CABLE
-2546-001)
F A K C W X S
+5 V DC
+12 V DC
+27 V DC
-12 V DC
40 V ENBL
DC PWR ENBL
230 V AC SW (H)
6 9 26 7 24 25 14
V P R L M N
230 V AC SW (L)
GND
GND
GND
GND
GND
17 18 19 1 2 4
P8
J7
J2
GND
14 15 16
SERIAL CONTROL
CARD A12 (OPTIONAL)
J1
+5 V DC
+12 V DC
+27 V DC
-12 V DC
SIG GND
EXCITER INTERFACE
CARD A11
J2
+5 V DC
+12 V DC
+27 V DC
-12 V DC
SIG GND
HIGH LEVEL GND
PUT PWR
P/O WIRING HARNESS A1A3W3

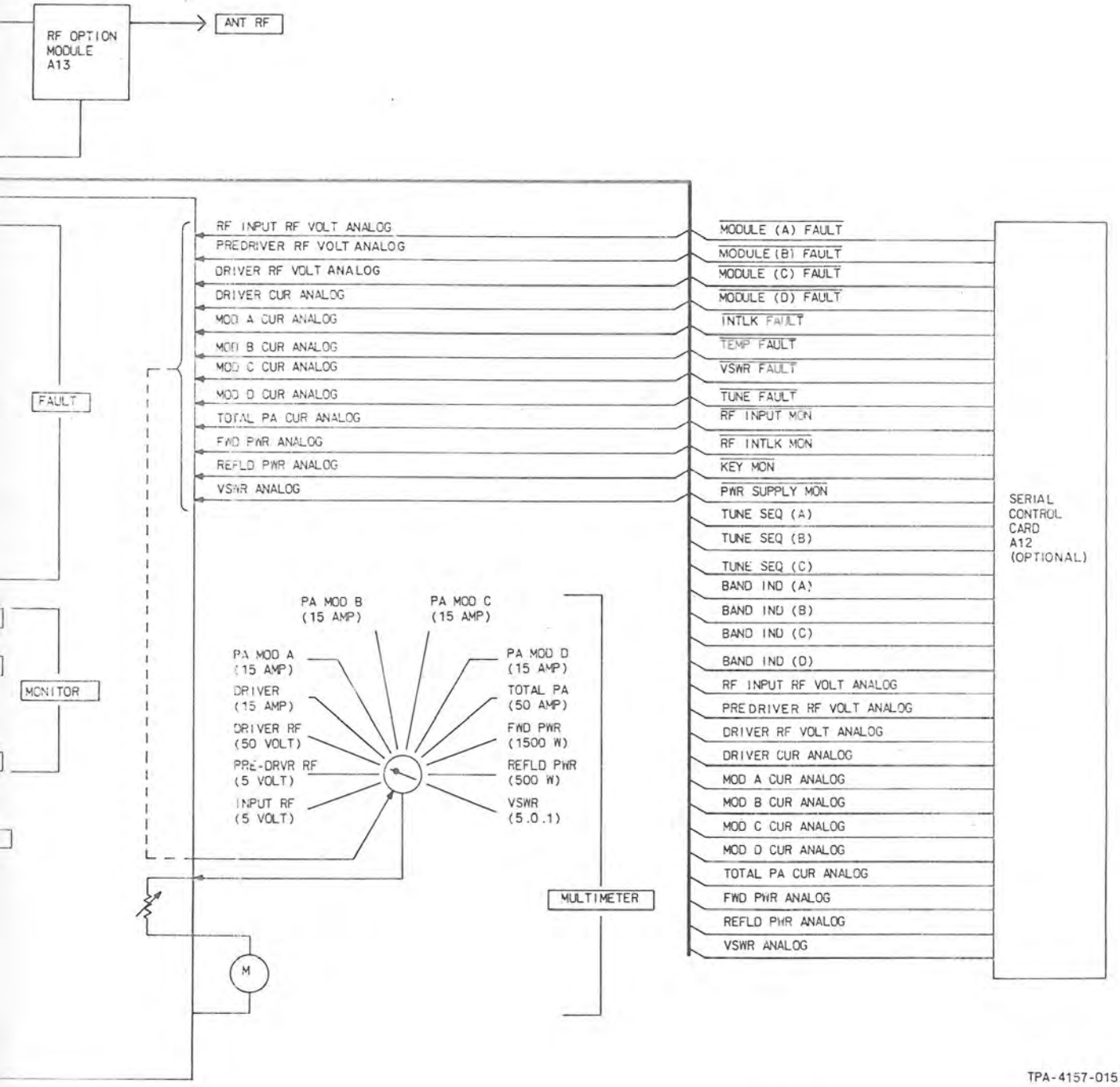

P/O 1 kW POWER AMPLIFIER HF-8023
WIRING HARNESS A1W1
WIRING HARNESS A1W2
P1
J5
(PENDANT CABLE)
HEADER ASSY
FRONT PANEL CARD A1A4
+5 V DC
+12 V DC
+27 V DC
+9 V DC REG
SIG GND
SERIAL CONTROL CARD A12 (OPTIONAL)
+5 V DC
+12 V DC
+27 V DC
-12 V DC
SIG GND
P/O J3
ANALOG CONTROL CARD A10
+27 V DC
+12 V DC
+5 V DC
-12 V DC
40 V ENBL
SIG GND
+9 V DC REG
P/O J3
J8
P2
+5 V DC
P3
J3
LOW PASS FILTER ASSY A8
+27 V DC
EXCITER INTERFACE CARD A11
+5 V DC
+12 V DC
+27 V DC
-12 V DC
SIG GND
HIGH LEVEL GND
J4
DIGITAL CONTROL CARD A9
+12 V DC
+5 V DC
-12 V DC
DC PWR ENBL
SIG GND
HIGH LEVEL GND
P10
J1
RF OPTION MODULE A13
+27 V DC
SIG GND
J6
P9
P/O WIRING HARNESS A1A3W3



HF-80 Solid-State 1-kW Power Amplifier-
Power Supply, Power Distribution
Block Diagram
Figure 4-3 (Sheet 3)


COUPLER CONTROL
J3
DRIVER MODULE A2
RF INPUT
SWITCHED ATTENUATOR ASSY A1A6 (-207 ONLY)
RELAY FILTER ASSY A1A5
RF INPUT
RF INPUT
DRIVER KEY LINE
PREDRIVER CARD A2A1
DRIVER OUTPUT CARD A2A2 (AND POWER (SPLITTER)
POWER AMPLIFIER OUTPUT MODULE (A) A3
POWER COMBINER A7
CLASS A ENABLE
TR RELAY HOLD
BAND ENABLES
BAND ENABLES
DIGITAL CONTROL CARD A9
RF INPUT MON
TEMP FAULT
THREE MODULE FAULT
PWR SUPPLY MON
ANT INTLK
INTLK
POWER AMPLIFIER OUTPUT MODULE (B) A4
PA MOD KEY LINE
RF INPUT RF VOLT ANALOG
ANALOG CONTROL CARD A10
PA MOD (A) KEY LINE
PA MOD (B) KEY LINE
PA MOD (C) KEY LINE
PA MOD (D) KEY LINE
POWER AMPLIFIER OUTPUT MODULE (C) A5
INTLK
MOD A CUR ANALOG
MOD B CUR ANALOG
MOD C CUR ANALOG
MOD D CUR ANALOG
REFLD PWR ANALOG
FWD PWR ANALOG
POWER AMPLIFIER OUTPUT MODULE (D) A6
TEMP FAULT
THREE MODULE FAULT
PWR SUPPLY MON
RF INPUT MON
VSWR ANALOG
VSWR FAULT
TOTAL PA CUR ANALOG
MODULE (A) (B) (C) (D) FAULT
TUNE SEQ (A) (B) (C)
BAND INDICATORS (A) (B) (C) (D)
INTLK FAULT
PA FAULT SMY
TUNE FAULT
PA READY
RF INPUT RF VOLT ANALOG
PREDRIVER RF VOLT ANALOG
DRIVER CUR ANALOG
DRIVER RF VOLT ANALOG
MOD D CUR ANALOG
MOD D CUR ANALOG
MOD C CUR ANALOG
MOD C CUR ANALOG
MOD B CUR ANALOG
MOD B CUR ANALOG
MOD A CUR ANALOG
MOD A CUR ANALOG


COUPLER CONTROL
J3
ACCESSORIES
TB1
1
2
EXTERNAL TUNING UNIT (IF USED)
LOW-PASS FILTER ASSY A8
POWER AMPLIFIER OUTPUT MODULE (A) A3
POWER COMBINER A7
LOW-PASS FILTER CARD A8A1
DIRECTIONAL COUPLER A8A2
DIRECTIONAL COUPLER A1A1
RF OPTION MODULE A13
ANT RF
BAND ENABLES
INTLK
POWER AMPLIFIER OUTPUT MODULE (B) A4
S6,S7
RF BACKPLANE A1A3A1
POWER AMPLIFIER OUTPUT MODULE (C) A5
RF INTLK/ANT INTLK
KEY INTLK
PWR PROTECTION SAMPLE (REFLD PWR)
PWR MON SAMPLE (FWD PWR)
EXCITER INTERFACE A11
POWER AMPLIFIER OUTPUT MODULE (D) A6
MODULE (A) FAULT
MODULE (B) FAULT
MODULE (C) FAULT
MODULE (D) FAULT
INTLK FAULT
TEMP FAULT
VSWR FAULT
TUNE FAULT
RF INPUT MON
RF INTLK MON
KEY MON
PWR SUPPLY MON
MOD A
MOD B
MOD C
MOD D
INTLK
TEMP
VSWR
TUNE
RF INPUT
RF INTLK
KEY
PWR SPLY
FAULT
MONITOR
TUNE SEQ (A)
TUNE SEQ (B)
TUNE SEQ (C)
TUNE STEP
BAND IND (A)
BAND IND (B)
BAND IND (C)
BAND IND (D)
BAND
RF INPUT RF VOLT
PREDRIVER RF VOLT
DRIVER RF VOLT ANA
DRIVER CUR ANALOG
MOD A CUR ANALOG
MOD B CUR ANALOG
MOD C CUR ANALOG
MOD D CUR ANALOG
TOTAL PA CUR ANALO
FWD PWR ANALOG
REFLD PWR ANALOG
VSWR ANALOG
PA MOD A (15 AMP)
DRIVER (15 AMP)
DRIVER RF (50 VOLT)
PRE-DRVR RF (5 VOLT)
INPUT RF (5 VOLT)
M
MOD D CUR ANALOG
MOD C CUR ANALOG
MOD B CUR ANALOG
MOD A CUR ANALOG
REFLD PWR ANALOG
FWD PWR ANALOG
INTLK
ANT INTLK
KEY MON



TPA-4157-015

1-kW Power Amplifier HF-8023,
Block Diagram
Figure 4-4

Monitors are provided to show status and fault indications. Status indications consist of tune step, band selected, rf input applied, rf interlocks applied, key applied, power supply monitor, and a front panel multimeter for measuring significant voltage, current, and power indications. Fault indications are provided for the following areas: power amplifier modules, interlocks, temperature, vswr, and tuning.

4.3.2 RF Circuits (Refer to figure 4-5)

With sufficient rf drive and a system key applied to digital control card A9, band enable signals are supplied by the band switches to driver module A2 and low-pass filter assembly A8.

The rf drive is applied through digital control card A9 to driver module A2 where the rf input signal is attenuated to maintain low overall power amplifier gain variation across the frequency range. This is accomplished using a diode matrix to enable/disable the attenuators. An attenuation of 0 to 15 dB can be selected in each frequency band.

The rf drive, applied through the attenuators, is amplified by the predriver and again by the driver output amplifier. It is then power-divided and supplied to each of four power amplifier output modules.

The rf signal is again amplified by each of the four power amplifier output modules and supplied to power combiner A7. The output of power combiner A7 is supplied through low-pass filter assembly A8 (band selected), directional coupler A8A2, an external tuning unit (if used), directional coupler A1A1, and rf option module A13 to the antenna.

4.3.3 Protection Circuits (Key and Interlocks)

4.3.3.1 Key Circuits (Refer to figure 4-6)

A system key signal can be supplied by the exciter or receiver-exciter (A1W1J2) or as a local key from the front panel card A1A4 and PA KEY switch through the local key circuit on exciter interface card A11 to the system key circuit.

With the system key applied and key interlock satisfied, a key signal is supplied to digital control card A9 where certain operating conditions must be met before the key can be applied to the power amplifier driver and output modules.

The following operating conditions are required by digital control card A9 to allow a key signal to be applied to driver module A2 and power amplifier output modules A3 through A6.

a. Tune start signal is not applied.
b. No tune faults.

c. Interlocks are all satisfied.
d. Dc power enable signal is applied.
e. Power supply monitor indicates power supply is operating.
f. No temperature faults.
g. No three module fault (at least two power amplifier output modules have not faulted).
h. Not in tune step 1 or tune step 2.
i. A band has been selected.

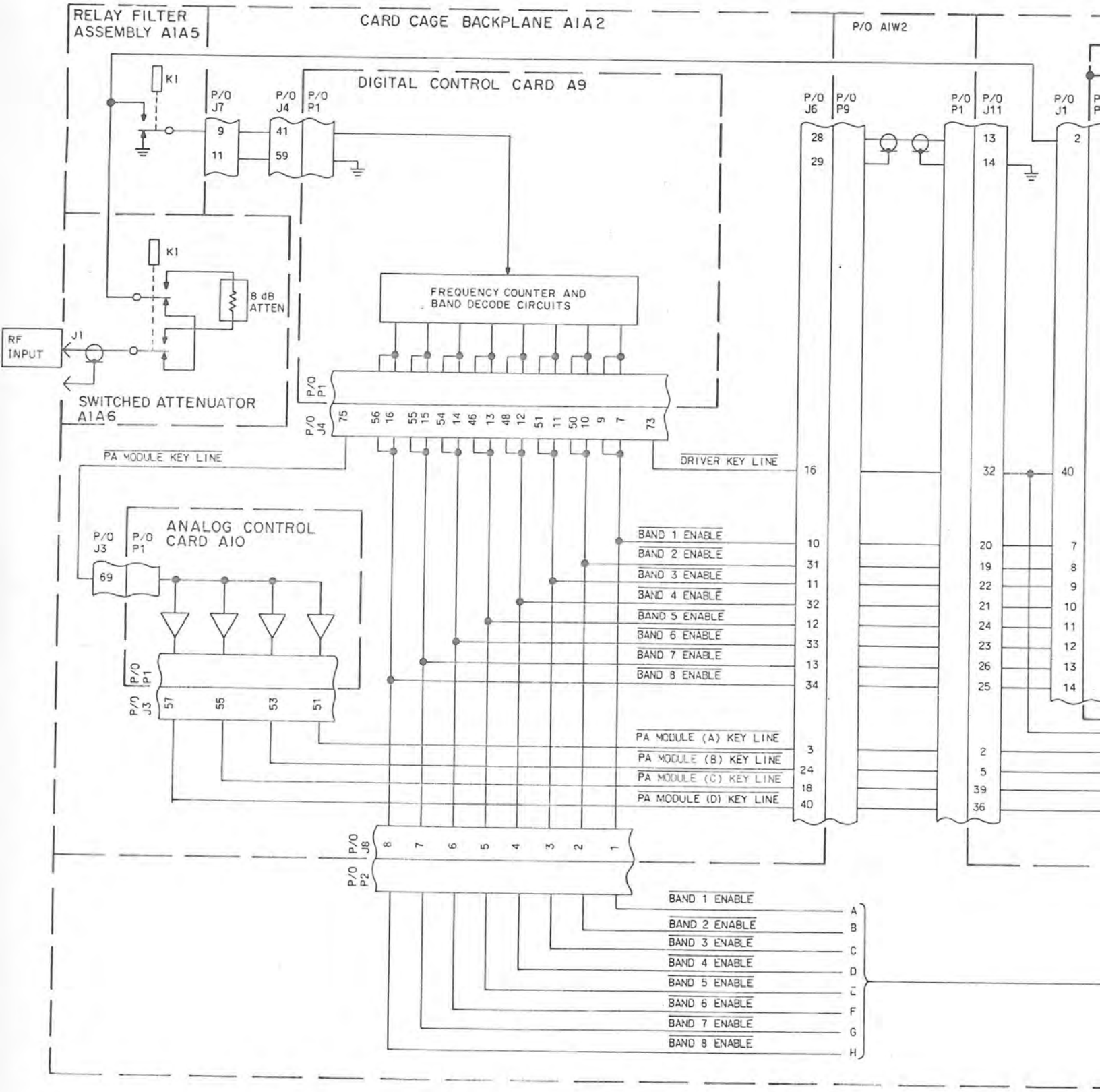
When all of the above conditions are satisfied, a key signal can be applied through digital control card A9 to driver module A2 and power amplifier output modules A3 through A6.

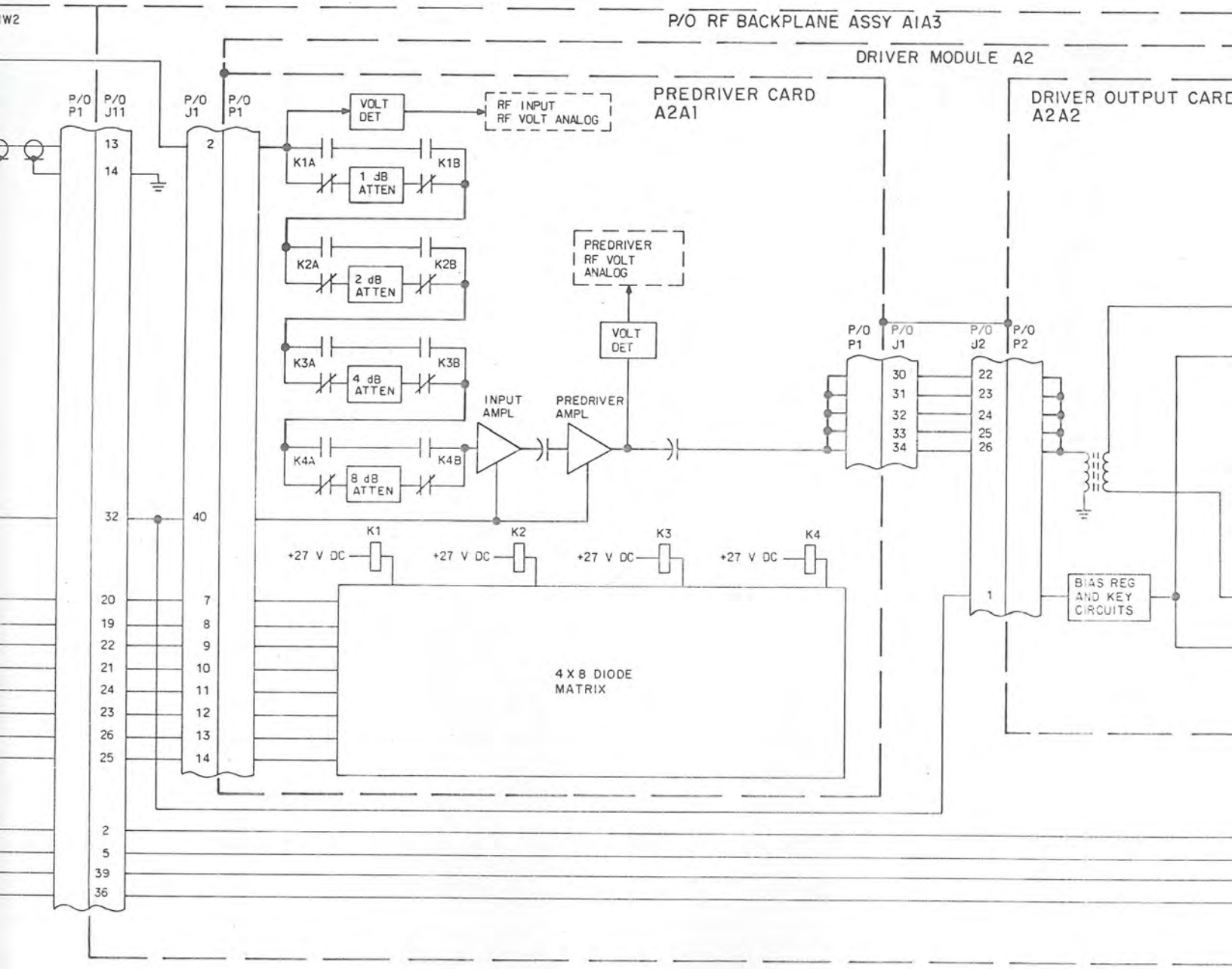
4.3.3.2 Interlocks (Refer to figure 4-7)

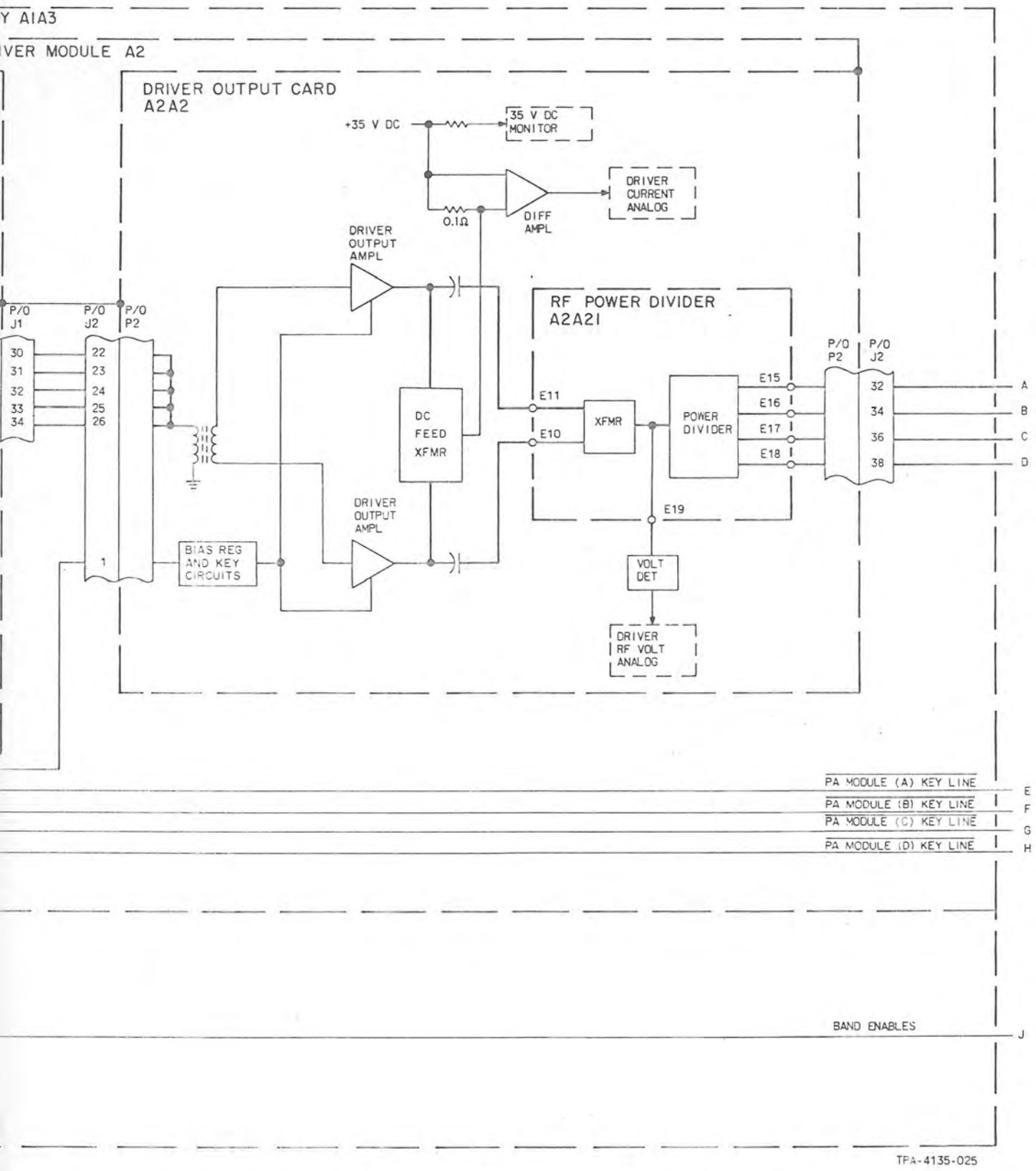
The interlock circuits are: internal interlock, key interlock, and external accessories (RF) interlock.

The internal interlock consists of a grounded interlock loop that begins with a ground signal at front panel card A1A4. The interlock is supplied through A1A2J5-6 (card cage backplane A1A2) to A1A2J8-12, A8J3-14, and A8J3-6 (low-pass filter assembly A8). From A8J3-6, the interlock is supplied through air plenum assembly (option module and driver module interlock switches S6 and S7), A1A2J8-11, and A1A2J6-2 to A1A3A1J11-7 and A1A3A1J11-10 (rf backplane A1A3A1). From A1A3A1J11-10, the interlock is applied through A1A2J6-6, A1A2J2-40 and A1A2J2-80 (exciter interface card A11), and A1A2J3-40 and A1A2J3-80 (analog control card) to A1A2J4-80 (digital control card A9) where it is applied to the key control circuit. Any break in this continuous grounded interlock loop prohibits application of a system key signal to the power amplifier and indicates an INTLK FAULT on the front panel.

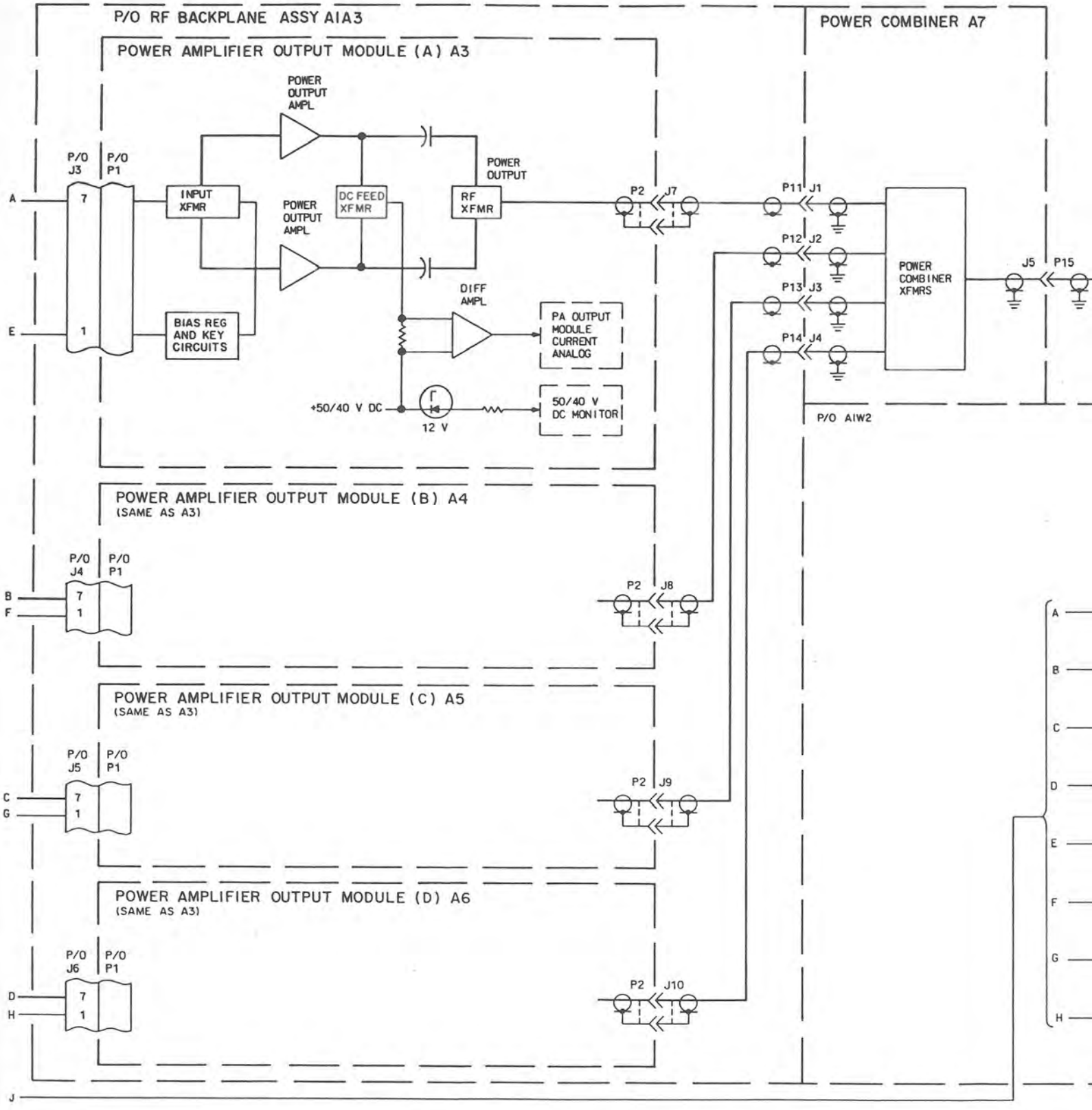
The key interlock consists of a grounded interlock loop that begins with a ground signal on card cage backplane A1A2. With coaxial jumper module A13 installed, the interlock loop is jumpered in the A13 option module. With tr relay module A13 installed, the interlock loop is sequenced in the A13 option module to prevent "hot" switching of the tr relay. With the tr relay module installed, a slight delay is built in to prevent transmit rf from being applied while the tr relay is switching from the receive to the transmit position. The interlock is supplied from A1A2J8-19 through A13J11-7 and A13J11-1 (rf option module A13) and A1A2J8-16 to A1A2J2-60 (HF-80 interface card A11) where it is applied to the system key control circuit. Any break in this continuous grounded interlock loop inhibits application of a system key signal to the power amplifier.

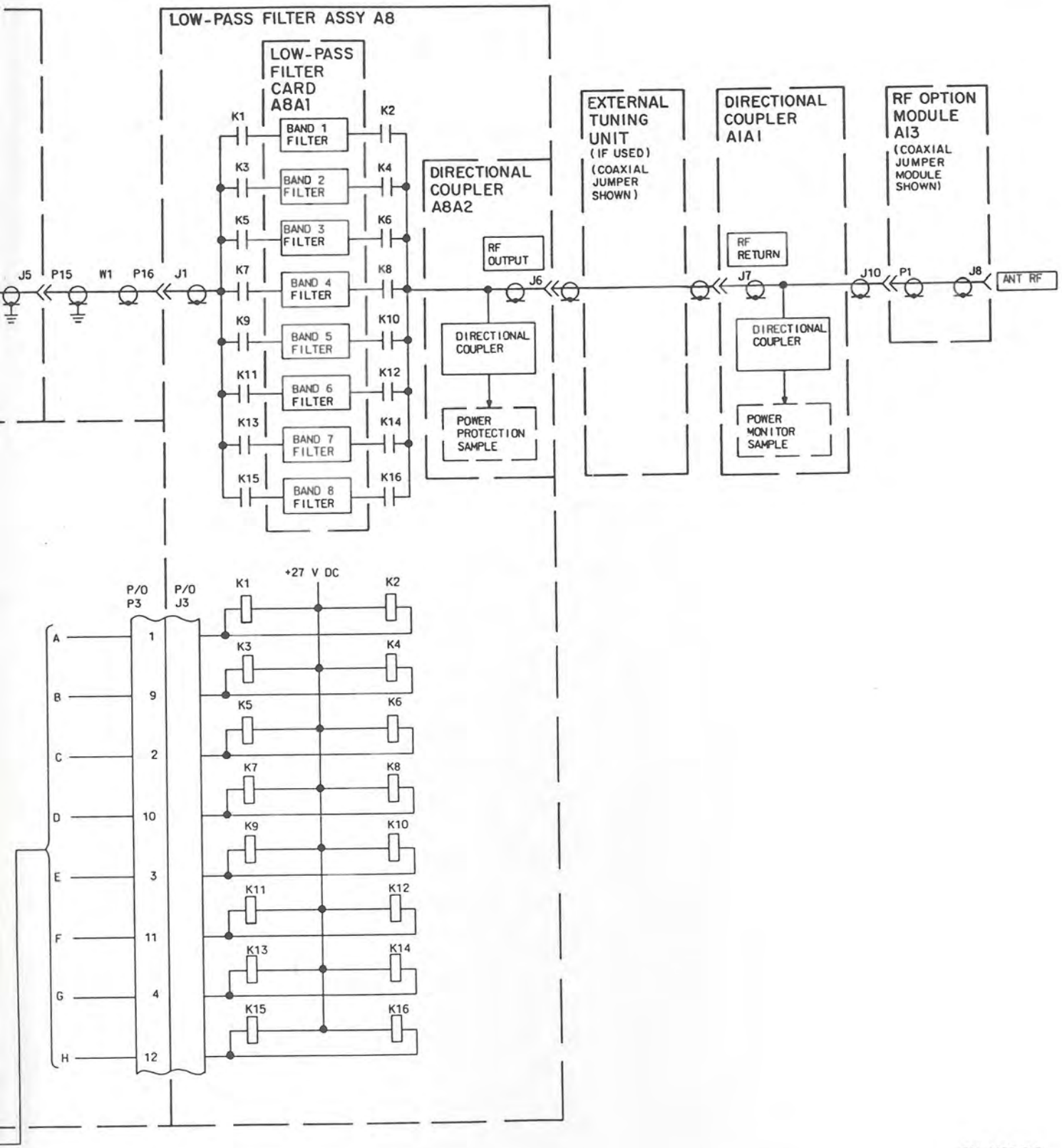

RELAY FILTER ASSEMBLY A1A5
CARD CAGE BACKPLANE A1A2
P/O A1W2
DIGITAL CONTROL CARD A9
K1
P/O J7
P/O J4
P/O P1
9
11
41
59
K1
8 dB ATTEN
RF INPUT
J1
SWITCHED ATTENUATOR A1A6
FREQUENCY COUNTER AND BAND DECODE CIRCUITS
P/O P1
P/O J4
75 56 16 55 15 54 14 46 13 48 12 51 11 50 10 9 7 73
PA MODULE KEY LINE
DRIVER KEY LINE
ANALOG CONTROL CARD A10
P/O J3
P/O P1
69
57 55 53 51
P/O J6
P/O P9
P/O P1
P/O J11
P/O J1
28 29
13 14
2
16
32
40
BAND 1 ENABLE 10
BAND 2 ENABLE 31
BAND 3 ENABLE 11
BAND 4 ENABLE 32
BAND 5 ENABLE 12
BAND 6 ENABLE 33
BAND 7 ENABLE 13
BAND 8 ENABLE 34
20 7
19 8
22 9
21 10
24 11
23 12
26 13
25 14
PA MODULE (A) KEY LINE 3
PA MODULE (B) KEY LINE 24
PA MODULE (C) KEY LINE 18
PA MODULE (D) KEY LINE 40
2
5
39
36
P/O J8
P/O P2
8 7 6 5 4 3 2 1
BAND 1 ENABLE A
BAND 2 ENABLE B
BAND 3 ENABLE C
BAND 4 ENABLE D
BAND 5 ENABLE E
BAND 6 ENABLE F
BAND 7 ENABLE G
BAND 8 ENABLE H


W2
P/O RF BACKPLANE ASSY A1A3
DRIVER MODULE A2
PREDRIVER CARD A2A1
DRIVER OUTPUT CARD A2A2
P/O P1
P/O J11
P/O J1
P/O P1
P/O P1
P/O J1
P/O J2
P/O P2
VOLT DET
RF INPUT RF VOLT ANALOG
K1A
K1B
1 dB ATTEN
K2A
K2B
2 dB ATTEN
K3A
K3B
4 dB ATTEN
K4A
K4B
8 dB ATTEN
PREDRIVER RF VOLT ANALOG
VOLT DET
INPUT AMPL
PREDRIVER AMPL
K1
K2
K3
K4
+27 V DC
+27 V DC
+27 V DC
+27 V DC
4 X 8 DIODE MATRIX
BIAS REG AND KEY CIRCUITS
13
14
32
20
19
22
21
24
23
26
25
2
5
39
36
2
40
7
8
9
10
11
12
13
14
30
31
32
33
34
22
23
24
25
26
1



RF Circuits, Block Diagram
Figure 4-5 (Sheet 1 of 2)


P/O RF BACKPLANE ASSY A1A3
POWER COMBINER A7
POWER AMPLIFIER OUTPUT MODULE (A) A3
POWER OUTPUT AMPL
POWER OUTPUT AMPL
POWER OUTPUT
P/O J3
P/O P1
A
E
7
1
INPUT XFMR
BIAS REG AND KEY CIRCUITS
DC FEED XFMR
RF XFMR
P2
J7
P11
J1
P12
J2
P13
J3
P14
J4
POWER COMBINER XFMRS
J5
P15
DIFF AMPL
PA OUTPUT MODULE CURRENT ANALOG
+50/40 V DC
12 V
50/40 V DC MONITOR
P/O A1W2
POWER AMPLIFIER OUTPUT MODULE (B) A4
(SAME AS A3)
P/O J4
P/O P1
B
F
P2
J8
POWER AMPLIFIER OUTPUT MODULE (C) A5
(SAME AS A3)
P/O J5
P/O P1
C
G
P2
J9
POWER AMPLIFIER OUTPUT MODULE (D) A6
(SAME AS A3)
P/O J6
P/O P1
D
H
P2
J10
A
B
C
D
E
F
G
H
J



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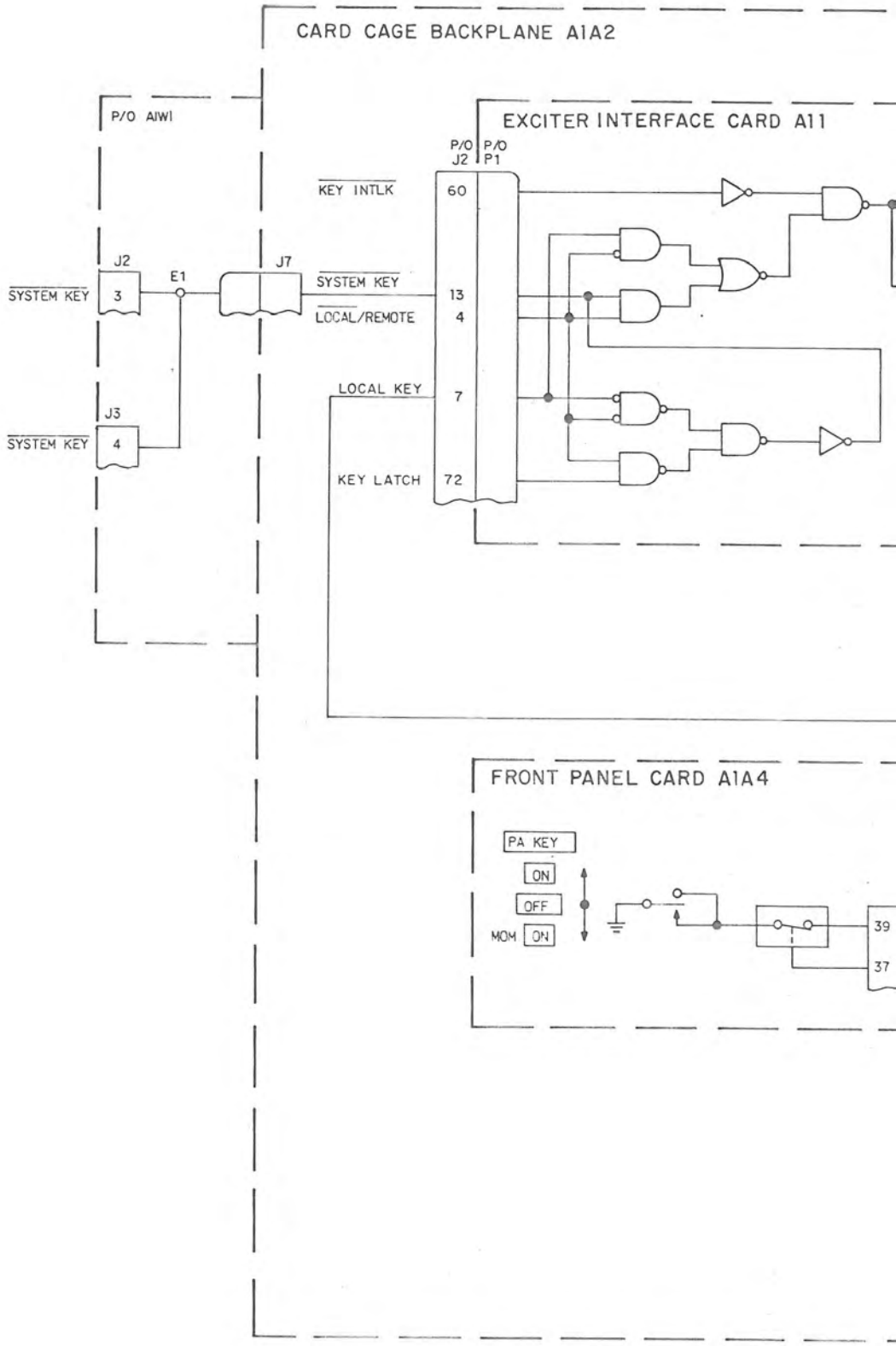
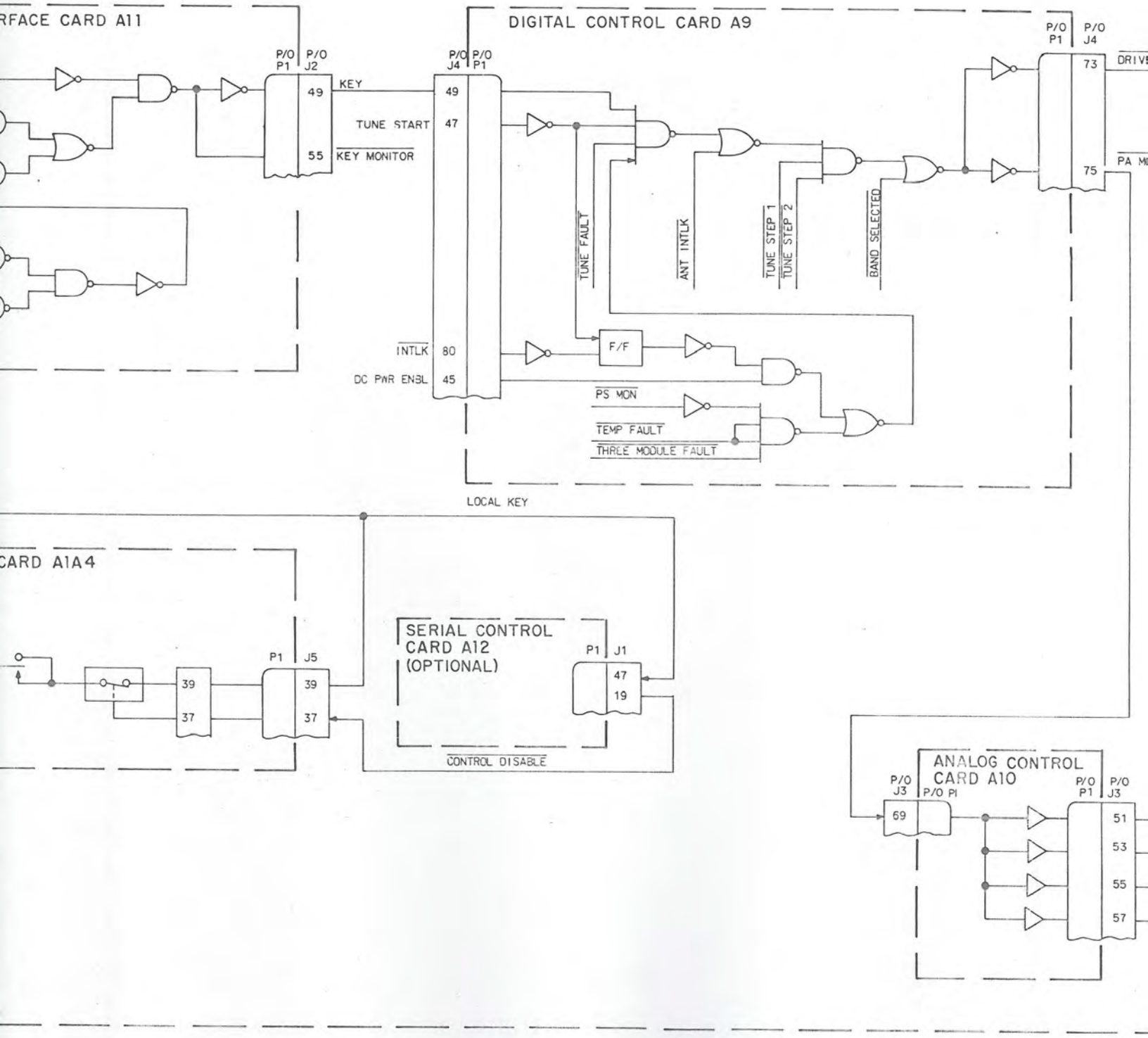
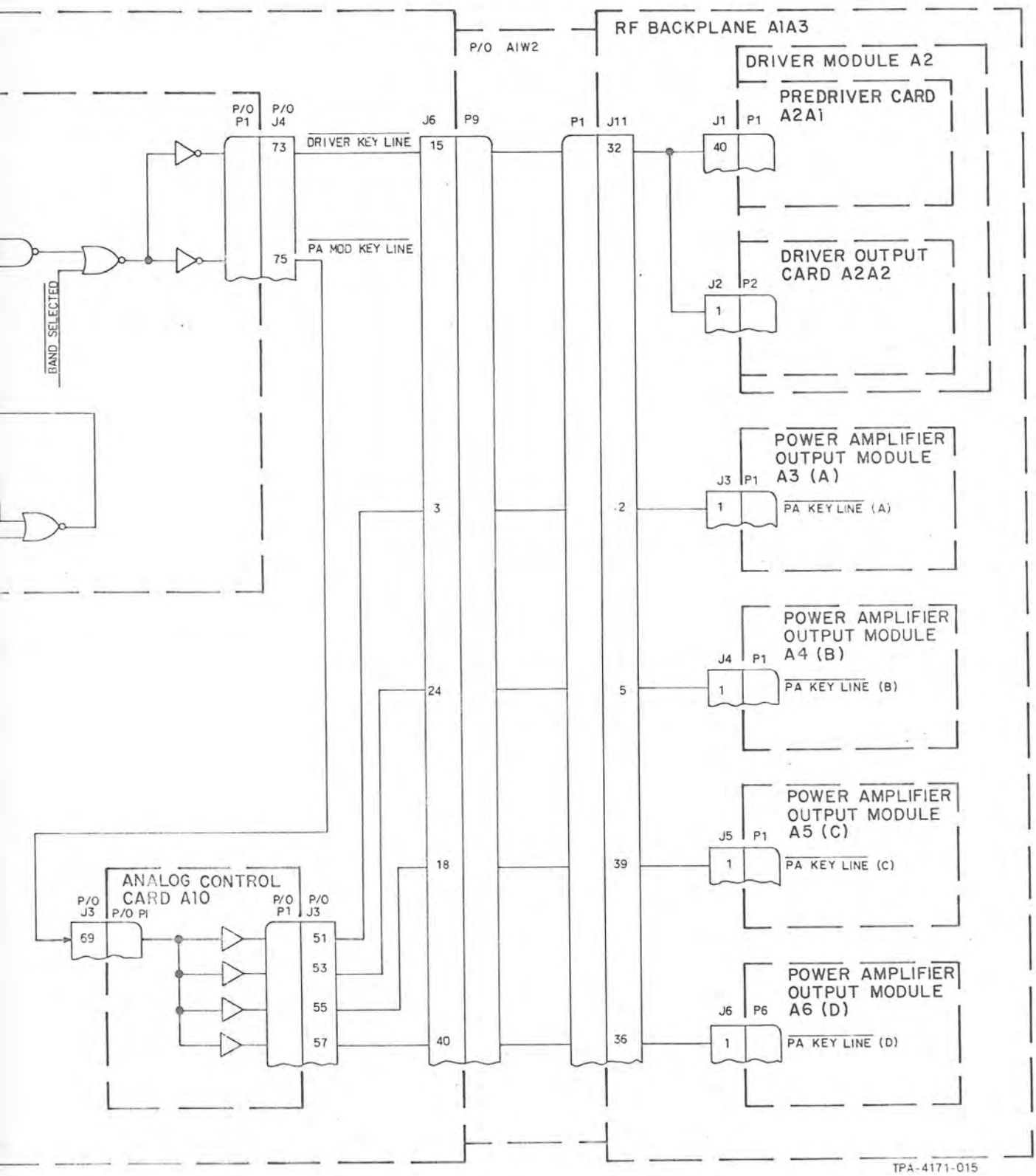
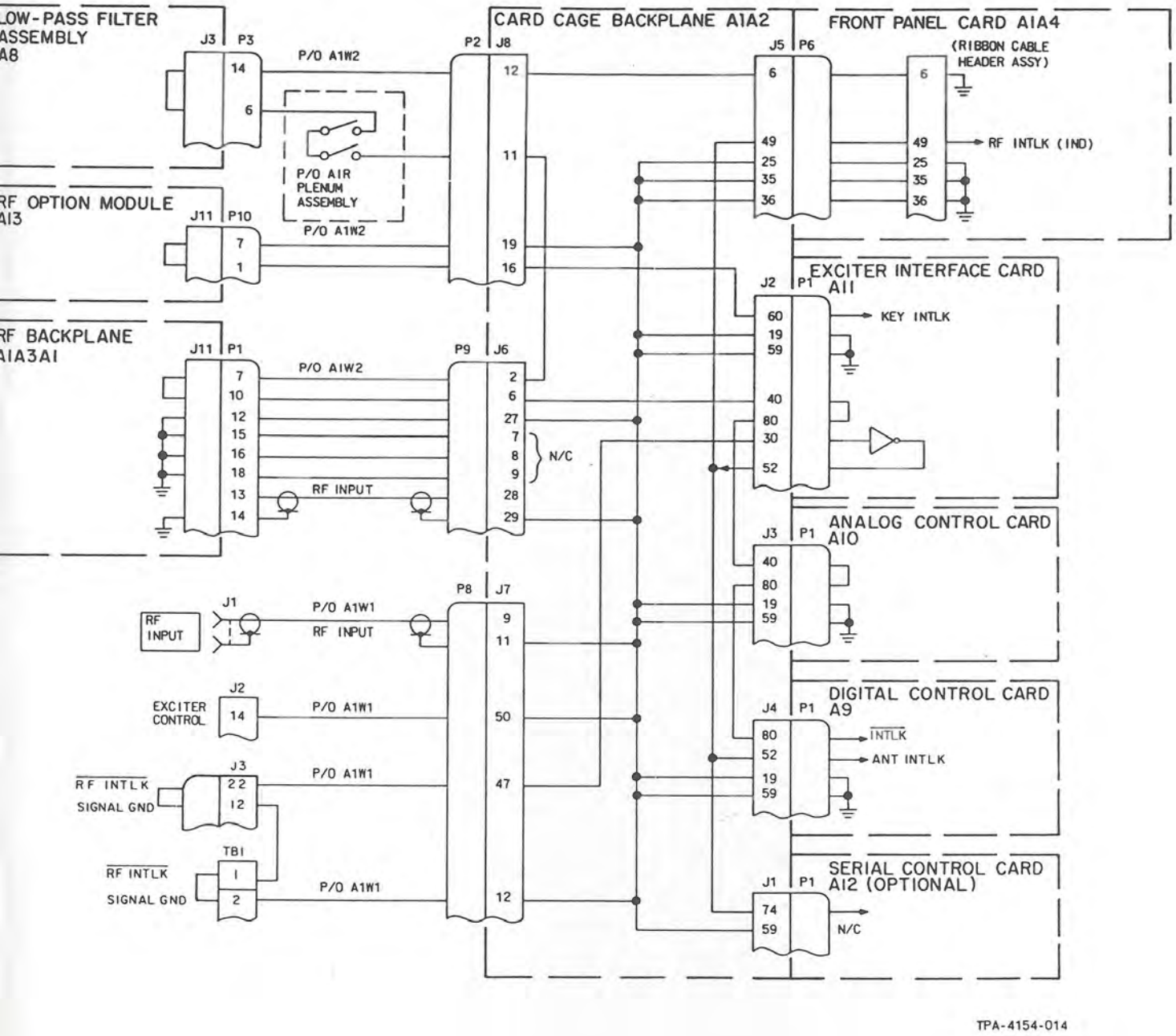
RF Circuits, Block Diagram
Figure 4-5 (Sheet 2)


CARD CAGE BACKPLANE A1A2
P/O A1W1
EXCITER INTERFACE CARD A11
P/O J2
P/O P1
KEY INTLK
60
J2
3
E1
J7
SYSTEM KEY
SYSTEM KEY
13
LOCAL/REMOTE
4
LOCAL KEY
7
J3
4
SYSTEM KEY
KEY LATCH
72
FRONT PANEL CARD A1A4
PA KEY
ON
OFF
MOM ON
39
37


RFACE CARD A11
DIGITAL CONTROL CARD A9
P/O P1
P/O J2
P/O J4
P/O P1
KEY
TUNE START
KEY MONITOR
49
47
55
INTLK
DC PWR ENBL
80
45
TUNE FAULT
ANT INTLK
TUNE STEP 1
TUNE STEP 2
BAND SELECTED
F/F
PS MON
TEMP FAULT
THRLE MODULE FAULT
73
75
DRIVE
PA M
LOCAL KEY
CARD A1A4
P1
J5
39
37
SERIAL CONTROL
CARD A12
(OPTIONAL)
P1
J1
47
19
CONTROL DISABLE
ANALOG CONTROL
CARD A10
P/O J3
P/O P1
69
51
53
55
57



Key Circuits, Block Diagram
Figure 4-6



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Interlocks and Interlock Commons, Simplified Schematic Diagram
Figure 4-7

The external accessories (rf) interlock consists of a grounded interlock loop that begins with a ground signal on card cage backplane A1A2. The interlock is supplied through A1A2J7-12, A1W1TB1-2 and A1W1TB1-1 (accessories and/or accessories terminal board), A1W1J3-12 and A1W1J3-22 (antenna coupler and/or coupler control connector), and A1A2J7-47 to A1A1J2-30 (HF-80 interface card A11). In the interface card, the external accessories interlock signal is inverted and supplied to A1A2J2-52, A1A2J4-52 (digital control card A9, antenna interlock signal), A1A2J2-74 (serial control card A12, interlock signal), and A1A2J5-49 (front panel card A1A4, rf interlock signal). The rf interlock signal at A1A2J5-49 is used to light the RF INTLK monitor on the front panel. Any break in this interlock loop inhibits application of a system key signal to the power amplifier and extinguishes the RF INTLK monitor on the power amplifier front panel. This interlock is used by external rf equipment such as antenna couplers, line flatteners, filters, and antenna coaxial switches to control the application of the rf output from the power amplifier during tuning or switching operations.

4.3.4 Monitor Circuits (Refer to figure 4-8)

Monitor circuits are provided to allow full operator/technician visibility of operational status of the power amplifier without removing the power amplifier dust/protective covers. These monitors include fault indicators, status indicators (monitors), a tune step indicator, a selected band indicator, and a multimeter to measure various voltage, current, and power parameters.

4.3.4.1 FAULT Indicators

MOD A, MOD B, MOD C, and MOD D fault indicators light when the dc monitor signal from power amplifier output modules A3, A4, A5, and A6, respectively, has not been received by analog control card A10 or falls below the level that would indicate faulty operation of the power amplifier output module. If no more than two of these fault indicators light, the power amplifier should remain operational at reduced power. If more than two light, the power amplifier will not accept a key signal.

INTLK fault indicator lights if the internal interlock circuit is not satisfied (ground loop not completed). The loop circuit consists of front panel card A1A4, card cage backplane A1A2, low-pass filter assembly A8, air plenum assembly, rf backplane A1A3A1, HF-80 interface card A11, analog control card A10, and digital control card A9.

TEMP fault indicator lights if any of the temperature sense inputs indicate one of the power amplifier modules is overheated beyond the point of reducing the power amplifier output by ALC/IGC actions. Power amplifier output module temperature sense signals are supplied to analog control card A10. If the temperature rises abnormally high, the power amplifier output power is reduced by the temperature sense signals controlling IGC/ALC. If further temperature rise occurs, a temperature fault is triggered and the power amplifier is unkeyed.

VSWR fault indicator lights if the reflected power analog and forward power analog indicate a vswr of more than 3.0:1 and the power amplifier output has been reduced by ALC/IGC actions. Forward and reflected power analogs are supplied by exciter interface A11 from directional coupler A1A1 samples. Both analogs are supplied to analog control card A10, compared, and the comparator output generates the vswr fault signal to light the VSWR fault indicator and unkey the power amplifier.

TUNE fault indicator lights if the power amplifier has failed to complete a tune cycle (including externally tuned elements) in less than 10 seconds (20 seconds with optional strapping on digital control card A9) after it was initiated. The tune fault signal supplied by digital control card A9 is set by a tune start input, initiated when the power amplifier begins tune step 2, and inhibited by the completion of tune step 5 if completed in less than 10 seconds (or 20 seconds) after initiation.

4.3.4.2 MONITOR Indicators

RF INPUT indicator lights if sufficient rf drive has been applied to initiate a tune cycle. Rf input rf voltage analog is sensed at the rf input of predriver card A2A1 and supplied to analog control card A10. The rf input rf voltage analog signal is converted to an rf input monitor signal and supplied to front panel card A1A4 to light the RF INPUT indicator.

KEY indicator lights if a system key is applied and the key interlock is satisfied. Key monitor signal is supplied by exciter interface A11 to front panel card A1A4 when a system key is received.

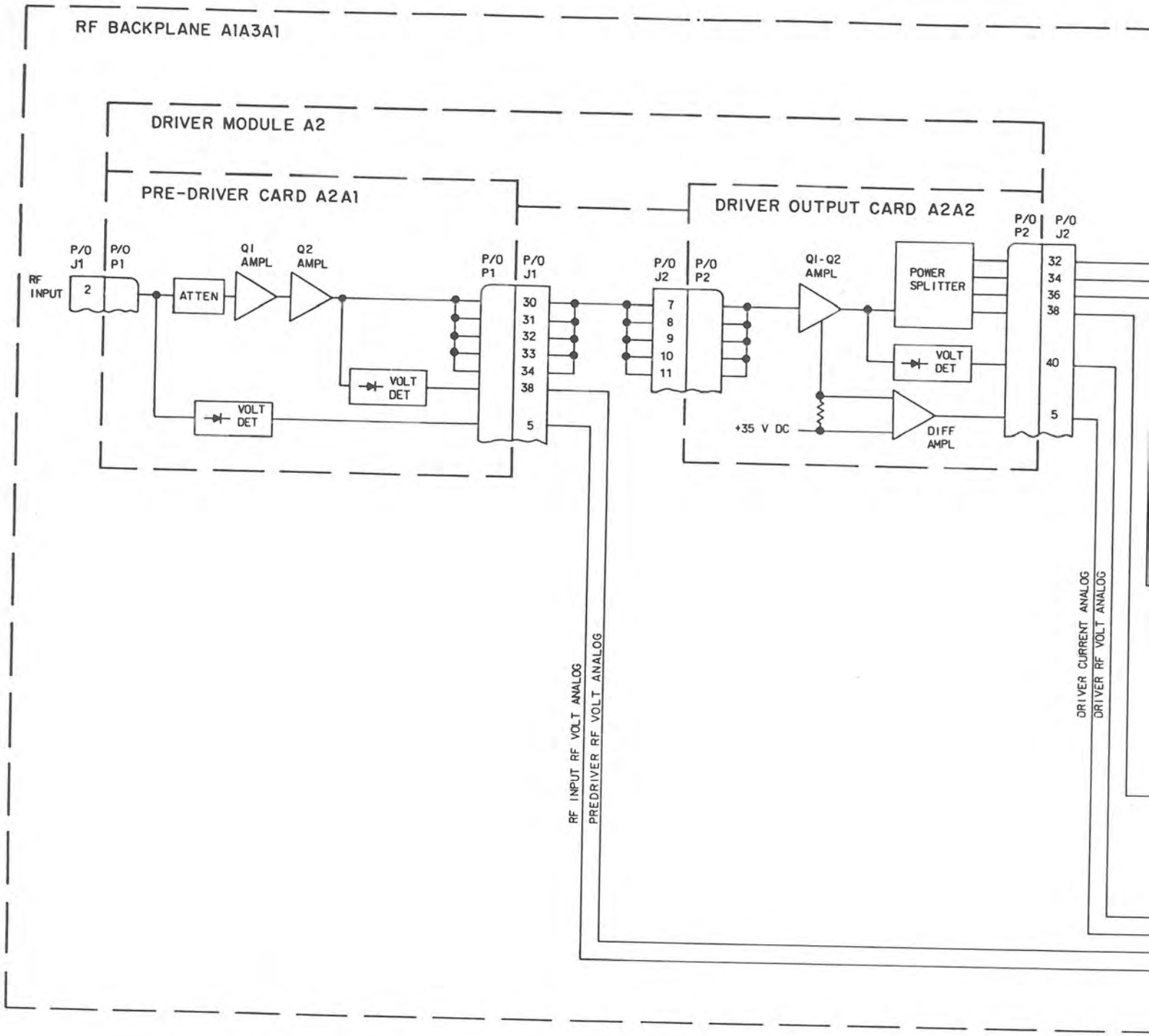
RF INTLK indicator lights if external control interlocks are satisfied (antenna coupler and/or accessories are installed or interlock jumpers are in place). Rf interlock monitor signal is supplied by exciter interface A11 to front panel card A1A4 when an antenna interlock signal is received by the antenna coupler and accessories interlock loop.

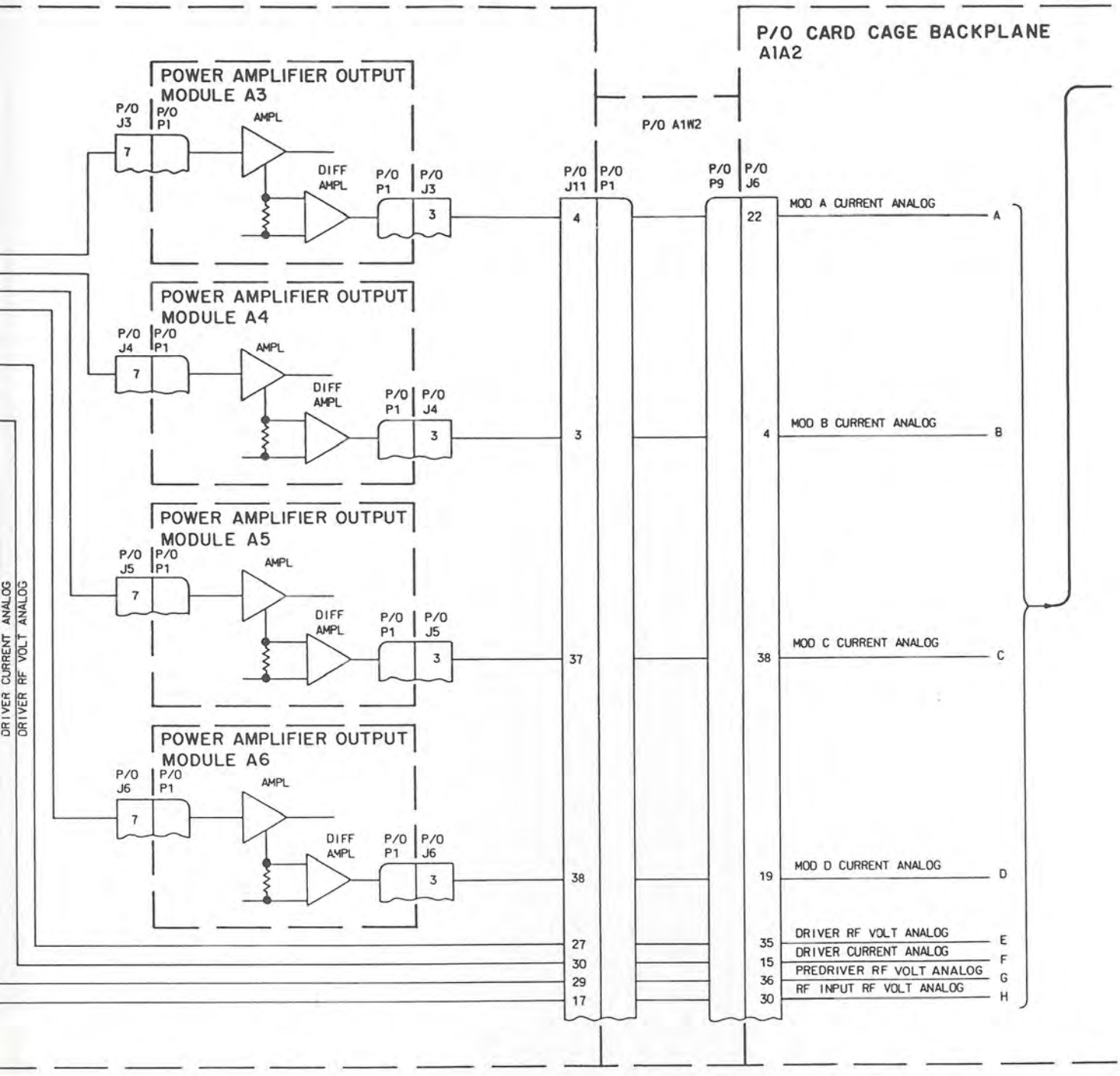
PWR SPLY indicator lights to indicate that dc power is on, the +35 V dc is applied, and +50/40 V dc is applied to not less than two power amplifier output modules. Power supply monitor signal is supplied by analog control A10 to front panel card A1A4 when these conditions are met.

4.3.4.3 TUNE STEP Indicator

The TUNE STEP indicator displays the number of the tune step in process or the last tune step completed if tuning ceases between tune steps.

Tune control is initiated in digital control card A9 and the digital control card generates a bcd tune sequence code that indicates the tune step in process. This tune sequence code is supplied to the TGC control circuits in exciter interface A11 and to front panel card A1A4, where it drives a 7-segment display to indicate the tune step.


RF BACKPLANE A1A3A1
DRIVER MODULE A2
PRE-DRIVER CARD A2A1
DRIVER OUTPUT CARD A2A2
RF INPUT
P/O J1
P/O P1
2
ATTEN
Q1 AMPL
Q2 AMPL
VOLT DET
VOLT DET
P/O P1
P/O J1
30
31
32
33
34
38
5
P/O J2
P/O P2
7
8
9
10
11
Q1-Q2 AMPL
+35 V DC
POWER SPLITTER
VOLT DET
DIFF AMPL
P/O P2
P/O J2
32
34
36
38
40
5
RF INPUT RF VOLT ANALOG
PREDRIVER RF VOLT ANALOG
DRIVER CURRENT ANALOG
DRIVER RF VOLT ANALOG



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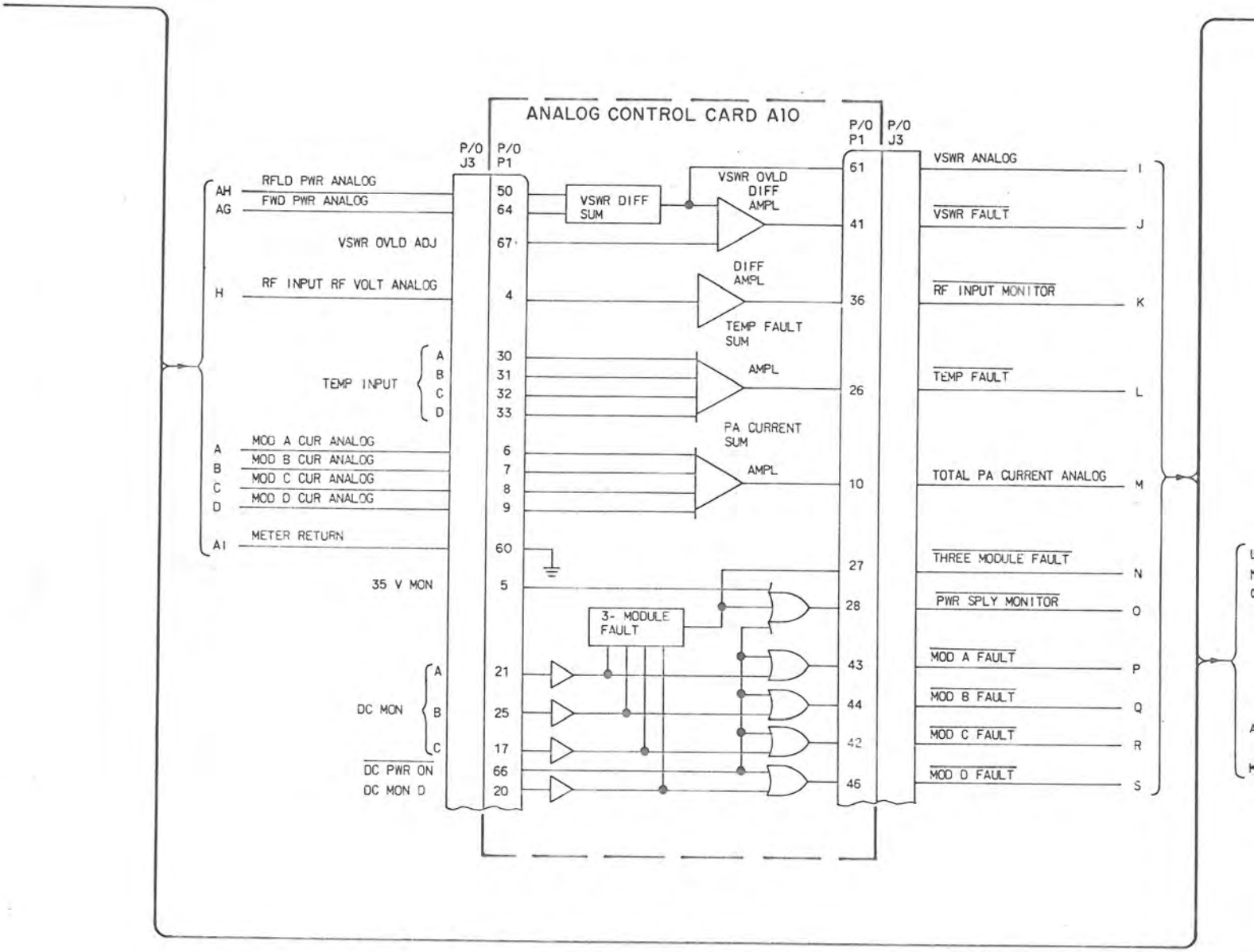
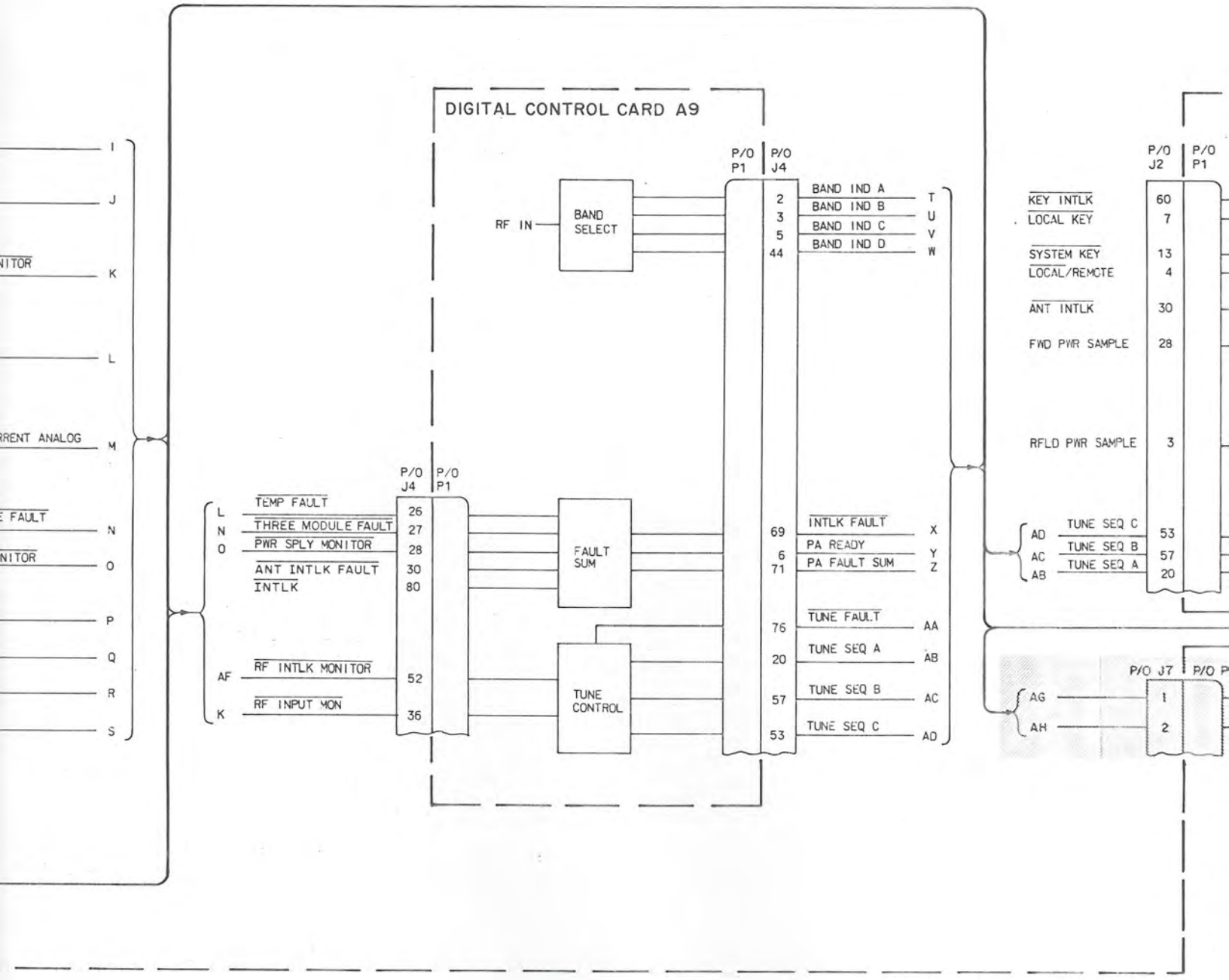
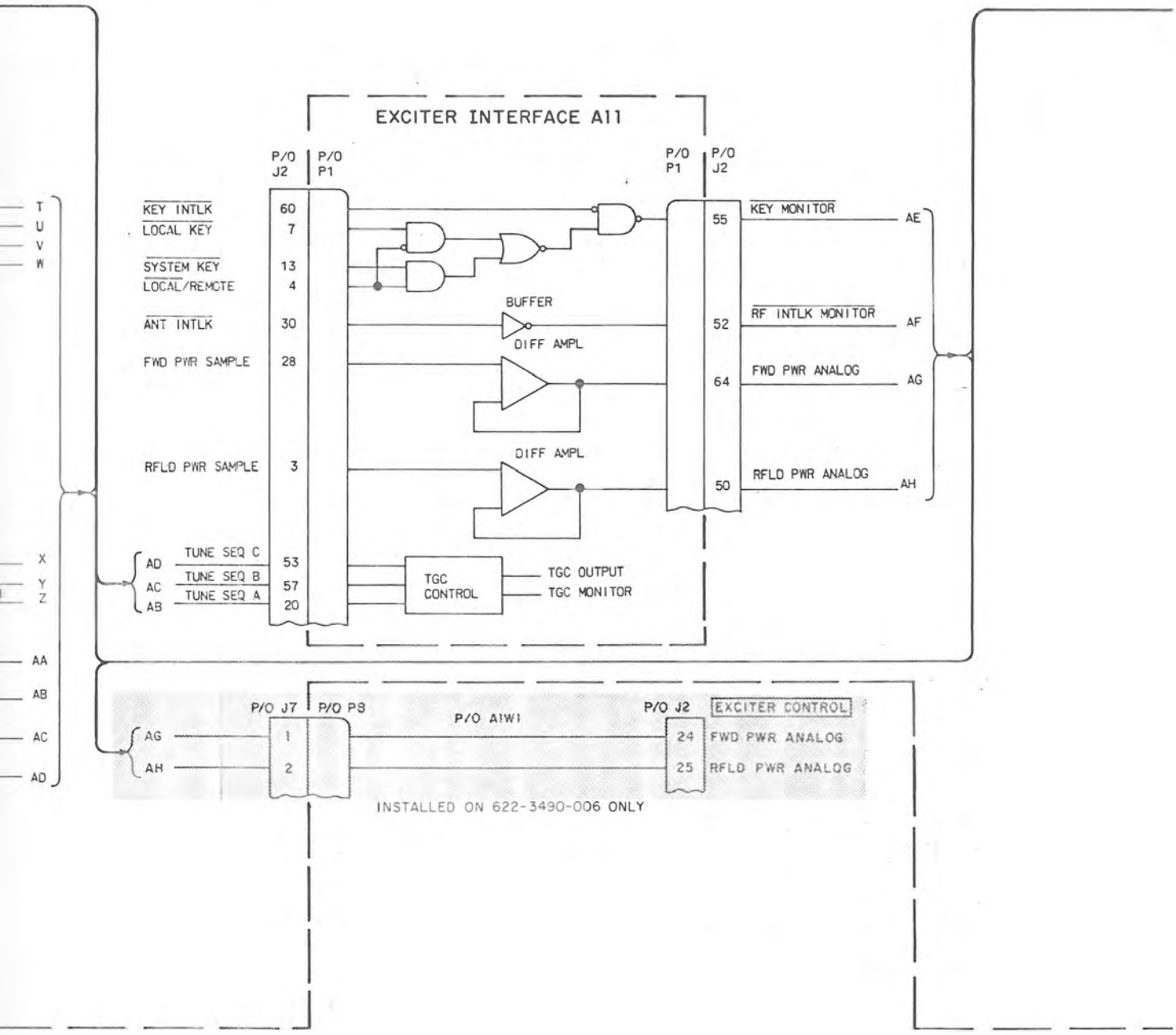
Monitor Circuits, Block Diagram
Figure 4-8 (Sheet 1 of 3)

P/O CARD CAGE BACKPLANE A1A2




DIGITAL CONTROL CARD A9
P/O P1
P/O J4
RF IN
BAND SELECT
BAND IND A
BAND IND B
BAND IND C
BAND IND D
2
3
5
44
T
U
V
W
P/O J4
P/O P1
L
N
O
TEMP FAULT
THREE MODULE FAULT
PWR SPLY MONITOR
ANT INTLK FAULT
INTLK
26
27
28
30
80
FAULT SUM
INTLK FAULT
PA READY
PA FAULT SUM
69
6
71
X
Y
Z
AF
K
RF INTLK MONITOR
RF INPUT MON
52
36
TUNE CONTROL
TUNE FAULT
TUNE SEQ A
TUNE SEQ B
TUNE SEQ C
76
20
57
53
AA
AB
AC
AD
P/O J2
P/O P1
KEY INTLK
LOCAL KEY
SYSTEM KEY
LOCAL/REMOTE
ANT INTLK
FWD PWR SAMPLE
RFLD PWR SAMPLE
60
7
13
4
30
28
3
AD
AC
AB
TUNE SEQ C
TUNE SEQ B
TUNE SEQ A
53
57
20
P/O J7
AG
AH
1
2
I
J
K
L
M
N
O
P
Q
R
S



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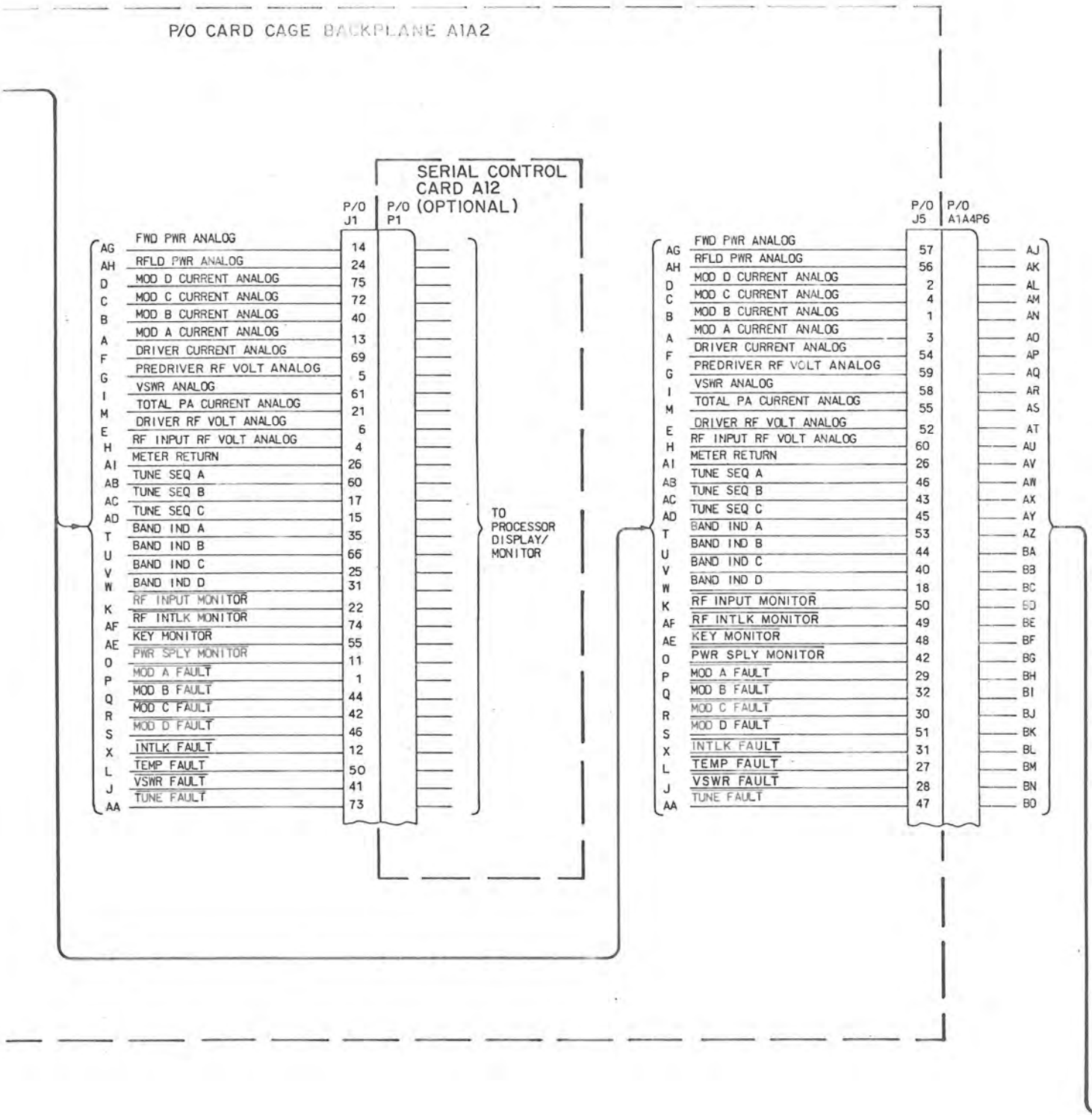
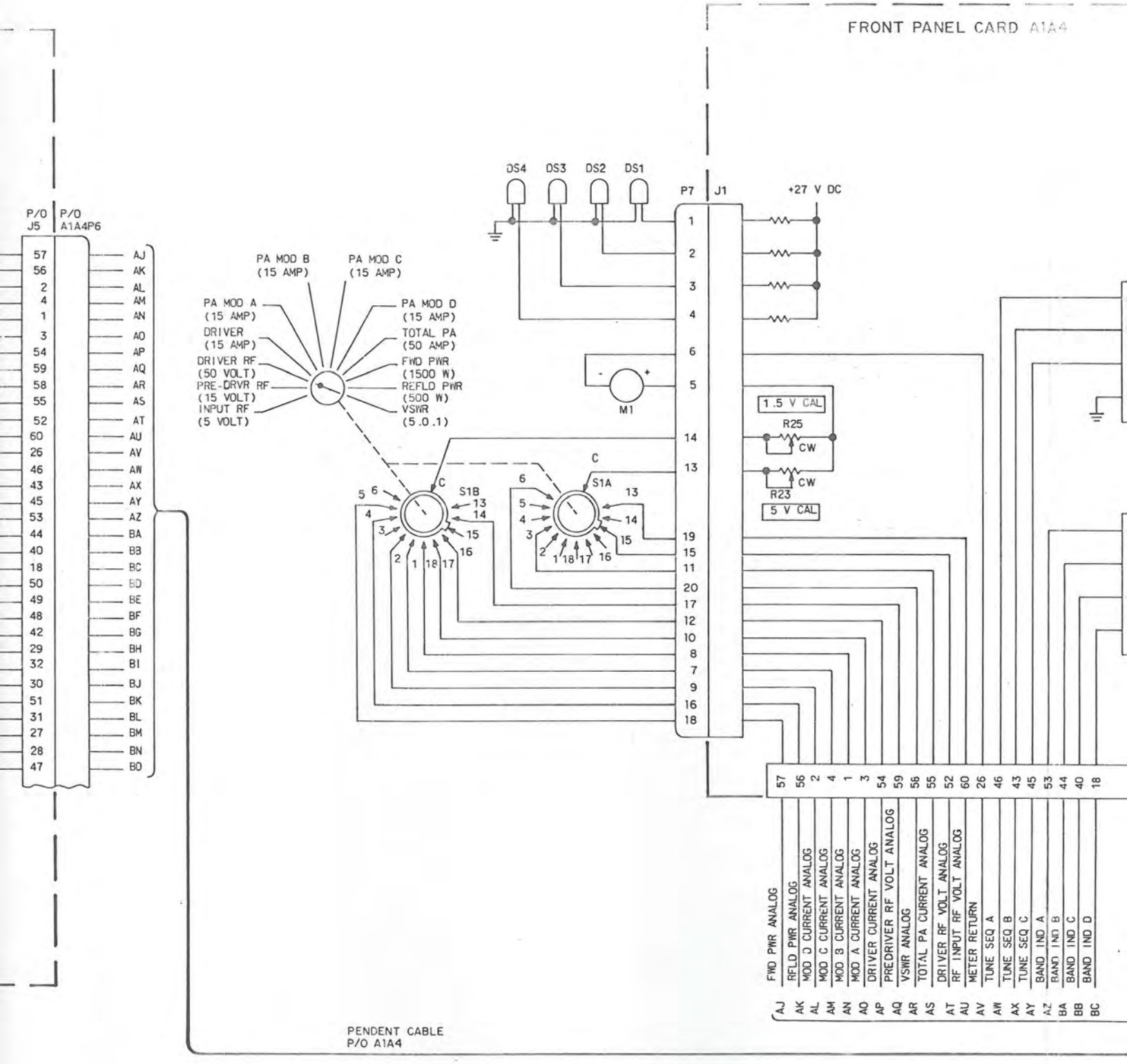
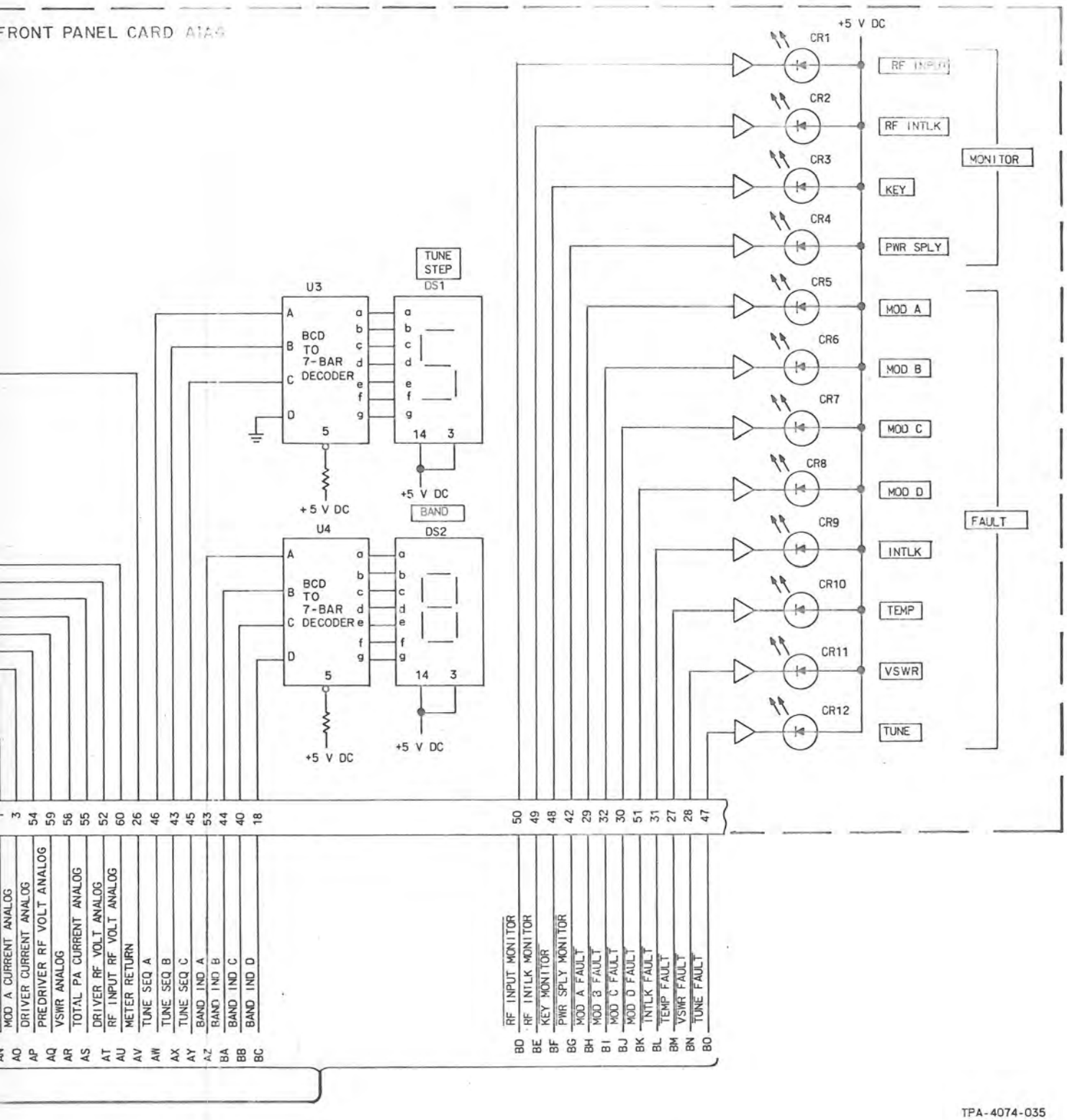
Monitor Circuits, Block Diagram
Figure 4-8 (Sheet 2)


P/O CARD CAGE BACKPLANE A1A2
SERIAL CONTROL CARD A12
P/O J1
P/O P1 (OPTIONAL)
AG FWD PWR ANALOG 14
AH RFLD PWR ANALOG 24
D MOD D CURRENT ANALOG 75
C MOD C CURRENT ANALOG 72
B MOD B CURRENT ANALOG 40
A MOD A CURRENT ANALOG 13
F DRIVER CURRENT ANALOG 69
G PREDRIVER RF VOLT ANALOG 5
I VSWR ANALOG 61
M TOTAL PA CURRENT ANALOG 21
E DRIVER RF VOLT ANALOG 6
H RF INPUT RF VOLT ANALOG 4
AI METER RETURN 26
AB TUNE SEQ A 60
AC TUNE SEQ B 17
AD TUNE SEQ C 15
T BAND IND A 35
U BAND IND B 66
V BAND IND C 25
W BAND IND D 31
K RF INPUT MONITOR 22
AF RF INTLK MONITOR 74
AE KEY MONITOR 55
O PWR SPLY MONITOR 11
P MOD A FAULT 1
Q MOD B FAULT 44
R MOD C FAULT 42
S MOD D FAULT 46
X INTLK FAULT 12
L TEMP FAULT 50
J VSWR FAULT 41
AA TUNE FAULT 73
TO PROCESSOR DISPLAY/ MONITOR
P/O J5
P/O A1A4P6
AG FWD PWR ANALOG 57 AJ
AH RFLD PWR ANALOG 56 AK
D MOD D CURRENT ANALOG 2 AL
C MOD C CURRENT ANALOG 4 AM
B MOD B CURRENT ANALOG 1 AN
A MOD A CURRENT ANALOG 3 AO
F DRIVER CURRENT ANALOG 54 AP
G PREDRIVER RF VOLT ANALOG 59 AQ
I VSWR ANALOG 58 AR
M TOTAL PA CURRENT ANALOG 55 AS
E DRIVER RF VOLT ANALOG 52 AT
H RF INPUT RF VOLT ANALOG 60 AU
AI METER RETURN 26 AV
AB TUNE SEQ A 46 AW
AC TUNE SEQ B 43 AX
AD TUNE SEQ C 45 AY
T BAND IND A 53 AZ
U BAND IND B 44 BA
V BAND IND C 40 BB
W BAND IND D 18 BC
K RF INPUT MONITOR 50 BD
AF RF INTLK MONITOR 49 BE
AE KEY MONITOR 48 BF
O PWR SPLY MONITOR 42 BG
P MOD A FAULT 29 BH
Q MOD B FAULT 32 BI
R MOD C FAULT 30 BJ
S MOD D FAULT 51 BK
X INTLK FAULT 31 BL
L TEMP FAULT 27 BM
J VSWR FAULT 28 BN
AA TUNE FAULT 47 BO


FRONT PANEL CARD A1A4
P/O J5
P/O A1A4P6
PENDENT CABLE P/O A1A4
DS4 DS3 DS2 DS1
P7 J1
+27 V DC
PA MOD A (15 AMP)
PA MOD B (15 AMP)
PA MOD C (15 AMP)
PA MOD D (15 AMP)
DRIVER (15 AMP)
TOTAL PA (50 AMP)
DRIVER RF (50 VOLT)
FWD PWR (1500 W)
PRE-DRVR RF (15 VOLT)
REFLD PWR (500 W)
INPUT RF (5 VOLT)
VSWR (5.0 .1)
M1
1.5 V CAL
R25
CW
R23
CW
5 V CAL
S1A
S1B
FWD PWR ANALOG
RFLD PWR ANALOG
MOD D CURRENT ANALOG
MOD C CURRENT ANALOG
MOD B CURRENT ANALOG
MOD A CURRENT ANALOG
DRIVER CURRENT ANALOG
PREDRIVER RF VOLT ANALOG
VSWR ANALOG
TOTAL PA CURRENT ANALOG
DRIVER RF VOLT ANALOG
RF INPUT RF VOLT ANALOG
METER RETURN
TUNE SEQ A
TUNE SEQ B
TUNE SEQ C
BAND IND A
BAND IND B
BAND IND C
BAND IND D



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Monitor Circuits, Block Diagram
Figure 4-8 (Sheet 3)

Tune steps indicate the following:

Step 1 - Indicates receipt of a tune start signal from the exciter or front panel card A1A4. Tune step counter is set to step 1. All faults must be cleared, sufficient rf input power must be applied to initiate band switching, and all interlocks must be satisfied before power amplifier can be advanced to step 2. When a system key is applied, it is latched for the duration of the tune cycle.

Step 2 - Indicates tune step 1 is complete, the rf frequency is sensed, and band switching is in process or completed. The internal power amplifier keyline is off and there is not rf output from the power amplifier in tune step 2.

Step 3 - Indicates tune step 2 is complete and power amplifier is keyed in tune power mode (approximately 200 watts forward power), for tuning of external tuning devices.

Step 4 - Indicates tune step 3 is complete and tune power mode is released, allowing TGC circuits to set overall transmitter gain when the power amplifier is being controlled and driven by an exciter.

Step 5 - Indicates tuning is complete, ALC is gated on, and the power amplifier is ready and fully operational.

4.3.4.4 BAND Indicator

The BAND indicator displays the number of the selected low-pass filter band. Frequencies of bands are as follows.

1 -- 1.60 to 2.29 MHz
2 -- 2.30 to 3.39 MHz
3 -- 3.40 to 4.89 MHz
4 -- 4.90 to 6.99 MHz
5 -- 7.00 to 9.99 MHz
6 -- 10.00 to 14.49 MHz
7 -- 14.50 to 20.99 MHz
8 -- 21.00 to 29.99 MHz

Band selection is initiated in digital control card A9. The digital control card generates a bcd band indicator code that indicates the band selected as required by the rf frequency applied. This band indicator code signal is supplied to front panel card A1A4. A binary band code is also generated which is decoded into a 1 of 8 line band enable signal applied to low-pass filter assembly A8.

4.3.4.5 MULTIMETER Functions

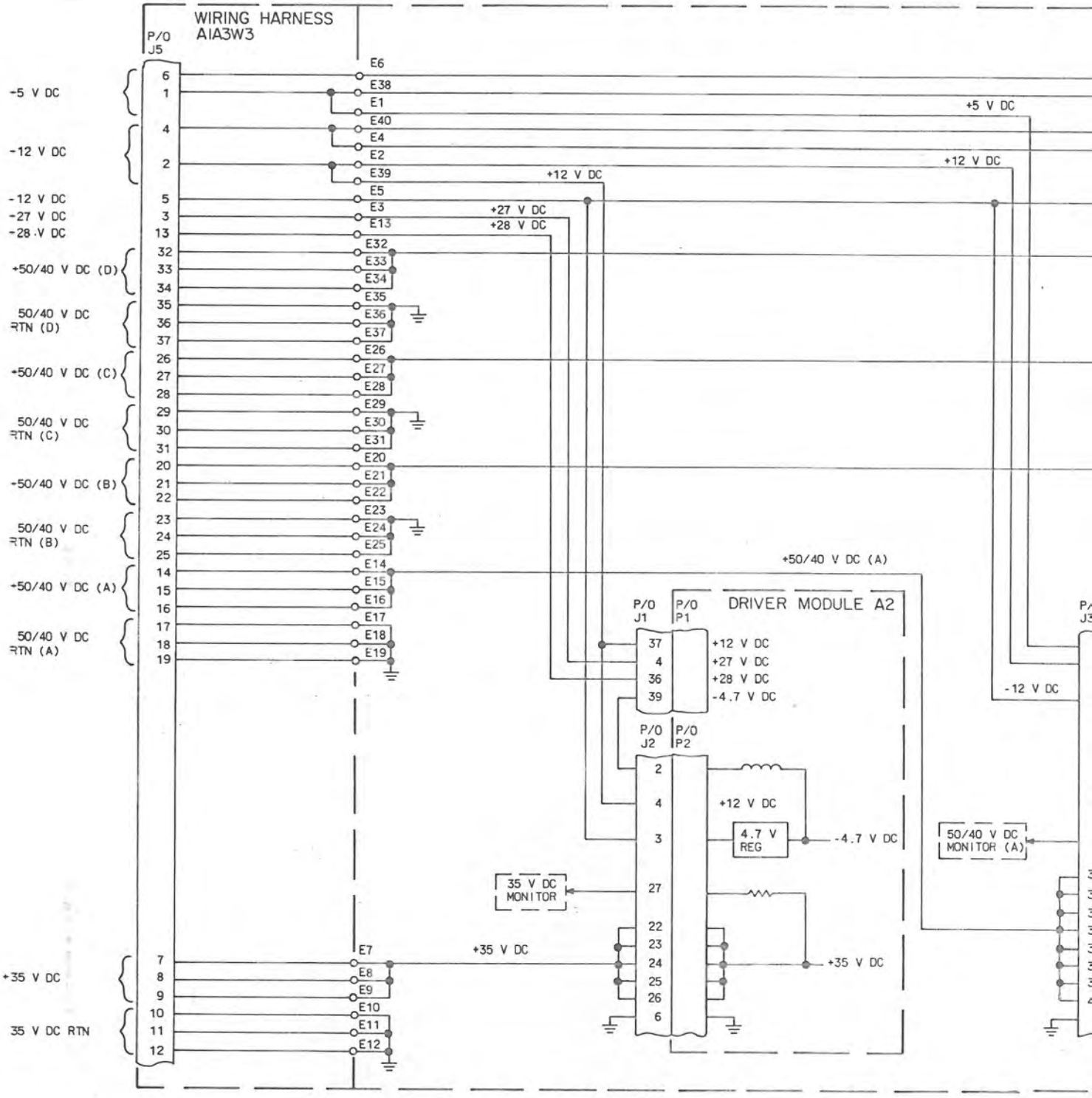
The front panel MULTIMETER provides a means of measuring voltages, currents, and power levels at points in the power amplifier to determine the operational status and to aid in maintaining the power amplifier.

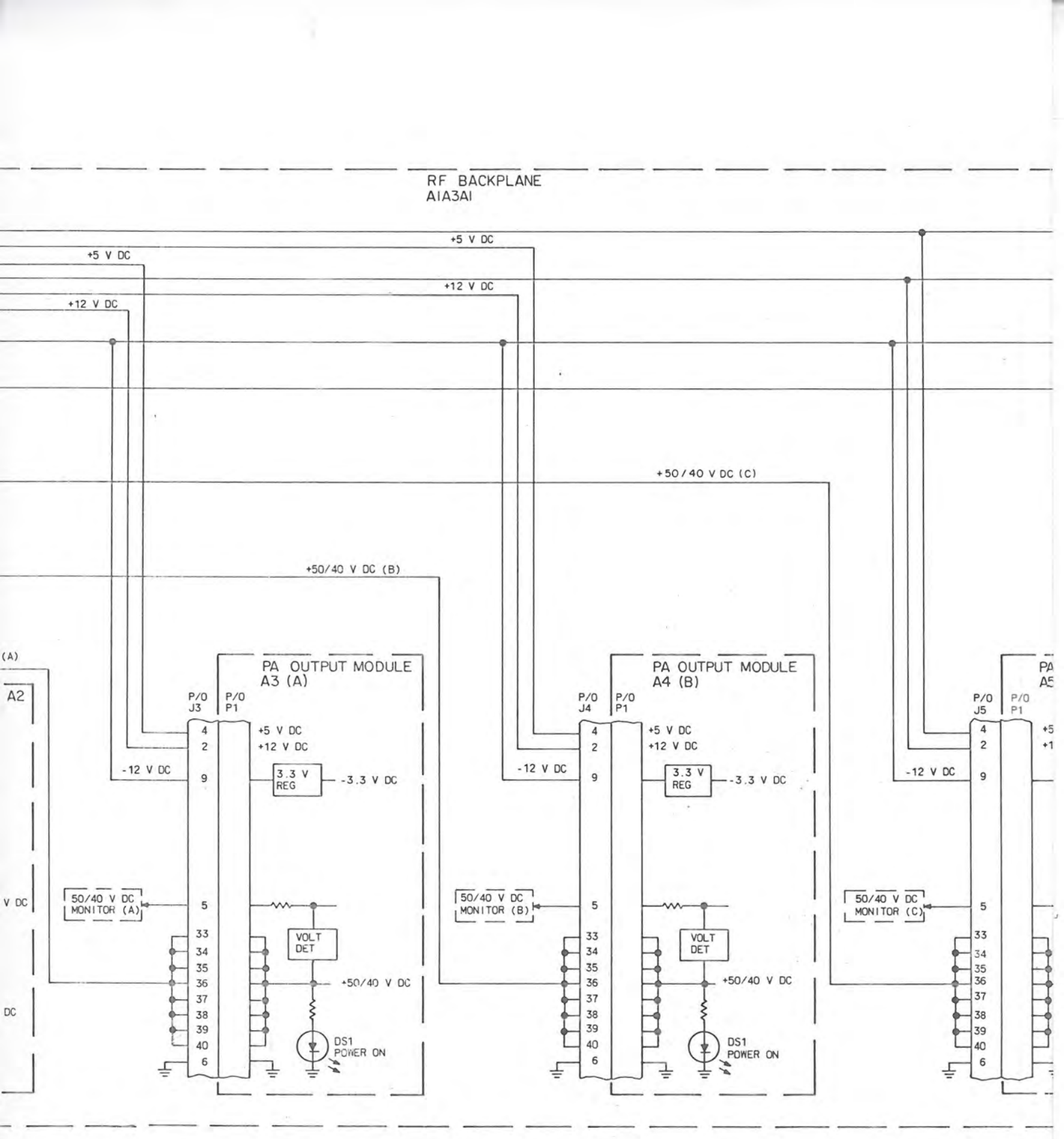
Parameters measured by the front panel MULTIMETER are as follows.

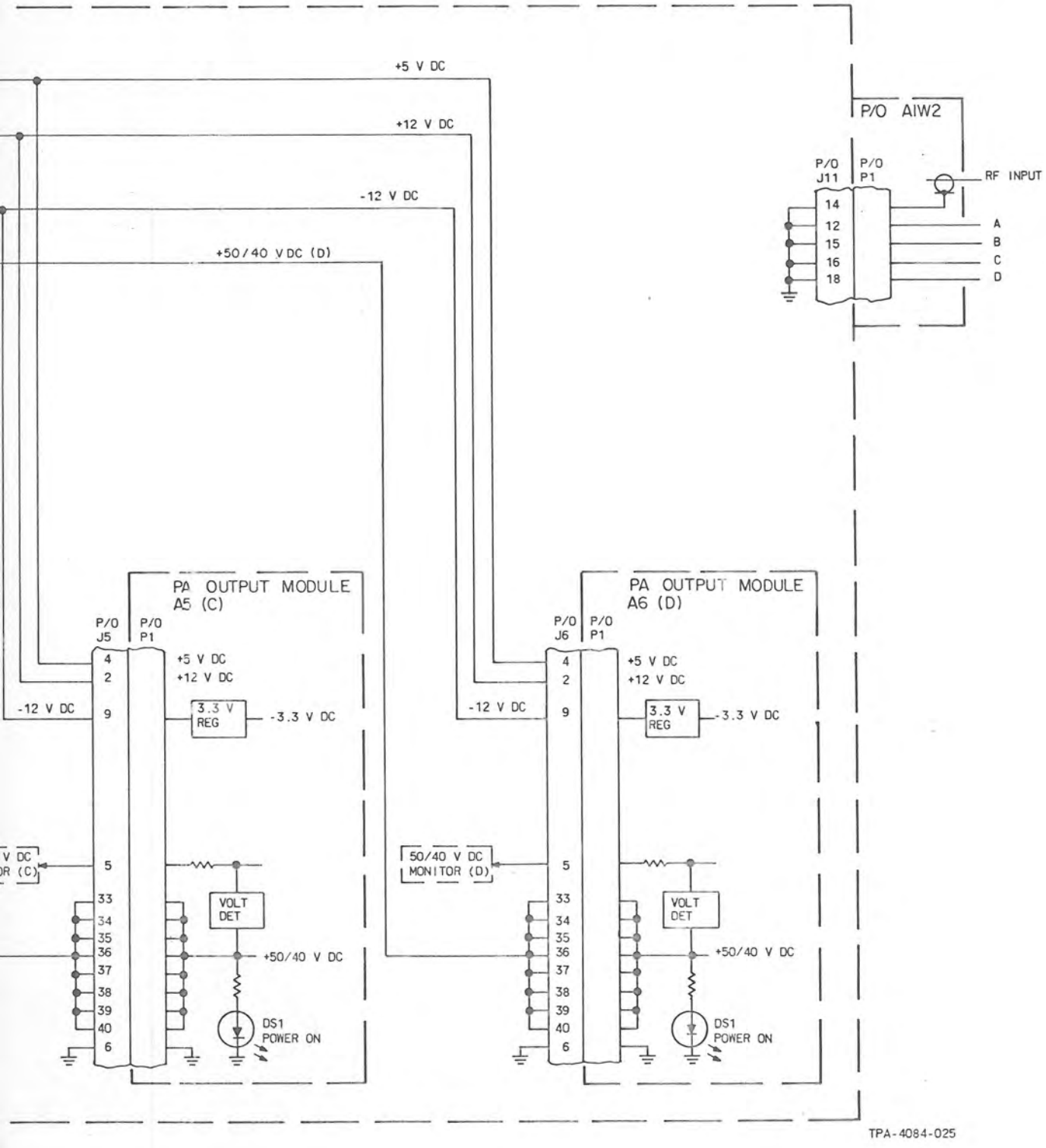
INDICATOR	FUNCTION
INPUT RF (5 VOLT)	Measures the rf input voltage to predriver card A2A1.
PRE-DRVR RF (15 VOLT)	Measures the rf output voltage of the predriver card A2A1 (same as input to driver output card A2A2).
DRIVER RF (50 VOLT)	Measures the rf output voltage of driver output card A2A2. This measurement is made in front of rf input drive applied to power splitter A2A2A1.
DRIVER (15 AMP)	Measures dc current on driver rf output stage drains (driver output card A2A2, Q1 and Q2).
PA MOD A (15 AMP)	Measures dc current on power amplifier output module A (A3) collectors (Q1 and Q2).
PA MOD B (15 AMP)	Measures dc current on power amplifier output module B (A4) collectors (Q1 and Q2).
PA MOD C (15 AMP)	Measures dc current on power amplifier output module C (A5) collectors (Q1 and Q2).
PA MOD D (15 AMP)	Measures dc current on power amplifier output module D (A6) collectors (Q1 and Q2).
TOTAL PA (50 AMP)	Measures total dc current on all power amplifier output module collectors (A, B, C, and D). This is the total current drain on the +50/40-V dc power sources.
FWD PWR (1500 W)	Indicates forward power of the power amplifier as measured at directional coupler A1A1.
REFLD PWR (500 W)	Indicates reflected power of the power amplifier as measured at directional coupler A1A1.
VSWR (5.0:1)	Indicates actual vswr of load connected to the power amplifier output as measured by the forward and reflected rf power samples at A1A1.

4.3.5 Power Distribution (Refer to figure 4-9)

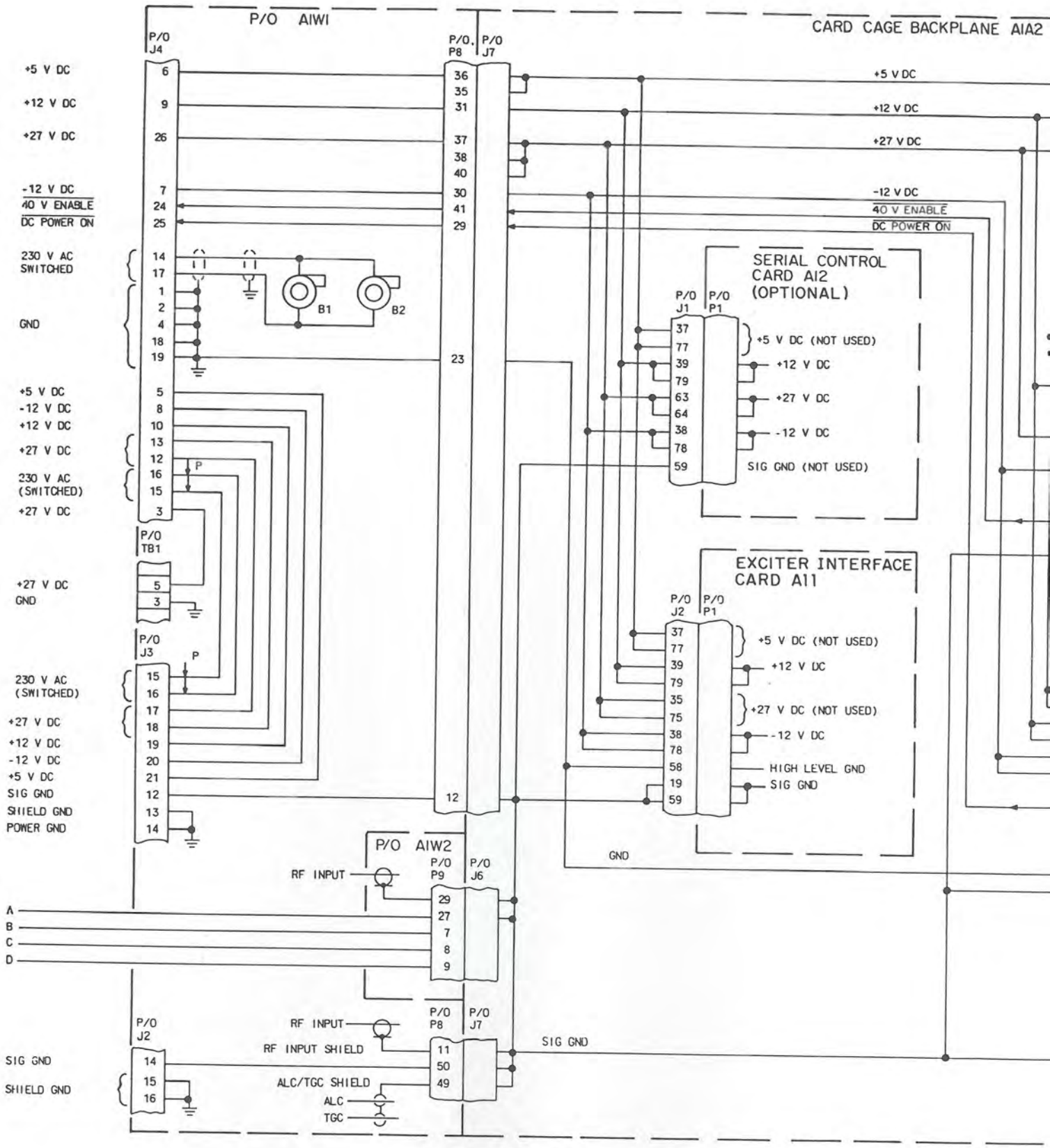
Primary power distribution in the power amplifier is controlled by the associated power supply. Input power from the associated power supply is connected to power supply control connector J4 and connector J5 on the rear panel of the power amplifier.

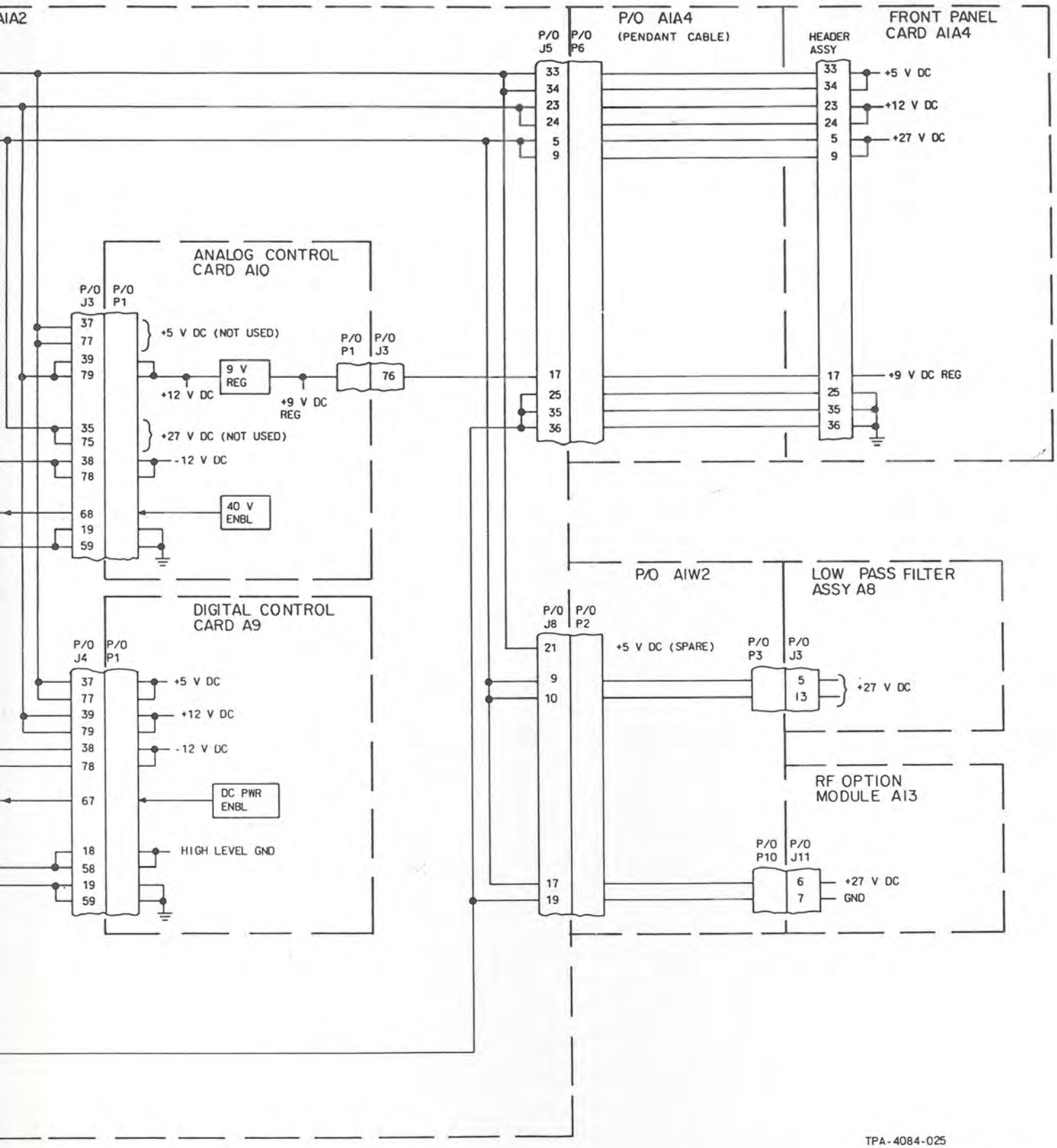

WIRING HARNESS
A1A3W3
P/O
J5
-5 V DC
-12 V DC
-12 V DC
-27 V DC
-28 V DC
+50/40 V DC (D)
50/40 V DC
RTN (D)
+50/40 V DC (C)
50/40 V DC
RTN (C)
+50/40 V DC (B)
50/40 V DC
RTN (B)
+50/40 V DC (A)
50/40 V DC
RTN (A)
+35 V DC
35 V DC RTN
E6
E38
E1
E40
E4
E2
E39
E5
E3
E13
E32
E33
E34
E35
E36
E37
E26
E27
E28
E29
E30
E31
E20
E21
E22
E23
E24
E25
E14
E15
E16
E17
E18
E19
E7
E8
E9
E10
E11
E12
+5 V DC
+12 V DC
+27 V DC
+28 V DC
+50/40 V DC (A)
-12 V DC
DRIVER MODULE A2
P/O
J1
P/O
P1
37
4
36
39
+12 V DC
+27 V DC
+28 V DC
-4.7 V DC
P/O
J2
P/O
P2
2
4
3
27
22
23
24
25
26
6
+12 V DC
4.7 V
REG
-4.7 V DC
35 V DC
MONITOR
+35 V DC
+35 V DC
50/40 V DC
MONITOR (A)


RF BACKPLANE
A1A3A1
+5 V DC
+5 V DC
+12 V DC
+12 V DC
+50/40 V DC (C)
+50/40 V DC (B)
(A)
A2
V DC
DC
PA OUTPUT MODULE
A3 (A)
P/O
J3
P/O
P1
4
2
9
5
33
34
35
36
37
38
39
40
6
+5 V DC
+12 V DC
-12 V DC
3.3 V
REG
-3.3 V DC
50/40 V DC
MONITOR (A)
VOLT
DET
+50/40 V DC
DS1
POWER ON
PA OUTPUT MODULE
A4 (B)
P/O
J4
P/O
P1
50/40 V DC
MONITOR (B)
PA
A5
P/O
J5
P/O
P1
50/40 V DC
MONITOR (C)



Power Distribution, Block Diagram
Figure 4-9 (Sheet 1 of 2)


P/O AIWI
CARD CAGE BACKPLANE AIA2
P/O J4
P/O P8
P/O J7
+5 V DC
+12 V DC
+27 V DC
-12 V DC
40 V ENABLE
DC POWER ON
230 V AC SWITCHED
GND
B1
B2
SERIAL CONTROL CARD AI2 (OPTIONAL)
P/O J1
P/O P1
+5 V DC (NOT USED)
SIG GND (NOT USED)
EXCITER INTERFACE CARD A11
P/O J2
HIGH LEVEL GND
SIG GND
P/O TB1
230 V AC (SWITCHED)
SIG GND
SHIELD GND
POWER GND
P/O AIW2
P/O P9
P/O J6
RF INPUT
A
B
C
D
RF INPUT SHIELD
ALC/TGC SHIELD
ALC
TGC



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Power Distribution, Block Diagram
Figure 4-9 (Sheet 2)

The power supply control connector supplies power for all control functions of the power amplifier and includes the following power input requirements.

a. +5 V dc
b. +12 V dc
c. -12 V dc
d. +27 V dc
e. 230 V ac switched (50 to 60 Hz) for blower operation
f. Ground

The power connector supplies power for all power output functions of the power amplifier and includes the following input requirements.

a. +5 V dc
b. +12 V dc
c. -12 V dc
d. +27 V dc
e. +28 V dc
f. +35 V dc
g. +50/40 V dc (A)
h. +50/40 V dc (B)
i. +50/40 V dc (C)
j. +50/40 V dc (D)
k. Ground

All secondary power required by the power amplifier is handled on a usage basis using one of the primary power sources and voltage regulator diodes.

4.3.6 Local Controls (Refer to figure 4-10)

Local controls are provided in the power amplifier to perform normal maintenance routines from the front panel.

NOTE

If a serial control card (A12) is installed, front panel control is disabled by the control disable signal.

The following functions have a local control on the power amplifier front panel.

a. Remote/local
b. Auto/manual
c. Tune step advance
d. Pa power
e. Pa key
f. Tune start

Remote/local, auto/manual, and tune step advance are local control only functions and are very useful in troubleshooting the power amplifier. The REMOTE/LOCAL switch provides for local control and allows the power amplifier to be controlled by the other front panel control switches. For normal operation (remote), this switch must be in the REMOTE position. The AUTO/MANUAL switch allows automatic tuning or manual tuning (one step at a time) of the power amplifier while being controlled locally. The TUNE STEP ADVANCE switch advances the power amplifier tune cycle one step at a time when a LOCAL, MANUAL tune cycle is selected.

Pa power, pa key, and tune start are system control functions that are transferred to the power amplifier front panel when being controlled locally. These switches provide the same functions whether being operated from the power amplifier front panel or from an exciter or receiver-exciter front panel.

Note that when in local operation, system signals in exciter interface card A11 are inhibited from controlling the power amplifier and likewise, when in remote operation, local signals from the front panel to the exciter interface card are inhibited from controlling the power amplifier.

4.4 POWER SUPPLY FUNCTIONAL THEORY

This section contains information describing the operating principles of the power supply on a functional level. Operating principles of the plug-in circuit cards (subassemblies) are described only to the level necessary to make the overall description meaningful. Specific operating principles of the circuit cards are presented in the individual circuit card instruction sections of the HF-80 Solid-State Power Amplifiers and Power Supplies Depot Maintenance Instruction Book.

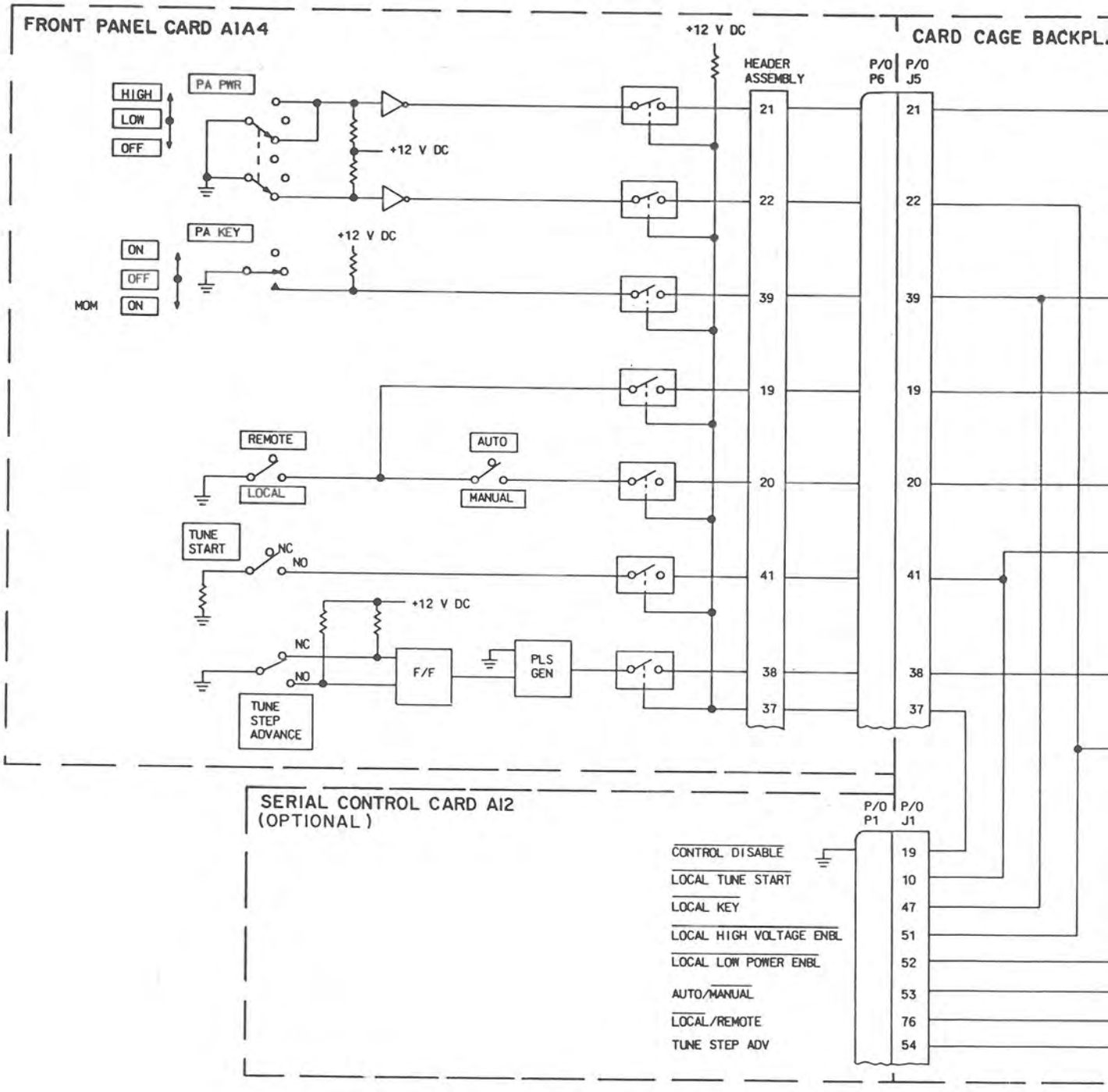
4.4.1 General

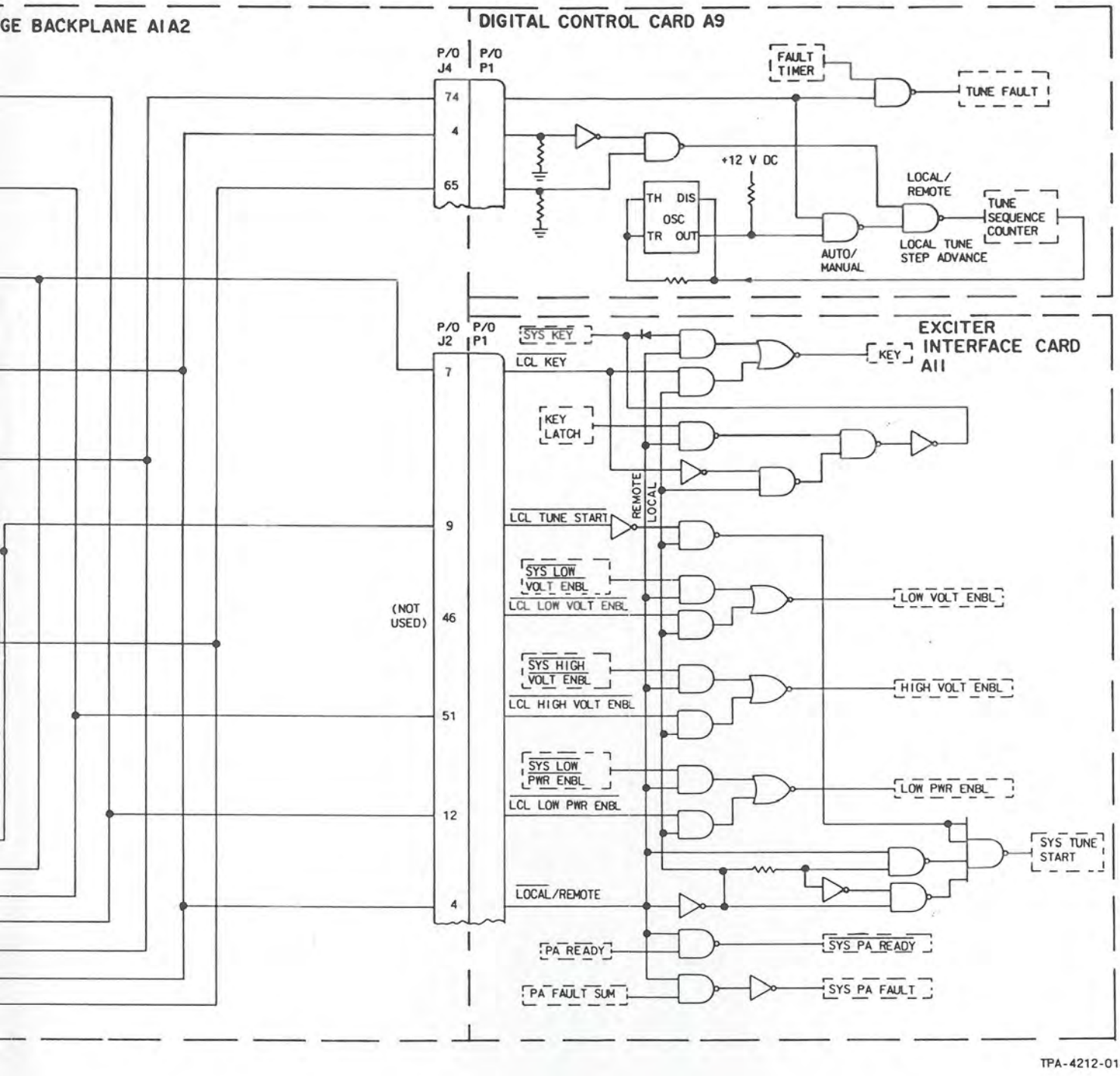
The power supply is a solid-state unit that provides the power sources necessary to operate one power amplifier.

Power Supply HF-8031 requires a single-phase, 50- to 60-Hz power source of 208, 220, 230, or 240 V ac. This power is regulated and controlled and provides the required dc voltages and 50- to 60-Hz, 230-V ac blower power to the power amplifier.

Power Supply HF-8032, part numbers 622-3512-001 and -004, requires a 3-phase, 50- to 60-Hz power source of 208, 220, 230, or 240 V ac and provides the same output power as Power Supply HF-8031.

Power Supply HF-8032, part numbers 622-3512-002 and -005, requires a 3-phase, 50- to 60-Hz or 400-Hz power source of 208, 220, 230, or 240 V ac and provides the same output power as Power Supply HF-8031. These units provide automatic changeover from 50-60 Hz to 400 Hz, with no operator or installation changes required.


FRONT PANEL CARD A1A4
+12 V DC
CARD CAGE BACKPL
HEADER ASSEMBLY
P/O P6
P/O J5
HIGH
LOW
OFF
PA PWR
+12 V DC
PA KEY
ON
OFF
MOM ON
REMOTE
LOCAL
AUTO
MANUAL
TUNE START
NC
NO
TUNE STEP ADVANCE
F/F
PLS GEN
21
22
39
19
20
41
38
37
SERIAL CONTROL CARD A12
(OPTIONAL)
P/O P1
P/O J1
CONTROL DISABLE
LOCAL TUNE START
LOCAL KEY
LOCAL HIGH VOLTAGE ENBL
LOCAL LOW POWER ENBL
AUTO/MANUAL
LOCAL/REMOTE
TUNE STEP ADV
19
10
47
51
52
53
76
54



Local Controls, Block Diagram
Figure 4-10

Power Supply HF-8031, part number 622-3491-003, and Power Supply HF-8032, part numbers 622-3512-004 and -005, include filter assembly A1A1 to filter selected power and control lines to the power amplifier. This filtering reduces transmitted power amplifier noise.

Refer to figure 4-11. The power supply consists of three power supply circuits: the low-voltage regulator, the high-voltage rectifier and power supplies, and the 230-V ac blower power circuit.

Input power is supplied through emi filters and circuit breaker CB1 to the high-voltage rectifier circuit. The high-voltage rectifier output is inhibited until after power is applied to the low-voltage regulator. With input power supplied through CB1, and CB2 set to on, power is applied to power control circuit, low-voltage regulator, and the 230-V ac blower power circuit.

With low-voltage input power applied, low-voltage regulator, dc control circuits, and blower power are enabled. The high-voltage rectifier output is enabled to the converter modules when the input ac voltage is high enough for proper operation. With these circuits enabled, when a dc power on is applied, the converter modules are enabled.

Input line power is metered through the dc control circuits with the equivalent dc analog signal from T2 and a bridge rectifier are applied to digital voltmeter A6.

In Power Supply HF-8032, part numbers 622-3512-002 and -005, a 400-Hz to 57-Hz converter is used for both internal and external blower power. When 50- or 60-Hz power is applied, the converter automatically passes 50- or 60-Hz power through to the blower circuits. Also, in a 50-60 Hz only application, this converter may be bypassed by using a proper jumper-plug.

In all power supplies, blower power is connected to the internal power supply blower and externally to the power amplifier blower(s).

The low-voltage outputs of low-voltage module A5 are metered by digital voltmeter A6, used internally to power other cards and modules, and supplied to the control portion of the associated power amplifier.

If output circuit breakers are on, high-voltage outputs from the converters are supplied to the power amplifier driver and output modules. A crowbar circuit is provided to protect the power amplifier and power supply circuits. High-voltage outputs are metered by DVM A6 and supplied to the output power circuits of the associated power amplifier.

4.4.2 Primary Power Distribution (Refer to figure 4-12)

Ac input is applied at input power connector J1, through the emi area and CB1 to:

a. High-voltage rectifier
b. CB2 and through CB2 to:
   1. Ac line jumper at J1-5 to low-voltage power transformer T1 and blower power circuit.
   2. Power control transformer T2 and rectifier

Ac power applied at J1-5 must be strapped to J1-2 for 208-volt operation; J1-3 for 220 volts; J1-16 for 230 volts; and J1-14 for 240 volts.

When strapped accordingly, transformer T1 provides 230 V ac for blower operation and externally for power amplifier blower(s). The 230 V ac from T1/J1-16, in 50-60 Hz and 400-Hz unit, is supplied to J11-9 through 400-Hz to 57-Hz converter module A8. The converter 230 V ac is supplied through J11-1 as 57 Hz, 230 V ac for blower power.

Ac power is supplied from the secondary of T1 to low-voltage module A5 for generation of the low-voltage power outputs.

Ac power is rectified by a full-wave bridge from the secondary T2 and supplied to monitor circuits and the dvm scaling circuit on crowbar/logic card A7. This input is combined with the dc power-on signal to provide an external blower power enable signal to K1 and a dc power-enable signal for the high-voltage power converters.

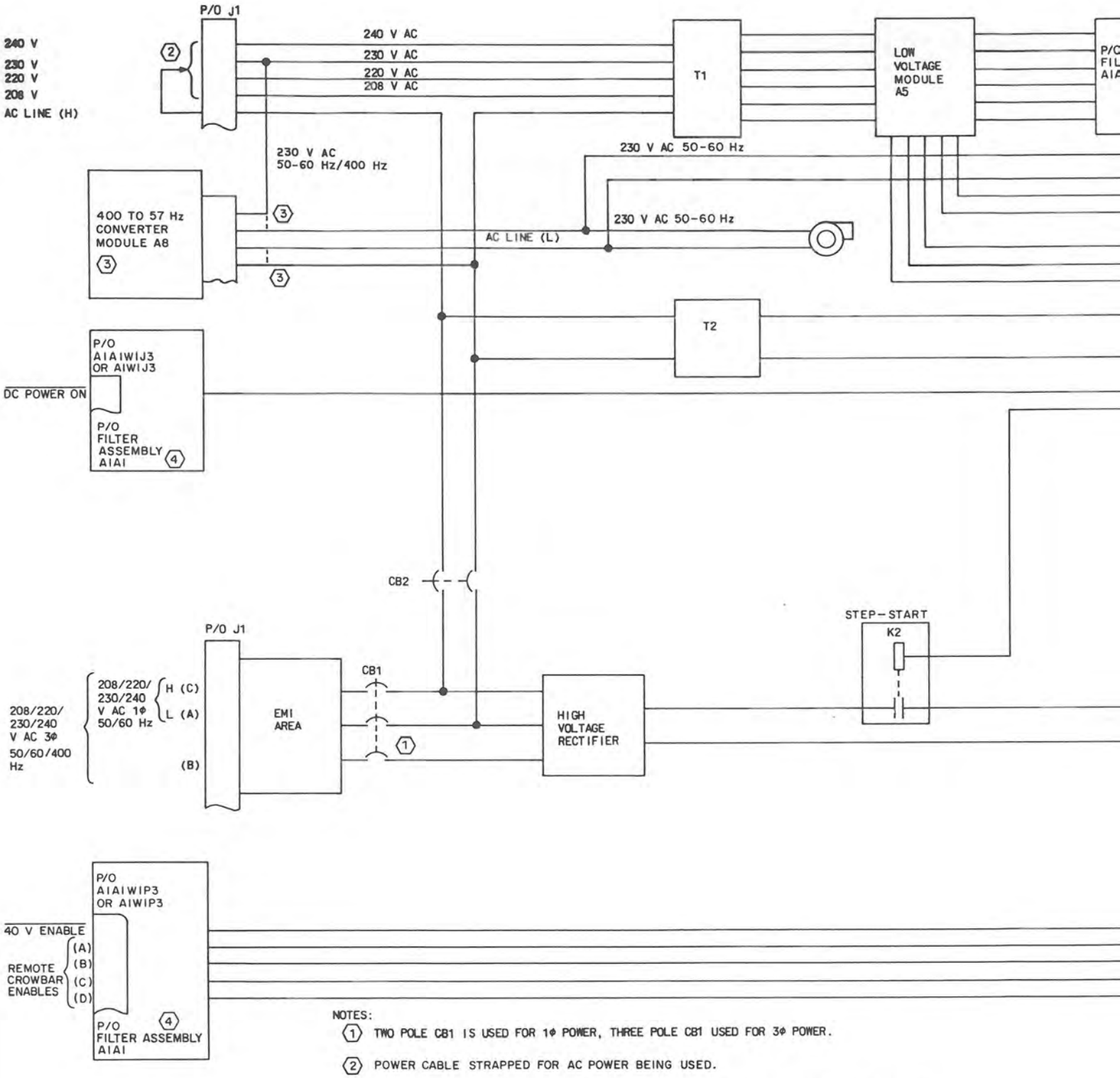
Ac power supplied by CB1 is rectified by full-wave high-voltage rectifier and supplied through step-start relay K2 and supplied as rectified 235-330 V dc. The 235-330 V dc is supplied to the 500-watt converter module and the two 1000-watt converter modules for generation of the +35-V dc and both +50/40-V programmable dc sources.

4.4.3 Power Control Circuits (Refer to figure 4-13)

With ac power applied (CB1 and CB2 set on), low-voltage power is applied to all circuits in the power supply. To enable the high-voltage power, some additional inputs must be received.

A dc power-on signal must be received from the power amplifier. This indicates the power amplifier has received a dc power enable signal and that its interlocks are satisfied.

When dc power is turned on, 500-watt converter module A4 (+35 V dc) is turned on and the 235-330 V dc is applied to 1000-watt converter modules A2/A3 (+50/40 V dc). Also, 230-V ac blower power is supplied from J3 to the associated power amplifier.



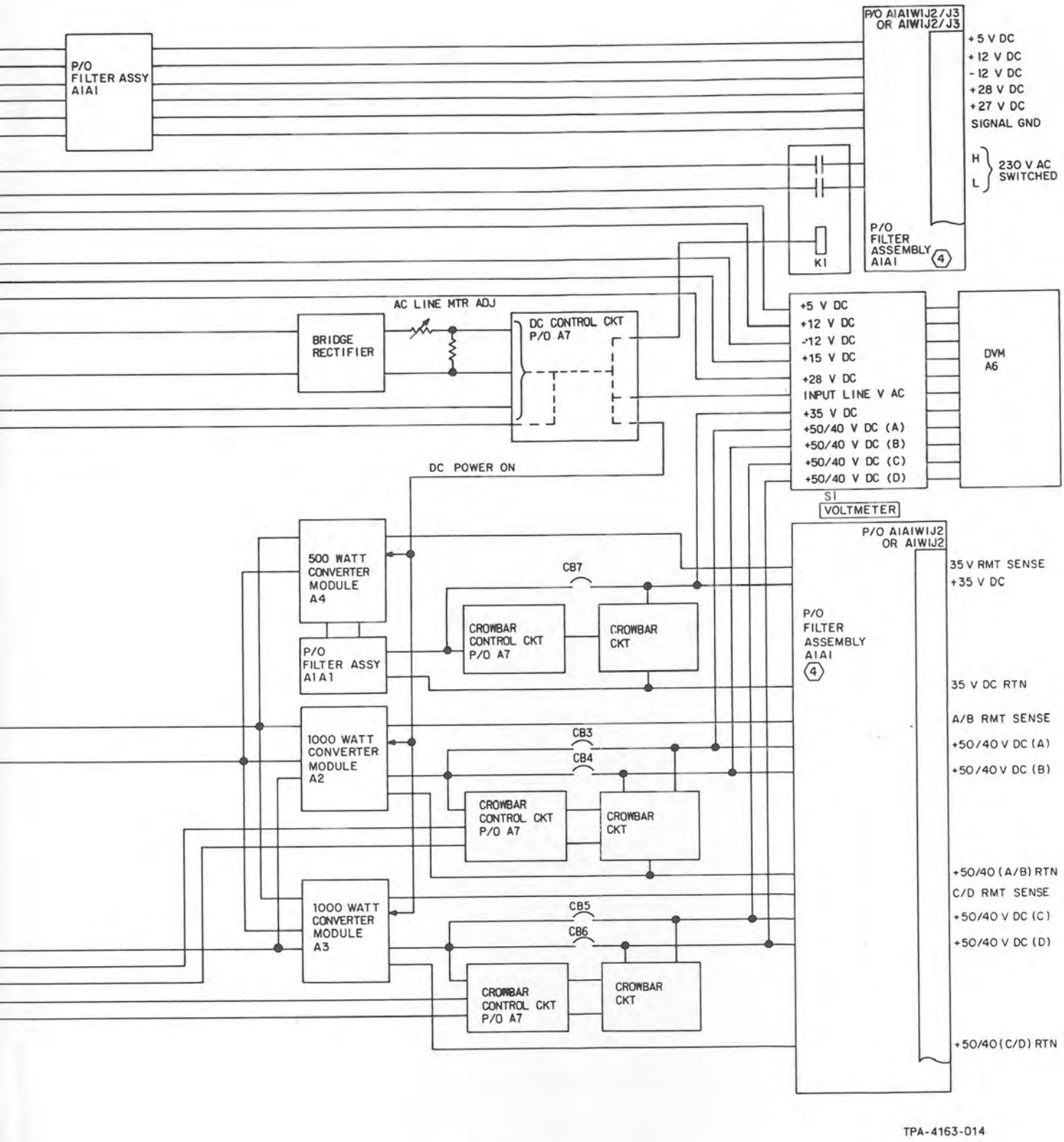
NOTES:

(1) TWO POLE CB1 IS USED FOR 1φ POWER, THREE POLE CB1 USED FOR 3φ POWER.

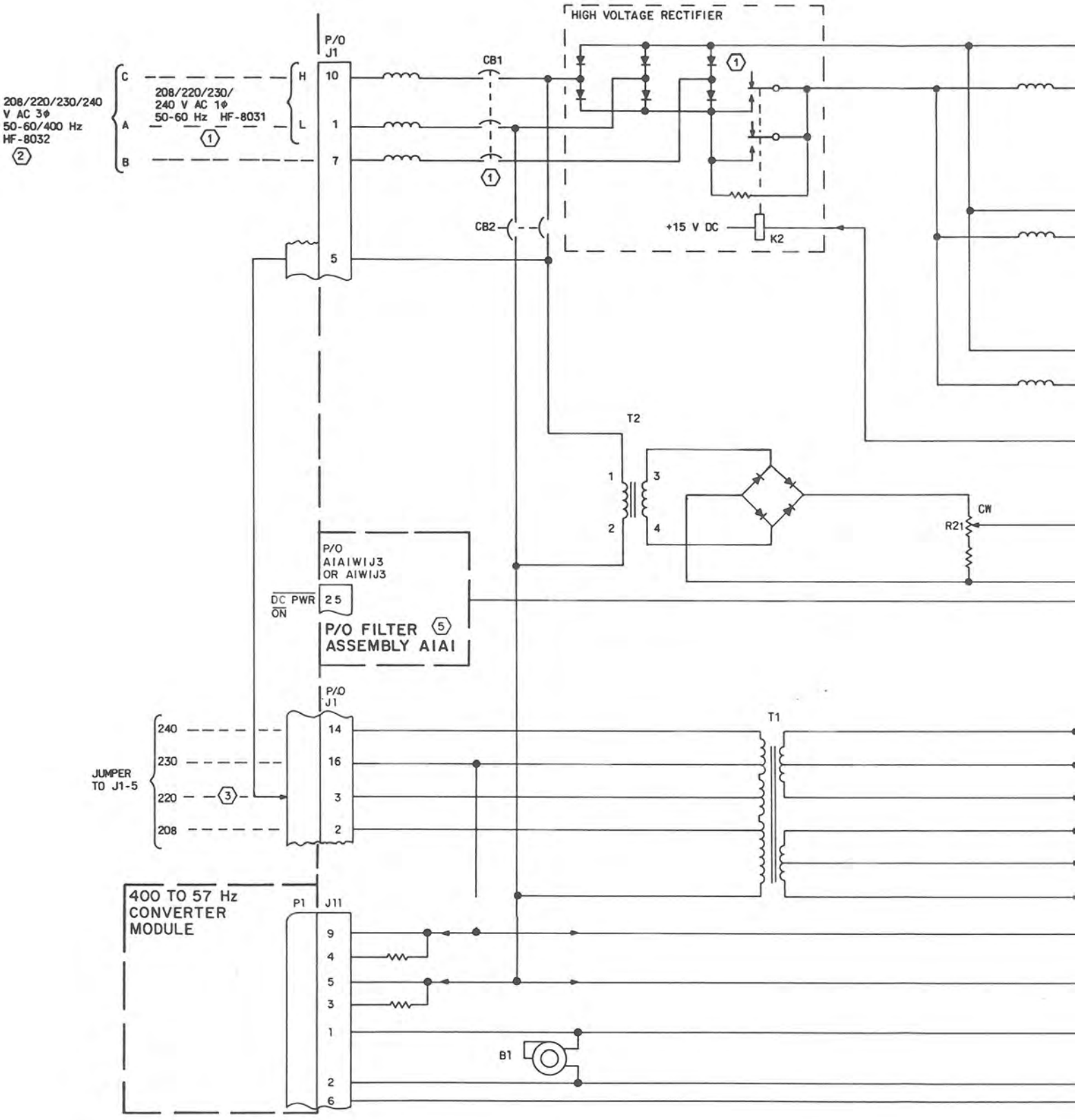
(2) POWER CABLE STRAPPED FOR AC POWER BEING USED.

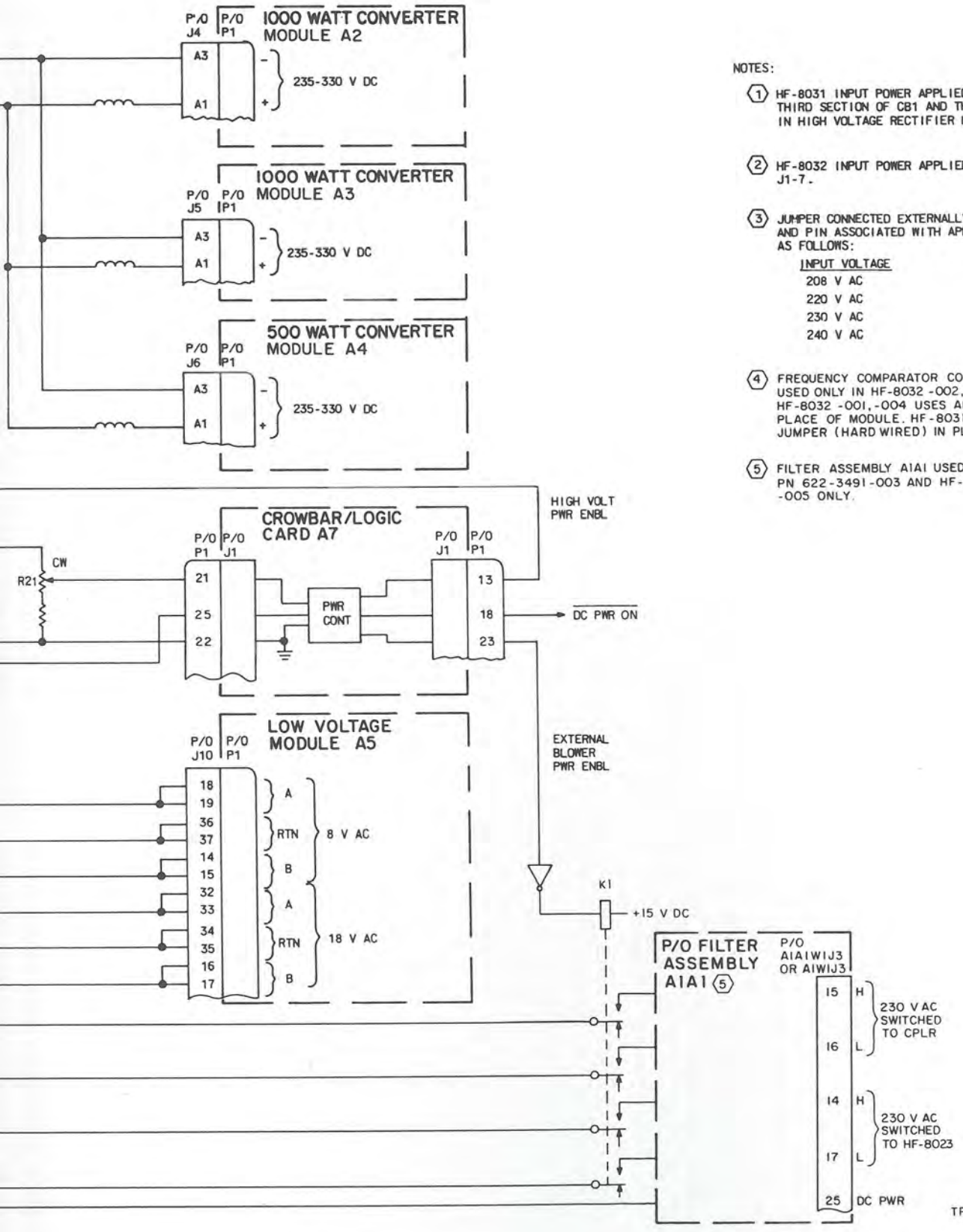
(3) 400 Hz TO 60 Hz CONVERTER USED ONLY BY HF-8032 POWER SUPPLY 622-3512-002, -005.

(4) FILTER ASSEMBLY A1A1 USED BY HF-8031 PN 622-3491-003 AND HF-8032 PN 622-3512-004, -005 ONLY.



Power Supply HF-8031 and HF-8032,
Block Diagram
Figure 4-11


HIGH VOLTAGE RECTIFIER
P/O J1
CB1
208/220/230/240 V AC 3φ 50-60/400 Hz HF-8032
208/220/230/ 240 V AC 1φ 50-60 Hz HF-8031
C
A
B
H
L
10
1
7
5
CB2
+15 V DC
K2
T2
1
2
3
4
CW
R21
P/O AIAIWIJ3 OR AIWIJ3
DC PWR ON
25
P/O FILTER ASSEMBLY AIAI
P/O J1
240
230
220
208
JUMPER TO J1-5
14
16
3
2
T1
400 TO 57 Hz CONVERTER MODULE
P1
J11
9
4
5
3
1
2
6
B1



NOTES:

(1) HF-8031 INPUT POWER APPLIED TO J1-10 AND J1-1. THIRD SECTION OF CB1 AND THIRD SET OF DIODES IN HIGH VOLTAGE RECTIFIER NOT INSTALLED IN HF-8031.

(2) HF-8032 INPUT POWER APPLIED TO J1-10, J1-1 AND J1-7.

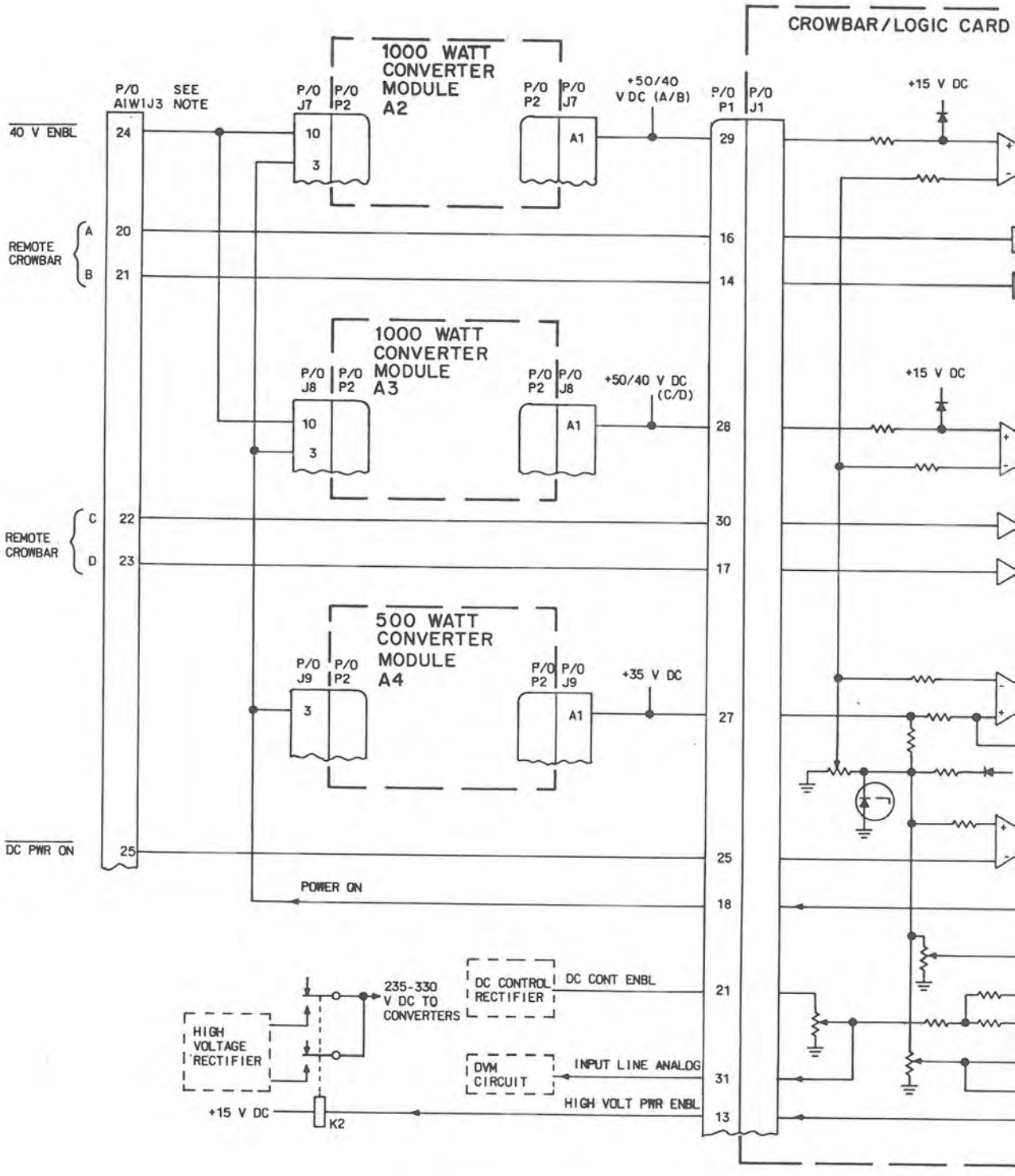
(3) JUMPER CONNECTED EXTERNALLY BETWEEN J1-5 AND PIN ASSOCIATED WITH APPLIED INPUT VOLTAGE AS FOLLOWS:

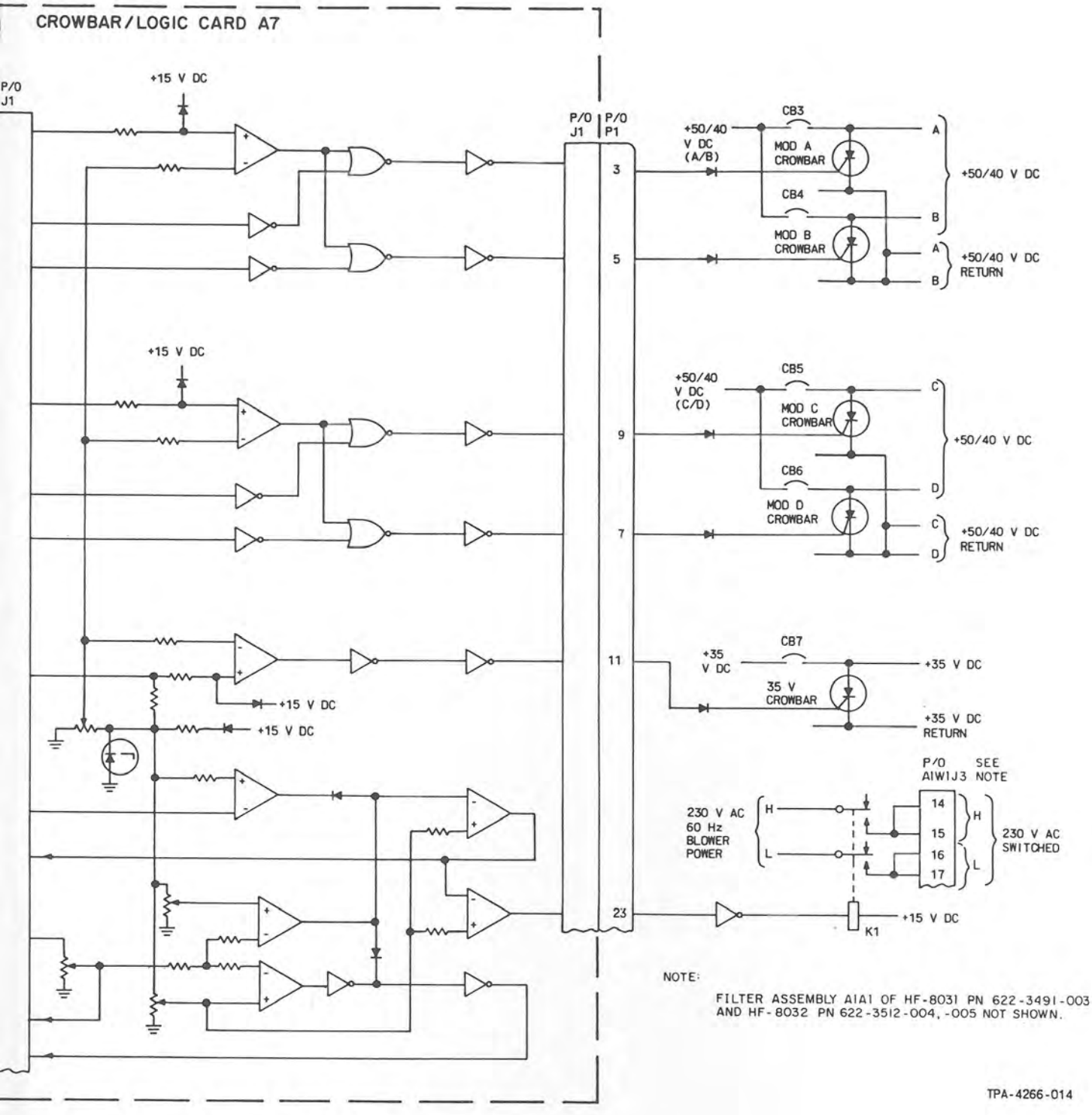
INPUT VOLTAGE	JUMPER
208 V AC	J1-5 TO J1-2
220 V AC	J1-5 TO J1-3
230 V AC	J1-5 TO J1-16
240 V AC	J1-5 TO J1-14

(4) FREQUENCY COMPARATOR CONVERTER MODULE USED ONLY IN HF-8032 -002, -005 POWER SUPPLIES. HF-8032 -001, -004 USES AN EXTERNAL JUMPER IN PLACE OF MODULE. HF-8031 USES AN INTERNAL JUMPER (HARD WIRED) IN PLACE OF MODULE.

(5) FILTER ASSEMBLY A1A1 USED BY HF-8031 PN 622-3491-003 AND HF-8032 PN 622-3512-004, -005 ONLY.

AC/DC Input Power Distribution, Block Diagram
Figure 4-12


CROWBAR/LOGIC CARD
1000 WATT CONVERTER MODULE A2
1000 WATT CONVERTER MODULE A3
500 WATT CONVERTER MODULE A4
P/O A1W1J3 SEE NOTE
P/O J7
P/O P2
P/O P1 J1
+50/40 V DC (A/B)
+50/40 V DC (C/D)
+35 V DC
+15 V DC
40 V ENBL
REMOTE CROWBAR A
REMOTE CROWBAR B
REMOTE CROWBAR C
REMOTE CROWBAR D
DC PWR ON
POWER ON
235-330 V DC TO CONVERTERS
HIGH VOLTAGE RECTIFIER
DC CONTROL RECTIFIER
DC CONT ENBL
DVM CIRCUIT
INPUT LINE ANALOG
HIGH VOLT PWR ENBL
K2



Power Control Circuits, Block Diagram
Figure 4-13

With dc power on and 40-V enable signal received from the power amplifier, 1000-watt converter modules A2/A3 (+50/40 V dc) are turned on and total power output from the power supply is achieved.

Note that if dc control enable signal is lost, all high-voltage output power (+35 V dc and +50/40 V dc) is disabled. If +35-V dc power is lost, +50/40 V dc may be disabled. If +50/40 is lost, only the +50/40-V dc power is disabled.

If voltage levels start to climb, the internal crowbar circuits trip, shorting the voltage to zero and tripping the circuit breaker. This crowbar action protects the power amplifier circuits from voltage surges.

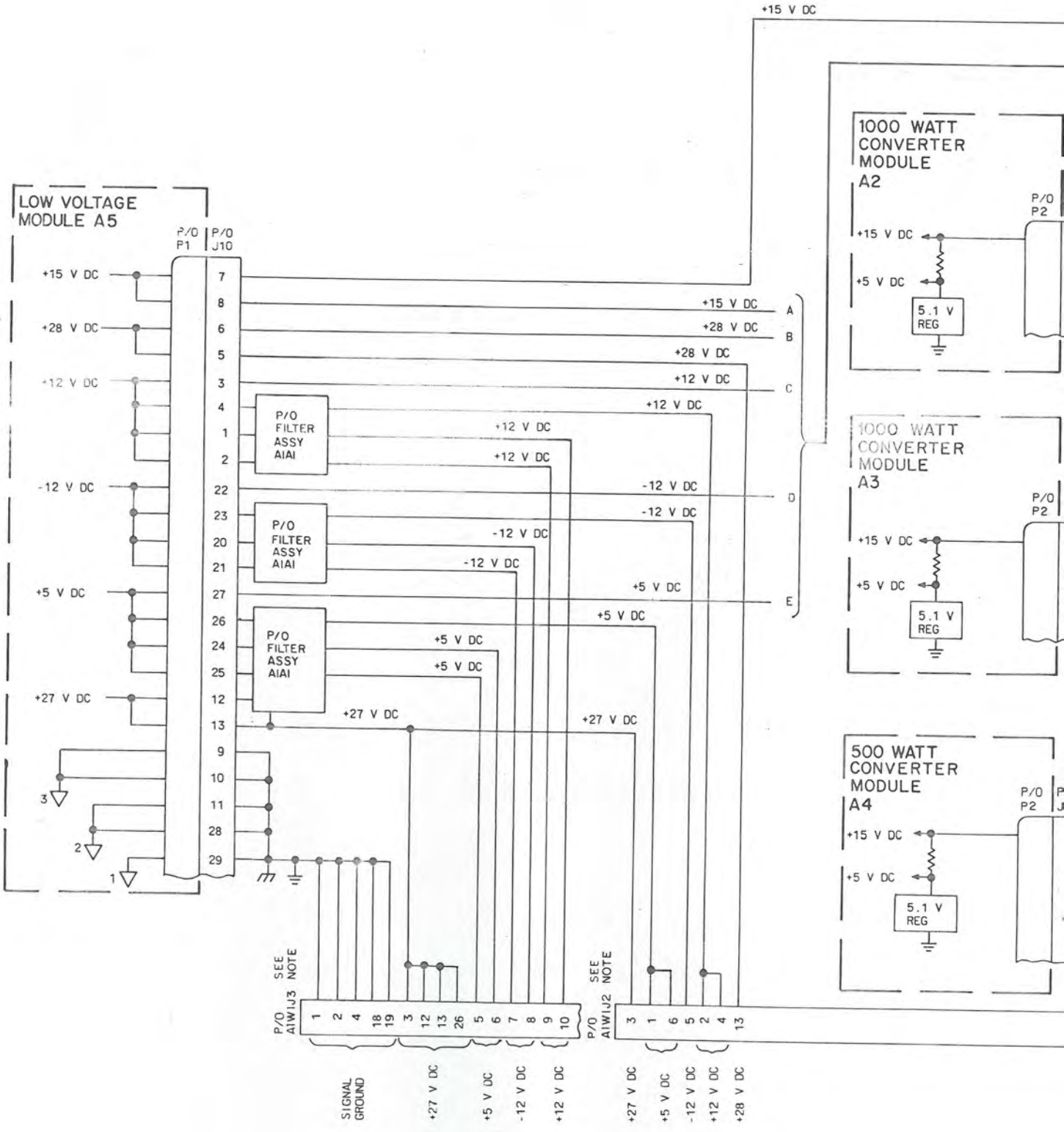
If remote crowbar signals (A, B, C, or D) are received from the associated power amplifier, that +50/40-V dc signal is crowbarred to zero and the associated circuit breaker trips. This disconnects that module from the transmit line and allows continued operation of the power amplifier through the remaining power amplifier output modules.

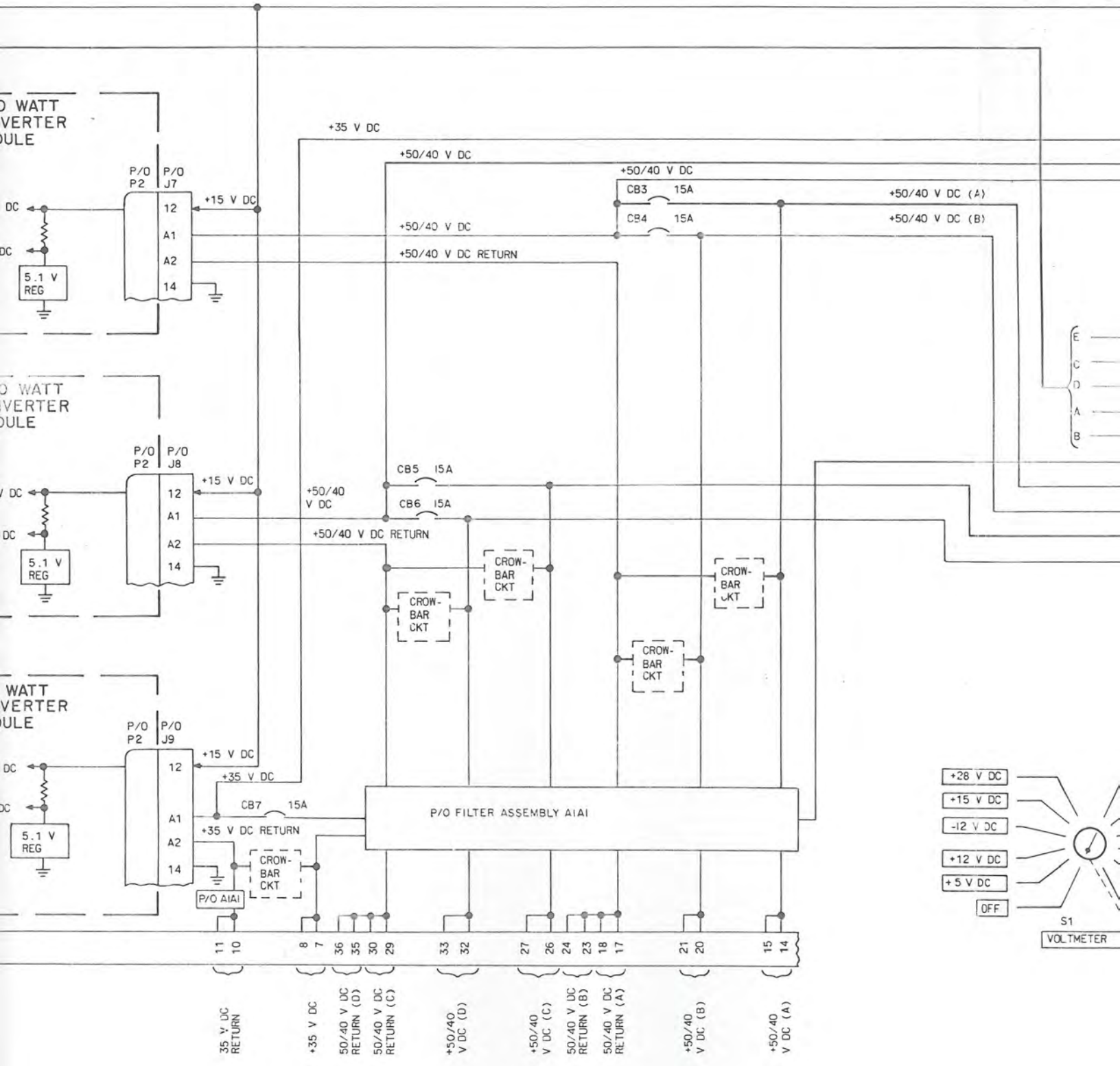
4.4.4 DC Output Power Distribution (Refer to figure 4-14)

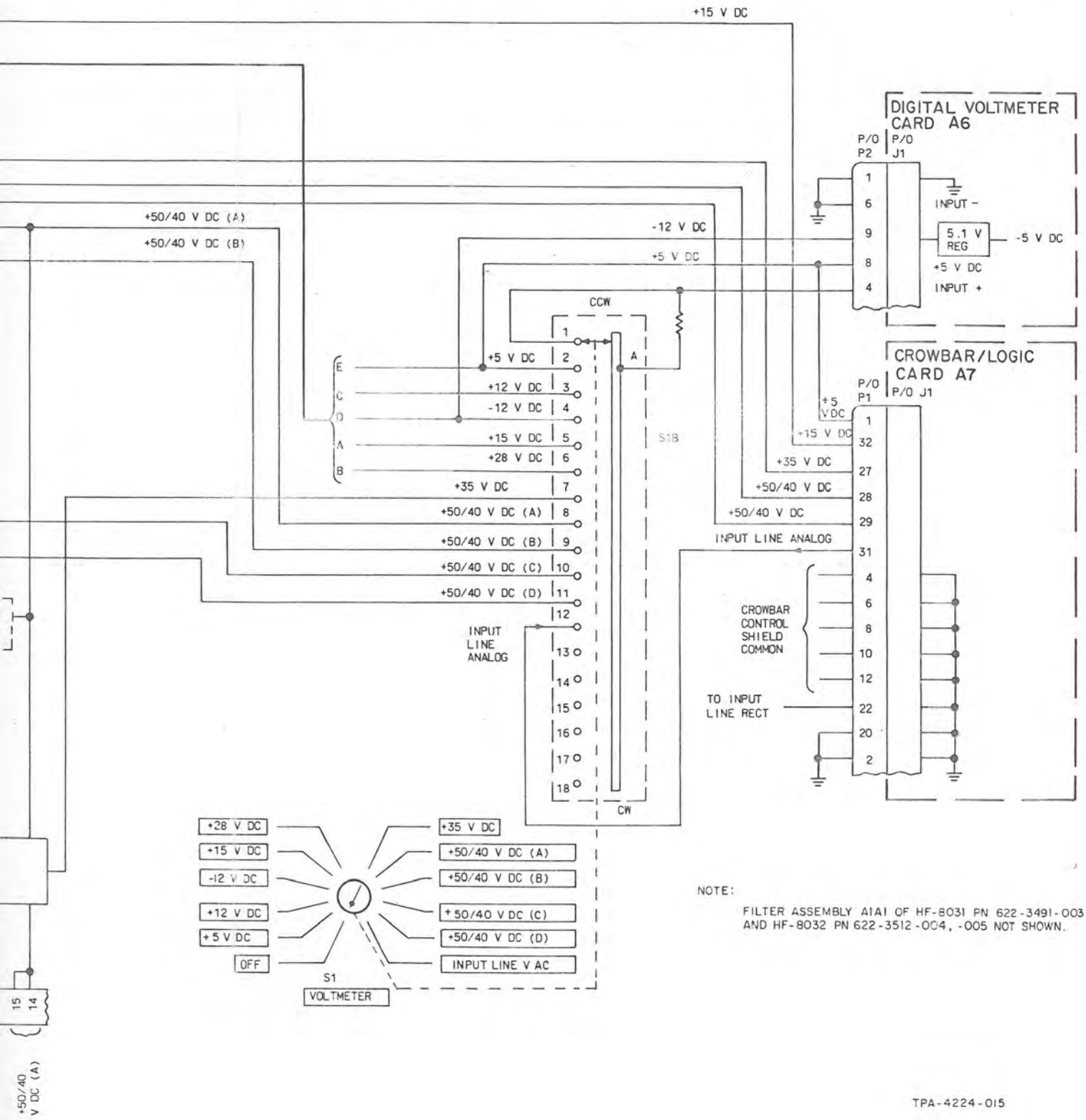
Output power from low-voltage module A5 is supplied to output connectors J2 and J3 and internally to 1000-watt converter modules A2 and A3, 500-watt converter module A4, digital voltmeter card A6, and crowbar/logic card A7.

Output power from 500-watt and 1000-watt converter modules is supplied to output connector J2 and internally to digital voltmeter card A6 and crowbar/logic card A7.

All dc power required for operation of Power Supply HF-8031 and HF-8032 and the associated power amplifier is supplied by low-voltage module A5 and/or converter modules A2, A3, and A4. The only exception is some modules have special requirements on voltages and use low-voltage/low-current voltage regulators internally to fulfill these requirements.


LOW VOLTAGE MODULE A5
P/O P1
P/O J10
+15 V DC
+28 V DC
+12 V DC
-12 V DC
+5 V DC
+27 V DC
P/O FILTER ASSY A1A1
P/O FILTER ASSY A1A1
P/O FILTER ASSY A1A1
1000 WATT CONVERTER MODULE A2
1000 WATT CONVERTER MODULE A3
500 WATT CONVERTER MODULE A4
P/O P2
5.1 V REG
A
B
C
D
E
SEE NOTE
P/O A1W1J3
P/O A1W1J2
SIGNAL GROUND
+27 V DC
+5 V DC
-12 V DC
+12 V DC
+28 V DC


WATT
VERTER
ULE
P/O P2
P/O J7
+15 V DC
12
A1
A2
14
5.1 V REG
+35 V DC
+50/40 V DC
+50/40 V DC (A)
+50/40 V DC (B)
CB3 15A
CB4 15A
+50/40 V DC RETURN
P/O J8
CB5 15A
CB6 15A
+50/40 V DC
CROW-BAR CKT
P/O J9
CB7 15A
+35 V DC RETURN
P/O FILTER ASSEMBLY A1A1
P/O A1A1
+28 V DC
+15 V DC
-12 V DC
+12 V DC
+5 V DC
OFF
S1
VOLTMETER
11 10
8 7
36 35
30 29
33 32
27 26
24 23
18 17
21 20
15 14
35 V DC RETURN
+35 V DC
50/40 V DC RETURN (D)
50/40 V DC RETURN (C)
+50/40 V DC (D)
+50/40 V DC (C)
50/40 V DC RETURN (B)
50/40 V DC RETURN (A)
+50/40 V DC (B)
+50/40 V DC (A)



NOTE:

FILTER ASSEMBLY A1A1 OF HF-8031 PN 622-3491-003 AND HF-8032 PN 622-3512-004, -005 NOT SHOWN.

TPA-4224-015

DC Output Power Distribution, Block Diagram
Figure 4-14

SECTION 5
MAINTENANCE

5.1 GENERAL

This section contains information necessary to maintain the HF-80 Solid-State 1-kW Power Amplifier-Power Supply. Maintenance of the power amplifier-power supply is divided into three functional areas. Paragraph 5.3 provides combined power amplifier-power supply maintenance procedures, paragraph 5.4 provides 1-kW Power Amplifier HF-8023 maintenance procedures, and paragraph 5.5 provides Power Supply HF-8031 and HF-8032 maintenance procedures.

5.2 TEST EQUIPMENT AND TOOLS

Table 5-1 lists all test equipment required to test, troubleshoot, and maintain the HF-80 Solid-State 1-kW Power Amplifier-Power Supply. If the specified test equipment is not available, equivalent items may be substituted. No special tools are required.

Table 5-1. Test Equipment.

ITEM	MINIMUM SPECIFICATIONS	REPRESENTATIVE TYPE
Power source	208, 220, 230, or 240 V ac ±10%, single-phase, 47 to 63 Hz or 208, 220, 230, or 240 V ac ±10%, 3-phase, 47 to 63 Hz	Any
Exciter or receiver-exciter	Provides 100-mW, 2-channel ISB transmit signal. Provides control and monitor functions as required for the HF-80 Solid-State 1-kW Power Amplifier-Power Supply.	Rockwell-International HF-8010( ), HF-8014( ), HF-8070( ), 671U-4( ), or 671U-9
Dummy load	50 Ω, 1500 W	Bird 8329 with BA88 blower
Digital multimeter (dmm)	High-impedance meter capable of measuring accurately (±0.1%) up to 100 V dc, 300 V ac, and resistances to 1.0 MΩ.	Fluke 8300A-01-02
Oscilloscope	Capable of measuring logic pulses from time of 0 ms to 15 seconds.	Tektronix 464
Rf signal generator	1.6 to 30 MHz, adjustable rf output of 0 to 2 W	HF-8640B with -001 and -003 options

Table 5-1. Test Equipment (Cont).

ITEM	MINIMUM SPECIFICATIONS	REPRESENTATIVE TYPE
Power supply	Capable of supplying all power required by 1-kW Power Amplifier HF-8023. Capable of handling 3000 W at 0.75 power factor.	Rockwell International Power Supply HF-8031 or HF-8032
Rf wattmeter		Bird 4300-21 with 100-H and 1000-H elements
Card extender	Compatible with power amplifier plug-in circuit cards.	Rockwell International TS-8022
Antenna coupler	Compatible with power amplifier.	Rockwell International HF-8040
Power supply	0 to 5 V dc variable, 1 A	Hewlett-Packard 6216A
Stopwatch	1-second accuracy	Meylan 202
Rf combiner	Used to combine the outputs of two rf signal generators.	Anzac THV-50
Spectrum analyzer	Used to measure intermodulation distortion.	Hewlett-Packard 3585A
Coaxial attenuator	20 dB, 1000 W	Weinschel 1-20
Directional coupler		Merrimac CRN-30-15
Power meter Power sensor Coaxial attenuators (2)	1.6 to 30 MHz, capable of measuring up to 1200 W.	Hewlett-Packard 435B Hewlett-Packard 8482A Bird 8329-300

NOTE

Power meter, power sensor, and 30-dB rf coaxial attenuator make up an accurate in-line rf wattmeter. To ensure accuracy, the power sensor and 30-dB rf coaxial attenuator need to be calibrated as a system and per Rockwell International document 597-0723-730.

Table 5-1. Test Equipment (Cont).

ITEM	MINIMUM SPECIFICATIONS	REPRESENTATIVE TYPE
Power supply test set	Compatible with Power Supply HF-8031 or HF-8032.	Rockwell International 965F-15, part no 622-7193-001
Dc power supply	0 to 60 V variable, 0 to 1 A variable	Hewlett-Packard 6274B
Current probe	12 A, clamp-on style	Tektronix F-5010P2
Oscilloscope	50 MHz bandwidth; compatible with current probe.	Tektronix 464 with DM44 option

5.3 HF-80 SOLID-STATE 1-kW POWER AMPLIFIER-POWER SUPPLY MAINTENANCE

WARNING

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

WARNING

Power Supply HF-8031 and HF-8032 uses direct rectification of the ac input power line; therefore the input rectifier/filter system may be floating above the chassis by over 230 V ac. Extreme care must be used when probing these circuits with power on.

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

5.3.1 Preventive Maintenance

Table 5-2 is an inspection schedule for the HF-80 Solid-State 1-kW Power Amplifier-Power Supply.

Table 5-2. Inspection Schedule.

ITEM	INTERVAL
Inspect the air filters in the front panels of the power amplifier and power supply. If the filter is dirty, refer to paragraph 5.3.1.1.	Weekly
Inspect the interior chassis, cards, and modules of the power amplifier and power supply. If they are dusty, dirty, or coated with a sticky film, refer to paragraph 5.3.1.2.	Weekly

5.3.1.1 Air Filter Cleaning

a. Remove the air filter by pulling it out through the front panel of the equipment.
b. Clean the filter by spraying it with warm soapy water.
c. Thoroughly rinse with clean water and allow filter to completely dry.
d. Replace the filter.

5.3.1.2 Chassis, Cards, and Modules Cleaning

If surfaces are dusty or dirty, use a soft-bristled brush and a low-pressure air stream directed at surfaces to remove all dust and dirt from the chassis, cards, and/or modules.

CAUTION

Do not use a hard-bristled brush or a high-pressure air system.

If surfaces are coated with dirt or a sticky film, they may be cleaned as follows.

a. Wash with warm soapy water and a soft-bristled brush in a plastic tub or pail.
b. Rinse the parts thoroughly with clean water.

CAUTION

Electrical shorts may result if parts are not thoroughly dry before reinstallation.

c. Dry the parts thoroughly. Use a low-pressure air stream to ensure moisture is not trapped in hard-to-get places.

5.3.2 Testing/Troubleshooting

5.3.2.1 Fault Isolation

Some faults that occur in the HF-80 Solid-State 1-kW Power Amplifier-Power Supply can be quickly isolated to a faulty unit or assembly by using the front panel control and monitor features. Table 5-3 contains a brief description of indications and isolation of apparent failures.

5.3.2.2 Test Point, Voltage and Signal Levels

As an additional aid in testing and troubleshooting, voltage and signal levels are given in table 5-4. These levels, when used with tables 5-3 and 5-5, further enable the user to isolate and identify faults.

Table 5-3. Power Amplifier and Power Supply, Fault Isolation.

INDICATION	ISOLATION OF APPARENT FAILURE
	NOTE All indicators listed here are front panel indicators on the power amplifier, unless otherwise noted. Front panel meter readings are useful in testing and troubleshooting, but are not normally an indication of any real apparent failure.
FAULT-INTLK lit	(1) Check that the latches for the power amplifier rf option module A13 and driver module A2 are in position and secure. (2) Check that the following power amplifier assemblies are in place and have all connectors securely attached. Digital control card A9 Analog control card A10 Exciter interface card A11 Rf backplane A1A3A1 Low-pass filter assembly A8 Front panel card A1A4
FAULT-TEMP lit	(1) Check that nothing is obstructing airflow through the power amplifier front panel air filter. (2) Check for excessive current through one or more power amplifier output modules (should be balanced within 1 A and not more than 12.5 A in any one module). (3) If any power amplifier output module has been removed, check that the associated "air gate" is closed.
FAULT-VSWR lit	(1) Antenna system or dummy load not connected to the power amplifier. (2) Faulty connections between the antenna system and the power amplifier.

Table 5-3. Power Amplifier and Power Supply, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
FAULT-TUNE lit	(1) Antenna system will not tune. (2) Power amplifier failed to complete a tune cycle; completed TUNE STEP 1 but failed to reach TUNE STEP 5 in 10 seconds (20 seconds if optional strap is used on digital control card). Faults need to be isolated with reference to where the TUNE STEP indicator stopped.
Power amplifier will not advance from TUNE STEP 1	(1) MONITOR-RF INPUT not lit; no rf input applied or sufficient rf applied. (2) MONITOR-RF INPUT lit; tune start not initiated (no key or tune start applied). If operated locally, tune start must be manually applied.
Power amplifier will not advance from TUNE STEP 2	(1) Wrong low-pass filter selected. (2) Incorrect frequency count of the rf input signal (BAND indicator should show 0). (3) Loss of rf drive after TUNE STEP 1 was completed.
Power amplifier will not advance from TUNE STEP 3	(1) Coupler or accessories do not tune. (2) If no coupler is connected, check for coupler jumper plug on J3 and jumper between TB1-1 and TB1-2. (MONITOR-RF INTLK will not be lit.)
Power amplifier will not advance from TUNE STEP 4	TGC failed to set up due to one of the following. (1) Loss of rf input exciter. (2) Exciter fault. (3) Insufficient rf drive from exciter for TGC to set up.

Table 5-3. Power Amplifier and Power Supply, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
TUNE STEP 5	Unit is completely tuned and functioning normally. NOTE Power amplifier faults usually stop the power amplifier in the TUNE STEP in which the fault occurs, except tuning will not be stopped if one or two power amplifier output module faults occur.
FAULT-MOD A, MOD B, MOD C, and/or MOD D lit	NOTE With one power amplifier output module failed/removed, output power equivalent to about 500 W is transmitted (PA FAULT and PA READY lights on exciter flash indicating reduced power). With two power amplifier output modules failed/removed, output power equivalent to about 250 W is transmitted (PA FAULT and PA READY lights on exciter flash). If three or more power amplifier output modules fail, the power amplifier is disabled (PA FAULT light on exciter comes on steady and PA READY light on exciter extinguishes). (1) Check associated power supply circuit breaker (if circuit breaker does not latch on, area of trouble is associated power amplifier output module, power supply crowbar/logic card A7, latches for power amplifier output modules, or power amplifier analog control card A10). INDICATOR / POWER SUPPLY / POWER AMPLIFIER MOD A / CB3 / A3 MOD B / CB4 / A4 MOD C / CB5 / A5 MOD D / CB6 / A6
(Cont)	(2) Check associated power amplifier output module.

Table 5-3. Power Amplifier and Power Supply, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
FAULT-MOD A, MOD B, MOD C, and/or MOD D lit (Cont)	(3) Normal indication if power amplifier output module is removed (operation with only 2 or 3 power amplifier output modules). (4) If both FAULT-MOD A and MOD B or both FAULT-MOD C and MOD D are lit, check associated power supply 1000-W converter module. INDICATORS — POWER SUPPLY MOD A and MOD B — A2 MOD C and MOD D — A3
MONITOR-RF INTLK does not light	(1) Antenna coupler interlock open or coupler jumper plug not connected to power amplifier coupler control connector J3. (2) Accessories interlock open or jumper not connected between power amplifier TB1-1 and TB1-2. (3) Antenna coupler interlock or associated accessories interlocks are not being enabled.
MONITOR-RF INPUT does not light	Rf input insufficient to initiate a tune cycle.
MONITOR-KEY does not light	Key interlock not satisfied (power amplifier rf option module A13 not installed or tr relay in A13 not enabled). NOTE If power amplifier operated locally, an exciter key must be used to apply rf power.

Table 5-3. Power Amplifier and Power Supply, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
MONITOR-PWR SPLY does not light	(1) PA POWER switch must be in STBY, HIGH, or LOW position to light MONITOR-PWR SPLY (either local or remote, as applicable). (2) +35-V dc driver power is faulted or circuit breaker is off. (3) Any three of the four +50/40-V dc power amplifier output module supplies are faulted or their circuit breakers are off.
BAND indicator does not change when an out-of-band rf input is applied and a new tune cycle initiated	(1) If MONITOR-RF INPUT is lit, digital control card failed. (2) If MONITOR-RF INPUT is not lit, rf input insufficient to satisfy input requirements.
BAND indicator shows 0 and tune cycle is inhibited	Tune cycle attempted with an rf input signal frequency below 1.6 MHz or above 30.0 MHz.

Table 5-4. Test Points, Voltage and Signal Levels.

UNIT	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
1-kW Power Amplifier HF-8023 (Cont)	MULTIMETER	INPUT RF (5 VOLT)	Rf input drive signal to driver module A2. With normal rf input (NMT 2.2 V rms) applied at RF INPUT (J5), meter should indicate the same level as applied at J5.

Table 5-4. Test Points, Voltage and Signal Levels.

UNIT	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
1-kW Power Amplifier HF-8023 (Cont)	MULTIMETER	PRE-DRVR RF (15 VOLT)	Rf output drive signal from pre-driver card A2A1 (rf input to driver output card A2A2). Typical predriver rf signals: FREQ — LOW POWER — HIGH POWER 2 MHz — 1.20 V rms — 1.70 V rms 14 MHz — 2.25 V rms — 3.75 V rms 29 MHz — 3.00 V rms — 4.75 V rms
		DRIVER RF (50 VOLT)	Rf output drive signal from driver output card A2A2 (rf input to rf power driver A2A2A1). Typical driver rf signals: FREQ — LOW POWER — HIGH POWER 2 MHz — 18.0 V rms — 27.5 V rms 14 MHz — 13.0 V rms — 19.0 V rms 29 MHz — 17.5 V rms — 29.0 V rms
(Cont)		DRIVER (15 AMP)	Current of driver output amplifier (in A2A2). Typical driver currents: FREQ — LOW POWER — HIGH POWER 2 MHz — 2.90 A — 4.00 A 14 MHz — 2.50 A — 4.00 A 29 MHz — 3.50 A — 5.40 A NOTE Difference in power amplifier module currents should be NMT 1.2 A with 1000-W rf output. Typically each module current differs slightly.

Table 5-4. Test Points, Voltage and Signal Levels (Cont).

UNIT	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
1-kW Power Amplifier HF-8023 (Cont)	MULTIMETER	PA MOD A (15 AMP)	Current of power output amplifier in power amplifier output module (A) A3. Typically, is 6.5 to 8.5 A at low power (500 W) and 10.0 to 12.0 (NMT 12.5) A at high power (1000 W) with normal rf input signal applied.
		PA MOD B (15 AMP)	Current of power output amplifier in power amplifier output module (B) A4. Typically, is 6.5 to 8.5 A at low power (500 W) and 10.0 to 12.0 (NMT 12.5) A at high power (1000 W) with normal rf input signal applied.
		PA MOD C (15 AMP)	Current of power output amplifier in power amplifier output module (C) A5. Typically, is 6.5 to 8.5 A at low power (500 W) and 10.0 to 12.0 (NMT 12.5) A at high power (1000 W) with normal rf input signal applied.
		PA MOD D (15 AMP)	Current of power output amplifier in power amplifier output module (D) A6. Typically, is 6.5 to 8.5 A at low power (500 W) and 10.0 to 12.0 (NMT 12.5) A at high power (1000 W) with normal rf input signal applied.
(Cont)		TOTAL PA (50 AMP)	Sum of all power output amplifier currents. Summing circuit in analog control card A10. Typically, is 26 to 34 A at low power (500 W) and 42 to 48 (NMT 50) A at high power (1000 W) with normal rf input signal applied.

Table 5-4. Test Points, Voltage and Signal Levels (Cont).

UNIT	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
1-kW Power Amplifier HF-8023 (Cont)	MULTIMETER	FWD PWR (1500 W)	Rf output power available at ANT RF (J8) output connector. Typically 475 to 525 W at low power (500 W) and 950 to 1000 W at high power (1000 W) with normal rf input signal applied.
		REFLD PWR (500 W)	Reflected power at ANT RF (J8) output connector. Typically 0 W at low power (500 W) and at high power (1000 W) with normal rf input signal applied and 50-Ω load connected to the power amplifier output. However, this signal is dependent on rf load characteristics at each frequency.
		VSWR (5.0:1)	Vswr of the load connected to J8, ANT RF output connector. Vswr difference summing circuit in analog control card A10. Typically, 1.0:1 (0.9 to 1.1) with normal rf input signal applied and a 50-Ω load connected to the power amplifier output.
Power Supply HF-8031, HF-8032 (Cont)	VOLTMETER	+5 VDC	+5.0 ±0.5 V dc, output from low-voltage module A5
		+12 VDC	+12.0 ±0.5 V dc, output from low-voltage module A5
		-12 VDC	-12.0 ±0.5 V dc, output from low-voltage module A5
		+15 VDC	+15.0 ±0.6 V dc, output from low-voltage module A5

Table 5-4. Test Points, Voltage and Signal Levels (Cont).

UNIT	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
Power Supply HF-8031, HF-8032 (Cont)	VOLTMETER	+28 VDC	+28.0 ±0.6 V dc, output from low-voltage module A5
		+35 VDC	+35.0 ±0.7 V dc, output from 500-W converter module A4, through CB7
		+50/40 VDC (A)	+50.0 ±1.0 V dc (high-voltage mode), +46.0 ±1.3 V dc (low-voltage mode), output from 1000-W converter module A2, through CB3
		+50/40 VDC (B)	+50.0 ±1.0 V dc (high-voltage mode), +46.0 ±1.3 V dc (low-voltage mode), output from 1000-W converter module A2, through CB4
		+50/40 VDC (C)	+50.0 ±1.0 V dc (high-voltage mode), +46.0 ±1.3 V dc (low-voltage mode), output from 1000-W converter module A2, through CB5
		+50/40 VDC (D)	+50.0 ±1.0 V dc (high-voltage mode), +46.0 ±1.3 V dc (low-voltage mode), output from 1000-W converter module A2, through CB6
		INPUT LINE VAC	188 to 264 V ac, ac input line voltage as indicated by the dc voltage produced by bridge rectifier (CR9 thru CR12) and crowbar/logic card A7

NOTE

Input line V ac meter circuit is a peak reading meter circuit calibrated to V rms. Therefore unstable/erratic peaks in input power may cause meter reading to vary from that of a true rms reading meter.

5.3.2.3 Testing/Troubleshooting Procedures

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

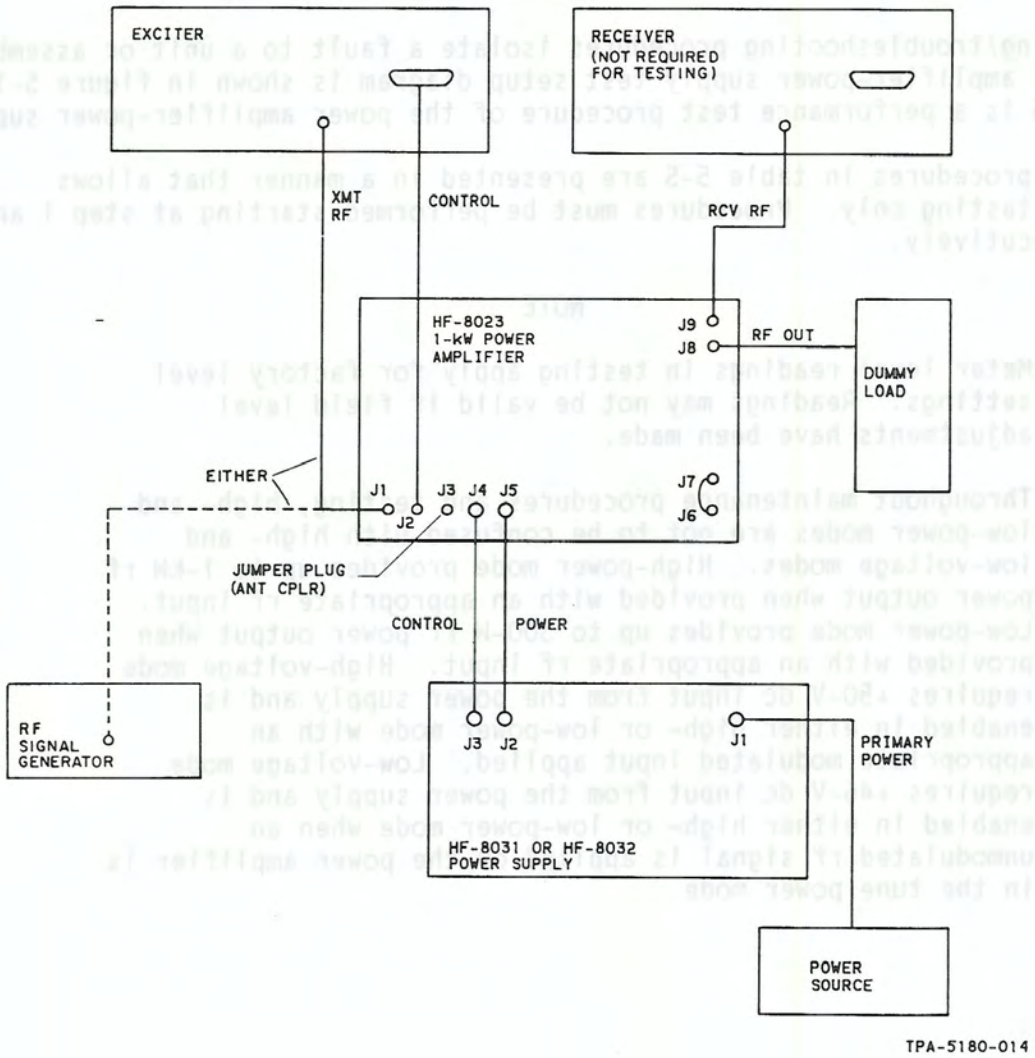
The testing/troubleshooting procedures isolate a fault to a unit or assembly. The power amplifier-power supply test setup diagram is shown in figure 5-1. Table 5-5 is a performance test procedure of the power amplifier-power supply.

The test procedures in table 5-5 are presented in a manner that allows complete testing only. Procedures must be performed starting at step 1 and run consecutively.

NOTE

Meter level readings in testing apply for factory level settings. Readings may not be valid if field level adjustments have been made.

Throughout maintenance procedures and testing, high- and low-power modes are not to be confused with high- and low-voltage modes. High-power mode provides up to 1-kW rf power output when provided with an appropriate rf input. Low-power mode provides up to 500-W rf power output when provided with an appropriate rf input. High-voltage mode requires +50-V dc input from the power supply and is enabled in either high- or low-power mode with an appropriate modulated input applied. Low-voltage mode requires +46-V dc input from the power supply and is enabled in either high- or low-power mode when an unmodulated rf signal is applied or the power amplifier is in the tune power mode.



HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Test Setup
Figure 5-1

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures.

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1	TEST SETUP		
1.1	Connect HF-80 Solid-State 1-kW Power Amplifier-Power Supply per test setup shown in figure 5-1.		
1.2	Set ac power source to the same power as the units are normally used (if available). If not available, check that the power cable is strapped correctly for the power source being used (refer to installation section).		
1.3	Set exciter or receiver-exciter controls as follows. PWR to off PA PWR to OFF PHONES for Channel A or A1 METER to XMT OUT Pilot carrier to OFF KEY to NORM MIC to OFF CONT to LCL MODE to CW FREQUENCY KHZ to 2000.0		
1.4	Set power supply controls as follows. MAIN POWER circuit breaker to OFF All other circuit breakers to ON VOLTMETER switch to INPUT LINE VAC		

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1	TEST SETUP (Cont)		
1.5	Set power amplifier controls as follows. MULTIMETER switch to INPUT RF (5 VOLT) MANUAL CONTROLS PA KEY switch to OFF PA POWER switch to HIGH MANUAL/AUTO switch to AUTO LOCAL/REMOTE switch to REMOTE		
	NOTE Ensure that antenna coupler control jack (J3) and accessories terminal board (TB1) on the power amplifier are jumpered correctly for the test bed being used.		
1.6	If preselector is used, set its power to on.		
1.7	If the bandpass filter is used, set its power to on.		
2	POWER UP		
	CAUTION Ensure that power cable is strapped for ac power source connected.		
2.1	Set power supply MAIN POWER circuit breaker to ON.	VOLTMETER reads ac power source voltage.	

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2	POWER UP (Cont)		
2.2	Using power supply VOLTMETER, measure the following power supply voltages.		
	+5 VDC	+5.0 +0.5 V dc	Low-voltage module A5
	+12 VDC	+12.0 +0.5 V dc	
	-12 VDC	-12.0 +0.5 V dc	
	+15 VDC	+15.0 +0.5 V dc	
	+28 VDC	0 V dc	
	+35 VDC	0 V dc	500-W converter module A4
	+50/40 VDC (A)	0 V dc	1000-W converter module A2
	+50/40 VDC (B)	0 V dc	
	+50/40 VDC (C)	0 V dc	1000-W converter module A3
	+50/40 VDC (D)	0 V dc	
2.3	Using power amplifier MULTIMETER, measure the following power amplifier signals.		Replace power amplifier cards or modules as indicated.
	INPUT RF (5 VOLT)	0 V rms	Driver module A2
	PRE-DRVR RF (15 VOLT)	0 V rms	
	DRIVER RF (50 VOLT)	0 V rms	
	DRIVER (15 AMP)	0 A	
	PA MOD A (15 AMP)	0 A	Power amplifier output module A3
	PA MOD B (15 AMP)	0 A	Power amplifier output module A4
	PA MOD C (15 AMP)	0 A	Power amplifier output module A5
	PA MOD D (15 AMP)	0 A	Power amplifier output module A6
(Cont)	TOTAL PA (50 AMP)	0 A	Analog control card A10

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2	POWER UP (Cont)		
2.3 (Cont)	FWD PWR (1500 W)	0 W	Exciter interface card A11
	REFLD PWR (500 W)	0 W	Exciter interface card A11
	VSWR (5.0:1)	0	Analog control card A10
2.4	Observe that power amplifier FAULT indicators are as follows.		Replace power amplifier cards as indicated.
	MOD A	Unlit	Analog control card A10
	MOD B	Unlit	Analog control card A10
	MOD C	Unlit	Analog control card A10
	MOD D	Unlit	Analog control card A10
	INTLK	Unlit	Digital control card A9, or check that the following interlocked power amplifier cards and modules are secured.
(Cont)			Digital control card A9, analog control card A10, exciter interface card A11, rf backplane A1A3A1, driver module A2 (latch is interlocked), rf option module A13 (latch is interlocked), low-pass filter assembly A8, front panel card A1A4, or power amplifier modules A3 through A6 (slides are interlocked).

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2	POWER UP (Cont)		
2.4 (Cont)	TEMP	Unlit	Analog control card A10
	VSWR	Unlit	
	TUNE	Unlit	Digital control card A11. Also check airflow if TEMP FAULT is lit.
2.5	Observe that power amplifier MONITOR indicators are as follows.		
	RF INPUT	Unlit	Analog control card A10
	KEY	Unlit	Exciter interface card A11
	RF INTLK	*Lighted	
	PWR SPLY	Unlit	Analog control card A10
2.6	Set exciter or receiver-exciter PWR switch to ON.		
2.7	No change in power supply or power amplifier indications. Observe the EQUIPMENT STATUS indicators on the exciter or receiver-exciter front panel.		Check associated unit or replace power amplifier cards, as indicated.
	EXCTR FAULT, EXCITER FAULT, or R/E FAULT	Lighted	Exciter or receiver-exciter
	PRESEL FAULT	Unlit	Preselector
	PA FAULT	Unlit	Exciter interface card A11 or digital control card A9
(Cont)			

*If antenna coupler is used and rf interlock is connected through coupler, RF INTLK will not light until coupler is tuned.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2	POWER UP (Cont)		
2.7 (Cont)	COUPLER FAULT	Unlit	Antenna coupler
	PA READY	Unlit	Exciter interface card A11 or digital control card A9
	KEY	Unlit	Exciter or receiver-exciter
	RF OUT	Unlit	Exciter interface card A11
2.8	Change any one of the exciter or receiver-exciter FREQUENCY KHZ digits. Observe:		
	EXCTR FAULT, EXCITER FAULT, or R/E FAULT	Extinguishes	
3	STANDBY POWER		
3.1	Set exciter or receiver-exciter PA PWR switch to STBY.		
3.2	Using power supply VOLTMETER, measure the following power supply voltages.		Replace power supply modules as indicated.
	+5 VDC	+5.0 ±0.5 V dc	Low-voltage module A5
	+12 VDC	+12.0 ±0.5 V dc	
	-12 VDC	-12.0 ±0.5 V dc	
	+15 VDC	+15.0 ±0.5 V dc	
	+28 VDC	0 V dc	
	+35 VDC	0 V dc	500-W converter module A4
	+50/40 VDC (A)	0 V dc	1000-W converter module A2
	+50/40 VDC (B)	0 V dc	
	+50/40 VDC (C)	0 V dc	1000-W converter module A3
	+50/40 VDC (D)	0 V dc	

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3	STANDBY POWER (Cont)		
3.3	Using power amplifier MULTIMETER, measure the following power amplifier signals.		Replace power amplifier cards and modules as indicated.
	INPUT RF (5 VOLT)	0 V rms	Driver module A2
	PRE-DRVR RF (15 VOLT)	0 V rms	
	DRIVER RF (50 VOLT)	0 V rms	
	DRIVER (15 AMP)	0 A	
	PA MOD A (15 AMP)	0 A	Power amplifier output module A3
	PA MOD B (15 AMP)	0 A	Power amplifier output module A4
	PA MOD C (15 AMP)	0 A	Power amplifier output module A5
	PA MOD D (15 AMP)	0 A	Power amplifier output module A6
	TOTAL PA (50 AMP)	0 A	Analog control card A10
	FWD PWR (1500 W)	0 W	Exciter interface card A11
	REFLD PWR (500 W)	0 W	
	VSWR (5.0:1)	0	Analog control card A10
3.4	Observe that power amplifier FAULT indicators are as follows.		Replace power amplifier cards as indicated.
	MOD A	Unlit	Same as step 2.4
	MOD B	Unlit	
	MOD C	Unlit	
	MOD D	Unlit	
	INTLK	Unlit	
	TEMP	Unlit	
	VSWR	Unlit	
	TUNE	Unlit	

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3	STANDBY POWER (Cont)		
3.5	Observe that power amplifier MONITOR indicators are as follows.		Replace power amplifier cards as indicated.
	RF INPUT	Unlit	Analog control card A10
	KEY	Unlit	Exciter interface card A11
	RF INTLK	*Lighted	
	PWR SPLY	Unlit	Analog control card A10
3.6	Observe that exciter or receiver-exciter EQUIPMENT STATUS indicators are as follows.		Check associated unit or replace power amplifier cards as indicated.
	EXCTR FAULT, EXCITER FAULT, or R/E FAULT	Unlit	Exciter or receiver-exciter
	PRESEL FAULT	Unlit	Preselector
	PA FAULT	Unlit	Exciter interface card A11 or digital control card A9
	COUPLER FAULT	Unlit	Antenna coupler
	PA READY	Unlit	Exciter interface card A11 or digital control card A9
	KEY	Unlit	Exciter or receiver-exciter
	RF OUT	Unlit	Exciter interface card A11

*If antenna coupler is used and rf interlock is connected through coupler, RF INTLK will not light until coupler is tuned.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3	STANDBY POWER (Cont)		
3.7	Observe power amplifier TUNE STEP indicator.	Indicates TUNE STEP 1.	Replace power amplifier digital control card A9 or front panel card A1A4.
3.8	Observe the BAND indicator.	Indicates BAND 0.	
	NOTE Rf power is not, and has not yet, been applied.		
4	LOW POWER		
4.1	Set exciter or receiver-exciter PA PWR switch to LOW.		
4.2	Using power supply VOLTMETER, measure the following power supply voltages.		Replace power supply modules as indicated.
	+5 VDC	+5.0 ±0.5 V dc	Low-voltage module A5
	+12 VDC	+12.0 ±0.5 V dc	
	-12 VDC	-12.0 ±0.5 V dc	
	+15 VDC	+15.0 ±0.15 V dc	
	+28 VDC	+28.0 ±0.5 V dc	
	+35 VDC	+35.0 ±0.7 V dc	500-W converter module A4
	+50/40 VDC (A)	+46.0 ±1.3 V dc	1000-W converter module A2
	+50/40 VDC (B)	+46.0 ±1.3 V dc	
	+50/40 VDC (C)	+46.0 ±1.3 V dc	1000-W converter module A3
	+50/40 VDC (D)	+46.0 ±1.3 V dc	

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.3	Using power amplifier MULTIMETER, measure the following power amplifier signals.		Replace power amplifier cards and modules as indicated.
	INPUT RF (5 VOLT)	0 V rms	Driver module A2
	PRE-DRVR RF (15 VOLT)	0 V rms	
	DRIVER RF (50 VOLT)	0 V rms	
	DRIVER (15 AMP)	0 A	
	PA MOD A (15 AMP)	0 A	Power amplifier output module A3
	PA MOD B (15 AMP)	0 A	Power amplifier output module A4
	PA MOD C (15 AMP)	0 A	Power amplifier output module A5
	PA MOD D (15 AMP)	0 A	Power amplifier output module A6
	TOTAL PA (50 AMP)	0 A	Analog control card A10
	FWD PWR (1500 W)	0 W	Exciter interface card A11
	REFLD PWR (500 W)	0 W	
	VSWR (5.0:1)	0	Analog control card A10
4.4	Observe that power amplifier FAULT indicators are as follows.		Replace power amplifier cards as indicated.
	MOD A	Unlit	Same as step 2.4
	MOD B	Unlit	
	MOD C	Unlit	
	MOD D	Unlit	
	INTLK	Unlit	
	TEMP	Unlit	
	VSWR	Unlit	
	TUNE	Unlit	

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.5	Observe that power amplifier MONITOR indicators are as follows.		Replace power amplifier cards as indicated.
	RF INPUT	Unlit	Analog control card A10
	KEY	Unlit	Exciter interface card A11
	RF INTLK	Lighted	
	PWR SPLY	Lighted	Analog control card A10
4.6	Observe that the EQUIPMENT STATUS indicators on the exciter or receiver-exciter front panel are as follows.		Check associated unit or replace power amplifier cards as indicated.
	EXCTR FAULT, EXCITER FAULT, or R/E FAULT	Unlit	Exciter or receiver-exciter
	PRESEL FAULT	Unlit	Preselector
	PA FAULT	Unlit	Exciter interface card A11 or digital control card A9
	COUPLER FAULT	Unlit	Antenna coupler
	PA READY	Unlit	Exciter interface card A11 or digital control card A9
	KEY	Unlit	Exciter or receiver-exciter
	RF OUT	Unlit	Exciter interface card A11

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.7	Observe power amplifier TUNE STEP indicator.	Indicates TUNE STEP 1.	Replace power amplifier digital control card A9 or front panel card A1A4.
4.8	Observe the BAND indicator.	Indicates BAND 0.	
	NOTE Rf power is not, and has not yet, been applied.		
4.9	Momentarily set the KEY switch on the exciter or receiver-exciter to LOCK. (Return it to NORM position.)		
	NOTE This momentarily applies rf power to power amplifier.		
4.10	Observe the TUNE STEP indicator.	Flashes through all five tune steps and stops on TUNE STEP 5.	If unit fails to tune (remains in TUNE STEP 1) and no FAULT indicators are lit, key signal was not received; check control connections or replace power amplifier exciter interface card A11. If unit stops in TUNE STEP 2, no rf input was received. Check rf input connections.
(Cont)			

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.10 (Cont)			If unit fails (TUNE) in TUNE STEP 3, rf power was insufficient; check rf connections, exciter or receiver-exciter rf out; check that jumper plug is installed on J3 and that jumper is installed between TB1-1 and TB1-2. If coupler is installed, check that it is tuned, or replace power amplifier digital control card A9.
4.11	Observe the BAND indicator.	Indicates BAND 1.	If BAND 0 is indicated, rf power was insufficient; check rf connections, exciter or receiver-exciter rf out, or replace power amplifier digital control card A9. If band other than BAND 1 is indicated, replace power amplifier digital control card A9 or front panel card A1A4.
4.12	Set the KEY switch on the exciter or receiver-exciter to LOCK.		

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.13	Observe the TUNE STEP indicator.	Indicates TUNE STEP 5.	Replace power amplifier digital control card A9 or front panel card A1A4.
4.14	Using power supply VOLTMETER, measure the following power supply voltages.		Replace power supply modules as indicated.
	+5 VDC	+5.0 ±0.5 V dc	Low-voltage module A5
	+12 VDC	+12.0 ±0.5 V dc	
	-12 VDC	-12.0 ±0.5 V dc	
	+15 VDC	+15.0 ±0.15 V dc	
	+28 VDC	+28.0 ±0.5 V dc	
	+35 VDC	+35.0 ±0.7 V dc	500-W converter module A4*
	+50/40 VDC (A)	+46.0 ±1.3 V dc	1000-W converter module A2*
	+50/40 VDC (B)	+46.0 ±1.3 V dc	
	+50/40 VDC (C)	+46.0 ±1.3 V dc	1000-W converter module A3*
	+50/40 VDC (D)	+46.0 ±1.3 V dc	

NOTE

Before replacing those modules marked with an asterisk (*), set the KEY switch on the exciter or receiver-exciter to OFF. If voltage(s) recover, replace associated power amplifier module(s) as follows.

+35 VDC - Driver module A2
+50/40 VDC (A) - Power amplifier output module A3
+50/40 VDC (B) - Power amplifier output module A4
+50/40 VDC (C) - Power amplifier output module A5
+50/40 VDC (D) - Power amplifier output module A6

If voltages do not recover, remove associated power amplifier module(s) and check voltages again. If voltages still do not recover, replace the associated power supply module(s).

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.15	Using power amplifier MULTIMETER, measure the following power amplifier signals.		Replace power amplifier cards and modules as indicated.
	INPUT RF (5 VOLT)	0.8 V rms nominal	Driver module A3
	PRE-DRVR RF (15 VOLT)	2.2 V rms nominal	Driver module A3
	DRIVER RF (50 VOLT)	11.0 V rms nominal	Driver module A3
	DRIVER (15 AMP)	2.5 A nominal	Driver module A3
	PA MOD A (15 AMP)	7.0 A nominal	Power amplifier output module A3
	PA MOD B (15 AMP)	7.0 A nominal	Power amplifier output module A4
	PA MOD C (15 AMP)	7.0 A nominal	Power amplifier output module A5
	PA MOD D (15 AMP)	7.0 A nominal	Power amplifier output module A6
	TOTAL PA (50 AMP)	28.0 A nominal	Analog control card A10
	FWD PWR (1500 W)	500 W nominal	Exciter interface card A11, directional coupler A1A1, or calibrate directional coupler A1A1
	REFLD PWR (500 W)	0 W nominal	Exciter interface card A11, directional coupler A1A1, or calibrate directional coupler A1A1
	VSWR (5.0:1)	1.0:1 nominal	Analog control card A10, front panel card A1A4, or adjust VSWR overload A1A4R12

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.16	Observe that power amplifier FAULT indicators are as follows.		
	MOD A	Unlit	See following chart.
	MOD B	Unlit	
	MOD C	Unlit	
	MOD D	Unlit	
			Check power amplifier module holddown slide interlock switch; replace module, card, and/or repair circuit breaker associated with indicated fault.

FAULT	POWER AMPLIFIER	POWER SUPPLY
MOD A	Power amplifier output module A3 Analog control card A10 Front panel card A1A4	1000-W converter A2 CB3
MOD B	Power amplifier output module A4 Analog control card A10 Front panel card A1A4	1000-W converter A2 CB4
MOD C	Power amplifier output module A5 Analog control card A10 Front panel card A1A4	1000-W converter A3 CB5
MOD D	Power amplifier output module A6 Analog control card A10 Front panel card A1A4	1000-W converter A3 CB6

(Cont)

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.16 (Cont)	INTLK	Unlit	Replace power amplifier digital control card A9 or check that interlocked cards and modules are secured (reference step 2.4).
	TEMP	Unlit	Ensure that airflow is not obstructed, replace power amplifier analog control card A10 or power amplifier output module A3, A4, A5, or A6.
	VSWR	Unlit	Replace power amplifier analog control card A10, exciter interface card A11, directional coupler A1A1, or front panel card A1A4; adjust VSWR overload A1A4R12, or calibrate directional coupler A1A1.
	TUNE	Unlit	Replace power amplifier digital control card A9, analog control card A10, or exciter interface card A11.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	LOW POWER (Cont)		
4.17	Observe that power amplifier MONITOR indicators are as follows.		Replace power amplifier cards as indicated.
	RF INPUT	Lighted	Analog control card A10
	KEY	Lighted	Exciter interface card A11
	RF INTLK	Lighted	
	PWR SPLY	Lighted	Analog control card A10
4.18	Observe exciter or receiver-exciter EQUIPMENT STATUS indicators are as follows.		Check associated unit or replace power amplifier cards as indicated.
	EXCTR FAULT, EXCITER FAULT, or R/E FAULT	Unlit	Exciter or receiver-exciter
	PRESEL FAULT	Unlit	Preselector
	PA FAULT	Unlit	Exciter interface card A11 or digital control card A9
	COUPLER FAULT	Unlit	Antenna coupler
	PA READY	Unlit	Exciter interface card A11 or digital control card A9
	KEY	Lighted	Exciter or receiver-exciter
	RF OUT	Lighted	Exciter interface card A11
4.19	Set KEY switch on the exciter or receiver-exciter to NORM.		

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER		
5.1	Set exciter or receiver-exciter PA PWR switch to HIGH POWER.		
5.2	Using power supply VOLTMETER, measure the following power supply voltages.		Replace power supply modules as indicated.
	+5 VDC	+5.0 ±0.5 V dc	Low-voltage module A5
	+12 VDC	+12.0 ±0.5 V dc	
	-12 VDC	-12.0 ±0.5 V dc	
	+15 VDC	+15.0 ±0.15 V dc	
	+28 VDC	+28.0 ±0.5 V dc	
	+35 VDC	+35.0 ±0.5 V dc	500-W converter module A4
	+50/40 VDC (A)	+46.0 ±1.3 V dc	1000-W converter module A2
	+50/40 VDC (B)	+46.0 ±1.3 V dc	
	+50/40 VDC (C)	+46.0 ±1.3 V dc	1000-W converter module A3
	+50/40 VDC (D)	+46.0 ±1.3 V dc	
5.3	Using power amplifier MULTIMETER, measure the following power amplifier signals.		Replace power amplifier cards and modules as indicated.
	INPUT RF (5 VOLT)	0 V rms	Driver module A2
	PRE-DRVR RF (15 VOLT)	0 V rms	
	DRIVER RF (50 VOLT)	0 V rms	
	DRIVER (15 AMP)	0 A	
	PA MOD A (15 AMP)	0 A	Power amplifier output module A3
	PA MOD B (15 AMP)	0 A	Power amplifier output module A4
	PA MOD C (15 AMP)	0 A	Power amplifier output module A5
(Cont)			

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.3 (Cont)	PA MOD D (15 AMP)	0 A	Power amplifier output module A6
	TOTAL PA (50 AMP)	0 A	Analog control card A10
	FWD PWR (1500 W)	0 W	Exciter interface card A11
	REFLD PWR (500 W)	0 W nominal	Exciter interface card A11
	VSWR (5.0:1)	0	Analog control card A10
5.4	Observe that power amplifier FAULT indicators are as follows.		Replace power amplifier cards as indicated.
	MOD A	Unlit	Analog control card A10
	MOD B	Unlit	Analog control card A10
	MOD C	Unlit	Analog control card A10
	MOD D	Unlit	Analog control card A10
	INTLK	Unlit	Replace power amplifier digital control card A9, or check that interlocked cards and modules are secured (reference step 2.4).
	TEMP	Unlit	Ensure that airflow is unobstructed.
	VSWR	Unlit	Replace analog control card A10 or digital control card A9.
	TUNE	Unlit	Replace analog control card A10 or digital control card A9.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.5	Observe that power amplifier MONITOR indicators are as follows.		Replace power amplifier cards as indicated.
	RF INPUT	Unlit	Analog control card A10
	KEY	Unlit	Exciter interface card A11
	RF INTLK	Lighted	
	PWR SPLY	Lighted	Analog control card A10
5.6	Observe that exciter or receiver-exciter EQUIPMENT STATUS indicators are as follows.		Check associated unit or replace power amplifier cards as indicated.
	EXCTR FAULT, EXCITER FAULT, or R/E FAULT	Unlit	Exciter or receiver-exciter
	PRESEL FAULT	Unlit	Preselector
	PA FAULT	Unlit	Exciter interface card A11 or digital control card A9
	COUPLER FAULT	Unlit	Antenna coupler
	PA READY	Unlit	Exciter interface card A11 or digital control card A9.
	KEY	Unlit	Exciter or receiver-exciter
	RF OUT	Unlit	Exciter interface card A11
5.7	Observe power amplifier TUNE STEP indicator.	Indicates TUNE STEP 1.	Replace power amplifier digital control card A9 or front panel card A1A4.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.8	Observe the BAND indicator.	Indicates BAND 1.	
	NOTE Rf power is not, and has not yet, been applied since switching to HIGH POWER.		
5.9	Momentarily set the KEY switch on the exciter or receiver-exciter to LOCK. (Return it to NORM position.)		
	NOTE This momentarily applies rf power to power amplifier.		
5.10	Observe the TUNE STEP indicator.	Flashes through all five tune steps and stops on TUNE STEP 5.	If unit fails to tune (remains in TUNE STEP 1) and no fault indicators are lit, key signal was not received; check control connections or replace power amplifier exciter interface card A11. If unit stops in TUNE STEP 2, no rf input was received. Check rf input connections.
(Cont)			

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.10 (Cont)			If unit fails (TUNE) in TUNE STEP 3, rf power was insufficient; check rf connections, exciter or receiver-exciter rf out; check that jumper plug is installed on J3 and that jumper is installed between TB1-1 and TB1-2. If coupler is installed, check that it is tuned, or replace power amplifier digital control card A9.
5.11	Observe the BAND indicator.	Indicates BAND 1.	Replace power amplifier digital control card A9 or front panel card A1A4.
5.12	Set the KEY switch on the exciter or receiver-exciter to LOCK.		
5.13	Observe the TUNE STEP indicator.	Indicates TUNE STEP 5.	Replace power amplifier digital control card A9 or front panel card A1A4.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.14	Using power supply VOLTMETER, measure the following power supply voltages.		Replace power supply modules as indicated.
	+5 VDC	+5.0 ±0.5 V dc	Low-voltage module A5
	+12VDC	+12.0 ±0.5 V dc	
	-12 VDC	-12.0 ±0.5 V dc	
	+15 VDC	+15.0 ±0.15 V dc	
	+28 VDC	28.0 ±0.5 V dc	
	+35 VDC	+35.0 ±0.7 V dc	500-W converter module A4*
	+50/40 VDC (A)	+46.0 ±1.3 V dc**	1000-W converter module A2*
	+50/40 VDC (B)	+46.0 ±1.3 V dc**	
	+50/40 VDC (C)	+46.0 ±1.3 V dc**	1000-W converter module A3*
	+50/40 VDC (D)	+46.0 ±1.3 V dc**	

NOTE

Before replacing those modules marked with an asterisk (*), set the KEY switch on the exciter or receiver-exciter to OFF. If voltage(s) recover, replace associated power amplifier module(s) as follows.

+35 VDC - Driver module A2
+50/40 VDC (A) - Power amplifier output module A3
+50/40 VDC (B) - Power amplifier output module A4
+50/40 VDC (C) - Power amplifier output module A5
+50/40 VDC (D) - Power amplifier output module A6

If voltages do not recover, remove associated power amplifier module(s) and check voltages again. If voltages still do not recover, replace the associated power supply module(s).

**+50.0 V dc with modulation applied or up to 3 seconds with no modulation applied, drops to +46.0 V dc after 3 seconds with no modulation.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.15	Using power amplifier MULTIMETER, measure the following power amplifier signals.		Replace power amplifier cards and modules as indicated.
	INPUT RF (5 VOLT)	NMT 2.20 V rms	Driver module A2
	PRE-DRVR RF (15 VOLT)	2.2 V rms nominal	Driver module A2
	DRIVER RF (50 VOLT)	18.0 V rms nominal	Driver module A2
	DRIVER (15 AMP)	2.5 A nominal (NMT 8.1 A)	Driver module A2
	PA MOD A (15 AMP)	NMT 12.5 A	Power amplifier output module A3
	PA MOD B (15 AMP)	NMT 12.5 A	Power amplifier output module A4
	PA MOD C (15 AMP)	NMT 12.5 A	Power amplifier output module A5
	PA MOD D (15 AMP)	NMT 12.5 A	Power amplifier output module A6
	TOTAL PA (50 AMP)	NMT 50.0 A	Analog control card A10
	FWD PWR (1500 W)	892 to 1122 W	Exciter interface card A11, directional coupler A1A1; or calibrate directional coupler A1A1.
	REFLD PWR (500 W)	0 W nominal	Exciter interface card A11, directional coupler A1A1; or calibrate directional coupler A1A1.
	VSWR (5.0:1)	1.0:1 nominal	Analog control card A10, front panel card A1A4, or adjust VSWR overload A1A4R12.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.16	Observe that power amplifier FAULT indicators are as follows.		
	MOD A	Unlit	See following chart.
	MOD B	Unlit	
	MOD C	Unlit	
	MOD D	Unlit	
			Check power amplifier module holddown slide interlock switch; replace module, card, and/or repair circuit breaker associated with indicated fault.

FAULT	POWER AMPLIFIER	POWER SUPPLY
MOD A	Power amplifier output module A3 Analog control card A10 Front panel card A1A4	1000-W converter A2 CB3
MOD B	Power amplifier output module A4 Analog control card A10 Front panel card A1A4	1000-W converter A2 CB4
MOD C	Power amplifier output module A5 Analog control card A10 Front panel card A1A4	1000-W converter A3 CB5
MOD D	Power amplifier output module A6 Analog control card A10 Front panel card A1A4	1000-W converter A3 CB6

(Cont)

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.16 (Cont)	INTLK	Unlit	Replace power amplifier digital control card A9 or check that interlocked cards and modules are secured (reference step 2.4).
	TEMP	Unlit	Ensure airflow is unobstructed; replace power amplifier analog control card A10 or power amplifier output module A3, A4, A5, or A6.
	VSWR	Unlit	Replace power amplifier analog control card A10, exciter interface card A11, directional coupler A1A1, or front panel card A1A4, adjust VSWR overload A1A4R12, or calibrate directional coupler A1A1.
	TUNE	Unlit	Replace power amplifier digital control card A9, analog control card A10, or exciter interface card A11.

Table 5-5. HF-80 Solid-State 1-kW Power Amplifier-Power Supply, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	HIGH POWER (Cont)		
5.17	Observe that power amplifier MONITOR indicators are as follows.		Replace power amplifier cards as indicated:
	RF INPUT	Lighted	Analog control card A10
	KEY RF INTLK	Lighted Lighted	Exciter interface card A11
	PWR SPLY	Lighted	Analog control card A10
5.18	Observe exciter or receiver-exciter EQUIPMENT STATUS indicators are as follows.		Check associated unit or replace power amplifier cards as indicated.
	EXCTR FAULT, EXCITER FAULT, or R/E FAULT	Unlit	Exciter or receiver-exciter
	PRESEL FAULT	Unlit	Preselector
	PA FAULT	Unlit	Exciter interface card A11 or digital control card A9
	COUPLER FAULT	Unlit	Antenna coupler
	PA READY	Unlit	Exciter interface card A11 or digital control card A9.
	KEY	Lighted	Exciter or receiver-exciter
	RF OUT	Lighted	Exciter interface card A11
5.19	Set exciter or receiver-exciter KEY switch to NORM.		

5.4 1-kW POWER AMPLIFIER HF-8023 MAINTENANCE

This section contains information necessary to maintain the power amplifier. Testing and troubleshooting procedures isolate a fault to a subassembly or chassis-mounted component. Refer to the HF-80 Solid-State Power Amplifiers and Power Supplies Depot Maintenance Instruction Book for fault isolation and repair of components on circuit cards or modules. Figure 5-6 shows the location of major components and subassemblies within the power amplifier.

WARNING

This device contains a radio frequency transmitter which, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of Occupational Safety and Health Administration (OSHA) recommended maximum limits.

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

5.4.1 Testing/Troubleshooting

5.4.1.1 Fault Isolation

Some faults that occur in the power amplifier can be quickly isolated to a faulty card or assembly by using the front panel control and monitor features. Table 5-6 contains a brief description of indications and isolation of apparent failures.

Table 5-6. 1-kW Power Amplifier HF-8023, Fault Isolation.

INDICATION	ISOLATION OF APPARENT FAILURE
	NOTE All indicators listed here are power amplifier front panel indicators unless otherwise noted. Front panel meter readings are useful in testing and troubleshooting, but are not normally an indication of any real apparent failure.
FAULT-INTLK lit	(1) Check that the latches for tr relay module A13 and driver module A2 are in position and secure. (2) Check that the following assemblies are in place and have all connectors securely attached. Digital control card A9 Analog control card A10 Interface card A11 Rf backplane A1A3A1 Low-pass filter assembly A8 Front panel card A1A4
FAULT-TEMP lit	(1) Check that nothing is obstructing airflow through the front panel air filter. (2) Check for excessive current through one or more power amplifier output modules (should be balanced within 1 A and not more than 12.5 A in any one module). (3) If any power amplifier output module has been removed, check that the associated "air gate" is closed.
FAULT-VSWR lit	(1) Antenna system or dummy load not connected to the rf amplifier. (2) Faulty connections between the antenna system and the rf amplifier.
FAULT-TUNE lit	(1) Antenna system will not tune. (2) Rf amplifier failed to complete a tune cycle; completed TUNE STEP 1 but failed to reach TUNE STEP 5 in 15 seconds (33 seconds if optional strap is used on digital control card). Faults need to be isolated with the reference to where the TUNE STEP indicator stopped.

Table 5-6. 1-kW Power Amplifier HF-8023, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
Power amplifier will not advance from TUNE STEP 1	(1) MONITOR-RF INPUT not lit; no rf input applied or insufficient rf applied. (2) MONITOR-RF INPUT lit; tune start not initiated (no key or tune start applied). If operated locally, tune start must be manually applied. NOTE Ensure no fault indicators are lit.
Power amplifier will not advance from TUNE STEP 2	(1) Incorrect frequency count of the rf input signal (BAND indicator should show 0). (2) Loss of drive after TUNE STEP 1 was completed.
Power amplifier will not advance from TUNE STEP 3	(1) Coupler or accessories do not tune. (2) If coupler is not installed, jumper plug is not in place on coupler control connector J3.
Power amplifier will not advance from TUNE STEP 4	TGC failed to set up due to one of the following. (1) Loss of rf input from exciter (2) Exciter fault (3) Insufficient rf drive from exciter TGC to set up
TUNE STEP 5	Unit is completely tuned and functioning normally. NOTE Power amplifier faults usually stop the power amplifier in the TUNE STEP in which the fault occurs, except tuning will not be stopped if one or two power amplifier output module faults occur.

Table 5-6. 1-kW Power Amplifier HF-8023, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
FAULT-MOD A, MOD B, MOD C, and/or MOD D lit	NOTE With one power amplifier output module failed/removed, output power equivalent to about 500 W is transmitted (PA FAULT and PA READY lights on exciter flash indicating reduced power). With two power amplifier output modules failed/removed, output power equivalent to about 250 W is transmitted (PA FAULT and PA READY lights on exciter flash). If three or more power amplifier output modules fail, the rf amplifier is disabled (PA FAULT light on exciter comes on steady and PA READY light on exciter extinguishes). (1) Check associated power supply circuit breaker (if circuit breaker does not latch on, area of trouble is associated power amplifier output module, latches for the power amplifier output modules, or analog control card A10). INDICATOR — POWER AMPLIFIER MOD A — A3 MOD B — A4 MOD C — A5 MOD D — A6 (2) Check associated power amplifier output module. (3) Normal indication if the power amplifier output module is removed (operation with only two or three power amplifier output modules).
MONITOR-RF INTLK does not light	(1) Antenna coupler interlock open or coupler jumper plug not connected to coupler control connector J3. (2) Accessories interlock open or jumper not connected between power amplifier TB1-1 and TB1-2. (3) Antenna coupler interlock or associated accessories interlocks are not being enabled.

Table 5-6. 1-kW Power Amplifier HF-8023, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
MONITOR-RF INPUT does not light	Rf input insufficient to initiate a tune cycle.
MONITOR-KEY does not light	Key interlock not satisfied (rf option module A13 not installed or tr relay in A13 not enabled). NOTE If power amplifier operated locally, an exciter key must be used to apply rf power.
MONITOR-PWR SPLY does not light	(1) PA POWER switch must be in STBY, HIGH, or LOW position to light MONITOR-PWR SPLY (either local or remote, as applicable). (2) +35-V dc driver power is faulted or circuit breaker is off. (3) Any three of the four +50/40-V dc power amplifier output module supplies are faulted or their circuit breakers are off.
BAND indicator does not change when an out-of-band rf input is applied and a new tune cycle initiated	(1) If MONITOR-RF INPUT is lit, digital control card failed. (2) If MONITOR-RF INPUT is not lit, rf input insufficient to satisfy input requirements.
BAND indicator shows 0 and tune cycle is inhibited	Tune cycle attempted with an rf input signal frequency below 1.6 MHz or above 30.0 MHz.

Table 5-6. 1-kW Power Amplifier HF-8023, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
MULTIMETER-INPUT RF (5 VOLT) position	Rf input drive signal to driver A2. With normal rf input (NMT 2.2 V rms) applied at RF INPUT (J1), meter should indicate the same level as applied at J1. (1) If no rf with apparent normal rf applied, check rf input connections. (2) If reading is too high, check meter adjustment. (3) Check A2, A1A3, and A1A4.
	NOTE Level of PRE-DRIVER RF (15 VOLT), DRIVER RF (50 VOLT), and DRIVER (15 AMP) is not normally a good indicator of any problem. If INPUT RF (5 VOLT) is present and one or all of these signals are not, check A2.
MULTIMETER-PRE-DRVR RF (15 VOLT) position	Rf output drive signal from predriver card A2A1 (rf input to driver output card A2A2). Typical predriver rf signals: FREQ — LOW POWER — HIGH POWER 2 MHz — 1.20 V rms — 1.70 V rms 14 MHz — 2.25 V rms — 3.75 V rms 29 MHz — 3.00 V rms — 4.75 V rms
MULTIMETER-DRIVER RF (50 VOLT) position	Rf output drive signal from driver output card A2A2 (rf input to power splitter A2A2A1). Typical driver rf signals: FREQ — LOW POWER — HIGH POWER 2 MHz — 18.0 V rms — 27.5 V rms 14 MHz — 13.0 V rms — 19.0 V rms 29 MHz — 17.5 V rms — 29.0 V rms

Table 5-6. 1-kW Power Amplifier HF-8023, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
MULTIMETER-DRIVER (15 AMP) position	Current of driver output amplifier (in A2A2). Typical driver currents:

FREQ	LOW POWER	HIGH POWER
2 MHz	2.90 A	4.00 A
14 MHz	2.50 A	4.00 A
29 MHz	3.50 A	5.40 A

NOTE

Difference in power amplifier module currents should be NMT 1.2 A with 1000-W rf output. Typically, each module current differs slightly. If any one or more of these modules exceeds 1.2-A difference, adjust or replace modules until the currents are relatively the same. Continued operation with a large module imbalance could affect the units performance.

MULTIMETER-PA MOD A (15 AMP) position	Current of power output amplifier in power amplifier output module (A) A3. Typically, is 6.5 to 8.5 A at low power (500 W) and 10.0 to 12.0 (NMT 12.5) A at high power (1000 W) with normal rf input signal applied.
MULTIMETER-PA MOD B (15 AMP) position	Current of power output amplifier in power amplifier output module (B) A4. Typically, is 6.5 to 8.5 A at low power (500 W) and 10.0 to 12.0 (NMT 12.5) A at high power (1000 W) with normal rf input signal applied.
MULTIMETER-PA MOD C (15 AMP) position	Current of power output amplifier in power amplifier output module (C) A5. Typically, is 6.5 to 8.5 A at low power (500 W) and 10.0 to 12.0 (NMT 12.5) A at high power (1000 W) with normal rf input signal applied.
MULTIMETER-PA MOD D (15 AMP) position	Current of power output amplifier in power amplifier output module (D) A6. Typically, is 6.5 to 8.5 A at low power (500 W) and 10.0 to 12.0 (NMT 12.5) A at high power (1000 W) with normal rf input signal applied.

Table 5-6. 1-kW Power Amplifier HF-8023, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
MULTIMETER-TOTAL PA (50 AMP) position	Sum of all power output amplifier currents. Summing circuit in analog control card A10. Typically, is 26 to 34 A at low power (500 W) and 42 to 48 (NMT 50) A at high power (1000 W) with normal rf input signal applied.
MULTIMETER-FWD PWR (1500 W) position	Rf output power available at ANT RF (J8) output connector. Typically 475 to 525 W at low power (500 W) and 950 to 1000 W at high power (1000 W) with normal rf input signal applied.
MULTIMETER-REFLD PWR (500 W) position	Reflected power at ANT RF (J8) output connector. Typically 0 W at low power (500 W) and at high power (1000 W) with normal rf input signal applied and 50-Ω load connected to the power amplifier output. However, this signal is dependent on rf load characteristics at each frequency.
MULTIMETER-VSWR (5.0:1) position	Vswr of the load connected to ANT RF (J8) output connector. Vswr difference summing circuit in analog control card A10. Typically 1.0:1 (0.9 to 1.1) with normal rf input signal applied and a 50-Ω load connected to the power amplifier output.

5.4.1.2 Test Point, Voltage and Signal Levels

As an additional aid in testing and troubleshooting, voltage and signal levels that are easily accessible are given in table 5-7. These levels, when used with tables 5-6 and 5-8, further enable the user to isolate and identify faults.

NOTE

All test points are accessible by removing the power amplifier top dust cover.

Table 5-7. 1-kW Power Amplifier HF-8023, Test Points, Voltage and Signal Levels.

CARD/MODULE	TEST	FUNCTION	SIGNAL, DESCRIPTION
Driver module A2			
Predriver card A2A1	*TP1	1 dB } Attenuation	Ground to enable input step attenuation relay. Band enable signals supplied through strapping diodes. Strapping diodes test-selected in final test (refer to paragraph 5.4.2.7, gain compensation).
	*TP2	2 dB	
	*TP3	4 dB	
	*TP4	8 dB	
	*TP5	Q1 bias	About -2 V dc unkeyed. +3 to +6 V dc with key applied.
	*TP6	Q2 bias	About -2 V dc unkeyed. +3 to +6 V dc with key applied.
	*TP7	Driver keyline	0 V dc, key applied; +12 V dc, no key applied
	TP8	+ } Predriver current monitor	0.20 V dc (2000 mA), keyed with no rf drive
	TP9	-	
Driver output card A2A2	TP1	Ground	0 V dc (signal common)
	TP2	Q1 bias	About -2 V dc unkeyed; +3 to +6 V dc with key applied
	TP3	Q2 bias	About -2 V dc unkeyed; +3 to +6 V dc with key applied
	TP4	+ } Driver current monitor	0.120 V dc (1200 mA), keyed with no rf drive
	TP5	-	
	*TP6	Driver keyline	0 V dc, key applied; +12 V dc, no key applied

*These test points are not accessible with driver module installed.

Table 5-7. 1-kW Power Amplifier HF-8023, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST	FUNCTION	SIGNAL, DESCRIPTION
Power amplifier output module A3	TP1 (−), TP2 (+)	Power amplifier current monitor	7.0 mV dc (100 mA) with no rf drive, +50 V dc at P1-33 through P1-40, and key signal applied
Power amplifier output module A4	TP1 (−), TP2 (+)	Power amplifier current monitor	7.0 mV dc (100 mA) with no rf drive, +50 V dc at P1-33 through P1-40, and key signal applied
Power amplifier output module A5	TP1 (−), TP2 (+)	Power amplifier current monitor	7.0 mV dc (100 mA) with no rf drive, +50 V dc at P1-33 through P1-40, and key signal applied
Power amplifier output module A6	TP1 (−), TP2 (+)	Power amplifier current monitor	7.0 mV dc (100 mA) with no rf drive, +50 V dc at P1-33 through P1-40, and key signal applied
Digital control card A9	TP1	Ground	0 V dc (signal common)
	TP2	Clock	Band logic clock oscillator; 4096 ±5 kHz
	TP3	Band A	Band signal, bcd wt 1. Logic 1 on (NLT +3.5 V dc), logic 0 off.
	TP4	Band B	Band signal, bcd wt 2. Logic 1 on (NLT +3.5 V dc), logic 0 off.
	TP5	Band C	Band signal, bcd wt 4. Logic 1 on (NLT +3.5 V dc), logic 0 off.
	TP6	Band D	Band signal, bcd wt 8. Logic 1 on (NLT +3.5 V dc), logic 0 off.
	TP7	Counter reset	Tune step counter reset, +12.0 V dc. Reset pulse +12 to 0 V dc, 20 to 25 ms.
(Cont)			

Table 5-7. 1-kW Power Amplifier HF-8023, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST	FUNCTION	SIGNAL, DESCRIPTION
Digital control card A9 (Cont)	TP8	Power amplifier fault	+12 V dc fault, 0 V dc no fault
	TP9	Clock inhibit	0 V dc inhibit, +12 V dc inhibit
Analog control card A10	TP1	Ground	0 V dc (signal common)
	TP2	ALC reference	Normally +8.6 to +9.0 V dc As temperature increases, voltage decreases: +4.18 ±0.1 V dc at +88 to +90 °C (+190 to +194 °F), +2.89 ±0.05 V dc at +106 to +108 °C (+223 to +226 °F).
	TP3	ADL out	0 V dc unkeyed. Small negative voltage, normally less than -1.0 V dc when keyed.
	TP4	ALC input	0 V dc unkeyed or no rf input applied. 0 to -6.05 V dc keyed and rf input applied.
	TP5	ALC DL	0 V dc unkeyed. When keyed, small negative voltage if exciter does not control ALC, normally less than -1.0 V dc.
	TP6	IGC	0 V dc unkeyed. Small positive voltage during tune or when IGC required (usually less than +2.0 V dc). Threshold about +0.10 V dc.
	TP7	+9 V	+9.0 V dc
	TP8	Vswr	Voltage in volts is directly related to ratio (ie, 1.0 volt = 1.0:1 ratio).
	TP9	Power amplifier current analog	Voltage in volts equals one-tenth of total power amplifier current in amperes.
(Cont)	TP10	40-volt enable	Application of ground at this test point disables 40-V enable output.

Table 5-7. 1-kW Power Amplifier HF-8023, Test Points, Voltage and Signal Levels (Cont).

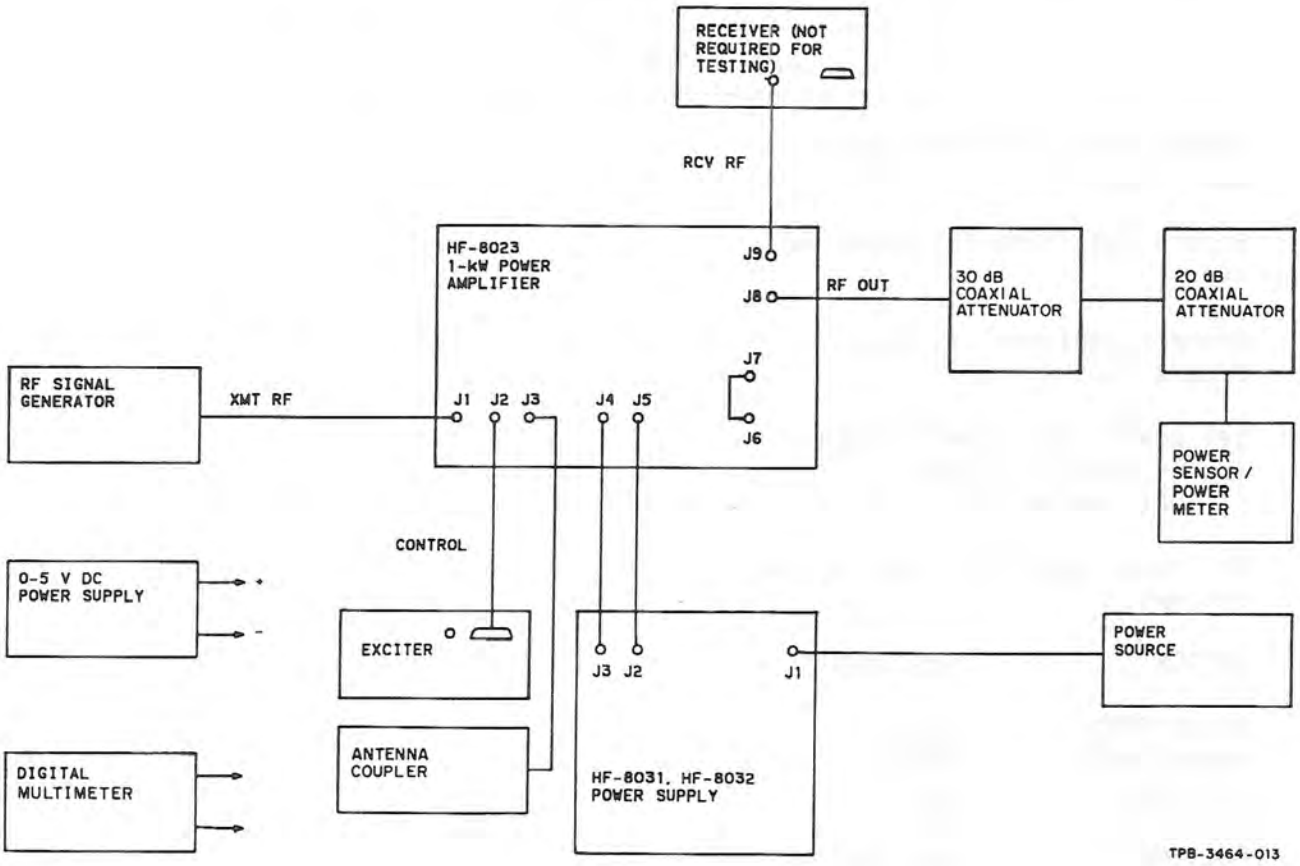
CARD/MODULE	TEST	FUNCTION	SIGNAL, DESCRIPTION
Analog control card A10 (Cont)	TP11	IGC enable	Application of ground at this test point disables IGC output.
HF-80 interface card A11	TP1	Ground	0 V dc (signal common)
	TP2	Coupler tune power	+12-V dc coupler tune, 0 V dc coupler tune
	TP3	System key	0-V dc key, +12-V dc key
	TP4	System tune start	Normal +12 V dc, tune start pulse +12 to 0 V dc, 80 to 100 ms
	TP5	System lv enable	+12-V dc enable, 0-V dc enable
	TP6	System hv enable	0-V dc enable, +12-V dc enable
	TP7	System low-power enable	0-V dc enable, +12-V dc enable
	TP8	System power amplifier fault	+12-V dc fault, 0-V dc no fault
	TP9	Sidetone enable	0-V dc enable, +5-V dc enable
	TP10	System power amplifier ready	0-V dc ready, +5-V dc ready
	TP11	Exciter tune	0-V dc exciter tune, +5-V dc exciter tune
	TP12	ALC	0 V dc unkeyed or no rf input applied; 0 to -0.1 V dc keyed and rf input applied (approximately -0.1 V dc at 1-kW output)
	TP13	TGC	0 V dc unkeyed or no rf input applied; 0 to -8 V dc keyed and rf input applied (approximately -8 V dc at 1-kW output)
	TP14	ALC amplifier	+12 V dc unkeyed or no rf input applied; 0 to -1.0 V dc keyed and rf input applied (approximately -1.0 V dc at 1-kW output)

5.4.1.3 Testing/Troubleshooting Procedures

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

The testing/troubleshooting procedures isolate a fault to a power amplifier circuit card or chassis-mounted component. A power amplifier test setup diagram is shown in figure 5-2. Table 5-8 presents a power amplifier performance test procedure. Table 5-9 presents directional coupler A1A1 testing and troubleshooting procedures.



1-kW Power Amplifier HF-8023, Test Setup
Figure 5-2

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures.

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL

CAUTION

This equipment contains its own internal blowers to provide adequate cooling of the unit. Do not block the air inlet during testing.

During testing of power amplifier, prolonged operation with rf power applied must be prevented when the blower/power combiner compartment cover is removed. Overheating may result with this cover removed during prolonged operation.

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

1	TEST SETUP		
1.1	Remove top cover from power amplifier.		
1.2	Ensure that facility power is off.		
1.3	Connect equipment as shown in figure 5-2.		
1.4	Set power supply MAIN POWER to off, and all other circuit breakers to on.		
1.5	Set power amplifier controls as follows.		

SWITCH	POSITION
LOCAL/REMOTE	LOCAL
MANUAL/AUTO	MANUAL
PA POWER	LOW
PA KEY	OFF
MULTIMETER	One that is not used

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1	TEST SETUP (Cont)		
1.6	Set exciter controls as follows. SWITCH — POSITION PWR — Off PA PWR — OFF KEY — NORM PILOT CARR — OFF All CHANNEL ENABLE — OFF CONT — LCL MODE — CW FREQUENCY KHZ — 14000.00		
1.7	Set signal generator RF OUT to OFF.		
2	MULTIMETER CALIBRATION		
2.1	Remove baffle plate from blower compartment by removing seven screws, one nut, and one lock-washer.		
2.2	MULTIMETER switch is set to an unused position.	Meter indicates exactly zero.	Set the zero adjust screw on the front bezel for exactly zero.
2.3	Using an external power supply, connect +5.0 ±0.01 V dc to MULTIMETER switch S1A-common (front section) and negative (blue wire to meter).	Meter reads full-scale deflection.	Adjust 5V CAL (A1A4R23) for full-scale meter deflection.
2.4	Reduce the external power supply voltage to +1.5 ±0.01 V dc.		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2	MULTIMETER CALIBRATION (Cont)		
2.5	Connect the external power supply to MULTIMETER switch S1A-common (rear section).	Meter reads full-scale deflection.	Adjust 1.5V CAL (A1A4R24) for full-scale meter deflection.
2.6	Set external power supply to off and disconnect it from unit.		
2.7	Install Teflon tape over 5V CAL and 1.5V CAL access holes.		
2.8	Reinstall baffle plate removed in step 2.1 using seven screws, one lockwasher, and one nut.		
3	FAULT-TEMP		
3.1	Remove low-pass filter assembly A8 using the procedures in paragraph 5.4.3.3.		
3.2	Connect low-pass filter assembly A8 to power amplifier, but not installed in the unit.		
3.3	Set facility power to on.		
3.4	On power supply set MAIN POWER circuit breaker to ON and note rf amplifier front panel indications.		
	FAULT indicators		Check: power amplifier module holddown slide interlock switches
	MOD A	Unlit	A3, A10, and A1A4
	MOD B	Unlit	A4, A10, and A1A4
(Cont)	MOD C	Unlit	A5, A10, and A1A4

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3	FAULT-TEMP (Cont)		
3.4 (Cont)	MOD D	Unlit	A6, A10, and A1A4
	INTLK	Unlit	seating of A1A4, A8, A1A3A1, A1A2, A11, A10, and A9
	TEMP	Unlit	Ensure airflow is not obstructed. Check A3, A4, A5, A6, A10, and A1A4.
	VSWR	Unlit	A1A1, A10, A11, and A1A4
	TUNE	Unlit	A9 and A1A4
	MONITOR indicators		Check:
	RF INPUT	Unlit	A10, A2, A1A4, and A1A3
	KEY	Unlit	A9, A1A4, A1A2, and A1W1
	RF INTLK	Lighted	A11, A1A4, J3, and A1TB1
	PWR SPLY	Lighted	A9, A2, A3, A4, A5, A6, and A1A4
	BAND indicator	0 (zero)	A9 and A1A4
	TUNE STEP indicator	1 (one)	A9 and A1A4
	Power amplifier	Blowers run	B1, B2, and A1W1
	DC ON indicators on A, B, C, and D power amplifier output modules	All are lighted.	Check applicable module, A3, A4, A5, or A6.

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3	FAULT-TEMP (Cont)		
3.5	Refer to figure 1-1. Make a ground connection from chassis A1 to A1A3A1J3-10 (power amplifier module A, temp sense A).	FAULT-TEMP indicator lights.	Check A10 and A1A4.
3.6	Remove ground from A1A3A1J3-10.		
3.7	Press TUNE START pushbutton.	FAULT-TEMP indicator goes out.	Check A10 and A1A4.
3.8	Make ground connection from chassis A1 to A1A3A1J4-10 (power amplifier module B, temp sense B).	FAULT-TEMP indicator lights.	Check A10.
3.9	Remove ground from A1A3A1J4-10.		
3.10	Press TUNE START pushbutton.	FAULT-TEMP indicator goes out.	Check A10.
3.11	Make ground connection from chassis A1 to A1A3A1J5-10 (power amplifier module C, temp sense C).	FAULT-TEMP indicator lights.	Check A10.
3.12	Remove ground from A1A3A1J5-10.		
3.13	Press TUNE START pushbutton.	FAULT-TEMP indicator goes out.	Check A10.
3.14	Make ground connection from chassis A1 to A1A3A1J6-10 (power amplifier module D, temp sense D).	FAULT-TEMP indicator lights.	Check A10.
3.15	Remove ground from A1A3A1J6-10.		
3.16	Press TUNE START pushbutton.	FAULT-TEMP indicator goes out.	Check A10.

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3	FAULT-TEMP (Cont)		
3.17	Remove ground lead.		
4	BAND SELECT RELAYS		
4.1	With low-pass filter assembly A8 connected as in step 3, set rf signal generator for 1.600 MHz and +10 dBm.		
4.2	Press TUNE START switch, set PA KEY to ON, and manually advance to TUNE STEP 2.	BAND 1 indicated on front panel. Relays A8K1 and A8K2 are pulled in.	Check A9, A1A4, and A8.
4.3	Repeat steps 4.1 and 4.2 at each of the following frequencies.		
	NOTE Set power amplifier PA KEY switch to OFF when changing frequency bands.		
	3.200 MHz	BAND 2 indicated on front panel. Relays A8K3 and A8K4 are pulled in.	Check A9, A1A4, and A8.
	3.500 MHz	BAND 3 indicated on front panel. Relays A8K5 and A8K6 are pulled in.	Check A9, A1A4, and A8.
	5.000 MHz	BAND 4 indicated on front panel. Relays A8K7 and A8K8 are pulled in.	Check A9, A1A4, and A8.

(Cont)

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	BAND SELECT RELAYS (Cont)		
4.3 (Cont)	9.900 MHz	BAND 5 indicated on front panel. Relays A8K9 and A8K10 are pulled in.	Check A9, A1A4, and A8.
	10.000 MHz	BAND 6 indicated on front panel. Relays A8K11 and A8K12 are pulled in.	Check A9, A1A4, and A8.
	20.000 MHz	BAND 7 indicated on front panel. Relays A8K13 and A8K14 are pulled in.	Check A9, A1A4, and A8.
	21.100 MHz	BAND 8 indicated on front panel. Relays A8K15 and A8K16 are pulled in.	Check A9, A1A4, and A8.
4.4	Set rf signal generator RF OUT to OFF.		
4.5	Set power amplifier PA KEY switch to OFF.		
4.6	Set power supply MAIN POWER circuit breaker to off.		
4.7	Install low-pass filter assembly A8 using the procedure in paragraph 5.4.4.3.		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	CONTROL SIGNALS		
5.1	Set power amplifier PA POWER switch to OFF.		
	NOTE Throughout these procedures logic 1 output is defined as NLT +3.5 V dc and logic 0 is NMT +0.5 V dc.		
5.2	Disconnect J2 (exciter control) and J3 (coupler control) on power amplifier.		
5.3	Set power amplifier PA POWER switch to LOW.		
5.4	Set power supply MAIN POWER circuit breaker to on.		
5.5	Momentarily apply the following logic signals at indicated connector pins and note associated indications on dmm.		
	J2-3 (ground) - system key	A11TP3 goes to logic 0 (from a logic 1).	Check A1W1, A1A2, and A11.
	J2-6 (ground) - system low-power enable	A11TP7 goes to logic 0 (from a logic 1).	Check A1W1, A1A2, and A11.
	J2-7 (ground) - system high-voltage enable	A11TP6 goes to logic 0 (from a logic 1).	Check A1W1, A1A2, and A11.
	J2-9 (ground) - system tune start	A11TP4 goes to logic 0 (from a logic 1).	Check A1W1, A1A2, and A11.
	J3-11 (ground) - coupler tune power.	A11TP2 goes to logic 0 (from a logic 1).	Check A1W1, A1A2, and A11.

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	CONTROL SIGNALS (Cont)		
5.6	On power amplifier, set PA POWER switch to OFF.		
5.7	Reconnect J2 (exciter control) and J3 (coupler control) on the power amplifier.		
6	COUPLER CONTROL		
6.1	On exciter: a. Set PWR switch to on. b. Clear EXCITER FAULT (by moving any frequency digit). c. Set PA PWR switch to LOW PWR. d. Set KEY switch to NORM.		
6.2	On power amplifier, set switches as follows. LOCAL/REMOTE to REMOTE MULTIMETER to FWD PWR (1500 W)		
6.3	Set rf signal generator for 14.000 MHz, +10 dBm, and rf output to ON.		
	NOTE Throughout these procedures logic 1 output is defined as NLT +3.5 V dc and logic 0 is NMT +0.5 V dc.		
6.4	Monitor the logic output at A11TP11 (exciter tune).		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6	COUPLER CONTROL (Cont)		
6.5	Set exciter KEY switch to LOCK momentarily, then return to NORM.	A11TP11 is logic 0 before tune complete (TUNE STEP 5) is reached, then it goes to logic 1. PA READY lights on exciter when power amplifier is tuned (TUNE STEP 5).	Check A11, A9, A10, A2, A3, A4, A5, and A6.
6.6	On exciter, set KEY switch to LOCK.		
6.7	Measure the logic output at A11TP9 (sidetone enable).	Logic 0 when rf output is present, logic 1 if rf is not present.	Check A9, A11, A2, A3, A4, A5, and A6.
6.8	Disconnect coupler plug (J3) from power amplifier, then change any exciter frequency digit and set KEY switch to LOCK.	PA FAULT lights on exciter front panel in about 10 seconds (25 seconds with optional strapping).	Check A11 and A1TB1.
6.9	Reconnect coupler plug (J3) to power amplifier, then change any exciter frequency digit.	PA FAULT on exciter goes out.	Check A11 and A1TB1.
6.10	Set exciter KEY switch to NORM.		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6	COUPLER CONTROL (Cont)		
6.11	Use oscilloscope to observe pulse at A11TP4 (tune start pulse).	Logic 0 pulse when tune start pulse applied. (Can be applied by power amplifier when in local control.)	Check A11 and A1W1.
	NOTE When making the following tests, logic pullups (+5.0 V dc power supply connected through a 1-kΩ resistor) must be connected to each of the following pins: J3-5, J3-6, J3-7, J3-8, J3-9, J3-10, J3-23, J3-24, J3-25, J3-26.		
6.12	Disconnect coupler plug (J3) from power amplifier.		
6.13	Set rf signal generator for 28.8XX MHz, +10 dBm, unmodulated.		
6.14	Initiate a tune start.		
6.15	Set exciter KEY switch to LOCK, momentarily.		
6.16	Measure logic levels at each of the following connector pins.		Check A9.
	NOTE Disregard FAULT-TUNE indication on power amplifier.		
	J3-5 (20 MHz)	Logic 1	
	J3-6 (10 MHz)	Logic 0	
	J3-7 (8 MHz)	Logic 1	
	J3-8 (4 MHz)	Logic 0	
	J3-9 (2 MHz)	Logic 0	
	J3-10 (1 MHz)	Logic 0	
	J3-23 (0.8 MHz)	Logic 1	
	J3-24 (0.4 MHz)	Logic 0	
	J3-25 (0.2 MHz)	Logic 0	
	J3-26 (0.1 MHz)	Logic 0	

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6	COUPLER CONTROL (Cont)		
6.17	Set rf signal generator for 17.700 MHz, +10 dBm, unmodulated.		
6.18	Initiate a tune start.		
6.19	Set exciter KEY switch to LOCK, momentarily.		
6.20	Measure logic levels at each of the following connector pins.		Check A9.
	J3-5 (20 MHz)	Logic 0	
	J3-6 (10 MHz)	Logic 1	
	J3-7 (8 MHz)	Logic 0	
	J3-8 (4 MHz)	Logic 1	
	J3-9 (2 MHz)	Logic 1	
	J3-10 (1 MHz)	Logic 1	
	J3-23 (0.8 MHz)	Logic 0	
	J3-24 (0.4 MHz)	Logic 1	
	J3-25 (0.2 MHz)	Logic 1	
	J3-26 (0.1 MHz)	Logic 1	
6.21	Reconnect J3 (coupler plug) on power amplifier.		
7	OUT-OF-BAND SIGNAL GAIN		
7.1	Set power amplifier front panel controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to LOW PA KEY to ON		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7	OUT-OF-BAND SIGNAL GAIN (Cont)		
7.2	On power amplifier, press TUNE START switch and disable IGC (apply ground to A10TP11, analog control card).		
	NOTE Analog control cards A10 prior to REV G do not have TP11. On analog control cards below REV G, disable IGC by applying a ground at junction of A10R175 and A10Q6-B.		
7.3	With applied rf input level sufficient to produce 500-W rf output on power meter at 14.000 MHz, use power amplifier front panel MULTIMETER to verify the following.	(Typical readings)	Check:
	INPUT RF (5 VOLT)	0.8 V rms	A2, A1A3, and A1A4
	PRE-DRVR RF (15 VOLT)	2.2 V rms	A2A1, A1A3, and A12A4
	DRIVER RF (50 VOLT)	6.5 V rms	A2A2, A1A3, and A1A4
	DRIVER (15 AMP)	2.5 A	A2, A1A3, and A1A4
	PA MOD A (15 AMP)	7.8 A	A3, A1A3, and A1A4
	PA MOD B (15 AMP)	7.8 A	A4, A1A3, and A1A4
	PA MOD C (15 AMP)	7.8 A	A5, A1A3, and A1A4
	PA MOD D (15 AMP)	7.8 A	A6, A1A3, and A1A4
	TOTAL PA (50 AMP)	31.5 A	A10, A1A2, and A1A4
	REFLD PWR (500 W)	0 W	A11, A1A1, and A1A2
	VSWR (5.0:1)	1.0:1 ratio	A10, A1A2, and A1A4

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7	OUT-OF-BAND SIGNAL GAIN (Cont)		
7.4	Set power amplifier PA KEY to OFF.		
7.5	Set PA POWER switch to HIGH.		
7.6	Set rf signal generator for 1.600 MHz at +10 dBm and press TUNE START.		
7.7	Set power amplifier PA KEY switch to ON and MULTIMETER switch to FWD PWR (1500 W).		
7.8	Slowly adjust the rf signal generator frequency control from 1.600 to 2.2 MHz (BAND 1) and note frequency at which FWD PWR is minimum and maximum.	Record frequency at minimum and maximum output. _____ min _____ max	
7.9	Set the rf signal generator to the frequency that produced the minimum output in step 7.8.		
7.10	Set the rf signal generator output level to produce 1000 ±10 W as indicated on power meter.		
7.11	Subtract rf signal generator output level in dBm from 60 dBm.	Difference is NLT 40 dB.	Check A8, A2, A1A1, A3, A4, A5, and A6.
7.12	Repeat steps 7.9, 7.10, and 7.11 at the frequency of maximum output recorded in step 7.8.	Difference is NLT 40 dB.	Same as step 7.11
7.13	Set power amplifier PA KEY switch to OFF.		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7	OUT-OF-BAND SIGNAL GAIN (Cont)		
	CAUTION Power amplifier must be unkeyed and a tune start initiated each time a band change is made.		
7.14	Repeat steps 7.5 through 7.13 for each of the following bands. Start at the low end of each band. BAND — FREQ RANGE (MHz) 2 — 2.40 to 3.30 3 — 3.50 to 4.80 4 — 5.00 to 6.90 5 — 7.10 to 9.90 6 — 10.00 to 14.40 7 — 14.60 to 20.90 8 — 21.10 to 29.90	Differences are NLT 40 dB at all points measured.	Same as step 7.11
7.15	Remove ground from A10TP11. (For analog control cards before REV G, see note of step 7.2.)		
8	TUNE TIME		
8.1	Set exciter front panel controls as follows. CONT to LCL PA PWR to LOW PWR KEY to NORM		
8.2	Set power amplifier front panel controls as follows. LOCAL/REMOTE to REMOTE MANUAL/AUTO to AUTO PA POWER to LOW PA KEY to OFF		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8	TUNE TIME (Cont)		
8.3	Connect oscilloscope input to A11TP11 and oscilloscope trigger to A11TP3, set for a negative-going trigger.		
8.4	On exciter reset TUNE STEP to 1, then momentarily set radio transmitter KEY switch to LOCK.		
8.5	Note the time between application of key and TUNE STEP 5 (logic 1 at A11TP11).	NMT 350 ms	Check A9, A11, and A10.
9	TUNE FAULT		
9.1	Set power amplifier front panel controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to LOW PA KEY to OFF		
	NOTE Use an electronic timer or stopwatch for the following test.		
9.2	Using the timer, measure the time from advancement of TUNE STEP to 2 to indication of a TUNE FAULT.	NLT 10 and NMT 15 seconds (NLT 22 and NMT 33 seconds if optional strapping is used)	Check A9.

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

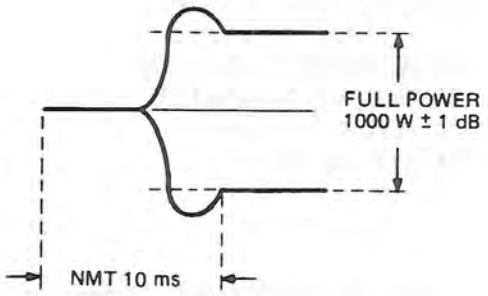
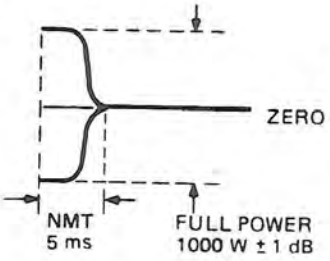
STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10	RF DELAY TIME		
10.1	Set power amplifier front panel controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to HIGH PA KEY to OFF Press TUNE START.		
10.2	Momentarily set power amplifier PA KEY switch to ON.		
10.3	Connect oscilloscope input to rf coaxial attenuator OUTPUT and oscilloscope trigger to A11TP3, set for a negative-going trigger.		
10.4	Set power amplifier PA KEY switch to ON. Note time between application of PA KEY and when the rf output reaches full power (1000 W ±1 dB). Repeat procedure as often as necessary to obtain an accurate result.		Check A11, A2, A3, A4, A5, and A6.
10.5	Set oscilloscope to trigger on positive-going pulse.		
10.6	Set power amplifier PA KEY switch to OFF. Note time between removal of PA KEY and when rf output reaches 0.01 W. Repeat as often as necessary to obtain accurate result.		Check A11, A9, and A10.

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Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
11	LOW-POWER IGC		
11.1	Set power amplifier front panel controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to LOW PA KEY to OFF		
11.2	Set rf signal generator to 14.000 MHz with rf output to ON.		
11.3	Set power amplifier front panel MULTIMETER switch to FWD PWR (1500 W).		
11.4	On power amplifier, set PA KEY switch to ON and press TUNE START.		
11.5	Slowly increase rf drive until IGC threshold is reached. (Use oscilloscope to observe IGC threshold voltage at A10TP6.)	Record rf input and rf output. (Rf output approximately 490 W on power meter.) _____ rf in _____ rf out	
	NOTE IGC threshold is defined as the point where IGC voltage just begins to control the rf output when ALC is not applied.		
11.6	Slowly increase rf drive 3 dB above IGC threshold (reference level of step 11.5).	Rf output shall not increase by more than 30 W.	Check A10, A2, A3, A4, A5, and A6.

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
11	LOW-POWER IGC (Cont)		
11.7	Slowly increase rf drive 3 dB more (6 dB above IGC threshold).	Rf output shall not increase by more than 30 W (60 W greater than when at IGC threshold).	Same as step 11.6
11.8	Set power amplifier PA KEY switch to OFF.		
12	HIGH-POWER IGC		
12.1	Set power amplifier front panel controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to HIGH PA KEY to OFF		
12.2	With exciter mode set to CW, set rf signal generator to 1.600 MHz, with rf output to off.		
12.3	Set power amplifier front panel MULTIMETER switch to FWD PWR (1500 W).		
12.4	Set power amplifier PA KEY switch to ON.		
12.5	Set rf signal generator RF OUT to ON and slowly increase rf drive until IGC threshold is reached. (Reference note of step 11.5.)	Forward power 892 to 1122 W on power meter.	Same as step 11.6

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
12	HIGH-POWER IGC (Cont)		
12.6	Reduce rf signal generator output by 3 dB.		
12.7	Apply a ground signal at A1OTP11. (For analog control cards before REV G, see note of step 7.2.)		
12.8	Adjust rf signal generator output for forward power of exactly 1000 W (as read on power meter).		
12.9	Using power amplifier front panel MULTIMETER, make the following checks.		Check:
	INPUT RF (5 VOLT)	NMT 2.20 V rms	A2, A1A3, and A1A4
	DRIVER (15 AMP)	NMT 8.1 A	A2A1, A1A3, and A1A4
	DRIVER RF (50 VOLT)	Reference only	
	PA MOD A (15 AMP)	NMT 12.5 A	A3, A1A3, and A1A4
	PA MOD B (15 AMP)	NMT 12.5 A	A4, A1A3, and A1A4
	PA MOD C (15 AMP)	NMT 12.5 A	A5, A1A3, and A1A4
	PA MOD D (15 AMP)	NMT 12.5 A	A6, A1A3, and A1A4
	TOTAL PA (50 AMP)	NMT 50.0 A	A10, A1A2, and A1A4
	FWD PWR (1500 W)	1000 W	A8, A7, A11, A1A1, and A1A2
	REFLD PWR (500 W)	NMT 20 W	A11, A1A1, and A1A2
12.10	Remove A1OTP1 ground. (For analog control cards before REV G, see note of step 7.2.)		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
12	HIGH-POWER IGC (Cont)		
12.11	Set power amplifier PA KEY switch to OFF.		
12.12	With the frequency of step 12.2 set at each of the following frequencies, repeat steps 12.1 thru 12.11. 2.000 MHz 3.000 MHz 4.000 MHz 6.000 MHz 8.000 MHz 12.000 MHz 18.000 MHz 29.000 MHz	Same as steps 12.1 thru 12.11	Same as step 12.9
13	INTERMODULATION DISTORTION		
13.1	Set power amplifier front panel controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to HIGH PA KEY to OFF NOTE Two-tone rf source consists of two rf signal generators connected to the inputs of an rf combiner. The output of the rf combiner is connected to RF INPUT jack (J1) on power amplifier.		
13.2	Connect 2-tone rf source. Set one rf signal generator to 1.600 MHz and the second rf signal generator to 1.602 MHz.		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
13	INTERMODULATION DISTORTION (Cont)		
13.3	Disable IGC by grounding A10TP11. (For analog control cards before REV G, see note of step 7.2.)		
13.4	Set power amplifier front panel MULTIMETER switch to FWD PWR (1500 W).		
13.5	Set power amplifier PA KEY switch to ON.		
13.6	Adjust each tone of 2-tone rf source separately for equal power on the power meter. (Set each tone for outputs of about 250 W.) Set both tones on and output should be approximately 500 W. If not exactly, readjust each tone so that together they will produce 500 W with equal output levels.		
13.7	Using attenuation (NLT 60 dB) and a spectrum analyzer, measure the 3rd, 5th, and 7th order intermodulation.	More than 30 dB below level f either tone.	Check A8, A2, A3, A4, A5, A6, and A7.
13.8	Set power amplifier PA KEY switch to OFF.		
13.9	With frequencies of step 13.2 set at each of the following frequencies, repeat steps 13.1 thru 13.8. 2.000 MHz, 2.002 MHz 3.000 MHz, 3.002 MHz 4.000 MHz, 4.002 MHz 6.000 MHz, 6.002 MHz 8.000 MHz, 8.002 MHz 12.000 MHz, 12.002 MHz 18.000 MHz, 18.002 MHz 29.000 MHz, 29.002 MHz	Same as steps 13.1 thru 13.8	Same as step 13.7

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
13	INTERMODULATION DISTORTION (Cont)		
13.10	Remove ground from A10TP11. (For analog control cards before REV G, see note of step 7.2.)		
14	VSWR		
14.1	Connect two rf coaxial attenuators (dummy load; 1 kW, 50Ω in parallel) with 10 feet of RG-213 coaxial cable between dummy load hookup and the power amplifier. Connect the output of one rf coaxial attenuator (30 dB), through a 20-dB attenuator to the input of a directional coupler. Connect the output of the directional coupler to the power sensor/power meter.		
14.2	Set power amplifier front panel controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to HIGH PA KEY to OFF MULTIMETER to FWD PWR (1500 W)		
14.3	Set rf signal generator frequency to 1.600 MHz, with a +10-dBm rf output.		
14.4	Set power amplifier PA KEY switch to ON.		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

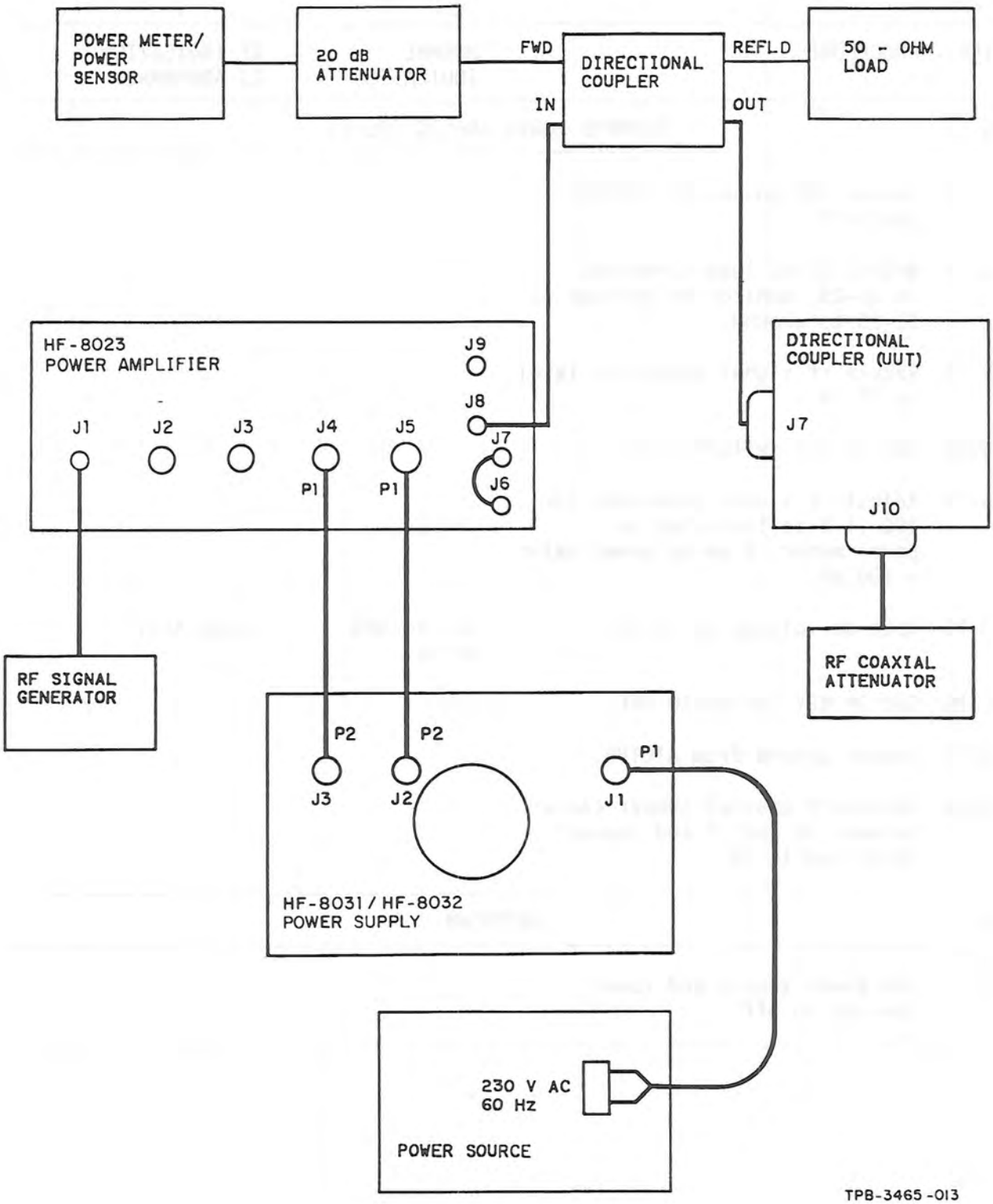
STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
14	VSWR (Cont)		
14.5	Slowly increase rf signal generator output until IGC threshold is reached. (Reference note of step 11.5.)	Forward power 150 to 500 W as read on power meter.	Check A8, A13, and A1A1.
	NOTE Monitor the rf output for any signs of instability.		
14.6	Using power amplifier front panel MULTIMETER, make the following checks.		
	PA MOD A (15 AMP)	NMT 11.0 A	Check A3.
	PA MOD B (15 AMP)	NMT 11.0 A	Check A4.
	PA MOD C (15 AMP)	NMT 11.0 A	Check A5.
	PA MOD D (15 AMP)	NMT 11.0 A	Check A6.
	VSWR (5.0:1)	NMT 2.1	Check A8, A13, and A1A1.
14.7	Set power amplifier PA KEY switch to OFF.		
14.8	With the frequency of step 14.3 set at each of the following frequencies, repeat steps 14.2 thru 14.7. 2.000 MHz 3.000 MHz 4.000 MHz 6.000 MHz 8.000 MHz 12.000 MHz 18.000 MHz 29.000 MHz	Same as steps 14.2 thru 14.7	Same as step 14.6

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
15	FORWARD POWER ANALOG		
	NOTE This test is applicable to 1-kW Power Amplifier HF-8023, part number 622-3490-006 only.		
15.1	Use test setup shown in figure 5-2.		
15.2	Set power amplifier front panel controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to HIGH PA KEY to OFF MULTIMETER to FWD PWR (1500 W)		
15.3	Set rf signal generator frequency to 14.000 MHz, with a +10-dBm rf output.		
15.4	Set power amplifier PA KEY switch to ON.		
15.5	Momentarily press TUNE START.		
15.6	Adjust rf signal generator for 1000 ±10 W as indicated on power meter (10 mW on power meter = 1000 W).		
15.7	With 10-kΩ load connected to J2-24, measure dc voltage at J2-24 to ground.	1.14 to 1.20 V dc	Check A10.
15.8	Set PA KEY switch to OFF.		
15.9	Connect coaxial jumper from J6 to J8 and connect a 50-Ω load to J7.		

Table 5-8. 1-kW Power Amplifier HF-8023, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
15	FORWARD POWER ANALOG (Cont)		
15.10	Ground TP8 on analog control card A10.		
15.11	With a 20-kΩ load connected to J2-25, monitor dc voltage at J2-25 to ground.		
15.12	Reduce rf signal generator level by 10 dB.		
15.13	Set PA KEY switch to ON.		
15.14	Adjust rf signal generator for 100 ±1 W as indicated on power meter (1 mW on power meter = 100 W).		
15.15	Note dc voltage at J2-25.	525 to 585 mV dc	Check A10.
15.16	Set PA KEY switch to OFF.		
15.17	Remove ground from A10TP8.		
15.18	Reconnect coaxial jumper cable between J6 and J7 and connect 50-Ω load to J8.		
16	SHUTDOWN		
16.1	Set power supply and power sources to off.		



Directional Coupler A1A1, Forward Power Test Setup
Figure 5-3

Table 5-9. Directional Coupler A1A1, Testing and Troubleshooting Procedures.

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1	FORWARD POWER ANALOG		
1.1	Ensure that facility power is off.		
1.2	Remove directional coupler A1A1 from chassis A1 per paragraph 5.4.3.5.1.		
1.3	Connect equipment as shown in figure 5-3.		
1.4	Set power supply MAIN POWER to off and all other circuit breakers to on.		
1.5	Set power amplifier controls as follows. LOCAL/REMOTE to LOCAL MANUAL/AUTO to AUTO PA POWER to HIGH PA KEY to OFF MULTIMETER to FWD PWR (1500 W)		
1.6	Set facility power to on.		
1.7	Set rf signal generator power to on.		
1.8	On power supply, set MAIN POWER circuit breaker to on.		
1.9	Set power amplifier controls as follows. PA POWER to HIGH PA KEY to ON		

Table 5-9. Directional Coupler A1A1, Testing and Troubleshooting Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1	FORWARD POWER ANALOG (Cont)		
1.10	Set rf signal generator to 14.000 MHz and apply a signal level sufficient to produce exactly 1000 W as indicated on power meter.		
1.11	Using a dmm, measure dc output at A1A1E7 (figure 6-3).	1170 ±10 mV dc	Adjust A1A1R4 (figure 5-7) for 1170 mV dc. Check A1A1CR2 and associated circuit.
2	REFLECTED POWER ANALOG		
2.1	Set PA KEY to OFF. Change directional coupler for reflected power setup (figure 5-4).		
2.2	Reduce rf signal generator output to zero.		
2.3	Set PA POWER to LOW.		
2.4	Set PA KEY to ON and adjust rf signal generator level to produce an output level of exactly 300 W as indicated on power meter.		
2.5	Using a dmm, measure dc output at A1A1E6 (figure 6-3).	613 ±10 mV dc	Adjust A1A1R3 (figure 5-7) for 613 mV dc. Check A1A1CR1 and associated circuit.

Table 5-9. Directional Coupler A1A1, Testing and Troubleshooting Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3	FORWARD BANDPASS		
3.1	Set PA KEY to OFF. Change directional coupler for forward power setup (figure 5-3).		
3.2	Set rf signal generator to first frequency listed below.		
3.3	Set PA KEY to ON.		
3.4	Set rf signal generator to produce the rf amplifier output level listed (exactly).		
3.5	Using a dmm, measure the dc output at A1A1E7.		Same as step 1.11

FREQUENCY	OUTPUT	A1A1E7 OUTPUT
1.600 MHz	1000 W	1.140 to 1.200 V dc
14.000 MHz	500 W	0.790 to 0.815 V dc
14.000 MHz	100 W	0.320 to 0.345 V dc
30.000 MHz	1000 W	1.140 to 1.200 V dc

CAUTION

PA KEY must be set to OFF when changing bands (frequencies).

3.6	Repeat steps 3.3 through 3.5 for each of the other three frequencies.		Same as step 1.11
4	REFLECTED BANDPASS		
4.1	Set PA KEY to OFF. Change directional coupler for reflected power setup (figure 5-4).		

Table 5-9. Directional Coupler A1A1, Testing and Troubleshooting Procedures (Cont).

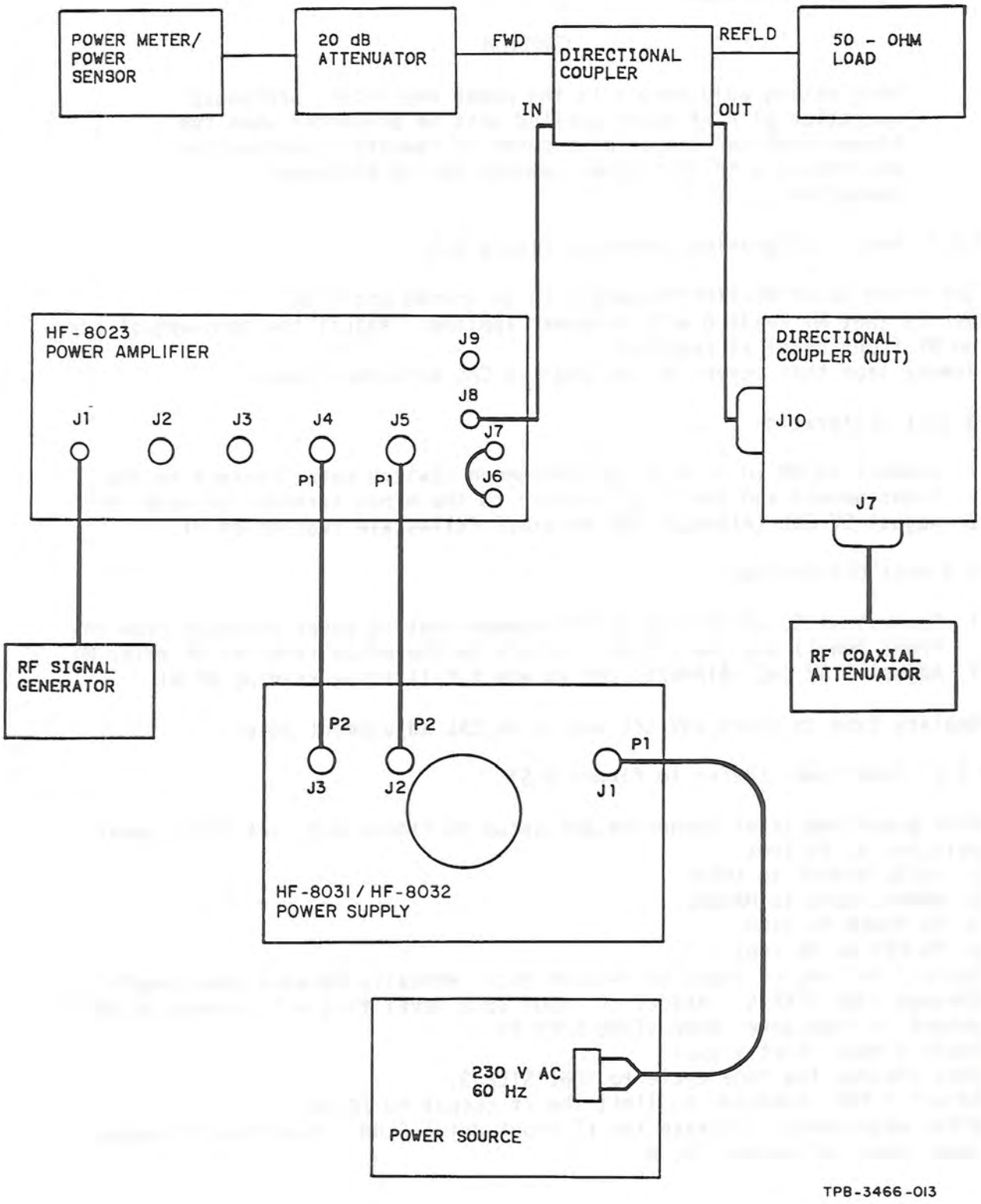
STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	REFLECTED BANDPASS (Cont)		
4.2	Set rf signal generator to first frequency listed below.		
4.3	Set PA POWER to LOW.		
4.4	Set PA KEY to ON.		
4.5	Set rf signal generator to produce the rf amplifier output level listed (exactly).		
4.6	Using a digital multimeter, measure the dc output at A1A1E6.		Same as step 2.5

FREQUENCY	OUTPUT	A1A1E7 OUTPUT
1.600 MHz	300 W	0.593 to 0.633 V dc
14.000 MHz	150 W	0.410 to 0.435 V dc
14.000 MHz	30 W	0.150 to 0.175 V dc
30.000 MHz	300 W	0.593 to 0.633 V dc

CAUTION

PA KEY must be set to OFF when changing bands (frequencies).

4.7	Repeat steps 4.3 through 4.6 for each of the other three frequencies.		
4.8	Set PA KEY to OFF.		
5	SHUTDOWN		
5.1	Set power supply MAIN POWER circuit breaker to off.		
5.2	Set facility power to off.		
5.3	Disconnect test setup.		



Directional Coupler A1A1, Reflected Power Test Setup
Figure 5-4

5.4.2 Alignment/Adjustment

CAUTION

When making adjustments in the power amplifier, prolonged operation with rf power applied must be prevented when the blower/combiner compartment cover is removed. Overheating may result with this cover removed during prolonged operation.

5.4.2.1 Meter Calibration (Refer to figure 5-5)

a. Set front panel MULTIMETER switch to an unused position.
b. Verify that M1 reads 0 with no power applied. Adjust the zero-adjust screw on M1 front bezel as required.
c. Remove tape that covers 5V CAL and 1.5 CAL adjustment holes.

d. 5-Volt Calibration

1. Connect +5.00 ±0.01 V dc to S1A-common (switch wafer closest to the front panel) and the 5-volt return to the minus terminal of meter M1.
2. Adjust 5V CAL (A1A4R23) for an exact full-scale reading of M1.

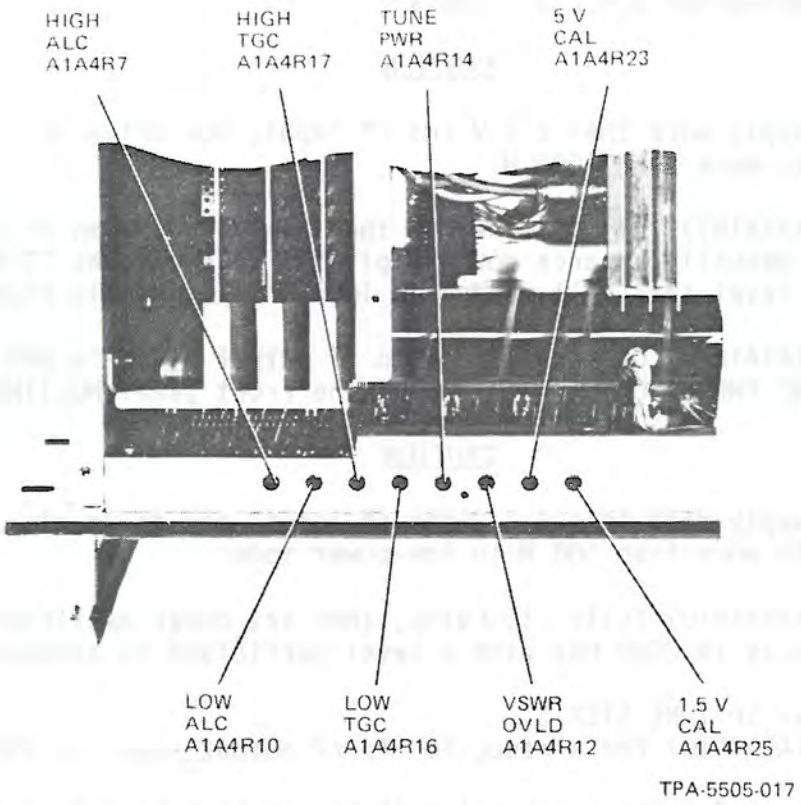
e. 1.5-Volt Calibration

1. Connect +1.50 ±0.01 V dc to S1B-common (switch wafer farthest from the front panel) and the 1.5-volt return to the minus terminal of meter M1.
2. Adjust 1.5V CAL (A1A4R25) for an exact full-scale reading of M1.

f. Replace tape to cover +5V CAL and +1.5V CAL adjustment holes.

5.4.2.2 Tune Power (Refer to figure 5-5)

a. With power amplifier connected per setup in figure 5-2, set front panel switches as follows.
   1. LOCAL/REMOTE to LOCAL
   2. MANUAL/AUTO to MANUAL
   3. PA POWER to HIGH
   4. PA KEY to ON (up)
b. Apply 1.0-V rms rf input at 14.0000 MHz. Manually advance power amplifier through TUNE STEP 5. Adjust rf input to a level that will produce a 500-W output in high-power mode (TUNE STEP 5).
c. Apply a tune start signal.
d. Step advance the tune cycle to TUNE STEP 3.
e. Adjust T PWR (A1A4R14) to limit the rf output to 200 W.
f. After adjustment, increase the rf input drive 6 dB. Note that rf output power does not exceed 220 W.



Front Panel Adjustments
Figure 5-5

5.4.2.3 TGC (Refer to figure 5-5)

a. With power amplifier connected per setup in figure 5-2, set front panel switches per paragraph 5.4.2.2, step a.
b. Apply 1.0-V rms rf input at 14.0000 MHz. Manually advance power amplifier through TUNE STEP 4. Adjust rf input to a level that will produce a 500-W rf output in high-power mode.
c. Adjust H TGC (A1A4R17) to produce -5.0 V dc on TP13 on HF-80 interface card A11 (or J2-13), ground (meter common) to TP1 on any card.
d. Set power amplifier to low-power mode at 14.0000 MHz. Adjust rf input level to produce 250-W rf output.
e. Adjust L TGC (A1A4R16) to produce -5.0 V dc on TP13 on HF-80 interface card A11 (or J2-13), ground (meter common) to TP1 on any card.

5.4.2.4 ALC (IGC) (Refer to figure 5-5)

a. With power amplifier connected per setup in figure 5-2, set front panel switches per paragraph 5.4.2.2, step a.

CAUTION

Do not apply more than 2.2 V rms rf input, nor drive rf output to more than 1000 W.

b. Adjust H ALC (A1A1R7) fully clockwise, then apply 1.0-V rms rf input at 14.0000 MHz. Manually advance power amplifier through TUNE STEP 5. Adjust rf input to a level that will produce a 1000-W rf output in high-power mode (TUNE STEP 5).
c. Adjust H ALC (A1A1R7) for a reduction in rf output power to 980 watts (as read in the FWD PWR (1500 W) position of the front panel MULTIMETER switch).

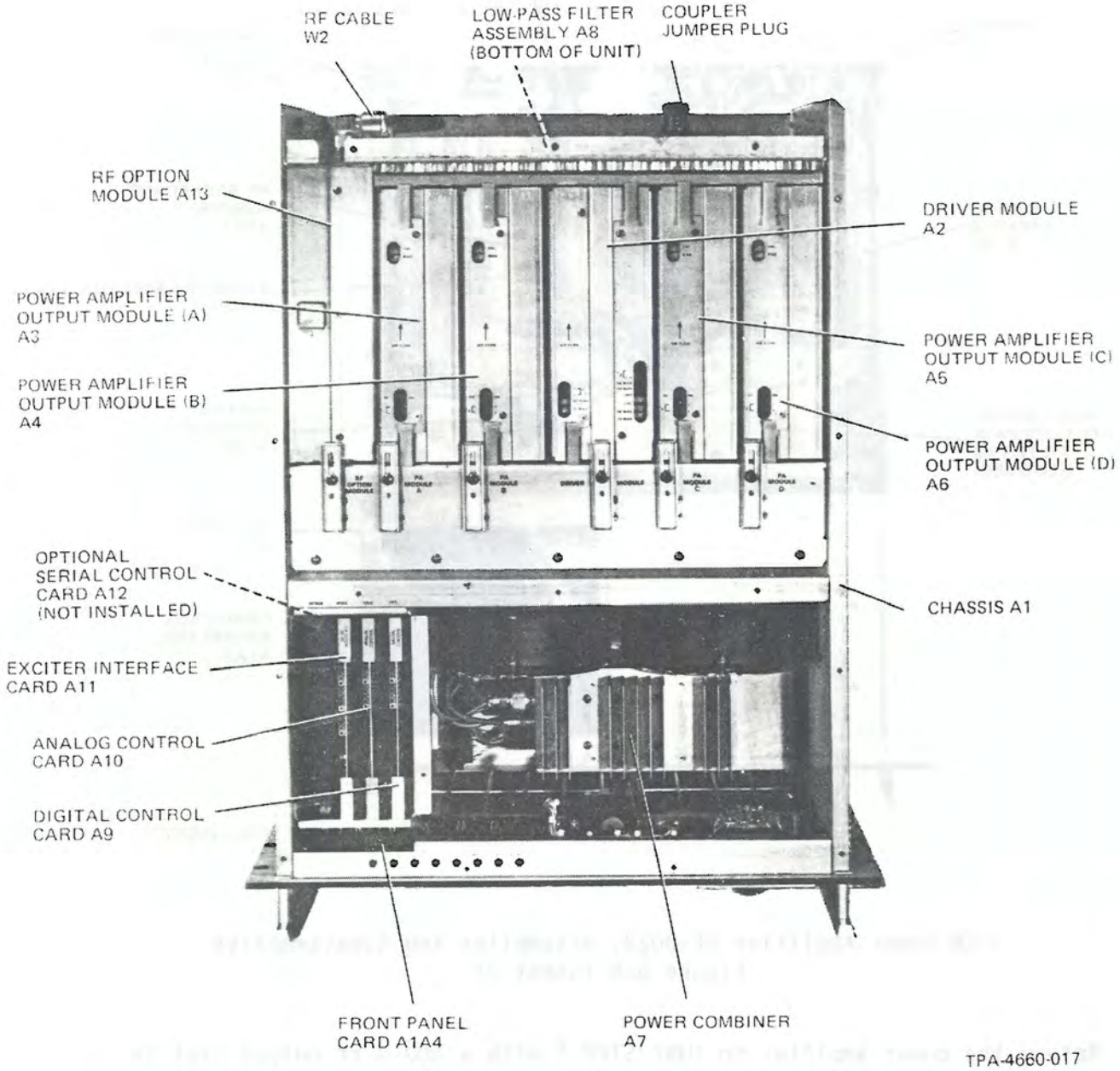
CAUTION

Do not apply more than 2.2 V rms rf input, nor drive rf output to more than 500 W in low-power mode.

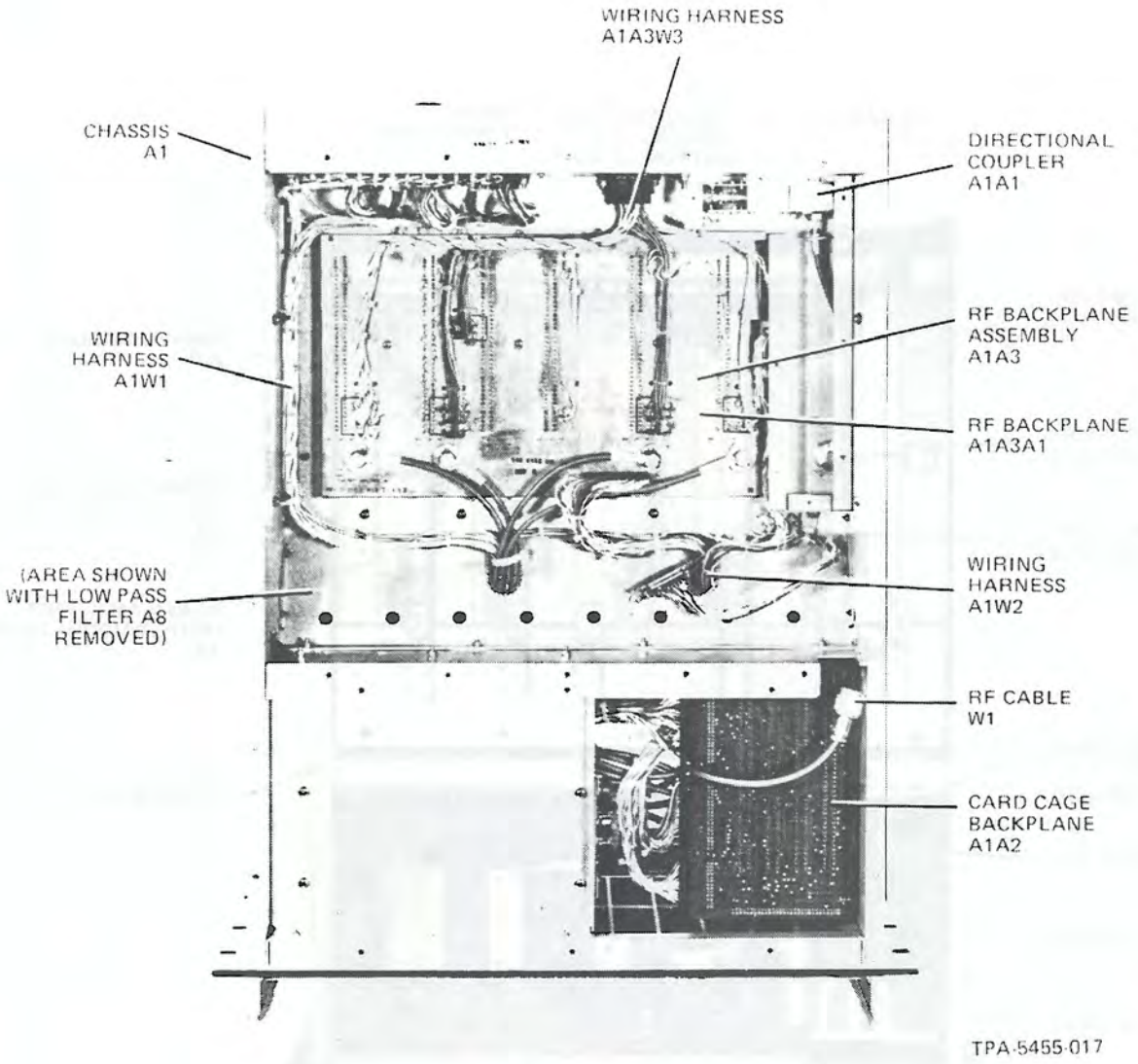
d. Adjust L ALC (A1A4R10) fully clockwise, then set power amplifier to low-power mode at 14.0000 MHz with a level sufficient to produce 500-W rf output.
e. Power amplifier in TUNE STEP 5.
f. Adjust L ALC (A1A4R10) for a reduction in rf output power to 490 W.

5.4.2.5 Directional Coupler Calibration (Refer to figures 5-5, 5-6, and 5-7)

a. Remove low-pass filter assembly A8 from the power amplifier but keep it electrically connected as normal to the power amplifier.
b. With power amplifier connected per setup in figure 5-2, set front panel switches per paragraph 5.4.2.2, step a.
c. Apply 1.0-V rms rf input at 14.0000 MHz. Manually advance power amplifier through TUNE STEP 5. Adjust rf input to a level that will produce a 1000-W rf output in high-power mode (TUNE STEP 5).
d. Step advance the tune cycle to TUNE STEP 5.
e. Adjust rf input for exactly 1000 W on wattmeter in rf output line. Adjust A1A1R4 for 1000-W indication on the front panel forward power meter.
f. Adjust rf input for exactly 300 W on wattmeter in rf output line.
g. Set power off. Connect rf output from J6 (RF OUTPUT) to J8 (ANT RF) and connect the 50-Ω rf load to J7 (RF RETURN). Apply a ground to A10TP8 to prevent a vswr fault.

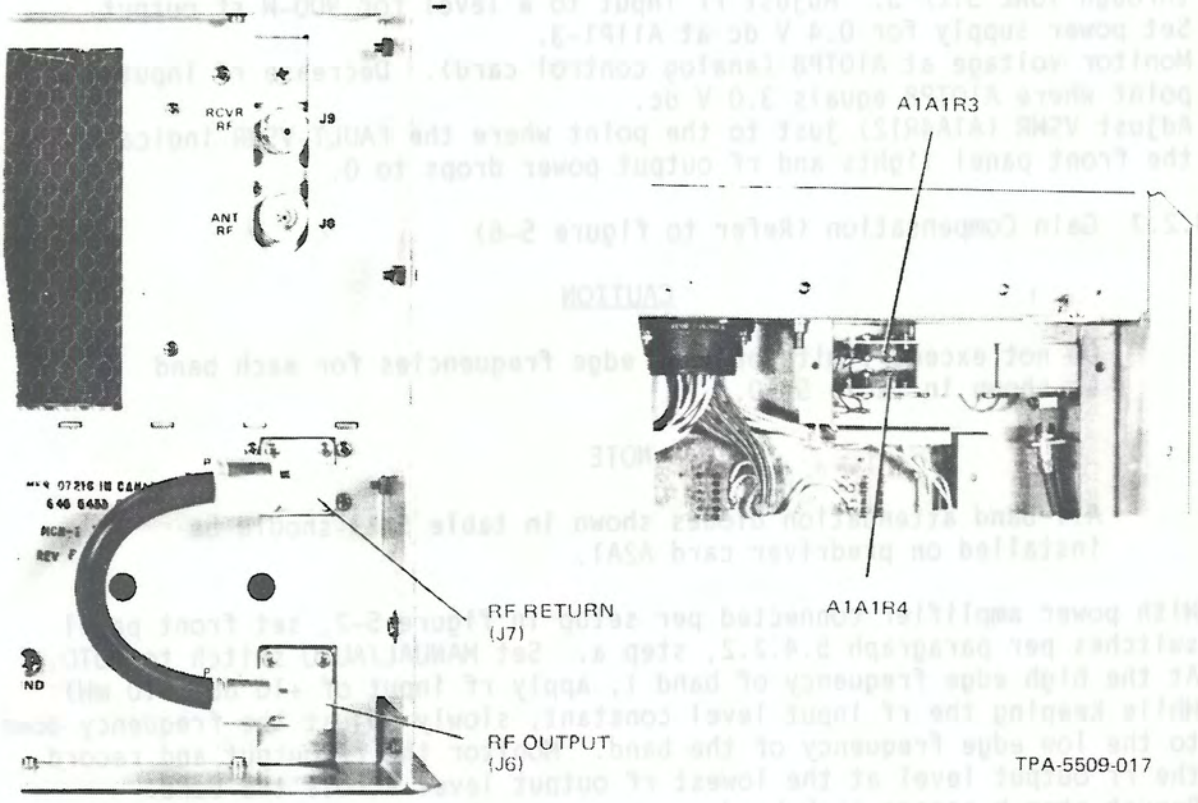


1-kW Power Amplifier HF-8023, Assemblies and Subassemblies
Figure 5-6 (Sheet 1 of 2)



1-kW Power Amplifier HF-8023, Assemblies and Subassemblies
Figure 5-6 (Sheet 2)

h. Return the power amplfier to TUNE STEP 5 with a 300-W rf output (set in step f). Adjust A1A1R3 for 300-W indication on the front panel reflected power meter.
i. Reconnect rf output from J6 (RF OUTPUT) to J7 (RF RETURN) and the 50-Ω rf load to J8 (ANT RF).



Directional Coupler A1A1, Adjustments
Figure 5-7

5.4.2.6 VSWR Overload (Refer to figure 5-5)

NOTE

Directional coupler must be calibrated before performing this adjustment. Refer to paragraph 5.4.2.5.

a. Set VSWR (A1A4R12) pot to maximum clockwise.
b. Extend exciter interface card A11 using Card Extender TS-8022.
c. Using 0- to 5-V dc power supply, connect positive lead to P1-3 of exciter interface card and negative lead to TP1 (gnd). Set power supply for 0 V dc.
d. With power amplifier connected per setup in figure 5-2, set front panel switches per paragraph 5.4.2.2, step a.
e. Apply 1.0-V rms rf input at 14.0000 MHz. Manually advance power amplifier through TUNE STEP 5. Adjust rf input to a level for 900-W rf output.
f. Set power supply for 0.4 V dc at A11P1-3.
g. Monitor voltage at A10TP8 (analog control card). Decrease rf input to point where A10TP8 equals 3.0 V dc.
h. Adjust VSWR (A1A4R12) just to the point where the FAULT-VSWR indicator on the front panel lights and rf output power drops to 0.

5.4.2.7 Gain Compensation (Refer to figure 5-6)

CAUTION

Do not exceed limits of band edge frequencies for each band as shown in table 5-10.

NOTE

All band attenuation diodes shown in table 5-11 should be installed on predriver card A2A1.

a. With power amplifier connected per setup in figure 5-2, set front panel switches per paragraph 5.4.2.2, step a. Set MANUAL/AUTO switch to AUTO.
b. At the high edge frequency of band 1, apply rf input of +10 dBm (10 mW). While keeping the rf input level constant, slowly adjust the frequency down to the low edge frequency of the band. Monitor the rf output and record the rf output level at the lowest rf output level across the band.
c. Repeat step b across each band.
d. Calculate the gain in dB at lowest output level of each band. The frequency which has the lowest gain shall be the reference frequency.

$$GAIN = 10 \log \frac{P_{out}}{P_{in}}$$

If the reference gain is greater than 43 dB, add attenuation to the reference band to reduce the reference gain to approximately 43 dB.

Table 5-10. Band Edge Frequencies.

BAND	LOW EDGE FREQ (MHz)	HIGH EDGE FREQ (MHz)
1	1.60	2.20
2	2.40	3.30
3	3.50	4.80
4	5.00	6.90
5	7.10	9.90
6	10.00	14.40
7	14.60	20.90
8	21.10	30.00

e. Subtract the reference gain from the lower gain of each of the edge frequencies in each band. Ignore any fractional dB's after subtracting. The results of the subtraction is the amount of attenuation which is required in the driver module. If gain is within 4 dB of reference gain, do not select any attenuation.
f. Remove driver module A2 and remove the appropriate diodes from predriver card A2A1 to provide the calculated attenuation. Refer to table 5-11.

Table 5-11. Predriver Card A2A1, Band Attenuation Diodes.

BAND	1 dB	2 dB	4 dB	8 dB
1	CR11	CR12	CR13	CR14
2	CR21	CR22	CR23	CR24
3	CR31	CR32	CR33	CR34
4	CR41	CR42	CR43	CR44
5	CR51	CR52	CR53	CR54
6	CR61	CR62	CR63	CR64
7	CR71	CR72	CR73	CR74
8	CR81	CR82	CR83	CR84

EXAMPLE:

Band 8 has lowest output level. At 30 MHz the output is 383 W (at 10-dBm input).

Band 1 has highest output level. At 1.60 MHz the output is 800 W (at 10-dBm input).

Using the formula of step d, the gain at 30 MHz is 45.8 dB and at 1.6 MHz it is 49.0 dB. 49.0 dB minus 43.8 dB equals 5.2 dB △ gain. For band 8 to reduce the gain by 5 dB (ignoring fractions) remove diode A2A1CR81 and A2A1CR83.

NOTE

The object of this attenuation test select is to provide overall gain flatness of 4 dB and limit the gain to approximately 43 dB.

5.4.3 Disassembly

WARNING

Do not attempt disassembly of the unit with primary power applied.

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

NOTE

Retain hardware removed during disassembly for use in reassembly. Refer to unit parts list as an aid in disassembly and assembly.

5.4.3.1 Meter Lamp Replacement

a. Using a small flat tip screwdriver, gently pry lamp and socket away from back of meter bracket until lamp is clear. Note that there are four lamps that illuminate the meter.
b. Remove and replace meter lamp.
c. Insert lamp and socket into meter lamp bracket. Press socket firmly in place.

5.4.3.2 Cards and Modules

a. Remove top cover by removing 16 screws that secure it in place.
b. After removing top cover, circuit cards (A9, A10, A11, and A12) can be removed from card cage A1A2 by pulling the circuit card straight up from its mounted position.
c. With top cover removed, modules (A2, A3, A4, A5, A6, and A13) can be removed by sliding the clip retainers on each module and pulling the module straight up from its mounted position.

5.4.3.3 Low-Pass Filter Assembly A8

a. Remove bottom plate from the front portion of the bottom of the power amplifier by removing the 10 screws that secure it in place.
b. Disconnect W1P16 from A8J1 (protrudes into front compartment of the power amplifier).
c. Disconnect type N adapter from A8J2 (J6, RF OUTPUT) at the rear of the power amplifier.
d. Remove low-pass filter assembly A8 by removing the 18 screws that secure it in place. Pull A8 straight away from the chassis, disconnecting A1W2P3 from A8J3.

5.4.3.4 Power Combiner A7

NOTE

It is suggested that both top cover and the bottom plate are removed for ease in removal of power combiner A7. This is not necessary, but makes access and removal easier.

a. Remove top cover by removing 16 screws that secure it in place.
b. Remove blower/combiner compartment cover by removing seven screws that secure it in place.
c. Remove bottom plate from the front portion of the bottom of the power amplifier by removing the 10 screws that secure it in place.
d. Disconnect W1P15 from A7J5.

NOTE

Ensure that BNC connectors are clearly identified before removing them. Connecting wrong BNC connectors will not harm operation but may give slightly varying indications from previous indications.

e. Disconnect the following BNC connectors (all pendant cables of A1A3).
   A1A3P11 from A7J1
   A1A3P12 from A7J2
   A1A3P13 from A7J3
   A1A3P14 from A7J4
f. Remove the screws that secure the power combiner in place and lift it from the chassis.

5.4.3.5 Chassis Assembly A1

a. Remove circuit cards (A9, A10, A11, A12) and modules (A2, A3, A4, A5, A6, A13) per paragraph 5.4.3.2.
b. Remove low-pass filter assembly A8 per paragraph 5.4.3.3.
c. Remove power combiner A7 per paragraph 5.4.3.4.

5.4.3.5.1 Directional Coupler A1A1

NOTE

Tag all wires unsoldered for use in assembly.

a. Mark and disconnect wires between the following (only A1A1 end has to be disconnected).
   A1A1P1 and A1J10
   A1A1E6 and A1E10
   A1A1E7 and A1E11
b. Remove the four screws and lockwashers that secure the directional coupler in place. Lift directional coupler A1A1 from chassis.

5.4.3.5.2 Card Cage Backplane A1A2

a. Disconnect the following connectors.
   A1W1P8 from A1A2J7
   A1W2P2 from A1A2J8
   A1W2P9 from A1A2J6
   A4P6 from A1A2J5
b. Remove the eight screws and lockwashers that secure the card cage backplane in place. Lift card cage backplane A1A2 from chassis.

5.4.3.5.3 RF Backplane Assembly A1A3

a. Disconnect the following connectors.
   A1W2P1 from A1A3J11
   A1A3P11 from A7J1
   A1A3P12 from A7J2
   A1A3P13 fr om A7J3
   A1A3P14 from A7J4
b. Remove the four screws, lockwashers, and nuts that secure A1A3W3J5 to the rear panel. Loosen A1A3W3J5 from the rear panel.
c. Remove the 12 screws and lockwashers that secure the rf backplane in place. Lift rf backplane A1A3 from chassis.

5.4.3.5.4 Front Panel Card A1A4

NOTE

Front panel is held in place by four insert hexscrews that secure the handles in place. Removing these four screws and laying the front panel on its face makes front panel card A1A4 much more accessible.

a. Disconnect the following connectors.
   A1P7 from A1A4J1
   A1A4P6 from A1A2J5
b. Remove the five screws, flat washers, and lockwashers that secure front panel card to the five standoffs. Lift front panel card A1A4 from the chassis.

5.4.3.5.5 Air Plenum Assembly

a. Remove five screws and five flat washers from top of shutter partition.
b. The shutter partition is secured to each side of the unit chassis using three screws and three flat washers on each side. Remove these screws and flat washers.
c. Remove five screws and five flat washers from bottom of shutter partition. (Cable retainers are secured in place with three of these screws.)

NOTE

Tag all wires unsoldered for use in assembly.

d. Mark and disconnect wires between the following (top side of terminal block only has to be disconnected).

S2-C and E4	S5-NC and E8
S2-NC and E5	S6-NC and E9
S3-NC and E6	S7-NC and E10
S4-NC and E7	

e. Pull shutter partition from unit.

NOTE

Once shutter partition is removed from chassis, interlocks (microswitches) S2, S3, S4, S5, S6, and S7 can be removed as follows.

f. Remove holddown slide associated with switch to be removed by removing screw and flat washer that secures holddown slide in place.
g. Remove two screws, two nuts, and two lockwashers that secure bracket, switch actuator, and interlock switch in place.
h. Tag and disconect two wires associated with interlock switch to be removed. Remove switch.

5.4.3.5.6 Blowers

NOTE

Tag all wires unsoldered for use in assembly.

a. Tag and disconnect wires to blower to be removed.
b. Remove two screws, two flat washers, two lockwashers, and two nuts that secure blowers in place. Remove blower from its mounted position.

5.4.4 Assembly (Refer to figure 5-6)

WARNING

Do not attempt assembly of the unit with primary power applied.

Except for the subassemblies that are mounted as part of chassis A1 (A1A1, A1A2, A1A3, A1A4), assembly of the unit is not in any certain order. The plug-in circuit cards are keyed so each card can be inserted in only the correct connector.

5.4.4.1 Chassis Assembly A1

5.4.4.1.1 Blowers

a. Position blower in its mounted position. Secure in place using two screws, two flat washers, two lockwashers, and two nuts.

NOTE

Direction of airflow, as indicated by arrow on blower assembly, must be from front to back of unit.

b. Solder in place the tagged wires to the blower.

5.4.4.1.2 Air Plenum Assembly

NOTE

If any microswitches were removed, install/replace them as follows.

a. Install interlock switch, actuator, and bracket in place using two screws, two nuts, and two lockwashers.
b. Position holddown slide both in its module-removed position and module-secured position. Check that the switch actuator is engaged in the module-secured position and disengaged in the module-removed position. If not, loosen the two screws and adjust the switch in the switch bracket until the switch actuator works properly. Secure the two screws.

NOTE

Switches S6 and S7 must be closed when engaged; S2, S3, S4, and S5 are open when engaged.

c. Position shutter partition to unit and reconnect wires that were disconnected from: E4, E5, E6, E7, E8, E9, and E10.
d. Slide shutter partition in place and secure using five screws and five flat washers on top and on bottom of chassis. Do not tighten screws.
e. Slide power amplifier output module A6 and rf option module A13 in position.
f. Adjust position of shutter partition so that modules are held in place but are not so tight that they cannot slide freely in and out of unit.
g. Tighten enough screws so that shutter partition will not move. Remove A6 and A13.
h. If an accurate ruler is available, measure distance between front of rear panel and back of shutter partition. It should be 8.190 $\pm$0.020 inches.
i. Finish securing shutter partition in place by tightening the 10 screws installed and installing three more screws and three flat washers on each side of the chassis.
j. Check that all modules slide in and out of unit without binding and within the guides of the unit.

5.4.4.1.3 Front Panel Card A1A4

a. Position front panel card A1A4 to the five standoffs provided. Secure it in place using the five screws, flat washers, and lockwashers removed in disassembly.
b. Reconnect the following connectors.
   A1P7 to A1A4J1
   A1A4P6 to A1A1J5 (if A1A2 installed)

NOTE

If front panel had been loosened for front panel card removal, reinstall front panel using four insert hexscrews and two handles.

5.4.4.1.4 RF Backplane Assembly A1A3

a. Position rf backplane assembly A1A3 in place. Secure it in place using the 12 screws and lockwashers removed in disassembly.
b. Position A1A3W3J5 in the rear panel and secure it in place using the four screws, lockwashers, and nuts removed in disassembly.
c. Reconnect the following connectors.
   A1W2P1 to A1A3J11
   A1A3P11 to A7J1
   A1A3P12 to A7J2
   A1A3P13 to A7J3
   A1A3P14 to A7J4

5.4.4.1.5 Card Cage Backplane A1A2

a. Position card cage backplane A1A2 in place. Secure it in place using the eight screws and lockwashers removed in disassembly.
b. Reconnect the following connectors.
   A1W1P3 to A1A2J7
   A1W2P2 to A1A2J8
   A1W2P9 to A1A2J6
   A4P6 to A1A2J5

5.4.4.1.6 Directional Coupler A1A1

a. Position directional coupler A1A1 in place. Secure it in place using the four screws and lockwashers removed in disassembly.
b. Reconnect and solder the following tagged wires between the following.
   A1A1P1 and A1J10
   A1A1E6 and A1E10
   A1A1E7 and A1E11

5.4.4.2 Power Combiner A7

a. Position power combiner A7 in place. Secure it in place using the four screws removed in disassembly.

b. Reconnect the following connectors.
   A1A3P11 to A7J1
   A1A3P12 to A7J2
   A1A3P13 to A7J3
   A1A3P14 to A7J4
c. Reconnect W1P15 to A7J5.
d. Replace blower/combiner compartment cover.

5.4.4.3 Low-Pass Filter Assembly A8

a. Position low-pass filter assembly A8 in place using care to ensure that A8J3 and A1W2P3 are properly mated.
b. Secure low-pass filter assembly A8 in place using the 18 screws removed in disassembly.
c. Reconnect W1P16 to A8J1 (protruding into front compartment of the power amplifier).
d. If used, reconnect the type N adapter at A8J2 (J6, RF OUTPUT) at the rear of the power amplifier.

5.4.4.4 Cards and Modules

CAUTION

When installing cards, be sure that the correct card is installed in the designated area and that it is in the card guides. Failure to do so could damage the key placed in the mating connector or damage the keyway on the circuit card.

a. Cards may be installed in card cage backplane A1A2 by inserting card into card guides and sliding down into position. When in position, press firmly on card handles to ensure card bottoms out in connector to make good electrical connection.

NOTE

If card does not bottom out with firm pressure applied, remove card and check that proper card is being installed and that keyway on circuit card and key in mating connector are not damaged. Reinstall card if this is okay.

b. Modules may be installed in rf backplane assembly by installing module in position and pressing it firmly to ensure good contact. Secure modules in place using the clip retainers.

5.4.4.5 Top Cover

Position top cover to unit and secure it in place using the 16 screws removed in disassembly.

5.4.4.6 Bottom Plate

Position bottom plate to unit and secure it in place using the 10 screws removed in disassembly.

5.4.5 Repair

Repair of the power amplifier consists of replacing subassemblies and chassis-mounted components. For replacement of subassemblies, refer to paragraphs 5.4.3 and 5.4.4. Use standard shop practices to replace chassis-mounted components.

5.5 POWER SUPPLY HF-8031 and HF-8032 MAINTENANCE

This section contains information necessary to maintain the power supply. Testing and troubleshooting procedures isolate a fault to a subassembly or chassis-mounted component. Refer to the HF-80 Solid-State Power Amplifiers and Power Supplies Depot Maintenance Instruction Book for fault isolation and repair of components on circuit cards or modules. Procedures for alignment, disassembly, assembly, and repair are included for use in normal maintenance routines or after a fault is located. Figure 5-9 shows the location of major components and subassemblies within the power supply.

WARNING

This equipment uses direct rectification of the ac input power line; therefore the input rectifier/filter system, 1-kW converter modules, and 500-W converter module may be floating above the chassis by over 230 V ac. Extreme care must be used when probing these circuits with power on.

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

5.5.1 Testing/Troubleshooting

5.5.1.1 Fault Isolation

Some faults that occur in Power Supply HF-8031 and HF-8032 can be quickly isolated to a faulty card or assembly by using the front panel control and monitor features. Table 5-12 contains a brief description of indications and isolation of apparent failures.

Table 5-12. Power Supply HF-8031 and HF-8032, Fault Isolation.

INDICATION	ISOLATION OF APPARENT FAILURE
Circuit breakers A, B, C, and/or D will not latch on	(1) Check associated circuit breaker (if circuit breaker does not latch on), or crowbar/logic card A7. CIRCUIT BREAKER — REF DES A — CB3 B — CB4 C — CB5 D — CB6 (2) If both A and B circuit breakers or both C and D circuit breakers will not latch, check associated 1000-W converter module. CIRCUIT BREAKER — REF DES A and B — A2 C and D — A3
+5 VDC (VOLTMETER position)	+5.0 ±0.5 V dc, output from low-voltage module A5
+12 VDC (VOLTMETER position)	+12.0 ±0.5 V dc, output from low-voltage module A5
-12 VDC (VOLTMETER position)	-12.0 ±0.5 V dc, output from low-voltage module A5
+15 VDC (VOLTMETER position)	+15.0 ±0.6 V dc, output from low-voltage module A5
+28 VDC (VOLTMETER position)	+28.0 ±0.6 V dc, output from low-voltage module A5
+35 VDC (VOLTMETER position)	+35.0 ±0.7 V dc, output from 500-W converter module A4, through CB7

Table 5-12. Power Supply HF-8031 and HF-8032, Fault Isolation (Cont).

INDICATION	ISOLATION OF APPARENT FAILURE
+50/40 VDC (A) (VOLTMETER position)	+50.0 ±1.0 V dc (high-voltage mode), +46.0 ±1.3 V dc (low-voltage mode), output from 1000-W converter module A2, through CB3
+50/40 VDC (B) (VOLTMETER position)	+50.0 ±1.0 V dc (high-voltage mode), +46.0 ±1.3 V dc (low-voltage mode), output from 1000-W converter module A2, through CB4
+50/40 VDC (C) (VOLTMETER position)	+50.0 ±1.0 V dc (high-voltage mode), +46.0 ±1.3 V dc (low-voltage mode), output from 1000-W converter module A2, through CB5
+50/40 VDC (D) (VOLTMETER position)	+50.0 ±1.0 V dc (high-voltage mode), +46.0 ±1.3 V dc (low-voltage mode), output from 1000-W converter module A2, through CB6
INPUT LINE VAC (VOLTMETER position)	188 to 264 V ac, ac input line voltage as indicated by the dc voltage produced by bridge rectifier (CR9 through CR12) and crowbar/logic card A7

NOTE

Input line V ac meter circuit is a peak reading meter circuit calibrated to V rms, therefore unstable/erratic peaks in input power may cause meter reading to vary from that of a true rms reading meter.

5.5.1.2 Test Point, Voltage and Signal Levels

As an additional aid in testing and troubleshooting, voltage and signal levels that are easily accessible are given in table 5-13. These levels, when used with tables 5-12 and 5-14, further enable the user to isolate and identify faults.

NOTE

All test points are accessible by removing the power supply top dust cover.

5.5.1.3 Testing/Troubleshooting Procedures

CAUTION

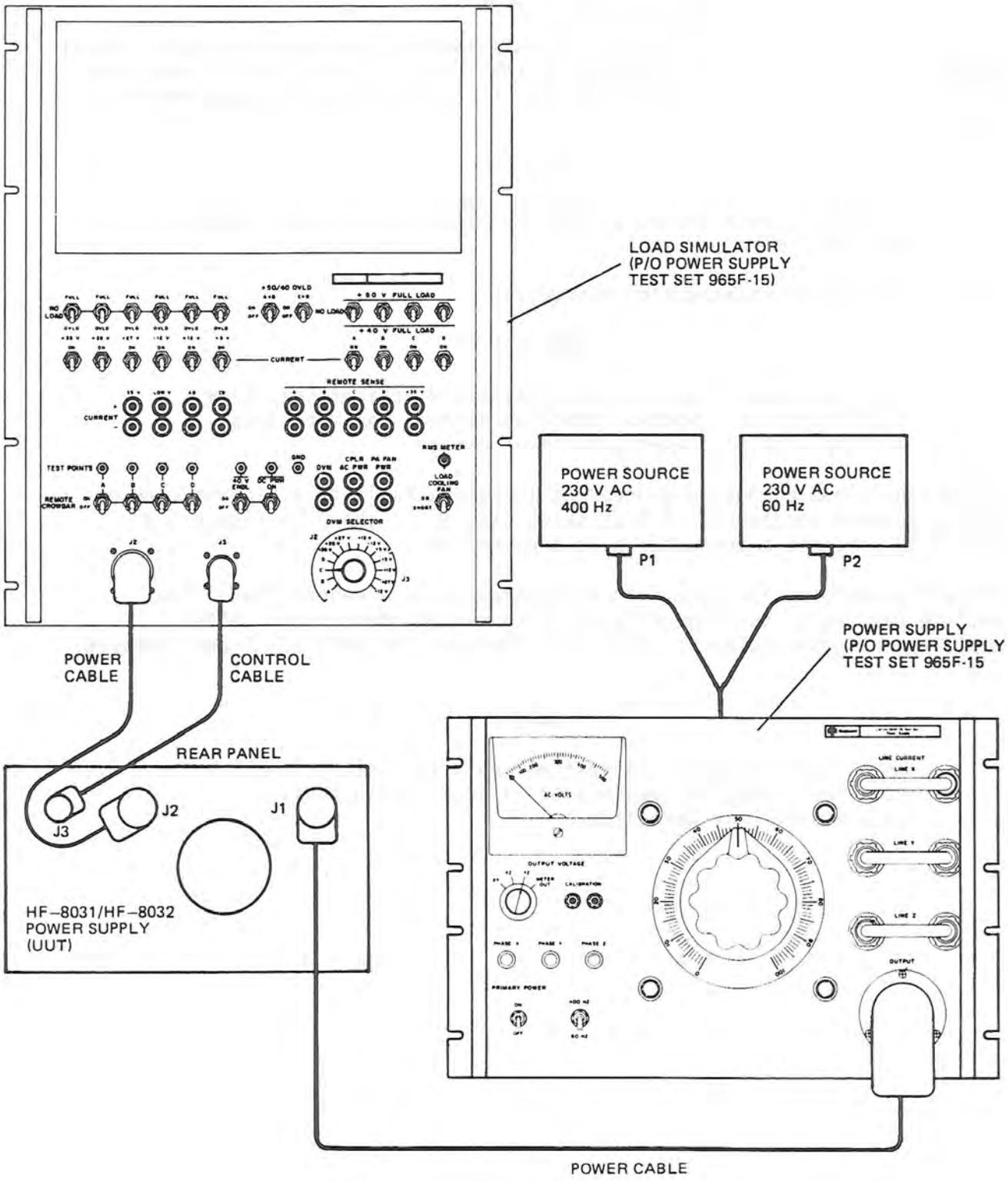
This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

The testing/troubleshooting procedures isolate a fault to a circuit card or chassis-mounted component. A test setup diagram is shown in figure 5-8. Table 5-14 presents a performance test procedure.

The test procedures in table 5-14 are presented in a manner that allows complete testing or testing of specific characteristics only. After completion of setup (step 1), test procedures may be entered at any numbered step.

NOTE

Meter level readings in testing apply to factory level settings. Readings may not be valid if field level adjustments have been made.



Power Supply HF-8031 and HF-8032, Test Setup
Figure 5-8

Table 5-13. Power Supply HF-8031 and HF-8032, Test Points, Voltage and Signal Levels.

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
1000-W converter module A2			
A2TB1	TP1	Ground	0 V dc (signal common)
	TP2	+50/40 V dc cap	+50 ±1.0 V dc
	TP3	Power on	0 V dc on; +9 V dc off
	TP4	40 volts enable	+7.5 V dc enable; 0 V enable
	TP5	+15 V dc	+15 ±0.15 V dc
	TP6	External sync	0 to +3.5 V, 4.5 ±0.4-µs pulse at a 40-kHz ±4% rate
	TP7	+50/40 V dc	+50 ±1.0 V dc
	TP8	Cap low	-140 ±25 V dc } Difference between cap high and cap low: 235 to 330 V dc
	TP9	Cap center	0 ±10 V dc
	TP10	Cap high	+140 ±25 V dc
Control card A2A1	*TP1	Ground	0 V dc (signal common)
	*TP2	External sync	0 to +3.5 V, 4.5 ±0.5-ms pulse at a 40-kHz ±4% rate
	*TP3	Thermal intlk	0 V dc (ground) with normal temperature; +14 to +15.15 V dc for overtemperature shutdown
	*TP4	+5 V dc	+4.8 to +5.4 V dc

*These test points are not accessible when unit is completely assembled. Where signal, description is not listed, test point is used solely for testing or troubleshooting. Refer to applicable testing and troubleshooting procedures.

Table 5-13. Power Supply HF-8031 and HF-8032, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
Base drive card A2A2	*TP1	Ground	0 V dc (signal common)
	*TP2	Q1-Q3 base drive	
	*TP3	Q5 bias	
	*TP4	Q7 output	
	*TP5	+15 V dc	
	*TP6	Q2-Q4 base drive	
	*TP7	Q6 base drive	
	*TP8	Q8 output	
	*TP9	+15 V dc	
1000-W converter module A3			
A3TB1	TP1	Ground	0 V dc (signal common)
	TP2	+50/40 V dc cap	+50 ±1.0 V dc
	TP3	Power on	0 V dc on; +9 V dc off
	TP4	40 volts enable	+7.5 V dc enable; 0 V dc enable
	TP5	+15 V dc	+15 ±0.15 V dc
	TP6	External sync	0 to +3.5 V, 4.5 ±0.5-µs pulse at a 40-kHz ±4% rate
	TP7	+50/40 V dc	+50 ±1.0 V dc

*These test points are not accessible when unit is completely assembled. Where signal, description is not listed, test point is used solely for testing or troubleshooting. Refer to applicable testing and troubleshooting procedures.

Table 5-13. Power Supply HF-8031 and HF-8032, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
A3TB1 (Cont)	TP8	Cap low	-140 ±25 V dc
	TP9	Cap center	0 ±10 V dc
	TP10	Cap high	+140 ±25 V dc
			Difference between cap high and cap low: 235 to 330 V dc
Control card A3A1	*TP1	Ground	0 V dc (signal common)
	*TP2	External sync	0 to +3.5 V, 4.5 ±0.5-µs pulse at a 40-kHz ±4% rate
	*TP3	Thermal intlk	0 V dc (ground) with normal temperature; +14 to +15.15 V dc for overtemperature shutdown
	*TP4	+5 V dc	+4.8 to +5.4 V dc
Base drive card A3A2	*TP1	Ground	0 V dc (signal common)
	*TP2	Q1-Q3 base drive	
	*TP3	Q5 bias	
	*TP4	Q7 output	
	*TP5	+15 V dc	
	*TP6	Q2-Q4 base drive	
	*TP7	Q6 base drive	
	*TP8	Q8 output	
	*TP9	+15 V dc	

*These test points are not accessible when unit is completely assembled. Where signal, description is not listed, test point is used solely for testing and troubleshooting. Refer to applicable testing and troubleshooting procedures.

Table 5-13. Power Supply HF-8031 and HF-8032, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
500-W converter module A4			
A4TB1	TP1	Ground	0 V dc (signal common)
	TP2	+35 V dc	+35 ±0.7 V dc
	TP3	Power on	0 V dc on; +9 V dc off
	TP4	(Not used)	
	TP5	+15 V dc	+15 ±0.15 V dc
	TP6	Oscillator	0 to +3.5 V, 4.5 ±0.4-µs pulse at a 40-kHz ±4% rate
	TP7	+35 V cap	+35 ±0.7 V dc
	TP8	Cap low	-140 ±25 V dc } Difference between cap high and cap low: 235 to 330 V dc
	TP9	Cap center	0 ±10 V dc
	TP10	Cap high	+140 ±25 V dc
Control card A4A1	*TP1	Ground	0 V dc (signal common)
	*TP2	Oscillator	0 to +3.5 V, 4.5 ±0.5-µs pulse at a 40-kHz ±4% rate
	*TP3	Thermal intlk	0 V dc (ground) with normal temperature; +14 to +15.15 V dc for overtemperature shutdown
	*TP4	+5 V dc	+4.8 to +5.4 V dc

*These test points are not accessible when unit is completely assembled. Where signal, description is not listed, test point is used solely for testing and troubleshooting. Refer to applicable testing and troubleshooting procedures.

Table 5-13. Power Supply HF-8031 and HF-8032, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
Base drive card A4A2	*TP1	Ground	0 V dc (signal common)
	*TP2	Q1-Q3 base drive	
	*TP3	Q5 bias	
	*TP4	Q7 output	
	*TP5	+15 V dc	
	*TP6	Q2-Q4 base drive	
	*TP7	Q6 base drive	
	*TP8	Q8 output	
	*TP9	+15 V dc	
Low-voltage regulator module A5	TP1	Ground	0 V dc (signal common)
	TP2	+28 V dc	+28.0 ±0.5 V dc
	TP3	+15 V dc	+15.0 ±0.15 V dc
	TP4	+12 V dc	+12.0 ±0.5 V dc
	TP5	-12 V dc	-12.0 ±0.5 V dc
	TP6	+5 V dc	+5.0 ±0.05 V dc
	TP7	+10 V dc	+8 to +12.5 V dc
	TP8	+20 V dc	+20 to +30 V dc
	TP9	-20 V dc	-20 to -30 V dc
	TP10	+35 V dc	+35 ±0.7 V dc

*These test points are not accessible when unit is completely assembled. Where signal, description is not listed, test point is used solely for testing and troubleshooting. Refer to applicable testing and troubleshooting procedures.

Table 5-13. Power Supply HF-8031 and HF-8032, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
Digital voltmeter card A6	*TP1	Ground	0 V dc (signal common)
	*TP2	-5 V dc	-5.1 ±0.30 V dc
	*TP3	Oscillator	
	*TP4	-12 V dc	-12 ±0.1 V dc
	*TP5	Low reference	+1.0 ±0.002 V dc
	*TP6	High input	+ Input voltage being measured
	*TP7	+5 V dc	+5.0 ±0.1 V dc
	*TP8	Test input	+5-V dc input displays all segments on dvm.
Crowbar/ logic card A7	TP1	Ground	0 V dc (signal common)
	TP2	External blower power enable	0 V dc enable (gnd), open circuit enable
	TP3	Dc power on	0 V dc on, +15 V dc off
	TP4	Remote crowbar A	+15 V dc enable, 0 V dc enable
	TP5	Remote crowbar B	+15 V dc enable, 0 V dc enable
	TP6	Remote crowbar C	+15 V dc enable, 0 V dc enable
	TP7	Remote crowbar D	+15 V dc enable, 0 V dc enable
	TP8	Ac analog	+18.8 to +26.4 V dc (front panel ac reading x 10)

*These test points are not accessible when unit is completely assembled. Where signal, description is not listed, test point is used solely for testing and troubleshooting. Refer to applicable testing and troubleshooting procedures.

Table 5-13. Power Supply HF-8031 and HF-8032, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
400- to 57-Hz converter module A8	TP1	Ac output	(A8A2J1) } 230 V ac, 50 to 60 Hz
	TP2	Ac output	(A8A3J1) }
Logic board A8A1	*TP-A	60-Hz detector	
	*TP-B	Power-on inhibit	
	*TP-C	Sequencer	
	*TP-D	Ground	0 V dc (signal common)
	*TP-E	Power-on inhibit (-tr input)	
	*TP-F	Clock	
	*TP-G	230-V ac detector	+6.9 to +8.0 V dc
	*TP-H		
	*TP-I		
	*TP-J		
	*TP-K		
	*TP-L		
	*TP-M		

*These test points are not accessible when unit is completely assembled. Where signal, description is not listed, test point is used solely for testing and troubleshooting. Refer to applicable testing and troubleshooting procedures.

Table 5-13. Power Supply HF-8031 and HF-8032, Test Points, Voltage and Signal Levels (Cont).

CARD/MODULE	TEST POINT	FUNCTION	SIGNAL, DESCRIPTION
Switching board A8A2	J1	Ac output	A8TP1
Switching board A8A3	J1	Ac output	A8TP2

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures.

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
	WARNING HIGH VOLTAGE is used in the operation of this equipment. DEATH ON CONTACT may result if personnel fail to observe safety precautions. Learn the areas containing high voltage in each piece of equipment. Be careful not to contact high-voltage connections when installing or operating this equipment. Before working inside the equipment, turn power off and ground points of high potential before touching them.		
	WARNING This equipment uses direct rectification of the ac input power line; therefore, input rectifier/filter system may be floating above chassis by over 230 V ac. Extreme care must be used when probing these circuits with power on. Similarly, the three power modules are off-the-line converters. Most of their heat sink components are powered directly off the rectified ac line and therefore may be floating above chassis by over 300 V ac.		
	CAUTION This unit has a self-contained fan. Full power can be sustained continuously only if all four removable modules are in place and top cover of unit is on. This unit can be operated on medium or full power for up to 10 minutes with all modules in place and top cover off. With top cover off and only low-voltage module in place, operate only with no load on existing output.		
1	SETUP		
1.1	Ensure that facility power is off.		
1.2	Connect equipment as shown in figure 5-8.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1	SETUP (Cont)		
1.3	Set Power Supply Test Set 965F-15 (hereafter referred to as test set) power supply control as follows.		
	CAUTION Ensure power supply cable W1 is strapped correctly for the power supply being tested. Refer to the installation section of this instruction book for strapping instructions.		
	a. Adjust variable transformer control for minimum voltage output.		
	b. Set ac line input for 60 Hz.		
1.4	Set test set load simulator controls as follows.		

SWITCH	POSITION
+35 V load	NO LOAD
+28 V load	NO LOAD
+27 V load	NO LOAD
-12 V load	NO LOAD
+12 V load	NO LOAD
+5 V load	NO LOAD
+50/40 OVLD - A+B	OFF
+50/40 OVLD - C+D	OFF
A load	NO LOAD
B load	NO LOAD
C load	NO LOAD
D load	NO LOAD
All REMOTE	OFF
CROWBAR switches	
40 V ENBL	OFF
DC PWR ON	ON
LOAD COOLING FAN	ON

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1	SETUP (Cont)		
1.5	Set power supply MAIN POWER to OFF, set all other circuit breakers to ON, and set VOLTMETER selector switch to INPUT LINE VAC.		
2	POWER UP		
2.1	On test set load simulator, ensure all load switches are at NO LOAD.		
2.2	Set facility power to on.		
	NOTE Test set load simulator cooling fans must be running before operating power supply into loads.		
2.3	On test set power supply, set PRIMARY POWER switch to ON and variable transformer control for 230 V ac.		
2.4	On test set load simulator, set all load switches to FULL position or +50 V FULL LOAD.		
2.5	Set power supply MAIN POWER circuit breaker to ON.	Power supply and test set load simulator blowers are operating.	Check CB2, A5, Q6, K1, and B1.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2	POWER UP (Cont)		
2.6	Using a dmm and DVM jacks and DVM SELECTOR on load simulator, verify that power supply front panel:		
	a. MAIN POWER circuit breakers are set to ON.	Voltages are present at all positions of DVM SELECTOR.	Check CB2, A5, and circuit breaker associated with missing voltage.
	b. Set MAIN POWER circuit breakers to OFF.	Voltages are at zero at all positions of DVM SELECTOR.	Check CB1.
	c. Set MAIN POWER circuit breakers to ON.	Voltages are present at all positions of DVM SELECTOR.	Check CB1.
	d. Set LOW VOLTAGE circuit breakers to OFF.	Voltages are at zero at all positions of DVM SELECTOR.	Check CB2.
	e. Set LOW VOLTAGE circuit breakers to ON.	Voltages are present at all positions of DVM SELECTOR.	Check CB2.
	f. Set 50/40 VDC - A circuit breaker to OFF.	Voltage at DVM SELECTOR J2 - A position is at zero. Voltages are present at all other positions of DVM SELECTOR.	Check CB3.

(Cont)

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2	POWER UP (Cont)		
2.6 (Cont)	g. Set 50/40 VDC - A circuit breaker to ON.	Voltages are present at all positions of DVM SELECTOR.	Check CB3.
	h. Set 50/40 VDC - B circuit breaker to OFF.	Voltage at DVM SELECTOR J2 - B position is at zero. Voltages are present at all other positions of DVM SELECTOR.	Check CB4.
	i. Set 50/40 VDC - B circuit breaker to ON.	Voltages are present at all positions of DVM SELECTOR.	Check CB4.
	j. Set 50/40 VDC - C circuit breaker to OFF.	Voltage at DVM SELECTOR J2 - C position is at zero. Voltages are present at all other positions of DVM SELECTOR.	Check CB5.
	k. Set 50/40 VDC - C circuit breaker to ON.	Voltages are present at all positions of DVM SELECTOR.	Check CB5.
	l. Set 50/40 VDC - D circuit breaker to OFF.	Voltage at DVM SELECTOR J2 - D position is at zero. Voltages are present at all other positions of DVM SELECTOR.	Check CB6.
(Cont)			

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2	POWER UP (Cont)		
2.6 (Cont)	m. Set 50/40 VDC - D circuit breaker to ON.	Voltages are present at all positions of DVM SELECTOR.	Check CB6.
	n. 35 VDC circuit breaker is set to OFF.	Voltage at DVM SELECTOR J2 - +35V, +28V, +27V position are at zero. Voltages are present at all other positions of DVM SELECTOR.	Check CB7.
	o. Set 35 VDC circuit breaker to ON.	Voltages are present at all positions of DVM SELECTOR.	Check CB7.
3	REMOTE CROWBAR		
3.1	All power supply circuit breakers are set to ON.		
3.2	On test set load simulator, set all load switches to NO LOAD.		
3.3	On load simulator, set REMOTE CROWBAR - A to ON.	Power supply 50/40 VDC - A circuit breaker trips.	Check Q2, A7, and associated circuit.
3.4	Set REMOTE CROWBAR - A to OFF.		
3.5	Set power supply 50/40 VDC - A circuit breaker to ON.		
3.6	On load simulator, set REMOTE CROWBAR - B to ON.	Power supply 50/40 VDC - B circuit breaker trips.	Check Q1, A7, and associated circuit.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3	REMOTE CROWBAR (Cont)		
3.7	Set REMOTE CROWBAR - B to OFF.		
3.8	Set power supply 50/40 VDC - B circuit breaker to ON.		
3.9	On load simulator, set REMOTE CROWBAR - C to ON.	Power supply 50/40 VDC - C circuit breaker trips.	Check Q4, A7, and associated circuit.
3.10	Set REMOTE CROWBAR - C to OFF.		
3.11	Set power supply 50/40 VDC - C circuit breaker to ON.		
3.12	On load simulator, set REMOTE CROWBAR - D to ON.	Power supply 50/40 VDC - D circuit breaker trips.	Check Q3, A7, and associated circuit.
3.13	Set REMOTE CROWBAR - D to OFF.		
3.14	Set power supply 50/40 VDC - D circuit breaker to ON.		
4	AC PWR OUTPUT		
4.1	Ensure all load switches on test set load simulators are set to NO LOAD.		
4.2	Using dmm, measure ac voltage across CPLR AC PWR jacks.	230 ±5 V ac	Check A7, Q6, K1, and associated input circuit.
4.3	Using dmm, measure ac voltage across PA FAN PWR jacks.	230 ±5 V ac	Check A8, K1, and associated output circuit.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4	AC PWR OUTPUT (Cont)		
4.4	Set DC PWR ON switch to OFF.		
4.5	Using dmm, measure ac voltage across CPLR AC PWR jacks.	0 V	Check K1 and associated input circuit.
5	UNDERVOLTAGE/OVERVOLTAGE		
5.1	Ensure all load switches on test set load simulator are set to NO LOAD. Set DC PWR ON switch to ON.		
5.2	Using a dmm, monitor ac voltage across CPLR AC PWR jacks.	230 ±5 V ac	
5.3	Using variable transformer control on test set power supply, slowly reduce input voltage until CPLR AC PWR switches off.		
5.4	Note input voltage on power supply VOLTMETER.	165 to 175 V ac	Check input circuits to A5 and A5 undervoltage circuits.
5.5	Using variable transformer control on test set power supply, slowly increase input voltage until CPLR AC PWR switches on.		
5.6	Note input voltage on power supply VOLTMETER.	182 to 188 V ac	Same as step 5.4
5.7	Using variable transformer control on test set power supply, slowly increase input voltage until CPLR AC PWR switches off.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5	UNDERVOLTAGE/OVERVOLTAGE (Cont)		
5.8	Note input voltage on power supply VOLTMETER.	270 to 280 V ac	Check input circuits to A5 and A5 overvoltage circuits.
5.9	Set variable transformer control on test set power supply for 230 V ac input voltage.		
6	CROWBAR		
6.1	Ensure all load switches on test set load simulators are set to NO LOAD and DC PWR ON switch is set to ON.		
6.2	Connect a dc supply to REMOTE SENSE +35 V terminals on the test set load simulator. Preset dc supply at 35 volts with a current limit of 0.5 A before making connections.		
6.3	Slowly increase dc supply voltage until power supply crowbars (+35 volts shorts out).		
6.4	Note voltage where crowbar occurred.	+38 to +42 V dc or 35 VDC circuit breaker trips.	Check +35 V crowbar circuit on A7 card and associated circuit.
6.5	Connect dc supply to REMOTE SENSE A terminals. Preset dc supply at 50 volts before making connections. (Reset 35 VDC circuit breaker, if necessary.)		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6	CROWBAR (Cont)		
6.6	Set 50/40 VDC - B circuit breaker to OFF.		
6.7	Slowly increase dc supply voltage until power supply crowbars (A shorts out).		
6.8	Note voltage where crowbar occurred.	+56 to +58 V dc	Check 50/40 A crowbar circuit on A7 card and associated circuit.
6.9	Connect dc supply to REMOTE SENSE - B and reduce voltage to +50 V dc or less.		
6.10	Set 50/40 VDC - B circuit breaker ON and 50/40 VDC - A circuit breaker OFF.		
6.11	Slowly increase dc supply voltage until power supply crowbars (B shorts out).		
6.12	Note voltage where crowbar occurred.	+56 to +58 V dc	Check 50/40 - B crowbar circuit on A7 card and associated circuit.
6.13	Connect dc supply to REMOTE SENSE - C and reduce voltage to +50 V dc or less.		
6.14	Set 50/40 VDC - A and 50/40 VDC - B circuit breakers to ON, and 50/40 VDC - D circuit breaker to OFF.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6	CROWBAR (Cont)		
6.15	Slowly increase dc supply voltage until power supply crowbars (C shorts out).		
6.16	Note voltage where crowbar occurred.	+56 to +58 V dc	Check 50/40 - C crowbar circuit on A7 card and associated circuit.
6.17	Connect dc supply to REMOTE SENSE - D and reduce voltage to +50 V dc or less.		
6.18	Set 50/40 VDC - D circuit breaker to ON and 50/40 VDC - C circuit breaker to OFF.		
6.19	Slowly increase dc supply voltage until power supply crowbars (D shorts out).		
6.20	Note voltage where crowbar occurred.	+56 to +58 V dc	Check 50/40 - D crowbar circuit on A7 card and associated circuit.
6.21	Set 50/40 VDC - C circuit breaker to ON.		
6.22	Remove dc supply from REMOTE SENSE - D terminals and set dc power supply off.		
6.23	Reset 50/40 VDC - D circuit breaker.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7	OUTPUT VOLTAGES (NO LOAD)		
7.1	Ensure all load switches on test set load simulator are set to NO LOAD, and 230-V ac power is applied.		
7.2	Connect a dmm, set for dc volts, across DVM terminals on test set load simulator.		
7.3	Set power supply VOLTMETER to each of the following positions and the DVM SELECTOR on the test set load simulator to the associated position.	External digital multimeter should indicate ±2% of VOLTMETER reading in all cases except INPUT LINE VAC.	Check A6 and/or associated load resistors.
	+5 VDC	+5V ±2% at J2/J3	
	+12 VDC	+12V ±2% at J2/J3	
	-12 VDC	-12V ±2% at J2/J3	
	+28 VDC	+28V ±2% at J2	
	+35 VDC	+35V ±2% at J2	
	+50/40 VDC (A)	+50V ±2% at J2 A	
	+50/40 VDC (B)	+50V ±2% at J2 B	
	+50/40 VDC (C)	+50V ±2% at J2 C	
	+50/40 VDC (D)	+50V ±2% at J2 D	
	INPUT LINE VAC	±6 V ac (for 200 to 250 V ac inputs) at CPLR AC PWR jacks	
8	+35 VDC UNDERVOLTAGE/OVERVOLTAGE		
8.1	Set low-voltage load switches on test set load simulator to FULL LOAD, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8	+35 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
8.2	Using VOLTMETER on power supply, measure +35 VDC.	+35 ±0.9 V dc	Check A4.
8.3	Set +35 V load switch on test set load simulator to NO LOAD.		
8.4	Using VOLTMETER on power supply, measure +35 VDC.	+35 ±0.9 V dc	Check A4.
8.5	Set +35 V load switch on test set load simulator to OVLD.		
8.6	Using VOLTMETER on power supply, measure +35 VDC.	+20 ±4.0 V dc or 35 VDC circuit breaker trips (either is acceptable).	Check A4, A7, and circuit associated with overload.
8.7	Set +35 V load switch on test set load simulator to FULL LOAD. Reset 35 VDC circuit breaker, if necessary.		
8.8	Repeat steps 8.1 through 8.7 with variable transformer control set for 265 V ac.	Same as steps 8.1 through 8.7	Same as steps 8.2, 8.4, and 8.6
9	+50 VDC UNDERVOLTAGE/OVERVOLTAGE		
9.1	Set low-voltage switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		
9.2	Using VOLTMETER on power supply, measure +50/40 VDC (A).	+50.0 ±1.3 V dc	Check A2.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9	+50 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
9.3	Set A load switch to +50 V FULL LOAD.		
9.4	Using VOLTMETER on power supply, measure +50/40 VDC (A).	+50.0 ±1.3 V dc	Check A2.
9.5	On test set load simulator, set +50/40 OVLD - A+B switch to ON.		
9.6	Using VOLTMETER on power supply, measure +50/40 VDC (A).	NMT +49.0 V dc or 50/40 VDC - A and B circuit breakers on power supply trip (either is acceptable).	Check A2, A7, and circuit associated with 50/40 VDC - A overload.
9.7	Set A load switch to NO LOAD.		
9.8	Set +50/40 OVLD - A+B switch on load simulator to OFF. Reset A and B circuit breakers on power supply (if necessary).		
9.9	On test set load simulator set 40 V ENBL switch to ON.		
9.10	Using VOLTMETER on power supply, measure +50/40 VDC (A).	+46.0 ±1.3 V dc	Check A2.
9.11	Set A load switch to +40 V FULL LOAD.		
9.12	Using VOLTMETER on power supply, measure +50/40 VDC (A).	+46.0 ±1.3 V dc	Check A2.
9.13	Set 40 V ENBL switch to OFF and A load switch to NO LOAD.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9	+50 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
9.14	Repeat steps 9.1 through 9.13 with variable transformer control set for 265 V ac.	Same as steps 9.1 through 9.13	Same as steps 9.2, 9,4, 9.6, 9.10, and 9.12
9.15	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		
9.16	Using VOLTMETER on power supply, measure +50/40 VDC (B).	+50.0 ±1.3 V dc	Check A2.
9.17	Set B load switch to +50 V FULL LOAD.		
9.18	Using VOLTMETER on power supply, measure +50/40 VDC (B).	+50.0 ±1.3 V dc	Check A2.
9.19	On test set load simulator, set +50/40 OVLD - A+B switch to ON.		
9.20	Using VOLTMETER on power supply, measure +50/40 VDC (B).	NMT +49.0 V dc or 50/40 VDC A and B circuit breakers on power supply trip (either is acceptable).	Check A2, A7, and circuit associated with 50/40 - B overload.
9.21	Set B load switch to NO LOAD.		
9.22	Set +50/40 OVLD - A+B switch on load simulator to OFF. Reset A and B circuit breakers on power supply (if necessary).		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9	+50 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
9.23	On test set load simulator set 40 V ENBL switch to ON.		
9.24	Using VOLTMETER on power supply, measure +50/40 VDC (B).	+46.0 ±1.3 V dc	Check A2.
9.25	Set B load switch to +40 V FULL LOAD.		
9.26	Using VOLTMETER on power supply, measure +50/40 VDC (B).	+46.0 ±1.3 V dc	Check A2.
9.27	Set 40 V ENBL switch to OFF and B load switch to NO LOAD.		
9.28	Repeat steps 9.15 through 9.27 with variable transformer control set for 265 V ac.	Same as steps 9.15 through 9.27	Same as steps 9.16, 9.18, 9.20, 9.24, and 9.26
9.29	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		
9.30	Using VOLTMETER on power supply, measure +50/40 VDC (C).	+50.0 ±1.3 V dc	Check A3.
9.31	Set C load switch to +50 V FULL LOAD.		
9.32	Using VOLTMETER on power supply, measure +50/40 VDC (C).	+50.0 ±1.3 V dc	Check A3.
9.33	On test set load simulator, set +50/40 OVLD - C+D switch to ON.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9	+50 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
9.34	Using VOLTMETER on power supply, measure +50/40 VDC (C).	NMT +49.0 V dc or 50/40 VDC C and D circuit breakers on power supply trip (either is acceptable).	Check A3, A7, and circuit associated with 50/40 - C overload.
9.35	Set C load switch to NO LOAD.		
9.36	Set +50/40 OVLD - C+D switch on load simulator to OFF. Reset C and D circuit breakers on power supply (if necessary).		
9.37	On test set load simulator set 40 V ENBL switch to ON.		
9.38	Using VOLTMETER on power supply, measure +50/40 VDC (C).	+46.0 ±1.3 V dc	Check A3.
9.39	Set C load switch to +40 V FULL LOAD.		
9.40	Using VOLTMETER on power supply, measure +50/40 VDC (C).	+46.0 ±1.3 V dc	Check A3.
9.41	Set 40 V ENBL switch to OFF and C load switch to NO LOAD.		
9.42	Repeat steps 9.29 through 9.41 with variable control set for 265 V ac.	Same as steps 9.29 through 9.41	Same as steps 9.30, 9.32, 9.34, 9.38, and 9.40
9.43	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9	+50 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
9.44	Using VOLTMETER on power supply, measure +50/40 VDC (D).	+50.0 ±1.3 V dc	Check A3.
9.45	Set D load switch to +50 V FULL LOAD.		
9.46	Using VOLTMETER on power supply, measure +50/40 VDC (D).	+50.0 ±1.3 V dc	Check A3.
9.47	On test set load simulator, set +50/40 OVLD - C+D switch to ON.		
9.48	Using VOLTMETER on power supply, measure +50/40 VDC (D).	NMT +49.0 V dc or 50/40 VDC C and D circuit breakers on power supply trip (either is acceptable).	Check A3, A7, and circuit associated with 50/40 - D overload.
9.49	Set D load switch to NO LOAD.		
9.50	On test set load simulator set 40 V ENBL switch to ON.		
9.51	Set +50/40 OVLD - C+D switch on load simulator to OFF. Reset C and D circuit breakers on power supply (if necessary).		
9.52	Using VOLTMETER on power supply, measure +50/40 VDC (D).	+46.0 ±1.3 V dc	Check A3.
9.53	Set D load switch to +40 V FULL LOAD.		
9.54	Using VOLTMETER on power supply, measure +50/40 VDC (D).	+46.0 ±1.3 V dc	Check A3.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
9	+50 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
9.55	Set 40 V ENBL switch to OFF and D load switch to NO LOAD.		
9.56	Repeat steps 9.43 through 9.55 with variable control set for 265 V ac.	Same as steps 9.43 through 9.55	Same as steps 9.44, 9.46, 9.48, 9.52, and 9.54
10	+28 VDC UNDERVOLTAGE/OVERVOLTAGE		
10.1	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		
10.2	Using VOLTMETER on power supply, measure +28 VDC.	+28.0 ±0.4 V dc	Check A5.
10.3	Set +28 V load switch to NO LOAD.		
10.4	Using VOLTMETER on power supply, measure +28 VDC.	+28.0 ±0.4 V dc	Check A5.
10.5	Set +28 V load switch to OVLD.		
10.6	Using VOLTMETER on power supply, measure +28 VDC	NMT +5.0 V dc or 35 VDC circuit breakers trips.	Check A5.
10.7	Set +28 V load switch to FULL. (Reset 35 VDC circuit breaker, if necessary.)		
10.8	Using a dmm connected to DVM jacks on test set load simulator, set DVM SELECTOR to J2 +27V.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10	+28 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
10.9	Measure +27 V dc.	+27.5 1.0 V dc	Check A5.
10.10	Set +27 V load switch to NO LOAD.		
10.11	Measure +27 V dc.	+27.5 ±1.0 V dc	Check A5.
10.12	Set +27 V load switch to FULL LOAD.		
10.13	Repeat steps 10.1 through 10.12 with variable transformer control set for 265 V ac.	Same as steps 10.1 through 10.12	Check A5.
11	+5 VDC UNDERVOLTAGE/OVERVOLTAGE		
11.1	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		
11.2	Using VOLTMETER on power supply, measure +5 VDC.	+4.8 to +5.2 V dc	Check A5.
11.3	Use dmm connected to DVM terminals.		
11.4	Set DVM SELECTOR to J2 +5V. Note dmm reading.	+4.8 to +5.2 V dc	Check A5.
11.5	Set DVM SELECTOR to J3 +5V. Note dmm reading.	+4.8 to +5.2 V dc	Check A5.
11.6	Set +5 V load switch to NO LOAD.		
11.7	Using VOLTMETER on power supply, measure +5 VDC.	+5.1 to +5.3 V dc	Check A5.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
11	+5 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
11.8	Set +5 V load switch to OVLD.		
11.9	With DVM SELECTOR at J3 +5V, note dmm reading.	NMT +4.0 V dc	Check A5.
	NOTE VOLTMETER on power supply may go blank.		
11.10	Set +5 V load switch to FULL.		
11.11	Set variable transformer control for 265 V ac.		
11.12	Repeat steps 11.2 and 11.6 through 11.10.		
12	+12 VDC UNDERVOLTAGE/OVERVOLTAGE		
12.1	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		
12.2	Using VOLTMETER on power supply, measure +12 VDC.	+12.0 ±0.6 V dc	Check A5.
12.3	Use dmm connected to DVM terminals.		
12.4	Set DVM SELECTOR to J2 +12V. Note dmm reading.	+12.0 ±0.6 V dc	Check A5.
12.5	Set DVM SELECTOR to J3 +12V. Note dmm reading.	+12.0 ±0.6 V dc	Check A5.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
12	+12 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
12.6	Set +12 V load switch to NO LOAD.		
12.7	Using VOLTMETER on power supply, measure +12 VDC.	+12.0 ±0.5 V dc	Check A5.
12.8	Set +5 V load switch to OVLD.		
12.9	Using VOLTMETER on power supply, measure +12 VDC.	NMT +10.0 V dc	Check A5.
12.10	Set +12 V load switch to FULL.		
12.11	Set variable transformer control for 265 V ac.		
12.12	Repeat steps 12.2 and 12.6 through 12.10.		
13	-12 VDC UNDERVOLTAGE/OVERVOLTAGE		
13.1	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 185 V ac.		
13.2	Using VOLTMETER on power supply, measure -12 VDC.	-12.0 ±0.6 V dc	Check A5.
12.3	Use dmm connected to DVM terminals.		
13.4	Set DVM SELECTOR to J2 -12V. Note dmm reading.	-12.0 ±0.6 V dc	Check A5.
13.5	Set DVM SELECTOR to J3 -12V. Note dmm reading.	-12.0 ±0.6 V dc	Check A5.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
13	-12 VDC UNDERVOLTAGE/OVERVOLTAGE (Cont)		
13.6	Set -12 V load switch to NO LOAD.		
13.7	Using VOLTMETER on power supply, measure -12 VDC.	-12.0 ±0.5 V dc	Check A5.
13.8	Set -12 V load switch to OVLD.		
13.9	Using VOLTMETER on power supply, measure -12 VDC.	NMT -10.0 V dc	Check A5.
13.10	Set -12 V load switch to FULL.		
13.11	Set variable transformer control for 265 V ac.		
13.12	Repeat steps 13.2 and 13.6 through 13.10.		
14	LV MAX CURRENT		
14.1	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 260 V ac.		
14.2	Use current probe clamped across the LINE CURRENT - LINE X on test set power supply to read current.	NMT 12 A rms	Check A2, A3, A4, and A5.
15	RIPPLE		
15.1	Set low-voltage load switches on test set load simulator to FULL load, +50 V/+40 V load switches to NO LOAD, and set variable transformer control on test set power supply for 230 ±5 V ac.		

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
15	RIPPLE (Cont)		
15.2	Use dmm connected to RMS METER connector.		
15.3	Measure dc voltage and ripple with +50 V/+40 V load switches to +50 V FULL LOAD and the DVM SELECTOR at each of the following positions.		
	J2 A	+50.0 ±0.5 V dc, NMT 50 mV rms (ripple)	Check A2.
	J2 B	+50.0 ±0.5 V dc, NMT 50 mV rms (ripple)	Check A2.
	J2 C	+50.0 ±0.5 V dc, NMT 50 mV rms (ripple)	Check A3.
	J2 D	+50.0 ±0.5 V dc, NMT 50 mV rms (ripple)	Check A3.
	J2 +35V	+35.0 ±0.5 V dc, NMT 25 mV rms (ripple)	Check A4.
	J2 +28V	+28.0 ±0.5 V dc, NMT 15 mV rms (ripple)	Check A5.
	J2 +27V	+27.5 ±0.5 V dc,NMT 15 mV rms (ripple)	Check A5.
	J2 +12V	+12.0 ±0.6 V dc, NMT 10 mV rms (ripple)	Check A5.
(Cont)			

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
15		RIPPLE (Cont)	
15.3 (Cont)	J2 -12V	-12.0 ±0.6 V dc, NMT 15 mV rms (ripple)	Check A5.
	J2 +5V	+5.0 ±0.2 V dc, NMT 5 mV rms (ripple)	Check A5.
	J3 +5V	+5.0 ±0.2 V dc, NMT 5 mV rms (ripple)	Check A5.
	J3 +12	+12.0 ±0.6 V dc, NMT 10 mV rms (ripple)	Check A5.
	J3 +27V	+27.5 ±0.5 V dc, NMT 15 mV rms (ripple)	Check A5.
	J3 -12V	-12.0 ±0.6 V dc, NMT 15 mV rms (ripple)	Check A5.
15.4	On test set load simulator, set 40 V ENBL switch to ON.		
15.5	Measure dc voltage and ripple with +50 V/+40 V load switches to +40 V FULL LOAD, and the DVM SELECTOR at each of the following positions.		
	J2 A	+46.0 ±0.8 V dc, NMT 50 mV rms (ripple)	Check A2.
(Cont)	J2 B	+46.0 ±0.8 V dc, NMT 50 mV rms (ripple)	Check A2.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
15	RIPPLE (Cont)		
15.5 (Cont)	J2 C	+46.0 ±0.8 V dc, NMT 50 mV rms (ripple)	Check A3.
	J2 D	+46.0 ±0.8 V dc, NMT 50 mV rms (ripple)	Check A3.
15.6	Set 40 V ENBL switch to OFF.		
16	400-Hz PRIMARY POWER		

NOTE

Step 16 applies to Power Supply HF-8032, part numbers 622-3512-002 and -005 only.

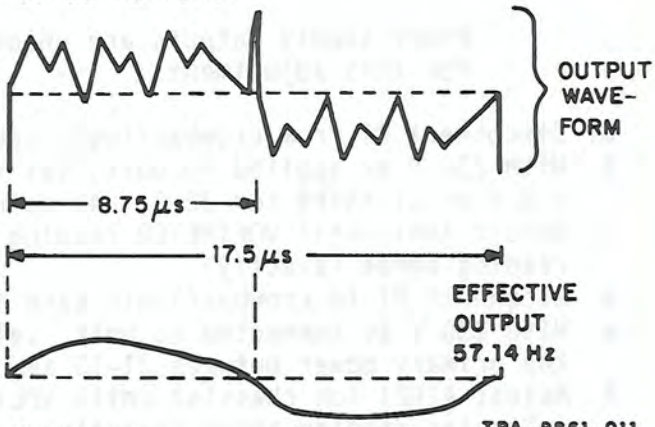
16.1 Set primary power source off.

16.2 Connect test set power supply to a 400-Hz source.

16.3 Set power supply for 400-Hz, 3-phase input.

16.4 Perform tests 5, 6, 7, and 15 with 400-Hz, 3-phase source.

Table 5-14. Power Supply HF-8031 and HF-8032, Performance Test Procedures (Cont).

STEP	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
16	400-Hz PRIMARY POWER (Cont)		
16.5	With 230-V, 400-Hz, 3-phase input, and all load switches set to NO LOAD, use oscilloscope to check waveform at PA FAN PWR jacks on test set load simulator. Connect bottom jack to scope channel A.	Waveform should be as follows: 	Check A8.
16.6	On test set load simulator, set LOAD COOLING FAN switch to SHORT.	On power supply, MAIN POWER or LOW VOLTAGE (or both) circuit breakers trip.	Check A8.
16.7	Set LOAD COOLING FAN switch to ON.		
16.8	Reset LOW VOLTAGE and MAIN POWER circuit breakers.		
16.9	Verify that waveform in step 16.5 is restored.	Same as step 16.5	Check A8.
17	SHUTDOWN		
17.1	Set MAIN POWER circuit breaker to OFF.		
17.2	Set facility power to off.		
17.3	Disconnect test setup.		

5.5.2 Alignment/Adjustment

NOTE

Power Supply HF-8031 and HF-8032 power connector should be strapped for 230 V ac and 230-V ac power source should be connected (J1).

5.5.2.1 Digital Voltmeter (Refer to figures 5-9 and 5-10)

NOTE

Power supply outputs are unloaded (J2 and J3 not connected) for this adjustment.

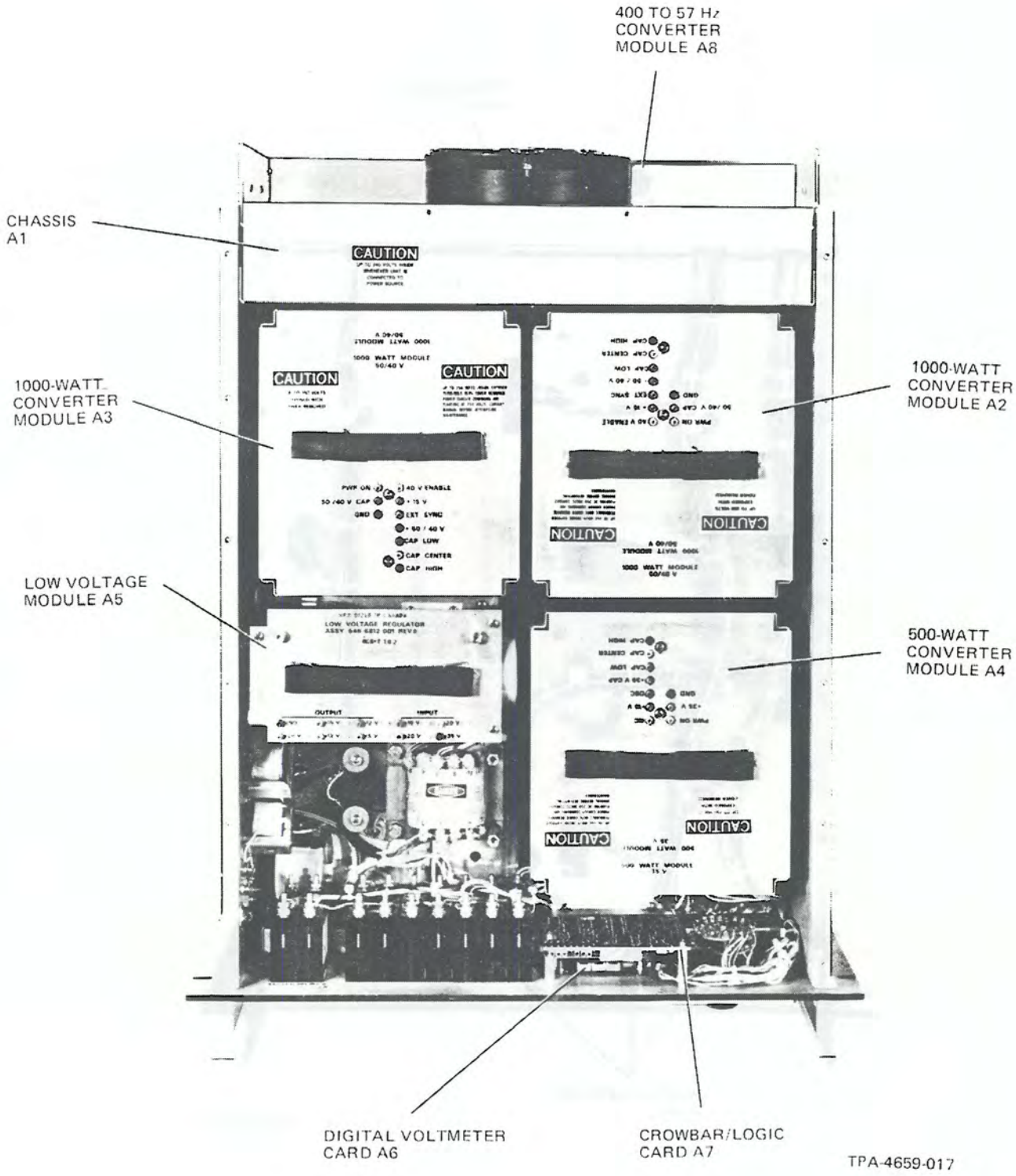
a. Disconnect P1 from crowbar/logic card A7.
b. With 230 V ac applied to unit, set VOLTMETER switch to +12 VDC. Measure +12 V dc at A5TP4 (or J2-2, -4) using a digital voltmeter.
c. Adjust A6R1 until VOLTMETER reading and the external digital voltmeter reading agree (exactly).
d. Reconnect P1 to crowbar/logic card A7.
e. With 230 V ac connected to unit, set VOLTMETER to INPUT LINE VAC. Measure the primary power between J1-10 and J1-1 using a digital voltmeter.
f. Adjust A1R21 (on chassis) until VOLTMETER reading and the external digital voltmeter reading agree (exactly).

5.5.2.2 Step Start (Refer to figure 5-11)

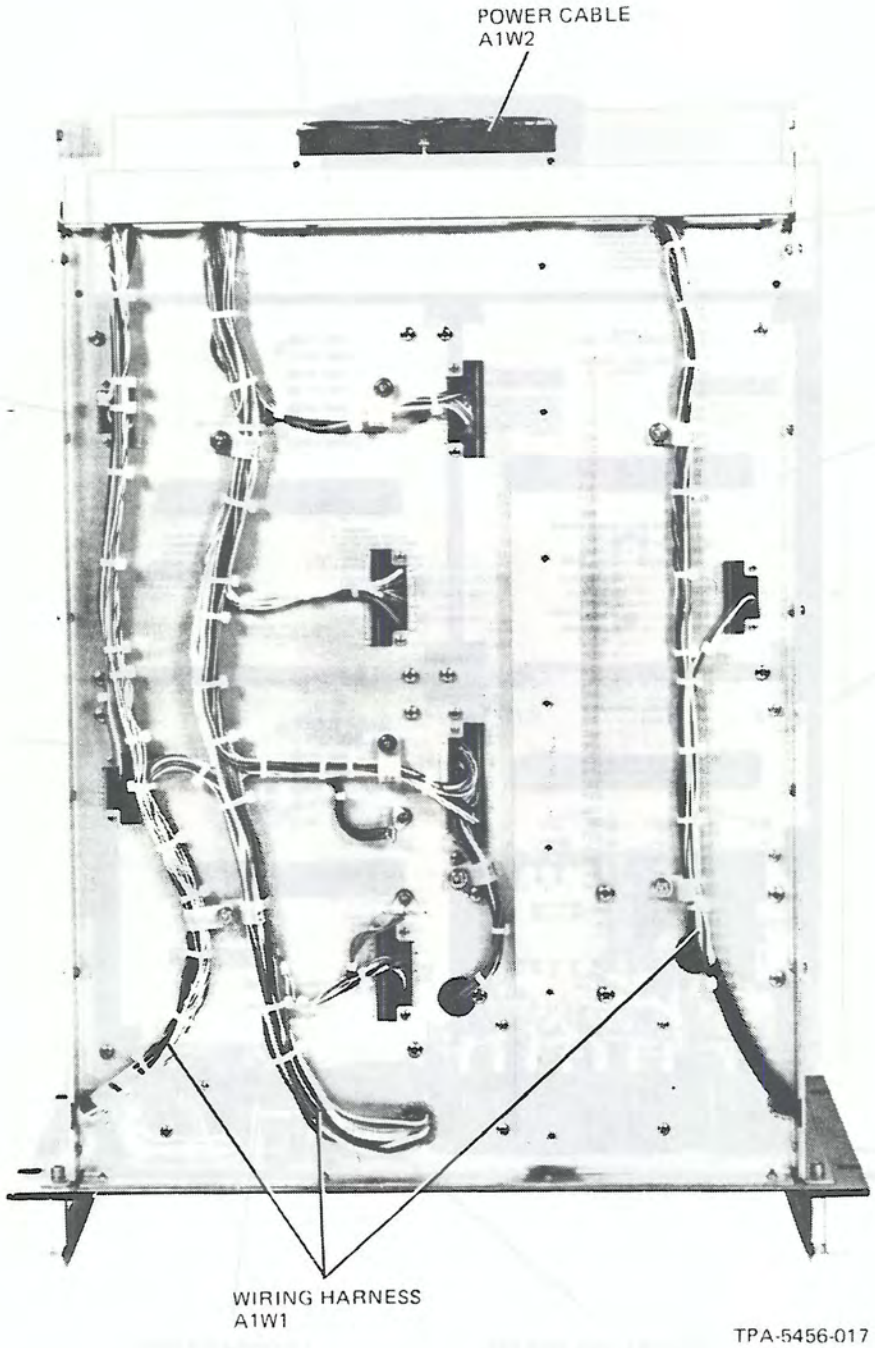
a. Using a variac or variable ac power source, set ac input power for 0 V ac.
b. With VOLTMETER set to INPUT LINE VAC, slowly adjust ac input power toward 200 V ac while listening for the click of step-start relay K2 as it pulls in. Note INPUT LINE VAC when it pulls in. It should be 182 to 188 V ac.
c. Slowly decrease ac input power toward 150 V ac while listening for the click of step-start relay K2 as it drops out. Note INPUT LINE VAC when it drops out. It should be 165 to 175 V ac.
d. If steps b and/or c are not within limits, adjust A7R3 to obtain limits. If limits cannot be obtained, adjustment of A7R1 or repair of associated circuit may be required.
e. A7R1 is adjusted the same as A7R3 (to obtain limits); however, if A7R1 is adjusted, VOLTMETER adjustment A1R21 must be readjusted per paragraph 5.5.2.1.

5.5.2.3 Overvoltage Crowbar (Refer to figure 5-11)

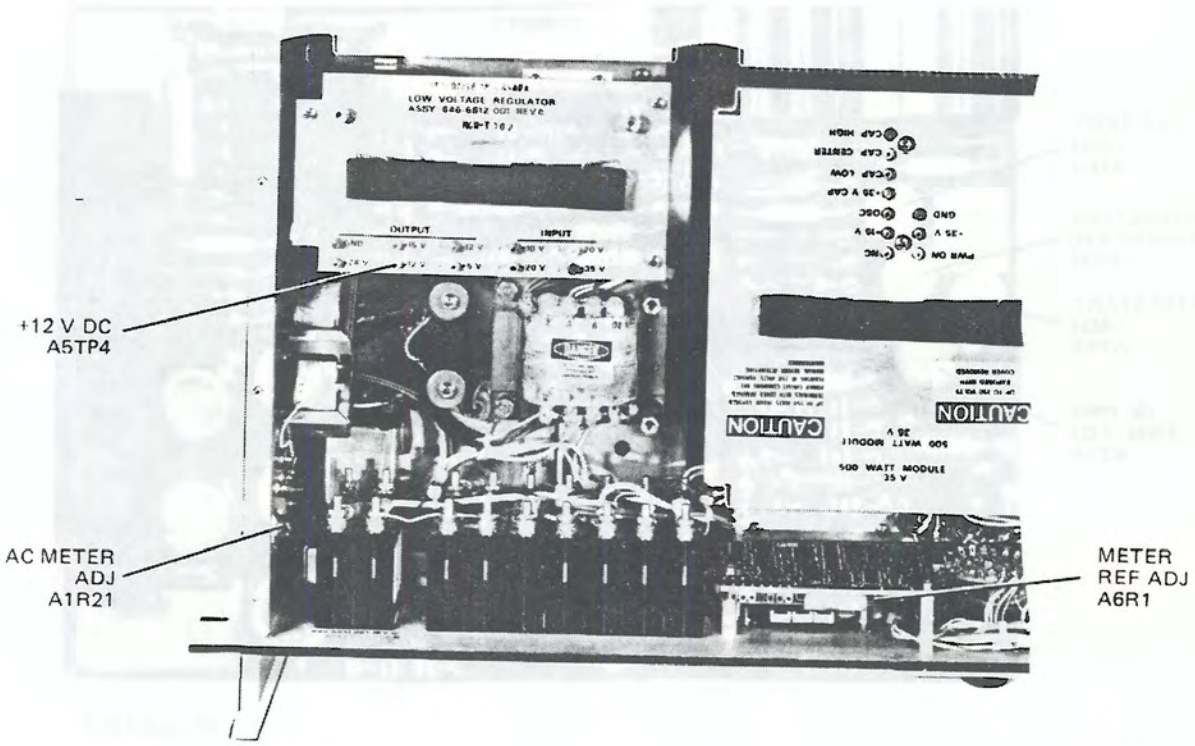
a. Remove 500-W converter module A4 from the power supply.
b. Connect a 0- to 60-V dc power source (with a 0.5-A current limit) between J2-7 (+) and J2-10 (-). Set power source for 0 V dc.
c. Set ac input power for 230 V ac.
d. Set VOLTMETER to +35 VDC.



Power Supply HF-8031 and HF-8032, Assemblies and Subassemblies
Figure 5-9 (Sheet 1 of 2)

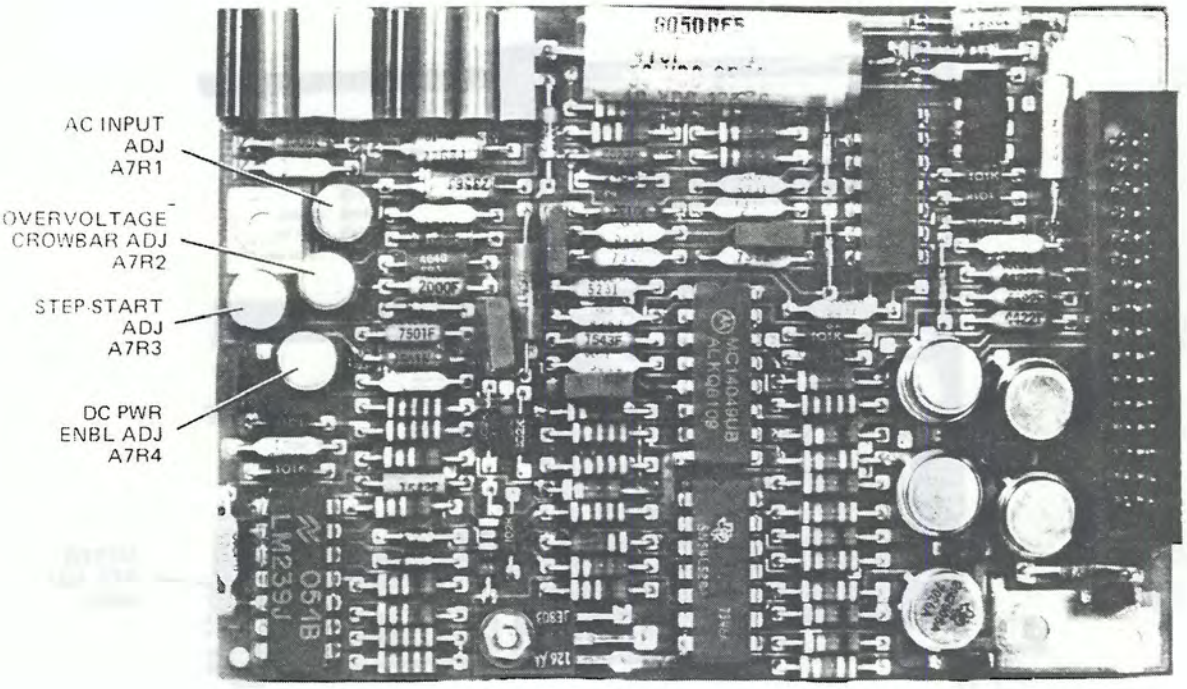


Power Supply HF-8031 and HF-8032, Assemblies and Subassemblies
Figure 5-9 (Sheet 2)



TPA-5506-017

Voltmeter Adjustments
Figure 5-10



Crowbar/Logic Card Adjustments
Figure 5-11

e. Slowly adjust 0- to 60-V dc power source toward 60 V dc. Stop adjustment just as soon as crowbar action occurs.
f. Set CB7 to OFF and note reading on VOLTMETER. It should be +38 to +42 V dc. If not, adjust A7R2 and repeat steps e and f until crowbar action occurs between +38 and +42 V dc.
g. Set ac input power to off.
h. Replace 500-W converter module A4 and remove 1000-W converter module A2 from the power supply.
i. Disconnect 0- to 60-V dc power source from J2-7 and J2-10 and reconnect it to J2-14 (+) and J2-17 (-). Set power source for 0 V dc.
j. Set CB4 to OFF.
k. Set ac input power for 230 V ac.
l. Set VOLTMETER to +50/40 VDC (A).
m. Slowly adjust 0- to 60-V dc power source toward 60 V dc. Stop adjustment just as soon as crowbar action occurs.
n. Set CB3 to OFF and note reading on VOLTMETER. It should be +54 to +56 V dc. If not, adjust A7R2 and repeat steps m and n until crowbar action occurs between +54 and +56 V dc.
o. Disconnect 0- to 60-V dc power source from J2-14 and J2-17 and reconnect it to J2-20 (+) and J2-23 (-). Set power source for 0 V dc.
p. Set CB3 to OFF and CB4 to ON.
q. Set VOLTMETER to +50/40 VDC (B).
r. Slowly adjust 0- to 60-V dc power source toward 60 V dc. Stop adjustment just as soon as crowbar action occurs.
s. Set CB4 to OFF and note reading on VOLTMETER. It should be +54 to +56 V dc. If not, adjust A7R2 and repeat steps r and s until crowbar action occurs between +54 and +56 V dc.
t. Set ac input power to off.
u. Replace 1000-W converter module A2 and remove 1000-W converter module A3 from the power supply.
v. Disconnect 0- to 60-V dc power source from J2-20 and J2-23 and reconnect it to J2-26 (+) and J2-29 (-). Set power source for 0 V dc.
w. Set CB6 to OFF.
x. Set ac input power for 230 V ac.
y. Set VOLTMETER to +50/40 VDC (C).
z. Slowly adjust 0- to 60-V dc power source toward 60 V dc. Stop adjustment just as soon as crowbar action occurs.
aa. Set CB5 to OFF and note reading on VOLTMETER. It should be +54 to +56 V dc. If not, adjust A7R2 and repeat steps z and aa until crowbar action occurs between +54 and +56 V dc.
ab. Disconnect 0- to 60-V dc power source from J2-26 and J2-29 and reconnect it to J2-32 (+) and J2-35 (-). Set power source for 0 V dc.
ac. Set CB5 to OFF and CB6 to ON.
ad. Set VOLTMETER to +50/40 VDC (D).
ae. Slowly adjust 0- to 60-V dc power source toward 60 V dc. Stop adjustment just as soon as crowbar action occurs.
af. Set CB6 to OFF and note reading on VOLTMETER. It should be +54 to +56 V dc. If not, adjust A7R2 and repeat steps ae and af until crowbar action occurs between +54 and +56 V dc.

ag. Replace 1000-W converter module A3.
ah. If any adjustments were made, repeat the procedures until no adjustment is required through entire procedure. If it does not appear possible to complete the procedure without making any adjustment, troubleshoot the crowbar circuit that appears to be the most out of adjustment.

5.5.3 Disassembly

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage.

NOTE

Do not attempt disassembly of the unit with primary power applied.

NOTE

Retain hardware removed during disassembly for use in reassembly. Refer to unit parts list as an aid in disassembly and assembly.

5.5.3.1 400- to 57-Hz Converter Module

NOTE

400- to 57-Hz converter module A8 is installed on rear of Power Supply HF-8032, part numbers 622-3512-002 and -005 only. Neither unit top or bottom cover needs to be removed to remove this module.

a. Loosen the four captive screws that secure the module to the rear panel.
b. When the captive screws have been completely loosened, carefully pull module from its position on the chassis assembly.

5.5.3.2 Plug-in Modules

a. Remove top cover by removing 14 screws that secure it in place.
b. After removing top cover, plug-in modules (A2, A3, A4, and A5) can be removed from chassis A1 by loosening four captive screws (one at each corner of module) and pulling the module straight up from its mounted position.

5.5.3.3 Crowbar/Logic Card A7

a. Remove 500-W converter module A4.
b. Disconnect P1 from A7J1.
c. Remove three screws, lockwashers, flat washers, and hexscrew posts that secure crowbar/logic card A7 in place. Lift A7 from its mounted position.

5.5.3.4 Digital Voltmeter Card A6

a. Remove 500-W converter module A4.
b. Disconnect P2 from A6J1.
c. Remove four screws, lockwashers, flat washers, and hexscrew posts that secure digital voltmeter card A6 in place. Lift A6 from its mounted position.

5.5.4 Assembly

Except for the subassemblies that are mounted on the back of the front panel, assembly of the unit is not in any certain order. These subassemblies (A6, A7) must be installed with 500-W converter module A7 removed. All converter modules will plug into the same connector; however, the 500-W converter module and 1000-W converter module input power is applied through different pins to prevent module operation and/or damage if they happen to be inserted in the wrong location. Refer to figure 5-9 for correct location of subassemblies/modules.

5.5.4.1 Digital Voltmeter Card A6

a. Place digital voltmeter card A6 in its mounted position.
b. Secure A6 using four screws, lockwashers, flat washers, and hexscrew posts removed during disassembly.
c. Connect P2 to A6J1.
d. Reinstall 500-W converter module A4 (if A7 is already installed).

5.5.4.2 Crowbar/Logic Card A7

a. Place crowbar/logic card A7 in its mounted position.
b. Secure A7 using three screws, lockwashers, flat washers, and hexscrew posts removed during disassembly.
c. Connect P1 to J7J1.
d. Reinstall 500-W converter module A4 (if A7 is already installed).

5.5.4.3 Plug-in Modules

a. Align plug-in module (A2, A3, A4, or A5) with its mating connector on chassis A1. Press module firmly in place.
b. Secure module in place using the four captive screws (one in each corner of the module).
c. Replace unit top cover and secure it in place using the 14 screws removed in disassembly.

5.5.4.4 400- to 57-Hz Converter Module A8

a. Carefully align connector J8P1 with mating connector (A1J11) on the rear panel. Press firmly in place.
b. Secure the 400- to 57-Hz converter module A8 in place by alternately tightening the four captive screws in a manner that seats the module evenly to the rear of the unit.

5.5.5 Repair

Repair of the power supply consists of replacing subassemblies and chassis-mounted components. For replacement of subassemblies, refer to paragraphs 5.5.3 and 5.5.4. Use standard shop practices to replace chassis-mounted components.

SECTION 6
PARTS LIST

6.1 INTRODUCTION

6.1.1 General

The purpose of this parts list, prepared by Collins Defense Communications of Rockwell International, is for identification and requisition of parts.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

6.1.2 Group Assembly Parts List

FIG-ITEM Column -- Digits preceding the dash are figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers on the illustrations.

PART NO Column -- Listed are MIL standard and vendor part numbers.

INDENT Column -- Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column -- Listed are the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching parts (AP), reference to other figures, and effectivities.

Attaching parts are identified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: Manufacturer Control Number (MCN) 101 and up; Configuration Identifier (CI) 5-digit number; Revision Identifier (REV) dash (--) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service Bulletins are identified by SB 1, SB 2, etc.

UNITS PER ASSY Column -- Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

USABLE ON CODE Column -- Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

6.1.3 Numerical Index

PART NUMBER Column -- Part numbers are listed in alphanumeric sequence.

FIG-ITEM Column -- Digits preceding the dash are figure numbers. Digits following the dash are item numbers.

TTL REQ Column -- Listed is the total quantity of parts or assemblies covered in the Group Assembly Parts List.

6.1.4 Reference Designation Index

REFERENCE DESIGNATION Column -- Reference designations are listed in alphanumeric sequence.

FIG-ITEM Column -- Digits preceding the dash are figure numbers. Digits following the dash are item numbers.

PART NUMBER Column -- Lists the MIL standard or vendor part number for each item in the parts list.

6.1.5 How To Use This Parts List

To locate a part number if the assembly in which the part is used is known, turn to the List of Illustrations and find the page number for the assembly in which the part is used. Locate the part and its index number on the illustration and find the index number on the Group Assembly Parts List page to determine its description and part number.

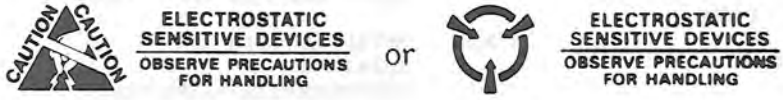
To locate the illustration for a part if the part number is known, refer to the Numerical Index and find the part number. Turn to the Group Assembly Parts List and find the first figure and index number indicated in the Numerical Index for that part. If this figure shows the part in a section or system of the equipment other than the one desired, refer to the other figure numbers listed in the Numerical Index.

To locate the illustration for a part if the reference designation is known, refer to the Reference Designation Index and find the symbol; turn to the Group Assembly Parts List and find the figure and index number indicated in the index.

CAUTION

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.



6.1.6 Manufacturer's Code, Name, and Address

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
A0262	PIONEER LITHO CO 1239 1ST AVE CEDAR RAPIDS IA 52402
00779	AMP INC EISENHOWER BLVD P O BOX 3608 HARRISBURG PA 17105
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT W GENESEE ST AUBURN NY 13021
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR 5005 E MCDOWELL RD PHOENIX AZ 85008-4229
05284	GASKET ENGINEERING CO INC 4500 E 75TH TERR P O BOX 5007 KANSAS CITY MO 64132-2054
06383	PANDUIT CORP 17301 RIDGELAND TINLEY PARK IL 60477-3048
06560	AIRCO INC AIRCO ELECTRONICS NOGALES AZ
08289	BLINN DELBERT CO INC THE 1678 E MISSION BLVD P O BOX 2007 POMONA CA 91769
11700	JB ELECTRONIC TRANSFORMERS INC 2300 W ARMITAGE AVE CHICAGO IL 60647-4424
12969	UNITRODE CORP 5 FORBES RD LEXINGTON MA 02173-7305
12998	QUALITY NAME PLATE INC MILL ROAD EAST GLASTONBURY CT 06025
13103	THERMALLOY CO INC 2021 W VALLEY VIEW LANE P O BOX 810839 DALLAS TX 75381
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
13556	TRW CYLINDRICAL CONNECTOR DIV OF TRW INC 8821 SCIENCE CENTER DR MINNEAPOLIS MN 55428-3619
14099	SEMTECH CORP 652 MITCHELL ROAD NEWBURY PARK CA 91320-2211
14752	ELECTRO CUBE INC 1710 S DEL MAR AVE SAN GABRIEL CA 91776-3825
15857	MODULAR ELECTRONICS CO INC 4386 E LA PALMA AVE ANAHEIM CA 92807-1806
17117	ELECTRONIC MOLDING CORP 96 MILL ST WOONSOCKET RI 02895-8418
18565	CHOMERICS INC 77 DRAGON COURT WOBURN MA 01801-1039
18677	SCANBE MFG CO DIV OF ZERO CORP 3445 FLETCHER AVE EL MONTE CA 91731
24931	SPECIALTY CONNECTOR CO INC 2100 EARLYWOOD DR P O BOX 547 FRANKLIN IN 46131
27264	MOLEX INC 2222 WELLINGTON COURT LISLE IL 60532-1613
28480	HEWLETT-PACKARD CO CORPORATE HQ 3000 HANOVER ST PALO ALTO CA 94304-1112
32997	BOURNS INC TRIMPOT DIV 1200 COLUMBIA AVE RIVERSIDE CA 92507-2114
44655	OHMITE MFG CO 3601 W HOWARD ST SKOKIE IL 60076-4014
46384	PENN ENGINEERING AND MFG CORP OLD EASTON RD P O BOX 1000 DANBORO PA 18916
50930	ACUSHNET CAPACITOR CO INC 720 BELLEVILLE AVE P O BOX B972 NEW BEDFORD MA 02741
51406	MURATA ERIE NORTH AMERICA INC GEORGIA OPERATIONS 1148 FRANKLIN RD SE MARIETTA GA 30067-8908
55616	ELFAB CORP 4200 WILEY POST RD P O BOX 34555 DALLAS TX 75234
56289	SPRAGUE ELECTRIC CO 1600 CURRAN MEMORIAL HIGHWAY NORTH ADAMS MA 01247-3987
59518	METALAGRAPHICS INC 18143 NAPA ST NORTHRIDGE CA 91325-3319
59660	TUSONIX INC 2155 N FORBES BLVD SUITE 107 TUCSON AZ 85745-1413
59730	THOMAS AND BETTS CORP HWY 218 S IOWA CITY IA 52240
60705	CERA-MITE CORP 1327 6TH AVE GRAFTON WI 53024-1831
66844	POWEREX INC HILLIS ST YOUNGWOOD PA 15697
71279	MIDLAND-ROSS CORP CAMBION DIV ONE ALEWIFE PLACE CAMBRIDGE MA 02140-2310
71468	ITT CANNON DIV OF ITT CORP 10550 TALBERT AVE P O BOX 8040 FOUNTAIN VALLEY CA 92708
71744	GENERAL INSTRUMENT CORP LAMP DIV /WORLDWIDE/ 4433 N RAVENSWOOD AVE CHICAGO IL 60640-5802
71785	TRW INC TRW CINCH CONNECTORS DIV 1501 MORSE AVE ELK GROVE VILLAGE IL 60007-5723
72962	ELASTIC STOP NUT A DIV OF HARVARD INDUSTRIES INC 2330 VAUXHALL RD UNION NJ 07083-5038

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
72982	MURATA ERIE NORTH AMERICA INC ERIE OPRATIONS 645 W 11TH ST ERIE PA 16512
74193	HEINEMANN ELECTRIC CO 2600 BRUNSWICK PIKE RT 1 P O BOX 6800 LAWRENCEVILLE NJ 08648-4105
74868	ALLIED CORP AMPHENOL PRODUCTS DIV R F CONNECTOR OPERATIONS 33 E FRANKLIN ST DANBURY CT 06810-5803
74921	ITEN INDUSTRIES 4001 BENEFIT AVE P O BOX 9 ASHTABULA OH 44004-5453
75037	MINNESOTA MINING AND MFG CO ELECTRO PRODUCTS DIV 3M CENTER ST PAUL MN 55101-1428
76854	OAK SWITCH SYSTEMS INC SUB OF OAK TECHNOLOGY INC 100 S MAIN ST P O BOX 517 CRYSTAL LAKE IL 60014-6201
77147	PATTON-MACGUYER CO DIV OF AVID CORP 17 VIRGINIA AVE PROVIDENCE RI 02905-4441
77250	ALLIED PRODUCTS CORP PHEOLL MFG CO DIV 5700 W ROOSEVELT RD CHICAGO IL 60650-1156
77342	AMF INC POTTER AND BRUMFIELD DIV 200 RICHLAND CREEK DR PRINCETON IN 47671
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIVISION ST CHARLES ROAD ELGIN IL 60120
78832	TURNER AND SEYMOUR MFG CO THE FOUNDRY DIV 100 LAWTON ST TORRINGTON CT 06790-6715
79807	WROUGHT WASHER MFG INC 2100 S BAY ST MILWAUKEE WI 53207-1208
79963	ZIERICK MFG CO RADIO CIRCLE MT KISCO NY 10549
80058	JOINT ELECTRONICS TYPE DESIGNATION SYSTEM ALL INQUIRIES REFERRED TO JETDS NOMENCLATURE CARDS
80145	LFE CORP PROCESS CONTROL DIV 55 GREEN ST CLINTON MA 01510-3002
80205	NATIONAL AEROSPACE STANDARDS COMMITTEE AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA INC 1725 DE SALES ST WASHINGTON DC
80223	TRW ELECTRONICS AND DEFENSE SECTOR INDUCTIVE PRODUCTS DIV MILITARY OPERATION 150 VARICK ST NEW YORK NY 10013-1218
81349	MILITARY SPECIFICATIONS
81352	AIR FORCE-NAVY AERONAUTICAL SPECIFICATIONS
81541	AIRPAX CORP CAMBRIDGE DIV A NORTH AMERICAN PHILIPS CO WOODS ROAD P O BOX 520 CAMBRIDGE MD 21613
81774	CAROL CABLE CO INC 249 ROOSEVELT AVE P O BOX 68 PAWTUCKET RI 02862
82877	ROTRON INC CUSTOM DIV 7 HASBROUCK LN WOODSTOCK NY 12498-1807
82879	ITT ROYAL ELECTRIC DIV 95 GRAND AVE PAWTUCKET RI 02862
83777	E-SYSTEMS INC MEMCOR DIV FLORIDA OPERATIONS 5426 W CRENSHAW RD TAMPA FL 33614-3009
86797	ROGAN CORP 3455 WOODHEAD DR NORTHBROOK IL 60062-1812

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
88044	AERONAUTICAL STANDARDS GROUP DEPT OF NAVY AND AIR FORCE
90095	TECHNITROL INC 1952 E ALLEGHENY AVE PHILADELPHIA PA 19134-3122
91663	ARMEL ELECTRONICS INC 1601 75TH STREET NORTH BERGEN NJ 07047-4046
91836	KINGS ELECTRONICS CO INC 40 MARBLEDALE ROAD TUCKAHOE NY 10707-3420
91886	MICRODOT MFG INC MALCO MFG DIV 12 PROGRESS DR MONTGOMERYVILLE PA 18936
91929	HONEYWELL INC MICRO SWITCH DIV 11 W SPRING ST FREEPORT IL 61032-4316
94375	AUTOMATIC CONNECTOR INC 400 MORELAND RD COMMACK NY 11725-5707
95105	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
95263	LEECRAFT MFG CO INC 21-16 44TH RD LONG ISLAND CITY NY 11101-5023
96906	MILITARY STANDARDS
98291	SEALECTRO CORP BICC ELECTRONICS 40 LINDEMAN DR TRUMBULL CT 06611-4739

6.1.7 Usable On Codes

6.1.7.1 The following usable on codes have been assigned for the 1-kW Power Amplifier HF-8023.

USABLE ON CODE	UNIT PART NUMBER	FIG-ITEM
A	622-3490-001	6-1-
B	622-3490-002	6-1-
C	622-3490-006	6-1-

6.1.7.2 The following usable on codes have been assigned for the Power Supply HF-8031 and HF-8032.

USABLE ON CODE	UNIT PART NUMBER	FIG-ITEM
A	622-3491-001	6-4-
B	622-3512-001	6-4-
C	622-3512-002	6-4-
D	622-3512-004	6-4-
E	622-3512-005	6-4-
F	622-3491-003	6-4-

6.1.8 Reference Designation Prefixes

6.1.8.1 The following prefixes have been assigned for the 1-kW Power Amplifier HF-8023.

PREFIX	UNIT PART NUMBER	FIG-ITEM
A1	646-6433-001	6-2-
A1	646-6433-005	6-2-
A1A1	642-2634-002	6-3-
A1A2	642-3588-001	6-2-44
A1A2	642-3588-003	6-2-44
A1A3	646-6435-001	6-2-88
A1A3W3	646-6438-001	6-2-105
A1A4	642-3586-001	6-2-22
A1A4	642-3586-002	6-2-22
A1W1	646-6436-001	6-2-54
A1W1	646-6436-004	6-2-54
A1W2	646-6437-001	6-2-37
A2	646-6407-001	6-1-9
A3	646-6406-001	6-1-8
A3	646-6406-002	6-1-8
A4	646-6406-001	6-1-7
A4	646-6406-002	6-1-7
A5	646-6406-001	6-1-6
A5	646-6406-002	6-1-6

PREFIX	UNIT PART NUMBER	FIG-ITEM
A6	646-6406-001	6-1-5
A6	646-6406-002	6-1-5
A7	646-7120-001	6-1-13
A8	646-6400-002	6-1-14
A9	642-3592-001	6-1-10
A10	642-3593-001	6-1-11
A11	635-0745-001	6-1-12
A13	646-6430-001	6-1-22
A13	622-3505-001	6-1-22
W1	646-6439-001	6-1-37
W2	651-4426-001	6-1-18

6.1.8.2 The following prefixes have been assigned for the Power Supply HF-8031 and HF-8032.

PREFIX	UNIT PART NUMBER	FIG-ITEM
A1	646-6884-001	6-5-
A1	646-6884-002	6-5-
A1	646-6884-003	6-5-
A1	646-6884-005	6-5-
A1	646-6884-006	6-5-
A1	646-6884-007	6-5-
A1A1	652-2255-001	6-6-
A1A1W1	652-2256-001	6-6-26
A1W1	646-7000-001	6-5-153
A1W1	646-7000-002	6-5-153
A1W1	646-7000-004	6-5-153
A1W1	646-7000-005	6-5-153
A2	646-6883-001	6-3-4
A3	646-6883-001	6-3-5
A4	646-6882-001	6-3-6
A5	646-6812-001	6-3-7
A6	642-3197-001	6-3-9
A7	642-3579-001	6-3-8
A8	651-4140-001	6-3-10

6.1.9 Configuration Identifiers

6.1.9.1 The following CI's/REV LTR's were used in compiling data for the 1-kW Power Amplifier HF-8023.

CI/REV LTR	UNIT PART NUMBER	FIG-ITEM
Y	622-3490-001	6-1-
Y	622-3490-002	6-1-
Y	622-3490-006	6-1-
B	651-4426-001	6-1-18
D	646-6430-001	6-1-22
D	646-6439-001	6-1-37

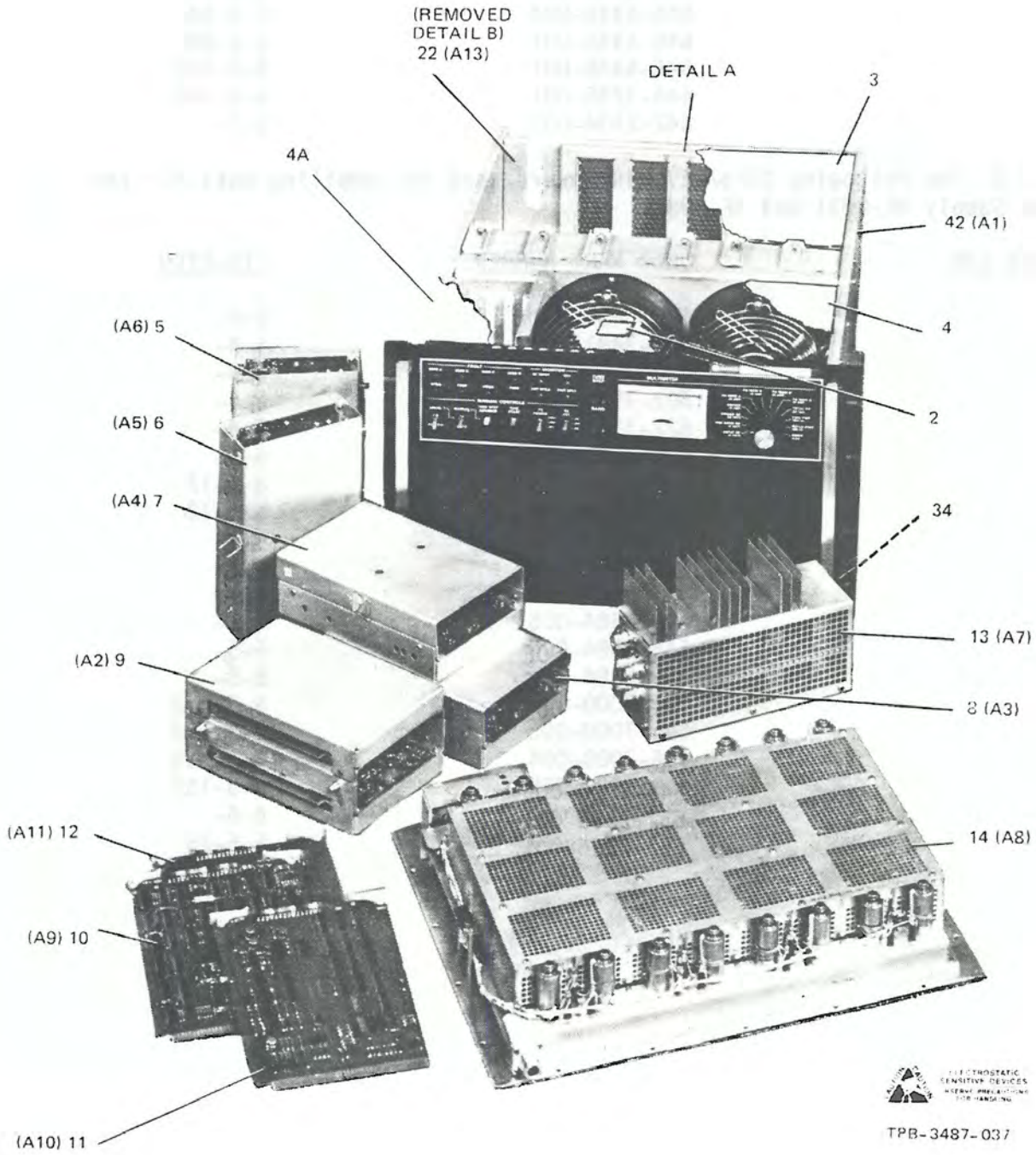
CI/REV LTR	UNIT PART NUMBER	FIG-ITEM
AC	646-6433-001	6-2-
AC	646-6433-005	6-2-
M	646-6437-001	6-2-37
L	642-3588-001	6-2-44
J	642-3588-003	6-2-44
P	646-6436-001	6-2-54
P	646-6436-004	6-2-54
K	646-6435-001	6-2-88
E	646-6438-001	6-2-105
K	646-3295-001	6-2-109
L	642-2634-002	6-3-

6.1.9.2 The following CI's/REV LTR's were used in compiling data for the Power Supply HF-8031 and HF-8032.

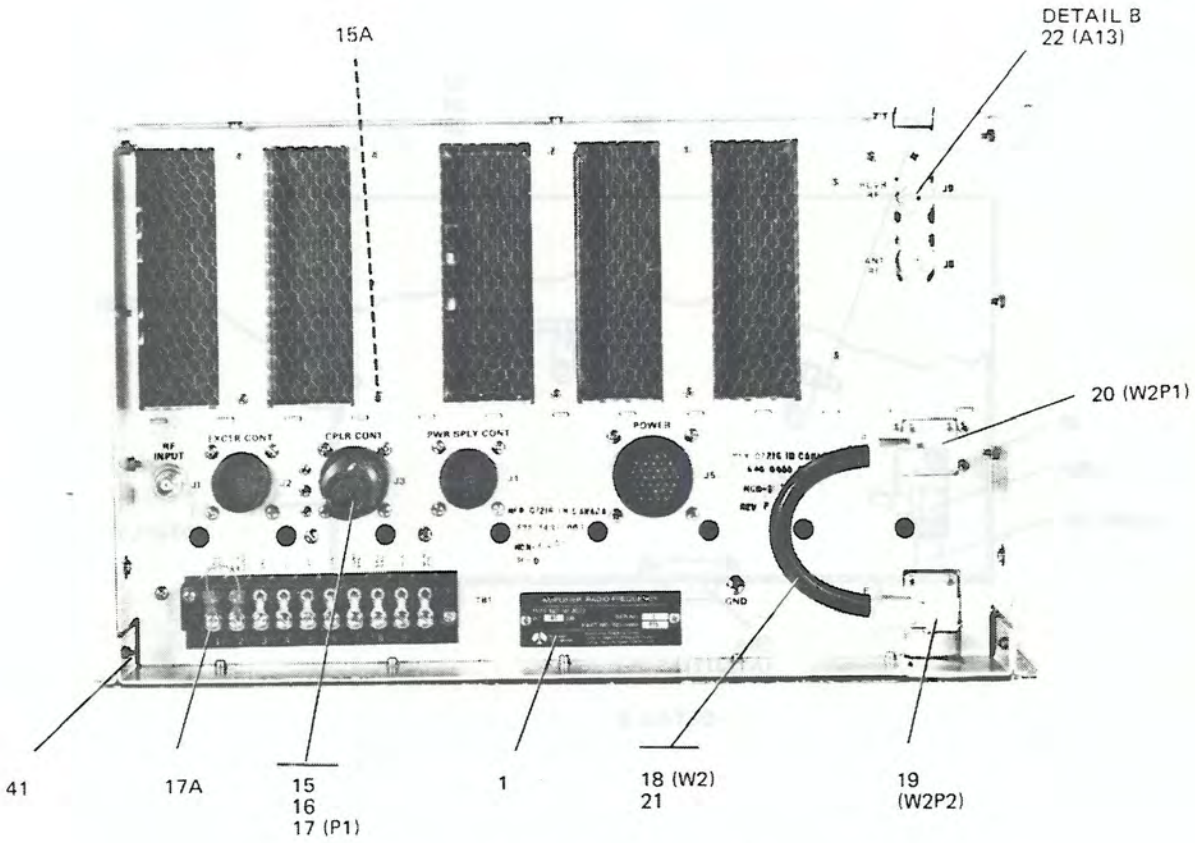
CI/REV LTR	UNIT PART NUMBER	FIG-ITEM
H	622-3491-001	6-4-
H	622-3491-003	6-4-
L	622-3512-001	6-4-
L	622-3512-002	6-4-
L	622-3512-004	6-4-
L	622-3512-005	6-4-
F	647-2547-001	6-4-12
F	647-2547-002	6-4-12
AA	646-6884-001	6-5-
AA	646-6884-002	6-5-
AA	646-6884-003	6-5-
AA	646-6884-005	6-5-
AA	646-6884-006	6-5-
AA	646-6884-007	6-5-
M	646-7000-001	6-5-153
M	646-7000-002	6-5-153
M	646-7000-004	6-5-153
M	646-7000-005	6-5-153
C	652-2255-001	6-6-
A	652-2256-001	6-6-26

6.2 PARTS LIST FOR 1-KW POWER AMPLIFIER HF-8023

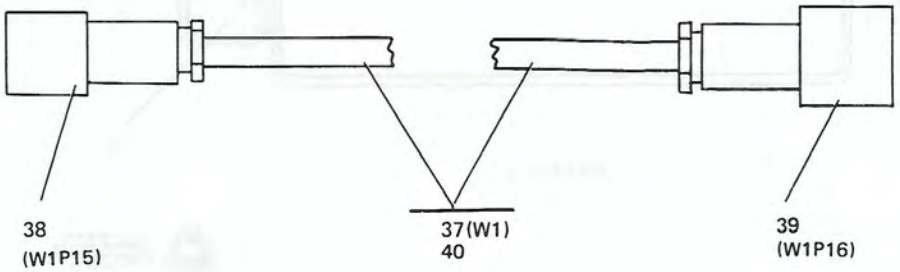
6.2.1 Group Assembly Parts List



1-kW Power Amplifier HF-8023, Parts Location Diagram
Figure 6-1 (Sheet 1 of 3)



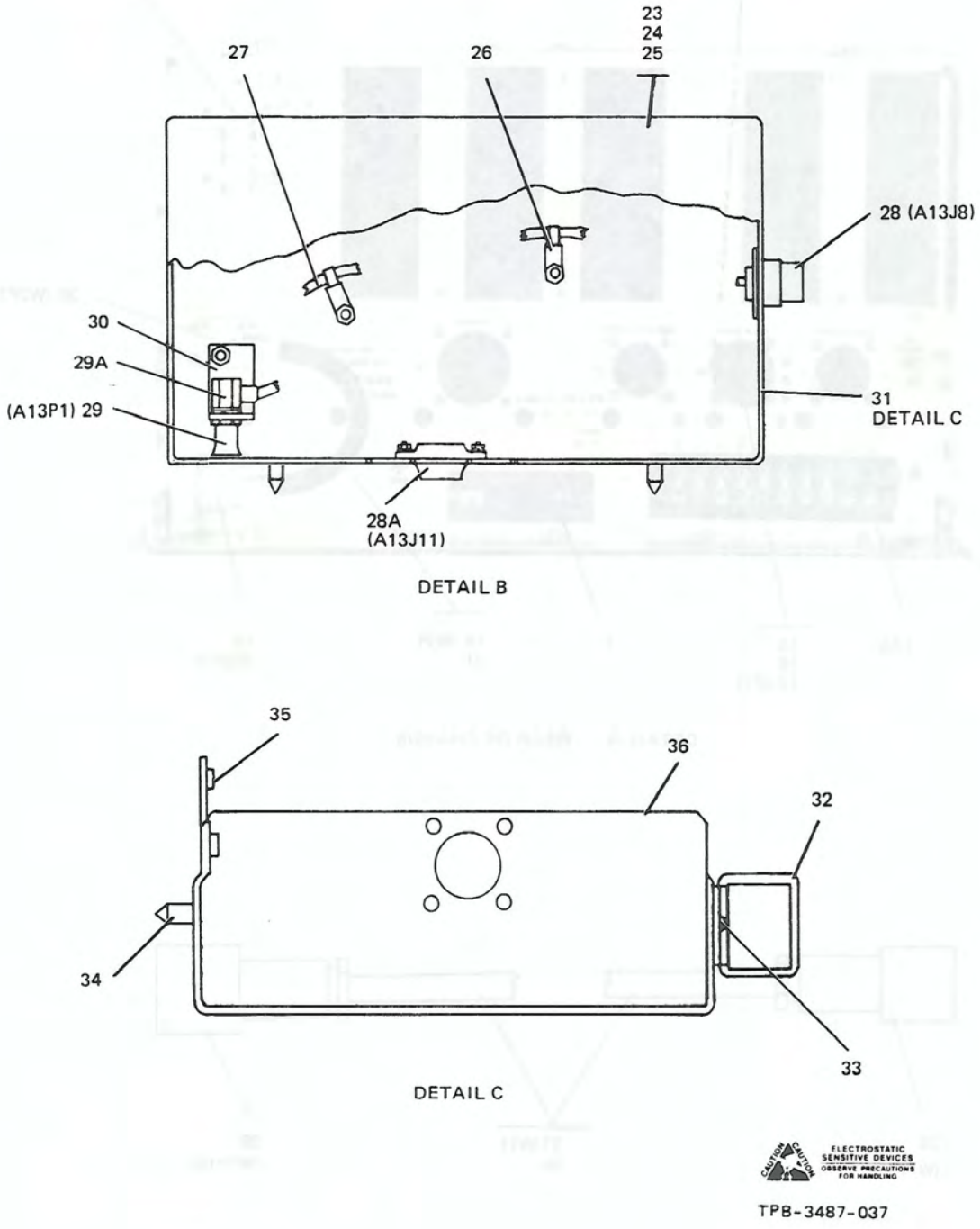
DETAIL A REAR OF CHASSIS



ELECTROSTATIC SENSITIVE DEVICES
OBSERVE PRECAUTIONS FOR HANDLING

TPB-3487-037

1-kW Power Amplifier HF-8023, Parts Location Diagram
Figure 6-1 (Sheet 2)



1-kW Power Amplifier HF-8023, Parts Location Diagram
Figure 6-1 (Sheet 3)

GROUP ASSEMBLY PARTS LIST

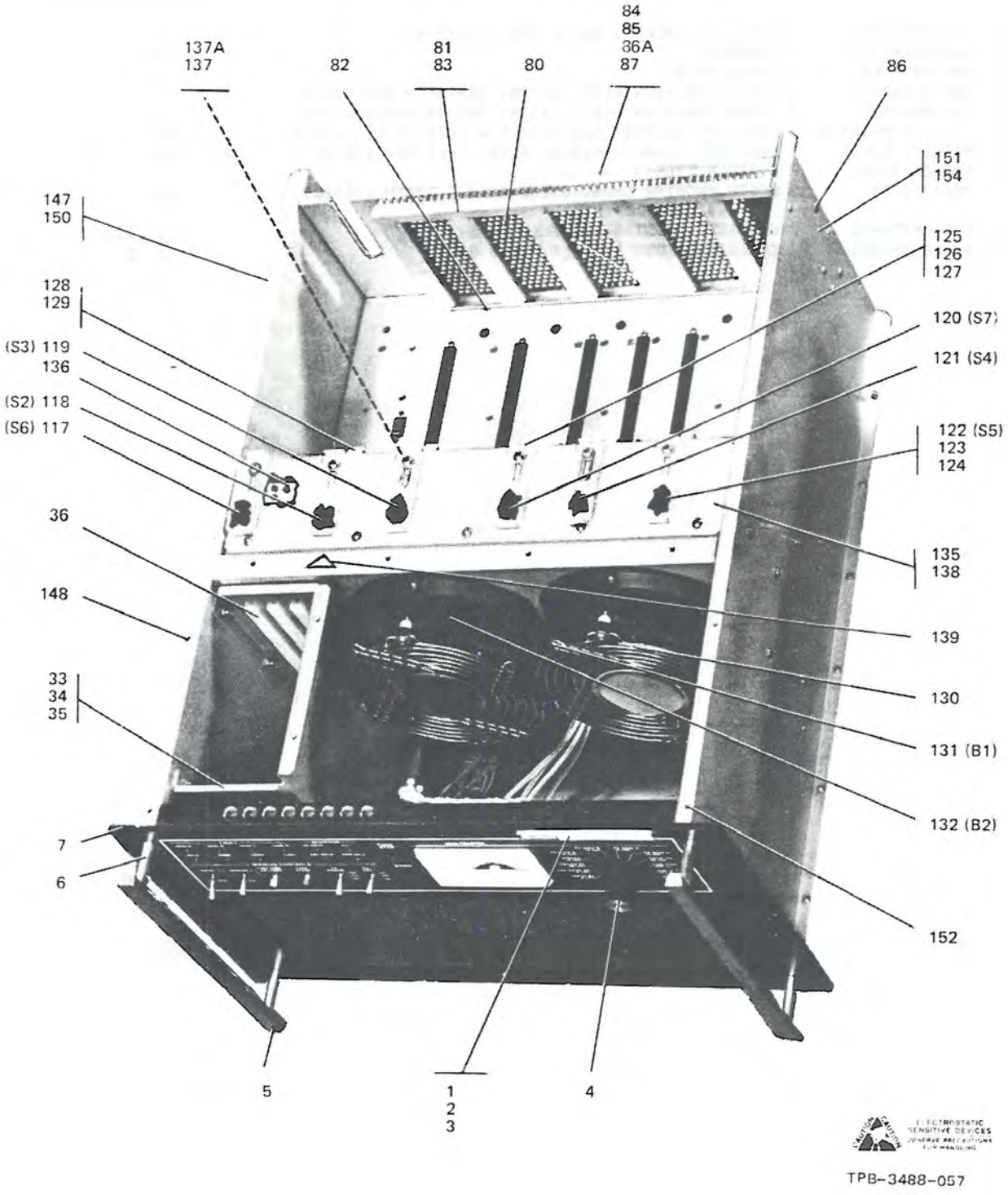
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-1-	622-3490-001	1	POWER AMPLIFIER, 1-KW HF-8023	1	A
	622-3490-002	1	POWER AMPLIFIER, 1-KW HF-8023	1	B
	622-3490-006	1	POWER AMPLIFIER, 1-KW HF-8023	1	C
1	642-0040-001	2	PLATE,IDENT	1	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	2	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP) (EFF TO REV LTR N)	2	A,B
2	280-2745-020	2	LABEL,WARNING (12998)	1	
3	646-6423-001	2	COVER,PROTECTIVE (EFF TO REV LTR J)	1	A,B
3	646-6423-002	2	COVER,PROTECTIVE (EFF REV LTR J)	1	A,B
3	646-6423-002	2	COVER, PROTECTIVE	1	C
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	17	
4	646-6434-001	2	PLATE,BAFFLE	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	1	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	1	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	7	
4A	652-0998-001	2	COVER,ACCESS (EFF REV LTR J)	1	A,B
4A	652-0998-001	2	COVER, ACCESS	1	C
5	646-6406-001	2	POWER AMPLIFIER OUTPUT MODULE A6 (EFF TO REV LTR H)SB 102	1	A,B
5	646-6406-002	2	POWER AMPLIFIER OUTPUT MODULE A6 (EFF REV LTR H)SB 102	1	A,B
5	646-6406-002	2	POWER AMPLIFIER OUTPUT MODULE A6	1	C
6	646-6406-001	2	POWER AMPLIFIER OUTPUT MODULE A5 (EFF TO REV LTR H)SB 102	1	A,B
6	646-6406-002	2	POWER AMPLIFIER OUTPUT MODULE A5 (EFF REV LTR H)SB 102	1	A,B
6	646-6406-002	2	POWER AMPLIFIER OUTPUT MODULE A5	1	C
7	646-6406-001	2	POWER AMPLIFIER OUTPUT MODULE A4 (EFF TO REV LTR H)SB 102	1	A,B
7	646-6406-002	2	POWER AMPLIFIER OUTPUT MODULE A4 (EFF REV LTR H)SB 102	1	A,B
7	646-6406-002	2	POWER AMPLIFIER OUTPUT MODULE A4	1	C
8	646-6406-001	2	POWER AMPLIFIER OUTPUT MODULE A3 (EFF TO REV LTR H)SB 102	1	A,B
8	646-6406-002	2	POWER AMPLIFIER OUTPUT MODULE A3 (EFF REV LTR H)SB 102	1	A,B
8	646-6406-002	2	POWER AMPLIFIER OUTPUT MODULE A3	1	C
9	646-6407-001	2	DRIVER MODULE (ESDS) A2	1	
10	642-3592-001	2	DIGITAL CONTROL CARD (ESDS) A9	1	
11	642-3593-001	2	ANALOG CONTROL CARD (ESDS) A10	1	
12	635-0745-001	2	HF-80 INTERFACE CARD (ESDS) A11	1	
13	646-7120-001	2	POWER COMBINER A7	1	
	MS51957-43	2	SCREW,MACHINE SST, 8-32 X 3/8 (96906) 343-0187-000 (AP)	4	
14	646-6400-002	2	LOW-PASS FILTER ASSEMBLY (ESDS) A8	1	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	18	
15	206070-1	2	CONNECTOR,CAB CLAMP ELEC (00779) 372-0514-050	1	
15A	C0012	2	CHAIN,WELDLESS (78832) 015-0325-000 (EFF REV LTR J)	AR	A,B
15A	C0012	2	CHAIN,WELDLESS (78832) 015-0325-000	AR	C
16	66506-9	2	CONTACT,PIN ELEC (00779) 372-0514-080	2	
17	206039-1	2	CONNECTOR,PLUG ELEC (00779) 372-0514-040 P1 (USED WITH A1W1J3)	1	
17A	MS25036-101	2	TERMINAL,LUG (96906) 304-0127-000	2	
18	651-4426-001	2	CABLE,RF W2	1	
19	M39012/05-0101	3	CONNECTOR,PLUG ELEC (81349) 357-9363-000 W2P2	1	
20	M39012/05-0101	3	CONNECTOR,PLUG ELEC (81349) 357-9363-000 W2P1	1	

GROUP ASSEMBLY PARTS LIST

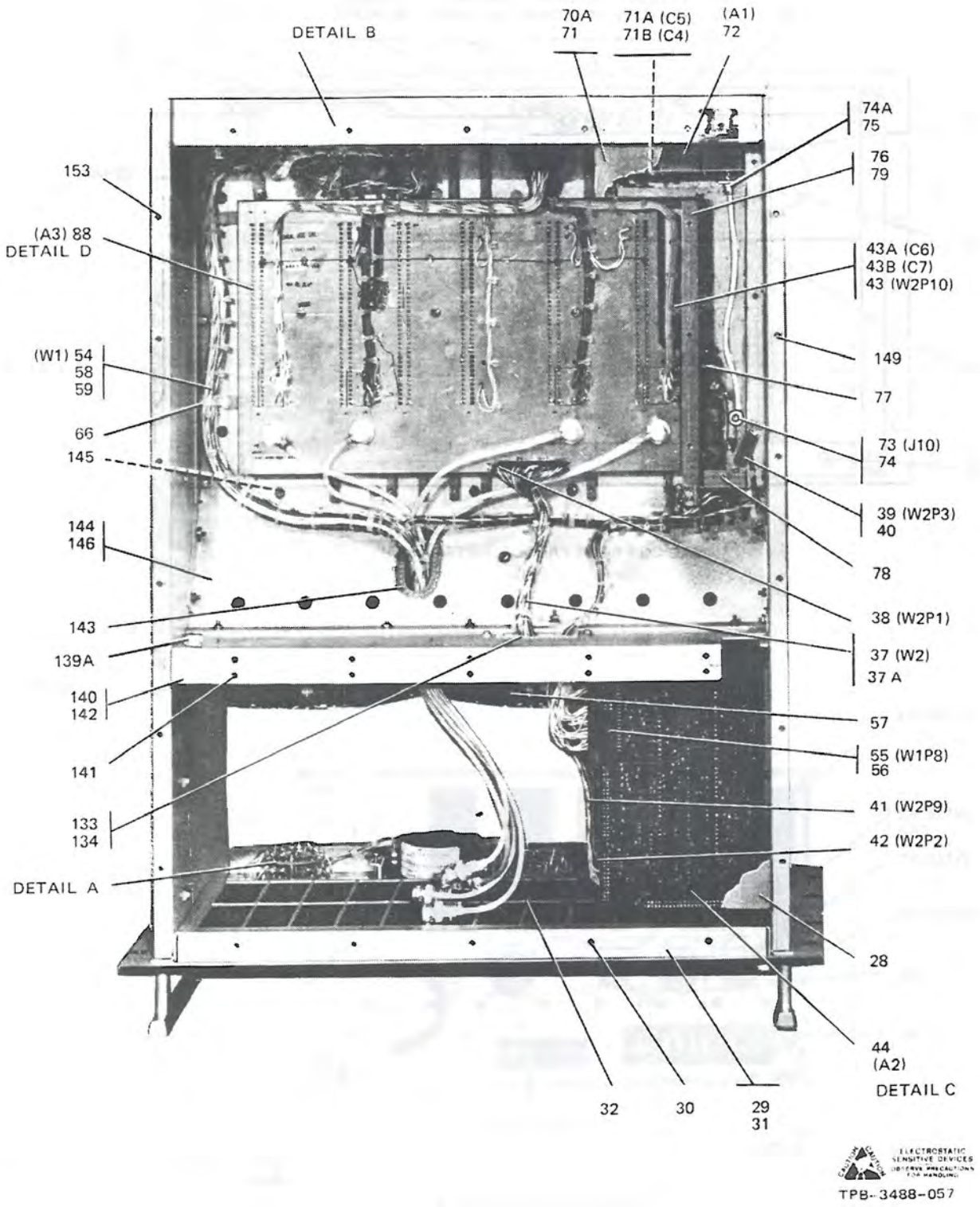
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-1-21	M17/74-RG213	3	CABLE,RF (81349) 425-0952-000	AR	
22	622-3505-001	2	MODULE,TR RELAY (P/O AC-8023) A13 (SEE PUB 523-0771679)	1	B,C
22	646-6430-001	2	MODULE,COAXIAL JUMPER A13	1	A
23	646-6425-001	3	COVER	1	
	NPBRS0.112-40	3	NUT,PLAIN,HEXAGON NP BRS, 0.112-40 (77250) 313-0051-000 (AP) (EFF TO REV LTR A)	7	
	MS35338-97	3	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP) (EFF TO REV LTR A)	7	
	MS51959-15	3	SCREW,MACHINE CRES, 0.112-40 X 0.38 (96906) 342-0046-000 (AP)	4	
	MS51957-15	3	SCREW,MACHINE STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	3	
24	333-1455-030	4	NUT,SELF-LOCKING CD PL STL, 0.138-32	1	
25	646-6425-002	4	COVER	1	
26	SSC-4S-S6	3	CLAMP,LOOP (06383) 435-0001-070	2	
	NPBRS0.112-40	3	NUT,PLAIN,HEXAGON NP BRS, 0.112-40 (77250) 313-0051-000 (AP)	2	
	MS35338-97	3	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	2	
	MS15795-803	3	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	2	
	MS51959-15	3	SCREW,MACHINE CRES, 0.112-40 X 0.38 (96906) 342-0046-000 (AP)	2	
27	M17/111-RG303/U	3	CABLE,RF (81349) 425-1492-000 (EFF TO REV LTR B)	AR	
27	M17/128-RG400	3	CABLE,RF (81349) 425-0218-010 (EFF REV LTR B)	AR	
28	M39012/04-0002	3	CONNECTOR,RCPT ELEC (81349) 357-9003-000 A13J8 (EFF TO REV LTR B)	1	
28	KN-19-02	3	CONNECTOR,RCPT ELEC (91836) 357-9692-010 A13J8 (EFF REV LTR B)	1	
	NPBRS0.112-40	3	NUT,PLAIN,HEXAGON NP BRS, 0.112-40 (77250) 313-0051-000 (AP)	4	
	4007-4HOTTINNED	3	TERMINAL,LUG (77147) 304-0015-000 (AP) (EFF TO REV LTR B)	1	
	MS35338-97	3	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	4	
	MS51959-14	3	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	4	
28A	DEM-9P-A176	3	CONNECTOR,RCPT ELEC (71468) 371-0168-000 A13J11 (EFF REV LTR B)	1	
	NPBRS0.112-40	3	NUT,PLAIN,HEXAGON NP BRS, 0.112-40 (77250) 313-0051-000 (AP)	2	
	MS35338-97	3	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	2	
	MS51959-14	3	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	2	
29	33JR171-1	3	CONNECTOR,RCPT ELEC (24931) 357-9210-010 A13P1	1	
29A	33T100-3	3	SHIELD,CONNECTOR (24931) 357-9260-000 (EFF REV LTR B)	1	
	1218-02	3	WASHER,LOCK CD PL STL, 0.322 ID X 0.435 OD (78189) 373-0080-000 (AP)	1	
30	642-2641-001	3	BRACKET,CONN	1	
	NPBRS0.112-40	3	NUT,PLAIN,HEXAGON NP BRS, 0.112-40 (77250) 313-0051-000 (AP)	2	
	MS35338-97	3	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	2	
	MS51959-15	3	SCREW,MACHINE CRES, 0.112-40 X 0.38 (96906) 342-0046-000 (AP)	2	
31	646-6424-001	3	CHASSIS	1	
32	546-6127-002	4	HANDLE,COVER	1	
33	546-6126-002	4	CLIP	1	
	MS16535-77	4	RIVET,TUBULAR AL, 0.089 DIA X 0.156 (96906) 305-1756-000 (AP)	2	
34	541-6560-002	4	PIN,LOCATING	2	

GROUP ASSEMBLY PARTS LIST

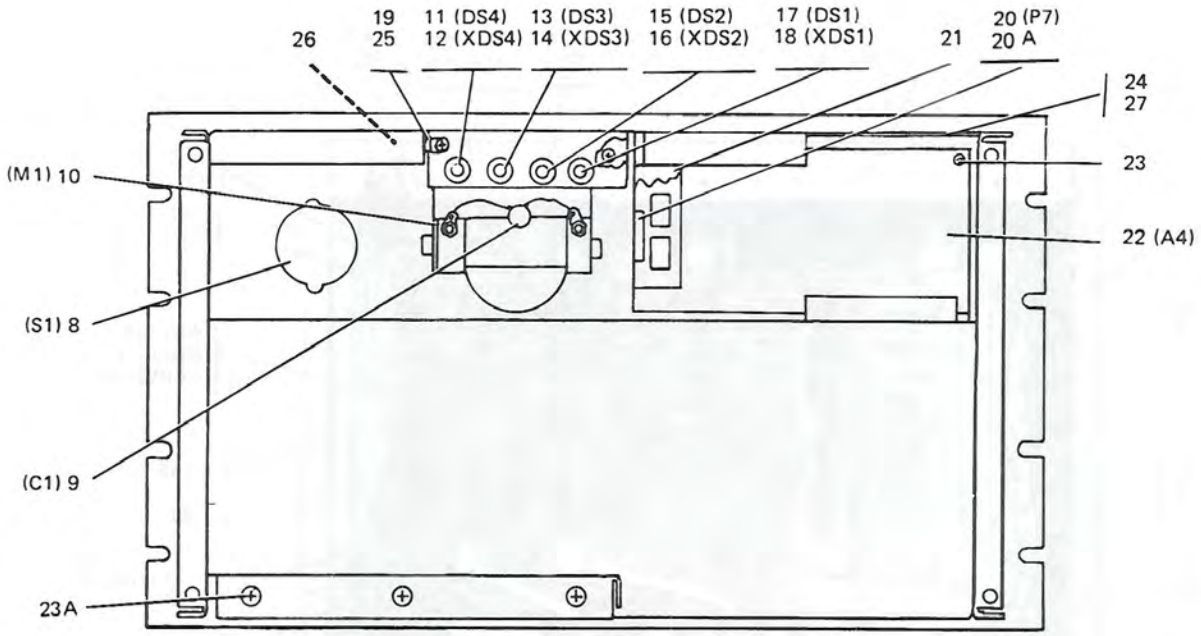
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-1-35	333-1455-020	4	NUT,SELF-LOCKING CD PL STL, 0.112-40	7	
36	646-6424-002	4	CHASSIS	1	
37	646-6439-001	2	CABLE,RF W1	1	
38	101-N1100A	3	CONNECTOR,PLUG ELEC (94375) 357-9519-000 W1P15	1	
39	101-N1100A	3	CONNECTOR,PLUG ELEC (94375) 357-9519-000 W1P16	1	
40	M17/111-RG303/U	3	CABLE,RF (81349) 425-1492-000 (EFF TO REV LTR A)	AR	
40	M17/128-RG400	3	CABLE,RF (81349) 425-0218-010 (EFF REV LTR A)	AR	
41	642-2633-001	2	PLATE,BOTTOM	1	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	10	
42	646-6433-001	2	CHASSIS (ESDS) A1 (SEE FIG 6-2)	1	A,B
42	646-6433-005	2	CHASSIS (ESDS) A1 (SEE FIG 6-2)	1	C



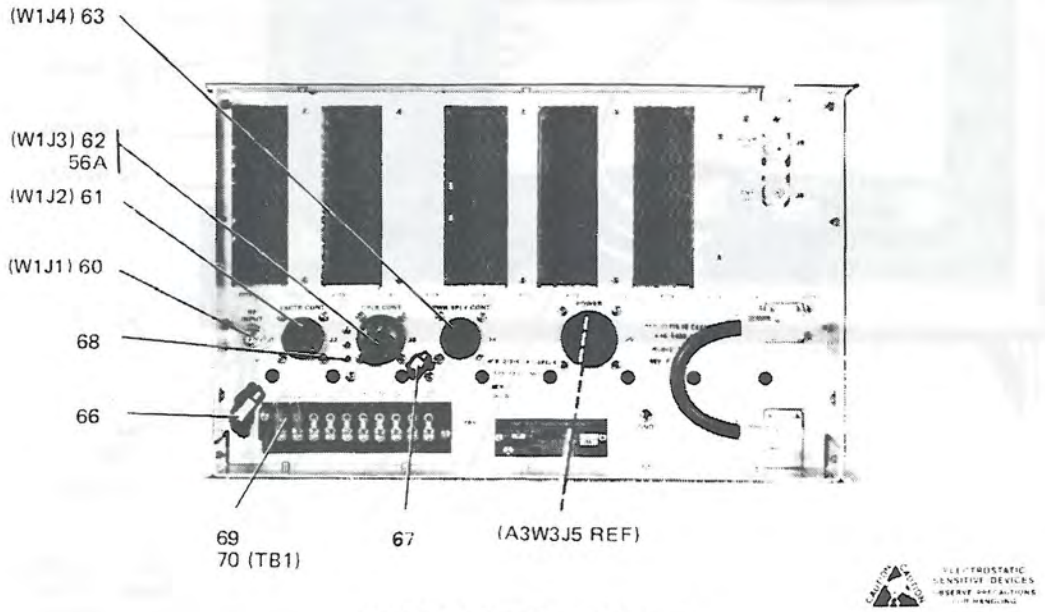
Chassis A1, Parts Location Diagram
Figure 6-2 (Sheet 1 of 5)



Chassis A1, Parts Location Diagram
Figure 6-2 (Sheet 2)



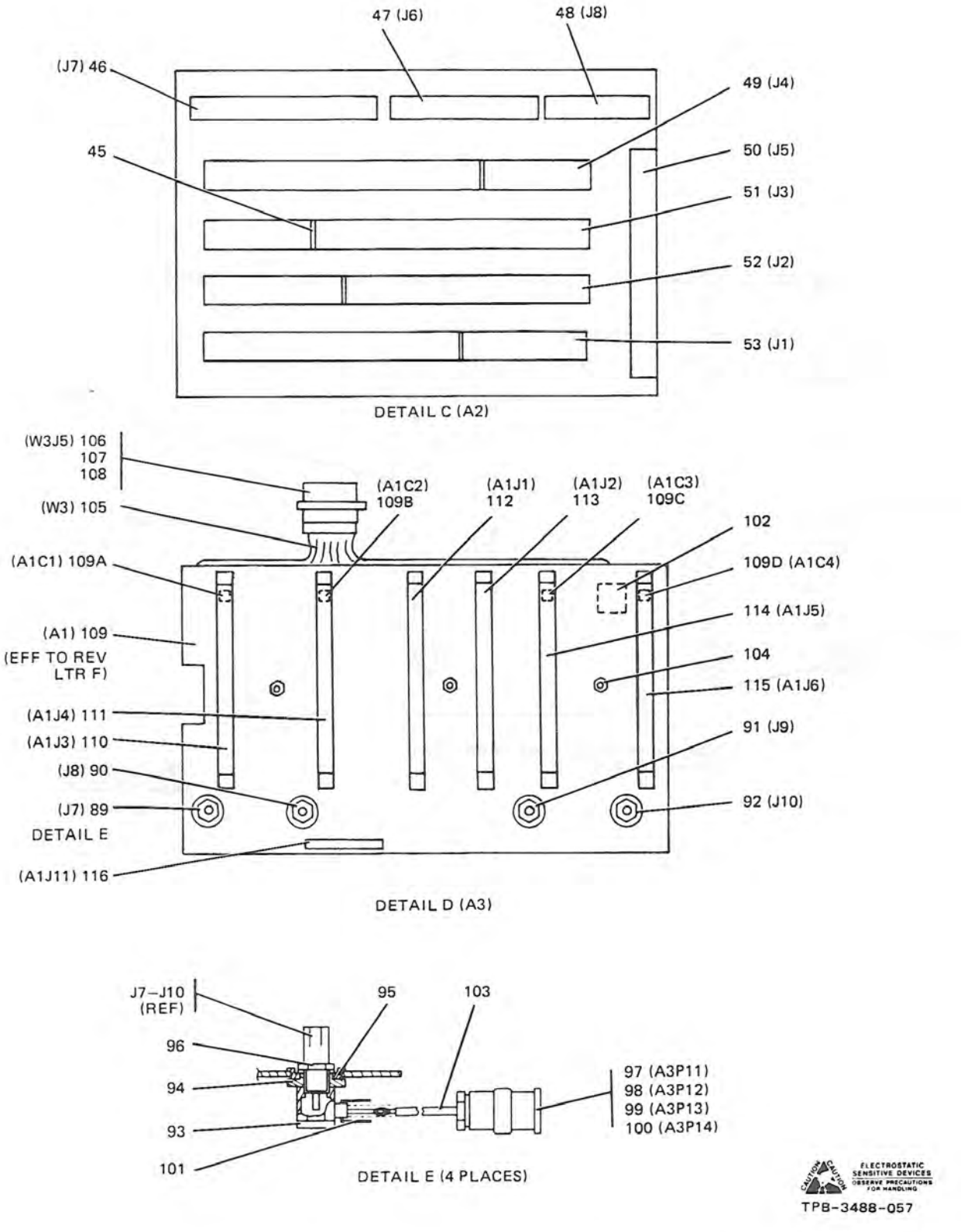
BACK OF FRONT PANEL - DETAIL A



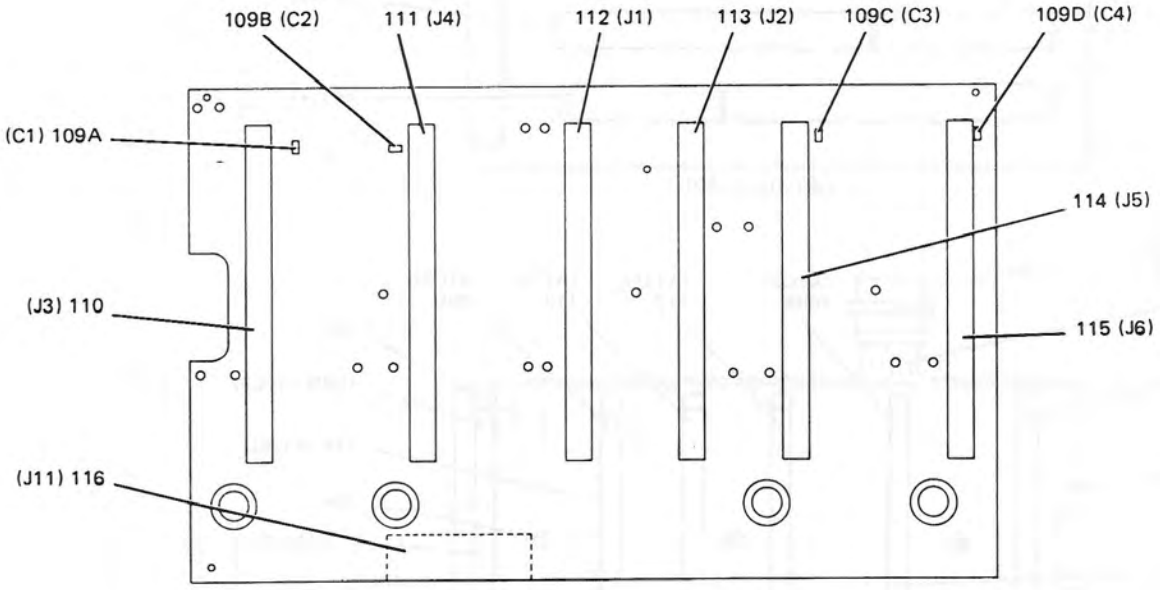
REAR PANEL VIEW - DETAIL B

TPB-3488-057

Chassis A1, Parts Location Diagram
Figure 6-2 (Sheet 3)



Chassis A1, Parts Location Diagram
Figure 6-2 (Sheet 4)



Chassis A1, Parts Location Diagram
Figure 6-2 (Sheet 5)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-	646-6433-001	1	CHASSIS (ESDS) A1 (SEE FIG 6-1-42 FOR NHA)	REF	A,B
	646-6433-005	1	CHASSIS (ESDS) A1 (SEE FIG 6-1-42 FOR NHA)	REF	C
1	646-6562-001	2	INSERT, IDENT	1	
2	623-9008-001	2	INSERT,HOUSEMARK	1	
3	632-5201-001	2	HOLDER	1	
	MS51959-13	2	SCREW,MACHINE CRES, 0.112-40 X 0.25 (96906) 342-0044-000 (AP)	2	
4	RB-67-2-SK-7-M	2	KNOB,DIAL SKIRTED (86797) 281-0650-020	1	
5	763-3339-005	2	HANDLE	2	
6	635-9714-001	2	POST,HANDLE	4	
	P312-0113-000	2	STUD,CONT THREAD STL, 10-32 X 5/8 (77250) 312-0113-000 (AP FOR 5,6)	4	
	MS16998-28	2	SCREW,CAP,SCH CD PL STL, 10-32 X 5/8 (96906) 324-1496-000 (AP FOR 5,6)	4	
	MS35338-100	2	WASHER,SPRING CD PL BRZ, 0.194 ID X 0.334 OD (96906) 310-0100-000 (AP FOR 5,6)	4	
7	642-2651-001	2	PANEL, FRONT	1	
8	5-17534-112	2	SWITCH,ROTARY (76854) 259-2258-000 A1S1	1	
	P334-4120-00	2	NUT,PLAIN,HEXAGON SST, 3/8-32 (77250) 334-4120-000 (AP)	1	
	1720-02	2	WASHER,LOCK CD PL STL, 0.391 ID X 0.507 OD (78189) 373-0085-000 (AP)	1	
9	565CBA201AX104ZA 07	2	CAPACITOR,FIXED CER DIEL, 0.10UF, P80%M20%, 200V (60705) 913-3681-000 A1C1	1	
10	36-3422-0050	2	WATTMETER (80145) 458-0653-050 A1M1	1	
	MS77068-2	2	TERMINAL,LUG (96906) 304-3120-010 (AP)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	2	
11	335LSV	2	LAMP,INCANDESCENT (71744) 262-2215-190 A1DS4	1	
12	16-240-1	2	LAMPHOLDER (95263) 262-1445-010 A1XDS4	1	
13	335LSV	2	LAMP,INCANDESCENT (71744) 262-2215-190 A1DS3	1	
14	16-240-1	2	LAMPHOLDER (95263) 262-1445-010 A1XDS3	1	
15	335LSV	2	LAMP,INCANDESCENT (71744) 262-2215-190 A1DS2	1	
16	16-240-1	2	LAMPHOLDER (95263) 262-1445-010 A1XDS2	1	
17	335LSV	2	LAMP,INCANDESCENT (71744) 262-2215-190 A1DS1	1	
18	16-240-1	2	LAMPHOLDER (95263) 262-1445-010 A1XDS1	1	
19	TC104	2	PLATE,MTG-TYRAP (59730) 150-0671-000	2	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	2	
20	1-87631-5	2	HOUSING,CONNECTOR ELEC (00779) 372-0044-080 A1P7	1	
20A	86015-2	2	CONTACT,ELECTRICAL (00779) 372-2501-050	20	
21	646-6415-001	2	WINDOW,DISPLAY	1	
22	642-3586-001	2	FRONT PANEL CARD A1A4	1	A,B
22	642-3586-002	2	FRONT PANEL CARD A1A4	1	C
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	5	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	5	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	5	
23	540-9047-003	2	POST,ELEC-MECH EQPT	5	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	5	
23A	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000	3	
24	646-6394-001	2	BRACKET,LAMP	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	4	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	4	
25	333-1455-020	3	NUT,SELF-LOCKING CD PL STL, 0.112-40	2	
26	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	4	
27	646-6394-002	3	BRACKET,LAMP	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-28	646-6404-001	2	PLATE,SUPPORT	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	3	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	3	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	3	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	3	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	3	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	3	
29	646-6413-001	2	RETAINER,FILTER	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP) (EFF TO REV LTR J)	4	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP) (EFF TO REV LTR J)	4	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	4	
30	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32 (EFF TO REV LTR A)	6	
30	M45938/5-6	3	NUT,SLFLKG,CLINCH CD PL STL, 0.138-32UNC-3B X 0.060 (81349) 333-0842-000 (EFF REV LTR A)	10	
31	646-6413-002	3	RETAINER	1	
32	646-6397-002	2	FILTER,AIR	1	
33	646-6416-001	2	CARD CAGE	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	4	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	4	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	4	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	2	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	2	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	2	
34	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	1	
35	646-6416-002	3	CARD CAGE	1	
36	23071-6	2	GUIDE,CARD (18677) 150-0810-060	8	
37	646-6437-001	2	WIRING,HARNESS A1W2	1	
	4007-6HOTTINNED	2	TERMINAL,LUG (77147) 304-0016-000 (AP)	1	
	MS35649-224	2	NUT,PLAIN,HEXAGON SST, 2-56 (96906) 313-0037-000 (AP)	2	
	MS35338-96	2	WASHER,SPRING CD PL BRZ, 0.088 ID X 0.172 OD (96906) 310-0093-000 (AP)	2	
	MS51957-4	2	SCREW,MACHINE CRES, 2-56 X 5/16 (96906) 343-0125-000 (AP)	2	
37A	86016-2	3	CONTACT,ELECTRICAL (00779) 372-2501-040	104	
38	3-87631-5	3	HOUSING,CONNECTOR ELEC (00779) 372-0044-180 A1W2P1	1	
39	DAM-15S-A176	3	CONNECTOR,RCPT ELEC (71468) 371-0220-000 A1W2P3	1	
40	D110277-2	3	SPRING LATCH ASSY (71468) 371-0040-090	2	
	MS51969-5	3	NUT,PLAIN,HEX BRS, 1/2-13 (96906) 313-0312-000 (AP) (EFF TO REV LTR M)	2	
	NAS671C4	3	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP) (EFF REV LTR M)	2	
	MS35338-135	3	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	MS51957-14	3	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	2	
41	3-87631-5	3	HOUSING,CONNECTOR ELEC (00779) 372-0044-180 A1W2P9	1	
42	2-87631-1	3	HOUSING,CONNECTOR ELEC (00779) 372-0044-110 A1W2P2	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-43	DEMF-9S-A176	3	CONNECTOR,RCPT ELEC (71468) 371-0164-000 A1W2P10	1	
43A	CK05BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 50VDC (81349) 913-5019-320 A1C6	1	
43B	CK05BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 50VDC (81349) 913-5019-320 A1C7	1	
44	642-3588-001	2	BACKPLANE, CARD CAGE A1A2	1	A,B
44	642-3588-003	2	BACKPLANE, CARD CAGE A1A2	1	C
	MS51957-15	2	SCREW,MACHINE STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	8	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	8	
45	98-0017-010	3	KEY,POLARIZING ELEC (55616) 372-7600-280	4	
46	15-41-8250	3	HOUSING,CONNECTOR ELEC (27264) 372-0043-210 A1A2J7	1	
47	15-41-8240	3	HOUSING,CONNECTOR ELEC (27264) 372-0043-160 A1A2J6	1	
48	15-41-8226	3	HOUSING,CONNECTOR ELEC (27264) 372-0043-090 A1A2J8	1	
49	BS1225F40PFF	3	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A2J4	1	
50	15-41-7260	3	HOUSING,CONNECTOR ELEC (27264) 372-0043-580 A1A2J5	1	
51	BS1225F40PFF	3	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A2J3	1	
52	BS1225F40PFF	3	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A2J2	1	
53	BS1225F40PFF	3	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A2J1	1	
54	646-6436-001	2	HARNESS,WIRING A1W1	1	A,B
54	646-6436-004	2	HARNESS, WIRING A1W1	1	C
55	4-87631-1	3	HOUSING,CONNECTOR ELEC (00779) 372-0044-210 A1W1P8	1	
56	86016-2	3	CONTACT,ELECTRICAL (00779) 372-2501-040	44	A,B
56	86016-2	3	CONTACT,ELECTRICAL (00779) 372-2501-040	47	C
56A	206509-1	3	CONNECTOR,PLUG ELEC (00779) 372-0514-100 (EFF REV LTR E)	1	A,B
56A	206509-1	3	CONNECTOR,PLUG ELEC (00779) 372-0514-100	1	C
57	MS25036-103	3	TERMINAL,LUG (96906) 304-1259-000	2	
58	66504-9	3	CONTACT,SOCKET ELEC (00779) 372-0514-090 (EFF TO REV LTR H)	26	A,B
58	66504-9	3	CONTACT,SOCKET ELEC (00779) 372-0514-090 (EFF REV LTR H)	27	A,B
58	66504-9	3	CONTACT,SOCKET ELEC (00779) 372-0514-090	27	C
59	66506-9	3	CONTACT,PIN ELEC (00779) 372-0514-080	41	A,B
59	66506-9	3	CONTACT,PIN ELEC (00779) 372-0514-080	44	C
60	819-B3800W-75	3	CONNECTOR,RCPT ELEC (94375) 357-7093-000 A1W1J1	1	
61	205840-3	3	CONNECTOR,RCPT ELEC (00779) 372-0514-010 A1W1J2	1	
62	206038-1	3	CONNECTOR,RCPT ELEC (00779) 372-0514-030 A1W1J3	1	
63	205840-3	3	CONNECTOR,RCPT ELEC (00779) 372-0514-010 A1W1J4	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP FOR 61-63)	12	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR 61-63)	12	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP FOR 61-63)	12	
	MS51957-29	2	SCREW,MACHINE CRES, 0.138-32 X 0.437IN (96906) 343-0170-000 (AP FOR 61-63)	12	
64		2	NOT USED		
65		2	NOT USED		
66	SSC-4S-S6	2	CLAMP,LOOP (06383) 435-0001-070	3	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	3	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP)	3	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	1	
	MS51959-29	2	SCREW,MACHINE CRES, 6-32 X 7/16 (96906) 342-0063-000 (AP)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	3	
67	403	2	TERMINAL,LUG (79963) 304-1089-000	2	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	2	
	P343-0329-000	2	SCREW,MACHINE NP BRS, 6-32 X 5/16 (77250) 343-0329-000 (AP)	2	
68	RTMT-12M	2	TERMINAL,STUD (91663) 306-0976-000	3	
	MS51957-13	2	SCREW,MACHINE STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	3	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	3	
69	MS10-141Y	2	STRIP,MARKER (71785) 367-1845-240	1	
70	354-18-10-001	2	TERMINAL BLOCK (71785) 367-0108-000 A1TB1	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP FOR 69,70)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR 69,70)	2	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP FOR 69,70)	2	
	MS51957-31	2	SCREW,MACHINE CRES, 0.138-32 X 0.625IN (96906) 343-0173-000 (AP FOR 69,70)	2	
70A	646-7024-001	2	DECAL (EFF REV LTR M)	1	A,B
70A	646-7024-001	2	DECAL	1	C
71	646-6426-001	2	COVER,UHF FILTER	1	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	8	
71A	CSK15045	2	CAPACITOR,FIXED CER DIEL, 2000PF, GMV 100V (72982) 913-0155-040 A1C5	1	
71B	CSK15045	2	CAPACITOR,FIXED CER DIEL, 2000PF, GMV 100V (72982) 913-0155-040 A1C4	1	
72	642-2634-002	2	COUPLER, DIRECTIONAL (ESDS) A1A1 (SEE FIG 6-3)	1	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	4	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	4	
73	UG-1050A/U	2	CONNECTOR,RCPT ELEC (80058) 357-9211-000 A1J10	1	
74	33T100-3	2	SHIELD,CONNECTOR (24931) 357-9260-000	1	
	642-2629-001	2	NUT,FLOAT (AP)	1	
	642-2630-001	2	WASHER,SPECIAL (AP)	1	
	642-2638-001	2	ADAPTER,CONN (AP)	1	
74A	21300	2	CABLE TERMN (74868) 357-9222-000	1	
75	651-3955-001	2	BRACKET,COAX,GND	1	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	1	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	1	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	1	
76	646-6422-001	2	HOUSING,FILTER,PRSD	1	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	5	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	5	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	4	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	1	
77	012-3401-000599WHT	3	TERMINAL,FEEDTHRU (98291) 306-1851-000 (EFF TO REV LTR B)	2	
78	333-1455-020	3	NUT,SELF-LOCKING CD PL STL, 0.112-40	6	
79	646-6422-002	3	HOUSING	1	
80	642-2624-001	2	HONEYCOMB, PROTECTIVE	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-	MS51957-18	2	SCREW,MACHINE STL, 4-40 X 5/8 (96906) 343-0138-000 (AP)	5	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	5	
	651-4361-001	2	WASHER,SPECIAL (AP)	5	
81	646-6405-001	2	SUPPORT, HONEYCOMB	1	
	MS51957-15	2	SCREW,MACHINE STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	1	
	MS51957-18	2	SCREW,MACHINE STL, 4-40 X 5/8 (96906) 343-0138-000 (AP)	10	
82	333-1455-020	3	NUT,SELF-LOCKING CD PL STL, 0.112-40 (EFF TO REV LTR A)	11	
82	M45938/5-3	3	NUT,SLFLKG,CLINCH CD PL STL, 0.112-40UNC-3B X 0.040 (81349) 333-0839-000 (EFF REV LTR A)	16	
83	646-6405-002	3	SUPPORT	1	
84	646-6411-001	2	PANEL,REAR	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	6	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	6	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	6	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	2	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	2	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	2	
	P343-0347-000	2	SCREW,MACHINE NP BRS, 10-32 X 1/2 (77250) 343-0347-000 (AP) (EFF TO REV LTR R)	1	A,B
	P343-0345-000	2	SCREW,MACHINE NP BRS, 10-32 X 3/8 (77250) 343-0345-000 (AP) (EFF REV LTR R)	1	A,B
	P343-0345-000	2	SCREW,MACHINE NP BRS, 10-32 X 3/8 (77250) 343-0345-000 (AP)	1	C
85	333-1455-050	3	NUT,SELF-LOCKING CD PL STL, 0.190-32	1	
86	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	8	
86A	M45938/5-4	3	NUT,SLFLKG,CLINCH CD PL STL, 0.112-40UNC-3B X 0.060 (81349) 333-0840-000 (EFF REV LTR F)	2	
87	646-6411-002	3	PANEL	1	
88	646-6435-001	2	ASSY, BACKPLANE,RF A1A3	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP FOR A1A3W3J5)	4	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR A1A3W3J5)	4	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP FOR A1A3W3J5)	4	
	MS51957-29	2	SCREW,MACHINE CRES, 0.138-32 X 0.437IN (96906) 343-0170-000 (AP FOR A1A3W3J5)	4	
	MS51957-15	2	SCREW,MACHINE STL, 4-40 X 3/8 (96906) 343-0135-000 (AP)	12	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	12	
	MS51959-13	2	SCREW,MACHINE CRES, 0.112-40 X 0.25 (96906) 342-0044-000 (AP)	3	
89	UG-1050A/U	3	CONNECTOR,RCPT ELEC (80058) 357-9211-000 A1A3J7	1	
90	UG-1050A/U	3	CONNECTOR,RCPT ELEC (80058) 357-9211-000 A1A3J8	1	
91	UG-1050A/U	3	CONNECTOR,RCPT ELEC (80058) 357-9211-000 A1A3J9	1	
92	UG-1050A/U	3	CONNECTOR,RCPT ELEC (80058) 357-9211-000 A1A3J10	1	
93	33T100-3	3	SHIELD,CONNECTOR (24931) 357-9260-000	4	
94	642-2629-001	3	NUT,FLOAT	4	
95	642-2638-001	3	ADAPTER,CONN	4	
96	642-2630-001	3	WASHER,SPECIAL	4	
97	M39012/16-0101	3	CONNECTOR,PLUG ELEC (81349) 357-9292-000 A1A3P11	1	

GROUP ASSEMBLY PARTS LIST

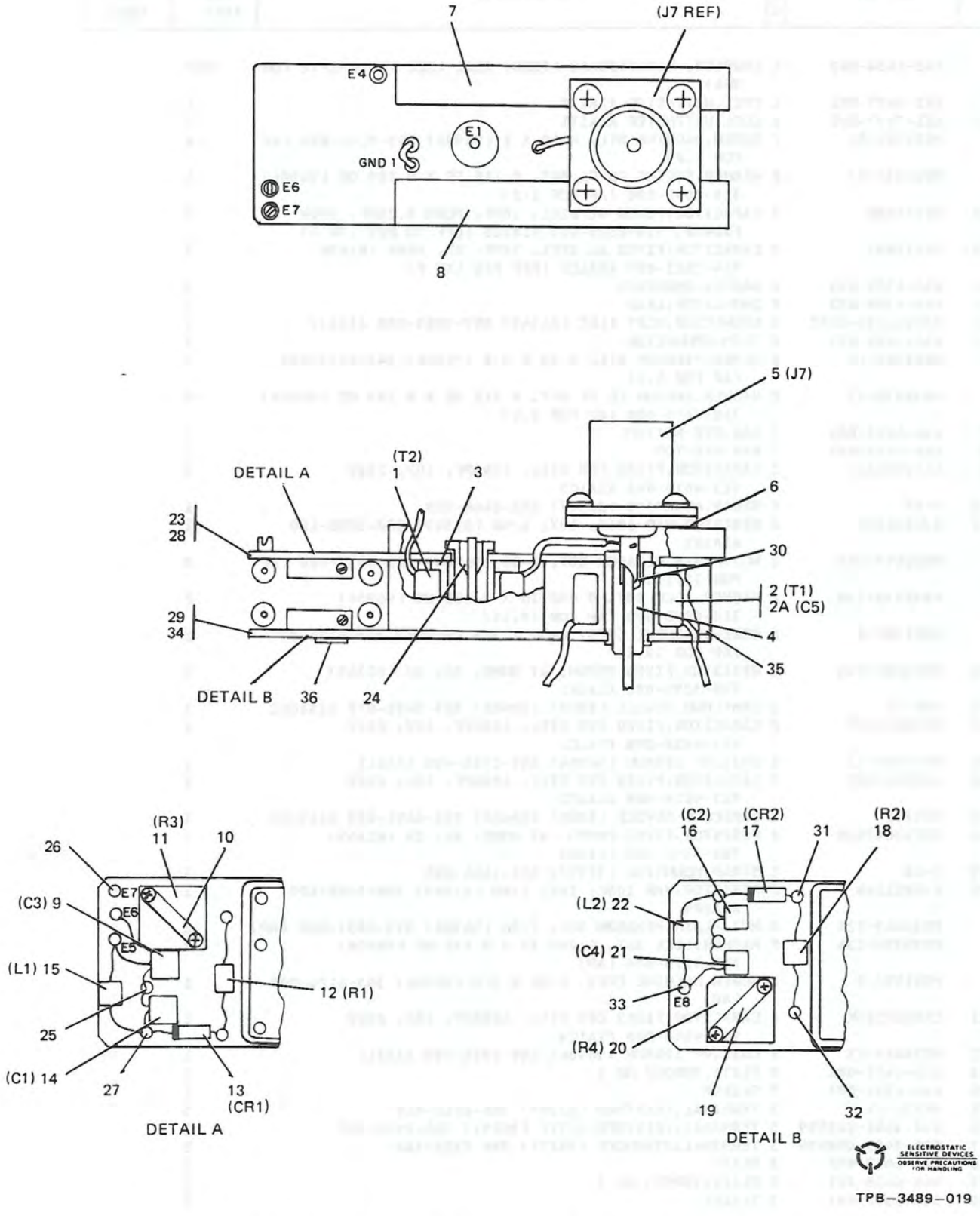
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-98	M39012/16-0101	3	CONNECTOR,PLUG ELEC (81349) 357-9292-000 A1A3P12	1	
99	M39012/16-0101	3	CONNECTOR,PLUG ELEC (81349) 357-9292-000 A1A3P13	1	
100	M39012/16-0101	3	CONNECTOR,PLUG ELEC (81349) 357-9292-000 A1A3P14	1	
101	M23053/5-107-9	3	SLEEVING,INSULATION (81349) 152-3993-000	AR	
102	707	3	CLAMP,CABLE (75037) 150-0836-010 (EFF REV LTR D)	1	
103	M17/128-RG400	3	CABLE,RF (81349) 425-0218-010	AR	
104	540-9166-003	3	POST,HEX	3	
	MS51957-13	3	SCREW,MACHINE STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	3	
	MS35338-97	3	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	3	
	MS15795-805	3	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP)	3	
105	646-6438-001	3	HARNESS,WIRING A1A3W3	1	
106	206151-1	4	CONNECTOR,RCPT ELEC (00779) 372-5932-070 A1A3W3J5	1	
107	66099-4	4	CONTACT,PIN ELEC (00779) 372-5932-120	23	
108	66103-4	4	CONTACT,PIN ELEC (00779) 372-5932-140	14	
109	642-3295-001	3	CARD,RF BACKPLANE A1A3A1	1	
109A	CK05BX104K	4	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 50VDC (81349) 913-5019-320 A1A3A1C1 (EFF REV LTR D)SB 99	1	
109B	CK05BX104K	4	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 50VDC (81349) 913-5019-320 A1A3A1C2 (EFF REV LTR D)SB 99	1	
109C	CK05BX104K	4	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 50VDC (81349) 913-5019-320 A1A3A1C3 (EFF REV LTR D)SB 99	1	
109D	CK05BX104K	4	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 50VDC (81349) 913-5019-320 A1A3A1C4 (EFF REV LTR D)SB 99	1	
110	BS1225F40PFF	4	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A3A1J3	1	
111	BS1225F40PFF	4	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A3A1J4	1	
112	BS1225F40PFF	4	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A3A1J1	1	
113	BS1225F40PFF	4	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A3A1J2	1	
114	BS1225F40PFF	4	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A3A1J5	1	
115	BS1225F40PFF	4	CONNECTOR,RCPT ELEC (55616) 372-7515-020 A1A3A1J6	1	
116	15-41-8240	4	HOUSING,CONNECTOR ELEC (27264) 372-0043-160 A1A3A1J11	1	
117	MS25085-1	2	SWITCH,SENSITIVE (81349) 260-2293-000 A1S6	1	
118	MS25085-1	2	SWITCH,SENSITIVE (81349) 260-2293-000 A1S2	1	
119	MS25085-1	2	SWITCH,SENSITIVE (81349) 260-2293-000 A1S3	1	
120	MS25085-1	2	SWITCH,SENSITIVE (81349) 260-2293-000 A1S7	1	
121	MS25085-1	2	SWITCH,SENSITIVE (81349) 260-2293-000 A1S4	1	
122	MS25085-1	2	SWITCH,SENSITIVE (81349) 260-2293-000 A1S5	1	
123	JS2	2	ADAPTER,SW ACTR (91929) 260-0944-000	6	
124	646-6398-001	2	BRACKET,INTERLOCK SWITCH	6	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	12	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	12	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	12	
125	646-6399-001	2	SLIDE,HOLDDOWN	6	
	MS51957-44	2	SCREW,MACHINE SST, 8-32 X 7/16 (96906) 343-0188-000 (AP)	6	
	AN961-8T	2	WASHER,FLAT TP BRS, 0.174 ID X 0.375 OD (88044) 310-0751-030 (AP)	6	
	310-6320-000	2	WASHER,FLAT SST, 0.092 X 0.219 OD (79807) (AP)	12	
126	629-5775-001	3	PIN	1	
127	646-6399-002	3	SLIDE	1	
128	646-6401-001	2	SHUTTER,AIR	8	
129	646-6402-001	2	BRACKET,SHUTTER	5	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP) (EFF TO REV LTR J)	10	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP) (EFF TO REV LTR J)	10	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	10	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-130	550272	2	FINGER GUARD,BLO (82877) 009-0236-020	2	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	4	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	4	
	AN961-6T	2	WASHER,FLAT TP BRS, 0.149 ID X 0.375 OD (88044) 310-0751-040 (AP) (EFF TO REV LTR L)	4	A,B
	AN961-6T	2	WASHER,FLAT TP BRS, 0.149 ID X 0.375 OD (88044) 310-0751-040 (AP) (EFF REV LTR L)	8	A,B
	AN961-6T	2	WASHER,FLAT TP BRS, 0.149 ID X 0.375 OD (88044) 310-0751-040 (AP)	8	C
	MS51957-31	2	SCREW,MACHINE CRES, 0.138-32 X 0.625IN (96906) 343-0173-000 (AP)	4	
131	028309	2	BLOWER,TUBEAXIAL (82877) 009-0236-030 A1B1	1	
132	028309	2	BLOWER,TUBEAXIAL (82877) 009-0236-030 A1B2	1	
	MS51957-31	2	SCREW,MACHINE CRES, 0.138-32 X 0.625IN (96906) 343-0173-000 (AP FOR 131,132)	4	
	AN961-6T	2	WASHER,FLAT TP BRS, 0.149 ID X 0.375 OD (88044) 310-0751-040 (AP FOR 131,132)	4	
	P343-0343-000	2	SCREW,MACHINE NP BRS, 10-32 X 1/4 (77250) 343-0343-000 (AP FOR 131,132)	2	
	MS35338-100	2	WASHER,SPRING CD PL BRZ, 0.194 ID X 0.334 OD (96906) 310-0100-000 (AP FOR 131,132)	2	
133	MS35489-16	2	GROMMET,RUBBER (96906) 201-0007-000	1	
134	MS35489-19	2	GROMMET,RUBBER (96906) 201-0009-000	1	
135	646-6409-001	2	PARTITION,SHUTTER	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP) (EFF TO REV LTR J)	7	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP) (EFF TO REV LTR J)	7	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP)	5	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	12	
136	012-3401-000599WHT	3	TERMINAL,FEEDTHRU (98291) 306-1851-000	8	
137	333-1455-040	3	NUT,SELF-LOCKING CD PL STL, 0.164-32	6	
137A	M45938/5-6	3	NUT,SLFLKG,CLINCH CD PL STL, 0.138-32UNC-3B X 0.060 (81349) 333-0842-000 (EFF REV LTR F)	10	
138	646-6409-002	3	PARTITION	1	
139	280-2745-040	2	LABEL,WARNING (12998)	1	
139A	SSC-4S-S6	2	CLAMP,LOOP (06383) 435-0001-070	3	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP) (EFF TO REV LTR J)	3	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP) (EFF TO REV LTR J)	3	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP)	1	
	MS51957-29	2	SCREW,MACHINE CRES, 0.138-32 X 0.437IN (96906) 343-0170-000 (AP)	3	
140	646-6412-001	2	PARTITION,FAN	1	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP) (EFF TO REV LTR K)	2	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP)	2	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	2	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP) (EFF TO REV LTR K)	6	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP) (EFF TO REV LTR K)	6	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	6	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-2-141	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32 (EFF TO REV LTR C)	23	
141	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32 (EFF REV LTR C)	29	
142	646-6412-002	3	PARTITION	1	
143	MS21266-2N	2	GROMMET,PLSTC CHAN (96906) 150-0175-000	1	
144	646-6414-001	2	PLATE,FLOOR	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	13	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP)	9	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	13	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	13	
	MS51959-14	2	SCREW,MACHINE CRES, 0.112-40 X 0.31 (96906) 342-0045-000 (AP)	2	
145	333-1455-020	3	NUT,SELF-LOCKING CD PL STL, 0.112-40	3	
146	646-6414-002	3	PLATE	1	
147	646-6410-001	2	PANEL,LEFT SIDE	1	
148	333-1455-040	3	NUT,SELF-LOCKING CD PL STL, 0.164-32	6	
149	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	10	
150	646-6410-002	3	PANEL	1	
151	642-2626-001	2	PANEL,RIGHT SIDE	1	
152	333-1455-040	3	NUT,SELF-LOCKING CD PL STL, 0.164-32	6	
153	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	10	
154	642-2626-002	3	PANEL	1	



Directional Coupler A1A1, Parts Location Diagram
Figure 6-3

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-3-	642-2634-002	1	COUPLER, DIRECTIONAL (ESDS) A1A1 (SEE FIG 6-2-72 FOR NHA)	REF	
1	651-3477-001	2	COIL,WATTMETER A1A1T2	1	
2	651-3477-001	2	COIL,WATTMETER A1A1T1	1	
	MS51957-21	2	SCREW,MACHINE STL, 4-40 X 1 (96906) 343-0141-000 (AP FOR 1,2)	6	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP FOR 1,2)	6	
2A	UV17100C	2	CAPACITOR,FIXED GL DIEL, 10PF, PORM 0.25PF, 500V (51406) 914-2520-000 A1A1C5 (EFF TO REV LTR F)	1	
2A	UV17100J	2	CAPACITOR,FIXED GL DIEL, 10PF, 5%, 500V (51406) 914-2521-000 A1A1C5 (EFF REV LTR F)	1	
3	646-6391-001	2	WASHER,SHOULDER	4	
4	646-6396-001	2	INSULATOR,LEAD	2	
5	M39012/04-0002	2	CONNECTOR,RCPT ELEC (81349) 357-9003-000 A1A1J7	1	
6	642-2625-001	2	SHIM,CONNECTOR	1	
	MS51957-15	2	SCREW,MACHINE STL, 4-40 X 3/8 (96906) 343-0135-000 (AP FOR 5,6)	4	
	MS35338-97	2	WASHER,SPRING CD PL BRZ, 0.115 ID X 0.209 OD (96906) 310-0095-000 (AP FOR 5,6)	4	
7	646-6420-001	2	BAR,MTG-BOTTOM	1	
8	646-6419-001	2	BAR,MTG-TOP	1	
9	CK05BX102K	2	CAPACITOR,FIXED CER DIEL, 1000PF, 10%, 200V 913-4018-000 A1A1C3	1	
10	H-25	2	STRAP,MOUNTING (32997) 381-1446-000	1	
11	RJ22CL104	2	RESISTOR,VAR 100K, 10%, 1/4W (81349) 380-3755-100 A1A1R3	1	
	MS35649-224	2	NUT,PLAIN,HEXAGON SST, 2-56 (96906) 313-0037-000 (AP FOR 10,11)	2	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP FOR 10,11)	2	
	MS51957-5	2	SCREW,MACHINE CRES, 2-56 X 3/8 (96906) 343-0126-000 (AP FOR 10,11)	2	
12	RCR32G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1W (81349) 745-3295-000 A1A1R1	1	
13	1N5711	2	SEMICOND DEVICE (ESDS) (28480) 353-3691-010 A1A1CR1	1	
14	CK05BX102K	2	CAPACITOR,FIXED CER DIEL, 1000PF, 10%, 200V 913-4018-000 A1A1C1	1	
15	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L1	1	
16	CK05BX102K	2	CAPACITOR,FIXED CER DIEL, 1000PF, 10%, 200V 913-4018-000 A1A1C2	1	
17	1N5711	2	SEMICOND DEVICE (ESDS) (28480) 353-3691-010 A1A1CR2	1	
18	RCR32G470JS	2	RESISTOR,FIXED CMPSN, 47 OHMS, 5%, 1W (81349) 745-3295-000 A1A1R2	1	
19	H-25	2	STRAP,MOUNTING (32997) 381-1446-000	1	
20	RJ22CL104	2	RESISTOR,VAR 100K, 10%, 1/4W (81349) 380-3755-100 A1A1R4	1	
	MS35649-224	2	NUT,PLAIN,HEXAGON SST, 2-56 (96906) 313-0037-000 (AP)	2	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	2	
	MS51957-5	2	SCREW,MACHINE CRES, 2-56 X 3/8 (96906) 343-0126-000 (AP)	2	
21	CK05BX102K	2	CAPACITOR,FIXED CER DIEL, 1000PF, 10%, 200V 913-4018-000 A1A1C4	1	
22	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L2	1	
23	646-6417-001	2	PLATE,TOROID NO 1	1	
24	646-6392-001	3	SLEEVE	1	
25	SE13XC01	3	TERMINAL,FEEDTHRU (81349) 306-2512-010	3	
26	002-3402-000599	3	TERMINAL,FEEDTHRU WHITE (98291) 306-2474-010	3	
27	004-3401-000599	3	TERMINAL,STANDOFF (98291) 306-2222-100	2	
28	646-6417-002	3	PLATE	1	
29	646-6418-001	2	PLATE,TOROID NO 2	1	
30	646-6392-001	3	SLEEVE	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-3-31	002-3402-000599	3	TERMINAL,FEEDTHRU WHITE (98291) 306-2474-010	1	
32	SE13XC01	3	TERMINAL,FEEDTHRU (81349) 306-2512-010	3	
33	004-3401-000599	3	TERMINAL,STANDOFF (98291) 306-2222-100	2	
34	646-6418-002	3	PLATE	1	
35	646-6421-001	2	SHIELD	1	
36	280-2758-040	2	LABEL,ELECTROSTATIC (12998) (EFF REV LTR L)	1	

6.2.2 Numerical Index

PART NUMBER	FIG-ITEM	TTL REQ
AN961-6T	6-2-130	
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	6-2-130	
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AN961-8T	6-2-125	6
BS1225F40PFF	6-2-49	
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	6-2-52	
	6-2-53	
	6-2-110	
	6-2-111	
	6-2-112	
	6-2-113	
	6-2-114	
	6-2-115	10
CK05BX102K	6-3-9	
	6-3-14	
	6-3-16	
	6-3-21	4
CK05BX104K	6-2-43A	
	6-2-43B	
	6-2-109A	
	6-2-109B	
	6-2-109C	
	6-2-109D	6
CSK15045	6-2-71A	
	6-2-71B	2
C0012	6-1-15A	AR
	6-1-15A	AR
DAM-15S-A176	6-2-39	1
DEM-9P-A176	6-1-28A	1
DEMF-9S-A176	6-2-43	1
D110277-2	6-2-40	2
H-25	6-3-10	
	6-3-19	2
JS2	6-2-123	6
KN-19-02	6-1-28	1
MS10-141Y	6-2-69	1
MS15795-803	6-1-26	
	6-2-22	
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MS15795-805	6-2-63	
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	6-2-70	
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	6-2-135	
	6-2-139A	
	6-2-144	39
MS16535-77	6-1-33	2
MS16998-28	6-2-6	4
MS21266-2N	6-2-143	1
MS25036-101	6-1-17A	2
MS25036-103	6-2-57	2
MS25085-1	6-2-117	
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	6-2-119	
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	6-2-121	
	6-2-122	6
MS35338-100	6-2-6	
	6-2-132	6
MS35338-134	6-3-11	
	6-3-20	4
MS35338-135	6-2-40	2
MS35338-96	6-2-37	2
MS35338-97	6-1-23	
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MS35338-98	6-1-4	
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	6-2-130	
	6-2-135	
	6-2-139A	
	6-2-140	
	6-2-144	80
MS35489-16	6-2-133	1
MS35489-19	6-2-134	1
MS35649-224	6-2-37	
	6-3-11	
	6-3-20	6
MS51957-13	6-2-68	
	6-2-104	6
MS51957-14	6-1-1	
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MS51957-15	6-1-23	
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	6-2-81	
	6-2-88	
	6-3-6	28
MS51957-18	6-2-80	
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MS51957-21	6-3-2	6
MS51957-28	6-1-3	
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MS51957-29	6-2-63	
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MS51957-31	6-2-70	
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	6-2-132	10
MS51957-4	6-2-37	2
MS51957-43	6-1-13	4
MS51957-44	6-2-125	6
MS51957-5	6-3-11	
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MS51959-13	6-2-3	
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MS51959-14	6-1-28	
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MS51959-15	6-1-23	
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MS51959-29	6-2-66	2
MS51969-5	6-2-40	2
MS75089-23	6-3-15	
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MS77068-2	6-2-10	2
M17/111-RG303/U	6-1-27	AR
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M17/128-RG400	6-1-27	AR
	6-1-40	AR
	6-2-103	AR
M17/74-RG213	6-1-21	AR
M23053/5-107-9	6-2-101	AR
M39012/04-0002	6-1-28	
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M39012/05-0101	6-1-19	
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M39012/16-0101	6-2-97	
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M45938/5-3	6-2-82	16
M45938/5-4	6-2-86A	2
M45938/5-6	6-2-30	
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NAS671C4	6-1-1	
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NAS671C6	6-1-4	
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NPBRS0.112-40	6-1-23	
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	6-1-28	
	6-1-28A	
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P312-0113-000	6-2-6	4
P334-4120-00	6-2-8	1
P343-0329-000	6-2-67	2
P343-0343-000	6-2-132	2
P343-0345-000	6-2-84	
	6-2-84	2
P343-0347-000	6-2-84	1
RB-67-2-SK-7-M	6-2-4	1
RCR32G470JS	6-3-12	
	6-3-18	2
RJ22CL104	6-3-11	
	6-3-20	2
RTMT-12M	6-2-68	3
SE13XC01	6-3-25	
	6-3-32	6
SSC-4S-S6	6-1-26	
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TC104	6-2-19	2
UG-1050A/U	6-2-73	
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UV17100C	6-3-2A	1
UV17100J	6-3-2A	1
002-3402-000599	6-3-26	
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004-3401-000599	6-3-27	
	6-3-33	4
009-0236-020	6-2-130	2
009-0236-030	6-2-131	
	6-2-132	2
012-3401-000599W HT	6-2-77	
	6-2-136	10
015-0325-000	6-1-15A	AR
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028309	6-2-131	
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1-87631-5	6-2-20	1
1N5711	6-3-13	
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101-N1100A	6-1-38	
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1218-02	6-1-29A	1
15-41-7260	6-2-50	1
15-41-8226	6-2-48	1
15-41-8240	6-2-47	
15-41-8240	6-2-116	2
15-41-8250	6-2-46	1
150-0175-000	6-2-143	1
150-0671-000	6-2-19	2
150-0810-060	6-2-36	8
150-0836-010	6-2-102	1
152-3993-000	6-2-101	AR
16-240-1	6-2-12	
	6-2-14	
	6-2-16	
	6-2-18	4
1720-02	6-2-8	1
2-87631-1	6-2-42	1
201-0007-000	6-2-133	1
201-0009-000	6-2-134	1
205840-3	6-2-61	
	6-2-63	2
206038-1	6-2-62	1
206039-1	6-1-17	1
206070-1	6-1-15	1
206151-1	6-2-106	1
206509-1	6-2-56A	
	6-2-56A	2
21300	6-2-74A	1
23071-6	6-2-36	8
240-2715-490	6-3-15	
	6-3-22	2
259-2258-000	6-2-8	1
260-0944-000	6-2-123	6
260-2293-000	6-2-117	
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280-2745-040	6-2-139	1
280-2758-040	6-3-36	1
281-0650-020	6-2-4	1
3-87631-5	6-2-38	
	6-2-41	2
304-0015-000	6-1-28	1
304-0016-000	6-2-37	1
304-0127-000	6-1-17A	2
304-1089-000	6-2-67	2
304-1259-000	6-2-57	2
304-3120-010	6-2-10	2
305-1756-000	6-1-33	2
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306-1851-000	6-2-77	
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	6-3-31	4

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342-0046-000	6-1-23	
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342-0063-000	6-2-66	2
343-0125-000	6-2-37	2
343-0126-000	6-3-11	
	6-3-20	4
343-0133-000	6-2-68	
	6-2-104	6
343-0134-000	6-1-1	
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343-0138-000	6-2-80	
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343-0141-000	6-3-2	6
343-0169-000	6-1-3	
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343-0173-000	6-2-70	
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343-0187-000	6-1-13	4
343-0188-000	6-2-125	6
343-0329-000	6-2-67	2
343-0343-000	6-2-132	2
343-0345-000	6-2-84	
	6-2-84	2
343-0347-000	6-2-84	1
353-3691-010	6-3-13	
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357-7093-000	6-2-60	1
357-9003-000	6-1-28	
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357-9222-000	6-2-74A	1
357-9260-000	6-1-29A	
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357-9292-000	6-2-97	
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357-9363-000	6-1-19	
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357-9519-000	6-1-38	
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357-9692-010	6-1-28	1
36-3422-0050	6-2-10	1
367-0108-000	6-2-70	1
367-1845-240	6-2-69	1
371-0040-090	6-2-40	2
371-0164-000	6-2-43	1
371-0168-000	6-1-28A	1
371-0220-000	6-2-39	1
372-0043-090	6-2-48	1
372-0043-160	6-2-47	
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372-0043-210	6-2-46	1
372-0043-580	6-2-50	1
372-0044-080	6-2-20	1
372-0044-110	6-2-42	1
372-0044-180	6-2-38	
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372-0044-210	6-2-55	1
372-0514-010	6-2-61	
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372-0514-030	6-2-62	1
372-0514-040	6-1-17	1
372-0514-050	6-1-15	1
372-0514-080	6-1-16	
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372-5932-140	6-2-108	14
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372-7600-280	6-2-45	4
373-0080-000	6-1-29A	1
373-0085-000	6-2-8	1
380-3755-100	6-3-11	
	6-3-20	2
381-1446-000	6-3-10	
	6-3-19	2
4-87631-1	6-2-55	1
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4007-6HOTTINNED	6-2-37	1
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425-1492-000	6-1-27	AR
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458-0653-050	6-2-10	1
5-17534-112	6-2-8	1
540-9047-003	6-2-23	5
540-9166-003	6-2-104	3
541-6560-002	6-1-34	2
546-6126-002	6-1-33	1
546-6127-002	6-1-32	1
550272	6-2-130	2
565CBA201AX104ZA 07	6-2-9	1
622-3490-001	6-1-	1
622-3490-002	6-1-	1
622-3490-006	6-1-	1
622-3505-001	6-1-22	1
623-9008-001	6-2-2	1
629-5775-001	6-2-126	1
632-5201-001	6-2-3	1
635-0745-001	6-1-12	1
635-9714-001	6-2-6	4
642-0040-001	6-1-1	1
642-2624-001	6-2-80	1
642-2625-001	6-3-6	1
642-2626-001	6-2-151	1
642-2626-002	6-2-154	1
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642-2630-001	6-2-74	
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642-2633-001	6-1-41	1
642-2634-002	6-2-72	1
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642-2651-001	6-2-7	1
642-3295-001	6-2-109	1
642-3586-001	6-2-22	1
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642-3592-001	6-1-10	1
642-3593-001	6-1-11	1
646-6391-001	6-3-3	4
646-6392-001	6-3-24	
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646-6396-001	6-3-4	2
646-6397-002	6-2-32	1
646-6398-001	6-2-124	6
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646-6399-002	6-2-127	1
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646-6401-001	6-2-128	8
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646-6416-002	6-2-35	1
646-6417-001	6-3-23	1
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646-6422-002	6-2-79	1
646-6423-001	6-1-3	1
646-6423-002	6-1-3	
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646-6424-001	6-1-31	1
646-6424-002	6-1-36	1
646-6425-001	6-1-23	1
646-6425-002	6-1-25	1
646-6426-001	6-2-71	1
646-6430-001	6-1-22	1
646-6433-001	6-1-42	1
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646-6434-001	6-1-4	1
646-6435-001	6-2-88	1
646-6436-001	6-2-54	1
646-6436-004	6-2-54	1
646-6437-001	6-2-37	1
646-6438-001	6-2-105	1
646-6439-001	6-1-37	1
646-6562-001	6-2-1	1
646-7024-001	6-2-70A	
	6-2-70A	2
646-7120-001	6-1-13	1
651-3477-001	6-3-1	
	6-3-2	2
651-3955-001	6-2-75	1
651-4361-001	6-2-80	5
651-4426-001	6-1-18	1
652-0998-001	6-1-4A	
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A1A1	6-3-	642-2634-002
A1A1CR1	6-3-13	1N5711
A1A1CR2	6-3-17	1N5711
A1A1C1	6-3-14	CK05BX102K
A1A1C2	6-3-16	CK05BX102K
A1A1C3	6-3-9	CK05BX102K
A1A1C4	6-3-21	CK05BX102K
A1A1C5	6-3-2A	UV17100C
A1A1C5	6-3-2A	UV17100J
A1A1J7	6-3-5	M39012/04-0002
A1A1L1	6-3-15	MS75089-23
A1A1L2	6-3-22	MS75089-23
A1A1R1	6-3-12	RCR32G470JS
A1A1R2	6-3-18	RCR32G470JS
A1A1R3	6-3-11	RJ22CL104
A1A1R4	6-3-20	RJ22CL104
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A1A1T2	6-3-1	651-3477-001
A1A2	6-2-44	642-3588-001
A1A2	6-2-44	642-3588-003
A1A2J1	6-2-53	BS1225F40PFF
A1A2J2	6-2-52	BS1225F40PFF
A1A2J3	6-2-51	BS1225F40PFF
A1A2J4	6-2-49	BS1225F40PFF
A1A2J5	6-2-50	15-41-7260
A1A2J6	6-2-47	15-41-8240
A1A2J7	6-2-46	15-41-8250
A1A2J8	6-2-48	15-41-8226
A1A3	6-2-88	646-6435-001
A1A3A1	6-2-109	642-3295-001
A1A3A1C1	6-2-109A	CK05BX104K
A1A3A1C2	6-2-109B	CK05BX104K
A1A3A1C3	6-2-109C	CK05BX104K
A1A3A1C4	6-2-109D	CK05BX104K
A1A3A1J1	6-2-112	BS1225F40PFF
A1A3A1J11	6-2-116	15-41-8240
A1A3A1J2	6-2-113	BS1225F40PFF
A1A3A1J3	6-2-110	BS1225F40PFF
A1A3A1J4	6-2-111	BS1225F40PFF
A1A3A1J5	6-2-114	BS1225F40PFF
A1A3A1J6	6-2-115	BS1225F40PFF
A1A3J10	6-2-92	UG-1050A/U
A1A3J7	6-2-89	UG-1050A/U
A1A3J8	6-2-90	UG-1050A/U
A1A3J9	6-2-91	UG-1050A/U
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A1A3P14	6-2-100	M39012/16-0101
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A1A4	6-2-22	642-3586-001
A1A4	6-2-22	642-3586-002
A1B1	6-2-131	028309
A1B2	6-2-132	028309
A1C1	6-2-9	565CBA201AX104Z07
A1C4	6-2-71B	CSK15045
A1C5	6-2-71A	CSK15045
A1C6	6-2-43A	CK05BX104K
A1C7	6-2-43B	CK05BX104K
A1DS1	6-2-17	335LSV
A1DS2	6-2-15	335LSV
A1DS3	6-2-13	335LSV
A1DS4	6-2-11	335LSV
A1J10	6-2-73	UG-1050A/U
A1M1	6-2-10	36-3422-0050
A1P7	6-2-20	1-87631-5
A1S1	6-2-8	5-17534-112
A1S2	6-2-118	MS25085-1
A1S3	6-2-119	MS25085-1
A1S4	6-2-121	MS25085-1
A1S5	6-2-122	MS25085-1
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A1S7	6-2-120	MS25085-1
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A1W1J3	6-2-62	206038-1
A1W1J4	6-2-63	205840-3
A1W1P8	6-2-55	4-87631-1
A1W2	6-2-37	646-6437-001
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A1W2P10	6-2-43	DEMF-9S-A176
A1W2P2	6-2-42	2-87631-1
A1W2P3	6-2-39	DAM-15S-A176
A1W2P9	6-2-41	3-87631-5
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A1XDS2	6-2-16	16-240-1
A1XDS3	6-2-14	16-240-1
A1XDS4	6-2-12	16-240-1
A10	6-1-11	642-3593-001
A11	6-1-12	635-0745-001
A13	6-1-22	622-3505-001
A13	6-1-22	646-6430-001
A13J11	6-1-28A	DEM-9P-A176
A13J8	6-1-28	M39012/04-0002
A13J8	6-1-28	KN-19-02
A13P1	6-1-29	33JR171-1
A2	6-1-9	646-6407-001
A3	6-1-8	646-6406-001
A3	6-1-8	646-6406-002
A3	6-1-8	646-6406-002
A4	6-1-7	646-6406-001
A4	6-1-7	646-6406-002
A4	6-1-7	646-6406-002
A5	6-1-6	646-6406-001
A5	6-1-6	646-6406-002
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A6	6-1-5	646-6406-002
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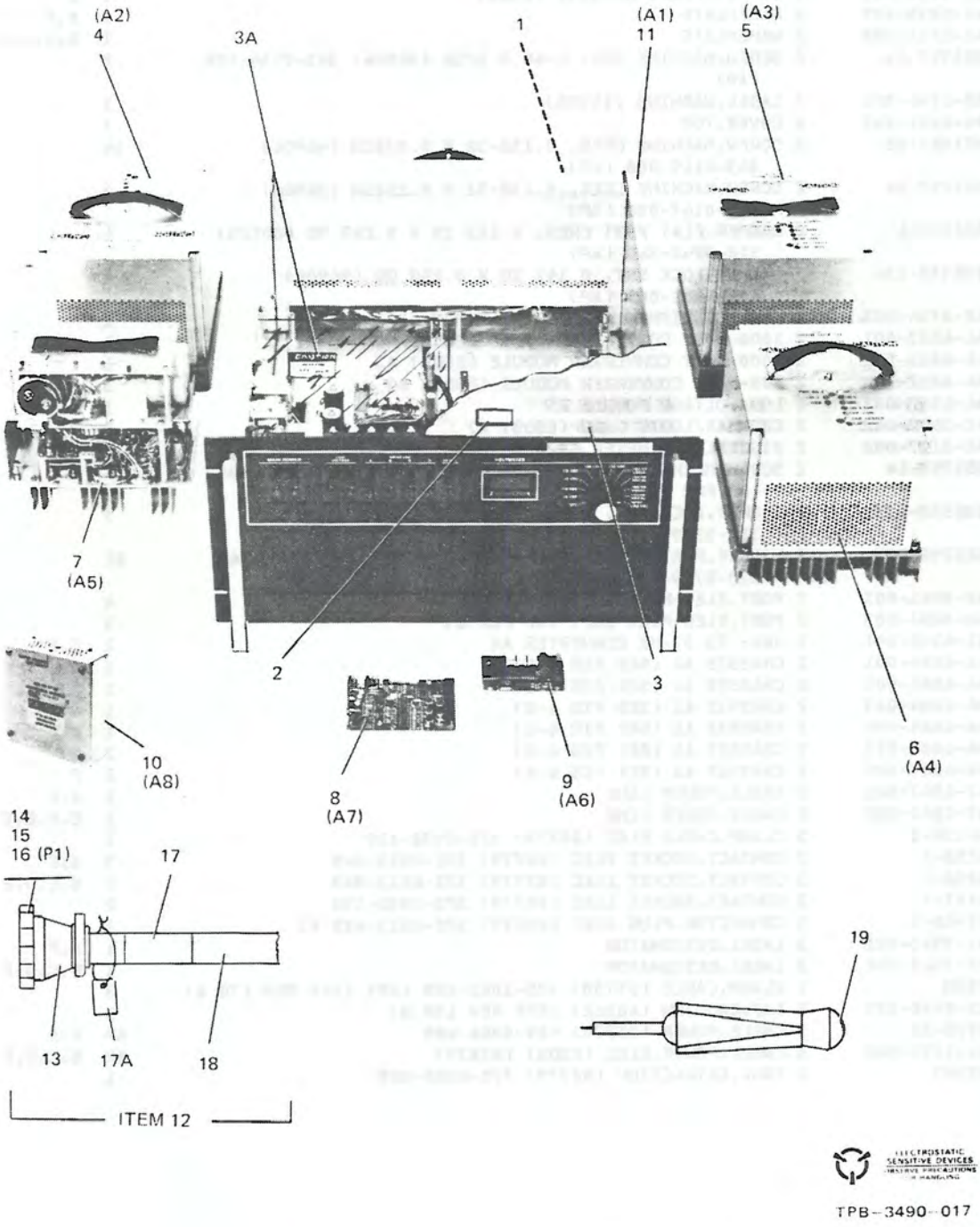
W2P2	6-1-19	M39012/05-0101

6.3 PARTS LIST FOR POWER SUPPLY HF-8031 AND HF-8032

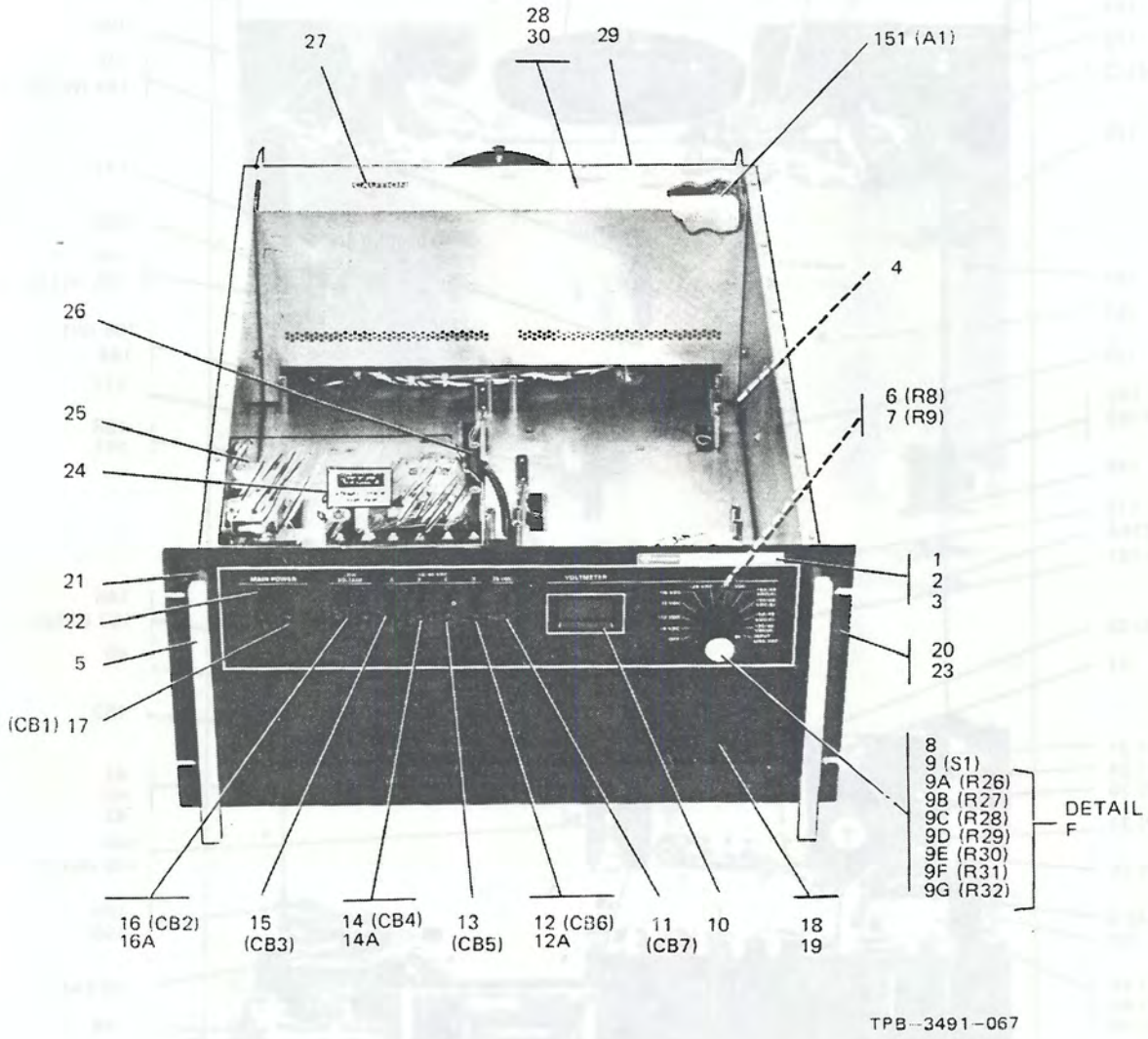
6.3.1 Group Assembly Parts List



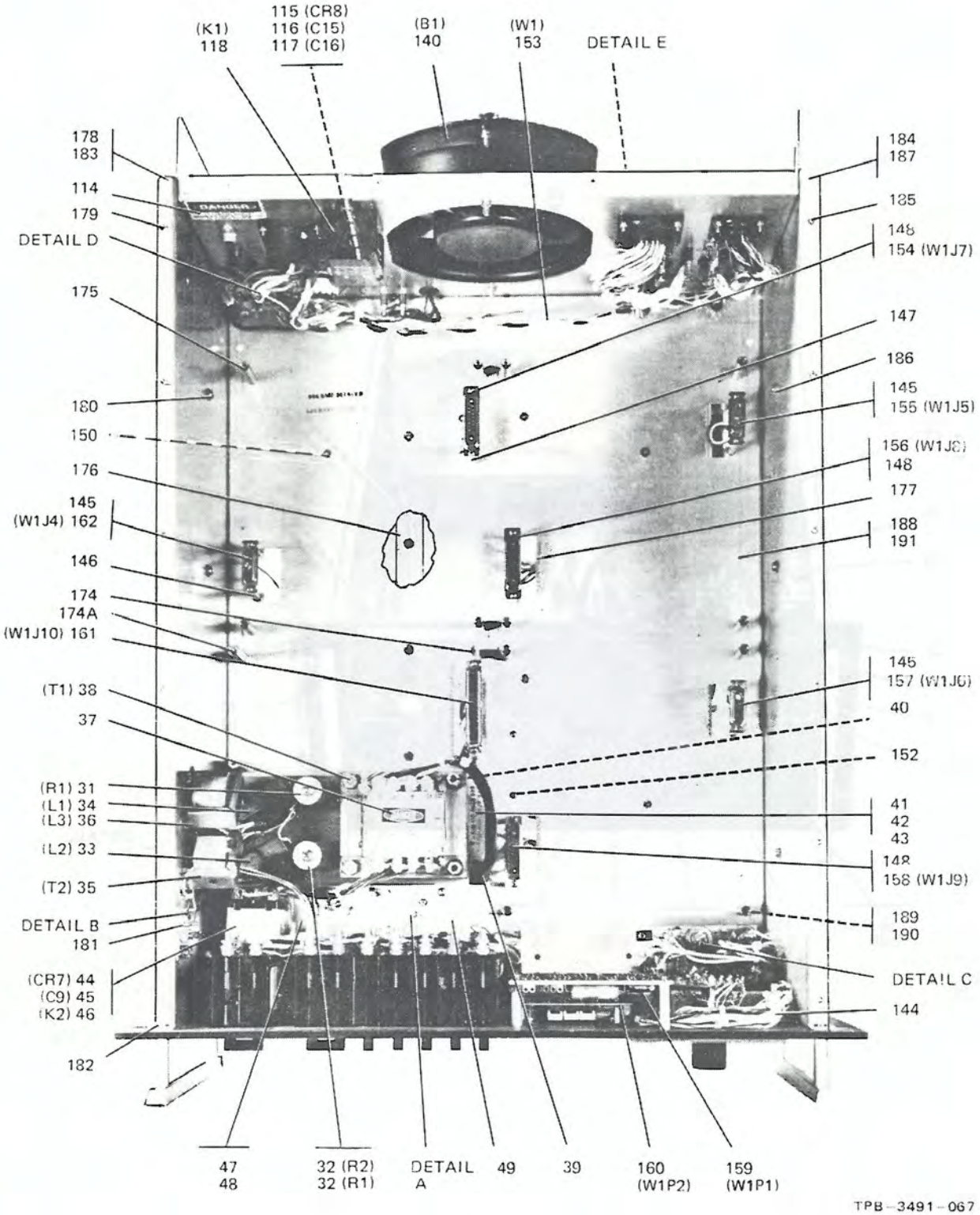
Power Supply HF-8031 and HF-8032, Parts Location Diagram
Figure 6-4

GROUP ASSEMBLY PARTS LIST

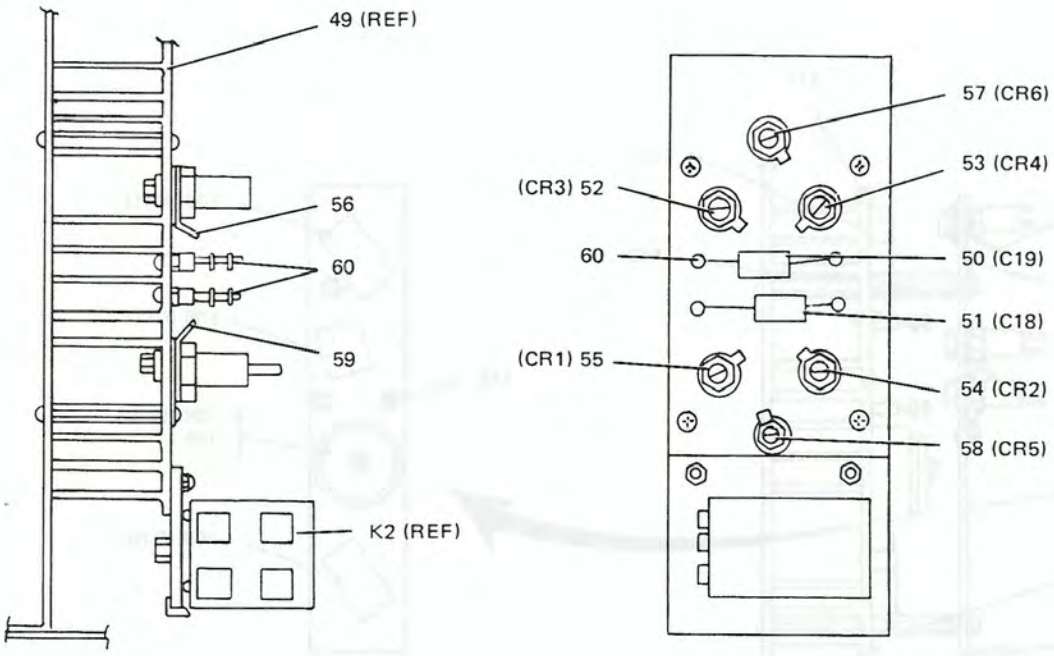
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-4-	622-3491-001	1	SUPPLY,POWER HF-8031 (ESDS)	1	A
	622-3491-003	1	SUPPLY,POWER HF-8031 (ESDS)	1	F
	622-3512-001	1	SUPPLY,POWER HF-8032 (ESDS)	1	B
	622-3512-002	1	SUPPLY,POWER HF-8032 (ESDS)	1	C
	622-3512-004	1	SUPPLY,POWER HF-8032 (ESDS)	1	D
	622-3512-005	1	SUPPLY,POWER HF-8032 (ESDS)	1	E
1	642-0039-000	2	NAMEPLATE	1	A,F
1	642-0111-000	2	NAMEPLATE	1	B,C,D,E
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	2	
2	280-2745-020	2	LABEL,WARNING (12998)	1	
3	646-6542-001	2	COVER,TOP	1	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	14	
	MS51957-26	2	SCREW,MACHINE CRES, 0.138-32 X 0.250IN (96906) 343-0167-000 (AP)	4	
	NAS620C6L	2	WASHER,FLAT PSVT CRES, 0.143 ID X 0.267 OD (80205) 310-0740-360 (AP)	4	
	MS35338-136	2	WASHER,LOCK SST, 0.141 ID X 0.250 OD (96906) 310-0282-000 (AP)	4	
3A	652-0734-001	2	DECAL,EQUIPMENT (EFF REV LTR F)	1	
4	646-6883-001	2	1000-WATT CONVERTER MODULE (ESDS) A2	1	
5	646-6883-001	2	1000-WATT CONVERTER MODULE (ESDS) A3	1	
6	646-6882-001	2	500-WATT CONVERTER MODULE (ESDS) A4	1	
7	646-6812-001	2	LOW-VOLTAGE MODULE A5	1	
8	642-3579-001	2	CROWBAR/LOGIC CARD (ESDS) A7	1	
9	642-3197-001	2	DIGITAL VOLTMETER CARD (ESDS) A6	1	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP FOR 8,9)	7	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 8,9)	7	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP FOR 8,9)	21	
	540-9041-003	2	POST,ELEC-MECH EQPT (AP FOR 9)	4	
	540-9057-003	2	POST,ELEC-MECH EQPT (AP FOR 8)	3	
10	651-4140-001	2	400- TO 57-HZ CONVERTER A8	1	C,E
11	646-6884-001	2	CHASSIS A1 (SEE FIG 6-5)	1	A
11	646-6884-002	2	CHASSIS A1 (SEE FIG 6-5)	1	B
11	646-6884-003	2	CHASSIS A1 (SEE FIG 6-5)	1	C
11	646-6884-006	2	CHASSIS A1 (SEE FIG 6-5)	1	D
11	646-6884-007	2	CHASSIS A1 (SEE FIG 6-5)	1	E
11	646-6884-005	2	CHASSIS A1 (SEE FIG 6-5)	1	F
12	647-2547-001	2	CABLE,POWER LINE	1	A,F
12	647-2547-002	2	CABLE,POWER LINE	1	B,C,D,E
13	206138-1	3	CLAMP,CABLE ELEC (00779) 372-5932-110	1	
14	66258-2	3	CONTACT,SOCKET ELEC (00779) 372-0513-040	3	A,F
14	66258-2	3	CONTACT,SOCKET ELEC (00779) 372-0513-040	4	B,C,D,E
15	66101-4	3	CONTACT,SOCKET ELEC (00779) 372-5932-130	2	
16	207485-1	3	CONNECTOR,PLUG ELEC (00779) 372-0513-020 P1	1	
17	647-7363-001	3	LABEL,DESIGNATOR	1	A,F
17	647-7363-002	3	LABEL,DESIGNATOR	1	B,C,D,E
	TY25M	3	CLAMP,CABLE (59730) 435-1062-000 (AP) (EFF REV LTR E)	3	
17A	025-0150-070	3	TAG,CAUTION (A0262) (EFF REV LTR B)	1	
18	02725-85	3	CABLE,POWER (81774) 424-0056-000	AR	A,F
18	424-1733-000	3	CABLE,POWER,ELEC (ESDS) (82879)	AR	B,C,D,E
19	305183	2	TOOL,EXTRACTION (00779) 372-8055-000	1	



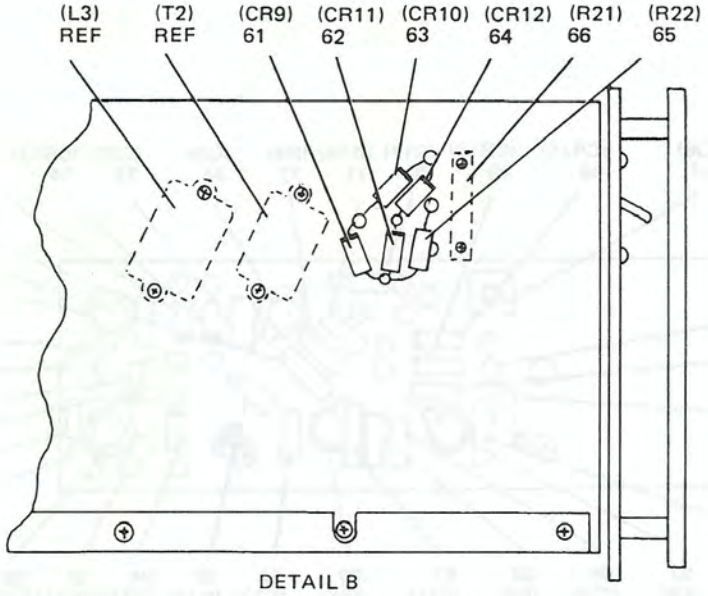
Chassis A1, Parts Location Diagram
Figure 6-5 (Sheet 1 of 6)



Chassis A1, Parts Location Diagram
Figure 6-5 (Sheet 2)



DETAIL A

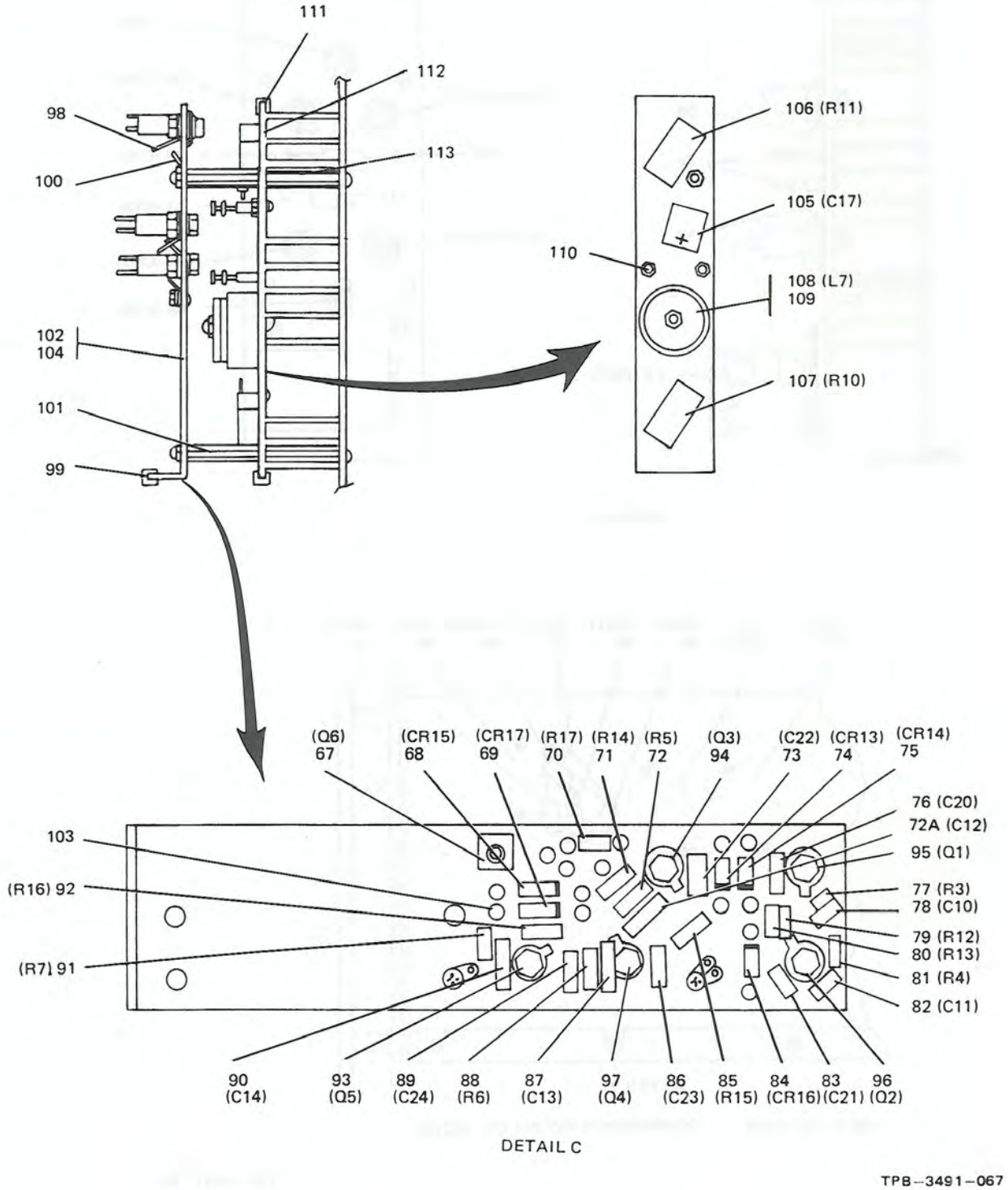


DETAIL B

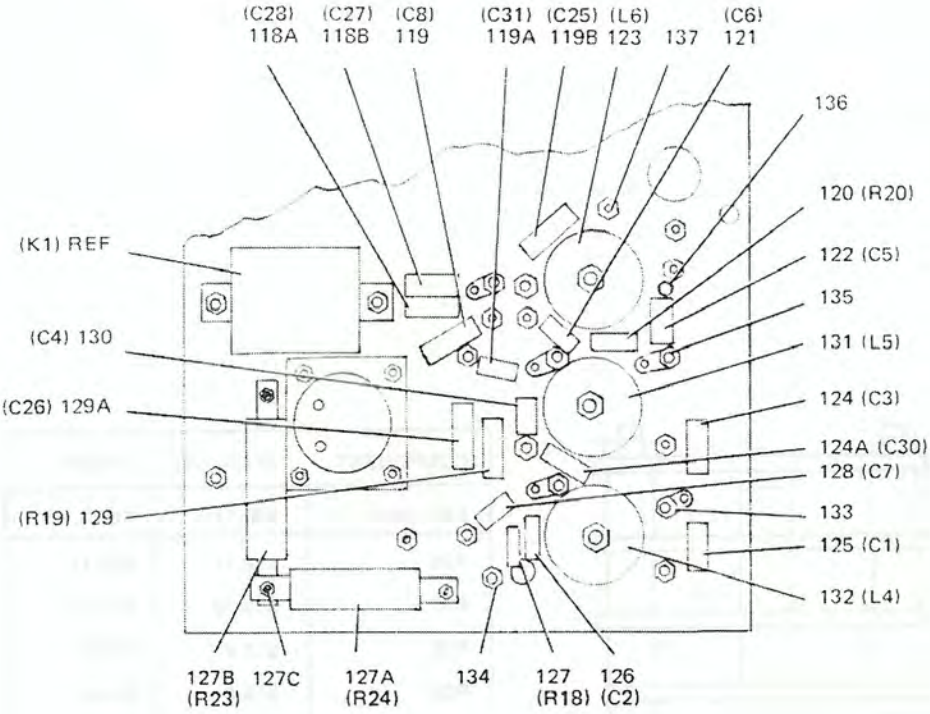
SIDE OF CHASSIS COMPONENTS MOUNT ON INSIDE

TPB-3491-067

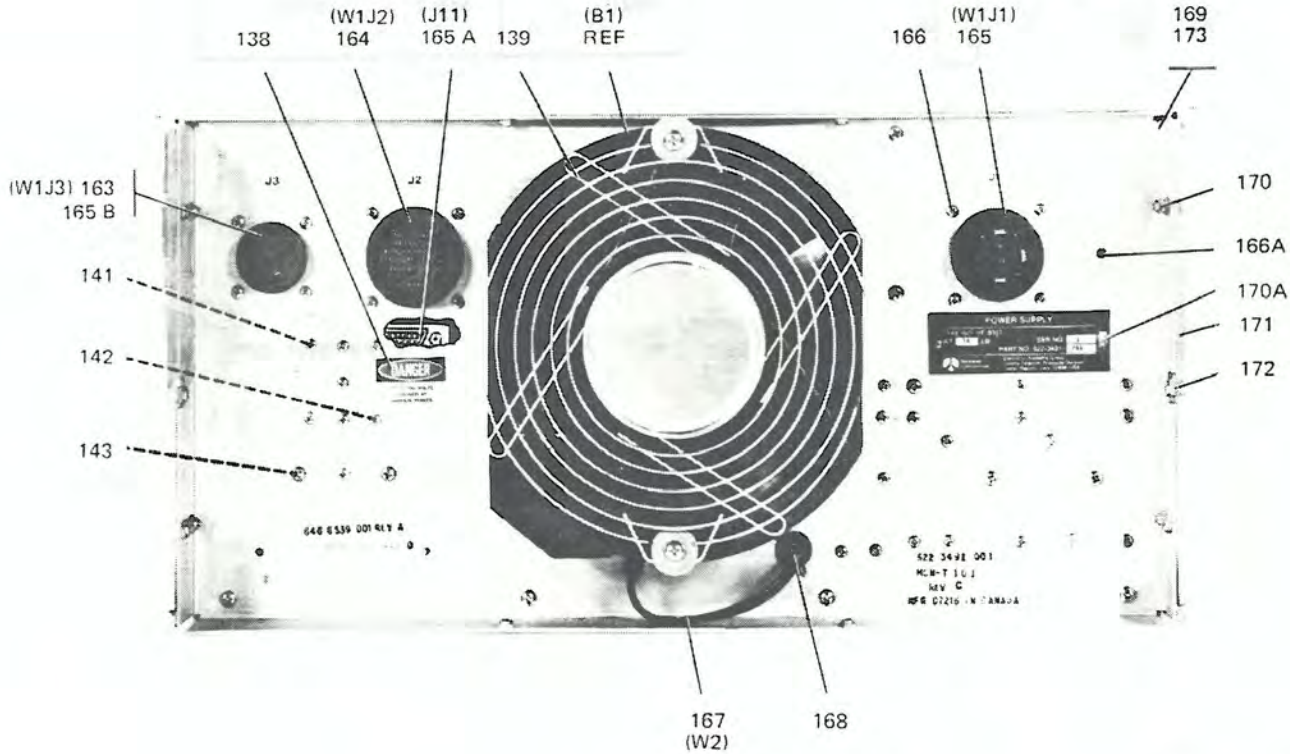
Chassis A1, Parts Location Diagram
Figure 6-5 (Sheet 3)



Chassis A1, Parts Location Diagram
Figure 6-5 (Sheet 4)



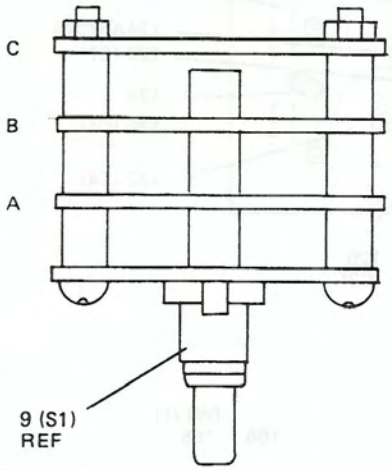
DETAIL D



DETAIL E

TPB-3491-067

Chassis A1, Parts Location Diagram
Figure 6-5 (Sheet 5)



COMPONENT	HOOK-UP	CHART
REF DES	FROM	TO
R26	S1B-11	S1C-11
R27	S1B-10	S1C-10
R28	S1B-9	S1C-9
R29	S1B-8	S1C-8
R30	S1B-6	S1C-6
R31	S1B-4	S1C-4
R32	S1B-2	S1C-2

DETAIL F

TPB-3491-067

Chassis A1, Parts Location Diagram
Figure 6-5 (Sheet 6)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-	646-6884-001	1	CHASSIS A1 (SEE FIG 6-4-11 FOR NHA)	REF	A
	646-6884-002	1	CHASSIS A1 (SEE FIG 6-4-11 FOR NHA)	REF	B
	646-6884-003	1	CHASSIS A1 (SEE FIG 6-4-11 FOR NHA)	REF	C
	646-6884-006	1	CHASSIS A1 (SEE FIG 6-4-11 FOR NHA)	REF	D
	646-6884-007	1	CHASSIS A1 (SEE FIG 6-4-11 FOR NHA)	REF	E
	646-6884-005	1	CHASSIS A1 (SEE FIG 6-4-11 FOR NHA)	REF	F
1	623-9008-001	2	HOUSEMARK	1	
2	646-6561-001	2	IDENT STRIP	1	A,F
2	646-7005-001	2	IDENT STRIP	1	B,C,D,E
3	632-5201-001	2	HOUSING,IDENT	1	
	MS51959-13	2	SCREW,MACHINE CRES, 0.112-40 X 0.25 (96906) 342-0044-000 (AP)	2	
4	646-6543-001	2	COVER,BOTTOM	1	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	10	
	MS51957-42	2	SCREW,MACHINE SST, 8-32 X 5/16 (96906) 343-0186-000 (AP)	3	
	NAS620C8	2	WASHER,FLAT PSVT CRES, 0.169 ID X 0.304 OD (80205) 310-0740-480 (AP)	3	
	MS35338-137	2	WASHER,LOCK CRES, 0.171 ID X 0.293 OD (96906) 310-0072-000 (AP)	3	
5	763-3339-004	2	HANDLE	2	
	635-9714-001	2	STANDOFF,HANDLE (AP)	4	
	MS16998-28	2	SCREW,CAP,SCH CD PL STL, 10-32 X 5/8 (96906) 324-1496-000 (AP)	4	
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP)	4	
	763-3340-001	2	STUD,HANDLE (AP)	4	
6	RCR07G271KS	2	RESISTOR,FIXED CMPSN, 270 OHMS, 10%, 1/4W (81349) 745-0728-000 A1R8	1	
7	RN60D5113F	2	RESISTOR,FIXED FILM, 511K, 1%, 1/4W (81349) 705-6726-000 A1R9	1	
8	RB-67-2-SK-7-M	2	KNOB,DIAL SKIRTED (86797) 281-0650-020	1	
9	5-17534-112	2	SWITCH,ROTARY (76854) 259-2258-000 A1S1 (EFF TO REV LTR M)	1	A,B,C
9	5-17534-113	2	SWITCH,ROTARY (76854) 259-2258-010 A1S1 (EFF REV LTR M)	1	A,B,C
9	5-17534-113	2	SWITCH,ROTARY (76854) 259-2258-010 A1S1	1	D,E,F
	P334-4120-00	2	NUT,PLAIN,HEXAGON SST, 3/8-32 (77250) 334-4120-000 (AP)	1	
9A	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R26 (EFF REV LTR M)	1	A,B,C
9A	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R26	1	D,E,F
9B	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R27 (EFF REV LTR M)	1	A,B,C
9B	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R27	1	D,E,F
9C	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R28 (EFF REV LTR M)	1	A,B,C
9C	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R28	1	D,E,F
9D	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R29 (EFF REV LTR M)	1	A,B,C
9D	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R29	1	D,E,F
9E	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R30 (EFF REV LTR M)	1	A,B,C
9E	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R30	1	D,E,F
9F	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R31 (EFF REV LTR M)	1	A,B,C

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-9F	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R31	1	D,E,F
9G	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R32 (EFF REV LTR M)	1	A,B,C
9G	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R32	1	D,E,F
10	646-6797-001	2	LENS,DISPLAY	1	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	2	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
11	AM1-Z625-4	2	CIRCUIT BREAKER (74193) 260-4008-440 A1CB7	1	
12	AM1-Z625-4	2	CIRCUIT BREAKER (74193) 260-4008-440 A1CB6	1	
12A	MS25036-108	2	TERMINAL,LUG (96906) 304-1271-000	2	
13	AM1-Z625-4	2	CIRCUIT BREAKER (74193) 260-4008-440 A1CB5	1	
14	AM1-Z625-4	2	CIRCUIT BREAKER (74193) 260-4008-440 A1CB4	1	
14A	MS25036-108	2	TERMINAL,LUG (96906) 304-1271-000	2	
15	AM1-Z625-4	2	CIRCUIT BREAKER (74193) 260-4008-440 A1CB3	1	
16	APL11-1709-230	2	CIRCUIT BREAKER (81541) 260-1004-230 A1CB2	1	A,B,D,F
16	295-11-1REC1-4459-020	2	CIRCUIT BREAKER (81541) 260-1039-020 A1CB2	1	C,E
16A	MS25036-103	2	TERMINAL,LUG (96906) 304-1259-000	4	
17	APL11-1709-470	2	CIRCUIT BREAKER (81541) 260-1004-470 A1CB1	1	A,F
17	AM333HEMG6-25-14-250-400	2	CIRCUIT BREAKER (74193) 260-4015-540 A1CB1	1	B,C,D,E
	MS51957-27B	2	SCREW,MACHINE CHEM BLK CRES, 0.138-32 X 5/16 (96906) 343-0033-000 (AP FOR 11-17)	18	A,F
	MS51957-27B	2	SCREW,MACHINE CHEM BLK CRES, 0.138-32 X 5/16 (96906) 343-0033-000 (AP FOR 11-17)	20	B,C,D,E
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 11-17)(EFF TO REV LTR L)	16	A
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 11-17)(EFF REV LTR L)	18	A
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 11-17)	18	F
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 11-17)(EFF TO REV LTR L)	18	B,C
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 11-17)(EFF REV LTR L)	20	B,C
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 11-17)	20	D,E
18	646-6545-001	2	COVER,FILTER	1	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	8	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	8	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	16	
	540-9048-003	2	POST,ELEC-MECH EQPT (AP)	8	
19	646-6397-001	2	FILTER, FAN	1	
	MS51957-19B	2	SCREW,MACHINE CHEM BLK CRES, 0.138-32 X 7/16 (96906) 343-0035-000 (AP)	4	
20	646-6541-001	2	PANEL,FRONT,PRSD	1	A,F
20	646-6541-002	2	PANEL,FRONT,PRSD	1	B,C,D,E
21	CFHC-440-6	3	STUD,CAPTIVE-SE SST, 4-40 X 3/8 (46384) 330-4923-000	1	
22	CFHC440-4	3	STUD,CAPTIVE SST, 4-40 X 1/4 (46384) 330-1736-020 (EFF TO REV LTR H)	16	
22	CFHC440-4	3	STUD,CAPTIVE SST, 4-40 X 1/4 (46384) 330-1736-020 (EFF REV LTR H)	17	
23	646-6541-003	3	PANEL,FRONT	1	A,F
23	646-6541-004	3	PANEL,FRONT	1	B,C,D,E

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-24	280-1368-400	2	LABEL,PRESSURE SENS (59518)	1	
25	646-6999-001	2	COVER,PROTECTIVE	1	
26	540-9448-003	2	POST,HEX	2	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP FOR 25,26)	4	
	MS51958-61	2	SCREW,MACHINE CRES, 0.190-32 X 0.375IN (96906) 343-0226-000 (AP FOR 25,26)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR 25,26)	4	
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 25,26)	2	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP FOR 25,26)	2	
	MS15795-807	2	WASHER,FLAT PSVT CRES, 0.196 ID X 0.390 OD (96906) 310-0779-070 (AP FOR 25,26)	2	
27	280-1368-400	2	LABEL,PRESSURE SENS (59518)	1	
28	646-6540-001	2	PLATE,DUCT-REAR	1	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP)	4	
29	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	4	
30	646-6540-002	3	PLATE	1	
31	RW35V331	2	RESISTOR,FIXED WW, 330 OHMS, PORM5%, 55W (81349) 747-2833-000 A1R1 (EFF TO REV LTR K)SB 101	1	
32	RW35V331	2	RESISTOR,FIXED WW, 330 OHMS, PORM5%, 55W (81349) 747-2833-000 A1R2 (EFF TO REV LTR K)SB 101	1	
32	RW35V270	2	RESISTOR,FIXED WW, 27 OHMS, PORM5%, 55W (81349) 747-2815-000 A1R1 (EFF REV LTR K)SB 101	1	
	MS51957-44	2	SCREW,MACHINE SST, 8-32 X 7/16 (96906) 343-0188-000 (AP FOR 31,32)(EFF TO REV LTR K)SB101	4	
	MS51957-44	2	SCREW,MACHINE SST, 8-32 X 7/16 (96906) 343-0188-000 (AP) (EFF REV LTR K)SB 101	2	
	310-0446-000	2	WASHER,FLAT SST, 0.172 ID X 0.750 OD (79807) (AP FOR 31,32)(EFF TO REV LTR K)SB101	4	
	310-0446-000	2	WASHER,FLAT SST, 0.172 ID X 0.750 OD (79807) (AP) (EFF REV LTR K)SB 101	1	
	MS35338-137	2	WASHER,LOCK CRES, 0.171 ID X 0.293 OD (96906) 310-0072-000 (AP FOR 31,32)(EFF TO REV LTR K)SB101	4	
	MS35338-137	2	WASHER,LOCK CRES, 0.171 ID X 0.293 OD (96906) 310-0072-000 (AP) (EFF REV LTR K)SB 101	2	
	302-0044-000	2	WASHER,NONMETALLIC CK NPRN, 0.390 ID X 0.875 OD (05284) (AP FOR 31,32)(EFF TO REV LTR K)SB101	4	
	302-0044-000	2	WASHER,NONMETALLIC CK NPRN, 0.390 ID X 0.875 OD (05284) (AP) (EFF REV LTR K)SB 101	2	
	P015-0557-000	2	POST,MTG,RES (77250) 015-0557-000 (AP FOR 31,32)(EFF TO REV LTR K)SB101	2	
	P015-0557-000	2	POST,MTG,RES (77250) 015-0557-000 (AP) (EFF REV LTR K)SB101	1	
33	14224	2	INDUCTOR (90095) 668-0519-010 A1L2	1	
34	14224	2	INDUCTOR (90095) 668-0519-010 A1L1	1	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP FOR 33,34)	4	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP FOR 33,34)	4	
35	124P295	2	TRANSFORMER,POWER (11700) 662-0933-010 A1T2	1	
36	14224	2	INDUCTOR (90095) 668-0519-010 A1L3	1	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP FOR 35,36)	4	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP FOR 35,36)	4	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 35,36)	4	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP FOR 35,36)	4	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-37	280-1368-340	2	LABEL,PRESSURE SENS (59518)	1	
38	CPD-240	2	TRANSFORMER (80223) 662-0937-010 A1T1	1	
	MS51958-61	2	SCREW,MACHINE CRES, 0.190-32 X 0.375IN (96906) 343-0226-000 (AP)	4	
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP)	4	
39	MS35489-11	2	GROMMET,RUBBER (96906) 201-0004-000	2	
40	540-9550-003	2	POST,HEX	6	
	MS51958-61	2	SCREW,MACHINE CRES, 0.190-32 X 0.375IN (96906) 343-0226-000 (AP)	4	
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP)	4	
41	646-6796-001	2	BRACKET,TRANSFORMER	1	
42	333-1455-020	3	NUT,SELF-LOCKING CD PL STL, 0.112-40	4	
43	646-6796-002	3	BRACKET	1	
44	1N5614	2	SEMICOND DEVICE (14099) 353-6556-010 A1CR7	1	
45	3857-500V-GP70-104Z	2	CAPACITOR,FIXED CER DIEL, 0.1UF, P80%M20%, 500V (59660) 913-3234-000 A1C9	1	
46	WU012D2-661	2	RELAY,POWER (76854) 970-0039-010 A1K2	1	
	P313-0046-000	2	NUT,PLAIN,HEX SST, 6-32 (77250) 313-0046-000 (AP)	1	
	MS35338-137	2	WASHER,LOCK CRES, 0.171 ID X 0.293 OD (96906) 310-0072-000 (AP)	1	
47	MS21266-3N	2	GROMMET,PLSTC CHAN (96906) 150-0177-000	1	
48	646-6550-001	2	PLATE,RELAY	1	
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	2	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	2	
49	646-6546-001	2	HEATSINK NO. 2	1	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP)	8	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	8	
	540-9229-003	2	POST,ELEC-MECH EQPT (AP)	4	
50	910B1E334K	2	CAPACITOR,FIXED PLSTC DIEL, 0.33UF, 10%, 250V (14752) 933-1424-040 A1C19	1	B,C,D,E
51	V323Z-226	2	CAPACITOR,FIXED PPR DIEL, 0.33UF, 20%, 600V (50930) 951-1066-000 A1C18	1	A,F
51	910B1E334K	2	CAPACITOR,FIXED PLSTC DIEL, 0.33UF, 10%, 250V (14752) 933-1424-040 A1C18	1	B,C,D,E
52	1N1190	2	SEMICOND DEVICE (04713) 353-6478-080 A1CR3	1	
53	1N1190	2	SEMICOND DEVICE (04713) 353-6478-080 A1CR4	1	
54	1N1190	2	SEMICOND DEVICE (04713) 353-6478-080 A1CR2	1	
55	1N1190	2	SEMICOND DEVICE (04713) 353-6478-080 A1CR1	1	
56	008-0131-0000	2	LUG,SOLDER (91886) 304-1528-010	4	
	MS35650-3255T	2	NUT,PLAIN,HEX TP BRS, 1/4-28 (96906) 313-0019-050 (AP FOR 52-56)	4	
	NAS620C416L	2	WASHER,FLAT PSVT CRES, 0.255 ID X 0.468 OD (80205) 310-0740-600 (AP FOR 52-56)	4	
	MS35333-108	2	WASHER,LOCK CD PL BRZ, 0.267 ID X 0.478 OD (96906) 373-3050-000 (AP FOR 52-56)	4	
	MW-1-265	2	INSULATOR,WASHER MICA, 0.265 ID X 1.0 OD (08289) 302-0640-270 (AP FOR 52-56)	4	
	646-7051-001	2	BUSHING,INSULATOR (AP FOR 52-56)	4	
57	1N1190	2	SEMICOND DEVICE (04713) 353-6478-080 A1CR6	1	B,C,D,E
58	1N1190	2	SEMICOND DEVICE (04713) 353-6478-080 A1CR5	1	B,C,D,E
59	008-0131-0000	2	LUG,SOLDER (91886) 304-1528-010	2	B,C,D,E
	MS35650-3255T	2	NUT,PLAIN,HEX TP BRS, 1/4-28 (96906) 313-0019-050 (AP FOR 57-59)	2	
	NAS620B416	2	WASHER,FLAT CD PL BRS, 0.255 ID X 0.468 OD (80205) 310-0740-630 (AP FOR 57-59)	2	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-	MS35333-108	2	WASHER,LOCK CD PL BRZ, 0.267 ID X 0.478 OD (96906) 373-3050-000 (AP FOR 57-59)	2	
	MW-1-265	2	INSULATOR,WASHER MICA, 0.265 ID X 1.0 OD (08289) 302-0640-270 (AP FOR 57-59)	2	
	646-7051-001	2	BUSHING,INSULATOR (AP FOR 57-59)	2	
60	572-4814-01-05-16	2	TERMINAL STUD (71279) 306-2513-250	2	A,F
60	572-4814-01-05-16	2	TERMINAL STUD (71279) 306-2513-250	4	B,C,D,E
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	2	A,F
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	4	B,C,D,E
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	A,F
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	4	B,C,D,E
61	1N5614	2	SEMICOND DEVICE (14099) 353-6556-010 A1CR9	1	
62	1N5614	2	SEMICOND DEVICE (14099) 353-6556-010 A1CR11	1	
63	1N5614	2	SEMICOND DEVICE (14099) 353-6556-010 A1CR10	1	
64	1N5614	2	SEMICOND DEVICE (14099) 353-6556-010 A1CR12	1	
65	RWR89S2051FR	2	RESISTOR,FIXED WW, 2.05K, 1%, 3W (81349) 747-2170-310 A1R22	1	
66	RJ12CP501	2	RESISTOR,VAR 500 OHMS, 10%, 1/4W (81349) 380-3773-020 A1R21	1	
	MS35649-224	2	NUT,PLAIN,HEXAGON SST, 2-56 (96906) 313-0037-000 (AP)	2	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	2	
	NAS620C3	2	WASHER,FLAT PSVT CRES, 0.102 ID X 0.180 OD (80205) 310-0740-160 (AP)	2	
	MS51957-7	2	SCREW,MACHINE CRES, 2-56 X 1/2 (96906) 343-0128-000 (AP)	2	
67	MJE803	2	TRANSISTOR (04713) 352-1083-020 A1Q6	1	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	1	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	1	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	1	
	60-11-6131-1674	2	INSULATOR,TH CNDCT (18565) 352-9105-030 (AP)	1	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	1	
68	DA2779GE	2	SEMICOND DEVICE (03508) 353-3644-050 A1CR15 (EFF TO REV LTR W)	1	
68	1N4454-1	2	SEMICOND DEVICE (12969) 353-3644-010 A1CR15 (EFF REV LTR W)	1	
69	DA2779GE	2	SEMICOND DEVICE (03508) 353-3644-050 A1CR17 (EFF TO REV LTR W)	1	
69	1N4454-1	2	SEMICOND DEVICE (12969) 353-3644-010 A1CR17 (EFF REV LTR W)	1	
70	RCR07G103KS	2	RESISTOR,FIXED CMPSN, 10K, 10%, 1/4W (81349) 745-0785-000 A1R17	1	
71	RWR81S45R3FR	2	RESISTOR,FIXED WW, 45.3 OHMS, PORM1%, 1W (81349) 747-2178-970 A1R14	1	
72	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R5	1	
72A	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C12	1	
73	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C22	1	
74	DA2779GE	2	SEMICOND DEVICE (03508) 353-3644-050 A1CR13 (EFF TO REV LTR W)	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-74	1N4454-1	2	SEMICOND DEVICE (12969) 353-3644-010 A1CR13 (EFF REV LTR W)	1	
75	DA2779GE	2	SEMICOND DEVICE (03508) 353-3644-050 A1CR14 (EFF TO REV LTR W)	1	
75	1N4454-1	2	SEMICOND DEVICE (12969) 353-3644-010 A1CR14 (EFF REV LTR W)	1	
76	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C20	1	
77	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R3	1	
78	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C10	1	
79	RWR81S45R3FR	2	RESISTOR,FIXED WW, 45.3 OHMS, PORM1%, 1W (81349) 747-2178-970 A1R12	1	
80	RWR81S45R3FR	2	RESISTOR,FIXED WW, 45.3 OHMS, PORM1%, 1W (81349) 747-2178-970 A1R13	1	
81	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R4	1	
82	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C11	1	
83	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C21	1	
84	DA2779GE	2	SEMICOND DEVICE (03508) 353-3644-050 A1CR16 (EFF TO REV LTR W)	1	
84	1N4454-1	2	SEMICOND DEVICE (12969) 353-3644-010 A1CR16 (EFF REV LTR W)	1	
85	RWR81S45R3FR	2	RESISTOR,FIXED WW, 45.3 OHMS, PORM1%, 1W (81349) 747-2178-970 A1R15	1	
86	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C23	1	
87	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C13	1	
88	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R6	1	
89	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C24	1	
90	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C14	1	
91	RCR07G102KS	2	RESISTOR,FIXED CMPSN, 1K, 10%, 1/4W (81349) 745-0749-000 A1R7	1	
92	RWR81S45R3FR	2	RESISTOR,FIXED WW, 45.3 OHMS, PORM1%, 1W (81349) 747-2178-970 A1R16	1	
93	C137BX41	2	SEMICOND DEVICE (66844) 353-6489-010 A1Q5	1	
94	C137BX41	2	SEMICOND DEVICE (66844) 353-6489-010 A1Q3	1	
95	C137BX41	2	SEMICOND DEVICE (66844) 353-6489-010 A1Q1	1	
96	C137BX41	2	SEMICOND DEVICE (66844) 353-6489-010 A1Q2	1	
97	C137BX41	2	SEMICOND DEVICE (66844) 353-6489-010 A1Q4	1	
98	008-0131-0000	2	LUG,SOLDER (91886) 304-1528-010	5	
	MS35650-3255T	2	NUT,PLAIN,HEX TP BRS, 1/4-28 (96906) 313-0019-050 (AP FOR 93-98)	5	
	AN961-416T	2	WASHER,FLAT TP BRS, 0.265 ID X 0.500 OD (88044) 310-0751-050 (AP FOR 93-98)	5	
	MS35338-101	2	WASHER,SPRING CD PL BRZ, 0.255 ID X 0.489 OD (96906) 310-0102-000 (AP FOR 93-98)	5	
	43-02-25	2	INSULATOR,PLATE (13103) 352-9605-060 (AP FOR 93-98)	10	
	TW-516-25-T	2	SPACER,INSULATING (08289) 352-9561-020 (AP FOR 93-98)	5	
99	MS21266-1N	2	GROMMET,PLSTC CHAN (96906) 150-0173-000	1	
100	MS77068-2	2	TERMINAL,LUG (96906) 304-3120-010	1	
101	540-9225-003	2	POST,HEX	3	
102	646-6553-001	2	PLATE,MOUNT	1	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP FOR 100-102)	3	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR 100-102)	3	
103	012-3401-000599WHT	3	TERMINAL,FEEDTHRU (98291) 306-1851-000	14	
104	646-6553-002	3	PLATE	1	
105	600D336G050DD5	2	CAPACITOR,FIXED ELCTLT, 33UF, P75%M10%, 50V (56289) 183-1277-320 A1C17	1	
106	RE70G1R00	2	RESISTOR,FIXED WW, 1.00 OHMS, 1%, 20W (81349) 747-8806-000 A1R11	1	
107	RE70G1R00	2	RESISTOR,FIXED WW, 1.00 OHMS, 1%, 20W (81349) 747-8806-000 A1R10	1	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP FOR 106,107)	4	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 106,107)	4	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP FOR 106,107)(EFF TO REV LTR P)	4	
	MS51957-15	2	SCREW,MACHINE STL, 4-40 X 3/8 (96906) 343-0135-000 (AP FOR 106,107)(EFF REV LTR P)	4	
108	APD-324	2	INDUCTOR,POWER (80223) 678-0305-010 A1L7	1	
109	GFD120-5-.171	2	RETAINER (15857) 679-1832-000	1	
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP FOR 108,109)	1	
	623-5821-001	2	WASHER,SPECIAL (AP FOR 108,109)	1	
	646-6811-003	2	WASHER,INSULATOR (AP FOR 108,109)	1	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR 108,109)	1	
	CRES0.138-32X1.125IN	2	SCREW,MACHINE CRES, 0.138-32 X 1.125IN (77250) 343-0177-000 (AP FOR 108,109)	1	
110	572-4814-01-05-16	2	TERMINAL STUD (71279) 306-2513-250	3	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	3	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	3	
111	MS21266-3N	2	GROMMET,PLSTC CHAN (96906) 150-0177-000	2	
112	646-6547-001	2	HEATSINK NO.1	1	
113	540-9229-003	2	POST,HEX	3	
	P312-0075-000	2	STUD,CONT THREAD STL, 8-32 X 1/2 (77250) 312-0075-000 (AP FOR 112,113)	3	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR 112,113)	3	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP FOR 112,113)	3	
114	280-1368-640	2	LABEL,PRESSURE SENS (59518)	1	
115	1N5614	2	SEMICOND DEVICE (14099) 353-6556-010 A1CR8	1	
116	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C15	1	
117	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C16	1	
118	KUP14D5512V	2	RELAY,ARMATURE (77342) 970-0007-080 A1K1	1	A,B,D,F
118	KUP17D5512V	2	RELAY,ARMATURE (77342) 970-0007-310 A1K1	1	C,E
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP)	2	
	MS15795-805	2	WASHER,FLAT PSVT CRES, 0.164 ID X 0.320 OD (96906) 310-0779-050 (AP)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	2	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	2	
118A	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C28	1	C,E

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-118B	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C27	1	C,E
119	M19978/1-0591K	2	CAPACITOR,FIXED PPR-MYLAR DIEL, 0.01UF, 10%, 600VDC (81349) 933-1074-040 A1C8	1	B,C,D,E
119A	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C31	1	C,E
119B	41C23A1	2	CAPACITOR,FIXED CER DIEL, 47000PF, P80%M20%, 1000V (60705) 913-4689-000 A1C25	1	C,E
120	RCR07G105KS	2	RESISTOR,FIXED CMPSN, 1MEGO, 10%, 1/4W (81349) 745-0857-000 A1R20	1	B,C,D,E
121	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C6	1	B,C,D,E
122	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C5	1	B,C,D,E
123	APD-324	2	INDUCTOR,POWER (80223) 678-0305-010 A1L6	1	B,C,D,E
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP)	1	
	623-5821-001	2	WASHER,SPECIAL (AP)	1	
	646-6811-003	2	WASHER,INSULATING (AP)	1	
	GFD120-5-.171	2	RETAINER (15857) 679-1832-000 (AP)	1	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	1	
	CRES0.138-32X1.125IN	2	SCREW,MACHINE CRES, 0.138-32 X 1.125IN (77250) 343-0177-000 (AP)	1	
124	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C3	1	
124A	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C30	1	C,E
125	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C1	1	
126	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C2	1	
127	RCR07G105KS	2	RESISTOR,FIXED CMPSN, 1MEGO, 10%, 1/4W (81349) 745-0857-000 A1R18	1	
127A	710-5076-110	2	RESISTOR,FIXED WW, 1.1 OHMS, 1%, 36W (83777) A1R24	1	C,E
127B	710-5076-110	2	RESISTOR,FIXED WW, 1.1 OHMS, 1%, 36W (83777) A1R23	1	C,E
127C	9	2	BRACKET (44655) 139-1141-070	4	C,E
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP FOR 127A-127C)	3	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR 127A-127C)	3	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP FOR 127A-127C)	3	
128	M19978/1-0591K	2	CAPACITOR,FIXED PPR-MYLAR DIEL, 0.01UF, 10%, 600VDC (81349) 933-1074-040 A1C7	1	
129	RCR07G105KS	2	RESISTOR,FIXED CMPSN, 1MEGO, 10%, 1/4W (81349) 745-0857-000 A1R19	1	
129A	910B1D205K	2	CAPACITOR,FIXED PLSTC DIEL, 2UF, 10%, 250V (14752) 933-1424-050 A1C26	1	C,E
130	CK62AW472M	2	CAPACITOR,FIXED CER DIEL, 4700PF, 20%, 500V (81349) 913-1187-000 A1C4	1	
131	APD-324	2	INDUCTOR,POWER (80223) 678-0305-010 A1L5	1	
132	APD-324	2	INDUCTOR,POWER (80223) 678-0305-010 A1L4	1	
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP FOR 131,132)	2	
	623-5821-001	2	WASHER,SPECIAL (AP FOR 131,132)	2	
	646-6811-003	2	WASHER,INSULATING (AP FOR 131,132)	2	
	GFD120-5-.171	2	RETAINER (15857) 679-1832-000 (AP FOR 131,132)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP FOR 131,132)	2	
	CRES0.138-32X1.125IN	2	SCREW,MACHINE CRES, 0.138-32 X 1.125IN (77250) 343-0177-000 (AP FOR 131,132)	2	
133	MS77068-2	2	TERMINAL,LUG (96906) 304-3120-010	4	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP)	3	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	3	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP)	3	
134	572-4814-01-05-16	2	TERMINAL STUD (71279) 306-2513-250	12	A,B,C
134	572-4814-01-05-16	2	TERMINAL STUD (71279) 306-2513-250	8	D,E,F
	MS51957-13	2	SCREW,MACHINE STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	12	A,B,C
	MS51957-13	2	SCREW,MACHINE STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	8	D,E,F
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	12	A,B,C
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	8	D,E,F
135	MS77068-2	2	TERMINAL,LUG (96906) 304-3120-010	2	B,C,D,E
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP)	2	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	2	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP)	2	
136	572-4814-01-05-16	2	TERMINAL STUD (71279) 306-2513-250	3	B,C,D,E
	MS51957-13	2	SCREW,MACHINE STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	3	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	3	
137	572-4814-01-05-16	2	TERMINAL STUD (71279) 306-2513-250	6	C,E
	MS51957-13	2	SCREW,MACHINE STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	4	
	MS51959-13	2	SCREW,MACHINE CRES, 0.112-40 X 0.25 (96906) 342-0044-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	6	
138	280-1368-340	2	LABEL,PRESSURE SENS (59518)	1	
139	550272	2	FINGER GUARD,BLO (82877) 009-0236-020	1	
	P313-0046-000	2	NUT,PLAIN,HEX SST, 6-32 (77250) 313-0046-000 (AP)	4	
	MS15795-807	2	WASHER,FLAT PSVT CRES, 0.196 ID X 0.390 OD (96906) 310-0779-070 (AP)	6	
	MS35338-137	2	WASHER,LOCK CRES, 0.171 ID X 0.293 OD (96906) 310-0072-000 (AP)	4	
	MS51957-47	2	SCREW,MACHINE SST, 8-32 X 3/4 (96906) 343-0191-000 (AP)	4	
140	028309	2	BLOWER,TUBEAXIAL (82877) 009-0236-030 A1B1	1	
	P343-0343-000	2	SCREW,MACHINE NP BRS, 10-32 X 1/4 (77250) 343-0343-000 (AP)	1	
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP)	1	
	MS15795-807	2	WASHER,FLAT PSVT CRES, 0.196 ID X 0.390 OD (96906) 310-0779-070 (AP)	1	
141	547-5305-002	2	TERMINAL,LUG	1	A,B,C
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP)	1	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	1	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	1	
142	547-5305-002	2	TERMINAL,LUG	3	A,B,C

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	3	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	3	
	547-8177-012	2	BUSHING,INSULATED (AP)	3	
	FBR 0.156IDX0.375OD	2	WASHER,NONMETALLIC FBR, 0.156 ID X 0.375 OD (74921) 302-7000-000 (AP)	3	
	MS51957-16	2	SCREW,MACHINE STL, 4-40 X 7/16 (96906) 343-0136-000 (AP)	3	
143	MS25281-R8	2	CLAMP,LOOP (96906) 150-0708-070	2	A,B,C
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP)	2	
	NIPLBRS.172IDX.437ODX.036	2	WASHER,FLAT NI PL BRS, 0.172 ID X 0.437 OD (79807) 310-0058-000 (AP)	2	
	MS51957-29	2	SCREW,MACHINE CRES, 0.138-32 X 0.437IN (96906) 343-0170-000 (AP)	2	
144	MS25281-R8	2	CLAMP,LOOP (96906) 150-0708-070	1	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	1	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	1	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	1	
	NIPLBRS.172IDX.437ODX.036	2	WASHER,FLAT NI PL BRS, 0.172 ID X 0.437 OD (79807) 310-0058-000 (AP)	1	
145	646-6878-001	2	PLATE,CONN GUIDE	3	
	MS51957-3	2	SCREW,MACHINE CRES, 2-56 X 1/4 (96906) 343-0124-000 (AP)	6	
	NAS1454-C04-0006	2	ROD,CONT THREAD CRES, 0.112-40 X 0.375L (80205) 312-0007-000 (AP)	6	
146	540-9180-003	2	POST,ELEC-MECH EQPT	6	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	6	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	6	
147	540-9184-003	2	POST,ELEC-MECH EQPT	6	
148	646-6879-001	2	PLATE,CONN GUIDE	3	
	MS51957-14	2	SCREW,MACHINE SST, 4-40 X 5/16 (96906) 343-0134-000 (AP FOR 147,148)	12	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 147,148)	6	
149			NOT USED		
150	SSC-4S-S6	2	CLAMP,LOOP (06383) 435-0001-070	8	
	NPBRS0.138-32	2	NUT,PLAIN,HEXAGON NP BRS, 0.138-32 (77250) 313-0053-000 (AP)	8	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	8	
	NIPLBRS.172IDX.437ODX.036	2	WASHER,FLAT NI PL BRS, 0.172 ID X 0.437 OD (79807) 310-0058-000 (AP)	8	
151	652-2255-001	2	FILTER ASSEMBLY A1A1 (SEE FIG 6-6)	1	D,E,F
	547-5305-002	2	TERMINAL,LUG (AP)	1	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP)	4	
152	547-5305-002	2	TERMINAL,LUG	2	
	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP)	2	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	2	
	547-8177-012	2	BUSHING,INSULATED (AP)	2	
	FBR 0.156IDX0.375OD	2	WASHER,NONMETALLIC FBR, 0.156 ID X 0.375 OD (74921) 302-7000-000 (AP)	2	
	MS51957-16	2	SCREW,MACHINE STL, 4-40 X 7/16 (96906) 343-0136-000 (AP)	2	

GROUP ASSEMBLY PARTS LIST

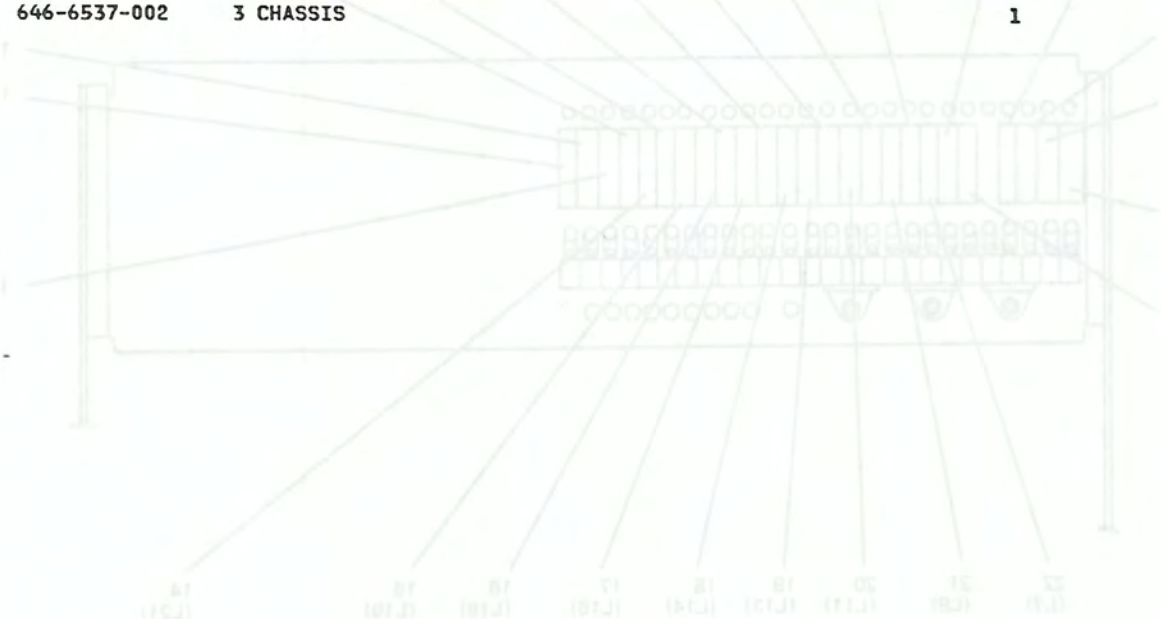
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-153	646-7000-001	2	WIRING HARNESS A1W1	1	A
153	646-7000-002	2	WIRING HARNESS A1W1	1	B,C
153	646-7000-005	2	WIRING HARNESS A1W1	1	D,E
153	646-7000-004	2	WIRING HARNESS A1W1	1	F
	MS3367-4-9	2	TIE,CABLE (96906) 435-1169-100 (AP)	10	
	66504-9	3	CONTACT,SOCKET ELEC (00779) 372-0514-090	2	A,B,C
	MS25036-112	3	TERMINAL,LUG (96906) 304-1282-000	5	A
	MS25036-112	3	TERMINAL,LUG (96906) 304-1282-000	7	B,C
	MS25036-112	3	TERMINAL,LUG (96906) 304-1282-000	12	D,E
	MS25036-112	3	TERMINAL,LUG (96906) 304-1282-000	10	F
	MS25036-103	3	TERMINAL,LUG (96906) 304-1259-000 (EFF TO REV LTR G)	1	
	MS25036-103	3	TERMINAL,LUG (96906) 304-1259-000 (EFF REV LTR G TO REV LTR H)	2	
	MS25036-103	3	TERMINAL,LUG (96906) 304-1259-000 (EFF REV LTR H)	3	
154	DBM-17W2P	3	CONNECTOR,RCPT ELEC (71785) 371-0914-000 A1W1J7	1	
	DM53745-27	3	CONTACT,PIN (13556) 371-2593-030	2	
	MS25036-112	3	TERMINAL,LUG (96906) 304-1282-000	1	
155	235-03-00-30D	3	CONNECTOR,RCPT ELEC (71785) 371-0910-000 A1W1J5	1	
	DM53744-25	3	CONTACT,SOCKET (13556) 371-2593-040	2	
156	DBM-17W2P	3	CONNECTOR,RCPT ELEC (71785) 371-0914-000 A1W1J8	1	
	DM53745-27	3	CONTACT,PIN (13556) 371-2593-030	2	
	MS25036-112	3	TERMINAL,LUG (96906) 304-1282-000	1	
157	235-03-00-30D	3	CONNECTOR,RCPT ELEC (71785) 371-0910-000 A1W1J6	1	
	DM53744-25	3	CONTACT,SOCKET (13556) 371-2593-040	2	
158	DBM-17W2P	3	CONNECTOR,RCPT ELEC (71785) 371-0914-000 A1W1J9	1	
	DM53745-27	3	CONTACT,PIN (13556) 371-2593-030	2	
	MS25036-108	3	TERMINAL,LUG (96906) 304-1271-000	6	
159	2-87631-7	3	HOUSING,CONNECTOR ELEC (00779) 372-0044-140 A1W1P1	1	
	86016-2	3	CONTACT,ELECTRICAL (00779) 372-2501-040	12	
	86015-2	3	CONTACT,ELECTRICAL (00779) 372-2501-050 (EFF TO REV LTR G)	24	
	86015-2	3	CONTACT,ELECTRICAL (00779) 372-2501-050 (EFF REV LTR G)	23	
	MS25036-147	3	TERMINAL,LUG (96906) 304-1254-000	3	
160	87631-7	3	HOUSING,CONNECTOR ELEC (00779) 372-0044-040 A1W1P2	1	
161	DCMF-37S-A176	3	CONNECTOR,RCPT ELEC (71468) 371-0167-000 A1W1J10	1	
162	235-03-00-30D	3	CONNECTOR,RCPT ELEC (71785) 371-0910-000 A1W1J4	1	
	DM53744-25	3	CONTACT,SOCKET (13556) 371-2593-040	2	
163	206038-1	3	CONNECTOR,RCPT ELEC (00779) 372-0514-030 A1W1J3	1	A,B,C
	66504-9	3	CONTACT,SOCKET ELEC (00779) 372-0514-090	14	
	66569-3	3	CONTACT,SOCKET ELEC (00779) 372-0514-070	5	
	206509-1	3	CONNECTOR,PLUG ELEC (00779) 372-0514-100	1	
164	206306-1	3	CONNECTOR,RCPT ELEC (00779) 372-5932-090 A1W1J2	1	A,B,C
	66105-4	3	CONTACT,SOCKET ELEC (00779) 372-5932-150	17	
	66101-4	3	CONTACT,SOCKET ELEC (00779) 372-5932-130	20	
	MS25036-112	3	TERMINAL,LUG (96906) 304-1282-000	5	
165	207486-1	3	CONNECTOR,RCPT ELEC (00779) 372-0513-010 A1W1J1	1	
	66261-3	3	CONTACT,PIN ELEC (00779) 372-0513-030	3	A,F
	66261-3	3	CONTACT,PIN ELEC (00779) 372-0513-030	4	B,C,D,E
	66099-4	3	CONTACT,PIN ELEC (00779) 372-5932-120	5	
	MS25036-112	3	TERMINAL,LUG (96906) 304-1282-000 (EFF TO REV LTR H)	1	
165A	646-7048-001	2	PLATE,CONN COVER	1	A,B,D,F
165A	DEMF-9S-A176	2	CONNECTOR,RCPT ELEC (71468) 371-0164-000 A1J11	1	C,E
	MS35649-224	2	NUT,PLAIN,HEXAGON SST, 2-56 (96906) 313-0037-000 (AP)	2	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	2	
	MS51957-4	2	SCREW,MACHINE CRES, 2-56 X 5/16 (96906) 343-0125-000 (AP)	2	
165B	66504-9	2	CONTACT,SOCKET ELEC (00779) 372-0514-090	4	A,B
165B	66504-9	2	CONTACT,SOCKET ELEC (00779) 372-0514-090	5	C
166	NAS671C4	2	NUT,PLAIN,HEXAGON CD PL STL, 0.112-40 (80205) 313-0132-000 (AP FOR 163-165)	12	

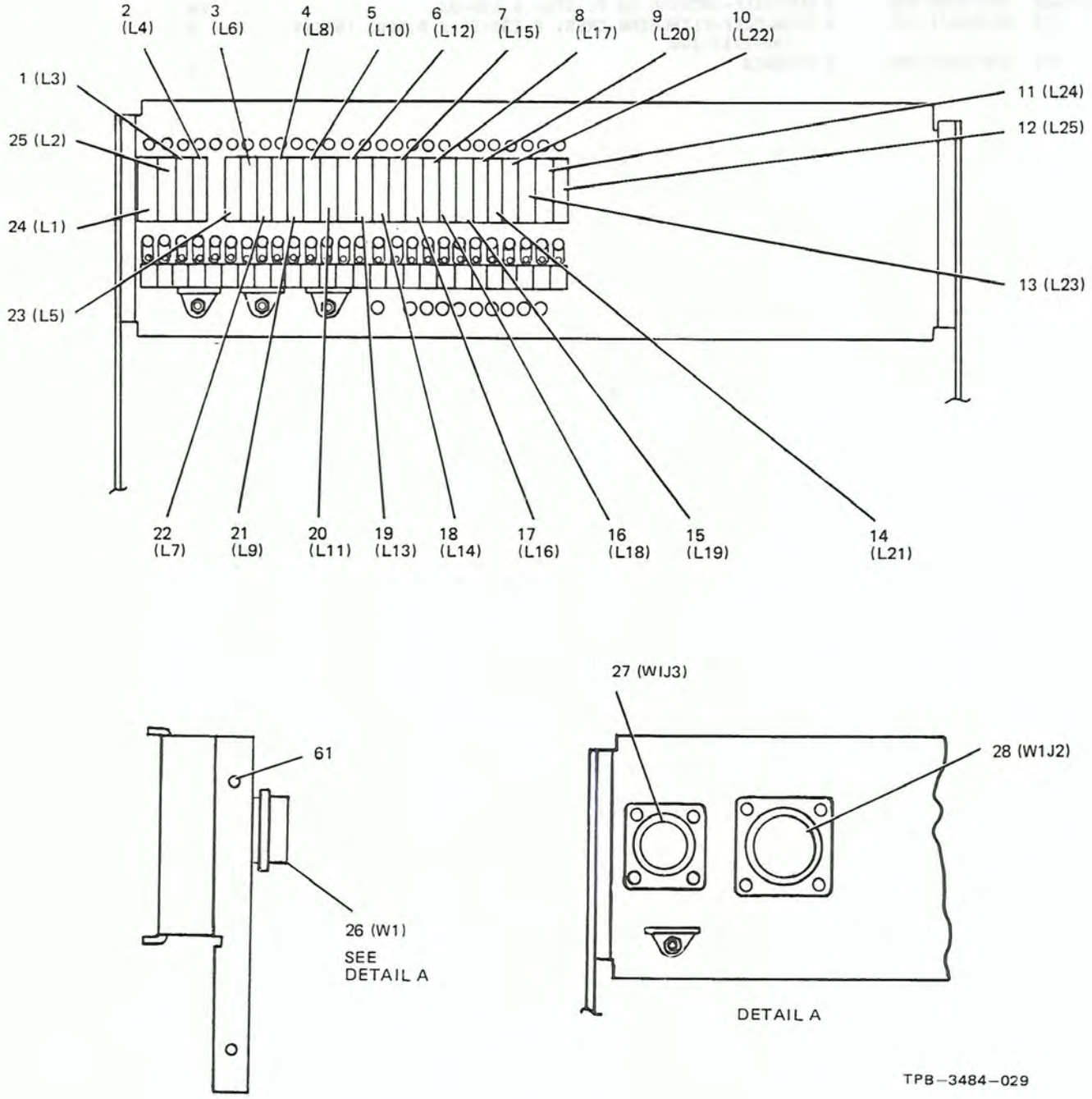
GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 163-165)	12	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP FOR 163-165)	12	
	MS51957-16	2	SCREW,MACHINE STL, 4-40 X 7/16 (96906) 343-0136-000 (AP FOR 163-165)	12	
166A	P343-0347-000	2	SCREW,MACHINE NP BRS, 10-32 X 1/2 (77250) 343-0347-000	1	
167	428056	2	CABLE,POWER (82877) 009-1840-060 A1W2 (EFF TO REV LTR M)	1	A,B,C
167	428056	2	CABLE,POWER (82877) 009-1801-060 A1W2 (EFF REV LTR M)	1	A,B,C
167	428056	2	CABLE,POWER (82877) 009-1801-060 A1W2	1	D,E,F
168	MS35489-6	2	GROMMET,RUBBER (96906) 201-0002-000	1	
169	646-6539-001	2	BRACKET,BLOWER	1	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP)	12	
170	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32 (EFF TO REV LTR E)	12	
170	M45938/5-6	3	NUT,SLFLKG,CLINCH CD PL STL, 0.138-32UNC-3B X 0.060 (81349) 333-0842-000 (EFF REV LTR E)	16	
170A	M45938/5-4	3	NUT,SLFLKG,CLINCH CD PL STL, 0.112-40UNC-3B X 0.060 (81349) 333-0840-000 (EFF REV LTR E)	2	
171	AN366DF1032A	3	NUT,SLFLKG,PLATE ANDZ AL ALLOY, 0.190-32 (81352) 333-0252-000	1	
172	MS20470AD3-3	3	RIVET,SOLID ANDZ AL, 0.094 DIA X 0.1875 (96906) 305-1154-000	2	
173	646-6539-002	3	BRACKET	1	
174	540-9026-003	2	POST,ELEC-MECH EQPT	2	
	MS51957-4	2	SCREW,MACHINE CRES, 2-56 X 5/16 (96906) 343-0125-000 (AP)	4	
	MS35338-134	2	WASHER,LOCK SST, 0.088 ID X 0.172 OD (96906) 310-0275-000 (AP)	4	
174A	540-9469-003	2	POST,ELEC-MECH	4	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	4	
	MS35338-98	2	WASHER,SPRING CD PL BRZ, 0.141 ID X 0.250 OD (96906) 310-0096-000 (AP)	4	
175	646-6998-001	2	POST,HOLDDOWN	12	
	MS16997-31	2	SCREW,CAP,SCH CD PL STL, 8-32 X 0.375 (96906) 324-2616-000 (AP)	12	
	MS35338-137	2	WASHER,LOCK CRES, 0.171 ID X 0.293 OD (96906) 310-0072-000 (AP)	12	
176	647-7487-001	2	BAR,SUPPORT	1	
	MS51959-41	2	SCREW,MACH CRES SST, 8-32 X 0.250 (96906) 342-0076-000 (AP)	7	
177	MS21266-2N	2	GROMMET,PLSTC CHAN (96906) 150-0175-000	AR	
178	646-6538-001	2	CHASSIS,SIDE-LEFT	1	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP)	3	
179	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	7	
180	333-1455-040	3	NUT,SELF-LOCKING CD PL STL, 0.164-32	5	
181	014-3401-000599	3	TERMINAL,STANDOFF (98291) 306-1521-000	6	
182	RM52LHA227-62	3	NUT,SLFLKG,PL CD PL STL, 6-32 (72962) 333-1160-000	2	
	MS20470AD3-3	3	RIVET,SOLID ANDZ AL, 0.094 DIA X 0.1875 (96906) 305-1154-000 (AP)	4	
183	646-6538-003	3	CHASSIS	1	
184	646-6538-002	2	CHASSIS,SIDE-RIGHT	1	
	MS51957-27	2	SCREW,MACHINE CRES, 0.138-32 X 0.312IN (96906) 343-0168-000 (AP)	3	
185	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	7	
186	333-1455-040	3	NUT,SELF-LOCKING CD PL STL, 0.164-32	5	
187	646-6538-004	3	CHASSIS	1	
188	646-6537-001	2	CHASSIS,BOTTOM	1	

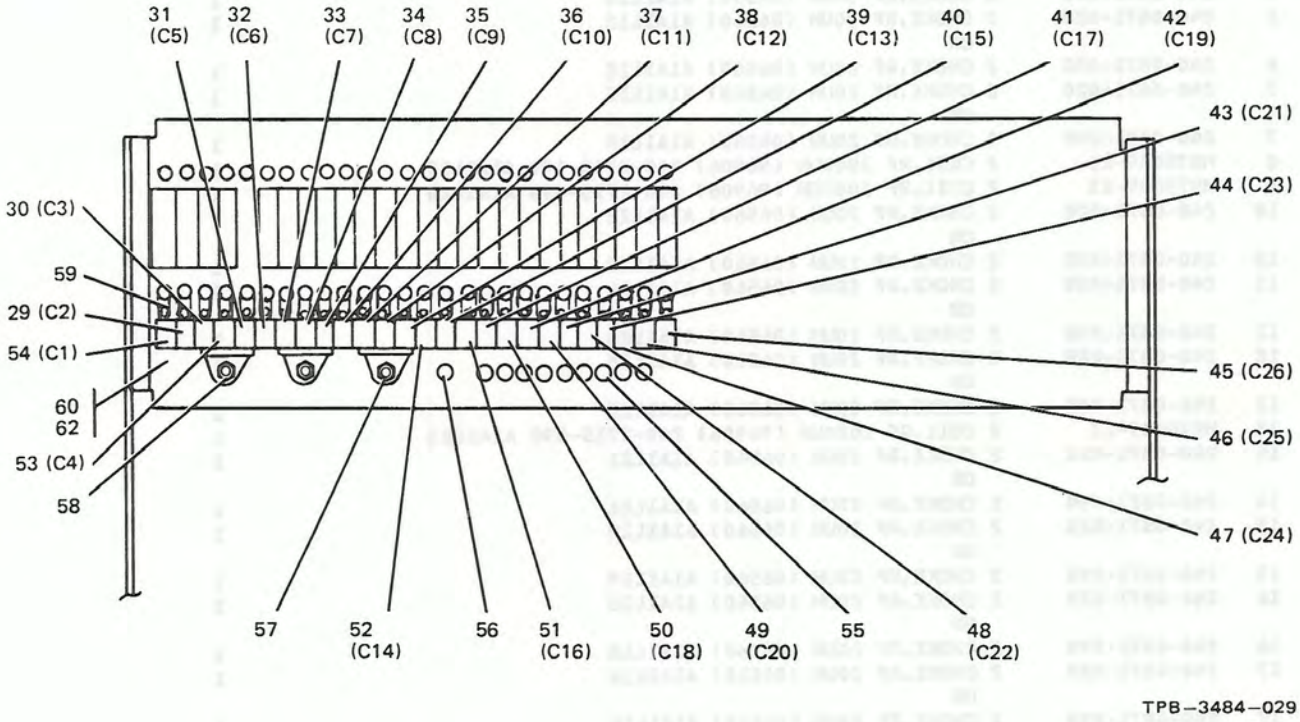
GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-5-189	333-1455-030	3	NUT,SELF-LOCKING CD PL STL, 0.138-32	20	
190	M63540/1-14C	3	STUD,SELF-CLINCHING CRES, 0.138-32 X 0.500L (81349) 330-1717-100	8	
191	646-6537-002	3	CHASSIS	1	





Filter Assembly A1A1, Parts Location Diagram
Figure 6-6 (Sheet 1 of 2)



Filter Assembly A1A1, Parts Location Diagram
Figure 6-6 (Sheet 2)

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-6-	652-2255-001	1	FILTER ASSEMBLY A1A1 (SEE FIG 6-5-151 FOR NHA)	REF	D,E,F
1	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L3	1	
			OR		
1	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L3	1	
2	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L4	1	
3	240-0871-030	2	CHOKE,RF 30UH (06560) A1A1L6	1	
			OR		
3	240-0871-100	2	CHOKE,RF 30UH (06560) A1A1L6	1	
4	MS75087-1	2	COIL,RF 0.10UH (96906) 240-2715-010 A1A1L8	1	
5	240-0871-030	2	CHOKE,RF 30UH (06560) A1A1L10	1	
			OR		
5	240-0871-100	2	CHOKE,RF 30UH (06560) A1A1L10	1	
6	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L12	1	
			OR		
6	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L12	1	
7	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L15	1	
			OR		
7	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L15	1	
8	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L17	1	
9	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L20	1	
10	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L22	1	
			OR		
10	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L22	1	
11	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L24	1	
			OR		
11	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L24	1	
12	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L25	1	
			OR		
12	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L25	1	
13	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L23	1	
14	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L21	1	
			OR		
14	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L21	1	
15	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L19	1	
			OR		
15	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L19	1	
16	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L18	1	
			OR		
16	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L18	1	
17	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L16	1	
			OR		
17	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L16	1	
18	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L14	1	
19	240-0871-020	2	CHOKE,RF 20UH (06560) A1A1L13	1	
			OR		
19	240-0871-090	2	CHOKE,RF 20UH (06560) A1A1L13	1	
20	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L11	1	
21	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L9	1	
22	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L7	1	
23	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L5	1	
24	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L1	1	
25	MS75089-23	2	COIL,RF 1000UH (96906) 240-2715-490 A1A1L2	1	
26	652-2256-001	2	WIRING HARNESS A1A1W1	1	
27	206038-1	3	CONNECTOR,RCPT ELEC (00779) 372-0514-030 A1A1W1J3	1	
	66569-3	3	CONTACT,SOCKET ELEC (00779) 372-0514-070	5	
	66504-9	3	CONTACT,SOCKET ELEC (00779) 372-0514-090	20	
	206509-1	3	CONNECTOR,PLUG ELEC (00779) 372-0514-100	1	
28	206306-1	3	CONNECTOR,RCPT ELEC (00779) 372-5932-090 A1A1W1J2	1	
	66101-4	3	CONTACT,SOCKET (00779) 372-5932-130	20	
	66105-4	3	CONTACT,SOCKET (00779) 372-5932-150	17	
29	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C2	1	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-6-30	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C3	1	
31	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C5	1	
32	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C6	1	
33	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C7	1	
34	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C8	1	
35	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C9	1	
36	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C10	1	
37	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C11	1	
38	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C12	1	
39	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C13	1	
40	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C15	1	
41	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C17	1	
42	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C19	1	
43	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C21	1	
44	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C23	1	
45	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C26	1	
46	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C25	1	
47	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C24	1	
48	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C22	1	
49	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C20	1	
50	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C18	1	
51	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C16	1	
52	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C14	1	
53	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C4	1	
54	CK06BX104K	2	CAPACITOR,FIXED CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1A1C1	1	
55	2308-4-1	2	TERMINAL STANDOFF (17117) 306-0234-000	61	
	MS51957-13	2	SCREW,MACHINE STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	61	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	61	
56	572-4814-01-05-16	2	TERMINAL STUD (71279) 306-2513-250	1	
	MS51957-13	2	SCREW,MACHINE STL, 4-40 X 1/4 (96906) 343-0133-000 (AP)	1	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	1	
57	547-5305-002	2	TERMINAL,LUG	2	

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
6-6-	MS35649-244	2	NUT,PLAIN,HEXAGON CRES, 0.112-40 (77250) 313-0043-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	MS15795-803	2	WASHER,FLAT PSVT CRES, 0.125 ID X 0.250 OD (96906) 310-0779-030 (AP)	4	
	547-8177-012	2	BUSHING,INSULATED (AP)	4	
	FBR 0.156IDX0.375OD	2	WASHER,NONMETALLIC FBR, 0.156 ID X 0.375 OD (74921) 302-7000-000 (AP)	2	
	MS51957-17	2	SCREW,MACHINE STL, 4-40 X 1/2 (96906) 343-0137-000 (AP)	2	
58	547-5305-002	2	TERMINAL,LUG	1	
	NAS671C6	2	NUT,PLAIN,HEXAGON CRES, 0.138-32 (80205) 313-0045-000 (AP)	1	
	MS35338-136	2	WASHER,LOCK SST, 0.141 ID X 0.250 OD (96906) 310-0282-000 (AP)	1	
	MS51957-28	2	SCREW,MACHINE CRES, 0.138-32 X 0.375IN (96906) 343-0169-000 (AP)	1	
59	2104-04-01-2520N	2	TERMINAL,LUG (78189) 304-0317-000	26	
60	652-2197-001	2	PLATE,TERMINAL - PRSD	1	
61	M45938/5-6	3	NUT,SLFLKG,CLINCH CD PL STL, 0.138-32UNC-3B X 0.060 (81349) 333-0842-000	4	
62	652-2197-002	3	PLATE,TERMINAL	1	

6.3.2 Numerical Index

PART NUMBER	FIG-ITEM	TTL REQ
AM1-Z625-4	6-5-11	
	6-5-12	
	6-5-13	
	6-5-14	
	6-5-15	5
AM333HEMG6-25-14	6-5-17	1
-250-400		
AN366DF1032A	6-5-171	1
AN961-416T	6-5-98	5
APD-324	6-5-108	
	6-5-123	
	6-5-131	
	6-5-132	4
APL11-1709-230	6-5-16	1
APL11-1709-470	6-5-17	1
CFHC-440-6	6-5-21	1
CFHC440-4	6-5-22	
	6-5-22	33
CK06BX104K	6-5-72A	
	6-5-73	
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	6-5-78	
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	6-5-126	
	6-5-130	12
CPD-240	6-5-38	1
CRES0.138-32X1.1	6-5-109	
25IN		
	6-5-123	
	6-5-132	4
C137BX41	6-5-93	
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	6-5-97	5
DA2779GE	6-5-68	
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	6-5-84	5
DBM-17W2P	6-5-154	

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PART NUMBER	FIG-ITEM	TTL REQ
DBM-17W2P	6-5-156	
	6-5-158	3
DCMF-37S-A176	6-5-161	1
DEMF-9S-A176	6-5-165A	1
DM53744-25	6-5-155	
	6-5-157	
	6-5-162	6
DM53745-27	6-5-154	
	6-5-156	
	6-5-158	6
FBR 0.156IDX0.37 5OD	6-5-142	
	6-5-152	
	6-6-57	7
GFD120-5-.171	6-5-109	
	6-5-123	
	6-5-132	4
KUP14D5512V	6-5-118	1
KUP17D5512V	6-5-118	1
MJE803	6-5-67	1
MS15795-803	6-4-9	
	6-5-10	
	6-5-18	
	6-5-34	
	6-5-36	
	6-5-67	
	6-5-142	
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MS15795-805	6-5-26	
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MS15795-807	6-5-26	
	6-5-139	
	6-5-140	9
MS16997-31	6-5-175	12
MS16998-28	6-5-5	4
MS20470AD3-3	6-5-172	
	6-5-182	6
MS21266-1N	6-5-99	1
MS21266-2N	6-5-177	AR
MS21266-3N	6-5-47	
	6-5-111	3
MS25036-103	6-5-16A	
	6-5-153	
	6-5-153	
	6-5-153	10
MS25036-108	6-5-12A	
	6-5-14A	
	6-5-158	10
MS25036-112	6-5-153	
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MS25036-147	6-5-159	3
MS25281-R8	6-5-143	
	6-5-144	3
MS3367-4-9	6-5-153	10
MS35333-108	6-5-56	
	6-5-59	6
MS35338-101	6-5-98	5
MS35338-134	6-5-66	
	6-5-165A	
	6-5-174	8
MS35338-135	6-4-9	
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MS35338-136	6-4-3	
	6-6-58	5
MS35338-137	6-5-4	
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	6-5-175	26
MS35338-138	6-5-5	
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	6-5-150	
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MS35489-6	6-5-168	1
MS35649-224	6-5-66	

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MS35649-224	6-5-165A	4
MS35649-244	6-6-57	2
MS35650-3255T	6-5-56	
	6-5-59	
	6-5-98	11
MS51957-13	6-5-134	
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	6-6-56	89
MS51957-14	6-4-1	
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	6-5-110	
	6-5-146	
	6-5-148	57
MS51957-15	6-5-107	4
MS51957-16	6-5-142	
	6-5-152	
	6-5-166	17
MS51957-17	6-6-57	2
MS51957-19B	6-5-19	4
MS51957-26	6-4-3	4
MS51957-27	6-5-28	
	6-5-49	
	6-5-102	
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	6-5-127C	
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MS51957-27B	6-5-17	
	6-5-17	38
MS51957-28	6-4-3	
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	6-5-174A	
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MS51957-29	6-5-143	2
MS51957-3	6-5-145	6
MS51957-4	6-5-165A	
	6-5-174	6
MS51957-42	6-5-4	3
MS51957-44	6-5-32	
	6-5-32	6
MS51957-47	6-5-139	4
MS51957-7	6-5-66	2
MS51958-61	6-5-26	
	6-5-38	
	6-5-40	10
MS51959-13	6-5-3	
	6-5-137	4
MS51959-41	6-5-176	7
MS75087-1	6-6-4	1
MS75089-23	6-6-2	
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MS77068-2	6-5-100	
	6-5-133	
	6-5-135	7
MW-1-265	6-5-56	
	6-5-59	6
M19978/1-0591K	6-5-119	
	6-5-128	2
M45938/5-4	6-5-170A	2
M45938/5-6	6-5-170	
	6-6-61	20
M63540/1-14C	6-5-190	8
NAS1454-C04-0006	6-5-145	6
NAS620B416	6-5-59	2
NAS620C3	6-5-66	2
NAS620C416L	6-5-56	4
NAS620C6L	6-4-3	4
NAS620C8	6-5-4	3
NAS671C4	6-5-10	
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NAS671C6	6-6-58	1
NIPLBRS.172IDX.4	6-5-143	
370DX.036		
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	6-5-150	11
NPBRS0.138-32	6-5-48	
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	6-5-118	
	6-5-123	
	6-5-127C	
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P015-0557-000	6-5-32	
	6-5-32	3
P312-0075-000	6-5-113	3
P313-0046-000	6-5-46	
	6-5-139	5
P334-4120-00	6-5-9	1
P343-0343-000	6-5-140	1

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RCR07G102KS	6-5-9A	
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RCR07G103KS	6-5-70	1
RCR07G105KS	6-5-120	
	6-5-127	
	6-5-129	3
RCR07G271KS	6-5-6	1
RE70G1R00	6-5-106	
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747-2833-000	6-5-31	
	6-5-32	2
747-8806-000	6-5-106	
	6-5-107	2
763-3339-004	6-5-5	2
763-3340-001	6-5-5	4
86015-2	6-5-159	
	6-5-159	47
86016-2	6-5-159	12
87631-7	6-5-160	1
9	6-5-127C	4
910B1D205K	6-5-129A	1
910B1E334K	6-5-50	
	6-5-51	2
913-1187-000	6-5-116	
	6-5-117	
	6-5-118A	
	6-5-118B	
	6-5-119A	
	6-5-121	
	6-5-122	
	6-5-124	
	6-5-124A	
	6-5-125	
	6-5-126	
	6-5-130	12
913-3234-000	6-5-45	1
913-4689-000	6-5-119B	1
913-5019-440	6-5-72A	
	6-5-73	
	6-5-76	
	6-5-78	
	6-5-82	
	6-5-83	
	6-5-86	
	6-5-87	
	6-5-89	
	6-5-90	
	6-6-29	
	6-6-30	
	6-6-31	
	6-6-32	
	6-6-33	
	6-6-34	
	6-6-35	
	6-6-36	
	6-6-37	
	6-6-38	
	6-6-39	
	6-6-40	
	6-6-41	
	6-6-42	
	6-6-43	
	6-6-44	
	6-6-45	
	6-6-46	
	6-6-47	
	6-6-48	
	6-6-49	
	6-6-50	
	6-6-51	
	6-6-52	
	6-6-53	
	6-6-54	36
933-1074-040	6-5-119	
	6-5-128	2
933-1424-040	6-5-50	
	6-5-51	2

NUMERICAL INDEX

PART NUMBER	FIG-ITEM	TTL REQ	PART NUMBER	FIG-ITEM	TTL REQ
933-1424-050	6-5-129A	1			
951-1066-000	6-5-51	1			
970-0007-080	6-5-118	1			
970-0007-310	6-5-118	1			
970-0039-010	6-5-46	1			

6.3.3 Reference Designation Index

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1	6-4-11	646-6884-001
A1	6-4-11	646-6884-002
A1	6-4-11	646-6884-003
A1	6-4-11	646-6884-006
A1	6-4-11	646-6884-007
A1	6-4-11	646-6884-005
A1	6-5-	646-6884-001
A1	6-5-	646-6884-002
A1	6-5-	646-6884-003
A1	6-5-	646-6884-006
A1	6-5-	646-6884-007
A1	6-5-	646-6884-005
A1A1	6-5-151	652-2255-001
A1A1	6-6-	652-2255-001
A1A1C1	6-6-54	CK06BX104K
A1A1C10	6-6-36	CK06BX104K
A1A1C11	6-6-37	CK06BX104K
A1A1C12	6-6-38	CK06BX104K
A1A1C13	6-6-39	CK06BX104K
A1A1C14	6-6-52	CK06BX104K
A1A1C15	6-6-40	CK06BX104K
A1A1C16	6-6-51	CK06BX104K
A1A1C17	6-6-41	CK06BX104K
A1A1C18	6-6-50	CK06BX104K
A1A1C19	6-6-42	CK06BX104K
A1A1C2	6-6-29	CK06BX104K
A1A1C20	6-6-49	CK06BX104K
A1A1C21	6-6-43	CK06BX104K
A1A1C22	6-6-48	CK06BX104K
A1A1C23	6-6-44	CK06BX104K
A1A1C24	6-6-47	CK06BX104K
A1A1C25	6-6-46	CK06BX104K
A1A1C26	6-6-45	CK06BX104K
A1A1C3	6-6-30	CK06BX104K
A1A1C4	6-6-53	CK06BX104K
A1A1C5	6-6-31	CK06BX104K
A1A1C6	6-6-32	CK06BX104K
A1A1C7	6-6-33	CK06BX104K
A1A1C8	6-6-34	CK06BX104K
A1A1C9	6-6-35	CK06BX104K
A1A1L1	6-6-24	MS75089-23
A1A1L10	6-6-5	240-0871-030
A1A1L10	6-6-5	240-0871-100
A1A1L11	6-6-20	MS75089-23
A1A1L12	6-6-6	240-0871-020
A1A1L12	6-6-6	240-0871-090
A1A1L13	6-6-19	240-0871-020
A1A1L13	6-6-19	240-0871-090
A1A1L14	6-6-18	MS75089-23
A1A1L15	6-6-7	240-0871-020
A1A1L15	6-6-7	240-0871-090
A1A1L16	6-6-17	240-0871-020
A1A1L16	6-6-17	240-0871-090
A1A1L17	6-6-8	MS75089-23
A1A1L18	6-6-16	240-0871-020
A1A1L18	6-6-16	240-0871-090
A1A1L19	6-6-15	240-0871-020
A1A1L19	6-6-15	240-0871-090
A1A1L2	6-6-25	MS75089-23
A1A1L20	6-6-9	MS75089-23
A1A1L21	6-6-14	240-0871-020
A1A1L21	6-6-14	240-0871-090
A1A1L22	6-6-10	240-0871-020
A1A1L22	6-6-10	240-0871-090
A1A1L23	6-6-13	MS75089-23
A1A1L24	6-6-11	240-0871-020
A1A1L24	6-6-11	240-0871-090
A1A1L25	6-6-12	240-0871-020
A1A1L25	6-6-12	240-0871-090
A1A1L3	6-6-1	240-0871-020
A1A1L3	6-6-1	240-0871-090
A1A1L4	6-6-2	MS75089-23
A1A1L5	6-6-23	MS75089-23
A1A1L6	6-6-3	240-0871-030
A1A1L6	6-6-3	240-0871-100
A1A1L7	6-6-22	MS75089-23
A1A1L8	6-6-4	MS75087-1
A1A1L9	6-6-21	MS75089-23
A1A1W1	6-6-26	652-2256-001
A1A1W1J2	6-6-28	206306-1
A1A1W1J3	6-6-27	206038-1
A1B1	6-5-140	028309

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1CB1	6-5-17	APL11-1709-470
A1CB1	6-5-17	AM333HEMG6-25-14-250-400
A1CB2	6-5-16	APL11-1709-230
A1CB2	6-5-16	295-11-1REC1-4459-020
A1CB3	6-5-15	AM1-Z625-4
A1CB4	6-5-14	AM1-Z625-4
A1CB5	6-5-13	AM1-Z625-4
A1CB6	6-5-12	AM1-Z625-4
A1CB7	6-5-11	AM1-Z625-4
A1CR1	6-5-55	1N1190
A1CR10	6-5-63	1N5614
A1CR11	6-5-62	1N5614
A1CR12	6-5-64	1N5614
A1CR13	6-5-74	DA2779GE
A1CR13	6-5-74	1N4454-1
A1CR14	6-5-75	DA2779GE
A1CR14	6-5-75	1N4454-1
A1CR15	6-5-68	DA2779GE
A1CR15	6-5-68	1N4454-1
A1CR16	6-5-84	DA2779GE
A1CR16	6-5-84	1N4454-1
A1CR17	6-5-69	DA2779GE
A1CR17	6-5-69	1N4454-1
A1CR2	6-5-54	1N1190
A1CR3	6-5-52	1N1190
A1CR4	6-5-53	1N1190
A1CR5	6-5-58	1N1190
A1CR6	6-5-57	1N1190
A1CR7	6-5-44	1N5614
A1CR8	6-5-115	1N5614
A1CR9	6-5-61	1N5614
A1C1	6-5-125	CK62AW472M
A1C10	6-5-78	CK06BX104K
A1C11	6-5-82	CK06BX104K
A1C12	6-5-72A	CK06BX104K
A1C13	6-5-87	CK06BX104K
A1C14	6-5-90	CK06BX104K
A1C15	6-5-116	CK62AW472M
A1C16	6-5-117	CK62AW472M
A1C17	6-5-105	600D336G050DD5
A1C18	6-5-51	V323Z-226
A1C18	6-5-51	910B1E334K
A1C19	6-5-50	910B1E334K
A1C2	6-5-126	CK62AW472M
A1C20	6-5-76	CK06BX104K
A1C21	6-5-83	CK06BX104K
A1C22	6-5-73	CK06BX104K
A1C23	6-5-86	CK06BX104K
A1C24	6-5-89	CK06BX104K
A1C25	6-5-119B	41C23A1
A1C26	6-5-129A	910B1D205K
A1C27	6-5-118B	CK62AW472M
A1C28	6-5-118A	CK62AW472M
A1C3	6-5-124	CK62AW472M
A1C30	6-5-124A	CK62AW472M
A1C31	6-5-119A	CK62AW472M
A1C4	6-5-130	CK62AW472M
A1C5	6-5-122	CK62AW472M
A1C6	6-5-121	CK62AW472M
A1C7	6-5-128	M19978/1-0591K
A1C8	6-5-119	M19978/1-0591K
A1C9	6-5-45	3857-500V-GP70-04Z
A1J11	6-5-165A	DEMF-9S-A176
A1K1	6-5-118	KUP14D5512V
A1K1	6-5-118	KUP17D5512V
A1K2	6-5-46	WU012D2-661
A1L1	6-5-34	14224
A1L2	6-5-33	14224
A1L3	6-5-36	14224
A1L4	6-5-132	APD-324
A1L5	6-5-131	APD-324
A1L6	6-5-123	APD-324
A1L7	6-5-108	APD-324
A1Q1	6-5-95	C137BX41
A1Q2	6-5-96	C137BX41
A1Q3	6-5-94	C137BX41
A1Q4	6-5-97	C137BX41
A1Q5	6-5-93	C137BX41
A1Q6	6-5-67	MJE803
A1R1	6-5-31	RW35V331
A1R1	6-5-32	RW35V270
A1R10	6-5-107	RE70G1R00
A1R11	6-5-106	RE70G1R00
A1R12	6-5-79	RWR81S45R3FR
A1R13	6-5-80	RWR81S45R3FR
A1R14	6-5-71	RWR81S45R3FR
A1R15	6-5-85	RWR81S45R3FR
A1R16	6-5-92	RWR81S45R3FR
A1R17	6-5-70	RCR07G103KS
A1R18	6-5-127	RCR07G105KS
A1R19	6-5-129	RCR07G105KS
A1R2	6-5-32	RW35V331
A1R20	6-5-120	RCR07G105KS
A1R21	6-5-66	RJ12CP501
A1R22	6-5-65	RWR89S2051FR
A1R23	6-5-127B	710-5076-110
A1R24	6-5-127A	710-5076-110
A1R26	6-5-9A	RCR07G102KS
A1R26	6-5-9A	RCR07G102KS
A1R27	6-5-9B	RCR07G102KS
A1R27	6-5-9B	RCR07G102KS
A1R28	6-5-9C	RCR07G102KS
A1R28	6-5-9C	RCR07G102KS
A1R29	6-5-9D	RCR07G102KS
A1R29	6-5-9D	RCR07G102KS
A1R3	6-5-77	RCR07G102KS
A1R30	6-5-9E	RCR07G102KS
A1R30	6-5-9E	RCR07G102KS
A1R31	6-5-9F	RCR07G102KS
A1R31	6-5-9F	RCR07G102KS
A1R32	6-5-9G	RCR07G102KS
A1R32	6-5-9G	RCR07G102KS
A1R4	6-5-81	RCR07G102KS
A1R5	6-5-72	RCR07G102KS
A1R6	6-5-88	RCR07G102KS
A1R7	6-5-91	RCR07G102KS
A1R8	6-5-6	RCR07G271KS
A1R9	6-5-7	RN60D5113F
A1S1	6-5-9	5-17534-112
A1S1	6-5-9	5-17534-113
A1S1	6-5-9	5-17534-113
A1T1	6-5-38	CPD-240
A1T2	6-5-35	124P295

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER
A1W1	6-5-153	646-7000-001			
A1W1	6-5-153	646-7000-002			
A1W1	6-5-153	646-7000-005			
A1W1	6-5-153	646-7000-004			
A1W1J1	6-5-165	207486-1			
A1W1J10	6-5-161	DCMF-37S-A176			
A1W1J2	6-5-164	206306-1			
A1W1J3	6-5-163	206038-1			
A1W1J4	6-5-162	235-03-00-30D			
A1W1J5	6-5-155	235-03-00-30D			
A1W1J6	6-5-157	235-03-00-30D			
A1W1J7	6-5-154	DBM-17W2P			
A1W1J8	6-5-156	DBM-17W2P			
A1W1J9	6-5-158	DBM-17W2P			
A1W1P1	6-5-159	2-87631-7			
A1W1P2	6-5-160	87631-7			
A1W2	6-5-167	428056			
A1W2	6-5-167	428056			
A1W2	6-5-167	428056			
A2	6-4-4	646-6883-001			
A3	6-4-5	646-6883-001			
A4	6-4-6	646-6882-001			
A5	6-4-7	646-6812-001			
A6	6-4-9	642-3197-001			
A7	6-4-8	642-3579-001			
A8	6-4-10	651-4140-001			
P1	6-4-16	207485-1			

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER	REFERENCE DESIGNATION	FIG-ITEM	PART NUMBER

Section 7 Diagrams

SECTION 7
DIAGRAMS

7.1 GENERAL

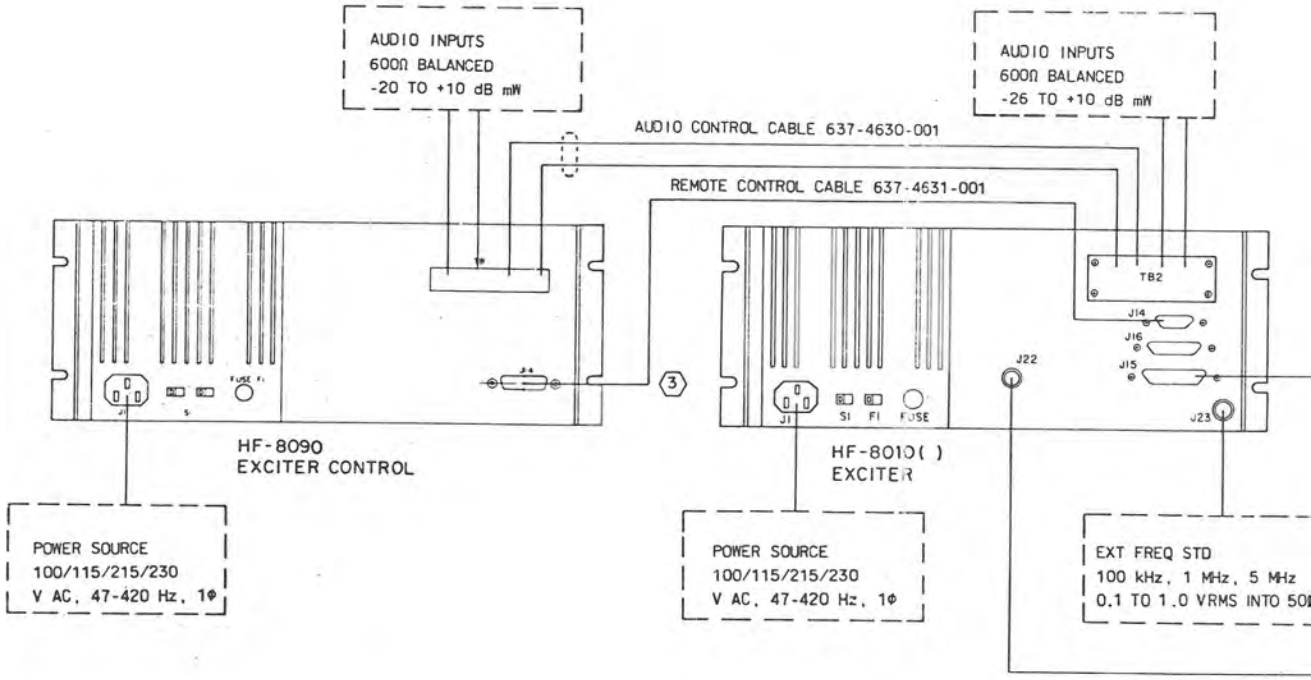
The diagrams in this section will aid in the troubleshooting and maintenance of the HF-80 Solid-State 1-kW Power Amplifier-Power Supply. Refer to the description section for the units that make up the HF-80 Solid-State 1-kW Power Amplifier-Power Supply and to the parts list section for the location of subassemblies (circuit cards and modules) and chassis components.

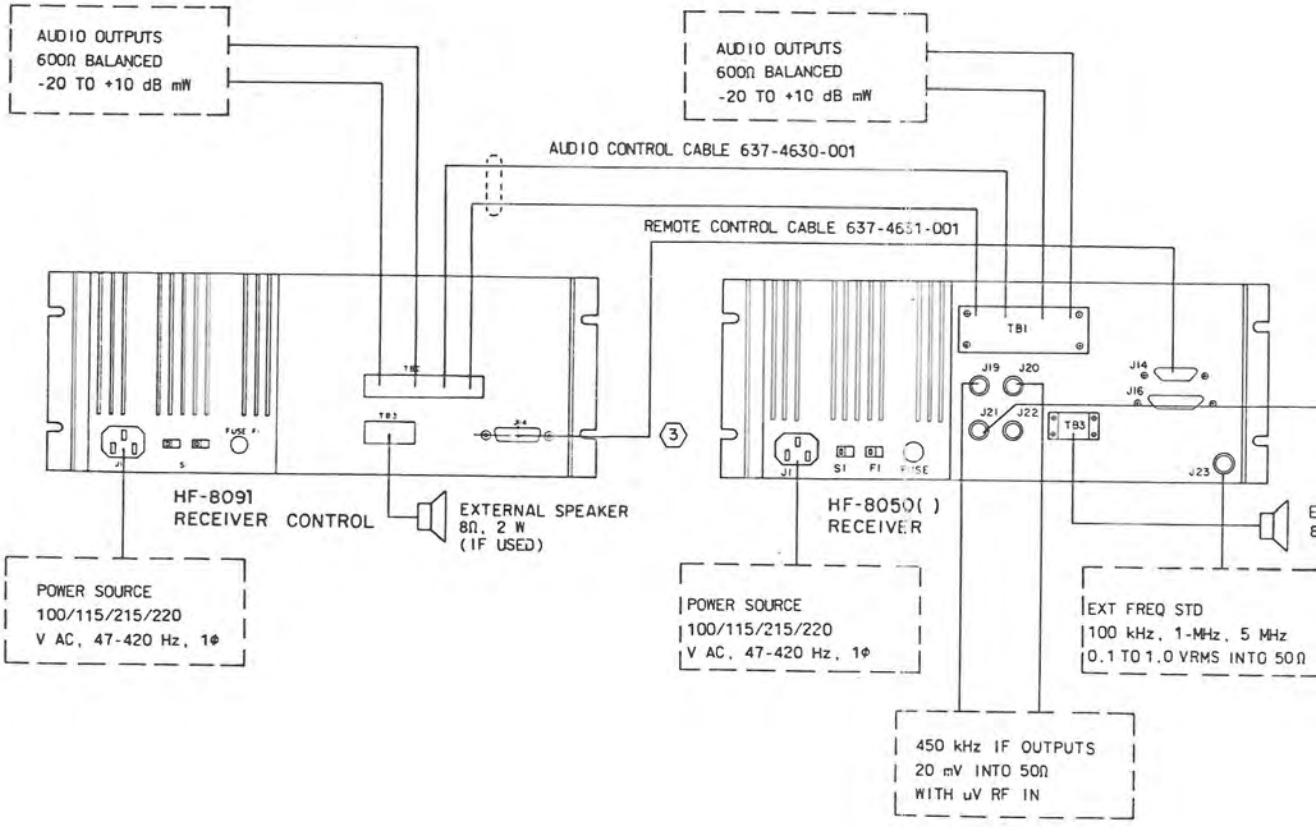
7.2 CONFIGURATION IDENTIFIERS

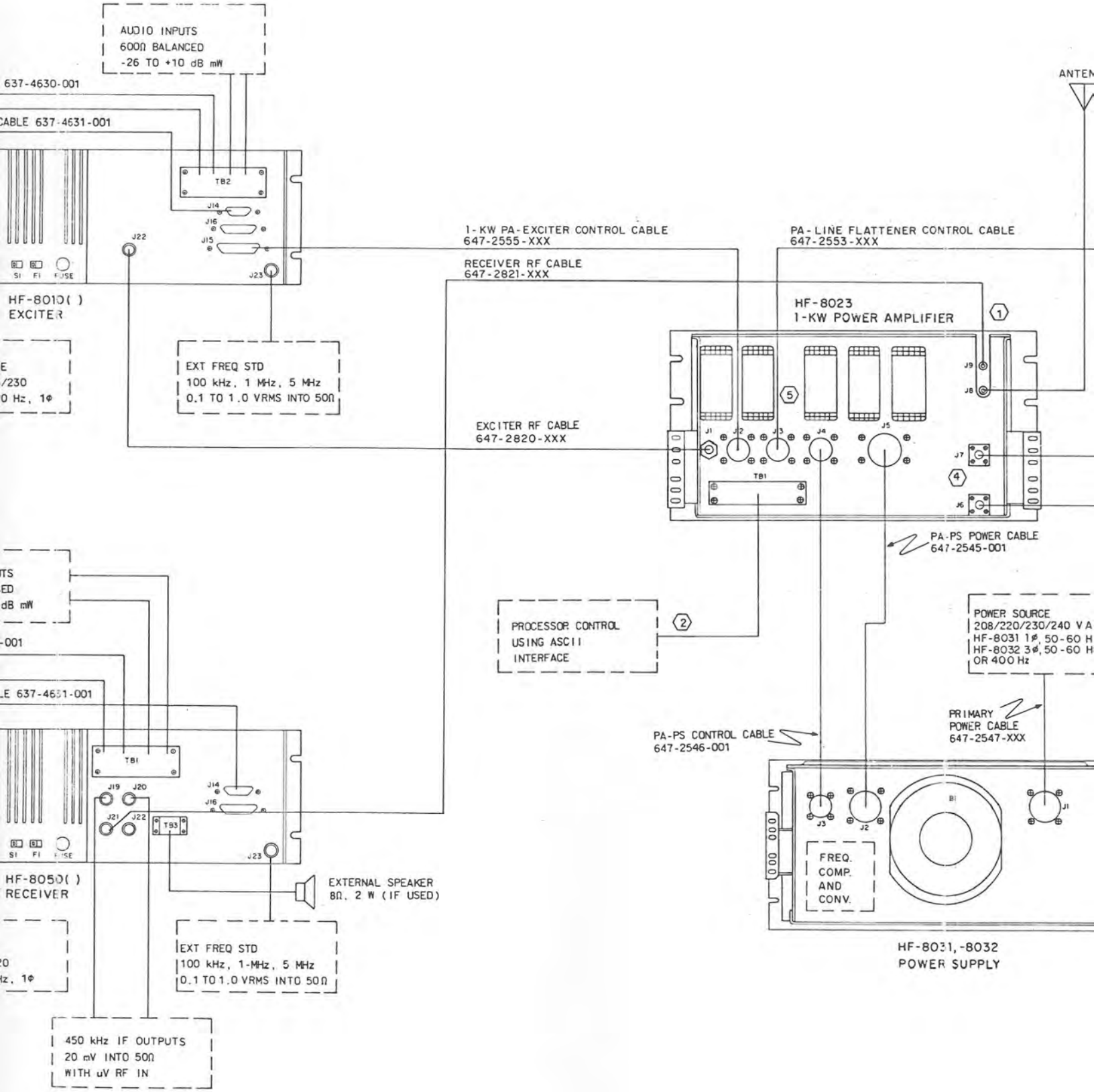
The procedure for identification of equipment design changes is described in the parts list section.

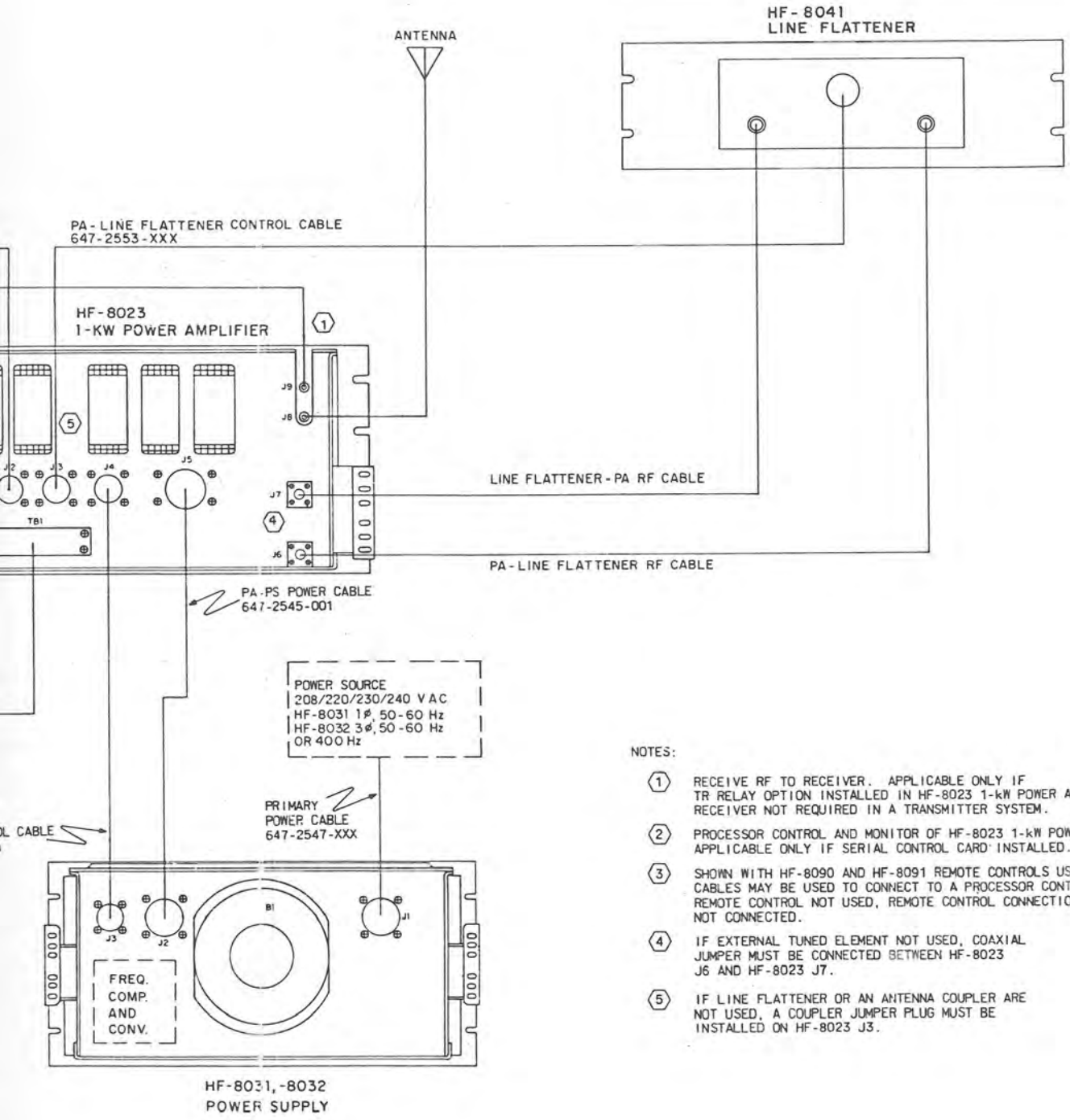
7.3 SCHEMATIC CHANGES

Equipment electrical design changes are identified on the applicable schematic diagrams with a revision identification (eg, A1 , A2 , B1 , C1) that points to the area on the schematic that is changed. The revision identification is listed on a schematic changes page that precedes the applicable schematic diagram.


AUDIO INPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO INPUTS
600Ω BALANCED
-26 TO +10 dB mW
AUDIO CONTROL CABLE 637-4630-001
REMOTE CONTROL CABLE 637-4631-001
TB2
J14
J16
J15
J22
J23
J24
3
J1
S1
F1
FUSE
HF-8090
EXCITER CONTROL
HF-8010( )
EXCITER
POWER SOURCE
100/115/215/230
V AC, 47-420 Hz, 1Φ
POWER SOURCE
100/115/215/230
V AC, 47-420 Hz, 1Φ
EXT FREQ STD
100 kHz, 1 MHz, 5 MHz
0.1 TO 1.0 VRMS INTO 50


AUDIO OUTPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO OUTPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO CONTROL CABLE 637-4630-001
REMOTE CONTROL CABLE 637-4631-001
TB1
TB2
TB3
J14
J16
J19
J20
J21
J22
J23
J24
3
J1
S1
F1
FUSE
HF-8091
RECEIVER CONTROL
EXTERNAL SPEAKER
8Ω, 2 W
(IF USED)
HF-8050( )
RECEIVER
POWER SOURCE
100/115/215/220
V AC, 47-420 Hz, 1Φ
POWER SOURCE
100/115/215/220
V AC, 47-420 Hz, 1Φ
EXT FREQ STD
100 kHz, 1-MHz, 5 MHz
0.1 TO 1.0 VRMS INTO 50Ω
450 kHz IF OUTPUTS
20 mV INTO 50Ω
WITH uV RF IN


AUDIO INPUTS
600Ω BALANCED
-26 TO +10 dB mW
637-4630-001
CABLE 637-4631-001
TB2
J14
J16
J15
J22
J23
SI FI FUSE
HF-8010( )
EXCITER
EXT FREQ STD
100 kHz, 1 MHz, 5 MHz
0.1 TO 1.0 VRMS INTO 50Ω
1-KW PA-EXCITER CONTROL CABLE
647-2555-XXX
RECEIVER RF CABLE
647-2821-XXX
EXCITER RF CABLE
647-2820-XXX
PA-LINE FLATTENER CONTROL CABLE
647-2553-XXX
HF-8023
1-KW POWER AMPLIFIER
J1
J2
J3
J4
J5
J6
J7
J8
J9
TB1
PA-PS POWER CABLE
647-2545-001
PROCESSOR CONTROL
USING ASCII
INTERFACE
POWER SOURCE
208/220/230/240 VA
HF-8031 1Ø, 50-60 H
HF-8032 3Ø, 50-60 H
OR 400 Hz
PRIMARY
POWER CABLE
647-2547-XXX
PA-PS CONTROL CABLE
647-2546-001
FREQ.
COMP.
AND
CONV.
HF-8031, -8032
POWER SUPPLY
TB1
J19
J20
J21
J22
TB3
EXTERNAL SPEAKER
8Ω, 2 W (IF USED)
EXT FREQ STD
100 kHz, 1-MHz, 5 MHz
0.1 TO 1.0 VRMS INTO 50Ω
450 kHz IF OUTPUTS
20 mV INTO 50Ω
WITH uV RF IN

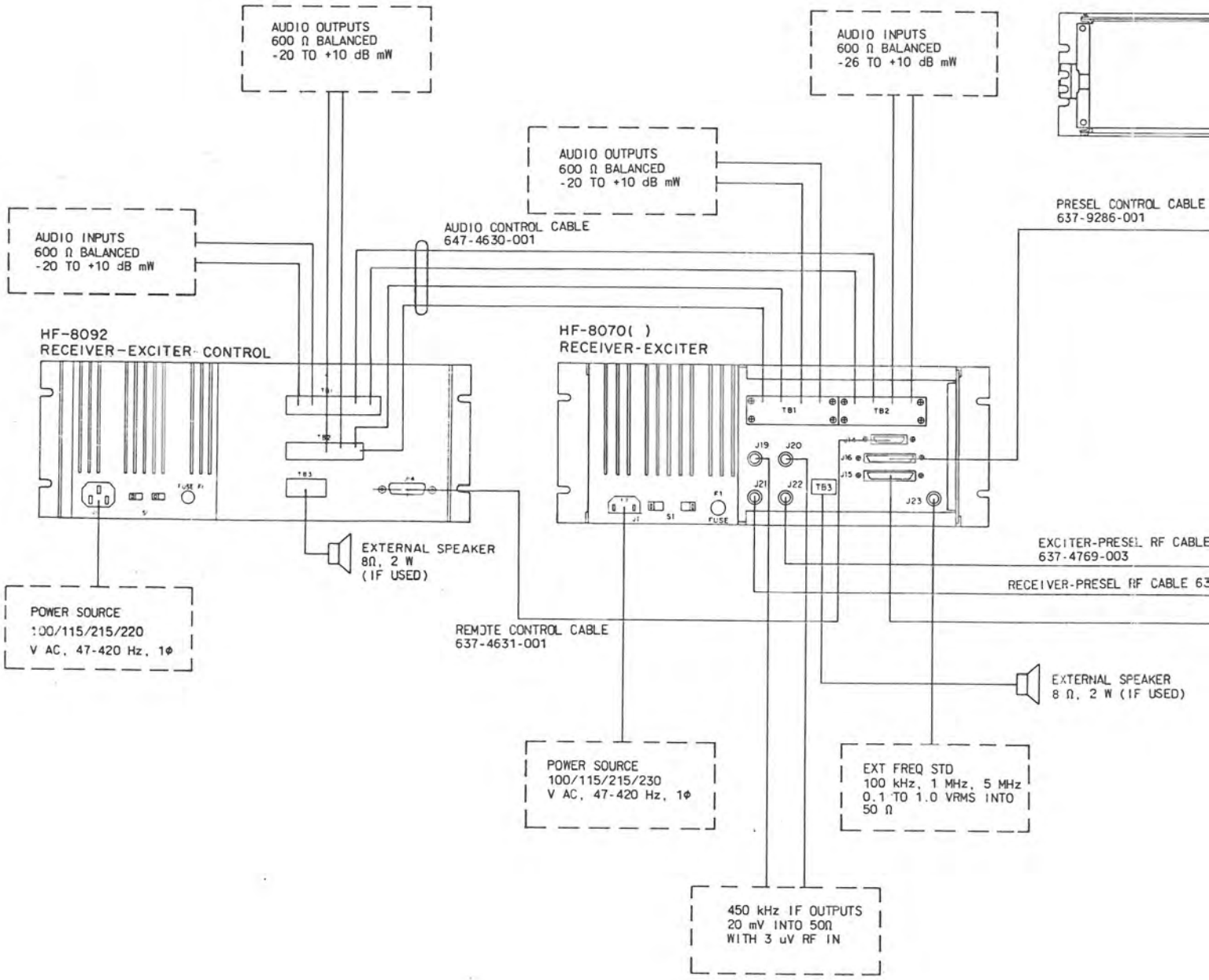


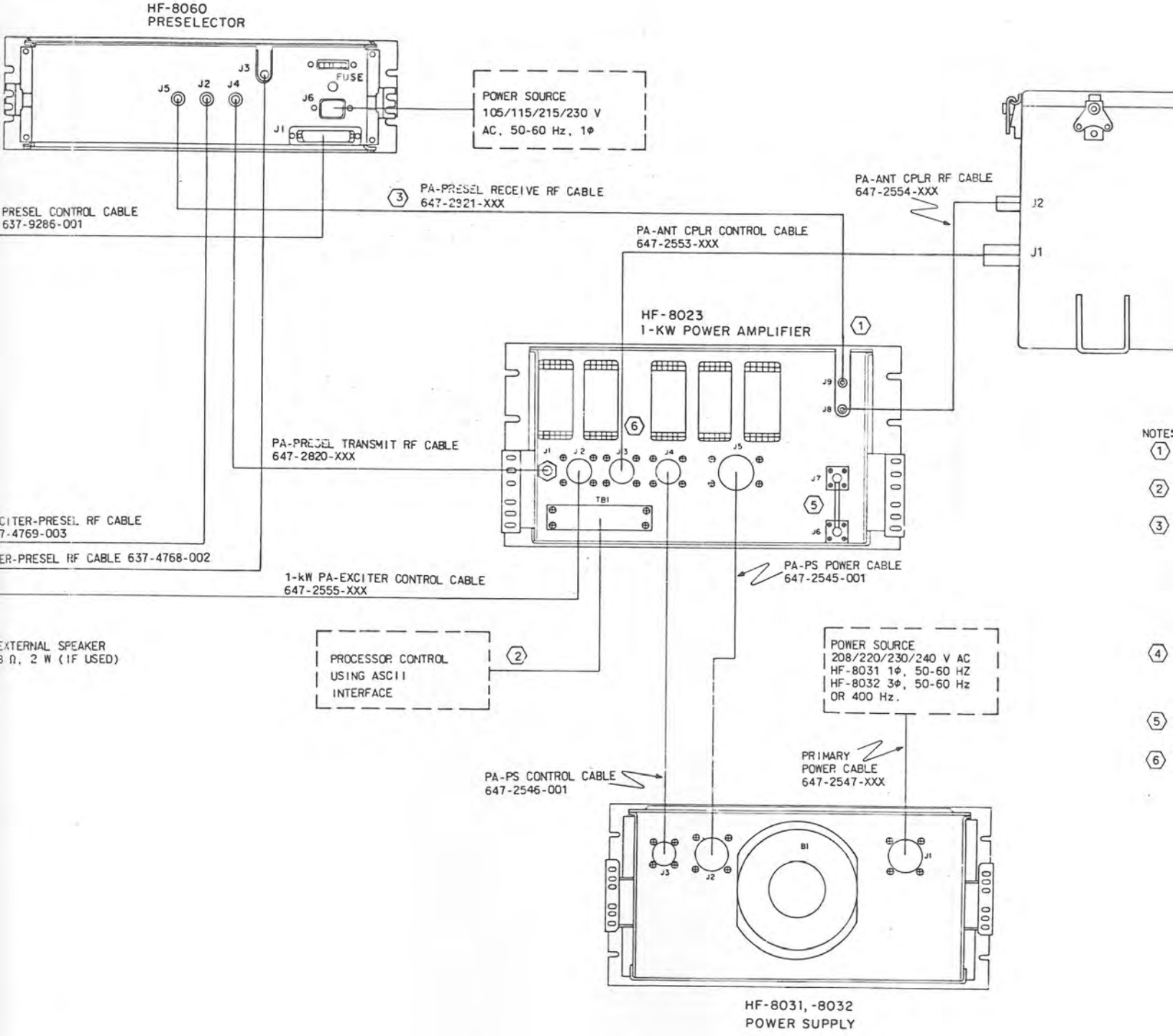
NOTES:

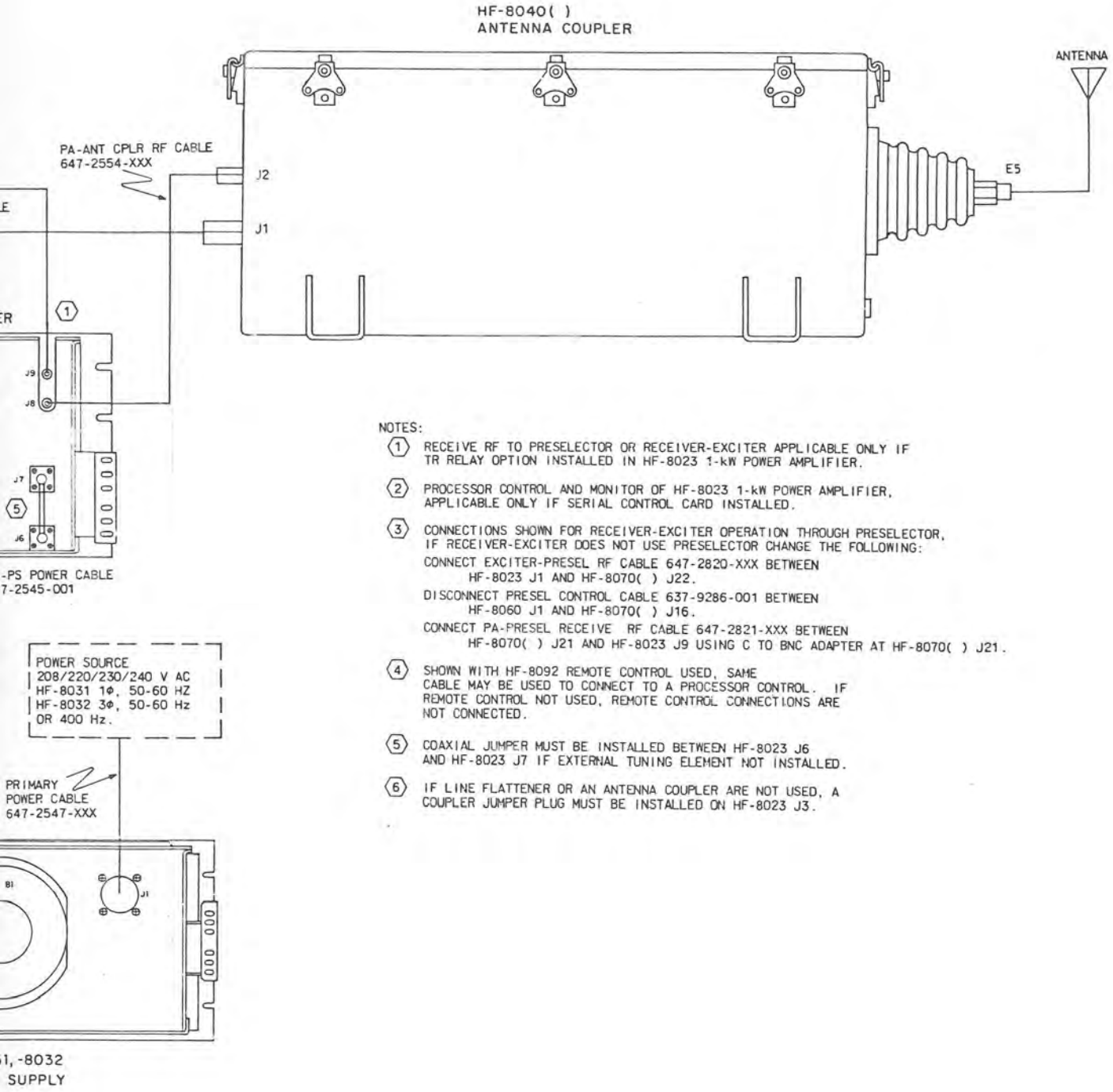
1. RECEIVE RF TO RECEIVER. APPLICABLE ONLY IF TR RELAY OPTION INSTALLED IN HF-8023 1-kW POWER AMPLIFIER. RECEIVER NOT REQUIRED IN A TRANSMITTER SYSTEM.
2. PROCESSOR CONTROL AND MONITOR OF HF-8023 1-kW POWER AMPLIFIER. APPLICABLE ONLY IF SERIAL CONTROL CARD INSTALLED.
3. SHOWN WITH HF-8090 AND HF-8091 REMOTE CONTROLS USED. SAME CABLES MAY BE USED TO CONNECT TO A PROCESSOR CONTROL. IF REMOTE CONTROL NOT USED, REMOTE CONTROL CONNECTIONS ARE NOT CONNECTED.
4. IF EXTERNAL TUNED ELEMENT NOT USED, COAXIAL JUMPER MUST BE CONNECTED BETWEEN HF-8023 J6 AND HF-8023 J7.
5. IF LINE FLATTENER OR AN ANTENNA COUPLER ARE NOT USED, A COUPLER JUMPER PLUG MUST BE INSTALLED ON HF-8023 J3.

TPA-4248-015

HF-80 Solid-State 1-kW Half-Duplex
Transceiver System Using Line Flattener
HF-8041, Typical Installation
Figure 7-1


AUDIO OUTPUTS
600 Ω BALANCED
-20 TO +10 dB mW
AUDIO INPUTS
600 Ω BALANCED
-26 TO +10 dB mW
AUDIO OUTPUTS
600 Ω BALANCED
-20 TO +10 dB mW
AUDIO INPUTS
600 Ω BALANCED
-20 TO +10 dB mW
AUDIO CONTROL CABLE
647-4630-001
PRESEL CONTROL CABLE
637-9286-001
HF-8092
RECEIVER-EXCITER CONTROL
HF-8070( )
RECEIVER-EXCITER
TB1
TB2
TB3
J19
J20
J21
J22
J23
J16
J15
EXTERNAL SPEAKER
8Ω, 2 W
(IF USED)
EXCITER-PRESEL RF CABLE
637-4769-003
RECEIVER-PRESEL RF CABLE 63
POWER SOURCE
100/115/215/220
V AC, 47-420 Hz, 1φ
REMOTE CONTROL CABLE
637-4631-001
EXTERNAL SPEAKER
8 Ω, 2 W (IF USED)
POWER SOURCE
100/115/215/230
V AC, 47-420 Hz, 1φ
EXT FREQ STD
100 kHz, 1 MHz, 5 MHz
0.1 TO 1.0 VRMS INTO
50 Ω
450 kHz IF OUTPUTS
20 mV INTO 50Ω
WITH 3 uV RF IN


HF-8060
PRESELECTOR
J3
J5
J2
J4
FUSE
J6
J1
POWER SOURCE
105/115/215/230 V
AC, 50-60 Hz, 1φ
PRESEL CONTROL CABLE
637-9286-001
3
PA-PRESEL RECEIVE RF CABLE
647-2921-XXX
PA-ANT CPLR RF CABLE
647-2554-XXX
J2
J1
PA-ANT CPLR CONTROL CABLE
647-2553-XXX
HF-8023
1-KW POWER AMPLIFIER
1
J9
J8
6
PA-PRESEL TRANSMIT RF CABLE
647-2820-XXX
J1
J2
J3
J4
J5
J7
5
TB1
J6
CITER-PRESEL RF CABLE
7-4769-003
ER-PRESEL RF CABLE 637-4768-002
1-kW PA-EXCITER CONTROL CABLE
647-2555-XXX
PA-PS POWER CABLE
647-2545-001
XTERNAL SPEAKER
8 Ω, 2 W (IF USED)
PROCESSOR CONTROL
USING ASCII
INTERFACE
2
POWER SOURCE
208/220/230/240 V AC
HF-8031 1φ, 50-60 HZ
HF-8032 3φ, 50-60 Hz
OR 400 Hz.
PRIMARY
POWER CABLE
647-2547-XXX
PA-PS CONTROL CABLE
647-2546-001
B1
J3
J2
J1
HF-8031, -8032
POWER SUPPLY
NOTES
1
2
3
4
5
6

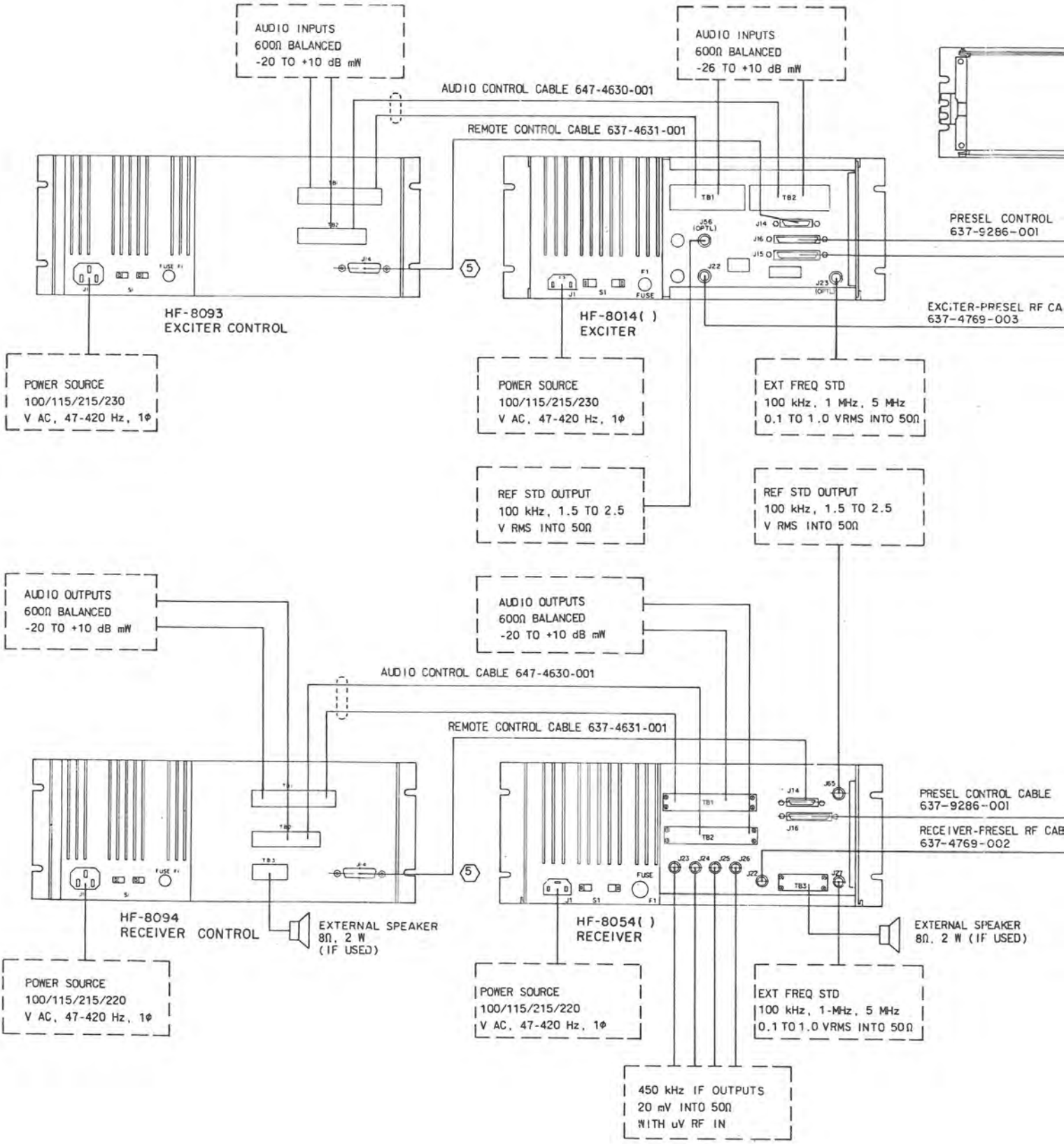


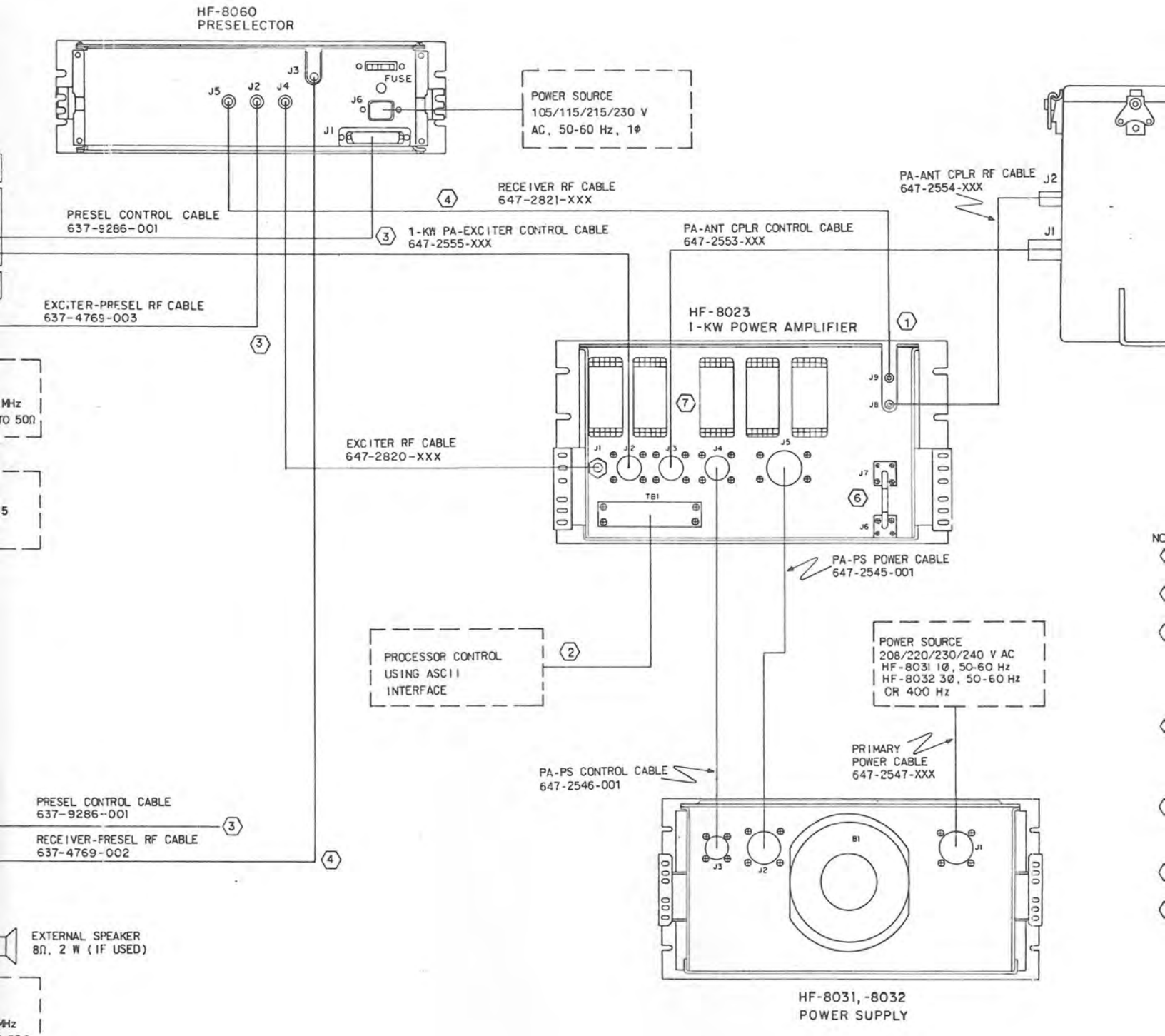
NOTES:

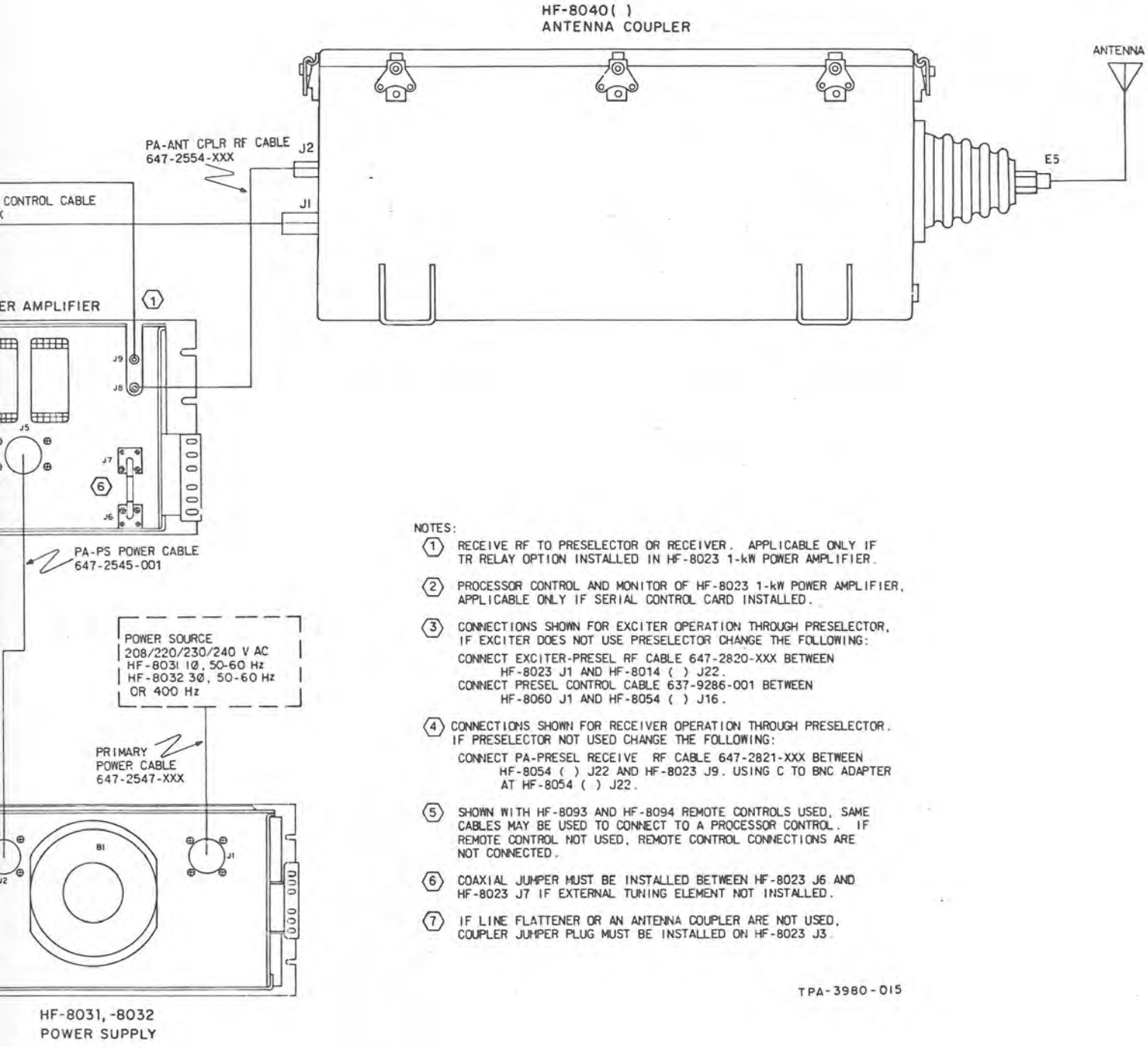
1. RECEIVE RF TO PRESELECTOR OR RECEIVER-EXCITER APPLICABLE ONLY IF TR RELAY OPTION INSTALLED IN HF-8023 1-kW POWER AMPLIFIER.
2. PROCESSOR CONTROL AND MONITOR OF HF-8023 1-kW POWER AMPLIFIER, APPLICABLE ONLY IF SERIAL CONTROL CARD INSTALLED.
3. CONNECTIONS SHOWN FOR RECEIVER-EXCITER OPERATION THROUGH PRESELECTOR, IF RECEIVER-EXCITER DOES NOT USE PRESELECTOR CHANGE THE FOLLOWING:
   CONNECT EXCITER-PRESEL RF CABLE 647-2820-XXX BETWEEN HF-8023 J1 AND HF-8070( ) J22.
   DISCONNECT PRESEL CONTROL CABLE 637-9286-001 BETWEEN HF-8060 J1 AND HF-8070( ) J16.
   CONNECT PA-PRESEL RECEIVE RF CABLE 647-2821-XXX BETWEEN HF-8070( ) J21 AND HF-8023 J9 USING C TO BNC ADAPTER AT HF-8070( ) J21.
4. SHOWN WITH HF-8092 REMOTE CONTROL USED, SAME CABLE MAY BE USED TO CONNECT TO A PROCESSOR CONTROL. IF REMOTE CONTROL NOT USED, REMOTE CONTROL CONNECTIONS ARE NOT CONNECTED.
5. COAXIAL JUMPER MUST BE INSTALLED BETWEEN HF-8023 J6 AND HF-8023 J7 IF EXTERNAL TUNING ELEMENT NOT INSTALLED.
6. IF LINE FLATTENER OR AN ANTENNA COUPLER ARE NOT USED, A COUPLER JUMPER PLUG MUST BE INSTALLED ON HF-8023 J3.

TPA-4247-015

HF-80 Solid-State 1-kW Transceiver
System Using Receiver-Exciter
HF-8070( ), Typical Installation
Figure 7-2


AUDIO INPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO INPUTS
600Ω BALANCED
-26 TO +10 dB mW
AUDIO CONTROL CABLE 647-4630-001
REMOTE CONTROL CABLE 637-4631-001
PRESEL CONTROL
637-9286-001
EXCITER-PRESEL RF CA
637-4769-003
HF-8093
EXCITER CONTROL
HF-8014( )
EXCITER
POWER SOURCE
100/115/215/230
V AC, 47-420 Hz, 1φ
POWER SOURCE
100/115/215/230
V AC, 47-420 Hz, 1φ
EXT FREQ STD
100 kHz, 1 MHz, 5 MHz
0.1 TO 1.0 VRMS INTO 50Ω
REF STD OUTPUT
100 kHz, 1.5 TO 2.5
V RMS INTO 50Ω
REF STD OUTPUT
100 kHz, 1.5 TO 2.5
V RMS INTO 50Ω
AUDIO OUTPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO OUTPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO CONTROL CABLE 647-4630-001
REMOTE CONTROL CABLE 637-4631-001
PRESEL CONTROL CABLE
637-9286-001
RECEIVER-FRESEL RF CAB
637-4769-002
HF-8094
RECEIVER CONTROL
EXTERNAL SPEAKER
8Ω, 2 W
(IF USED)
HF-8054( )
RECEIVER
EXTERNAL SPEAKER
8Ω, 2 W (IF USED)
POWER SOURCE
100/115/215/220
V AC, 47-420 Hz, 1φ
POWER SOURCE
100/115/215/220
V AC, 47-420 Hz, 1φ
EXT FREQ STD
100 kHz, 1-MHz, 5 MHz
0.1 TO 1.0 VRMS INTO 50Ω
450 kHz IF OUTPUTS
20 mV INTO 50Ω
WITH uV RF IN


HF-8060
PRESELECTOR
J3
FUSE
J5
J2
J4
J6
J1
POWER SOURCE
105/115/215/230 V
AC, 50-60 Hz, 1Φ
4
RECEIVER RF CABLE
647-2821-XXX
PRESEL CONTROL CABLE
637-9286-001
3
1-KW PA-EXCITER CONTROL CABLE
647-2555-XXX
PA-ANT CPLR RF CABLE
647-2554-XXX
J2
J1
PA-ANT CPLR CONTROL CABLE
647-2553-XXX
EXCITER-PRESEL RF CABLE
637-4769-003
3
HF-8023
1-KW POWER AMPLIFIER
1
J9
J8
7
EXCITER RF CABLE
647-2820-XXX
J1
J2
J3
J4
J5
J7
6
J6
TB1
PA-PS POWER CABLE
647-2545-001
PROCESSOR CONTROL
USING ASCII
INTERFACE
2
POWER SOURCE
208/220/230/240 V AC
HF-8031 1Ø, 50-60 Hz
HF-8032 3Ø, 50-60 Hz
OR 400 Hz
PRIMARY
POWER CABLE
647-2547-XXX
PA-PS CONTROL CABLE
647-2546-001
PRESEL CONTROL CABLE
637-9286-001
3
RECEIVER-PRESEL RF CABLE
637-4769-002
4
B1
J3
J2
J1
EXTERNAL SPEAKER
8Ω, 2 W (IF USED)
HF-8031, -8032
POWER SUPPLY



NOTES:

(1) RECEIVE RF TO PRESELECTOR OR RECEIVER. APPLICABLE ONLY IF TR RELAY OPTION INSTALLED IN HF-8023 1-kW POWER AMPLIFIER.

(2) PROCESSOR CONTROL AND MONITOR OF HF-8023 1-kW POWER AMPLIFIER, APPLICABLE ONLY IF SERIAL CONTROL CARD INSTALLED.

(3) CONNECTIONS SHOWN FOR EXCITER OPERATION THROUGH PRESELECTOR, IF EXCITER DOES NOT USE PRESELECTOR CHANGE THE FOLLOWING:
CONNECT EXCITER-PRESEL RF CABLE 647-2820-XXX BETWEEN HF-8023 J1 AND HF-8014 ( ) J22.
CONNECT PRESEL CONTROL CABLE 637-9286-001 BETWEEN HF-8060 J1 AND HF-8054 ( ) J16.

(4) CONNECTIONS SHOWN FOR RECEIVER OPERATION THROUGH PRESELECTOR. IF PRESELECTOR NOT USED CHANGE THE FOLLOWING:
CONNECT PA-PRESEL RECEIVE RF CABLE 647-2821-XXX BETWEEN HF-8054 ( ) J22 AND HF-8023 J9. USING C TO BNC ADAPTER AT HF-8054 ( ) J22.

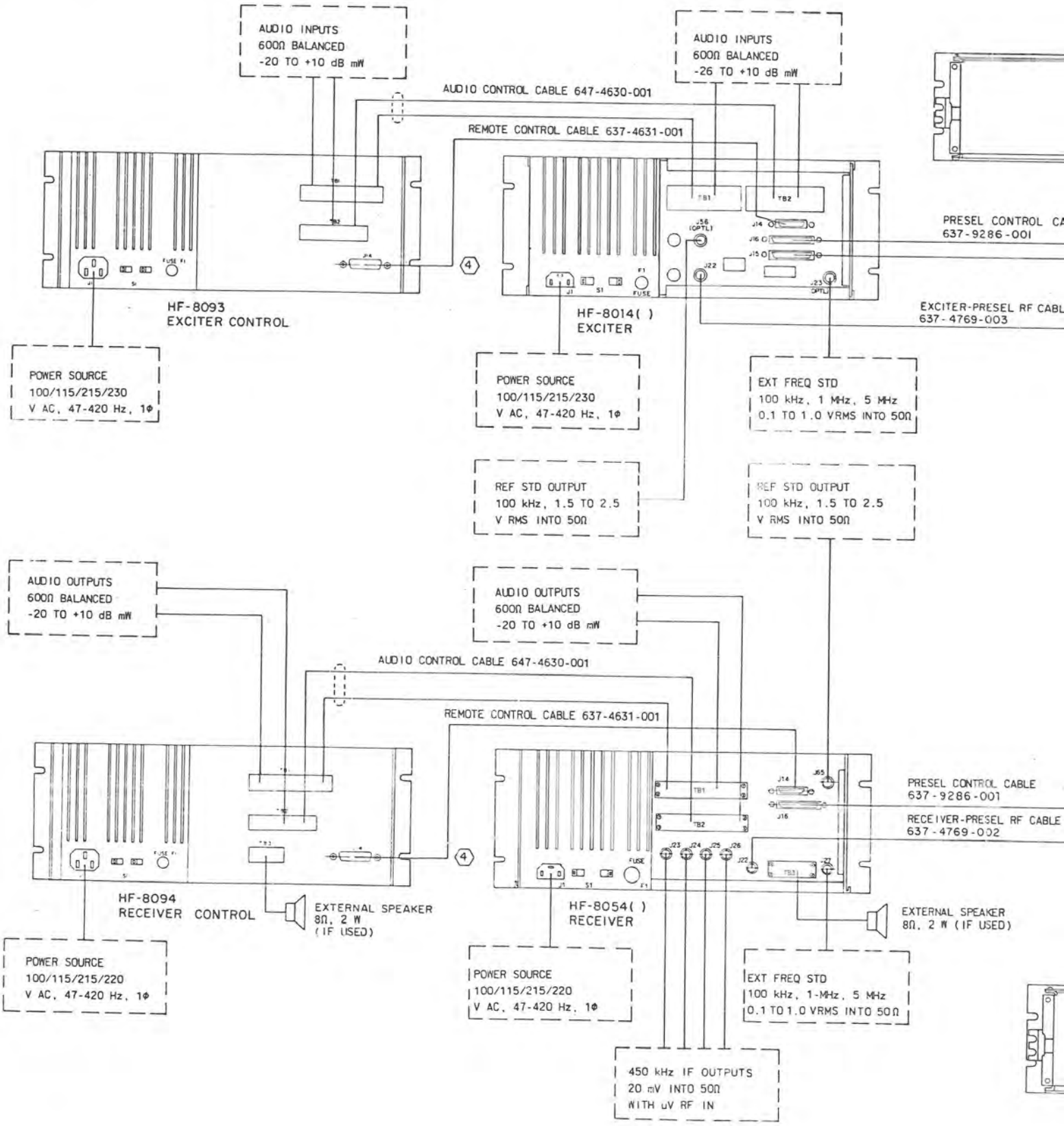
(5) SHOWN WITH HF-8093 AND HF-8094 REMOTE CONTROLS USED, SAME CABLES MAY BE USED TO CONNECT TO A PROCESSOR CONTROL. IF REMOTE CONTROL NOT USED, REMOTE CONTROL CONNECTIONS ARE NOT CONNECTED.

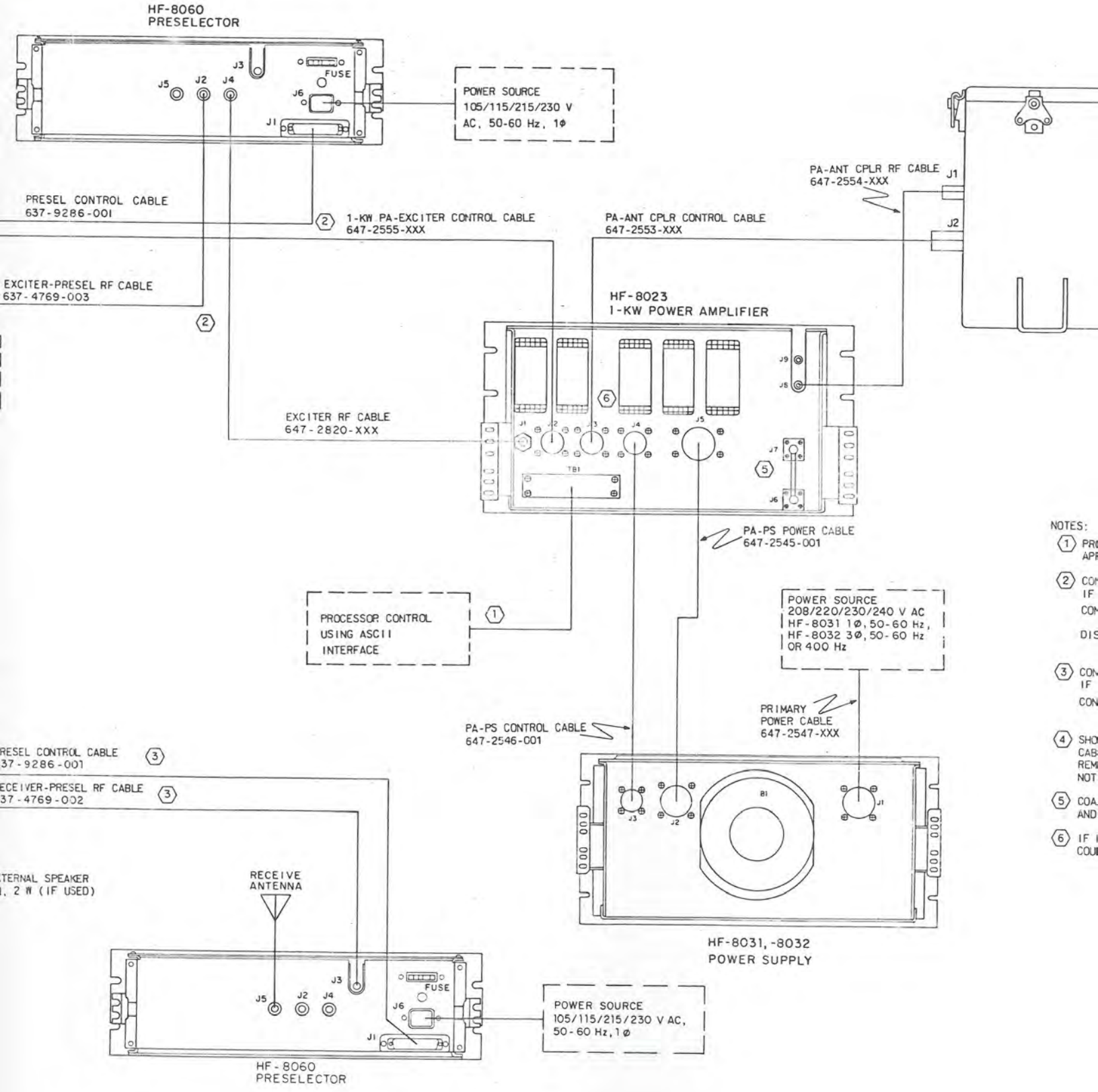
(6) COAXIAL JUMPER MUST BE INSTALLED BETWEEN HF-8023 J6 AND HF-8023 J7 IF EXTERNAL TUNING ELEMENT NOT INSTALLED.

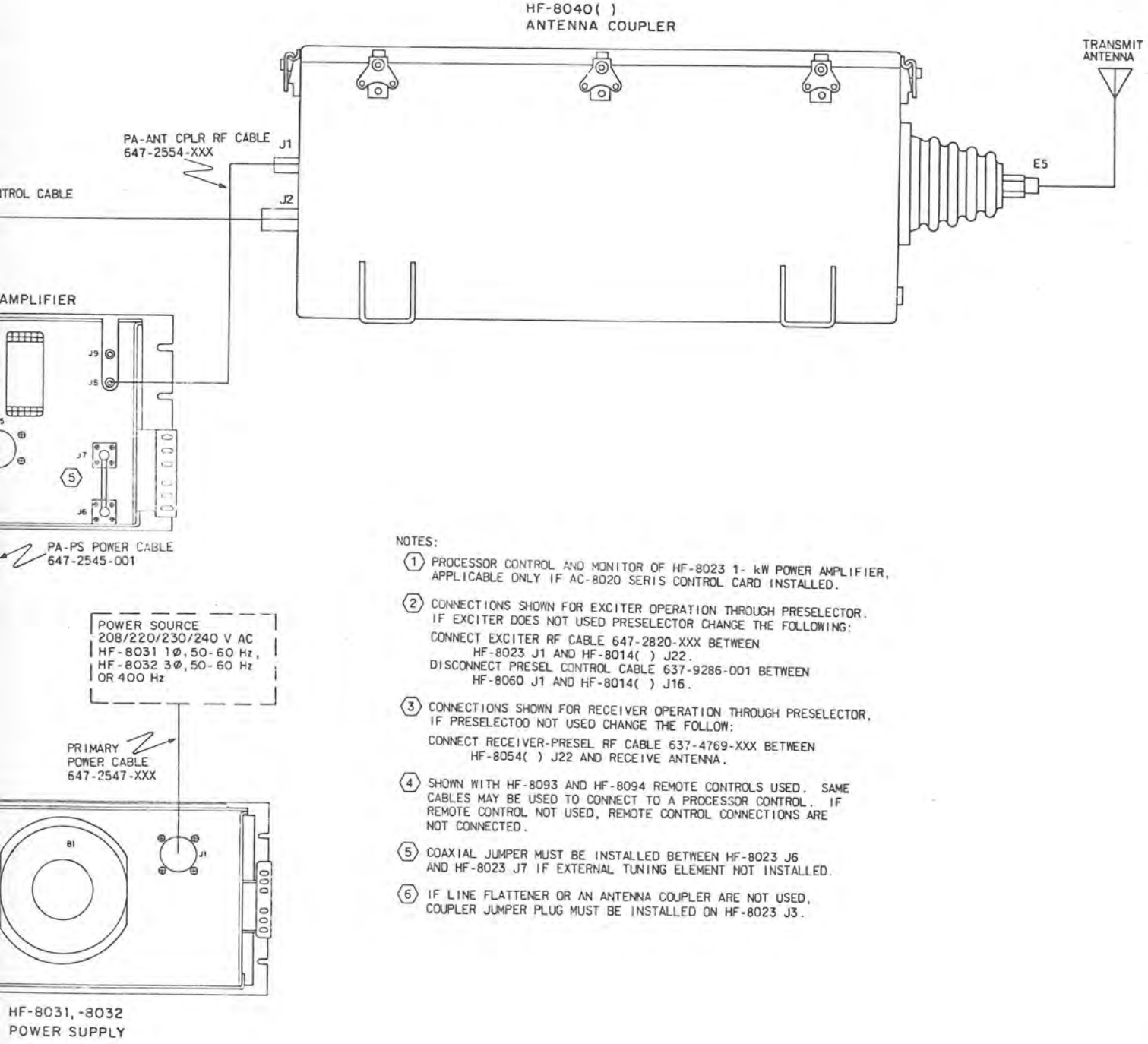
(7) IF LINE FLATTENER OR AN ANTENNA COUPLER ARE NOT USED, COUPLER JUMPER PLUG MUST BE INSTALLED ON HF-8023 J3.

TPA-3980-015

HF-80 Solid-State 1-kW Half-Duplex Transceiver System Using Exciter HF-8014( ) and Receiver HF-8054( ), Typical Installation
Figure 7-3


AUDIO INPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO INPUTS
600Ω BALANCED
-26 TO +10 dB mW
AUDIO CONTROL CABLE 647-4630-001
REMOTE CONTROL CABLE 637-4631-001
PRESEL CONTROL CA
637-9286-001
EXCITER-PRESEL RF CABL
637-4769-003
HF-8093
EXCITER CONTROL
HF-8014( )
EXCITER
POWER SOURCE
100/115/215/230
V AC, 47-420 Hz, 1Φ
POWER SOURCE
100/115/215/230
V AC, 47-420 Hz, 1Φ
EXT FREQ STD
100 kHz, 1 MHz, 5 MHz
0.1 TO 1.0 VRMS INTO 50Ω
REF STD OUTPUT
100 kHz, 1.5 TO 2.5
V RMS INTO 50Ω
REF STD OUTPUT
100 kHz, 1.5 TO 2.5
V RMS INTO 50Ω
AUDIO OUTPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO OUTPUTS
600Ω BALANCED
-20 TO +10 dB mW
AUDIO CONTROL CABLE 647-4630-001
REMOTE CONTROL CABLE 637-4631-001
PRESEL CONTROL CABLE
637-9286-001
RECEIVER-PRESEL RF CABLE
637-4769-002
HF-8094
RECEIVER CONTROL
EXTERNAL SPEAKER
8Ω, 2 W
(IF USED)
HF-8054( )
RECEIVER
EXTERNAL SPEAKER
8Ω, 2 W (IF USED)
POWER SOURCE
100/115/215/220
V AC, 47-420 Hz, 1Φ
POWER SOURCE
100/115/215/220
V AC, 47-420 Hz, 1Φ
EXT FREQ STD
100 kHz, 1-MHz, 5 MHz
0.1 TO 1.0 VRMS INTO 50Ω
450 kHz IF OUTPUTS
20 mV INTO 50Ω
WITH uV RF IN


HF-8060
PRESELECTOR
J3
FUSE
J5
J2
J4
J6
J1
POWER SOURCE
105/115/215/230 V
AC, 50-60 Hz, 1Ø
PRESEL CONTROL CABLE
637-9286-001
2
1-KW PA-EXCITER CONTROL CABLE
647-2555-XXX
PA-ANT CPLR RF CABLE
647-2554-XXX
J1
PA-ANT CPLR CONTROL CABLE
647-2553-XXX
J2
EXCITER-PRESEL RF CABLE
637-4769-003
2
HF-8023
1-KW POWER AMPLIFIER
J9
J8
6
EXCITER RF CABLE
647-2820-XXX
J1
J2
J3
J4
J5
J7
5
TB1
J6
PA-PS POWER CABLE
647-2545-001
PROCESSOR CONTROL
USING ASCII
INTERFACE
1
POWER SOURCE
208/220/230/240 V AC
HF-8031 1Ø, 50-60 Hz,
HF-8032 3Ø, 50-60 Hz
OR 400 Hz
PRIMARY
POWER CABLE
647-2547-XXX
PA-PS CONTROL CABLE
647-2546-001
RESEL CONTROL CABLE
37-9286-001
3
ECEIVER-PRESEL RF CABLE
37-4769-002
3
TERNAL SPEAKER
, 2 W (IF USED)
RECEIVE
ANTENNA
B1
J3
J2
J1
HF-8031, -8032
POWER SUPPLY
J3
FUSE
J5
J2
J4
J6
J1
POWER SOURCE
105/115/215/230 V AC,
50-60 Hz, 1Ø
HF-8060
PRESELECTOR
NOTES:
1 PR
AP
2 CO
IF
CO
DI
3 CO
IF
CO
4 SHO
CAB
REM
NOT
5 COA
AND
6 IF
COU



NOTES:

(1) PROCESSOR CONTROL AND MONITOR OF HF-8023 1- kW POWER AMPLIFIER, APPLICABLE ONLY IF AC-8020 SERIS CONTROL CARD INSTALLED.

(2) CONNECTIONS SHOWN FOR EXCITER OPERATION THROUGH PRESELECTOR. IF EXCITER DOES NOT USED PRESELECTOR CHANGE THE FOLLOWING:
CONNECT EXCITER RF CABLE 647-2820-XXX BETWEEN
HF-8023 J1 AND HF-8014( ) J22.
DISCONNECT PRESEL CONTROL CABLE 637-9286-001 BETWEEN
HF-8060 J1 AND HF-8014( ) J16.

(3) CONNECTIONS SHOWN FOR RECEIVER OPERATION THROUGH PRESELECTOR, IF PRESELECTOO NOT USED CHANGE THE FOLLOW:
CONNECT RECEIVER-PRESEL RF CABLE 637-4769-XXX BETWEEN
HF-8054( ) J22 AND RECEIVE ANTENNA.

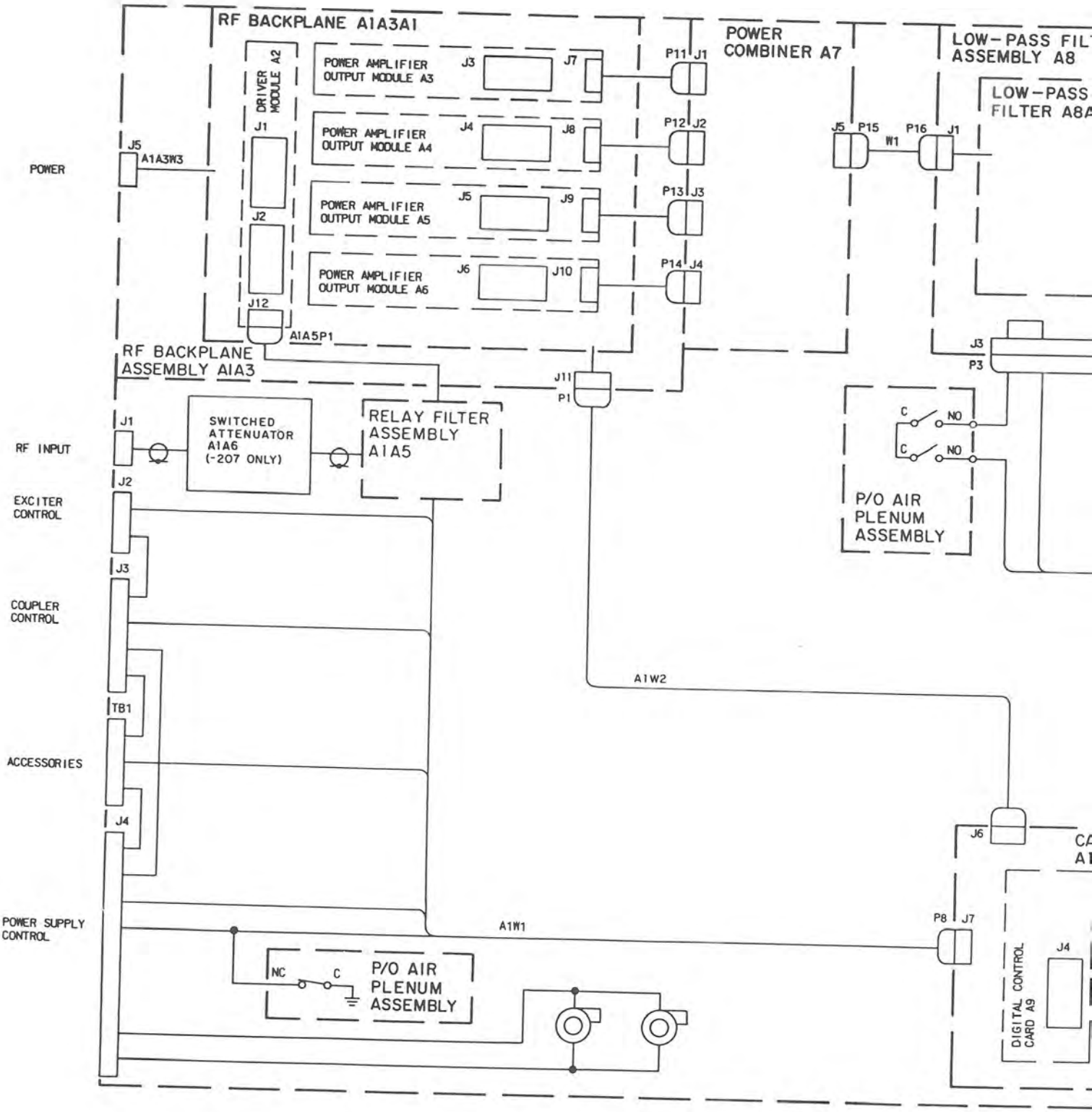
(4) SHOWN WITH HF-8093 AND HF-8094 REMOTE CONTROLS USED. SAME CABLES MAY BE USED TO CONNECT TO A PROCESSOR CONTROL. IF REMOTE CONTROL NOT USED, REMOTE CONTROL CONNECTIONS ARE NOT CONNECTED.

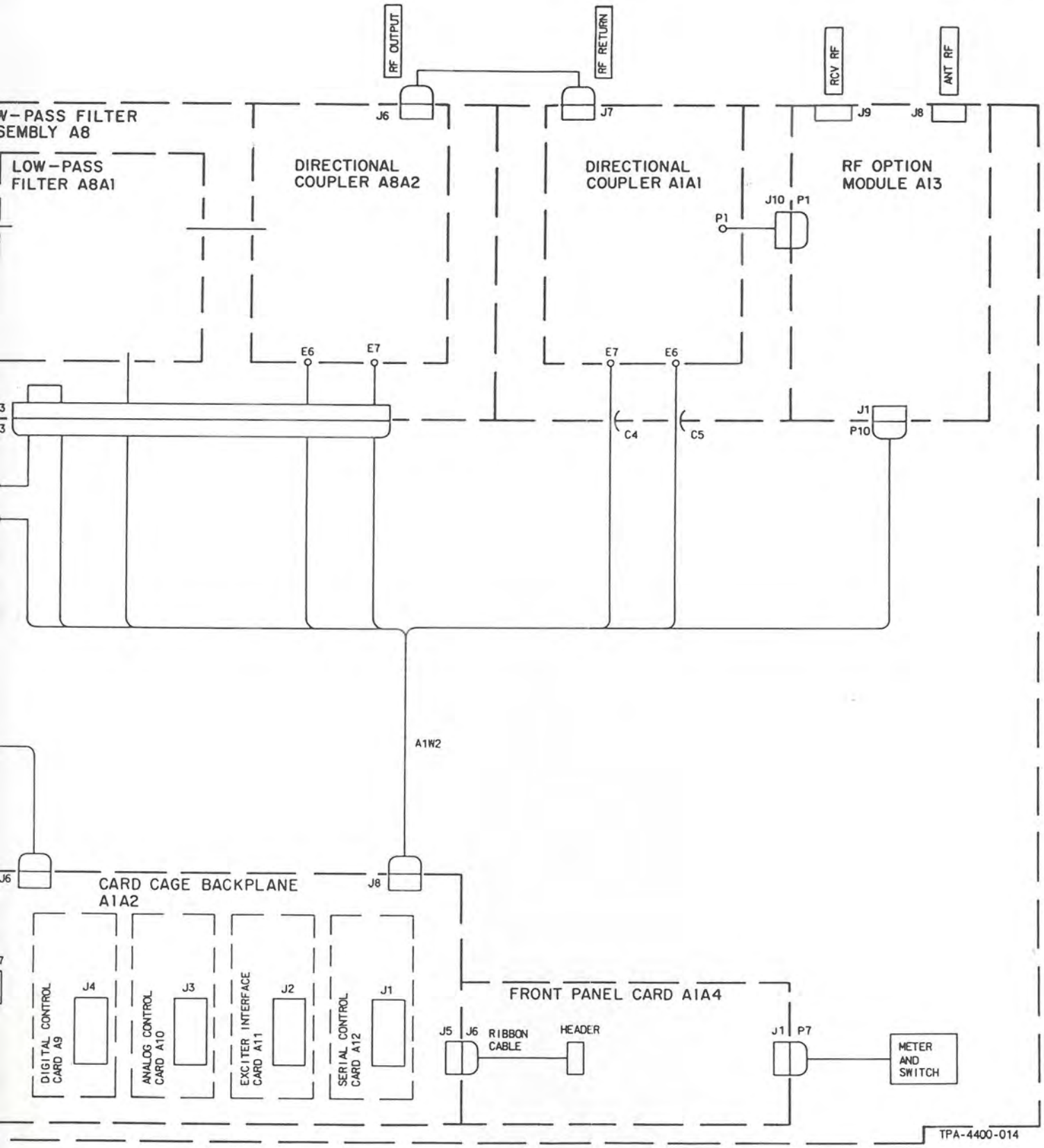
(5) COAXIAL JUMPER MUST BE INSTALLED BETWEEN HF-8023 J6 AND HF-8023 J7 IF EXTERNAL TUNING ELEMENT NOT INSTALLED.

(6) IF LINE FLATTENER OR AN ANTENNA COUPLER ARE NOT USED, COUPLER JUMPER PLUG MUST BE INSTALLED ON HF-8023 J3.

TPA-4246-015

HF-80 Solid-State 1-kW Full-Duplex
Transceiver System Using Exciter
HF-8014( ) and Receiver HF-8054( ),
Typical Installation
Figure 7-4


RF BACKPLANE A1A3A1
DRIVER MODULE A2
POWER AMPLIFIER OUTPUT MODULE A3
POWER AMPLIFIER OUTPUT MODULE A4
POWER AMPLIFIER OUTPUT MODULE A5
POWER AMPLIFIER OUTPUT MODULE A6
POWER COMBINER A7
LOW-PASS FIL ASSEMBLY A8
LOW-PASS FILTER A8A
POWER
J5
A1A3W3
J1
J2
J12
A1A5P1
RF BACKPLANE ASSEMBLY A1A3
J3
J4
J5
J6
J7
J8
J9
J10
P11 J1
P12 J2
P13 J3
P14 J4
J5 P15
W1
P16 J1
J3
P3
J11
P1
RF INPUT
J1
SWITCHED ATTENUATOR A1A6 (-207 ONLY)
RELAY FILTER ASSEMBLY A1A5
C
NO
C
NO
P/O AIR PLENUM ASSEMBLY
EXCITER CONTROL
J2
COUPLER CONTROL
J3
A1W2
TB1
ACCESSORIES
J4
J6
POWER SUPPLY CONTROL
A1W1
P8 J7
NC
C
P/O AIR PLENUM ASSEMBLY
DIGITAL CONTROL CARD A9
J4



1-kW Power Amplifier HF-8023,
Chassis Cabling Diagram
Figure 7-5

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1	Changed wiring as follows:	97	646-6436-001, REV G and above
	Added wire between J2-10 and J3-27.		
	Changed wire from TB1-1 to J3-22, to TB1-1 to J3-12.		
	Changed wire from TB1-2 to P8-47, to TB1-2 to P8-12.		
	Changed wire from J3-12 to P8-12, to J3-22 to P8-47.		
	Related silk screen changes made to rear panel:		646-6411-002, REV C and above
	TB1-1 changed from RF INTLK (CPLR) to RF INTLK.		
	TB1-2 changed from RF INTLK (LOGIC) to SIGNAL GND.		
A2	Added A1A3A1C1, A1A3A1C2, A1A3A1C3, and A1A3A1C4; each 0.1 µF.	99	642-3295-001, REV D and above
A3	Changed power amplifier output modules A3, A4, A5, and A6 from 646-6406-001 to 646-6406-002.	102	622-3490-001, -002; REV H and above
B1	Added forward and reflected power analog lines to wiring harness A1W1.		Wiring harness 646-6436-004 REV M and above

1-kW Power Amplifier HF-8023, Schematic Diagram
Figure 7-6 (Sheet A)

NOTES:

(1) UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN PICOFARADS AND INDUCTANCE VALUES ARE IN MICROHENRYS. LED'S A1A4CR1 THROUGH A1A4CR4 ARE TYPE MV5253 AND A1A4CR5 THROUGH A1A4CR12 ARE TYPE MV5053.

(2) PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.

(3) RF INTERLOCK JUMPER-REFER TO INSTALLATION SECTION FOR APPLICATION INFORMATION.

(4) RF CABLE W2 USED UNLESS EXTERNAL TUNING UNIT USED IN SYSTEM.

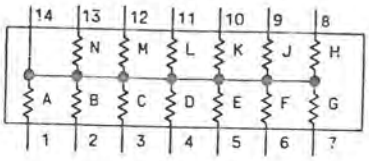
(5) RF OPTION MODULE A13 MAY BE ANY OF THE FOLLOWING:
(1) COAXIAL JUMPER MODULE
(2) TR RELAY

(6) MODULE CONNECTOR PINS GROUNDED BUT NOT SHOWN ON DRAWING:
DRIVER MODULE:
J1-1,3,6,16-29,35 AND 41-80
J2-6,12-21,28-31,33,35,37,39 AND 41-80
PA MODULE A:
J3-6,8,11-32 AND 41-80
PA MODULE B:
J4-6,8,11-32 AND 41-80
PA MODULE C:
J5-6,8,11-32 AND 41-80
PA MODULE D:
J6-6,8,11-32 AND 41-80

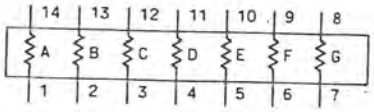
(7) NOTE DELETED

(8) U12,U13,U14 AND U15 ARE RESISTOR ARRAYS SHOWN BELOW:

U12,U13 R = 100 k



U14,U15 R = 150



(9) TYPE DESIGNATIONS SHOWN MAY BE GENERIC IN FORM AND ARE FOR REFERENCE ONLY. SEE APPLICABLE PARTS LIST FOR REPLACEMENT PARTS.

(10) THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED TO PREVENT EQUIPMENT DAMAGE

(11) JUMPER PLUG MUST BE USED WHEN NO SYSTEM CABLE IS CONNECTED TO J3.

(12) S2, S3, S4, AND S5 ARE MECHANICAL INTERLOCK MICROSWITCHES WHICH ARE OPEN WHEN THE PA MODULE HOLDDOWNS ARE IN PLACE AND SECURED AS FOLLOWS:

S2, PA MODULE A A3
S3, PA MODULE B A4
S4, PA MODULE C A5
S5, PA MODULE D A6

(13) S6 AND S7 ARE MECHANICAL INTERLOCK MICROSWITCHES WHICH ARE CLOSED WHEN THE DRIVER MODULE AND RF OPTION MODULE HOLDDOWNS ARE IN PLACE AND SECURED AS FOLLOWS:
S6, DRIVER MODULE A2
S7, RF OPTION MODULE A13

(14) FORWARD AND REFLECTED POWER ANALOGS ARE INSTALLED ON 622-3490-006 ONLY

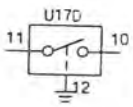
MICROCIRCUIT INFORMATION

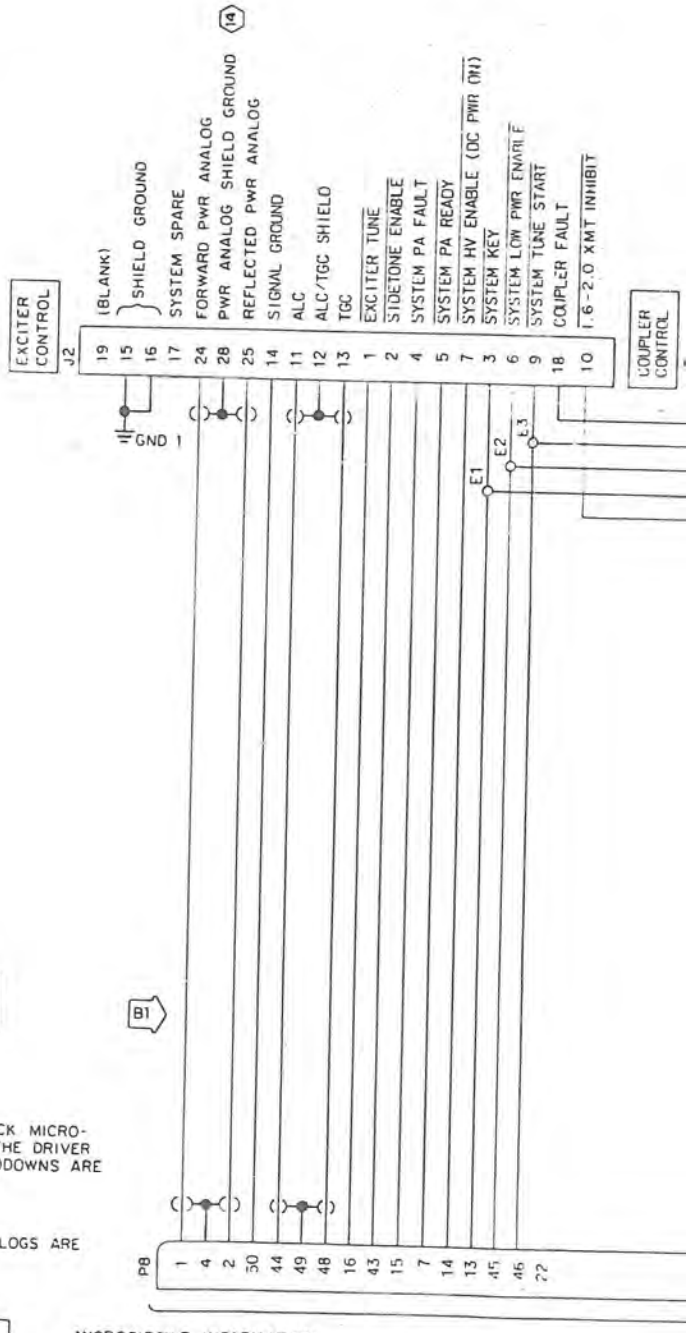
U NO	TYPE	POWER (V DC)		
		+5	+12	GND
U1	4011		14	7
U2	4528		16	8
U3	7447	16		8
U4	7447	16		8
U5	NOT USED			
U6	NOT USED			
U7	4050	1		8
U8	4049	1		8
U9	4049	1		8
U10	7406	14		7

MICROCIRCUIT INFORMATION

U NO	TYPE	POWER (V DC)		
		5	12	GND
U11	7406	14		7
(8) U12	ARRAY			14
(8) U13	ARRAY			14
(8) U14	ARRAY			
(8) U15	ARRAY			
U16	4066		14	7
U17	4066		14	7

A1A4 SPARES

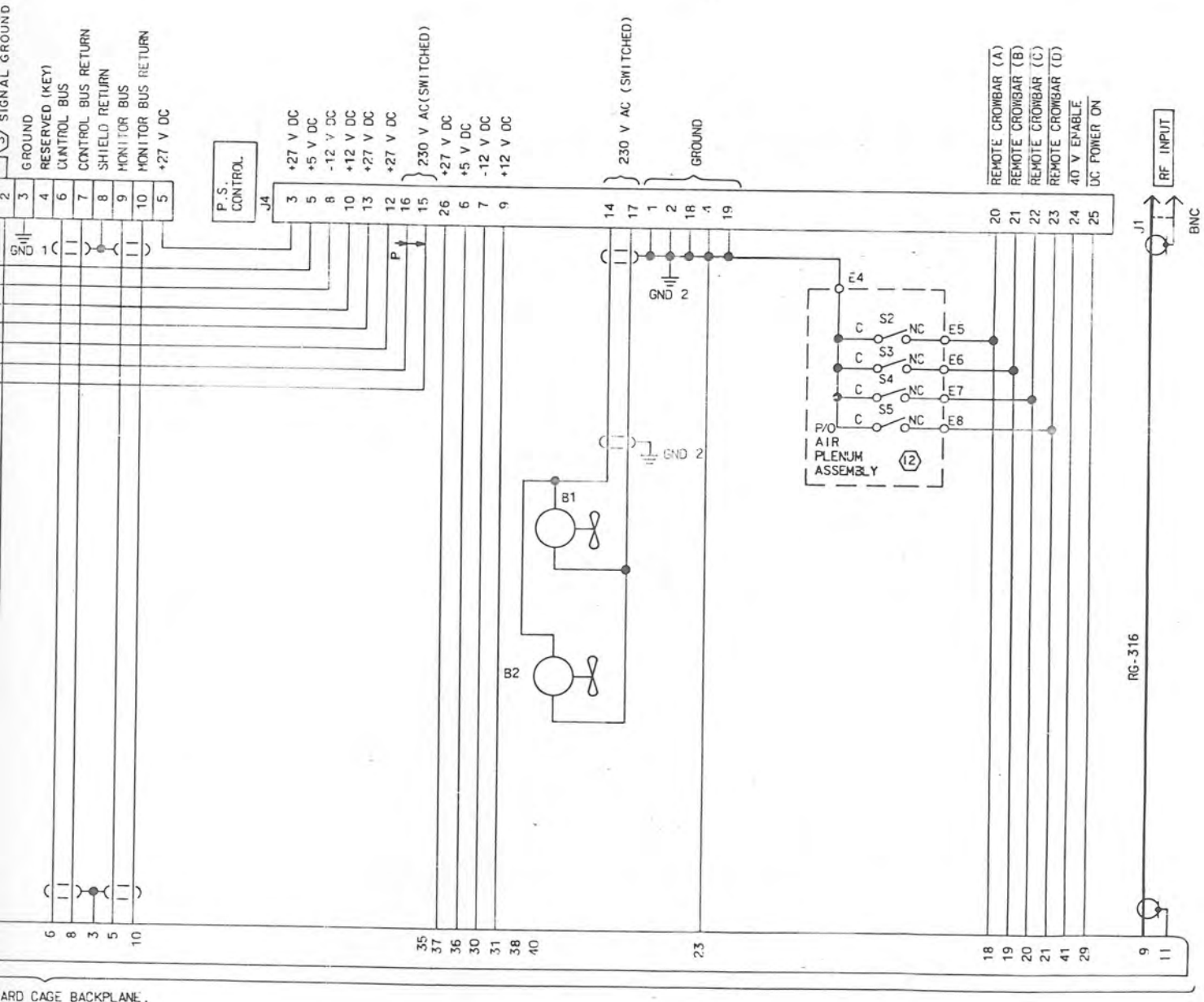




SYSTEM HV ENABLE (DC PWR ON)
SYSTEM KEY
SYSTEM LOW PWR ENABLE
SYSTEM TUNE START
COUPLER FAULT
1.6-2.0 XMT INHIBIT
COUPLER CONTROL
J3
COUPLER FAULT
SYSTEM TUNE START
SYSTEM LOW PWR ENABLE
SYSTEM KEY
20 MHz
10 MHz
8 MHz
4 MHz
2 MHz
1 MHz
0.8 MHz
0.4 MHz
0.2 MHz
0.1 MHz
SHIELD GROUND
POWER GROUND
COUPLER TUNE PWR
1.6-2.0 XMT INHIBIT
230 V AC (SWITCHED)
+27 V DC
+12 V DC
-12 V DC
+5 V DC
RF INTERLOCK
SIGNAL GROUND
TB1
RF INTERLOCK
SIGNAL GROUND
GROUND
RESERVED (KEY)
CONTROL BUS
CONTROL BUS RETURN
SHIELD RETURN
MONITOR BUS
MONITOR BUS RETURN
+27 V DC
P.S. CONTROL
J4
+27 V DC
+5 V DC
-12 V DC
+12 V DC
+27 V DC
+27 V DC
230 V AC(SWITCHED)
+27 V DC
E1
E2
E3
GND 1
GND 1
P
P
A1
A1
A1
WIRING HARNESS A1W1
TO CARD CAGE BACKPLANE,
A1A2 MATES WITH A1A2J7

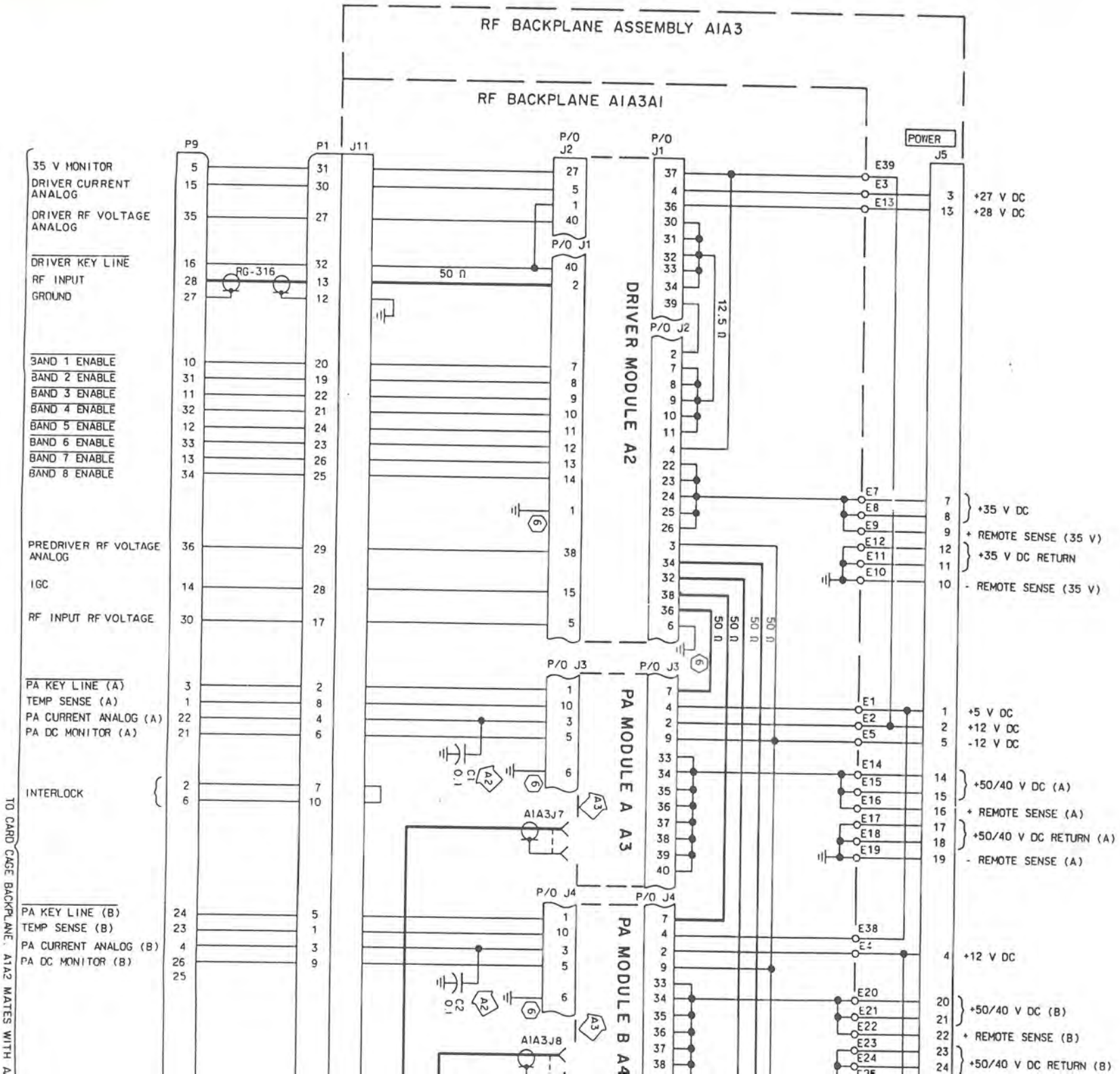
A1A4 SPARES

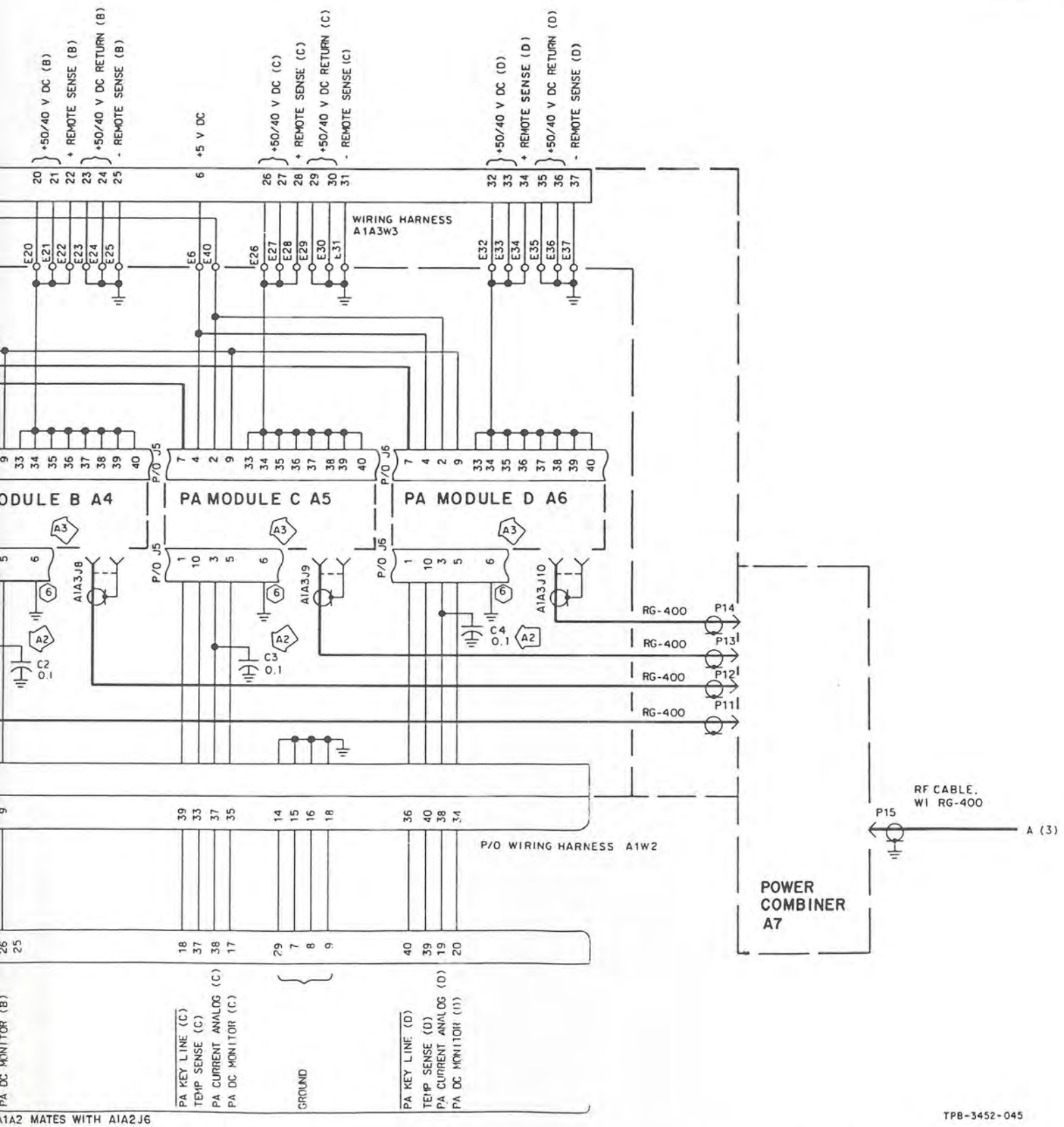
U17D
U7C
U7A
U9E
U2A
T1
T2
R
A
B
Q
Q



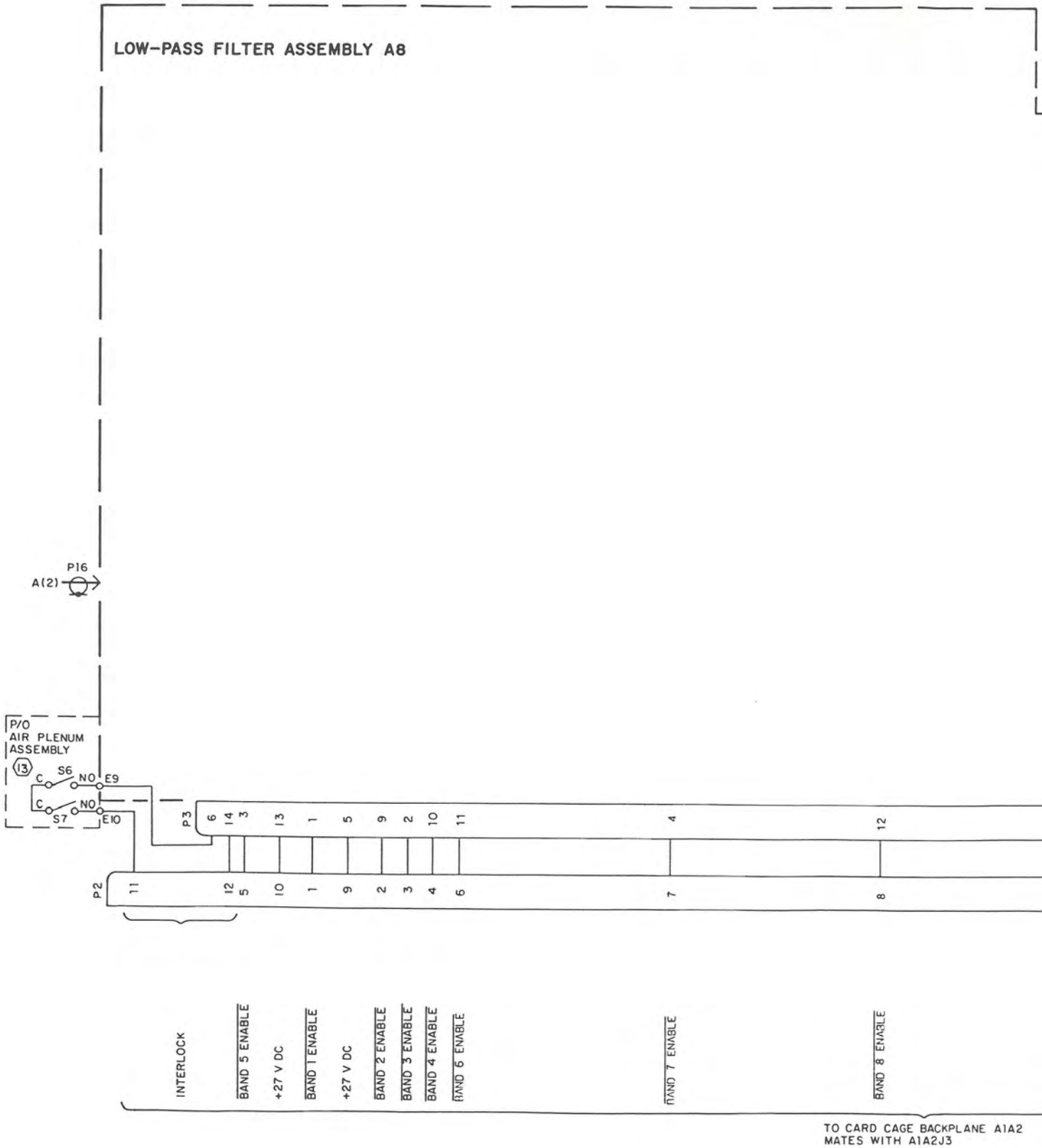
TPB-3452-045

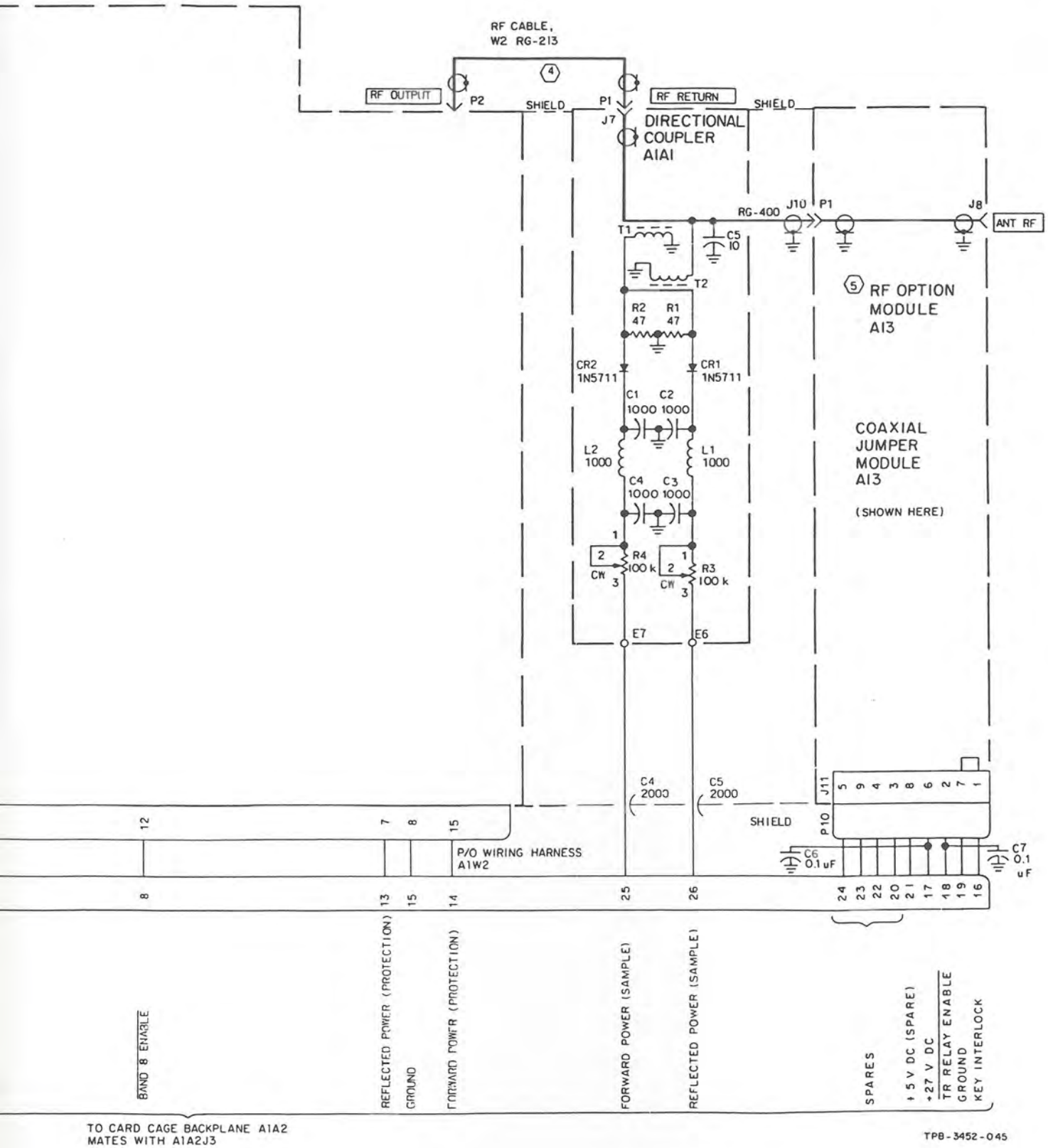
1-kW Power Amplifier HF-8023,
Schematic Diagram
Figure 7-6 (Sheet 1 of 4)


RF BACKPLANE ASSEMBLY A1A3
RF BACKPLANE A1A3A1
TO CARD CAGE BACKPLANE, A1A2 MATES WITH A
35 V MONITOR
DRIVER CURRENT ANALOG
DRIVER RF VOLTAGE ANALOG
DRIVER KEY LINE
RF INPUT
GROUND
RG-316
50 Ω
12.5 Ω
BAND 1 ENABLE
BAND 2 ENABLE
BAND 3 ENABLE
BAND 4 ENABLE
BAND 5 ENABLE
BAND 6 ENABLE
BAND 7 ENABLE
BAND 8 ENABLE
PREDRIVER RF VOLTAGE ANALOG
IGC
RF INPUT RF VOLTAGE
PA KEY LINE (A)
TEMP SENSE (A)
PA CURRENT ANALOG (A)
PA DC MONITOR (A)
INTERLOCK
PA KEY LINE (B)
TEMP SENSE (B)
PA CURRENT ANALOG (B)
PA DC MONITOR (B)
P9
P1
J11
P/O J2
P/O J1
P/O J1
P/O J2
DRIVER MODULE A2
P/O J3
P/O J3
PA MODULE A A3
A1A3J7
P/O J4
P/O J4
PA MODULE B A4
A1A3J8
C1 0.1
C2 0.1
POWER
J5
E39
E3
E13
E7
E8
E9
E12
E11
E10
E1
E2
E5
E14
E15
E16
E17
E18
E19
E38
E4
E20
E21
E22
E23
E24
+27 V DC
+28 V DC
+35 V DC
+ REMOTE SENSE (35 V)
+35 V DC RETURN
- REMOTE SENSE (35 V)
+5 V DC
+12 V DC
-12 V DC
+50/40 V DC (A)
+ REMOTE SENSE (A)
+50/40 V DC RETURN (A)
- REMOTE SENSE (A)
+12 V DC
+50/40 V DC (B)
+ REMOTE SENSE (B)
+50/40 V DC RETURN (B)

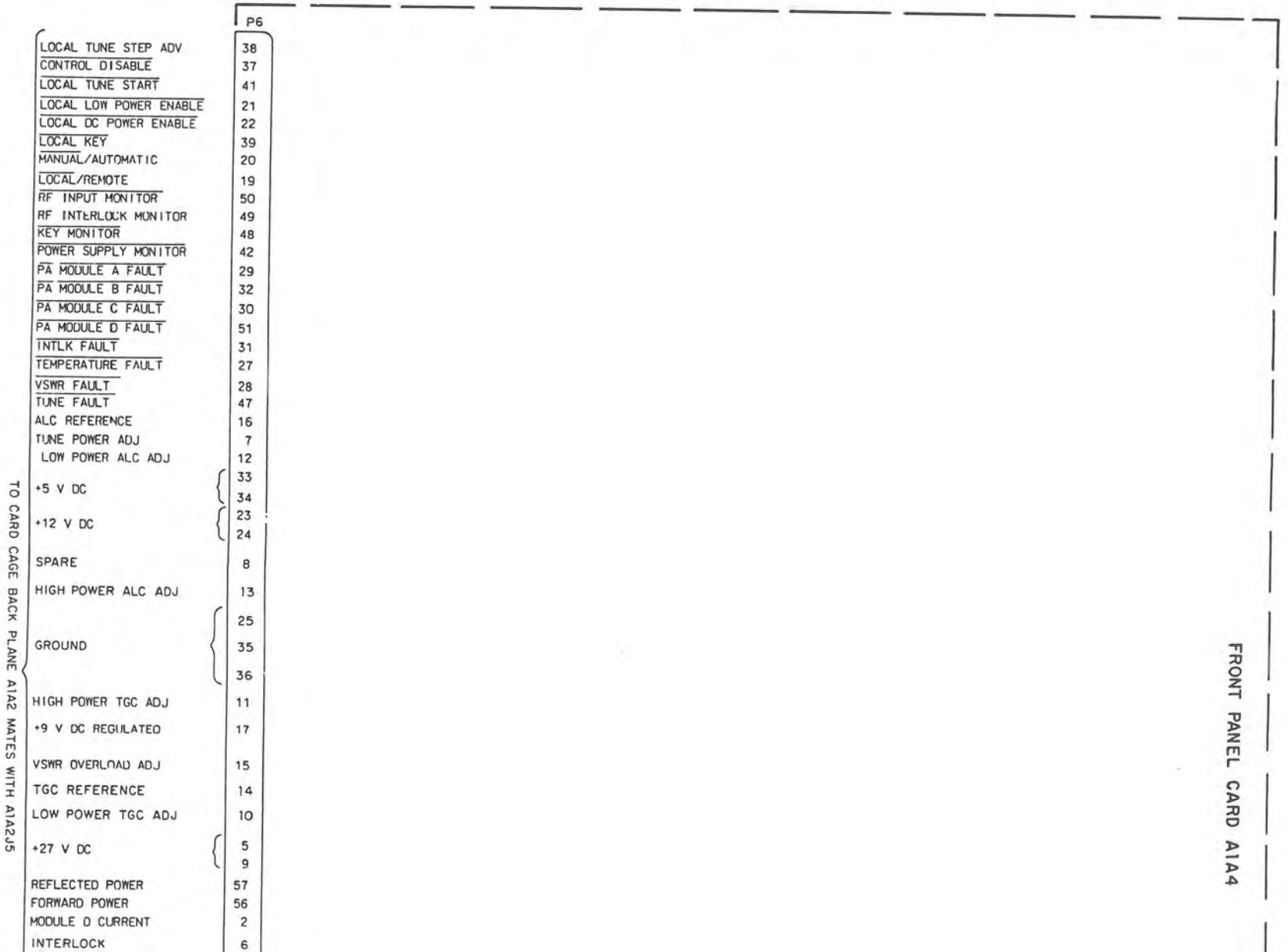


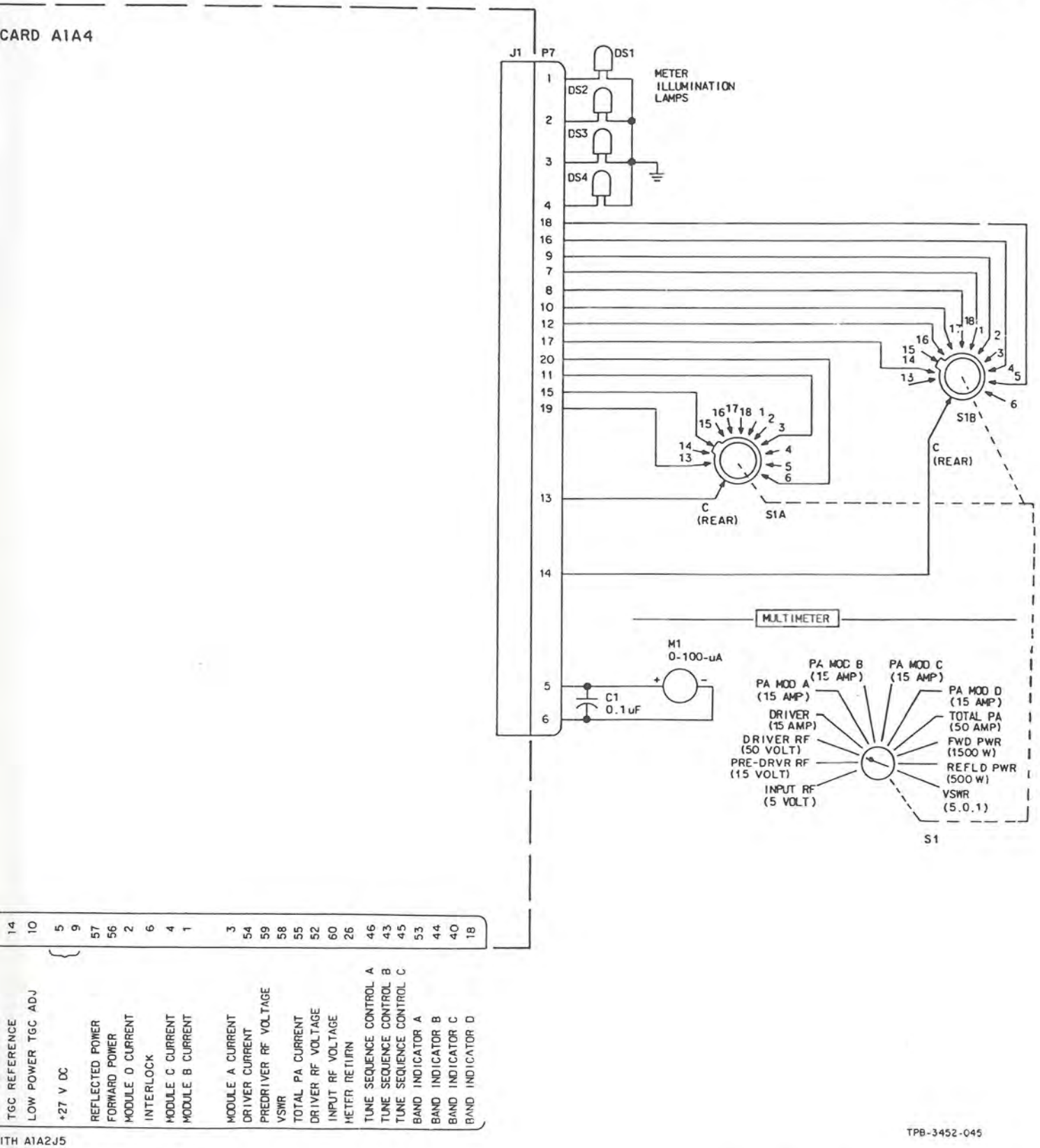
1-kW Power Amplifier HF-8023,
Schematic Diagram
Figure 7-6 (Sheet 2)


LOW-PASS FILTER ASSEMBLY A8
P16
A(2)
P/O
AIR PLENUM
ASSEMBLY
13
C
S6
NO
E9
C
S7
NO
E10
P3
6
14
3
13
1
5
9
2
10
11
4
12
P2
11
12
5
10
1
9
2
3
4
6
7
8
INTERLOCK
BAND 5 ENABLE
+27 V DC
BAND 1 ENABLE
+27 V DC
BAND 2 ENABLE
BAND 3 ENABLE
BAND 4 ENABLE
BAND 6 ENABLE
BAND 7 ENABLE
BAND 8 ENABLE
TO CARD CAGE BACKPLANE A1A2
MATES WITH A1A2J3

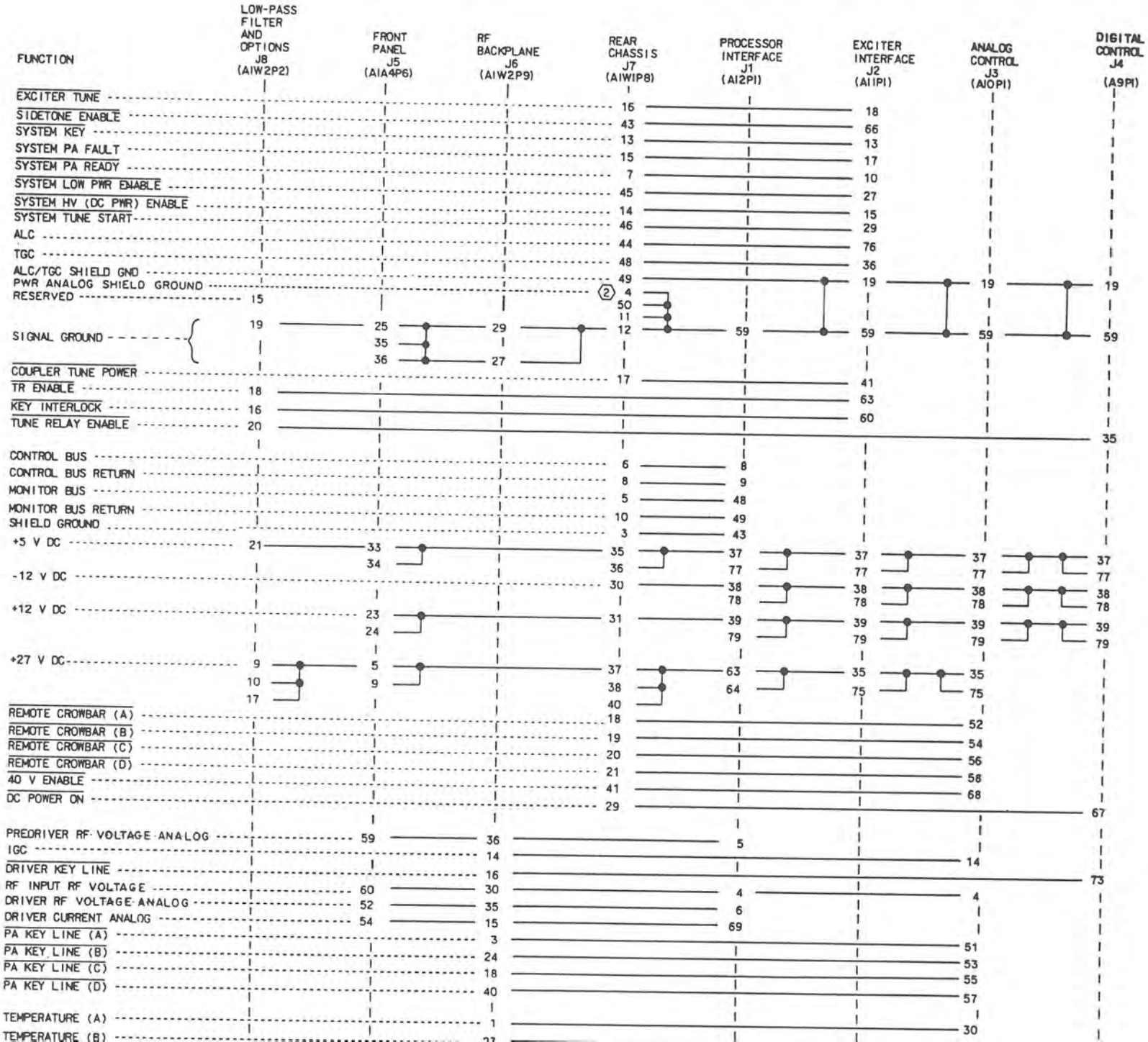


1-kW Power Amplifier HF-8023,
Schematic Diagram
Figure 7-6 (Sheet 3)

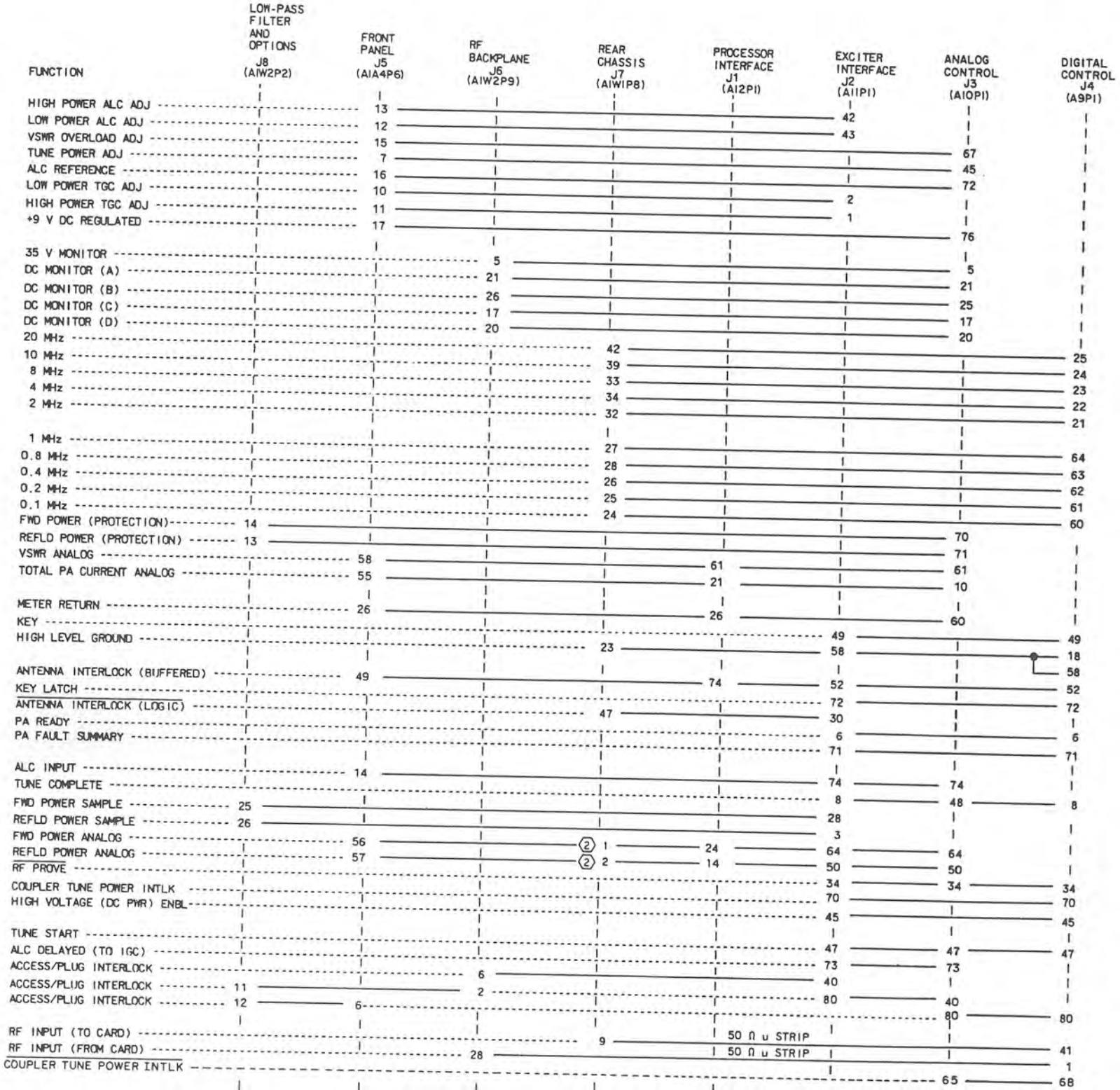

FRONT PANEL CARD A1A4
P6
LOCAL TUNE STEP ADV 38
CONTROL DISABLE 37
LOCAL TUNE START 41
LOCAL LOW POWER ENABLE 21
LOCAL DC POWER ENABLE 22
LOCAL KEY 39
MANUAL/AUTOMATIC 20
LOCAL/REMOTE 19
RF INPUT MONITOR 50
RF INTERLOCK MONITOR 49
KEY MONITOR 48
POWER SUPPLY MONITOR 42
PA MODULE A FAULT 29
PA MODULE B FAULT 32
PA MODULE C FAULT 30
PA MODULE D FAULT 51
INTLK FAULT 31
TEMPERATURE FAULT 27
VSWR FAULT 28
TUNE FAULT 47
ALC REFERENCE 16
TUNE POWER ADJ 7
LOW POWER ALC ADJ 12
+5 V DC 33 34
+12 V DC 23 24
SPARE 8
HIGH POWER ALC ADJ 13
GROUND 25 35 36
HIGH POWER TGC ADJ 11
+9 V DC REGULATED 17
VSWR OVERLOAD ADJ 15
TGC REFERENCE 14
LOW POWER TGC ADJ 10
+27 V DC 5 9
REFLECTED POWER 57
FORWARD POWER 56
MODULE D CURRENT 2
INTERLOCK 6
TO CARD CAGE BACK PLANE A1A2 MATES WITH A1A2J5

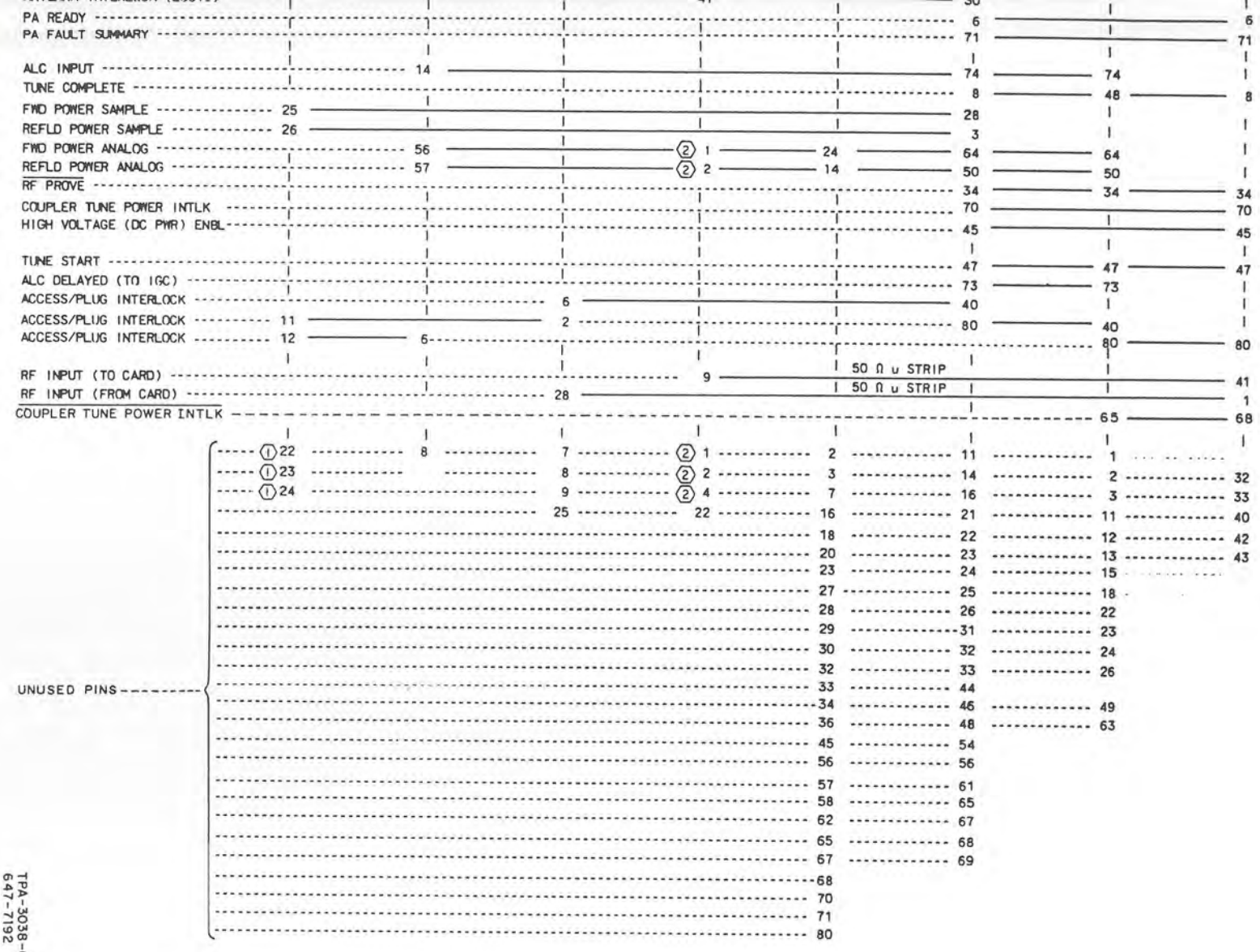


1-kW Power Amplifier HF-8023,
Schematic Diagram
Figure 7-6 (Sheet 4)


FUNCTION
LOW-PASS FILTER AND OPTIONS J8 (A1W2P2)
FRONT PANEL J5 (A1A4P6)
RF BACKPLANE J6 (A1W2P9)
REAR CHASSIS J7 (A1W1P8)
PROCESSOR INTERFACE J1 (A12P1)
EXCITER INTERFACE J2 (A11P1)
ANALOG CONTROL J3 (A10P1)
DIGITAL CONTROL J4 (A9P1)
EXCITER TUNE
SIDETONE ENABLE
SYSTEM KEY
SYSTEM PA FAULT
SYSTEM PA READY
SYSTEM LOW PWR ENABLE
SYSTEM HV (DC PWR) ENABLE
SYSTEM TUNE START
ALC
TGC
ALC/TGC SHIELD GND
PWR ANALOG SHIELD GROUND
RESERVED
SIGNAL GROUND
COUPLER TUNE POWER
TR ENABLE
KEY INTERLOCK
TUNE RELAY ENABLE
CONTROL BUS
CONTROL BUS RETURN
MONITOR BUS
MONITOR BUS RETURN
SHIELD GROUND
+5 V DC
-12 v DC
+12 V DC
+27 V DC
REMOTE CROWBAR (A)
REMOTE CROWBAR (B)
REMOTE CROWBAR (C)
REMOTE CROWBAR (D)
40 V ENABLE
DC POWER ON
PREDRIVER RF VOLTAGE ANALOG
IGC
DRIVER KEY LINE
RF INPUT RF VOLTAGE
DRIVER RF VOLTAGE ANALOG
DRIVER CURRENT ANALOG
PA KEY LINE (A)
PA KEY LINE (B)
PA KEY LINE (C)
PA KEY LINE (D)
TEMPERATURE (A)
TEMPERATURE (B)

Card Cage Backplane A1A2,
Schematic Diagram
Figure 7-7 (Sheet 1 of 2)


FUNCTION
LOW-PASS FILTER AND OPTIONS J8 (A1W2P2)
FRONT PANEL J5 (A1A4P6)
RF BACKPLANE J6 (A1W2P9)
REAR CHASSIS J7 (A1W1P8)
PROCESSOR INTERFACE J1 (A12P1)
EXCITER INTERFACE J2 (A11P1)
ANALOG CONTROL J3 (A10P1)
DIGITAL CONTROL J4 (A9P1)
HIGH POWER ALC ADJ
LOW POWER ALC ADJ
VSWR OVERLOAD ADJ
TUNE POWER ADJ
ALC REFERENCE
LOW POWER TGC ADJ
HIGH POWER TGC ADJ
+9 V DC REGULATED
35 V MONITOR
DC MONITOR (A)
DC MONITOR (B)
DC MONITOR (C)
DC MONITOR (D)
20 MHz
10 MHz
8 MHz
4 MHz
2 MHz
1 MHz
0.8 MHz
0.4 MHz
0.2 MHz
0.1 MHz
FWD POWER (PROTECTION)
REFLD POWER (PROTECTION)
VSWR ANALOG
TOTAL PA CURRENT ANALOG
METER RETURN
KEY
HIGH LEVEL GROUND
ANTENNA INTERLOCK (BUFFERED)
KEY LATCH
ANTENNA INTERLOCK (LOGIC)
PA READY
PA FAULT SUMMARY
ALC INPUT
TUNE COMPLETE
FWD POWER SAMPLE
REFLD POWER SAMPLE
FWD POWER ANALOG
REFLD POWER ANALOG
RF PROVE
COUPLER TUNE POWER INTLK
HIGH VOLTAGE (DC PWR) ENBL
TUNE START
ALC DELAYED (TO IGC)
ACCESS/PLUG INTERLOCK
ACCESS/PLUG INTERLOCK
ACCESS/PLUG INTERLOCK
RF INPUT (TO CARD)
RF INPUT (FROM CARD)
COUPLER TUNE POWER INTLK
50 Ω u STRIP
50 Ω u STRIP



NOTES:

(1) J8-22, 23 AND 24 USED ON -002 ONLY.

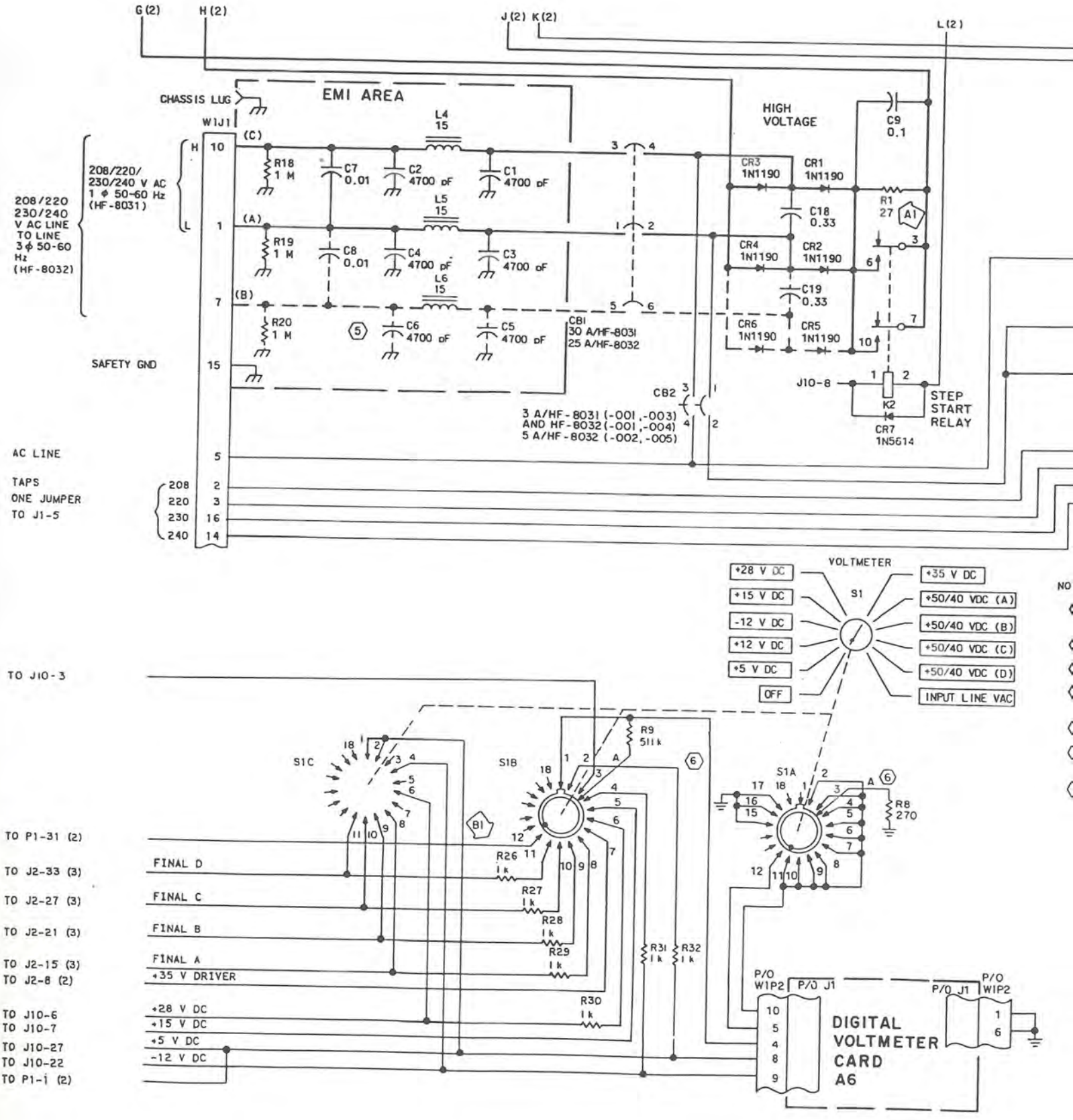
(2) J7-1, 2 AND 4 USED ON -003 ONLY.

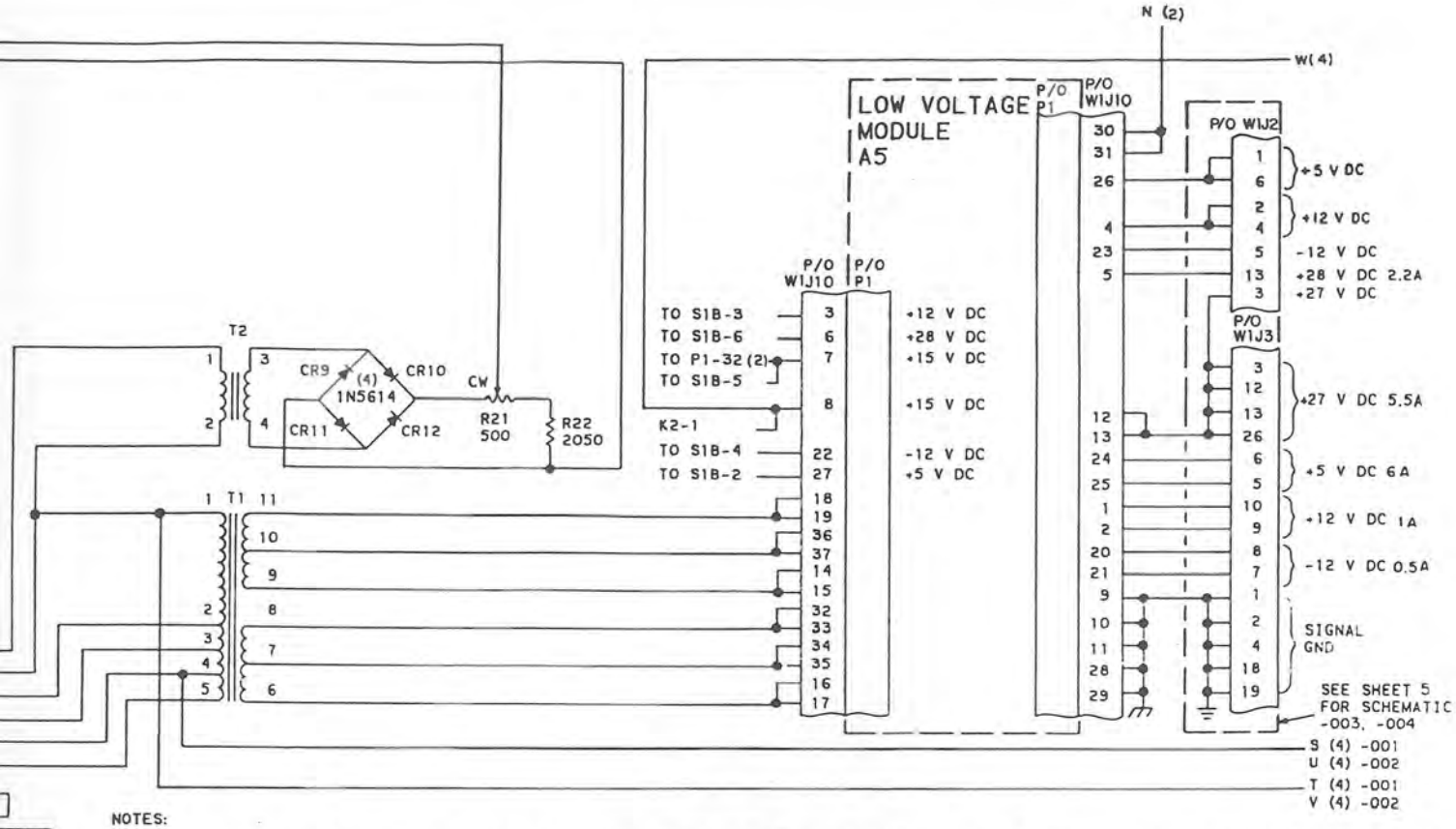
Card Cage Backplane A1A2,
Schematic Diagram
Figure 7-7 (Sheet 2)

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
A1	Deleted R2, 330 Ω from across C9. Changed R1 from 330 Ω to 27 Ω.	101	646-6884-001, -002, -003; REV K and above
B1	Added resistors R26 through R32.		Chassis A1 part no 646-6884-001, -002, -003; REV M and above
B2	Changed type number of CR13 through CR17 from DA2779GE to 1N4454.		Chassis A1 part no 646-6884-( ) REV W and above.
B3	Changed value of A1A1L8 from 30 µh to 0.1 µh to prevent ringing on the line, resulting in tune steps 3 and 4 being skipped.	157	Filter assembly A1A1 part no 652-2255-001 REV C and above.

Power Supply HF-8031 and HF-8032, Schematic Diagram
Figure 7-8 (Sheet A)


G(2)
H(2)
J(2) K(2)
L(2)
EMI AREA
CHASSIS LUG
W1J1
208/220/230/240 V AC 1 φ 50-60 Hz (HF-8031)
208/220 230/240 V AC LINE TO LINE 3 φ 50-60 Hz (HF-8032)
SAFETY GND
AC LINE
TAPS ONE JUMPER TO J1-5
208
220
230
240
R18 1 M
R19 1 M
R20 1 M
C7 0.01
C8 0.01
C6 4700 pF
C4 4700 pF
C2 4700 pF
C3 4700 pF
C5 4700 pF
C1 4700 pF
L4 15
L5 15
L6 15
CB1 30 A/HF-8031 25 A/HF-8032
CB2 3 A/HF-8031 (-001,-003) AND HF-8032 (-001,-004) 5 A/HF-8032 (-002,-005)
HIGH VOLTAGE
C9 0.1
CR3 1N1190
CR1 1N1190
CR4 1N1190
CR2 1N1190
CR6 1N1190
CR5 1N1190
C18 0.33
C19 0.33
R1 27
A1
J10-8
K2
CR7 1N5614
STEP START RELAY
VOLTMETER
S1
+28 V DC
+15 V DC
-12 V DC
+12 V DC
+5 V DC
OFF
+35 V DC
+50/40 VDC (A)
+50/40 VDC (B)
+50/40 VDC (C)
+50/40 VDC (D)
INPUT LINE VAC
TO J10-3
S1C
S1B
S1A
R9 511 k
R8 270
R26 1 k
R27 1 k
R28 1 k
R29 1 k
R30 1 k
R31 1 k
R32 1 k
B1
TO P1-31 (2)
TO J2-33 (3)
FINAL D
TO J2-27 (3)
FINAL C
TO J2-21 (3)
FINAL B
TO J2-15 (3)
FINAL A
TO J2-8 (2)
+35 V DRIVER
TO J10-6
TO J10-7
+28 V DC
+15 V DC
TO J10-27
+5 V DC
TO J10-22
-12 V DC
TO P1-j (2)
P/O W1P2
P/O J1
P/O J1
P/O W1P2
DIGITAL VOLTMETER CARD A6



NOTES:

1. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS AND INDUCTANCE VALUES ARE IN MICROHENRYS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.
3. TYPE DESIGNATIONS SHOWN MAY BE GENERIC IN FORM AND ARE FOR REFERENCE ONLY. SEE APPLICABLE PARTS LIST FOR REPLACEMENT PARTS.
4. THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED TO PREVENT EQUIPMENT DAMAGE.
5. PARTS USED ON HF-8032 ONLY: C5, C6, C8, C19, CB1 (THREE GANG BREAKER), L6, R20, J1-7, CR5, CR6
6. PIN A ON S1A AND S1B ARE LOCATED ON THE KNOB OR DRIVEN SIDE, ALL OTHER PINS ARE ON THE REAR. ROTOR, FRONT AND REAR, ARE ELECTRICAL.
7.

DESCRIPTION	UNIT	SCHEMATIC DASH NO.
1φ, 50/60 Hz, 230 V AC LINE-NEUT	HF-8031 (001)	-001
1φ, 50/60 Hz, 230 V AC LINE-NEUT LOW NOISE	HF-8031 (003)	-003
3φ, 50/60 Hz, 230 V AC LINE-LINE	HF-8032 (001)	-001
3φ, 50/60/400 Hz, 230 V AC LINE-LINE	HF-8032 (002)	-002
3φ, 50/60 Hz, 230 V AC LINE-LINE LOW NOISE	HF-8032 (004)	-003
3φ, 50/60/400 Hz, 230 V AC LINE-LINE LOW NOISE	HF-8032 (005)	-004

MICROCIRCUIT INFO FOR A7

REF DES	COMMON DEVICE	PWR (V DC) +5	+15	GND
U1	LM239		3	12
U2	LM239		3	12
U3	4049	1		8
U4	54LS28	14		7

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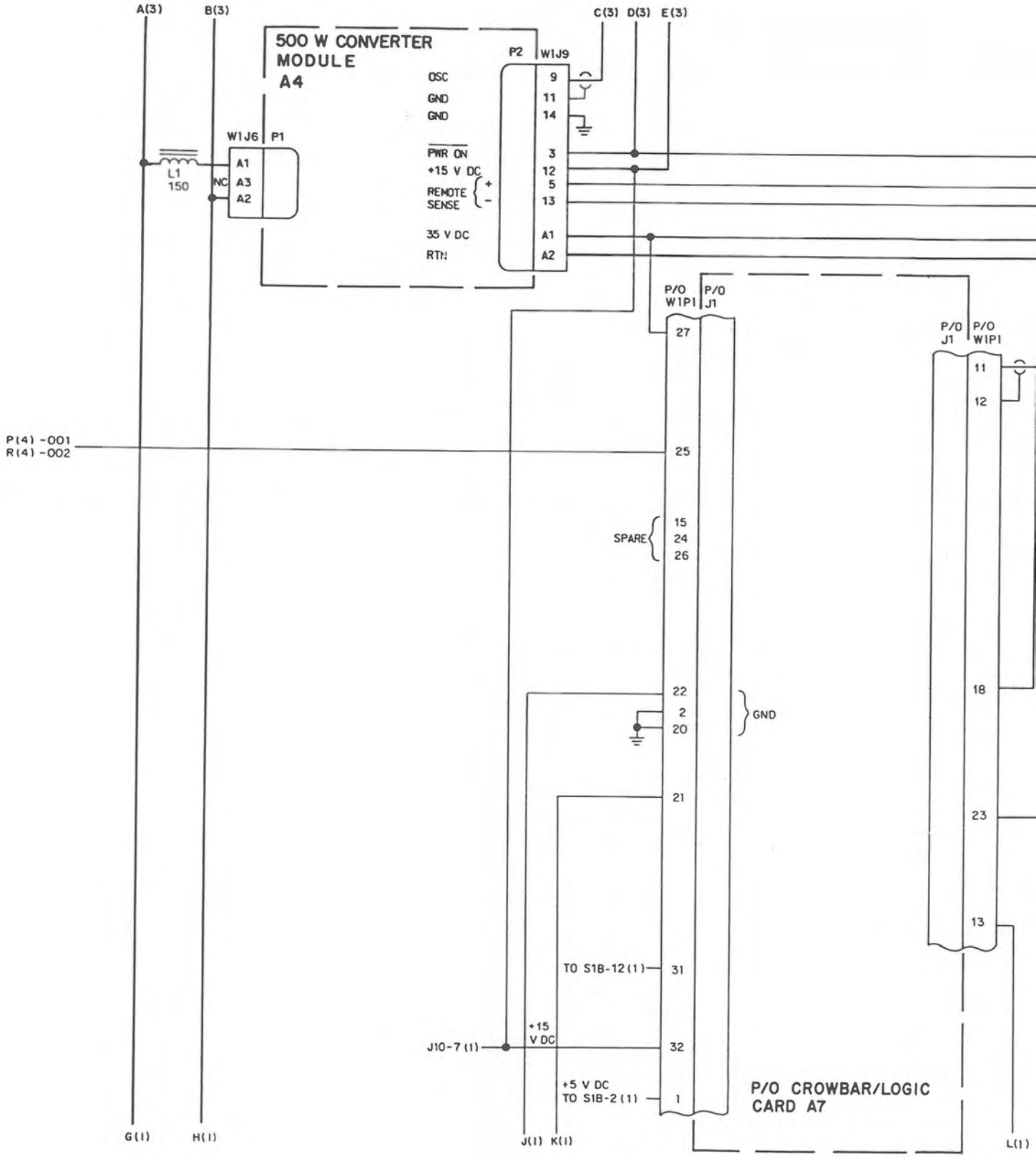
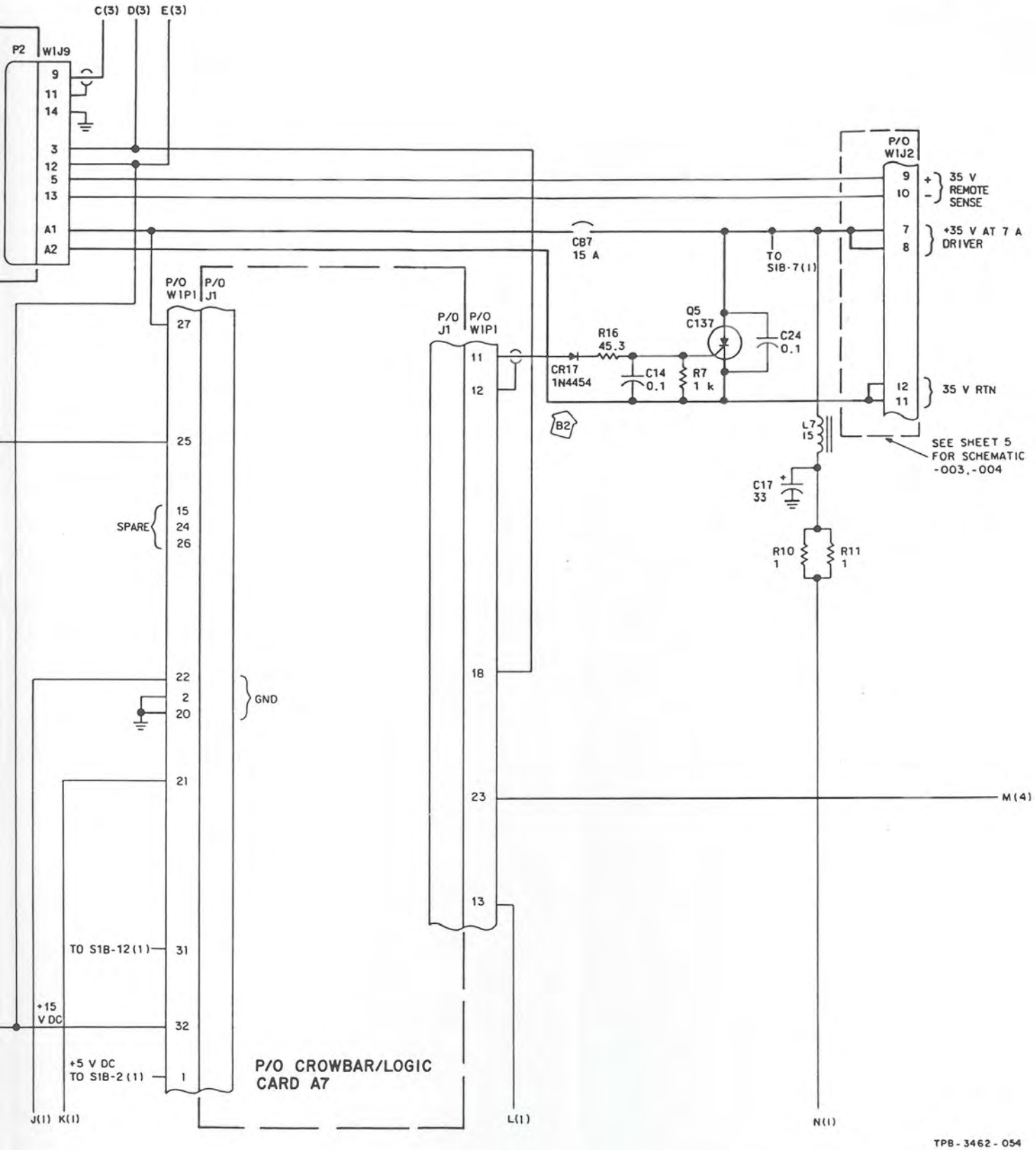
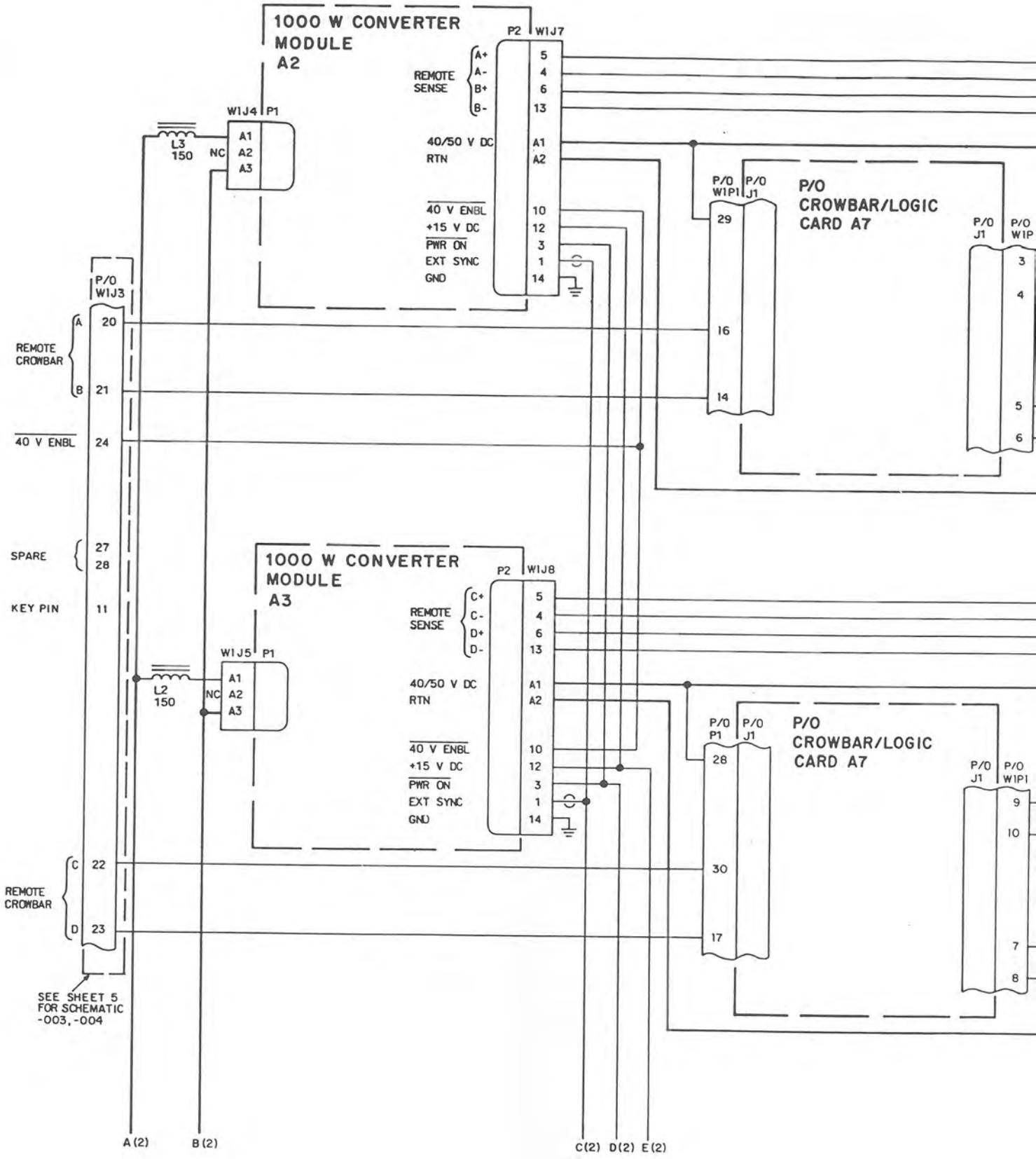
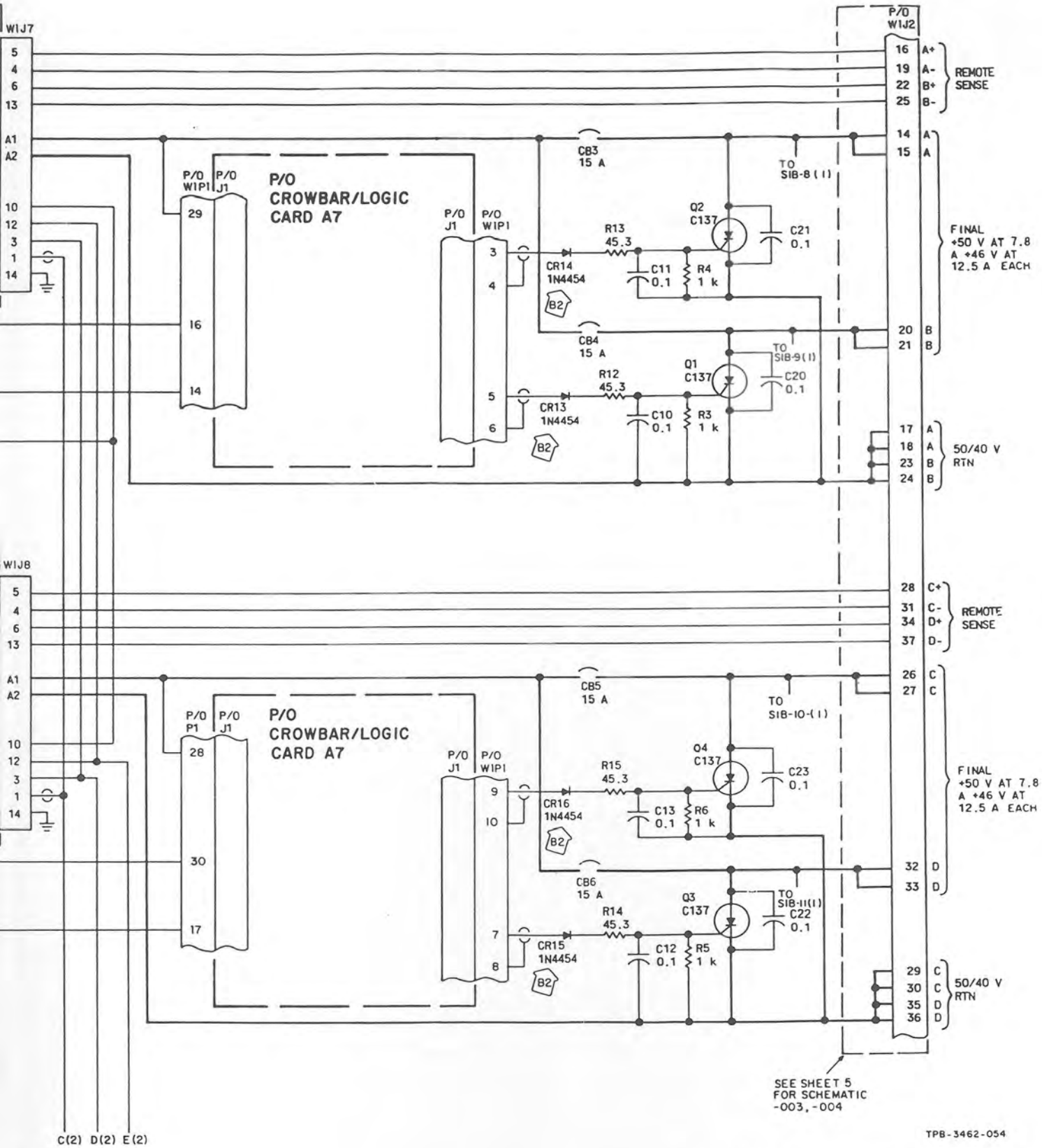
Power Supply HF-8031 and HF-8032, Schematic Diagram
Figure 7-8 (Sheet 1 of 5)


A(3)
B(3)
C(3)
D(3)
E(3)
500 W CONVERTER MODULE A4
P2
W1J9
OSC
GND
GND
PWR ON
+15 V DC
REMOTE SENSE
+
-
35 V DC
RTN
9
11
14
3
12
5
13
A1
A2
W1J6
P1
A1
A3
A2
NC
L1
150
P/O W1P1
P/O J1
27
25
SPARE
15
24
26
22
2
20
GND
21
TO S1B-12(1)
31
+15 V DC
J10-7(1)
32
+5 V DC TO S1B-2(1)
1
P/O CROWBAR/LOGIC CARD A7
P/O J1
P/O W1P1
11
12
18
23
13
P(4)-001
R(4)-002
G(1)
H(1)
J(1)
K(1)
L(1)

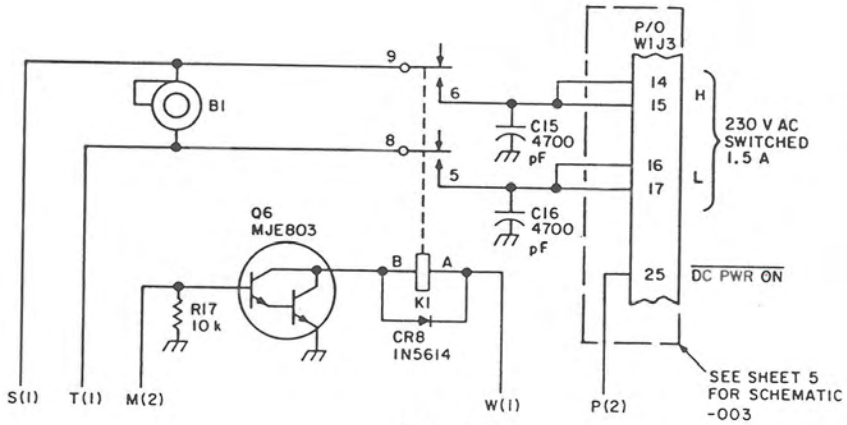


Power Supply HF-8031 and HF-8032,
Schematic Diagram
Figure 7-8 (Sheet 2)


1000 W CONVERTER MODULE A2
P2 W1J7
REMOTE SENSE
A+
A-
B+
B-
5
4
6
13
40/50 V DC RTN
A1
A2
40 V ENBL
+15 V DC
PWR ON
EXT SYNC
GND
10
12
3
1
14
W1J4 P1
L3 150
NC
A1
A2
A3
P/O W1J3
A
20
REMOTE CROWBAR
B
21
40 V ENBL
24
SPARE
27
28
KEY PIN
11
P/O W1P1
P/O J1
29
16
14
P/O CROWBAR/LOGIC CARD A7
P/O J1
P/O W1P
3
4
5
6
1000 W CONVERTER MODULE A3
P2 W1J8
REMOTE SENSE
C+
C-
D+
D-
5
4
6
13
40/50 V DC RTN
A1
A2
40 V ENBL
+15 V DC
PWR ON
EXT SYNC
GND
10
12
3
1
14
W1J5 P1
L2 150
NC
A1
A2
A3
C
22
REMOTE CROWBAR
D
23
P/O P1
P/O J1
28
30
17
P/O CROWBAR/LOGIC CARD A7
P/O J1
P/O W1P1
9
10
7
8
SEE SHEET 5 FOR SCHEMATIC -003, -004
A(2)
B(2)
C(2)
D(2)
E(2)



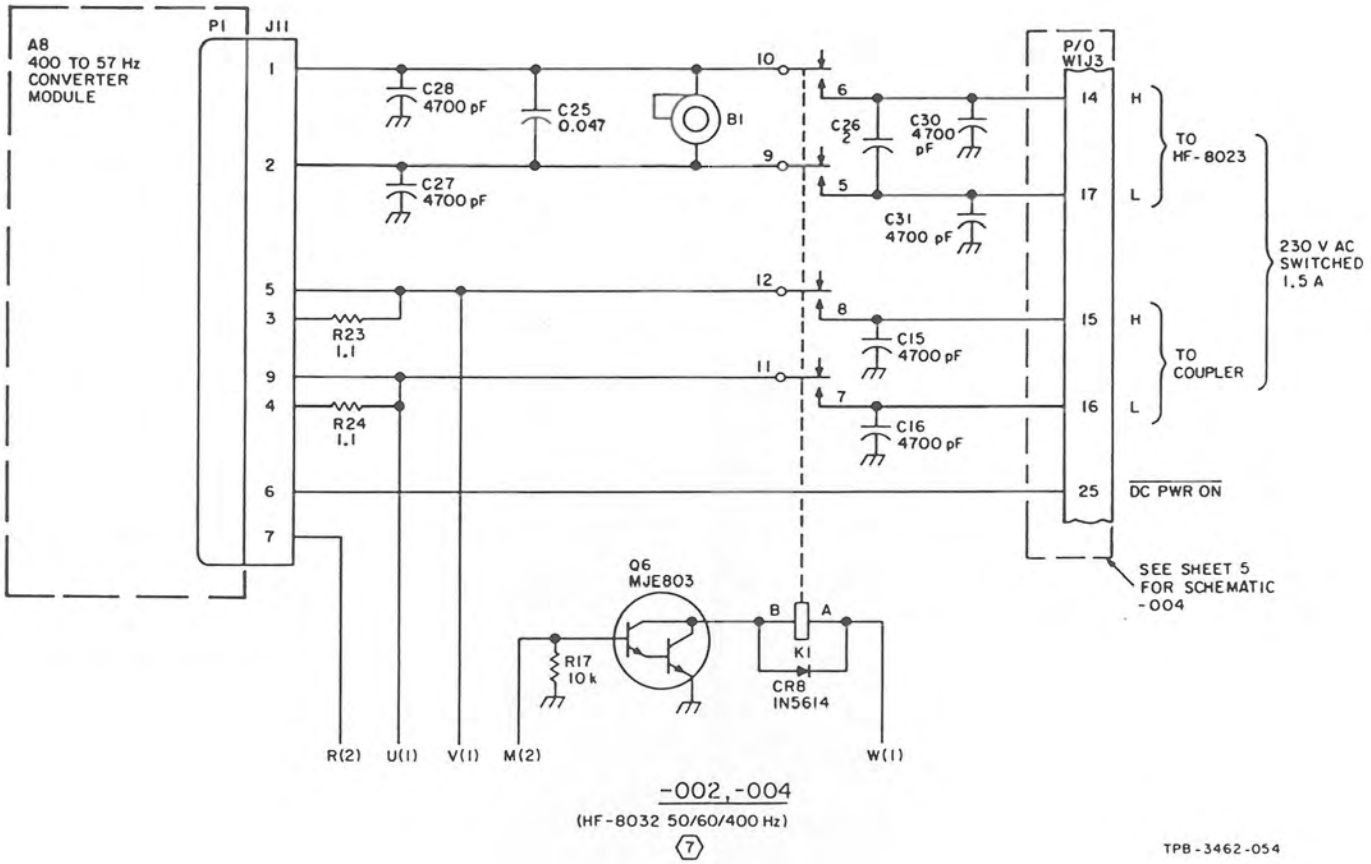
Power Supply HF-8031 and HF-8032,
Schematic Diagram
Figure 7-8 (Sheet 3)



-001, -003

(HF-8031/HF-8032 50/60 Hz)

(7)



-002, -004
(HF-8032 50/60/400 Hz)
⑦

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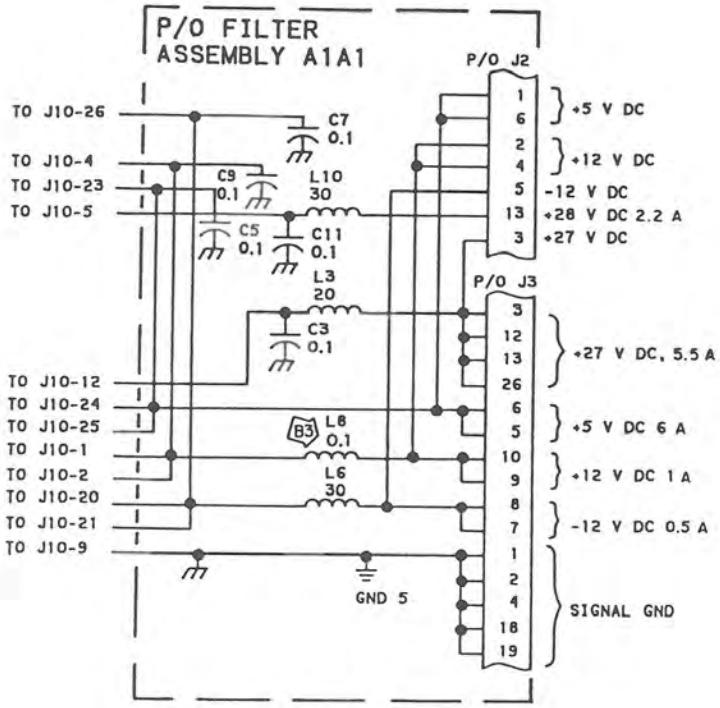
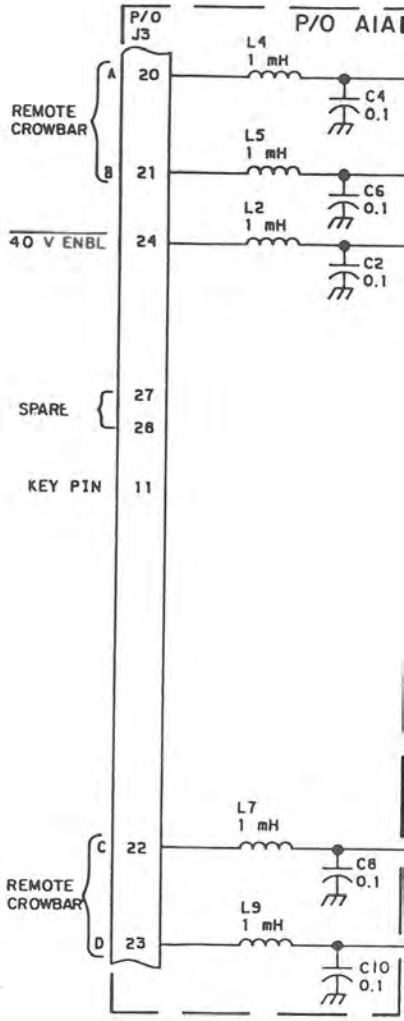
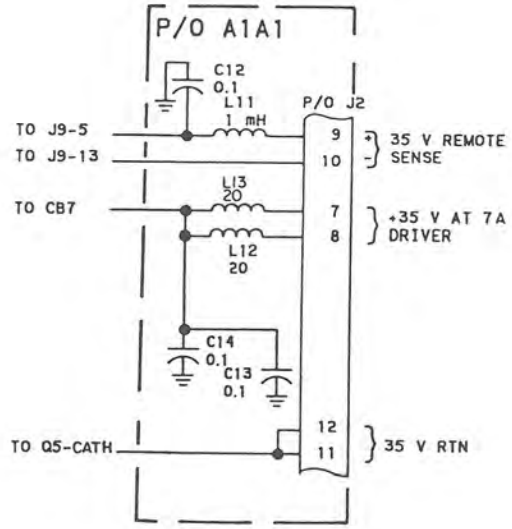
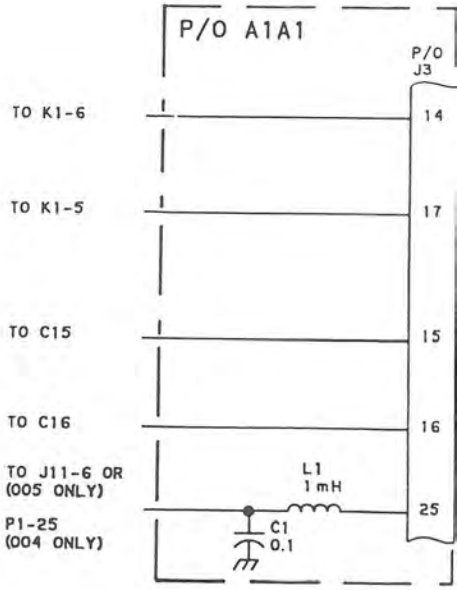
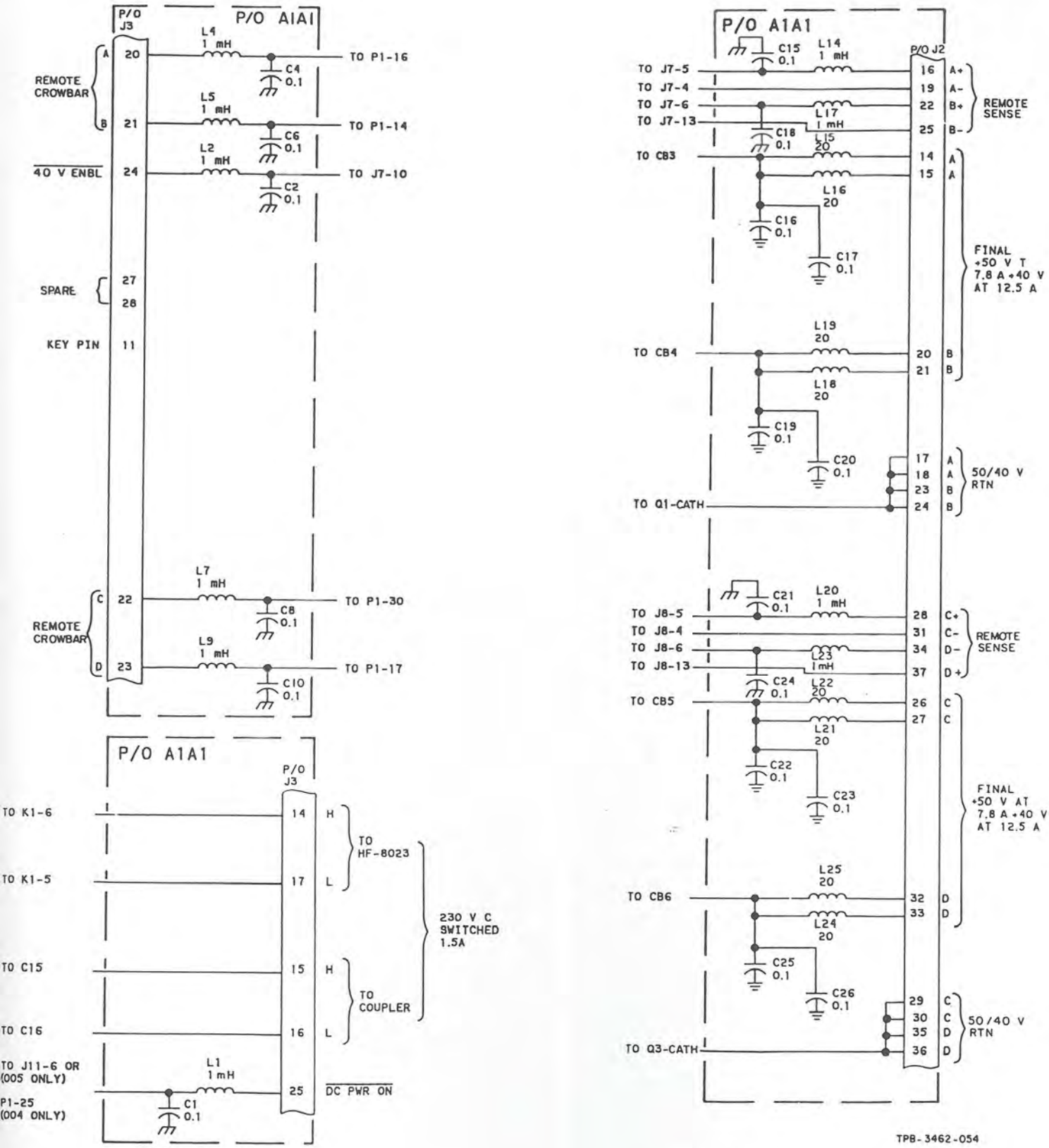
Power Supply HF-8031 and HF-8032,
Schematic Diagram
Figure 7-8 (Sheet 4)


P/O FILTER
ASSEMBLY A1A1
P/O J2
P/O J3
TO J10-26
TO J10-4
TO J10-23
TO J10-5
TO J10-12
TO J10-24
TO J10-25
TO J10-1
TO J10-2
TO J10-20
TO J10-21
TO J10-9
C7 0.1
C9 0.1
C5 0.1
L10 30
C11 0.1
L3 20
C3 0.1
B3
L8 0.1
L6 30
GND 5
1
6
2
4
5
13
3
+5 V DC
+12 V DC
-12 V DC
+28 V DC 2.2 A
+27 V DC
3
12
13
26
+27 V DC, 5.5 A
6
5
+5 V DC 6 A
10
9
+12 V DC 1 A
8
7
-12 V DC 0.5 A
1
2
4
18
19
SIGNAL GND

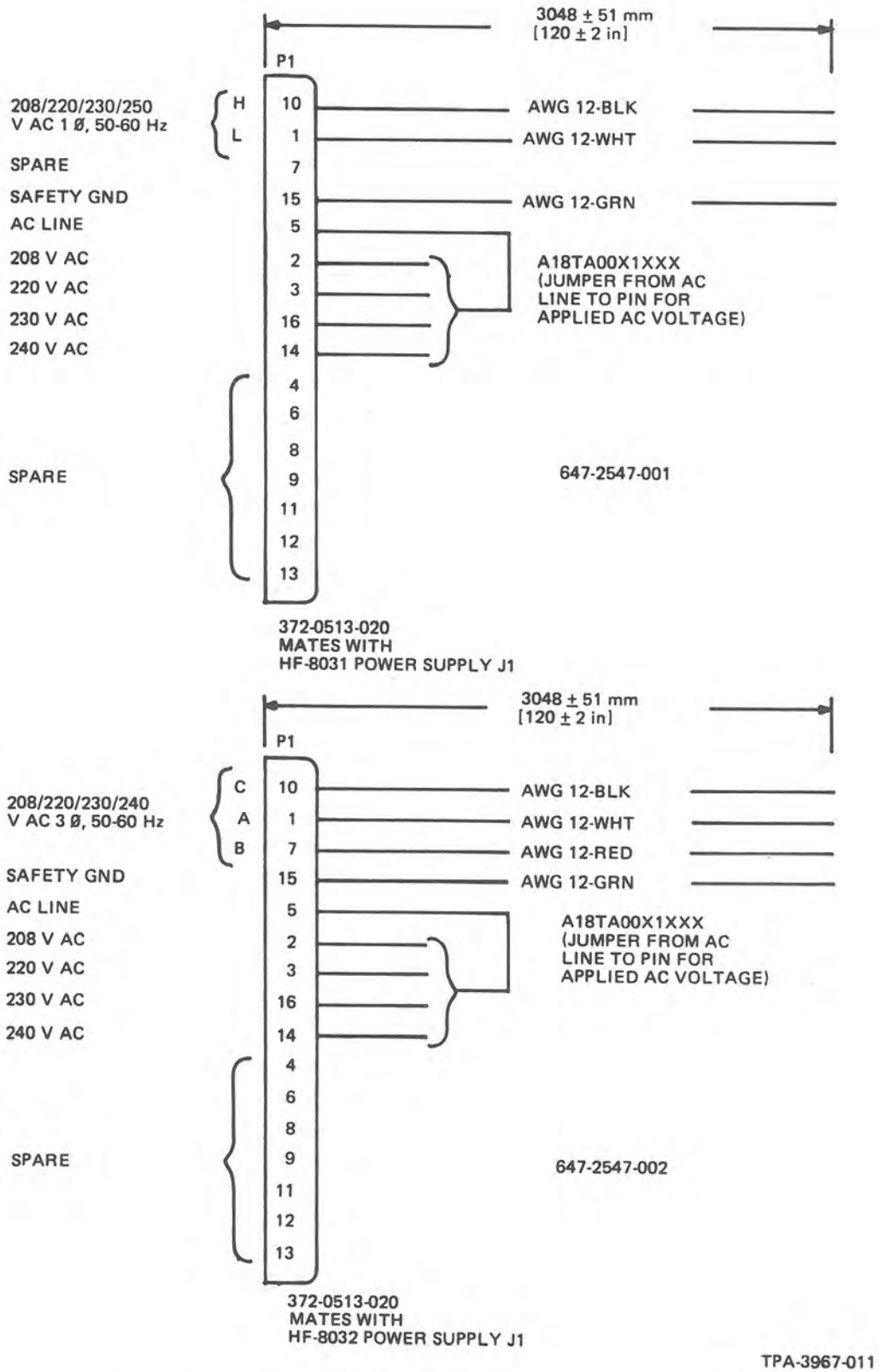

P/O
J3
P/O A1A1
REMOTE
CROWBAR
A
20
L4
1 mH
C4
0.1
B
21
L5
1 mH
C6
0.1
40 V ENBL
24
L2
1 mH
C2
0.1
SPARE
27
28
KEY PIN
11
C
22
L7
1 mH
C8
0.1
REMOTE
CROWBAR
D
23
L9
1 mH
C10
0.1


P/O A1A1
C12
0.1
L11
1 mH
P/O J2
TO J9-5
TO J9-13
9
10
35 V REMOTE
SENSE
TO CB7
L13
20
L12
20
7
8
+35 V AT 7A
DRIVER
C14
0.1
C13
0.1
TO Q5-CATH
12
11
35 V RTN


P/O A1A1
P/O
J3
TO K1-6
14
TO K1-5
17
TO C15
15
TO C16
16
TO J11-6 OR
(005 ONLY)
P1-25
(004 ONLY)
L1
1 mH
C1
0.1
25



Power Supply HF-8031 and HF-8032,
Schematic Diagram
Figure 7-8 (Sheet 5)



Primary Power Cable 647-2547-( ), Schematic Diagram
Figure 7-9

AC-8130A Connector Kit (622-3510-XXX)

Rockwell International

instructions

Collins Defense Communications Division

Printed in USA

523-0771765-001211
15 September 1982

1. DESCRIPTION

The AC-8130A Connector Kit, Collins part number (CPN) 622-3510-001, -002, supplies the connectors required to construct cables for the HF-80 1-kW solid-state transmitter or transceiver systems. AC-8130A, CPN 622-3510-001, is for system configurations without a preselector and CPN 622-3510-002 is for systems that include a preselector. The connectors supplied in the kit are solder-on connectors.

To determine which cables are required for a specific system configuration, refer to the appropriate equipment instruction books (see table 2) and the cable chart in table 1. The length of the cables depends on the mounting location of the system components.

2. ASSEMBLY

The selection of cable or wire used with the connectors contained in the AC-8130A kit is left to the customer. It should be noted that the size and type of cable or wire depends on a number of factors such as ambient noise, length of cable run, and current requirements. Refer to table 1 for cable connectors and recommended cable and wire.

Table 1. System Cables.

CABLE	FUNCTION	TYPICAL WIRE OR CABLE	LUGS AND CONNECTORS
Exctr rf	Connects power amplifier to exciter, receiver-exciter, or preselector	RG-58 C/U	2 BNC coax
Pa-exctr control	Connects power amplifier to exciter or receiver-exciter	Alpha 6014	1-37 pin, 1-37 socket
Pa-ant cplr control	Connects power amplifier to antenna coupler	Alpha 5351	1-28 socket, 1-39 socket
Pa-pwr sply control	Connects power amplifier to power supply	Type E, 600-V, Teflon insulated high-temperature hook-up wire, #22 AWG	1-28 pin, 1-28 socket
Pa-pwr sply pwr	Connects power amplifier to power supply	Type E, 600-V, Teflon insulated high-temperature hook-up wire, #16 and 18 AWG	1-37 pin, 1-37 socket

Table 1. System Cables (Cont).

CABLE	FUNCTION	TYPICAL WIRE OR CABLE	LUGS AND CONNECTORS
Pa-ant cplr rf	Connects power amplifier to antenna coupler	RG-213	2 type N coax
Pa-rcv rf	Connects power amplifier to receiver or receiver-exciter	RG-58 C/U	1 BNC, 1 type C coax
Pa-presel rcv rf	Connects power amplifier to preselector	RG-58 C/U	2 type C coax
Remote control	Connects remote control to exciter, receiver, or receiver-exciter	Alpha 6010	2-25 pin
Presel control	Connects exciter, receiver, or receiver-exciter to preselector	Alpha 5315	1-37 socket, 1-50 socket
Audio control	Connects remote control to exciter, receiver, or receiver-exciter	Alpha 6012	24 terminal lugs
Exctr-presel rf	Connects exciter or receiver-exciter to preselector	RG-58 C/U	2 BNC coax
Rcvr-presel rf	Connects receiver or receiver-exciter to preselector	RG-58 C/U	2 BNC coax

Table 2. Associated Publications.

INSTRUCTION BOOK	COLLINS PART NUMBER
HF-8010( ) Exciter	523-0767418
HF-8014( ) Exciter	523-0770718
HF-8040 Antenna Coupler	523-0767458
HF-8041 Line Flattener	TBA
HF-8050( ) Receiver	523-0767466
HF-8054( ) Receiver	523-0770698
HF-8060 Preselector	523-0767474
HF-8061 Bandpass Filter	523-0771209
HF-8062 Low Pass Filter	523-0771390
HF-8070( ) Receiver-Exciter	523-0767482
HF-8090 Exciter Control	523-0767490

SCHEMATIC CHANGES

REVISION IDENTIFICATION	DESCRIPTION OF REVISION AND REASON FOR CHANGE	SERVICE BULLETIN	EFFECTIVITY
	(This page will contain schematic revision information.)		

TS-8021 Maintenance Panel (CPN 622-3397-002).
Schematic Diagram
Figure 2 (Sheet A)

Table 2. Associated Publications (Cont).

INSTRUCTION BOOK	COLLINS PART NUMBER
HF-8091 Receiver Control	523-0767498
HF-8092 Receiver-Exciter Control	523-0767506
HF-8093 Exciter Control	523-0770750
HF-8094 Receiver Control	523-0770751
HF-8095 Receiver Control	523-0769836
851S-1 Receiver	523-0769210
HF-80 1-kW Solid-State Power Amplifier-Power Supply (includes HF-8023 1-kW Power Amplifier and HF-8031, HF-8032 Power Supply)	523-0771296

3. PARTS LIST/DIAGRAMS

Table 3 assists in identification and requisition of parts for maintenance of the equipment. Listed below are the manufacturer's names and addresses for the manufacturer's codes used in table 3.

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP INC P O BOX 3608 HARRISBURG PA 17105
22835	TRA-CON INC 55 NORTH ST MEDFORD MA 02155
71468	ITT CANNON ELECTRIC DIV OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORP 10550 TALBERT AVE P O BOX 8040 FOUNTAIN VALLEY CA 92708
77820	BENDIX CORP THE ELECTRICAL COMPONENTS DIV SHERMAN AVE SIDNEY NY 13838
81349	MILITARY SPECIFICATIONS
94375	AUTOMATIC CONNECTOR INC 400 MORELAND RD COMMACK NY 11725
96906	MILITARY STANDARD

Table 3. AC-8130A Connector Kit, Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	622-3510-001	1	KIT, CONNECTOR AC-8130A	1	A
	622-3510-002	1	KIT, CONNECTOR AC-8130A	1	B
	TRABONDBB2106T	2	ADHESIVE (22835) 005-2434-010	1	
	MILT23594TYP1-1-2	2	TAPE,INSULATION (81349) 014-0552-000	1	
	52929	2	TERMINAL,LUG (00779) 304-1531-030	24	
	MS3420-8	2	BUSHING,CABLE (96906) 357-8436-000	1	
	MS3420-10	2	BUSHING,CABLE (96906) 357-8437-000	1	
	MS3420-12	2	BUSHING,CABLE (96906) 357-8438-000	1	
	M39012-16-0101	2	CONNECTOR,PLUG ELEC (81349) 357-9292-000	3	A
	M39012-16-0101	2	CONNECTOR,PLUG ELEC (81349) 357-9292-000	6	B
	M39012-01-0005	2	CONNECTOR,PLUG ELEC (81349) 357-9326-000	2	
	101C1100A	2	CONNECTOR,PLUG ELEC (94375) 357-9693-000	1	A
	101C1100A	2	CONNECTOR,PLUG ELEC (94375) 357-9693-000	2	B
	D20419-18	2	SCREW LOCK ASSY (71468) 371-0040-020	6	A
	D20419-18	2	SCREW LOCK ASSY (71468) 371-0040-020	8	B
	D20420-13	2	SCREW LOCK ASSY (71468) 371-0040-050	2	B
	M24308-1-4	2	CONNECTOR,RCPT ELEC (81349) 371-0358-230	1	A
	M24308-1-4	2	CONNECTOR,RCPT ELEC (81349) 371-0358-230	2	B
	M24308-1-5	2	CONNECTOR,RCPT ELEC (81349) 371-0358-240	1	B
	M24308-3-3	2	CONNECTOR,RCPT ELEC (81349) 371-1284-220	2	A
	M24308-3-3	2	CONNECTOR,RCPT ELEC (81349) 371-1284-220	2	B
	PT06W20-39S	2	CONNECTOR,PLUG ELEC (77820) 371-8386-470	1	
	205839-3	2	CONNECTOR,PLUG ELEC (00779) 372-0514-020	2	
	206039-1	2	CONNECTOR,PLUG ELEC (00779) 372-0514-040	2	
	206070-1	2	CONNECTOR,CAB CLAMP ELEC (00779) 372-0514-050	4	
	66570-3	2	CONTACT,PIN ELEC (00779) 372-0514-060	54	
	66569-3	2	CONTACT,SOCKET ELEC (00779) 372-0514-070	54	
	206509-1	2	CONNECTOR,PLUG ELEC (00779) 372-0514-100	2	
	91067-2	2	INSRTN/EXTRCTN TOOL (00779) 372-0514-110	1	
	206150-1	2	CONNECTOR,PLUG ELEC (00779) 372-5932-080	1	
	206305-1	2	CONNECTOR,PLUG ELEC (00779) 372-5932-100	1	
	206138-1	2	CABLE CLAMP,CONN ELEC (00779) 372-5932-110	2	
	66181-1	2	CONNECTOR,CONTACT (00779) 372-5932-170	37	
	66180-1	2	CONTACT,PIN (00779) 372-5932-180	37	
	305183	2	TOOL,CONN (00779) 372-8055-000	1	
	520-8361-040	2	ENVELOPE,DRAWING	1	
	634-8565-002	2	SHELL ASSEMBLY	1	A
	634-8565-002	2	SHELL ASSEMBLY	2	B
	634-8566-002	2	SHELL ASSEMBLY	2	
	634-8576-002	2	SHELL ASSEMBLY	1	B

CA-8011
Cable Retractor
(622-3420-001)

Rockwell International

instructions

Collins Defense Communications

Printed in USA

523-0770906-002211
2nd Edition, 15 September 1982

1. DESCRIPTION

The CA-8011 Cable Retractor, part number 622-3420-001, (figure 1) provides automatic retraction of interconnecting cabling for slide-mounted HF-80 equipment.

2. PARTS LIST

The CA-8011 Cable Retractor must be ordered as a complete assembly, part number 622-3420-001.

CA-8011 Cable Retractor
Figure 1

NOTICE: This section replaces first edition dated 15 January 1981.

Rockwell International

CA-8011
Cable Retractor
(822-3420-001)

CA-8011 Cable Retractor
Figure 1

AC-8023 TR Relay Kit (622-3505-001)

Rockwell International

instructions

Collins Defense Communications Division

Printed in USA

523-0771679-001211
15 September 1982

1. DESCRIPTION

The AC-8023 TR Relay Kit (figure 1), Collins part number 622-3505-001, is designed for installation into the HF-8023 1-kW Solid-State Power Amplifier. When installed, it is designated A13. The tr relay permits transmit and receive capability with one antenna for the HF-80 1-kW solid-state transmitter/ transceiver systems.

2. SPECIFICATIONS

Power source .....+28 V dc @ 500 mA maximum

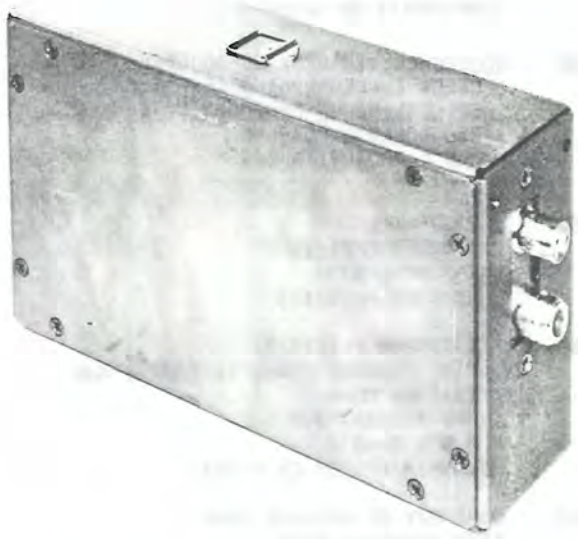
Tr time

Receive to transmit ...-6 milliseconds

Transmit to receive ...-5 milliseconds

3. INSTALLATION

a. Remove the dust cover from the HF-8023 power amplifier.
b. Refer to the HF-8023 instruction book parts list section for location of coax jumper module A13.
c. Disengage module holddown bracket and remove retaining screw on rear panel.
d. Unplug coax jumper module A13.
e. Plug the tr relay module in where the coax jumper module was located.
f. Engage module holddown bracket and install retaining screw on rear panel.
g. Reinstall the HF-8023 into the dust cover.



TPA-4679-017

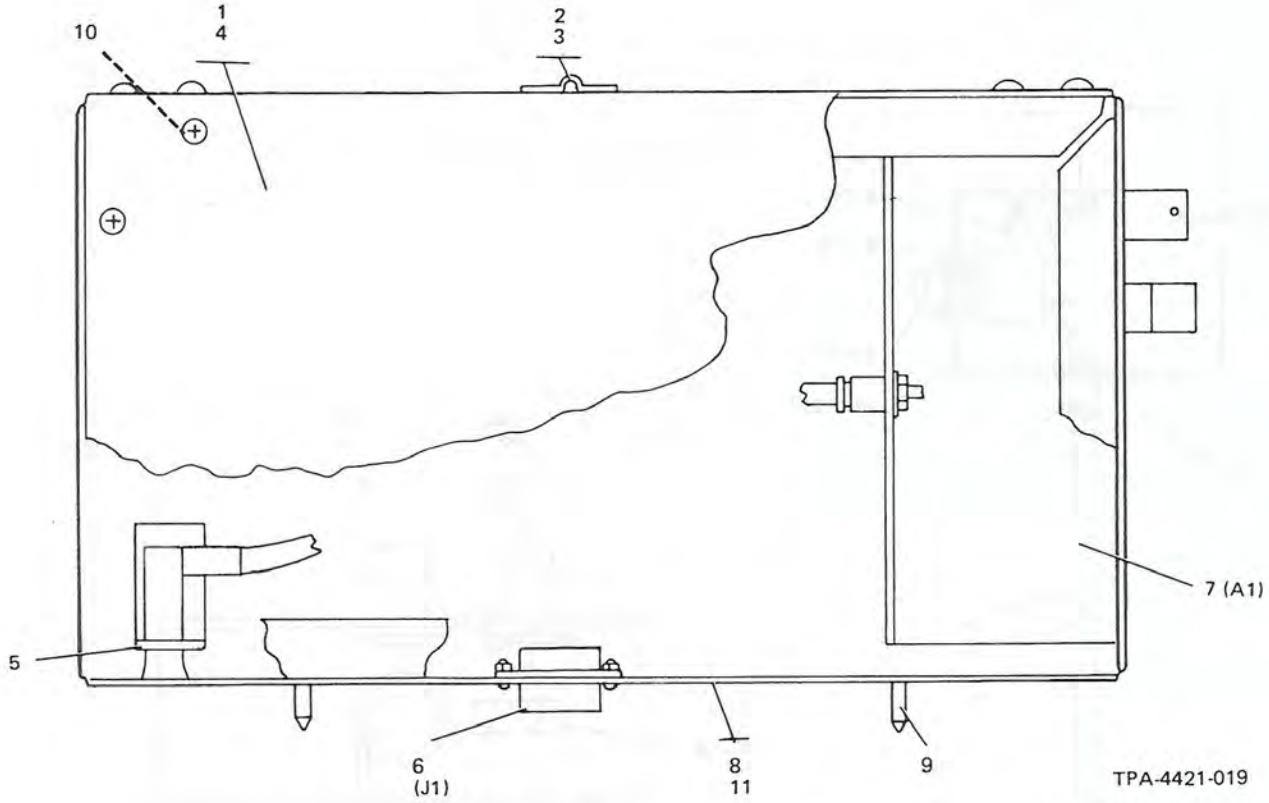
AC-8023 TR Relay Kit
Figure 1

h. Connect coax cable from receiver rf input to J8 (type C connector) and coax cable from antenna to J7 (type N connector).

4. PARTS LIST/DIAGRAMS

Figures 2 and 3 and tables 1 and 2 will assist in identification, requisition, and location of parts for maintenance of the equipment. Figure 4 is a schematic diagram of the tr relay module. Listed below are the manufacturer's names and addresses for the manufacturer's codes used in tables 1 and 2.

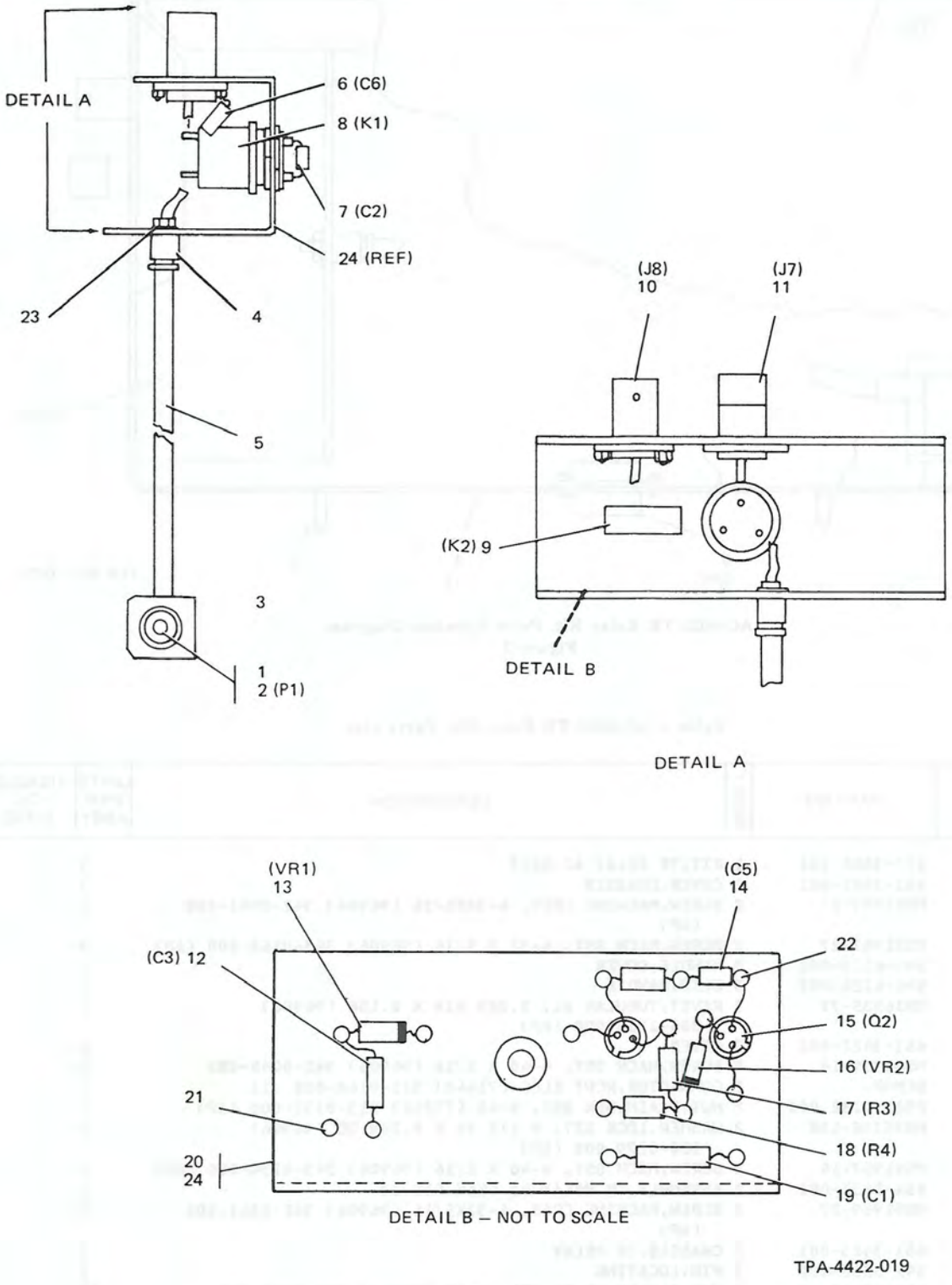
MFR CODE	MANUFACTURER'S NAME AND ADDRESS
01526	GENERAL ELECTRIC CO DATA COMMUNICATION PRODUCTS DEPT GENERAL ELECTRIC DR WAYNESBORO VA 22980
04099	CAPCO INC FORESIGHT INDUSTRIAL PARK P O BOX 2164 GRAND JUNCTION CO 81501
04713	MOTOROLA INC SEMICONDUCTOR GROUP 5005 E MCDOWELL RD PHOENIX AZ 85008
12615	U S TERMINALS INC 7504 CAMARGO ROAD CINCINNATI OH 45243
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS DIV 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
49956	RAYTHEON CO EXECUTIVE OFFICES 141 SPRING ST LEXINGTON MA 02173
71468	ITT CANNON ELECTRIC DIV OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORP 10550 TALBERT AVE P O BOX 8040 FOUNTAIN VALLEY CA 92708
72962	ESNA DIV OF AMERACE CORP 2330 VAUXHALL ROAD UNION NJ 07083
73905	ITT JENNINGS 970 MC LAUGHLIN AVE SAN JOSE CA 95116
74868	BUNKER RAMO CORP AMPHENOL NORTH AMERICA RF OPERATIONS 33 E FRANKLIN ST DANBURY CT 06810
77147	PATTON-MACGUYER CO DIV OF AVID CORP 17 VIRGINIA AVE PROVIDENCE RI 02905
77250	ALLIED PRODUCTS CORP PHEOLL MFG CO DIV 5700 W ROOSEVELT RD CHICAGO IL 60650
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIVISION ST CHARLES ROAD ELGIN IL 60120
81349	MILITARY SPECIFICATIONS
81483	INTERNATIONAL RECTIFIER 9220 SUNSET BLVD P O BOX 2321 TERMINAL ANNEX LOS ANGELES CA 90054
94375	AUTOMATIC CONNECTOR INC 400 MORELAND RD COMMACK NY 11725
95275	VITRAMON INC BOX 544 BRIDGEPORT CT 06601
96906	MILITARY STANDARD
98291	SEALECTRO CORP 225 HOYT MAMARONECK NY 10544



AC-8023 TR Relay Kit, Parts Location Diagram
Figure 2

Table 1. AC-8023 TR Relay Kit, Parts List.

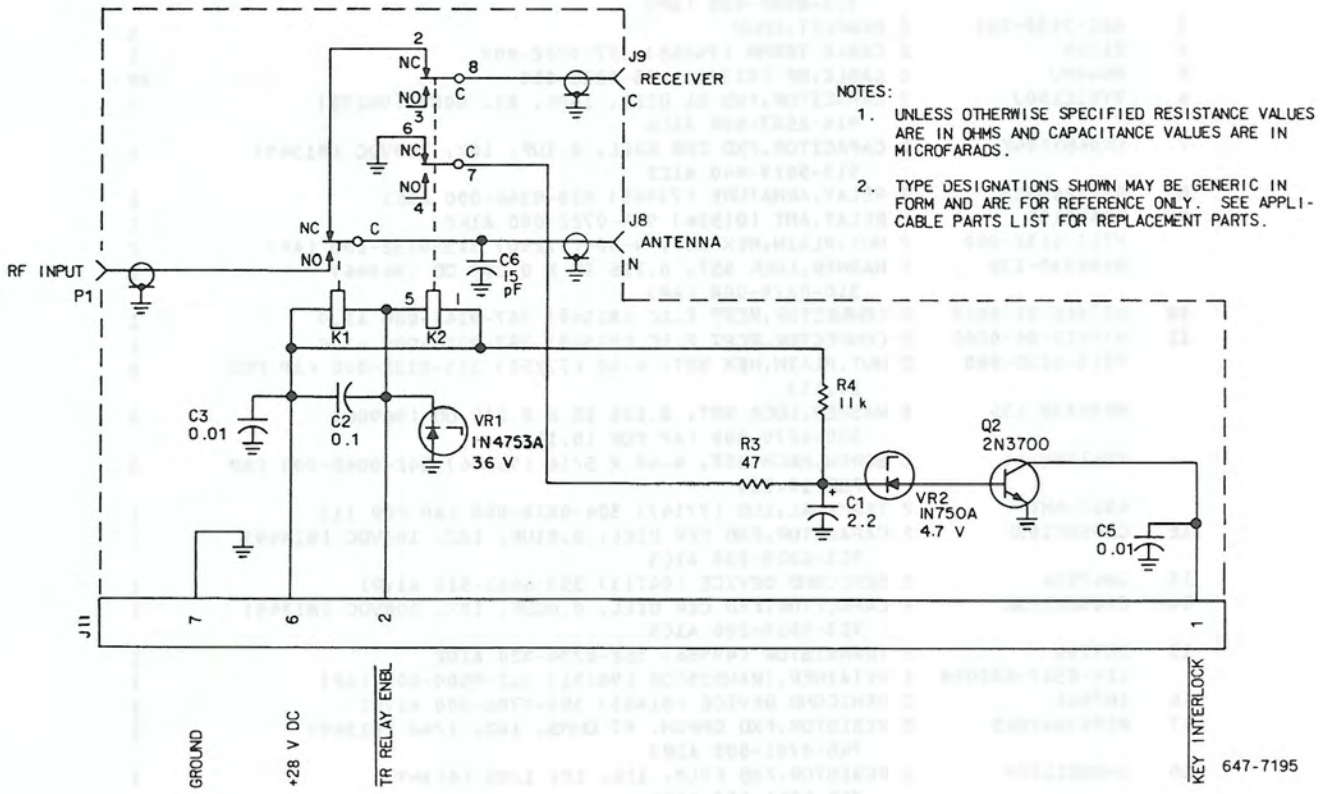
FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	622-3505-001	1	KIT,TR RELAY AC-8023	1	
1	651-3422-001	2	COVER,CHASSIS	1	
	MS51959-27	2	SCREW,MACHINE CRES, 6-32X5/16 (96906) 342-0061-000 (AP)	6	
	MS51957-27	2	SCREW,MACH SST, 6-32 X 5/16 (96906) 343-0168-000 (AP)	4	
2	546-6127-002	3	HANDLE,COVER	1	
3	546-6126-002	3	CLIP,HANDLE	1	
	MS16535-77	3	RIVET,TUBULAR AL, 0.089 DIA X 0.156 (96906) 305-1756-000 (AP)	2	
4	651-3422-002	3	COVER	1	
5	MS51959-14	2	SCREW,MACH SST, 4-40 X 5/16 (96906) 342-0045-000	2	
6	DEM9P	2	CONNECTOR,RCPT ELEC (71468) 371-0168-000 J11	1	
	P313-0132-000	2	NUT,PLAIN,HEX SST, 4-40 (77250) 313-0132-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
	MS51957-14	2	SCREW,MACH SST, 4-40 X 5/16 (96906) 343-0134-000 (AP)	2	
7	651-3431-001	2	ASSEMBLY,TR RELAY A1 (SEE FIG 3)	1	
	MS51959-27	2	SCREW,MACHINE CRES, 6-32X5/16 (96906) 342-0061-000 (AP)	2	
8	651-3423-001	2	CHASSIS,TR RELAY	1	
9	541-6560-002	3	PIN,LOCATING	2	
10	F12NCFMA2-62	3	NUT,SLFLKG CD PL STL, 6-32 (72962) 333-0842-000	11	
11	651-3423-002	3	CHASSIS	1	



TR Relay Assembly A1, Parts Location Diagram
Figure 3

Table 2. TR Relay Assembly A1, Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
3-	651-3431-001	1	ASSEMBLY,TR RELAY A1 (SEE FIG 2-7 FOR NHA)	REF	
1	2325	2	SHIELD,ELEC CON (74868) 357-9260-000	1	
2	9210-010	2	CONNECTOR,RCPT ELEC (94375) 357-9210-010 A1P1	1	
	1218-02	2	WASHER,LOCK CD PL STL, 0.322 ID X 0.435 OD (78189) 373-0080-000 (AP)	1	
3	651-3432-001	2	BRACKET,CONN	1	
4	21300	2	CABLE TERMN (74868) 357-9222-000	1	
5	RG400U	2	CABLE,RF (81349) 425-0218-010	AR	
6	VY81C150J	2	CAPACITOR,FXD GL DIEL, 15PF, 5%, 500V (95275) 914-2533-000 A1C6	1	
7	CK06BX104K	2	CAPACITOR,FXD CER DIEL, 0.1UF, 10%, 100VDC (81349) 913-5019-440 A1C2	1	
8	RJ1A26N323	2	RELAY,ARMATURE (73905) 410-0346-000 A1K1	1	
9	3SAF1131	2	RELAY,AMT (01526) 974-0722-000 A1K2	1	
	P313-0132-000	2	NUT,PLAIN,HEX SST, 4-40 (77250) 313-0132-000 (AP)	2	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP)	2	
10	M39012-12-0001	2	CONNECTOR,RCPT ELEC (81349) 357-9141-000 A1J9	1	
11	M39012-04-0002	2	CONNECTOR,RCPT ELEC (81349) 357-9003-000 A1J8	1	
	P313-0132-000	2	NUT,PLAIN,HEX SST, 4-40 (77250) 313-0132-000 (AP FOR 10,11)	8	
	MS35338-135	2	WASHER,LOCK SST, 0.115 ID X 0.209 OD (96906) 310-0279-000 (AP FOR 10,11)	8	
	MS51959-14	2	SCREW,MACH SST, 4-40 X 5/16 (96906) 342-0045-000 (AP FOR 10,11)	8	
	4007-4HT	2	TERMINAL,LUG (77147) 304-0015-000 (AP FOR 11)	1	
12	CK05BX103K	2	CAPACITOR,FXD CER DIEL, 0.01UF, 10%, 100VDC (81349) 913-5019-200 A1C3	1	
13	1N4753A	2	SEMICOND DEVICE (04713) 353-6481-510 A1VR1	1	
14	CK05BX103K	2	CAPACITOR,FXD CER DIEL, 0.01UF, 10%, 100VDC (81349) 913-5019-200 A1C5	1	
15	2N3700	2	TRANSISTOR (49956) 352-0734-020 A1Q2	1	
	119-0507-000009	2	RETAINER,TRANSISTOR (98291) 352-9509-000 (AP)	1	
16	1N750A	2	SEMICOND DEVICE (81483) 353-2708-000 A1VR2	1	
17	RCR07G470KS	2	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W (81349) 745-0701-000 A1R3	1	
18	RN55D1102F	2	RESISTOR,FXD FILM, 11K, 1%, 1/8W (81349) 705-1046-000 A1R4	1	
19	CRC1-250	2	CAPACITOR,FXD PLSTC DIEL, 2.2UF, 10%, 50V (04099) 933-1081-250 A1C1	1	
20	651-3428-001	2	BRACKET,RELAY-PRSD	1	
21	M5-540-3	3	TERMINAL,FEEDTH (12615) 306-2608-050	5	
22	SL158-198	3	TERMINAL,FEEDTH (12615) 306-1270-000	11	
23	M45938/5-6	3	NUT,SLFLKG,CLINCH CD PL STL, 6-32 (81349) 333-0842-000	2	
24	651-3428-002	3	BRACKET,RELAY	1	



TR Relay Module, Schematic Diagram
Figure 4

Cable Kit AC-8071A (622-3507-( ))

Rockwell International

instructions

Collins Defense Communications

Printed in USA

523-0771680-002211
2nd Edition, 15 September 1988

1. DESCRIPTION

Cable Kit AC-8071A, part number 622-3507-001, -002, -003, -004, and -006, consists of one power amplifier/power supply control cable and one power amplifier/power supply power cable. These cables connect 1-kW Power Amplifier HF-8023 to Power Supply HF-8031 or HF-8032. Cables supplied in each Cable Kit AC-8071A are listed in table 1.

The power amplifier/power supply control cable is a multiconductor cable with two 28-pin connectors, P1 and P2. Connector P1 mates with J3 on Power Supply HF-8031 or HF-8032 and P2 mates with J4 on Power Amplifier HF-8023.

The power amplifier/power supply power cable is a multiconductor cable with two 37-pin connectors, P1 and P2. Connector P1 mates with J2 on Power Supply HF-8031 or HF-8032 and P2 mates with J5 on Power Amplifier HF-8023.

NOTICE: This section replaces first edition dated 15 September 1982.

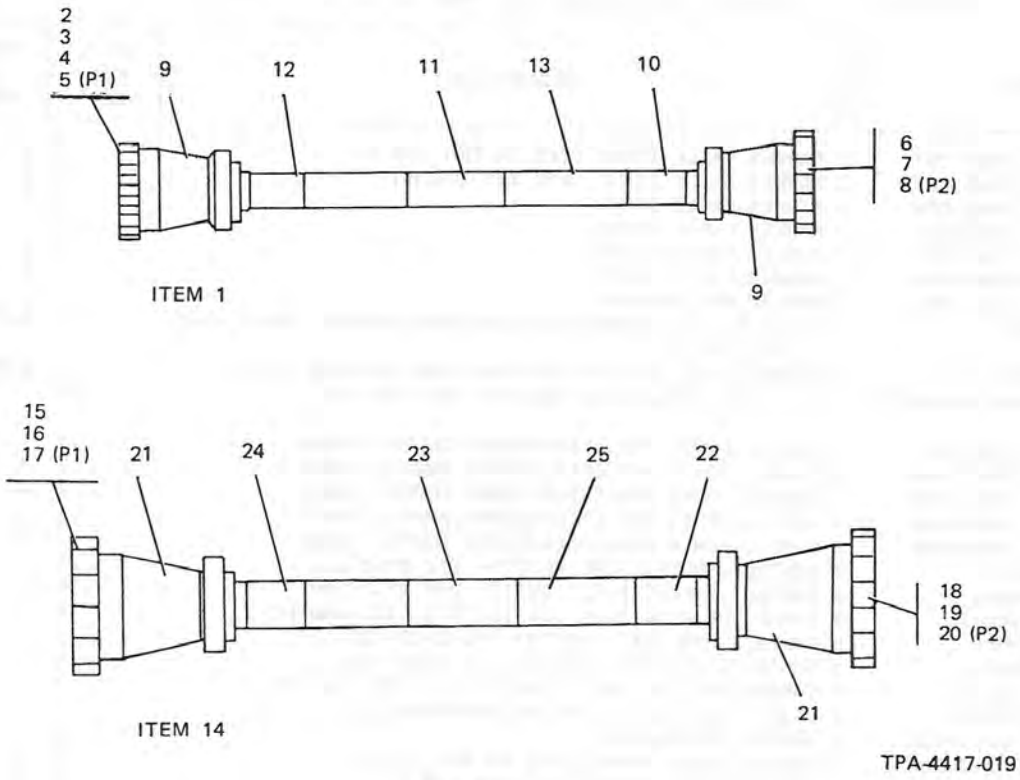
Table 1. Cables Supplied.

	CABLE KIT AC-8071A (622-3507-( ))					LENGTH
	-001	-002	-003	-004	-006	
Power amplifier/power supply power cable						
647-2545-001	X					1.52 m (5.0 ft)
-002		X				2.43 m (8.0 ft)
-003			X			3.04 m (10.0 ft)
-004				X		3.35 m (11.0 ft)
-006					X	6.40 m (21.0 ft)
Power amplifier/power Supply control cable						
622-3507-001	X					1.52 m (5.0 ft)
-002		X				2.43 m (8.0 ft)
-003			X			3.04 m (10.0 ft)
-004				X		3.35 m (11.0 ft)
-006					X	6.40 m (21.0 ft)

2. PARTS LIST/DIAGRAMS

Figure 1 and table 2 will assist in identification, requisition, and location of parts for maintenance of the equipment. Figures 2 and 3 are the cable schematic diagrams. Listed below are the manufacturer's names and addresses for the manufacturer's codes used in table 2.

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP INC EISENHOWER BLVD P O BOX 3608 HARRISBURG PA 17105
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
59730	THOMAS AND BETTS CORP HWY 218 S IOWA CITY IA 52240
81349	MILITARY SPECIFICATIONS
95105	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498



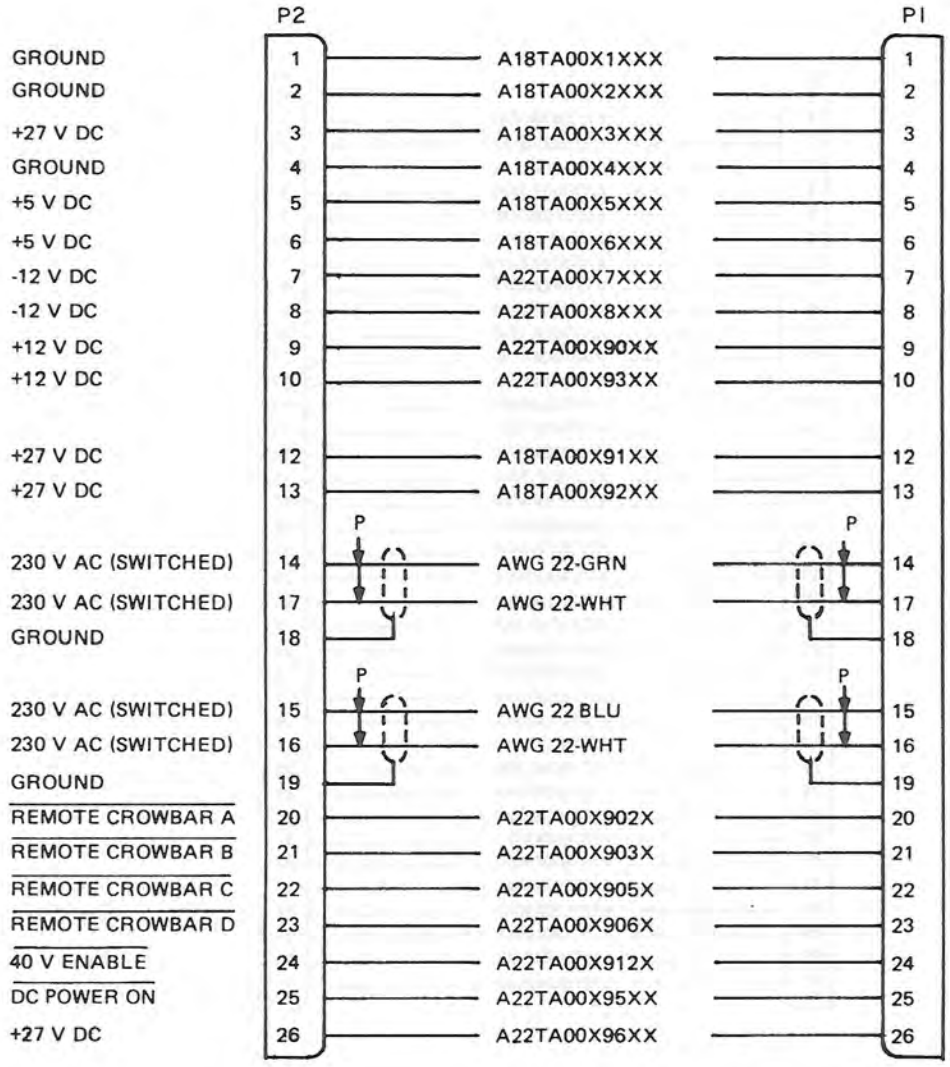
Cable Kit AC-8071A, Parts Location Diagram
Figure 1

Table 2. Cable Kit AC-8071A, Parts List.

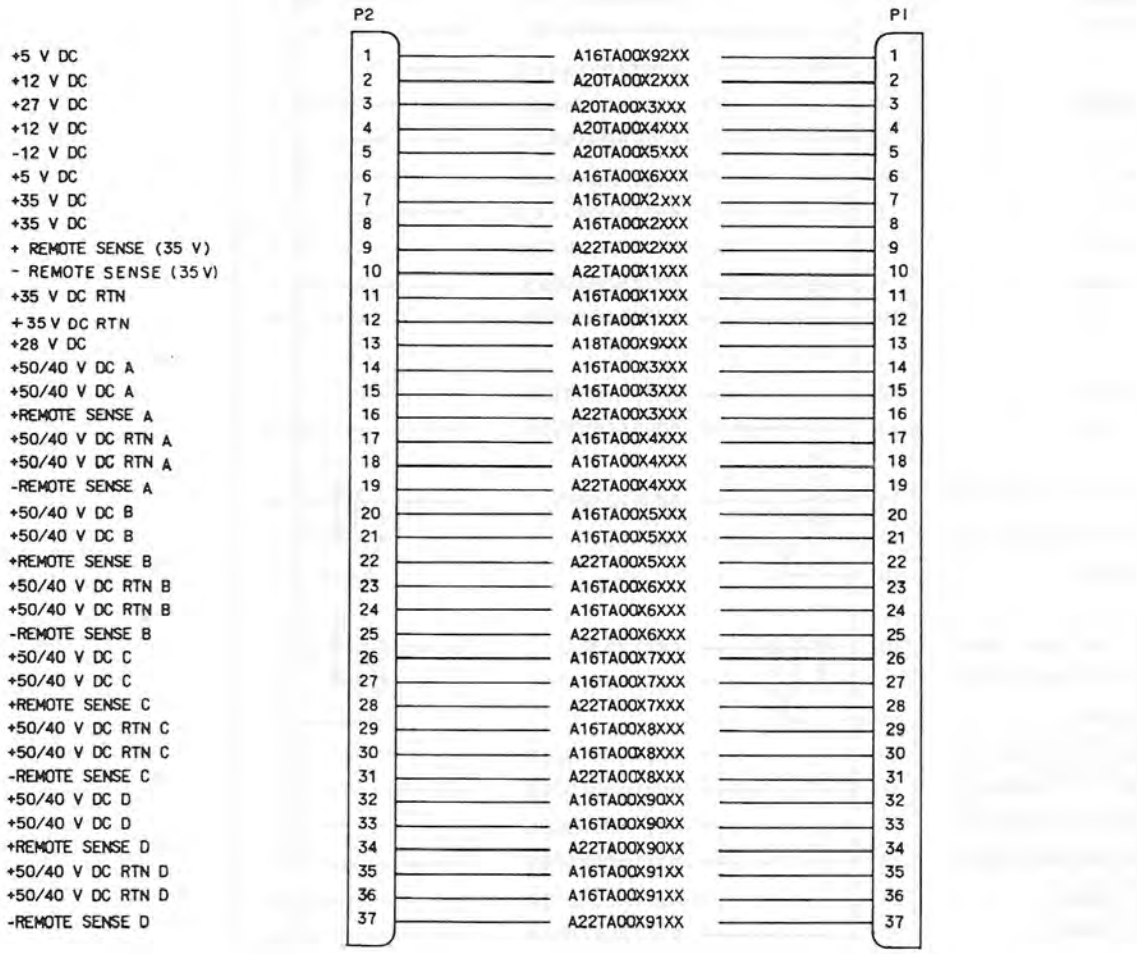
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	622-3507-001	1	KIT, CABLE AC-8071A	1	A
	622-3507-002	1	KIT, CABLE AC-8071A	1	B
	622-3507-003	1	KIT, CABLE AC-8071A	1	C
	622-3507-004	1	KIT, CABLE AC-8071A	1	D
	622-3507-006	1	KIT, CABLE AC-8071A	1	E
1	647-2546-001	2	CABLE, POWER AMPLIFIER/POWER SUPPLY CONTROL	1	A
1	647-2546-002	2	CABLE, POWER AMPLIFIER/POWER SUPPLY CONTROL	1	B
1	647-2546-003	2	CABLE, POWER AMPLIFIER/POWER SUPPLY CONTROL	1	C
1	647-2546-004	2	CABLE, POWER AMPLIFIER/POWER SUPPLY CONTROL	1	D
1	647-2546-006	2	CABLE, POWER AMPLIFIER/POWER SUPPLY CONTROL	1	E
2	66569-3	3	CONTACT,SOCKET ELEC (00779) 372-0514-070	8	
3	66504-9	3	CONTACT,SOCKET ELEC (00779) 372-0514-090	17	
4	206509-1	3	CONNECTOR,PLUG ELEC (00779) 372-0514-100	1	
5	205839-3	3	CONNECTOR,PLUG ELEC (00779) 372-0514-020 P1	1	
6	66570-3	3	CONTACT,PIN ELEC (00779) 372-0514-060 (EFF TO REV LTR B)	8	A
6	66570-3	3	CONTACT,PIN ELEC (00779) 372-0514-060 (EFF REV LTR B)	9	A
6	66570-3	3	CONTACT,PIN ELEC (00779) 372-0514-060	9	B,C,D,E
7	66506-9	3	CONTACT,PIN ELEC (00779) 372-0514-080	17	
8	206039-1	3	CONNECTOR,PLUG ELEC (00779) 372-0514-040 P2	1	
9	206070-1	3	CONNECTOR,CAB CLAMP ELEC (00779) 372-0514-050	2	
10	647-7363-006	3	MARKER,DESIGNATOR	1	

Table 2. Cable Kit AC-8071A, Parts List (Cont).

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11	647-7363-007	3	MARKER,CABLE IDENT (EFF TO REV LTR B)	1	A
11	647-7363-007	3	MARKER,CABLE IDENT (EFF REV LTR B)	2	A
11	647-7363-010	3	MARKER,CABLE IDENT	2	B
11	647-7363-013	3	MARKER,CABLE IDENT	2	C
11	647-7363-017	3	MARKER,CABLE IDENT	2	D
11	647-7363-015	3	MARKER,CABLE IDENT	2	E
12	647-7363-008	3	MARKER,DESIGNATOR	1	
	TY25M	3	CLAMP,CABLE (59730) 435-1062-000 (AP FOR 10-12)(EFF REV LTR G)	12	A,B,C
	TY25M	3	CLAMP,CABLE (59730) 435-1062-000 (AP FOR 10-12)	12	D,E
13	CL130TYBCATB7/16 BK	3	SLEEVING,INSULATION (81349) 152-1391-000	AR	
14	647-2545-001	2	CABLE, POWER AMPLIFIER/POWER SUPPLY POWER	1	A
14	647-2545-002	2	CABLE, POWER AMPLIFIER/POWER SUPPLY POWER	1	B
14	647-2545-003	2	CABLE, POWER AMPLIFIER/POWER SUPPLY POWER	1	C
14	647-2545-004	2	CABLE, POWER AMPLIFIER/POWER SUPPLY POWER	1	D
14	647-2545-006	2	CABLE, POWER AMPLIFIER/POWER SUPPLY POWER	1	E
15	66101-4	3	CONTACT,SOCKET ELEC (00779) 372-5932-130	23	
16	66105-4	3	CONTACT,SOCKET ELEC (00779) 372-5932-150	14	
17	206150-1	3	CONNECTOR,PLUG ELEC (00779) 372-5932-080 P1	1	
18	66099-4	3	CONTACT,PIN ELEC (00779) 372-5932-120	23	
19	66103-4	3	CONTACT,PIN ELEC (00779) 372-5932-140	14	
20	206305-1	3	CONNECTOR,PLUG ELEC (00779) 372-5932-100 P2	1	
21	206138-1	3	CLAMP,CABLE ELEC (00779) 372-5932-110	2	
22	647-7363-003	3	MARKER,DESIGNATOR	1	
23	647-7363-004	3	MARKER,CABLE IDENT (EFF TO REV LTR C)	1	A
23	647-7363-004	3	MARKER,CABLE IDENT (EFF REV LTR C)	2	A
23	647-7363-009	3	MARKER,CABLE IDENT	2	B
23	647-7363-012	3	MARKER,CABLE IDENT	2	C
23	647-7363-016	3	MARKER,CABLE IDENT	2	D
23	647-7363-014	3	MARKER,CABLE IDENT	2	E
24	647-7363-005	3	MARKER,DESIGNATOR	1	
	TY25M	3	CLAMP,CABLE (59730) 435-1062-000 (AP FOR 22-24)(EFF REV LTR H)	12	A,B,C
	TY25M	3	CLAMP,CABLE (59730) 435-1062-000 (AP FOR 22-24)	12	D,E
25	CL130TYBCATB5/8B K	3	SLEEVING,INSULATION (81349) 152-1395-000	AR	



Power Amplifier/Power Supply Control Cable, Schematic Diagram
Figure 2



TPA-3965-013

Power Amplifier/Power Supply Power Cable, Schematic Diagram
Figure 3

Cable Kit AC-8072A (622-3508-( ))

Rockwell International

instructions

Collins Defense Communications

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1. DESCRIPTION

Cable Kit AC-8072A, part number 622-3508-001, -003, -005, -008, -015, -030, consists of one control cable, one receive rf cable, and one exciter rf cable. Table 1 lists cables supplied.

The control cable is a multiconductor cable with nine pairs of shielded wire and two connectors, P1 and P2. Connector P1 mates with J15 on the exciter or receiver-exciter. Connector P2 mates with J2 on the power amplifier.

The receive rf cable is an RG-58 C/U coaxial cable with a BNC connector (P1) on one end and a type C connector (P2) on the other end. The cable connects the power amplifier to the receiver or receiver-exciter. Connector P1 mates with receiver J21 (2-channel receiver), or receiver J22 (4-channel receiver). Connector P2 mates with power amplifier J9.

The exciter rf cable is an RG-58 C/U coaxial cable with two BNC connectors, P1 and P2. In installations which include Preselector HF-8060, the cable connects the power amplifier to the preselector. In installations without a preselector, the cable connects the power amplifier to the exciter or receiver-exciter. Connector P1 mates with preselector J4 or exciter J22. Connector P2 mates with power amplifier J1.

NOTICE: This section replaces first edition dated 15 September 1982.

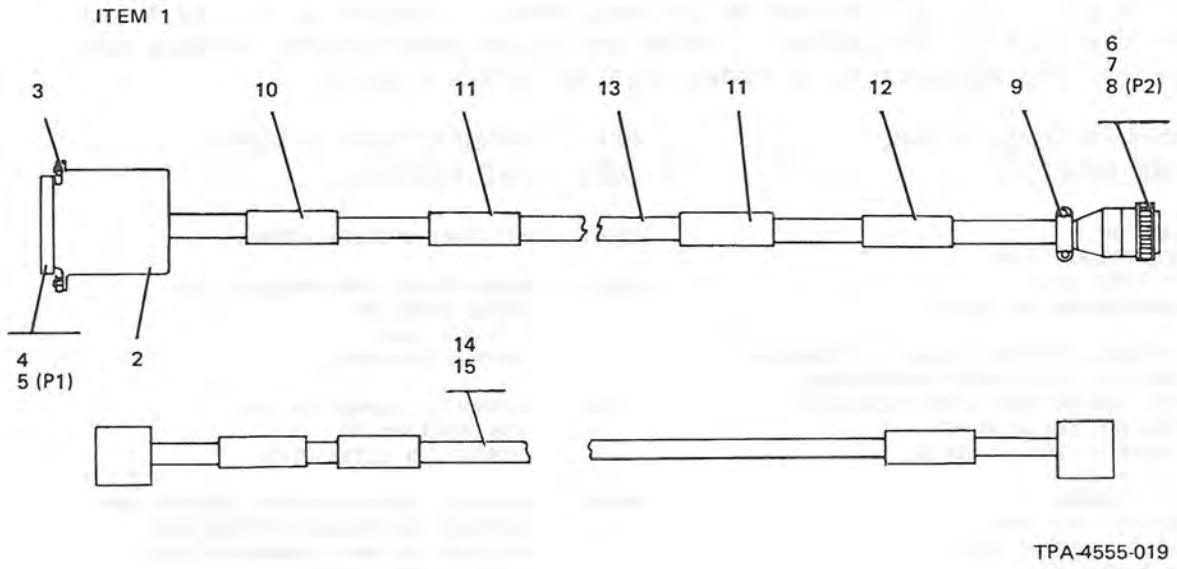
Table 1. Cables Supplied.

	CABLE KIT AC-8072A (622-3508-( ))						LENGTH
	-001	-003	-005	-008	-015	-030	
Control cable							
647-2555-001	X						2.21 m (7.3 ft)
-003		X					3.05 m (10.0 ft)
-005			X				4.87 m (16.0 ft)
-008				X			7.61 m (25.0 ft)
-015					X		15.23 m (50.0 ft)
-030						X	30.46 m (100.0 ft)
Receive rf cable							
647-2821-001	X						2.21 m (7.3 ft)
-003		X					3.05 m (10.0 ft)
-005			X				4.87 m (16.0 ft)
-008				X			7.61 m (25.0 ft)
-015					X		15.23 m (50.0 ft)
-030						X	30.46 m (100.0 ft)
Exciter rf cable							
647-2820-001	X						2.36 m (7.8 ft)
-003		X					3.22 m (10.5 ft)
-005			X				5.03 m (16.5 ft)
-008				X			7.77 m (25.5 ft)
-015					X		15.38 m (50.5 ft)
-030						X	30.61 m (100.5 ft)

2. PARTS LIST/DIAGRAMS

Figures 1 and 2 and tables 2 and 3 will assist in identification, requisition, and location of parts for maintenance of the equipment. Figures 3, 4, and 5 are schematic diagrams of the cables. Listed below are manufacturer's names and addresses for the manufacturer's codes used in tables 2 and 3.

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP INC EISENHOWER BLVD P O BOX 3608 HARRISBURG PA 17105
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
71468	ITT CANNON DIV OF ITT CORP 10550 TALBERT AVE P O BOX 8040 FOUNTAIN VALLEY CA 92708
81349	MILITARY SPECIFICATIONS
92914	BERKLEY MACHINE PRODUCTS INC 31520 PAMCO DR P O BOX 4045 LIVONIA MI 48151
94375	AUTOMATIC CONNECTOR INC 400 MORELAND RD COMMACK NY 11725-5707
95105	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498



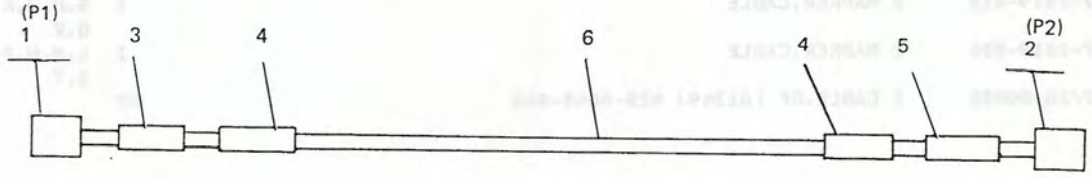
Cable Kit AC-8072A, Parts Location Diagram
Figure 1

Table 2. Cable Kit AC-8072A, Parts List.

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	622-3508-001	1	KIT, CABLE AC-8072A	1	A
	622-3508-008	1	KIT, CABLE AC-8072A	1	B
	622-3508-015	1	KIT, CABLE AC-8072A	1	C
	622-3508-030	1	KIT, CABLE AC-8072A	1	D
	622-3508-003	1	KIT, CABLE AC-8072A	1	E
	622-3508-005	1	KIT, CABLE AC-8072A	1	F
1	647-2555-001	2	CABLE, CONTROL	1	A
1	647-2555-008	2	CABLE, CONTROL	1	B
1	647-2555-015	2	CABLE, CONTROL	1	C
1	647-2555-030	2	CABLE, CONTROL	1	D
1	647-2555-003	2	CABLE, CONTROL	1	E
1	647-2555-005	2	CABLE, CONTROL	1	F
2	634-8565-002	3	SHELL ASSEMBLY	1	
3	D20419-121	3	SCREW LOCK ASSEMBLY (71468) 371-0040-020	2	
4	030-1953-000-A176	3	CONTACT,ELECTRICAL (71468) 371-0946-040	37	
5	DCU-37S-F0	3	CONNECTOR,RCPT ELEC (71468) 371-0922-040 P1	1	
6	66504-9	3	CONTACT,SOCKET ELEC (00779) 372-0514-090	27	
7	206509-1	3	CONNECTOR,PLUG ELEC (00779) 372-0514-100	1	
8	205839-3	3	CONNECTOR,PLUG ELEC (00779) 372-0514-020 P2	1	
9	206070-1	3	CONNECTOR,CAB CLAMP ELEC (00779) 372-0514-050	1	
10	647-3341-001	3	MARKER, CABLE	1	

Table 2. AC-8072A Cable Kit, Parts List (Cont).

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
11	647-3341-003	3	MARKER, CABLE	2	A
11	647-3341-004	3	MARKER, CABLE	2	B
11	647-3341-005	3	MARKER, CABLE	2	C
11	647-3341-006	3	MARKER, CABLE	2	D
11	647-3341-013	3	MARKER, CABLE	2	E
11	647-3341-014	3	MARKER, CABLE	2	F
12	647-3341-002	3	MARKER, CABLE	1	
13	6014	3	CABLE,SHIELDED (92914) 424-0866-020	AR	
14	647-2821-001	2	CABLE, RECEIVE RF (SEE FIG 2)	1	A
14	647-2821-008	2	CABLE, RECEIVE RF (SEE FIG 2)	1	B
14	647-2821-015	2	CABLE, RECEIVE RF (SEE FIG 2)	1	C
14	647-2821-030	2	CABLE, RECEIVE RF (SEE FIG 2)	1	D
14	647-2821-003	2	CABLE, RECEIVE RF (SEE FIG 2)	1	E
14	647-2821-005	2	CABLE, RECEIVE RF (SEE FIG 2)	1	F
15	647-2820-001	2	CABLE, EXCITER RF (SEE FIG 2)	1	A
15	647-2820-008	2	CABLE, EXCITER RF (SEE FIG 2)	1	B
15	647-2820-015	2	CABLE, EXCITER RF (SEE FIG 2)	1	C
15	647-2820-030	2	CABLE, EXCITER RF (SEE FIG 2)	1	D
15	647-2820-003	2	CABLE, EXCITER RF (SEE FIG 2)	1	E
15	647-2820-005	2	CABLE, EXCITER RF (SEE FIG 2)	1	F

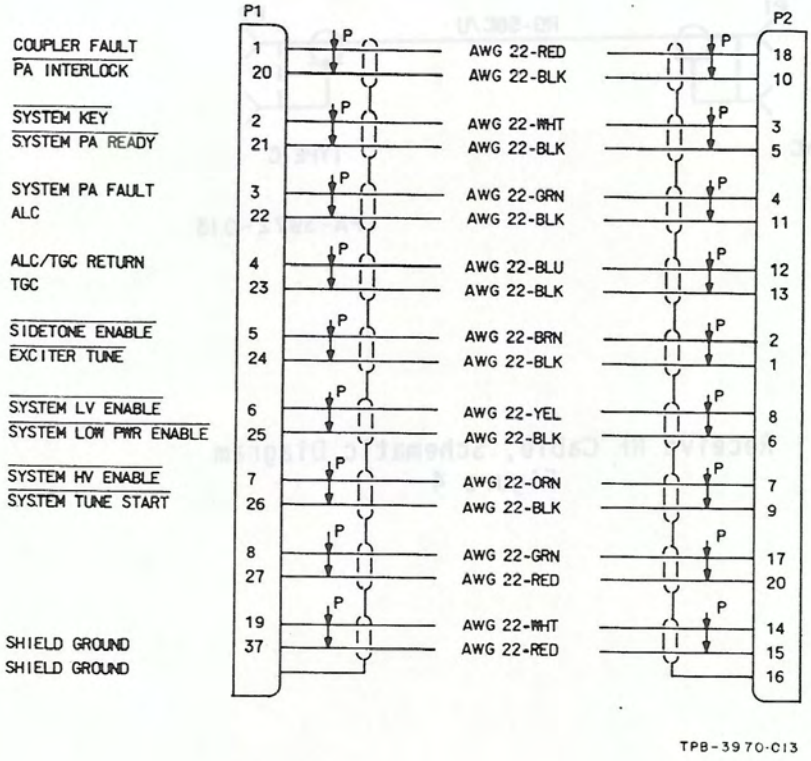


TPA-4418-019

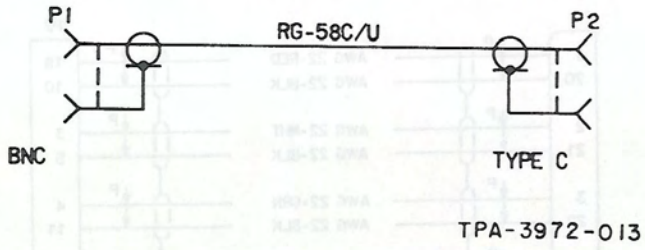
Receive/Exciter RF Cable, Parts Location Diagram
Figure 2

Table 3. Receive/Exciter RF Cable, Parts List.

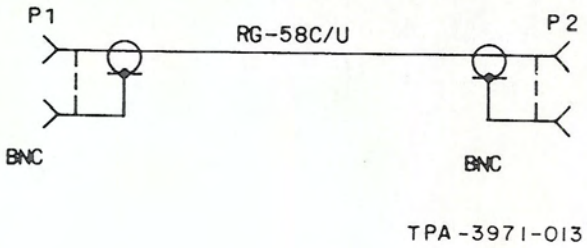
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	647-2821-001	1	CABLE, RECEIVE RF (SEE FIG 1-14 FOR NHA)	REF	G
	647-2821-008	1	CABLE, RECEIVE RF (SEE FIG 1-14 FOR NHA)	REF	H
	647-2821-015	1	CABLE, RECEIVE RF (SEE FIG 1-14 FOR NHA)	REF	J
	647-2821-030	1	CABLE, RECEIVE RF (SEE FIG 1-14 FOR NHA)	REF	K
	647-2820-001	1	CABLE, EXCITER RF (SEE FIG 1-15 FOR NHA)	REF	L
	647-2820-008	1	CABLE, EXCITER RF (SEE FIG 1-15 FOR NHA)	REF	M
	647-2820-015	1	CABLE, EXCITER RF (SEE FIG 1-15 FOR NHA)	REF	N
	647-2820-030	1	CABLE, EXCITER RF (SEE FIG 1-15 FOR NHA)	REF	P
	647-2821-003	1	CABLE, RECEIVE RF (SEE FIG 1-14 FOR NHA)	REF	Q
	647-2821-005	1	CABLE, RECEIVE RF (SEE FIG 1-14 FOR NHA)	REF	R
	647-2820-003	1	CABLE, EXCITER RF (SEE FIG 1-15 FOR NHA)	REF	S
	647-2820-005	1	CABLE, EXCITER RF (SEE FIG 1-15 FOR NHA)	REF	T
1	M39012/16-0101	2	CONNECTOR,PLUG ELEC (81349) 357-9292-000 P1	1	
2	101C1100A	2	CONNECTOR,PLUG ELEC (94375) 357-9693-000 P2	1	G,H,J,K Q,R
2	M39012/16-0101	2	CONNECTOR,PLUG ELEC (81349) 357-9292-000 P2	1	L,M,N,P S,T
3	647-2819-007	2	MARKER,CABLE	1	G,H,J,K Q,R
3	647-2819-001	2	MARKER,CABLE	1	L,M,N,P S,T
4	647-2819-008	2	MARKER,CABLE (EFF TO REV LTR A)	1	G
4	647-2819-008	2	MARKER,CABLE (EFF REV LTR A)	2	G
4	647-2819-009	2	MARKER,CABLE (EFF TO REV LTR A)	1	H
4	647-2819-009	2	MARKER,CABLE (EFF REV LTR A)	2	H
4	647-2819-010	2	MARKER,CABLE (EFF TO REV LTR A)	1	J
4	647-2819-010	2	MARKER,CABLE (EFF REV LTR A)	2	J
4	647-2819-011	2	MARKER,CABLE (EFF TO REV LTR A)	1	K
4	647-2819-011	2	MARKER,CABLE (EFF REV LTR A)	2	K
4	647-2819-002	2	MARKER,CABLE (EFF TO REV LTR A)	1	L
4	647-2819-002	2	MARKER,CABLE (EFF REV LTR A)	2	L
4	647-2819-003	2	MARKER,CABLE (EFF TO REV LTR A)	1	M
4	647-2819-003	2	MARKER,CABLE (EFF REV LTR A)	2	M
4	647-2819-004	2	MARKER,CABLE (EFF TO REV LTR A)	1	N
4	647-2819-004	2	MARKER,CABLE (EFF REV LTR A)	2	N
4	647-2819-005	2	MARKER,CABLE (EFF TO REV LTR A)	1	P
4	647-2819-005	2	MARKER,CABLE (EFF REV LTR A)	2	P
4	647-2819-015	2	MARKER,CABLE	2	Q
4	647-2819-016	2	MARKER,CABLE	2	R
4	647-2819-013	2	MARKER,CABLE	2	S
4	647-2819-014	2	MARKER,CABLE	2	T
5	647-2819-012	2	MARKER,CABLE	1	G,H,J,K Q,R
5	647-2819-006	2	MARKER,CABLE	1	L,M,N,P S,T
6	M17/28-RG058	2	CABLE,RF (81349) 425-0042-000	AR	



Control Cable, Schematic Diagram
Figure 3



Receive RF Cable, Schematic Diagram
Figure 4



Exciter RF Cable, Schematic Diagram
Figure 5

Cable Kit AC-8073A (622-3509-( ))

Rockwell International

instructions

Collins Defense Communications

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2nd Edition, 15 September 1988

1. DESCRIPTION

Cable Kit AC-8073A, part number 622-3509-001, -006, -015, -030, -060, and -090, consists of a control cable and an rf cable. Refer to table 1 for cable applicability information. These cables connect 1-kW Power Amplifier HF-8023 to Antenna Coupler HF-8040.

The power control cable is a multiconductor cable with seven pairs of wires, an overall shield, and two connectors, P1 and P2. Connector P1 mates with J3 on Power Amplifier HF-8023 and P2 mates with J1 on Antenna Coupler HF-8040.

The rf cable is an RG-213 coaxial cable with two type N connectors. Connector P1 mates with J8 on Power Amplifier HF-8023 and P2 mates with J2 on Antenna Coupler HF-8040.

NOTICE: This section replaces first edition dated 15 September 1982.

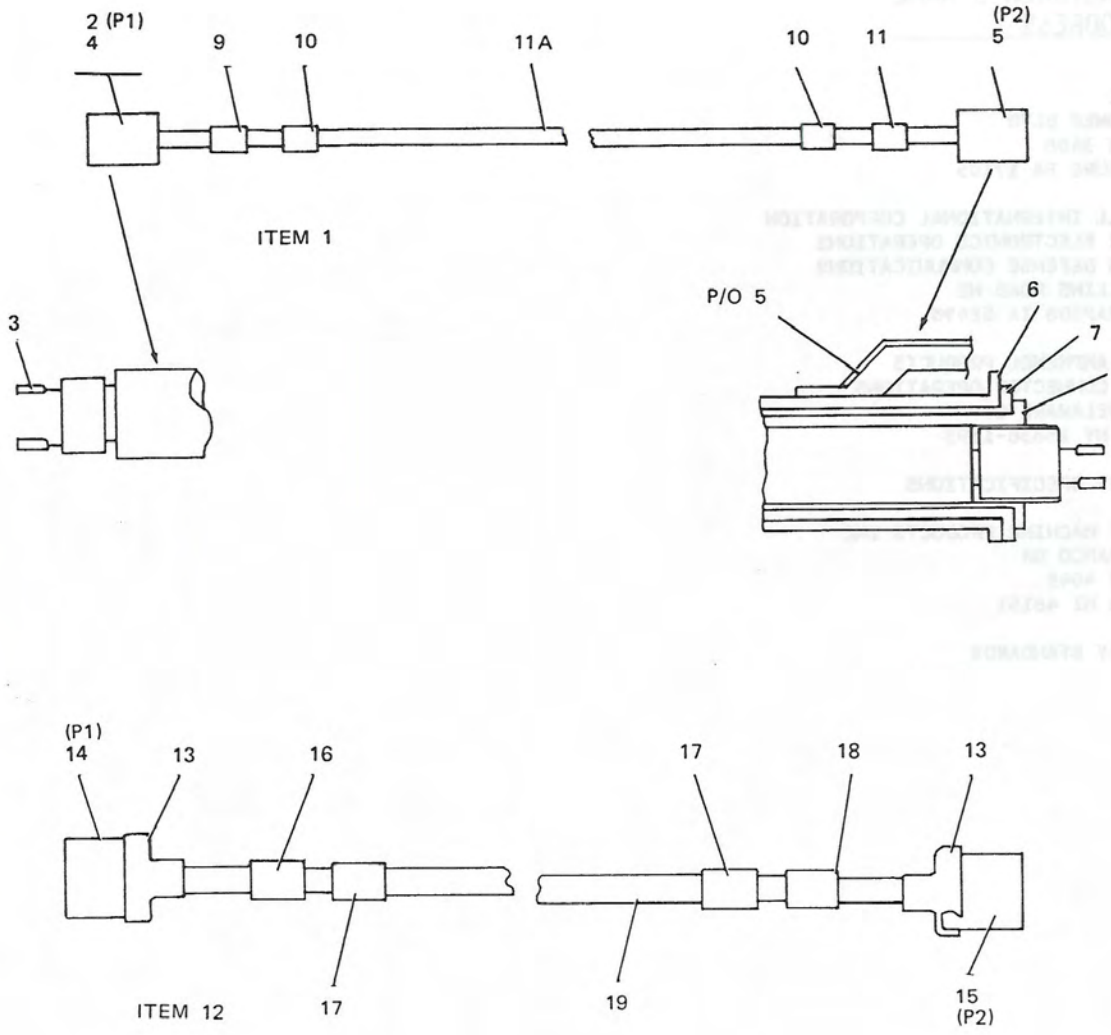
Table 1. Cables Supplied.

	CABLE KIT AC-8073A (622-3509-( ))						LENGTH
	-001	-006	-015	-030	-060	-090	
Control cable							
647-2553-001	X						7.62 m (25.0 ft)
-006		X					6.10 m (20.0 ft)
-015			X				15.24 m (50.0 ft)
-030				X			30.49 m (100.0 ft)
-060					X		60.98 m (200.0 ft)
-090						X	91.46 m (300.0 ft)
Rf cable							
647-2554-001	X						7.62 m (25.0 ft)
-006		X					6.10 m (20.0 ft)
-015			X				15.24 m (50.0 ft)
-030				X			30.49 m (100.0 ft)
-060					X		60.98 m (200.0 ft)
-090						X	91.46 m (300.0 ft)

2. PARTS LIST/DIAGRAMS

Figure 1 and table 2 assist in identification, requisition, and location of parts for maintenance of the equipment. Figures 2 and 3 are the cable schematic diagrams. Listed below are manufacturer's names and addresses for the manufacturer's codes used in table 2.

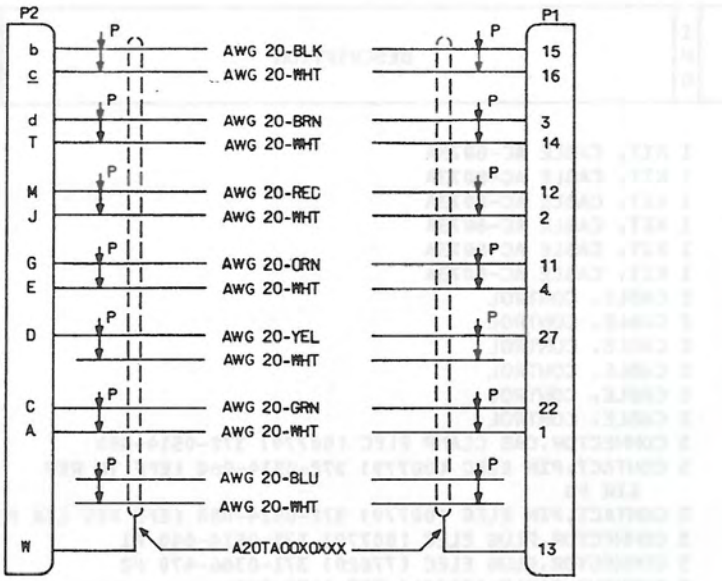
MFR CODE	MANUFACTURER'S NAME AND ADDRESS
00779	AMP INC EISENHOWER BLVD P O BOX 3608 HARRISBURG PA 17105
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
77820	ALLIED AMPHENOL PRODUCTS BENDIX CONNECTOR OPERATIONS 40-60 DELAWARE ST SIDNEY NY 13838-1395
81349	MILITARY SPECIFICATIONS
92914	BERKLEY MACHINE PRODUCTS INC 31520 PAMCO DR P O BOX 4045 LIVONIA MI 48151
96906	MILITARY STANDARDS



Cable Kit AC-8073A, Parts Location Diagram
Figure 1

Table 2. Cable Kit AC-8073A, Parts List.

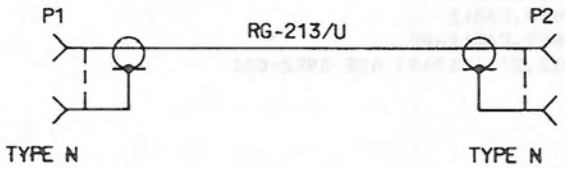
FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	622-3509-001	1	KIT, CABLE AC-8073A	1	A
	622-3509-015	1	KIT, CABLE AC-8073A	1	B
	622-3509-030	1	KIT, CABLE AC-8073A	1	C
	622-3509-060	1	KIT, CABLE AC-8073A	1	D
	622-3509-006	1	KIT, CABLE AC-8073A	1	E
	622-3509-090	1	KIT, CABLE AC-8073A	1	F
1	647-2553-001	2	CABLE, CONTROL	1	A
1	647-2553-015	2	CABLE, CONTROL	1	B
1	647-2553-030	2	CABLE, CONTROL	1	C
1	647-2553-060	2	CABLE, CONTROL	1	D
1	647-2553-006	2	CABLE, CONTROL	1	E
1	647-2553-090	2	CABLE, CONTROL	1	F
2	206070-1	3	CONNECTOR,CAB CLAMP ELEC (00779) 372-0514-050	1	
3	66570-3	3	CONTACT,PIN ELEC (00779) 372-0514-060 (EFF TO REV LTR F)	27	
3	66506-9	3	CONTACT,PIN ELEC (00779) 372-0514-080 (EFF REV LTR F)	27	
4	206039-1	3	CONNECTOR,PLUG ELEC (00779) 372-0514-040 P1	1	
5	PT06W20-39S	3	CONNECTOR,PLUG ELEC (77820) 371-8386-470 P2	1	
6	MS3420-12	3	BUSHING,CABLE (96906) 357-8438-000	1	
7	MS3420-10	3	BUSHING,CABLE (96906) 357-8437-000	1	
8	MS3420-8	3	BUSHING,CABLE (96906) 357-8436-000	1	
9	647-2881-048	3	MARKER,CABLE-P1	1	
10	647-2881-058	3	MARKER,CABLE	2	A
10	647-2881-059	3	MARKER,CABLE	2	B
10	647-2881-061	3	MARKER,CABLE	2	C
10	647-2881-062	3	MARKER,CABLE	2	D
10	647-2881-070	3	MARKER,CABLE	2	E
10	647-2881-063	3	MARKER,CABLE	2	F
11	647-2881-050	3	MARKER,CABLE-P2	1	
11A	5351	3	CABLE,SHLD,PR (92914) 424-0865-010	AR	
12	647-2554-001	2	CABLE, RF	1	A
12	647-2554-015	2	CABLE, RF	1	B
12	647-2554-030	2	CABLE, RF	1	C
12	647-2554-060	2	CABLE, RF	1	D
12	647-2554-006	2	CABLE, RF	1	E
12	647-2554-090	2	CABLE, RF	1	F
13	M23053/5-109-9	3	SLEEVING,INSULATION (81349) 152-0018-070	AR	
14	M39012/01-0005	3	CONNECTOR,PLUG ELEC (81349) 357-9326-000 P1	1	
15	M39012/01-0005	3	CONNECTOR,PLUG ELEC (81349) 357-9326-000 P2	1	
16	647-2881-031	3	MARKER,CABLE-P1	1	
17	647-2881-041	3	MARKER,CABLE	2	A
17	647-2881-042	3	MARKER,CABLE	2	B
17	647-2881-044	3	MARKER,CABLE	2	C
17	647-2881-045	3	MARKER,CABLE	2	D
17	647-2881-071	3	MARKER,CABLE	2	E
17	647-2881-046	3	MARKER,CABLE	2	F
18	647-2881-033	3	MARKER,CABLE-P2	1	
19	M17/74-RG213	3	CABLE,RF (81349) 425-0952-000	AR	



NOTE:
SERVICE BULLETIN 97 AND REV B REVERSED THE CONNECTIONS AT P1-12 AND P1-14 TO PREVENT POSSIBLE DAMAGE TO EXTERNAL TUNING ELEMENTS.

TPA-3968-013

Control Cable, Schematic Diagram
Figure 2



RF Cable, Schematic Diagram
Figure 3

AC-8020 Serial Control Card (622-3482-001)

Rockwell International

instructions

Collins Defense Communications

Printed in USA

523-0774268-101211
1st Edition, 1 December 1985
1st Revision, 15 October 1986

1. DESCRIPTION

AC-8020 Serial Control Card, part number 622-3482-001, provides remote control and access to digital and analog monitor information, in various power amplifiers, for fault isolation when used with processor control.

There are two configurations of the AC-8020 Serial Control Card. The original configuration includes serial control card assembly, part number 637-9736-001. This assembly consists of two separate circuit cards that interconnect through mating multipin connectors. The newer configuration consists of a single serial control card, part number 659-2355-001. Refer to table 2 for complete parts listing of the AC-8020 Serial Control Card.

The two configurations of the AC-8020 Serial Control Card are not necessarily interchangeable. Refer to table 1 for a summary of operational differences for the two configurations.

Table 1. Operational Differences.

CONFIGURATION	COMPATIBLE POWER AMPLIFIERS	USABLE BAUD RATE	DATA FORMAT	SUPPORTS NO PARITY STRAPPING
Original	HF-8021, HF-8022 and 208U-10B	50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, and 4800	RS-232C	Yes
Newer	HF-8020, HF-8021, HF-8022, HF-8023, and 208U-10B	75, 110, 150, 300, 600, 1200, 2400, 4800, 9600, and 19 200	RS-232C and RS-422	No

2. RELATED PUBLICATIONS

The serial control card assembly, part number 637-9736-001, and serial control card, part number 659-2355-001, are covered in detail in the following publications.

EQUIPMENT	PUBLICATION
Serial Control Card Assembly (637-9736-001)	Instructions, part number 523-0773096
Serial Control Card (659-2355-001)	Instructions, part number 523-0774193

instructions 523-0774268

3. PARTS LIST

A complete list of parts for the AC-8020 Serial Control Card, part number 622-3482-001, is included in table 2.

Table 2. Parts List.

PART DESCRIPTION	PART NUMBER	CONFIGURATION USED ON	
		ORIGINAL	NEWER
Serial control card assembly	637-9736-001	X	
Serial bus interface main board	637-2697-001	X	
Computer interface plug-in board	637-2699-001	X	
Schematic diagram	637-8827-001	X	
Production test specification	671-0715-001	X	
Pressure sensitive label	280-2745-010	X	
Serial control card	659-2355-001		X

Slide Mounting Kit CA-8031 (622-3419-( ))

Rockwell International

instructions

Collins Defense Communications

Printed in USA

523-0770904-003211
3rd Edition, 15 September 1988

1. DESCRIPTION

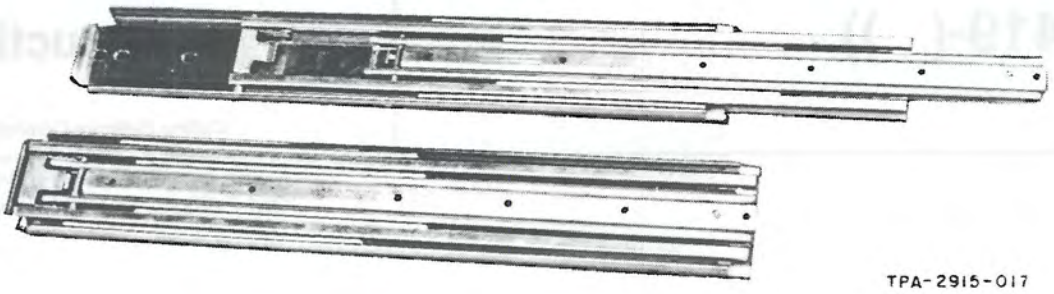
Slide Mounting Kit CA-8031, part number 622-3419-001, -002, -003, and -004, (figure 1) is a mounting support with slides for easy access of equipment. Slide Mounting Kit CA-8031 was designed for use with 1-kW Power Amplifier HF-8020 or HF-8023; Power Supply HF-8030, HF-8031, or HF-8032; or Band Pass Filter HF-8061 in Equipment Cabinets CA-8020, CA-8020A, and CA-8020B.

2. PARTS LIST

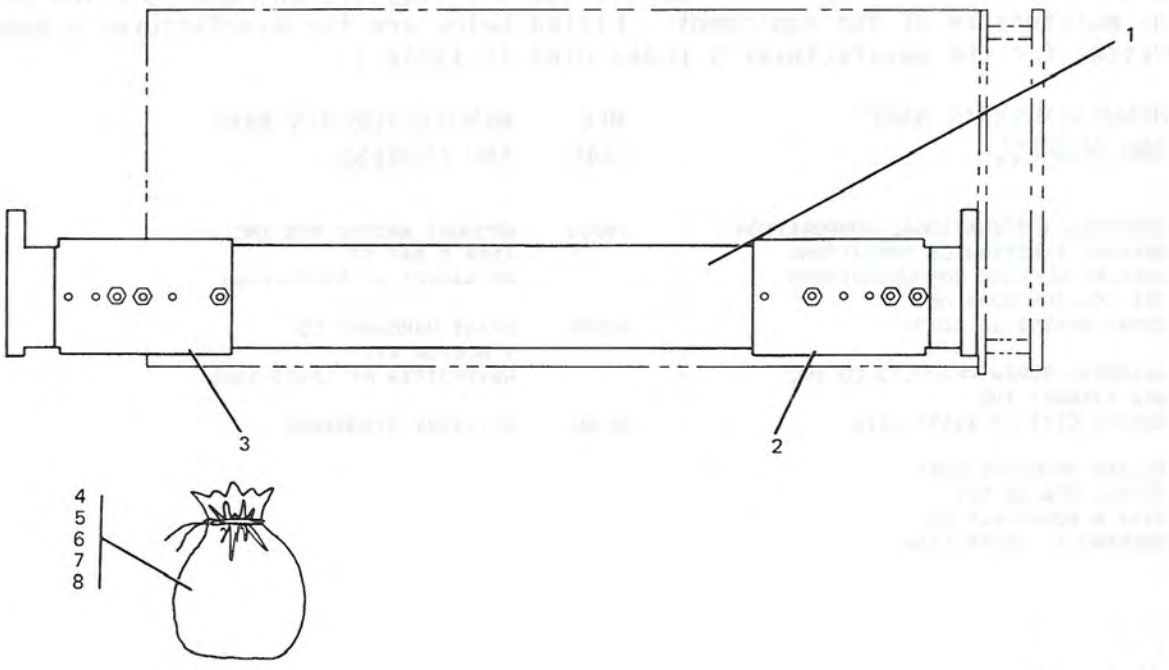
Figure 2 and table 1 will assist in identification, requisition, and location of parts for maintenance of the equipment. Listed below are the manufacturer's names and addresses for the manufacturer's codes used in table 1.

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
70318	ALLMETAL SCREW PRODUCTS CO INC 821 STEWART AVE GARDEN CITY NY 11530-4810
77250	ALLIED PRODUCTS CORP PHEOLL MFG CO DIV 5700 W ROOSEVELT RD CHICAGO IL 60650-1156
79807	WROUGHT WASHER MFG INC 2100 S BAY ST MILWAUKEE WI 53207-1208
83508	GRANT HARDWARE CO 7 HOOVER AVE HAVERSTRAW NY 10927-1024
96906	MILITARY STANDARDS

NOTICE: This section replaces second edition dated 15 September 1982.



Slide Mounting Kit CA-8031
Figure 1



Slide Mounting Kit CA-8031, Parts Location Diagram
Figure 2

Table 1. Slide Mounting Kit CA-8031, Parts List.

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	622-3419-001	1	KIT, SLIDE MOUNTING CA-8031	1	A
	622-3419-002	1	KIT, SLIDE MOUNTING CA-8031	1	B
	622-3419-003	1	KIT, SLIDE MOUNTING CA-8031	1	C
	622-3419-004	1	KIT, SLIDE MOUNTING CA-8031	1	D
1	3335-24	2	SLIDE (PAIR) (83508) 015-3728-010	1	A,C
1	C03335-0127-10-0	2	SLIDE (PAIR) (83508) 015-3728-020	1	B,D
	MS35649-284	2	NUT,PLAIN,HEX SST, 8-32 (96906) 313-0017-000 (AP)	2	
	310-0283-000	2	WASHER,LOCK SST, 0.168 ID X 0.280 OD (70318) (AP)	2	
	MS51957-43	2	SCREW,MACHINE SST, 8-32 X 3/8 (96906) 343-0187-000 (AP)	12	
2	635-9736-002	2	BRACKET,SLIDE-LH	2	A,B
2	659-9280-002	2	BRACKET,SLIDE-LH	2	C,D
	MS35650-304	2	NUT,PLAIN,HEXAGON SST, 10-32 (96906) 313-0019-000 (AP)	6	
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP)	6	
	MS15795-808	2	WASHER,FLAT PSVT CRES, 0.227 ID X 0.533 OD (96906) 310-0779-080 (AP)	6	C,D
	MS51960-65	2	SCREW,MACHINE CRES, 0.190-32 X 0.50IN (96906) 342-0224-000 (AP)	6	
3	635-9736-001	2	BRACKET,SLIDE-RH	2	A,B
3	659-9280-001	2	BRACKET,SLIDE-RH	2	C,D
	MS35650-304	2	NUT,PLAIN,HEXAGON SST, 10-32 (96906) 313-0019-000 (AP)	6	
	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP)	6	
	MS15795-808	2	WASHER,FLAT PSVT CRES, 0.227 ID X 0.533 OD (96906) 310-0779-080 (AP)	6	C,D
	MS51960-65	2	SCREW,MACHINE CRES, 0.190-32 X 0.50IN (96906) 342-0224-000 (AP)	6	
4	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000	16	
5	P325-0048-000	2	SCREW,MACH STL, 10-32UNF-2A X 5/16 (77250) 325-0048-000	16	A,B
5	P325-0051-000	2	SCREW,MACH STL, 10-32UNF-2A X 1/2 (77250) 325-0051-000	16	C,D
6	310-0730-010	2	WASHER,FLAT STL, 0.191 ID X 0.375 OD (79807)	16	
7	MS51957-45	2	SCREW,MACHINE SST, 8-32 X 1/2 (96906) 343-0189-000 (EFF REV LTR E)	2	
8	659-9134-001	2	PLATE,IDENT	4	C,D

CA-8020/8020A/8020B Equipment Cabinet (622-3417-XXX, 622-3437-XXX, 622-3464-XXX)

Rockwell International

instructions

Collins Defense Communications

Printed in USA

523-0770901-002211
2nd Edition, 15 September 1982

(622-3417-XXX, 622-3437-XXX, 622-3464-XXX)

1. DESCRIPTION

The CA-8020/8020A/8020B Equipment Cabinets (figure 1) are rack-mounting enclosures for HF-80 equipment with the exception of the 3-kW and 10-kW power amplifiers. The CA-8020, part number 622-3417-002 and the CA-8020A, PN 622-3437-002, include bottom plates to anchor the cabinet to the floor (refer to figure 2). Refer to table 1 for size and weight of the cabinets. All cabinets are gray in color.

The CA-8020B, PN 622-3464-002 (figure 3), has sound proofing and special front and rear doors for noise reduction. Floor mounting is not available with the CA-8020B cabinet.

2. PARTS LIST

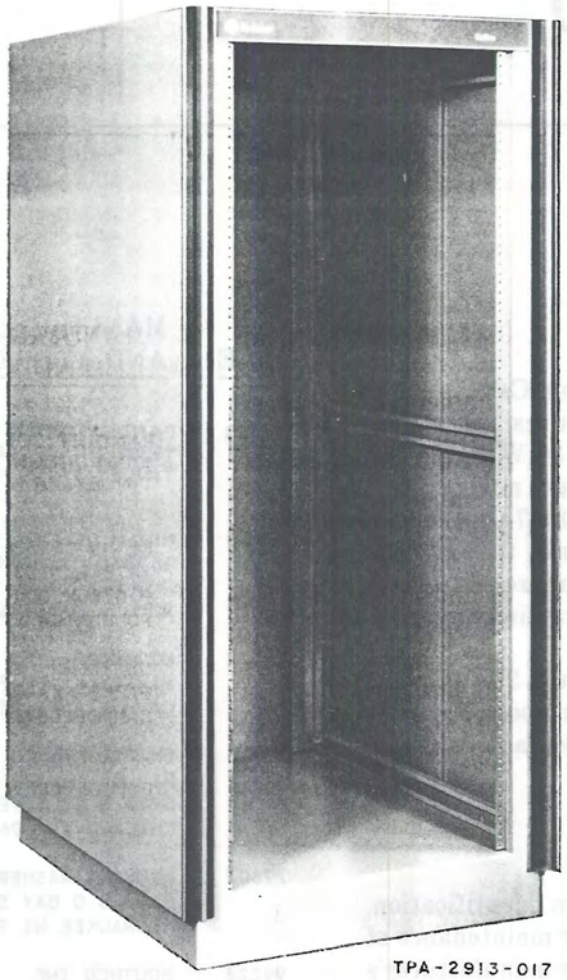
Figure 4 and table 2 will assist in identification, requisition, and location of parts for maintenance of the equipment. Listed below are the manufacturer's names and addresses for the manufacturer's codes used in table 2.

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
06383	PANDUIT CORP 17301 RIDGELAND TINLEY PARK IL 60477
08289	BLINN DELBERT CO INC THE 1678 E MISSION BLVD P O BOX 2007 POMONA CA 91766
45722	USM CORP PARKER-KALON FASTENER DIV CAMPBELLSVILLE KY 42718
77250	PHEOLL MFG CO DIV OF ALLIED PRODUCTS CORP 5700 W ROOSEVELT RD CHICAGO IL 60650
79807	WROUGHT WASHER MFG INC 2100 S O BAY ST MILWAUKEE WI 53207
94222	SOUTHCO INC LESTER PA 19113
96906	MILITARY STANDARD

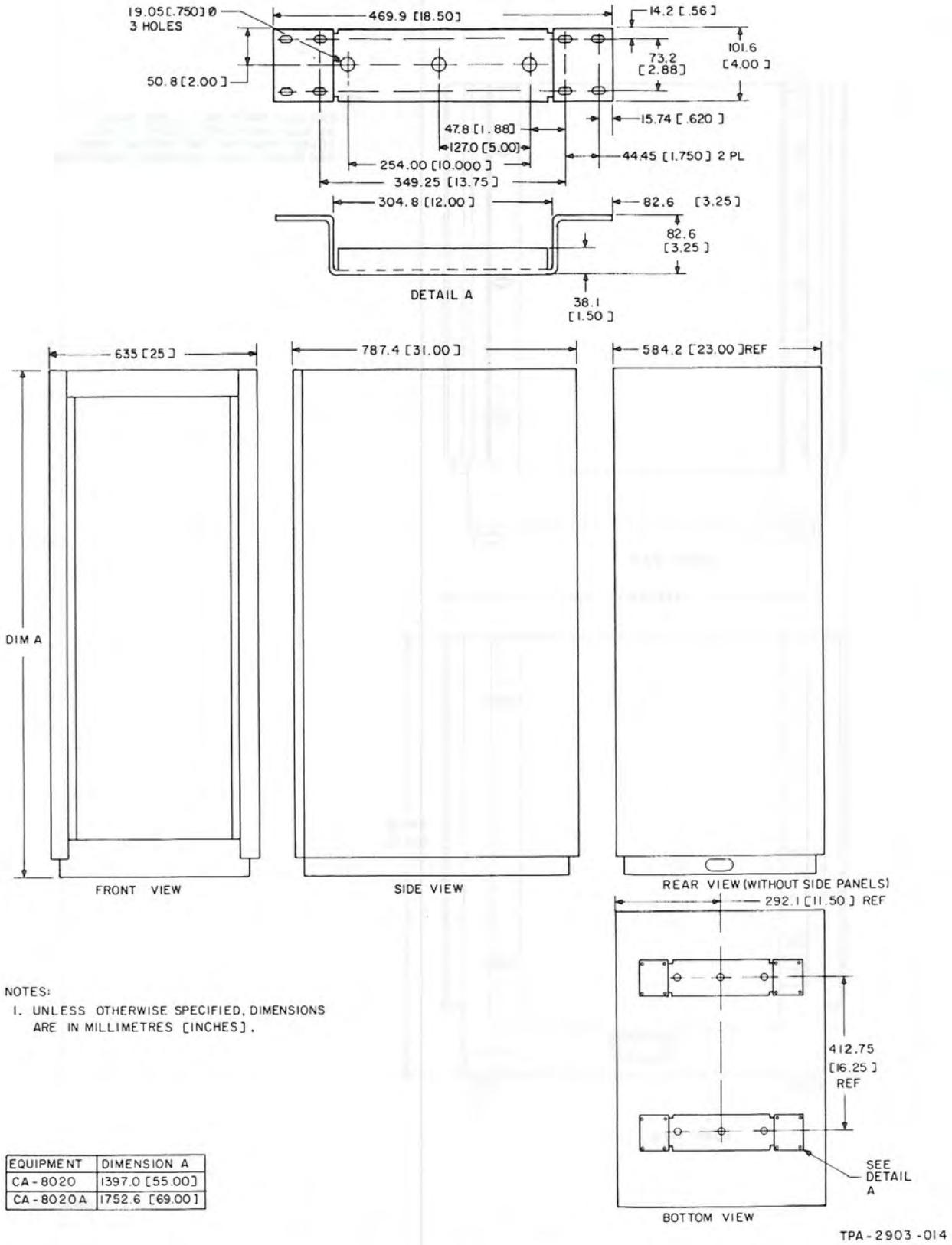
Table 1. HF-80 Equipment Cabinets, Size and Weight.

EQUIPMENT	PART NUMBER	WEIGHT kg (lb)	WIDTH mm (in)	HEIGHT mm (in)	DEPTH mm (in)
CA-8020	622-3417-001, -002	93 (205)	635 (25)	1417.6 (55.81)	787.4 (31.0)
CA-8020A	622-3437-001, -002	111.1 (245)	635 (25)	1773.2 (69.81)	787.4 (31.0)
CA-8020B	622-3464-001, -002	77 (170)	635 (25)	706.37 (27.81)	787.4 (31.0)

NOTICE: This section replaces first edition dated 15 January 1981.



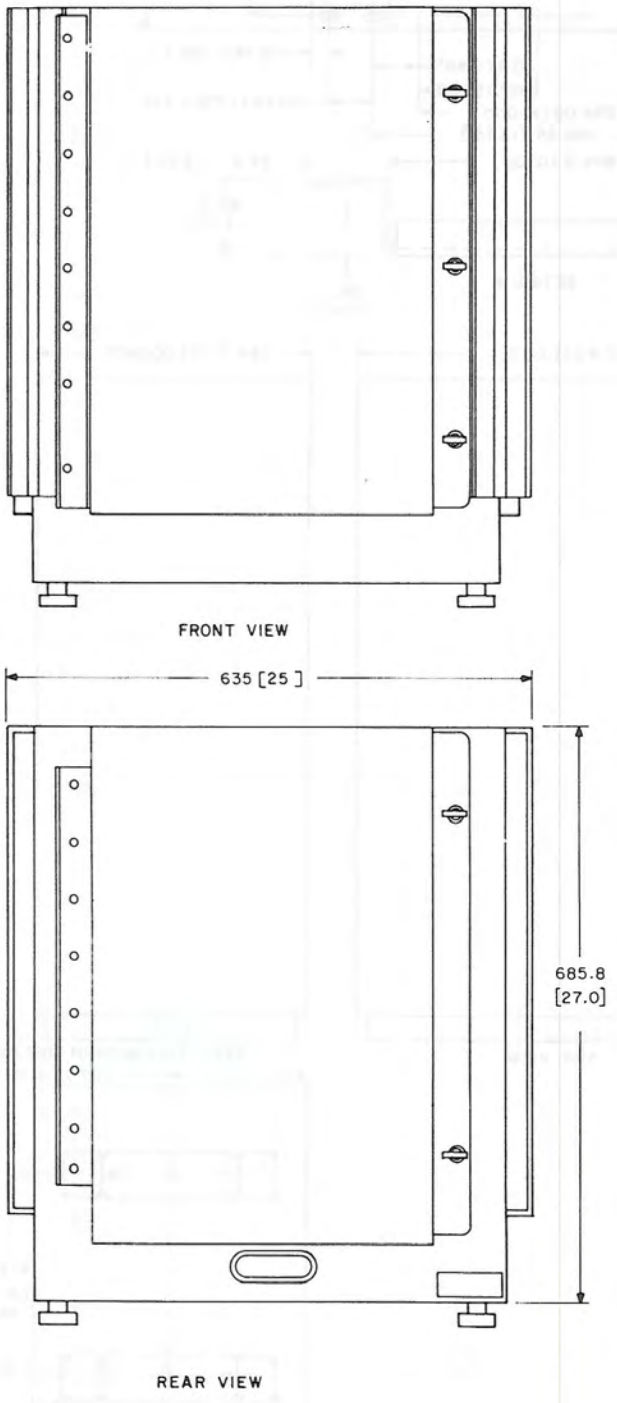
CA-8020( ) Equipment Cabinet
Figure 1



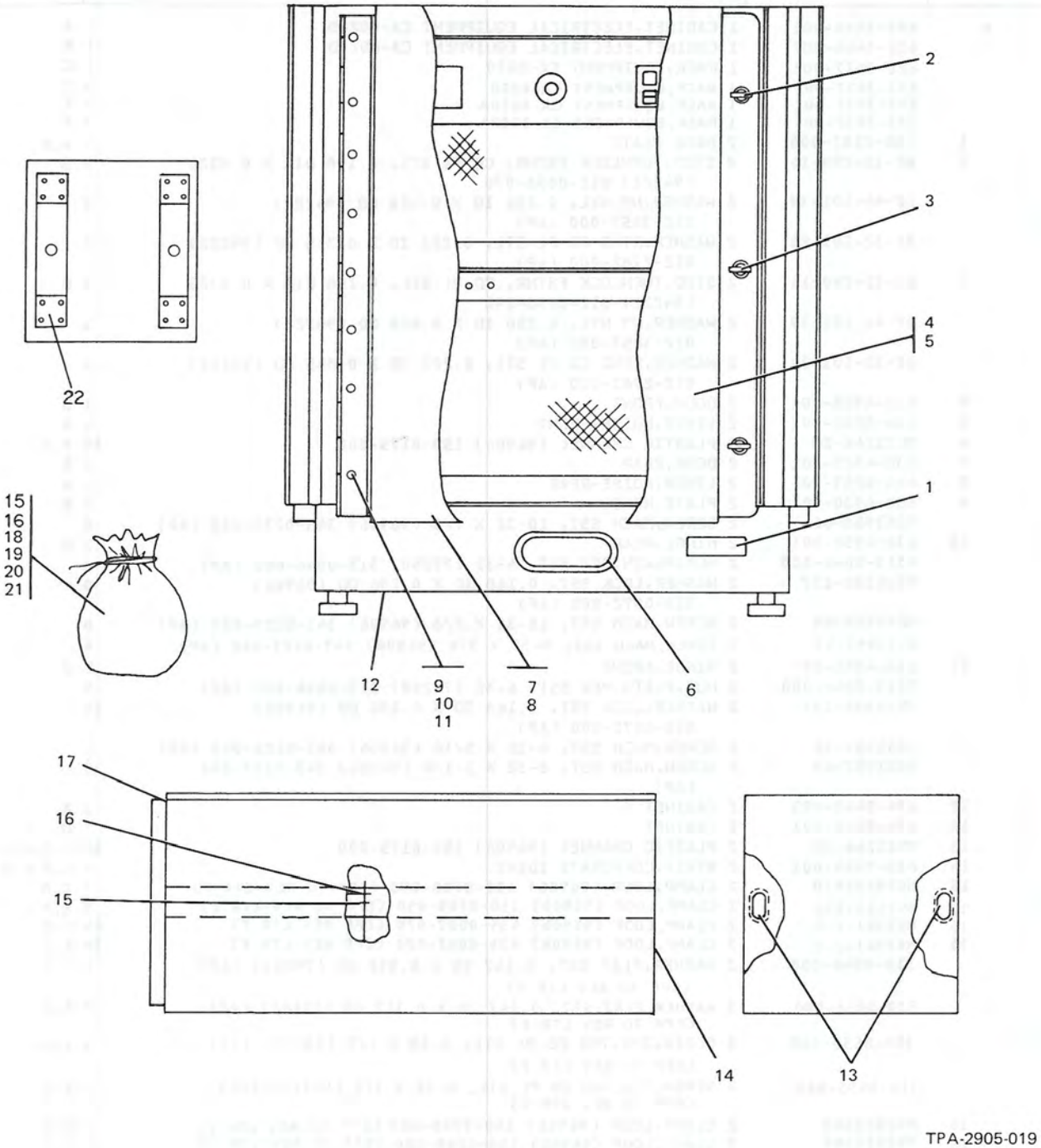
NOTES:
1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETRES [INCHES].

EQUIPMENT	DIMENSION A
CA-8020	1397.0 [55.00]
CA-8020A	1752.6 [69.00]

CA-8020/8020A Equipment Cabinet, Outline and Mounting Dimensions
Figure 2



CA-8020B Equipment Cabinet, Outline and Mounting Dimensions
Figure 3



CA-8020/8020A/8020B Equipment Cabinet, Parts Location
Figure 4

Table 2. CA-8020/8020A/8020B Equipment Cabinet, Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-	622-3464-001	1	CABINET,ELECTRICAL EQUIPMENT CA-8020B	1	A
	622-3464-002	1	CABINET,ELECTRICAL EQUIPMENT CA-8020B	1	B
	622-3417-001	1	RACK,EQUIPMENT CA-8020	1	C
	622-3417-002	1	RACK,EQUIPMENT CA-8020	1	D
	622-3437-001	1	RACK,EQUIPMENT CA-8020A	1	E
	622-3437-002	1	RACK,EQUIPMENT CA-8020A	1	F
1	635-2102-000	2	NAME PLATE	1	A,B
2	82-12-200-16	2	STUD,TURNLOCK FSTNR, CD PL STL, 0.198 DIA X 0.9325 (94222) 012-0058-070	2	B
	82-46-101-39	2	WASHER,NM NYL, 0.250 ID X 0.420 OD (94222) 012-3857-000 (AP)	2	
	82-32-101-20	2	WASHER,RTNG CD PL STL, 0.222 ID X 0.365 OD (94222) 012-2782-000 (AP)	2	
3	82-12-240-16	2	STUD,TURNLOCK FSTNR, CD PL STL, 0.198 DIA X 0.9725 (94222) 012-0058-090	3	B
	82-46-101-39	2	WASHER,NM NYL, 0.250 ID X 0.420 OD (94222) 012-3857-000 (AP)	3	
	82-32-101-20	2	WASHER,RTNG CD PL STL, 0.222 ID X 0.365 OD (94222) 012-2782-000 (AP)	3	
4	638-4928-001	2	DOOR,FRONT	1	B
5	634-5252-001	2	LINER,NOISE-FRONT	1	B
6	MS21266-2N	2	PLASTIC CHANNEL (96906) 150-0175-000	AR	A,B
7	638-4929-001	2	DOOR,REAR	1	B
8	634-5253-001	2	LINER,NOISE-REAR	1	B
9	638-4930-001	2	PLATE,HINGE	1	B
	MS51958-66	2	SCREW,MACH SST, 10-32 X 7/8 (96906) 343-0230-000 (AP)	8	
10	638-4932-001	2	HINGE,REAR	1	B
	P313-0046-000	2	NUT,PLAIN,HEX SST, 6-32 (77250) 313-0046-000 (AP)	8	
	MS35338-137	2	WASHER,LOCK SST, 0.168 ID X 0.296 OD (96906) 310-0072-000 (AP)	8	
	MS51958-64	2	SCREW,MACH SST, 10-32 X 5/8 (96906) 343-0229-000 (AP)	8	
	MS51957-43	2	SCREW,MACH SST, 8-32 X 3/8 (96906) 343-0187-000 (AP)	8	
11	638-4931-001	2	HINGE,FRONT	1	B
	P313-0046-000	2	NUT,PLAIN,HEX SST, 6-32 (77250) 313-0046-000 (AP)	9	
	MS35338-137	2	WASHER,LOCK SST, 0.168 ID X 0.296 OD (96906) 310-0072-000 (AP)	18	
	MS51957-42	2	SCREW,MACH SST, 8-32 X 5/16 (96906) 343-0186-000 (AP)	9	
	MS51957-43	2	SCREW,MACH SST, 8-32 X 1-1/4 (96906) 343-0187-000 (AP)	9	
12	634-5440-003	2	CABINET	1	A
12	634-5440-001	2	CABINET	1	B
13	MS21266-2N	2	PLASTIC CHANNEL (96906) 150-0175-000	AR	C,D,E,F
14	635-9655-001	2	STRIP,CORPORATE IDENT	1	C,D,E,F
15	MS25281R10	2	CLAMP,LOOP (96906) 150-0708-090 (EFF TO REV LTR F)	2	C,D
15	MS25281R10	2	CLAMP,LOOP (96906) 150-0708-090 (EFF TO REV LTR E)	2	E,F
15	MS3367-2-9	2	CLAMP,LOOP (96906) 435-0002-070 (EFF REV LTR F)	24	C,D
15	MS3367-2-9	2	CLAMP,LOOP (96906) 435-0002-070 (EFF REV LTR E)	30	E,F
	310-0046-000	2	WASHER,FLAT SST, 0.147 ID X 0.312 OD (79807) (AP) (EFF TO REV LTR F)	2	C,D
	310-0046-000	2	WASHER,FLAT SST, 0.147 ID X 0.312 OD (79807) (AP) (EFF TO REV LTR E)	2	E,F
	330-0655-000	2	SCREW,TPG,THD CD PL STL, 6-18 X 1/2 (45722) (AP) (EFF TO REV LTR F)	2	C,D
	330-0655-000	2	SCREW,TPG,THD CD PL STL, 6-18 X 1/2 (45722) (AP) (EFF TO REV LTR E)	2	E,F
16	MS25281R9	2	CLAMP,LOOP (96906) 150-0708-080 (EFF TO REV LTR F)	1	C,D
16	MS25281R9	2	CLAMP,LOOP (96906) 150-0708-080 (EFF TO REV LTR E)	1	E,F
16	TM2S6	2	TIE MOUNT (06383) 435-0003-030 (EFF REV LTR F)	12	C,D
16	TM2S6	2	TIE MOUNT (06383) 435-0003-030 (EFF REV LTR E)	15	E,F
	310-0046-000	2	WASHER,FLAT SST, 0.147 ID X 0.312 OD (79807) (AP) (EFF TO REV LTR F)	1	C,D
	310-0046-000	2	WASHER,FLAT SST, 0.147 ID X 0.312 OD (79807) (AP) (EFF TO REV LTR E)	1	E,F
	330-0655-000	2	SCREW,TPG,THD CD PL STL, 6-18 X 1/2 (45722) (AP) (EFF TO REV LTR F)	1	C,D

Table 2. CA-8020/8020A/8020B Equipment Cabinet, Parts List (Cont).

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
	330-0655-000	2	SCREW,TPG,THD CD PL STL, 6-18 X 1/2 (45722) (AP) (EFF TO REV LTR E)	1	E,F
	330-0736-000	2	SCREW,TPG,THD CD PL STL, 6-20 X 5/16 (45722) (AP) (EFF REV LTR F)	12	C,D
	330-0736-000	2	SCREW,TPG,THD CD PL STL, 6-20 X 5/16 (45722) (AP) (EFF REV LTR E)	15	E,F
17	637-9864-001	2	RACK,EQUIPMENT	1	C,D
17	637-9864-002	2	RACK,EQUIPMENT	1	E,F
18	MS27127-10NPBRS	2	WASHER,LOCK NP BRS, 0.234 ID X 0.560 OD (96906) 310-0086-000	44	C,D
18	MS27127-10NPBRS	2	WASHER,LOCK NP BRS, 0.234 ID X 0.560 OD (96906) 310-0086-000	60	E,F
19	MS51960-65	2	SCREW,MACH SST, 10-32 X 1/2 (96906) 342-0224-000	44	C,D
19	MS51960-65	2	SCREW,MACH SST, 10-32 X 1/2 (96906) 342-0224-000	60	E,F
20	NW15-10	2	WASHER,NM NYL, 0.415 ID X 0.576 OD (08289) 302-0639-030	44	C,D
20	NW15-10	2	WASHER,NM NYL, 0.415 ID X 0.576 OD (08289) 302-0639-030	60	E,F
21	520-8360-176	2	ENVELOPE,DWG	1	
22	634-8346-001	2	BRACKET,FLOOR MTG	2	D,F
	MS16997-59	2	SCREW,CAP,SCH CD PL STL, 1/4-20 X 5/8 (96906) 324-2636-000 (AP)	16	D,F
	MS35338-139	2	WASHER,LOCK SST, 0.255 ID X 0.489 OD (96906) 310-0288-000 (AP)	16	D,F
	MS15795-810	2	WASHER,FLAT CRES, 0.296 ID X 0.640 OD (96906) 310-0779-100 (AP)	16	D,F

CA-8033
Slide Mounting Kit
(622-3527-( ))

Rockwell International

instructions

Collins Defense Communications

Printed in USA

523-0774384-002211
2nd Edition, 15 May 1987

1. DESCRIPTION

The CA-8033 Slide Mounting Kit 622-3527-001, -002 is a mounting support with solid bearing slides for easy access. The CA-8033 was designed for use with 483-mm (EIA standard 19-in) rack-mounted HF-80 equipment and can be mounted in the CA-8020, CA-8020A, CA-8020B, and CA-8036 cabinets.

Slide kit 622-3527-001 is used for mounting lighter weight and smaller HF-80 equipment, such as exciters, receivers, and controls. Slide kit 622-3527-002 is used for mounting heavier and larger equipment, such as power amplifiers and power supplies. Refer to table 1 for a list of equipment that can be mounted using the CA-8033 Slide Mounting Kit.

2. INSTALLATION

The following procedures describe the methods for installing slide mounts to the associated equipment and equipment racks.

Note

Refer to table 1 to determine which CA-8033 Slide Mounting Kit is applicable to your unit.

Table 1. List of Associated Equipment.

ASSOCIATED EQUIPMENT	PART NUMBER	KIT USED		
		-001	-002	
HF-8010 Exciter	622-3389-XXX	X		
HF-8010A Exciter	622-3395-XXX	X		
HF-8014 Exciter	622-3472-XXX	X		
HF-8014A Exciter	622-3473-XXX	X		
HF-8020 Power Amplifier	622-3380-XXX		X	
HF-8023 Power Amplifier	622-3490-XXX		X	
HF-8031 Power Supply	622-3491-XXX		X	
HF-8032 Power Supply	622-3512-XXX		X	
HF-8050 Receiver	622-3385-XXX	X		
HF-8050A Receiver	622-3393-XXX	X		
HF-8054 Receiver	622-3474-XXX	X		
HF-8054A Receiver	622-3475-XXX	X		
HF-8060 Preselector	622-3386-XXX	X		
HF-8061 Filter-Line Flattener	622-3497-XXX		X	
HF-8064 Preselector	622-3522-XXX	X		
HF-8064B Preselector	622-7505-XXX	X		
HF-8070 Receiver-Exciter	622-3387-XXX	X		
HF-8070A Receiver-Exciter	622-3394-XXX	X		
HF-8090 Exciter Control	622-3390-XXX	X		
HF-8091 Receiver Control	622-3391-XXX	X		
HF-8092 Receiver-Exciter Control	622-3392-XXX	X		
HF-8093 Exciter Control	622-3476-XXX	X		
HF-8094 Receiver Control	622-3477-XXX	X		
HF-8095 Receiver Control	622-3489-XXX	X		
HF-8096 SELSCAN® Automatic Communications Processor	622-3502-XXX	X		
851S-1 Receiver	622-4272-XXX	X		
851S-2 Receiver	622-4755-XXX	X		

2.1 Short Exciters, Receivers, Receiver-Exciters, and Controls (Refer to figure 1, sheet 1)

a. Separate the inner and outer slides of each slide assembly. This is done by releasing the slide lock and sliding the inner and outer slides apart.
b. Fasten the outer slides to the equipment rack using a nut bar and three each of 0.190-32 x 0.62 machine screws, 0.190 flat washers, and 0.190 lockwashers per mounting bracket, in accordance with details B and C of above referenced figure/sheet.
c. Fasten the inner slides to the unit using two 0.190-32 x 0.38 machine screws per slide, in accordance with detail A of above referenced figure/sheet.
d. When the inner and outer slides are secured, lift the unit into position and slide inner slides into channels of outer slides. Press the slide locks on both slide assemblies and slide unit completely into the equipment rack.

2.2 Long Exciters and Receivers (Refer to figure 1, sheet 2)

a. Separate the inner and outer slides of each slide assembly. This is done by releasing the slide lock and sliding the inner and outer slides apart.
b. Fasten the outer slides to the equipment rack using a nut bar and three each of 0.190-32 x 0.62 machine screws, 0.190 flat washers, and 0.190 lockwashers per mounting bracket, in accordance with details B and C of above referenced figure/sheet.
c. Fasten the inner slides to the unit using three 0.190-32 x 0.38 machine screws per slide, in accordance with detail A of above referenced figure/sheet.
d. When the inner and outer slides are secured, lift the unit into position and slide inner slides into channels of outer slides. Press the slide locks on both slide assemblies and slide unit completely into the equipment rack.

2.3 Power Amplifiers (Refer to figure 1, sheet 3)

a. Separate the inner and outer slides of each slide assembly. This is done by releasing the slide lock and sliding the inner and outer slides apart.
b. Fasten the outer slides to the equipment rack using a nut bar and three each of 0.190-32 x 0.62 machine screws, 0.190 flat washers, and 0.190 lockwashers per mounting bracket, in accordance with details B and C of above referenced figure/sheet.
c. Fasten the adapter bars to the power amplifier using three 0.164-32 x 0.44 machine screws per bar, in accordance with detail A of the above referenced figure/sheet.
d. Fasten the inner slides to the adapter bars using four 0.164-32 x 0.75 machine screws per slide, in accordance with detail A of above referenced figure/sheet.
e. When the inner and outer slides are secured, lift the power amplifier into position and slide inner slides into channels of outer slides. Press the slide locks on both slide assemblies and slide power amplifier completely into the equipment rack.

2.4 Power Supplies (Refer to figure 1, sheet 4)

a. Separate the inner and outer slides of each slide assembly. This is done by releasing the slide lock and sliding the inner and outer slides apart.
b. Fasten the outer slides to the equipment rack using a nut bar and three each of 0.190-32 x 0.62 machine screws, 0.190 flat washers, and 0.190 lockwashers per mounting bracket, in accordance with details B and C of above referenced figure/sheet.
c. Fasten the adapter bars to the power supply using three 0.164-32 x 0.44 machine screws per bar, in accordance with detail A of the above referenced figure/sheet.
d. Fasten the inner slides to the adapter bars using four 0.164-32 x 0.75 machine screws per slide, in accordance with detail A of above referenced figure/sheet.
e. When the inner and outer slides are secured, lift the power supply into position and slide inner slides into channels of outer slides. Press the slide locks on both slide assemblies and slide power supply completely into the equipment rack.

2.5 Narrow Preselectors (Refer to figure 1, sheet 5)

a. Separate the inner and outer slides of each slide assembly. This is done by releasing the slide lock and sliding the inner and outer slides apart.
b. Fasten the outer slides to the equipment rack using a nut bar and three each of 0.190-32 x 0.62 machine screws, 0.190 flat washers, and 0.190 lockwashers per mounting bracket, in accordance with details B and C of above referenced figure/sheet.
c. Fasten the inner slides to the preselector using five each spacers and 0.190-32 x 0.38 machine screws per slide, in accordance with detail A of above referenced figure/sheet.
d. When the inner and outer slides are secured, lift the preselector into position and slide inner slides into channels of outer slides. Press the slide locks on both slide assemblies and slide preselector completely into the equipment rack.

2.6 Filter-Line Flattener (Refer to figure 1, sheet 6)

a. Separate the inner and outer slides of each slide assembly. This is done by releasing the slide lock and sliding the inner and outer slides apart.
b. Fasten the outer slides to the equipment rack using a nut bar and three each of 0.190-32 x 0.62 machine screws, 0.190 flat washers, and 0.190 lockwashers per mounting bracket, in accordance with details B and C of above referenced figure/sheet.
c. Fasten the adapter bars to the filter-line flattener using three 0.164-32 x 0.44 machine screws per bar, in accordance with detail A of the above referenced figure/sheet.
d. Fasten the inner slides to the adapter bars using four 0.164-32 x 0.75 machine screws per slide, in accordance with detail A of above referenced figure/sheet.
e. When the inner and outer slides are secured, lift the filter-line flattener into position and slide inner slides into channels of outer slides. Press the slide locks on both slide assemblies and slide filter-line flattener completely into the equipment rack.

2.7 Wide Preselectors (Refer to figure 1, sheet 7)

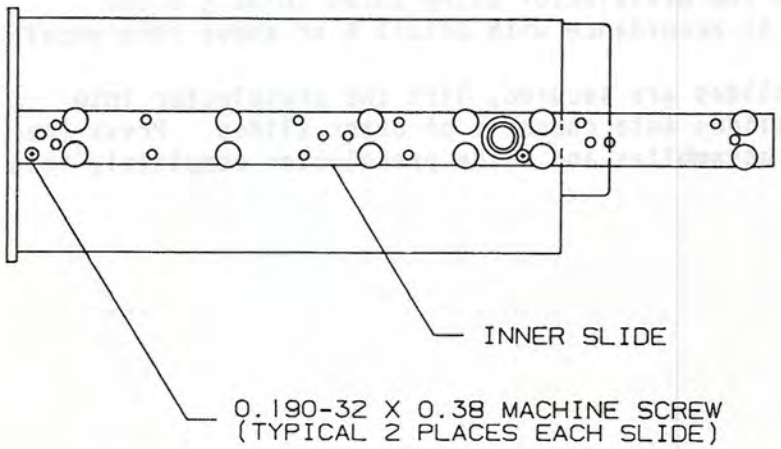
a. Separate the inner and outer slides of each slide assembly. This is done by releasing the slide lock and sliding the inner and outer slides apart.
b. Fasten the outer slides to the equipment rack using a nut bar and three each of 0.190-32 x 0.62 machine screws, 0.190 flat washers, and 0.190 lockwashers per mounting bracket, in accordance with details B and C of above referenced figure/sheet.
c. Fasten the inner slides to the preselector using three 10-32 x 0.312 machine screws per slide, in accordance with detail A of above referenced figure/sheet.
d. When the inner and outer slides are secured, lift the preselector into position and slide inner slides into channels of outer slides. Press the slide locks on both slide assemblies and slide preselector completely into the equipment rack.

NOTES:

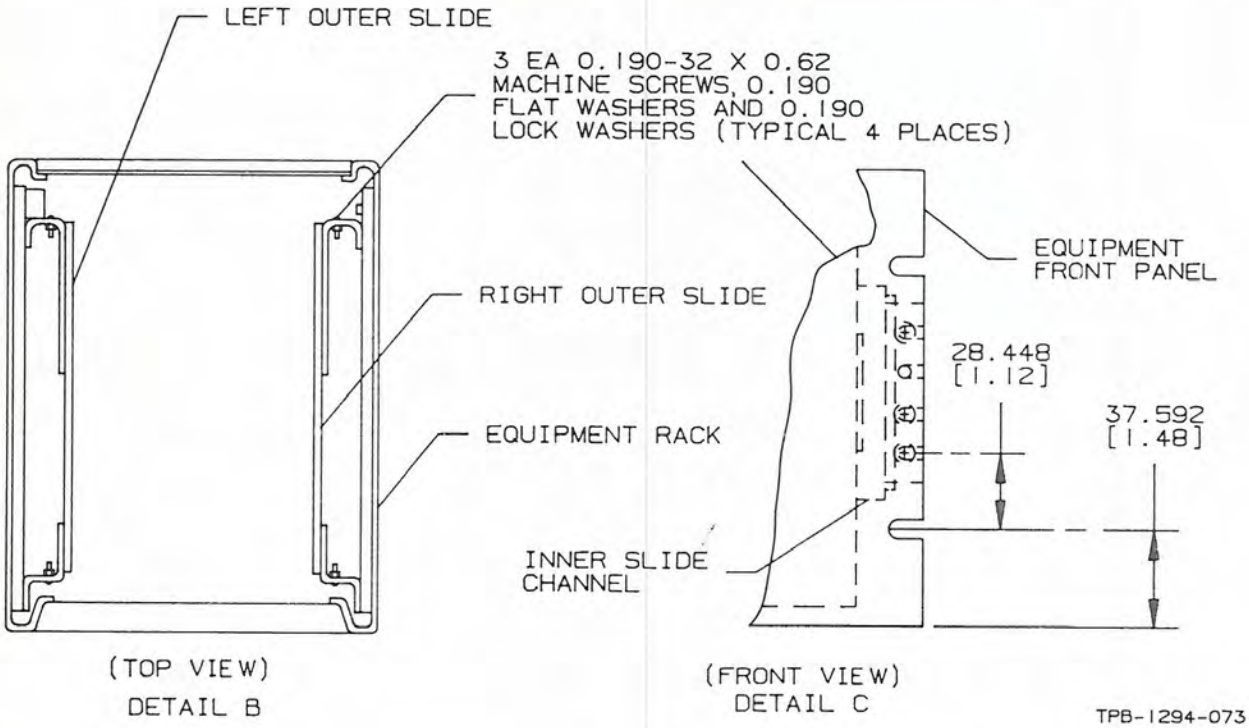
1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. USES SLIDE MOUNTING KIT CA-8033 622-3527-001.

THIS DRAWING APPLICABLE TO:

MODEL	PART NUMBER
HF-8010	622-3389-XXX
HF-8010A	622-3395-XXX
HF-8050	622-3385-XXX
HF-8050A	622-3393-XXX
HF-8070	622-3387-XXX
HF-8070A	622-3394-XXX
HF-8090	622-3390-XXX
HF-8091	622-3391-XXX
HF-8092	622-3392-XXX
HF-8093	622-3476-XXX
HF-8094	622-3477-XXX
HF-8095	622-3489-XXX
HF-8096	622-3502-XXX
851S-1	622-4272-XXX
851S-2	622-4755-XXX



(SIDE VIEW)
DETAIL A



(TOP VIEW)
DETAIL B

(FRONT VIEW)
DETAIL C

TPB-1294-073

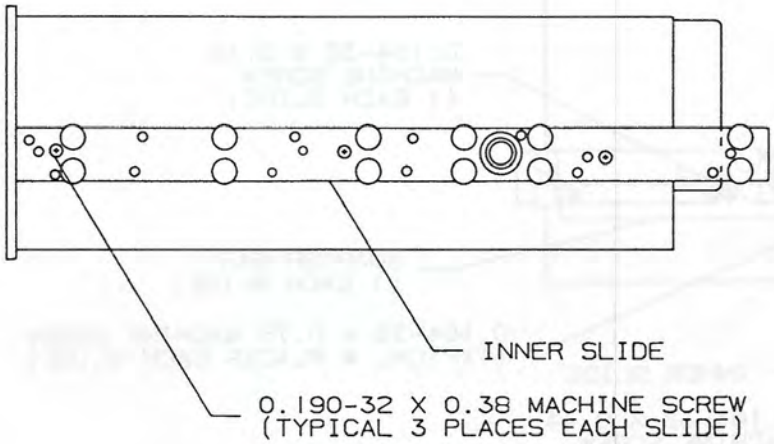
Installation Diagram
Figure 1 (Sheet 1 of 7)

NOTES:

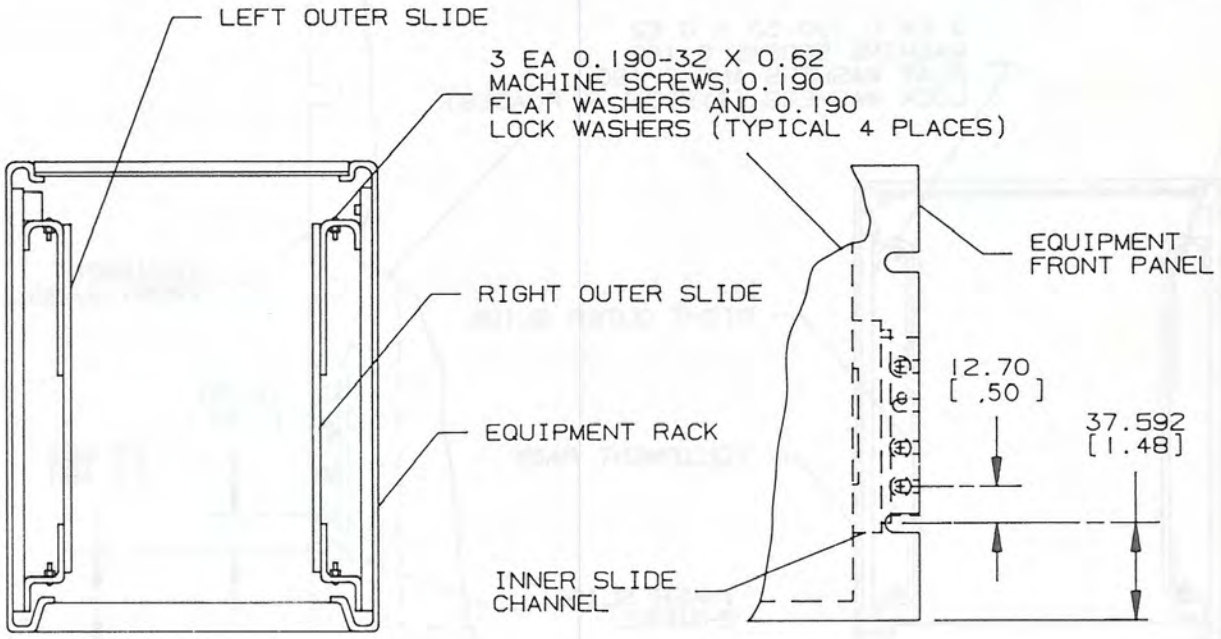
1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. USES SLIDE MOUNTING KIT CA-8033 622-3527-001.

THIS DRAWING APPLICABLE TO:

MODEL	PART NUMBER
HF-8014	622-3472-XXX
HF-8014A	622-3473-XXX
HF-8054	622-3474-XXX
HF-8054A	622-3475-XXX



(SIDE VIEW)
DETAIL A



(TOP VIEW)
DETAIL B

(FRONT VIEW)
DETAIL C

TPB-1294-073

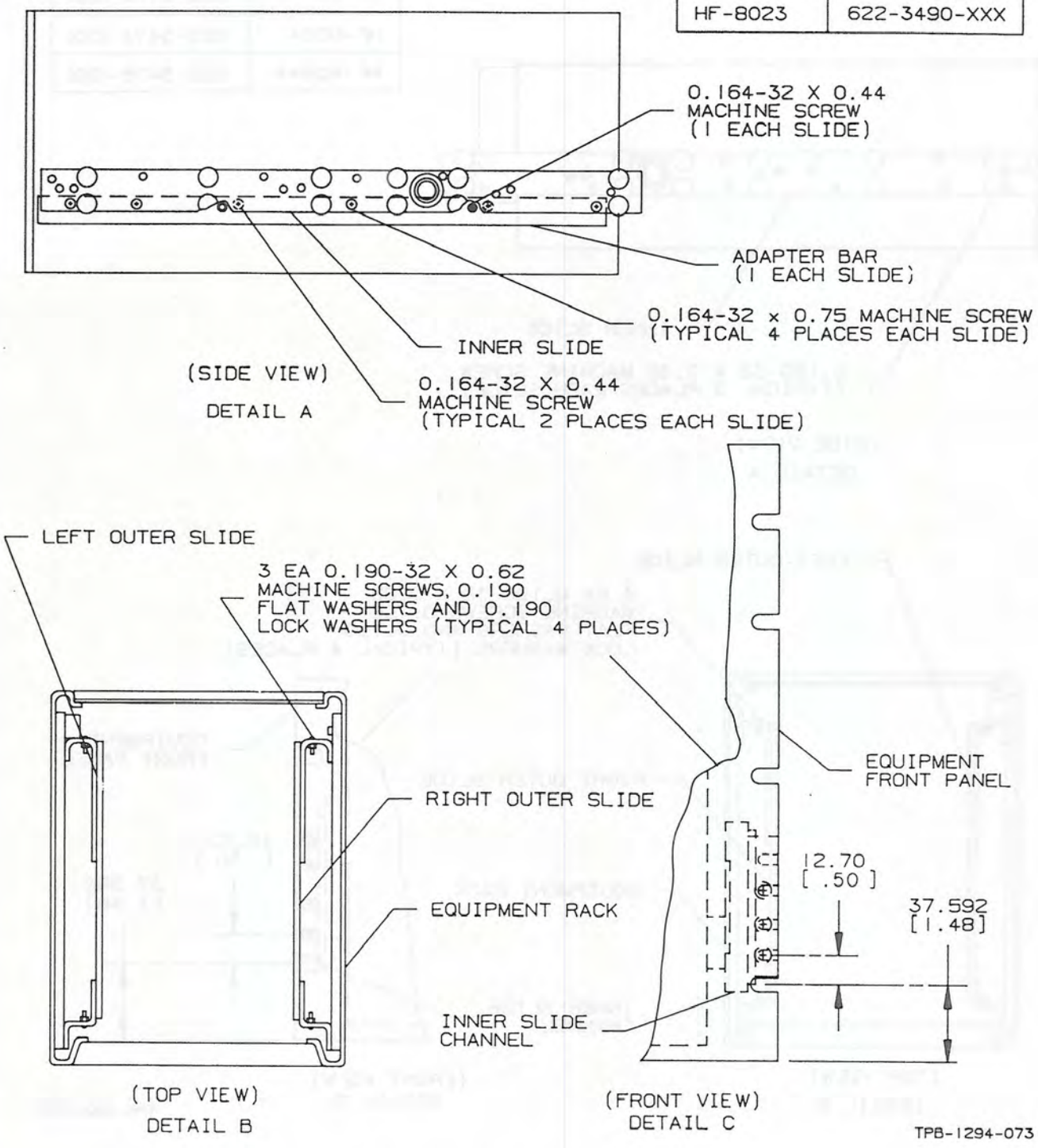
Installation Diagram
Figure 1 (Sheet 2)

NOTE:

1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. USES SLIDE MOUNTING KIT CA-8033 622-3527-002.

THIS DRAWING APPLICABLE TO:

MODEL	PART NUMBER
HF-8020	622-3380-XXX
HF-8023	622-3490-XXX



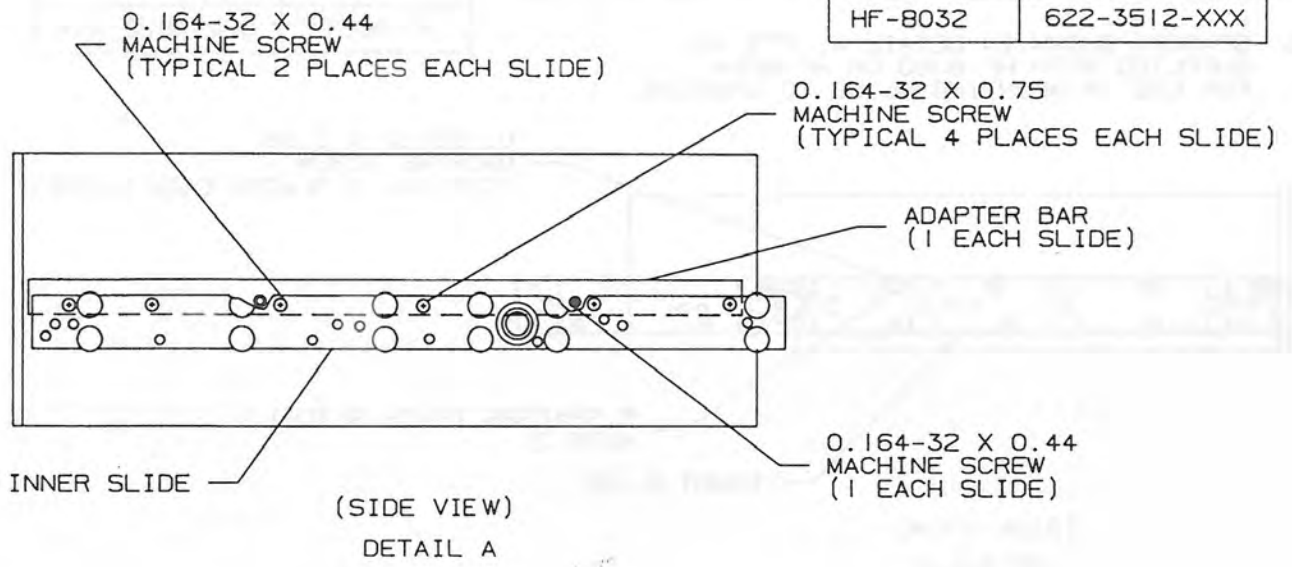
Installation Diagram
Figure 1 (Sheet 3)

NOTES:

1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. USES SLIDE MOUNTING KIT CA-8033 622-3527-002.

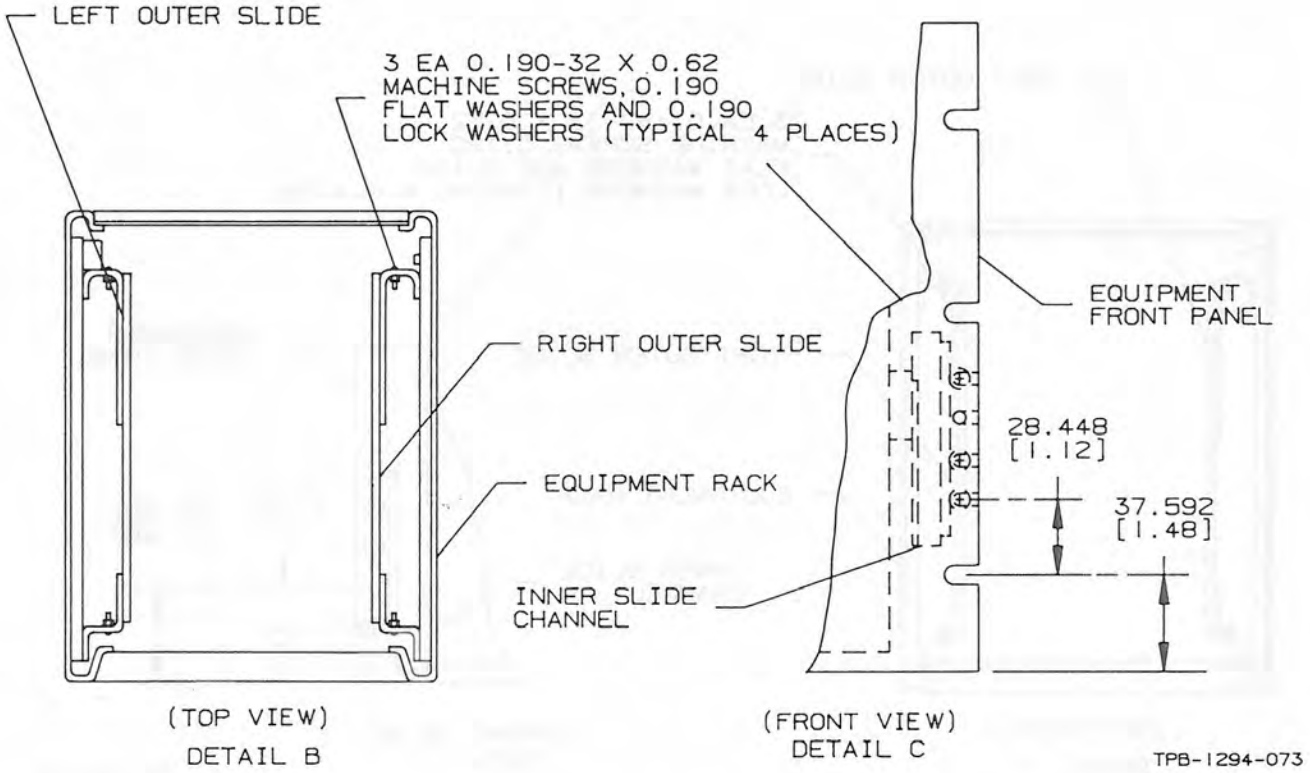
THIS DRAWING APPLICABLE TO:

MODEL	PART NUMBER
HF-8031	622-3491-XXX
HF-8032	622-3512-XXX



(SIDE VIEW)

DETAIL A



(TOP VIEW)

DETAIL B

(FRONT VIEW)

DETAIL C

TPB-1294-073

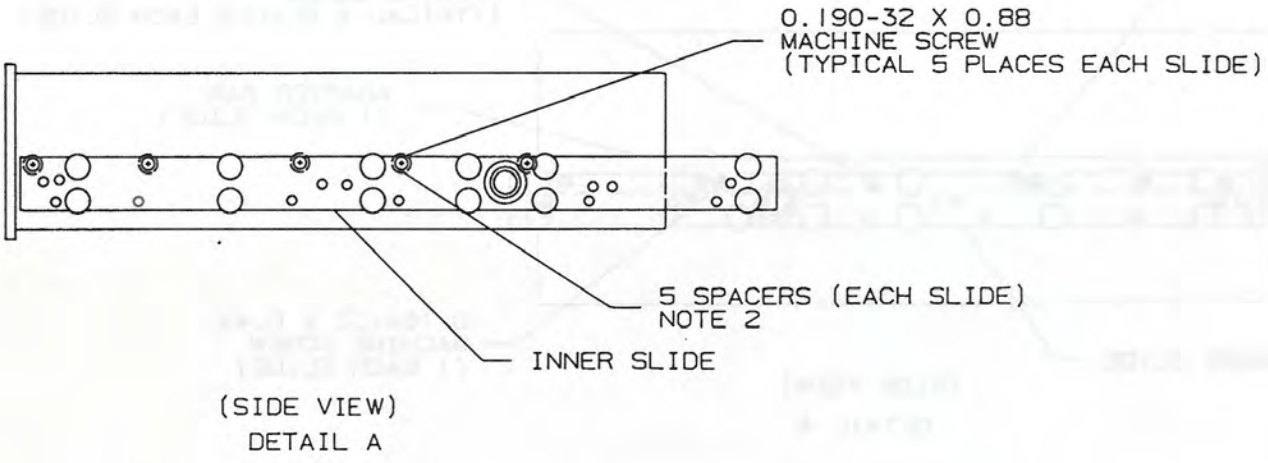
Installation Diagram
Figure 1 (Sheet 4)

NOTES:

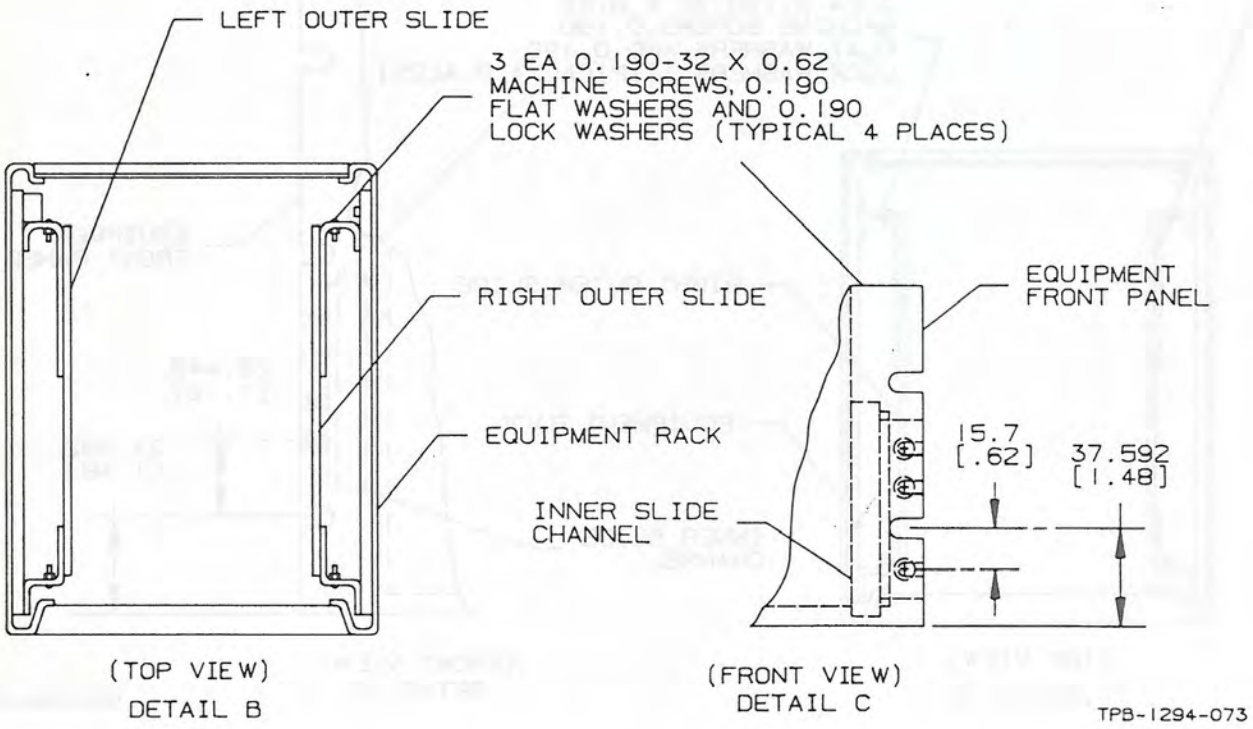
1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. USES SLIDE MOUNTING KIT CA-8033 622-3527-001.
3. SPACERS SHOWN IN DETAIL A, QTY 10, SUPPLIED WITH HF-8060 OR HF-8064 FOR USE IN MOUNTING SLIDE TO CHASSIS.

THIS DRAWING APPLICABLE TO:

MODEL	PART NUMBER
HF-8060	622-3386-XXX
HF-8064	622-3522-XXX



(SIDE VIEW)
DETAIL A



(TOP VIEW)
DETAIL B

(FRONT VIEW)
DETAIL C

TPB-1294-073

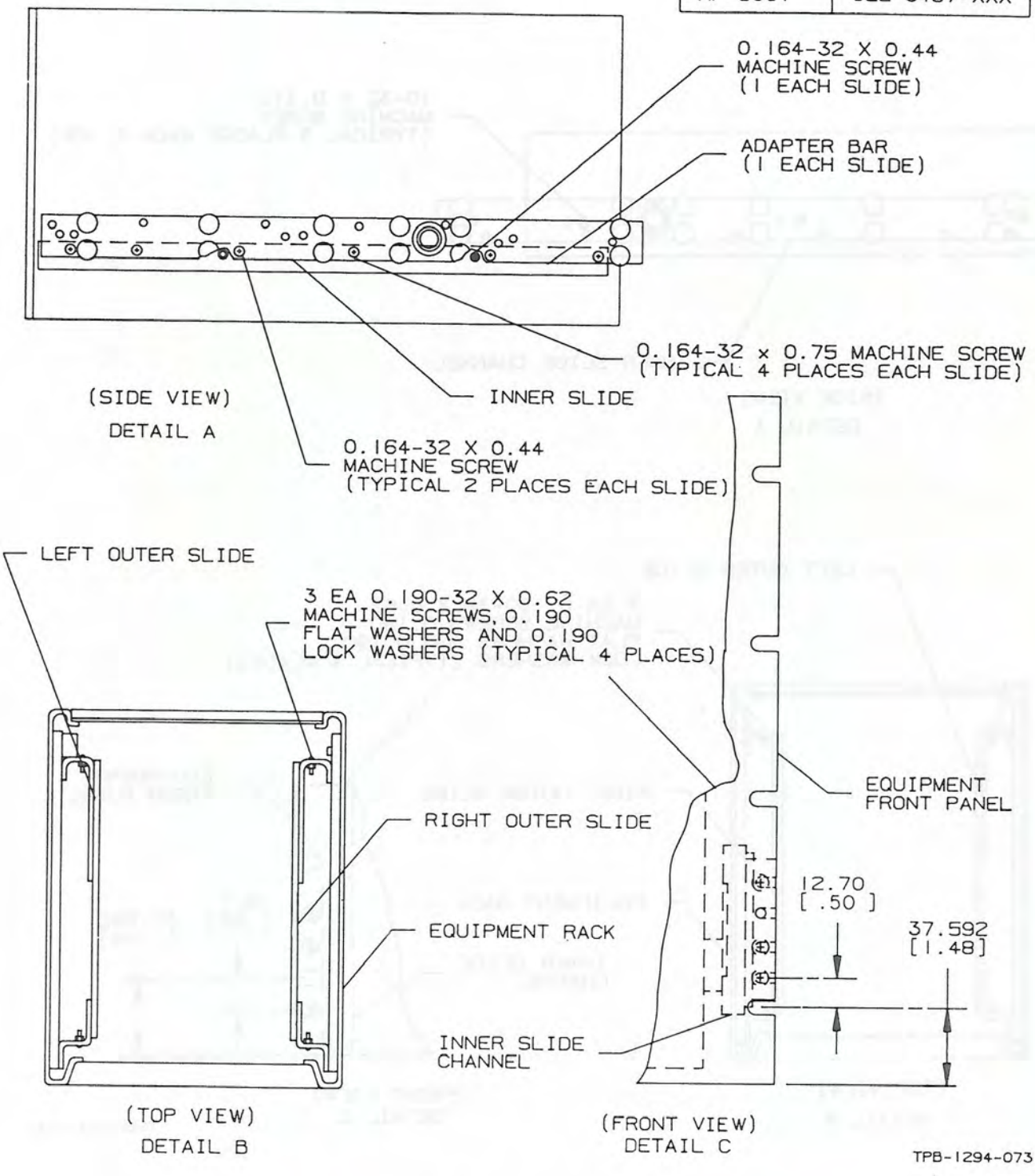
Installation Diagram
Figure 1 (Sheet 5)

NOTES:

1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. USES SLIDE MOUNTING KIT CA-8033 622-3527-002.

THIS DRAWING APPLICABLE TO:

MODEL	PART NUMBER
HF-8061	622-3497-XXX



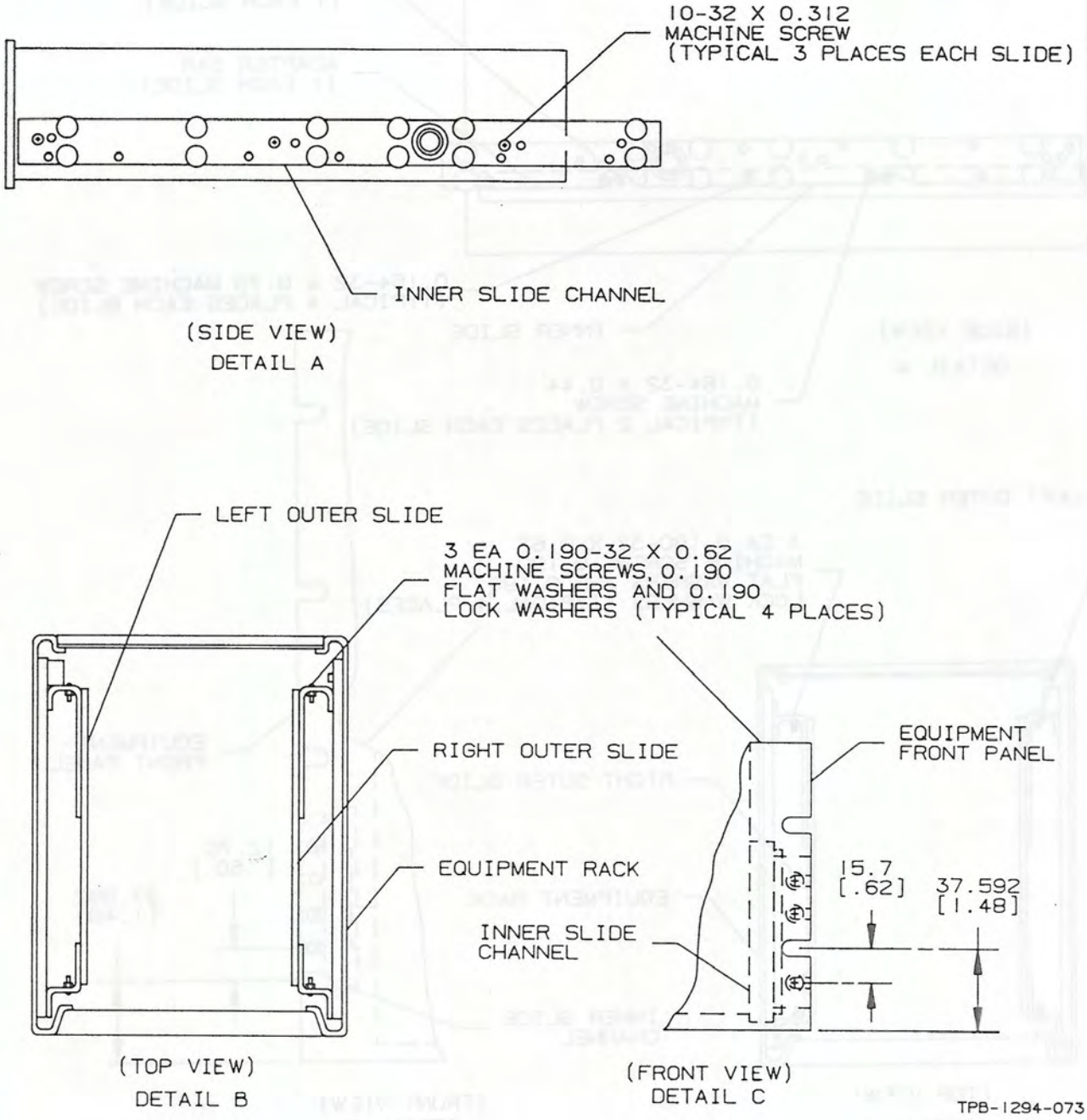
Installation Diagram
Figure 1 (Sheet 6)

NOTES:

1. DIMENSIONS ARE IN MILLIMETRES [INCHES].
2. USES SLIDE MOUNTING KIT CA-8033 622-3527-001.

THIS DRAWING APPLICABLE TO:

MODEL	PART NUMBER
HF-8064B	622-7505-XXX



Installation Diagram
Figure 1 (Sheet 7)

3. PARTS LIST

3.1 Introduction

3.1.1 General

The purpose of this parts list, prepared by Collins Defense Communications, Rockwell International, is for identification and requisition of parts.

Parts listed meet critical equipment design specification requirements. Use only part numbers specified in this parts list for replacement of parts.

3.1.2 Group Assembly Parts List

FIG-ITEM Column -- Digits preceding the dash are figure numbers. Digits following the dash are item numbers assigned in sequence to correspond with item numbers cn the illustrations.

PART NO Column -- Listed are MIL standard and vendor part numbers.

INDENT Column -- Items are coded 1, 2, 3, etc, to indicate the relationship to the next higher assembly.

DESCRIPTION Column -- Listed are the noun name, modifier, descriptive information, federal manufacturer's code, reference designation, attaching part (AP), reference to other figures, and effectivities.

Attaching parts are indentified by (AP) following the part or parts they attach.

Effectivities are identified by the following methods: Manufacturer Control Number (MCN) 101 and up; Configuration Identifier (CI) 5-digit number; Revision Identifier (REV) dash (--) denotes original, letter A first change, letter B second change, etc. One of the above identifiers is listed on each chassis and/or replaceable assembly. Service bulletins are identified by SB 1, SB 2, etc.

UNITS PER ASSY Column -- Quantities specified are per item number. Letters AR denote the selection of parts as required. Letters REF refer to an assembly completely assembled on a preceding figure and illustration.

USABLE ON CODE Column -- Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

3.1.3 Numerical Index

PART NUMBER Column -- Part numbers are listed in alphanumeric sequence.

FIG-ITEM Column -- Digits preceding the dash are figure numbers. Digits following the dash are item numbers.

TTL REQ Column -- Listed is the total quantity of parts or assemblies covered in the Group Assembly Parts List.

3.1.4 How To Use This Parts List

To locate a part number if the assembly in which the part is used is known, locate the part and its index number on the illustration. Find the index number on the Group Assembly Parts List page to determine its description and part number.

To locate the illustration for a part if the number is known, refer to the Numerical Index and find the part number. Turn to the Group Assembly Parts List and find the first figure and index number indicated in the Numerical Index for that part.

3.1.5 Manufacturer's Code, Name, and Address

MFR CODE	MANUFACTURER'S NAME AND ADDRESS
05236	JONATHAN MFG CORP 1101 S ACACIA AVE FULLERTON CA 92631-5312
13499	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
77250	ALLIED PRODUCTS CORP PHEOLL MFG CO DIV 5700 W ROOSEVELT RD CHICAGO IL 60650-1156
81349	MILITARY SPECIFICATIONS
95105	ROCKWELL INTERNATIONAL CORPORATION DEFENSE ELECTRONICS OPERATIONS COLLINS DEFENSE COMMUNICATIONS 350 COLLINS ROAD NE CEDAR RAPIDS IA 52498
96906	MILITARY STANDARDS

3.1.6 Usable On Codes

The following usable on codes have been assigned in this manual:

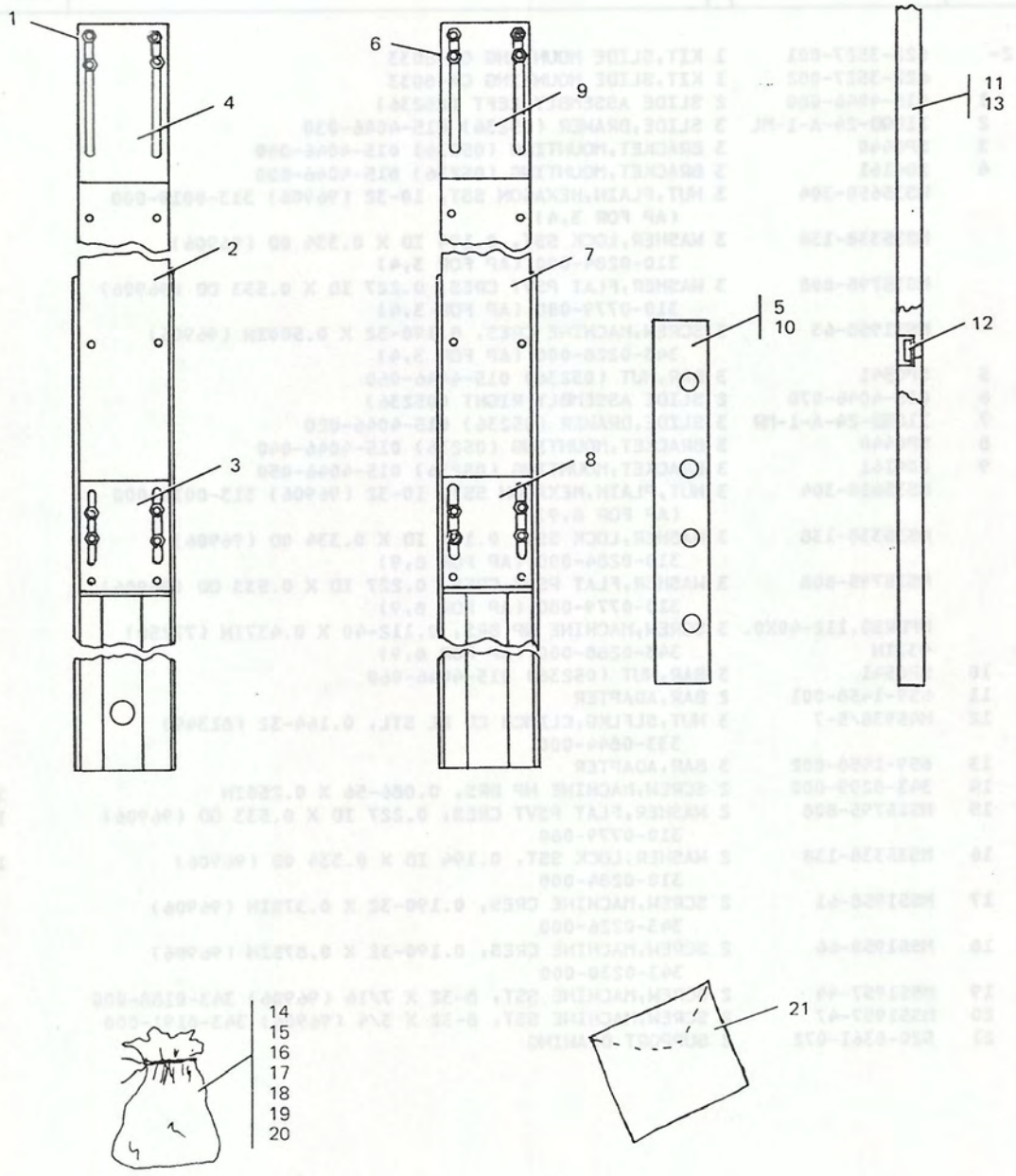
USABLE ON CODE	UNIT PART NUMBER	FIG-ITEM
A	622-3527-001	2-
B	622-3527-002	2-

3.1.7 Configuration Identifiers

The following CI's/REV LTR's were used in compiling data for this manual:

CI/REV LETTER	UNIT PART NUMBER	FIG-ITEM
B	622-3527-001	2-
B	622-3527-002	2-

3.2 Group Assembly Parts List



CA-8033 Slide Mounting Kit, Parts Location Diagram
Figure 2

GROUP ASSEMBLY PARTS LIST

FIG-ITEM	PART NO	IND	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	622-3527-001	1	KIT,SLIDE MOUNTING CA-8033	1	A
	622-3527-002	1	KIT,SLIDE MOUNTING CA-8033	1	B
1	015-4046-080	2	SLIDE ASSEMBLY LEFT (05236)	1	B
2	110QD-24-A-1-ML	3	SLIDE,DRAWER (05236) 015-4046-030	1	
3	SP0440	3	BRACKET,MOUNTING (05236) 015-4046-040	1	
4	204161	3	BRACKET,MOUNTING (05236) 015-4046-050	1	
	MS35650-304	3	NUT,PLAIN,HEXAGON SST, 10-32 (96906) 313-0019-000 (AP FOR 3,4)	8	
	MS35338-138	3	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 3,4)	8	
	MS15795-808	3	WASHER,FLAT PSVT CRES, 0.227 ID X 0.533 OD (96906) 310-0779-080 (AP FOR 3,4)	8	
	MS51958-63	3	SCREW,MACHINE CRES, 0.190-32 X 0.500IN (96906) 343-0228-000 (AP FOR 3,4)	8	
5	SP0541	3	BAR,NUT (05236) 015-4046-060	2	
6	015-4046-070	2	SLIDE ASSEMBLY RIGHT (05236)	1	
7	110QD-24-A-1-MR	3	SLIDE,DRAWER (05236) 015-4046-020	1	
8	SP0440	3	BRACKET,MOUNTING (05236) 015-4046-040	1	
9	204161	3	BRACKET,MOUNTING (05236) 015-4046-050	1	
	MS35650-304	3	NUT,PLAIN,HEXAGON SST, 10-32 (96906) 313-0019-000 (AP FOR 8,9)	8	
	MS35338-138	3	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000 (AP FOR 8,9)	8	
	MS15795-808	3	WASHER,FLAT PSVT CRES, 0.227 ID X 0.533 OD (96906) 310-0779-080 (AP FOR 8,9)	8	
	NPBRS0.112-40X0.437IN	3	SCREW,MACHINE NP BRS, 0.112-40 X 0.437IN (77250) 343-0288-000 (AP FOR 8,9)	8	
10	SP0541	3	BAR,NUT (05236) 015-4046-060	2	
11	659-1458-001	2	BAR,ADAPTER	2	B
12	M45938/5-7	3	NUT,SLFLKG,CLINCH CD PL STL, 0.164-32 (81349) 333-0844-000	2	B
13	659-1458-002	3	BAR,ADAPTER	1	B
14	343-0299-000	2	SCREW,MACHINE NP BRS, 0.086-56 X 0.250IN	12	B
15	MS15795-808	2	WASHER,FLAT PSVT CRES, 0.227 ID X 0.533 OD (96906) 310-0779-080	12	
16	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000	12	
17	MS51958-61	2	SCREW,MACHINE CRES, 0.190-32 X 0.375IN (96906) 343-0226-000	9	A
18	MS51958-66	2	SCREW,MACHINE CRES, 0.190-32 X 0.875IN (96906) 343-0230-000	9	A
19	MS51957-44	2	SCREW,MACHINE SST, 8-32 X 7/16 (96906) 343-0188-000	6	B
20	MS51957-47	2	SCREW,MACHINE SST, 8-32 X 3/4 (96906) 343-0191-000	8	B
21	520-8361-072	2	SUPPORT DRAWING	1	

3.3 Numerical Index

PART NUMBER	FIG-ITEM	TTL REQ
MS15795-808	2-4	
	2-9	
	2-15	28
MS35338-138	2-4	
	2-9	
	2-16	28
MS35650-304	2-4	
	2-9	16
MS51957-44	2-19	6
MS51957-47	2-20	8
MS51958-61	2-17	9
MS51958-63	2-4	8
MS51958-66	2-18	9
M45938/5-7	2-12	2
NPBRS0.112-40X0.437IN	2-9	8
SP0440	2-3	
	2-8	2
SP0541	2-5	
	2-10	4
015-4046-020	2-7	1
015-4046-030	2-2	1
015-4046-040	2-3	
	2-8	2
015-4046-050	2-4	
	2-9	2
015-4046-060	2-5	
	2-10	4
015-4046-070	2-6	1
015-4046-080	2-1	1
110QD-24-A-1-ML	2-2	1
110QD-24-A-1-MR	2-7	1
204161	2-4	
	2-9	2
310-0284-000	2-4	
	2-9	
	2-16	28
310-0779-080	2-4	
	2-9	
	2-15	28
313-0019-000	2-4	
	2-9	16
333-0844-000	2-12	2
343-0188-000	2-19	6
343-0191-000	2-20	8
343-0226-000	2-17	9
343-0228-000	2-4	8
343-0230-000	2-18	9
343-0288-000	2-9	8
343-0299-000	2-14	12
520-8361-072	2-21	1
622-3527-001	2-	1
622-3527-002	2-	1
659-1458-001	2-11	2
659-1458-002	2-13	1

Rockwell International

TS-8022 Extender Card (622-3430-001)

instructions

Collins Defense Communications

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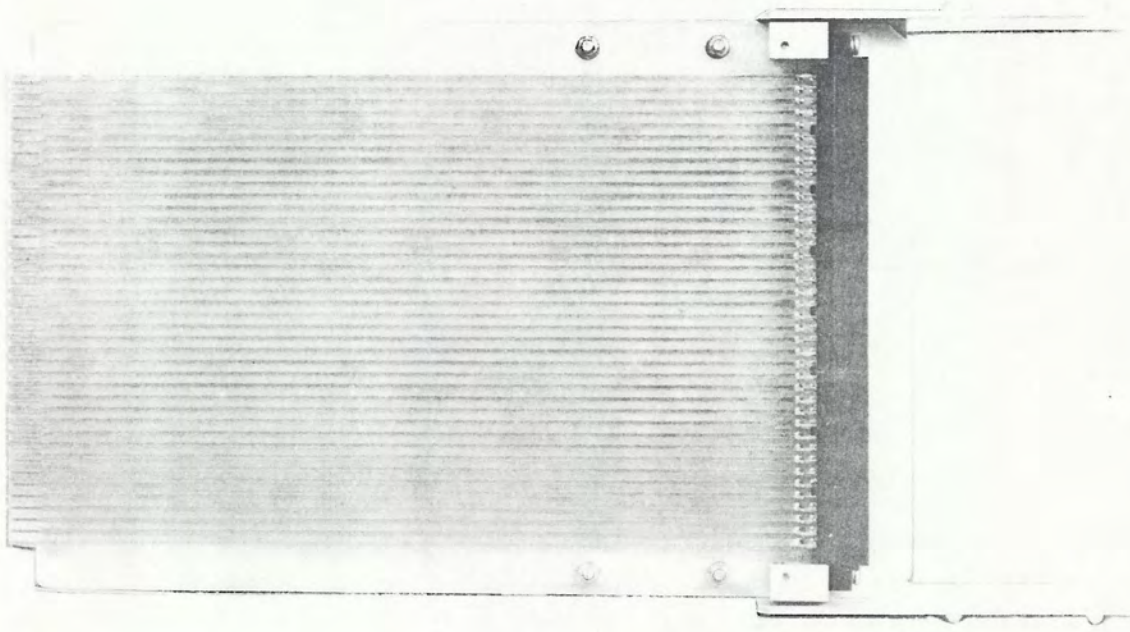
1. DESCRIPTION

TS-8022 Extender Card, part number 622-3430-001, shown in figure 1, is a universal card extender for extending cards in the HF-80 series power amplifiers. This extender enables testing and troubleshooting of individual circuit cards in hot mockup or in on-line situations without the need of sophisticated test fixtures or test equipment.



TP5-2099-017

TS-8022 Extender Card
Figure 1

NOTICE: This section replaces third edition dated 15 September 1982.

The TS-8022 extends all edge-on connector planar cards in the HF-8020 1-kW Power Amplifier, HF-8030 1-kW Power Supply, HF-8021 3-kW Power Amplifier, and HF-8022 10-kW Power Amplifier for testing and troubleshooting.

2. REPAIR

Repair of the TS-8022 Extender Card is accomplished using standard maintenance and circuit card repair procedures.

3. PARTS LIST/DIAGRAMS

This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. The part number and description are listed for each nonstandard replacement part.

All pins of the extender card are one-to-one connections; therefore, a schematic diagram is not shown.

DESCRIPTION	PART NUMBER
TS-8022 extender card	622-3430-001
Card guide (mounts inside extender card brackets)	150-0810-010
Connector housing	372-7515-030
Printed wiring board	601-1993-907
Connector mount block	628-3033-001
Extender card bracket (right)	628-3968-001
Extender card bracket (left)	628-3968-002