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Rockwell-Collins (Australasia) Pty. Limited

HF-80
10kW & 1kW Transmitter Systems
and
Receiver Systems
for
Australian Army

523-1003165-1012M1

Rockwell International

Collins instruction book

HF-80 10-kW & 1-kW TRANSMITTER SYSTEMS AND RECEIVER SYSTEMS FOR AUSTRALIAN ARMY

This Instruction Book contains four (4) parts:-

HF-80 10-kW Transmitter Systems and Accessories:

(Introduction, Description, Installation, Operation, Theory, Maintenance, Parts List and Kits)

HF-80 1-kW Transmitter Systems and Accessories:

(Introduction, Description, Installation, Operation, Theory, Maintenance, Parts List, and Kits)

HF-80 Receiver Systems:

(Introduction, Description, Installation, Operation, Theory, Maintenance, Parts List and Kits)

Common Equipment:

(Equipment Cabinet, Equipment Console, Power Point Bracket Assembly, Power Distribution Unit, Master Control Switch, Fault Alarm Panel).

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Caution

The material in this manual is subject to change. Before attempting any maintenance operation on the equipment covered in this manual, verify that you have a complete and up-to-date publication applicable to your equipment.

We welcome your comments concerning this instruction book. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the instruction book part number, the paragraph or figure number, and the page number.

Send your comments to:

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Attn. Support Engineering

Record of Revisions

RETAIN THIS RECORD IN THE FRONT OF MANUAL.
ON RECEIPT OF REVISIONS, INSERT REVISED PAGES IN THE MANUAL, AND ENTER DATE INSERTED AND INITIALS.

ASSIGNED TO (JOB TITLE)	LOCATION

PAGE NO.	SECTION	REVISION DATE	BY	PAGE NO.	SECTION	REVISION DATE	BY
5 & 6	PART 2 KITS	23 JUL 84	R. HALL				

HF-80 10kW and 1 kW TRANSMITTER SYSTEM

AND RECEIVER SYSTEMS FOR

AUSTRALIAN ARMY

GENERAL INTRODUCTION:

For the reader's convenience this instruction book has been structured into four (4) parts, namely:

HF-80 10-kW Transmitter Systems and Accessories;

HF-80 1-kW Transmitter Systems and Accessories;

HF-80 Receiver Systems;

Common Equipment

However, actual installations may be composite of the above systems. From reading the individual equipment descriptive and installation details it will be apparent that common connection and signalling methods are used throughout all systems.

Rockwell-Collins engineering advice is available in cases where further variations in installation configuration are required.

AUSTRALIAN ARMY HF-80 SYSTEMS

PART 1: 10kW TRANSMITTER SYSTEM

List of Associated Publications

Title	Part No.
Collins Instruction Books:	
HF-8022 10kW Power Amplifier	523-0767442
HF-8014( ) Exciter (Parts 1 & 2)	523-0770718
HF-8093 Exciter Control	523-0770750
HF-8060 Preselector	523-0767474
HF-80 Remote Display	523-1003164
TS-8020 Maintenance Panel	523-0767514
TS-8023 PA Card Test Set	523-0768236
TS-8024 Driver Test Set	523-0770753
TS-8060 Preselector Test Set	523-0768237
Philips-T.M.C. Ltd. Handbook:	
Modem Type 9584 613 02000	9584 618 06010

INTRODUCTION

DESIGN FEATURES

The Australian Army HF-80 10-kW 4-Channel Transmitter System provides 10-kW pep or average power in the 2.0 to 29.9999 MHz frequency band.

Operating modes include ISB (UUSB, USB, LSB, LLSB), CW and AM (AME). The Systems also operate in an adjustable low-power mode where output power may be varied from 3000 to 7000 W.

The transmitter system may be operated entirely locally. However the normal local control may be extended up to a distance of 152 metres (500 feet). Remote Control facilities are also available, which enable control and monitoring of operating conditions and faults from unlimited distance, in which case a voice frequency control circuit is employed.

Additional design features are as follows:-

- Slide-in rack-mounted units.
- Maximum use of solid-state and microelectronic circuits.
- Optional bandwidth filters for the exciter.
- Flexibility in adding additional units.
- Ease of maintenance.
- Up to Four (4) independent channels.

NOTE

Whilst, for convenience, this handbook separately describes 1kW and 10kW Transmitter Systems, a combined system containing both 1 kW Transmitters (HF 8022/HF8030) and 10kW Transmitters (HF 8022) may be installed, and operated by a Common control system, provided that all Exciters and all Remote Controls are of the same type. In the case of four channel equipment, type HF 8014A Exciter and type HF 8039 Exciter Control meet this requirement.

STRUCTURE OF PART 1 OF THIS INSTRUCTION BOOK:

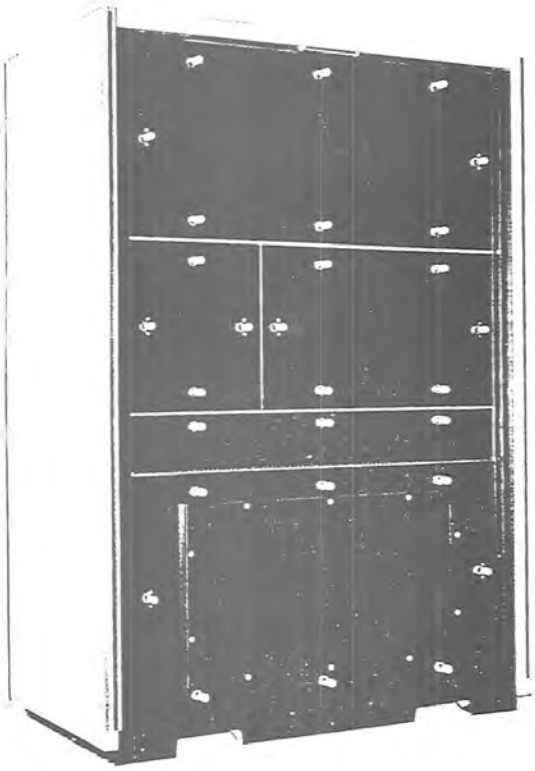
This part is subdivided as follows:-

Australian Army HF-8154A Transmitter System:

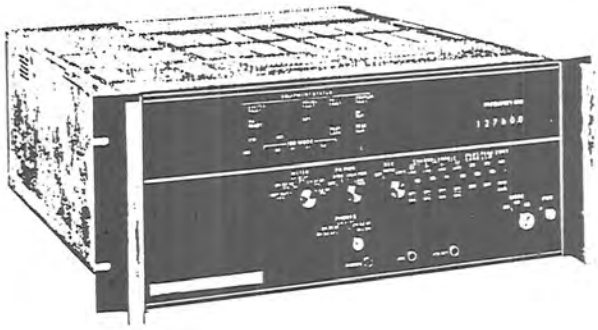
Description
Installation
Operation
Theory
Maintenance
Parts List

Australian Army Accessories and Kits:

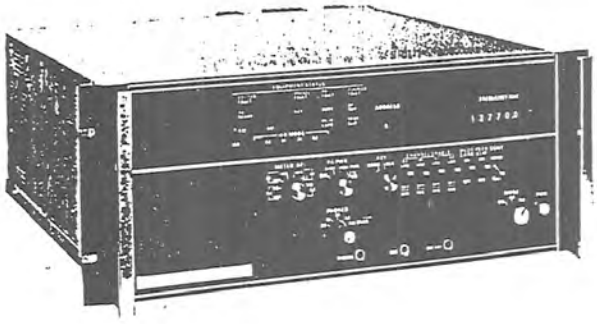
Each component of which contains Description, Installation, Operation, Theory, Maintenance and Parts List information as appropriate.



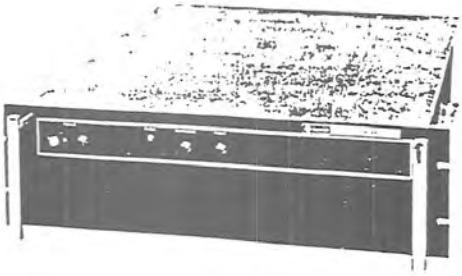
HF-8022
10-kW POWER
AMPLIFIER



HF-8014A
EXCITER



HF-8093
EXCITER
CONTROL



HF-8060
PRESELECTOR
(OPTIONAL)

HF-80 10-kW Transmitter System Equipment

DESCRIPTION

10-kW TRANSMITTER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

DESCRIPTION

Printed in Australia

523-1003173-0012M1

1 October, 1981

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1. GENERAL.

The HF-80 10-kW Transmitter System provides 10-kW pep or average output power in the 2.0000 to 29.9999 MHz frequency range. The transmitter system may be operated in the low-power mode where the output may be adjusted from 3000 to 7000 watts. Emission modes include 4-channel ISB (UUSB, USB, LSB, LLSB), AME and CW.

The HF-8154A 10-kW Transmitter System is a locally-controlled 4-Channel system when using the HF-8014A Exciter and HF-8022 10-kW Power Amplifier, and a remotely-controlled system when using the HF-8093 Exciter Remote Control. By means of the Master Control Switch the system may be controlled from either one of two alternative sites.

WARNING

The HF-80 10-kW Transmitter System 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 the U.S. Occupational Safety and Health Administration (OSHA) recommended maximum limits.

2. EQUIPMENT SUPPLIED:

The equipments supplied with the HF-8154A 10-kW Transmitter System are listed and described in Table 1.

3. ASSOCIATED EQUIPMENT:

Table 2 lists the equipments associated with the HF-8154A 10-kW Transmitter System, as well as their function and description.

4. ACCESSORIES:

Table 3 lists the accessories available with the HF-8154A 10-kW Transmitter System as well as their function and characteristics.

5. OPTIONS:

Table 4 lists options available for the HF-8154A 10-kW Transmitter System, as well as their function.

6. EQUIPMENT SPECIFICATIONS:

Table 5 lists the specifications for equipments that comprise the HF-8154A 10-kW Transmitter System.

TABLE 1 : EQUIPMENT SUPPLIED/CONFIGURATION

EQUIPMENT	COLLINS PART No.	DESCRIPTION
HF-8014A Exciter	622-3473-001	Provides 100-mW rf output for AME, ISB, and CW modes over the frequency range of 1.6000 to 29.9999 MHz in 100-Hz steps. HF-8014A provides 4-Channel operation and can be locally or remotely controlled. Preselector interface at rear panel.
HF-8022 10-kW Power Amplifier	622-3382-001	Provides a full 10-kW rf power output over the frequency range of 2.0000 to 29.9999 Mhz. The HF-8022 also has a low power operational capability, adjustable from 3000 to 7000 watts. The operating frequencies are selectable in 100-Hz, 10-Hz, 1-Hz steps depending upon the options elected in the hf system exciter. The HF-8022 is totally compatible in operator-attended installations or fully automated remote communications stations.
HF-8093 Exciter Control	622-3476-001	Provides remote control capability of from 1 to 16 HF-8014A exciters. Control unit also accepts monitor information that continually indicates the status of the unit under control. Basic unit controls AM (AME), ISB (LLSB, LSB, USB, UUSB), and CW modes of operation over the frequency range of 1.6000 to 29.9999 MHz in 100-Hz steps. Standard filters controlled are 2.85 kHz (USB and LSB). Remote control of exciter is by FSK, RS-232C, or MIL-STD-188C.

TABLE 1 : EQUIPMENT SUPPLIED/CONFIGURATION

EQUIPMENT	COLLINS PART No.	DESCRIPTION
HF-8060 Preselector	622-3386-001	May be used between Exciter output and Power Amplifier to remove unwanted frequency products of the synthesized frequency generator. Tuning is controlled by the Exciter.
Data Modem	---	Philips-TMC type 9584 613 0200. Translation of signals to and from Remote Controller HF-8093 at a location remote from Exciters.
HF-80 Remote Display Unit	---	Displays operating condition of up to 16 remotely controlled transmitters, as well as fault indication. Each unit contains four (4) displays, and consists of:
	631-0954-001	Module Frame
	631-1024-001	Display Module
	631-0955-001	Interface Unit
	631-1018-00X	Cables Kit, and
	631-1027-00X	Front Panel.
Fault Alarm Panel	631-1143-002	Takes output from Remote Display Unit and provides indication of an equipment fault.
Master Control Switch	631-1096-001	Allows system or part of system to be operated from either of two locations.
Power Distribution Unit	631-1151-00X	Provides mains input connection, circuit breakers for equipment and a standard Aust. mains outlet.

TABLE 2 : HF-80 1-kW TRANSMITTER SYSTEMS ASSOCIATED EQUIPMENT

EQUIPMENT	FUNCTION	CHARACTERISTICS
Headphones	Provide headphone monitoring of the transmit audio.	Standard 600-ohm head-phones.
Microphone	Provides voice audio input for voice transmissions.	200-ohm microphone
CW Key	Provides CW key for CW transmissions.	
Interconnecting Cables	Cables necessary for system operation.	
Balun.	Balanced/unbalanced change and impedance changes in antenna feed.	
Antenna	Transmits	10-kW hf capability.
Connector Kit	rf output.	

TABLE 3 : HF-80 10-kW SYSTEM ACCESSORIES.

REQUIREMENT	COLLINS PART NUMBER	FUNCTION	CHARACTERISTICS
AC-8010 CW Key	622-3415-001	Keys transmitter for CW operation	Hand-operated CW key
AC-8011 Microphone Footswitch	622-3432-001	Keys transmitter	Foot switch for hands-free keying of microphone.
AC-8050 Standard Headphones	622-3412-001	Provide headphone monitoring of transmit and receive audio.	Standard 600-ohm headphones with sound-blocking earmuffs.
AC-8051 Lightweight Headphones	622-3413-001	Provide headphone monitoring of transmit and receive audio.	Lightweight 500-ohm headphones with comfort designed ear pieces.
Control Cable	631-0744-001	Connects Exciter J15 to Power Amplifier TB1 and TB2	rf
Coaxial Cable BNC/BNC	NPN	Connects Exciter J22 to Power Amplifier J1.	rf input to PA
Cable	NPN	For Antenna Interlock	
Cable W12	631-0962-00X	Connects Exciter J16 to Preselector J1	Refer to kit section of Instruction Book.
CA-8011 Cable Retractor	622-3420-001	Provides retraction of interconnecting cabling for slide mounted equipments	Refer to kit section of Instruction Book.
Power Distribution Unit.	631-1151-00X	Provides outlet for distribution of 240VAC Power	
Equipment Cabinet	021-M012-XXX	Enclosure for rack-mounting of HF-80 equipment.	
Equipment Console	021-M011-XXX	Enclosure for rack-mounting of HF-80 equipment, and desk.	
CA-8030 Slide Mounting Kit	622-3418-001	Slide mounting kit for HF-8093 and HF-8060 when installed in cabinets.	Refer to kit section of Instruction Book.
CA-8032 Slide Mounting Kit	622-3493-001	Slide mounting kit for HF-8014A when installed in cabinets.	Refer to kit section of Instruction Book.

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TABLE 3 : HF80 10-kW System Accessories, (Cont'd)

REQUIREMENT	COLLINS PART NUMBER	FUNCTION	CHARACTERISTICS
Special Test Accessories			
TS-8010 Card Extender Kit	622-3431-001	Provides adapters to extend HF-8014A and HF-8093 cards and modules beyond the chassis for troubleshooting.	Includes a 130-pin edge-on connector extender (635-0913-001); 56-pin edge-on connector extender (635-0915-001); rf module extender (635-0915-002); synthesizer extender (637-2843-001); seven subminiax coaxial extenders (635-9686-001); and subminiax to BNC coaxial extender (635-9686-002).
TS-8010 Card Extender Kit	622-3431-002	Provides adapter to extend HF-8093 cards beyond the chassis for trouble-shooting.	Includes a 130-pin edge-on connector extender (635-0913-001) and a 56-pin edge-on connector extender (635-0915-001).
TS-RDC1 Card Extender Kit	TBD	Provides adapter to extend Remote Display Unit Cards.	Extender for two (2) cards 631-1066-001 and 631-1068-001).
TS-8021 Maintenance Panel	622-3397-001 622-3397-002	Operates and tests HF-8022 during installation checks and trouble-shooting.	-001 version for installation in the HF-8022 -002 version for rack-mount installation.
TS-8022 Universal Card Extender	622-3430-001	Extends circuit cards from the chassis for testing and troubleshooting.	
TS-8023 PA Card Test Set	622-3458-001	Provides test capability for all HF-8022 circuit cards and TS-8021 Maintenance Panel.	

TABLE 4 : HF-80 10kW TRANSMITTER SYSTEMS OPTIONS

OPTION	COLLINS PART NUMBER	FUNCTION
AC-8012 Oven Standard Kit	622-3460-001	Internal oven frequency standard with a stability of 1 x 10(-8) over the specified operating temperature range. Implemented by adding oven oscillator assembly (637-9135 -001), 2-wire cable harness, a coaxial cable, and an external phase-lock card (634-0655-001). Applicable to the HF-8014A.
AC-8013 External Reference Standard Kit	622-3461-001	Permits operation from an external frequency of 100-kHz, 1-MHz, or 5-MHz as desired. Implemented by adding a coaxial cable harness with rf connector mounted on rear panel, and installing an external phase-lock card (635-0655-001). Applicable to HF-8014A.
AC-8014 Frequency Display Kit (10 and 100 Hz)	622-3470-XXX	
10-Hz frequency display kit	622-3470-001	Provides an LED display in 10-Hz increments of the frequency selected in HF-8014A, either locally or remote. In local operation this display agrees with the frequency thumbwheel setting on the HF-8014A. In remote operation this display agrees with the frequency selected on the exciter remote control.
100-Hz frequency display kit	622-3470-002	Same as 622-3470-001 except has 100-Hz increments.

TABLE 4 : HF-80 10kW TRANSMITTER SYSTEMS OPTIONS

OPTION	COLLINS PART NUMBER	FUNCTION
AC-8015 Frequency Standard Switch Kit	622-3499-001	Provides for automatic switching from an external frequency reference input to the HF-8014A oven stabilized frequency standard upon loss of the external input. Applicable to HF-8014A. AC-8012 Oven Standard Kit must be installed in HF-8014A.
AC-8017 100- to 10-Hz Tuning Conversion Kit	622-3453-001	10-Hz tuning increment capability. Implemented by installing a Synthesizer 100/10-Hz Decade Card (623-2080-004) in the A18 slot, by moving the Synthesizer End Decade Card (635-0657-001) from the A18 slot to the A17 slot, and by changing the front panel frequency switchboard from 635-0830-001 to 635-0830-002 applicable to the HF-8014A.
AC-8017A Control Unit 100- to 10-Hz Tuning Conversion Kit	622-3453-002	NOTE The AC-8017A is required for the HF-8093 when the AC-8017 is installed in the HF-8014A. Expends frequency tuning increments of the HF-8093 from the normal 100-Hz steps to 10- Hz steps. Implemented by changing the front panel frequency switch- board from 635-0830-001 to 635-0830 -002 and changing the front panel frequency display from 637-1781-001 to 637-1781-002.

TABLE 4 : HF-80 10kW TRANSMITTER SYSTEMS OPTIONS

OPTION	COLLINS PART NUMBER	FUNCTION
AC-8019 10- to 1-Hz Tuning Conversion Kit	622-3455-001	NOTE The optional 1-Hz tuning capability is recommended on processor controlled units only. Implemented by installing two synthesizer 100/10-Hz Decades 623-2080-004, one in the A18 slot and one in the A17 slot, by moving the Synthesizer End Decade 635-0657-001 from the A18 slot to the A16 slot; and by changing the front panel frequency switchboard from 635-0830-001 to 635-0830-002. Applicable to HF-8014A.
AC-8020 Serial Control Card	622-3482-001	Provides access to digital and analog monitor information, and also control of the power amplifier independent of the exciter, for diagnostic fault isolation when used with processor control. Applicable to HF-8022.
AC-8021 Remote Wattmeter Panel	622-3483-001	Monitors forward and reflected power as measured by the directional coupler of the HF-8022 10-kW Power Amplifier.
CA-8021 Trim Kit	622-3424-001	Left and right side panels for HF-8022 10-kW Power Amplifier.
CA-8023 Trim Kit	622-3426-001	Front access door panel for the HF-8022 10-kW Power Amplifier.
CA-8025 Trim Kit	622-3436-001	Rear panel and top cover for the HF-8022 10-kW Power Amplifier.

TABLE 5 : HF-80 10-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
Physical	
Size	
HF-8014A Exciter	176.8mm (7 in) high,483mm (19in) wide, 574mm (22.6 in) deep (with handles).
HF-8022 10-kW Power Amplifier	No trim: 1751 mm (68.94 in) high 1168 mm (46 in) wide, 635 mm (25 in) deep. Full trim: 1753 mm (69 in) high, 1237 mm (48.72 in) wide, 635 mm (27.75 in) deep.
HF-8060 Preselector	132.6mm (5.22 in) high, 483mm (19 in) wide, 484mm (23 in) deep (with handles)
HF-8093 Exciter-Control	176.8mm (7 in) high, 483mm (19 in) wide, 524mm (20.6 in) deep (with handles).
021-M012-010 Cabinet -	1753 mm (69 in) high, 535 mm (21 in) wide, 981 mm (31 in) deep.
with side panels	1753 mm (69 in) high, 586 mm (23 in) wide, 818 mm (32 in) deep.
021-M012-010 Console with side panels, including desk.	1546 mm (61 in) high, 586 mm (23 in) wide, 1175 mm (46 in) deep.
Weight:	
HF-8014A Exciter	21.8 kg (28 lb)
HF-8022 10-kW Power Amplifier	No trim: 753 kg (1660 lb) Full trim: 848 kg (1870 lb)
HF-8060 Preselector	12.2 kg (27 lb).
HF-8093 Exciter Control	13.2 kg (29 lb)

TABLE 5 : HF-80 10-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
Environmental	
Temperature	0 to +55deg C (+32 to +131 deg F). full performance. -57 to + 70 deg C (-71 to +158 deg F) non-operating.
Humidity	0 to 95% relative at +30 deg C. (+86 deg F).
Altitude	Up to 3048m (10 000 ft) at +55+/-C (+131+/-F), operating; up to 4572 (15 000 ft) at +25+/-C (+77+/-F), operating; up to 12 192 m (40 000 ft), nonoperating
Shock	NOTE
HF-8022 Power Amplifier	Shock test performed with equipment not operating during test but operational after test. Test performed on power amplifier without trim panels and front door. Three impacts in each direction planes, except vertical from top for a total of 15 impacts. Each impact 15-g average and 11-ms duration.
Exciters/Controls	Bench handling (MIL-STD-810C), procedure X, method 516-2)

TABLE 5 : HF-80 10-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
Vibration	Test performed without trim panels or front door on power amplifier in vertical, horizontal front-to-back, and horizontal side-to-side planes. Unit vibrated from 5 to 55 Hz in discrete intervals of 1 Hz as follows: 5 to 15 Hz, 0.76mm (0.03 in) double amplitude sinusoidal input. 16 to 55 Hz, 0.51mm (0.02 in) double amplitude sinusoidal input.
Electrical General Modes of Operation	
4-channel	Transmit-A3B/A9B/A3J (ISB), A3/A3H (AME), and A3A (pre-inserted pilot Carrier).
Frequency Stability	Not less than 5 x 10(-7) over specified temperature range; drift rate of not more than 3 x10(-8) per week. Optional oven standard provides not less than 1 x 10(-8) over specified temperature. External reference standard option provides stability of the 100-kHz, 1-MHz, or 5-MHz external standard used.
Duty Cycle	Continuous

TABLE 5 : HF-80 10-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
Primary Power	
HF-8014A Exciter	100, 115, 215, 230 +/-10%, V ac, 47 to 420 Hz, single phase, 80 W maximum.
HF-8022 Power Amplifier	The HF-8022 can be operated from power sources of 198- to 255-V ac or 343- to 442-V ac, 3 phase, 3 or 4 wire, 47 to 63 Hz source power systems by changing transformer strapping. nominal voltages are 208/360, 225/390, and 243/422 V ac +/- 5%. Maximum power 23000 W at 0.95 pf. Aust. Army equipment is strapped for 415 V ac when delivered from the factory.
HF-8060 Preselector	100/115/215/230 V ac +/-10%, 47 to 63 Hz, single phase, 50W maximum.
HF-8093 Exciter Control	100, 115, 215, or 230 V ac +/-10%.
Transmit	
Frequency Range	2.0000 through 29.9999 MHz, 100-Hz tuning increments; 10 or 1 Hz optional.
Frequency tune time	6 seconds nominal, 10 seconds maximum.
RF output	High power: 10-kW pep or average Low power: 3000 to 7000 W, adjustable.
Antenna output impedance	50 ohms, unbalanced: 3:1 vswr, maximum.
RF protective circuits	Internal gain control: protects amplifier from damage due to overdriving or abnormal tuning. Reflected power: unkeys amplifier when reflected power is greater than 3300 W.

TABLE 5 : HF-80 10-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
	Antenna interlock: prevents amplifier keying if an rf load is not present.
Audio circuits	
4-channel (all channels when in ISB)	Line input: 600 +/-10+/- ohms, balanced, 0 dB mW, nominal for full rated output; adjustable between -26 and +10 dB mW.
Microphone	Dynamic type: 200 +/-10% ohms, unbalanced, -55 dB mW nominal, for rated output from power amplifier, compression range 30 dB minimum.

10-kW TRANSMITTER SYSTEM

for

AUSTRALIAN ARMY

Rockwell International

INSTALLATION

Printed in Australia

523-1003174-0012M1

1 October, 1981

table of contents

1. GENERAL

This instruction book provides a guide to the overall installation. Installation details which relate to individual equipments are included in the relevant equipment instruction books.

WARNING

The HF-80 10-kW Transmitter Systems contain 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 the U.S. Occupational Safety and Health Administration (OSHA) recommended maximum limits.

2. UNPACKING AND INSPECTION

WARNING

The equipments of the HF-80 10-kW Transmitter Systems are heavy. Use adequate man power and the proper mechanical lifting devices to move the equipments.

The equipments should be unpacked and handled with care. Inspect the equipment for damage caused during shipment. In case of damage, notify the transportation agency immediately. Check the equipment against the packing list. Save all boxes, fillers, and original packing containers for use when the shipment is repacked for storage or reshipment.

Refer to individual equipment instruction books for relevant unpacking and inspection requirements.

Inspection procedures for the HF-8022 Power Amplifier are included in the HF-8022 Instruction Book, Installation, page 13.

When unpacking, locate and retain the Test Data Sheet for each particular equipment.

3. PREINSTALLATION CHECK/REQUIREMENTS

Preinstallation checks/requirements consist of input power strapping and ensuring adequate cooling for the HF-8022 10-kW Power Amplifier, and input power, transmission, audio input, and optional external frequency standard strapping for the HF-8093 Exciter Control.

Perform the procedures in paragraph 3 that apply to the equipments in the HF-8154A 10-kW Transmitter Systems.

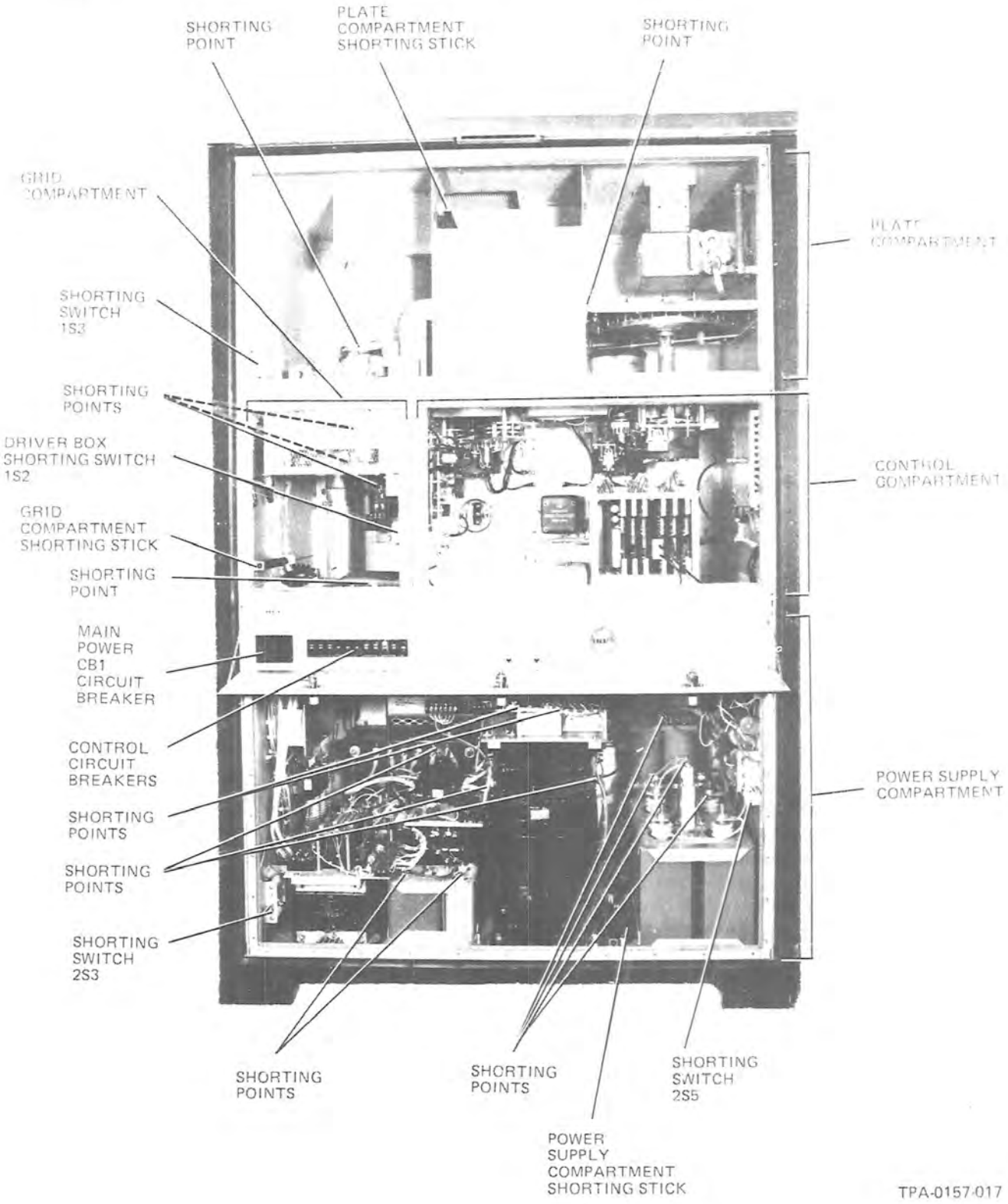
WARNING

For the safety of all personnel concerned, read and thoroughly understand the contents of paragraph 3.1, safety considerations and safety features. The extremely high voltages involved with the 10-kW power amplifier make it mandatory that installation, operating, and maintenance personnel become fully aware of all potential hazards. Installation, operating, and maintenance personnel should also fully understand the capabilities and limitations of the safety features of the power amplifier and practice the recommended safety precautions and procedures to prevent death, severe shocks, severe burns, and other serious injury.

3.1 HF-8022 Safety Considerations and Safety Features

Extremely high voltages (up to 6500 V dc), present within the power amplifier, can cause death, severe shocks, severe burns, or other serious injuries to personnel working with the power amplifier. The power amplifier contains high-voltage shorting switches (shown in figure 1) and control interlock switches that turn off the high voltage and short high-voltage circuits to ground whenever a compartment door is opened. Large capacitors and filters in the power amplifier may retain dangerous high-voltage charges for extended periods of time. Do not depend totally on the bleeder resistors in the power amplifier to completely remove the high-voltage charges. While the high-voltage shorting and control interlock switches are extremely reliable, it is mandatory that the shorting sticks (figure 1) be used to discharge all potentially hazardous high-voltage points before reaching into any compartment. The minimum recommended points to be shorted are shown in figure 1. The following recommendations should be adhered to before working inside the power amplifier cabinet.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.1 HF-8022 Safety Considerations and Safety Features



Power Amplifier Safety Features and High-Voltage Shorting Points
Figure 1

3. PREINSTALLATION CHECK/REQUIREMENTS
3.1 HF-8022 Safety Considerations and Safety Features

a. The installation site primary power source should have a circuit breaker installation, which is clearly labelled and can be turned off and locked.

b. There should always be more than one person in the area when maintenance work on the power amplifier is being performed.

c. High-voltage gloves should be readily available and their location known to all applicable personnel.

d. Remove wristwatches, rings, bracelets, medallions, etc, before working in any of the compartments. A slight voltage charge on a capacitor or coil, in itself not dangerous, can cause an injury when recoiling from a slight shock.

e. MAIN POWER CB1 circuit breaker (figure 1) should be turned off before opening any compartment. CB1 controls the primary power input to the cabinet and the line inputs to all of the other circuit breakers.

f. Three shorting sticks (figure 1), one in the grid compartment, one in the plate compartment, and one in the power supply compartment, should be used to short all potential high-voltage points to ground regardless of whether the power amplifier has just been turned off or has been turned off for a significant period of time.

g. Be sure that the metallic rod portion of the shorting stick contacts both the high-voltage point and chassis ground or goes across both terminals of an oil filter capacitor. This is the surest method of shorting the high- voltage point. There is always a possibility that the twin-wire cord on the shorting stick could become defective (such as high-current damage by attempting to short an active high-voltage circuit) and not provide a good ground.

h. In the event that a shorting stick is used on an active power circuit (that is, one of the primary power lines) and carries a heavy current, it should be considered unsafe for further use and replaced immediately or proven to be safe for future use. No further work should be performed in the compartment until the shorting stick has been replaced or tested.

3. PREINSTALLATION CHECK/REQUIREMENTS

3.1 HF-8022 Safety Considerations and Safety Features

i. The red plastic covers in the grid and control compartments should be kept in place unless troubleshooting or maintenance work specifically requires their removal. When they must be removed, always use the shorting stick on the feedthrough filter capacitors. The control compartment has no shorting stick; therefore, a plastic-handled screwdriver may be used by grounding the end first, then touching the screwdriver shaft to each feedthrough capacitor. 1C36 and 1C37 carry 225 V ac; all others carry 30 V dc or less.

j. The control compartment contains four servo assemblies that consist of gears and belt pulleys driven by high-torque dc motors. These servo assemblies are only active during the tune cycle. Care must be exercised not to get any part of the body or clothing caught in the moving gears, pulleys, and belts on the servo assemblies.

k. Do not work on the power amplifier if it is connected to an antenna when an electrical storm is anywhere near.

l. Read the entire installation section of this and the HF-8022 instruction books before attempting to install or operate the power amplifier.

m. Do not assume - be sure. Make certain that conditions are completely safe before reaching into any compartment.

3.2 HF-8022 Physical Characteristics

The HF-8022 10-kW Power Amplifier must be installed in a shelter that will provide all-weather protection. The floor of the shelter must support 848.1 kg (1870 lb) per equipment. Clearance must be provided for electrical connections, cooling, ducting, and access for operation and maintenance.

Space requirements, weight, mounting dimensions, and air duct connections for trimmed and untrimmed equipment are shown in figure 2, Installation section, of the HF-8022 instruction book.

Prior to moving the HF-8022 into its permanent operating location, the requirements of paragraphs 3.3 through 3.5 must be satisfied. If it is desirable, or necessary, to unpack the HF-8022 immediately upon receipt, unpack the unit at a point as close as possible to the permanent installation location that will allow access for inspection, ducting, cabling, and power amplifier tube installation. Perform all of the unpacking and inspection procedures of paragraph 3.1.,Installation, HF-8022 Instruction Book.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.2 HF-8022 Physical Characteristics

WARNING

Large filters and capacitors in the HF-8022 retain dangerous high-voltage charges for extended periods of time. Always discharge potential high-voltage points with the shorting sticks before reaching into any of the HF-8022 compartments.

3.3 HF-8022 Cable Entry Requirements

The HF-8022 is supplied with provisions for overhead power and control cable entry on the sides of the unit. Conversion for floor trench cable entry requires no additional hardware. The conversion for floor trench power cable entry is as follows:

a. Remove the Phillips-head screws that secure the power cable cover to the left side of the unit (viewed from the front of the unit).

b. Remove the cover, turn it upside down, and place it over the screw holes that will allow it to be as close to the cable entry point as practical.

c. Secure the cable box with the Phillips-head screws.

d. The conversion for floor trench control cable entry takes the same procedure as used for power cable entry. Change the control cable cover, on the right side of the equipment, as specified in steps a, b, and c above.

3.4 HF-8022 Primary Power Requirements

The HF-8022 is factory wired for a 3-phase, wye-configured, 415-V ac +/- 5% input power source. The HF-8022 can be operated from power sources of 198- to 225-V ac or 343- to 442-V ac, 3-phase, 3- or 4-wire, 47- to 63-Hz source power systems by changing transformer strapping. Nominal voltages are 208/360, 225/390, and 243/422 V ac +/- 5%. Strapping information, for changing the factory wired configuration to coincide with the installation site source power system, is contained in paragraph 3.6.

3. PREINSTALLATION CHECK/REQUIREMENTS

3.4 HF-8022 Primary Power Requirements

CAUTION

If the installation site input power source is not 3-phase with a nominal line-to-line voltage of 415 V ac, the HF-8022 must be restrapped before it is connected to the input power source or serious damage to the unit may occur.

CAUTION

The correct phase sequence must be observed when making connections to the 3-phase power supply. Failure to do so will cause the blower to run in reverse direction and to provide inadequate cooling. The air interlock switch will then prevent start-up.

The station primary power-line drop to the power amplifier should have current protection of not less than 100 amperes per line for any primary voltage combination.

3.5 HF-8022 Cooling

The HF-8022 has a convertible cooling (air) system that requires no additional hardware to be adapted to meet specific installation site requirements. For further details, including the provision of external ducting, see HF-8022 Instruction Book, Installation, page 4.

If external air ducts are to be used, the external duct design procedures of paragraphs 3.5 in the HF-8022 Instruction Book, under Installation, should be performed before the power amplifier is moved into the permanent location in the installation.

3.6 HF-8022 Transformer Strapping

Before connecting the HF-8022 to the installation site primary input (source) power, it is mandatory that the transformers and blower motor be strapped to coincide with the source power available.

Australian Army systems are strapped for 415 V ac 3-phase power supply. It is essential that correct phasing sequence be followed. Failure to connect correctly will result in the blower running in the reverse direction, which will provide inadequate cooling. The air interlock switch will then prevent start-up. For further details of transformer strapping, refer to Installation, page 19 in the HF-8022 Instruction Book.

3. PREINSTALLATION CHECK/REQUIREMENTS

3.7 Exciter and Remote Control Cooling

The exciters and remote control units of the HF-80 10-kW Transmitter operate with natural convective cooling in single-unit installations. In multiple unit installations or where other heat-producing equipment is installed in the same cabinet, it is recommended a cabinet blower (CA-8027) be installed to prevent excessive temperature buildup.

3.8 Exciter and Remote Control Strapping

The exciters and remote control units of the HF-80 10-kW Transmitter Systems are strapped for input power, transmission between exciters and remote control units, audio input/output, and for the optional external frequency standard.

3.8.1 Input Power

CAUTION

Do not remove or install plug-in cards or modules with power on. Damage to the cards or modules may result.

Do not operate the primary input voltage selector switches with power applied. Be sure switches are in proper position with proper fuse installed before applying power. Connect the ground terminal located on the rear panel to a ground strap that is securely connected to earth ground. (Ground strap should be no 14 AWG or larger).

Switches are provided for strapping the units for desired primary input power. The units may be operated from 100, 115, 215, or 230 V ac nominal input. In the lower left corner of the rear panel of the units, set the primary input voltage selector switches to the position corresponding to the value nearest the primary input voltage. Figure 2 shows the switches set to the 230 V position.

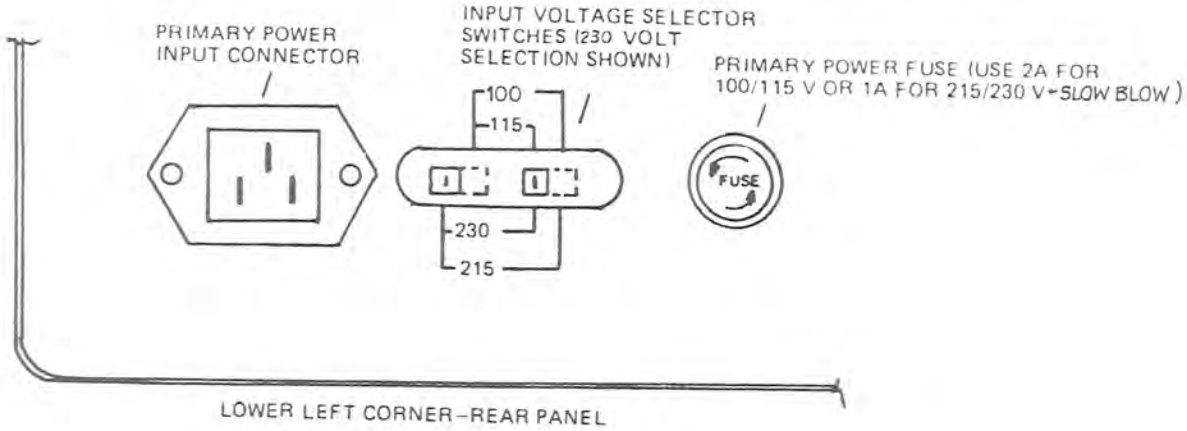
3.8.2 Data Transmission and Address Strapping (HF-8014A with HF-8093)

Both the exciter and the associated exciter control must operate at the same baud rate, signalling method and word format. This is accomplished by the proper strapping of the serial interface card in the HF-8014A and the HF-8093, using the dipswitches provided. Figure 3 shows the strapping requirements on the serial interface card. The switches set the baud rate, FSK/RS-232C signalling, word format, EIA/MIL-STD-188C polarity, parity, number of stop bits, exciter or exciter control and address enable/disable.

NOTE

In the systems supplied for the Australian Army, the Serial Interface Card is strapped for 1200 baud operation, EIA/RS-232C transmission, ASCII mode, odd parity, with two stop bits.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.8 Exciter and Remote Control Strapping



Primary Input Voltage Selector Switches
Figure 2

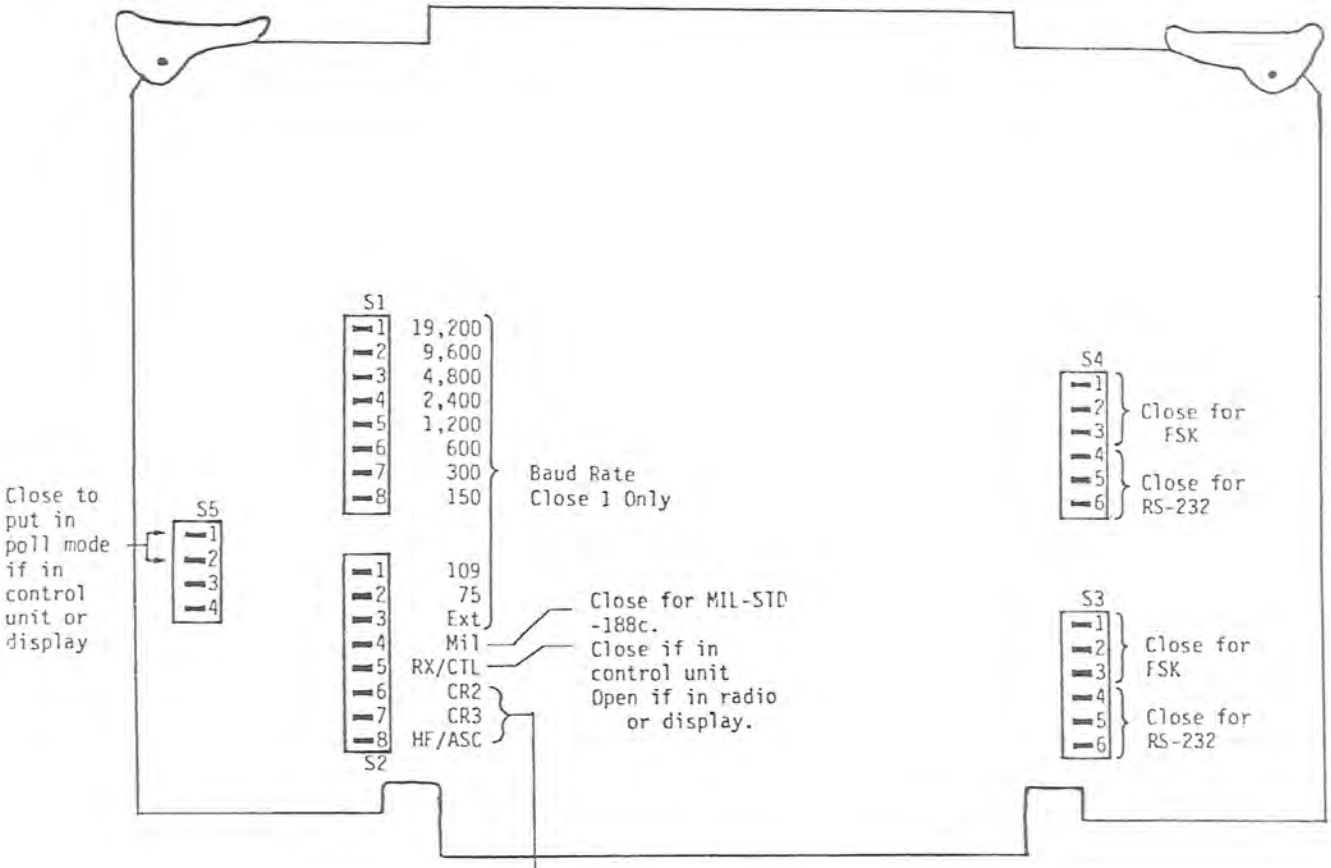
The ADDRESS switch on the HF-8093 Exciter Control front panel develops a 4-bit binary output. Each exciter must be strapped at the interconnecting connector J14 to correspond to the address pattern for that unit.

When an HF-80 Remote Display is installed, in order to continually display the status of several equipments the serial interface card in the control unit and the remote display unit must be strapped for polling (see figure 3).

For further strapping details refer to the HF-8014A and HF-8093 instruction books.

3. PREINSTALLATION CHECK/REQUIREMENTS

3.8 Exciter and Remote Control Strapping



*SWITCH			WORD FORMAT	PARITY	NO OF STOP BITS
8	7	6			
C	C	C	ASCII	Even	2
C	C	O	ASCII	Odd	2
C	O	C	ASCII	Even	1
C	O	O	ASCII	Odd	1
O	C	C	HF-80	None	2
O	C	O	HF-80	None	1
O	O	C	HF-80	Even	1
O	O	O	HF-80	Odd	1

*O = Open, C = Closed

NOTE: For polling system the card must be strapped for RS-232C data transmission.

Figure 3 Strapping Requirements on the Serial Interface Card

3. PREINSTALLATION CHECK/REQUIREMENTS
3.8 Exciter and Remote Control Strapping

3.8.3 Control Lines and Digital Modem Interface

When remote control is required over long distances or when control signals must use audio circuits, the FSK mode is used. To control multiple exciters an RS-232C or MIL-STD-188C dc signal must be used. An external digital modem allows dc signals to be used locally and translates these signals to FSK tones for long distance use. One modem is located physically near the exciter. The two modems may be interconnected using two wire pairs or a duplex voice circuit. By using separate FSK tones, additional circuits may be added to the audio channel.

Table 1 shows the interconnections between the remote control and a typical digital modem using RS-232C signal levels.

Table 2 shows the interconnections between the exciters and a digital modem using RS-232C signal levels. Up to 16 exciters may be connected to one interface circuit.

An external frequency standard may be used providing the external phase-lock card and oscillator assembly are installed on the synthesizer reference module and providing the appropriate straps are in place (refer to AC-8012 Oven Standard Kit and AC-8015 Frequency Standard Kit details in the HF-8014( ) Exciter book, part 2.

3.8.5 Line Audio Inputs/Outputs

The transmit line audio inputs are adjusted at the factory so that -15dB mW audio input corresponds to compression threshold. If your requirements for audio inputs/outputs are different than described, make audio line adjustments as outlined in the appropriate equipment related publication.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.8 Exciter and Remote Control Strapping

TABLE 1 : REMOTE CONTROL/MODEM, CONTROL INTERFACE CONNECTIONS

EXCITER CONTROL		DIGITAL MODEM	
CONNECTOR J14	FUNCTION	CONNECTOR	FUNCTION
		DIGITAL	
2	Control Data	2	Transmitted data
3	Monitor Data	3	Received data
14, 16	Signal return	7	Signal ground
15, 17	Chassis ground	1	Protective ground
		AUDIO	
		Cable Ident: White, Red	Voice Frequency send
		Cable Ident: Blue, Green	Voice frequency receive

NOTE

1. For connections outside the equipment cabinet, each data line must be paired with a signal return line and have a shield connected to chassis ground.
2. In the modem, strap the request-to-send line.

TABLE 2 : EXCITER/MODEM, CONTROL INTERFACE CONNECTIONS

EXCITER		DIGITAL MODEM	
CONNECTOR J14	FUNCTION	CONNECTOR	FUNCTION
		DIGITAL	
2	Control data	2	Transmitted data
3	Monitor data	3	Transmitted data
14, 16	Signal return	7	Signal ground
15, 17	Chassis ground	1	Protective ground
		AUDIO	
		Cable Ident: White, Red	Voice frequency send
		Cable Ident: Blue, Green	Voice frequency receive

NOTE

1. For connections outside the equipment cabinet, each data line must be paired with a signal return line and have a shield connected to chassis ground.
2. In the modem, strap the request-to-send line.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.8 Exciter and Remote Control Strapping

3.8.6 HF-8060 Input Power Strapping

CAUTION

Do not operate the input voltage selector switches with power applied. Be sure switches are in proper position with proper fuse installed before applying power. Connect the ground terminal located on the rear panel to a ground strap that is securely connected to earth ground. (Ground strap should be no 14 AWG or larger).

Install line fuse F1 in the HF-8060 and set line voltage switches S1 in accordance with the following table:

LINE VOLTAGE (V ac)	LOW/NOM SWITCH	115/230 SWITCH	F1 FUSE (A)
100	Low	115	2
115	Nominal	115	2
215	Low	230	1 (SLOW BLOW)
230	Nominal	230	1 (SLOW BLOW)

3.8.7 Operation

The HF-80 10-kW Transmitter Systems equipments were operating within specified standards when they were shipped from the factory. The minimum performance test, in the maintenance section of the appropriate exciter, remote control, or optional preselector instruction books, should be performed to ensure that the equipments are operating within specification before being installed into a system. The postinstallation check, HF-8022 Instruction book, Installation, page 28, should be performed on the HF-8022 10-kW Power Amplifier before connecting other equipments of the HF-80 10-kW Transmitter Systems.

3.8.8. Master Control Switch.

When system control is required from two sites, a Master Control Switch is used to allow selection of the Control point. The Control Cables from each excitor are then taken separately to the Master Control Switch. For further detail of this unit, refer to Part 4 - Common Equipment, of this instruction book.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.8 Exciter and Remote Control Strapping
3.8.7 Operation

3.8.9. Data Modem Strapping.

The Philips TMC Modem, where used, requires strapping for the correct VF Output level. The factory setting is 0 dBm. It is also necessary to strap the RTS function to ON. Refer to Philips-TMC Modem Handbook for strapping details.

4. CABLING

The following paragraphs provide information on cables necessary to connect the equipments of HF-8154A 10-kW Transmitter equipments. See also figure 4. Refer to HF-80 Accessories in this book under Description , Table 3, and Kits (rear section of this book) for further details of cables. For wiring details, refer to the HF-8154A instructions, Installation Section, figure 2.

4.1 HF-8022 10-kW Power Amplifier

Interconnecting cables between the HF-8022 and other equipments of HF-80 10-kW Transmitter Systems are determined by the particular system requirements. The following recommendations should be observed before installing the HF-8022 in the permanent operating location.

Four power cable lugs are supplied with the power amplifier for use with type AWG no 4 stranded wire. Power cable size and type of insulation must be chosen to meet routing, distance, temperature, and line voltage conditions of the installation. Voltage drop should not exceed 2 percent of line voltage. Maximum power is 24.5 kVA at 0.95 power factor. If a cable larger that AWG no 4 is needed, suitable terminal lugs must be procured. The rf input connector is a type BNC female. RG-58C/U coax cable is recommended for the rf input. Maximum recommended length is 30.5 metres (100 feet). Lower-loss cable such as RG-213/U may be used for longer distances. For ease of installation, RG-213/U cable should be reduced to RG-58C/U at the entry point to the power amplifier. A type BNC connector for RG-58C/U is supplied with the unit. If RG-213/U is used, a suitable connector/adapter must be procured.

The rf output connector on the HF-8022 is an EIA 1-5/8-inch flange. The rf output cable should be an EIA 1-5/8-inch, 50-ohm coaxial cable or equivalent terminated at the power with an EIA 1-5/8-inch connector. The cable must be capable of handling 10 kilowatts of true forward power, at 3:1 vwsr, at a frequency of 30 MHz, and must provide an acceptable loss for the distance required to the antenna.

The system control lines may be terminated at the HF-8022 with crimp lugs that are supplied.

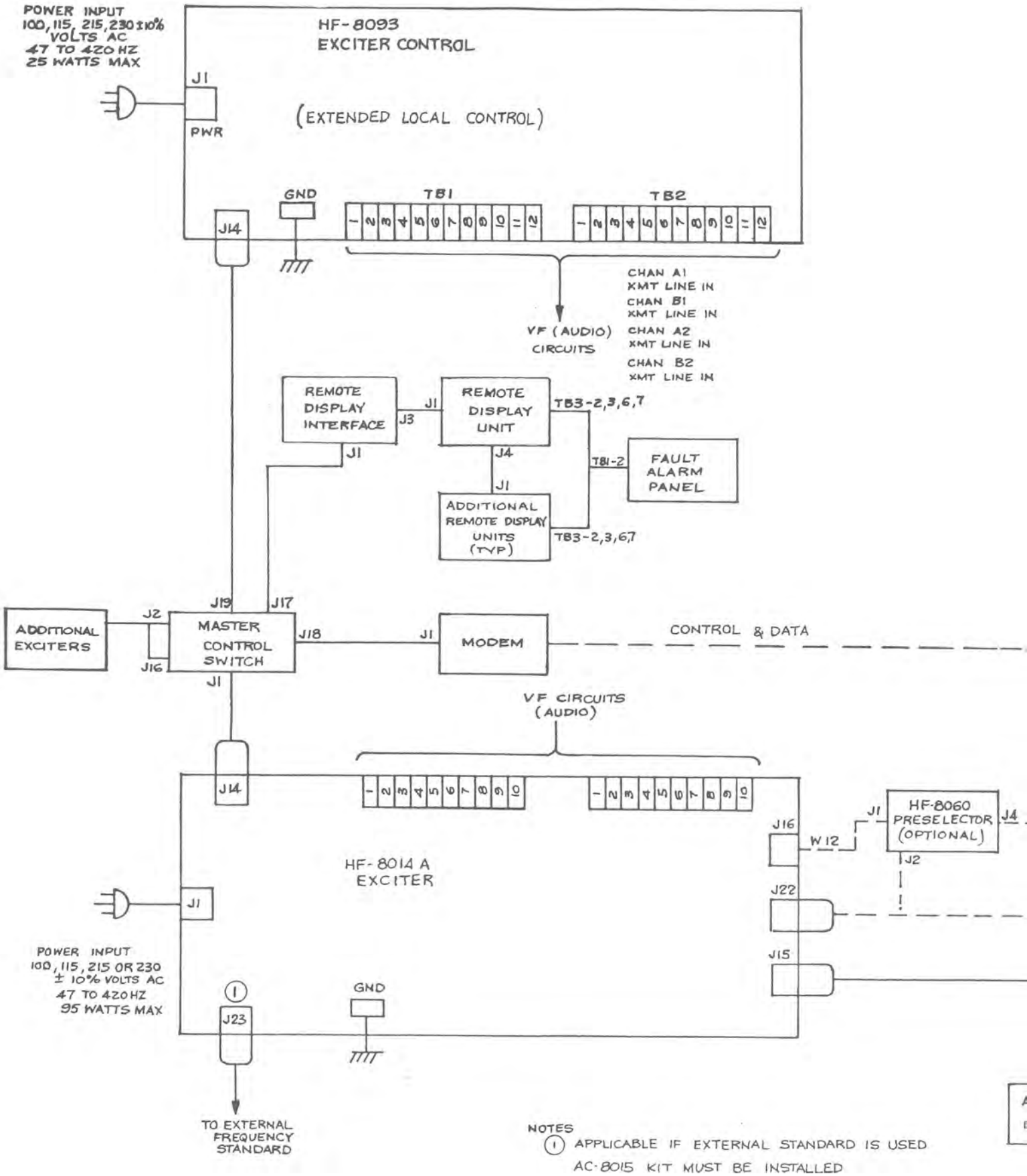
Auxiliary interlocks may be connected between 1A18TB1-13 and 1A18TB1-14. If anungrounded antenna is used, IAI8TBI-13 must be returned to IAI8TBI-2. If no auxiliary interlocks are required, jumper 1A18TB1-13 to 1A18TB1-14. An open circuit in the antenna interlock circuit will prevent the HF-8022 from keying.

WARNING

To ensure safety of personnel and equipment, a method of shunting lightning energy to ground must be provided in the external path.

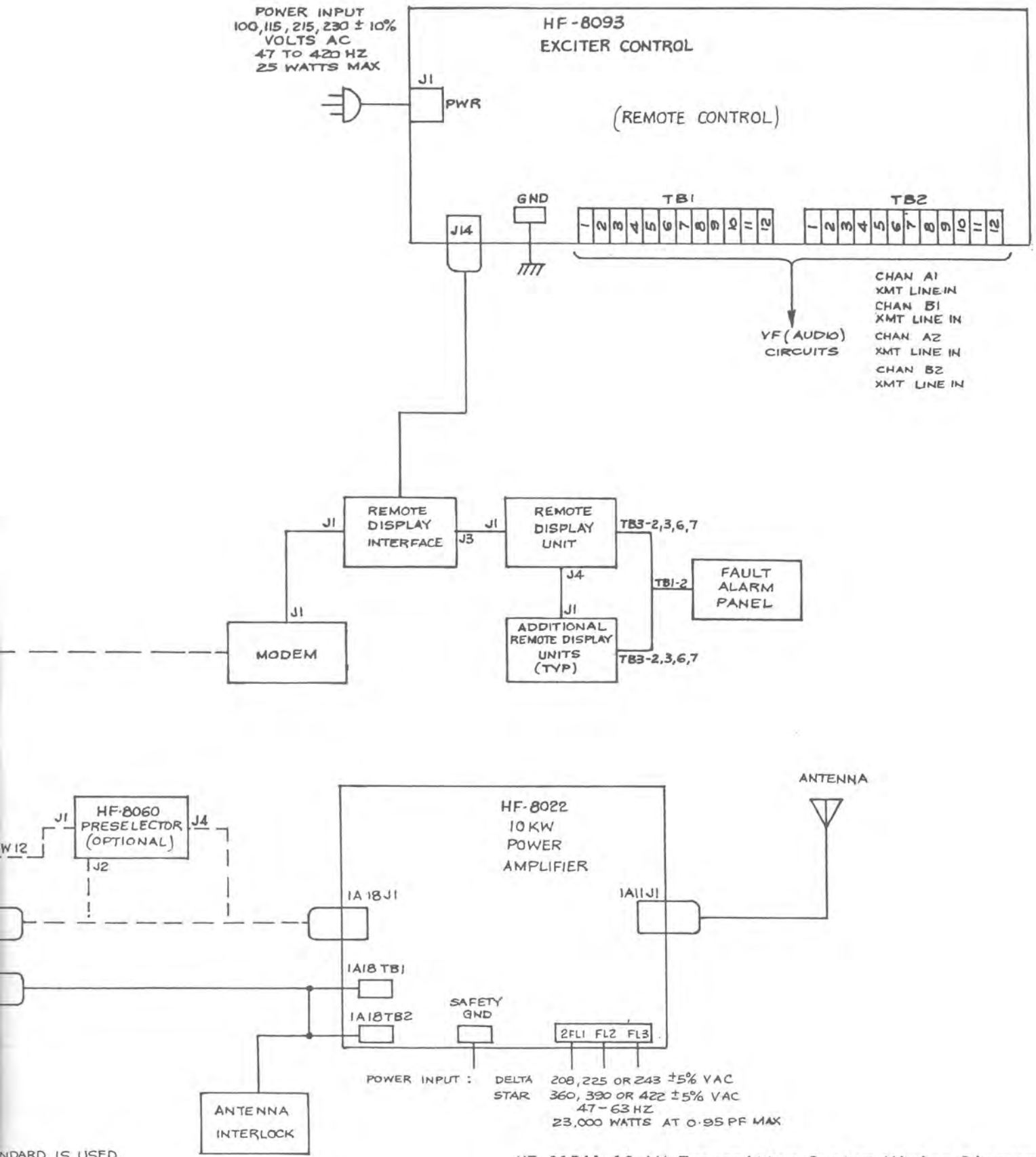
4. CABLING

4.1 HF-8022 10-kW Power Amplifier



NOTES

(1) APPLICABLE IF EXTERNAL STANDARD IS USED
AC-8015 KIT MUST BE INSTALLED



HF-8154A 10-kW Transmitter System Wiring Diagram
Figure 4

4. CABLING

4.1 HF-8022 10-kW Power Amplifier

The HF-8022 cabinet should be grounded to the transmitter station ground. Use minimum 50 mm (2-in) wide braided copper ground strap (or equivalent). Connect the ground strap to one of the large bolts in the base of the HF-8022.

4.2 Exciter to Exciter Control

Maximum allowable separation between the exciter control and the exciter is dependent upon the characteristics of the transmission lines used, the method of signaling, and the transmission data rates selected. When using RS-232C or MIL-STD-188C signaling, maximum line length should be not more than 152 m (500 ft). Where longer distances exist between exciter and exciter control, digital modems may be employed (refer paragraph 3.8.3).

Preassembled cables are available from Rockwell-Collins for installing the equipments.

4.3 Multiple Exciters (HF-8014A).

Remote control of multiple exciters is accomplished by connecting in parallel all the exciter's control data bus (J14-2 and J14-14) and the monitor data bus (J14-3 and J14-16). Each exciter must be strapped for a unique address as described in paragraphs 3.8.2. and in the HF-8014( ) exciter book, under Installation, paragraph 3.1.3.

The exciters must also be strapped for the same data rates, the same parity and the same signalling methods. The signalling methods strapped must be either RS-232C or MIL-STD-188C.

4.4 Exciter and Remote Control to Primary Power Source.

Separation between exciter or remote control units and primary power source (100, 115, 215, or 230 V ac) should be kept to a minimum. Preassembled power cables are supplied as part of the exciters.

4.5 Exciter to External Key Line.

The exciter can be keyed from rear panel EXT KEY Terminal TB2-6. When the front panel KEY switch is in the EXT position, a ground key signal applied to TB2-6 keys the exciter.

4.6 Remote Control Key-Line Operation.

The remote control key line is internally connected to the microphone push-to-talk key, and CW key jack, the front panel KEY switch, and the rear panel terminal strip (TB1-11, EXT KEY). Grounding of any of these points generates transmission of the serial key command in the control data to the remote exciter. This causes the exciter and power amplifier to be keyed. Removing the ground from the key line again generates transmission of the serial command data, causing the

4. CABLING
4.6 Remote Control Key-Line Operation.

exciter and power amplifier to unkey.

For normal push-to-talk (or equivalent) system keying, a wired key line between the control and the remote exciter is not required, since the key command is transmitted in the serial control data to the exciter.

Delay time (in milliseconds) required for transmission of the key command from the control to the exciter may be calculated by dividing 22 000 by the data baud rate. The serial data transfer between the control unit and the remote exciter is not fast enough to support serial, remote CW keying. CW keying from the control unit requires a wired key-line connection between the EXT KEY terminals of the control and the remote exciter. Where distances between the control and remote exciter make direct wiring of CW key-line connections impractical, the key-line signal must be converted externally to some form suitable for transmission to the remote site. (One channel of a multichannel data modem or microwave link could be used to transmit the CW key signal, as an example.)

The rear panel EXT KEY may be used as an external device (for example, a data set that provides a key-line output prior to start of data transmission) to initiate a remote serial control key. However, modulation to the remote exciter must be delayed by at least the amount of time required for transmission of the serial key command (as calculated above). For remote CW operation, an external key line must be connected.

Although the key line is defined as ground for key, and open circuit to unkey, an RS-232C logic level signal may be used on the key line with the MARK condition (-3 to -15 V dc) representing the keyed state and the SPACE condition (+3 to +15 V dc) representing the unkeyed state.

4.7 Exciter to External Frequency Standard

Separation between exciter and external frequency standard should be kept to a minimum. A BNC-to-BNC cable is required.

4.8 Exciter to Preselector

Separation between exciter and preselector should be kept to a minimum. Preassembled cables are available from Rockwell-Collins. Cable CPN 631-0962-00X is required.

5. INSTALLATION

5.1 General

With the exception of the HF-8022 10-kW Power Amplifier, the equipments of the HF-80 10-kW Transmitter Systems may be individually mounted, mounted in desk-top cabinets, or mounted in a standard 483-mm (19-in) wide rack. Available cabinets, mounting kits, and accessories are listed in table 3 of the description section of this book.

Equipment preparation and installation procedures for the individual equipments are described in the following paragraphs.

5.2 HF-8022 10-kW Power Amplifier

5.2.1 Inspection

Inspection procedures are contained in the HF-8022 Instruction Book, Installation Procedures.

5.3 Installation of Slide Mounts

Procedures are given below for the attachment of the slide mounts to the equipment and to the equipment cabinet. Refer to table 3 for the appropriate slide mounting kit to be used.

TABLE 3 SLIDE MOUNTING KITS

MOUNTING KIT	PART NUMBER	USED WITH
CA-8030	622-3418-001	HF-8060 Preselector HF-8093 Exciter Control
CA-8032	622-3493-001	HF-8014A Exciter

NOTE

A rotating slide mounting kit, part number 015-M040-020, is available for special applications such as training establishments etc. This slide kit is suitable for use with the HF8014A Exciter and HF-8060 Preselector. For further details of the slide kit, associated hardware and installation instructions, refer toyour Rockwell International Supplier.

5.3.1 Installation of CA-8030 Slide Mount Kit

Refer to the appropriate outline and mounting dimensions drawing for the equipment to be slide mounted (refer to respective equipment instruction book) and to the installation drawing of the CA-8030 (figure 5); then proceed as follows:

5. INSTALLATION
5.3 Installation of Slide Mounts
5.3.1 Installation of CA-8030 Slide Mount Kit

NOTE

Right and left refer to the sides of the equipments as viewed from the front panel.

a. Using two 0.190 - 32 x 3/8 button head screws, attach each inner slide channel to the sides of the equipment.

NOTE

When mounting slide kit to HF-8060, use five 0.190 - 32 x 3/4 screws to attach the inner slide channel to the equipment. Five 3/8 - inch long spacers are required between the inner slide channel and the equipment.

b. Using two 0.190 - 32 x 3/8 panhead screws, lockwashers, and nuts, attach an end (adapter) bracket to the rear ends of each outer slide channel.

NOTE

Mount the end brackets 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.

c. Fully extend the slide channels. Lift the equipment into position and square it properly with the equipment cabinet.

d. Using four panhead screws (10-32 UNF-2A x 1/2"), four lock washers (No. 10), four flat washers (No.10) and four hex. head nuts (10-32 UNF 1/8" x 3/8"), secure the end bracket to the equipment cabinet with the nuts on the internal side of the corner uprights.

e. Refer to cabling paragraphs and make the required cable connections to the equipment.

f. Install the equipment ground strap (no 14 AWG or larger) from the GND terminal on the rear of the equipment cabinet.

NOTE

Be sure that the ground point is free from paint and foreign material.

5. INSTALLATION
5.3 Installation of Slide Mounts
5.3.1 Installation of CA-8030 Slide Mount Kit

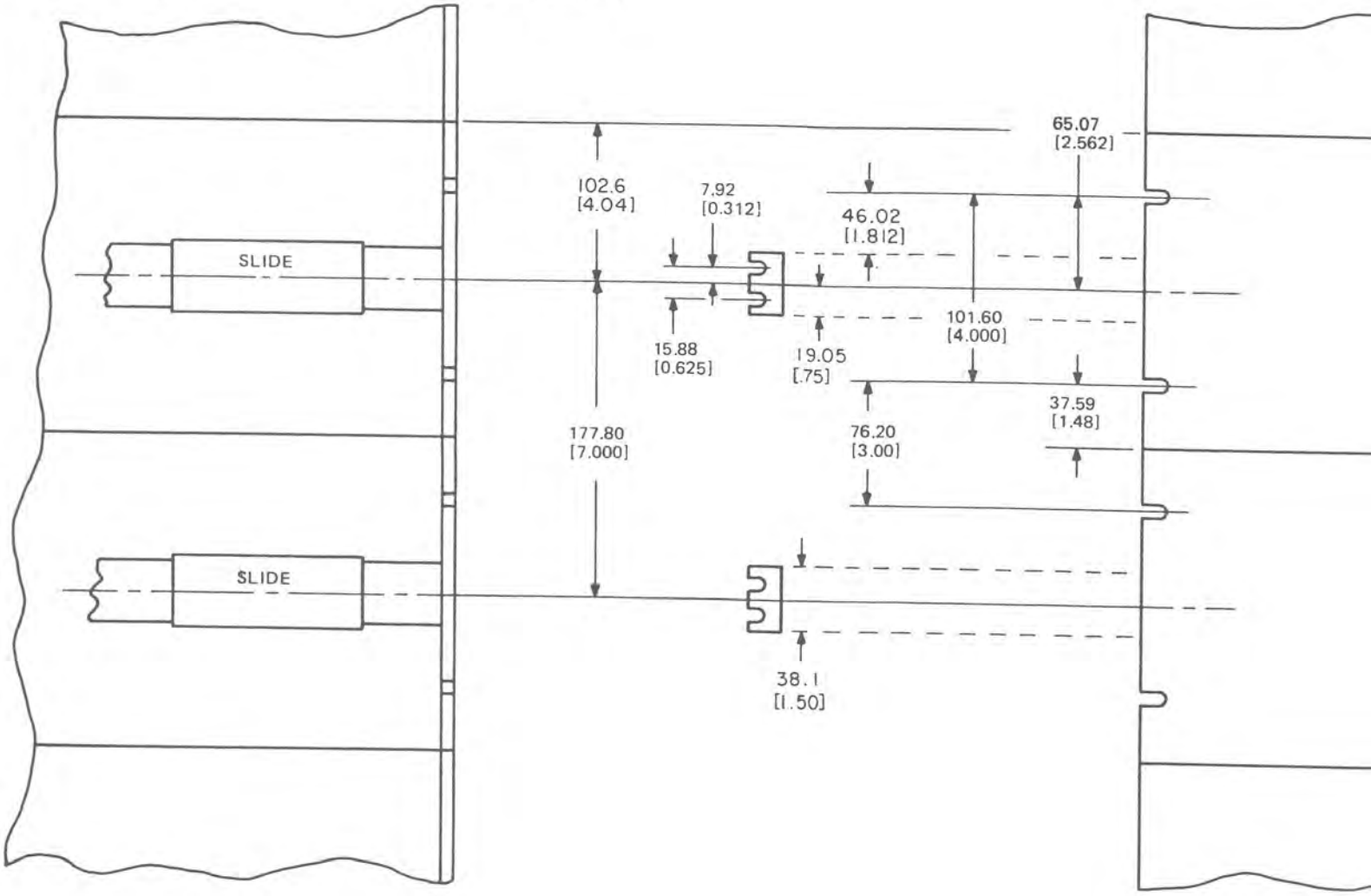
NOTES:

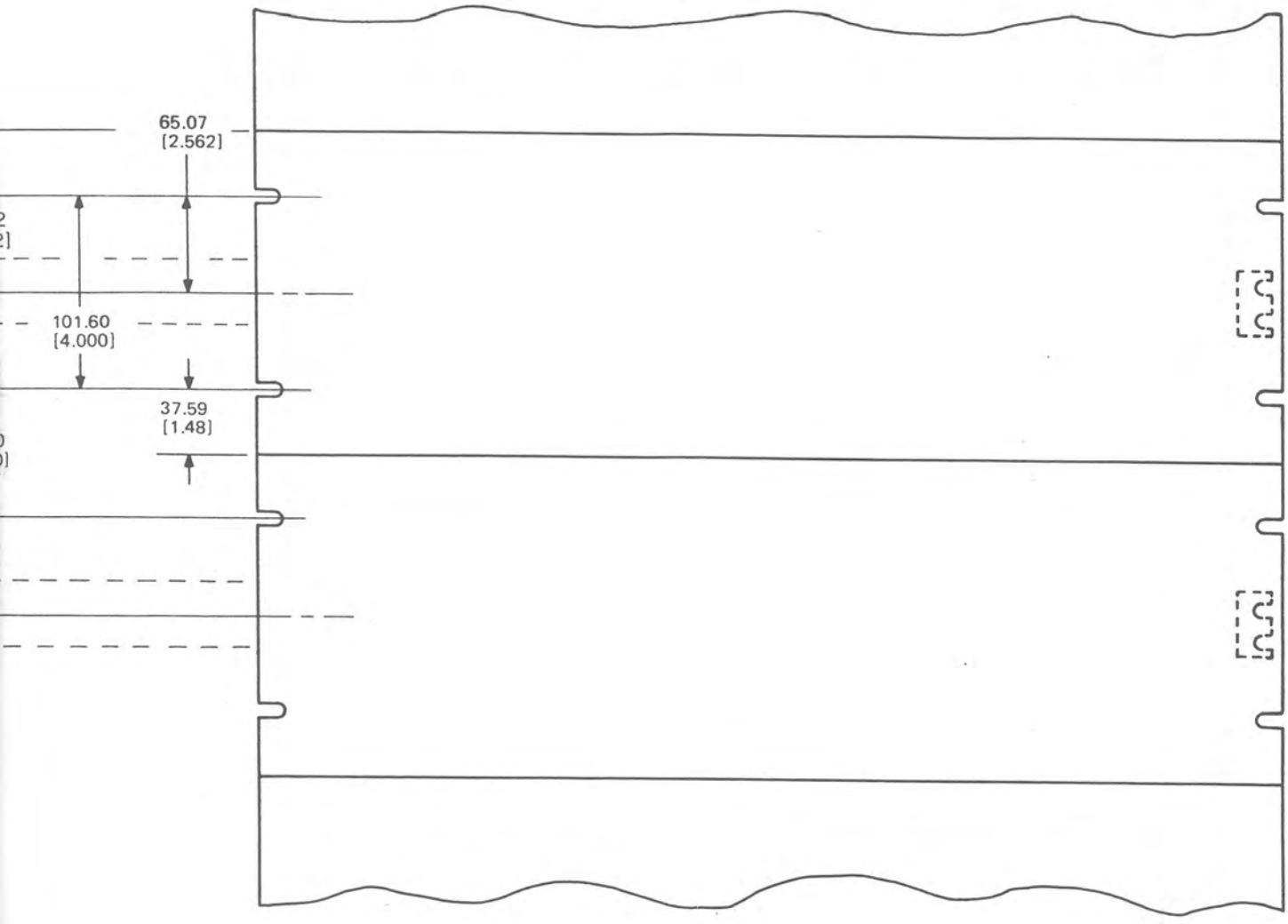
(1) SLIDE BRACKETS MOUNT TO REAR SURFACE OF FRONT CABINET RAILS AND FRONT SURFACE OF REAR RAILS.

(2) a. FOR CABINETS WITH THREADED MOUNTING HOLES USE SCREWS AND FLAT WASHERS FROM BRACKET SIDE INTO CABINET. SCREW MUST NOT PROJECT BEYOND PANEL MOUNTING SURFACE.

b. FOR CABINETS WITH CLEARANCE HOLES IN THE RAILS, THE HOLES USED FOR MOUNTING THE SLIDE BRACKETS MUST BE COUNTERSUNK AND FLAT HEAD SCREWS USED FOR MOUNTING.

(3) DIMENSIONS ARE IN MILLIMETRES [INCHES].





Installation of CA-8030 Slides in Rack Mounts
Figure **5**

5. INSTALLATION
5.3 Installation of Slide Mounts
5.3.1 Installation of CA-8030 Slide Mount Kit

g. Press the lockout catch on the extended slide section and slide the equipment completely into the equipment cabinet.

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

5.3.2 Installation of CA-8032 Slide Mount Kit

Refer to the appropriate outline and dimension drawing for the equipment to be slide mounted (refer to the respective equipment instruction book) and to the installation drawing of the CA-8032 (figure 6); then proceed as follows:

NOTE

Right and left refer to the sides of the equipment as viewed from the front panel.

a. Using two 0.190 - 32 x 3/8 button head screws, attach each inner slide channel to the sides of the equipment.

b. Using two 0.190 - 32 x 3/8 panhead screws, lockwashers, and nuts, attach an end (adapter) bracket to the rear ends of each outer slide channel.

NOTE

Mount the end brackets 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.

c. Fully extend the slide channels. Lift the equipment into position and square it properly with the equipment cabinet.

d. Using two panhead screws (10-32 UNF-2A x 1/2), two lock washers (No. 10) and two hex head nuts (10-32 UNF 1/8" x 3/8") secure the rear and bracket to the rear cabinet corner upright. The nuts shou ld be on the internal side of the corner upright.

e. Using two panhead screws (10-32 UNF-2A x 1 1/8"), two lock washers (No. 10), two flat washers (No. 10), two hex head nuts (10-32 UNF x 1/8" x 3/8") and one spacer (CPN 646-6887-001) secure the bracket to the front cabinet corner upright. The spacer should be position ed between the upright and the bracket. The nuts should be on the internal side of the corner upright.

5. INSTALLATION
5.3 Installation of Slide Mounts
5.3.2 Installation of CA-8032 Slide Mount Kit

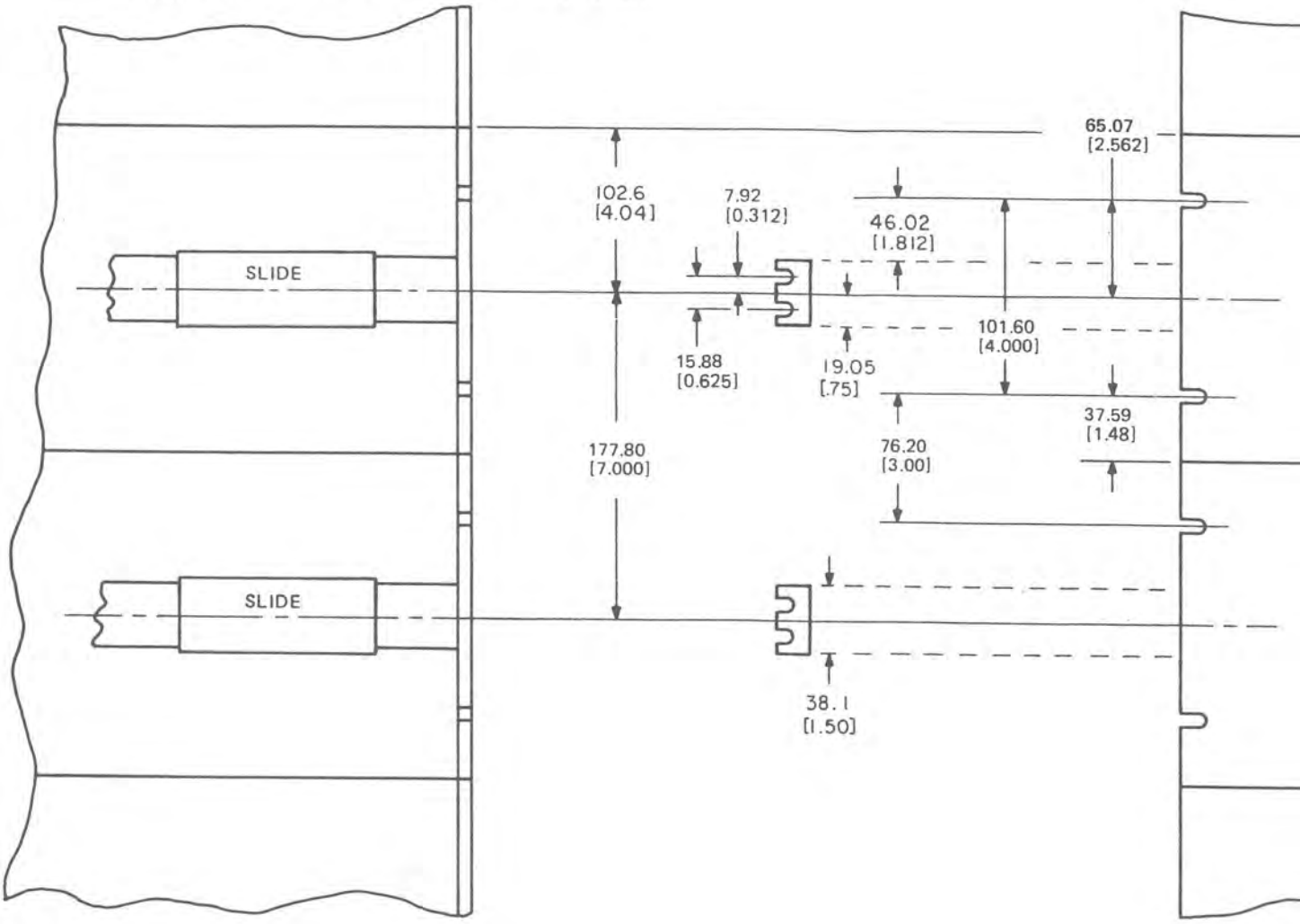
NOTES:

(1) SLIDE BRACKETS MOUNT TO REAR SURFACE OF FRONT CABINET RAILS AND FRONT SURFACE OF REAR RAILS.

(2) a. FOR CABINETS WITH THREADED MOUNTING HOLES USE SCREWS AND FLAT WASHERS FROM BRACKET SIDE INTO CABINET. SCREW MUST NOT PROJECT BEYOND PANEL MOUNTING SURFACE.

b. FOR CABINETS WITH CLEARANCE HOLES IN THE RAILS, THE HOLES USED FOR MOUNTING THE SLIDE BRACKETS MUST BE COUNTERSUNK AND FLAT HEAD SCREWS USED FOR MOUNTING.

(3) DIMENSIONS ARE IN MILLIMETRES [INCHES].



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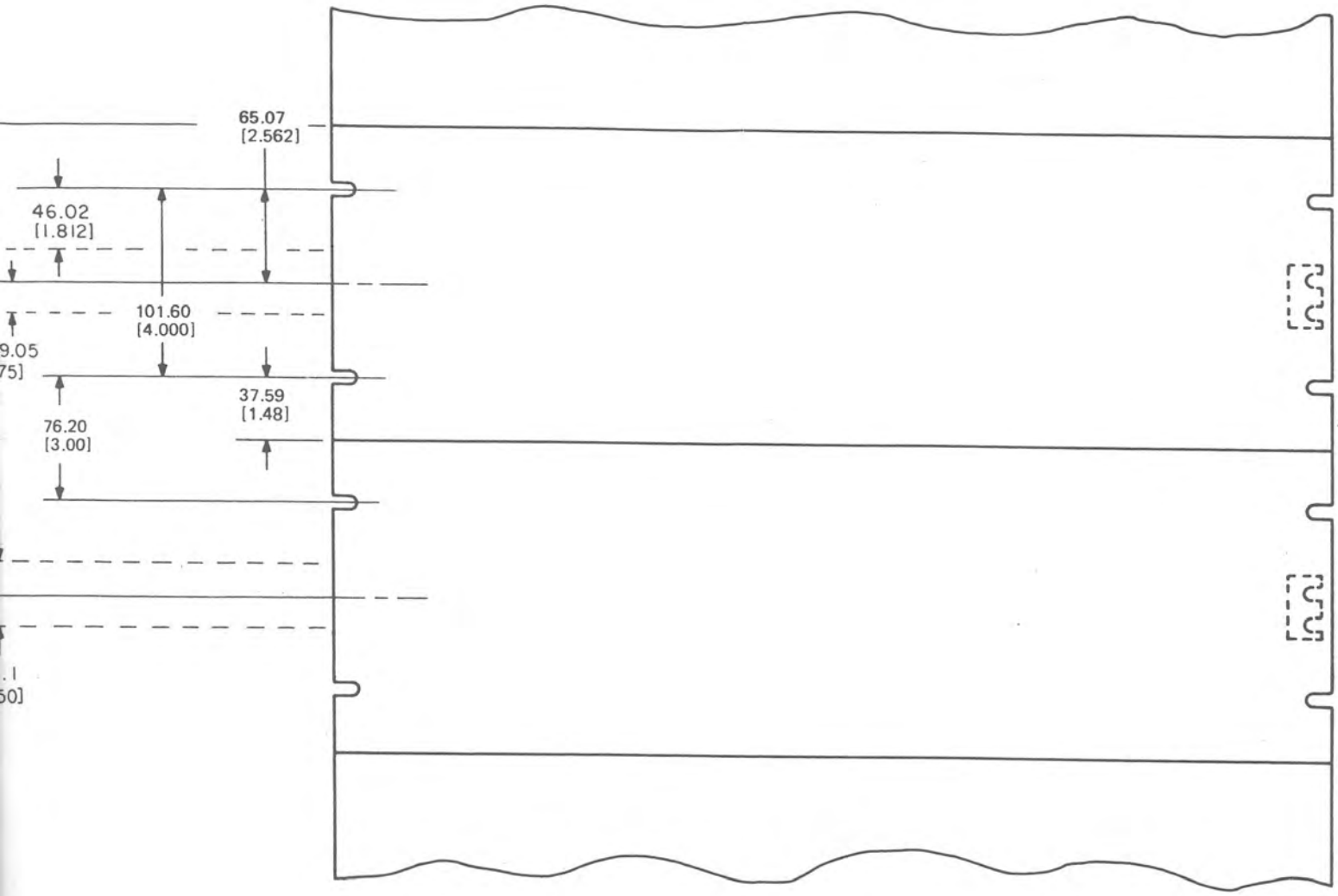

Installation of CA-8032 Slides in Rack Mounts
Figure 6

5. INSTALLATION
5.3 Installation of Slide Mounts
5.3.2 Installation of CA-8032 Slide Mount Kit

f. Refer to the cabling paragraphs and make the required cable connections to the equipment.

g. Install the equipment ground strap (no 14 AWG or larger) from the GND terminal on the rear of the equipment to a suitable ground point in the equipment cabinet.

NOTE

Be sure that the ground point is free from paint and foreign material.

h. Press the lockout catch on the extended slide 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.

5.4 HF-8014A Exciter

The HF-8014A has standard EIA 483-mm (19-in) rack-mounting characteristics and can be mounted using four mounting screws through the edges of the front panel; however, on all rack-mounted configurations, slide mounting is recommended for ease of service and side support. Refer to paragraph 5.3 for slide mount information. Table 2 in the description section shows the equipment cabinets available for HF-8014A installation. When installation is complete, ensure all electrical connections are made (including strapping) and that all dust covers are in place.

5.5 HF-8093 Exciter Control

The HF-8093 Control has standard EIA 483-mm (19-in) rack-mounting characteristics and can be mounted using four mounting screws through the edges of the front panel; however, on all rack-mounted configurations, slide mounting is recommended for ease of service and side support. Refer to paragraph 5.3 for slide mount information. Table 2 in the description section shows the equipment cabinets available for HF-8093 installation. When installation is complete, ensure all electrical connections are made (including strapping) and that all dust covers are in place.

5.6 HF-8060 Preselector

The HF-8060 has standard EIA 483-mm (19-in) rack-mounting characteristics and can be mounted using four mounting screws through the edges of the front panel ;

5. INSTALLATION
5.6 HF-8060 Preselector

however, on all rack-mounted configurations, slide mounting is recommended for ease of service and side support. Refer to paragraph 5.3 for slide mount information. Table 2 in the description section shows the equipment cabinets available for HF-8060 installation. When installation is complete, ensure all electrical connections are made (including strapping) and that all dust covers are in place.

5.6.1 Installation of Slide Mounts

a. Refer to paragraph 5.3 and to CA-8030 instructions (in Kit Section) . Attach slide mounting kit (CPN 637-4725-001) to CA-8030 slide rails and place in proper location in the cabinet used. Attach to HF-8060.

b. Lift the HF-8060, position it squarely, and engage the slides of the mounting kit. Slide the HF-8060 completely into the cabinet to assure the slides function properly.

c. Refer to the cabling paragraph of the appropriate HF-80 10-kW system installation section and make the necessary cable connections.

d. Connect a ground strap (no 14 AWG or larger) from the GND terminal located on the rear of the HF-8060 to a suitable ground point in the equipment cabinet. Be sure the cabinet ground point is free of paint or foreign material.

e. Slide the HF-8060 into place in the equipment cabinet, and secure it with four screws on each side of the front panel.

6. POSTINSTALLATION CHECK/REQUIREMENTS.

There are no postinstallation checks to be performed on the exciters, remote control units, or optional preselector as individual equipments.

The HF-8154A 10-kW Transmitter Systems postinstallation checks consist of mechanical checks, cooling checks, electrical checks and local testing using the TS-8021 Maintenance Panel.

6.1 HF-8022 10-kW Power Amplifier Mechanical Check

a. Make sure all connectors fit properly.

b. Check the operation of the interlock switches operated by the compartment doors.

c. Check the operation of high-voltage shorting switches 1S2, 1S4, 2S3, and 2S4. When the compartment doors are open, each switch should measure less than 1 ohm across its terminals. Operate one switch at a time with the remaining switches open.

d. Check that high-voltage shorting sticks are in their mounting clips in the plate compartment. Check for secure ground connections. The resistance between the shorting stick conductor and chassis ground should be less than 1 ohm.

6.2 HF-8022 10-kW Power Amplifier Cooling Check

After the HF-8022 is installed in the permanent operating location, a final pressure test must be performed to assure adequate cooling (air mass flow through the HF-8022). The ducting system must be connected and all air filters must be in place prior to conducting the cooling check.

If the blower motor or blower pulleys, or belt, have been changed or adjusted to change the blower fan speed, be sure the pulleys are properly aligned to prevent excessive belt wear. Refer to paragraph 5.3.13 in the maintenance section of the HF-8022 10-kW Power Amplifier Instruction Book for pulley/belt adjustment procedures.

6.2.1 Cooling (Air Mass Flow) Check

The procedure for determining if the unit has sufficient cooling (air mass flow) is described in the HF-8022 instruction book, under Installation, paragraphs 4.3.1 and 4.3.2.

6.3 Cabling Check

Each cable should be checked thoroughly before applying power to the system. A pin-to-pin check of each multiconductor cable should be performed. A wiring

6. POSTINSTALLATION CHECK/REQUIREMENTS.

6.3 Cabling Check

diagram of each multiconductor cable is included in the Kits section of this instruction book. After checking each cable, refer to figure 4 and check that all cables are properly installed and securely attached.

6.4 Grounding and Bonding Check

Check that each equipment is properly grounded and that proper system bonding is maintained to eliminate hazardous voltages between units.

6.5 HF-8022 10-kW Power Amplifier Electrical Check

The postinstallation electrical test procedures in Installation, page 22 and Table 3, page 28 of the HF-8022 Instruction Book should be performed to ensure the HF-8022 is functioning properly before connecting to system equipments. The procedures of Table 3 include adjustments. Test Equipment or equivalents listed in the HF-80 10-kW Transmitter Systems maintenance section should be used.

WARNING

Lethal voltages are present within the HF-8022. Use extreme caution when testing, adjusting, or troubleshooting to prevent death, severe electrical shock, severe burns, or other serious injury.

6.6 System Check and Adjustments

6.6.1 Preliminary Setup

Set the system controls as follows:

a. Set the HF-8014A Exciter controls as follows:

1. PWR to off (press inward until switch is released and latched in the outward position)
2. PA PWR to OFF
3. KEY to NORM
4. P CAR to OFF
5. MIC to OFF
6. CONT to LCL
7. MODE to USB
8. FREQUENCY KHZ to 14 000.0

6. POSTINSTALLATION CHECK/REQUIREMENTS.
6.6 System Check and Adjustments
6.6.1 Preliminary Setup

b. Set the TS-8021 Maintenance Panel controls as follows:

1. LOCAL-REMOTE to REMOTE
2. MANUAL-AUTO to AUTO
3. FIL to ON
4. HV to ON
5. MULTIMETER select switch to FWD PWR
6. SERVO CONTROL switches to ON
7. RF POWER to HIGH
8. KEY to OFF

c. Set HF-8022 circuit breakers as follows:

1. MAIN POWER to OFF
2. CONTROL POWER to ON
3. LOW LEVEL PLATE to ON
4. PA FILAMENT to ON
5. BIAS SUPPLY to ON
6. LOW LEVEL FILAMENT to ON

6.6.2 Transmitter Gain Control (TGC) Adjustment

NOTE

Refer to figure 15 in HF-8022 Power Amplifier installation section for location of adjustments.

NOTE

The HF-8022 should be thoroughly warmed up (15 minutes, key down, no rf input) before performing adjustments.

To perform the TGC adjustment, proceed as follows:

6. POSTINSTALLATION CHECK/REQUIREMENTS.

6.6 System Check and Adjustments

6.6.2 Transmitter Gain Control (TGC) Adjustment

a. Set the HF-8014A MAIN POWER circuit breaker to ON.

b. Set the HF-8014A PWR switch to on (inward and latched) and PA PWR switch to STBY. Change one digit of the FREQUENCY KHZ switches. Then reset to 14 000.0. Allow a 30-second warmup before proceeding.

c. Set the HF-8014A PA PWR to HIGH PWR and KEY switch to LOCK. The HF-8022 will tune automatically. The PA READY indicator on the HF-8014A will light to indicate the power amplifier has tuned. Allow a 10-minute warmup with static conditions before proceeding.

d. Set the TS-8021 LOCAL-REMOTE switch to LOCAL, MANUAL-AUTO switch to MANUAL, and KEY switch to ON. Press TUNE STEP ADV switch until TUNE STEP indicator indicates 6.

e. Adjust the HF-8022 HIGH PWR TGC potentiometer for a reading of one-half the desired high-power output indication on the TS-8021 multimeter; for example, 5 kW for 10-kW nominal operating power. Some hysteresis effect will be observed when adjusting the TGC potentiometer.

f. Set the TS-8021 RF POWER switch to ON.

g. Adjust the HF-8022 LOW PWR TGC potentiometer for a reading of one-half the desired low-power output indication on the TS-8021 multimeter: for example, 2.5 kW for 5-kW nominal operating power. Some hysteresis effect will be observed when adjusting the TGC potentiometer.

h. Set the TS-8021 KEY switch to OFF and RF POWER switch to HIGH.

6.6.3 Anode Dissipation Limiter (ADL) and Automatic Level Control (ALC) Adjustments

To adjust ADL and ALC, proceed as follows:

a. Set the HF-8014A FREQUENCY KHZ switches to 02 000.0 and MODE switch to CW.

b. Set the TS-8021 MANUAL-AUTO switch to AUTO and KEY switch to ON. The TUNE STEP indicator should advance to step 7 (operate) as the HF-8022 automatically tunes.

6. POSTINSTALLATION CHECK/REQUIREMENTS.

6.6 System Check and Adjustments

6.6.3 Anode Dissipation Limiter (ADL) and Automatic Level Control (ALC) Adjustments

c. Adjust the HF-8022 ADL RF SAMP potentiometer two turns in a clockwise direction or until the TS-8021 multimeter indicates 10.5 kW. If 10.5 kW is obtained, proceed to step f.

d. If 10.5 kW was not obtained in step c, adjust the HF-8022 HIGH PWR ALC potentiometer for a reading of 11 kW on the TS-8021 multimeter.

e. Adjust the HF-8022 ADL RF SAMP potentiometer for a reading of 10.5 kW on the TS-8021 multimeter.

f. Adjust the HF-8022 HIGH PWR ALC potentiometer in a counter-clockwise direction for a reading of 9.5 kW on the TS-8021 multimeter.

g. Set the TS-8021 KEY switch OFF.

h. Set the HF-8014A FREQUENCY KHZ switches to 14 000.0.

i. Press the TS-8021 TUNE START switch. Set KEY switch to ON. The TUNE STEP indicator should advance to step 7 (operate) as the HF-8022 automatically tunes.

j. Observe the TS-8021 multimeter. Forward power should indicate between 9 and 11 kW.

k. Set the TS-8021 KEY switch to OFF.

l. Set the HF-8014A FREQUENCY KHZ switches to 28 000.0.

m. Set the TS-8021 KEY switch to ON. The TUNE STEP indicator should advance to step 7 (operate) as the HF-8022 automatically tunes.

n. Observe the TS-8021 multimeter. Forward power should indicate between 9 and 11 kW.

o. Set the TS-8021 KEY switch to OFF and RF POWER switch to LOW.

p. Set the HF-8014A PA PWR switch to LOW PWR and FREQUENCY KHZ switches to 02 000.0.

q. Set the TS-8021 KEY switch to ON. The TUNE STEP indicator should advance to step 7 as the HF-8022 automatically tunes.

6. POSTINSTALLATION CHECK/REQUIREMENTS.

6.6 System Check and Adjustments

6.6.3 Anode Dissipation Limiter (ADL) and Automatic Level Control (ALC) Adjustments

r. Adjust the HF-8022 LOW PWR ALC potentiometer for a reading of 4.5 kW (nominal operating power) on the TS-8021 multimeter.

s. Set the TS-8021 KEY switch to OFF.

t. Set the HF-8014A FREQUENCY KHZ switches to 14 000.0.

u. Set the TS-8021 KEY switch to ON. The TUNE STEP indicator should advance to step 7 as the HF-8022 automatically tunes.

v. Observe the TS-8021 multimeter. Forward power should indicate between 4.0 and 5.5 kW.

w. Set the TS-8021 KEY switch to OFF.

x. Set the HF-8014A FREQUENCY KHZ switches to 28 000.0.

y. Set the TS-8021 KEY switch to ON. The TUNE STEP indicator should advance to step 7 as the HF-8022 automatically tunes.

z. Observe the TS-8021 multimeter. Forward power should indicate between 4.0 and 5.5 kW. Set KEY switch to OFF.

aa. Set the HF-8014A KEY switch to NORM, PA PWR switch to HIGH PWR, and FREQUENCY KHZ switches to 02 000.0. Set KEY switch to LOCK.

ab. Set the TS-8021 LOCAL-REMOTE switch to REMOTE. The TUNE STEP advance indicator should advance to step 7 as the HF-8022 automatically tunes.

ac. Observe the TS-8021 multimeter. Forward power should indicate between 9 and 11 kW.

ad. Repeat steps aa and ac except set the HF-8014A FREQUENCY KHZ switches to 14 000.0 and then to 28 000.0.

ae. Set the HF-8014A KEY switch to NORM, PA PWR switch to LOW PWR, and FREQUENCY KHZ switches to 02 000.0. Set the KEY switch to LOCK.

af. Observe the TS-8021 multimeter. Forward power should indicate between 4.0 and 5.5 kW.

6. POSTINSTALLATION CHECK/REQUIREMENTS.

6.6 System Check and Adjustments

6.6.3 Anode Dissipation Limiter (ADL) and Automatic Level Control (ALC) Adjustments

ag. Repeat steps ae and af except set the HF-8014A FREQUENCY KHZ switches to 14 000.0 and then to 28 000.0.

ah. Set the HF-8014A KEY switch to NORM. Wait approximately 20 seconds to allow the power amplifier to cool before proceeding.

ai. Set the HF-8104A PA PWR switch to OFF and PWR switch to OFF.

aj. Set the HF-8022 MAIN POWER circuit breaker to OFF.

6.6.3 System Operational Check

Perform the HF-8154A 10-kW Transmitter System operating procedures as described in the Operation section. Perform tune cycles, in 1-MHz steps from 2.000 to 29.999 MHz. Observe HF-8022 operation closely.

10-kW TRANSMITTER SYSTEM

for

AUSTRALIAN ARMY

Rockwell International

OPERATION

Printed in Australia

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1 October, 1981

table of contents

1. GENERAL.

The Australian Army HF-8154A 10-kW Transmitter Systems consist of 4-channel equipments configured for local or remote control.

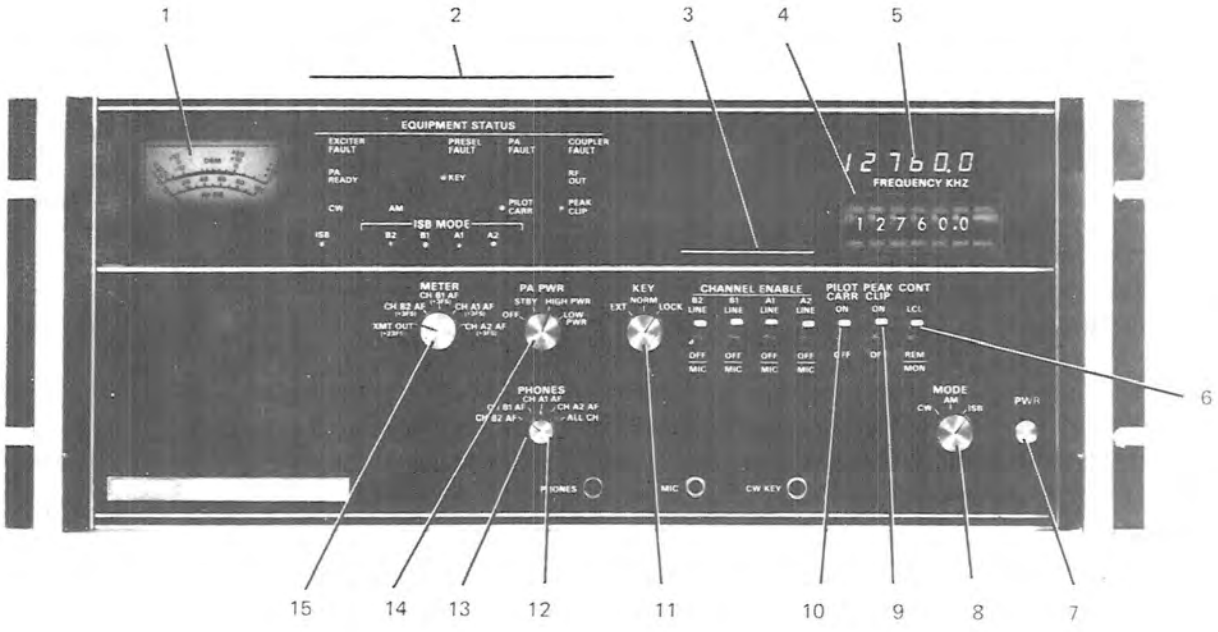
WARNING

The HF-80 10-kW Transmitter Systems contain 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 the U.S. Occupational Safety and Health Administration (OSHA) recommended maximum limits.

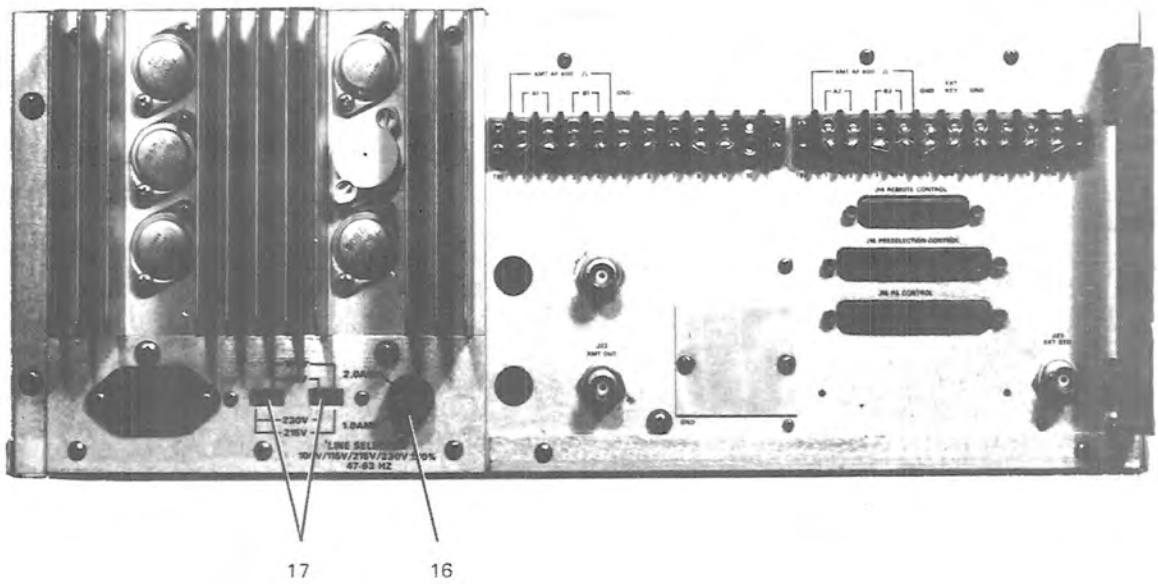
2. CONTROLS AND INDICATORS.

Figures 1 to 5 and associated tables show the location of controls, indicators,and adjustments (HF-8022) with function of each for the equipments in the HF- 8154A 10-kW Transmitter System.

FIG. 1



FRONT PANEL



REAR PANEL

TPA-2783-017

HF-8014A Exciter - Controls and Indicators
Figure 1

Table 1 HF-8014/8014A, Control and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Meter M1	Indicates levels as selected by meter switch A2A2S1.
2	EQUIPMENT STATUS indicators (color)	
	RF OUT A2A1DS1 (yellow)	Indicates that the associated pa has an rf output. Illuminated by sidetone enable signal supplied from the associated pa.
	PA READY A2A1DS2 (yellow)	Indicates the associated pa is ready for rf transmission. Illuminated by the pa ready signal from the associated pa.
	PA FAULT A2A1DS3 (red)	Indicates pa fault. Illuminated by the pa fault signal from the associated pa.
	KEY A2A1DS4 (yellow)	Indicates key signal applied to exciter key circuits.
	EXCITER FAULT A2A1DS5 (red)	Indicates power supply voltage is low or synthesizer has a fault. Illuminated by power supply fault signal supplied by power supply module A1 or synthesizer voltage regulator A14. Synthesizer fault signal is summary of all synthesizer loss-of-lock signals supplied by A16 through A22.
	COUPLER FAULT A2A1DS8 (red)	Indicates a coupler fault. Illuminated by a coupler fault signal from the coupler.
	AM A2A1DS9 (yellow)	Indicates AM modes has been selected. Illuminated by the AM enable signal.
	CW A2A1DS10 (yellow)	Indicates CW mode has been selected. Illuminated by the CW enable signal.
	PEAK CLIP A2A1DS11 (yellow)	Indicates the if peak clipper circuit is enabled. Illuminated by the peak clipper enable signal.
	PILOT CARR A2A1DS13 (yellow)	Indicates the pilot carrier is enabled. Illuminated by the pilot carrier enable signal.
	ISB A2A1DS14 (yellow)	Indicates ISB mode has been selected. Illuminated by the ISB enable signal.
	B1 A2A1DS15 (yellow)	Indicates channel B1 has been connected to LINE or MIC. ISB mode must be selected.
	A1 A2A1DS16 (yellow)	Indicates channel A1 has been connected to LINE or MIC. ISB mode must be selected.
	B2 A2A1DS18 (yellow)	Indicates channel B2 has been connected to LINE or MIC. ISB mode must be selected.
	A2 A2A1DS19 (yellow)	Indicates channel A2 has been connected to LINE or MIC. ISB mode must be selected.
	PRESEL FAULT A2A1DS23 (red)	Indicates a preselector fault. Illuminated by a preselector fault signal from the associated preselector.

Table 1 HF-8014/8014A. Control and Indicators (Cont).

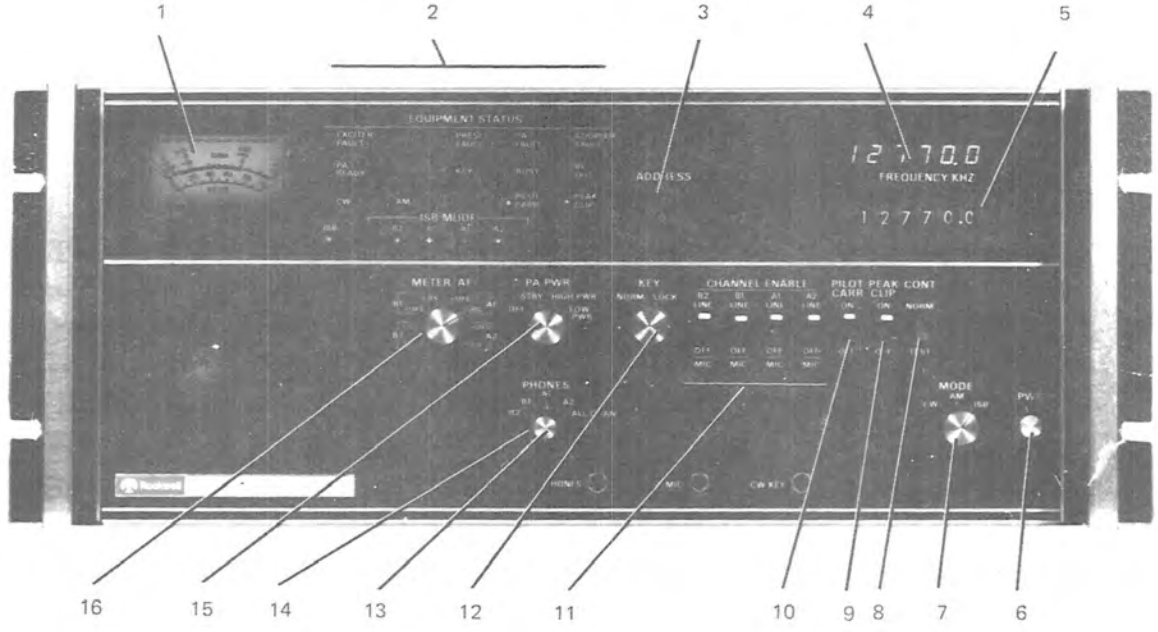
FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
3	CHANNEL ENABLE switches A2A2S4 thru A2A2S7	Three-position switches that select the source of the transmit audio signal for the individual transmit audio channels. a. B2 LINE OFF MIC switch A2A2S4 selects microphone input (MIC), line audio input (LINE), or inhibits channel B2 (OFF). When MIC position is selected, the channel B2 audio line input is inhibited. b. B1 LINE OFF MIC switch A2A2S5 selects microphone input (MIC), line audio input (LINE), or inhibits channel B1 (OFF). When MIC position is selected, the channel B1 audio line input is inhibited. c. A1 LINE OFF MIC switch A2A2S6 selects microphone input (MIC), line audio input (LINE), or inhibits channel A1 (OFF). When MIC position is selected, the channel A1 audio line input is inhibited. d. A2 LINE OFF MIC switch A2A2S7 selects microphone input (MIC), line audio input (LINE), or inhibits channel A2 (OFF). When MIC position is selected, the channel A2 audio line input is inhibited.
4	FREQUENCY KHZ controls S17A through S17G	Sets bcd frequency control signal for frequency as indicated by thumb-wheel display. a. S17A selects tens megahertz. b. S17B selects ones megahertz. c. S17C selects hundreds kilohertz. d. S17D selects tens kilohertz. e. S17E selects ones kilohertz. f. S17F selects hundreds hertz. g. S17G selects tens hertz (optional).
5	Frequency display	Displays the operating frequency of the exciter in both local and remote modes. (Applicable only to exciters with Frequency Display Option AC-8014).
6 (Cont)	CONT switch A2A2S12	Selects the use and method of controlling the HF-8014A. a. LCL position allows unit to be controlled locally. (HF-8014 must be kept in LCL position for operation.) b. REM position allows unit to be controlled remotely. REM position disables local control of mode, frequency, pilot carrier, peak clip, pa power, and key signals. Local audio controls, signals, and monitors remain enabled.

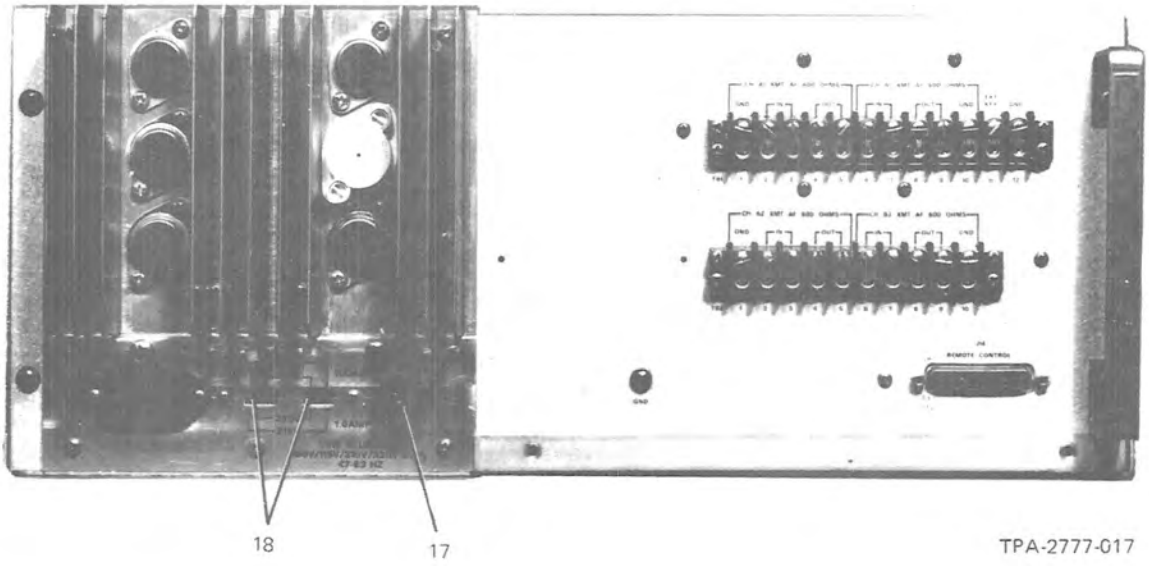
Table 1 HF-8014/8014A, Control and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
6 (Cont)		c. MON position is a momentary position that enables local controls and sets the monitor bit (word 4, character 5, bit 1) of the exciter control monitor response. This may be used, for example, to command a processor control to modify a stored preset table of operating frequency and mode information to that set on the local controls.
7	PWR switch S15	Set power on/off. When pressed and latched (inward position), power is applied to the HF-8014/8014A. When pressed and unlatched (outward position), power is removed from HF-8014/8014A.
8	MODE switch A2A2S10	Selects the HF-8014/8014A operating mode and bandwidth. a. CW position selects CW mode and if attenuator pad (16-kHz bandwidth). b. AM position selects AM mode and channel A1 bandpass filter (2.85-kHz bandwidth). c. ISB position selects ISB mode and UUSB, USB, LLSB, and LSB bandpass filters (2.85-kHz bandwidth filters).
9	PEAK CLIP switch A2A2S9	Controls the if amplifier peak clipper. In the ON position, peak clipper circuit is enabled. In the OFF position, the peak clipper circuit is disabled.
10	PILOT CARR switch A2A2S8	Controls pilot carrier enable signal. In the ON position, pilot carrier is enabled. In the OFF position, the pilot carrier is disabled.
11	KEY switch A2A2S3	Selects the method for applying a key signal. a. EXT position allows an external key (ground or +6 V dc) to be applied at the EXT KEY or EXT KEY (+6 V) terminals on the HF-8014/8014A rear panel. b. NORM position allows an external key (ground) to be applied at CW KEY jack J1 or MIC jack J3 on the HF-8014/8014A front panel. c. LOCK position applies a fixed local key signal.
12	PHONES( ) level control R13	Controls headphone volume, full clockwise equals maximum volume.
13	PHONES switch S11	Selects audio to be monitored at PHONES jack J2 on the HF-8014/8014A front panel. a. CH B2 AF position selects channel B2 transmit audio. b. CH B1 AF position selects channel B1 transmit audio. c. CH A1 AF position selects channel A1 transmit audio. d. CH A2 AF position selects channel A2 transmit audio. e. ALL CH position selects all four channels simultaneously.

Table 1 HF-8014/8014A, Control and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
14	PA PWR switch A2A2S2	Selects pa power control as indicated: a. OFF position disables power in associated power amplifier. b. STBY (standby) position enables low-voltage circuits in the associated power amplifier. (Power amplifier cannot be keyed in this position.) c. HIGH PWR position enables low-voltage and high-voltage circuits in the associated power amplifier and allows high power transmissions from the power amplifier when it is keyed. d. LOW PWR position enables low-voltage and high-voltage circuits in the associated power amplifier and signals the power amplifier to operate in the low power mode when keyed.
15	METER switch A2A2S1	Selects signal levels to be measured by meter M1. Selectable positions are as follows: a. XMT OUT (+23FS) position monitors transmit rf signal output from exciter (indicates +23 dB mW full scale). b. CH B2 AF (+3FS) position monitors channel B2 transmit audio (indicates if channel B2 transmit audio is in compression range, black segment on meter). c. CH B1 AF (+3FS) position monitors channel B1 transmit audio (indicates if channel B1 transmit audio is in compression range, black segment on meter). d. CH A1 AF (+3FS) position monitors channel A1 transmit audio (indicates if channel A1 transmit audio is in compression range, black segment on meter). e. CH A2 AF (+3FS) position monitors channel A2 transmit audio (indicates if channel A2 transmit audio is in compression range, black segment on meter).
16	Fuse F1 (located on rear panel)	Main line fuse. 2-A rated fuse for 100/115-V ac operation and 1-A rated fuse for 215/230-V ac operation (slow blow).
17	Power selection switch S1A and S1B (located on rear panel)	Controls input power strapping or power transformer in power supply. a. 100 V position, power transformer strapped for 100-V ac operation. b. 115 V position, power transformer strapped for 115-V ac operation. c. 215 V position, power transformer strapped for 215-V ac operation. d. 230 V position, power transformer strapped for 230-V ac operation.





HF-8093 Exciter Control, Controls and Indicators
Figure 2

Table 2 HF-8093 Controls and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	METER M1	Indicates levels as selected by meter switch A2A2S1.
2	EQUIPMENT STATUS indicators	
	RF OUT A2A1DS1	Indicates that associated pa has an rf output. Indicated by sidetone enable signal supplied from associated pa.
	PA READY A2A1DS2	Indicates pa ready for rf transmission. Indicated by pa ready signal supplied from associated pa.
	PA FAULT A2A1DS3	Indicates pa fault. Indicated by pa fault signal supplied from associated pa.
	KEY A2A1DS4	Indicates key applied to internal circuits of exciter and to external system key line.
	EXCITER FAULT A2A1DS5	Indicates a fault condition exists in the addressed remote exciter.
	COUPLER FAULT A2A1DS8	Indicates a coupler fault. Indicated by a coupler fault signal supplied from associated coupler.
	AM A2A1DS9	Indicates that associated exciter has the AM operating mode selected.
	CW A2A1DS10	Indicates that associated exciter has the CW operating mode selected.
	PEAK CLIP A2A1DS11	Indicates that associated exciter has the peak clipper circuit enabled.
	PILOT CARR A2A1DS13	Indicates that associated exciter has the pilot carrier enabled.
	ISB A2A1DS14	Indicates that associated exciter has the ISB operating mode selected.
	B1 A2A1DS15	Indicates that associated exciter has channel B1 enabled.
	A1 A2A1DS16	Indicates that associated exciter has channel A1 enabled.
	B2 A2A1DS18	Indicates that associated exciter has channel B2 enabled.
	A2 A2A1DS19	Indicates that associated exciter has channel A2 enabled.
	BUSY A2A1DS22	Indicates that addressed exciter is in local mode.
	PRESEL FAULT A2A1DS23	Indicates a preselector fault. Indicates by a preselector fault signal from associated preselector.
3	ADDRESS switch A2A6	Sets binary address to the complement of the address indicated by thumb-wheel display (0 thru 15). Exciter with associated address strapping is the unit under control.

Table 2 HF-8093 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
4	Frequency kHz display A2A5U20 through A2A5U26	Displays operating frequency of addressed exciter (with CONT switch in NORM position) or setting of FREQUENCY KHZ front panel controls (with CONT switch in TEST position). These are 7-bar digital displays. a. A2A5U20 displays tens megahertz. b. A2A5U21 displays ones megahertz. c. A2A5U22 displays hundreds kilohertz. d. A2A5U23 displays tens kilohertz. e. A2A5U24 displays ones kilohertz. f. A2A5U25 displays hundreds hertz. g. A2A5U26 displays tens hertz (optional).
5	FREQUENCY KHZ controls S17A through S17G	Sets bcd frequency control signal for frequency as indicated by thumb-wheel display. a. S17A selects tens megahertz. b. S17B selects ones megahertz. c. S17C selects hundreds kilohertz. d. S17D selects tens kilohertz. e. S17E selects ones kilohertz. f. S17F selects hundreds hertz. g. S17G selects tens hertz (optional).
6	PWR switch S15	Sets power on/off. When pressed and latched (inward position) power is applied to HF-8093. When pressed and unlatched (outward position) power is removed from HF-8093.
7	MODE switch A2A2S10	Selects HF-8093 operation mode. a. CW position selects CW mode. b. AM position selects AM mode. c. ISB (independent sideband) position selects ISB mode.
8 (Cont)	CONT switch A2A2S12	Selects use and method of controlling the exciter. a. NORM position allows the exciter control to control an addressed exciter (addressed exciter must be in the remote mode).

Table 2 HF-8093 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
8 (Cont)		b. TEST position is a self-test position and allows the exciter control to test its operation internally.
9	PEAK CLIP switch A2A2S9	In the ON position, peak clipper is enabled. In the OFF position, peak clipper is disabled.
10	PILOT CARR switch A2A2S8	Controls pilot carrier enable signal. In the ON position, pilot carrier is enabled. In the OFF position, pilot carrier is disabled.
11	CHANNEL ENABLE switches	Selects the corresponding audio channel inputs when the MODE switch A2A2S10 is in the ISB position. a. B2 (LLSB) switch A2A2S4 selects either LINE, OFF, or MIC. In LINE position, selects the rear panel line audio input. In MIC position, selects the front panel microphone input. In OFF position, disables the audio inputs. b. B1 (LSB) switch A2A2S5 selects either LINE, OFF, or MIC. In LINE, selects the rear panel line audio input. In MIC position, selects the front panel microphone input. In OFF position disables the audio inputs. c. A1 (USB) switch A2A2S6 selects either LINE, OFF, or MIC. In LINE position, selects the rear panel line audio input. In MIC position, selects the front panel microphone input. In OFF position, disables the audio inputs. d. A2 (UUSB) switch A2A2S7 selects either LINE, OFF, or MIC. In LINE position, selects the rear panel line audio input. In MIC position, selects the front panel microphone input. In OFF position, disables the audio inputs.
12	KEY switch A2A2S3	Selects the method for applying a key signal. a. NORM position allows a local key (ground) to be applied at CW KEY jack J1 or MIC jack J3 on the HF-8093 front panel or at the EXT KEY terminal on the HF-8093 rear panel. b. LOCK position applies a fixed local key signal.
13	PHONES switch S11 ( )	Selects audio to be monitored at PHONES jack J2 on the HF-8093 front panel. a. B2 position selects channel B2 transmit audio output. b. B1 position selects channel B1 transmit audio output. c. A1 position selects channel A1 transmit audio output. d. A2 position selects channel A2 transmit audio output. e. ALL CHAN position selects all four (A1, A2, B1, B2) channels transmit audio output.

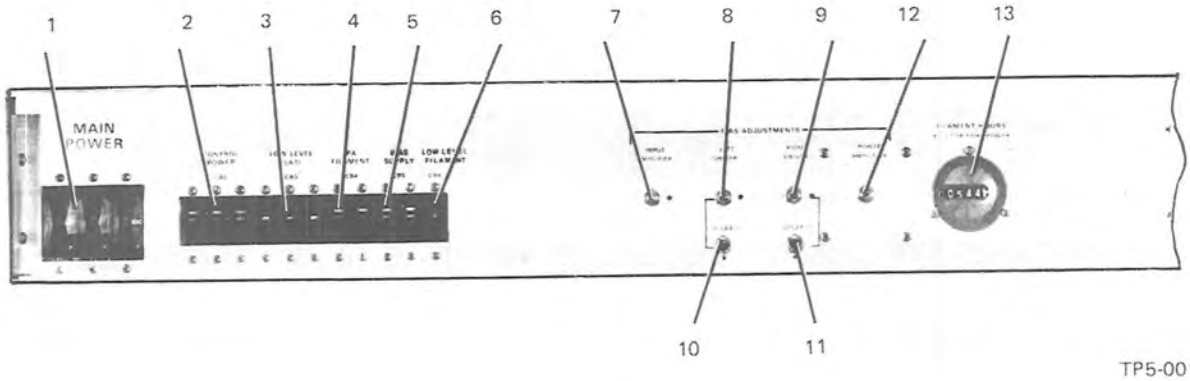
Table 2 HF-8093 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
14	PHONES ( ) level control R13	Controls headphones volume, full clockwise equals maximum volume.
15	PA PWR switch A2A2S2	Selects pa power control as indicated in the following switch positions: a. OFF position disables power in associated power amplifier. b. STBY (standby) position enables low-voltage circuit in the associated power amplifier. (Power amplifier cannot be keyed in this position.) c. HIGH PWR position enables low-voltage and high-voltage circuits in the associated power amplifier and allows high power transmissions from the power amplifier when it is keyed. d. LOW PWR position enables low-voltage and high-voltage circuits in the associated power amplifier and signals the power amplifier to operate in low power mode when it is keyed.
16	METER switch A2A2S1	Selects signal levels to be measured by meter M1. Selectable METER (AF) positions are as follows: a. B2 +13FS, position monitors channel B2 transmit audio, +13 dB mW full scale. b. B2 +3FS, position monitors channel B2 transmit audio, +3 dB mW full scale. c. B1 +13FS, position monitors channel B1 transmit audio, +13 dB mW full scale. d. B1 +3FS position monitors channel B1 transmit audio, +3 dB mW full scale. e. A1 +13FS, position monitors channel A1 transmit audio, +13 dB mW full scale. f. A1 +3FS, position monitors channel A1 transmit audio, +3 dB mW full scale. g. A2 +13FS, position monitors channel A2 transmit audio, +13 dB mW full scale. h. A2 +3FS position monitors channel A2 transmit audio, +3 dB mW full scale.
Not shown (located in lower left-hand corner facing rear panel) (Cont)	Power selection switch S2A and S2B (located on rear panel)	Controls input power strapping of power transformer in power supply. a. 100 position, power transformer strapped for 100-V ac operation.

Table 2 HF-8093 Controls and Indicators (Cont).

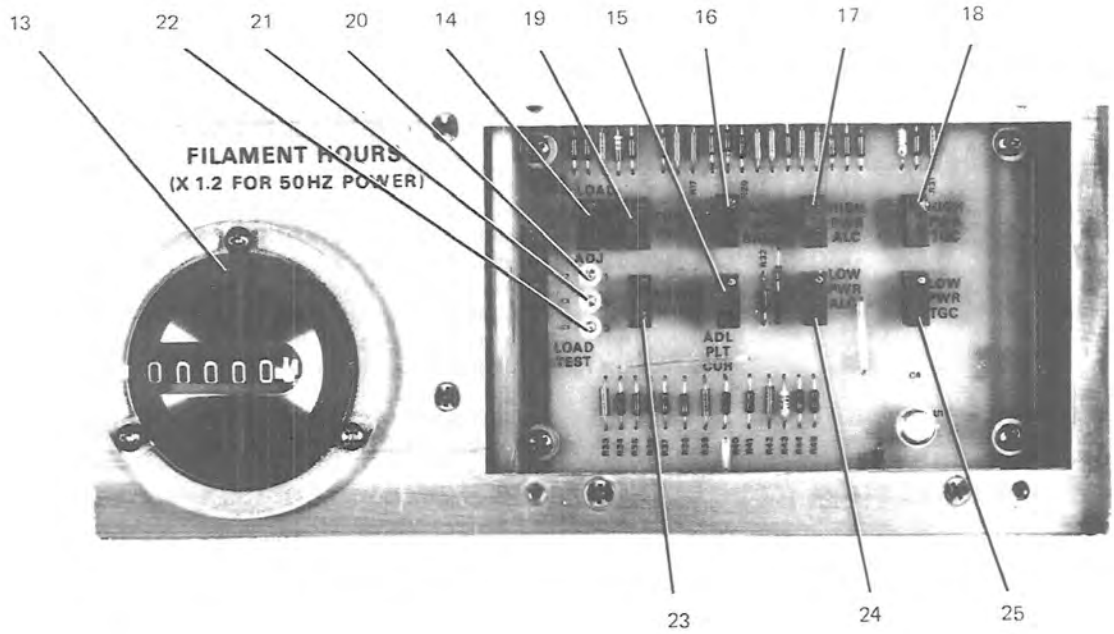
FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
Not shown (Cont)		b. 115 position, power transformer strapped for 115-V ac operation. c. 215 position, power transformer strapped for 215-V ac operation. d. 230 position, power transformer strapped for 230-V ac operation.
Not shown (located in lower left-hand corner facing rear panel)	Fuse F1 (located on rear panel)	Fuse in power line. 2 A used for 100/115-V ac operation, 1 A used for 215/230-V ac operation (slow blow)

FIG. 3



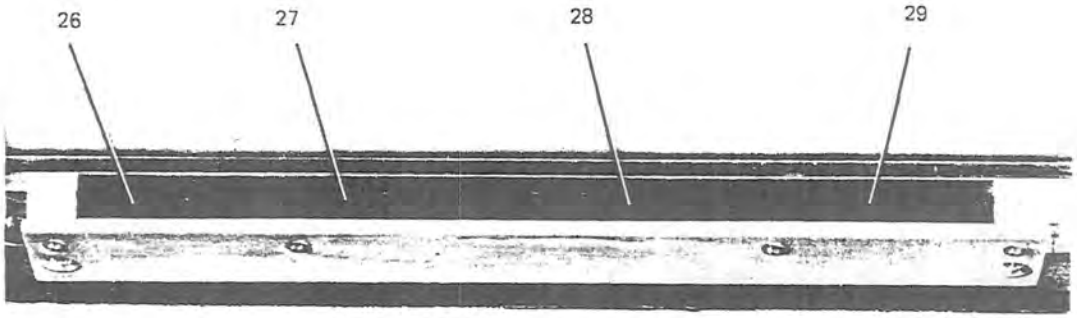
TP5-0018-017

HF-8022 10-kW Power Amplifier, Unit 2 Control Panel



TP5-2314-017

HF-8022 10-kW Power Amplifier, Adjustment Panel
Figure **3**



HF-8022 10-kW Power Amplifier, Status Indicator Lamps
Figure 3

Table 3 *HF-8022 Controls and Indicators.*

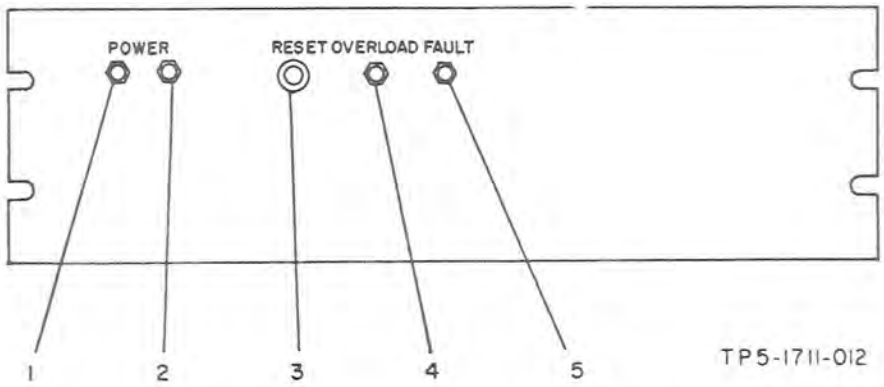
FIGURE AND INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
7-1	MAIN POWER (CB1)	A 3-pole, 100-A circuit breaker located within the power supply cold compartment. Closure of this circuit breaker applies primary power to the circuits controlled by individual circuit breakers on the power supply control panel. It also protects the plate and screen power supply from sustained overload and provides a means for disconnecting the primary power from the power amplifier.
7-2	CONTROL POWER (CB2)	A 3-pole, 3-A circuit breaker that controls primary power to 28-V dc transformer 2T2.
7-3	LOW LEVEL PLATE (CB3)	A 3-pole, 3.5-A circuit breaker that controls power to low-level supply transformer 2T3.
7-4	PA FILAMENT (CB4)	A 2-pole, 10-A circuit breaker that controls primary power to PA FILAMENT transformer 1T1.
7-5	BIAS SUPPLY (CB5)	A 2-pole, 0.5-A circuit breaker that controls power to bias power supply 2A4.

Table 3 HF-8022 Controls and Indicators (Cont).

FIGURE AND INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
7-6	LOW LEVEL FILAMENT (CB6)	A 1-pole, 0.5-A circuit breaker that controls power to 1A-driver filament transformer 1T2.
7-7	INPUT AMPLIFIER BIAS ADJUSTMENT (R5)	Adjust grid bias on input amplifier tube 1A1V1.
7-8	LEFT DRIVER BIAS ADJUSTMENT (R6)	Adjust grid bias on left driver tube 1A1V2.
7-9	RIGHT DRIVER BIAS ADJUSTMENT (R7)	Adjust grid bias on right driver tube 1A1V3.
7-10	LEFT DRIVER DISABLE (S1)	Applies cutoff bias to the grid of left driver tube 1A1V2 to allow adjustment of the right driver grid bias.
7-11	RIGHT DRIVER DISABLE (S2)	Applies cutoff bias to the grid of right driver tube 1A1V3 to allow adjustment of left driver grid bias.
7-12	POWER AMPLIFIER BIAS ADJUSTMENT (R8)	Adjust grid bias on power amplifier tube 1V1.
7-13	FILAMENT HOURS (2MI)	Indicates total filament power-on hours.
8-14	LOAD ADJ (1A16R1)	Adjusts power amplifier loading comparator.
8-15	ADL PLT CUR (1A16R7)	Adjusts plate current threshold for ADL.
8-16	ADL RF SAMP (1A16R3)	Adjusts level of rf sample for ADL.
8-17	HIGH PWR ALC (1A16R4)	Adjusts high-power ALC delay bias threshold.
8-18	HIGH PWR TGC (1A16R5)	Adjusts high-power TGC output voltage.
8-19	TUNE PWR (1A16R2)	Determines rf output power during tune cycles.
8-20	LOAD TEST 1	Grid detector voltage test point.
8-21	LOAD TEST 2	Grid detector voltage plus plate detector voltage used to set up loading adj pot 1A16R1.
8-22	LOAD TEST 3	Plate detector voltage test points.
8-23	VSWR OVLD (1A16R6)	Adjusts reflected power level at which vswr overload occurs.
8-24	LOW PWR ALC (1A16R8)	Adjusts low-power ALC delay bias threshold.
8-25	LOW PWR TGC (1A16R9)	Adjusts low-power TGC output voltage.
9-26	CONTROL indicator lamp (1A21DS1)	An amber indicator lamp that lights when control power (+28, +12, -12, and +5 V dc) is present on the equipment.
9-27	FILAMENT indicator lamp (1A21DS2)	A green indicator lamp that lights when filament and bias circuits are energized.

Table 3 HF-8022 Controls and Indicators (Cont).

FIGURE AND INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
9-28	PLATE indicator lamp (1A21DS3)	A red indicator lamp that lights when high voltage, plate, and screen circuits are energized.
9-29	READY indicator lamp (1A21DS4)	A blue indicator lamp that lights when a tune cycle is completed and the equipment is ready for normal operation.



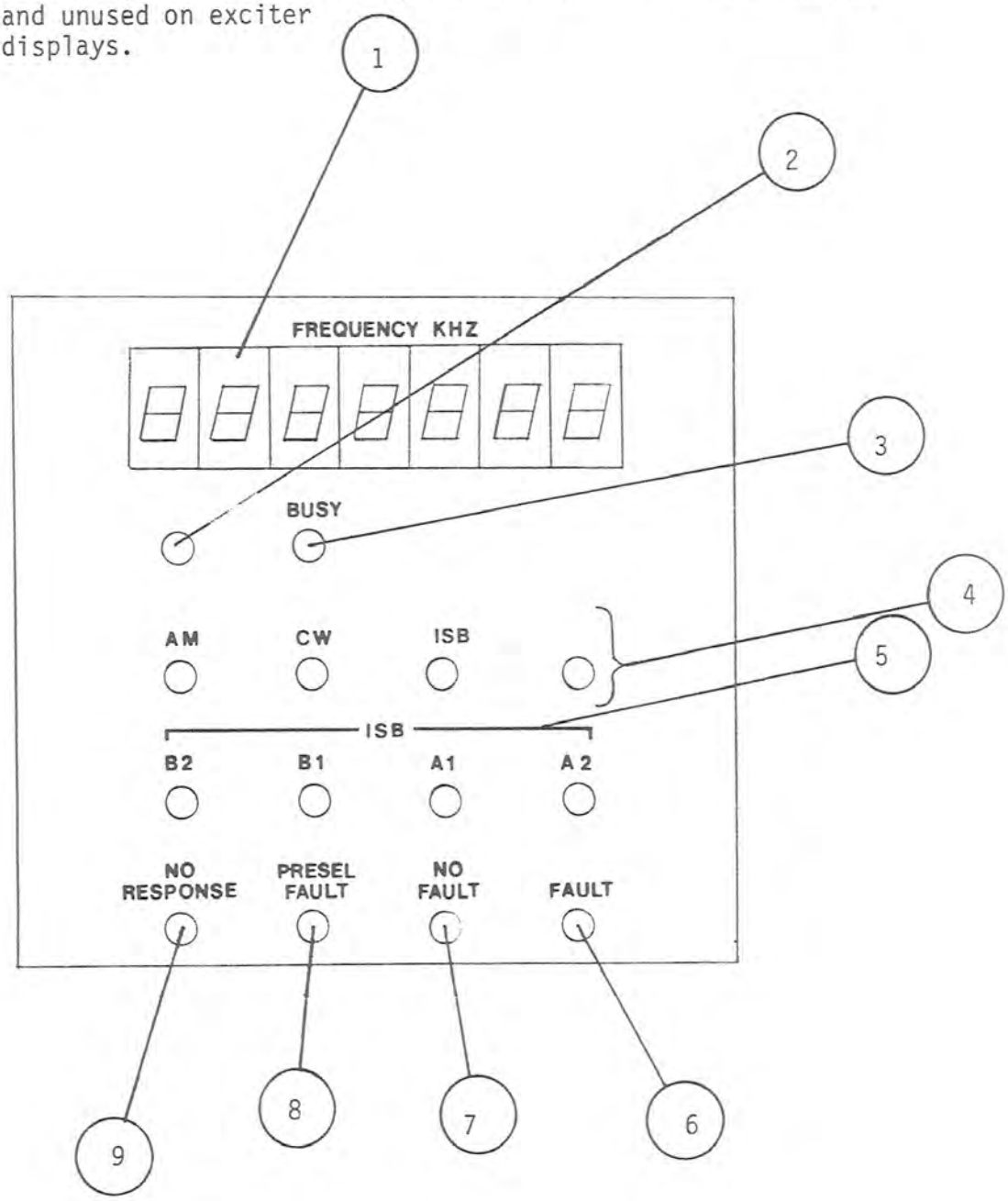
HF-8060 Preselector, Controls and Indicators
Figure 4

Table 4 HF-8060 Preselector, Controls and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	POWER switch S2	Connects/disconnects primary power.
2	POWER indicator DS1	Indicates primary power is applied and +24-V dc power supply is operational.
3	RESET switch S3	Resets overload protection circuit.
4	OVERLOAD indicator DS2	Indicates overload from received rf signal.
5	FAULT indicator DS3	Indicates internal power supply, transmit signal, or tuning timeout fault.
LINE SELECTOR switch S1 selects 100, 115, 215, or 230 V ac for input (located on rear panel) power transformer.		
	Note When 100 or 115 V ac is selected, install a 2-A fuse. When 215 or 230 V ac is selected, install a 1-A fuse(slow blow).	

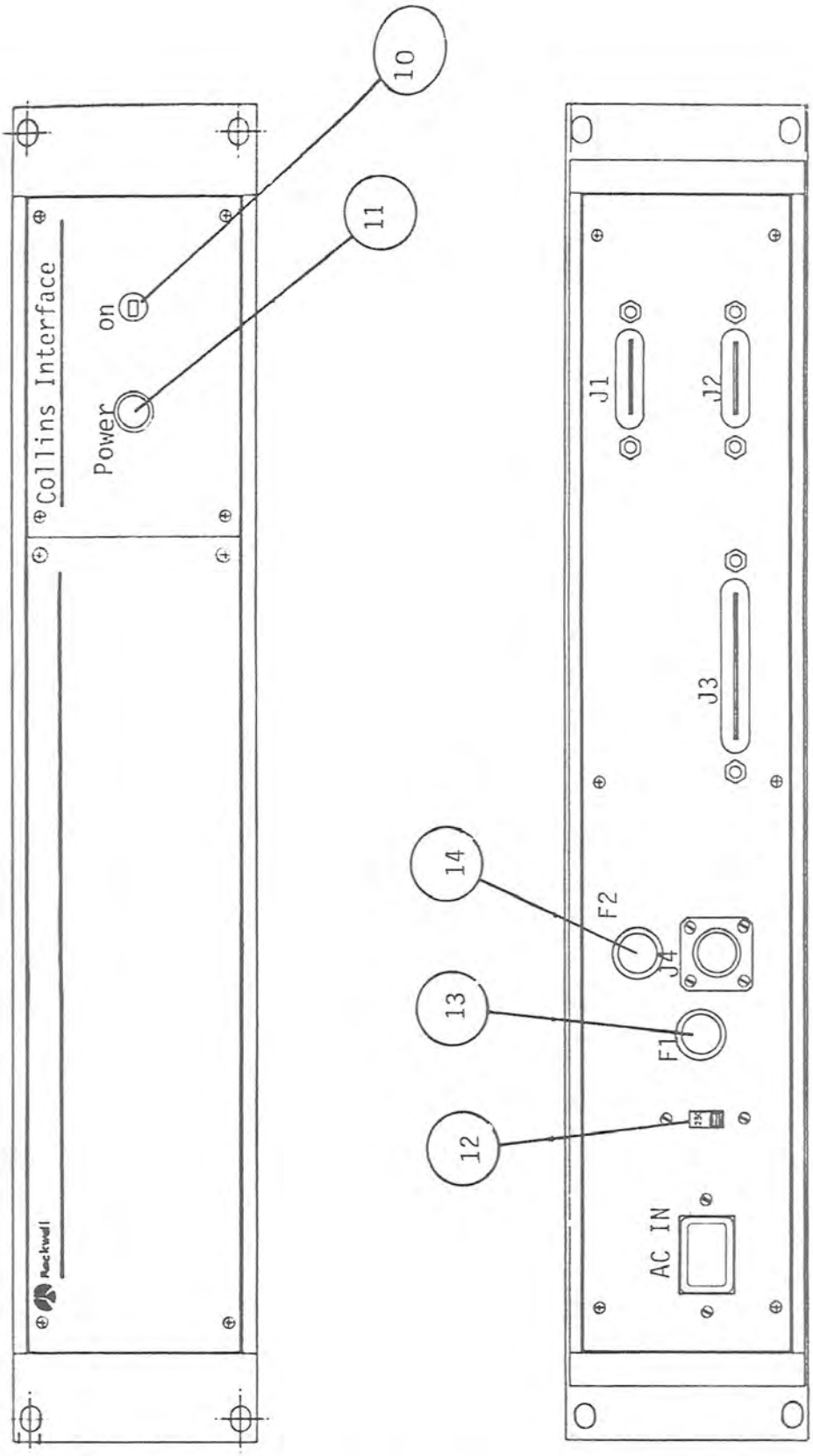
Notes: 1. Item #2 is RF OUT/PA Ready (strappable for either indication) on exciter displays and unused on receiver displays.

2. Item #4 (unmarked indicator) is NET DATA on receiver displays and unused on exciter displays.



AC-8111 (Four-channel System)
Display Module Panel Indicators
Figure 5 (Sheet 1)

FIG. 5



HF-80 Interface Unit Controls and Indicators

Figure 5 (Sheet 2)

Table 5 HF-80 Remote Display, Controls and Indicators

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Frequency Khz Display	Display numeric frequency as set by receiver/exciter remote control a) Displays tens megahertz. b) Displays ones megahertz. c) Displays hundreds kilohertz. d) Displays tens kilohertz. e) Displays ones kilohertz. f) Displays hundreds hertz. g) Displays tens hertz.
2	RF Out/PA Ready	Indicates that associated pa has an rf output or is ready to provide an rf output depending on indication option selected.
3	Busy	Indicates that addressed receiver/exciter is in local mode.
4	Operating mode Indicators	
	AM	Indicates that associated receiver/exciter has the AM operating mode selected.
	CW	Indicates that associated receiver/exciter has the CW operating mode selected.
	ISB	Indicates that associated receiver/exciter has the ISB operating mode selected.
	NET DATA	Indicates that associated receiver has the NET DATA operating mode selected.
5	ISB Channel Indicator	Indicates which channel(s) (B2, B1, A2, A1) are in use when the associated receiver/exciter has the ISB mode selected.

Table 5 HF-80 Remote Display, Controls and Indicators Cont/...

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
6	FAULT	Indicates that associated receiver or exciter/pa has faulted, (Refer to respective instruction books for an explanation of equipment faults). An alarm is also provided at the respective terminal of TB3; located on the rear of display unit.
7	NO FAULT	Indicates that associated receiver or exciter/pa has not faulted.
8	PRESEL FAULT	Indicates that the preselector of associated receiver has faulted. The preselector fault is not used with exciter systems.
9	NO RESPONSE	Indicates that associated receiver/exciter is not responding to status requests from control unit. Note: This is not necessarily a fault indication.
10	PWR Switch	Sets power on/off. When latched in the "up" position, power is applied to the HF-80 Remote Display. When latched in the "down" position, power is removed from the HF-80 Remote Display.
11	PWR Indicator	Indicates when power is applied to the HF-80 Remote Display.
12	Power Selection Switch	Controls input power strapping of power transformer in power supply. When in the down position, the power transformer is strapped for 230-V ac operation. When in the up position, the power transformer is strapped for 115-V ac operation.
13	Fuse F1	Fuse for line input power 2A used for 115-v ac operation. 1A used for 230-V ac operation.
14	Fuse F2	Fuse in +12-V dc power to display units. 15A used in all applications.

3. OPERATING PROCEDURES

3.1. Local Operation

The HF-8154A is locally controlled by the HF-8014A Exciter.

3.1.1 Turn-On Procedure.

CAUTION

Be sure the HF-8022 is connected to a dummy load or an antenna for the selected frequency.

To turn on the HF-8154A, proceed as follows:-

a. Set the HF-8014A Exciter controls as follows:-

1. PWR to OFF (Press inward until switch is released and latched in outward position).
2. PA PWR to OFF
3. KEY to NORM
4. PILOT CARR to OFF
5. PEAK CLIP to OFF
6. CONT to LCL
7. MODE to ISB
8. CHANNEL ENABLE switches to OFF

b. Set facility power circuit breakers to ON.

c. Set HF-8022 10-kW Power Amplifier controls as follows:-

1. CONTROL POWER circuit breaker to ON.
2. LOW LEVEL PLATE circuit breaker to ON.
3. PA FILAMENT circuit breaker to ON.
4. BIAS SUPPLY circuit breaker to ON.
5. LOW LEVEL FILAMENT circuit breaker to ON.
6. MAIN POWER circuit breaker to ON.

3. OPERATING PROCEDURES

3.1. Local Operation

3.1.1 Turn-On Procedure.

CAUTION

If the blower motor fails to function properly, turn off all power to the HF-8022 to prevent serious damage to the equipment. Normally the power amplifier will self-protect and turn off after 5 seconds if either air pressure is insufficient or the blower malfunctions.

NOTE

In the following steps, all controls and indicators used for operation are located on the HF-8014A unless otherwise specified.

d. Plug headphones into PHONES jack.

e. Plug microphones into MIC jack or key into CW KEY jack.

f. Press PWR switch (inward and latched).

NOTE

EXCITER FAULT indicator will light when power is applied. This is normal condition.

g. Change one digit of the FREQUENCY KHZ switches. EXCITER FAULT indicator should extinguish.

h. Set PA PWR switch to STBY. The green FILAMENT indicator on the HF-8022 lights.

NOTE

Allow a 30-minute warm-up period of the HF-8022 before proceeding.

i. Set PA PWR switch to HIGH PWR for 10-kW output power or to LOW PWR for low-power output (3000 to 7000W, adjustable). The red PLATE indicator on the HF-8022 lights.

j. Set FREQUENCY KHZ switches to the desired operating frequency.

3. OPERATING PROCEDURES
3.1. Local Operation
3.1.1 Turn-On Procedure.

k. Set METER switch XMT OUT (+23FS). Set MODE switch to CW.

l. Set KEY switch to LOCK. During the tune cycle, the KEY indicator lights When tune cycle is complete, the PA READY indicator will light to indicate that the HF-8022 is tuned. Meter M1 will indicate rf output from HF-8014A (+10 to +20 dB mW). The blue READY indicator on the HF-8022 lights.

NOTE

EQUIPMENT STATUS indicators EXCITER FAULT and PA FAULT must be extinguished for continued operation.

m. Set KEY switch as follows:-

1. EXT position for keying from the EXT KEY terminal on the rear panel

2. NORM position for keying from the front panel MIC or CW KEY jack.

3.1.2 CW OPERATION

a. Perform turn-on procedure in paragraph 3.1.1.

b. Set MODE switch to CW mode.

c. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

NOTE

The HF-8014A Exciter provides CW (A1) operation, which means the carrier is switched on and off. A receiver equipped to receive CW (A1) has a bfo or a similar means of detecting a transmitted CW carrier. If the receiver is not equipped to receive a transmitted CW carrier signal, the receiver must be offset from the operating frequency to generate a received CW audio signal.

d. Set KEY switch to NORM if using front panel CWK KEY jack or the EXT KEY if using rear panel EXT KEY input.

e. Momentarily apply key and allow system to tune.

f. When tuning is complete, normal CW communication can be established. Monitor CW sidetone by connecting headphones

3. OPERATING PROCEDURES

3.1. Local Operation

3.1.2 CW OPERATION

to PHONES jack on front panel, with PHONES switch in CH A1 position.

3.1.3 AM Operation

a. Perform turn-on procedures in paragraph 3.1.1.

b. Set MODE switch to AM mode.

c. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

d. Set KEY switch to NORM if using front panel MIC jack or to EXT KEY if using rear panel EXT KEY input.

e. Momentarily apply key and allow system to tune.

f. When tuning is complete, set CH A1 CHANNEL ENABLE switch to MIC if MIC jack is to be used, or set to LINE if line audio input is to be used.

3.1.4 ISB Operation

a. Perform turn-on procedures in paragraph 3.1.1.

b. Set MODE switch to ISB mode.

c. Set FREQUENCY kHz thumb-wheel controls to desired operating frequency.

d. Set KEY switch to EXT KEY if using rear panel EXT KEY input or to NORM if using front panel MIC jack.

e. Ensure that the desired channel A1, A2, B1, B2 audio inputs are properly connected.

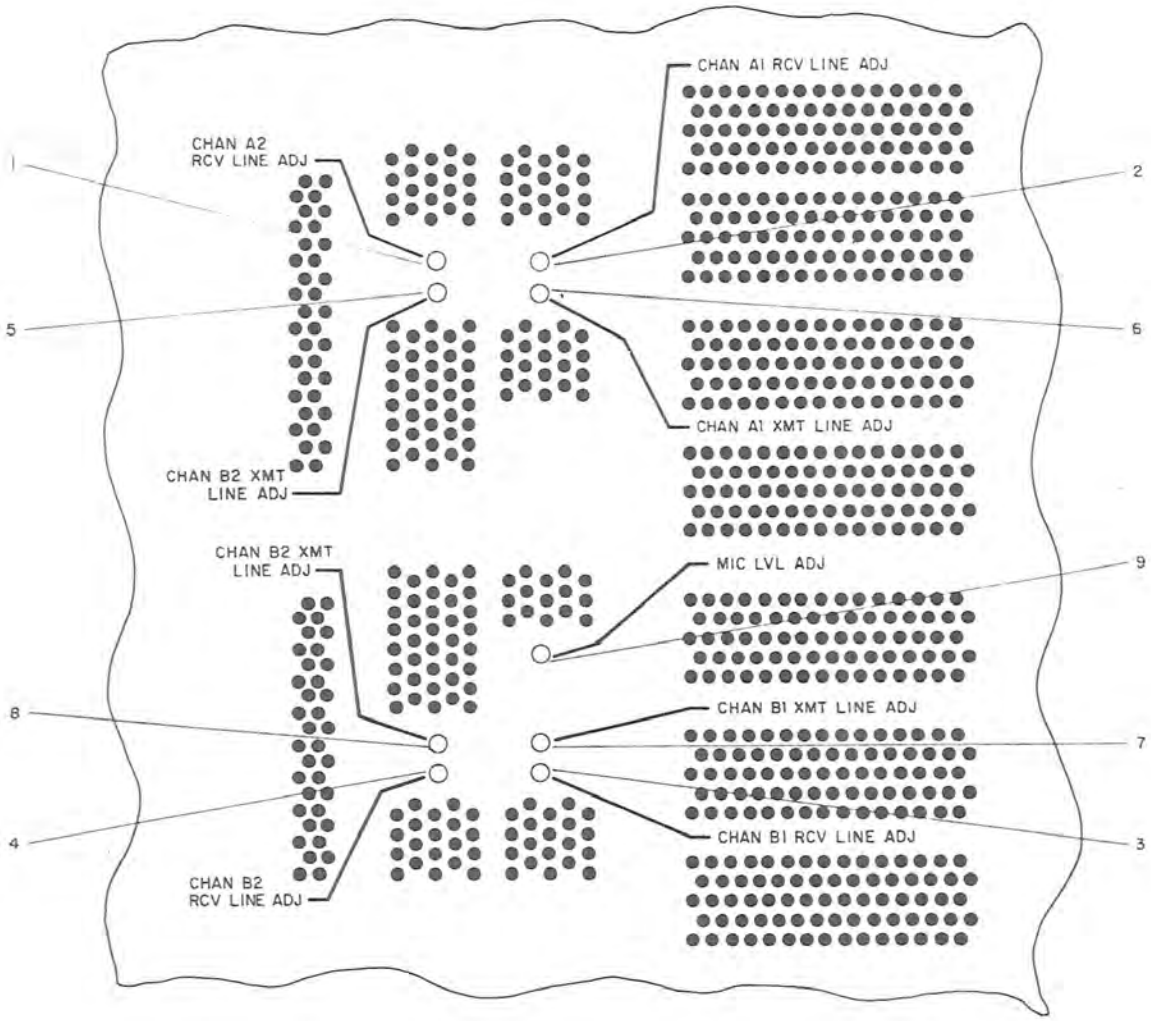
f. Momentarily apply key and allow system to tune.

g. When tuning is complete, normal ISB voice and/or data audio communications can be established. Set CHANNEL ENABLE switches to MIC or LINE depending on the source of the audio signal.

3.1.5 Audio Adjustments

Transmit line audio input and microphone audio input levels may be adjusted by the operator when required. These adjustments may be made through the top cover of the HF-8014A. Refer to Figure 6 for the location of these adjustments. The receive audio adjustments are not applicable for the HF-8014A.

3. OPERATING PROCEDURES
3.1. Local Operation
3.1.5 Audio Adjustments



HF-8014/8014A Exciter Top Cover, Location of Audio Adjustments
Figure **6**

3. OPERATING PROCEDURES

3.1. Local Operation

3.1.5 Audio Adjustments

Transmit line audio adjustments are applicable only when transmit line audio inputs are connected to the channel A1, A2, B1 or B2 XMT AF 600-ohm terminals the rear panel. For AM operation, channel A1 is used. For ISB mode of operation, channel A1, A2, B1 or B2 or any combination of the four channels may used. The audio input signal used may be either an FSK tone or a tone set to the level of the normal voice peaks. This procedure adjusts the internal audio amplifiers to accept signals above and below these nominal levels.

a. Perform turn-on procedures in paragraph 3.1.1

b. Set MODE switch to ISB mode and MIC switch to OFF.

NOTE

Line audio inputs are within the 15-dB compression range of the audio amplifier if the front panel indication is in the black segment of the front panel meter with audio applied. METER switch must be in the CH A1 AF (+3FS), CH A2 AF (+3FS), CH B2 (+3FS), or CH B1 AF (+3FS) position as applicable. RF output is constant when the audio input is within the indicated compression range.

c. Connect an audio signal to the XMT AF 600-ohm terminals on the rear panel associated with the channel to be adjusted. Enable the channel to be adjusted and set the METER switch to the appropriate channel. Adjust the following for midrange of the compression range (darkened segment shown on front panel meter).

CH A1 XMT LINE ADJ A5R53.

CH B1 XMT LINE ADJ A5R130

CH A2 XMT LINE ADJ A3R53

CH B2 XMT LINE ADJ A3R130

To adjust the HF-8014A microphone audio input level, proceed as follows:-

a. Perform turn-on procedures in paragraph 3.1.1.

b. Set MODE switch ISB and MIC switch to ON.

c. Connect a microphone to the MIC jack.

3. OPERATING PROCEDURES
3.1. Local Operation
3.1.5 Audio Adjustments

NOTE

Microphone level is set so when spoken into in normal voice the level deflects into the -5 to 0-dB mW region on the front panel meter. METER switch must be inthe CH A1 AF (+3FS), CH A2 AF (+3FS), CH B2 AF (+3FS), or CH B1 AF (+3FS) position as applicable. Avoid setting the microphone gain too high to prevent excessive background noise from being transmitted.

d. Key microphone and speak into it in a normal level.

e. Refer to Figure 6. Adjust MIC LVL ADJ A4R1 for an indication between the -5 to 0-dB mW area on the meter.

3.2 Remote Operation

The HF-8154A is remotely controlled by the HF-8093 Exciter Control. To operate the HF-8154A from a remote location, proceed as follows:-

NOTE

Ensure that the Master Control Switch (if used) is correctly set (to LOCAL) for the particular Exciter to be checked from the Exciter Controller.

CAUTION

Be sure HF-8022 is connected to a dummy load or an antenna for the selected frequency.

a. Set the HF-8093 Exciter Control controls as follows:-

1. PWR to OFF (Press inward until switch is released and latched in the outward position).
2. PA PWR to OFF.
3. KEY to NORM.
4 PILOT CARR to OFF.
5. PEAK CLIP to OFF.
6. CONT to NORM.

3. OPERATING PROCEDURES

3.2 Remote Operation

7. MODE to ISB

8. CHANNEL ENABLE switches to OFF.

b. Set facility power circuit breaker to ON.

c. Set the HF-8014A CONT switch to REM and depress PWR pushbutton (press inward and latch).

d. Set the HF-8022 controls as follows:-

1. CONTROL POWER circuit breaker to ON.

2. LOW LEVEL PLATE circuit breaker to ON.

3. PA FILAMENT circuit breaker to ON.

4. BIAS SUPPLY circuit breaker to ON.

5. LOW LEVEL FILAMENT circuit breaker to ON.

6. MAIN POWER circuit breaker to ON.

CAUTION

If the blower motor fails to function properly, turn off all power to the HF-8022 to prevent serious damage to the equipment. Normally the power amplifier will self-protect and turn off after 5 seconds if either air pressure is insufficient or the blower malfunctions.

NOTE

In the following steps all controls and indicators used for operation are located on the HF-8093 unless otherwise specified.

e. Plug headphones into PHONES jack.

f. Plug microphones into MIC jack or key into CW KEY jack.

g. Press PWR switch (inward and latched).

h. Set ADDRESS switch to the number of the controlled exciter. Set to 0 if only one exciter is used.

3. OPERATING PROCEDURES
3.2 Remote Operation

NOTE

EXCITER FAULT indicator will light when power is applied. This is a normal condition.

i. Change one digit of the FREQUENCY KHZ switches. EXCITER FAULT indicator should extinguish.

j. Set PA PWR switch to STBY. The green FILAMENT indicator on the HF-8022 lights.

NOTE

Allow a 30-minute warm-up period of the HF-8022 before proceeding.

k. Set PA PWR switch to HIGH PWR for 10-kW output power or to LOW PWR for low-power output (3000 to 7000 W adjustable). The red PLATE indicator on the HF-8022 lights.

l. Set FREQUENCY KHZ switches to the desired operating frequency.

m. Set METER switch to XMT OUT (+23FS). Set MODE switch to CW.

n. Set KEY switch to LOCK. During the tune cycle, the KEY indicator lights. When the tune cycle is complete, the PA READY indicator will light to indicate the HF-8022 is tuned. METER M1 will indicate the rf output from the HF-8014A (+10 to +20 dB mW). The blue READY indicator on the HF-8022 lights.

o. KEY Switch to NORM.

p. Set MODE switch to desired mode.

q. Set PHONES switch to desired channel (A1, A2, B1, B2 or ALL CHAN) for monitoring.

r. Set METER switch to desired meter scale and channel for monitoring.

s. Set PILOT CARR switch to OFF.

t. Set CHANNEL ENABLE switches to desired channel.

3. OPERATING PROCEDURES
3.2 Remote Operation

u. IF EQUIPMENT STATUS fault indicators are not lighted and the PA READY indicator is lit, establish transmission.

3.2.1 Audio Adjustments
3.2.1.1 General

The system audio is connected to the CHA1, CHA2, CHB1, and CHB2 XMT AF 600 OHMS IN terminals located on the rear panel of the HF-8093. The input level of the transmit audio signal should produce sufficinet drive from the HF-8014A to produce a 10-kW rf output from the HF-8022. Typically, this would be an FSK tone or the peak of a voice signal. The following procedures adjust the internal audio amplifiers to accommodate signals above and below nominal input levels. Substituting an audio signal generator with the level set to the normal voice peaks level greatly simplifies these adjustment procedures.

3.2.1.2 Transmit Line Audio Adjustments

To adjust the HF-8154A transmit line audio levels, proceed as follows:-

a. Perform turn-on procedures in paragraph 3.1.1.

b. On the HF-8093, set the MODE switch to ISB, CHANNEL ENABLE switches to OFF position, and METER switch to A1 (+13FS).

c. Refer to Figure 7. With an audio input signal connected to the CH A1 XMT AF 600 OHMS IN terminals, adjust CH A1 PH LVL ADJ control until METER M1 indicates 0dB.

d. On the HF-8014A, set MODE switch to ISB, METER switch to CH A1 AF (+3FS) and CHANNEL ENABLE switches OFF.

e. Refer to Figure 6. Adjust the HF-8014A CH A XMT LINE ADJ control until METER M1 indicates the correct set-up level.

f. Repeat steps b. through f. for CHANNELS, A2, B1, and B2 using the following information:

Channel A2 - HF-8093 METER switch to A2 (+13FS); adjust CH A2 PH LVL ADJ on HF-8093, audio connected to CH A2 XMT AF 600 OHMS IN terminals. HF-8014A METER switch to CH A2 AF (+3FS), adjust CH A2 XM XMT LINE ADJ on HF-8014A.

Channel B1 - HF-8093 METER switch to B1 (+13FS); adjust CH B1 PH LVL ADJ on HF-8093, audio connected to CH B1 XMT AF 600 OHMS IN terminals.

3. OPERATING PROCEDURES
3.2 Remote Operation
3.2.1 Audio Adjustments
3.2.1.2Transmit Line Audio Adjustments

HF-8014A METER switch to CH B1 AF (+3FS), adjust CH B1 XMT LINE ADJ on HF-8014A.

Channel B2 - HF-8093 METER switch to B2 (+13FS); adjust CH B1 PH LVL ADJ on HF-8093, audio connected to CH B2 XMT AF 600 OHMS IN terminals. HF-8014A METER switch to CH B2 AF (+3FS), adjust CH B2 XMT LINE ADJ on HF-8014A

10-kW TRANSMITTER SYSTEM

for

AUSTRALIAN ARMY

Rockwell International

THEORY

Printed in Australia

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THEORY

1. GENERAL

This section presents the theory of operation of the HF-80 10kW Transmitter Systems. Simplified block diagram (Figure 1) shows the transmitter system. Functional block diagrams (Figures 1, 3, 4, 5, 6) show the functional theory of the individual HF-80 10-kW Transmitter Equipments.

The HF-80 10-kW Transmitter Systems presented in this instruction book are typical (basic) systems that provide functions of a transmitter with an rf output of 10-kW. Various options that enhance operational capability may be added.

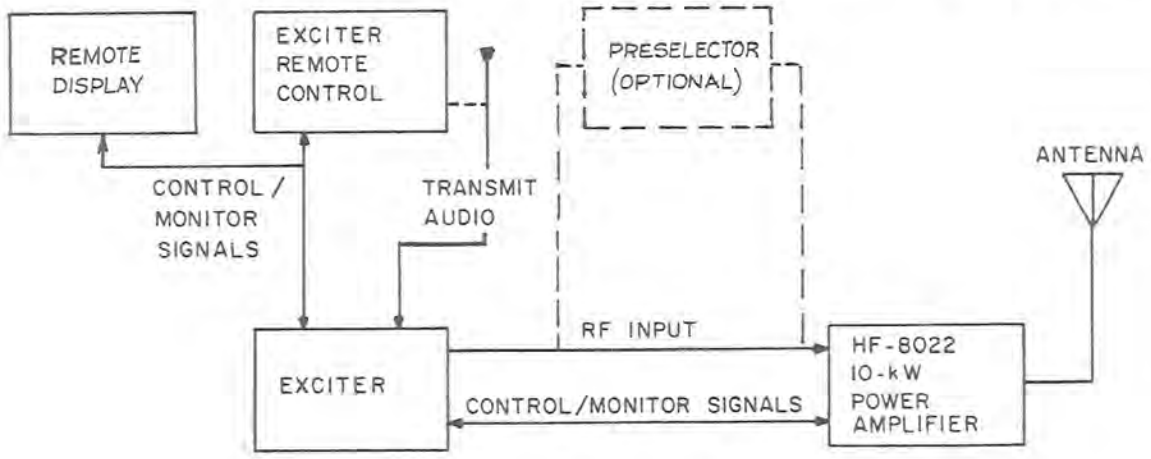
2. TRANSMITTER SYSTEM THEORY.

Refer to Figure 1. The primary function of the transmitter systems is to transmit rf signals in the 2.0 to 29.9999 MHz frequency range. The standard configuration provides 100-Hz tuning increments over the frequency range. The power output is 10-kW pep or average. When operated in the low power mode, the power output is adjustable from 3000 to 7000 watts. Emission modes include ISB, (UUSB, USB, LSB, LLSB), AME and CW.

The transmitter system consists of the HF-8022 10-kW Power Amplifier,an Exciter and a Remote Control Unit when remote control is desired.

The 4-channel Exciter provides local control, monitoring, and rf drive for the HF-8022 10-kW Power Amplifier. The HF-8022 amplifies the rf input from the exciter and provides a 10-kW rf output to the antenna.

The transmitter systems may be remotely controlled from the 4-channel exciter remote control unit. The exciter remote control unit also provides monitoring of the transmitter system. The exciter remote control unit also amplifies the transmit audio signal before application to the exciter during remote operation.



HF-80 10-kW Transmitter, Block Diagram
Figure 1

3. LOCAL CONTROL AND MONITOR SIGNALS.

3.1 General

The local control and monitor signals for the HF-80 10-kW Transmitter Systems are shown in Figure 2.

The application of the control signals is determined by the tuning sequence of the HF-8022. Complete tuning of the HF-8022 is accomplished in approximately six (6)seconds. The tuning sequence consists of two (2) tuning operations: coarse positioning and fine tuning. The operations are accomplished in seven (7) sequential tune steps that are controlled and monitored by the control logic circuits.

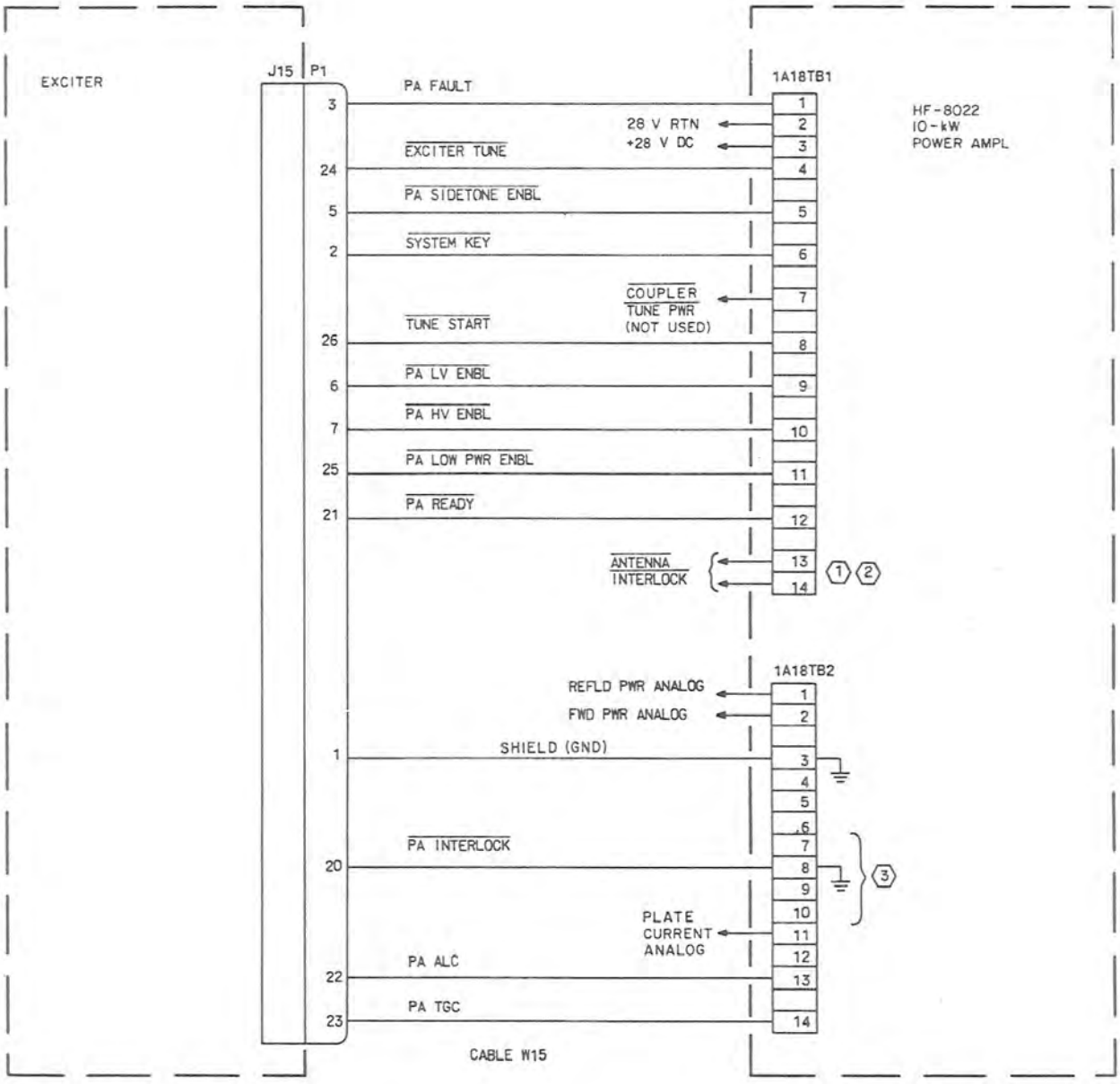
Initially, the system operator selects an operating frequency, which generates a tune start signal. The tune start signal resets the HF-8022 tune sequence control of the control logic circuits to the beginning (step 1) of the 7-step tune sequence. The normal progression through the HF-8022 tuning steps, and the functions occurring within each step, is as follows:-

a. Step 1 - Tune Start

The tune power threshold control voltage is enabled and the exciter tune enable output is applied to the exciter. The tune power threshold voltage is adjustable and limits the HF-8022 output power to 3-kW nominal during tune steps 3 through 5. All tuning servos are disabled. The tune step counter is set to step 1. All faults must be cleared and all interlocks must be satisfied before the tune cycle is allowed to advance . When a key command is applied by the exciter, the system key line is latched and remains latched until tune step 7 is reached or a tune fault occurs. The exciter now produces a CW carrier signal to drive the HF-8022 for tuning purposes. If the rf input level from the exciter is above a given threshold, the frequency is counted and loaded into the digital-to-analog converter during the 25 ms preceding step 2. All HF-8022 tube stages are bias ed to cut off during step 1.

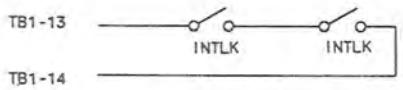
3. LOCAL CONTROL AND MONITOR SIGNALS.

3.1 General



NOTES:

(1) TB1-13 CONNECTS TO AUXILIARY ANTENNA INTERLOCKS AND RETURN TO TB1-14.



IF INTERLOCKS ARE NOT USED, CONNECT TB1-13 TO TB1-2.

(2) GROUND TB1-14 IF UNGROUNDED ANTENNA IS USED.

(3) USED WHEN AC-8020 PA SERIAL CONTROL CARD IS USED.

TP5-4903-014

Local Control and Monitor Signals
Figure 2

3. LOCAL CONTROL AND MONITOR SIGNALS.

3.1 General

b. Step 2 - Coarse Position

When the conditions of tune step 1 are satisfied, the tuning sequence advances to step 2. All four servos are enabled to coarse position the tuning elements of the HF-8022. During this tune step, each servo amplifier receives two inputs, one from its own shaper circuit on the coarse positioning-10 circuit card and the other from the servo followup potentiometer. The voltage from the potentiometer corresponds to the position of the tuning element driven by the servomotor. The servo amplifier has a differential input, thus it compares the shaper voltage (which is derived from the frequency of the rf drive) against the followup potentiometer voltage and drives the servo motor until the two voltages are equal in level. At this point the servo stops (in a null condition), leaving the running elements positioned near the fine-tuning point. At the beginning of step 2, the tune cycle timer is enabled. This timer will unkey the HF-8022 and generate a tune fault indication if the tuning sequence does not progress to step 7 within a nominal 25 seconds. When all enabled servos have nulled as indicated by individual servo run sensor inputs to control logic circuit card 1A7A4, the tuning sequence will progress to step 3 after a nominal 250-ms delay. All rf amplifier tube stages are biased at cutoff during step 2.

c. Step 3 - Conditional Fine Tune

All servos except loading respond to the dc error outputs of the respective phase discriminators. The discriminator outputs are applied to one input of the servo amplifier; the other input is grounded for fine tune steps 3 through 6. The discriminator output is a dc voltage that may be positive, zero, or negative, depending upon the position of its associated tuning element. A null or zero voltage is achieved at proper tuning . The loading servo is disabled in step 3 only to prevent interaction with the other servos. In this tune step, the operating bias is applied to all tube rf amplifier stages. When the enabled servos have nulled and if no fault has occurred, the tuning sequence progresses to tuning step 4 after a nominal 250-ms delay.

d. Step 4 - Fine Tune 1

When the conditions of tune step 3 are satisfied, the loading servo is enabled to addition to all other servos. The loading servo amplifier receives an input from the loading comparator circuit. The loading comparator circuit is a summation of a negative dc voltage proportional to the rf voltage on the power amplifier tube grid and a positive

3. LOCAL CONTROL AND MONITOR SIGNALS.

3.1 General

dc voltage proportional to the rf voltage on the power amplifier tube anode. When the amplifier is properly loaded (that is, predetermined rf voltage gain in the power amplifier stage), the comparator output is at 0 V and the loading servo is nulled. When all servos have nulled, the tuning sequence progresses to step 5 after a 250-ms delay.

e. Step 5 - Fine Tune 2.

All of the conditions of step 4 apply to step 5. If no faults have occurred, the tuning sequence progresses to step 6.

f. Step 6 - High-Power Trim

When the conditions of step 5 are satisfied, the tune power threshold control voltage is disabled which releases the tune power level and allows the HF-8022 to make final trim tuning under high power. All servos are enabled for final trim tuning. TGC is allowed to set the overall transmitter gain when the power amplifier is being controlled and driven by the exciter. When all servos have nulled, and after a 250-ms delay the tuning sequency progresses to step 7. The tune sequence timer is disabled at the end of tune step 6.

g. Step 7 - Operate

All servos are disabled and the system key line unlatches. The READY indicator lights, indicating the successful completion of an automatic turn cycle. ALC is gated to the exciter and the HF-8022 is fully operational.

3.2 System Low-Voltage Enable.

When the PA PWR control on the exciter is set to the STBY position, a logic 0 signal is applied to the power-amplifier low-voltage enable line. The power-amplifier low-voltage enable signal is routed from the exciter to the HF-8022 by cable W15 (P1-6 to 1A18TB1-9). Ths signal enables the filament, blower, and low-level supplies.

3.3 System High-Voltage Enable.

When the PA PWR control on the exciter is set to the HIGH PWR or LOW PWR position, a logic 0 signal is applied to the power-amplifier, high-voltage enable line. The power-amplifier high-voltage enable signal is routed from the exciter to the HF-8022 by cable W15 (P1-7 to 1A18TB1-10). This signal is processed by the HF-8022 control circuits and, if no fault exists and the low voltage has been energized for at least 30 seconds, the HF-8022 plate and screen voltages are enabled immediately. Otherwise plate and screen voltage are enabled at the end of the 30-second period following low-voltage enable.

3. LOCAL CONTROL AND MONITOR SIGNALS.

3.3 System High-Voltage Enable

3.4 Power-Amplifier Fault.

The HF-8022 generates a logic 0 signal on the pa fault line if any of the following conditions occur:

a. If there is no continuity through all circuit breakers of the HF-8022 power supply (circuit breaker fault).

b. The HF-8022 power supply door, grid compartment door, plate compartment door, low-level driver assembly 1A1 cover plate, and connectors of all rf amplifier unit 1 plug-in assemblies are not properly mated (interlocked) (access/plug interlock fault).

c. Circuit cards 1A7A2 through 1A7A7 are removed from the HF-8022 (access/ plug interlock fault).

d. The HF-8022 blower motor fails to produce the proper flow of air (air fault).

e. The antenna interlock circuit detects a fault (antenna interlock fault).

f. When a vswr or tune fault exists.

g. When plate current overload or screen current overload fault exists.

If a fault condition is present, the HF-8022 is inoperative until the fault is cleared.

The pa fault signal is routed from the HF-8022 to the exciter by cable W15 (1A18TB1-1 to P1-3). If a pa fault exists, the PA FAULT indicator on the exciter will light.

3. LOCAL CONTROL AND MONITOR SIGNALS.

3.4 Power-Amplifier Fault.

3.5 System Key.

A system key is initiated by the exciter when not inhibited and any of the following conditions are met:

a. A local key and local enable signal are applied.

b. A remote key is applied and a local enable signal is applied.

c. A CW enable, CW key enable, or an external key is applied.

The system key is inhibited when any of the following conditions are met:

a. When the frequency selected is below 2.0 MHz.

b. When an exciter fault is present.

c. When power amplifier fault is present.

The system key signal is routed from the exciter to the HF-8022 by cable W15 (P1-2 to 1A18TB-6).

An internal key interlock signal latches the keying circuits during tune steps 2 through 6. After tuning, the latch function is not used.

3.6 System Tune Start

A system tune start pulse is initiated by the exciter to tune/retune the HF-8022. The following conditions initiate a tune start signal.

a. Application or removal of a local enable signal.

b. Change of a local frequency control of 1kHz or more, when a local enable signal is applied.

c. Setting PA PWR switch to LOW PWR or from LOW PWR position.

d. Change of a remote frequency control of 1 kHz or more when a local enable signal is not applied.

The tune start signal is a single pulse supplied to the HF-8022. The tune start

3. LOCAL CONTROL AND MONITOR SIGNALS.

3.6 System Tune Start

pulse resets the HF-8022 to tune step 1.

The tune start pulse is routed from the exciter to the HF-8022 by cable W15 (p1-26 to 1A18TB1-8).

3.7 Exciter Tune

The exciter tune signal (ground during tune steps 1 through 6) is routed from the HF-8022 to the exciter by cable W15 (1A18TB1-4 to P1-24). This signal produces a CW carrier for HF-8022 tuning purposes from the exciter when a system key signal is applied. The HF-8022 removes the ground on the exciter tune line at the end of the automatic tune cycle. This causes the exciter to remove a fixed attenuator of 5 dB from the rf drive circuits. Since TGC voltage has established the system gain at -3 dB of the desired operating power, the exciter will drive into ALC by a nominal 2 dB at peak drive.

3.8 Power-Amplifier Interlock.

The power-amplifier interlock line is connected to ground in the HF-8022. This ground is applied from the HF-8022 to the exciter by cable W15 (1A18TB2-8 to P1-20). This ground prevents the exciter from keying the HF-8022 when frequencies below 2 Mhz are selected.

3.9 Transmitter Gain Control

The purpose of transmitter gain control (TGC) is to compensate for pa rf gain variations with frequency, and exciter to pa coax cable losses which vary with length and frequency. The TGC loop, at each operating frequency, established a nominal transmitter gain from audio input to pa rf output.

The TGC voltage is generated during tune steps 4 through 7 of the HF-8022 tune cycle. The TGC voltage from the HF-8022 is directly proportional to rf output power. The absolute level of TGC voltage may be adjusted between 0 and -8 V dc when rf output is 10-kW. This voltage may be independently adjusted for both the low- and high-power levels of operation. TGC in the PA, is adjusted to produce -5V when the pa is producing exactly one half the desired operating rf output power. The exciter internal TGC attenuator varies either up or down (increasing or decreasing rf drive to the HF-8022) until it receives -5V dc on the TGC line. The TGC attenuator then stops, having established the HF-8022 output power at half the desired operating power and thus the total transmitter gain. The TGC voltage is routed from the HF-8022 to the exciter by cable W15 (1A18TB2-14 to P1-23).

3.10 Automatic Level Control

The purpose of the automatic level control (ALC) voltage is to control the peak rf output level of the exciter after the HF-8022 has completed the tuning cycle . By controlling the rf input level to the HF-8022, the output power level is controlled. The ALC voltage is zero for rf power levels up to a predetermined

3. LOCAL CONTROL AND MONITOR SIGNALS.

3.10 Automatic Level Control

value (adjustable). Then a negative ALC voltage is developed with a slope of approximately 5 V per dB above threshold. This threshold may be adjusted independently for both the low- and high-power levels of operation.

The ALC voltage is routed from the HF-8022 to the exciter by cable W15 (1A18TB2-13 to P1-22).

3.11 System Power-Amplifier Ready

The system power-amplifier ready signal (ground when ready) is routed from the HF-8022 to the exciter by cable W15 (1A18TB1-12 to P1-21). This ground signal indicates that the HF-8022 has completed tuning and is operationally ready. This signal causes the PA READY indicator on the exciter to light. The HF-8022 inhibits this function when the HF-8022 is locally controlled by the TS-8021 Maintenance Panel.

3.12 Power-Amplifier Sidetone Enable

When an rf output signal is generated by the HF-8022, a logic 0 signal is applied to the pa sidetone enable line. The pa sidetone enable signal is routed from the HF-8022 to the exciter by cable W15 (1A18TB1-5 to P1-5). In the exciter this signal lights the RF OUT indicator.

3.13 System Low-Power Enable

When the PA PWR switch on the exciter is set to the LOW PWR position, a logic 0 signal is generated on the system low-power enable control line. This signal is routed through cable W15 (1A18TB1-11 to P1-25) to the HF-8022. In the HF- 8022, the logic 0 signal switches the ALC and TGC circuits to the low-power setting. The ALC and TGC signals are routed to the exciter and establish transmitter gain at a reduced rf output level. When the PA PWR switch on the exciter is set to the HIGH PWR position, a logic 1 signal is generated. The logic 1 switches the ALC and TGC circuits to the high-power setting. This allows full rated power from the HF-8022.

4. FUNCTIONAL THEORY

4.1 *HF-8022 10-kW Power Amplifier.*

4.1.1 General

Refer to Figure 3. The HF-8022 consists of two (2) units: unit 1 is the rf section, and unit 2 is the power supply. The rf section (figure 3, sheet 1) contains the rf amplifier stages, impedance matching networks, and the control system of the HF-8022. The power supply (Figure 3, sheet 2) contains five (5) separate power supplies that provide operating voltages, regulated bias voltage for the rf amplifier circuits, and servo system power in the rf section.

4.1.2 RF Section

Refer to Figure 3, sheet 1. The rf input from the exciter is routed through coarse positioning circuit card 1A7A5 to feedback mixer circuit 1A1TB1. The rf signal is combined with a negative feedback signal from the power amplifier V1. This combined signal is amplified and routed to input amplifier 1A1V1. The input amplifier tube is biased to operate class A. Internal gain control (IGC) circuits control the grid bias of this stage to protect the power amplifier from overdrive conditions, mistuning, or incorrect loading.

The output of input amplifier 1A1V1 is routed through drive grid circuit 1A1TB2 to driver amnplifiers 1A1V2 and 1A1V3. The output of the driver amplifiers is tuned by a variable inductor and capacitor which are positioned by servo motor 1A3B1. Phase discriminator 1A1A1 provides fine tuning information to the servo drive system that controls servo motor B1. The signal from the drive amplifier is applied to the input circuit of power amplifier V1 where it is amplified to 10-kW. This amplifier is operated class AB1. The rf output signal is coupled through rf tune coil 1A8, loading coil 1A9., low-pass filter 1A10 and directional coupler 1A11 to the output connector.

RF tune coil 1A8 is a double-tuned, magnetically coupled bandpass network. The double-tuned network is fine tuned by two phase discriminators 1A13 and 1A14. Phase disciminator 1A13 compares the phase difference between the input and output signals of power amplifier V1 and drives primary servo motor 1A4B1 until there is a 180 degree phase difference. Phase discriminator 1A14 compares the phase difference between the primary and secondary signals of rf tune coil 1A8and drive secondary servo motor 1A5B1 until there is a 90-degree phase difference.

Loading coil 1A9 is positioned to establish the proper gain of power amplifier V1. Fine tuning of the load coil is accomplished by comparing the ratio of grid to plate voltage of the power amplifier. This information is routed through coarse positioning circuit card 1A7A5 and dual servo amplifier circuit card 1A7A7 to load coil tuning drive 1A6. Servo motor 1A6B1 positions loading coil 1A9 for a correct voltage ratio.

Harmonics are attenuated by the output network and low-pass filter 1A10. Directional coupler 1A11 provides reflected and foward samples, and couples the rf signal to the output connector.

4. FUNCTIONAL THEORY

4.1 HF-8022 10-kW Power Amplifier.

4.1.2 RF Section

A portion of the rf input signal is sampled by coarse positioning -10 circuit card 1A7A5. The frequency of this signal is counted and this information is processed to determine the coarse tune position for the four (4) servo systems.Fine tuning is accomplished by the phase discriminator signals as previously discussed.

Interface circuit card 1A7A3 provides all the circuits necessary to interface the HF-8022 with the exciter. In addition to performing interface functions, this circuit card provides switching between external equipment and local maintenance functions and generates ALC and TGC. ALC is generated from a sampling of power-amplifier plate voltage compared with a preset threshold voltage. TGC is generated from a sample of the power-amplifier rf plate voltage. The ALC and TGC levels are both controlled by the low-voltage enable signal which provides full power output or reduced power output operation.

4.1.3 Power Supply

Refer to Figure 3, Sheet 2. The input voltage is applied through electromagnetic interference (emi) filters FL1, FL2, and FL3 and MAIN POWER circuit breaker 2CB1 to buck boost transformer 2T1. When the primary is delta-connected , transformer 2T1 may be strapped to operate from 198 to 225 V ac. When the primary is wye-connected, transformer 2T1 may be strapped to operate from 343 to 442 V ac. The 28-V dc transformer 2T2, screen supply transformer 2T3, plate supply transformer 2T4, the transformer in bias power supply 2A4, low-level power supply 2A3, and blower motor 2A5B1 must be strapped for the voltage selected for transformer 2T1.

The high-voltage section is energized through high-voltage contactor 2K2. Contactor 2K2 requires a high-voltage control signal and +28 Vdc for operation.The high-voltage section consists of the power-amplifier plate and screen and low-level power supplies.

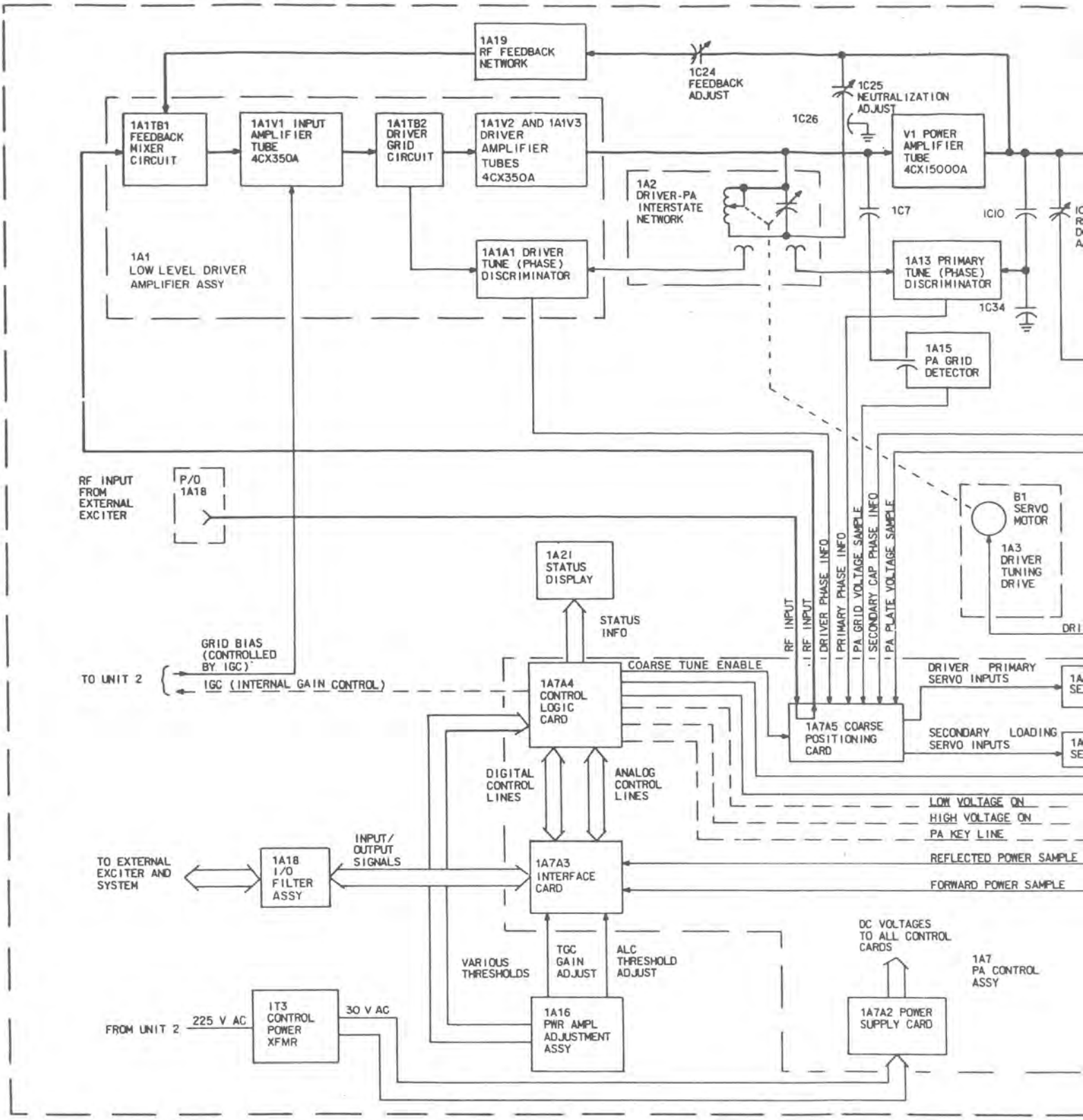
The low-voltage section is energized through low-voltage contactor 2K1. Contactor 2K1 requires a low-voltage control signal and +28V dc for operation. The low-voltage section consists of blower assembly 2A5, bias supply 2A4, and the power-amplifier filament voltage circuit.

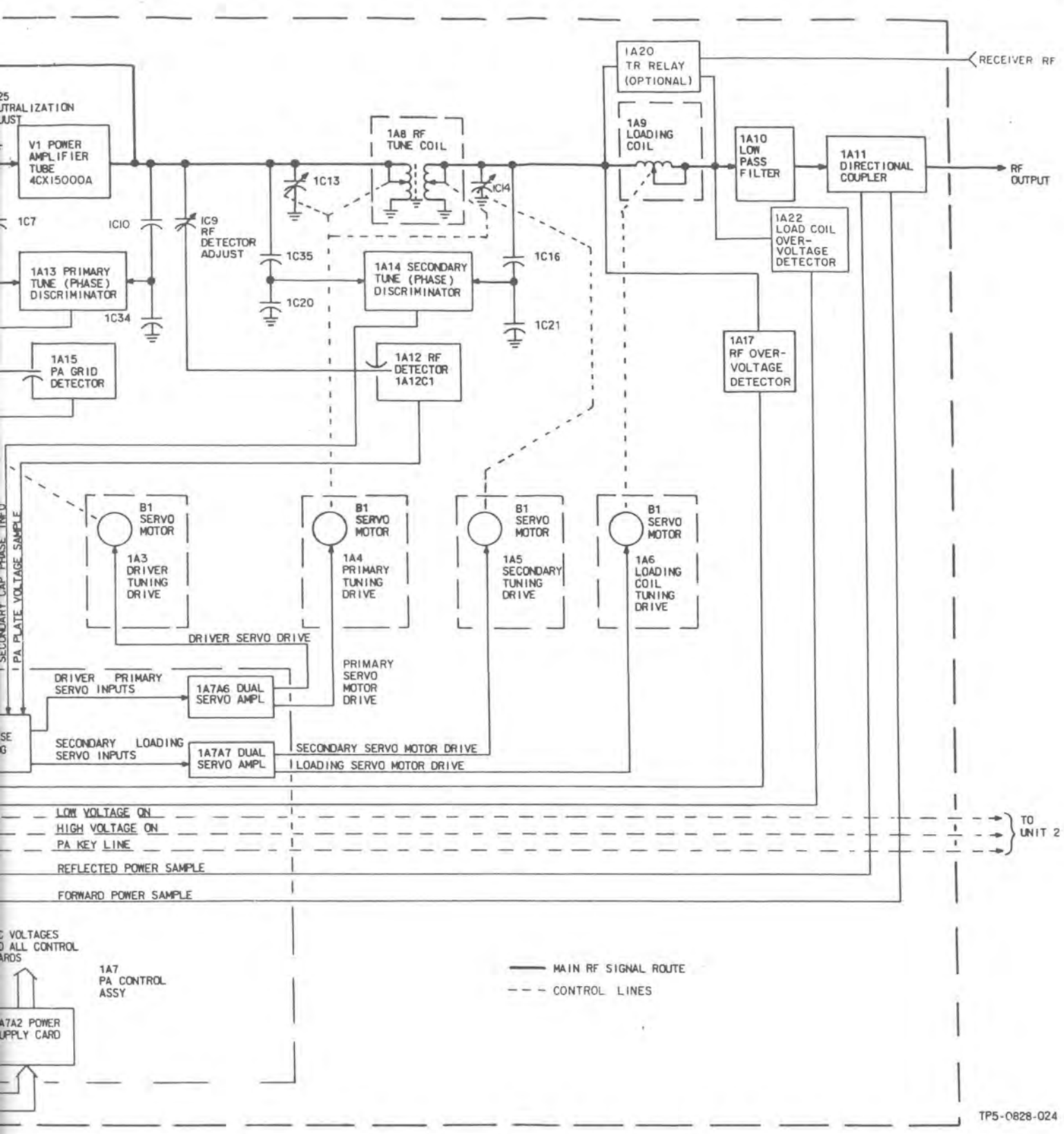
4.2 HF-8014A Exciter

Refer to Figure 4. The HF-8014A is frequency controlled directly from the front panel. Bcd frequency signals from the front panel are applied directly to synthesizer cards A17 through A23 and to the control card A10.

The bcd frequency signals applied are used to establish the frequency of the vfo output (109.35 to 79.350 01 MHz) from the synthesizer and control the preselector and pa outputs from the control card.

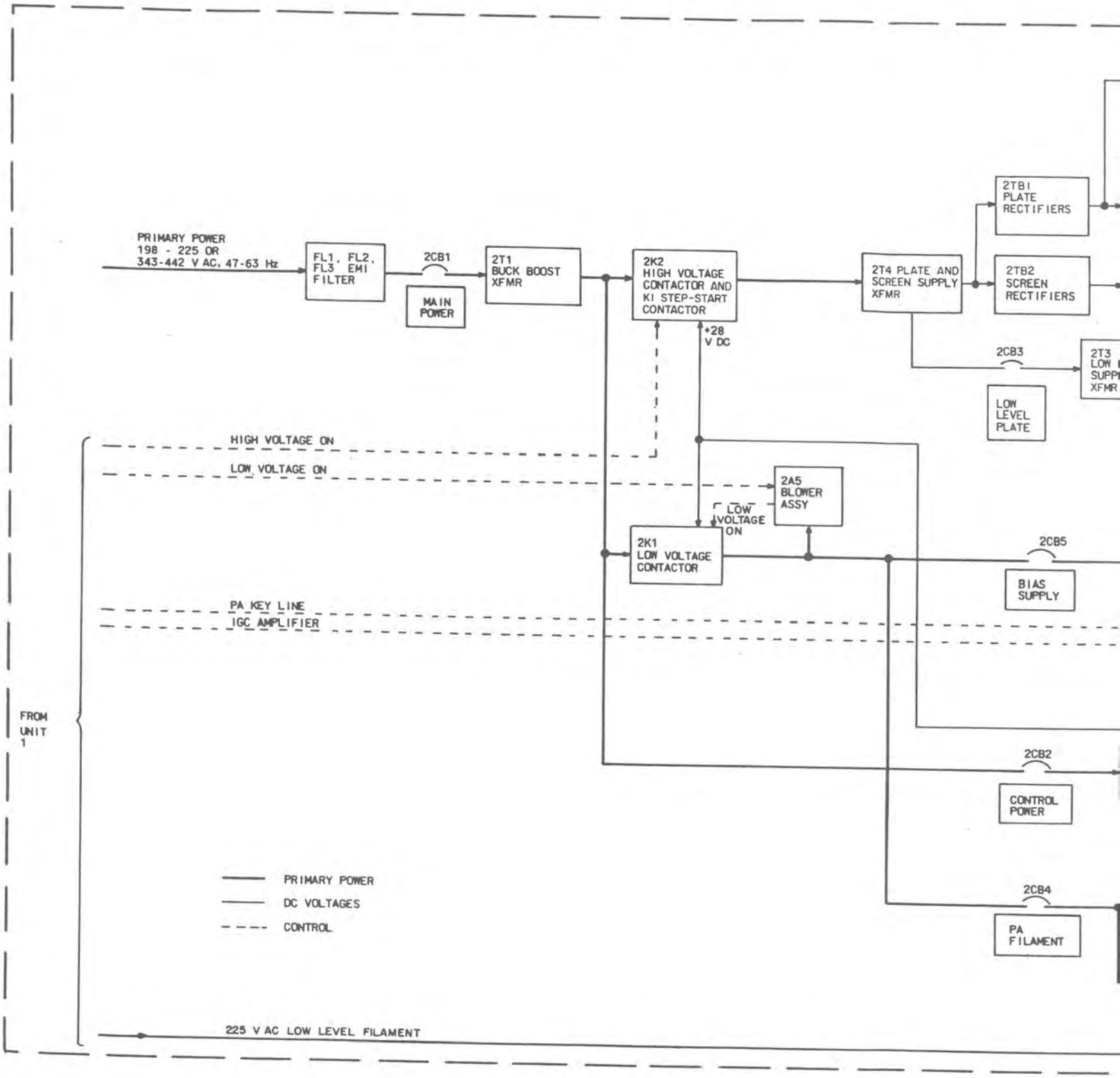
4. FUNCTIONAL THEORY
4.2 HF-8014A Exciter

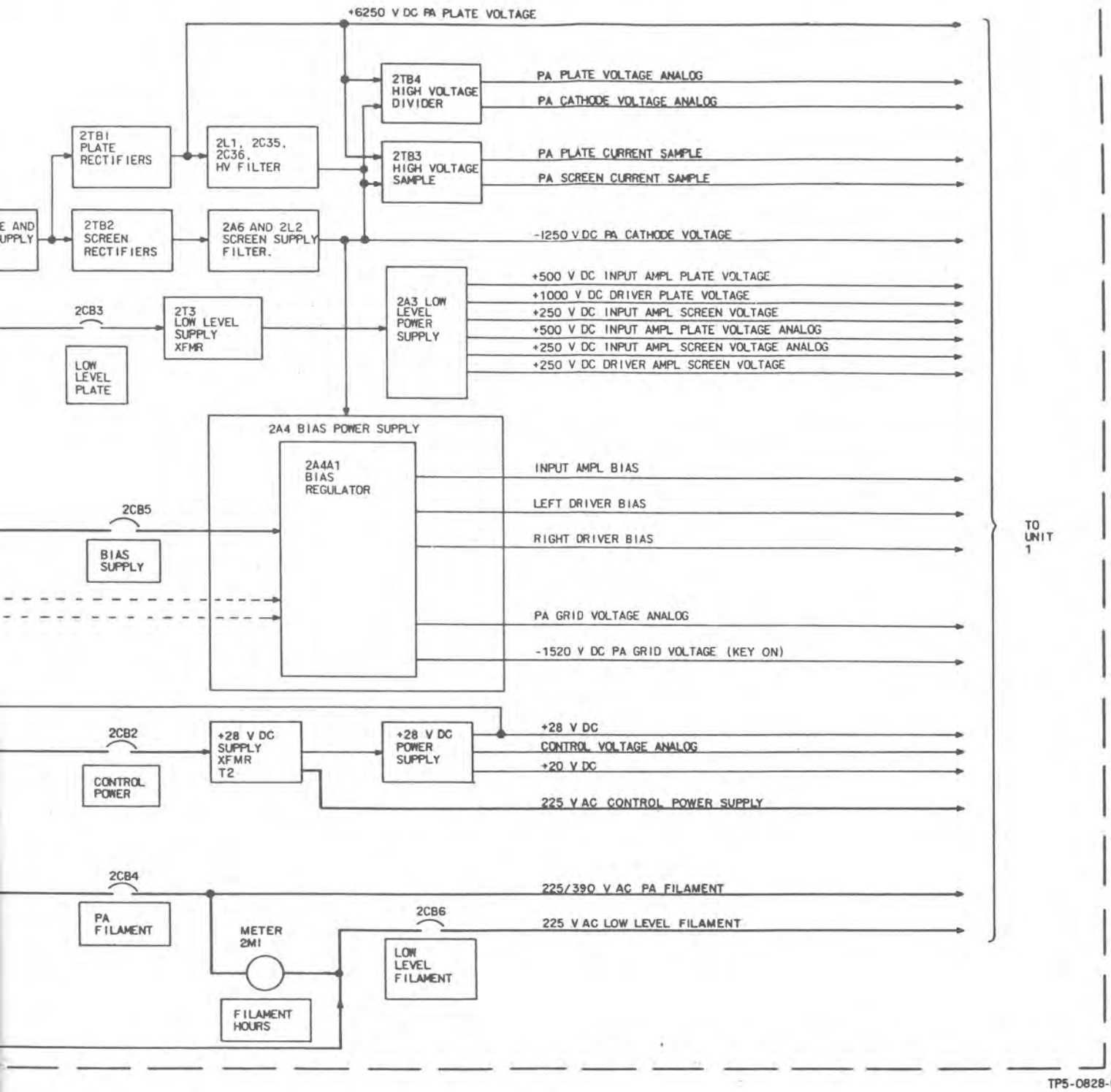




HF-8022 10-kW Power Amplifier, Block Diagram
Figure 3 (Sheet 1 of 2)

4. FUNCTIONAL THEORY
4.2 HF-8014A Exciter





HF-8022 10-kW Power Amplifier, Block Diagram
Figure 3 (Sheet 2)

4. FUNCTIONAL THEORY

4.2 HF-8014A Exciter

The HF-8014A operating mode is controlled directly from the front panel. Mode signals from the front panel are applied directly to the control card A10 and to the selected audio and if cards. This controls all mode switching in the HF-8104A and provides necessary mode signals for the associated power amplifier.

The HF-8014A transmit audio signals are applied at either the MIC jack on the front panel or the channel A1, channel A2, and channel B1, and channel B2 line inputs on the rear panel. These signals are applied to the A1-B1 audio card A4 and the A2-B2 audio card A3 where the audio channel is determined by the setting of the front panel CHANNEL ENABLE switches in conjunction with the MODE switch. The audio output from the audio cards (A3 and A4) is applied to the if amplifiers circuit cards, A5 through A8. The if channels, channel A1, channel A2, Channel B1, and Channel B2, are enabled in accordance with the MODE switch setting and the CHANNEL ENABLE switches. In the if cards the audio signal is converted to the first if signal and then mixed with 9.9 MHz to produce the 9.45 MHz second if signal that is supplied to rf translator module A9. The first if signal is obtained by mixing the audio signal with 450 kHz on the channel A1 if and the channel B1 if, with 456.29 kHz on the channel A2 if, and the 443.71 kHz on the channel B2 if. The 9.9 MHz mixing is accomplished only on the channel A1 if circuit card A8. The 9.45 MHz signal applied to the rf translator module is mixed with the fixed 118.8 MHz injection signal and the vfo injection signal to provide an rf output signal to drive the power amplifier. The level of the output signal is controlled by the TGC signal during the system tuning operation and by the ALC signal during normal transmission.

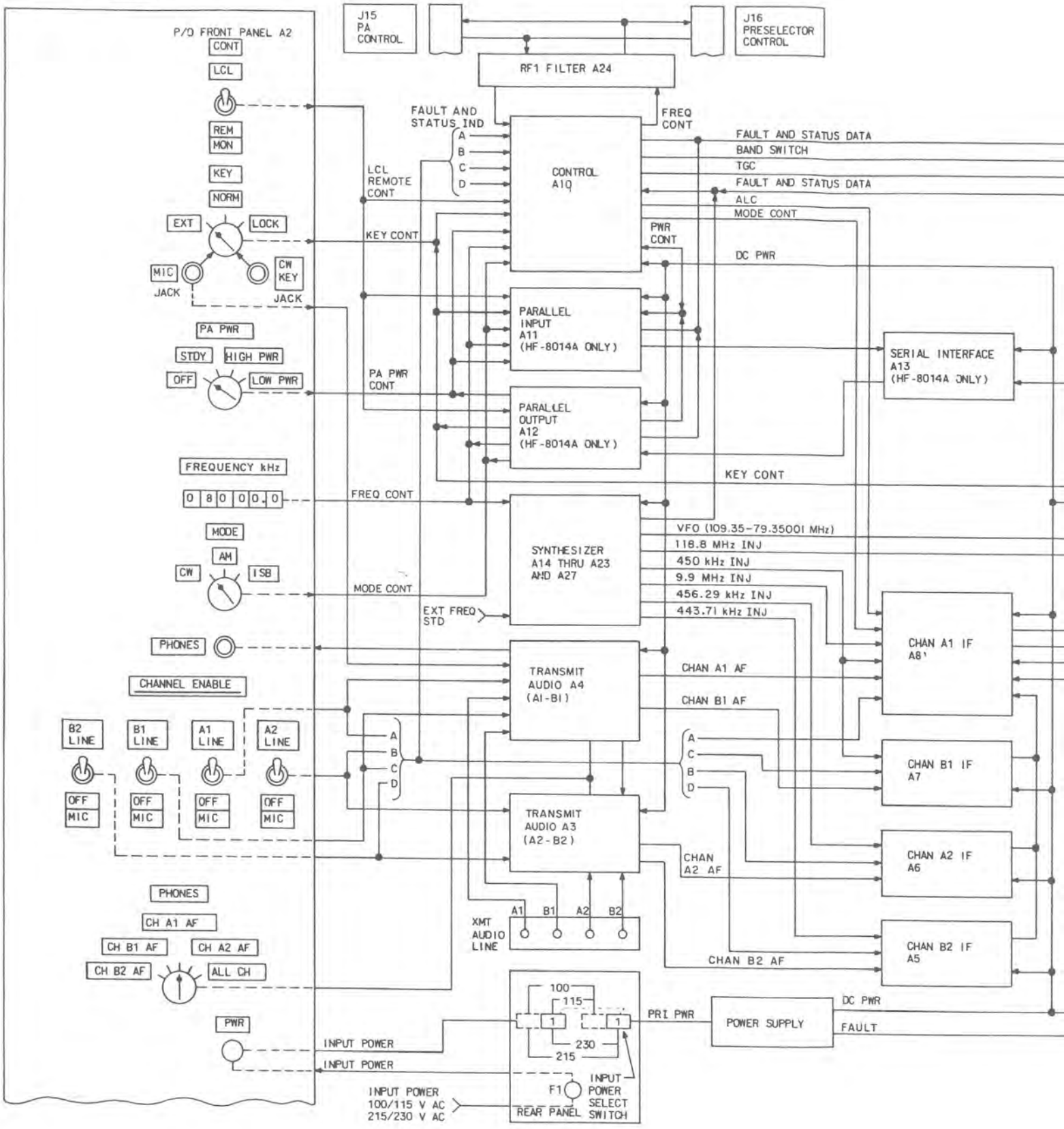
4.3 HF-8093 Exciter Control

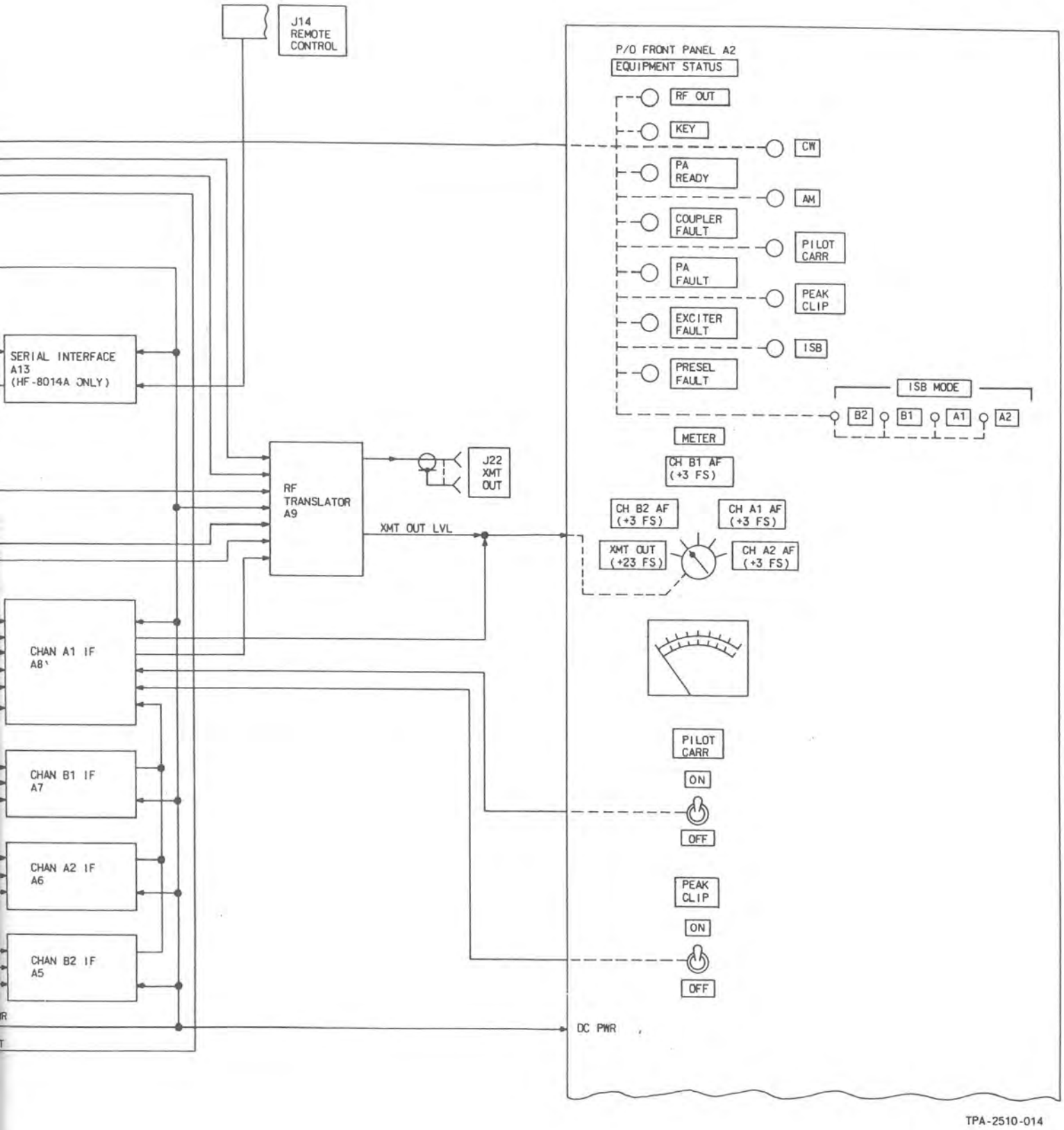
4.3.1 General

Two (2) methods of serial data signalling are used in the HF-8093 Exciter Control and are switch selectable on the serial interface card. The two (2) methods are frequency-shift keyed (FSK) audio tones and RS-232C data logic levels. In conjunction with selection of the RS-232C signalling, strapping is available to invert the polarity of the RS-232C data for compatibility with the logic polarity and voltage levels defined in MIL-STD-188C.

When the FSK method is selected, only one remote HF-8014A Exciter may be controlled and monitored by a single HF-8093 Exciter Control. When the RS-232C logic level signalling method is selected, up to 16 individually addressable remote exciters may be controlled and monitored by a single exciter control. The RS-232C control can be by direct connection to the control unit or by transmission over data modems for longer distances.

4. FUNCTIONAL THEORY
4.3 HF-8093 Exciter Control
4.3.1 General





HF-8014/8014A Exciter, Block Diagram
Figure **4**

4. FUNCTIONAL THEORY

4.3 HF-8093 Exciter Control

4.3.1 General

Two (2) separate sets of data lines are used with the control unit. One set, called the control bus, is used to transmit command data. The other set, called the monitor bus, is used to receive status information. When using FSK signalling, the control and monitor buses are balanced 600-ohm audio lines. When strapped for RS-232C signalling, the control and monitor buses are unbalanced lines to ground. The data transmission (baud) rate on the control and monitor buses is switch selectable on the serial interface card. Baud rates are 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud. The usable data rates for FSK signalling method are limited to not more than 600 baud. Each remote exciter must be strapped for the same baud rate as the associated exciter control.

Data transmitted and received on the control and monitor buses is serial, asynchronous, and organized in groups of characters called words. The formats are independent of the type of signalling (FSK, RS-232C, or MIL-STD-188C) used. The data formats apply to both the exciter and exciter control. On the control bus, the command data is determined by settings of the exciter control front panel switches and controls. On the monitor bus, the monitor data is determined by the current operational status of the exciter.

The two different data formats are switch selectable on the serial interface card. One format uses ASCII coded characters and the other format used an 8- bit byte character code. The input to the serial interface card is the same bit byte character code. The input to the serial interface card is the same for both ASCII or 8-bit byte codes.

4.3.2 Theory of Operation

The functional theory discussion includes the following: power distribution, control, frequency control and address selection, audio, and monitor functions.A block diagram is provided as an aid in each discussion.

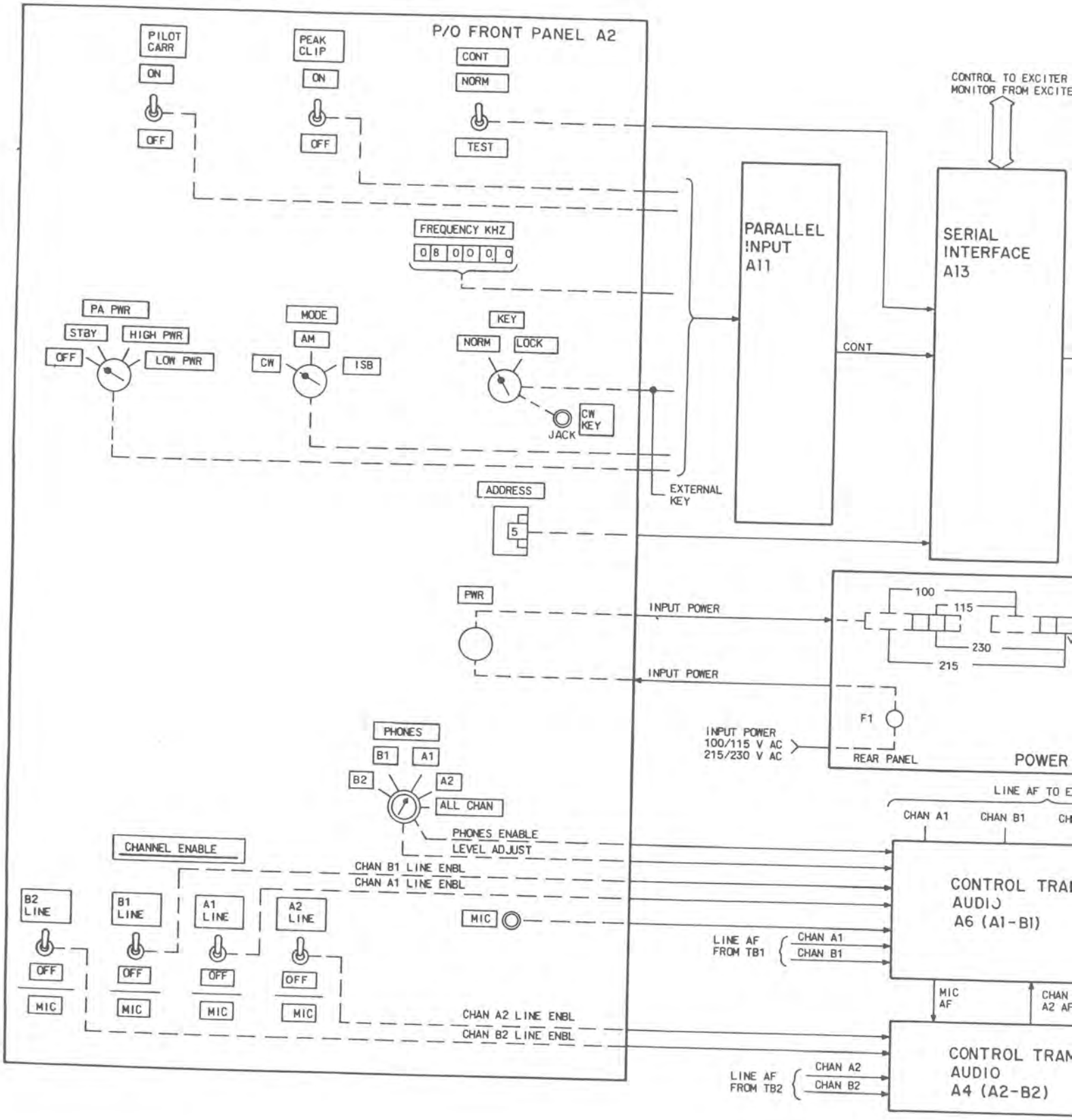
The exciter control supplies control signals to the remote exciter. Control data, in parallel format from the front panel controls, is converted to serial data for application to the exciter. Monitor signals are received from exciter and converted from serial data to parallel data to indicate current operational status of the remote exciter.

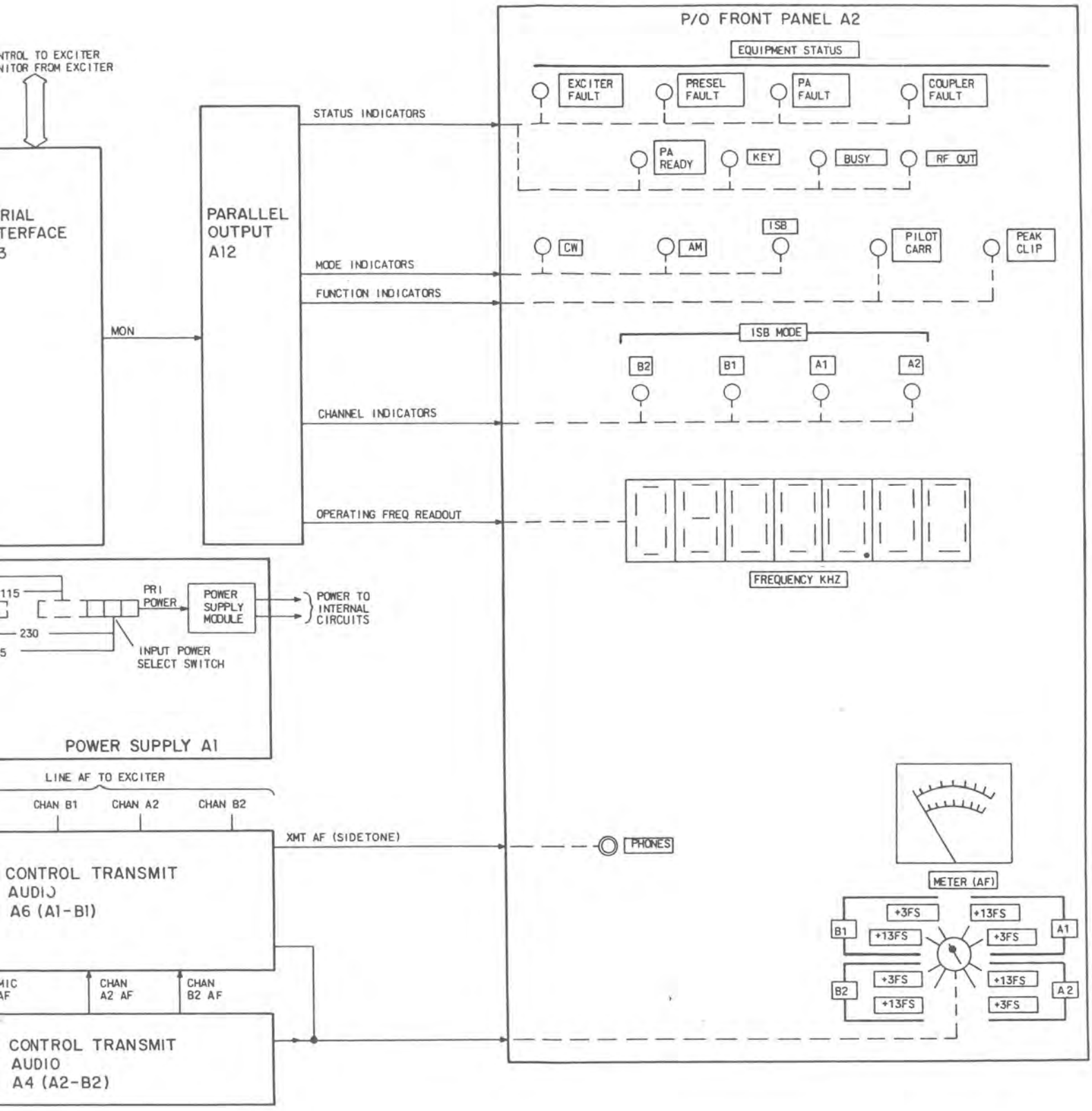
In single exciter configurations, audio signals may be run via the exciter control on lines separate to the control lines. This provides metering of audio levels and toggle switch control of audio lines, (line, off, microphone).

In multiple exciter configurations audio signals are run direct to the exciters. Metering of audio levels may be performed by applying them to the line inputs of the exciter control.

The front panel developed frequency, mode, power-amplifier level, pilot carrier, peak clipper, and keying information signals are applied in parallel format to the parallel input card. A11. On this card the parallel data is processed and applied to the serial interface card as 8-bit characters.

4. FUNCTIONAL THEORY
4.3 HF-8093 Exciter Control
4.3.2 Theory of Operation





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HF-8093 Exciter Control, Block Diagram
Figure **5**

4. FUNCTIONAL THEORY
4.3 HF-8093 Exciter Control
4.3.2 Theory of Operation

Start, parity, stop bits are added to the eight data bits on the serial interface (A13) to form the complete 11-bit character. Address information, also from the front panel, is applied directly to the interface card. The address and data information, combined to form the four data words, is applied in serial format to the exciter under control.

Two different data formats are available, and are switch selectable on the serial interface card. One format uses 7-bit ASCII coded characters and the other format uses an 8-bit BYTE character code. The input to the serial interface card is the same for both ASCII or 8-bit BYTE codes. Refer to tables 1 through 3 for data format.

Monitor information is returned, in serial format, from the exciter to the exciter control serial interface card. The serial interface decodes the information and applies the monitor data to parallel output card (A12). Circuits on the parallel output card convert the monitor data from serial to parallel format and apply the resulting signals to the EQUIPMENT STATUS indicators on the front panel. These indicators then display the status of the operating condition of the exciter under control.

In single exciter configurations transmit audio cards (A4 and A6) amplify the audio inputs and develop (when selected) channels A1, B1, A2 and B2 audio outputs to the exciter under control. The audio signals are input from the front panel MIC connector or the rear panel line terminals. Positioning the CHANNEL ENABLE switches to LINE (while in ISB mode) enables that channel (A1, B1, A2, or B2), line audio input. When any of the CHANNEL ENABLE switches are set to MIC, that channel's microphone audio input is enabled. When the front panel MODE selector is in AM position, channel A1 (CHANNEL ENABLE A1 MIC selected) is used to enable the microphone audio input. the PHONES selector switch enables any one (channel A1, B1, A2, or B2), or all channels transmit audio output to be monitored in the headphones. The METER (AF) switch allows monitoring of any one or all of the channel's input audio level on either the 3 dB mW or 13 dB mW full scale.

In multiple exciter configuations, the audio signals may be input to the rear panel line terminals. The phones Selector Switch enables any one (channel A1, B1, A2, B2), or all channels transmit audio output to be monitored in the headphones. The METER (AF) Switch allows monitoring of any one or all of the channels input audio level on either the 3dB mW or 13dB mW full scale.

A local CW oscillator is provided to supply a sidetone enable signal to the headphones when in the CW mode on the exciter control.

Primary input power to the HF-8093 can be either 115 or 230 V ac. Input power switching S1 must be set to the position that corresponds to the primary input power used. The input ac voltage is converted to regulated dc outputs to supply the various circuits. Voltages used in the HF-8093 are +5, +24, -15,, and +15 volts. A zener regulated circuit on the parallel output card develops +5.6 volts dc from the +15V dc input for use by several logic components on this card.

4. FUNCTIONAL THEORY
4.3 HF-8093 Exciter Control
4.3.2 Theory of Operation

Table 1. ASCII Control Word Format.

CHARACTER SIGNIFICANCE		ASCII PRINT CHARS	FUNCTIONAL BIT CODING			
			WT 8	WT 4	WT 2	WT 1
CR LF A1 A2 SD F1 F2 F3 F4 F5 F6 F7 F8 X	WORD 1 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	0,1,2	NA	NA	NA	NA
F1	FREQUENCY 10 MHz (BCD)	0,1,2	0	0	10 MHz (2)	10 MHz (1)
F2	FREQEUNCY - 1 MHz (BCD)	0-9	1 MHz (8)	1 MHz (4)	1 MHz (2)	1 MHz (1)
F3	FREQUENCY-100 kHz (BCD)	0-9	100 kHz (8)	100 kHz (4)	100 kHz (2)	100 kHz (1)
F4	FREQUENCY- 10 kHz (BCD)	0-9	10 kHz (8)	10 kHz (4)	10 kHz (2)	10 kHz (1)
F5	FREQUENCY- 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
F6	FREQUENCY-100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
F7	FREQUENCY- 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
F8	FREQUENCY- 1 Hz (BCD)	0-9	1 Hz (8)	1 Hz (4)	1 Hz (2)	1 Hz (1)
X	EXECUTE	X	NA	NA	NA	NA
CR LF A1 A2 SD M1 M2 M3 M4 M5 M6 M7 M8 X	WORD 2 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	4,5,6	NA	NA	NA	NA
M1	RESERVED	0	0	0	0	0
M2	RESERVED	0	0	0	0	0
M3	RESERVED	0	0	0	0	0
M4	RESERVED	0	0	0	0	0
M5	RESERVED	0	0	0	0	0
M6	PEAK CLIPPER ENABLE	0,1	0	0	0	PEAK CLIPPER ENABLE
M7	MODE	0-9, A-F	0	AM ENABLE	CW ENABLE	ISB ENABLE
M8	ISB CHANNEL ENABLES	0-9, A-F	B2 ENABLE	B1 ENABLE	A1 ENABLE	A2 ENABLE
X	EXECUTE	X	NA	NA	NA	NA
CR LF A1 A2 SD V1 V2 V3 V4 V5 V6 V7 V8 X	WORD 3 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	8,9,A	NA	NA	NA	NA
V1	RESERVED	0	0	0	0	0
V2	RESERVED	0	0	0	0	0
V3	RESERVED	0	0	0	0	0
V4	RESERVED	0	0	0	0	0
V5	AUXILIARY	0-9, A-F	-	-	-	-
V6	AUXILIARY	0-9, A-F	-	-	-	-
V7	RESERVED	0	0	0	0	0
V8	PILOT CARRIER/PA CONTROL	0-9, A-F	PILOT CARR ENABLE	PA LO PWR ENABLE	PA HV ENABLE	PA LV ENABLE
X	EXECUTE	X	NA	NA	NA	NA
CR LF A1 A2 SD K1 X	WORD 4 CHARACTER SEQUENCE					
CR	CARRIER RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS, M.S D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	C,D,E	NA	NA	NA	NA
K1	EXCITER/PA SYSTEM KEY	0,1	0	0	0	SYSTEM KEY
X	EXECUTE	X	NA	NA	NA	NA

4. FUNCTIONAL THEORY
4.3 HF-8093 Exciter Control
4.3.2 Theory of Operation

Table 2. ASCII Monitor Word Format.

CHARACTER SIGNIFICANCE		ASCII PRINT CHARS.	FUNCTIONAL BIT CODING WT 8	WT 4	WT 2	WT 1
-	-	A1 A2 SD F1 F2 F3 F4 F5 F6 F7 F8 S	WORD 1 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	1	NA	NA	NA	NA
F1	FREQUENCY- 10 MHz (BCD)	0,1,2	0	0	10 MHz (2)	10 MHz (1)
F2	FREQUENCY 1 MHz (BCD)	0-9	1 MHz (8)	1 MHz (4)	1 MHz (2)	1 MHz (1)
F3	FREQUENCY- 100 kHz (BCD)	0-9	100 kHz (8)	100 kHz (4)	100 kHz (2)	100 kHz (1)
F4	FREQUENCY- 10 kHz (BCD)	0-9	10 kHz (8)	10 kHz (4)	10 kHz (2)	10 kHz (1)
F5	FREQUENCY- 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
F6	FREQUENCY- 100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
F7	FREQUENCY- 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
F8	FREQUENCY 1 Hz (BCD)	0-9	1 Hz (8)	1 Hz (4)	1 Hz (2)	1 Hz (1)
S	END DELIMITER	S	NA	NA	NA	NA
-	-	A1 A2 SD M1 M2 M3 M4 M5 M6 M7 M8 S	WORD 2 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	5	NA	NA	NA	NA
M1	RESERVED	0	0	0	0	0
M2	RESERVED	0	0	0	0	0
M3	RESERVED	0	0	0	0	0
M4	RESERVED	0	0	0	0	0
M5	RESERVED	0	0	0	0	0
M6	PEAK CLIPPER ENABLE	0	0	0	0	PEAK CLIPPER ENABLE
M7	MODE	0-9, A-F	0	AM ENABLE	CW ENABLE	ISB ENABLE
M8	ISB CHANNEL ENABLES	0-9, A-F	B2 ENABLE	B1 ENABLE	A1 ENABLE	A2 ENABLE
S	END DELIMITER	S	NA	NA	NA	NA
-	-	A1 A2 SD V1 V2 V3 V4 V5 V6 V7 V8 S	WORD 3 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	9	0	0	0	0
V1	RESERVED	0	0	0	0	0
V2	RESERVED	0	0	0	0	0
V3	RESERVED	0	0	0	0	0
V4	RESERVED	0	0	0	0	0
V5	AUXILIARY	0-9, A-F	-	-	-	-
V6	AUXILIARY	0-9, A-F	-	-	-	-
V7	RESERVED	0	0	0	0	0
V8	PILOT CARRIER/PA CONTROL	0-9, A-F	PILOT CARRIER ENABLE	PA LOW PWR ENABLE	PA HIGH VOLT ENABLE	PA LOW VOLT ENABLE
S	END DELIMITER	S	NA	NA	NA	NA
-	-	A1 A2 SD S1 S2 S3 S4 S5 S6 S7 S8 S	WORD 4 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	0	NA	NA	NA	NA
S1	EXCITER FAULT/KEY MONITOR	0-3	0	0	EXCITER FAULT	SYSTEM KEY MONITOR
S2	AF MONITORS	0-9, A-F	B2 AF MONITOR	B1 AF MONITOR	A1 AF MONITOR	A2 AF MONITOR
S3	SYNTH FAULTS	0-9, A-F	0	10 Hz LOCK FAULT	100 Hz LOCK FAULT	1 kHz LOCK FAULT
S4	SYNTH FAULTS	0-9, A-F	10 kHz LOCK FAULT	100 kHz LOCK FAULT	SYNTH OUT LOCK FAULT	FREQ REF FAULT
S5	SUBCARRIER FAULT/RF MON/PWR SPLY FAULT	0-7	0	SUBCARR LOCK FAULT	EXCITER RF MONITOR	EXCTR PWR SPLY FAULT
S6	EXTERNAL STD/IF MONITOR	0-9, A-F	0	EXTERNAL STANDARD	A1 IF MONITOR	0
S7	PA/COUPLER STATUS	0-9, A-F	PA READY	PA FAULT	PA RF MONITOR	COUPLER FAULT
S8	PRESEL FAULT/DATA ERROR/LOCAL/MONITOR	0-9, A-F	PRESEL FAULT	DATA ERROR	LOCAL CONTROL	MONITOR
S	END DELIMITER	S	NA	NA	NA	NA

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4. FUNCTIONAL THEORY
4.3 HF-8093 Exciter Control
4.3.2 Theory of Operation

Table 3 Control and Monitor Word Format.

WORD	CHAR-ACTER	STOP BIT	PARITY BIT	CHARACTER BIT POSITION B8	B7	B6	B5	B4	B3	B2	B1	START BIT	REF NOTES
1	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	0	ADDRESS A4	A3	A2	A1	0	2
	2	1	X	CMD/STATUS REQ $\bar{C}$=0	$\bar{S}$=1	FREQ (10 MHz) (2)	(1)	FREQ (1 MHz) (8)	(4)	(2)	(1)	0	
	3	1	X	FREQ (100 kHz) (8)	(4)	(2)	(1)	FREQ (10 kHz) (8)	(4)	(2)	(1)	0	
	4	1	X	FREQ (1 kHz) (8)	(4)	(2)	(1)	FREQ (100 Hz) (8)	(4)	(2)	(1)	0	
	5	1	X	FREQ (10 Hz) (8)	(4)	(2)	(1)	FREQ (1 Hz) (8)	(4)	(2)	(1)	0	
2	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	1	ADDRESS A4	A3	A2	A1	0	2
	2	1	X	CMD/STATUS REQ $\bar{C}$=0	$\bar{S}$=1	0	RESERVED					0	
	3	1	X	RESERVED								0	
	4	1	X	RESERVED							PEAK CLIPPER ENABLE	0	
	5	1	X	MODE SELECT 0	AM	CW	ISB	CHAN B2 ENABLE	CHAN B1 ENABLE	CHAN A1 ENABLE	CHAN A2 ENABLE	0	
3	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	0	ADDRESS A4	A3	A2	A1	0	2
	2	1	X	CMD/STATUS REQ $\bar{C}$=0	$\bar{S}$=1	0	RESERVED					0	
	3	1	X	RESERVED								0	
	4	1	X	AUXILIARY								0	
	5	1	X	RESERVED				PILOT CARRIER ENABLE	PA LOW POWER ENABLE	PA HIGH VOLTAGE ENABLE	PA LOW VOLTAGE ENABLE	0	
4	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	1	ADDRESS A4	A3	A2	A1	0	2
	2	1	X	CMD/STATUS REQ $\bar{C}$=0	$\bar{S}$=1	EXCITER FAULT	SYSTEM KEY	B2 AF MON	B1 AF MON	A1 AF MON	A2 AF MON	0	
	3	1	X	0	10 Hz LOCK FAULT	100 Hz LOCK FAULT	1 kHz LOCK FAULT	10 kHz LOCK FAULT	100 kHz LOCK FAULT	SYN OUT LOCK FAULT	FREQ REF FAULT	0	3
	4	1	X	0	SUBCARR LOCK FAULT	EXCITER RF MON	EXCITER PWR SPLY FAULT	0	EXTERNAL STANDARD	A1 IF MON	0	0	
	5	1	X	PA READY	PA FAULT	PA RF MON	COUPLER FAULT	PRE-SELECTOR FAULT	DATA ERROR	LOCAL CONTROL	MONITOR	0	

NOTES:

(1) 1=LOGIC 1; 0=LOGIC 0; X=FUNCTION OF STRAPPING; (1),(2),(4) (8)=BINARY WEIGHT OF BIT POSITION.

(2) FROM A CONTROL UNIT, ONLY CHARACTERS 1 AND 2 ARE TRANSMITTED IN WORD 4; ONLY STATUS REQUEST ($\bar{C}$=1, $\bar{S}$=0) IS TRANSMITTED IN WORDS 1,2, AND 3.
ALL MONITOR WORDS ARE 5 CHARACTERS LONG.

(3) MONITOR WORD 4 CHARACTERS 3,4, AND 5 CONTAIN FAULT AND PERFORMANCE MONITOR BITS FOR WHICH NO CORRESPONDING CONTROL BITS EXIST. DATA ERROR BIT IS THE LOGICAL SUM OF THE FOLLOWING CONDITIONS:

A. RECEIVED CHARACTER PARITY ERROR.
B. FRAMING ERROR (NO VALID STOP RECEIVED WITH THE CHARACTER)
C. OVERRUN ERROR (PREVIOUS CHARACTER NOT PROCESSED BEFORE THE CURRENT CHARACTER WAS RECEIVED).
D. INVALID CHARACTER SEQUENCE.

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4. FUNCTIONAL THEORY

4.4 HF-8060 Preselector (Optional)

4.4.1 General

Refer to Figure 6. The Preselector provides additional filtering for the Exciter output.

NOTE

The HF-8060 is optional equipment and is not required for normal operation of the transmitter systems.

4.4.2 Transmit Function

The transmit signal is applied to XMT IN jack J4. This signal is routed through the contacts of relay A7K2 to 3-pole filter assembly A8. The control system selects the appropriate filter. Rf amplifier A6 restores the signal level lost in the filter. The amplified signal is applied to XMT OUT jack J4.

4.4.3 Control and Monitor Function

Bcd frequency information and a tune start signal are applied to interface card A2. The frequency information is applied in digital form to d/a converter A3. The tune start pulse is applied to tune logic A4. The output signals from tune logic A4 enable d/a converter A3 and servo amplifier A5. A digital logic circuit on d/a converter A3 converts the five most significant frequencies to appropriate frequency band signals.

4.5 HF-80 Remote Display

4.5.1 General

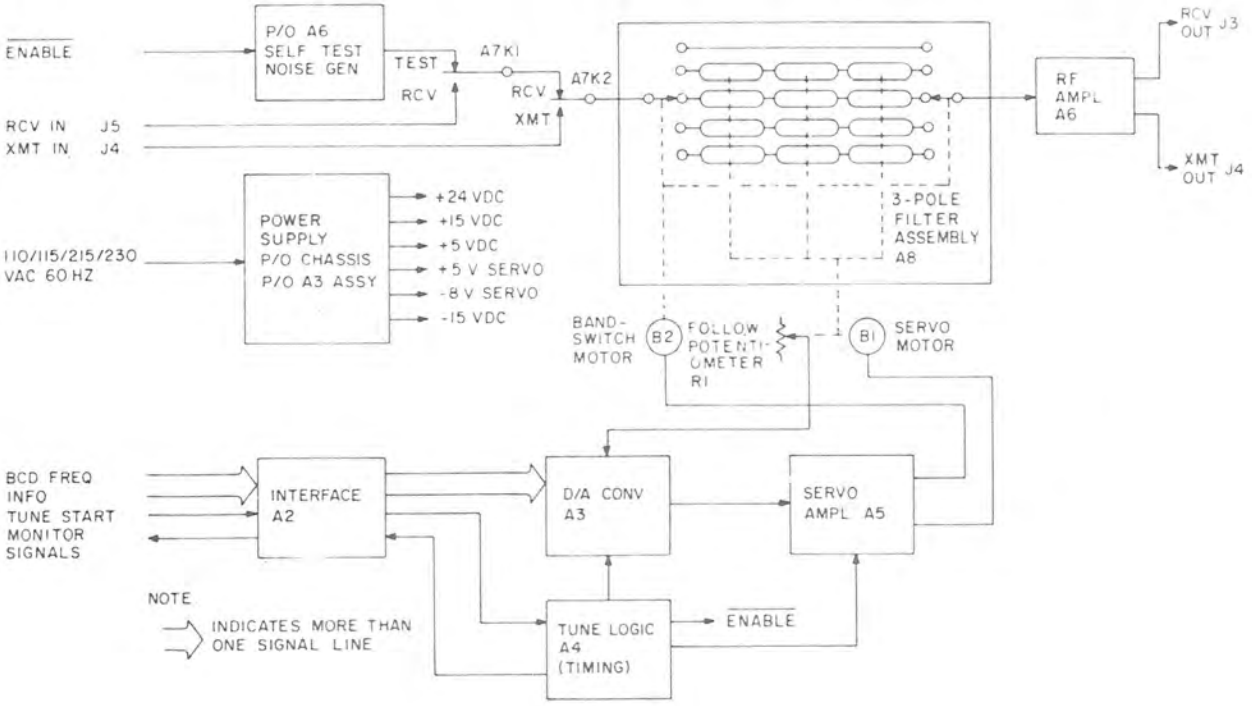
The remote display consists of an interface unit which decodes the serial data on the control bus into parallel format for display by the addressed display module and up to sixteen (16) display modules. Up to four (4) display modules may be implemented in a single module frame and four (4) module frames comprise a fully implemented display system.

A block diagram showing the various functional blocks of the remote display is shown in Figure 7.

4.5.2 Functional Theory

The HF-80 Remote Display operates with either ASCII or HF-80 word formats. In addition, strapping is available on the serial interface card, to invert the polarity of the RS-232C data for compatibility with logic polarity and voltage levels defined in MIL-STD-188C.

4. FUNCTIONAL THEORY
4.5 HF-80 Remote Display
4.5.2 Functional Theory



HF-8060 Preselector, Block Diagram
Figure 6

4. FUNCTIONAL THEORY
4.5 HF-80 Remote Display
4.5.2 Functional Theory

Two (2) separate sets of data lines are required by the remote display. One (1) set, the control bus, is used to receive status information to be displayed from the HF-8022 Control Unit. The other set, the monitor bus, is used to respond to the control unit when interrogated such as after a power-down, power-up sequence.

Each display module must be addressed, via switch S1, to respond to the same address as its associated equipment. The sixteen (16) possible positions of S1 are listed in Table 4.

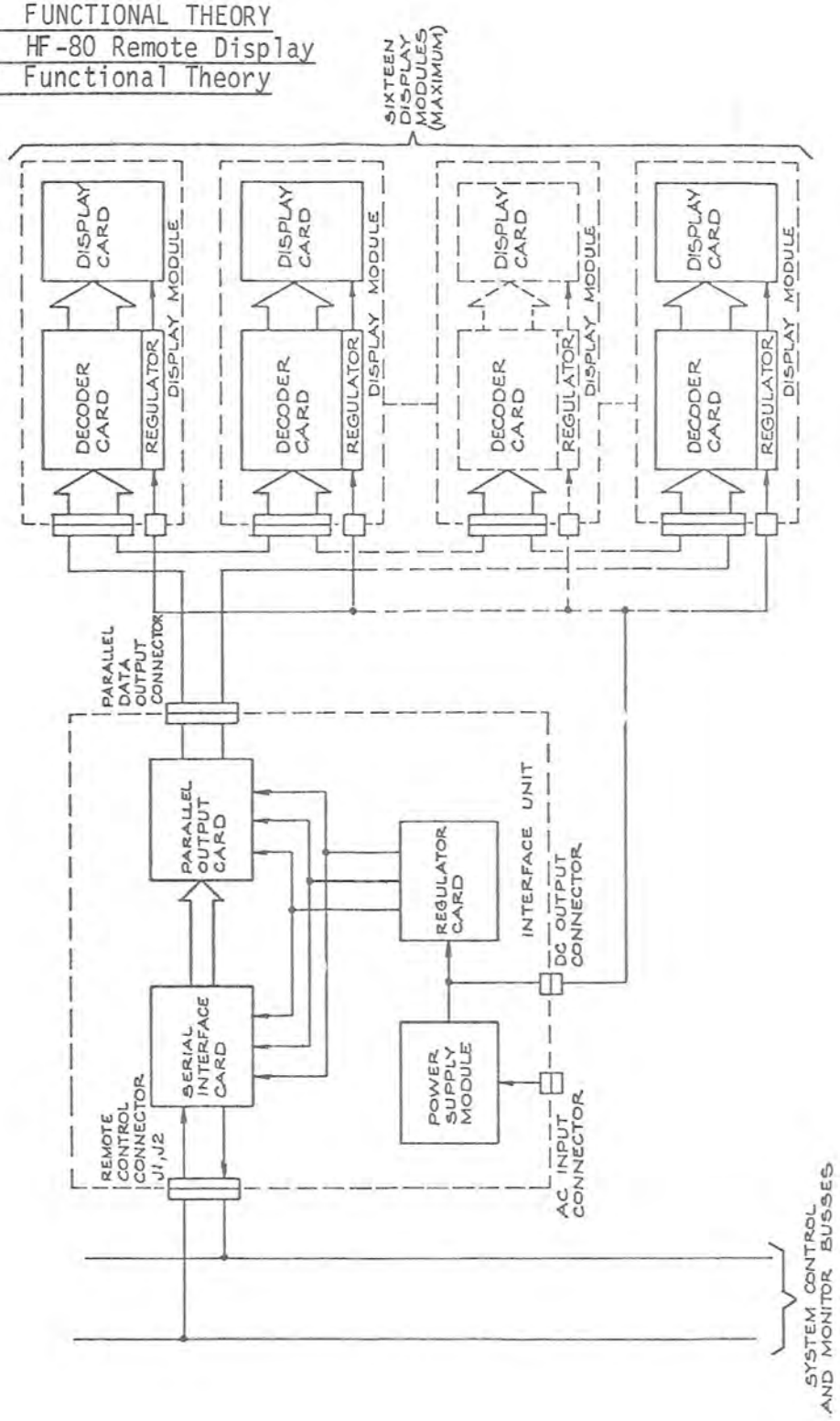
The transfer of data and control signals to and from the system control and monitor busses is controlled by the serial interface card in the interface unit. For functional description and theory of operation of the serial interface and parallel output cards, refer to the Instructions Sheets at the rear of equipment instruction books.

Table 4 : Address Selector Switch (S1)

ADDRESS	S1-1	S1-2	S1-3	S1-4
0	0	0	0	0
1	X	0	0	0
2	0	X	0	0
3	X	X	0	0
4	0	0	X	0
5	X	0	X	0
6	0	X	X	0
7	X	X	X	0
8	0	0	0	X
9	X	0	0	X
10	0	X	0	X
11	X	X	0	X
12	0	0	X	X
13	X	0	X	X
14	0	X	X	X
15	X	X	X	X

Note: X indicates a closed switch.

4. FUNCTIONAL THEORY
4.5 HF-80 Remote Display
4.5.2 Functional Theory



HF-80 Remote Display Block Diagram
Figure 7

4. FUNCTIONAL THEORY
4.5 HF-80 Remote Display
4.5.3 Overall Unit

The status information to be displayed is converted from serial form (on the control bus) to parallel form and gated to the display module where it remains latched until an update signal occurs and new information is provided to that display module.

Automatic updating of the displayed information is provided upon power-up of the remote display; this scheme provides a useful facility for maintenance purposes since it eliminates the need to individually re-address each equipment via the address thumbwheel switch after power-up sequences.

Address selection for each display module is accomplished by switch S1 on the module decoder/driver board.

In addition if more than one remote display is being used in a remote control system, then address strapping is required on the serial interface card. Up to eight (8) HF-80 remote displays may be used in one remote control system.

4.5.4 Power Distribution

Primary power to the HF-80 remote display can be either 115 or 230 V ac. The input power swtich (S2) must be set to the position that corresponds to the primary input power used. In the interface unit the input ac voltage is converted to 12 V dc unregulated by the power supply module, and a regulator card provides regulated DC supply voltages (+5, +/-15) to the serial interface and parallel output cards. Unregulated 12 V dc is also taken to the display module where it is regulated to 5 V dc by on-board IC regulators (U17).

For detailed functional theory, refer to the HF-80 Remote Display Instruction Book 523-1003164.

4.6 Theory of Operation - HF-8154A

The following theory of operation is presented in an operational sequence, from turn on to fully operational.

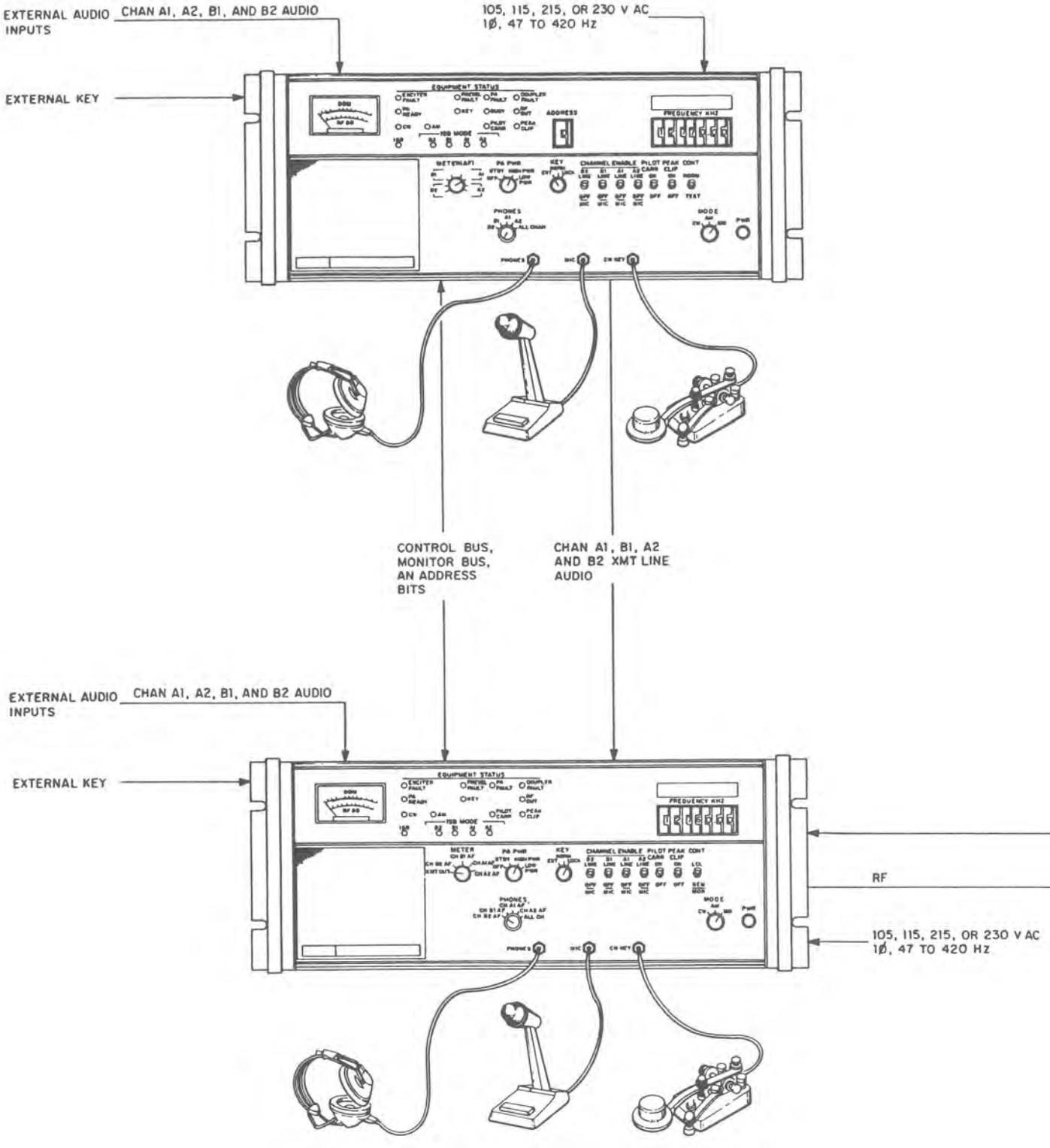
4.6.1 HF-8154A 10-kW Transmitter System

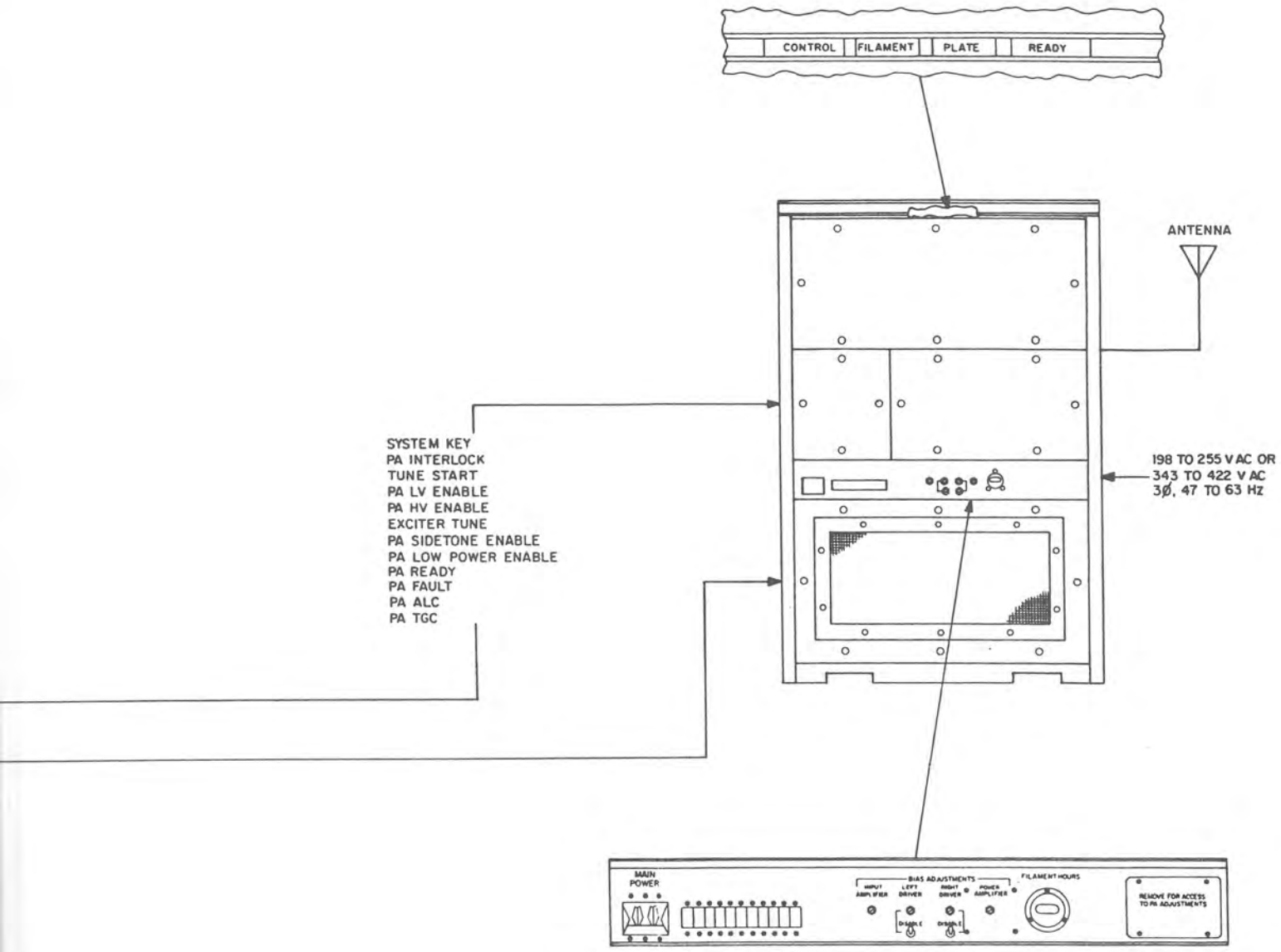
Refer to the HF-8154A 10-kW Transmitter System Functional block diagram, Figure 8.

4. FUNCTIONAL THEORY

4.6 Theory of Operation - HF-8154A

4.5.3 Overall Unit





HF-8154/8154A 10-kW Transmitter System, Functional Block Diagram
Figure 8

4. FUNCTIONAL THEORY
4.6 Theory of Operation - HF-8154A
4.6.2 Energizing the System

To energize the system, set the HF-8014A Exciter CONT switch to REM. Set the HF8093 Exciter Control controls as follows:-

CONTROL	SETTING
PA PWR	OFF
PWR	ON
KEY	NORM
FREQUENCY KHZ	Desired operating frequency
MODE	Desired mode of operation
CHANNEL ENABLE	Desired channel of operation when MODE switch is in ISB.
CONT	NORM
ADDRESS	Desired exciter to control sets the binary address to the complement of the address indicated. Exciter with associated address strapping is the unit under control.

Turn on the system primary power source.

On the HF-8022, set the CONTROL POWER, LOW LEVEL PLATE, PA FILAMENT, BIAS SUPPLY, and LOW LEVEL FILAMENT circuit breakers to ON. Set the MAIN POWER circuit breaker to ON. The amber CONTROL indicator on the HF-8022 lights. On the HF-8014A, set the PA PWR switch to STBY. Setting the PA PWR switch to STBY causes the HF-8014A to generate the pa low voltage enable signal. This signal applied to the HF-8022 starts the blower motor and enables the pa tube filament v oltage and low level supplies. The green FILAMENT indicator on the HF-8022 lights.

On the HF-8014A, set the PA PWR switch to HIGH PWR. Setting the PA PWR switch to HIGH PWR causes the HF-8014A to generate the pa high voltage enable signal and the pa low power enable (logic 1) signal. The pa hv enable signal is processed by the HF-8022 control circuits and if no fault exists and low voltage has been enabled for at least 30 seconds, the HF-8022 plate and screen voltages are enabled. The pa low voltage enable signal at a logic 1 establishes the TGC threshold in the HF-8022 for high power. Setting the HF-8014A PA PWR switch to LOW PWR generates the pa hv enable signal and the pa low power enable signal at a logic 0 level. The logic 0 pa low power enable input to the HF-8022 sets the TGC

4. FUNCTIONAL THEORY
4.6 Theory of Operation - HF-8154A
4.6.2 Energizing the System

threshold for low power operation. The HF-8014A PA PWR switch in either HIGH PWR or LOW PWR position causes the HF-8022 red plate indicator to light.

4.6.3 Transmitter System Tuning

The tuning sequence for the HF-8154A 10-kW Transmitter System is determined by the tuning sequence of the HF-8022. The tuning sequence consists of two tuning operations: coarse positioning and fine tuning. The operations are performed in seven (7) sequential steps that are controlled and monitored by the control circuits in the HF-8022. Step 1 of the tune sequence consists of applying a tune start and a system key signal to the HF-8022, and determines the frequency selected by the operator for HF-8022 tuning. The tune start signal is generated by setting the HF-8014A CONT switch to LCL, changing the FREQUENCY KHZ switches 1 kHz or more, or moving the PA PWR switch from HIGH PWR to LOW PWR or from LOW PWR to any position and back again. The tune start signal resets the HF-8022 tune sequence counter to step 1, sets the tune power threshold, and causes the HF-8022 to generate the exciter tune signal. The exciter tune signal applied to the HF-8014A enables a CW carrier rf output and enables TGC. When the system key signal is applied to the HF-8022, the frequency of the CW carrier applied to the HF-8022 is determined and the tune sequence starts. The pa interlock signal (grounded in the HF-8022) inhibits the HF-8014A from generating a system key signal at frequencies below 2.0 MHz.

When the above conditions are satisfied, the tuning sequence advances to tune step 2.

Tune step 2 of the tuning sequence consists of coarse positioning the tuning elements and starting the tune cycle timer in the HF-8022. The system key is latched and remains latched until tune step 7 is reached. The HF-8014A produces a CW carrier rf signal that is applied to the HF-8022.

The timer will unkey the HF-8022 and generate a tune fault signal if the tuning sequence is not complete within 25 seconds. When coarse positioning is complete, determined by the nulling of the tuning elements in the HF-8022, the tune sequence advances to tune step 3.

Tune step 3 is the conditional fine tuning step for the tuning elements of the HF-8022 except the loading element. The operating bias is applied to all rf amplifier stages, thereby generating rf out from the HF-8022. IGC controls rf output to maximum of 3 kW. The pa sidetone enable signal is applied to the HF-8014A to light the RF OUT indicator. When conditional fine tune is complete, determined by the tuning elements nulling, the tune sequence advances to tune step 4.

Tune step 4 is fine tune for all HF-8022 tuning elements. IGC controls pa rf output to maximum of 3 kW. If the desired operating power is less than 6 kW, the TGC signal will control exciter gain to one-half desired operating power. The TGC signal sets the overall transmitter gain by controlling the HF-8014A CW rf

4. FUNCTIONAL THEORY
4.6 Theory of Operation - HF-8154A
4.6.3 Transmitter System Tuning

output. The TGC voltage generated in the HF-8022 is applied to the HF-8014A to set the rf output from the HF-8014A to a level that will drive the HF-8022 to half-power output during tuning. An internal TGC attenuator in the HF-8014A varies the rf drive to the HF-8022 until the TGC voltage from the HF-8022 is -5V dc. The -5 V dc establishes the HF-8022 output power at half the desired operating power. When the tuning elements have nulled, the tune sequence advances to tune step 5.

Tune step 5 is fine tune for the HF-8022 tuning elements. All the conditions of tune step 4 apply to tune step 5. When the tuning elements have nulled, the tune sequence advances to tune step 6.

Tune step 6 is fine trim tuning of the HF-8022. The tune power threshold is released which allows the HF-8022 to final trim tune under full rated power.

When the fine trim tuning is complete, the tune sequence advances to tune step 7, and the tune sequence timer is disabled.

Tune step 7 is the operate tune step. A tune complete signal within the HF-8022 disables the exciter tune signal, enables ALC to the exciter and the system key is unlatched.

Disabling the exciter tune signal causes the HF-8014A control circuits to lock the TGC output at a constant level and doubles exciter rf output levels. The ALC signal generated in the HF-8022 controls the peak rf output level of the exciter. The ALC signal is zero volts until the rf output of the HF-8022 is one half dB below peak rated power. Then a negative ALC signal is developed with a slope of approximately 5 V per dB above threshold.

The HF-8022 blue READY indicator lights, and the HF-8022 applies the pa ready signal to the HF-8014A to light the PA READY Indicator.

Normal transmission may now be established. The operator may monitor the transmit audio by plugging headphones into the PHONES jack and selecting channel A1, A2 or channel B1, B2 transmit audio using the PHONES switch.

4.5.4 System Faults

The HF-8022 generates a logic 0 signal on the pa fault line if any of the conditions specified in paragraph 3.4 of the theory section occur. This signal applied to the HF-8014A drops the system key, and lights the PA FAULT indicator.

If the HF-8014 generates a fault, the system key drops out and the R/E FAULT indicator lights.

10-kW TRANSMITTER SYSTEM

for

AUSTRALIAN ARMY

Rockwell International

MAINTENANCE

Printed in Australia

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1 October, 1981

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MAINTENANCE

1. GENERAL

This section presents information necessary to maintain the HF-8154A 10-kW Transmitter System. Testing and troubleshooting procedures isolate a fault in the system to an equipment. Refer to the appropriate equipment instruction book for fault isolation and repair of the faulty equipment.

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 the U.S. Occupational Safety and Health Administration (OSHA) recommended maximum limits.

WARNING

For the safety of all personnel concerned, read and thoroughly understand the contents of paragraph 3.1 in the Installation Section of this book for safety considerations and safety features. The extremely high voltages involved with the 10-kW power amplifier make it mandatory that installation, operating, and maintenance personnel become fully aware of all potential hazards. Installation, operating, and maintenance personnel should also fully understandthe capabilities and limitations of the safety features of the power amplifier and practice the recommended safety precautions and procedures to prevent death, severe shock, severe burns, and other serious injury.

2. TEST EQUIPMENT

The test equipment required to test, troubleshoot, and align the HF-8154A 10-kW Transmitter System is listed in Table 2.

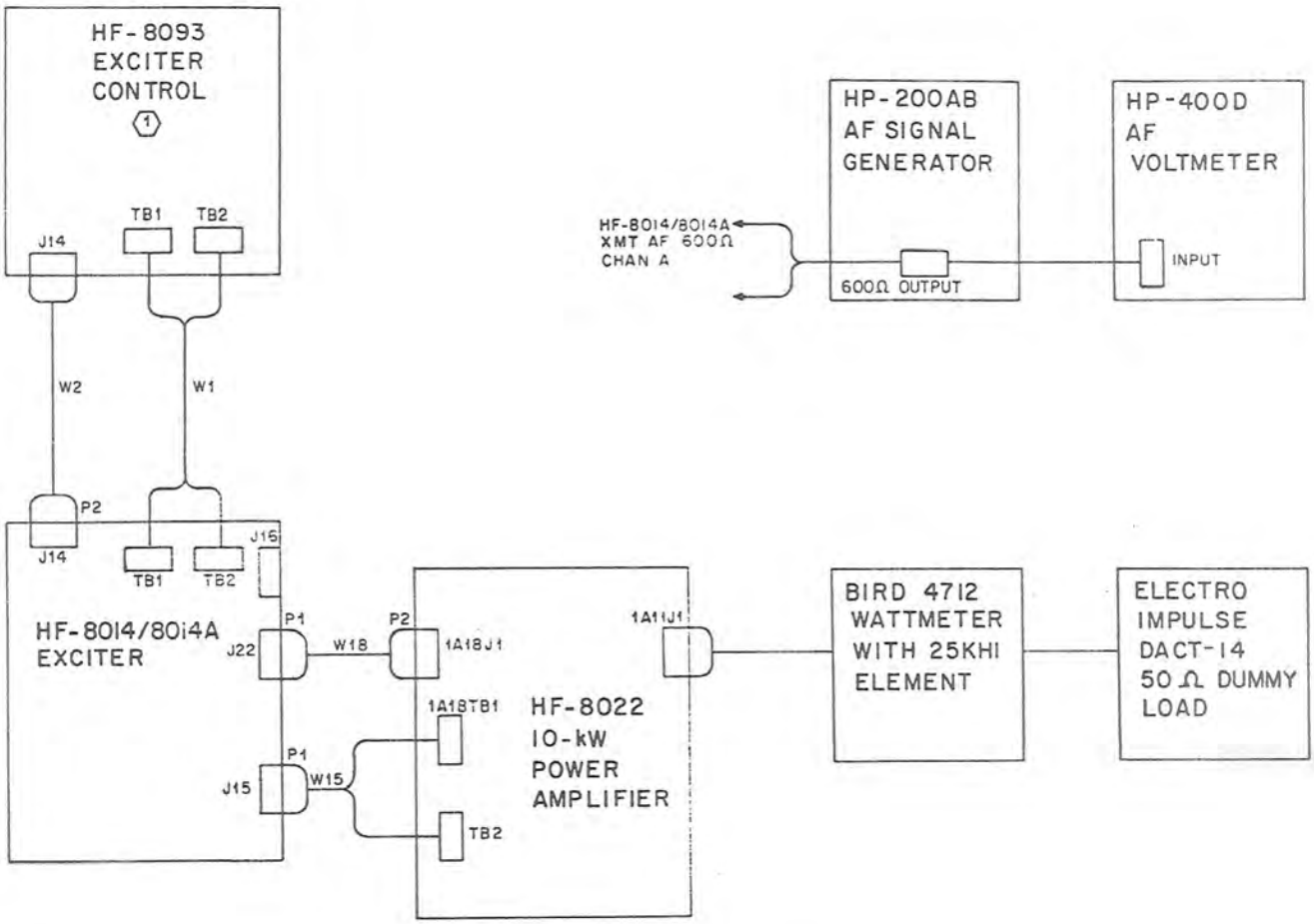
Before performing the system testing and troubleshooting procedures, check the system for proper cabling, grounding, and bonding.

3. Testing and Troubleshooting Procedures

Perform the procedures in Table 1. Refer to the test setup diagram (Figure 1) and connect the equipment as shown. The first part of the testing and trouble shooting procedures is for the HF-8154A transmitter system with the HF-8014A Exciter in local control. The second part of the testing and troubleshooting procedures is for the HF-8154A transmitter system with the HF-8014A in remote control using the HF-8093 Exciter Control.

3. TESTING AND TROUBLESHOOTING.

3. Testing and Troubleshooting Procedures



NOTE:

(1) USED WITH HF-8154A ONLY.

HF-8154A 10-kW Transmitter System
Test Set-Up Diagram
Figure 1

3. TESTING AND TROUBLESHOOTING.

3. Testing and Troubleshooting Procedures

Table 1. Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Preliminary power control settings	***Caution*** Ensure the LINE SELECTOR switches located on the rear panel of the HF-8014/8014A Exciter and HF-8093 Exciter Control are set to the same voltage as the primary power source voltage. Ensure the transformers of the HF-8022 10-kW Power Amplifier are strapped for the primary source voltage. a. Set all LINE SELECTOR switches (and strap all transformers) for the correct primary source voltage. b. Set the HF-8014/8014A Exciter controls as follows: PWR to OFF (press inward until switch is released and latched in the outward position) PA PWR switch to OFF KEY to NORM PHONES switch to CH A1 AF PHONES potentiometer to midrange METER to XMT OUT (+23FS) PILOT CARR to OFF PEAK CLIP to OFF CHANNEL ENABLE (4) to OFF CONT to LCL MODE to CW FREQUENCY KHZ to 02000.0 c. Set the TS-8021 Maintenance Panel (if used) LOCAL/REMOTE switch to REMOTE. d. Set the HF-8022 circuit breakers as follows: MAIN POWER to OFF CONTROL POWER to ON LOW LEVEL PLATE to ON PA FILAMENT to ON BIAS SUPPLY to ON LOW LEVEL FILAMENT to ON		
2. Power turn-on	a. On the HF-8022, set the MAIN POWER circuit breaker ON.	HF-8022 amber CONTROL indicator lights.	Repair HF-8022.
(Cont)	b. Set the HF-8014/8014A PWR switch to ON (press inward and latch).	HF-8014/8014A EXCITER FAULT indicator lights.	Replace/repair HF-8014/8014A.

3. TESTING AND TROUBLESHOOTING.

3. Testing and Troubleshooting Procedures

Table 1. Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	c. Set the HF-8014/8014A PA PWR switch to STBY. *Note* Allow 3 minutes for system warmup.	HF-8022 green FILAMENT indicator lights.	Repair HF-8022.
	d. Set the HF-8014/8014A PA PWR switch to LOW PWR. *Caution* If the blower motor fails to function properly, turn off all power immediately or serious damage to the HF-8022 will result. Normally, the power amplifier will self-protect and turn itself off after 5 seconds if either air pressure is insufficient or blower malfunctions.	HF-8022 blower motor runs, and red PLATE indicator lights.	Repair HF-8022.
	e. Change one digit of the HF-8014/8014A FREQUENCY KHZ switches and then reset frequency to 02000.0.	HF-8014/8014A EXCITER FAULT indicator extinguishes.	Replace/repair HF-8014/8014A.
3. System tuning	a. Set the HF-8014/8014A KEY switch to LOCK.	HF-8014/8014A KEY indicator lights during tuning, EXCITER FAULT indicator is off, METER indicates +10 dB mW to +20 dB mW, RF OUT indicator lights, and the PA READY indicator lights when tuning is complete.	If the HF-8014/8014A PA FAULT indicator is lit, check the HF-8022 blue READY indicator. If the blue READY indicator is lit, repair or replace HF-8014/8014A. If the blue READY indicator is extinguished, repair the HF-8022.
	b. Set the HF-8014/8014A KEY switch to NORM, the METER switch to CH A1 AF (+3FS), the MODE switch to ISB, and the CHANNEL ENABLE A1 LINE switch to A1 LINE.	HF-8014/8014A KEY and RF OUT indicators extinguished.	Repair/replace HF-8014/8014A.
4. Audio	Perform the audio check/adjustment procedures as outlined in paragraph 3.1.5 of the HF-8154/8154A Transmitter System operation section.	Audio check/adjustments per paragraph 3.1.5 within parameters.	Repair/replace HF-8014/8014A.

3. TESTING AND TROUBLESHOOTING.
3. Testing and Troubleshooting Procedures

Table 1. Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. Power output	a. Set the HF-8014/8014A controls as follows: MODE to CW PA PWR to LOW PWR FREQUENCY KHZ to 02000.0 KEY to LOCK		
	b. Observe wattmeter.	Wattmeter indicates 3000 to 7000 watts.	Repair HF-8022.
	c. Set the HF-8014/8014A switches as follows: KEY to NORM PA PWR to HIGH PWR KEY to LOCK		
	d. Observe wattmeter.	Wattmeter indicates 8000 to 11 000 watts.	Repair HF-8022.
	e. Set the HF-8014/8014A switches as follows: KEY to NORM FREQUENCY KHZ to 15000.0 KEY to LOCK		
	f. Observe wattmeter.	Wattmeter indicates 8000 to 11 000 watts.	Repair HF-8022.
	g. Set the HF-8014/8014A controls as follows: KEY to NORM FREQUENCY KHZ to 29000.0 KEY to LOCK		
	h. Observe wattmeter.	Wattmeter indicates 8000 to 11 000 watts.	Repair HF-8022.
	Note The following testing and trouble-shooting procedures are for the HF-8154A 10-kW Transmitter only.		
6. Preliminary setup (Cont)	a. Set the HF-8014A controls as follows: KEY to NORM PA PWR to OFF CONT to REM METER to XMT OUT (+23FS)		

3. TESTING AND TROUBLESHOOTING.

3. Testing and Troubleshooting Procedures

Table 1. Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
6. (Cont)	b. Set the HF-8093 Exciter Control control as follows: PA PWR to OFF MODE to CW CONT to NORM CHANNEL ENABLE (4) to OFF PILOT CARR to OFF PEAK CLIP to OFF KEY to NORM ADDRESS to number of controlled exciter FREQUENCY KHZ to 02000.0 PWR to ON (press inward and latch)		
	c. Connect CW key to HF-8093.	HF-8093 BUSY indicator is extinguished.	Repair/replace HF-8093.
7. Power turn on	a. Set the HF-8093 PA PWR switch to STBY. *Note* Allow 3 minutes for system warmup.	HF-8022 green FILAMENT indicator lights.	Repair HF-8022.
	b. Set the HF-8093 PA PWR switch to LOW PWR. *Caution* If the blower motor fails to function properly, turn off all power immediately or serious damage to the HF-8022 will result. Normally, the power amplifier will self-protect and turn itself off after 5 seconds if either air pressure is insufficient or blower malfunctions.	HF-8022 blower motor runs, and red PLATE indicator lights.	Repair HF-8022.
	c. Change one digit of the HF-8093 FREQUENCY KHZ switches and then reset frequency to 02000.0.	HF-8093 EXCITER FAULT indicator extinguishes.	Repair/replace HF-8014/8014A. Repair/replace HF-8093.
8. System tuning (Cont)	a. Key the CW key.	HF-8093 KEY indicator lights during tuning, EXCITER FAULT indicator is off, HF-8014A METER indicates +10 dB mW to +20 dB mW, HF-8093 RF OUT indicator lights, and the PA READY indicator lights when tuning is complete.	If the HF-8093 PA FAULT indicator is lit, check the HF-8022 blue READY indicator. If the blue READY indicator is lit, repair or replace HF-8093. If the blue READY indicator is extinguished, repair the HF-8022.

3. TESTING AND TROUBLESHOOTING.
3. Testing and Troubleshooting Procedures

Table 1. Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. (Cont)	b. Release the CW key.	HF-8093 KEY and RF OUT indicators extinguished.	Repair/replace HF-8093.
9. Audio	Perform the audio check/adjustment procedures as outlined in paragraph 3.2.3 of the HF-8154/8154A transmitter system operation section.	Audio check/ adjustments per paragraph 3.2.3 within parameters.	Repair/replace HF-8093.
10. Power output	a. Set the HF-8093 controls as follows: MODE to CW PA PWR to LOW PWR Key the CW key.		
	b. Observe wattmeter.	Wattmeter indicates 3000 to 7000 watts.	Repair HF-8022.
	c. Release the CW key.		
	d. Set HF-8093 controls as follows: PA PWR to HIGH PWR Key the CW key.		
	e. Observe wattmeter.	Wattmeter indicates 8000 to 11 000 watts.	Repair HF-8022.
	f. Release the CW key.		
	g. Set the HF-8093 controls as follows: FREQUENCY KHZ to 15000.0 Key the CW key.		
	h. Observe wattmeter.	Wattmeter indicates 8000 to 11 000 watts.	Repair HF-8022.
	i. Release the CW key.		
	j. Set the HF-8093 controls as follows: FREQUENCY KHZ to 29000.0 Key the CW key.		
	k. Observe wattmeter.	Wattmeter indicates 8000 to 11 000 watts.	Repair HF-8022.

3. TESTING AND TROUBLESHOOTING.

3. Testing and Troubleshooting Procedures

Table 2. Test Equipment and Tools.

ITEM	MINIMUM SPECIFICATIONS	REPRESENTATIVE TYPE
Audio frequency signal generator	1000 Hz at 0 dB mW, 600-Ω output	HP 200AB
Audio frequency vtvm	1000 Hz, -5 to +5 dB mW	HP 400D
In-line rf wattmeter	2 to 30 MHz	Bird model 4712 with 25-kHl element
Rf load	50 Ω, 10 000 W	Electro Impulse DACT-14
Rf signal generator	1 to 30 MHz	HP 8640B-001
Microphone	Dynamic	Collins SM-80, SM-81, MM-80, or MM-81
CW key	Hand-operated CW key	Collins AC-8010

10-kW TRANSMITTER SYSTEM

for

AUSTRALIAN ARMY

Rockwell International

PARTS LIST

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PARTS LIST

PARTS LIST - EQUIPMENT

PART NO.	INDENT	DESCRIPTION	SEE NOTE BELOW
622-3382-001	2	Power Amplifier HF-8022 (See Collins Pub 523-0767448)	
622-3382-002	2	Power Amplifier HF-8022 (See Collins Pub 523-0767448)	
622-3473-XXX	2	Exciter HF-8014A (See Collins Pub 523-0770718)	
622-3476-XXX	2	Exciter Control HF-8093 (See Collins Pub 523-0770750)	
622-3386-XXX	2	Preselector HF-8060 (See Collins Pub 523-0767474) (Option)	
	2	HF-80 Remote Display, comprising:	
631-0954-001	3	Module Frame	
631-1024-001	3	Display Module	
631-0955-001	3	Interface Unit	
631-1018-00X	3	Cables Kit	
631-1027-00X	3	Front Panel	
631-1143-001	2	Fault Alarm Panel	2
631-1096-001	2	Master Control Switch	2
9584-613-0200	2	Data Modem (Philips TMC)	
631-1151-00X	2	Power Distribution Unit	2
	2	Balun (A.E.A. Type T10K/530)	
	2	Connector Kit, RF Output (Andrew Antennas)	
631-0744-001	2	Control Cable	1
NPN	2	Coaxial Cable BNC/BNC	1
NPN	2	Antenna Interlock Cable	1

PARTS LIST - EQUIPMENT

PART NO.	INDENT	DESCRIPTION	SEE NOTE BELOW
631-0962-00X	2	Cable W12	1
622-3420-001	2	Cable Retractor, CA-8011	1
021-M012-010	2	Equipment Cabinet	1
021-M011-010	2	Equipment Console	1

NOTES:

1. For further detail, see Kits Section of this Book.
2. For further detail, see Part 4 of this Book.

10-kW TRANSMITTER SYSTEM

for

AUSTRALIAN ARMY

Rockwell International

KITS

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EXCITER TO POWER AMPLIFIER CONTROL CABLE (631-0744-001)

1. DESCRIPTION

The Collins part number 631-0744-001 Control Cable consists of a type D sub-miniature connector and a nine-pair cable fitted with spade lugs.

The control cable connects the exciter to the 10-kW power amplifier, and provides the control signals.

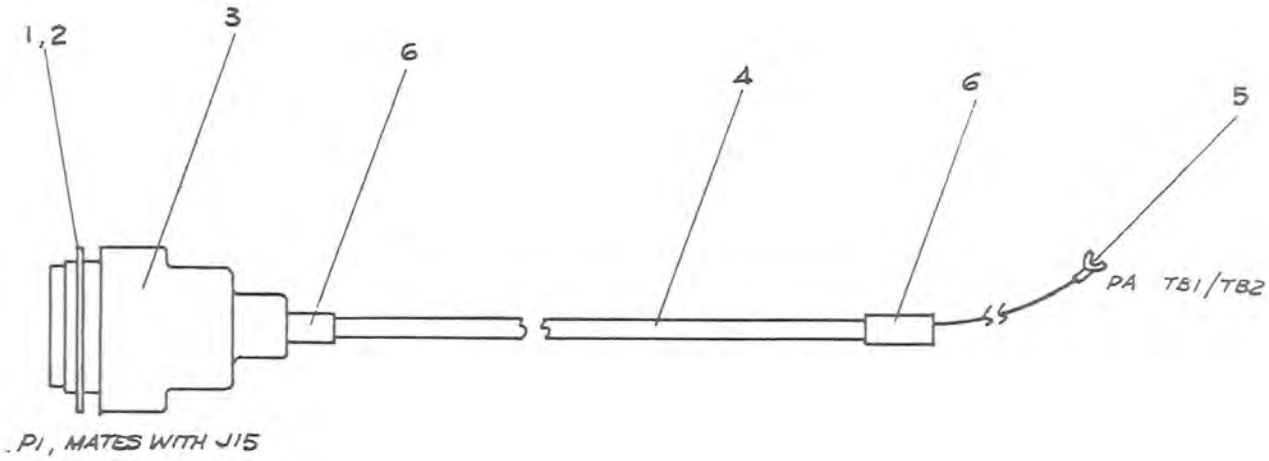
The nine-pair cable is shielded and wired to the 37-pin connector at one end.

The connector mates with the exciter J15 and the ends fitted with lugs connect to the power amplifier TB1 and TB2.

2. PARTS LIST/DIAGRAM

Figure 1 and table 2 provide identification, requisition details and location of parts, for maintenance purposes.

Figure 2 provides wiring details.



Power Amplifier Control Cable
Figure 1

EXCITER TO POWER AMPLIFIER CONTROL CABLE (631-0744-001)

1. DESCRIPTION

TABLE 1 : CONTROL CABLE PARTS LIST

FIG-ITEM	PART No.	INDENT	DESCRIPTION	UNITS PER ASSY
1	631-0744-001	1		
-1	C71-0922-040	2	Connector	1
-2	C71-0946-040	2	Snap-In Socket Contact	18
-3	C71-0396-040	2	Backshell, Strain Relief	1
-4	D24-0866-020	2	Cable, 9-Pair, Shielded	A/R
-5	304-0414-00	2	Lug, Spade	18
-6	152-3973-000	2	Tubing, Heat Shrink	A/R

EXCITER TO POWER AMPLIFIER CONTROL CABLE (631-0744-001)
1. DESCRIPTION

PAIR No.	WIRE COLOUR NOTE Z	FROM	TO	FUNCTION
1A	BLK	P1-23	TB2-14	TGC
1B	RED	P1-32	TB2-13	ALC
2A	BLK	P1-2	TB1-6	SYST. KEY
2B	WHT	P1-1	N/C INSULATE	NOT USED
3A	BLK	P1-21	TB1-12	PA READY
3B	GRN	P1-20	TB2-3	PA INTLK (GND) INHIBIT <2MHz
4A	BLK	P1-25	TB1-11	LOW PWR EN
4B	BLUE	P1-24	TB1-4	EXC TUNE
5A	BLK	P1-27	INC INSULATE	NOT USED
5B	BRN	P1-26	TB1-3	TUNE START
6A	BLK	P1-37	TB2-3	GROUND
6B	YELLOW	P1-19	TB1-2	28VDC GROUND
7A	BLK	P1-9	TB2-5	SYST SPARE
7B	OR	P1-3	TB2-4	SYST SPARE
8A	RED	P1-6	TB1-9	L.V. EN
8B	GRN	P1-7	TB1-10	HV EN
9A	RED	P1-3	TB1-1	PA FAULT
9B	WHT	P1-5	TB1-3	SIDE TONE EN

Exciter to Power Amplifier Control Cable
Wiring Details
Figure 2

CABLE W12 - EXCITER TO PRESELECTOR (631-0962-001)

1. DESCRIPTION

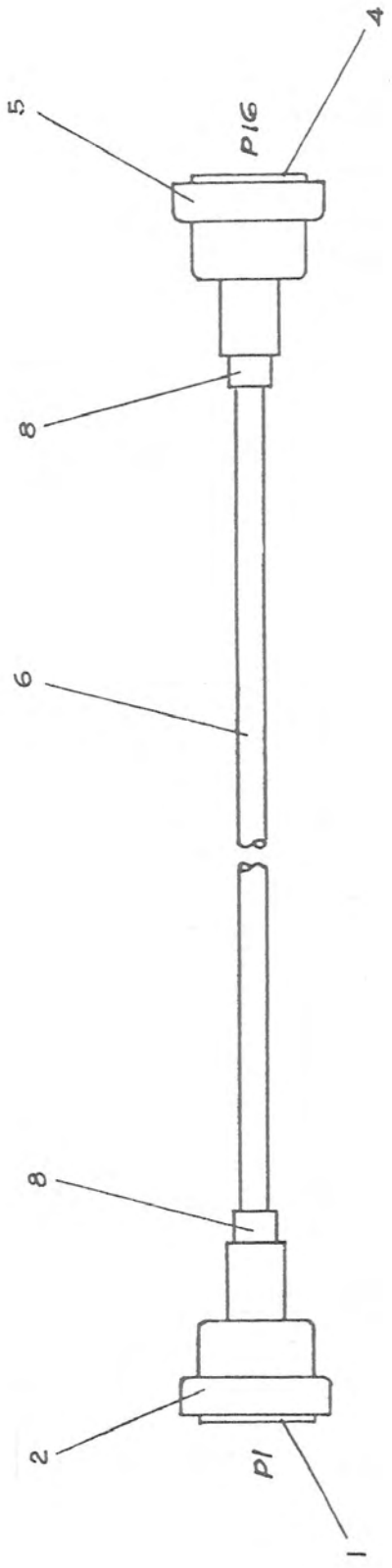
The Collins part number 631-0962-001 cable consists of a 31-wire cable and two type D sub-miniature connectors (one 37-pin and one 50-pin).

The W12 cable connects the exciter to the preselector. The 37-pin connector mates with exciter J16 and the 50-pin connector mates with the preselector J1.

2. PARTS LIST/DIAGRAM

Figure 1 and Table 1 provide identification, requisition details and location of parts, for maintenance purposes.

CABLE W12 - EXCITER TO PRESELECTOR (631-0962-001)
1. DESCRIPTION



Cable W12
Figure 1

CABLE W12 - EXCITER TO PRESELECTOR (631-0962-001)

TABLE 1 : CABLE W12 PARTS LIST

FIG-ITEM	PART No.	INDENT	DESCRIPTION	UNITS PER ASSY
1-	631-0962-001	1	Cable Assy, W12, Exciter to Preselector	1
-1	C71-0922-050	2	Connector, Type 50S	1
-2	C71-0396-050	2	Backshell	1
-3	C71-0946-040	2	Contact, Socket	52
-4	C71-0922-040	2	Connector, Type 37S	1
-5	C71-0396-040	2	Backshell	1
-6	424-0859-150	2	Cable	1600mm
-7	439-4031-000	2	Wire, Elec, A22TA00X0XXX	122mm
-8	152-M001-090	2	Sleeving, Heat Shrink	153mm

PART 2.

AUSTRALIAN ARMY HF-80 SYSTEMS

PART 2: 1kW TRANSMITTER SYSTEM

List of Associated Publications

Collins Instruction Books:

HF-8020	1kW Power Amplifier	523-0767426
HF-8030	1kW Power Supply	523-0767450
HF-8014( )	Exciter (Parts 1 & 2)	523-0770718
HF-8093	Exciter Control	523-0770750
HF-8060	Preselector	523-0767458
HF-80	Remote Display	523-1003164
TS-8020	Maintenance Panel	523-0767514
TS-8023	PA Card Test Set	523-0768236
TS-8024	Driver Test Set	523-0770753
TS-8060	Preselector Test Set	523-0768237

Philips-T.M.C. Ltd. Handbook:

Modem Type 9584 613 02000	9584 618 06010

INTRODUCTION

DESIGN FEATURES

The Australian Army HF-80 1-kW 4-Channel Transmitter System provides 1-kW pep or average power in the 1.6 to 29.9999 MHz frequency band.

Operating modes include ISB (UUSB, USB, LSB, LLSB), CW and AM (AME). The Systems also operate in an adjustable low-power mode where output power may be varied from 300 to 700 W.

The transmitter system may be operated entirely locally. However the normal local control may be extended up to a distance of 152 metres (500 feet). Remote Control facilities are also available, which enable control and monitoring of operating conditions and faults from unlimited distance, in which case a voice frequency control circuit is employed.

Additional design features are as follows:-

- Slide-in rack-mounted units.
- Maximum use of solid-state and microelectronic circuits.
- Optional bandwidth filters for the receiver and exciter.
- Flexibility in adding additional units.
- Up to Four (4) independent channels.

NOTE

Whilst for convenience, this handbook separately describes 1kW and 10kW Transmitter Systems, a combined system containing both 1 kW Transmitters (HF 8020/HF 8030) and 10kW Transmitters (HF 8022) may be installed, and operated by a Common Control System provided that all Exciters and all Remote Controls are of the same type. In the case of four channel equipment, type HF 8014A Exciter and type HF 8093 Exciter Control meet this requirement.

STRUCTURE OF PART 2 OF THIS INSTRUCTION BOOK:

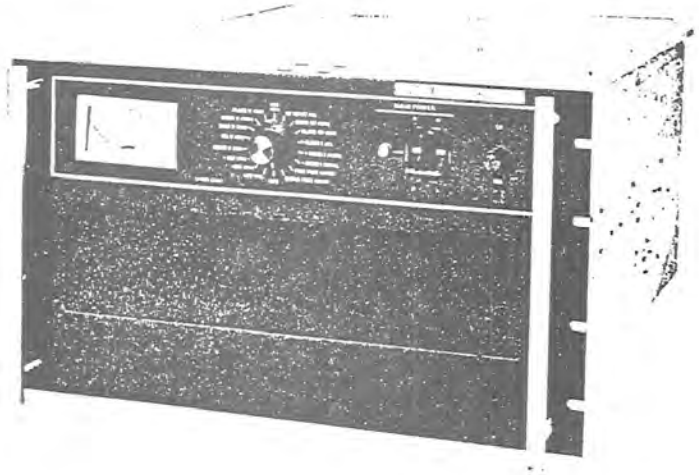
This part is subdivided as follows:-

Australian Army HF-8134A Transmitter System:

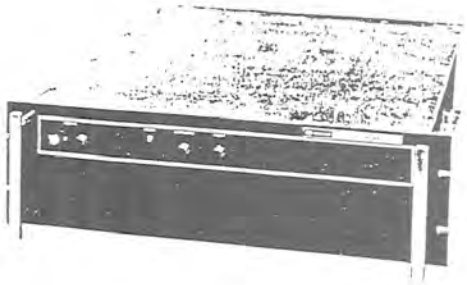
Description
Installation
Operation
Theory
Maintenance
Parts List

Australian Army Accessories and Kits:

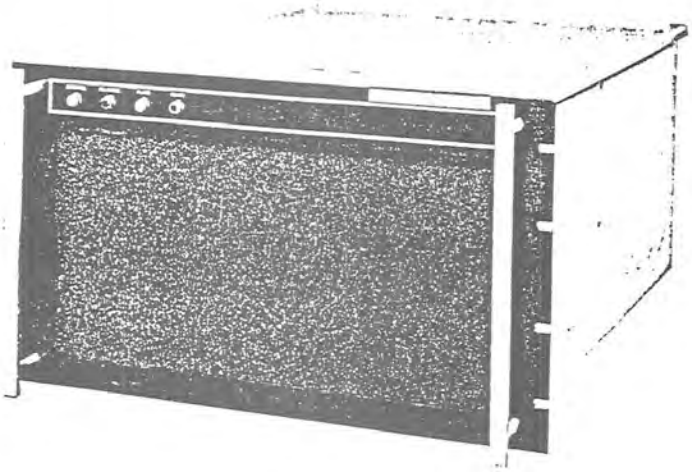
Each component of which contains Description, Installation, Operation, Theory, Maintenance and Parts List information as appropriate.



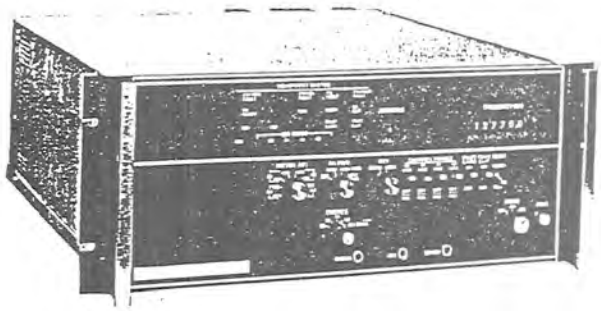
HF-8030
1-kW POWER SUPPLY



HF-8060
PRESELECTOR
(OPTIONAL)



HF-8020
1-kW POWER AMPLIFIER



HF-8093
EXCITER
CONTROL

HF-80 1KW TRANSMITTER SYSTEM

1-kW TRANSMITTER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

DESCRIPTION

Printed in Australia

523-1003180-0012M1

10October, 1981

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1. GENERAL.

The HF-80 1-kW Transmitter System provides 1-kW pep or average output power in the 1.6000 to 29.9999 MHz frequency range. The transmitter system may be operated in the low-power mode where the output may be adjusted from 300 to 700 watts. Emission modes include 4-channel ISB (UUSB, USB, LSB, LLSB), AME and CW.

The HF-8134A 1-kW Transmitter System is a locally-controlled 4-Channel system when using the HF-8014A Exciter and HF-8020 1-kW Power Amplifier, and a remotely-controlled system when using the HF-8093 Exciter Remote Control. By means of the Master Control Switch the system may be controlled from either one of two alternative sites.

WARNING

The HF-80 1-kW Transmitter Systems contain 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 the U.S. Occupational Safety and Health Administration (OSHA) recommended maximum limits.

2. EQUIPMENT SUPPLIED:

The equipments supplied with the HF-8134A 1-kW Transmitter System are listed and described in Table 1.

3. ASSOCIATED EQUIPMENT:

Table 2 lists the equipments associated with the HF-8134A 1-kW Transmitter System, as well as their function and description.

4. ACCESSORIES:

Table 3 lists the accessories available with the HF-8134A 1-kW Transmitter System as well as their function and characteristics.

5. OPTIONS:

Table 4 lists options available for the HF-8134A 1-kW Transmitter System, as well as their function.

6. EQUIPMENT SPECIFICATIONS:

Table 5 lists the specifications for equipments that comprise the HF-8134A 1-kw Transmitter System.

TABLE 1 : EQUIPMENT SUPPLIED/CONFIGURATION

EQUIPMENT	COLLINS PART No.	DESCRIPTION
HF-8014A Exciter	622-3473-001	Provides 100-mW rf output for AME, ISB, and CW modes over the frequency range of 1.6000 to 29.9999 MHz in 100-Hz steps. HF-8014A provides 4-Channel operation and can be locally or remotely controlled. Preselector interface at rear panel.
HF-8020 1-kW Power Amplifier	622-3380-001	Provides a full 1-kW rf power output over the frequency range of 1.6000 to 29.9999 Mhz. The HF-8020 also has a low power operational capability, adjustable from 300 to 700 watts. The operating frequencies are selectable in 100-Hz, 10-Hz, 1-Hz steps depending upon the options elected in the hf system exciter. The HF-8020 is totally compatible in operator-attended installations or fully automated remote communications stations.
HF-8030 1-kW Power Supply	622-3383-001	Provides all power requirements for the HF-8020.
HF-8093 Exciter Control	622-3476-001	Provides remote control capability of from 1 to 16 HF-8014A exciters. Control unit also accepts monitor information that continually indicates the status of the unit under control. Basic unit controls AM (AME), ISB (LLSB, LSB, USB, UUSB), and CW modes of operation over the frequency range of 1.6000 to 29.9999 MHz in 100-Hz steps. Standard filters controlled are 2.85 kHz (USB and LSB). Remote control of exciter is by FSK, RS-232C, or MIL-STD-188C.

TABLE 1 : EQUIPMENT SUPPLIED/CONFIGURATION

EQUIPMENT	COLLINS PART No.	DESCRIPTION
HF-8060 Preselector	622-3386-001	May be used between Exciter output and Power Amplifier to remove unwanted frequency products of the synthesized frequency generator. Tuning is controlled by the Exciter.
Data Modem	---	Philips-TMC type 9584 613 0200. Translation of signals to and from Remote Controller HF-8093 at a location remote from Exciters.
HF-80 Remote Display Unit	---	Displays operating condition of up to 16 remotely controlled transmitters, as well as fault indication. Each unit contains four (4) displays, and consists of:
	631-0954-001	Module Frame
	631-1024-001	Display Module
	631-0955-001	Interface Unit
	631-1018-00X	Cables Kit, and
	631-1027-00X	Front Panel.
Fault Alarm Panel	631-1143-001	Takes output from Remote Display Unit and provides indication of an equipment fault.
Master Control Switch	631-1096-00X	Allows system or part of system to be operated from either of two locations.
Power Distribution Unit	631-1151-00X	Provides mains input connections, circuit breakers for equipment and a standard Aust. mains outlet.

TABLE 2 : HF-80 1-kW TRANSMITTER SYSTEMS ASSOCIATED EQUIPMENT

EQUIPMENT	FUNCTION	CHARACTERISTICS
Headphones	Provide headphone monitoring of the transmit audio.	Standard 600-ohm head-phones.
Microphone	Provides voice audio input for voice transmissions.	200-ohm microphone
CW Key	Provides CW key for CW transmissions.	
Interconnecting Cables	Cables necessary for system operation.	
Balun.	Balanced/unbalanced change and impedance changes in antenna feed.	
Antenna	Transmits	1-kW hf capability.

TABLE 3 : HF-80 1-kW TRANSMITTTER SYSTEM ACCESSORIES

REQUIREMENT	COLLINS PART NUMBER	FUNCTION	CHARACTERISTICS
AC-8010 CW Key	622-3415-001	Keys transmitter for CW operation	Hand-operated CW Key
AC-8011 Microphone Footswitch	622-3432-001	Keys transmitter	Foot switch for handsfree keying of microphone
AC-8050 Standard Headphones.	622-3412-001	Provides headphone monitoring of transmit and receiver audio	Standard 600-ohm headphones with sound-blocking earmuffs.
AC-8051 Lightweight Headphones.	622-3413-001	Provides headphone monitoring of transmit and receiver audio.	Lightweight 500-ohm headphones with comfort designed ear pieces.
Cable W3	631-0956-00X	Connects Exciter J15 to Power Supply J4.	Refer to Kit Section of Instruction Book.
Cable W5	631-0961-001	Connects Exciter J22 to Power Amplifier J3.	Refer to Kit Section of Instruction Book.
Cable W7	631-0958-00X	Connects Power Supply J2 to Power Amplifier J1	Refer to Kit Section of Instruction Book.
Cable W8	631-0957-00X	Connects Power Supply J3 to Power Amplifier J2.	Refer to Kit Section of Instruction Book.
Cable W9	631-0959-00X	Connects Power Supply J1 to Power Amplifier J5	Refer to Kit Section of Instruction Book.
Cable W10	631-0965-00X	Connects Mains to Power Supply.	Refer to Kit Section of Instruction Book.
Cable W11	631-0960-00X	Connects Power Amplifier J6 to Antenna	Refer to Kit Section of Instruction Book.
Cable W12	631-0962-00X	Connects Exciter J16 to Preselector J1.	Refer to Kit Section of Instruction Book.
Cable W14	631-0961-00X	Connects Exciter J22 to Preselector J2	Refer to Kit Section of Instruction Book.
Cable W17	631-0961-003	Connects Power Amplifier J3 to Preselector J4.	Refer to Kit Section of Instruction Book.
CA-8011 Cable Retractor	622-3420-001	Provides automatic retraction of interconnecting cabling for slide-mounted HF-8014A or HF-8093.	Refer to Kit Section of Instriction Book.

TABLE 3 : HF-80 1-kW Transmitter System Accessories. (Cont'd)

REQUIREMENT	COLLINS PART NUMBER	FUNCTION	CHARACTERISTICS
Equipment Cabinet	021-M012-XXX	Rack-mounting cabinet enclosure for HF-80 equipment with standard EIA mounting configuration.	Refer to Kit Section of Instruction Book.
Equipment Console Cabinet	021-M011-XXX	Rack-mounting cabinet enclosure for HF-80 equipment with standard EIA mounting configuration. With desk.	Refer to Kit Section of Instruction Book.
CA-8027 Cabinet Blower.	622-3469-XXX	Cooling blower for CA-8020 cabinets	Refer to Kit Section of Instruction Book.
Power Distribution Unit	631-1151-00X	Provides 240VAC Power outlet plus mains circuit breakers for various equipments within cabinets.	Refer to Common Equipment (Part 4)
CA-8030 Slide Mounting Kit	622-3418-001	Slide Mounting kit for HF-8060, or Hf-8093 when installed in CA-8020 or CA-8026 cabinets.	Refer to Kit Section of Instruction Book.
CA-8032 Slide Mounting Kit	622-3493-001	Slide Mounting for HF-8014A when installed in CA-8020 cabinets.	Refer to Kit Section of Instruction Book.
Microphone boom	128-0042-110	Flexible boom for SM-81 for hands-free boom-supported configuration.	533.4 mm (21 in) long
Microphone desk stand	128-0042-100	Desk top stand for SM-81	
MM-80 Handheld Microphone	128-0042-010	Provides voice audio input for HF-8014A for voice transmission	Handheld dynamic onmidirectional microphone with 200-ohm impedance. Has ptt switch.
MM-81 Handheld Microphone.	128-0042-020	Provides voice audio input for HF-8014A, or for voice trans-missions.	Handheld dynamic microphone with 200-ohm impedance and noise-cancelling characteristics. Has ptt switch.
MM-80 Desk Top Microphone.	128-0042-060	Provides voice audio input for HF-8014A, or for voice transmissions.	Desk top dynamic cardioid micro-phone with 200-ohm impedance. Has ptt bar and continuous key switch.
SM-81 Universal Microphone	128-0042-080	Provides voice audio input for HF-8014A, for voice transmissions.	Universal dynamic cardioid micro-phone with 200-ohm impedance. Has continuous key switch.
Special Test Accessories.			
TS-8010 Card Extender Kit	622-3431-001	Provides adapters to extend HF-8014A and HF-8093 cards and modules beyond the chassis for troubleshooting.	Includes a 130-pin edge-on connector extender (635-0913-001); 56-pin edge-on connector entender(635-0915-

Table 3 : HF-80 1-kW Transmitter System Accessories, (Cont'd)

REQUIREMENT	COLLINS PART NUMBER	FUNCTION	CHARACTERISTICS
Special Test Accessories (Cont'd)			001); rf module extender (635-0915-002); synthesizer extender (637-2843-001); seven subminiax coaxial extenders (635-9686-001); and subminiax to BNC coaxial extender (635-9686-002).
TS-8010 Card Extender Kit	622-3431-002	Provides adapter to extend HF-8093 cards beyond the chassis for trouble-shooting.	Includes: 130-pin edge-on connector extender (635-0913-001) and 56-pin edge-on connector extender (635-0915-001).
TS-8020 Maintenance Panels.	622-3396-001	Provides means of manually operating and testing the HF-8020 during troubleshooting.	Plugs into control card cage for operation. May be stored in place, inside power amplifier when not in use. Contains test switches and monitor indications.
TS-8022 Universal Card Extender	622-3430-001	Extends circuit cards from the chassis for testing and troubleshooting. Applicable to HF-8020 and HF-8030.	
TS-8024 Drive Test Set	622-3465-001	Tests the HF-8020 Drive Module	Provides excitation, loads, and controls and indicators to test drive module.

TABLE 4 : HF-80 1kW TRANSMITTER SYSTEMS OPTIONS

OPTION	COLLINS PART NUMBER	FUNCTION
AC-8012 Oven Standard Kit	622-3460-001	Internal oven frequency standard with a stability of 1 x 10(-8) over the specified operating temperature range. Implemented by adding oven oscillator assembly (637-9135 -001), 2-wire cable harness, a coaxial cable, and an external phase-lock card (634-0655-001). Applicable to the HF-8014A.
AC-8013 External Reference Standard Kit	622-3461-001	Permits operation from an external frequency of 100-kHz, 1-MHz, or 5-MHz as desired. Implemented by adding a coaxial cable harness with rf connector mounted on rear panel, and installing an external phase-lock card (635-0655-001). Applicable to HF-8014A.
AC-8014 Frequency Display Kit (10 and 100 Hz)	622-3470-XXX	
10-Hz frequency display kit	622-3470-001	Provides an LED display in 10-Hz increments of the frequency selected in HF-8014A, either locally or remote. In local operation this display agrees with the frequency thumbwheel setting on the HF-8014A. In remote operation this display agrees with the frequency selected on the exciter remote control.
100-Hz frequency display kit	622-3470-002	Same as 622-3470-001 except has 100-Hz increments.

TABLE 4 : HF-80 1kW TRANSMITTER SYSTEMS OPTIONS

OPTION	COLLINS PART NUMBER	FUNCTION
AC-8015 Frequency Standard Switch Kit	622-3499-001	Provides for automatic switching from an external frequency reference input to the HF-8014A oven stabilized frequency standard upon loss of the external input. Applicable to HF-8014A. AC-8012 Oven Standard Kit must be installed in HF-8014A.
AC-8017 100- to 10-Hz Tuning Conversion Kit	622-3453-001	10-Hz tuning increment capability. Implemented by installing a Synthesizer 100/10-Hz Decade Card (623-2080-004) in the A18 slot, by moving the Synthesizer End Decade Card (635-0657-001) from the A18 slot to the A17 slot, and by changing the front panel frequency switchboard from 635-0830-001 to 635-0830-002 applicable to the HF-8014A.
AC-8017A Control Unit 100- to 10-Hz Tuning Conversion Kit	622-3453-002	NOTE The AC-8017A is required for the HF-8093 when the AC-8017 is installed in HF-8014A. Extends frequency tuning increments of the HF-8093 from the normal 100-Hz steps to 10- Hz steps. Implemented by changing the front panel frequency switch-board from 635-0830-001 to 635-0830-002 and changing the front panel frequency display from 637-1781-001 to 637-1781-002.

TABLE 4 : HF-80 1kW TRANSMITTER SYSTEMS OPTIONS

OPTION	COLLINS PART NUMBER	FUNCTION
AC-8019 10- to 1-Hz Tuning Conversion Kit	622-3455-001	NOTE The optional 1-Hz tuning capability is recommended on processor controlled units only. Implemented by installing two synthesizer 100/10-Hz Decades 623-2080-004, one in the A18 slot and one in the A17 slot, by moving the Synthesizer End Decade 635-0657-001 from the A18 slot to the A16 slot; and by changing the front panel frequency switchboard from 635-0830-001 to 635-0830-002. Applicable to HF-8014A.
HF-8040 Antenna Coupler	622-3384-001	Automatic antenna coupler for matching HF-8020 to various whip and long-wire antennas or to 50-ohm unbalanced termination. Not required with HF-8020 unless vswr is greater than 3:1. Size: 526 mm (20.7 in) wide, 373 mm (14.7 in) high, and 1011 mm (39.8 in) deep. Colour is grey.
HF-8060 Pre-selector	622-3386-001	Automatically tuned bandpass filter for installations where transmit and receive antennas cannot be separated by large distances. Provides front-end selectivity and overload protection for receivers, improving cross modulation and out-of-band intermodulation performance. Used with exciters for improved transmit spurious signal and noise suppression.

TABLE 4 : HF-80 1kW TRANSMITTER SYSTEMS OPTIONS

OPTION	COLLINS PART NUMBER	FUNCTION
HF-8060 Pre-selector (contd.)	622-3386-002	Same as 622-3386-001 with addition of half-duplex frequency latch for maritime use.
	622-3386-003	Same as 622-3386-001 with addition of local tuning capability.
HF-8061 Bandpass Filter	622-3497-001	Automatically tuned bandpass filter for use in hf communications where several systems are operating simultaneously on nearby frequencies. The bandpass filter is capable of continuously handling rf power of up to 1500 watts at the tuned frequency.
HF-8040M Antenna Coupler	622-2612-001	Provides automatic impedance matching of various antennas to provide a 50-ohm resistive load to associated power amplifier. The antenna coupler is a sealed unit constructed for watertight integrity. Unit contains a tr relay for half-duplex capability.

TABLE 5 : HF-80 1-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
Physical	
Size	
HF-8014A Exciter	176.8mm (7 in) high,483mm (19in) wide, 574mm (22.6 in) deep (with handles).
HF-8020 1-kW Power Amplifier	267mm (10.5 in) high, 483mm (19 in) wide, 653mm (25.8in) deep (with handles).
HF-8030 1-kW Power Supply	267mm (10.5 in) high, 483mm (19 in) wide, 636mm (25 in) deep (with handles).
HF-8060 Preselector	132.6mm (5.22 in) high, 483mm (19 in) wide, 484mm (23 in) deep (with handles)
HF-8093 Exciter-Control	176.8mm (7 in) high, 483mm (19 in) wide, 524mm (20.6 in) deep (with handles).
Weight:	
HF-8014A Exciter	21.8 kg (48 lb)
HF-8020 1-kW Power Amplifier	23.56 kg (52 lb)
HF-8030 1-kW Power Supply	71.6 kg (158 lb)
HF-8060 Preselector	12.2 kg (27 lb).
HF-8093 Exciter Control	13.2 kg (29 lb)
Environmental	
Temperature	0 to +50deg C (+32 to +131 deg F). full performance. -57 to + 70 deg C (-71 to +158 deg F) non-operating.

TABLE 5 : HF-80 1-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
Humidity	0 to 95% relative at +30 deg C. (+86 deg F).
Altitude	Up to 3048m (10 000 ft) at +55 deg C (+131 deg F), operating; up to 4572 (15 000 ft) at +25 deg C (+77 deg F), operating; up to 12 192 m (40 000 ft), nonoperating
Shock	NOTE
HF-8020 and HF-8030	Shock test performed with equipment not operating during test but operational after test.
	Three impacts in each direction planes, except vertical from top for a total of 15 impacts. Each impact 15-g average and 11-ms duration.
Exciters/Controls	Bench handling (MIL-STD-810C), procedure X, method 516-2)
Vibration	Unit vibrated from 5 to 55 Hz in discrete intervals of 1 Hz as follows:
	5 to 15 Hz, 0.76mm (0.03 in)double amplitude sinusoidal input.
	16 to 55 Hz, 0.51mm (0.02 in) double amplitude sinusoidal input.
Electrical General Modes of Operation	
4-channel	Transmit-A3B/A9B/A3J (ISB), A3/A3H (AME), and A1 (CW)

TABLE 5 : HF-80 1-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
Frequency Stability	Not less than 5 x 10(-7) over specified temperature range; drift rate of not more than 3 x10(-8) per week. Optional oven standard provides not less than 1 x 10(-8) over specified temperature. External reference standard option provides stability of the 100-kHz, 1-MHz, or 5-MHz external standard used.
Duty Cycle	Continuous
Primary Power	
HF-8014A Exciter	100, 115, 215, 230 +/-10%, V ac, 47 to 420 Hz, single phase, 80 W maximum.
HF-8020 1-kW Power Amplifier	All primary power for the HF-8020 is supplied by the HF-8030 1-kW Power Supply.
HF-8030 1-kW Power Supply	105/210, 115/230, 122/244 +/-10% V ac, 47 to 63 Hz, single phase, 3600 W maximum.
HF-8060 Preselector	100/115/215/230 V ac +/-10%, 47 to 63 Hz, single phase, 50W maximum.
HF-8093 Exciter Control	100, 115, 215, or 230 V ac +/-10%.
Transmit	
Frequency Range	1.6000 through 29.9999 MHz, 100-Hz tuning increments; 10 or 1 Hz optional.
Frequency tune time	6 seconds nominal, 10 seconds maximum.
RF output	High power: 1-kW pep or average Low power: 300 to 700 W, adjustable.

TABLE 5 : HF-80 1-kW TRANSMITTER SYSTEM EQUIPMENT SPECIFICATIONS

CHARACTERISTIC	SPECIFICATION
Antenna output impedance	50 ohms, unbalanced: 3:1 vswr, maximum.
RF protective circuits	Internal gain control: protects amplifier from damage due to overdriving or abnormal tuning. Reflected power: unkeys amplifier when reflected power is greater than 330 W. Antenna interlock: prevents amplifier keying if an rf load is not present.
Audio circuits	
4-channel (all channels when in ISB)	Line input: 600 +/- 10% ohms, balanced, 0 dB mW, nominal for full rated output; adjustable between -26 and +10 dB mW.
Microphone	Dynamic type: 200 +/-10% ohms, unbalanced, -55 dB mW nominal, for rated output from power amplifier, compression range 30 dB minimum.

1-kW TRANSMITTER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

INSTALLATION

Printed in Australia

523-1003181-0012M1

10October, 1981

table of contents

1. GENERAL

This instruction book provides a guide to requirements which relate to the overall installation. Installation details which relate to individual equipments are included in the relevant equipment instruction books.

This section provides preinstallation requirements, cabling information, installation procedures, and postinstallation information peculiar to the HF-8134A 1-kW Transmitter System.

WARNING

The HF-80 1-kW Transmitter Systems contain a radio frequency power amplifier that, when operated into an antenna, may produce electromagnetic fields in close proximity to the antenna that are in excess of the U.S. Occupational Safety and Health Administration (OSHA) recommended maximum limits.

2. UNPACKING AND INSPECTION

WARNING

The units of the HF-8134A 1-kW Transmitter System are heavy. Use adequate manpower and the proper mechanical lifting devices to move this equipment.

The units of the HF-8134A 1-kW Transmitter System must be unpacked and handled with care. Inspect the equipment for damage caused during shipment. If damage is indicated, notify the transportation agency immediately. Verify that the equipment received agrees with the packing list. Save all boxes, fillers, and original packing containers for use when the equipment is repackedfor storage or reshipment.

Refer to individual equipment instruction books for relevant unpacking and inspection requirements.

When unpacking, locate and retain the Test Data Sheet for each particular equipment.

3. PREINSTALLATION CHECK/REQUIREMENTS

WARNING

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

3.1 Location

The HF-8134A 1-kW Transmitter System when mounted properly in a rack or equipment cabinet, must 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 that the flow of cooling air through the equipment is not impeded. In new installations, the rack or equipment cabinet should be located for easy access to the equipment adjustment points and equipment items that may require replacement.

3.2 Primary Power Requirements

3.2.1 1-kW Power Amplifier and Power Supply

All power required to operate the HF-8020 1-kW Power Amplifier is provided by the HF-8030 1-kW Power Supply, and may be operated from a 105/ 115/122, 210/220/230/237/244 V ac +/-10%, 47 to 63 Hz, single-phase primary power source. Maximum power required is 3500 watts. The HF-8020 must be strapped for compatibility with the site primary source voltage and with the connections in the HF-8030 1-kW Power Supply. Strapping of the HF-8020 is performed as follows:-

a. Place the HF-8020 on its left side (as viewed from the front panel). Remove the screws that secure the bottom cover to the chassis, and remove the bottom cover.

b. Locate terminal strip TB1 in the lower front area of the chassis.

c. Refer to Figure 1. Strap TB1 for the voltage that coincides with the primary source voltage. If minor differences exist between the source voltage and the nominal value shown, move the black A/orange B leads up or down one position on terminal strip TB1.

Strap the HF-8030 1-kW Power Supply for the identical primary voltage connections as shown in Table 1.

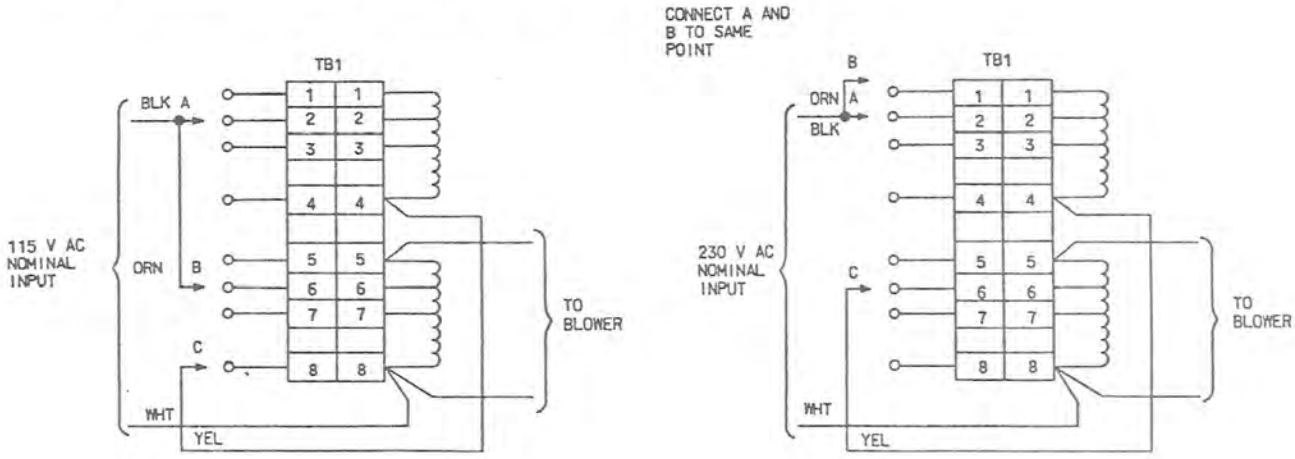
NOTE

Be sure to make these connections on both transformers T1 and T2 in the HF-8030.

3. PREINSTALLATION CHECK/REQUIREMENTS

3.2 Primary Power Requirements

3.2.1 1-kW Power Amplifier and Power Supply



PRIMARY CONNECTIONS FOR 115 V AC NOMINAL INPUT			
WIRES TO TB1	INPUT VOLTAGE (V AC)		
	105	115	122
	TB1 CONNECTIONS		
BLACK/ORANGE(A)	3	2	1
ORANGE (B)	7	6	5
YELLOW (C)	8	8	8

PRIMARY CONNECTIONS FOR 230 V AC NOMINAL INPUT					
WIRES TO TB1	INPUT VOLTAGES (V AC)				
	210	220	230	237	244
BLACK/ORANGE (A)	3	3	2	2	1
ORANGE (B)	3	3	2	2	1
YELLOW (C)	7	6	6	5	5

HF-8020 Power Transformer T1, Strapping Information
Figure 1

Table 1. HF-8030 Transformer Strapping.

WIRES TO TRANSFORMERS	INPUT VOLTAGE (V AC)							
	105	115	122	210	220	230	237	244
	TERMINAL CONNECTIONS FOR T1 AND T2							
Input 1 (black)	3	2	1	3	3	2	2	1
Input 2 (orange)	7	6	5	3	3	2	2	1
Jumper (yellow)	8	8	8	7	6	6	5	5

Note

Proper connections must be made on both T1 and T2.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.2 Primary Power Requirements
3.2.1 1-kW Power Amplifier and Power Supply

After the HF-8030 has been strapped, check the filament voltage of the HF-8030 using the procedures of paragraph 6.2.1.1. The value must be 5.8 to 6.0 V dc. If required, change the strapping on terminal board TB2 to obtain the proper filament voltage requirements.

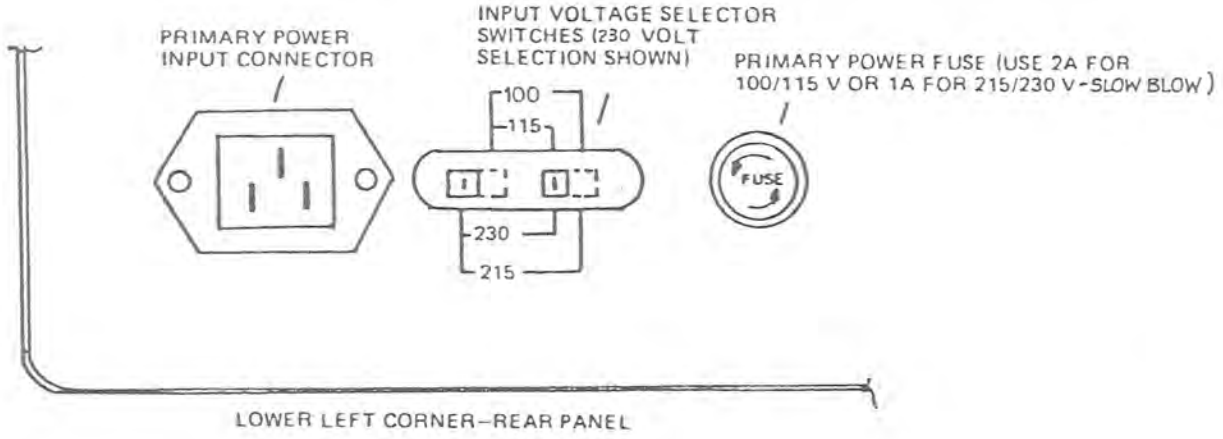
3.2.2. Exciter, Remote Display, Remote Control and Preselector Strapping.

The exciters, remote displays, remote controls, and the preselector in the HF-80 1-kW Transmitter Systems are strapped for input power, transmission between exciters, remote control units, audio input/output, and optional external frequency standard.

CAUTION

Do not remove or install plug-in cards or modules with power turned on. Damage to the cards or modules can result.

Do not operate the primary power input voltage selector switches with power applied. Be sure that the switches are in their proper position with suitable fuse installed before applying power. Connect the ground terminal, located on the rear panel, to a ground strap that is securely connected to an earth ground. (Ground strap must be #14 AWG or larger).



Primary Input Voltage Selector Switches
Figure 2

3. PREINSTALLATION CHECK/REQUIREMENTS

3.2 Primary Power Requirements

3.2.2. Exciter, Remote Display, Remote Control and Preselector Strapping.

Switches are provided for strapping the units for the desired primary input voltage. The units may be operated from 100-, 115-, 215-, or 230-V ac nominal input voltage. Set the primary input voltage selector switches on the rear of the units to the position corresponding to the to the value nearest the primary input voltage. Figure 2 shows the switches set for 230 V ac operation.

3.3 Data Transmission and Address Strapping (HF-8014A with HF-8093)

Both the exciter and the associated exciter control must operate at the same baud rate, signalling method and word format. This is accomplished by the proper strapping of the serial interface card in the HF-8014A and the HF-8093 using the dipswitches provided.

Figure 3 shows the strapping requirements on the serial interface card. The switches set the baud rate, FSK/RS-232 signaling, word format, EIA/ MIL-STD-188C polarity, parity, number of stop bits, exciter or exciter control and address enable/disable.

NOTE

In the systems supplied for the Australian Army, the Serial Interface Card is strapped for 1200 baud rate, EIA/RS-232C signalling method, ASCII word format, odd parity, with 2 stop bits.

The ADDRESS switch on the HF-8093 Exciter Control front panel develops a 4-bit binary output. Each exciter must be strapped at the interconnecting connector J14 to correspond to the address pattern for that unit.

When an HF-80 Remote Display is installed, in order to continually display the status of several equipments the serial interface card in the control unit and the remote display unit must be strapped for polling (see figure 3).

For further strapping details refer to the HF-8014A and HF-8093 instruction books.

3.4 Miscellaneous Considerations

3.4.1 Control Lines and Digital Modem Interface.

When remote control is required over long distances or when control signals must use audio circuits, the FSK mode is used. To control multiple exciters, an RS-232C or MIL-STD-188C dc signal must be used. An external digital modem allows dc signals to be used locally and translates these signals to FSK tones for long distance use. One modem is located physically near the remote control unit and the other modem is located physically near the exciter. The two modems may be interconnected using two wire pairs or a duplex voice circuit.

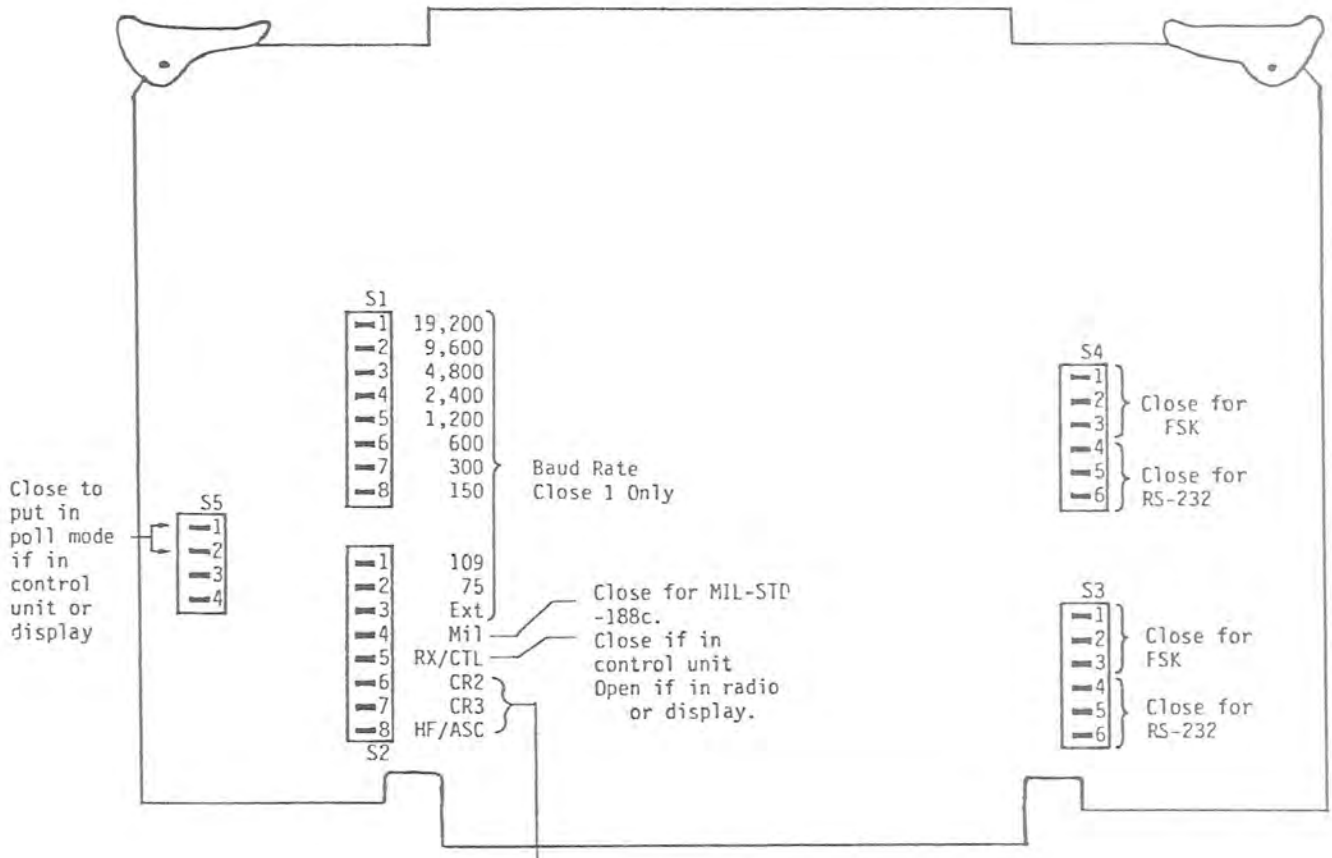
Table 2 shows the interconnections between the remote control and a typical digital modem using RS-232C signal levels.

3. PREINSTALLATION CHECK/REQUIREMENTS

3.4 Miscellaneous Considerations

Table 3 shows the interconnections between the exciters and a typical digital modem using RS-232C signal levels. Up to 16 exciters may be connected to one interface circuit.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.4 Miscellaneous Considerations



*SWITCH			WORD FORMAT	PARITY	NO OF STOP BITS
8	7	6			
C	C	C	ASCII	Even	2
C	C	O	ASCII	Odd	2
C	O	C	ASCII	Even	1
C	O	O	ASCII	Odd	1
O	C	C	HF-80	None	2
O	C	O	HF-80	None	1
O	O	C	HF-80	Even	1
O	O	O	HF-80	Odd	1

*O = Open, C = Closed

NOTE: For polling system the card must be strapped for RS-232C data transmission.

Serial Interface Card Strapping
Figure **3**

3. PREINSTALLATION CHECK/REQUIREMENTS

TABLE 2 : REMOTE CONTROL/MODEM, CONTROL INTERFACE CONNECTIONS

EXCITER CONTROL		DIGITAL MODEM	
CONNECTOR J14	FUNCTION	CONNECTOR	FUNCTION
		DIGITAL	
2	Control Data	2	Transmitted data
3	Monitor Data	3	Received data
14, 16	Signal return	7	Signal ground
15, 17	Chassis ground	1	Protective ground
		AUDIO	
		Cable Ident (White, Red)	Voice Frequency send
		Cable Ident (Blue, Green)	Voice frequency receive

NOTE

1. For connections outside the equipment cabinet, each data line must be paired with a signal return line and have a shield connected to chassis ground.
2. In the modem, strap the request-to-send line.

TABLE 3 : EXCITER/MODEM, CONTROL INTERFACE CONNECTIONS

EXCITER		DIGITAL MODEM	
CONNECTOR J14	FUNCTION	CONNECTOR	FUNCTION
		DIGITAL	
2	Control data	2	Transmitted data
3	Monitor data	3	Transmitted data
14, 16	Signal return	7	Signal ground
15, 17	Chassis ground	1	Protective ground
		AUDIO	
		Cable (White, Red)	Voice frequency send
		Ident (Blue, Green)	Voice frequency receive

NOTE

1. For connections outside the equipment cabinet, each data line must be paired with a signal return line and have a shield connected to chassis ground.
2. In the modem, strap the request-to-send line.

3. PREINSTALLATION CHECK/REQUIREMENTS
3.4 Miscellaneous Considerations

3.4.2 External Frequency Standard (Exciters)

An external frequency standard may be used providing the external phaselock card and oscillator assembly are installed on the synthesizer reference module and provided further that the appropriate straps are in place. (Refer to AC-8012 Oven Standard Kit and AC-8015 Frequency Standard Switch Kit details in the HF-8014A Exciter book, part 2).

3.4.3 Line Audio Inputs/Outputs

The transmit line audio inputs are adjusted at the factory so that -15- dB mW audio input corresponds to compression threshold. If your requirements for audio input/outputs are different from those described, make audio line adjustments as outlined in the appropriate equipment publication.

3.5 Antenna Strapping

Antenna interlock switch S9 on the rear panel of HF-8020 1-kW Power Amplifier must be set for the type of antenna coupler/antenna being used with the system.Set antenna interlock switch S9 as follows.

CAUTION

Once switch S9 has been set to coincide with specific system requirements, do not change the switch position unless the system requirements change. Damage to the system equipment can result.

a. If the HF-8040/8040M Antenna Coupler is used, set antenna interlock switch S9 to the center position.

b. If an antenna coupler or antenna is to be used that presents less than 150 ohm dc resistance to ground on the rf output line (connector J6), set antenna interlock switch S9 to the left position (as viewed from the rear of the power amplifier).

c. If an antenna coupler or antenna is to be used that presents greater than 150 ohm dc resistance to ground on the rf output line (connector J6), set antenna interlock switch S9 to the right position (as viewed from the rear of the power amplifier).

3.6 Cooling Requirements
3.6.1. HF-8020 and HF-8030 Cooling

The HF-8020 has a self-contained cooling (blower) system that provides adequate cooling-air flow. Adequate cooling can be maintained if the airflow to the air intake and exhaust ports is not restricted. Cooling air is brought into the unit

3. PREINSTALLATION CHECK/REQUIREMENTS

3.6 Cooling Requirements

3.6.1. HF-8020 and HF-8030 Cooling

through the filtered air intake opening on the front of the unit and exhausted to the rear. Auxiliary cooling must be provided when the unit cover is removed for maintenance. An air pressure switch, located in the unit, provides a fault signal via the power supply monitor to the power amplifier that disables the HF-8030 power circuits when the air pressure drops below safe operating limits.

3.6.2 Exciter, Remote Control, and Preselector Cooling

The exciters, remote control units and the preselector of the HF-8134A 1-kW Transmitter System operate with natural convection cooling in single-unit installations. In multiple unit installations or where other heat-producing equipment is installed in the same cabinet is is recommended that a cabinet blower be installed to prevent excessive temperature buildup.

3.7 Operation

The HF-8134A 1-kW Transmitter Systems have undergone many thorough inspections and tests before being shipped; however, to assure proper performance before installation of the equipment in a rack or equipment cabinet, a preinstallation test should be performed.

The minimum performance tests, in the maintenance section of the appropriate individual equipment instruction book, should be performed to assure that each unit is operating within specifications. If trouble is encountered, perform the test procedures and corrective action indicated in the maintenance procedures to obtain all operating parameters within specification. A postinstallation check, paragraph 6, will then verify the overall system performance.

4. CABLING

The following paragraphs provide information on cables required to interconnect the equipment of the HF-8134A 1kW Transmitter Systems. Refer to accessories and options available in the description section of this instruction book where detailed information is shown for pre-assembled cables. The following recommendations should be followed when installing interconnecting cables and wires.

a. Keep cables away from circuits carrying pulses or other sources of interference.

b. Leave service loops in cables and wires to prevent damage due to vibration or movement and to provide for ease in disconnecting them for equipment removal.

c. Avoid sharp bends in all wires and cables, and lace them to the cabinet or rack members to relieve strain of associated connectors.

d. Connect the safety ground strap to the safety ground on the rear of the equipment where provided.

e. Connect the HF-8030 power cable to the cable strain relief on the rear of the equipment where provided.

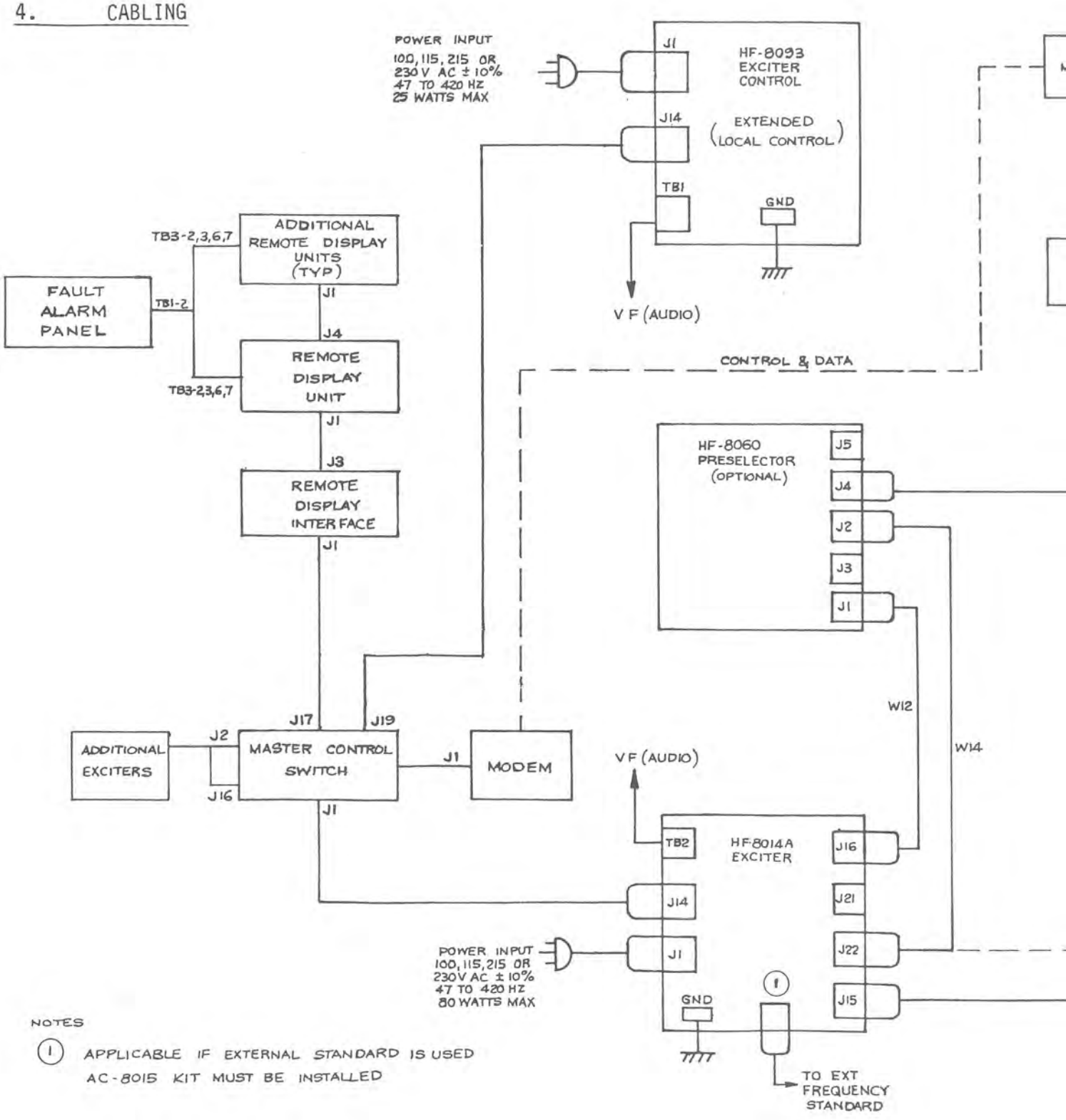
4.1 System Cabling Diagram

A cabling diagram for the HF-8134A 1 kW Transmitter System, with the several optional units, is shown in figure 4.

4.2 Cable Assemblies

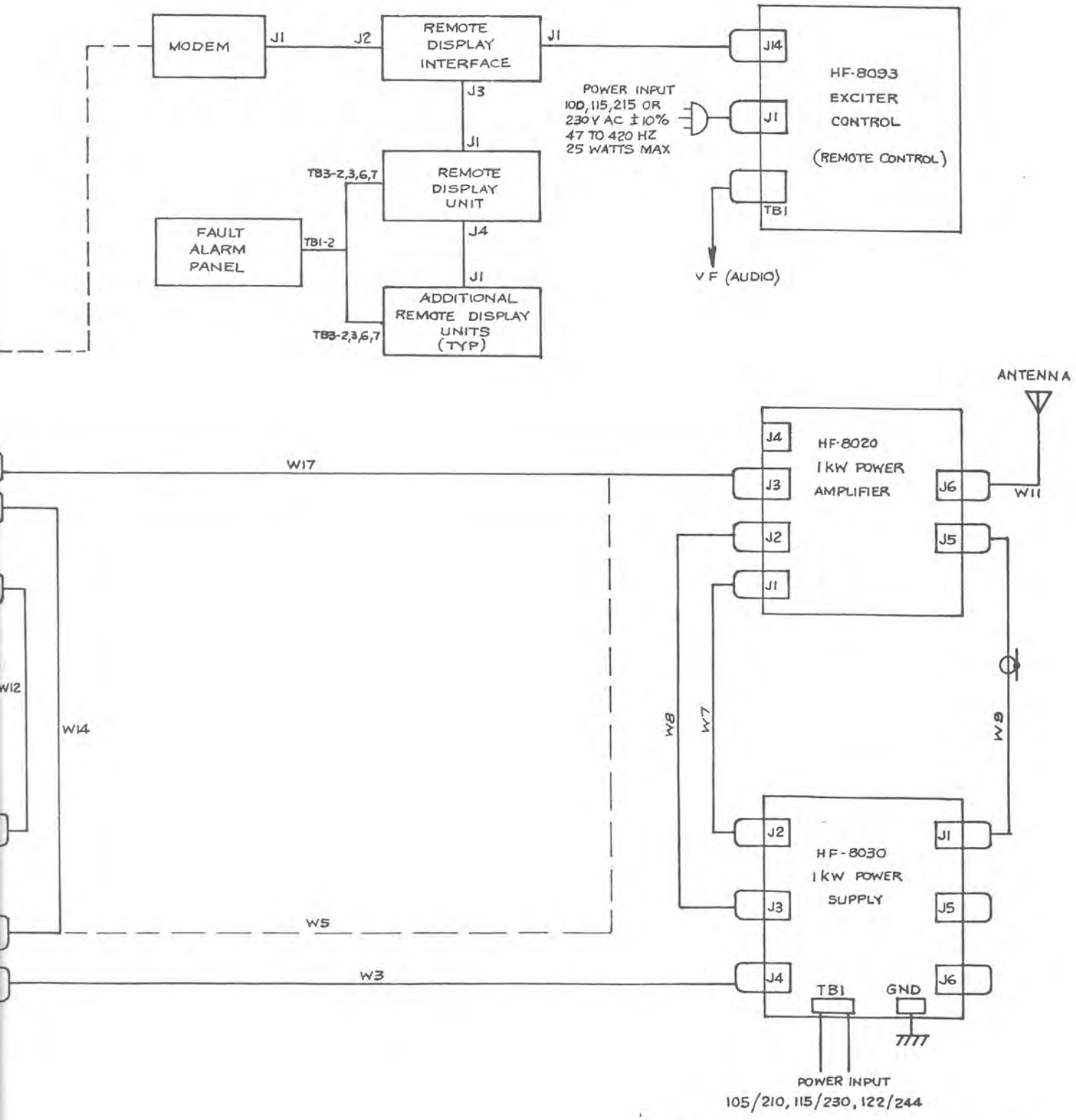
Preassembled cables may be purchased from Rockwell-Collins to interconnect system components (see description section for cable list). If the cables are not purchased, a mating connector kit can be obtained to aid in local fabrication of cables unique to the installation.

4. CABLING



NOTES

(1) APPLICABLE IF EXTERNAL STANDARD IS USED
AC-8015 KIT MUST BE INSTALLED



HF-8134A 1-kW Transmitter System
Figure 4

4. CABLING

4.3 Cabling Procedures

4.3.1 Exciter to Exciter Control

The maximum allowable separation between the exciter and exciter control depends on the characteristics of the transmission line used, the method of signalling and the transmission data rates selected. When using RS-232C or MIL-STD-188C signalling, maximum cable length should not exceed 152 m (500 ft).Transmission of data over private carrier leased-lines, microwave links, or other communications circuits permit unlimited separation between the remote control and the controlled unit.

4.3.2 Multiple Exciters

Remote control of multiple exciters is accomplished by connecting in parallel all the control data buses (J14-2 and J14-6) and monitor data buses (J14-3 and J14-6) of all the exciters. Each controlled unit must be strapped for a unique address as described in HF-8014A and HF-8093 instruction books.

The exciters must also be strapped for the same data rates, the same parity and the same signalling methods. The signalling methods strapped must be either RS-232C or MIL-STD-188C, FSK cannot be used for multiple exciter systems.

4.3.3 Exciter and Remote Control to Primary Power Source

Separation between exciter and its remote control unit(s) and the primary power source (215- or 230-V ac) should be kept to a minimum. Preassembled power cables are supplied with the exciter.

4.3.4 Exciter to External Key Line

The exciter can be keyed from rear panel EXT KEY terminal TB2-6. When the front panel KEY switch is in the EXT position, a ground key signal applied to TB2-6 keys the exciter.

4.3.5 Remote Control Key-Line Operation

The remote control key line is internally connected to the microphone push-to-talk key, the CW key jack, the front panel KEY switch, and the rear panel terminal strip (TB1-11, EXT KEY). Grounding any of these points generates transmission of the serial key command in the control data to the remote exciter. This causes the controlled equipment and its associated power amplifier to be keyed. Removing the ground from the key line again generates transmission of the serial command data that causes the controlled equipment and power amplifier to unkey.

For normal push-to-talk (or equivalent) system keying, a wired key line between the control and the controlled equipment is not required. As explained above the key command is transmitted to the controlled equipment by the serial control data sent to the exciter by the control.

4. CABLING
4.3 Cabling Procedures
4.3.5 Remote Control Key-Line Operation

Delay time (in milliseconds) required for transmission of the key command from the control to the controlled equipment may be calculated by dividing 22000 by the data baud rate. The serial data transfer between the control unit and the controlled equipment is not fast enough to support serial, remote CW keying. CW keying from the control unit requires a wired key-line connection between the EXT KEY terminals of the control and the controlled equipment. Where distances between the control unit and the controlled equipment make direct wiring of the CW key line impractical, the key line signal must be converted externally to some form suitable for transmission to the controlled equipment site. (One channel of a multichannel data modem, or microwave link can be used to transmit the CW keying signal, for instance).

The rear panel EXT KEY may be used by an external device (a data set that provides a key-line output prior to start of data transmission,for instance) to initiate a remote serial control key. Modulation of the controlled equipment by the data or voice transmission under these circumstances must be delayed at least the amount of time required for transmission of the serial key command in order to avoid distortion of the intitial characters of the transmission (see calculation above).

Although the key line is defined as ground for key and open for unkey, an RS-232C logic level signal may be used on the key line with the MARK condition (-3 to -15 V dc) representing the keyed state, and the SPACE condition (+3 to +15 V dc) representing the unkeyed state.

4.3.6 Exciter to External Frequency Standard

Separation between the exciter and an external frequency standard should be kept to a minimum. A BNC-to-BNC cable is required. Cables W5, or W14 may be used.

5. INSTALLATION PROCEDURES

5.1 General

The components of the HF-8134A 1kW Transmitter System may be individually mounted either in desk-top cabinets or in a standard 483 mm (19 in) wide rack. Refer to the description section of this instruction book for a description of the equipment cabinets, mounting kits, and accessories available.

Where rack mounting is desired, the equipment may be attached by mounting screws through the edges of the front panel; however, slide mounting is recommended for ease of servicing and equipment side support. Table 4 lists the mounting kits for each component.

The installation procedures for the equipments of the HF-8134A are presented in the paragraph below. Before installing the equipment, perform the input power and data and address strapping required in accordance with paragraphs 3.2 onwards, then replace the equipment covers.

TABLE 4. SLIDE MOUNTING KITS

MOUNTING KIT	PART NUMBER	USED WITH
CA-8030	622-3418-001	HF-8093 Exciter Control
CA-8031	622-3419-001	HF-8020 1kW Power Amplifier HF-8030 1kW Power Supply
CA-8032	622-3493-001	HF-8014A Exciter

NOTE

A rotating slide mounting kit, part number 015-M040-020, is available for special applications such as training establishments etc. This slide kit is suitable for use with the HF-8014A Exciter and HF-8060 Preselector. For further details of the slide kit, associated hardware and installation instructions, refer to your Rockwell International Supplier.

5.2 Installation of Slide Mounts

Procedures are given below for the attachment of the slide mounts to the equipment and to the equipment cabinet. Refer to table 4 for the appropriate slide mounting kit to be used. Outline and dimension drawings of individual equipments are included in the Installation sections of the respective equipment instruction books.

5.2.1 Installation of CA-8030 Slide Mount Kit

Refer to the appropriate outline and mounting dimension drawing for the equipment to be slide mounted and to the installation drawing of the CA-8030 (figure 5): then proceed as follows:

5. INSTALLATION PROCEDURES
5.2 Installation of Slide Mounts
5.2.1 Installation of CA-8030 Slide Mount Kit

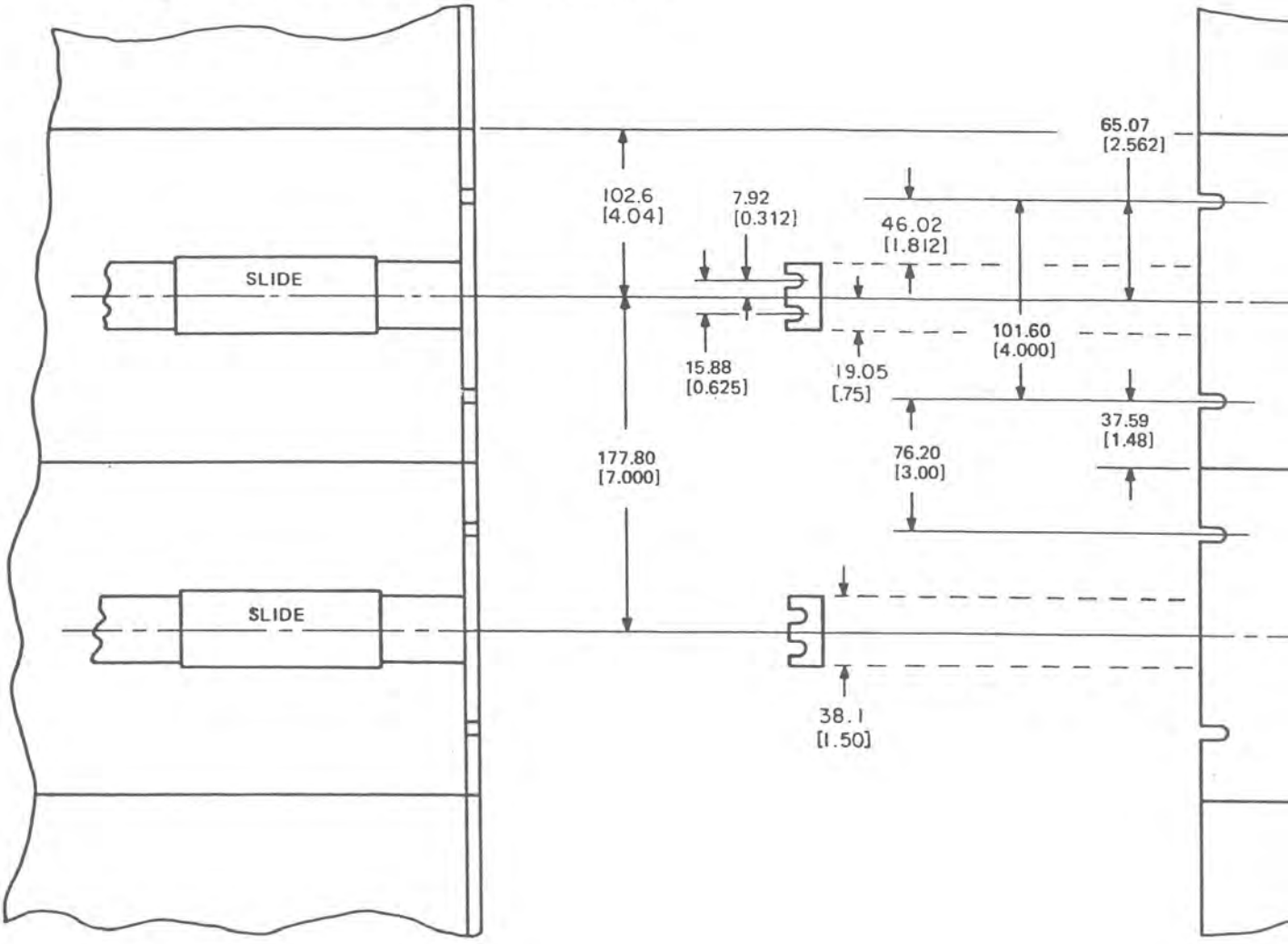
NOTES:

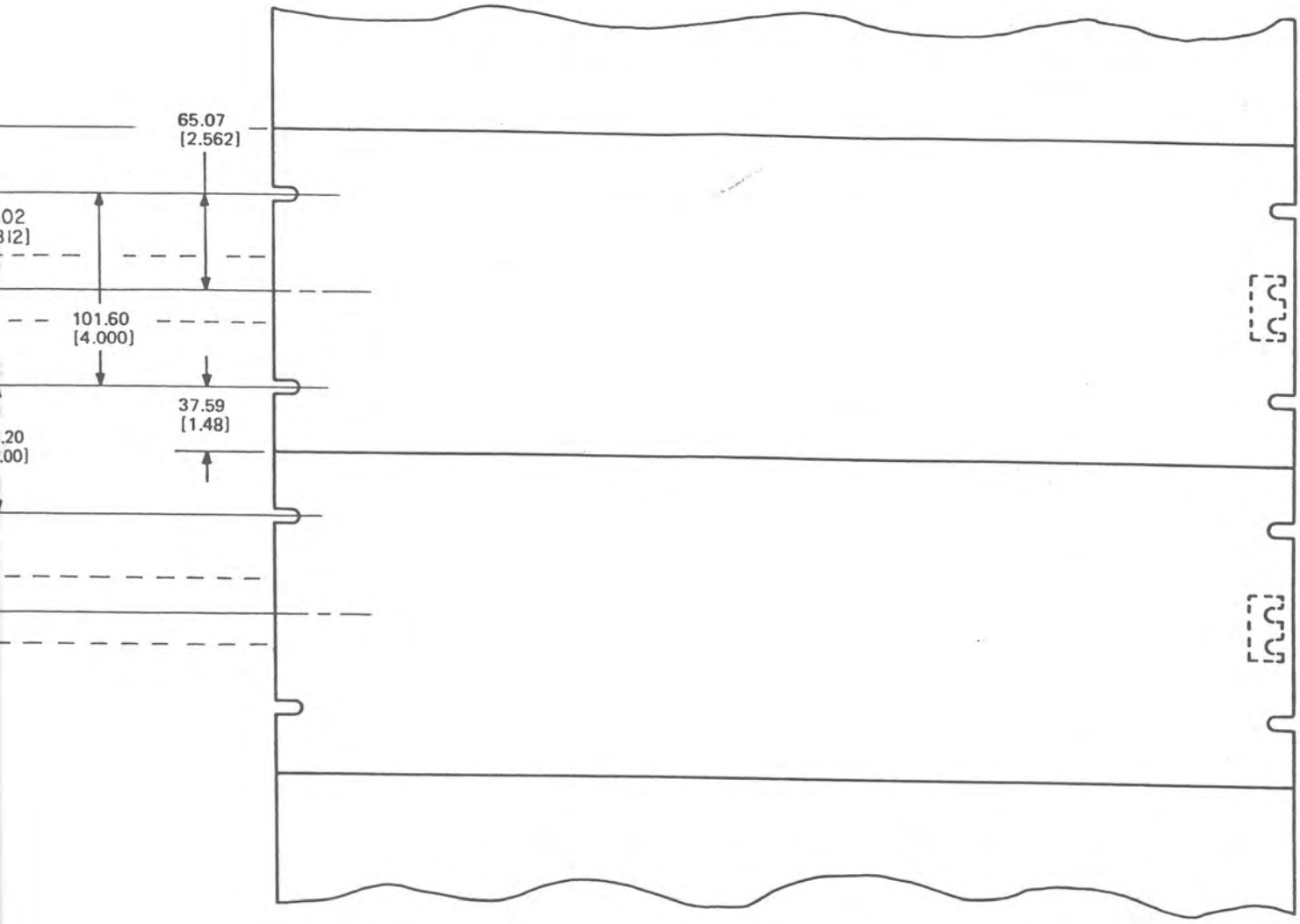
(1) SLIDE BRACKETS MOUNT TO REAR SURFACE OF FRONT CABINET RAILS AND FRONT SURFACE OF REAR RAILS.

(2) a. FOR CABINETS WITH THREADED MOUNTING HOLES USE SCREWS AND FLAT WASHERS FROM BRACKET SIDE INTO CABINET. SCREW MUST NOT PROJECT BEYOND PANEL MOUNTING SURFACE.

b. FOR CABINETS WITH CLEARANCE HOLES IN THE RAILS, THE HOLES USED FOR MOUNTING THE SLIDE BRACKETS MUST BE COUNTERSUNK AND FLAT HEAD SCREWS USED FOR MOUNTING.

(3) DIMENSIONS ARE IN MILLIMETRES [INCHES].





Installation of CA-8030 Slides in Rack Mounts
Figure 5

5. INSTALLATION PROCEDURES
5.2 Installation of Slide Mounts
5.2.1 Installation of CA-8030 Slide Mount Kit

NOTE

Right and left refer to the sides of the equipment as viewed from the front panel.

a. Using two 0.190-32 x 3/8 button head screws, attach each inner slide channel to the sides of the equipment.

NOTE

When mounting slide kit to HF-8060, use five 0.190-32 x 3/4 screws to attach the inner slide channel to the equipment. Five 3/8 in long spacers are required between the inner slide channel and the equipment.

b. Using two 0.190-32 x 3/8 pan-head screws, lockwashers, and nuts, attach an end (adapter) bracket to the rear ends of each outer slide channel.

NOTE

Mount the end brackets with the heads of the screws inserted in the slide outerchannel; then through the end brackets so that the lockwashers and nuts are outward away from the channel.

c. Fully extend the slide channels. Lift the equipment into position and square it properly with the equipment cabinet.

d. Using four panhead screws (10-32 UNF -2A x 1/2"), four lock washers (No.10), four flat washers (No.10) and four Hex. head nuts (10-32 UNF 1/8" x 3/8")secure the end brackets to the equipment cabinet with the nuts on the internal side of the corner upright.

e. Refer to cabling paragraphs and make the required cable connections to the equipment.

f. 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.

NOTE

Be sure that the ground point is free from paint and foreign material.

g. Press the lockout catch on the extended slide section and

5. INSTALLATION PROCEDURES
5.2 Installation of Slide Mounts
5.2.1 Installation of CA-8030 Slide Mount Kit

slide the equipment completely into the equipment cabinet.

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

5.2.2 Installation of CA-8031 Slide Mount Kit

Refer to the appropriate outline and mounting dimensions drawing for the equipment to be slide mounted (refer to the relevant equipment instruction book) and to the installation drawing of the CA-8031 (figure 6); then proceed as follows:

a. On the CA-8031, 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 installed properly on the equipment).

NOTE

Slides are furnished in pairs and marked R.H. and L.H. Right and left 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.

c. Using three 0.190-32 x 1/2 flat head 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 and nuts are outward away from the channel.

d. Using four panhead screws (10-32 UNF-2A x 1/2"), four lock washers (No.10), four flat washers (No.10) and four Hex. head nuts (10-32 UNF 1/8" x 3/8") at each end bracket, secure the end bracket to the equipment cabinet with the nuts on the internal side of the corner uprights.

NOTE

Do not use centre 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.

5. INSTALLATION PROCEDURES
5.2 Installation of Slide Mounts

NOTES:

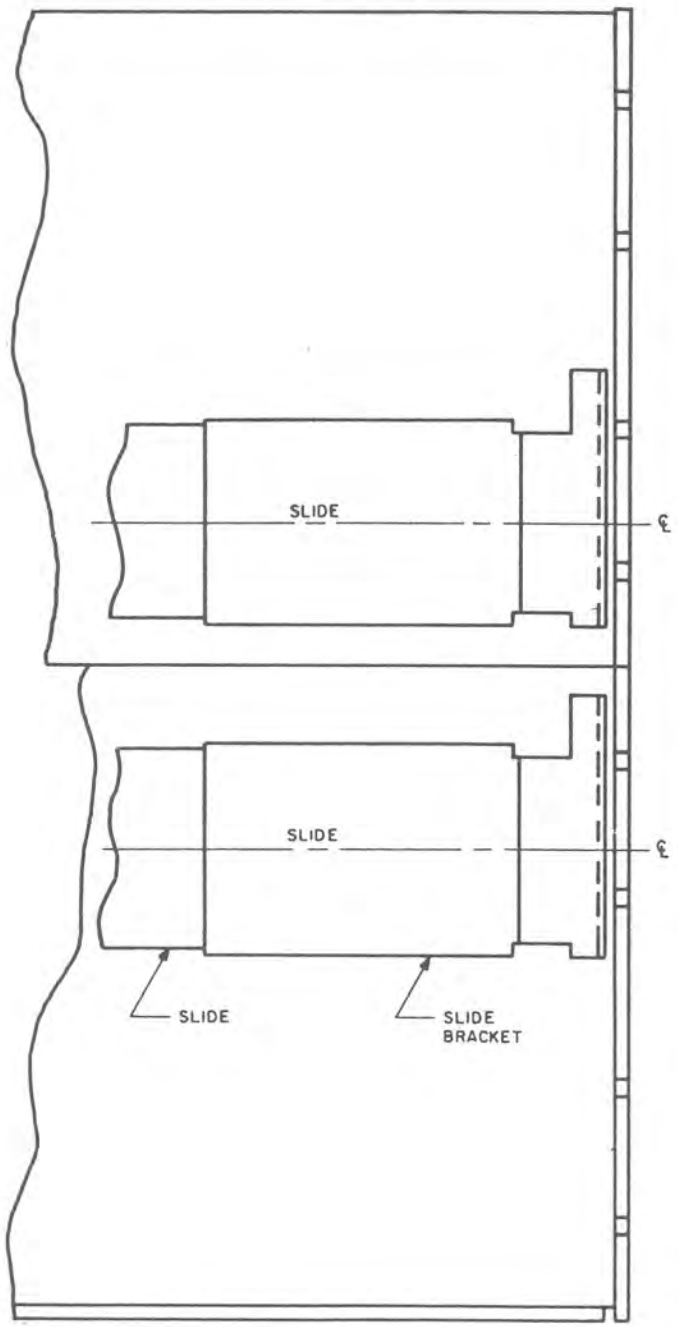
(1) SLIDE BRACKETS MOUNT TO REAR SURFACE OF FRONT CABINET RAILS AND FRONT SURFACE OF REAR RAILS.

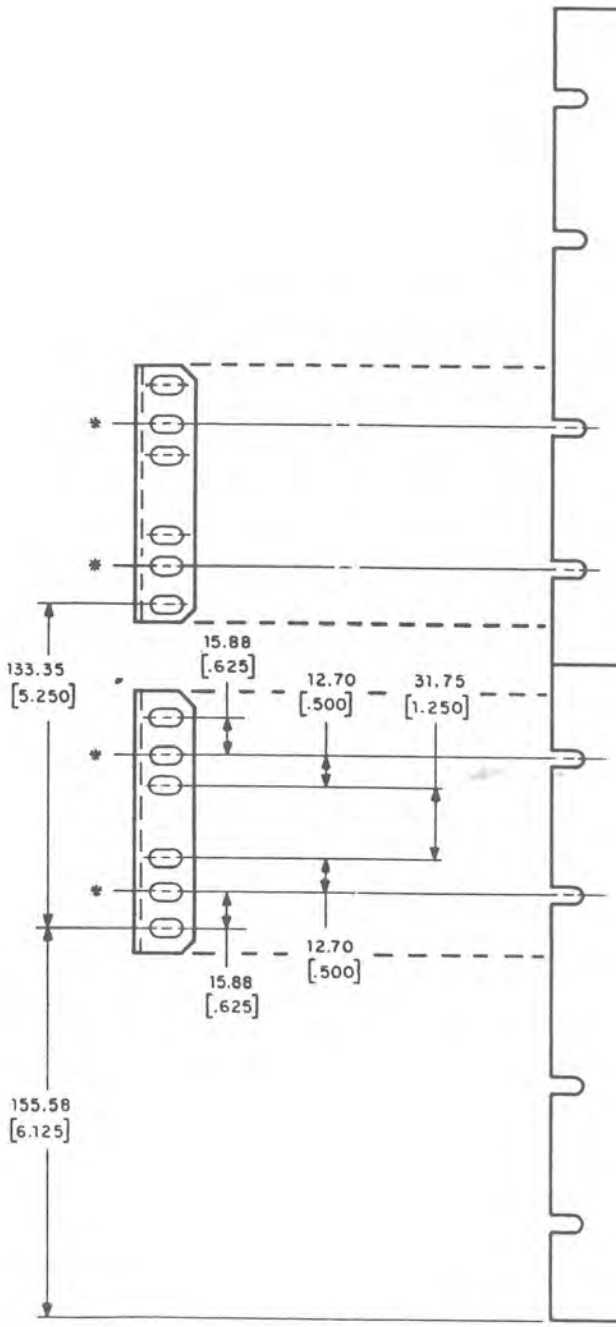
(2) a. FOR CABINETS WITH THREADED MOUNTING HOLES USE SCREWS AND FLAT WASHERS FROM BRACKET SIDE INTO CABINET. SCREW MUST NOT PROJECT BEYOND PANEL MOUNTING SURFACE.

b. FOR CABINETS WITH CLEARANCE HOLES IN THE RAILS, THE HOLES USED FOR MOUNTING THE SLIDE BRACKETS MUST BE COUNTERSUNK AND FLAT HEAD SCREWS USED FOR MOUNTING.

(3) DO NOT USE HOLES INDICATED * FOR ATTACHING SLIDES.

(4) DIMENSIONS ARE IN MILLIMETRES [INCHES]

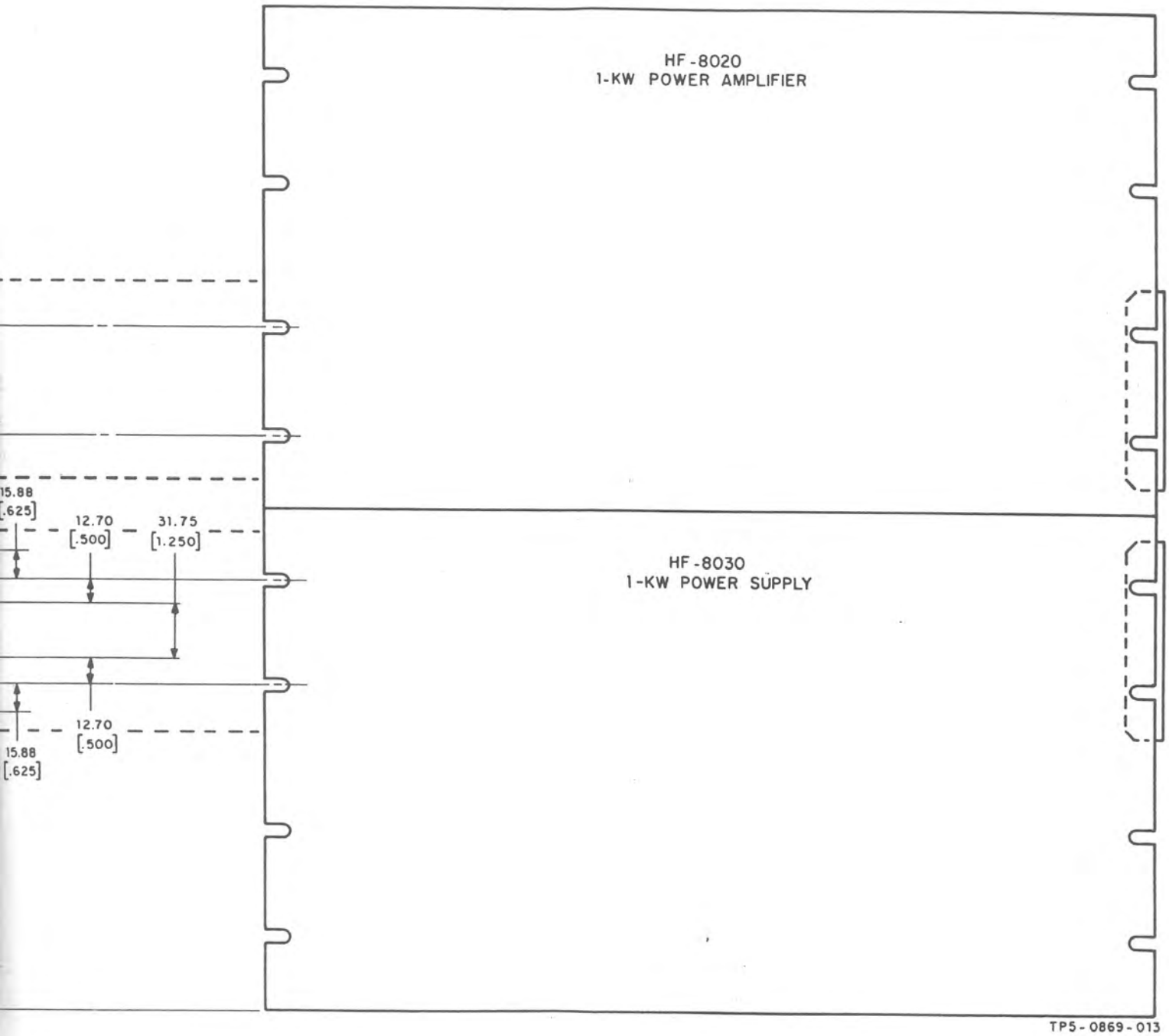




EAR RAILS.

ACKET

SLIDE



Installation of CA-8031 Slides in Rack Mounts
Figure 6

5. INSTALLATION PROCEDURES
5.2 Installation of Slide Mounts
5.2.2 Installation of CA-8031 Slide Mount Kit

WARNING

Use heavy equipment transport aids to install the HF-8030 in a rack or cabinet. Verify that the rack or cabinet is securely anchored before attempting installation of this unit.

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 centre 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.

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 extender centre section and slide the equipment completely into the equipment cabinet.

CAUTION

Use care when sliding the HF-8030 to the rear to prevent damage to the interconnecting cables.

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

5. INSTALLATION PROCEDURES
5.2 Installation of Slide Mounts
5.2.2 Installation of CA-8031 Slide Mount Kit

5.2.3 Installation of CA-8032 Slide Mount Kit

Refer to the appropriate outline and mounting dimension drawing for the equipment to be slide mounted (refer to the relevant equipment instruction book) and to the installation drawing of the CA-8032 (figure 7); then proceed as follows:

NOTE

Right and left refer to the sides of the equipment as viewed from the front panel.

a. Using two 0.190-32 x 3/8 button head screws, attach each inner slide channel to the sides of the equipment.

b. Using two 0.190-32 x 3/8 panhead screws, lockwashers, and nuts, attach an end (adapter) bracket to the rear ends of each outer slide channel.

NOTE

Mount the end brackets with the heads of the screws inserted in the slide outerchannel; then through the end brackets so that the lockwashers and nuts are outward away from the channel.

c. Fully extend the slide channels. Lift the equipment into position and square it properly with the equipment cabinet.

d. Using two panhead screws (10-32 UNF-2A x 1/2"), two lock washers (No.10), two flat washers (No.10) and two Hex. head nuts (10-32 UNF 1/8" x 3/8") secure the rear end bracket to the rear cabinet corner upright. The nuts should be on the internal side of the corner upright.

e. Using two panhead screws (10-32 UNF-2A x 1 1/8"), two lock washers (No.10), two flat washers (No.10), two Hex. head nuts (10-32 UNF x 1/8" x 3/8") and one spacer (CPN 646-6887-001) secure the bracket to the front cabinet corner upright. The spacer should be positioned between the upright and the bracket. The nuts should be on the internal side of the corner upright.

f. Refer to cabling paragraph and make the required cable connections to the equipment.

5. INSTALLATION PROCEDURES
5.2 Installation of Slide Mounts
5.2.3 Installation of CA-8032 Slide Mount Kit

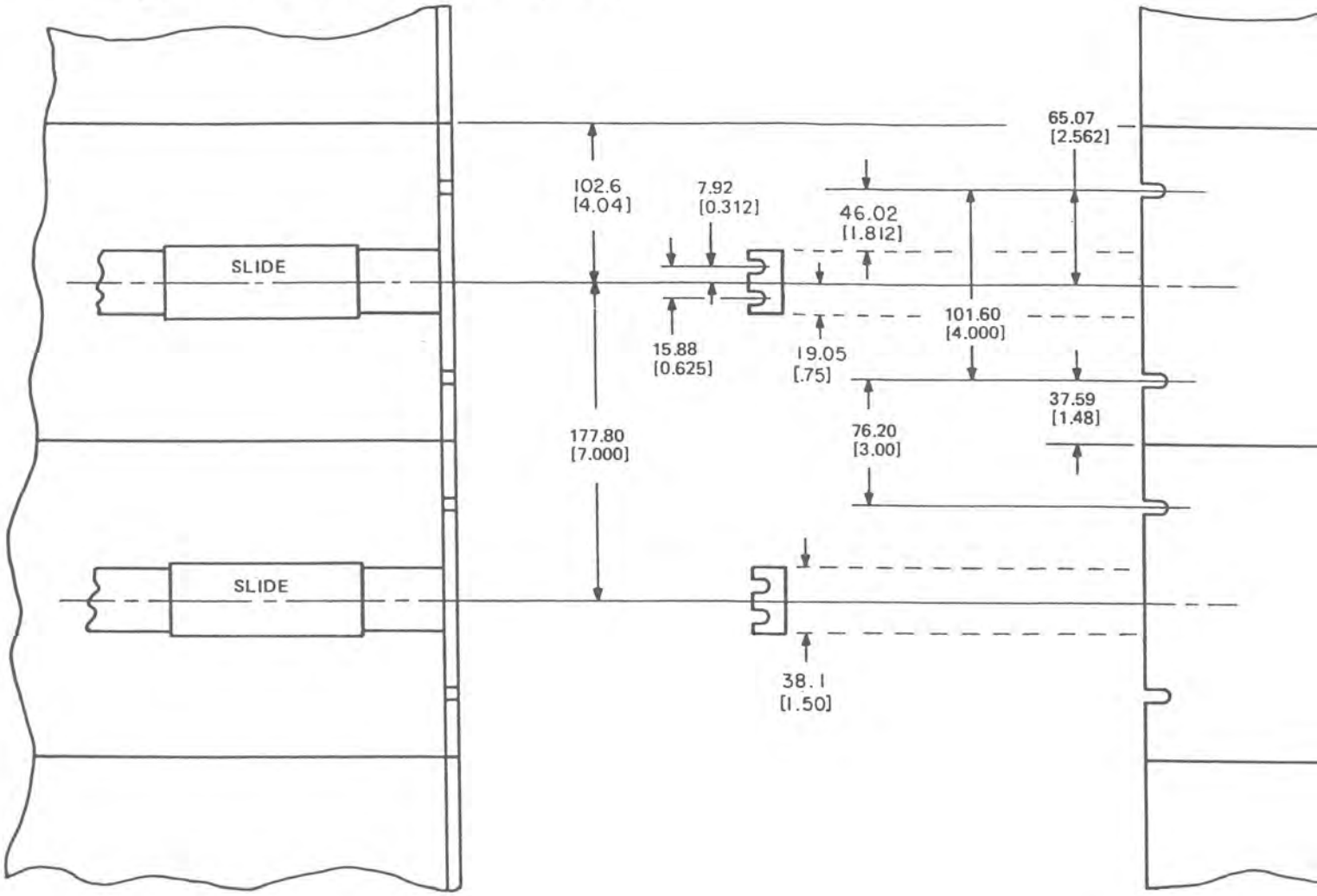
NOTES:

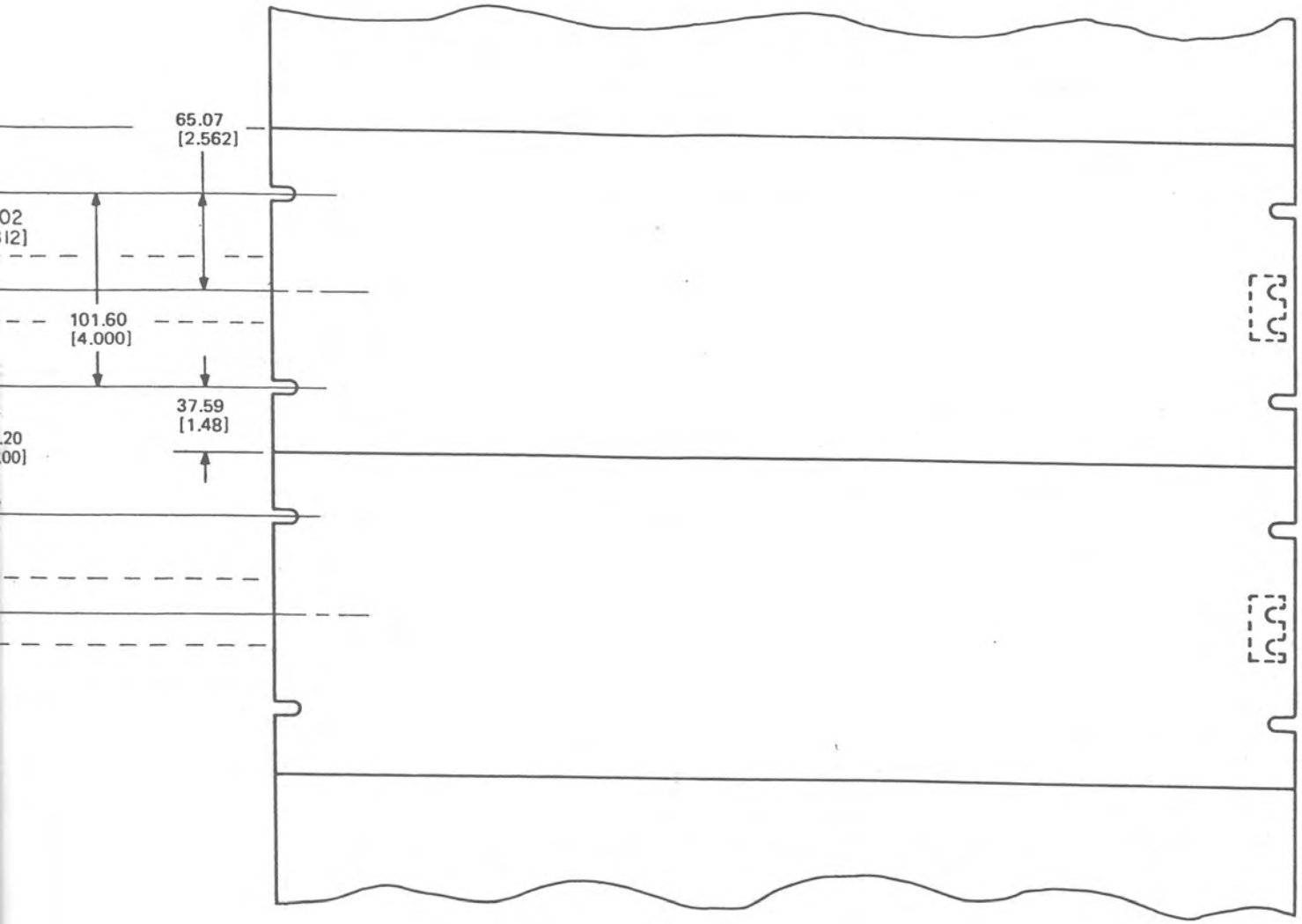
(1) SLIDE BRACKETS MOUNT TO REAR SURFACE OF FRONT CABINET RAILS AND FRONT SURFACE OF REAR RAILS.

(2) a. FOR CABINETS WITH THREADED MOUNTING HOLES USE SCREWS AND FLAT WASHERS FROM BRACKET SIDE INTO CABINET. SCREW MUST NOT PROJECT BEYOND PANEL MOUNTING SURFACE.

b. FOR CABINETS WITH CLEARANCE HOLES IN THE RAILS, THE HOLES USED FOR MOUNTING THE SLIDE BRACKETS MUST BE COUNTERSUNK AND FLAT HEAD SCREWS USED FOR MOUNTING.

(3) DIMENSIONS ARE IN MILLIMETRES [INCHES].





Installation of CA-8032 Slides in Rack Mounts
Figure 7

5. INSTALLATION PROCEDURES
5.2 Installation of Slide Mounts
5.2.3 Installation of CA-8032 Slide Mount Kit

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.

NOTE

Be sure that the ground point is free from paint and foreign material.

h. Press the lockout catch on the extended slide 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.

5.3 Mounting Data
5.3.1 HF-8014A Exciter

Refer to paragraph 5.2 and install the CA-8032 Slide Mounting Kit as indicated. Connect to associated equipment of the HF-8134A 1 kW Transmitter System and accessories as indicated in paragraph 4.

5.3.2 HF-8020 1kW Power Amplifier

NOTE

The HF-8030 1kW Power Supply should be installed prior to installing the HF-8020. Refer to paragraph 5.3.3.

WARNING

Do not connect facility power to the HF- 8030 1kW Power Supply until installation of the HF-8020 has been completed.

CAUTION

Ensure that HF-8020 has been strapped for identical primary power connections as the HF-8030 1kW Power Supply. Damage to the equipment can occur if the instructions of paragraph 3.2.1 are not followed.

Refer to paragraph 5.2 and install the CA-8031 Slide Mounting Kit as indicated.Connect the associated equipment of the HF-8134A 1kW Transmitter System and accessories as indicated in paragraph 4.

Connect a 25.4 mm (1 in) wide braided copper ground strap from the SAFETY GND connection on the rear of the HF-8020 to a suitable ground point on the equipment cabinet. Ensure that the cabinet ground point is free from paint and corrosion.

5. INSTALLATION PROCEDURES
5.3 Mounting Data
5.3.2 HF-8020 1kW Power Amplifier

CAUTION

Use care when sliding the HF-8020 to the rear of the cabinet to avoid damage to the interconnecting cables.

5.3.3 HF-8030 1kW Power Supply

WARNING

Do not connect facility power to the HF-8030 until installation of the HF-8020 1kW Power Amplifier has been completed.

CAUTION

Use heavy equipment transport aids to install the HF-8030 in a rack or cabinet.Verify that the rack or cabinet is securely anchored before attempting installation of this unit.

CAUTION

Ensure that the HF-8020 1kW Power Amplifier has been strapped for identical primary power connections as the HF-8030. Damage to the equipment can occur ifthe instructions of paragraph 3.2.1 are not followed.

Refer to paragraph 5.2 and install the CA-8031 Slide Mounting Kit as indicated.Connect the associated equipment of the HF-8134A 1kW Transmitter System and accessories as indicated in paragraph 4.

5.3.4 HF-8060 Preselector

Refer to paragraph 5.2 and install CA-8030 Slide Mount Kit (CPN 622-3418-001) as indicated.

CAUTION

The HF-8060 must be strapped for the system primary power source voltage. Set switches in accordance with paragraph 3.2.2 and figure 2.

Connect the associated equipment of the HF-8134A 1kW Transmitter System and associated accessories as indicated in paragraph 4.

5.3.5 HF-8093 Exciter Control

Refer to paragraph 5.2 and install the CA-8030 Slide Mounting Kit as indicated. Connect to associated equipment of the HF-8134A 1kW Transmitter System and accessories as indicated in paragraph 4.

6. POSTINSTALLATION CHECK/REQUIREMENTS

The following mechanical and electrical checks must be performed before placing the HF-8134A 1 kW Transmitter System into service.

6.1 Mechanical Checks

Perform the following mechanical checks before applying any power to the HF-8134A 1 kW Transmitter System.

a. Assure that all units are in place in the rack/cabinet(s) and that all attaching hardware is securely tightened.

b. Verify that all equipment/cabinet ground straps are properly installed and that all rack/cabinet and equipment grounds are bonded to a common earth ground.

c. Carefully perform a pin-to-pin and pin-to-ground check of each locally-fabricated multiconductor cable before connecting it to any equipment. Then verify that all interconnecting cables are properly connected between the individual system units and secure each in place. (Refer to the interconnection diagrams in applicable system book.

d. At HF-8020 and HF-8030, verify that the air filters are clean and properly installed.

e. At HF-8020 and HF-8030, verify that both inlet and outlet air openings are not obstructed.

f. At HF-8030, place MAIN POWER circuit creaker to OFF.

g. Verify all antenna connections are secure, including connections to the balun or other Antenna system equipment.

6.2 Electrical Checks

Perform the following electrical checks before applying any power to the HF-8134A 1kW Transmitter System.

CAUTION

Equipment damage can occur unless the primary input voltage selector switches and transformer straps in each equipment are set for the primary power source value in use.

a. Verify that all units are strapped for the primary power source voltage being used (see paragraph 3.2).

b. Verify that all serial interface,address, and external frequency standard straps are installed properly.

c. Verify that TS-8020 Maintenance Panel has been installed in HF-8020, verify the system is connected to dummy load or antenna, then set its control as follows:

6. POSTINSTALLATION CHECK/REQUIREMENTS

6.2 Electrical Checks

On HF-8014A Exciter, set the controls as follows:

1. KEY switch to NORM
2. PA PWR switch to OFF
3. PWR to off (press inward until switch is released and latched in the outward position.)
4. PILOT CARR switch to OFF
5. CHANNEL ENABLE switches to OFF
6. CONT switch to LCL
7. MODE switch to CW
8. FREQUENCY KHZ switches to 14 000.00

d. On the HF-8030 1 kW Power Supply, set MAIN POWER circuit breaker to OFF.

e. On the TS-8020 Maintenance Panel, set LOCAL/REMOTE switch to REMOTE.

f. On the HF-8060 Preselector, if used, set POWER switch to ON.

6.2.1 Preliminary Checks and Adjustments

6.2.1.1 Filament Voltage Checks

To perform the filament voltage check, proceed as follows:

a. On the HF-8030, set MAIN POWER circuit breaker to ON.

b. On the HF-8014A, set PWR switch to on (inward and latched), and PA PWR switch to STBY; then rotate one digit of the FREQUENCY KHZ switches and return it to 14 000.00.

6. POSTINSTALLATION CHECK/REQUIREMENTS
6.2 Electrical Checks
6.2.1 Preliminary Checks and Adjustments
6.2.1.1 Filament Voltage Checks

c. Permit the equipment to warm up for 25 minutes before proceeding.

d. On the HF-8030, set the meter selector switch to FIL V and observe that the front panel meter on the HF-8030 reads 5.9 +/- 0.2 V dc. (If reading is out of limits, refer to HF-8030 instruction book and add or bypass one or more of the resistors in the filament circuit.)

6.2.1.2 Bias Voltage Adjustment

To adjust the bias voltage, proceed as follows:

a. On the HF-8014A, set PA PWR switch to LOW PWR; then set KEY switch momentarily to LOCK. Observe that the power amplifier tunes.

b. On the HF-8014A, set MODE switch to ISB; then set CHANNEL ENABLE, A1/LINE/OFF switch to A1. Then set KEY switch to LOCK.

NOTE

Do not apply any audio to the microphone input.

c. On the HF-8030, place the meter selector switch to PLATE 1.

d. Wait 5 minutes before continuing these procedures.

e. Refer to figure 8. Adjust BIAS R31 control on subassembly A6 for a meter reading of 300 mA on the HF-8030 front panel meter.

f. On the HF-8014A, set KEY switch to NORM and return MODE switch to CW.

6.2.2 Low-Power Adjustments

To perform the low-power adjustments, proceed as follows:

6. POSTINSTALLATION CHECK/REQUIREMENTS

6.2 Electrical Checks

6.2.2 Low-Power Adjustments

a. On the TS-8020 Maintenance Panel, set the controls as follows:

1. LOCAL/REMOTE switch to LOCAL
2. MNL/AUTO switch to MNL
3. MANUAL CONTROL, TUNE switch to ON
4. MANUAL CONTROL, LOAD switch to ON
5. MANUAL CONTROL, BDSW switch to ON
6. PWR switch to L
7. FIL switch to ON
8. HV switch to ON
9. KEY switch to NORM
10. FREQ MHZ switches to 14

b. On HF-8014A, set the KEY switch to LOCK.

c. On TS-8020, press TUNE START ADV pushbutton until TUNE STEP 5 lamp lights.

NOTE

When pressing the TUNE START ADV push- button, permit servos to halt at each step before pressing to advance the cycle to the next tune step digit.

d. On the HF-8030, set meter-selector switch to FWD PWR (1.5 kW).

e. Refer to figure 8. Adjust TUNE PWR R22 control on subassembly A6 for 220 watts on the HF-8030 front panel meter.

f. On the TS-8020,press TUNE STEP ADV pushbutton once, and observe that TUNE STEP 6 lamp lights. Refer to figure 13. Adjust L TGC R9 control on subassembly A6 for 250 watts or to one half desired operating power (300 to 700 watts) on the HF-8030 front panel meter.

g. On the TS-8020, press TUNE STEP ADV pushbutton once, and observe that TUNE STEP 7 lamp lights. Note that the READY lamp on the HF-8020 front panel also lights.

h. On the HF-8020, adjust L ALC R17 control on subassembly A6 for 500 watts or desired operating power on the HF-8030 front panel meter.

i. On the TS-8020, set KEY switch to OFF; then on HF-8014A, return KEY switch to NORM.

6. POSTINSTALLATION CHECK/REQUIREMENTS
6.2 Electrical Checks
6.2.3 High-Power Adjustments

To perform the high-power adjustments, proceed as follows:

a. Verify that the switches on TS-8020 Maintenance Panel are set to the positions shown in step a of paragraph 6.2.2 except set PWR switch to H. If the TUNE START 1 lamp is not lit, press TUNE START ADV pushbutton to return it there.

b. On HF-8014A, set KEY switch to LOCK.

c. On the HF-8020, set KEY switch to ON; then on the TS-8020, press TUNE START ADV pushbutton until TUNE STEP 6 lamp lights.

NOTE

When pressing the TUNE START ADV pushbutton permit servos to halt at each step before pressing to advance the cycle to the next tune step digit.

d. Refer to figure 8. Adjust H TGC R6 control on subassembly A6 for 500 watts on the HF-8030 front panel meter.

e. On the TS-8020, press TUNE START ADV pushbutton once, and observe that TUNE START 7 lamp on the TS-8020 and the READY lamp on the front panel of the HF-8020 both light.

f. Refer to figure 8. Adjust H ALC R14 control on subassembly A6 for 800 to 900 watts at 1.6 MHz and set ADL if at 8.0 MHz for 1.05 kW on the HF-8030 front panel meter.

g. On the TS-8020, set the KEY switch to OFF; then on the HF-8014A, set KEY switch to NORM.

h. On the TS-8020, return the LOCAL/REMOTE switch to REMOTE.

6.2.4 Voice Tests

To perform the voice tests, proceed as follows;

a. On the HF-8014A, set the FREQUENCY KHZ switches to 15 500.00. On the HF-8014A, set MODE switch to ISB, then set CHANNEL ENABLE A1/LINE/OFF switch to A1; then set KEY switch to NORM and PA PWR switch to LOW PWR.

b. Connect a microphone to the remote control unit at MIC jack, and set MIC switch to CH A.

c. Momentarily press the microphone push-to-talk (ptt) switch and observe that the HF-8020 tunes.

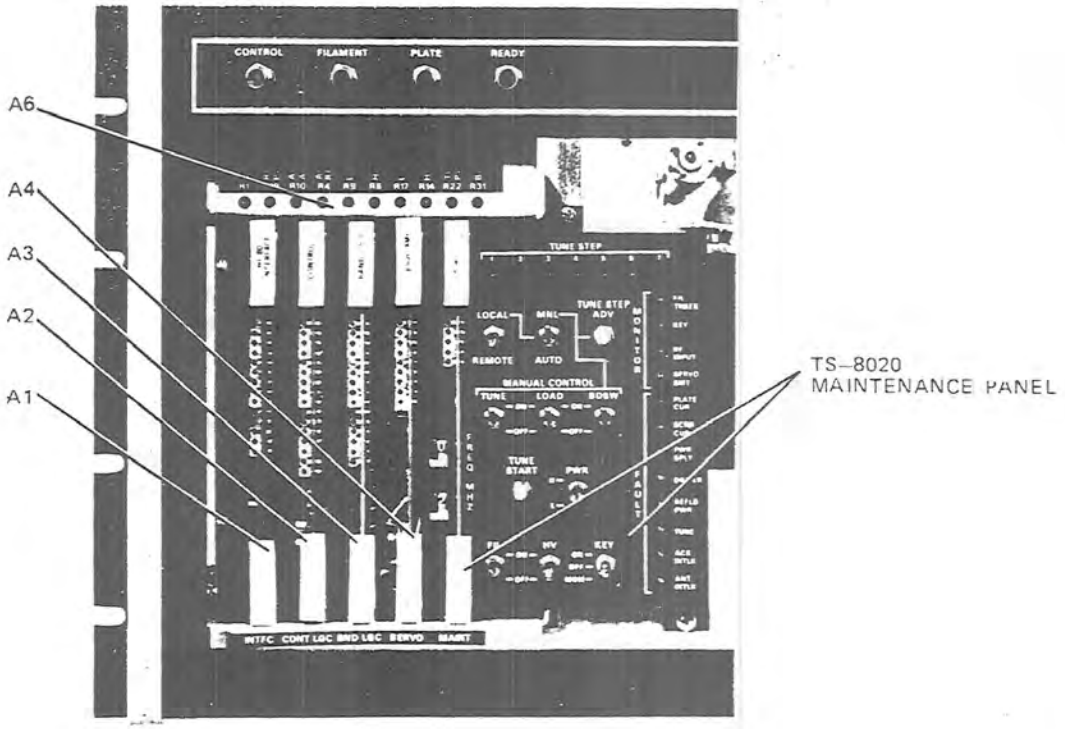
d. Press the microphone ptt switch and speak into the microphone. On HF-8014A observe that RF OUT lamp lights and on the HF-8030 that the front panel meter indicates output power. Release the

microphone ptt switch.

e. On HF-8014A, set PA PWR switch to HIGH PWR and observe that TUNE STEP 1 lamp on the TS-8020 Maintenance Panel is lit.

f. On the HF-8014A, set the PA PWR switch to OFF; then set PWR switch to OFF.

g. On the HF-8030, set MAIN POWER circuit breaker to OFF.



Plug-in Circuit Card, TS-8020 Maintenance Panel, Test Point Locations
Figure 8

1-kW TRANSMITTER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

OPERATION

Printed in Australia

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1 October, 1981

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1. GENERAL.

The HF-8134A 1-kW Transmitter System provides 1-kW pep or average output power in the 1.6000- to 29.9999-MHz frequency range in 100-Hz steps. The transmitter may be operated in the low power mode, where the output may be adjusted from 300 to 700 watts. Emission modes include independent sideband (ISB) (including UUSB, USB, LSB, LLSB), amplitude modulation equivalent (AME), and continuous wave (CW).

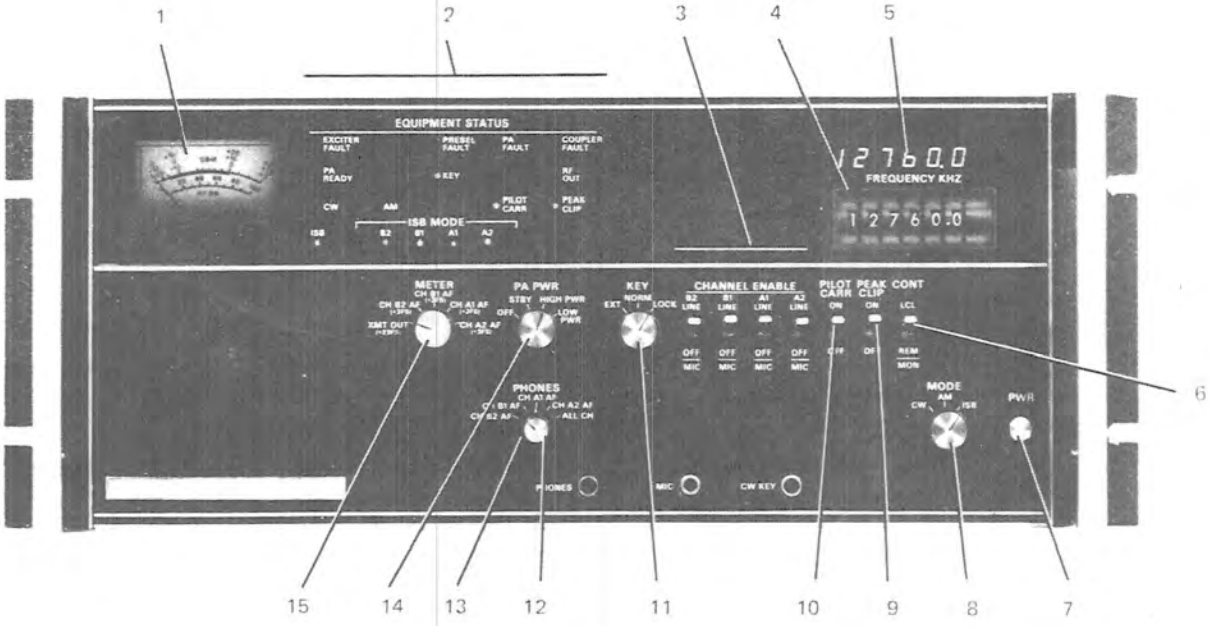
WARNING

The HF-8134A 1 kW Transmitter System 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 the U.S. Occupational Safety and Health Administration (OSHA) recommended maximum limits.

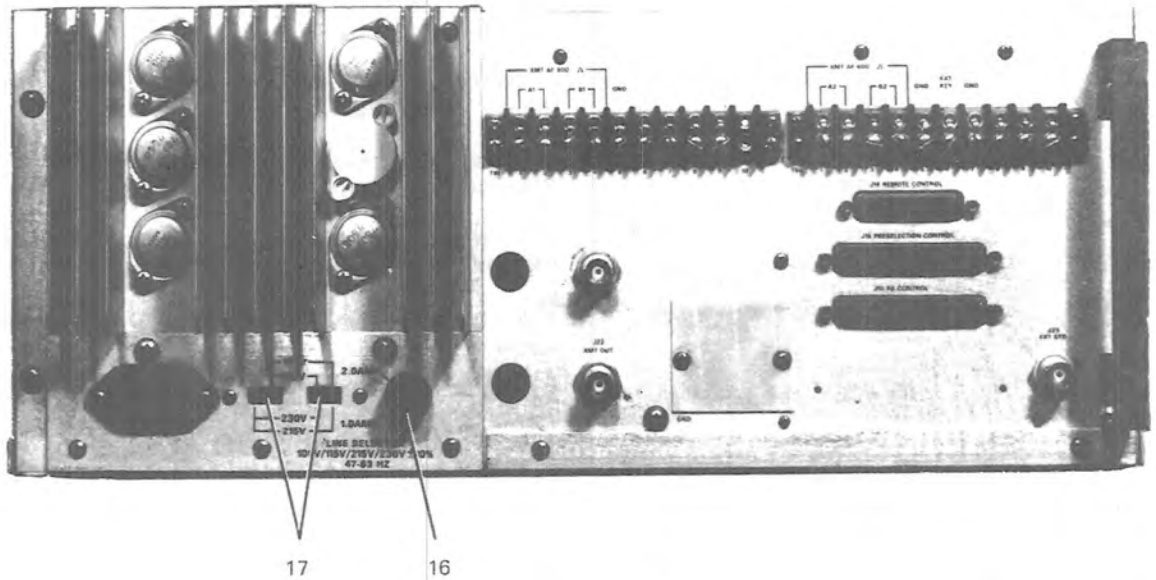
2. CONTROLS AND INDICATORS

Figures 1 to 7 and associated tables show the location of controls and indicators together with the function of each for the equipments in the HF-80 1 kW Transmitter Systems.

2. CONTROLS AND INDICATORS



FRONT PANEL



REAR PANEL

TPA-2783-017

HF-8014/8014A Exciter, Controls and Indicators
Figure 1

2. CONTROLS AND INDICATORS

Table 1. HF-8014/8014A, Control and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Meter M1	Indicates levels as selected by meter switch A2A2S1.
2	EQUIPMENT STATUS indicators (color)	
	RF OUT A2A1DS1 (yellow)	Indicates that the associated pa has an rf output. Illuminated by sidetone enable signal supplied from the associated pa.
	PA READY A2A1DS2 (yellow)	Indicates the associated pa is ready for rf transmission. Illuminated by the pa ready signal from the associated pa.
	PA FAULT A2A1DS3 (red)	Indicates pa fault. Illuminated by the pa fault signal from the associated pa.
	KEY A2A1DS4 (yellow)	Indicates key signal applied to exciter key circuits.
	EXCITER FAULT A2A1DS5 (red)	Indicates power supply voltage is low or synthesizer has a fault. Illuminated by power supply fault signal supplied by power supply module A1 or synthesizer voltage regulator A14. Synthesizer fault signal is summary of all synthesizer loss-of-lock signals supplied by A16 through A22.
	COUPLER FAULT A2A1DS8 (red)	Indicates a coupler fault. Illuminated by a coupler fault signal from the coupler.
	AM A2A1DS9 (yellow)	Indicates AM mode has been selected. Illuminated by the AM enable signal.
	CW A2A1DS10 (yellow)	Indicates CW mode has been selected. Illuminated by the CW enable signal.
	PEAK CLIP A2A1DS11 (yellow)	Indicates the if peak clipper circuit is enabled. Illuminated by the peak clipper enable signal.
	PILOT CARR A2A1DS13 (yellow)	Indicates the pilot carrier is enabled. Illuminated by the pilot carrier enable signal.
	ISB A2A1DS14 (yellow)	Indicates ISB mode has been selected. Illuminated by the ISB enable signal.
	B1 A2A1DS15 (yellow)	Indicates channel B1 has been connected to LINE or MIC. ISB mode must be selected.
	A1 A2A1DS16 (yellow)	Indicates channel A1 has been connected to LINE or MIC. ISB mode must be selected.
	B2 A2A1DS18 (yellow)	Indicates channel B2 has been connected to LINE or MIC. ISB mode must be selected.
	A2 A2A1DS19 (yellow)	Indicates channel A2 has been connected to LINE or MIC. ISB mode must be selected.
	PRESEL FAULT A2A1DS23 (red)	Indicates a preselector fault. Illuminated by a preselector fault signal from the associated preselector.

2. CONTROLS AND INDICATORS

Table 1. HF-8014/8014A, Control and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
3	CHANNEL ENABLE switches A2A2S4 thru A2A2S7	Three position switches that select the source of the transmit audio signal for the individual transmit audio channels. a. B2 LINE OFF MIC switch A2A2S4 selects microphone input (MIC), line audio input (LINE) or inhibits channel B2 (OFF). When MIC position is selected, the channel B2 audio line input is inhibited. b. B1 LINE OFF MIC switch A2A2S5 selects microphone input (MIC), line audio input (LINE), or inhibits channel B1 (OFF). When MIC position is selected, the channel B1 audio line input is inhibited. c. A1 LINE OFF MIC switch A2A2S6 selects microphone input (MIC) line audio input (LINE), or inhibits channel A1 (OFF). When MIC position is selected, the channel A1 audio line input is inhibited. d. A2 LINE OFF MIC switch A2A2S7 selects microphone input (MIC) line audio input (LINE), or inhibits channel A2 (OFF). When MIC position is selected, the channel A2 audio line input is inhibited.
4	FREQUENCY KHZ controls S17A through S17G	Set bcd frequency control signal for frequency as indicated by thumb-wheel display. a. S17A selects tens megahertz. b. S17B selects ones megahertz. c. S17C selects hundreds kilohertz. d. S17D selects tens kilohertz. e. S17E selects ones kilohertz. f. S17F selects hundreds hertz. g. S17G selects tens hertz (optional).
5	Frequency display	Displays the operating frequency of the exciter in both local and remote modes. (Applicable only to exciters with the AC-8014 Frequency Display option).
6 (Cont)	CONT switch A2A2S12	Selects the use and method of controlling the HF-8014A. a. LCL position allows unit to be controlled locally. (HF-8014 must be kept in LCL position for operation.)

2. CONTROLS AND INDICATORS

Table 1. HF-8014/8014A, Control and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
6 (Cont)		b. REM position allows unit to be controlled remotely. REM position disables local control of mode, frequency, pilot carrier, peak clip, pa power, and key signals. Local audio controls, signals, and monitors remain enabled. c. MON position is a momentary position that enables local controls and sets the monitor bit (word 4, character 5, bit 1) of the exciter control monitor response. This may be used, for example, to command a processor control to modify a stored preset table of operating frequency and mode information to that set on the local controls.
7	PWR switch S15	Set power on/off. When pressed and latched (inward position), power is applied to the HF-8014/8014A. When pressed and unlatched (outward position), power is removed from HF-8014/8014A.
8	MODE switch A2A2S10	Selects the HF-8014/8014A operating mode and bandwidth. a. CW position selects CW mode and if attenuator pad (16-kHz bandwidth). b. AM position selects AM mode and channel A1 bandpass filter (2.85-kHz bandwidth). c. ISB position selects ISB mode and UUSB, USB, LLSB, and LSB bandpass filters (2.85-kHz bandwidth filters).
9	PEAK CLIP switch A2A2S9	Controls the if amplifier peak clipper. In the ON position, peak clipper circuit is enabled. In the OFF position, the peak clipper circuit is disabled.
10	PILOT CARR switch A2A2S8	Controls pilot carrier enable signal. In the ON position, pilot carrier is enabled. In the OFF position, the pilot carrier is disabled.
11	KEY switch A2A2S3	Selects the method for applying a key signal. a. EXT position allows an external key (ground or +6 V dc) to be applied at the EXT KEY or EXT KEY (+6 V) terminals on the HF-8014/8014A rear panel. b. NORM position allows an external key (ground) to be applied at CW KEY jack J1 or MIC jack J3 on the HF-8014/8014A front panel. c. LOCK position applies a fixed local key signal.
12	PHONES ( ) level control R13	Controls headphone volume; full clockwise equals maximum volume.

2. CONTROLS AND INDICATORS

Table 1. HF-8014/8014A, Control and Indicators (Cont).

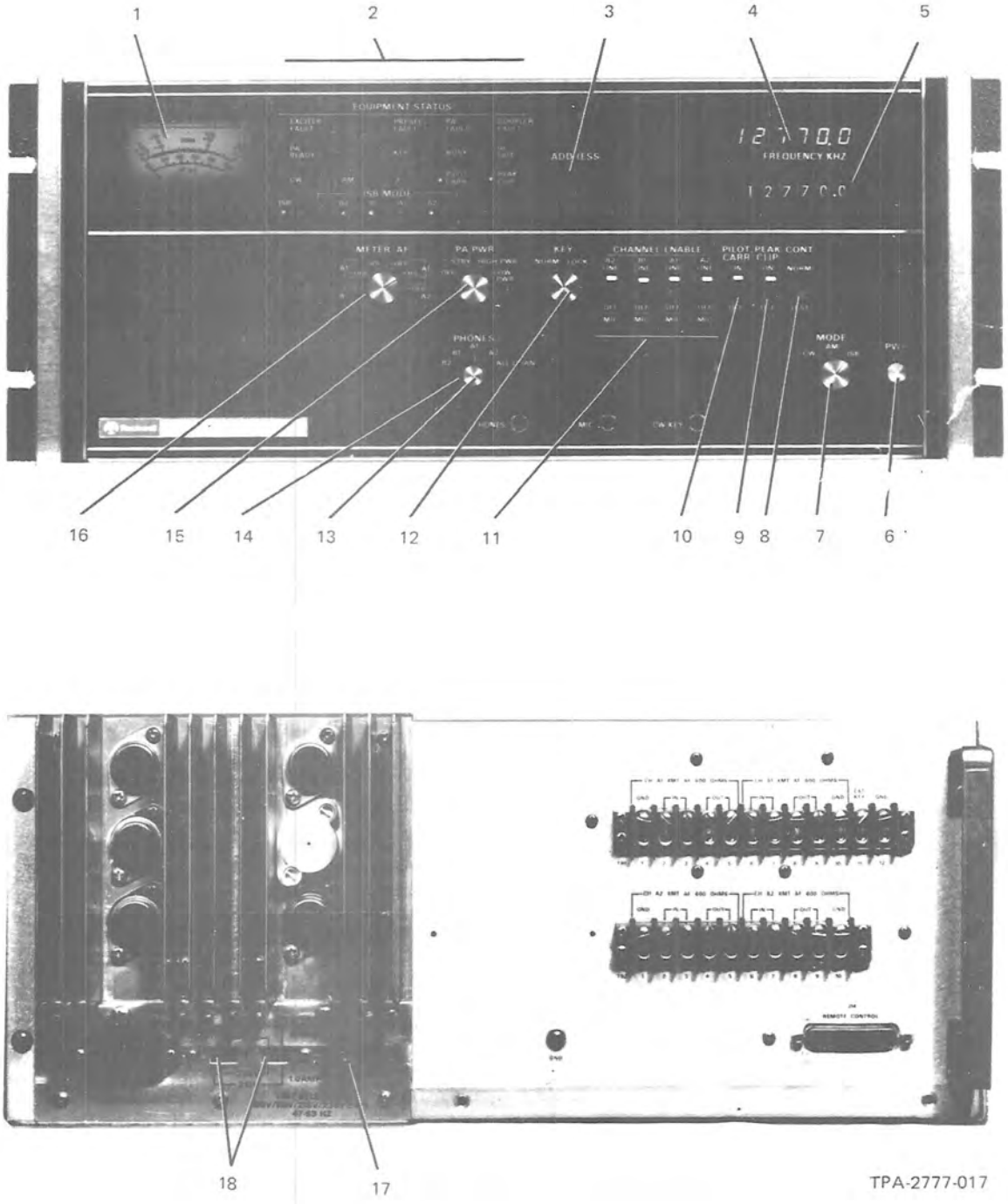
FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
13	PHONES switch S11	Selects audio to be monitored at PHONES jack J2 on the HF-8014/8014A front panel. a. CH B2 AF position selects channel B2 transmit audio. b. CH B1 AF position selects channel B1 transmit audio. c. CH A1 AF position selects channel A1 transmit audio. d. CH A2 AF position selects channel A2 transmit audio. e. ALL CH position selects all four channels simultaneously.
14	PA PWR switch A2A2S2	Selects pa power control as indicated: a. OFF position disables power in associated power amplifier. b. STBY (standby) position enables low-voltage circuits in the associated power amplifier. (Power amplifier cannot be keyed in this position.) c. HIGH PWR position enables low-voltage and high-voltage circuits in the associated power amplifier and allows high-power transmissions from the power amplifier when it is keyed. d. LOW PWR position enables low-voltage and high-voltage circuits in the associated power amplifier and signals the power amplifier to operate in the low-power mode when keyed.
15 (Cont)	METER switch A2A2S1	Selects signal levels to be measured by meter M1. Selectable positions are as follows: a. XMT OUT (+23FS) position monitors transmit rf signal output from exciter (indicates +23 dB mW full scale). b. CH B2 AF (+3FS) position monitors channel B2 transmit audio (indicates if channel B2 transmit audio is in compression range, black segment on meter). c. CH B1 AF (+3FS) position monitors channel B1 transmit audio (indicates if channel B1 transmit audio is in compression range, black segment on meter). d. CH A1 AF (+3FS) position monitors channel A1 transmit audio (indicates if channel A1 transmit audio is in compression range, black segment on meter).

2. CONTROLS AND INDICATORS

Table 1. HF-8014/8014A, Control and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
15 (Cont)		e. CH A2 AF (+3FS) position monitors channel A2 transmit audio (indicates if channel A2 transmit audio is in compression range, black segment on meter).
16	Fuse F1 (located on rear panel)	Main line fuse. 2-ampere rated fuse for 100/115-V ac operation and 1-ampere rated fuse for 215/230-V ac operation (slow blow).
17	Power selection switches S1A and S1B (located on rear panel)	Control input power strapping or power transformer in power supply. a. 100 V position, power transformer strapped for 100-V ac operation. b. 115 V position, power transformer strapped for 115-V ac operation. c. 215 V position, power transformer strapped for 215-V ac operation. d. 230 V position, power transformer strapped for 230-V ac operation.

2. CONTROLS AND INDICATORS



HF-8093 Exciter Control - Controls and Indicators
Figure 2

2. CONTROLS AND INDICATORS

Table 2. HF-8093 Controls and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Meter M1	Indicates levels as selected by meter switch A2A2S1.
2	EQUIPMENT STATUS indicators	
	RF OUT A2A1DS1	Indicates that associated pa has an rf output. Indicated by sidetone enable signal supplied from associated pa.
	PA READY A2A1DS2	Indicates pa ready for rf transmission. Indicated by pa ready signal supplied from associated pa.
	PA FAULT A2A1DS3	Indicates pa fault. Indicated by pa fault signal supplied from associated pa.
	KEY A2A1DS4	Indicates key applied to internal circuits of exciter and to external system key line.
	EXCITER FAULT A2A1DS5	Indicates a fault condition exists in the addressed remote exciter.
	COUPLER FAULT A2A1DS8	Indicates a coupler fault. Indicated by a coupler fault signal supplied from associated coupler.
	AM A2A1DS9	Indicates that associated exciter has the AM operating mode selected.
	CW A2A1DS10	Indicates that associated exciter has the CW operating mode selected.
	PEAK CLIP A2A1DS11	Indicates that associated exciter has the peak clipper circuit enabled.
	PILOT CARR A2A1DS13	Indicates that associated exciter has the pilot carrier enabled.
	ISB A2A1DS14	Indicates that associated exciter has the ISB operating mode selected.
	B1 A2A1DS15	Indicates that associated exciter has channel B1 enabled.
	A1 A2A1DS16	Indicates that associated exciter has channel A1 enabled.
	B2 A2A1DS18	Indicates that associated exciter has channel B2 enabled.
	A2 A2A1DS19	Indicates that associated exciter has channel A2 enabled.
	BUSY A2A1DS22	Indicates that addressed exciter is in local mode.
	PRESEL FAULT A2A1DS23	Indicates a preselector fault. Indicated by a preselector fault signal from associated preselector.
3	ADDRESS switch A2A6	Sets binary address to the complement of the address indicated by thumb-wheel display (0 through 15). Exciter with associated address strapping is the unit under control.

2. CONTROLS AND INDICATORS

Table 2 HF-8093 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
4	Frequency kHz displays A2A5U20 through A2A5U26	Display operating frequency of addressed exciter (with CONT switch in NORM position) or setting of FREQUENCY KHZ front panel controls (with CONT switch in TEST position). These are 7-bar digital displays. a. A2A5U20 displays tens megahertz. b. A2A5U21 displays ones megahertz. c. A2A5U22 displays hundreds kilohertz. d. A2A5U23 displays tens kilohertz. e. A2A5U24 displays ones kilohertz. f. A2A5U25 displays hundreds hertz. g. A2A5U26 displays tens hertz (optional).
5	FREQUENCY KHZ controls S17A through S17G	Set bcd frequency control signal for frequency as indicated by thumb-wheel display. a. S17A selects tens megahertz. b. S17B selects ones megahertz. c. S17C selects hundreds kilohertz. d. S17D selects tens kilohertz. e. S17E selects ones kilohertz. f. S17F selects hundreds hertz. g. S17G selects tens hertz (optional).
6	PWR switch S15	Sets power on/off. When pressed and latched (inward position), power is applied to HF-8093. When pressed and unlatched (outward position), power is removed from HF-8093.
7	MODE switch A2A2S10	Selects HF-8093 operation mode. a. CW position selects CW mode. b. AM position selects AM mode. c. ISB (independent sideband) position selects ISB mode.
8	CONT switch A2A2S12	Selects use and method of controlling the exciter. a. NORM position allows the exciter control to control an addressed exciter (addressed exciter must be in the remote mode). b. TEST position is a self-test position and allows the exciter control to test its operation internally.

2. CONTROLS AND INDICATORS

Table 2 HF-8093 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
9	PEAK CLIP switch A2A2S9	In the ON position, peak clipper is enabled. In the OFF position, peak clipper is disabled.
10	PILOT CARR switch A2A2S8	Controls pilot carrier enable signal. In the ON position, pilot carrier is enabled. In the OFF position, pilot carrier is disabled.
11	CHANNEL ENABLE switches	Select the corresponding audio channel inputs when the MODE switch A2A2S10 is in the ISB position. a. B2 (LLSB) switch A2A2S4 selects either LINE, OFF, or MIC. In LINE position, selects the rear panel line audio input. In MIC position, selects the front panel microphone input. In OFF position, disables the audio inputs. b. B1 (LSB) switch A2A2S5 selects either LINE, OFF, or MIC. In LINE, selects the rear panel line audio input. In MIC position, selects the front panel microphone input. In OFF position, disables the audio inputs. c. A1 (USB) switch A2A2S6 selects either LINE, OFF, or MIC. In LINE position, selects the rear panel line audio input. In MIC position, selects the front panel microphone input. In OFF position, disables the audio inputs. d. A2 (UUSB) switch A2A2S7 selects either LINE, OFF, or MIC. In LINE position, selects the rear panel line audio input. In MIC position, selects the front panel microphone input. In OFF position, disables the audio inputs.
12	KEY switch A2A2S3	Selects the method for applying a key signal. a. NORM position allows a local key (ground) to be applied at CW KEY jack J1 or MIC jack J3 on the HF-8093 front panel or at the EXT KEY terminal on the HF-8093 rear panel. b. LOCK position applies a fixed local key signal.
13 (Cont)	PHONES switch S11 ( )	Selects audio to be monitored at PHONES jack J2 on the HF-8093 front panel. a. B2 position selects channel B2 transmit audio output. b. B1 position selects channel B1 transmit audio output. c. A1 position selects channel A1 transmit audio output. d. A2 position selects channel A2 transmit audio output.

2. CONTROLS AND INDICATORS

Table 2 HF-8093 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
13 (Cont)		e. ALL CHAN position selects all four (A1, A2, B1, B2) channels transmit audio output.
14	PHONES ( ) level control R13	Controls headphones volume, full clockwise equals maximum volume.
15	PA PWR switch A2A2S2	Selects pa power control as indicated in the following switch positions: a. OFF position disables power in associated power amplifier. b. STBY (standby) position enables low-voltage circuit in the associated power amplifier. (Power amplifier cannot be keyed in this position.) c. HIGH PWR position enables low-voltage and high-voltage circuits in the associated power amplifier and allows high-power transmissions from the power amplifier when it is keyed. d. LOW PWR position enables low-voltage and high-voltage circuits in the associated power amplifier and signals the power amplifier to operate in low-power mode when it is keyed.
16	METER switch A2A2S1	Selects signal levels to be measured by meter M1. Selectable METER (AF) positions are as follows: a. B2 +13 FS, position monitors channel B2 transmit audio, +13 dB mW full-scale. b. B2 +3FS, position monitors channel B2 transmit audio, +3 dB mW full-scale. c. B1 +13FS, position monitors channel B1 transmit audio, +13 dB mW full-scale. d. B1 +3FS position monitors channel B1 transmit audio, +3 dB mW full-scale. e. A1 +13FS, position monitors channel A1 transmit audio, +13 dB mW full-scale. f. A1 +3FS, position monitors channel A1 transmit audio, +3 dB mW full-scale. g. A2 +13FS, position monitors channel A2 transmit audio, +13 dB mW full-scale. h. A2 +3FS position monitors channel A2 transmit audio, +3 dB mW full-scale.
Not shown (located in lower left-hand corner facing rear panel) (Cont)	Power selection switches S2A and S2B (located on rear panel)	Control input power strapping of power transformer in power supply. a. 100 position, power transformer strapped for 100-V ac operation.

2. CONTROLS AND INDICATORS

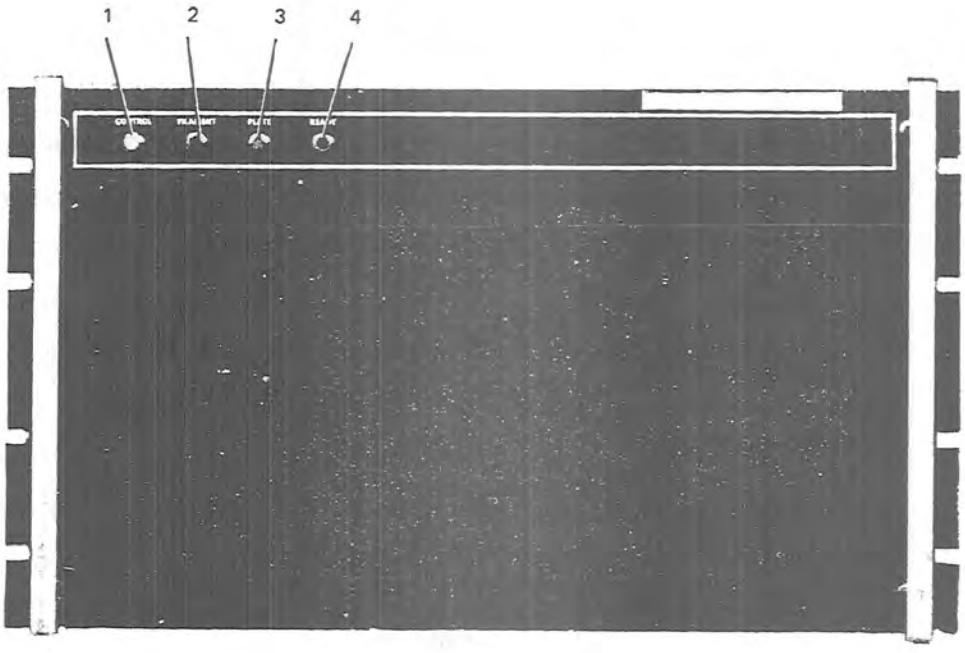
Table 2. HF-8093 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
(Cont)		b. 115 position, power transformer strapped for 115-V ac operation. c. 215 position, power transformer strapped for 215-V ac operation. d. 230 position, power transformer strapped for 230-V ac operation.
Not shown (located in lower left-hand corner facing rear panel)	Fuse F1 (located on rear panel)	Fuse in power line. 2 amperes used for 100/115-V ac operation, 1 ampere used for 215/230-V ac operation (slow blow).

2. CONTROLS AND INDICATORS

Table 3 HF-8020 Controls and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	CONTROL indicator DS1 (amber)	Indicates that low-voltage dc (control has been applied to the HF-8020.
2	FILAMENT indicator DS2 (green)	Indicates that ac filament and ac blower motor voltages have been applied to the HF-8020.
3	PLATE indicator DS3 (red)	Indicates that +2900-V dc plate and +225-V dc screen voltages have been applied to power amplifier tube V1 in the HF-8020. There is a 3-minute time delay from the time that low-voltage is applied until the plate voltage can be applied.
4	READY indicator DS4 (blue)	Indicates that the HF-8020 has completed the tune cycle and is ready for operation.



TP5-0506-017

HF-8020 1-kW Power Amplifier, Controls and Indicators
Figure 3

2. CONTROLS AND INDICATORS

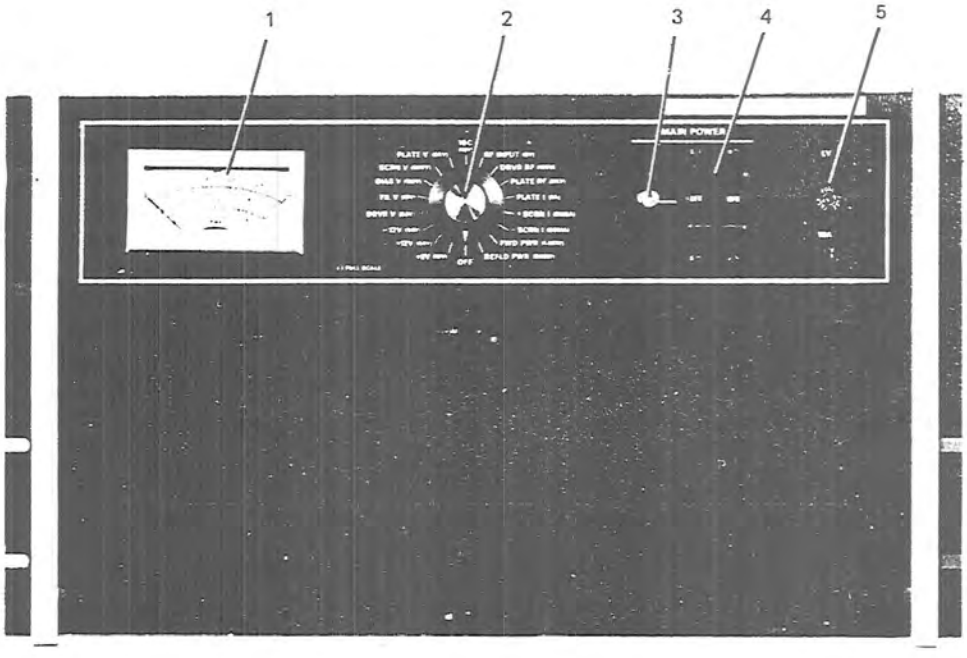
Table 4. HF-8030 Controls and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	METER	
	Ranges	
	V/I (0-1, 0-5)	Two ranges used to monitor all voltage and current readings.
	PWR (0-1.5, 0-5)	Two ranges used to monitor forward and reflected power.
2	METER SELECT	An 18-position switch used to select the power supply and rf power amplifier analogs to be monitored.
	Positions	Meter indicates:
	OFF	Meter shorted.
	+5V (10V)	+5-V dc output of HF-8030
	+12V (50V)	+12-V dc output of HF-8030
	-12V (50V)	-12-V dc output of HF-8030
	DRVR V (50V)	Driver voltage (V dc) output of HF-8030
	FIL V (10V)	Analog of pa filament (V ac) voltage
	BIAS V (100V)	Pa bias voltage output (V dc) of HF-8030
	SCRN V (500V)	Pa screen voltage output (V dc) of HF-8030
	PLATE V (5 KV)	Output of high-voltage supply (V dc) section of HF-8030
	IGC (10V)	Internal gain control voltage (V dc) from rf pa
	RF INPUT (5V)	Analog of rf voltage input to pa driver amplifier
	DRVR INPUT (100V)	Analog of driver rf input to pa final amplifier
	PLATE RF (5 KV)	Rf voltage in pa final amplifier plate circuit
	PLATE I (1A)	Plate current of pa final amplifier
	+SCRN I (50 MA)	Positive screen current from pa final amplifier
	-SCRN I (50 MA)	Negative screen current from pa final amplifier
	FWD PWR (1.5 KW)	Analog of forward rf power output from pa
	REFLD PWR (500 W)	Analog of reflected rf power at output of pa final amplifier
3	MAIN POWER indicator	Indicator lamp lit when HF-8030 low-voltage circuits are energized.

2. CONTROLS AND INDICATORS

Table 4. HF-8030 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
4	MAIN POWER circuit breaker	Provides manual control of primary power input to HF-8030. Provides overcurrent protection for the HF-8030.
5	LV 10A fuse	Protects low-voltage circuits against damage from overcurrent condition.



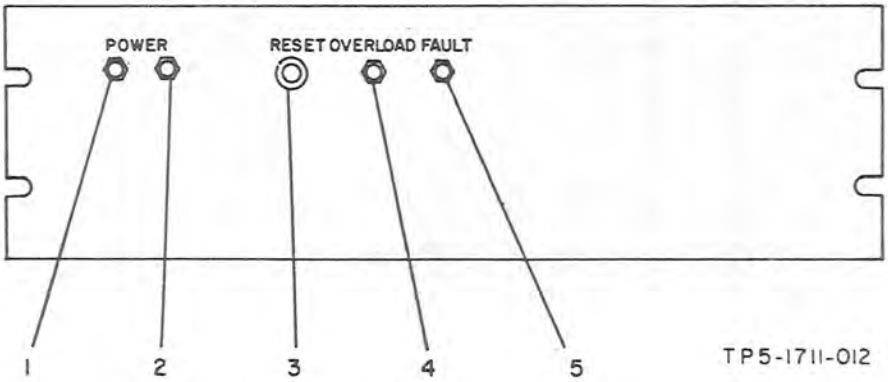
TP5-1353-017

HF-8030 1-kW Power Supply, Controls and Indicators
Figure 4

2. CONTROLS AND INDICATORS

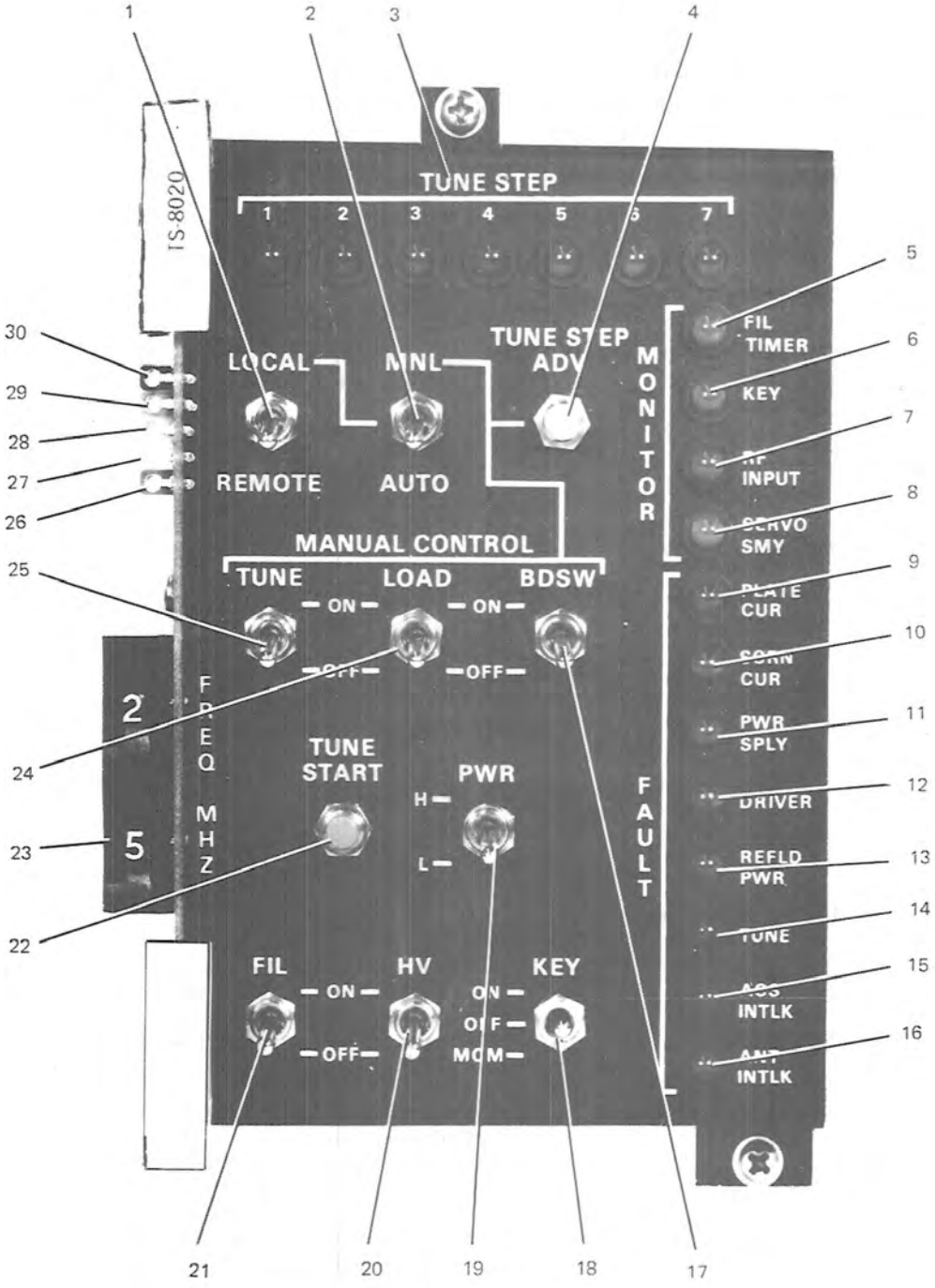
Table 5. HF-8060 Preselector, Controls and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	POWER switch S2	Connects/disconnects primary power.
2	POWER indicator DS1	Indicates primary power is applied and +24-V dc power supply is operational.
3	RESET switch S3	Resets overload protection circuit.
4	OVERLOAD indicator DS2	Indicates overload from received rf signal.
5	FAULT indicator DS3	Indicates internal power supply, transmit signal, or tuning timeout fault.
	LINE SELECTOR switch S1 (located on rear panel)	Selects 100, 115, 215, or 230 V ac for input power transformer.
	Note When 100 or 115 V ac is selected, install a 2-A fuse. When 215 or 230 V ac is selected, install a 1-A fuse (slow blow).	



HF-8060 Preselector, Controls and Indicators
Figure 5

2. CONTROLS AND INDICATORS



TS-8020 Controls and Indicators
Figure 6

2. CONTROLS AND INDICATORS

Table 6. TS-8020 Controls and Indicators.

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	LOCAL/REMOTE switch S7	Set to REMOTE during normal system operation. LOCAL position places power amplifier in local control.
2	MNL/AUTO switch S8	Manual/automatic switch permits selection of automatic or manually controlled power amplifier tune cycle when the LOCAL/REMOTE switch is set to LOCAL.
3	TUNE STEP indicators (1 through 7)	Indicate tune step number to which HF-8020 has progressed in tune cycle.
4	TUNE STEP ADV switch S12	Tune step advance advances power amplifier tune cycle by one step each time it is pressed provided the power amplifier is in local control and servos have nulled between tune steps.
	MONITOR indicators	
5	FIL TIMER	Filament timer monitor indicates that power amplifier filament voltage has been applied for the required time period (3 minutes).
6	KEY	Key monitor indicates that key command has been applied to power amplifier.
7	RF INPUT	Rf input monitor indicates that rf input is applied to HF-8020.
8	SERVO SMY	Servo summary monitor indicates that tuning servos in the HF-8020 have nulled and stopped running.
	FAULT indicators	
9	PLATE CUR	Plate current overload fault monitor indicates power amplifier plate current overload.
10	SCRN CUR	Screen current overload fault monitor indicates power amplifier screen current overload.
11	PWR SPLY	Power supply fault monitor indicates power supply fault condition.
12	DRIVER	Driver fault monitor indicates air switch not operated.
13	REFLD PWR	Reflected power fault monitor indicates excessive vswr condition at HF-8020 rf output.
14	TUNE	Tune fault monitor indicates HF-8020 has failed to complete tune cycle in required time.
15	ACS INTLK	Access interlock monitor indicates that an assembly, card, plug, or cover is not properly installed.
16	ANT INTLK	Antenna interlock monitor indicates open interlock circuit if lighted while HF-8020 is keyed.

2. CONTROLS AND INDICATORS

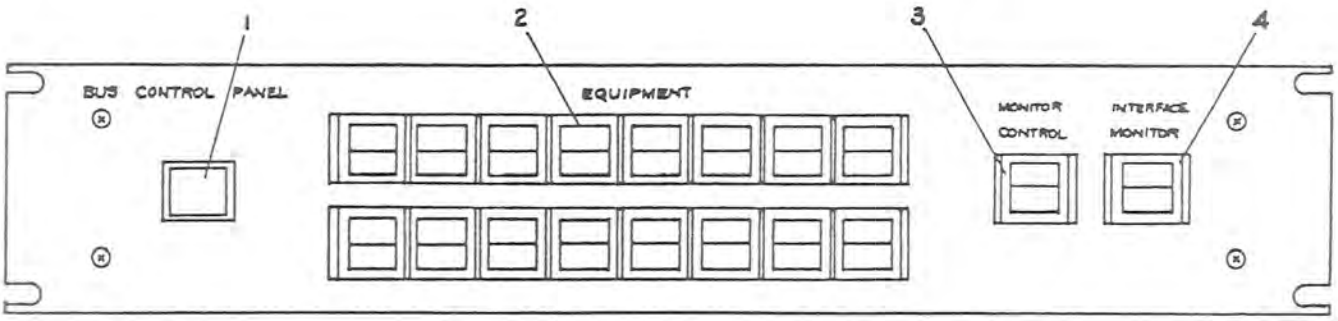
Table 6. TS-8020 Controls and Indicators (Cont).

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
17	MANUAL CONTROL BDSW switch S11	Band-switch control. Allows band switch to be enabled (ON) or disabled (OFF) when HF-8020 is in local control (TS-8020 LOCAL/REMOTE switch set to LOCAL).
18	KEY switch S6	Provides local control of key command to system key line. This keys HF-8020 and other equipment such as exciter or antenna coupler. May be used as momentary (MOM) or continuous key (ON). Set to OFF position during normal system operation.
19	PWR H/L switch S4	Rf high-power/low-power switch. Permits selection of high (H) or low (L) rf output power of HF-8020. Affects HF-8020 operation only when LOCAL/REMOTE switch of TS-8020 is set to LOCAL.
20	HV ON/OFF switch S3	High-voltage on/off switch. Provides local control of high-voltage power supply when LOCAL/REMOTE switch of TS-8020 is set to LOCAL.
21	FIL ON/OFF switch S2	Filament on/off switch. Provides local control of low-voltage power supplies when LOCAL/REMOTE switch of TS-8020 is set to LOCAL.
22	TUNE START switch S5	Momentary contact pushbutton switch that applies tune start command to system line to initiate tune sequence of HF-8020 and other equipment in system such as exciter or antenna coupler.
23	MANUAL CONTROL LOAD switch S10	Allows HF-8020 loading servo to be enabled (ON) or disabled (OFF) when HF-8020 is in local control (TS-8020 LOCAL/REMOTE switch set to LOCAL).
24	FREQ MHZ switch S1	Frequency megahertz control. Dual thumb wheel switch provides local control of HF-8020 operating frequency. Top thumb wheel controls 10- to 20-MHz frequencies. Bottom thumb-wheel controls 0- to 9-MHz frequency increments. Highest frequency that can be set is 29.0 MHz.
25	MANUAL CONTROL TUNE switch S9	Allows HF-8020 tuning servo to be enabled (ON) or disabled (OFF) when HF-8020 is in local control (TS-8020 LOCAL/REMOTE switch to LOCAL).
	Test points	
26	TP5	Provides access to reflected power analog voltage of HF-8020 for external test equipment.
27	TP4	Provides access to forward power analog voltage of HF-8020 for external test equipment.
28	TP3	Provides access to output voltage of HF-8020 loading servo follow-up potentiometer for external test equipment.
29	TP2	Provides access to output voltage of HF-8020 tuning servo follow-up potentiometer for external test equipment.
30	TP1	Provides low-level ground reference point for external test equipment during measurement of voltages present at TP2 through TP5.

2. CONTROLS AND INDICATORS

Table 7 Master Control Switch Controls and Indicators

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Power Switch S19 (illuminated)	Mains power on/off
2	Dialight Switches S1 to S16. Two segments (upper and lower) for REMOTE/LOCAL switching.	Provide REMOTE/LOCAL control for each respective unit of a multiple installation (exciters or receivers).
3	Dialight MASTER CONTROL switch.	Allows local control over all units installed.
4	Dialight INTERFACE MONITOR Switch (LOCAL/REMOTE)	Allows the associated Remote Display to monitor either locally or remotely controlled units.



3. OPERATING PROCEDURES

3.1 Local Operation

The HF-8134A is locally controlled by the HF-8014A Exciter.

3.1.1 Turn-on Procedure

CAUTION

Be sure the HF-8020 is connected to a dummy load or to an antenna for the selected frequency. Set the interlock switch S9 on rear panel to the correct position.

To turn on the HF-8134A, proceed as follows:

a. Set the HF-8014A Exciter controls as follows:

1. PWR to OFF (press inward until switch is released and latched in outward position).
2. PA PWR to OFF
3. KEY to NORM
4. PILOT CARR to OFF
5. PEAK CLIP to OFF
6. CONT to LCL
7. MODE to ISB
8. CHANNEL ENABLE switches to OFF

b. Set facility power circuit breakers to ON.

c. Set the HF-8030 MAIN POWER circuit breaker to ON and the meter select switch to OFF.

d. If used, set the HF-8060 POWER switch to ON.

NOTE

In the following steps, all controls and indicators used for operation are located on the HF-8014A unless otherwise specified.

e. Plug headphones into PHONES jack.

f. Plug microphones into MIC jack or key into CW KEY jack.

g. Press PWR switch (inward and latched).

3. OPERATING PROCEDURES
3.1 Local Operation
3.1.1 Turn-On Procedure

NOTE

EXCITER FAULT indicator will light when power is applied. This is a normal condition.

h. Change one digit of the FREQUENCY KHZ switches. EXCITER FAULT indicator should extinguish.

i. Set PA PWR switch to STBY.

NOTE

Allow a 3-minute warmup period for the HF-8020 before proceeding.

j. Set PA PWR switch to HIGH PWR for 1 kW output power or to LOW PWR for low power output (300 to 700 watts adjustable).

k. Set FREQUENCY KHZ switches to desired operating frequency.

l. Set METER switch to XMT OUT (+23FS). Set MODE switch to CW.

m. Set KEY switch to LOCK. During tune cycle, KEY indicator lights. When tune cycle is complete, PA READY indicator will light to indicate that the HF-8020 is tuned. Meter M1 will indicate rf output from the HF-8014A (+10 to +20 dB mW).

NOTE

EQUIPMENT STATUS indicators EXCITER FAULT, PRESEL FAULT, and PA FAULT, must be extinguished for continued operation.

n. Set KEY switch as follows:

1. EXT position for keying from EXT KEY terminal on rear panel.
2. NORM position for keying from front panel MIC or CW KEY Jack.

3. OPERATING PROCEDURES

3.1 Local Operation

3.1.2 CW Operation

a. Perform turn-on procedures in paragraph 3.1.1
b. Set MODE switch to CW mode.
c. Set FREQUENCY KHZ thumb wheel controls to desired operating frequency.

NOTE

The HF-8014A Exciter provides CW (A1) operation, which means the carrier is switched on and off. A receiver equipped to receive CW (A1) has a bfo or similar means of detecting a transmitted CW carrier. If the receiver is not equipped to receive a transmitted CW carrier signal the receiver must be offset from the operating frequency to generate a received CW audio signal.

d. Set KEY switch to NORM if using front panel CW KEY jack, or to EXT KEY if using rear panel EXT KEY input.

e. Momentarily apply key and allow system to tune.

f. When tuning is complete, normal CW communication can be established. Monitor CW sidetone by connecting headphones to PHONES jack on front panel, with PHONES switch in CH A1 position.

3.1.3 AM Operation

a. Perform turn-on procedure in paragraph 3.1.1.

b. Set MODE switch to AM mode.

c. Set FREQUENCY kHz thumb-wheel controls to desired operating frequency.

d. Set KEY switch to NORM if using front panel MIC jack, or to EXT KEY if using rear panel EXT KEY input.

e. Momentarily apply key and allow system to tune.

f. When tuning is complete, set CH A1 CHANNEL ENABLE switch to MIC if MIC jack is to be used, or set to LINE if line audio input is to be used.

3.1.4 ISB Operation

a. Perform turn on procedures in paragraph 3.1.1.

3. OPERATING PROCEDURES
3.1 Local Operation
3.1.4 ISB Operation

b. Set MODE switch to ISB mode.

c. Set FREQUENCY KHZ thumbwheel controls to desired operating frequency.

d. Set KEY switch to EXT KEY if using rear panel EXT KEY input; to NORM if using front panel MIC jack.

e. Ensure that the desired channel A1, A2, B1, and B2 audio inputs are properly connected.

f. Momentarily apply key and allow system to tune.

g. When tuning is complete, normal ISB voice and/or data audio communications can be established. Set CHANNEL ENABLE switches to MIC or LINE, depending on the source of the audio signal.

3.1.5 Audio Adjustments

Transmit line audio input and microphone audio input levels may be adjusted by the operator when required. These adjustments may be made through the top cover of the HF-8014A. Refer to figure 8 for location of these adjustments.

Transmit line audio adjustments are applicable only when transmit line audio inputs are connected to channel A1, A2, B1 or B2 XMT AF 600-ohm terminals on the rear panel. For AM operation, channel A1 is used. For ISB mode of operation, channel A1, A2, B1 or B2, or any combination of the four channels, may be used. The audio input signal used may be either an FSK tone or a tone set to the level of the normal voice peaks. This procedure adjusts the internal audio amplifiers to accept signals above and below these nominal levels.

a. Perform turn-on procedures in paragraph 3.1.1.

b. Set MODE switch to ISB mode and MIC switch to OFF.

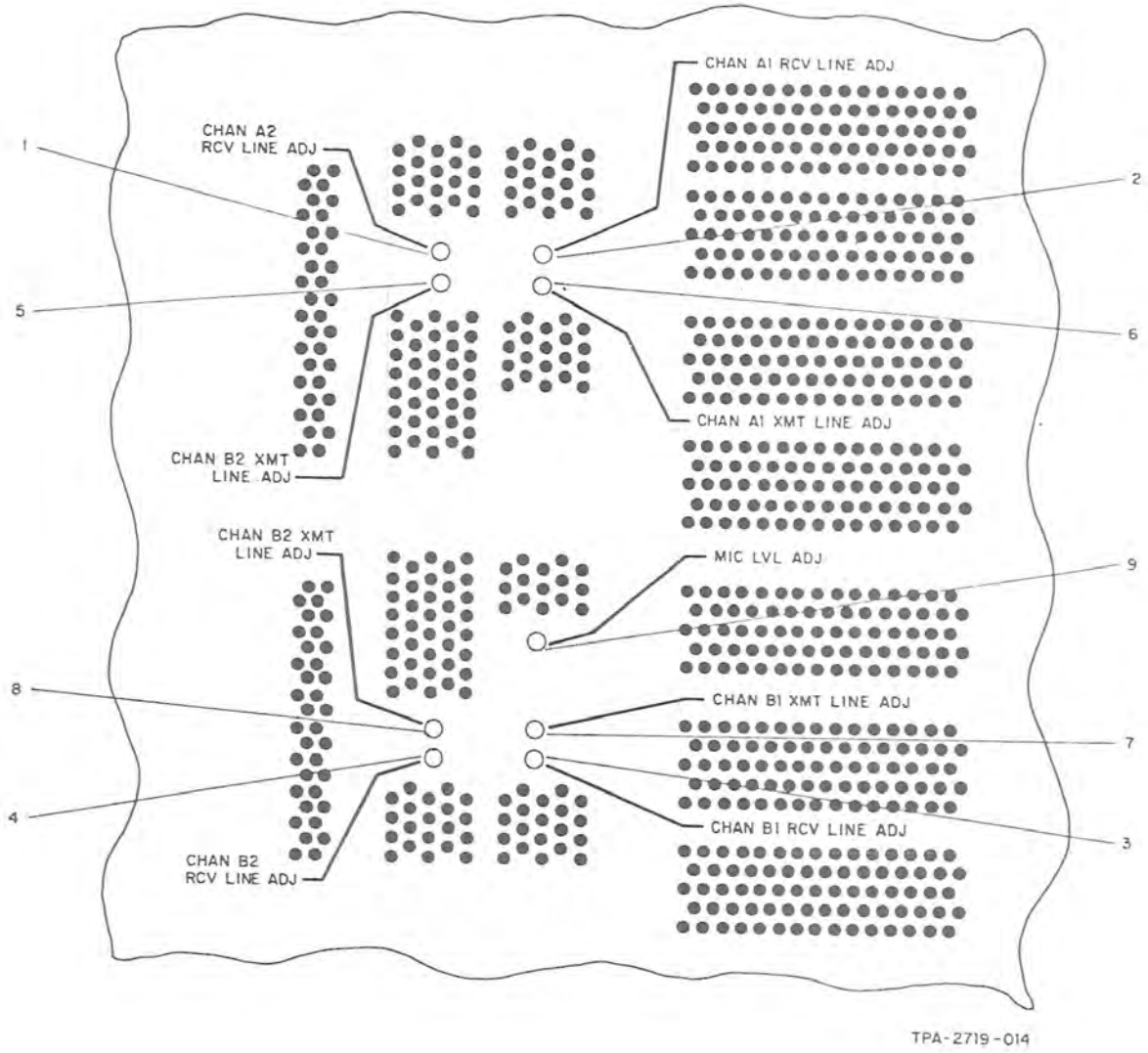
NOTE

Line audio inputs are within the 15dB compression range of the audio amplifier if the front panel indication is in the black segment of the front panel meter with audio applied. METER switch must be in the CH A1 AF (+3FS), CH A2 AF (+3FS), CH B2 AF (+3FS), CH B1 AF (+3FS) position, as applicable. Rf output is constant when audio input is within the indicated compression range.

3. OPERATING PROCEDURES

3.1 Local Operation

3.1.5 Audio Adjustments



HF-8014/8014A Exciter Top Cover, Location of Audio Adjustments
Figure 8

3. OPERATING PROCEDURES
3.1 Local Operation
3.1.5 Audio Adjustments

c. Connect an audio signal to XMT AF 600 ohm terminals on rear panel associated with channel to be adjusted. Enable the channel to be adjusted and set METER switch to appropriate channel. Adjust the following for midrange of the compression range (darkened segment shown on front panel meter):

1. CH A1 XMT LINE ADJ A5R53
2. CH B1 XMT LINE ADJ A5R130
3. CH A2 XMT LINE ADJ A3R53
4. CH B2 XMT LINE ADJ A3R130

To adjust the HF-8014A microphone audio input level, proceed as follows:

a. Perform turn-on procedures in paragraph 3.1.1
b. Set MODE switch ISB and MIC switch to ON.
c. Connect a microphone to MIC jack.

NOTE

Microphone level is set so that when spoken into in normal voice, the level deflects into the -5- to 0dB mW region on front panel meter. METER switch mustbe in the CH A1 AF (+3FS), CH A2 AF (+3FS), CH B2 AF (+3FS) or CH B1 AF (+3FS) position, as applicable. To prevent excessive background noise from being transmitted, avoid setting microphone gain too high.

d. Key microphone and speak into it in a normal level.

e. Refer to Figure 8. Adjust MIC LVL ADJ A4R1 for an indication between -5- to 0-dB mW area on the meter.

3. OPERATING PROCEDURES
3.2 Remote Operation
3.2.1 Turn-On Procedure

The HF-8134A is remotely controlled by the HF-8093 Exciter Control. To operate the HF-8134A from a remote location, proceed as follows:

CAUTION

Be sure the HF-8020 is connected to a dummy load, or to an antenna, for the selected frequency.

a. Set the HF-8093 Exciter Control controls as follows:

   1. PWR to OFF (press inward until switch is released and latched in outward position).
   2. PA PWR to OFF.
   3. KEY to NORM.
   4. PILOT CARR to OFF.
   5. PEAK CLIP to OFF.
   6. CONT to NORM.
   7. MODE to ISB.
   8. CHANNEL ENABLE switches to OFF.

b. Set facility power circuit breaker to ON.

c. Set the HF-8030 MAIN POWER circuit breaker to ON and set meter select switch to OFF.

d. If used, set HF-8060 POWER switch to ON.

NOTE

In the following steps, all controls and indicators used for operation are located on the HF-8093 unless otherwise specified.

e. Plug headphones into PHONES jack.

f. Plug microphone into MIC jack or key into CW KEY jack.

3. OPERATING PROCEDURES

3.2 Remote Operation

3.2.1 Turn-On Procedure

g. Press PWR switch (inward and latched)

h. Set ADDRESS switch to the number of the controlled exciter. Set to 0 if only one exciter is used, or to any address if dip switch 1 on serial interface cards is set to closed position

NOTE

EXCITER FAULT indicator will light when power is applied. This is a normal condition.

i. Change one digit of the FREQUENCY KHZ switches. EXCITER FAULT indicator should extinguish.

j. Set PA PWR switch to STBY.

NOTE

Allow a 3-minute warmup period for the HF-8020 before proceeding.

k. Set PA PWR switch to HIGH PWR for 1-kW output power or to LOW PWR for low-power output (300 to 700 watts, adjustable).

l. Set FREQUENCY KHZ switches to desired operating frequency.

m. Set METER switch to XMT OUT (+23FS). Set MODE switch to CW.

n. Set KEY switch to LOCK. During tune cycle, KEY indicator lights. When tune cycle is complete, PA READY indicator will light to indicate the HF-8020 is tuned. Meter M1 will indicate rf output from the HF-8014A (+10 to +20 dB mW).

o. Release CW key.

p. Set MODE switch to desired mode.

q. Set PHONES switch to desired channel (A1, A2, B1, B2 or ALL CHAN) for monitoring.

r. Set METER switch to desired meter scale and channel for monitoring.

s. Set PILOT CARR switch to OFF.

3. OPERATING PROCEDURES
3.2 Remote Operation
3.2.1 Turn-On Procedure

t. Set CHANNEL ENABLE switches to desired channel. Set to OFF if external line input is used.

u. If EQUIPMENT STATUS fault indicators are not lighted and PA READY indicator is lit, establish transmission.

3.2.2 Audio Adjustments
3.2.2.1 General

The following line audio adjustment procedures are used when system audio is routed through the HF-8093 to the HF-8014A. System audio is connected to CH A1, CH A2, CH B1, and CH B2 XMT AF 600 OHMS IN terminals located on the rear panel of the HF-8093. Input level of the transmit audio signal should produce sufficient drive from the HF-8014A to produce a 1-kW rf output from the HF-8020. Typically, this would be FSK tone or the peak of a voice signal. The following procedures adjust internal audio amplifiers to accommodate signals above and below nominal input levels. Substituting an audio signal generator with the level set to the normal voice peaks level greatly simplifies these adjustment procedures.

3.2.2.2 Transmit Line Audio Adjustments

To adjust the HF-8134A transmit line audio levels, proceed as follows:

a. Perform turn-on procedures in paragraph 3.1.1.

b. On the HF-8093, set MODE switch to ISB, CHANNEL ENABLE switches to OFF position, and METER switch to A1 (+13FS).

c. Refer to Figure 9. With an audio input signal connected to CH A1 XMT AF 600 OHMS IN terminals, adjust CH A1 PH LVL ADJ control until meter M1 indicated 0 dB.

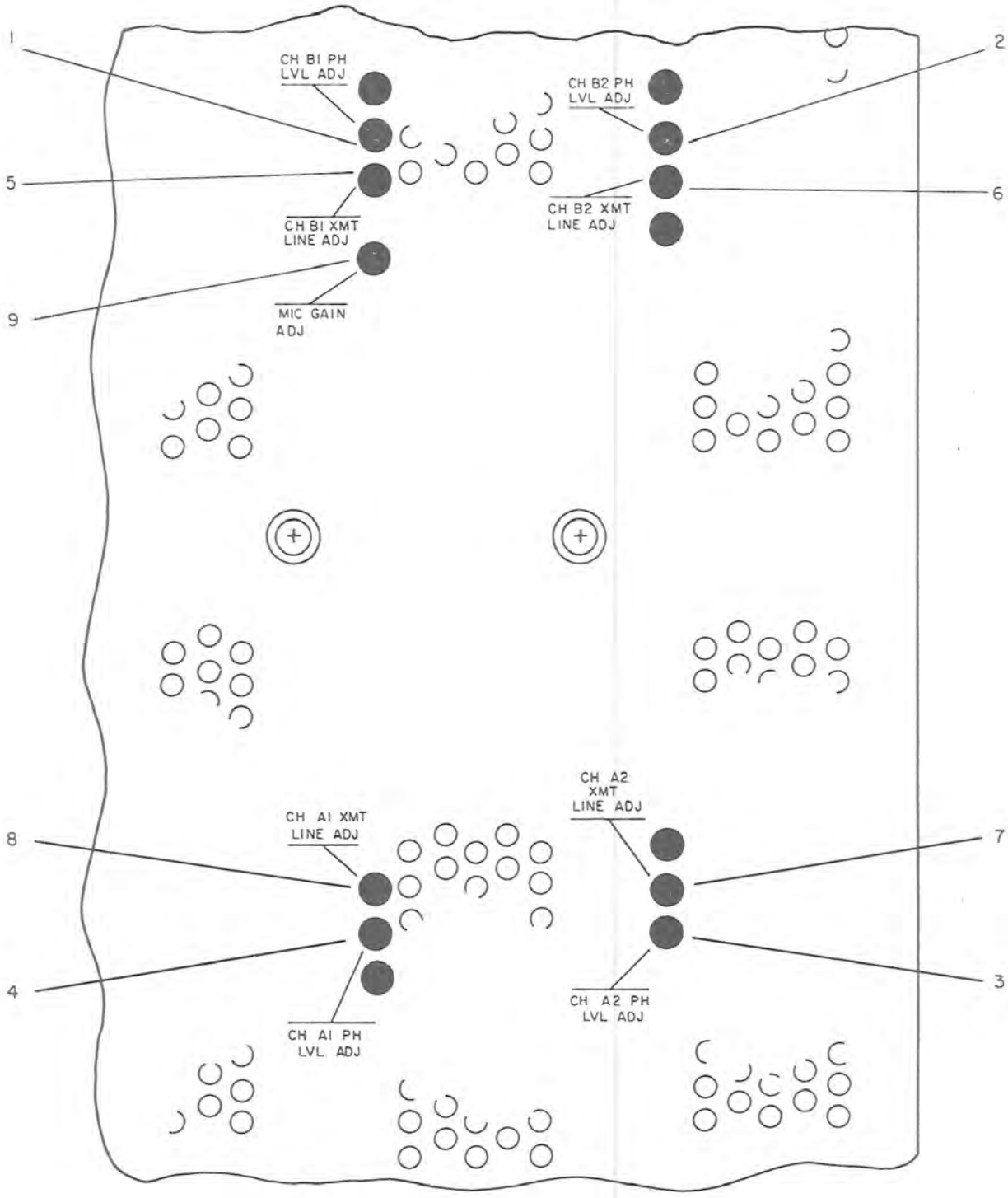
d. On the HF-8014A, set MODE switch to ISB, METER switch to CH A1 AF (+3 FS), and CHANNEL ENABLE switches to OFF.

e. Refer to Figure 8. Adjust the HF-8014A CH A XMT LINE ADJ control until meter M1 indicates -5 dB.

NOTE

If there is no signal at the HF-8014A, check for audio input level from the HF-8093. This signal is connected to channel A XMT AF 600- ohm terminals (TB2-1 and TB2-2) on the rear panel of the HF-8014A.

3. OPERATING PROCEDURES
3.2 Remote Operation
3.2.2 Audio Adjustments
3.2.2.2 Transmit Line Audio Adjustments



HF-8093 Exciter Control Top Cover, Location of Audio Adjustments
Figure 9

3. OPERATING PROCEDURES
3.2 Remote Operation
3.2.2 Audio Adjustments
3.2.2.2 Transmit Line Audio Adjustments

f. Repeat steps b. through f. for Channels A2, B1, and B2 using the following information:

1. Channel A2
   (a) HF-8093 METER switch to A2 (+13FS)
   (b) Adjust CH A2 PH LVL ADJ on HF-8093.
   (c) Audio connected to CH A2 XMT AF 600 OHMS IN terminals.
   (d) HF-8014A METER switch to CH A2 AF (+3FS).
   (e) Adjust CH A2 XMT LINE ADJ on HF-8014A

2. Channel B1
   (a) HF-8093 METER switch to B1 (+13FS)
   (b) Adjust CH B1 PH LEVEL ADJ on HF-8093.
   (c) Audio connected to CH B1 XMT AF 600 OHMS IN terminals.
   (d) HF-8014A METER switch to CH B1 AF (+3FS).
   (e) Adjust CH B1 XMT LINE ADJ on HF-8014A.

3. Channel B2.
   (a) HF-8093 METER switch to B2 (+13FS).
   (b) Adjust CH B2 PH LVL ADJ on HF-8093.
   (c) Audio connected to CH B2 XMT AF 600 OHMS IN terminal.
   (d) HF-8014A METER switch to CH B2 AF (+3FS).
   (e) Adjust CH B2 XMT LINE ADJ on HF-8014A.

1-kW TRANSMITTER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

THEORY

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table of contents

THEORY

1. GENERAL

This section presents the theory of operation of the HF-80 1-kW Transmitter Systems. Simplified block diagram (Figure 1) shows the transmitter system. Functional block diagrams (Figure 3 to 8) shows the functional theory of the individual HF-80 1-kW Transmitter Systems equipment.

The HF-80 1-kW Transmitter Systems presented in this instruction book are typical (basic) systems that provide functions of a transmitter with an rf output of 1 kW. The systems may be enlarged with various options that enhance operational capability.

The theory of operation is presented in an operational sequence in paragraph 6 from turn on to fully operational.

2. TRANSMITTER SYSTEM THEORY

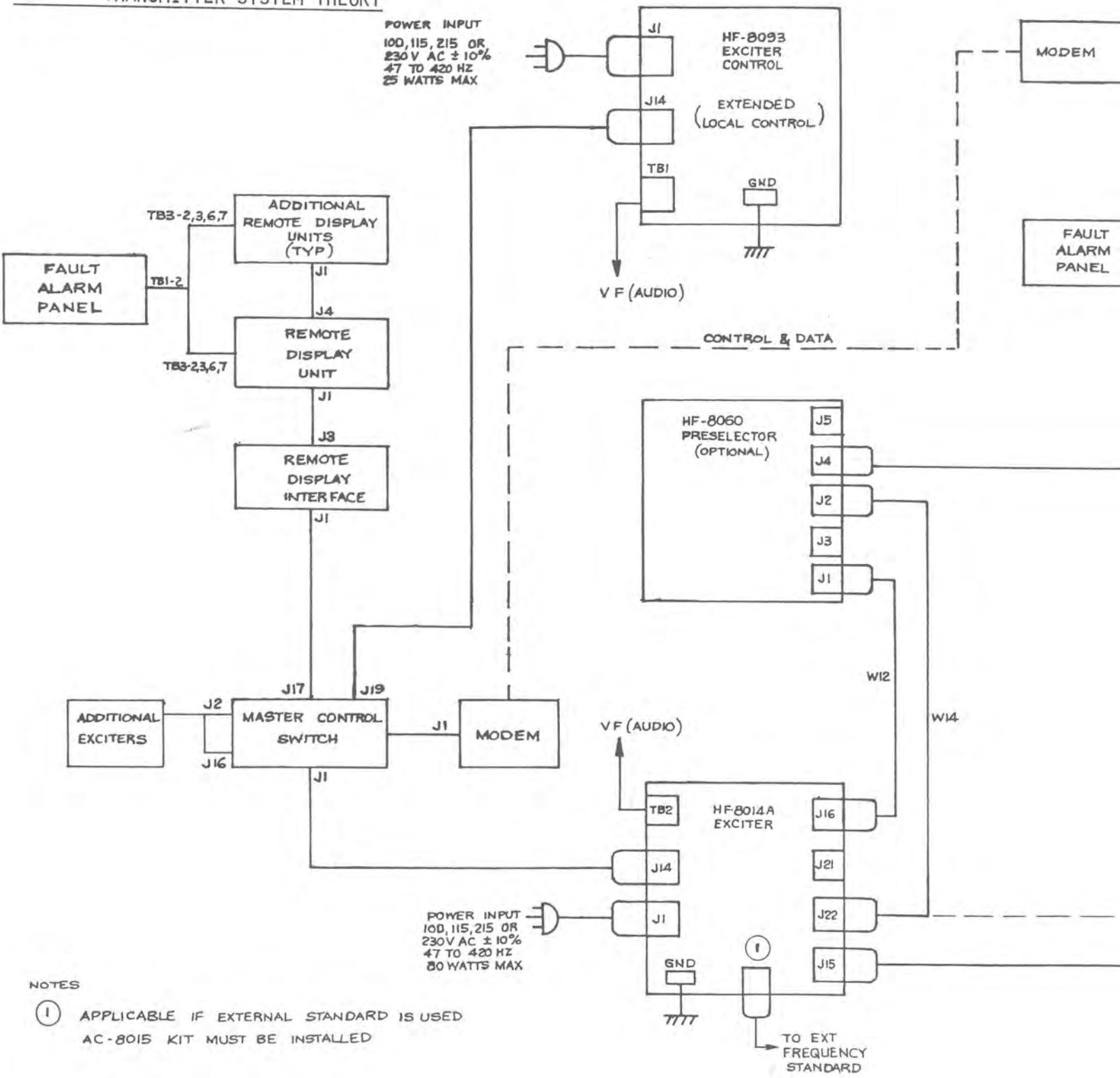
Refer to Figure 1. The primary function of the transmitter system is to transmit rf signals in the hf frequency range. The standard configuration provides 100-Hz tuning increments over the frequency range. The power output is 1-kW pep or average. When operated in the low power mode, the power output is adjustable from 300 to 700 watts. Emissions modes include ISB, (UUSB, USB, LSB, LLSB), AME, and CW.

There are two basic transmitter systems. One for local operation and one for local/remote operation. Both systems contain an exciter, 1-kW power supply and a 1-kW power amplifier. The transmitter system with local/remote operating capability contains one additional unit, the exciter control. The two systems may also contain the following equipments as options to enhance the operational capability of the system; a bandpass filter, preselector and an antenna coupler.

The exciter provides local control, monitoring, and rf drive for the 1-kW power amplifier. The 1-kW power amplifier amplifies the rf input from the exciter and provides a 1-kW rf output to the antenna.

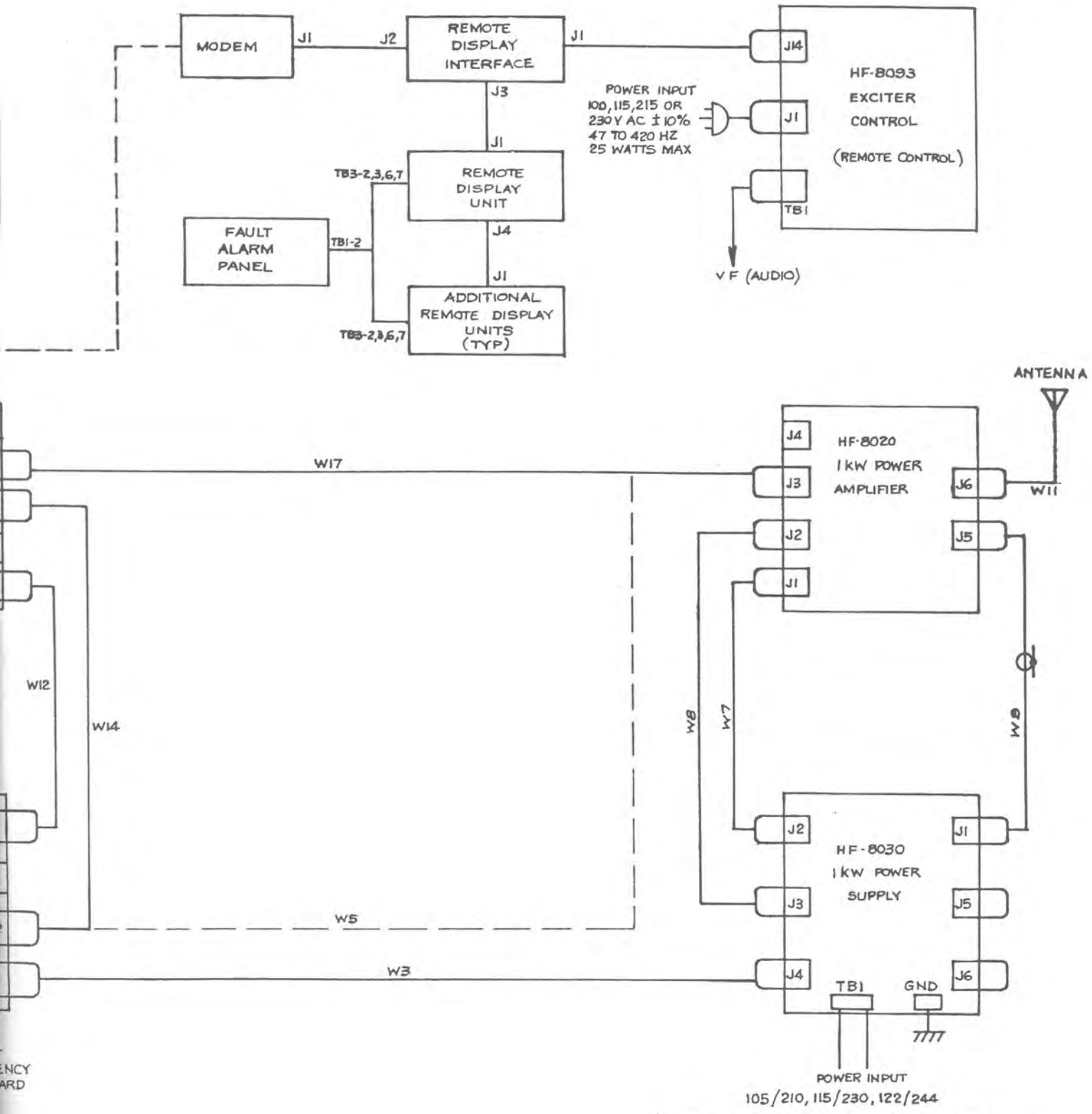
The transmitter systems may be remotely controlled from the exciter remote control unit. Four-channel exciters require four-channel exciter control units. The remote exciter control unit provides remote control and monitoring of the transmitter system and also amplifies the transmit audio signal before application to the exciter during remote operation.

2. TRANSMITTER SYSTEM THEORY



NOTES

(1) APPLICABLE IF EXTERNAL STANDARD IS USED
AC-8015 KIT MUST BE INSTALLED



HF-8134A 1-kW Transmitter System
Figure 1

3. LOCAL CONTROL AND MONITOR SIGNALS

3.1 General

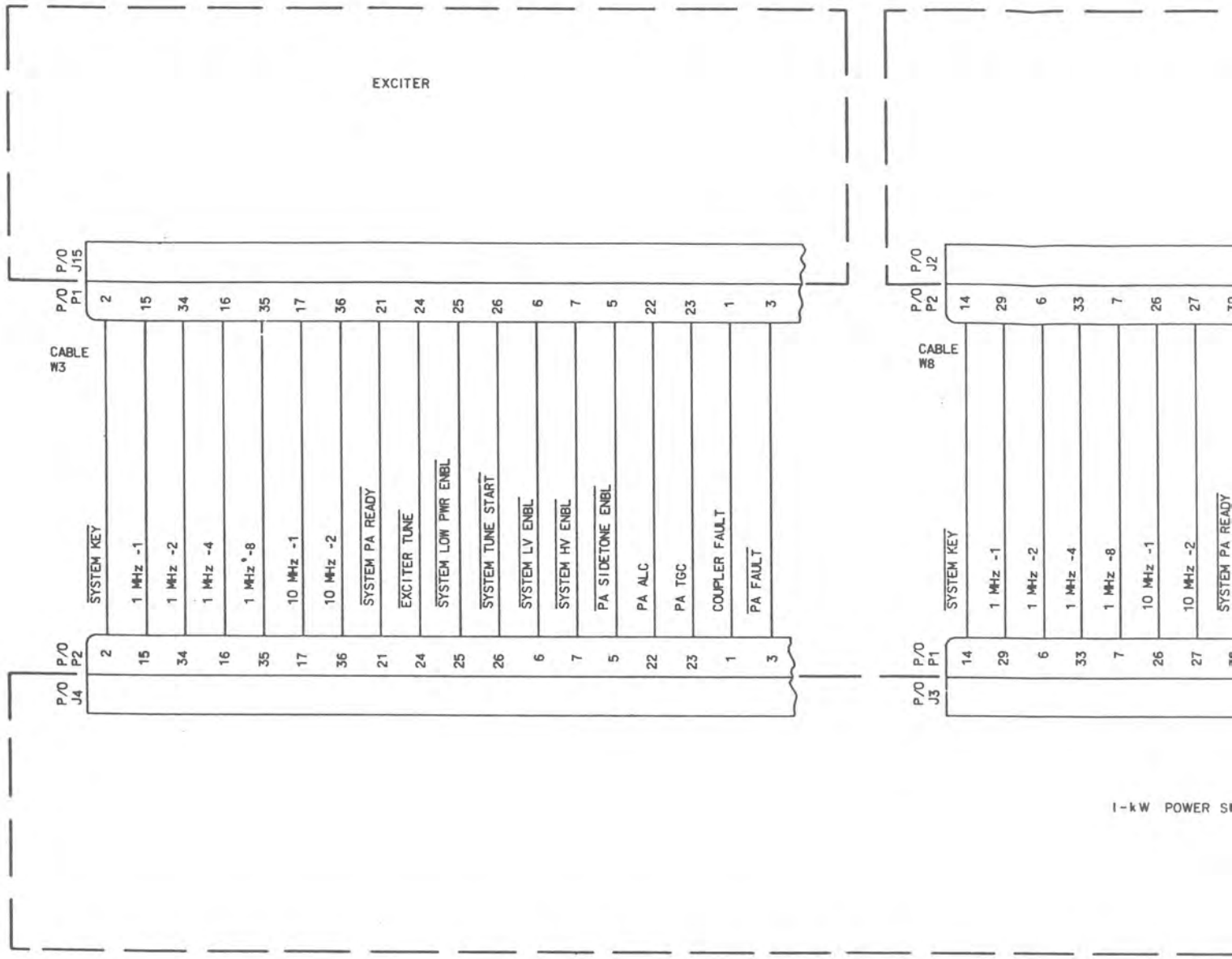
The local control and monitor signals are shown in Figure 2. The application of the control signals is determined by the tuning sequence of the 1-kW power amplifier. Complete tuning of the power amplifier is accomplished in approximately 6 seconds. The tuning sequence consists of three tuning operations: band switching, coarse positioning and fine tuning. The three operations are accomplished in seven sequential tune steps that are controlled and monitored by the control logic circuits.

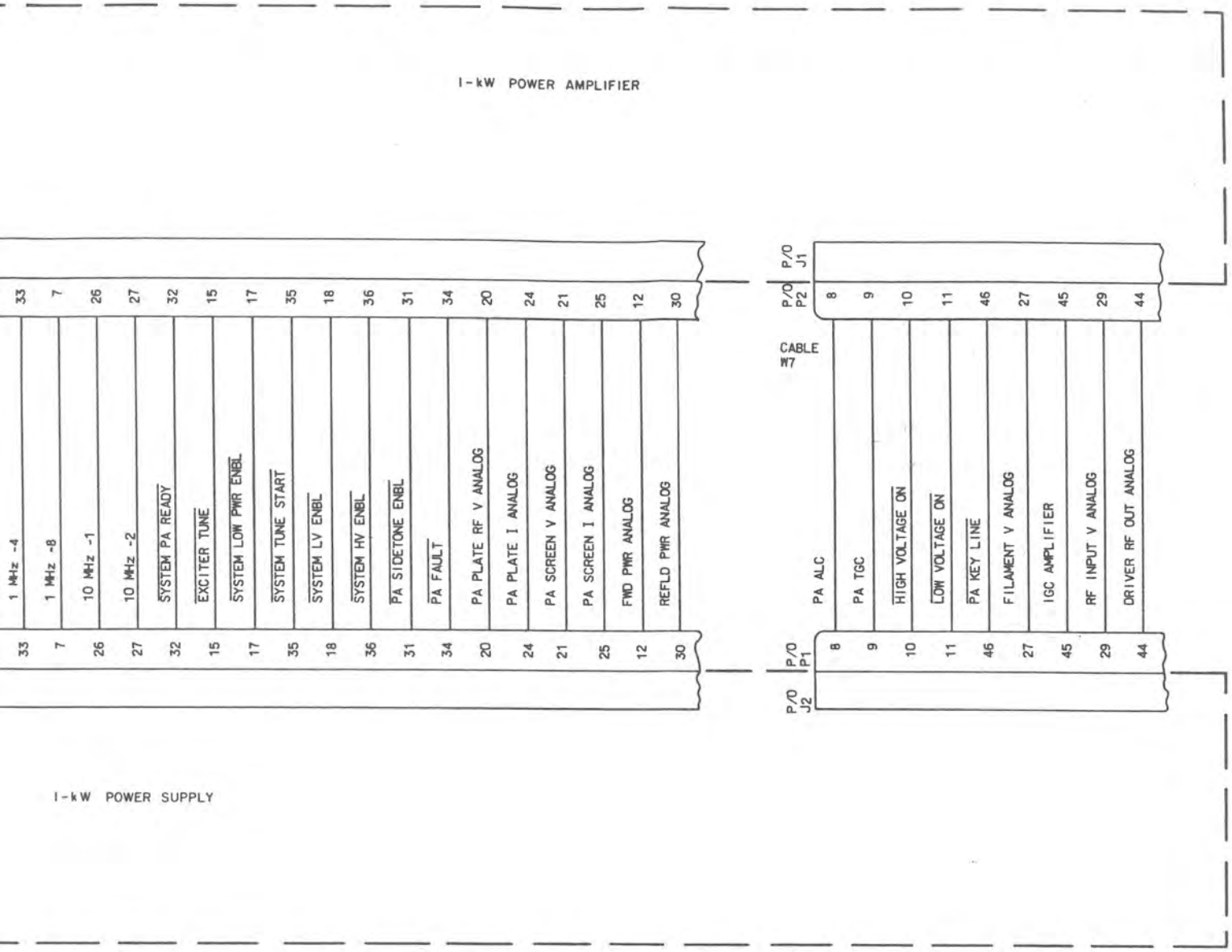
Initially, the system operator selects an operating frequency, on the exciter, which generates a tune start signal. The tune start signal resets the 1-kW power amplifier tune sequence control of the control logic circuits to the beginning (step 1) of the 7-step tune sequence. The normal progression through the 1-kW power amplifier tuning steps, and the functions occurring within each step, is as follows:

a. Step 1 - Ready to Tune
   1. System tune start signal resets all 1-kW power amplifier control functions to tune step 1.
   2. 1-kW power amplifier awaits rf input signal from exciter (rf input monitor output signal from driver module A8). Monitor must be present for tune steps 2 to 6.
   3. 1-kW power amplifier awaits high voltage from 1-kW power supply on monitor (+2900 V dc applied to power amplifier tube V1). Monitor must be present for tune steps 2 to 6.
   4. 1-kW power amplifier awaits system key command from the exciter.
   5. Transmit-receive (tr) relay is enabled (transmit) with application of the system key. Tr relay remains energized through step 6.
   6. 1-kW power amplifier applies the exciter tune command to the exciter for tune steps 1 to 6.
   7. The tune power relay in the 1-kW power amplifier is energized if the coupler/bandpass filter tune power is a logic 0 (if an antenna coupler/bandpass filter is used). Relay remains energized through tune step 4.

3. LOCAL CONTROL AND MONITOR SIGNALS

3.1 General





TP5-4904-014

Local Control and Monitor Signals
Figure 2

3. LOCAL CONTROL AND MONITOR SIGNALS
3.1 General

b. Step 2 - Coarse Tune

1. System key signal is latched by the 1-kW power amplifier. Key remains latched through tune step 6.
2. 1-kW power amplifier tune power relay remains enabled.
3. 1-kW power amplifier band switch selects the proper frequency band.
4. The 1-kW power amplifier tuning and loading coils are coarse positioned (coarse tuned).
5. 1-kW power amplifier does not apply internal key (V1 operating bias).
6. The 1-kW power amplifier 20-second tune fault timer is enabled and remains on until tune step 7 is reached.
7. The 1-kW power amplifier band-switch, tuning, and loading servo motors must be stopped (tuned) before proceeding to tune step 3.

c. Step 3 - Fine-Tune 1

1. The 1-kW power amplifier tune power relay remains enabled.
2. The power-amplifier key line is enabled and remains enabled through tune step 6. If the antenna interlock input line is open, the power amplifier key line is inhibited.
3. The 1-kW power amplifier tuning servo loop is enabled.
4. The 1-kW power amplifier loading servo loop is inhibited.
5. The 1-kW power amplifier 220-W tune power level is controlled by the internal gain control (IGC) circuit.
6. Bandpass filter (if used) begins tuning.
7. Both ALC and TGC are disabled.
8. The 1-kW power amplifier tuning servo motor must stop (tuned) before proceeding to step 4.

d. Step 4 - Fine-Tune 2

1. The 1-kW power amplifier tune power relay remains enabled.
2. The 1-kW power amplifier tuning servo loop remains enabled.
3. The 1-kW power amplifier loading servo loop is enabled.
4. TGC is enabled but the gain of the 1-kW power amplifier is controlled by the IGC circuits at 220-W output. If the desired operating power is less than 440 watts, the TGC signal will control exciter gain to one-half desired operating power.
5. ALC is disabled.
6. Both 1-kW power amplifier tuning and loading servos must be stopped (tuned) before proceeding to step 5.

3. LOCAL CONTROL AND MONITOR SIGNALS

3.1 General

e. Step 5 - Fine-Tune 3

1. 1-kW power amplifier tune power relay is disabled. Tune power resistors are removed from the rf output path and pa tunes into impedance at antenna.
2. The 1-kW power amplifier tuning servo loop remains enabled.
3. The 1-kW power amplifier loading servo loop remains enabled.
4. TGC is enabled but the gain of the 1-kW power amplifier is controlled by the IGC circuits at 220-W output. If the desired operating power is less than 440 watts, the TGC signal will control exciter gain to one-half desired operating power.
5. ALC is disabled.
6. Both 1-kW power amplifier tuning and loading servo motors must be stopped (tuned) before proceeding to step 6.

f. Step 6 - High-Power Tune

1. The 1-kW power amplifier tuning servo loop remains enabled.
2. The 1-kW power amplifier loading servo loop remains enabled.
3. The 1-kW power amplifier tune power relay is disabled.
4. The 1-kW power amplifier 220-W tune power level is disabled.
5. The TGC signal is applied to the exciter. The exciter rf output is limited to the level required to produce half rated output from the 1-kW power amplifier.
6. ALC is disabled.
7. Both 1-kW power amplifier tuning and loading servo motors must be stopped (tuned) before proceeding to step 7.

g. Step 7 - Tune Complete (Operate)

1. The 1-kW power-amplifier key-line latch is released disabled).
2. The 1-kW power-amplifier key line is released unless held enabled by the system key.
3. TGC counter in the exciter is disabled, and holds the gain at the level established in tune step 6.
4. The exciter tune line is disabled.
5. ALC is enabled.
6. The 1-kW power amplifier 20-second tune fault timer is disabled.
7. The 1-kW power amplifier band-switch, tuning, and loading servo loops are disabled.
8. The 1-kW power amplifier blue PA READY indicator lights.

3. LOCAL CONTROL AND MONITOR SIGNALS

3.1 General

3.1.1 System Low-Voltage Enable

When the PA PWR control on the exciter is set from the OFF position to the STBY position, a logic 0 signal is applied to the system low-voltage enable line. The system low-voltage enable signal is routed from the exciter to the 1-kW power supply by cable W3 (P1-6 to P2-6). This signal is then routed from the 1-kW power supply to the 1-kW power amplifier by cable W8 (P1-18 to P2-18). This signal is processed through the 1-kW power amplifier control circuits and routed to the 1-kW power supply by cable W7 (P2-11 to P1-11). This signal enables the filament, blower, and low-level power supplies.

3.1.2 System High-Voltage Enable

When the PA PWR control on the exciter is set to the HIGH PWR or LOW PWR position, a logic 0 signal is applied to the system high-voltage enable lines. The system high-voltage enable signal is routed from the exciter to the 1-kW power supply by cable W3 (P1-7 to P2-7). This signal is then routed from the 1-kW power supply to the 1-kW power amplifier by cable W8 (P1-36 to P2-36). This signal is processed by the 1-kW power amplifier control circuits and, if no fault exists and after a 3-minute time delay, it is routed to the 1-kW power supply by cable W7 (P2-10 to P1-10). This signal enables the plate and screen voltages for the 1-kW power amplifier.

3.1.3 Power Amplifier Fault

The 1-kW power amplifier generates a logic 0 signal on the pa fault line if any of the following conditions occur.

a. The high-voltage cable (W9) is disconnected or improperly connected to J5.

b. The 1-kW power amplifier top or bottom covers are off or improperly secured.

c. Circuit cards A1, A3, A4 or A6 or driver module A8 are removed from the 1-kW power amplifier.

d. The 1-kW power amplifier blower motor fails to produce the proper flow of air.

If a fault condition is present, the 1-kW is inoperative until the fault is cleared.

The pa fault signal is routed from the 1-kW power amplifier to the 1-kW power supply by cable W8 (P2-34 to P1-34). This signal is then routed from the 1-kW power supply to the exciter by cable W3 (P2-3 to P1-3). If a pa fault exists, the PA FAULT indicator in the exciter will light.

3.1.4 System Key

3. LOCAL CONTROL AND MONITOR SIGNALS

3.1 General

3.1.4 System Key

A system key is initiated by the exciter when not inhibited and any of the following conditions are met:

a. A local key and local enable signal are applied.

b. A remote key is applied and a local enable signal is not applied.

c. CW enable, CW key enable, or an external key is applied.

The system key is inhibited when the following conditions are met:

a. When the frequency selected is below 1.6 MHz.

b. When an exciter fault is present.

The system key signal is routed from the exciter to the 1-kW power supply by cable W3 (P1-2 to P2-2). This signal is then routed from the 1-kW power supply to the 1-kW power amplifier by cable W8 (P1-14 to P2-14).

In the 1-kW power amplifier, the system key signal energizes the TR relay. An internal key interlock signal latches the keying circuits during tune steps 2 to 6. After tuning, the latch function is released.

3.1.5 Band Switch and Coarse Tuning

The band switch and coarse tuning signals are generated by the setting of the FREQUENCY KHZ switches on the front panel of the exciter. These bcd signals (1 MHz and 10 MHz) are routed from the exciter to the 1-kW power amplifier by cable W3 (P1/P2-15, 34, 16, 35, 17, and 36). These signals are then routed from the 1-kW power supply to the 1-kW power amplifier.

In the 1-kW power amplifier, these signals are processed by band logic circuits into one of the nine frequency bands in the 1.6- to 29.9999 MHz frequency range. These band signals are used to coarse tune the the tuning elements to the appropriate frequency band.

Fine tuning of the 1-kW power amplifier is accomplished by sensing the rf output of the exciter and tuning the elements to the correct frequency.

3.1.6 System Tune Start

A system tune start pulse is initiated by the exciter to tune/retune the 1-kW power amplifier. The following conditions initiate a tune start signal.

a. Change of position of local/remote switch.

b. Change of a local frequency control of 1 kHz or more.

3. LOCAL CONTROL AND MONITOR SIGNALS
3.1 General
3.1.6 System Tune Start

c. Setting PA PWR switch to LOW PWR or HIGH PWR position.

d. Change of a remote frequency control of 1 kHz or more when a local enable signal is not applied.

The tune start signal is a single pulse that initiates application of maximum TGC output and supplies a tune start pulse to the 1-kW power amplifier. The tune start pulse resets the 1-kW power amplifier to tune step 1.

The tune start pulse is routed from the exciter to the 1-kW power supply by cable W3 (P1-26 to P2-26). This signal is then routed from the 1-kW power supply to the 1-kW power amplifier by cable W8 (P1-35 to P2-35).

3.1.7 Exciter Tune

The exciter tune signal (ground during tune steps 1 to 6) is routed from the 1-kW power amplifier to the 1-kW power supply by cable W8 (P2-15 to P1-15). This signal is then routed to the exciter by cable W3 (P2-24 to P1-24). This signal produces a CW carrier for 1-kW power amplifier tuning purposes from the exciter when a system key signal is applied. The 1-kW power amplifier removes the ground on the exciter tune line at the end of the automatic tune cycle. This causes the exciter to remove a fixed attenuator of 5 dB from the rf drive circuits. Since TGC voltage has established the system gain at -3dB of the desired operating power, the exciter will drive into ALC by a nominal 2 dB at peak drive.

3.1.8 PA Key Line

The pa key line signal is generated by the internal key line circuits in the 1-kW power amplifier. During tune steps 1 and 2, a logic 1 signal is produced.During tune steps 3 through 6, a logic 0 is produced. At tune step 7 (operate)the internal key line is unlatched and pa key line is controlled by the system key line from the exciter.

The pa key line signal is routed from the 1-kW power amplifier to the 1-kW power supply by cable W7 (P2-46 to P1-46). A logic 0 input enables the -40-V dc (adjustable) bias supply. A logic 1 input enables the -80-V dc bias supply.The bias voltages are applied to the 1-kW power amplifier. The -80-V dc bias voltage disables the output power of the 1-kW power amplifier during tune steps 1 and 2.

3.1.9 Transmitter Gain Control (TGC)

The purpose of the transmitter gain control (TGC) voltage is to set the rf output from the exciter to a level which will drive the 1-kW power amplifier to the half-power output level during tuning.

The TGC voltage is generated during tune steps 4 through 7 of the 1-kW power amplifier tune cycle. The TGC voltage from the 1-kW is directly proportional to

3. LOCAL CONTROL AND MONITOR SIGNALS

3.1 General

3.1.9 Transmitter Gain Control (TGC)

rf output power. The absolute level of TGC voltage may be adjusted between 0 to -8 V dc when rf output is 1-kW. This voltage may be independently adjusted for both the low-power and high-power levels of operation. The exciter internal TGC attenuator varies either up or down (increasing or decreasing rf drive to the 1-kW power amplifier) until it receives -5 V dc on the TGC line. The TGC attenuator then stops, having established the 1-kW power amplifier output power at half the desired operating power.

The TGC voltage is routed from the 1-kW power amplifier to the 1-kW power supply by cable W7 (P2-9 to P1-9). This voltage is then routed from the 1-kW power supply to the exciter by cable W3 (P2-23 to P1-23).

3.1.10 Automatic Level Control (ALC)

The purpose of the automatic level control (ALC) voltage is to control the peak rf output level of the exciter after the 1-kW power amplifier has completed the tuning cycle. By controlling the rf input level to the 1-kW power amplifier, the output power level is controlled. The ALC voltage is zero for rf power levels up to an adjustable predetermined level. Then a negative ALC voltage is developed with a slope of approximately 5 V per dB above threshold. This threshold may be adjusted independently for both the low-power and high-power levels of operation.

The ALC voltage is routed from the 1-kW power amplifier to the 1-kW power supply by cable W7 (P2-8 to P1-8). This voltage is then routed from the 1-kW power supply to the exciter by cable W3 (P2-22 to P1-22).

3.1.11 System Power Amplifier Ready

The system power-amplifier ready signal (ground when ready) is routed from the 1-kW power amplifier to the 1-kW power supply by cable W8 (P2- 32 to P1-32). This ground signal indicates that the 1-kW power amplifier has completed tuning and is operationally ready. This signal is then routed from the 1-kW power supply by cable W3 (P2-21 to P1-21) to the exciter. This signal causes the PA READY indicator to light.

3.1.12 Power Amplifier Sidetone Enable

When an rf output signal is generated by the 1-kW power amplifier, a logic 0 signal is applied to the pa sidetone enable line. The pa sidetone enable signal is routed from the 1-kW power amplifier to the 1-kW power supply by cable W8 (P2-31 to P1-31). This signal is then routed from the 1-kW power supply to the exciter by cable W3 (P2- 5 to P1-5). In the exciter this signal lights the RF OUT indicator.

3.1.13 Sytem-Low Power Enable

When the PA PWR switch on the exciter is set to the LOW PWR position, a logic 0 signal is generated on the system low-power enable control line. This signal is

3. LOCAL CONTROL AND MONITOR SIGNALS
3.1 General
3.1.13 Sytem-Low Power Enable

routed through cable W3 (P1-25 to P2-25) to the 1-kW power supply. This signal is then routed to the 1-kW power amplifier through cable W8 (P1-17 to P2-17). In the 1-kW power amplifier, the logic 0 signal switches the ALC and TGC circuits to the low-power setting. The ALC and TGC signals are routed to the exciter and establish transmitter gain at a reduced rf output level. When the PA PWR switch on the exciter is set to the HIGH PWR position, a logic 1 signal is generated. The logic 1 signal switches the ALC and TGC circuits to the high-power setting. This allows full rated power from the 1-kW power amplifier.

3.1.14 Power amplifier Monitor Signals

NOTE

In addition to the system voltage/currents listed, the 1-kW power supply meter also monitors internal voltages.

The 1-kW power supply has a meter for monitoring analog voltages/ currents from the 1-kW power amplifier to aid in the operation and maintenance of the HF-80 1-kW Transmitter System. The monitored voltages are as follows:-

a. Power amplifier rf voltage.

b. Power amplifier plate current.

c. Power amplifier screen voltage and current.

d. Forward power.

e. Reflected power.

f. Filament voltage.

g. IGC amplifier voltage.

h. Rf input voltage.

i. Driver rf output voltage.

4.0 FUNCTIONAL THEORY

4.1 HF-8014A Exciter

Refer to Figure 3. The HF-8014A is controlled directly from the front panel during local operation.

During remote operation the HF-8014A is controlled by the HF-8093 Exciter Control.

4.1.1 Local Operation

The HF-8014A is frequency controlled from the front panel. The frequency information is fed to the synthesizer cards and control card. The synthesizer processes the bcd frequency information to establish the frequency of the vfo output (109.35 to 79.35001 MHz). The control card provides the circuitry necessary to distribute all frequency information required for other circuits in the exciter and all other required system equipments.

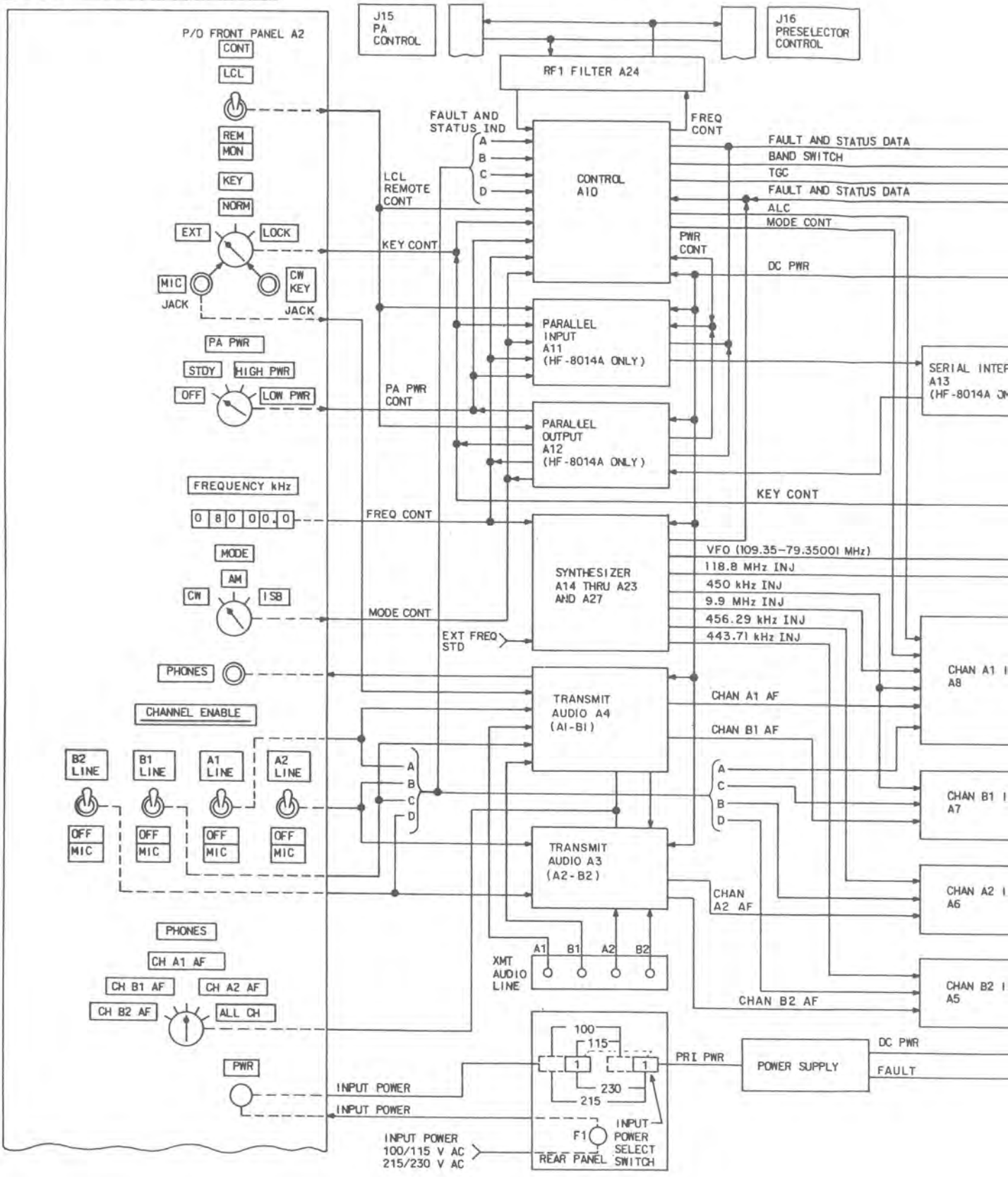
The HF-8014A operating modes are controlled from the front panel. Mode signals from the front panel are applied to the control card where they are distributed to the selected audio and if cards.

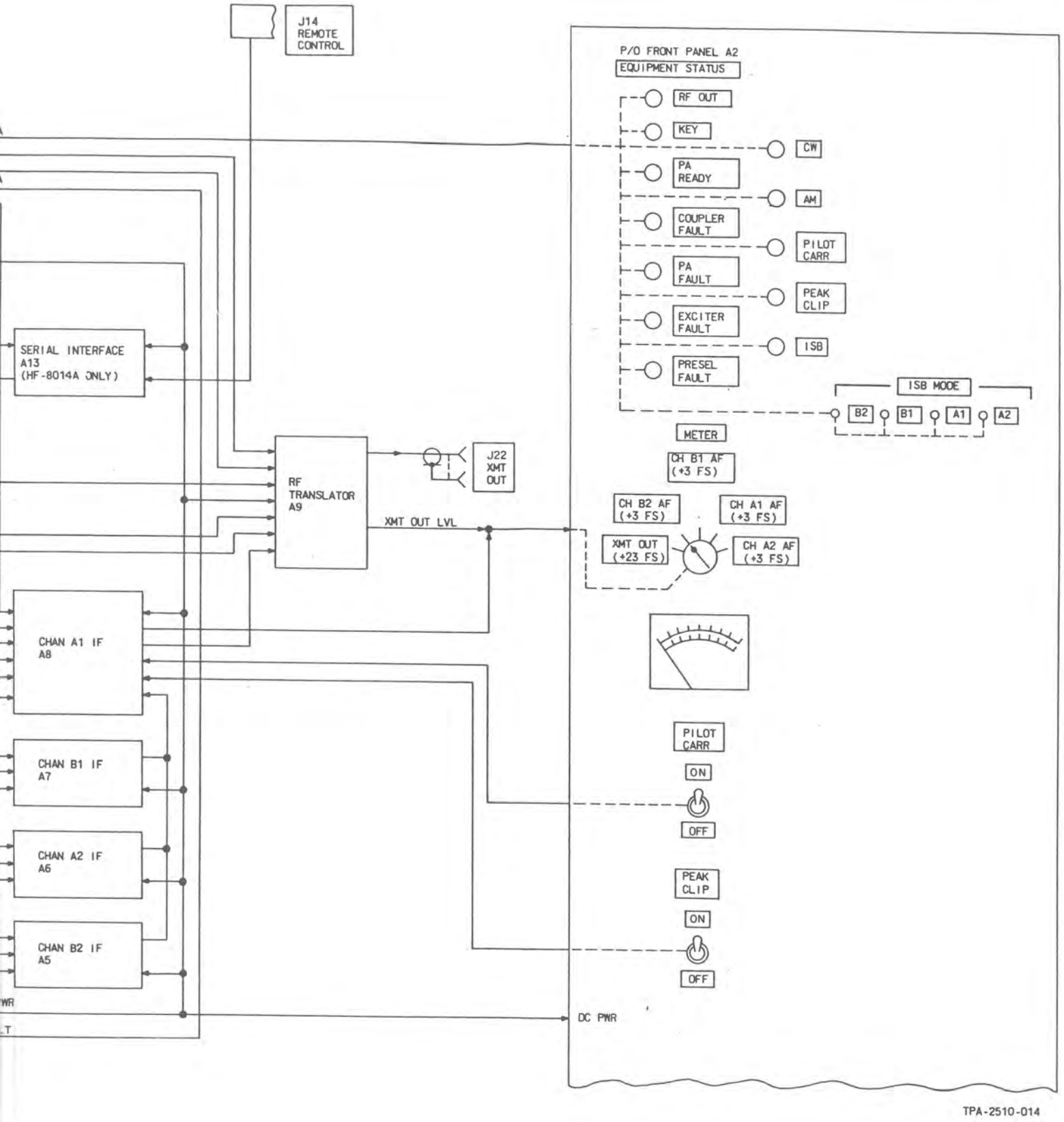
The HF-8014A transmit audio signals are applied at either the MIC jack on the The HF-8014A transmit audio signals are applied at either the MIC jack on the front panel or the Channel A1, Channel A2, Channel B1, and Channel B2 line inputs on the rear panel. These signals are applied to the A1-B1 audio card and the A2-B2 audio card where the audio channel is determined by the setting of the front panel CHANNEL ENABLE switches in conjunction with the MODE switch. The audio output from the audio cards is applied to the if amplifier circuit cards, A5 through A8. The if channels, channel A1, Channel A2, Channel B1, and Channel B2, are enabled in accordance with the MODE switch setting and the CHANNEL ENABLE switches. In the if cards the audio signal is converted to the first if signal and then mixed with 9.9 MHz to produce the 9.45 MHz second if that is supplied to the rf translator module. The first if signal is obtained by mixing the audio signal with 450 kHz on the channel A1 if and the channel B 1 if, with 456.29 kHz on the channel A2 if, and with 443.71 kHz on the Channel B2 if. The 9.9 MHz mixing is accomplished only on the channel A1 if circuit card. The 9.45 MHz signal applied to the rf translator module is mixed with the fixed 118.8 MHz injection signal and the vfo injection signal to provide an rf output signal to drive the power amplifier. The level of the output signal is controlled by the TGC signal during the system tuning operation and by the ALC signal during normal transmission.

4.1.2 Remote Operation

The HF-8014A exciter is used with the HF-8093 Exciter Control for remote operation. The HF-8014A contains the following cards: serial interface, parallel input and parallel output cards. Refer to HF-8014A instruction book for detailed analysis.

4.0 FUNCTIONAL THEORY
4.1 HF-8014A Exciter
4.1.2 Remote Operation





HF-8014/8014A Exciter, Block Diagram
Figure **3**

4.0 FUNCTIONAL THEORY
4.1 HF-8014A Exciter
4.1.2 Remote Operation

The control card performs as a switching unit so that controls and monitoring may be selected on the front panel of the local exciter or on the front panel of a remote exciter control.

The functions selected from the remote exciter are sent to the exciter serial interface card, and then to the parallel output card, transposed to parallel format and applied to the control card for distribution to the appropriate circuits. Monitor functions from the exciter are sent from the control card to the parallel input card, transposed to serial data, sent to the serial interface card for distribution to appropriate circuits in the remote exciter control.

4.2 HF-8020 1-kW Power Amplifier

Refer to Figure 4. The HF-8020 amplifies a 100 mW rf input signal to provide an rf power output of 1-kW pep or average in the hf frequency range of 1.6000 to 29.9999 MHz.

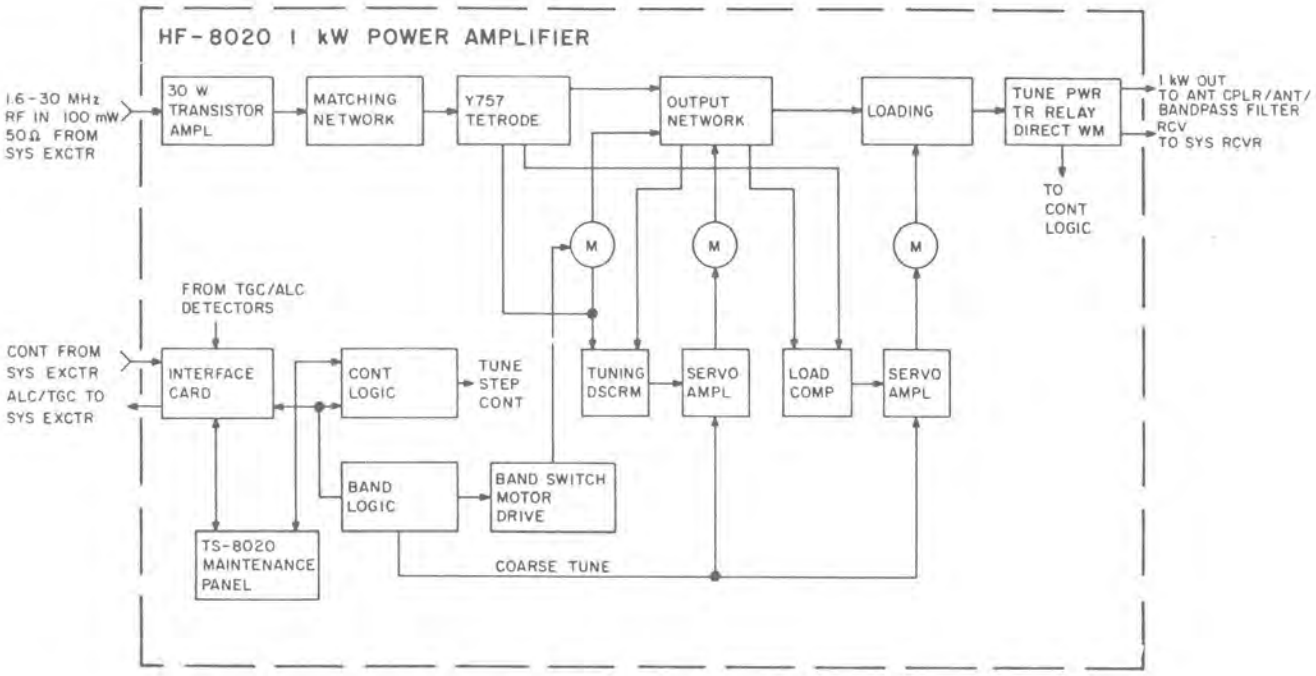
The 100-mW rf input is applied to the 30-W amplifier. This transistorized amplifier consists of four class A biased stages that amplify the input signal to the level required to drive power amplifier V1. Power amplifier V1 amplifies the 30-W input signal and provides an output signal of 1-kW pep or average. This signal is routed through the automatically tuned output network, loading coil, and directional wattmeter to the output connector.

Forward and reflected power measurements are provided by a directional coupler in the rf output line. The assembly contains the directional wattmeter, transmit/receive relay, tune power relay, and antenna interlock circuits. The tune power resistor assembly provides isolation of an antenna coupler or bandpass filter (when used) during a coupler or bandpass filter tuning period.

The interface card provides all circuits necessary to interface with the associated HF-80 Transmitter equipments.

Complete tuning of the HF-8020 is accomplished in approximately 6- seconds (10 seconds maximum). The tuning sequence consists of three tuning operations: band switching, coarse tuning, and fine tuning. The three tuning operations are accomplished in seven sequential steps that are controlled and monitored by the control logic circuits. Refer to paragraph 3 for overall functional system description of tuning sequence.

4.0 FUNCTIONAL THEORY
4.2 HF-8020 1-kW Power Amplifier



HF-8020 1-kW Power Amplifier, Block Diagram
Figure **4**

The frequency control information is applied to the interface card. This information is routed to the control logic card and to the band logic card. The band logic card combines the functions of band logic, band switching motor drive, coarse tuning, and servo input switching. The tuning elements in the output network and the loading coil are initially positioned by band switching logic and coarse-tuning information from the band logic card.

The tuning element in the output network is fine tuned by a phase discriminator. The phase discriminator compares the phase difference between the input and output signals of the power amplifier V1. When a tuning error is detected, the phase discriminator provides a signal to a servo amplifier that drives a servo motor. This servo motor drives the tuning element in the outpu t network until the tuning error is corrected.

4.0 FUNCTIONAL THEORY

4.2 HF-8020 1-kW Power Amplifier

The loading coil is fine tuned by a load comparator. The load comparator compares the output of the plate and grid voltage detectors of power amplifier V1. When the ratio of these voltages is incorrect, the load comparator provides a signal to a servo amplifier that drives a servo motor. This servo motor drives the loading coil until the desired voltage ratio is obtained.

4.3 HF-8030 1-kW Power Supply

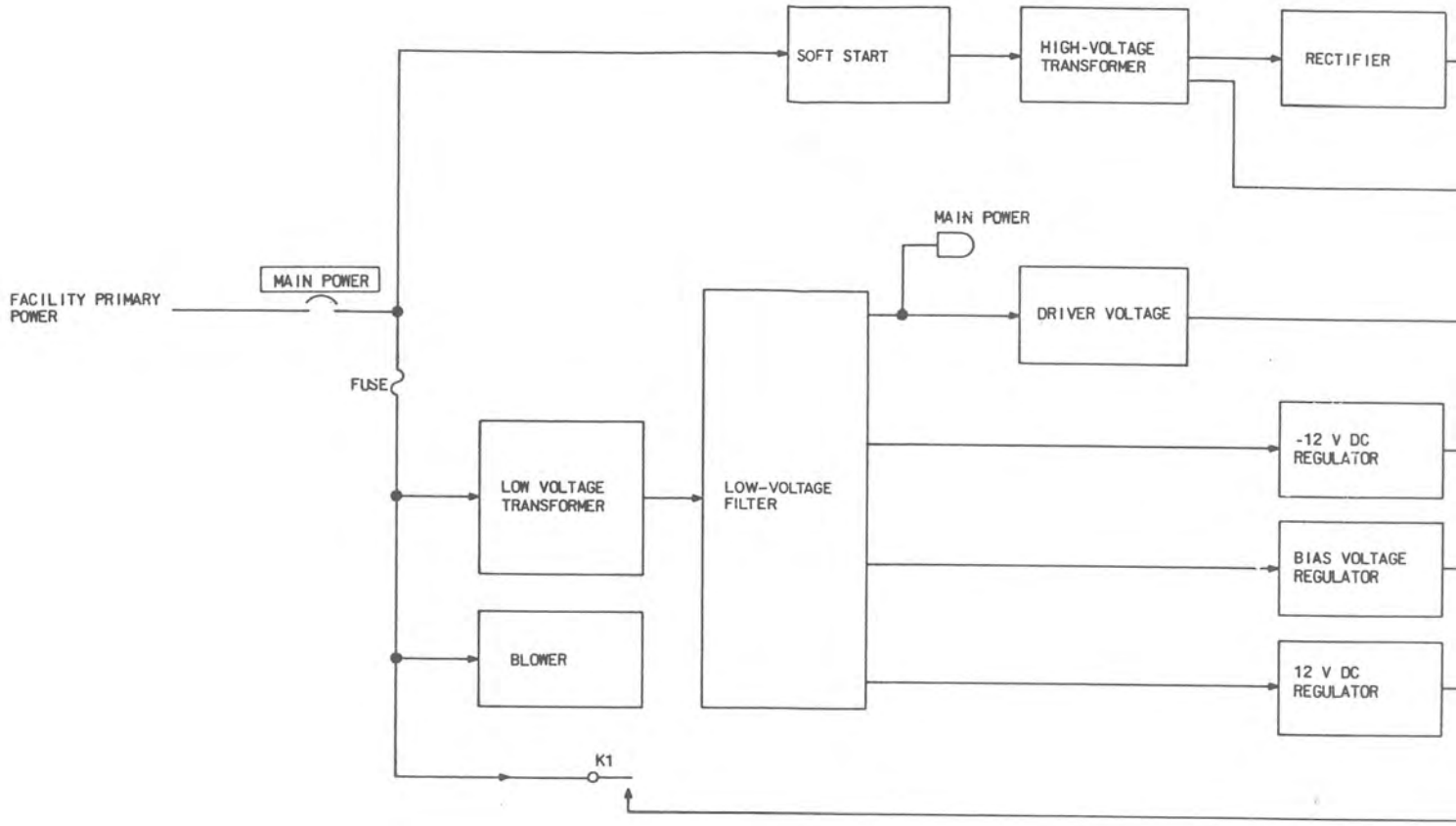
Refer to Figure 5. The HF-8030 provides operating voltages for the HF-8020 1-kW Power Amplifier.

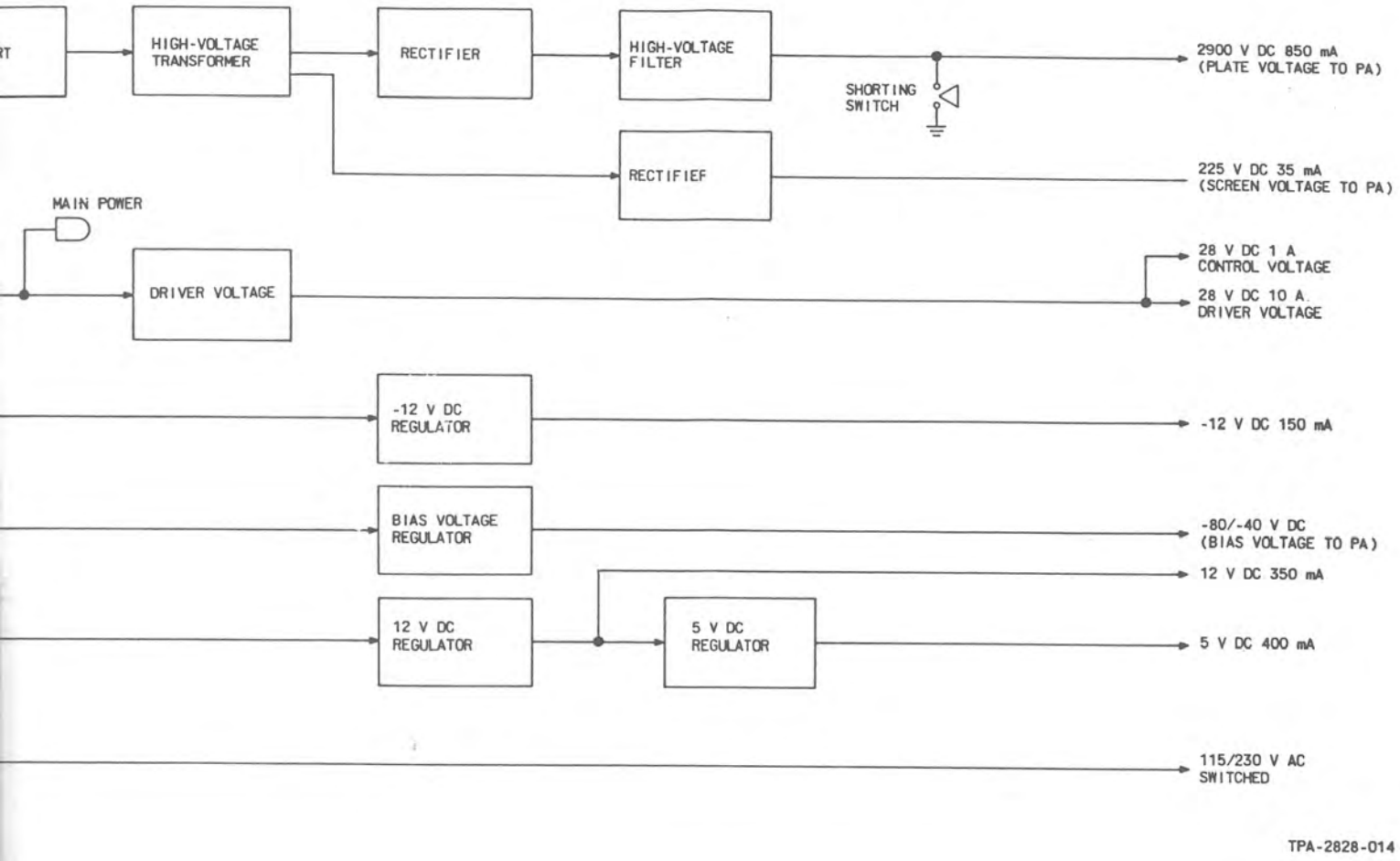
4.3.1 High-Voltage Circuits

Input voltage, 105/210, 115/230, 122/244 +/- 10% V ac, 47 to 63 Hz, single phase, is applied to the soft-start circuit through the MAIN POWER circuit breaker. The soft-start circuit prevents the initial surge of power to the high-voltage transformer. The input voltage is applied to the high-voltage transformer in steps over a period of 825 ms. After this period of time, the full voltage input is present.

A nominal 2900 V dc at 850 mA is provided for the final rf amplifier plate voltage in the HF-8020. This voltage is an output of transformer A1T1, a rectifier circuit, and an associated high-voltage filter. Shorting switch A1S3 is actuated by the HF-8030 top cover. This switch provides high-voltage protection for maintenance personnel by grounding the high-voltage circuit when the cover is removed.

4.0 FUNCTIONAL THEORY
4.3 HF-8030 1-kW Power Supply
4.3.2 Low-Voltage Circuits





HF-8030 1-kW Power Supply, Block Diagram
Figure 5

4.0 FUNCTIONAL THEORY
4.3 HF-8030 1-kW Power Supply
4.3.2 Low-Voltage Circuits

The low-voltage transformer provides the voltage for the driver, bias, and other low-voltage requirements of the HF-8020. These circuits are protected by a fuse. Rectifier and filter circuits are then provided for the low-voltage outputs. The voltage level of all voltages are supplied to a power supply monitor (monitor summary) for monitoring by external equipment.

A regulated 28-V dc, 10-A, driver voltage is provided by the low- voltage circuit. The power supply control circuit card provides a driver control to set the operating level of the regulator circuits in the driver voltage heat-sink assembly.

The low voltage circuit supplies a selectable -80-/-40-V dc bias voltage. This circuit provides a -80-V dc blocking bias for the rf power amplifier in the HF-8020 when the power amplifier is unkeyed and a nominal -40V dc (variable) when the power amplifier is keyed. The bias level is controlled in the circuits of power supply control card A2.

The 28-, 12-, -12-, and 5-V dc power requirements of the HF-8020 are supplied by the low-voltage circuits. Ac power from the low-voltage transformer is rectified, filtered, and regulated.

4.3.3 External Control Signals

The external control signals are generated in the HF-8020 (controlled by exciter) and routed to the HF-8030. These signals enable, inhibit, or switch output voltages.

The HIGH VOLTAGE ON signal is determined by the operational status of the HF-8020. A logic 0 applied to soft-start control enables the soft-start circuit. This enables the high-voltage circuits which supply plate and screen grid voltages to the power-amplifier in the HF-8020. A logic 1 signal inhibits the high-voltage circuits.

The PA KEY LINE signal is determined by the keying status of the HF-8020. When the HF-8020 is keyed, a logic 0 signalis applied to the bias regulator circuit which drops the bias voltage from -80 V dc to a nominal -40 V dc (adjustable). A logic 1 signal changes the bias level back to -80 V dc.

The LOW VOLTAGE ON signal is applied from the HF-8020 to the driver control circuits in the HF-8030. A logic 0 signal enables the 28-V dc driver voltage circuits. A logic 1 signal inhibits the 28-V dc driver voltage circuits.

4.3.4 Monitor Circuits

Analog voltages from the HF-8020 and the antenna coupler are routed to a selector switch on the front panel of the HF-8030. These various voltages, currents, and

4.0 FUNCTIONAL THEORY
4.3 HF-8030 1-kW Power Supply
4.3.4 Monitor Circuits

power analogs are selected by the switch and displayed on a front panel meter.

A voltage monitor located on the control card monitors the low voltages produced by the HF-8030 and a thermal sensor switch. If an over-temperature condition exists, a logic 1 signal is generated which disables the HF-8020.

4.4 HF-8060 Preselector (Optional)
4.4.1 General

Refer to Figure 6. In transmit, the preselector reduces broadband noise and spurious outputs.

4.4.2 Transmit Function

The transmit signal is applied to XMT IN jack J4. This signal is routed through the contacts of relay A7K2 to 3-pole filter assembly A8. The control system selects the appropriate filter. Rf amplifier A6 restores the signal level lost in the filter. The amplified signal is applied to XMT OUT jack J4.

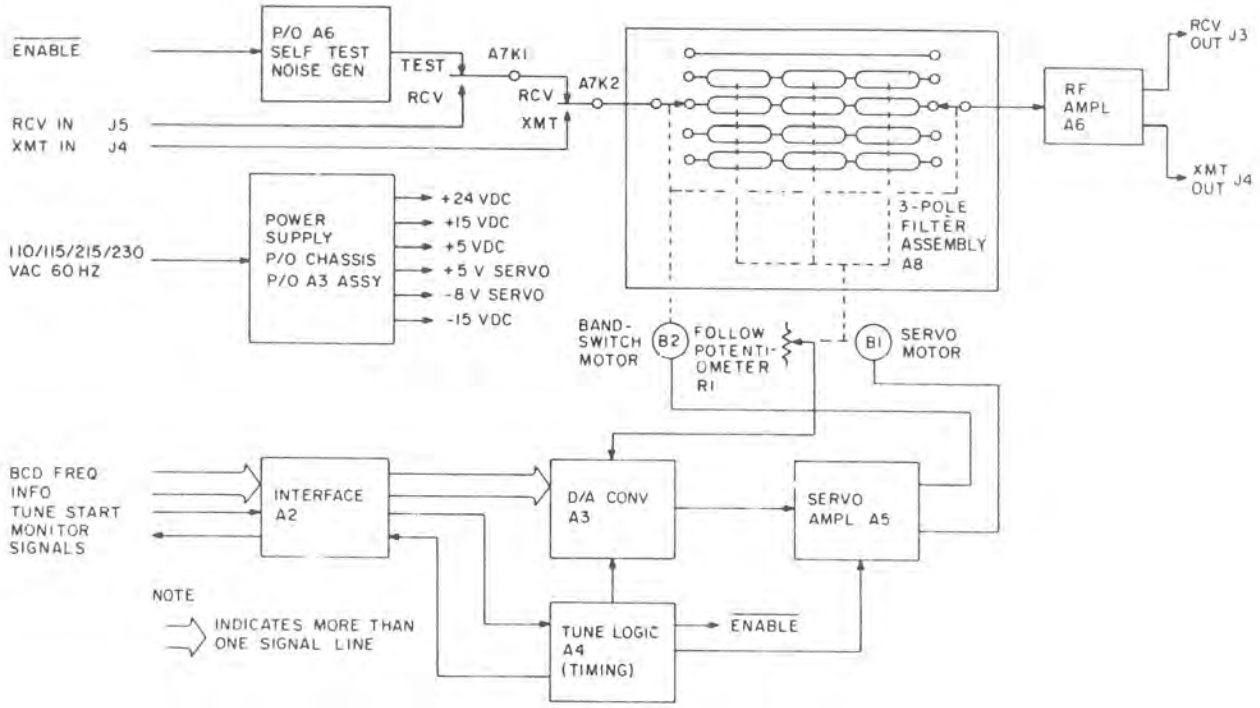
4.4.3 Control and Monitor Function

Bcd frequency information and a tune start signal are applied to interface card A2. The frequency information is applied in digital form to a d/a converter A3. A digital logic circuit on d/a converter A3 converts the five most significant frequencies to appropriate frequency band signals.

The frequency band signal and a timing signal from tune logic A4 energize band-switch motor B2. This motor selects the proper frequency band in 3-pole filter assembly A8. If the frequency does not fall within one of four bands, motor B2 effectively bypasses the filters. An out-of-band frequency also energizes relays which bypass rf amplifier A6. The frequency, in digital form, is converted to a dc voltage in d/a converter A3 and is compared with the output of the follow potentiometer. Servo motor B1 drives the follow potentiometer until a null condition exists between the potentiometer voltage and the d/a converter voltage. When this condition is attained the 3-pole filter is tuned to the proper frequency.

A monitor signal is routed from tune logic A4 through interface card A2 to associated equipment to indicate the operational status of the preselector. In addition, a FAULT and OVERLOAD indicator on the front panel of the preselector provides local indications of operational status.

4.0 FUNCTIONAL THEORY



HF-8060 Preselector, Block Diagram
Figure 6

4.5 HF-8093 Exciter Control

4.5.1 General

The HF-8093 provides complete operating control for from one to 16 remote HF-8014A exciters. Voice grade communication lines can be used for frequency, mode, power level, keying, and ISB channel commands. Equipment status indicators provide fault indications and operational status for the controlled equipment. Control of a single remote HF-8014A is through an FSK modem. Control of the multiple remote units using the HF-8093 is through strappable EIA RS-232C or MIL-STD-188C circuits within the HF-8093. The HF-8093 Exciter Control also may be used as an input/output device with a processor when strapped this way.

Two methods of serial data signaling are used in the HF-8093. They are strap selectable on the serial interface card. The two methods are frequency shift audio tones (FSK) and RS-232C data logic levels. In conjunction with selection of the RS-232C signaling,strapping is available to invert the polarity of the RS-232C data for compatibility with the logic polarity and voltage levels defined in MIL-STD-188C.

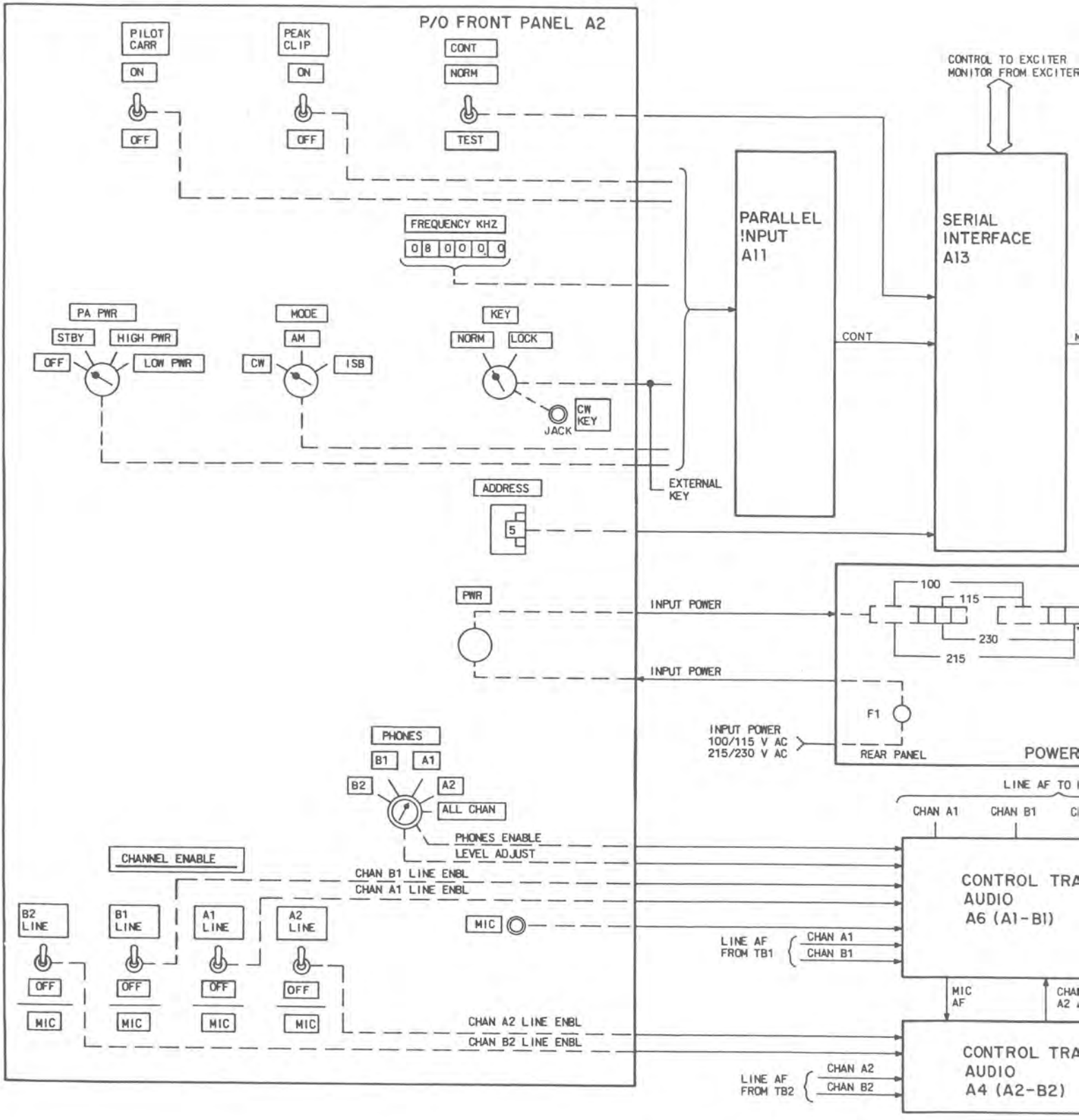
4.0 FUNCTIONAL THEORY
4.5 HF-8093 Exciter Control
4.5.1 General

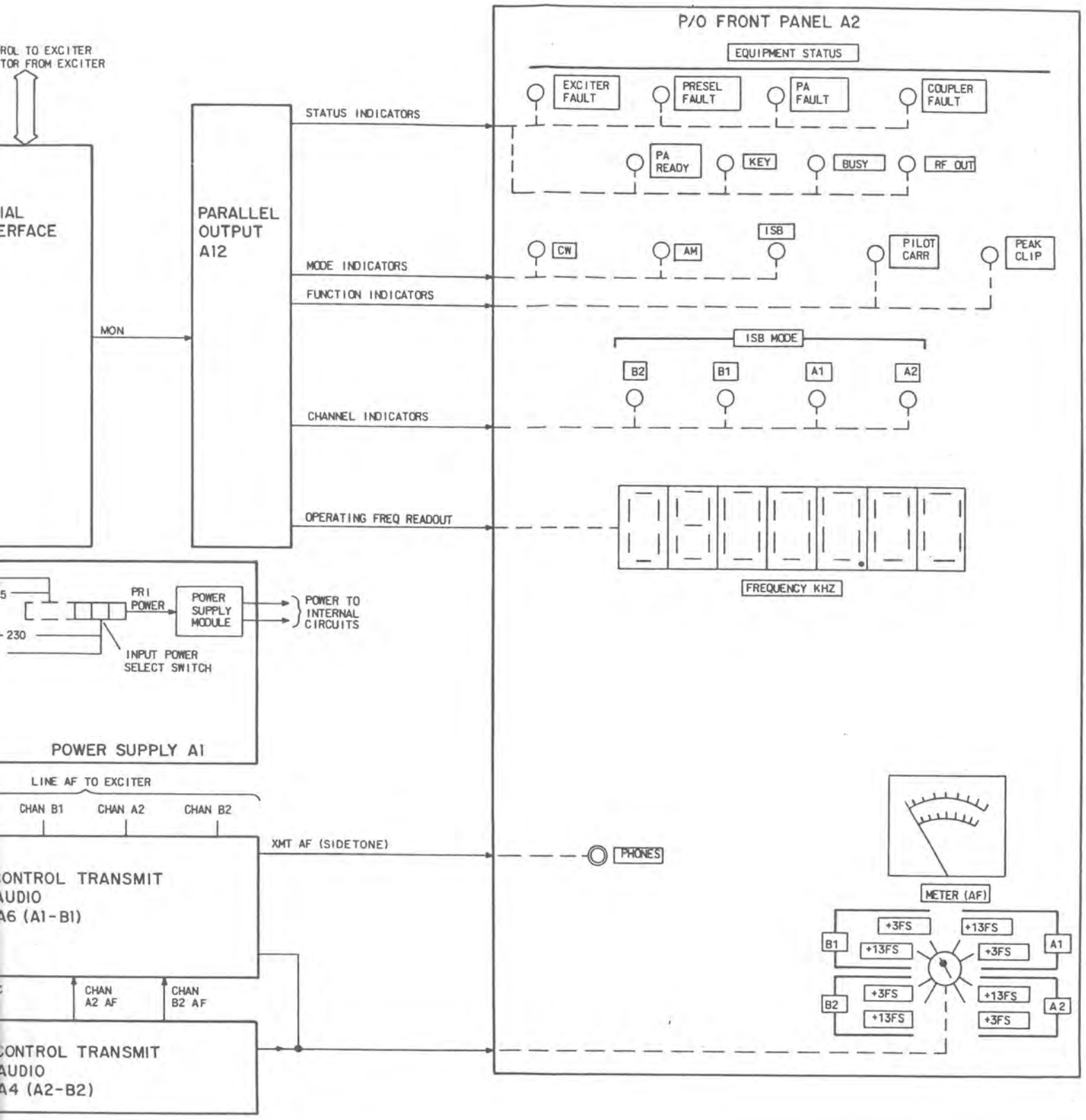
When the FSK method of serial data signaling is used only one remote HF-8014A may be controlled with a single HF-8093. When the RS-232C logic level signaling method is used, up to 16 individually addressable remote HF-8014A may be controlled and monitored by direct connection to the HF-8093 or by transmission over data modems for longer distances.

Two separate sets of data lines are connected to the HF-8093: the control bus and monitor bus. The monitor bus is used to receive status information. The control bus is used to send control data to the HF-8014A exciter. When FSK signaling is used, the control and monitor of frequency, mode, power-amplifier power level, and keying information from the front panel controls are applied in parallel format to pass information and apply the resulting signals to the serial interface card as four 8-bit, 5-character words. Address information also from the front panel is applied directly to the serial interface card. The address and data information are combined to form the four data words applied in serial format to the HF-8014A.

Two different data formats are available, and are switch selectable on the serial interface card. One format uses 7-bit ASCII coded characters, tables 1 and 2, and the other format uses an 8-bit BYTE character code, table 3. The input to the serial interface card is the same for both ASCII or 8-bit BYTE codes.

4.0 FUNCTIONAL THEORY
4.5 HF-8093 Exciter Control
4.5.1 General





TPA-2697-014

HF-8093 Exciter Control, Block Diagram
Figure 7

4.0 FUNCTIONAL THEORY
4.5 HF-8093 Exciter Control
4.5.1 General

Table 1. ASCII Control Word Format.

	CHARACTER SIGNIFICANCE	ASCII PRINT CHARS	FUNCTIONAL BIT CODING			
			WT 8	WT 4	WT 2	WT 1
	CR LF A1 A2 SD F1 F2 F3 F4 F5 F6 F7 F8 X — WORD 1 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	0,1,2	NA	NA	NA	NA
F1	FREQUENCY 10 MHz (BCD)	0,1,2	0	0	10 MHz (2)	10 MHz (1)
F2	FREQEUNCY - 1 MHz (BCD)	0-9	1 MHz (8)	1 MHz (4)	1 MHz (2)	1 MHz (1)
F3	FREQUENCY-100 kHz (BCD)	0-9	100 kHz (8)	100 kHz (4)	100 kHz (2)	100 kHz (1)
F4	FREQUENCY- 10 kHz (BCD)	0-9	10 kHz (8)	10 kHz (4)	10 kHz (2)	10 kHz (1)
F5	FREQUENCY- 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
F6	FREQUENCY-100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
F7	FREQUENCY- 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
F8	FREQUENCY- 1 Hz (BCD)	0-9	1 Hz (8)	1 Hz (4)	1 Hz (2)	1 Hz (1)
X	EXECUTE	X	NA	NA	NA	NA
	CR LF A1 A2 SD M1 M2 M3 M4 M5 M6 M7 M8 X — WORD 2 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	4,5,6	NA	NA	NA	NA
M1	RESERVED	0	0	0	0	0
M2	RESERVED	0	0	0	0	0
M3	RESERVED	0	0	0	0	0
M4	RESERVED	0	0	0	0	0
M5	RESERVED	0	0	0	0	0
M6	PEAK CLIPPER ENABLE	0,1	0	0	0	PEAK CLIPPER ENABLE
M7	MODE	0-9, A-F	0	AM ENABLE	CW ENABLE	ISB ENABLE
M8	ISB CHANNEL ENABLES	0-9, A-F	B2 ENABLE	B1 ENABLE	A1 ENABLE	A2 ENABLE
X	EXECUTE	X	NA	NA	NA	NA
	CR LF A1 A2 SD V1 V2 V3 V4 V5 V6 V7 V8 X — WORD 3 CHARACTER SEQUENCE					
CR	CARRIAGE RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	8,9,A	NA	NA	NA	NA
V1	RESERVED	0	0	0	0	0
V2	RESERVED	0	0	0	0	0
V3	RESERVED	0	0	0	0	0
V4	RESERVED	0	0	0	0	0
V5	AUXILIARY	0-9, A-F	-	-	-	-
V6	AUXILIARY	0-9, A-F	-	-	-	-
V7	RESERVED	0	0	0	0	0
V8	PILOT CARRIER/PA CONTROL	0-9, A-F	PILOT CARR ENABLE	PA LO PWR ENABLE	PA HV ENABLE	PA LV ENABLE
X	EXECUTE	X	NA	NA	NA	NA
	CR LF A1 A2 SD K1 X — WORD 4 CHARACTER SEQUENCE					
CR	CARRIER RETURN	CR	NA	NA	NA	NA
LF	LINE FEED	LF	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	C,D,E	NA	NA	NA	NA
K1	EXCITER/PA SYSTEM KEY	0,1	0	0	0	SYSTEM KEY
X	EXECUTE	X	NA	NA	NA	NA

4.0 FUNCTIONAL THEORY
4.5 HF-8093 Exciter Control
4.5.1 General

Table 2. ASCII Monitor Word Format.

CHARACTER SIGNIFICANCE		ASCII PRINT CHARS.	FUNCTIONAL BIT CODING WT 8	WT 4	WT 2	WT 1
-	-	A1 A2 SD F1 F2 F3 F4 F5 F6 F7 F8 S	WORD 1 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	1	NA	NA	NA	NA
F1	FREQUENCY- 10 MHz (BCD)	0,1,2	0	0	10 MHz (2)	10 MHz (1)
F2	FREQUENCY 1 MHz (BCD)	0-9	1 MHz (8)	1 MHz (4)	1 MHz (2)	1 MHz (1)
F3	FREQUENCY- 100 kHz (BCD)	0-9	100 kHz (8)	100 kHz (4)	100 kHz (2)	100 kHz (1)
F4	FREQUENCY- 10 kHz (BCD)	0-9	10 kHz (8)	10 kHz (4)	10 kHz (2)	10 kHz (1)
F5	FREQUENCY- 1 kHz (BCD)	0-9	1 kHz (8)	1 kHz (4)	1 kHz (2)	1 kHz (1)
F6	FREQUENCY- 100 Hz (BCD)	0-9	100 Hz (8)	100 Hz (4)	100 Hz (2)	100 Hz (1)
F7	FREQUENCY- 10 Hz (BCD)	0-9	10 Hz (8)	10 Hz (4)	10 Hz (2)	10 Hz (1)
F8	FREQUENCY 1 Hz (BCD)	0-9	1 Hz (8)	1 Hz (4)	1 Hz (2)	1 Hz (1)
S	END DELIMITER	S	NA	NA	NA	NA
-	-	A1 A2 SD M1 M2 M3 M4 M5 M6 M7 M8 S	WORD 2 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	5	NA	NA	NA	NA
M1	RESERVED	0	0	0	0	0
M2	RESERVED	0	0	0	0	0
M3	RESERVED	0	0	0	0	0
M4	RESERVED	0	0	0	0	0
M5	RESERVED	0	0	0	0	0
M6	PEAK CLIPPER ENABLE	0	0	0	0	PEAK CLIPPER ENABLE
M7	MODE	0-9, A-F	0	AM ENABLE	CW ENABLE	ISB ENABLE
M8	ISB CHANNEL ENABLES	0-9, A-F	B2 ENABLE	B1 ENABLE	A1 ENABLE	A2 ENABLE
S	END DELIMITER	S	NA	NA	NA	NA
-	-	A1 A2 SD V1 V2 V3 V4 V5 V6 V7 V8 S	WORD 3 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	9	0	0	0	0
V1	RESERVED	0	0	0	0	0
V2	RESERVED	0	0	0	0	0
V3	RESERVED	0	0	0	0	0
V4	RESERVED	0	0	0	0	0
V5	AUXILIARY	0-9, A-F	-	-	-	-
V6	AUXILIARY	0-9, A-F	-	-	-	-
V7	RESERVED	0	0	0	0	0
V8	PILOT CARRIER/PA CONTROL	0-9, A-F	PILOT CARRIER ENABLE	PA LOW PWR ENABLE	PA HIGH VOLT ENABLE	PA LOW VOLT ENABLE
S	END DELIMITER	S	NA	NA	NA	NA
-	-	A1 A2 SD S1 S2 S3 S4 S5 S6 S7 S8 S	WORD 4 CHARACTER SEQUENCE			
-	HYPHEN	-	NA	NA	NA	NA
-	HYPHEN	-	NA	NA	NA	NA
A1	ADDRESS, M.S.D. (BCD)	0-3	0	0	A1(2)	A1(1)
A2	ADDRESS, L.S.D. (BCD)	0-9	A2(8)	A2(4)	A2(2)	A2(1)
SD	SEQUENCE DESIGNATOR	0	NA	NA	NA	NA
S1	EXCITER FAULT/KEY MONITOR	0-3	0	0	EXCITER FAULT	SYSTEM KEY MONITOR
S2	AF MONITORS	0-9, A-F	B2 AF MONITOR	B1 AF MONITOR	A1 AF MONITOR	A2 AF MONITOR
S3	SYNTH FAULTS	0-9, A-F	0	10 Hz LOCK FAULT	100 Hz LOCK FAULT	1 kHz LOCK FAULT
S4	SYNTH FAULTS	0-9, A-F	10 kHz LOCK FAULT	100 kHz LOCK FAULT	SYNTH OUT LOCK FAULT	FREQ REF FAULT
S5	SUBCARRIER FAULT/RF MON/PWR SPLY FAULT	0-7	0	SUBCARR LOCK FAULT	EXCITER RF MONITOR	EXCTR PWR SPLY FAULT
S6	EXTERNAL STD/IF MONITOR	0-9, A-F	0	EXTERNAL STANDARD	A1 IF MONITOR	0
S7	PA/COUPLER STATUS	0-9, A-F	PA READY	PA FAULT	PA RF MONITOR	COUPLER FAULT
S8	PRESEL FAULT/DATA ERROR/LOCAL/MONITOR	0-9, A-F	PRESEL FAULT	DATA ERROR	LOCAL CONTROL	MONITOR
S	END DELIMITER	S	NA	NA	NA	NA

4.0 FUNCTIONAL THEORY
4.5 HF-8093 Exciter Control
4.5.1 General

Table 3 Control and Monitor Word Format.

WORD	CHAR-ACTER	STOP BIT	PARITY BIT	CHARACTER BIT POSITION B8	B7	B6	B5	B4	B3	B2	B1	START BIT	REF NOTES
1	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	0	ADDRESS A4	A3	A2	A1	0	②
	2	1	X	CMD/STATUS REQ $\bar{C}$=0	$\bar{S}$=1	FREQ (10 MHz) (2)	(1)	FREQ (1 MHz) (8)	(4)	(2)	(1)	0	②
	3	1	X	FREQ (100 kHz) (8)	(4)	(2)	(1)	FREQ (10 kHz) (8)	(4)	(2)	(1)	0	
	4	1	X	FREQ (1 kHz) (8)	(4)	(2)	(1)	FREQ (100 Hz) (8)	(4)	(2)	(1)	0	
	5	1	X	FREQ (10 Hz) (8)	(4)	(2)	(1)	FREQ (1 Hz) (8)	(4)	(2)	(1)	0	
2	1	1	X	WORD SYNC 1	1	SUBADDRESS 0	1	ADDRESS A4	A3	A2	A1	0	②
	2	1	X	CMD/STATUS REQ $\bar{C}$=0	$\bar{S}$=1	0	RESERVED					0	②
	3	1	X	RESERVED								0	
	4	1	X	RESERVED							PEAK CLIPPER ENABLE	0	
	5	1	X	MODE SELECT 0	AM	CW	ISB	CHAN B2 ENABLE	CHAN B1 ENABLE	CHAN A1 ENABLE	CHAN A2 ENABLE	0	
3	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	0	ADDRESS A4	A3	A2	A1	0	②
	2	1	X	CMD/STATUS REQ $\bar{C}$=0	$\bar{S}$=1	0	RESERVED					0	②
	3	1	X	RESERVED								0	
	4	1	X	AUXILIARY								0	
	5	1	X	RESERVED				PILOT CARRIER ENABLE	PA LOW POWER ENABLE	PA HIGH VOLTAGE ENABLE	PA LOW VOLTAGE ENABLE	0	
4	1	1	X	WORD SYNC 1	1	SUBADDRESS 1	1	ADDRESS A4	A3	A2	A1	0	②
	2	1	X	CMD/STATUS REQ $\bar{C}$=0	$\bar{S}$=1	EXCITER FAULT	SYSTEM KEY	B2 AF MON	B1 AF MON	A1 AF MON	A2 AF MON	0	②
	3	1	X	0	10 Hz LOCK FAULT	100 Hz LOCK FAULT	1 kHz LOCK FAULT	10 kHz LOCK FAULT	100 kHz LOCK FAULT	SYN OUT LOCK FAULT	FREQ REF FAULT	0	③
	4	1	X	0	SUBCARR LOCK FAULT	EXCITER RF MON	EXCITER PWR SPLY FAULT	0	EXTERNAL STANDARD	A1 IF MON	0	0	③
	5	1	X	PA READY	PA FAULT	PA RF MON	COUPLER FAULT	PRE-SELECTOR FAULT	DATA ERROR	LOCAL CONTROL	MONITOR	0	

NOTES:

① 1=LOGIC 1; 0=LOGIC 0; X=FUNCTION OF STRAPPING; (1),(2),(4) (8)=BINARY WEIGHT OF BIT POSITION.

② FROM A CONTROL UNIT, ONLY CHARACTERS 1 AND 2 ARE TRANSMITTED IN WORD 4; ONLY STATUS REQUEST ($\bar{C}$=1, $\bar{S}$=0) IS TRANSMITTED IN WORDS 1,2, AND 3.
ALL MONITOR WORDS ARE 5 CHARACTERS LONG.

③ MONITOR WORD 4 CHARACTERS 3,4, AND 5 CONTAIN FAULT AND PERFORMANCE MONITOR BITS FOR WHICH NO CORRESPONDING CONTROL BITS EXIST. DATA ERROR BIT IS THE LOGICAL SUM OF THE FOLLOWING CONDITIONS:

A. RECEIVED CHARACTER PARITY ERROR.
B. FRAMING ERROR (NO VALID STOP RECEIVED WITH THE CHARACTER)
C. OVERRUN ERROR (PREVIOUS CHARACTER NOT PROCESSED BEFORE THE CURRENT CHARACTER WAS RECEIVED).
D. INVALID CHARACTER SEQUENCE.

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4.0 FUNCTIONAL THEORY
4.5 HF-8093 Exciter Control
4.5.1 General

Monitor information is returned in serial format from the HF-8014A to the HF-8093 serial interface card. The serial inferface card decodes the information and applies the monitor data from serial to parallel output card. Circuits on the parallel output card convert the monitor data from serial to parallel format and apply the resulting signals to the indicators on the front panel. These indicators display that status of operating condition of the transmitter under control.

In single exciter configuations the audio lines may be run via the exciter control to the remote exciter. Audio may also be applied at the microphone input. The transmit audio card amplifies the audio inputs (LINE or MIC) and develops channel A1-B1 and channel A2-B2 audio outputs to the HF-8014A. The audio signals are received from the front panel microphone or the rear panel line terminals. Positioning of the CHANNEL ENABLE selector switch to eithr MIC or LINE position (from the OFF position) switches that channel from either the line or the microphone input and does not affect the other channels. Audio is supplied to the operator's headphone through a selector switch. This selector switch is capable of monitoring any one, or all of the ISB channels. A front panel meter monitors the audio frequency line input level.

In multiple exciter configurations the audio signals are applied direct to the exciters. For monitoring purposes they may be input to the rear panel line terminals. The phones selector switch enables any one (channel A1, B1, A2, B2) or all channels transmit audio output to be monitored in the headphones. The METER (AF) switch allows monitoring of any one or all of the channels input audio level.

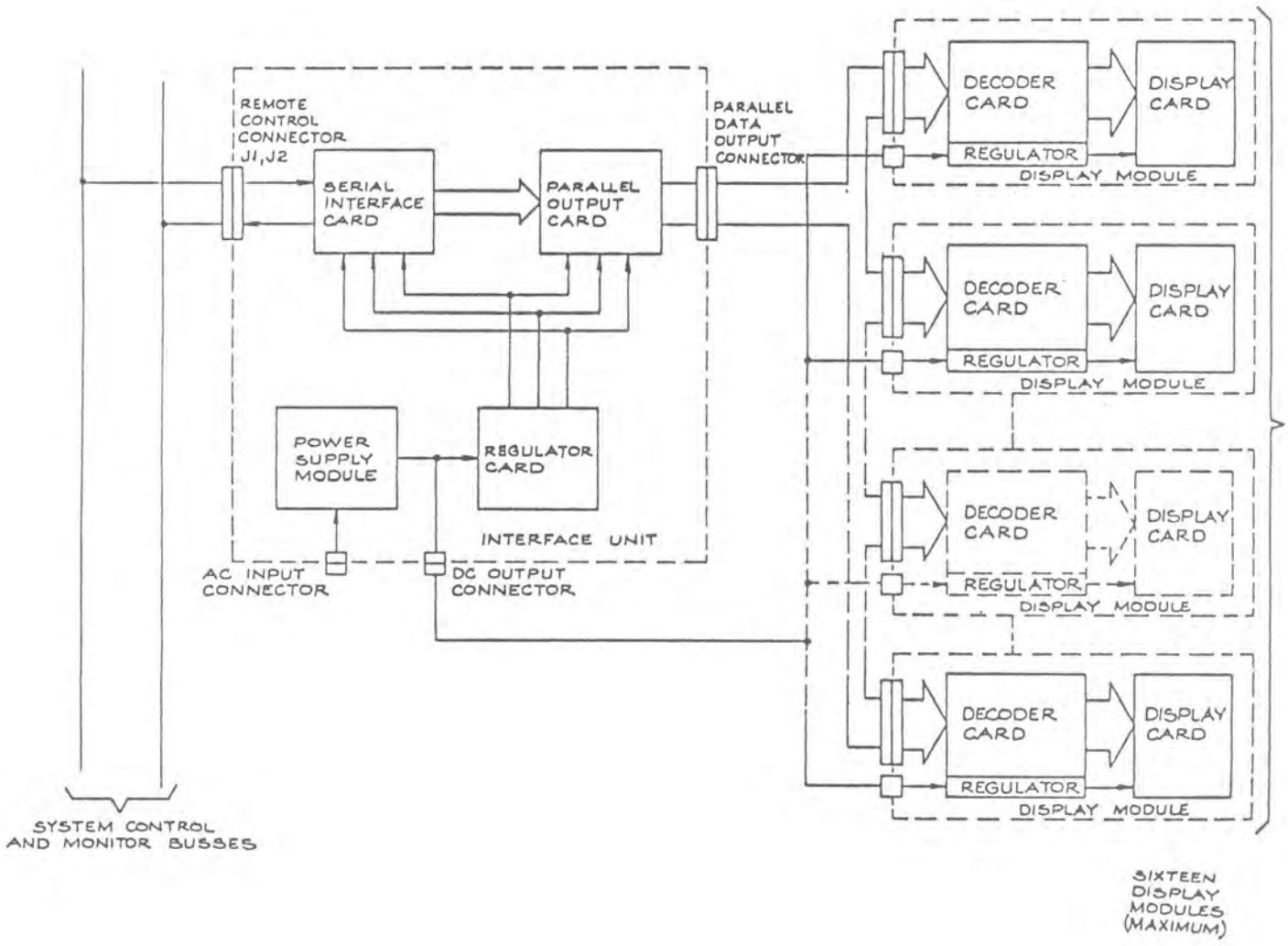
Primary input voltage of 100, 115, 215 or 230 V ac is selected by a switch onthe rear panel. Fuse F1 is 2 A when 100 or 115 V ac is selected and 1 A when215 or 230 V ac is selected. The power supply module provides the internal dc operating voltages.

4.6 HF-80 Remote Display
4.6.1 General

The remote display consists of an interface unit which decodes the serial data on the control bus into parallel format for display by the addressed display module and up to sixteen (16) display modules. Up to four display modules may be implemented in a single module frame and four module frames comprise a fully implemented display system.

A block diagram showing the various functional blocks of the remote display is shown in Figure 8.

4.0 FUNCTIONAL THEORY
4.6 HF-80 Remote Display
4.6.1 General



HF-80 Remote Display Block Diagram
Figure 8

4.0 FUNCTIONAL THEORY
4.6 HF-80 Remote Display
4.6.2 Functional Theory

The HF-80 Remote Display operates with either ASC-II or HF-80 word formats. In addition, strapping is available on the serial interface card, to invert the polarity of the RS-232C data for compatibility with the logic polarity and voltage levels defined in MIL-STD-188C.

Two separate sets of data lines are required by the remote display. One set, the control bus, is used to receive status information to be displayed from the HF-8093 Control Unit. The other set, the monitor bus, is used to respond to the control unit when interrogated such as after a power-down, power-up sequence.

Each display module must be addressed, via switch S1, to respond to the same address as its associated exciter.

Functional theory is discussed in further detail in the 10kW part of this book and in Instruction Book 523-1003164, HF-80 Remote Display.

5. THEORY OF OPERATION

5.1 HF-8134A Transmitter System

Refer to the HF-8134A 1-kW Transmitter Functional Diagram.

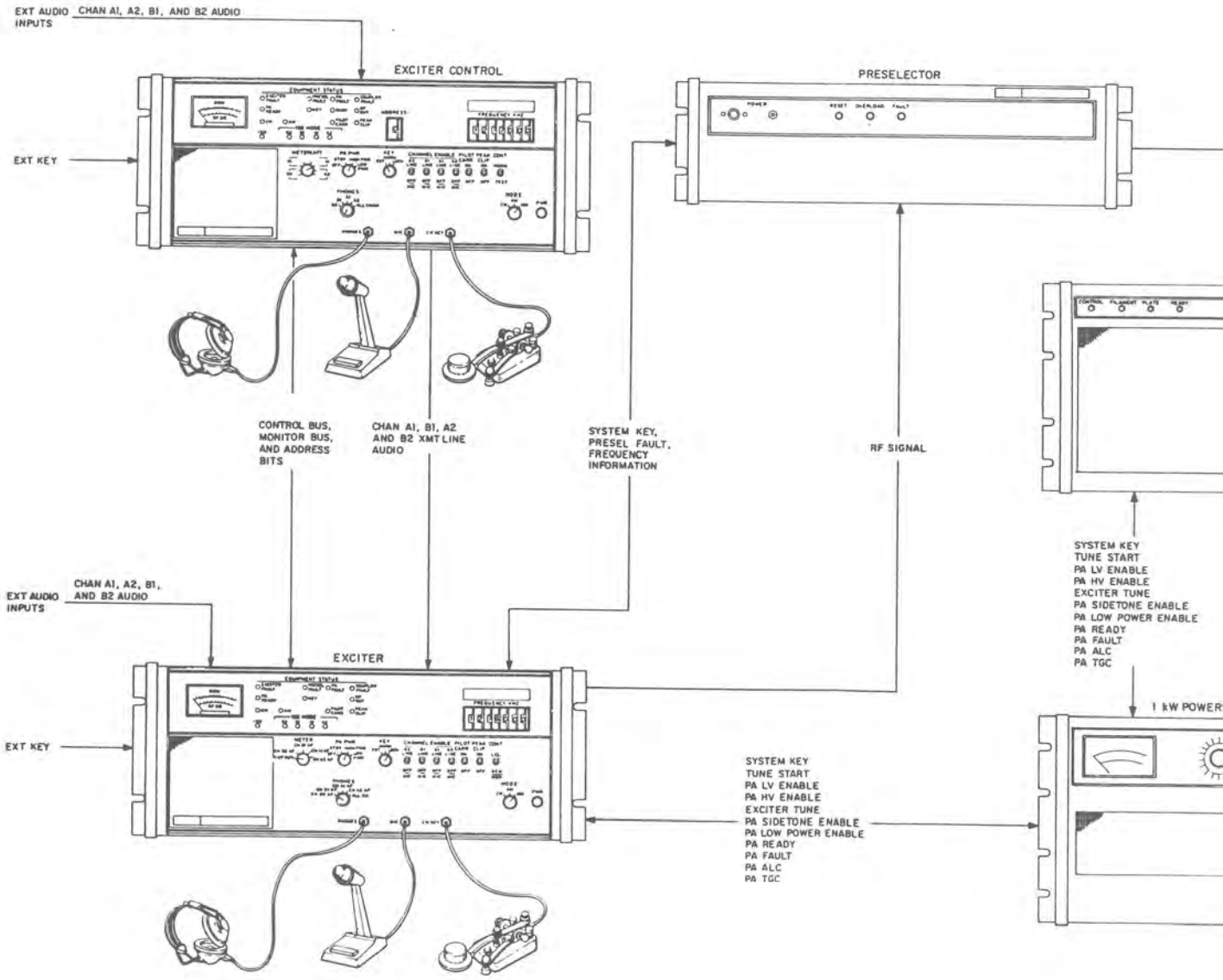
The HF-8093 controls the system by sending on the control bus control words that contain the operator-selected information. Status and fault information from the system is returned to the HF-8093 on the monitor bus.

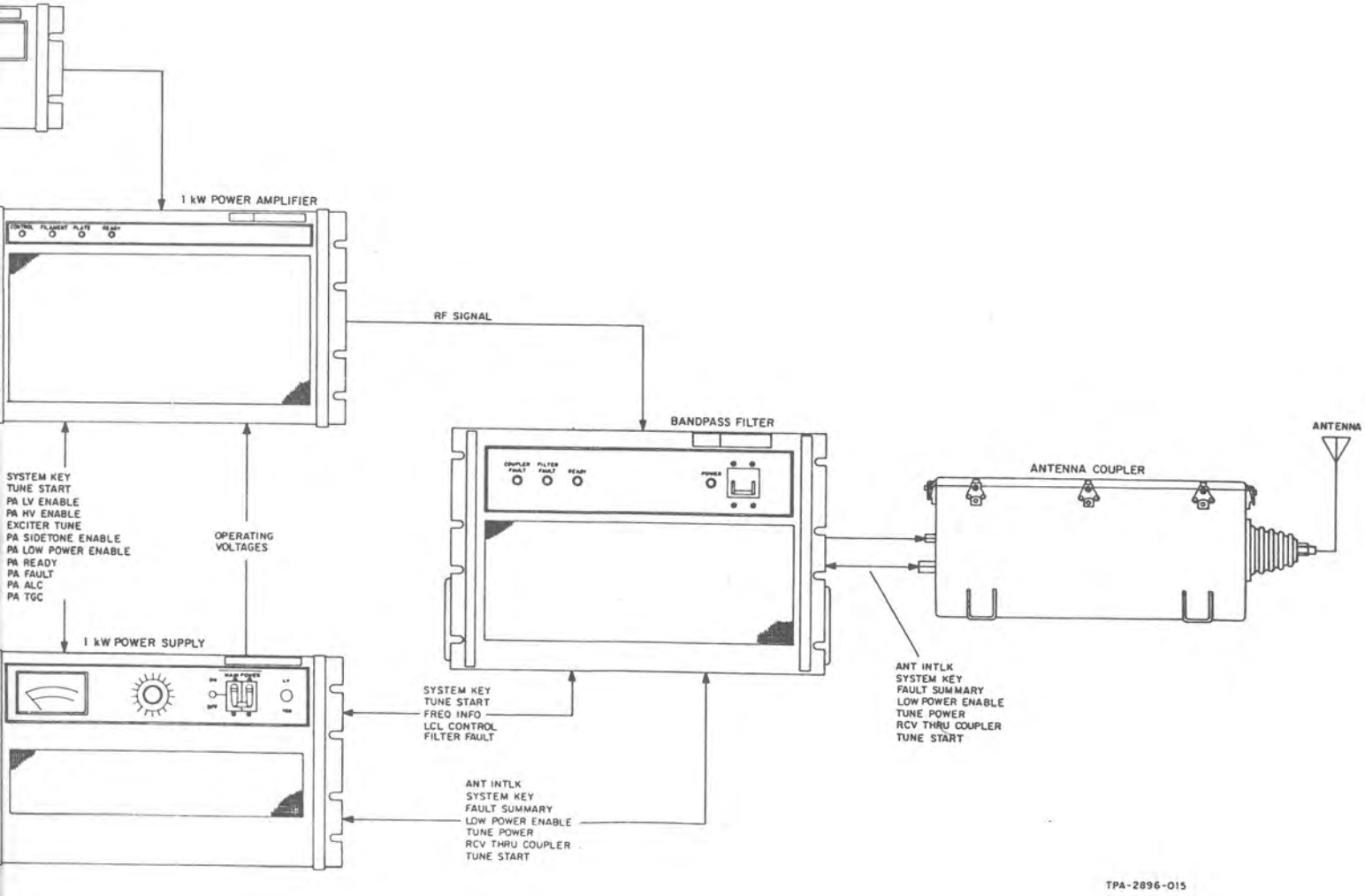
5.1.1. Energizing the System

To energize the HF-8134A, set the HF-8014A Exciter CONT switch to REM. Set the HF-8093 Exciter Control controls as follows:

CONTROL	SETTING
PA PWR	OFF
PWR	ON
KEY	NORM
FREQUENCY KHZ	Desired operating frequency
MODE	Desired mode of operation
CHANNEL ENABLE	Desired channel of operating when MODE switch is in ISB.
CONT	NORM
ADDRESS	Desired exciter to control. Sets binary address to the complement of the address indicated. Exciter with associated address strapping is the unit under control.

5. THEORY OF OPERATION
5.1 HF-8134A Transmitter System
5.1.1. Energizing the System





HF-8134A 1-kW Transmitter System
Functional Diagram
Figure 8

5. THEORY OF OPERATION

5.1 HF-8134A Transmitter System

5.1.1. Energizing the System

Turn on the system primary power source. On HF-8060 (if used), set POWER switch to ON and observe that POWER indicator is lit.

On the HF-8030, set MAIN POWER circuit breaker to ON. Observe that HF-8060 blower runs and the amber CONTROL indicator on the HF-8020 lights. On the HF-8014A set the PA PWR switch to STBY. Setting the PA PWR switch from off to STBY causes the HF-8014A to generate a system low voltage enable signal. This signal applied to the HF-8030 starts the HF-8020 blower motor and enables the HF-8020 tube filament voltage and low level supplies. The green FILAMENT indicator on the HF-8020 lights.

On the HF-8014A, set the PA PWR switch to HIGH PWR. Setting the PA PWR switch to HIGH PWR causes the HF-8014A to generate the system high voltage enable signal and the system low power enable (logic 1) signal. The system hv enable signal is processed by the HF-8020 control circits and if no fault exists and low voltage has been enabled for at least 3 minutes, the HF-8020 plate and screen voltages are enabled. The system low voltage enable signal at a logic 1 establishes the TGC threshold in the HF-8020 for high power. Setting the HF-8014A PA PWR switch to LOW PWR generates the system low power enable signal at a logic 0 level. The logic 0 system low power enable input to the HF-8020 sets the TGC threshold for low power operation. The HF-8014A PA PWR switch in either HIGH PWR or LOW PWR position causes the HF-8020 red plate indicator to light.

5.1.2 Transmitter System Tuning

The tuning sequence for the HF-8134A 1-kW Transmitter System is determined by the tuning sequence of the HF-8020. The tuning sequence consists of two tuning operations: coarse positioning and fine tuning. The operations are performed in seven sequential steps that are controlled and monitored by the control circuits in the HF-8020. Step 1, ready to tune, of the tune sequence consists of applying a tune start and a system key signal to the HF-8020, and determines the frequency selected by the operator for HF-80 tuning. The tune start signal is generated by changing the HF-8014A CONT switch to LCL, changing the FREQUENCY KHZ switches 1 kHz or more, or moving the PA PWR switch from HIGH PWR to LOW PWR or from LOW PWR to any position and back again. The tune start signal resets the HF-8020 tune sequence counter to step 1, sets the tune power threshold, and causes the HF-8020 to generate the exciter tune signal. The exciter tune signal applied to the HF-8014A enables a CW carrier rf ouput and enables maximum rf output. When the system key signal is applied to the HF-8020, the frequency of the CW carrier applied to the HF-8020 is determined and the tune sequence starts.

If the optional HF-8060 is used, the HF-8060 must tune to the desired operating frequency and the system key signal must energize a tr relay to allow the CW carrier to pass through the preselector to the HF-8020.

5. THEORY OF OPERATION

5.1 HF-8134A Transmitter System

5.1.2 Transmitter System Tuning

Normal progression through the 1-kW power amplifier tuning steps are described in paragraph 3.1

Normal transmission may then be established. The operator may monitor the transmit audio by plugging headphones into the PHONES jack and selecting channel A or channel B transmit audio using the PHONES switch.

5.1.3 System Faults

The HF-8020 generates a logic 0 signal on the pa fault line if any of the conditions specified in paragraph 4.1.3 occur. This signal applied to the HF-8014A drops the system key, and lights the PA FAULT indicator

If the HF-8014A generates a fault, the system key drops out and the EXCTR FAULT indicator lights.

The HF-8060 (if used) will generate a fault if the unit does not tune within 3 seconds or if there is no rf output. The preselector fault signal applied to the HF-8014A (if used) lights the PRESEL FAULT indicator.

1-kW TRANSMITTER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

MAINTENANCE

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table of contents

MAINTENANCE

1. GENERAL

This section presents information necessary to maintain the HF-8134A 1-kW Transmitter System. Testing and troubleshooting procedures isolate a fault to an equipment. Refer to the appropriate equipment instruction book for fault isolation and repair of the faulty equipment

WARNING

The HF-8134A 1-kW Transmitter System 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 the U.S. Occupational Safety and Health Administration (OSHA) recommended maximum limits.

2. TEST EQUIPMENT

Table 1 lists the test equipment and tools required to test, troubleshoot, and align the HF-80 1-kW Transmitter System.

TABLE 1 : TEST EQUIPMENT AND TOOLS

ITEM	MINIMUM SPECIFICATIONS	REPRESENTATIVE TYPE
Audio frequency signal generator	1000 Hz at 0 dB mW, 600-ohm output	HP-200 AB
Audio frequency vtvm	1000 Hz, -5 to + 5 dB mW	HP-400D
In-line rf wattmeter	2 to 30 MHz	Bird Model 43 with 1000H element.
Rf load	50 ohms, 2000 W	Bird 8329
Rd Signal Generator	1 to 20 MHz	HP 8640B-001
Microphone	Dynamic type	Collins SM-80, SM-81, MM-80 or MM-81 (or equivalent.
CW key	Hand-operated CW key	Collins AC-8010 (or equivalent.

3. TESTING/TROUBLESHOOTING

3.1 General

Maintenance for the HF-8134A Transmitter System is on a replacement/ repair concept. A known good unit is substituted for a defective unit, or the defective unit is repaired and retested. Whenever a unit is replaced/repaired (except for defective indicators) during the testing/ troubleshooting procedure, the test must be restarted from the beginning.

3.2 Physical Checks

Before performing the system testing/troubleshooting procedures, check the system for proper cabling, grounding, and bonding.

3.3 Testing/Troubleshooting Procedures

Refer to figure 1 for test setup and table 2 for testing/troubleshooting procedures.

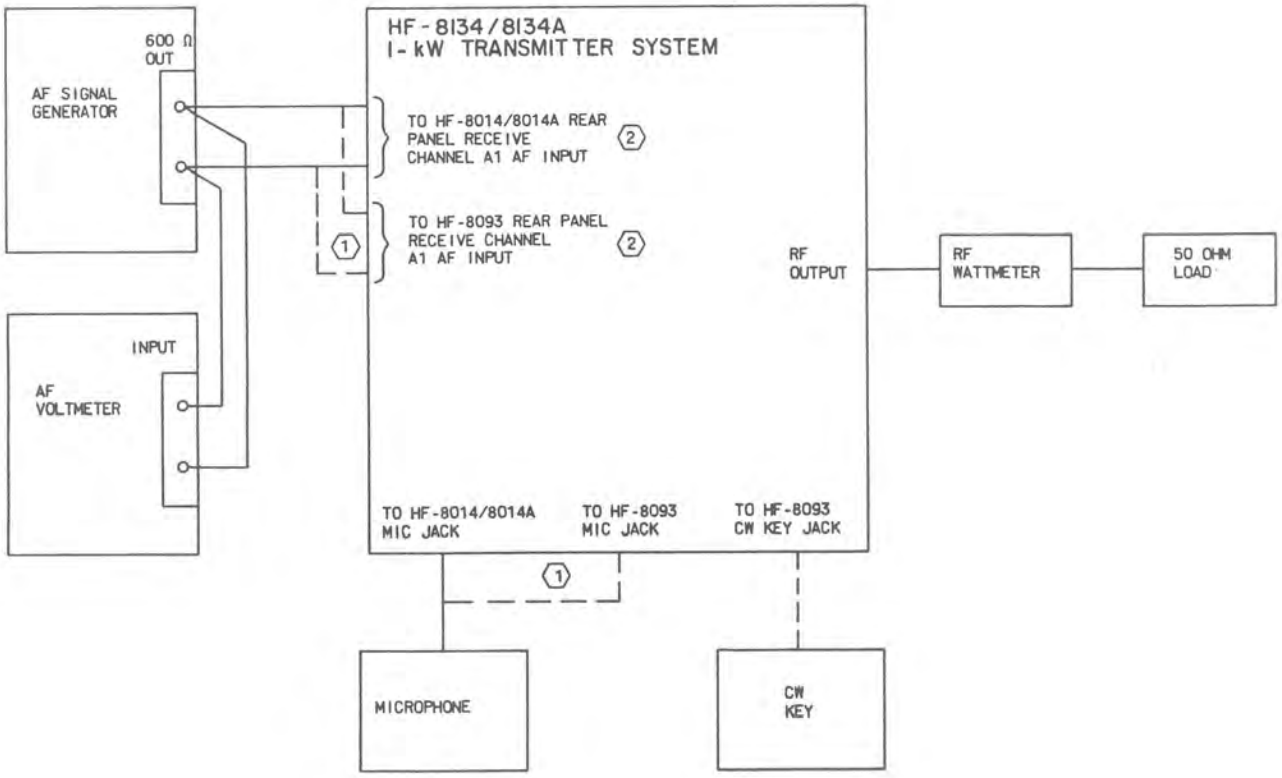
3.4 Meter Readings

Table 3 provides test meter readings for the HF-8030 Power Supply.

3. TESTING/TROUBLESHOOTING

3.1 General

3.4 Meter Readings



NOTES:

1. TEST SETUP REQUIRED FOR HF-8134A (REMOTE OPERATION) TESTING/TROUBLESHOOTING PROCEDURES.
2. TEST SETUP IS FOR CHANNEL A1. TO TEST CHANNELS A2, B1, OR B2, MAKE CONNECTIONS TO APPLICABLE CHANNELS AND SELECT APPROPRIATE SWITCH SETTINGS ON FRONT PANEL WHEN PERFORMING TESTING/TROUBLESHOOTING PROCEDURES.

TPA-2815-014

HF-8134/8134A Transmitter System, Test Setup Diagram
Figure 1

3. TESTING/TROUBLESHOOTING

3.1 General

3.4 Meter Readings

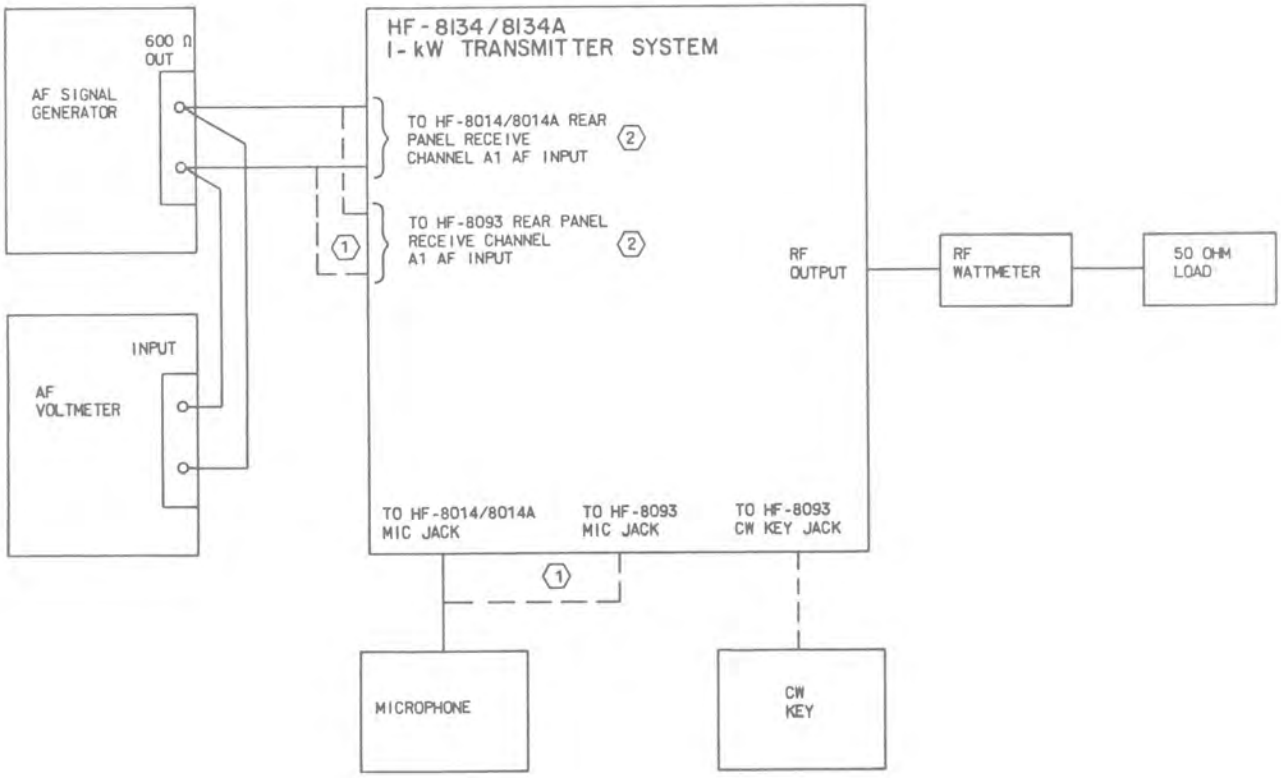
TABLE 2 : HF-8134A TRANSMITTER SYSTEM TESTING/TROUBLESHOOTING PROCEDURES

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Preliminary power connection check	Refer to HF-80 1-kW Transmitter Systems Installation section for proper strapping or line selection of primary power of your system.		
2. Preliminary settings	a. Set HF-8014A controls as follows:- PWR to OFF. (Press inward until switch is released and latched in outward position.) KEY to NORM. PHONES potentiometer to midrange METER to XMT OUT PA PWR to OFF PILOT CARR to OFF PEAK CLIP to OFF MODE to CW CONT to LCL FREQUENCY KHZ to 02000.0 b. Set HF-8030 controls as follows: MAIN POWER circuit breaker to OFF METER select switch to RF INPUT c. Set TS-8020 (if used) LOCAL/REMOTE switch to REMOTE. d. Set HF-8060 (if used) POWER switch to off.		
3. Power turn-on cont'd	a. Set HF-8030 MAIN POWER circuit breaker to ON. NOTE HF-8014A EXCTR FAULT indicator will light. This is normal indication. b. Set HF-8014A PWR switch to on (press inward and latch) c. Set HF-8060 (if used) POWER switch to ON . d. Set HF-8014A PA PWR switch to STBY	HF-8030 MAIN POWER indicator lights HF-8014A power applied. HF-8060 POWER indicator lights.	Check HF-8030 MAIN POWER indicator, repair/ replace HF-8030. Check HF-8060 POWER indicator, replace/ repair HF-8060

3. TESTING/TROUBLESHOOTING

3.1 General

3.4 Meter Readings



NOTES:

1. TEST SETUP REQUIRED FOR HF-8134A (REMOTE OPERATION) TESTING/TROUBLESHOOTING PROCEDURES.
2. TEST SETUP IS FOR CHANNEL A1. TO TEST CHANNELS A2, B1, OR B2, MAKE CONNECTIONS TO APPLICABLE CHANNELS AND SELECT APPROPRIATE SWITCH SETTINGS ON FRONT PANEL WHEN PERFORMING TESTING/TROUBLESHOOTING PROCEDURES.

TPA-2815-014

HF-8134/8134A Transmitter System, Test Setup Diagram
Figure 1

3. TESTING/TROUBLESHOOTING

3.1 General

3.4 Meter Readings

TABLE 2 : HF-8134A TRANSMITTER SYSTEM TESTING/TROUBLESHOOTING PROCEDURES

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Preliminary power connection check	Refer to HF-80 1-kW Transmitter Systems Installation section for proper strapping or line selection of primary power of your system.		
2. Preliminary settings	a. Set HF-8014A controls as follows:- PWR to OFF. (Press inward until switch is released and latched in outward position.) KEY to NORM. PHONES potentiometer to midrange METER to XMT OUT PA PWR to OFF PILOT CARR to OFF PEAK CLIP to OFF MODE to CW CONT to LCL FREQUENCY KHZ to 02000.0 b. Set HF-8030 controls as follows: MAIN POWER circuit breaker to OFF METER select switch to RF INPUT c. Set TS-8020 (if used) LOCAL/REMOTE switch to REMOTE. d. Set HF-8060 (if used) POWER switch to off.		
3. Power turn-on cont'd	a. Set HF-8030 MAIN POWER circuit breaker to ON. NOTE HF-8014A EXCTR FAULT indicator will light. This is normal indication. b. Set HF-8014A PWR switch to on (press inward and latch) c. Set HF-8060 (if used) POWER switch to ON . d. Set HF-8014A PA PWR switch to STBY	HF-8030 MAIN POWER indicator lights HF-8014A power applied. HF-8060 POWER indicator lights.	Check HF-8030 MAIN POWER indicator, repair/ replace HF-8030. Check HF-8060 POWER indicator, replace/ repair HF-8060

3. TESTING/TROUBLESHOOTING

3.1 General

3.4 Meter Readings

Table 2 : HF-8134A Transmitter System Testing/Troubleshooting Procedures, (Cont'd)

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. (Cont'd)	NOTE Allow 5-minute warmup period for HF-8030.		
	e. Set HF-8014A PA PWR switch to LOW PWR	HF-8030 blower runs, MAIN POWER Indicator lights and unkeyed voltages normal. (refer to Table 2).	Check HF-8030 LV 10-A fuse, replace/repair HF-8030
		HF-8020 blower runs, and CONTROL, FILAMENT and PLATE indicators light.	Replace/repair HF-8020
4. Local operation	a. On HF-8014A change one digit of of the FREQUENCY KHZ switches.	HF-8014A EXCTR FAULT indicator extinguishes	Replace/repair HF-8014A
	b. Set HF-8014A KEY switch to LOCK	HF-8014A KEY and PA READY indicators light EXCTR FAULT indicator remains unlit, meter indicates +10-to+20-dB mW. RF OUT indicator lights.	Check/replace HF-8014A fuse, replace/repair HF-8014A. If PA FAULT indicator is lit replace/ repair HF-8020. If HF-8014A PRESEL FAULT indicator is lit, check/ replace HF-8060 fuse, replace/repair HF-8060. Check HF-8030 keyed voltages per table 2 and if abnormal, replace/ repair HF-8030. If HF-8020 READY indicator is extinguished, replace/ repair HF-8020.
	c. Set HF-8014A switches as follows: KEY to NORM CHANNEL ENABLE A1 to ON MODE to ISB.	HF-8014A ISB MODE indicator A1 lights.	
	NOTE Test setup and procedure as set for CH A1 audio adjustments.		
	d. Perform audio check/adjustments (local operation) procedures in HF-8134A Transmitter System operation section of the instruction book.	Audio checks normal.	Replace/repair HF-8014A
	e. Set HF-8014A switches as follows: MODE to CW PA PWR to LOW PWR	Wattmeter reads 500 ±200W	Replace/repair HF-8020
4. (Cont'd)			

3. TESTING/TROUBLESHOOTING
3.1 General
3.4 Meter Readings

Table 2 : HF-8134A Transmitter System Testing/Troubleshooting Procedures, (Cont'd)

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont'd)	FREQUENCY KHZ to 02000.0 KEY to LOCK		
	f. Set HF-8014A switches as follows: KEY to NORM PA PWR to HIGH PWR KEY to LOCK	Wattmeter reads 1000 ±200W	Replace/repair HF-8020
	g. Set HF-8014A switches as follows: KEY to NORM FREQUENCY KHZ to 15000.0 KEY to LOCK	Wattmeter reads 1000 ± 200W	Replace/repair HF-8020
	h. Set HF-8014A switches as follows: KEY to NORM FREQUENCY KHZ to 29000.0 KEY to LOCK	Wattmeter reads 1000 ±200W	Replace/repair HF-8020
	i. Set HF-8014A switches as follows: KEY to NORM PA PWR to OFF	Wattmeter reads 0 W.	
	j. Set HF-8014A PWR switch to OFF.		
5. Preliminary settings remote	a. Set HF-8014A switches as follows: CONT to REM METER to XMT OUT		
	b. Set HF-8093 switches as follows: PA PWR to OFF MODE to CW CONT to NORM KEY to NORM ADDRESS to number of controlled exciter		
5. (Cont'd)	FREQUENCY KHZ to 02000.0		

3. TESTING/TROUBLESHOOTING
3.1 General
3.4 Meter Readings

Table 2 : HF-8134A Transmitter System Testing/Troubleshooting Procedures (Cont'd)

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont'd)	PILOT CARR to OFF PEAK CLIP to OFF		
6. Power turn-on	a. Set HF-8093 PWR switch to on (press inward and latch)	HF-8093 BUSY indicator extinguished.	Replace/repair HF-8093
	b. Set HF-8093 PA PWR switch to STBY	NOTE HF-8093 EXCTR FAULT indicator lights. This is a normal indication.	Check HF-8093 indicator, replace/repair HF-8030. Replace/repair HF-8093.
	NOTE Allow 5-minute warmup period for HF-8030		
	c. Set HF-8093 PA PWR switch to LOW PWR	HF-8030 blower runs, MAIN POWER indicator lights, and unkeyed voltages normal (refer to Table 2).	Check HF-8030 LV 10-A fuse, replace/repair HF-8030.
		HF-8020 blower runs, and CONTROL, FILAMENT and PLATE indicators light	Replace/repair HF-8020
7. Remote Operation	a. On HF-8093 change one digit of the FREQUENCY KHZ switches.	HF-8093 EXCTR FAULT indicator extinguishes	Replace/repair HF-8093
	b. Apply CW key	HF-8093 RF OUT, KEY, and PA READY indicators light, meter indicates +10 to+20 dB mW.	Check/replace HF-8093 fuse, replace/repair HF-8093. Replace/repair HF-8014A. If PA FAULT indicator is lit replace/repair HF-8020. If COUPLER FAULT indicator is lit and only HF-8040/8040M used, replace/repair HF-8040/8040M If HF-8014A meter reads +10 to+20 dB mW, replace/repair HF-8014A. Check HF-8030 keyed voltages per table 2 and if abnormal, replace/repair HF-8030. If HF-8020 READY indicator is extinguished, replace/repair HF-8020.
	c. Release CW key	HF-8093 KEY and RF OUT indicators extinguish.	Replace/repair HF-8093
(Cont'd)			

3. TESTING/TROUBLESHOOTING

3.1 General

3.4 Meter Readings

Table 2 : HF-8134A Transmitter System Testing/Troubleshooting Procedures (Cont'd)

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. (Cont'd)	NOTE Test setup and procedure are set for CH A1 audio adjustments.		
	d. Perform audio check/adjustments procedures (remote operation) in HF-8134A 1-kW Transmitter System operation section of instruction book.	Audio checks normal.	Replace/repair HF-8093
	e. Apply CW key	Wattmeter reads 500 ±200W.	Replace/repair HF-8020
	f. Release CW key	Wattmeter reads 1000 ±200W.	Replace/repair HF-8020
	g. Set HF-8093 PA PWR switch to HIGH PWR Apply CW key		
	h. Release CW key		
	i. Set HF-8093 FREQUENCY KHZ switches to 15000.0. Apply CW key.	Wattmeter reads 1000 ±200 W.	Replace/repair HF-8020
	j. Release CW key		
	k. Set HF-8093 FREQUENCY KHZ switches to 29 000.0 Apply CW Key.	Wattmeter reads 1000 ±200W.	Replace/repair HF-8020
	l. Release CW key	Wattmeter reads 0 W.	

3. TESTING/TROUBLESHOOTING
3.1 General
3.4 Meter Readings

TABLE 3 - HF-8030 1-kW Power Supply Meter Readings

SWITCH POSITION	OPERATIONAL STATUS	APPLICABLE INDICATION
OFF		0
+5 (10V)	Unkeyed	5 +/- 0.2V
+12(50V)	Unkeyed	12 +/- 0.5V
-12 (50V)	Unkeyed	-12 +/-0.5V
DRVR V (50V)	Unkeyed	28 +/-1.0V
FIL V (10V)	Unkeyed	5.8 +/- 0.1V (adjustable)
BIAS V (100V)	Unkeyed	71 +/- 10V
BIAS V (100V)	Keyed	35 +/-4 V (set for 300 mA static)
SCRN V (500V)	Unkeyed	225 +/- 5V
PLATE V (5KV)	Unkeyed	3000 +/- 300V
PLATE V (5kV)	Keyed	2900 +/- 300V
IGC (10V)	Keyed	Less than 4.5V
RF INPUT (5V)	--	Less than 1.0V
DRVR RF (100V)	Keyed	20 +/- 5V
PLATE RF (5kV)	Keyed	1400 +/- 200V
PLATE I (1A)	Keyed	Less than 650 mA
+ SCRN I (50mA)	*If positive,note 1	Less than 25 mA
- SCRN I (50mA)	*If negative,note 1	Less than 25 mA
FWD PWR (1.5kW)	Set	500W
REFLD PWR (500W)	Keyed	Less than 10W

*If screen current is positive, + SCRN I (50mA) position indicates screen current and in -SCRN I (50mA) position, meter may go into stops. If screen current is negative, the indications reverse.

1-kW TRANSMITTER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

PARTS LIST

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AUSTRALIAN ARMY

HF-8134A 1 kW TRANSMITTER SYSTEM

PARTS LIST - EQUIPMENT

PART NO.	IDENT	DESCRIPTION	SEE NOTE BELOW
NPN	1	TRANSMITTER SYSTEM, REMOTE CONTROLLED, 1-kW, HF-8134A	
622-3380-001	2	POWER AMPLIFIER, 1-kW, HF-8020 (See Collins Pub.523-0767432)	
622-3383-001	2	POWER SUPPLY, 1-kW, HF-8030 (See Collins Pub.523-0767456)	
622-3473-XXX	2	EXCITER, HF-8014A (See Collins Pub.523-0770718)	
622-3476-XXX	2	EXCITER CONTROL, HF-8093, (See 523-0770750)	
622-3386-XXX	2	PRESELECTOR, HF-8060 (See Collins Pub.523-0767474) (OPTION)	
622-3497-001	2	BANDPASS FILTER, HF-8061 (See Collins Pub.523-0770752) (OPTION)	3
622-3384-001	2	ANTENNA COUPLER, HF-8040 (See Collins Pub. 523-0767458) (OPTION)	3
622-2612-001	2	ANTENNA COUPLER, HF-8040M (OPTION)	3
	2	HF-80 REMOTE DISPLAY, comprising:	
631-0954-001	3	Module Frame	
631-1024-001	3	Display Module	
631-0955-001	3	Interface Unit	
631-1018-00X	3	Cables Kit	

PART NO.	IDENT	DESCRIPTION	SEE NOTE BELOW
631-1027-00X	3	Front Panel	
631-1143-001	2	Fault Alarm Panel	2
631-1096-001	2	Master Control Switch	2
9584-613-0200	2	Data Modem (Philips TMC)	
631-1151-00X	2	Power Distribution Unit	2
---	2	Balun (A.E.A.Type T1000/530)	
	2	Connector Kit, Rf Output (Andrew Antennas)	
631-0956-00X	2	Cable Assy W3	1
631-0961-001	2	Cable Assy W5	1
631-0958-00X	2	Cable Assy W7	1
631-0957-00X	2	Cable Assy W8	1
631-0959-00X	2	Cable Assy W9	1
631-0965-00X	2	Cable Assy W10	1
631-0960-00X	2	Cable Assy W11	1
631-0962-00X	2	Cable Assy W12	1
631-0961-00X	2	Cable Assy W14	1
631-0961-004	2	Cable Assy W16	1
622-3420-001	2	Cable Retractor, CA-8011	2
021-M012-010	2	Equipment Cabinet	2
021-M011-010	2	Equipment Console	2

NOTES: 1. For further detail, see Kits Section of this Book
2. For further detail, see Part 4 of this Book.
3. Not used in equipment/systems supplied to Australian Army against Contract CAPO C138008.

1-kW TRANSMITTER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

KITS

Printed in Australia

523-1003186-0012M1

1 October, 1981

table of contents

CABLE KIT 1-kW EQUIPMENT (631-0966-00X)

1. DESCRIPTION

The Cable Kit, Collins part number 631-0966-00X provides all cabling for the various arrangements of equipment which occur in 021-M012-00X cabinets and 021-M011-00X console cabinets.

The cable kit consists of five co-axial cables (W5, W9, W11, W14, and W16), four control cables (W3, W7, W8, and W12), and one power cable (W10).

Control Cable W3 is a multiconductor cable with two identical 37-pin connectors P1 and P2. P1 mates with J4 on the power supply. Coaxial cable W5 has two rf-BNC connectors P1 and P2. P1 connects to the exciter J22 and P2 connects to the power amplifier J3. Control cable W7 is a multiconductor cable with two differing 50-pin connectors P1 and P2. P1 connects to J2 on the power supply and P2 connects to the power amplifier J1. Control cable W8 is a multiconductor cable with tw two 37-pin connectors P1 and P2. P1 connects to J3 on the power supply and P2 connects to J2 on the power amplifier. Coaxial cable W9 has two UG-932 A/V connectors P1 and P2. P1 connects to J1 on the power supply and P2 connects to J5 on the power amplifier. Power cable W10 provides mains power from the distribution unit to the power supply. Coaxial cable W11 has two type N connectors, and connects the power amplifier to the balun or antenna interface. Control Cable W12 is a multi-conductor cable with 37-pin (P2) and a 50-pin (P1) connectors. P1 connects P1 to exciter J16 and P2 connects to the preselector J1. Coaxial cable W14 has two rf-BNC connectors P1 and P2. P1 connects to the exciter J22 and P2 connects to the preselector J2. Coaxial cable W17 has two rf-BNC connectors P1 and P2. P2 connects to the power amplifier J3 and P1 connects to the preselector J4.

Cable lengths and identification are shown in table 1.

2. PARTS LIST

Figure 1 and Table 2 provide identification and location information for the requisition and maintenance of the console and its components.

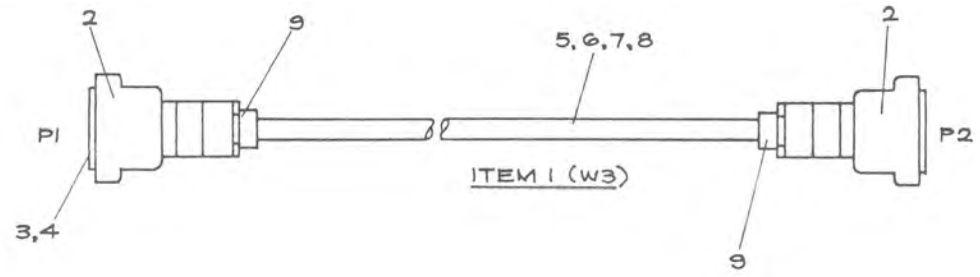
Tables 3 and 4 provide wiring schedules for cables W3, W7, W8 and W12.

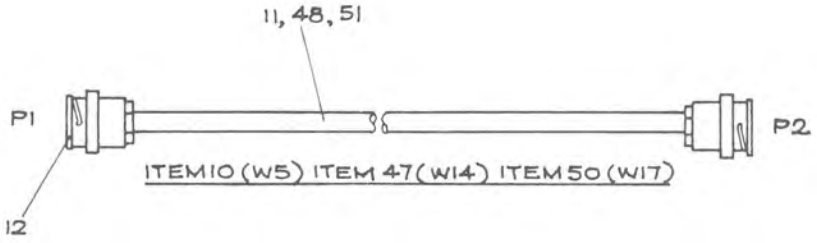
CABLE KIT 1-kW EQUIPMENT (631-0966-00X)
2. PARTS LIST

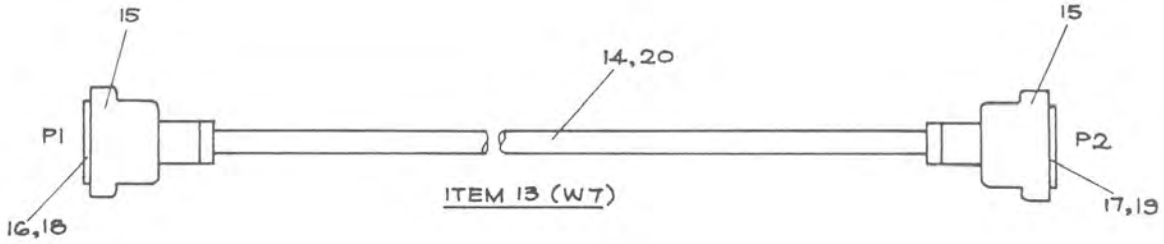
TABLE 1 - CABLE LENGTHS AND IDENTIFICATION

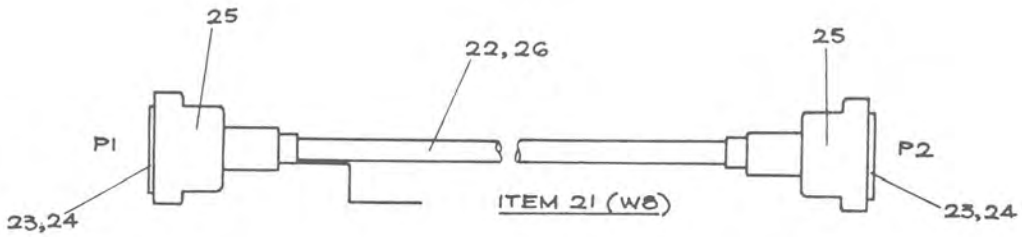
CABLE	COLLINS PART NO.	CABLE LENGTH mm (inches)
W3	631-0956-001	3000 (118)
W5	631-0961-001	3000 (118)
W7	631-0958-001	1524 (60)
W8	631-0957-001	1800 (71)
W9	631-0959-001	2388 (94)
W10	631-0965-001	2540 (100)
W11	631-0960-001	3500 (138)
W12	631-0962-00X	1600 (63)
W14	631-0961-002	1800 (71)
W17	631-0961-003	3200 (126)

CABLE KIT 1-kW EQUIPMENT (631-0966-00X)
2. PARTS LIST



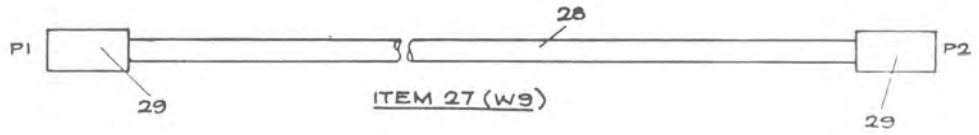


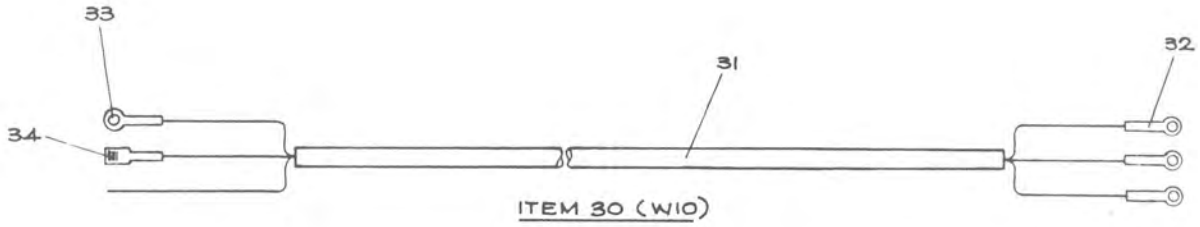


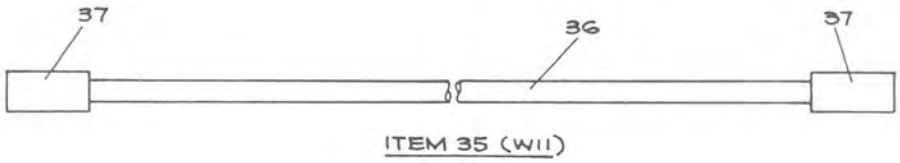


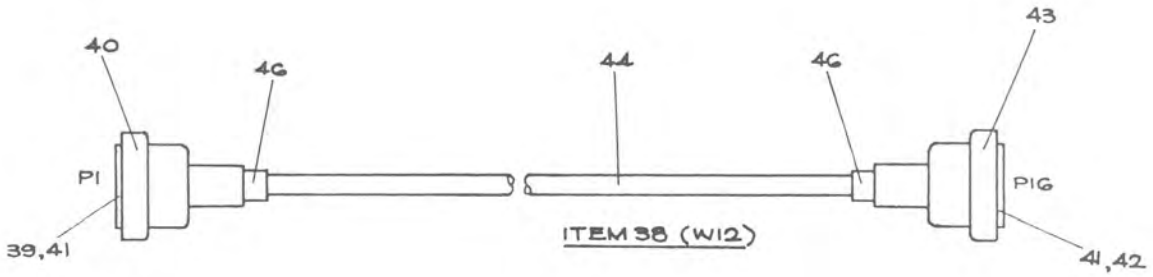
Cable Kit, 1-kW Equipment, Parts List
Figure 1 (Sheet 1 of 2)

CABLE KIT 1-kW EQUIPMENT (631-0966-00X)
2. PARTS LIST









Cable Kit, 1-kW Equipment, Parts List
Figure 1 (Sheet 2 of 2)

CABLE KIT 1-kW EQUIPMENT (631-0966-00X)

2. PARTS LIST

TABLE 2 - CABLE KITS, PARTS LIST

FIG-ITEM	PART No.	IDENT	DESCRIPTION	UNITS PER ASSY	USED ON CODE
1-	631-0966-001	1	Cable Kit, 1-kW without Preselector.	1	A
	631-0966-002	1	Cable Kit, 1-kW with Preselector	1	B
1	631-0956-001	2	Control Cable Assy,W3	1	AB
NI	D24-0866-030	3	Cable, Special 15 pair	1	AB
2	C71-0396-040	3	Backshell	2	AB
3	C71-0922-040	3	Connector 37S	2	AB
4	C71-0946-040	3	Contact, Socket	64	AB
5	152-M003-060	3	Sleeving, Fibreglass, 102mm lg	1	AB
6	152-M003-080	3	Sleeving, Fibreglass, 102mm lg	1	AB
7	152-M001-070	3	Sleeving, Ht Shrink, 76mm lg.	1	AB
8	152-M001-060	3	Sleeving, Ht Shrink, 254mm lg.	1	AB
9	152-M001-090	3	Sleeving, Ht Shrink, 150mm lg	1	AB
10	631-0961-001	2	Coaxial Cable, Assy, W5	1	B
11	D25-0042-000	3	Cable, Coaxial, RG-58C/U 3m lg.	1	B
12	357-X026-020	3	Connector, rf, BNC	2	B
13	631-0958-001	2	Control Cable Assy, W7	1	AB
14	152-M001-100	3	Sleeving, Ht Shrink, 122mm lg.	1	AB
15	C71-0396-050	3	Backshell	2	AB
16	C71-0373-090	3	Connector, 50P	1	AB
17	C71-0922-050	3	Connector, 50S	1	AB
18	C71-0373-020	3	Contact, Pin	47	AB
19	C71-0946-040	3	Contact, Socket	47	AB
20	---		Cable, Shielded,1524mm lg	1	AB
NI	152-M006-020	3	Sleeve, Solder	8	AB
21	631-0957-001	2	Control Cable Assy, W8	1	AB
22	424-0859-001	3	Cable, Special Purpose	1	AB
23	C73-0373-080	3	Connector, 37P	2	AB
24	C71-0373-020	3	Contact Pin	74	AB
25	C71-0396-001	3	Backshell	2	AB
26	152-M001-090	3	Sleeving, Ht Shrink 152mm lg.	1	AB
27	631-0959-001	2	Coaxial Cable Assy, W9	1	AB
28	425-M005-010	3	Cable, Coaxial, RG59B/U 2388mm lg.	1	AB
29	357-X029-010	3	Connector, UG932A/U	2	AB

CABLE KIT 1-kW EQUIPMENT (631-0966-00X)

2. PARTS LIST

TABLE 2 - CABLE KITS, PARTS LIST

FIG-ITEM	PART No.	IDENT	DESCRIPTION	UNITS PER ASSY	USED ON CODE
30	631-0965-001	2	Power Cable Assy, W10		
31	424-M025-010	3	Cable, Power, Elec, 2540mm lg	1	AB
32	C04-1282-000	3	Terminal, Lug	3	AB
33	C04-0258-000	3	Terminal, Lug	1	AB
34	C04-0255-000	3	Terminal, Push-On	1	AB
35	631-0960-001	2	Coaxial Cable Assy, W11	1	AB
36	357-X028-010	3	Cable, Coaxial, 3500mm lg	1	AB
37	C57-9326-000	3	Connector, Type N	2	AB
38	631-0962-001	2	Control Cable Assy, W12	1	A
39	C71-0922-050	3	Connector, Type 50S	1	A
40	C71-0396-050	3	Backshell	1	A
41	C71-0946-040	3	Contact, Socket	52	A
42	C71-0922-040	3	Connector, Type 37S	1	A
43	C71-0396-040	3	Backshell	1	A
44	424-0859-150	3	Cable, Shielded,1600mm lg	1	A
45	439-4031-000	3	Wire, Elec, 12mm lg	1	A
46	152-M001-090	3	Sleeving, Ht Shrink, 153mm lg.	1	A
47	631-0961-002	2	Coaxial Cable Assy, W14	1	A
48	D25-0042-000	3	Cable, Coaxial, RG-58C/U, 1800mm lg.	1	A
49	357-X026-020	3	Connector, Coaxial, RG213	2	A
50	631-0961-003	2	Coaxial Cable Assy, W17	1	A
51	D25-0042-000	3	Cable, Coaxial, RG58C/U, 3.2m lg	1	A
52	357-X026-020	3	Connector,Coaxial,RG58C/U	2	A

CABLE KIT 1-kW EQUIPMENT (631-0966-00X)

WIRE No.	WIRE CODE	FROM	TO
1A	ITEM 1 ORN	P1-1	P2-1
1B	ITEM 1 BLK	P1-2	P2-2
1S	ITEM 1 SHLD		
2A	ITEM 1 YEL	P1-20	P2-20
2B	ITEM 1 BLK	P1-21	P2-21
2S	ITEM 1 SHLD		
3A	ITEM 1 GRY	P1-22	P2-22
3B	ITEM 1 WHT	P1-23	P2-23
3S	ITEM 1 SHLD	P1-4	P2-4
4A	ITEM 1 RED	P1-3	P2-3
4B	ITEM 1 GRN	P1-5	P2-5
4S	ITEM 1 SHLD		
5A	ITEM 1 WHT	P1-24	P2-24
5B	ITEM 1 BLK	P1-25	P2-25
5S	ITEM 1 SHLD		
6A	ITEM 1 GRN	P1-6	P2-6
6B	ITEM 1 BLK	P1-7	P2-7
6S	ITEM 1 SHLD		
7A	ITEM 1 GRN	P1-26	P2-26
7B	ITEM 1 BLU	P1-27	P2-27
7S	ITEM 1 SHLD		
8A	ITEM 1 RED	P1-8	P2-8
8B	ITEM 1 WHT	P1-9	P2-9
8S	ITEM 1 SHLD		
9A	ITEM 1 BLU	P1-28	P2-28
9B	ITEM 1 BLK	P1-10	P2-10
9S	ITEM 1 SHLD	WIRE 10S	WIRE 10S
10A	ITEM 1 RED	P1-29	P2-29
10B	ITEM 1 BLK	P1-11	P2-11
10S	ITEM 1 SHLD	P1-30	P2-30
11A	ITEM 1 BRN	P1-12	P2-12
11B	ITEM 1 BLK	P1-31	P2-31
11S	ITEM 1 SHLD		
12A	ITEM 1 BLU	P1-15	P2-15
12B	ITEM 1 RED	P1-34	P2-34
12S	ITEM 1 SHLD		
13A	ITEM 1 ORN	P1-16	P2-16
13B	ITEM 1 RED	P1-35	P2-35
13S	ITEM 1 SHLD		
14A	ITEM 1 YEL	P1-17	P2-17
14B	ITEM 1 RED	P1-36	P2-36
14S	ITEM 1 SHLD		
15A	ITEM 1 BRN	P1-19	P2-19
15B	ITEM 1 RED	P1-37	P2-37
15S	ITEM 1 SHLD		

WIRE No.	COLOUR	WIRE CODE	FROM	TO
1A	WHITE	ITEM 44	P1-1	P2-1
1B	ORN	ITEM 44	P1-18	P2-18
1S		ITEM 44 SHIELD	WIRE 2	WIRE 3
2	GREEN	A20TA00X5XXX	P1 END 1S	P1-14
3	GREEN	A20TA00X5XXX	P2 END 1S	P2-14
4	BROWN	A22TA00X1XXX	P1-2	P2-2
5	RED	A20TA00X2XXX	P1-3	P2-3
6	ORN	A20TA00X3XXX	P1-4	P2-4
7	YELLOW	A20TA00X4XXX	P1-5	P2-5
8	BLACK	A20TA00X0XXX	P1-6	P2-6
9	BLU	A20TA00X6XXX	P1-7	P2-7
10A	WHT	ITEM 45	P1-8	P2-8
10B	BRN	ITEM 45	P1-9	P2-9
10S		ITEM 45 SHIELD	WIRE 11	WIRE 12
11	GREEN	A20TA00X5XXX	P1 END 10S	P1-25
12	GREEN	A20TA00X5XXX	P2 END 10S	P2-25
13	VIOLET	A22TA00X7XXX	P1-10	P2-10
14	GREY	A22TA00X8XXX	P1-11	P2-11
15	WHITE	A22TA00X9XXX	P1-12	P2-12
16	WH/BLACK	A22TA00X90XX	P1-13	P2-13
17A	WH	ITEM 46	P1-16	P2-16
17B	RED	ITEM 46	P1-17	P2-17
17S		ITEM 46 SHIELD	WIRE 19	WIRE 20
18A	WH	ITEM 47	P1-49	P2-49
18B	ORN	ITEM 47	P1-50	P2-50
18S		ITEM 47 SHIELD	WIRE 19	WIRE 20
19	GREEN	A22TA00X5XXX	P1 ENDS 17S,18S	P1-33
20	GREEN	A22TA00X5XXX	P2 ENDS 17S,18S	P2-33
21	WH/BK	A22TA00X91XX	P1-19	P2-19
22	WH/RED	A20TA00X92XX	P1-20	P2-20
23	WH/OR	A20TA00X93XX	P1-21	P2-21
24	WH/GR	A22TA00X95XX	P1-22	P2-22
25	WH/BLU	A22TA00X96XX	P1-23	P2-23
26	WH/BLK/RED	A22TA00X902X	P1-24	P2-24
27	WH/BLK/OR	A22TA00X903X	P1-26	P2-26
28	WH/BLK/GRN	A22TA00X905X	P1-27	P2-27
29	WH/BLK/BLU	A22TA00X906X	P1-28	P2-28
30	WH/BRN/RED	A22TA00X912X	P1-29	P2-29
31	WH/BRN/OR	A22TA00X913X	P1-30	P2-30
32	WH/BRN/GRN	A22TA00X915X	P1-32	P2-32
33	WH/BRN/BLUE	A20TA00X916X	P1-34	P2-34
34	WH/RED/ORG	A20TA00X923X	P1-35	P2-35
35	WH/RED/GRN	A20TA00X925X	P1-36	P2-36
36	WH/RED/BLU	A20TA00X926X	P1-37	P2-37
37	WH/OR/GRN	A20TA00X935X	P1-38	P2-38
38	WH/OR/BLU	A20TA00X936X	P1-39	P2-39
39	WH/GRN/BLU	A20TA00X956X	P1-40	P2-40
40	BLK	A20TA00X0XXX	P1-41	P2-41
41	BRN	A20TA00X1XXX	P1-42	P2-42
42	ORG	A22TA00X3XXX	P1-43	P2-44
43	YEL	A22TA00X4XXX	P1-44	P2-44
44	GRN	A22TA00X5XXX	P1-45	P2-45
45	BLU	A22TA00X6XXX	P1-46	P2-46
46	VIOLET	A22TA00X7XXX	P1-47	P2-47

Table 3 : Wiring Schedules for Cables W3 & W7

CABLE KIT 1-kW EQUIPMENT (631-0966-00X)

WIRE NO	WIRE CODE	FROM	TO
1	WHITE/BLK/GRN	P1-1	P2-1
2	WHITE/BLK/VIO	P1-2	P2-2
3	WHITE/BRN	P1-3	P2-3
4	WHITE/BLK/BLU	P1-4	P2-4
5	WHITE/BLK/GRY	P1-5	P2-5
6	WHT/RED	P1-6	P2-6
7	BRN	P1-7	P2-7
8	WHT/ORN	P1-8	P2-8
9	RED	P1-9	P2-9
10	WHT/BRN/YEL	P1-10	P2-10
11	BLK	P1-11	P2-11
12	ORN	P1-12	P2-12
13	GRY	P1-13	P2-13
14	WHT/YEL	P1-14	P2-14
15	WHT/GRN	P1-15	P2-15
16	WHT/BRN/RED	P1-16	P2-16
17	WHT/BLU	P1-17	P2-17
18	WHT/BRN/ORN	P1-18	P2-18
19	WHT/BRN/BLU	P1-19	P2-19
20	WHT/BLK/YEL	P1-20	P2-20
21	WHT/BLK/ORN	P2-21	P2-21
22	WHT/BLK	P1-22	P2-22
23	WHT/BLK/RED	P2-23	P2-23
24	WHT/BLK/BRN	P1-24	P2-24
25	WHT	P1-25	P2-25
26	BLU	P1-26	P2-26
27	GRN	P1-27	P2-27
28	WHT/RED/GRN	P1-28	P2-28
29	VIO	P1-29	P2-29
30	YEL	P1-30	P2-30
31	WHT/RED/ORN	P1-31	P2-31
32	WHT/RED/YEL	P1-32	P2-32
33	WHT/GRY	P1-33	P2-33
34	WHT/VIO	P1-34	P2-34
35	WHT/BRN/VIO	P1-35	P2-35
36	WHT/BRN/GRY	P1-36	P2-36
37	WHT/BRN/GRN	P1-37	P2-37
38	SHLD	NOTES 1 & 2	
39	WHITE	P1-12	-
40	RED	P1-30	-

WIRE No.	WIRE CODE	FROM	TO
1	ITEM 6 BLK	P1-12	P16-36
2	" BRN	P1-28	P16-17
3	" RED	P1-44	P16-35
4	" ORN	P1-11	P16-16'
5	" YEL	P1-27	P16-34
6	ITEM 6 GRN	P1-43	P16-15
7	" BLU	P1-10	P16-33
8	" VIO	P1-26	P16-14
9	" GRY	P1-42	P16-32
10	" WHT	P1-9	P16-13
11	ITEM 6 WHT/BLK	P1-25	P16-31
12	" WHT/BRN	P1-41	P16-12
13	" WHT/RED	P1-40	P16-30
14	" WHT/ORN	P1-24	P16-11
15	" WHT/YEL	P1-8	P16-29
16	ITEM 6 WHT/GRN	P1-39	P16-10
17	" WHT/BLU	P1-23	P16-28
18	" WHT/VIO	P1-7	P16-9
19	" WHT/GRY	P1-46	P16-26
20	" WHT/BLK/BRN	P1-14	P16-2
21	ITEM 6 WHT/BLK/RED	P1-13	P16-27
22	" WHT/BLK/ORN	P1-1	P16-37
23	" WHT/BLK/YEL	P1-30	P16-8
24	" WHT/BLK/GRN	NC	NC
25	" WHT/BLK/BLU	NC	NC
26	ITEM 6 WHT/BLK/VIO	NC	NC
27	" WHT/BLK/GRY	NC	NC
28	" SHLD	NC	NC
29	A22TA00X0XXX	P1-20	P1-3
30	A22TA00X0XXX	P1-6	P1-34
31	A22TA00X0XXX	P1-34	P1-4

Table 4 : Wiring Schedules for Cables W8 & W12

PART 3.

AUSTRALIAN ARMY HF-80 SYSTEMS

PART 3: RECEIVER SYSTEM

List of Associated Publications

Title	Part No.
Collins Instruction Books:	
HF-8054( ) Receiver (Parts 1 & 2)	523-0770698
HF-8094 Receiver Control	523-0770751
HF-8060 Preselector	523-0767458
HF-80 Remote Display	523-1003164
TS-8060 Preselector Test Set	523-0768237
Philips-T.M.C. Ltd. Handbook:	
Modem Type 9584 613 02000	9584 618 06010

INTRODUCTION
DESIGN FEATURES

The Australian Army HF HF-80 Receiver System includes all equipment necessary to provide remote and/or local control of multiple four-channel receivers for the frequency range of 2.00MHz to 29.99999MHz. Operating modes include ISB(UUSB, USB, LSB, LLSB), CW and AME.

With suitable antenna installations and by making appropriate interconnections between multiple receivers and receiver controls, a space diversity system can be provided which will minimise the effects of fading.

The HF-80 receiver system includes the following design features:-

- Slide-in rack-mounted units.
- Maximum use of solid-state and microelectronic circuits.
- Optional bandwidth filters.
- Flexibility in adding additional units.
- Ease of maintenance.
- Up to Four (4)independent channels.
- NET DATA mode: compatible to netted data link type operations such as TADIL A ands LINK II. Includes an AGC crowbar circuit for the fast response time required for this type of operation.
- AGC busing: in ISB operation, allows the gain of inactive channels to be controlled by the AGC levels of active channels, thus reducing the background noise of the inactive channels.
- Control of up to 16 receivers by using the standard receiver control, and up to 32 receivers by using a processor control system.

The receiver system may be operated entirely locally. However the normal local control may be extended up to a distance of 152 metres (500 feet). Remote control facilities are also available, which enable control and monitoring of operating conditions and faults from unlimited distance, in which case a voice frequency contol circuit is employed.

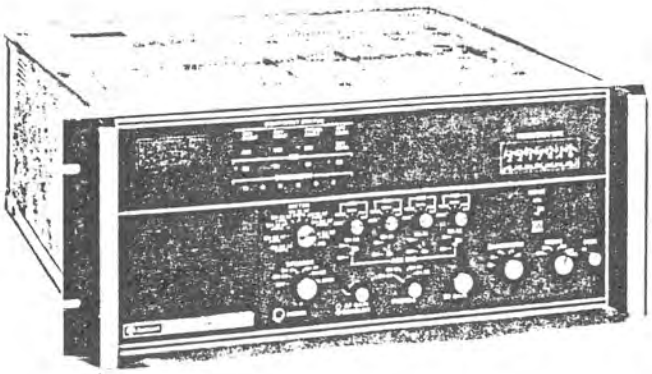
INTRODUCTION

STRUCTURE OF PART 3 OF THIS INSTRUCTION BOOK:

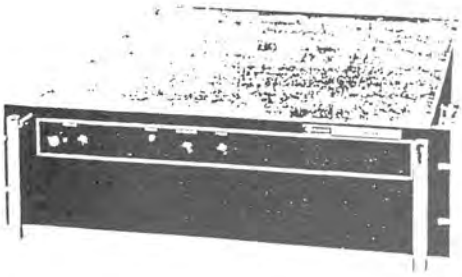
This part is subdivided as follows:-

Description
Installation
Operation
Theory
Maintenance
Parts List
Kits - each component of which contains Description, Installation, Operation, Maintenance and Parts List as appropriate.

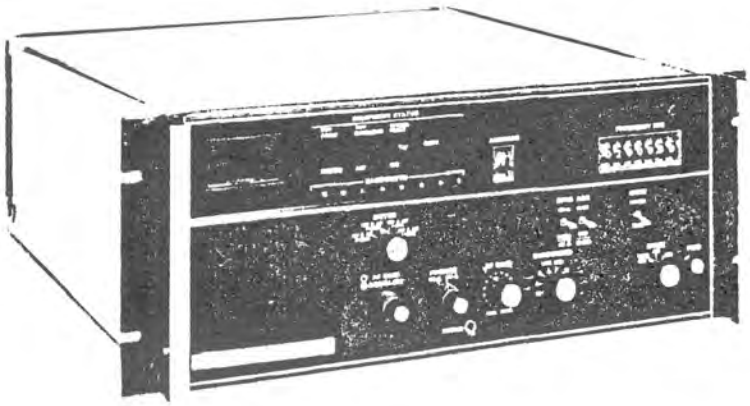
INTRODUCTION



HF-8054A
RECEIVER



HF-8060
PRESELECTOR
(OPTIONAL)



HF-8094
RECEIVER CONTROL

HF-80 RECEIVER SYSTEM

HF-80 RECEIVER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

DESCRIPTION

Printed in Australia

523-1003187-0012M1

1 October, 1981

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1. GENERAL.

The Australian Army HF-80 Receiver System provides four-channel reception of ISB(UUSB, USB, LSB, LLSB), CW and AME signals over the frequency range of 2.00MHz to 29.99999MHz in 10Hz or 100Hz steps.

The HF-8054A Receiver may be locally controlled from its front panel, or remotely controlled using an HF-8094 receiver control.

Remote control of the HF-8054A Receiver can be provided by FSK, RS-232C, or MIL-STD-188C data signals. The signaling method is changed by changing strapped clips on serial interface A13. As many as 16 HF-8054A Receivers can operate in parallel when using the HF-8094 Receiver ontrol. Up to 32 HF-8054A Receivers can operate in parallel when using processor. For multiple receiver operation from one control or processor, RS-232C or MIL-STD-188C data signaling must be used.

A space diversity system to minimise the effects of fading can be provided using the standard equipment and suitable antenna arrangements. For description and details of installation procedures, see the Space Diversity Systems using HF-8054( ) Receivers, Supplement , publication 523-00770881.

The receiver system equipments can be mounted in a standard 483-mm (19-in) rack using an optional slide-mounting kit. They can also be mounted in a desk-top enclosure or in a console-style equipment cabinet.

The HF-80 receiver system can be operated from 100, 115, 215, or 230V ac 47 to 420 Hz power source.

2. EQUIPMENT SUPPLIED/CONFIGURATION

Equipment supplied in the HF-80 Receiver System, and its configuration is listed in table 1.

3. ASSOCIATED EQUIPMENT

Associated equipment required for operation but not supplied as a part of the HF-80 Receiver System is listed in table 2.

4. ACCESSORIES

Table 3 lists the accessories available for the HF-80 Receiver Systems,as well as their functions.

5. OPTIONS

Options available for the HF-80 Receiver System are listed in table 4.

6. EQUIPMENT SPECIFICATIONS

Specifications for the HF-80 Receiver System as listed in table 5.

TABLE 1 HF-80 RECEIVERS - EQUIPMENT SUPPLIED.

EQUIPMENT TITLE	COLLINS PART No.	DESCRIPTION/FUNCTION
HF-8054A Receivers	622-3475-003	Four-channel reception of ISB (UUSB, USB, LSB, LLSB), CW and AME signals over the frequency range of 250.00 kHz to 29.99999MHz, tunable to 100Hz Locally controlled from front panel. Includes vbfo, afc, high stability oven, external frequency standard and three front panel selected bandpass filters.
HF-8094 Receiver Control	622-3477-001	Provides remote control and status monitoring facility, when used in conjunction with a modem. Voice frequency control signalling is employed
Data Modem	---	Philips-TMC type 9584 613 02000. Translation of signals to and from Receiver control at a location remote from the Receiver.
Master Control Switch	631-1096-001	Allows system or part of system to be operated from either of two locations.
Power Distribution Unit	631-1151-00X	Provides mains input connection, circuit breakers for equipment and a standard Australian mains output.
HF-80 Remote Display	---	Displays operating condition of up to 16 remotely controlled receivers, as well as fault indication. Each unit contains four displays and consists of 631-0954-001 Module Frame, 631-1024-001 Display Module 631-0955-001 Interface Unit 631-1018-00X Cable Kit 631-1027-00X Front Panel.
Fault Alarm Panel	631-1143-001	Takes output from the Remote Display Unit and provides indication of equipment fault.

TABLE 1 HF-80 RECEIVERS - EQUIPMENT SUPPLIED.

EQUIPMENT TITLE	COLLINS PART No.	DESCRIPTION/FUNCTION
HF-8060 Preselector	622-3386-001	May be used between the antenna or balun and the receiver to provide additional selectivity and protection in a strong signal environment.
High Pass Filter	241-M004-010	Eliminates interference due to unwanted frequencies below a desired cut-off frequency. (Metropole Products Inc. FHA-001 has 1 dB cut-off at 2MHz).

TABLE 2 - HF-80 RECEIVERS - ASSOCIATED EQUIPMENT

EQUIPMENT	FUNCTION	CHARACTERISTICS
Headphones	Provide headphone monitoring of the receiver audio.	Standard 600 ohm headphone
Antenna	Provides 50 ohm unbalanced signal source.	Standard 50 ohm antenna
Balun	Provides for balanced/unbalanced signal input changes.	

TABLE 3 - HF-80 RECEIVERS - ACCESSORIES

TITLE	COLLINS PART No.	DESCRIPTION/FUNCTION
Cable W5	631-0961-001	rf input to Preselector
Cable W12	631-0962-001	Control cable, receiver to Preselector.
Cable W16	631-0961-002	rf input to Receiver.
Console	021-M011-XXX	483mm (19in) Racking-mounting enclosure for equipment. Writing shelf with laminated plastic desk top. Side panels may be omitted when more than one console is located side by side. Removeable rear door.
Cabinet	021-M012-XXX	483mm (19in) rack mounting enclosure for equipment. Side Panels may be omitted when more than one console is located side by side. Removeable, louvred rear door.
CA-8011 Cable Retractor	622-3420-001	Provides extension and retraction of interconnecting cabling when equipment is moved on slides.
CA-8030 Slide Mounting Kit	622-3418-001	For slide mounting of HF-8054A, HF-8094 and HF-8060 when installed in HF-80 cabinets and consoles.

Table 4. Options

OPTION	PART NUMBER	FUNCTION
AC-8012 Oven Standard Kit	622-3460-001	Internal oven frequency standard with a stability of 1×10^{-8} over the specified operating temperature range. Implemented by adding oven oscillator assembly (637-9135-001), 2-wire cable harness, a coaxial cable, and an external phase-lock (635-0655-001).
AC-8013 External Standard Kit	622-3461-001	Permits operation from an external frequency of 100 kHz, 1 MHz, or 5 MHz as desired. Implemented by adding a coaxial cable harness with rf connector mounted on rear panel and installing an external phase-lock (635-0655-001).
AC-8014 Frequency Display Kit	622-3470-001	Provides an LED display in 10-Hz increments of the frequency selected in the HF-8054( ) Receiver either locally or remotely. In local operation this display agrees with the frequency switchboard setting in the HF-8054( ) Receiver front panel. In remote operation this display agrees with the frequency switchboard setting on the receiver control.
	622-3470-002	Same as 622-3470-001 except LED display is in 100-Hz increments.
AC-8015 Frequency Standard Switch Kit	622-3499-001	Provides automatic switchover from an external frequency reference input to the oven-stabilized frequency standard upon loss of the external input. The nominal external input level should be 0.5 to 2.0 V ac into 50 ohms at 5.0 MHz, 1.0 MHz, or 100 kHz. When the kit is installed, a continuous 100-kHz output, 1.5 V ac nominal, is available at a BNC jack for peripheral equipment. This kit is intended for factory installation. The oven standard must be installed for the AC-8015 to operate.
AC-8017 100-Hz to 10-Hz Tuning Conversion Kit	622-3453-001	10-Hz tuning increment capability. Implemented by installing a synthesizer 100/10-Hz decade card (623-2080-004) in the A19 slot, by moving the synthesizer end decade (635-0657-001) from the A19 slot to the A18 slot, and by changing the front panel frequency switchboard from 635-0830-001 to 635-0830-002.
AC-8018 10-Hz to 1-Hz Tuning Conversion Kit	622-3454-001	1-Hz tuning increment capability is recommended for processor controlled units only. Implemented by installing an additional synthesizer 100/10-Hz decade (623-2080-004) in the A18 slot and moving the synthesizer end decade (635-0657-001) from the A18 slot to the A17 slot.
AC-8019 100-Hz to 1-Hz Tuning Conversion Kit	622-3455-001	1-Hz tuning increment capability is recommended for processor-controlled units only. Implemented by installing two synthesizer 100/10-Hz decades (623-2080-004), one in the A19 slot and one in the A18 slot, by moving synthesizer end decade (634-0657-001) from the A19 slot to the A17 slot, and by changing the front panel frequency switchboard from 635-0830-001 to 635-0830-002.
AC-8017A 100- to 10-Hz Tuning Conversion Kit	622-3453-002	For Receiver Control 10-Hz tuning increment capability. Implemented by changing the front panel frequency switchboard from 635-0830-001 to 635-0830-002 and changing the front panel frequency display from 637-1781-006 to 637-1782-002.

Table 4. Options

OPTION	PART NUMBER	FUNCTION
AC-8055 IF Filters Kit	622-3452-001	Provides five additional if bandwidth filters. Implemented by installing A8A2 filter (637-2515-001) and applying the appropriate stick-on decals to the BANDWIDTH switch (A = 6.0 kHz, B = 3.0 kHz, C = 1.0 kHz, D = 0.5 kHz, E = 0.2 kHz).
	622-3452-002	Provides two additional if bandwidth filters. Implemented by installing A8A2 filter (637-2515-002) and applying the appropriate stick-on decals to the BANDWIDTH switch (A = 6.0 kHz, E = 0.2 kHz). 0.2-kHz filter offset by 1 kHz to USB.
	622-3452-003	Provides five additional if bandwidth filters. Implemented by installing A8A2 filter (637-2515-003) and applying the appropriate stick-on decals to the BANDWIDTH switch (A = 6.0 kHz, B = 3.0 kHz, C = 1.0 kHz, D = 0.5 kHz, E = 0.2 kHz). 1.0-, 0.5-, and 0.2-kHz filters offset by 1 kHz to USB.
	622-3452-004	For use with non-ISB radio. Provides six additional if bandwidth filters including LSB (2.75 kHz). Implemented by installing A8A2 filter (637-2515-005) and applying the appropriate stick-on decals to the BANDWIDTH switch (A = 6.0 kHz, B = 3.0 kHz, C = 1.0 kHz, D = 0.5 kHz, E = 0.2 kHz).
	622-3452-005	Provides five additional if bandwidth filters. Implemented by installing A8A2 filter (637-2515-006) and applying the appropriate stick-on decals to the BANDWIDTH switch (A = 6.0 kHz, B = 3.0 kHz, C = 1.0 kHz, D = 0.54 kHz, E = 0.1 kHz).
	622-3452-006	Provides one additional if bandwidth filter. Implemented by installing A8A2 filter (637-2515-010) and applying the appropriate stick-on decal to the BANDWIDTH switch (A = 6.0 kHz).
	622-3452-007	Provides three additional if bandwidth filters. Implemented by installing A8A2 filter (637-2515-011) and applying the appropriate stick-on decals to the BANDWIDTH switch (A = 6.0 kHz, C = 1.0 kHz, E = 2.0 kHz).
	622-3452-008	Provides five additional if bandwidth filters. Implemented by installing A8A2 filter (637-2515-013) and applying the appropriate stick-on decals to the BANDWIDTH switch (A = 0.25 U, B = 0.7 U, C = 0.7 L, D = 0.25 L, E = 5.0 kHz). A offset by 1125 Hz to USB, B offset by 1275 Hz to USB, C offset by 1275 Hz to LSB, and D offset by 1125 Hz to LSB.
CA-8030 Slide Mounting Kit	622-3418-001	Mounting support with slides for 483-mm (19-in) rack-mounted HF-8054( ) Receivers. (Required for rack-mount installations.)

Table 5. Equipment Specifications

CHARACTERISTIC	SPECIFICATION
Electrical (Signal levels are open circuit from 50-ohm source.)	
Modes of operation	A3A, A3J, A3B, A9B (ISB); A3, A3H (AM); A1, A2 (CW)
Frequency range	250.000 kHz to 29.999 999 MHz
Tuning increments	10-Hz or 100-Hz; optional 1-Hz for processor control applications
Frequency stability	Not less than 5×10^{-7} over specified temperature range; drift rate of not more than 3×10^{-8} per week Optional oven standard provides not less than 1×10^{-8} over specified temperature range; drift rate not more than 1×10^{-8} per week after 72 hours of continuous operation Optional external standard provides stability equal to the stability of the 100-kHz, 1-MHz, or 5-MHz external standard used; input impedance, 50 Ω; input level, 0.1 to 1.0 V rms
Frequency tune time	5 ms max; 2 ms nom
Sensitivity	
Standard rf translator	ISB: 250 kHz to 1.599 99 MHz; 2 μV hard (-107 dB mW) for 10 dB (s+n)/n, 1.6 to 29.999 99 MHz; 0.7 μV hard (-116 dB mW) for 10 dB (s+n)/n. AM (30% mod): 1.6 to 20.999 99 MHz; 5.7 μV hard (-98 dB mW) for 10 dB (s+n)/n.
High performance rf translator	ISB: 250 kHz to 1.599 99 MHz; 2.8 μV hard (-104 dB mW) for 10 dB (s+n)/n, 1.6 to 29.999 99 MHz; 1 μV hard (-113 dB mW) for 10 dB (s+n)/n. AM (30% mod): 250 kHz to 1.599 99 MHz; 23.1 μV hard (-86 dB mW) for 10 dB (s+n)/n, 1.6 to 29.999 99 MHz; 8 μV hard (-95 dB mW) for 10 dB (s+n)/n.
Digital vbfo	
Tuning range	±9.99 kHz in 10-Hz steps
Frequency stability	Same as frequency standard (see frequency stability above)
Intermodulation distortion	
Standard rf translator	In band: -47 dB below either of two input tones at 0.1 volt per tone. Out of band: from either of two input tones of -15 dB mW per tone, 50 kHz or more off tune frequency; second and third order distortion products are -60 dB.
High performance rf translator	In band: -47 dB below either of two input tones at 0.1 volt per tone. Out of band: from either of two input tones of -15 dB mW per tone, 50 kHz or more off tune frequency; second order distortion products are -65 dB, third order distortion products are -100 dB.
Spurious responses to external signals	If rejection: 100 dB min Image rejection: 100 dB min Other spurious signals: -80 dB min at 20 kHz or more off center frequency

Table 5. Equipment Specifications

CHARACTERISTIC	SPECIFICATION
Internal spurious emissions	Equivalent to 0.5 μV max input signals over the 1.6- to 29.999 99-MHz frequency range
Audio outputs	Line: 600 Ω, 10%, balanced; 0 dB mW, nom; adjustable from -20 to +10 dB mW; total harmonic distortion, 1% max for 1-kHz tone at -20 to +10 dB mW in ISB mode. Headphone: 600 Ω nom; capable of +10 dB mW min; total harmonic distortion, 5% max for 1-kHz tone at +10 dB mW in ISB mode Speaker: 8 Ω nom; capable of 2 W peak min, total harmonic distortion, 5% max for 1-kHz tone at 2 W output in ISB mode
AGC threshold	1 μV max
AGC control	6-dB rise in audio out for signal increase from 1 μV to 2 V
AGC time constants	AGC MODE / ATTACK TIME / DECAY TIME FAST / 20 ms, max / 15 to 30 ms MED / 20 ms, max / 70 to 150 ms SLOW / 20 ms, max / 1 to 2 seconds (Applicable to HF-8054A Receiver, 622-3475-002 only.) DATA / 20 ms, max / 15 to 30 ms VOICE / 20 ms, max / 1 to 2 seconds FAX / 2 seconds, max / 3 to 6 seconds
AGC crowbar	AGC crowbar action provides fast reaction of AGC to stop signal level changes between local and distant stations in data networks. It is enabled in NET DATA mode and for channel A1 (USB) and channel B1 (LSB) ifs only. Crowbar action is initiated by a decrease in received signal level of 20 dB or by application of an end of message signal.
AGC bus	AGC bus interconnects AGC lines of ifs by operation of AGC bus switches.
Squelch	Operates on audio snr of voice signals below 1000 Hz; applicable to speaker output only
If output	20 mV nom at 450 kHz into 50 Ω for 3-μV input signal
Bandwidths	ISB: Channel A1 (USB) -2 dB points: carrier +250 Hz max and carrier +3100 Hz min. Channel B1 (LSB) -2 dB points: carrier -250 Hz min and carrier -3100 Hz max. Channel A2 (UUSB) -2 dB points: carrier +3190 Hz max and carrier +6040 Hz max. Channel B2 (LLSB) -2 dB points: carrier -3190 Hz min and carrier -6040 Hz min. AM or CW: with 16 selected 16 kHz bandwidth is 16 ±4 kHz with center frequency at carrier frequency. Provisions for up to five additional filters that can be selected in AM or CW mode using the BANDWIDTH switch.

Table Equipment Specifications (Cont).

CHARACTERISTIC	SPECIFICATION
Antenna input impedance	50 Ω nom, unbalanced
Rf overload protection	Up to 100-V rf input, power on or off
Built-in test (BIT) functions	Fault detectors: located on power supply outputs, phase-locked loops of frequency synthesizer and vbfo, and injection signal outputs. Provides fault summary indications and individual fault indications in serial monitor data. Performance monitors: located on audio outputs, AGC levels, and if signal level. Individual performance monitor status provided in serial monitor data.
Duty cycle	Continuous
Power requirements	100/115/215/230 V ±10%, 47 to 420 Hz, single-phase ac, 80 watts maximum
Serial control and monitor interface characteristics	
Output data levels	FSK: -5 to +5 dB mW into 600 Ω, 0 dB mW nominal RS-232C/MIL-STD-188C: ±6 ±1 V dc into 3 to 6 kΩ
Input data levels	FSK: -25 to +5 dB mW (20 dB snr min) RS-232C/MIL-STD-188C: ±6 ±1 V dc
Line output impedance	FSK: 600 Ω nom RS-232C/MIL-STD-188C: 300 Ω max when transmitting, 50 kΩ min when not transmitting
Line input impedance	FSK: 600 Ω nom RS-232C/MIL-STD-188C: 47 kΩ nom
FSK tone frequencies	Mark: 1260 Hz Space: 2133 Hz
Data rates	FSK: 75, 109, 150, 300, 600 bauds RS-232C/MIL-STD-188C: 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600, 19 200 bauds
Data format	Selectable 7-bit ASCII code or 8-bit character code
Line characteristics	FSK: 600 Ω balanced RS-232C/MIL-STD-188C: unbalanced, line to ground
Environmental	
Temperature	Full performance: 0 to +50 °C (+32 to +122 °F) Reduced performance: -20 to 0 °C (-4 to +32 °F) Nonoperating: -57 to +71 °C (-71 to 160 °F)
Humidity	0 to 95% relative humidity
Altitude	Operating: 0 to 3048 m (10 000 ft), 0 to +50 °C (+32 to +122 °F); 0 to 4572 m (15 000 ft), 0 to +25 °C (+32 to +77 °F) Nonoperating: 0 to 12 192 m (40 000 ft), -57 to +71 °C (-71 to +160 °F)
Shock	Bench handling (MIL-STD-810C, procedure V, method 516.2)
Vibration	1.5 g, 5.5 to 55 Hz (MIL-STD-810C, procedure X, method 514.2)
Receiver	
Size	177 mm (7 in) high x 483 mm (19 in) wide x 619 mm (24.4 in) deep with handles
Weight	21.8 kg (48 lb) max
Mounting	Desk-top cabinet or standard 483-mm (19-in) rack with optional slide mounting kit for rack
Receiver Control	
Size	177 mm (7 in) high x 483 mm (19 in) wide x 523.8 mm (20.62 in) deep with handles
Weight	13.6 kg (30 lb) max

HF-80 RECEIVER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

INSTALLATION

Printed in Australia

523-1003187-0012M1

10October, 1981

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1. GENERAL

The HF-80 Receiver System is ready, as shipped, for mounting in a in a standard 483-mm (19-in) equipment rack. This section contains information for installing the equipment in a rack and making the unit operational.

All interconnecting cables are attached at the rear panel. The headphone jack is located on the front panel for operator convenience.

The equipments operate with natural convective cooling in single-unit installations. Where other heat-producing equipment is installed in the same cabinet, it is desirable to install a cabinet blower to remove hot air and prevent excessive temperature build-up.

NOTE

For detailed information (including manufacturer's part number and physical description) pertaining to equipment mounting racks and preassembled interconnecting cables, refer to the Description section of this instruction book.

2. UNPACKING AND INSPECTION

Unpack the receiver carefully and check each item received against the shipping invoice. Inspect the items for evidence of damage during shipment. All claims for damage in shipment should be filed promptly with the transportation company involved. If claims for damage are filed, save the original packing cases and materials.

When unpacking, locate and retain the Test Data Sheet for each piece of equipment.

3. PREINSTALLATION CHECK AND REQUIREMENTS

3.1 Strapping

3.1.1 Input Power

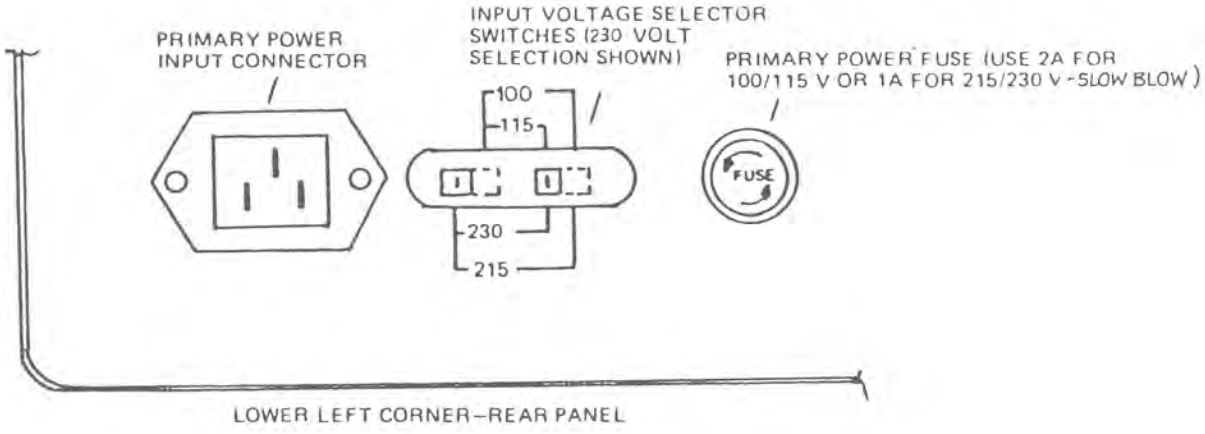
CAUTION

Do not operate the primary input voltage selector switches with power applied. Be sure switches are in proper position with proper fuse installed before applying.

Do not remove or install plug-in cards or modules with power on. Damage to cards or modules may result.

Connect the ground terminal located on the rear panel to a ground strap that is securely connected to earth ground. (Ground strap should be #14 AWG or larger).

Switches are provided for strapping the unit for the desired primary input power. The unit may be operated from 100, 115, 215, or 230 volts ac, nominal input. In the lower left corner of the rear panel, set the primary input voltage selector switches to the position corresponding to the value nearest the primary input voltage. Figure 1 shows the switches set to the 230 volt position and location of primary power fuse holder.



Primary Input Voltage Selector Switches
Figure 1

3. PREINSTALLATION CHECK AND REQUIREMENTS

3.1 Strapping

3.1.1 Input Power

Fuses are provided in the maintenance kit supplies with the receiver. For 215 or 230 V ac operation, install a 1-ampere slow blow fuse.

3.1.2 Remote Control

Both the receiver and the associated receiver control or processor must operate at the same baud rate, signalling method and word format. This is accomplished by the proper strapping of the serial interface, parallel output, and parallel input cards using the dipswitches and straps provided.

Figure 2 is a partial view of serial interface card with the dipswitches shown. These switches control baud rate, FSK/RS-232C signaling, word format, EIA/MIL-STD-188C polarity, parity, number of stop bits, application, and address recognition enable/disable. (Note: Switch #1 of each dipswitch is toward the top of the card).

NOTE

In the systems supplied for the Australian Army, the Serial Interface Card is strapped for 1200 baud rate, EIA/RS-232C signalling method, ASC11 word format, odd parity, with 2 stop bits.

The ADDRESS switch on the HF-8094 Receiver Control front panel developes a 4-bit binary output. Each receiver must be strapped, at interconnecting cable connector J14, to correspond to the address bit pattern for that unit.

When an HF-80 Remote Display is installed, in order to continually display the status of several equipments the serial interface card in the control unit and the remote display unit must be strapped for polling (see figure 3).

For further strapping details refer to the HF-8094 instruction book.

3.1.3 Frequency Standard

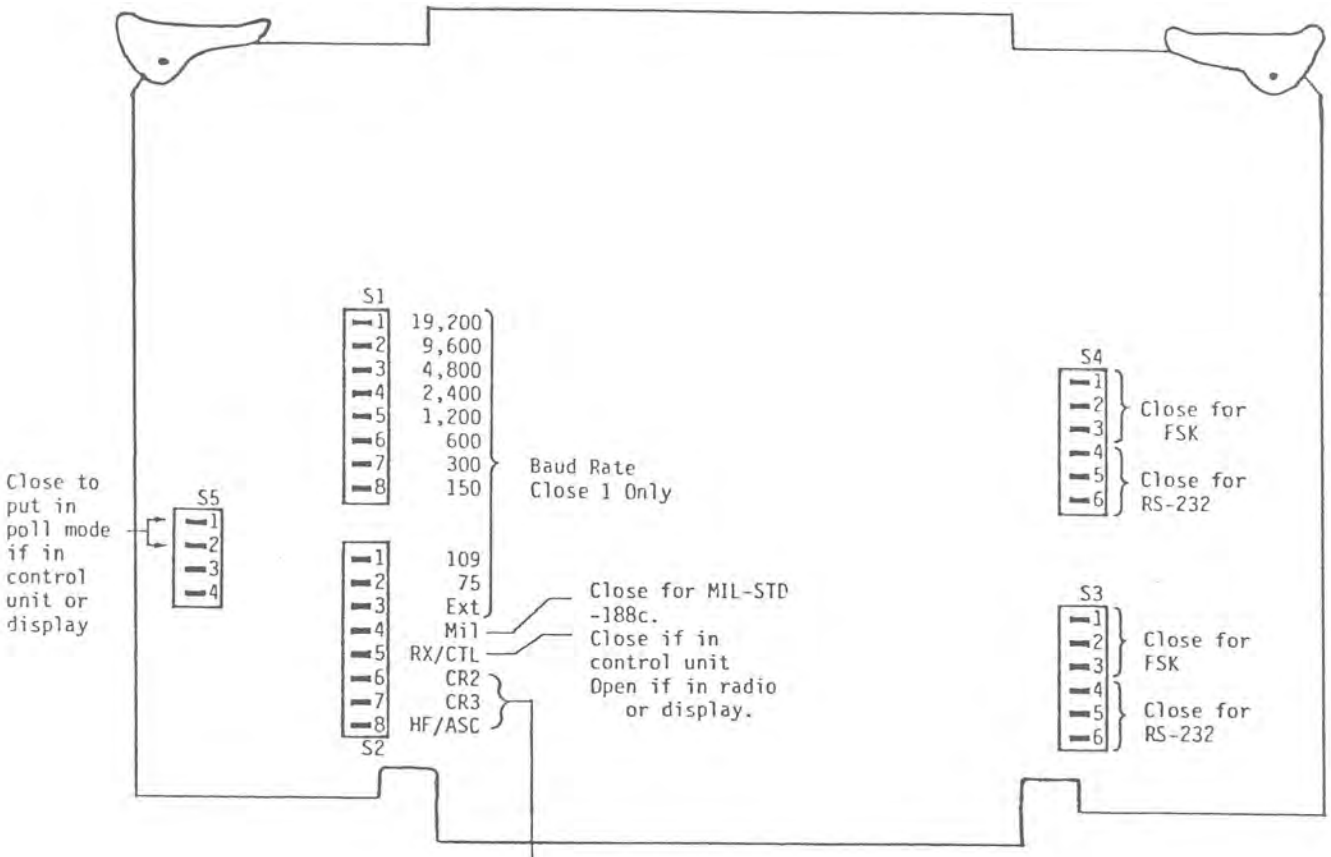
3.1.3.1 Internal Standard

A temperature-compensated crystal oscillator provides an internal 100-kHz frequency standard. To use the internal frequency standard, the strap on synthesizer reference A16 must be set to the INT (internal) position.

3.1.3.2 Oven Standard

To use the oven standard, the strap on synthesizer reference A16 must be set to the EXT (external) position and the strap on external phase-lock A16A4 must be set to the 1-MHz position.

3. PREINSTALLATION CHECK AND REQUIREMENTS



*SWITCH			WORD FORMAT	PARITY	NO OF STOP BITS
8	7	6			
C	C	C	ASCII	Even	2
C	C	O	ASCII	Odd	2
C	O	C	ASCII	Even	1
C	O	O	ASCII	Odd	1
O	C	C	HF-80	None	2
O	C	O	HF-80	None	1
O	O	C	HF-80	Even	1
O	O	O	HF-80	Odd	1

*O = Open, C = Closed

NOTE: For polling system the card must be strapped for RS-232C data transmission.

Figure 2 Strapping Requirements on the Serial Interface Card

3. PREINSTALLATION CHECK AND REQUIREMENTS

3.1.3 Frequency Standard

3.1.3.3 External Frequency Standard

To use the external frequency standard (frequency standard switch A30 not installed), the strap on synthesizer reference A16 must be set to the EXT (external) position and the strap on external phase-lock A16A4 must be set to the frequency position of the external standard (100-kHz, 1-MHz, or 5-MHz).

3.1.3.4 Frequency Standard Switch

To use the frequency standard switch, the strap on synthesizer reference A16 must be set to the EXT (external) position and the strap on external phase-lock A16A4 must be set to the 1-MHz position.

To enable the use of external standard, the frequency selector switch on frequency standard switch A30 must set to the frequency position of the external standard (100-kHz, 1-MHz or 5-MHz).

3.2 Line Audio Outputs

NOTE

Receive line audio outputs may be adjusted to any desired level within the amplifier range (-20 to +10 dB mW output for a 3-uV rf input). These adjustments are accessible through the top dust cover.

The receive line audio outputs are adjusted at the factory so that 0 dB mV output with a 3-uV rf input in the ISB modes. If your requirements for audio output are different from this, make line audio adjustments as outlined in the maintenance section of this instruction book.

3.3 Operation

The receiver operation was within the specified standards when the unit was shipped from the factory. The minimum performance test in the maintenance section should be performed to ensure that the equipment is operating within specifications.

4. CABLING

Refer to figure 3.

4.1 Receiver to HF-8094 Receiver Control

Maximum allowable separation between the HF-8094 Receiver Control and receiver is dependent upon the characteristics of the transmission lines used, the method of signaling, and the transmission data rates selected . Transmission of the FSK data signals over private carrier leased lines, commercial telephone lines, microwave links, or satellite communications links, using data modems, permits unlimited separation between the receiver control and receiver. Preassembled cables are available from Rockwell-Collins for use in remote control and receiver installations.

4.2 Multiple Receivers to Remote Control

Remote control of multiple receivers is accomplished by connecting in parallel all control data bus (J14-2 and J14-14) and monitor data bus (J 14-3 and J14-16) of the receivers. Each receiver must be strapped for a unique address. The receivers must also be strapped for the same data rates, same parity, and same signal levels. (The signal level strapped must be either RS-232C or MIL-STD-188C; FSK cannot be used for multiple receiver systems).

4.3 Receiver to Primary Power Source

Separation between receiver and primary power source (100, 115, 215, 230 V ac) should be kept to a minimum. A preassembled power cable is supplied as a part of the receiver.

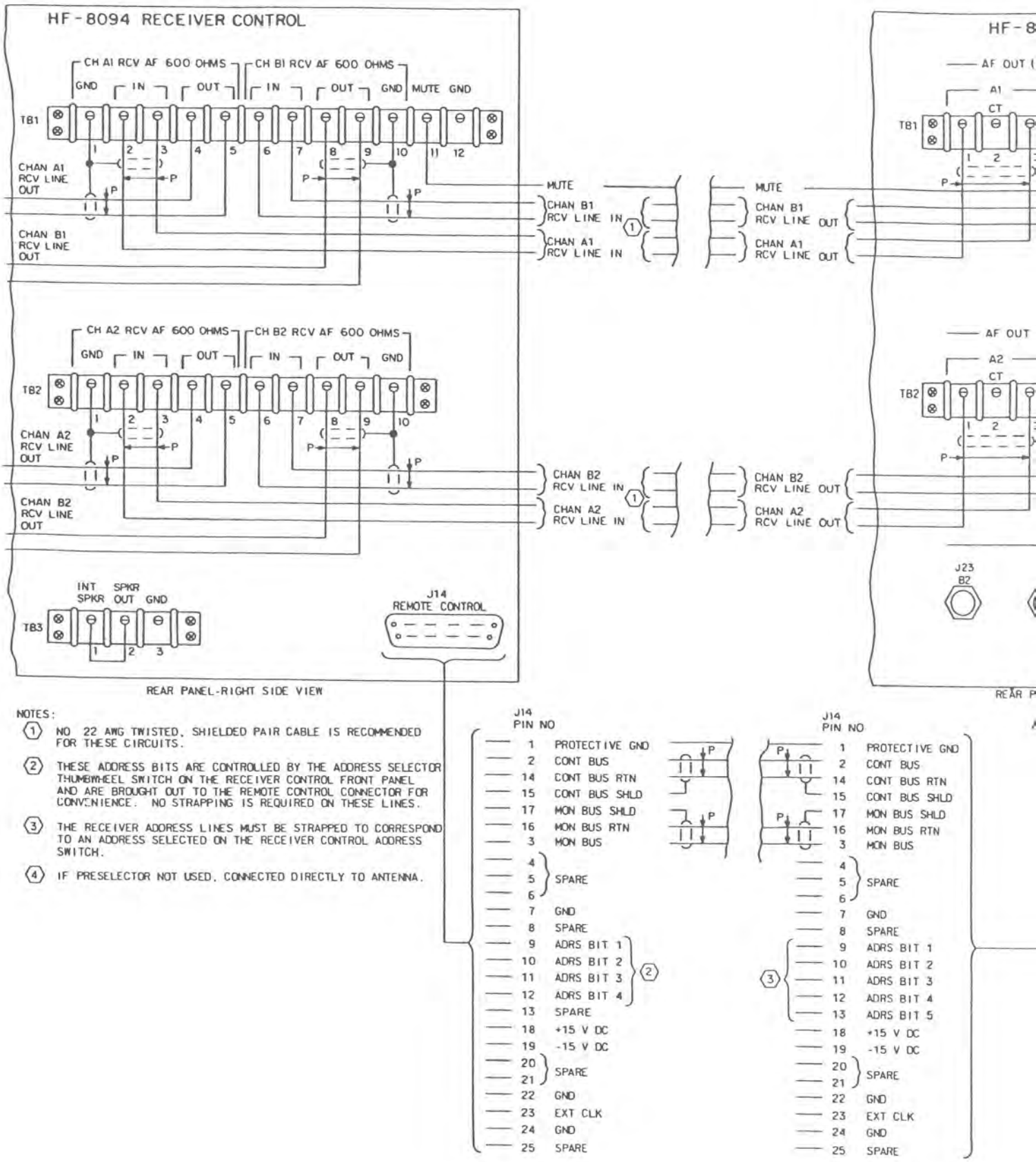
4.4 Receiver to External Speaker

Separation between receiver or receiver control and external speaker should be kept to a minimum. However, field grade twisted-pair wire should be acceptable for most external speaker requirements. Terminal clips or wires can be attached to the receiver and receiver control. Refer to applicable speaker for connection requirements. Jumper between TB3-1 and TB3-2 is removed for external speaker, and external speaker leads are connected to TB3-2 and TB3-3.

4.5 Receiver to HF-8060 Preselector and/or Antenna

Separation between receiver and preselector or antenna should be kept to a minimum. Preassembled cables are available from Rockwell-Collins for use in installations where the preselector and antenna are used or where only an antenna is used.

4. CABLING



NOTES:

(1) NO. 22 AWG TWISTED, SHIELDED PAIR CABLE IS RECOMMENDED FOR THESE CIRCUITS.

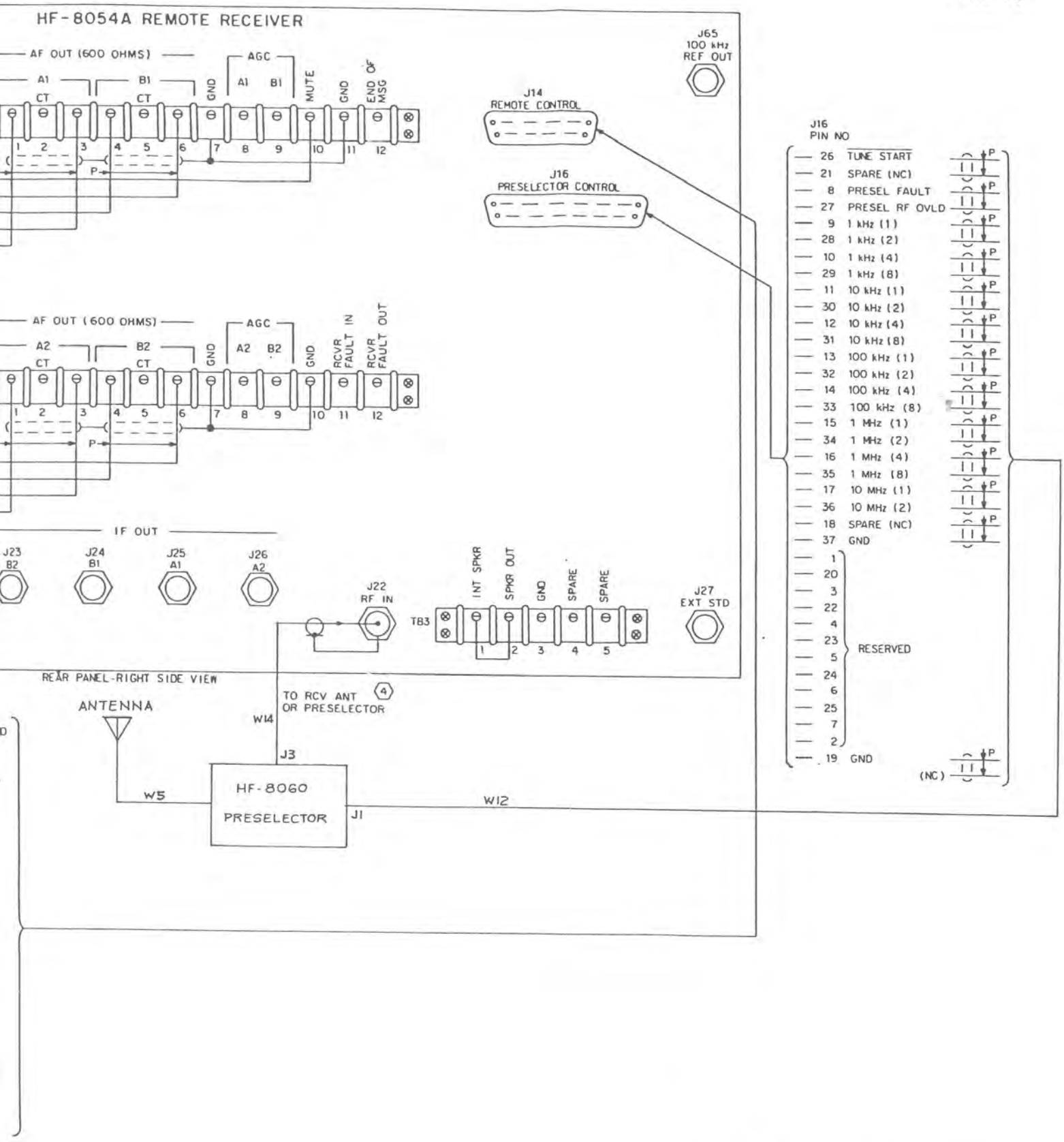
(2) THESE ADDRESS BITS ARE CONTROLLED BY THE ADDRESS SELECTOR THUMBWHEEL SWITCH ON THE RECEIVER CONTROL FRONT PANEL AND ARE BROUGHT OUT TO THE REMOTE CONTROL CONNECTOR FOR CONVENIENCE. NO STRAPPING IS REQUIRED ON THESE LINES.

(3) THE RECEIVER ADDRESS LINES MUST BE STRAPPED TO CORRESPOND TO AN ADDRESS SELECTED ON THE RECEIVER CONTROL ADDRESS SWITCH.

(4) IF PRESELECTOR NOT USED, CONNECTED DIRECTLY TO ANTENNA.

J14 PIN NO		
1	PROTECTIVE GND	
2	CONT BUS	
14	CONT BUS RTN	
15	CONT BUS SHLD	
17	MON BUS SHLD	
16	MON BUS RTN	
3	MON BUS	
4, 5, 6	SPARE	
7	GND	
8	SPARE	
9	ADRS BIT 1	(2)
10	ADRS BIT 2	(2)
11	ADRS BIT 3	(2)
12	ADRS BIT 4	(2)
13	SPARE	
18	+15 V DC	
19	-15 V DC	
20, 21	SPARE	
22	GND	
23	EXT CLK	
24	GND	
25	SPARE	

J14 PIN NO		
1	PROTECTIVE GND	
2	CONT BUS	
14	CONT BUS RTN	
15	CONT BUS SHLD	
17	MON BUS SHLD	
16	MON BUS RTN	
3	MON BUS	
4, 5, 6	SPARE	
7	GND	
8	SPARE	
9	ADRS BIT 1	(3)
10	ADRS BIT 2	(3)
11	ADRS BIT 3	(3)
12	ADRS BIT 4	(3)
13	ADRS BIT 5	(3)
18	+15 V DC	
19	-15 V DC	
20, 21	SPARE	
22	GND	
23	EXT CLK	
24	GND	
25	SPARE	



HF-8054( ) Receiver, Typical Installation
Figure 3

4. CABLING

4.6 Receiver to External Frequency Standard

Separation between receiver and external frequency standard should be kept to a minimum. A BNC-to-external frequency standard connector rf cable is required.

4.7 Receiver ID Output to External Detector or TTY Converter

Separation between receiver and external receiver audio modem should be kept to a minimum. Two external receive audio connector rf cables are required.

4.8 Receiver Mute Line

The receiver may be muted by connecting an external mute line to TB1-10 . This line must be grounded to mute, open, or high-level logic 1 to receive. If high-level logic 1 is used for receive, applied voltage must not exceed +30V dc.

4.9 Receive to AGC Output Monitor

AGC output signals provided by channels A1, A2, B1, and B2 if's are proportional to the gain reduction of the receiver. The AGC output signals are caused by AGC action or by manual or remote rf gain control. Channel A1 AGC is on TB1-8, channel B1 AGC is on TB1-9, channel A2 AGC is on TB2-8, and channel B2 AGC is on TB2-9. These outputs can be used as an indicator of signal strength when AFC is enabled. Output indicates signal strength above a 1-uV input. To monitor the AGC outputs, a resistive load of not less than 10 k ohm may be connected. External lines connected to these terminals must be shielded to prevent noise or hum pick up from modulating the gain of the receiver.

4. CABLING
4.10 Connections for Space Diversity

NOTE

Diversity reception is a form of reception used to compensate for signal fading. In space diversity, the same signal is received from more than one transmission path (separate spaced antennae) separated far enough to minimize the effects of fading.

Space diversity connections using the HF-8054A Receivers can be accomplished using one of several different methods:

a. Manual control (audio combining)
b. Manual control (AGC cross-coupling)
c. Remote-controlled master receiver to slave receiver
d. Locally-controlled master receiver to slave receiver

Space diversity connections using the HF-8054 Receivers can be accomplished only by using:

a. Manual control (audio combining)
b. Manual control (AGC cross-coupling)

Refer to the space diversity systems using HF-8054( ) Receivers supplement 523-0770881 for detailed information on these space diversity connections. The following paragraphs give a brief description of the connections.

4.10.1 Manual Control (Audio Combining)

Simplest space diversity receiving system consists of two separate receivers operating at the same frequency but using separate spaced antennae. The audio (or if) outputs from these receivers are connected to one RTTY converter or suitable audio combiner that has provisions for diversity inputs.

Under fading conditions, the background noise increases in the receiver experiencing fading. This can be alleviated by using a sophisticated audio combiner or by cross-coupling the AGC lines of the receivers. Refer to paragraph 4.10.2 for instructions for AGC cross-coupling.

4.10.2 Manual Control (AGC Cross-Coupling)

The space diversity receiving system using AGC cross-coupling consists of the manual control (audio combining) system described in paragraph 4.10.1 with the AGC lines of the receivers cross-coupled.

On the HF-8054( ) Receivers AGC cross-coupling is accomplished by connecting the channel A1 AGC input/output (TB1-8) on the receiver to the channel A1 AGC input/output (TB1-8) on the other receiver in the system. Similarly all other active channels are cross-connected. Care must be taken that the AGC lines are shielded to prevent pick-up of hum and noise. A good ground return must be

4. CABLING
4.10 Connections for Space Diversity
4.10.2 Manual Control (AGC Cross-Coupling)

established between receivers (interconnect TB1-7 with bus wire). Do not add any external capacitor filters or resistors.

4.10.3 Remote-Controlled Diversity Receivers

When two HF-8054A Receivers are connected as a diversity pair they may be connected for remote control. This space diversity system uses audio combining, AGCcross-coupling, and the remote control for setting the receiver pair to the same control settings and for system monitoring.

In this method, the control data output of the receiver control is connected to the control data input (J14-2, -14) of receiver no.1, the monitor data output (J14-3, -16) of receiver no.1 is connected to the control data input (J14-2,-14) of receiver no.2, and the monitor data output (J14-3, -16) of receiver no.2 is connected to the monitor data input of the receiver control. The diversity master input (J14-8) of receiver no.1 is grounded and the receiver fault output(TB2-12) of receiver no.1 is connected to the receiver fault input (TB2-11) of receiver no.2. Audio combining and AGC cross-coupling are connected as described in paragraphs 4.10.1 and 4.10.2.

4.10.4 Master Receiver to Slave Receiver

Using the HF-8054A Receivers, it is possible to set up a space diversity system with a master receiver controlling a slave receiver. This is accomplished by causing the master receiver to provide serial control data for the slave receiver.

This space diversity system uses audio combining, AGC cross-coupling, and a master-slave receiver pair.

In this method, the master receiver serial interface A13 is set for control operation (close switch 5 of S2 on A13). Connect the monitor data output (J14-3, -16) of the master receiver to the control data input (J14-2, -14) of the slave receiver. The receiver fault output (TB2-12) of the slave receiver is connected to the receiver fault input (TB2-11) of the master receiver. Audio combining and AGC cross-coupling are connected as described in paragraphs 4.10.1 and 4.10.2.

5. INSTALLATION PROCEDURES

The equipments are standard 483-mm (19-in) rack-mounting, and can be mounted using four mounting screws through the edges of the front panel; however, on all rack-mounting configurations, slide mounting is recommended for ease of service and slide support. When installation is complete, ensure that all electrical connections are made (including strapping) andthat all dust covers and shields are in place.

5.1 Installation of Slide Mounts

a. Attach the CA-8030 Slide Mounting Kit (slide rails) to the proper location in the Equipment Cabinet or Equipment Desk Cabinet and to the equipment. For attachment details, refer to the 10kW Transmitter Installation Section of this instruction book.

b. Lift the equipment, position it squarely, and engage the slides of the mounting kit. Slide the equipment completely into the cabinet to assure that the slides function properly.

c. Connect a ground strap (#14 AWG or larger) from the GND terminal, located on the rear of the receiver, to a suitable ground point in the equipment cabinet. Be sure that the cabinet ground point is free of paint or foreign material.

d. Refer to cabling, paragraph 4, and make the necessary cable connections as applicable to your unit.

e. Slide the equipment into place in the equipment cabinet, and secure it with four screws on each side of the front panel.

NOTE

A Rotating Slide Mounting Kit, part number 015-M040-020, is available for special applications such as training establishments etc. This slide kit is suitable for use with the HF-8054A Receiver and HF-8060 Preselector. For further details of the slide kit, associated hardware and installation instructions, refer to your Rockwell International supplier.

6. POSTINSTALLATION CHECK/REQUIREMENTS

There is no postinstallation check/requirements to be performed on the receiver or receiver controller as a unit. The operation procedures presented in the operation section of this instruction book may be used as a postinstallation operational check.

For postinstallation check/requirements of other equipments, refer to the respective instruction books.

HF-80 RECEIVER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

OPERATION

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table of contents

1. GENERAL.

All controls and indicators necessary for operation of a receiver system are located on the front panel of the HF-8054A Receiver and HF-8094 Receiver Control.

When the HF-8054A Receiver is connected to a receiver control and set for remote operation, the mode, channel enable, bandwidth, frequency, rf gain, AGC, AFC,and vbfo front-panel controls on the receiver do not affect the operation of the receiver. Likwise, with the receiver set for local operation, the corresponding controls on the receiver control do not affect the operation of the receiver. Audio controls, signals, and monitors of the receiver and receiver control remain enabled whether being operated remotely or locally.

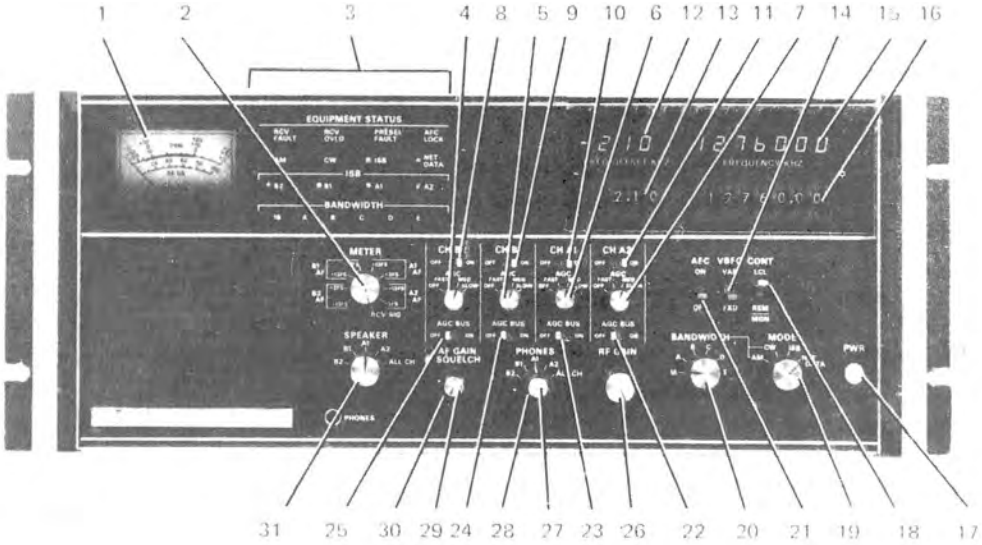
Note that channel B1, A2, B2 if and audio circuits are active only in ISB (independent sideband) or NET DATA modes. In ISB and NET DATA operation, channel A1 output signals are USB (upper sideband), channel B1 output signals are LSB (lower sideband), channel A2 output signals are UUSB (upper-upper sideband) and channel B2 output signals are LLSB (lower-lower sideband). In all other modes, only channel A1 circuits are active and provide signal outputs regardless of if filter selected.

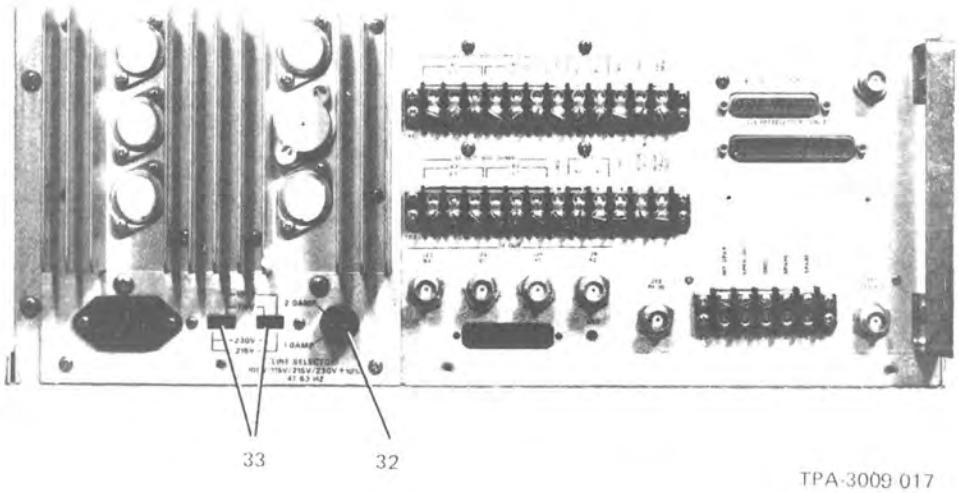
2. CONTROLS AND INDICATORS

Controls and indicators of the HF-8054( ) Receiver and HF-8094 Receiver Control and Master Control Switch are shown in figures 1,2 and 3 and are listed in tables 1, 2 and 3 along with their functions. All controls and indicators listed are applicable to all units unless otherwise indicated.

NOTE

All units referred to in the controls and indicators table are interfaced through the receiver control.





TPA-3009 017

HF-8054( ) Receiver, Controls and Indicators
Figure 1

Table 1. HF-8054 Receiver, Controls and Indicators.

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Meter A2M1	Indicates levels as selected by METER switch A2S1.
2	METER switch A2S1	Selects signal levels to be measured by meter A2M1. Selectable positions are as follows: a. B2 AF +13FS position monitors channel B2 receive line audio output (indicates +13 dB mW full scale). b. B2 AF +3FS position monitors channel B2 receive line audio output (indicates +3 dB mW full scale). c. B1 AF +13FS position monitors channel B1 receive line audio output (indicates +13 dB mW full scale). d. B1 AF +3FS position monitors channel B1 receive line audio output (indicates +3 dB mW full scale). e. A1 AF +13 FS position monitors channel A1 receive line audio output (indicates +13 dB mW full scale). f. A1 AF +3FS position monitors channel A1 receive line audio output (indicates +3 dB mW full scale). g. A2 AF +13FS position monitors channel A2 receive line audio output (indicates +13 dB mW full scale). h. A2 AF +3FS position monitors channel A2 receive line audio output (indicates +3 dB mW full scale). i. RCV SIG position monitors (AGC level) receive rf input signal (indicates 0 to 100 dB above a 1-μV rf input signal).
3	EQUIPMENT STATUS indicators (color)	
	RCV FAULT A2A1DS5 (red)	Indicates power supply low voltage, synthesizer fault, or vbfo synthesizer fault. Indicated when fault signal is supplied by power supply A1, synthesizer voltage regulator A14, synthesizer subcarrier generator A15, and/or vbfo A4. (Synthesizer fault signal from synthesizer voltage regulator A14 is a summary of all synthesizer loss-of-lock signals supplied by A16 through A23.)
	RCV OVERLOAD A2A1DS6 (red)	Indicates a receive rf signal overload condition from translator module A9 or from associated preselector.
	PRESEL FAULT A2A1DS23 (red)	Indicates a preselector fault. Indicated by a preselector fault signal from associated preselector.
	AFC LOCK A2A1DS3 (yellow) (used with AFC option only)	Indicates that AFC (automatic frequency control) is locked to a signal.
	AM A2A1DS2 (yellow)	Indicates that AM operating mode is selected.
	CW A2A1DS7 (yellow)	Indicates that CW operating mode is selected.
(Cont)	ISB A2A1DS4 (yellow)	Indicates that ISB operating mode is selected.

Table 1. HF-8054( ) Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
3 (Cont)	NET DATA A2A1DS22 (yellow)	Indicates that NET DATA operating mode is selected.
	ISB channel indicators	
	B2 A2A1DS10 (yellow)	Indicates that B2 (LLSB) receive circuits are enabled.
	B1 A2A1DS9 (yellow)	Indicates that B1 (LSB) receive circuits are enabled.
	A1 A2A1DS12 (yellow)	Indicates that A1 (USB) receive circuits are enabled.
	A2 A2A1DS13 (yellow)	Indicates that A2 (UUSB) receive circuits are enabled.
	BANDWIDTH indicators	
	16 A2A1DS14 (yellow)	Indicates that 16-kHz if attenuator pad (FL8) is selected.
	A A2A1DS17 (yellow)	Indicates that optional if filter A (FL3) is selected.
	B A2A1DS18 (yellow)	Indicates that optional if filter B (FL4) is selected.
	C A2A1DS15 (yellow)	Indicates that optional if filter C (FL5) is selected.
	D A2A1DS16 (yellow)	Indicates that optional if filter D (FL6) is selected.
	E A2A1DS19 (yellow)	Indicates that optional if filter E (FL7) is selected.
4	Channel B2 AGC switch A2S24	Selects AGC attack and decay times for channel B2. AGC switch is a 4-position switch with the following positions: OFF-VOICE-DATA-FAX or OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In DATA or FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In VOICE or SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled. e. In FAX position, AGC attack time of 2 seconds maximum and decay time of 3 to 6 seconds is enabled.
5	Channel B1 AGC switch A2S25	Same as A2S24 except used for channel B1.
6	Channel A1 AGC switch A2S26	Same as A2S24 except used for channel A1.
7	Channel A2 AGC switch A2S27	Same as A2S24 except used for channel A2.
8	CH B2 (ON/OFF) enable switch A2S5	Enables/disables channel B2 circuits in ISB and NET DATA modes only.
9	CH B1 (ON/OFF) enable switch A2S3	Enables/disables channel B1 circuits in ISB and NET DATA modes only.
10	CH A1 (ON/OFF) enable switch A2S2	Enables/disables channel A1 circuits in ISB and NET DATA modes only.

Table 1. HF-8054( ) Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
11	CH A2 (ON/OFF) enable switch A2S4	Enables/disables channel A2 circuits in ISB and NET DATA modes only.
12	VBFO OFFSET KHZ display A2A5U15 thru A2A5U19 (used with frequency display option only and only when dvbfo option is installed)	Displays bcd vbfo offset frequency as set by VBFO OFFSET KHZ switches or a remote receiver control. a. A2A5U15 displays direction of vbfo offset frequency from carrier (+ or -). b. A2A5U16 displays ones kilohertz. c. A2A5U17 displays hundreds hertz. d. A2A5U18 displays tens hertz. e. A2A5U19 displays ones hertz.
13	VBFO OFFSET KHZ controls A2S18A thru A2S18D (used with dvbfo option only)	Sets bcd frequency for vbfo as indicated by thumb wheel display. a. A2S18A selects the direction of the offset of the dvbfo signal (+ or -). b. A2S18B selects ones kilohertz. c. A2S18C selects hundreds hertz. d. A2S18D selects tens hertz.
14	VBFO switch A2S11 (used with dvbfo option only)	Selects the bfo injection signal to be used. a. VAR position enables dvbfo. b. FXD position selects the fixed 450-kHz injection signal.
15	FREQUENCY KHZ display A2A5U20 thru A2A5U26 (used with frequency display option only)	Displays bcd frequency as set by FREQUENCY KHZ controls or a remote receiver control. a. A2A5U20 displays tens megahertz. b. A2A5U21 displays ones megahertz. c. A2A5U22 displays hundreds kilohertz. d. A2A5U23 displays tens kilohertz. e. A2A5U24 displays ones kilohertz. f. A2A5U25 displays hundreds hertz. g. A2A5U26 displays tens hertz. h. A2A5U27 displays ones hertz (option).
16 (Cont)	FREQUENCY KHZ controls A2S17A thru A2S17G	Sets bcd frequency as indicated by thumb-wheel display. a. A2S17A selects tens megahertz.

Table 1. HF-8054( ) Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
16 (Cont)		b. A2S17B selects ones megahertz. c. A2S17C selects hundreds kilohertz. d. A2S17D selects tens kilohertz. e. A2S17E selects ones kilohertz. f. A2S17F selects hundreds hertz. g. A2S17G selects tens hertz.
17	PWR switch A2S28	Sets power on/off. When pressed and latched (inward position), power is applied to the receiver. When pressed and unlatched (outward position), power is removed from the receiver.
18	CONT switch A2S13 (preset option not installed)	Selects use and method of controlling the HF-8054A Receiver. a. LCL position allows unit to be controlled locally. (HF-8054 Receiver must be kept in LCL position for operation.) b. REM position allows unit to be controlled remotely. REM position disables local control of mode, bandwidth, frequency, rf gain, bfo, AGC, AGC, and vbfo signals. Local audio controls, signals, and monitors remain enabled. c. MON position is a momentary position that enables local controls and sets the monitor bit (word 4, character 5, bit 1) of the receiver control monitor response. This may be used, for example, to command a processor control to modify a stored preset table of operating frequency and mode information to that set on the local controls.
	CONT switch A2S13 (used with preset option installed)	Selects method of controlling the HF-8054 Receiver (preset option not used in HF-8054A Receiver). a. NORM position allows unit to be controlled using the front panel controls. b. PSET position allows unit to be controlled using the PRESET switch A2S14 and CHAN selector A2A6.
Not shown (is mounted just right of CONT switch A2S13)	PRESET switch A2S14 (used with preset option only)	Selects preset controlling functions when CONT switch is in PSET position. a. OPER position selects the control functions preset on the channel selected by CHAN selector A2A6. The preset functions include frequency mode and bandwidth. b. STORE position presets the channel selected by CHAN selector A2A6 to the control settings on the front panel. The preset functions include frequency, mode, and bandwidth.
19 (Cont)	MODE switch A2S21	Selects the receiver operating mode and bandwidth. a. AM position selects AM mode, enables BANDWIDTH switch A2S22 and channel A1.

Table 1. HF-8054( ) Receiver, Controls and Indicators (Cont).

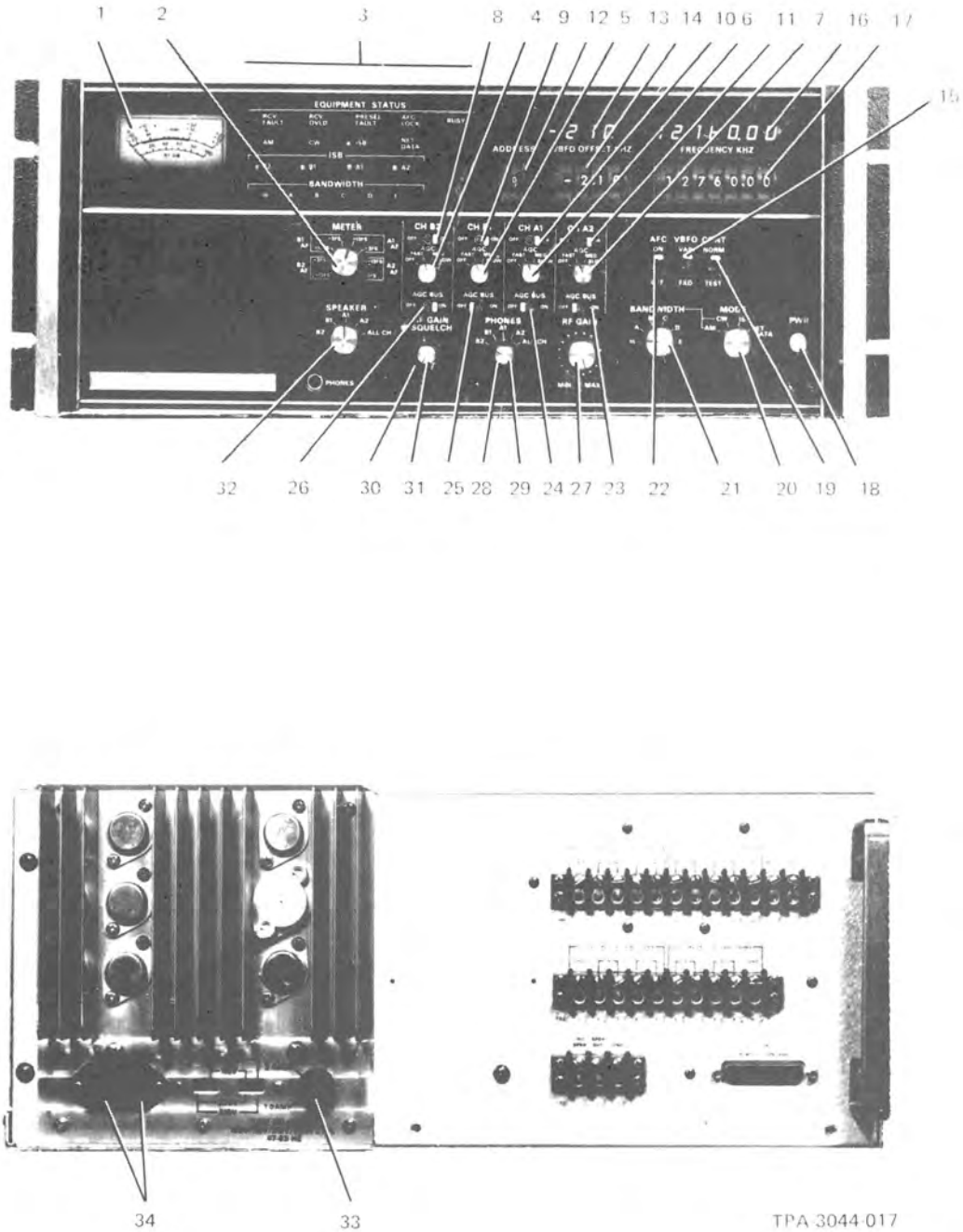
INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
19 (Cont)		b. CW position selects CW mode, enables BANDWIDTH switch A2S22 and channel A1. c. ISB position selects ISB mode and allows enabling the CH A1, CH B1, CH A2, CH B2 enable switches and the AGC BUS switches. d. NET DATA position selects NET DATA mode and allows enabling the CH A1 and CH B1 enable switches. **Note** Although the CH A2 and CH B2 enable switches and the AGC BUS switches are not disabled in the NET DATA mode they should be set to OFF in NET DATA mode.
20	BANDWIDTH switch A2S22	Selects receive operating bandwidth when MODE switch A2S21 is in AM or CW position. a. 16 position selects if attenuator pad (16-kHz bandwidth). b. A position selects bandpass filter FL3 (optional filter). c. B position selects bandpass filter FL4 (optional filter). d. C position selects bandpass filter FL5 (optional filter). e. D position selects bandpass filter FL6 (optional filter). f. E position selects bandpass filter FL7 (optional filter).
21	AFC switch A2S12 (used with AFC option only)	Sets AFC (automatic frequency control) on or off.
22	CH A2 - AGC BUS switch A2S8	Used in ISB mode to connect channel A2 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other if's connected to the AGC bus.
23	CH A1 - AGC BUS switch A2S6	Same as A2S8 except connects channel A1 AGC to common bus.
24	CH B1 - AGC BUS switch A2S7	Same as A2S8 except connects channel B1 AGC to common bus.
25	CH B2 - AGC BUS switch A2S9	Same as A2S8 except connects channel B2 AGC to common bus.

Table 1. HF-8054 Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
26	RF GAIN control A2R11	Controls rf AGC threshold/level, which in turn controls the gain of the rf and if circuits in the receiver. Disabled in NET DATA mode (maximum rf gain).
27	PHONES level control (◉) A2S19B	Controls headphone volume, full clockwise equals maximum volume.
28	PHONES switch (◯) A2S19A	Selects audio to be monitored at PHONES jack J1 on the receiver front panel. a. B2 position selects channel B2 receive audio. b. B1 position selects channel B1 receive audio. c. A1 position selects channel A1 receive audio. d. A2 position selects channel A2 receive audio. e. ALL CH position selects receive audio of all channels (B2, B1, A1, A2).
29	◯ AF GAIN control A2S16A	Controls volume of speaker.
30	◉ SQUELCH control A2S16B and A2S16C	Enables/disables squelch and controls the squelch threshold. In extreme counterclockwise position, squelch is disabled. When control is moved clockwise, squelch is enabled and squelch threshold is adjusted by further clockwise rotation of the control. Note Speaker squelch operates (breaks squelch) only on audio signals below 1000 Hz.
31	SPEAKER switch A2S15	Switches the selected audio to the speaker amplifier. a. B2 position selects channel B2 audio input. b. B1 position selects channel B1 audio input. c. A1 position selects channel A1 audio input. d. A2 position selects channel A2 audio input. e. ALL CH position selects audio input of all channels (B2, B1, A1, A2).
32	Fuse A1F1 (located on rear panel)	Fuse in power line. 2 A used for 100/115-V ac operation, 1 A used for 215/230-V ac operation (slow blow).
33 (Cont)	Power selection switch A1S1A and A1S1B (located on rear panel)	Controls input power strapping of power transformer in power supply A1. a. In 100-V position, power transformer strapped for 100-V ac operation (90 to 110 V ac).

Table 1. HF-8054( ) Receiver, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
33 (Cont)		b. In 115-V position, power transformer strapped for 115-V ac operation (103 to 127 V ac). c. In 215-V position, power transformer strapped for 215-V ac operation (193 to 237 V ac). d. In 230-V position, power transformer strapped for 230-V ac operation (207 to 253 V ac).



HF-8094 Receiver Control, Controls and Indicators
Figure 1

Table 2 HF-8094 Receiver Control, Controls and Indicators.

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Meter A2M1	Indicates levels as selected by METER switch A2S1.
2	METER switch A2S1	Selects signal levels to be measured by meter A2M1. Selectable positions are as follows: a. B2 AF +13FS position monitors channel B2 receive line audio output (indicates +13-dB mW full scale). b. B2 AF +3FS position monitors channel B2 receive line audio output (indicates +3-dB mW full scale). c. B1 AF +13FS position monitors channel B1 receive line audio output (indicates +13-dB mW full scale). d. B1 AF +3FS position monitors channel B1 receive line audio output (indicates +3-dB mW full scale). e. A1 AF +13FS position monitors channel A1 receive line audio output (indicates +13-dB mW full scale). f. A1 AF +3FS position monitors channel A1 receive line audio output (indicates +3-dB mW full scale). g. A2 AF +13FS position monitors channel A2 receive line audio output (indicates +13-dB mW full scale). h. A2 AF +3FS position monitors channel A2 receive line audio output (indicates +3-dB mW full scale).
3	EQUIPMENT STATUS indicators (color)	
	RCV FAULT A2A1DS5 (red)	Indicates receiver power supply low voltage, synthesizer fault, or vbfo synthesizer fault. Indicated when power supply fault signal is supplied by power supply module A1, synthesizer fault signal is supplied by synthesizer voltage regulator A14, synthesizer subcarrier fault signal is supplied by synthesizer subcarrier A15, and/or vbfo synthesizer fault signal is supplied by vbfo A4. (Synthesizer fault signal from synthesizer voltage regulator A14 is a summary of all synthesizer loss-of-lock signals supplied by A16 through A23.) When flashing, indicates monitor information from the receiver is not being received by the receiver control.
	RCV OVERLOAD A2A1DS6 (red)	Indicates a receive rf overload condition. Indicated by a receive rf overload signal from translator module A9 or from associated preselector caused by excessively high rf inputs from antenna.
	PRESEL FAULT A2A1DS23 (red)	Indicates a preselector fault. Indicated by a preselector fault signal from associated preselector.
	AFC LOCK A2A1DS3 (yellow) (used with AFC option only)	Indicates that AFC (automatic frequency control) is locked.
	BUSY A2A1DS8 (yellow)	Indicates the addressed receiver is being operated in the local control mode.
(Cont)	AM A2A1DS2 (yellow)	Indicates that AM operating mode is selected.

Table 2 HF-8054 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
3 (Cont)	CW A2A1DS7 (yellow)	Indicates that CW operating mode is selected.
	ISB A2A1DS4 (yellow)	Indicates that ISB operating mode is selected.
	NET DATA A2A1DS22 (yellow)	Indicates that NET DATA operating mode is selected.
	ISB channel indicators	
	B2 A2A1DS10 (yellow)	Indicates that B2 (LLSB) receive circuits are enabled.
	B1 A2A1DS9 (yellow)	Indicates that B1 (LSB) receive circuits are enabled.
	A1 A2A1DS12 (yellow)	Indicates that A1 (USB) receive circuits are enabled.
	A2 A2A1DS13 (yellow)	Indicates that A2 (UUSB) receive circuits are enabled.
	BANDWIDTH indicators	
	16 A2A1DS14 (yellow)	Indicates that 16-kHz if attenuator pad (FL8) is selected.
	A A2A1DS17 (yellow)	Indicates that optional if filter A (FL3) is selected.
	B A2A1DS18 (yellow)	Indicates that optional if filter B (FL4) is selected.
	C A2A1DS15 (yellow)	Indicates that optional if filter C (FL5) is selected.
	D A2A1DS16 (yellow)	Indicates that optional if filter D (FL6) is selected.
	E A2A1DS19 (yellow)	Indicates that optional if filter E (FL7) is selected.
4	Channel B2 AGC switch A2S24	Selects AGC attack and decay times for channel B2. AGC switch A2S24 is a 4-position switch with the following positions: OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled.
5	Channel B1 AGC switch A2S25	Selects AGC attack and decay times for channel B1. AGC switch A2S25 is a 4-position switch with the following positions: OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled.

Table 2. HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
6	Channel A1 AGC switch A2S26	Selects AGC attack and decay times for channel A1. AGC switch A2S26 is a 4-position switch with the following positions: OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled.
7	Channel A2 AGC switch A2S27	Selects AGC attack and decay times for channel A2. AGC switch A2S27 is a 4-position switch with the following positions: OFF-FAST-MED-SLOW. a. In OFF position, AGC is disabled. b. In FAST position, AGC attack time of 20 milliseconds maximum and decay time of 15 to 30 milliseconds is enabled. c. In MED position, AGC attack time of 20 milliseconds maximum and decay time of 70 to 150 milliseconds is enabled. d. In SLOW position, AGC attack time of 20 milliseconds maximum and decay time of 1 to 2 seconds is enabled.
8	CH B2 (ON/OFF) enable switch A2S5	Enables/disables channel B2 audio circuits in ISB and NET DATA modes only.
9	CH B1 (ON/OFF) enable switch A2S3	Enables/disables channel B1 audio circuits in ISB and NET DATA modes only.
10	CH A1 (ON/OFF) enable switch A2S2	Enables/disables channel A1 audio circuits in ISB and NET DATA modes only.
11	CH A2 (ON/OFF) enable switch A2S4	Enables/disables channel A2 audio circuits in ISB and NET DATA modes only.
12	ADDRESS switch A2A6S23	Sets binary address to the complement of the address indicated by thumb wheel display (0 thru 15). Receiver with associated address strapping is the controlled/monitored unit.
13	VBFO OFFSET KHZ display A2A5U15 thru A2A5U19 (used with frequency display option only, and only when dvbfo option is installed)	Displays bcd vbfo offset frequency control signal as set by VBFO OFFSET KHZ controls or a remote receiver control. a. A2A5U15 displays direction of vbfo offset frequency from carrier (+ or -). b. A2A5U16 displays ones kilohertz. c. A2A5U17 displays hundreds hertz. d. A2A5U18 displays tens hertz. e. A2A5U19 displays ones hertz.

Table 2 HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
14	VBFO OFFSET KHZ controls A2S18A thru A2S18D (used with dvbfo option only)	Sets bcd frequency control signal for vbfo as indicated by thumb wheel display. a. A2S18A selects the direction of the offset of the dvbfo signal, + or -. b. A2S18B selects ones kilohertz. c. A2S18C selects hundreds hertz. d. A2S18D selects tens hertz.
15	VBFO switch A2S11 (used with dvbfo option only)	Selects the bfo injection signal to be used. a. VAR position enables dvbfo. b. FXD position selects the fixed 450-kHz injection signal.
16	FREQUENCY KHZ display A2A5U20 thru A2A5U26	Displays bcd frequency control signal of addressed receiver (with CONT switch in NORM position) or setting of FREQUENCY KHZ controls (with CONT switch in TEST position). a. A2A5U20 displays tens megahertz. b. A2A5U21 displays ones megahertz. c. A2A5U22 displays hundreds kilohertz. d. A2A5U23 displays tens kilohertz. e. A2A5U24 displays ones kilohertz. f. A2A5U25 displays hundreds hertz. g. A2A5U26 displays tens hertz. h. A2A5U27 displays ones hertz (option).
17	FREQUENCY KHZ controls A2S17A thru A2S17G	Sets bcd frequency control signal as indicated by thumb wheel display. a. A2S17A selects tens megahertz. b. A2S17B selects ones megahertz. c. A2S17C selects hundreds kilohertz. d. A2S17D selects tens kilohertz. e. A2S17E selects ones kilohertz. f. A2S17F selects hundreds hertz. g. A2S17G selects tens hertz.
18	PWR switch A2S28	Sets power on/off. When pressed and latched (inward position), power is applied to the receiver control. When pressed and unlatched (outward position), power is removed from the receiver control.

Table 2 HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
19	CONT switch A2S13 (preset option not installed)	Selects use and method of controlling the receiver/receiver control. a. NORM position allows the receiver control to control the addressed receiver (addressed receiver must be in the remote mode). b. TEST position is a self-test position that allows the receiver control to test its operation internally.
	CONT switch A2S13 (used with preset option installed)	Selects method of controlling the receiver (preset option not used in HF-8054A). a. NORM position allows the receiver control to control the addressed receiver (addressed receiver must be in the remote mode). b. PSET position allows the receiver control to control the frequency, mode and bandwidth, of the addressed receiver, by using stored presets.
Not shown (is mounted just right of CONT switch A2S13)	PRESET switch A2S14 (used with preset option only)	Selects preset controlling functions when CONT switch is in PSET position. a. SEND position transmits the preset control functions to the addressed receiver (addressed receiver must be in the remote mode). The preset functions include frequency, mode, and bandwidth. b. DISPLAY position allows the frequency, mode, and bandwidth data, stored in the channel selected by CHAN selector A2A7, to be displayed on the remote control front panel. c. STORE position presets the channel selected by CHAN selector A2A7 to the control settings on the front panel. The preset functions include frequency, mode, and bandwidth.
Not shown (is mounted to the right of PRESET switch (A2A2S14)	CHAN switch A2A7S20	Selects any one of sixteen presets containing frequency, mode, and bandwidth information.
20	MODE switch A2S21	Selects the remote receiver operating mode and bandwidth. a. AM position selects AM mode and enables BANDWIDTH switch A2S22. b. CW position selects CW mode and enables BANDWIDTH switch A2S22. c. ISB position selects ISB mode. d. NET DATA position selects NET DATA mode.

Table 2 HF-8054 Receiver Control, Controls and Indicators (Cont).

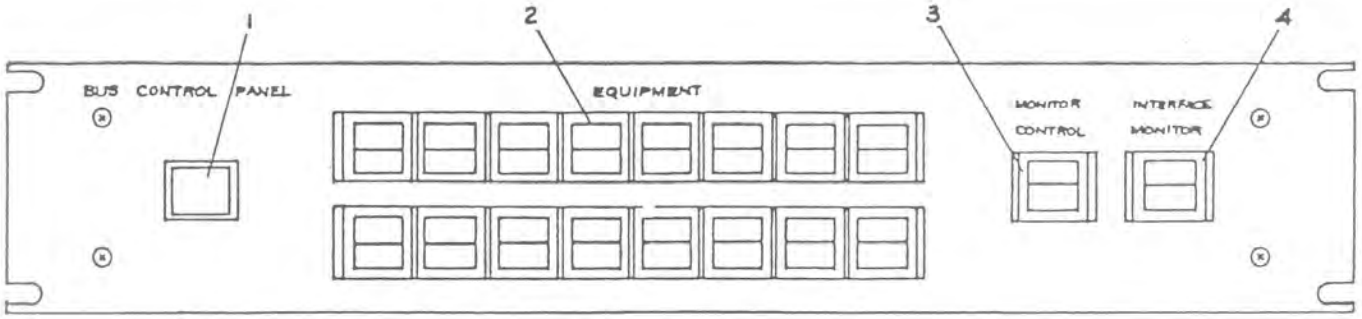
INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
21	BANDWIDTH switch A2S22	Selects HF-8054A Receiver operating bandwidth when MODE switch A2S21 is in AM or CW position. a. 16 position selects if attenuator pad (16-kHz bandwidth). b. A position selects bandpass filter FL3 (optional filter). c. B position selects bandpass filter FL4 (optional filter). d. C position selects bandpass filter FL5 (optional filter). e. D position selects bandpass filter FL6 (optional filter). f. E position selects bandpass filter FL7 (optional filter).
22	AFC switch A2S12 (used with AFC option only)	Sets AFC (automatic frequency control) on or off.
23	CH A2 - AGC BUS switch A2S8	Used in ISB mode to connect channel A2 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other if's connected to the AGC bus.
24	CH A1 - AGC BUS switch A2S6	Used in ISB or NET DATA mode to connect channel A1 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other if's connected to the AGC bus.
25	CH B1 - AGC BUS switch A2S7	Used in ISB or NET DATA mode to connect channel B1 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other if's connected to the AGC bus.
26	CH B2 - AGC BUS switch A2S9	Used in ISB mode to connect channel B2 AGC to common bus. When connected to AGC bus (ON), the if generating the strongest AGC voltage sets the gain of the other ifs connected to the AGC bus.
27	RF GAIN control A2S29	Controls bcd rf AGC signal. The bcd AGC is converted to an analog rf AGC threshold/level in the receiver, and this in turn controls the gain of the receive rf circuits in the addressed receiver. MIN produces the highest bcd/analog, thus the lowest gain. MAX produces the lowest bcd/analog, thus the highest gain.
28	PHONES level control ◉ S19B	Controls headphones volume; full clockwise equals maximum volume.
29	PHONES switch ◯ A2S19A	Selects audio to be monitored at the PHONES jack (J1) on the receiver control front panel. a. B2 position selects channel B2 receive audio. b. B1 position selects channel B1 receive audio. c. A1 position selects channel A1 receive audio. d. A2 position selects channel A2 receive audio. e. ALL CH position selects receive audio of all channels (B2, B1, A1, A2).

Table 2 HF-8094 Receiver Control, Controls and Indicators (Cont).

INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
30	◯ AF GAIN control A2S16A	Controls volume of speaker.
31	◉ SQUELCH control A2S16B and A2S16C	Enables/disables squelch and controls the squelch threshold. In extreme counterclockwise position, squelch is disabled. When control is moved clockwise, squelch is enabled and squelch threshold is adjusted by further clockwise rotation of the SQUELCH control. Note Speaker squelch operates (breaks squelch) only on audio signals below 1000 Hz.
32	SPEAKER switch A2S15	Switches the selected audio to the speaker amplifier. a. B2 position selects channel B2 audio input. b. B1 position selects channel B1 audio input. c. A1 position selects channel A1 audio input. d. A2 position selects channel A2 audio input. e. ALL CH position selects audio input of all channels (B2, B1, A1, A2).
33	Fuse A1F1 (located on rear panel)	Fuse in power line. 2 A used for 100/115-V ac operation, 1 A used for 215/230-V ac operation (slo-blo).
34	Power selection switch A1S1A and A1S1B (located on rear panel)	Controls input power strapping of power transformer in power supply. a. In 100-V position, power transformer strapped for 100-V ac operation (90 to 110 V ac). b. In 115-V position, power transformer strapped for 115-V ac operation (103 to 127 V ac). c. In 215-V position, power transformer strapped for 215-V ac operation (193 to 237 V ac). d. In 230-V position, power transformer strapped for 230-V ac operation (207 to 253 V ac).

Table 3 Master Control Switch Controls and Indicators

FIGURE INDEX NUMBER	CONTROL OR INDICATOR	FUNCTION
1	Power Switch S19 (illuminated)	Mains power on/off.
2	Dialight Switches S1 to S16 Two segments (upper and lower) for REMOTE/LOCAL switching.	Provide REMOTE/LOCAL control for each respective unit of a multiple receiver installation.
3	Dialight MASTER CONTROL Switch.	Allows local control over all units installed.
4	Dialight INTERFACE MONITOR Switch. (LOCAL/REMOTE)	Allows the associated Remote Display to monitor either local units or remotely controlled units.



Master Control Switch - Controls & Indicators

Figure 7.

3. OPERATING PROCEDURES

3.1 Line Audio Adjustments

Line audio output levels of the receiver and receiver control may be adjusted by a qualified operator when his application requires it. The line audio adjustments are shown in figures 4 and 5 and listed in tables 4 and 5. Refer to maintenance section for audio output adjustment procedures.

3.2 Normal (Local) Operating Procedures

3.2.1 General

When power is turned on or restored to the remote receiver, it is normal for the RCV FAULT indicator to light. This is caused by latching the receiver fault circuit when power interruptions are detected. The RCV FAULT is cleared by changing one of the frequency digits on the receiver, or on the receiver control when the remote receiver CONT switch is set to REM.

Note that all channel line audio output levels are individually monitored by the front panel meter, as selected by the METER switch. When the METER switch is in the RCV SIG position, the if channel with the strongest signal strength determines the meter reading.

Headphones can be used to monitor any channel independent of the speaker switch.

3.2.2 AM Operation - Local

To operate the receiver locally in AM mode and with no special options or applications, follow the procedures outlined below:

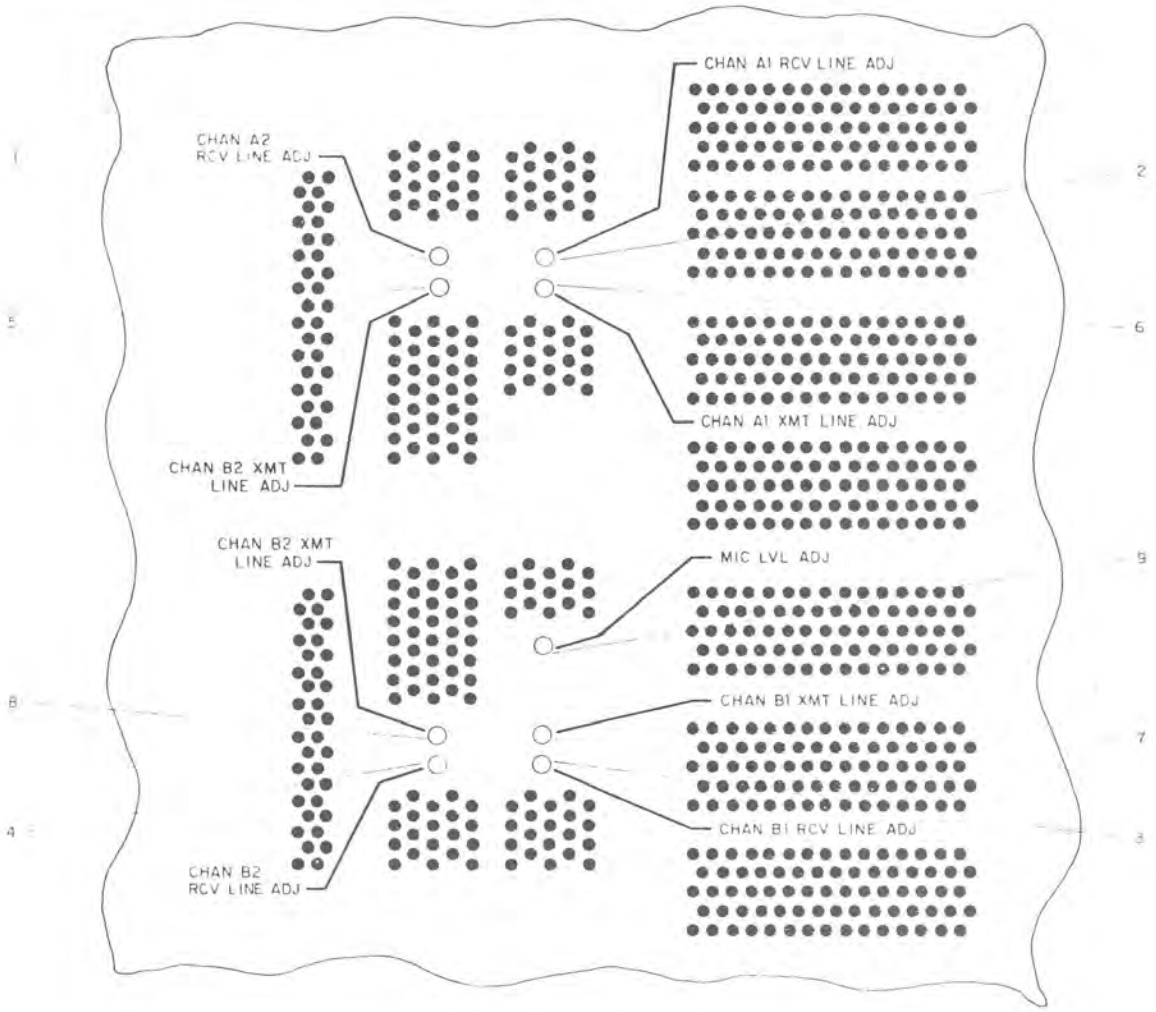
a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to LCL position.
c. Set MODE switch to AM mode.
d. Set BANDWIDTH switch to desired if filter.
   1. 16 (F18, if attenuator pad)

NOTE

If filter A8A2 is not installed in your unit, 16 must be selected. If filter A8A2 is installed, 16 or any filter installed on filter A8A2 may be selected.

   2. A (FL3, optional filter)
   3. B (FL4, optional filter)
   4. C (FL5, optional filter)
   5. D (FL6, optional filter)
   6. E (FL7, optional filter)

3. OPERATING PROCEDURES

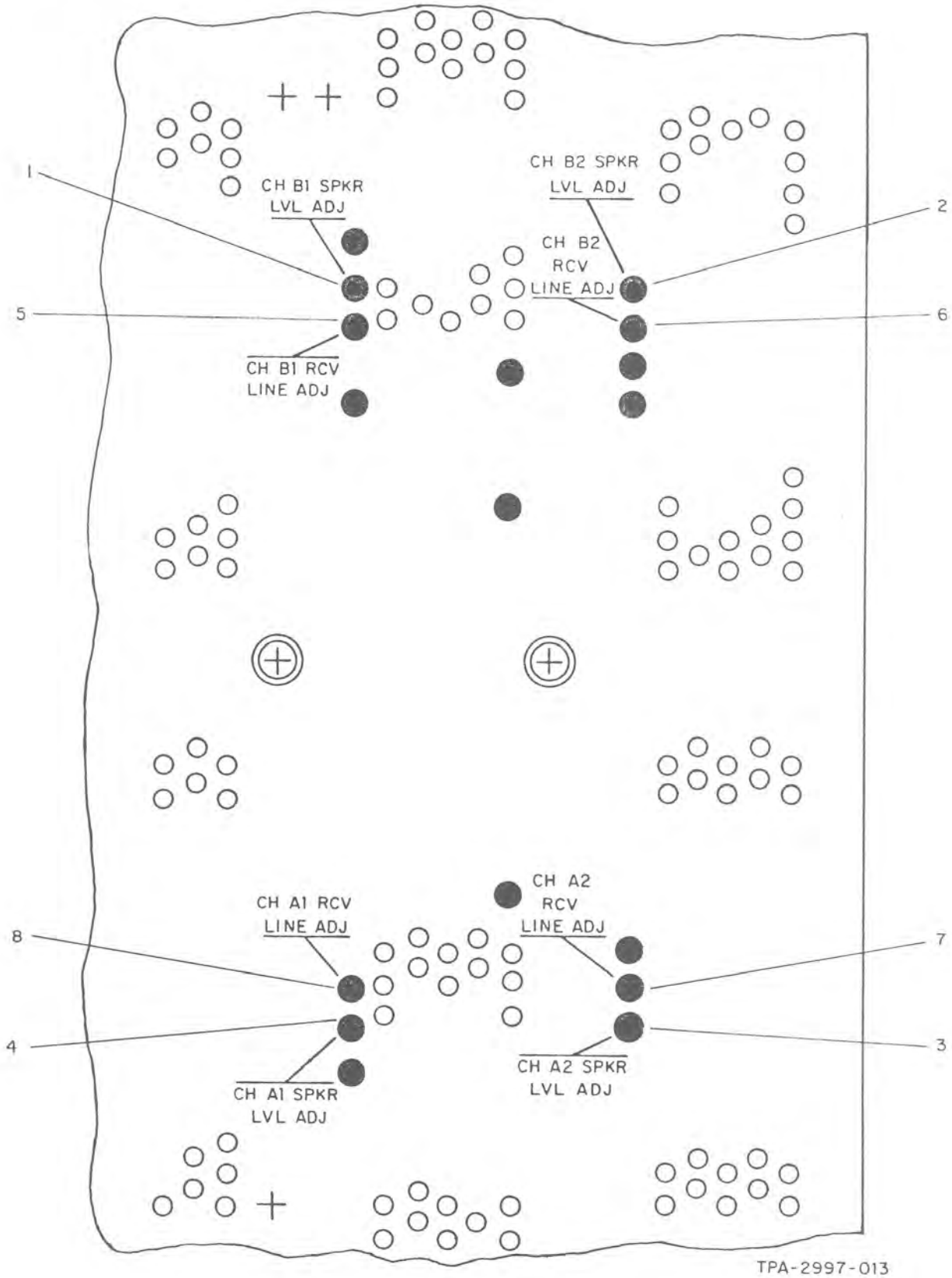


Top Cover Adjustments
Figure **4**

Table **4** *Line Audio Adjustments.*

INDEX NUMBER	ADJUSTMENT	PURPOSE
1	CH A1 RCV LINE ADJ A25R28 (accessible through top cover)	Controls channel A1 receive line audio. Normally adjusted for 0-dB mW audio output (as read on front panel meter) for a 3-μV input in ISB modes. Adjustable from -20- to +10-dB mW audio output with a 3-μV input.
2	CH B1 RCV LINE ADJ A25R65 (accessible through top cover)	Controls channel B1 receive line audio. Normally adjusted for 0-dB mW audio output (as read on front panel meter) for a 3-μV input in ISB modes. Adjustable from -20- to +10 dB mW audio output with a 3-μV input.
3	CH A2 RCV LINE ADJ A26R28 (accessible through top cover)	Controls channel A2 receive line audio. Normally adjusted for 0-dB mW audio output (as read on front panel meter) for a 3-μV input in ISB modes. Adjustable from -20- to +10-dB mW audio output with a 3-μV input.
4	CH B2 RCV LINE ADJ A26R65 (accessible through top cover)	Controls channel B2 receive line audio. Normally adjusted for 0-dB mW audio output (as read on front panel meter) for a 3-μV input in ISB modes. Adjustable from -20- to +10-dB mW audio output with a 3-μV input.

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.2 AM Operation - Local



Top Cover Adjustments
Figure 5

3. OPERATING PROCEDURES

Table 5 Line Audio Adjustments.

INDEX NUMBER	ADJUSTMENT	PURPOSE
	Note With SPKR LVL ADJ and RCV LINE ADJ controls set for maximum gain, the total gain of the line amplifier circuits is NLT 33 dB. Line audio output adjustable from -20 to +10 dB mW with a line audio input of -23 to +10 dB mW (not less than unity gain).	
1	CH B1 SPKR LVL ADJ A6R39 (accessible through top cover)	Controls channel B1 receive line audio input and channel B1 speaker amplifier input. Normally adjusted with a 1000-Hz, 0-dB mW input for a +15-dB mW line audio output (A6R48 at maximum).
2	CH B2 SPKR LVL ADJ A4R39 (accessible through top cover)	Controls channel B2 receive line audio input and channel B2 speaker amplifier input. Normally adjusted with a 1000-Hz, 0-dB mW input for a +15-dB mW line audio output (A4R48 at maximum).
3	CH A2 SPKR LVL ADJ A4R6 (accessible through top cover)	Controls channel A2 receive line audio input and channel A2 speaker amplifier input. Normally adjusted with a 1000-Hz, 0-dB mW input for a +15-dB mW line audio output (A4R15 at maximum).
4	CH A1 SPKR LVL ADJ A6R6 (accessible through top cover)	Controls channel A1 receive line audio input and channel A1 speaker amplifier input. Normally adjusted with a 1000-Hz, 0-dB mW input for a +15-dB mW line audio output (A6R15 at maximum).
5	CH B1 RCV LINE ADJ A6R48 (accessible through top cover)	Controls channel B1 receive line audio output. Normally adjusted with a 1000-Hz, 0-dB mW input for a 0-dB mW line audio output (with A6R39 normally adjusted).
6	CH B2 RCV LINE ADJ A4R48 (accessible through top cover)	Controls channel B2 receive line audio output. Normally adjusted with a 1000-Hz, 0-dB mW input for a 0-dB mW line audio output (with A4R39 normally adjusted).
7	CH A2 RCV LINE ADJ A4R15 (accessible through top cover)	Controls channel A2 receive line audio output. Normally adjusted with a 1000-Hz, 0-dB mW input for a 0-dB mW line audio output (with A4R6 normally adjusted).
8	CH A1 RCV LINE ADJ A6R15 (accessible through top cover)	Controls channel A1 receive line audio output. Normally adjusted with a 1000-Hz, 0-dB mW input for a 0-dB mW line audio output (with A6R6 normally adjusted).

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.2 AM Operation - Local

e. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

f. Set channel A1 AGC switch to desired AGC decay time.

1. OFF, AGC is disabled.
2. DATA or FAST equals 15 to 30 milliseconds.
3. MED equals 70 to 150 milliseconds.
4. VOICE or SLOW equals 1 to 2 seconds.
5. FAX equals 3 to 6 seconds.

g. Set RF GAIN control to full gain (clockwise).

h. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A1, and adjust PHONES level control for comfortable listening level.

i. With SQUELCH control full ccw, set SPKR switch to CH 1 and adjust AF GAIN control for a comfortable listening level. With no signal input, adjust SQUELCH control until noise just squelches.

3.2.3 AM Operation - Remote

Check that power is applied to the HF-8054A Receiver to be controlled (receiver PWR switch set on) and that the receiver is set for remote control (receiver CONT switch to REM).

To operate the HF-8054A Receiver remotely in AM mode using the HF-8094 Receiver Control, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to AM mode.
d. Set BANDWIDTH switch to desired if filter.
   1. 16 (FL8, if attenuator pad)

NOTE

If filter card (A8A2) is not installed in your remote receiver, 16 must be selected. If filter card is installed, 16 or any filter installed on A8A2 may be selected.

   2. A (FL3, optional filter)
   3. B (FL4, optional filter)
   4. C (FL5, optional filter)
   5. D (FL6, optional filter)
   6. E (FL7, optional filter)

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.3 AM Operation - Remote

e. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

f. Set channel A1 AGC switch to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. FAST equals 15 to 30 milliseconds.
   3. MED equals 70 to 150 milliseconds.
   4. SLOW equals 1 to 2 seconds.

g. Set RF GAIN control to full gain (clockwise).

h. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A1 and adjust PHONES level control for comfortable listening level.

i. With SQUELCH control full ccw, set SPKR switch to CH A1 and adjust AF GAIN control for a comfortable listening level. With no signal input, adjust SQUELCH control until noise just squelches.

3.2.4 CW Operation - Local

To operate the receiver locally in CW mode and with no special options or applications, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to LCL position.
c. Set MODE switch to CW mode.
d. Set BANDWIDTH switch to desired if filter.
   1. 16 (FL8, if attenuator pad)

NOTE

If filter A8A2 is not installed in your unit, 16 must be selected. If filter A8A2 is installed, 16 or any filter installed on filter A8A2 may be selected.

   2. A (FL3, optional filter)
   3. B (FL4, optional filter)
   4. C (FL5, oprional filter)
   5. D (FL6, optional filter)
   6. E (FL7, optional filter)

e. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.4 CW Operation - Local

NOTE

Speaker squelch operates (breaks squelch) only on audio signals below 1000 Hz.

f. If receiver is to receive CW and DVBFO option is not installed, adjust FREQUENCY KHZ thumb-wheel controls off the CW operating frequency by 300 to 2700 Hz (until frequency tone is pleasant to operator). If receiver is to receive CW and DVBFO option is installed, set VBFO switch to VAR and adjust the VBFO OFFSET KHZ controls to a frequency tone that is pleasant to the operator.

g. Set channel A1 AGC switch to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. DATA, or FAST equals 15 to 30 milliseconds.
   3. MED equals 70 to 150 milliseconds.
   4. VOICE or SLOW equals 1 to 2 seconds.
   5. FAX (not recommended).

h. Set RF GAIN control to full gain (clockwise).

i. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A1 and adjust PHONES level control for comfortable listening level.

j. With SQUELCH control full ccw, set SPKR switch to CH A1 and adjust AF GAIN control for a comfortable listening level. With no signal input, adjust SQUELCH control until noise just squelches.

NOTE

The optional dvbfo can be especially useful in CW mode when receiving single-channel FSK RTTY signals. If the receiver is tuned to the center frequency of the FSK RTTY signal (midway between mark and space frequencies) and the VBFO OFFSET KHZ is set to the center frequency of the associated audio converter, the receiver mark/space audio signal will be precise and stable without the need for fine tuning to achieve good copy. Operation is further improved if the receiver contains optional narrow-band if filters centered at the tuned frequency, which can be switched in to remove possible interference.

3.2.5 CW Operation - Remote

Check that power is applied to the HF-8054A Receiver to be controlled (receiver PWR switch set to on) and that the receiver is set for remote control (receiver CONT switch to REM).

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.5 CW Operation - Remote

To operate the HF-8054A Receiver remotely in CW mode using the HF-8094 Receiver Control, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to CW mode.
d. Set BANDWIDTH switch to desired if filter.
   1. 16 (FL8, if attenuator pad).

NOTE

If filter card (A8A2) is not installed in your remote receiver, 16 must be selected. If filter card is installed, 16 or any filter installed on A8A2 may be selected.

   2. A (FL3, optional filter)
   3. B (FL4, optional filter)
   4. C (FL5, optional filter)
   5. D (FL6, optional filter)
   6. E (FL7, optional filter)

e. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

NOTE

Speaker squelch operates (breaks squelch) only on audio signals below 1000 Hz.

f. If the receiver is to receive CW, and dvbfo option is not installed, adjust FREQUENCY KHZ thumb-wheel controls off the CW operating frequency by 300 to 2700 Hz (until frequency tone is pleasant to operator). If receiver is to receive CW and dvbfo option is installed, set VBFO switch to VAR. When the VBFO switch is in the VAR position, the dvbfo is used to set the bfo frequency. Adjust the VBFO OFFSET KHZ controls to a frequency tone that is pleasant to the operator.

g. Set channel A1 AGC switch to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. FAST equals 15 to 30 milliseconds.
   3. MED equals 70 to 150 milliseconds.
   4. SLOW equals 1 to 2 seconds.

h. Set RF GAIN control to full gain (clockwise).

i. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to CH A1 and adjust PHONES level control for

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.5 CW Operation - Remote

comfortable listening level.

j. With SQUELCH control full ccw, set SPKR switch to CH A1 and adjust AF GAIN control for a comfortable listening level. With no signal input, adjust SQUELCH control until noise just squelches.

3.2.6 ISB Operation - Local

To operate the receiver locally in ISB mode and with no special options or applications, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to ISB mode.

NOTE

BANDWIDTH switch is disabled in ISB mode. Channels enabled and their bandwidths are controlled by the channel enable switches (table 1, items 8 through 11).

CH A1 (USB) - (2.85 kHz, carrier +250 Hz to +3100 Hz).

CH B1 (LSB) - (2.85 kHz, carrier -250 Hz to -3100 Hz).

CH A2 (UUSB) - (2.85 kHz, carrier +3190 Hz to +6040 Hz).

CH B2 (LLSB) - (2.85 kHz, carrier -3190 Hz to -6040 Hz).

d. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

e. Set CH A1, CH B1, CH A2, CH B2 (or any combination of these) enable switches to ON. If more than one channel is enabled, it might be desirable to set the appropriate AGC BUS switches to ON.

NOTE

When set to ON, AGC BUS switches allow the gain of inactive channels to be controlled by the AGC level of the active channels, thus reducing the background noise of inactive channels.

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.6 ISB Operation - Local

f. Set appropriate AGC switch (channel A1, B1, A2, B2) to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. DATA OR FAST equals 15 to 30 milliseconds.
   3. MED equals 70 to 150 milliseconds.
   4. VOICE or SLOW equals 1 to 2 seconds.
   5. FAX equals 3 to 6 seconds.

g. Set RF GAIN control to full gain (clockwise).

h. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to appropriate channel (whichever channel to be monitored by the operator). Adjust PHONES level control for comfortable listening level. The PHONES switch may be set to monitor CH A1, CH B1, CH B2, or to monitor all (ALL CH) channels simultaneously.

i. With SQUELCH control full ccw, set SPKR switch to appropriate channel and adjust AF GAIN control for a comfortable listening level. With no signal input, adjust SQUELCH control until noise just squelches. The SPKR switch may be set to monitor CH A1, CH B1, CH A2, CH B2, or to monitor all (ALL CH) channels simultaneously.

3.2.7 ISB Operation - Remote

Check that power is applied to the HF-8054A Receiver to be controlled (receiver PWR switch set to on) and that the receiver is set for remote control (receiver CONT switch to REM).

To operate the HF-8054A Receiver remotely in ISB mode using the HF-8094 Receiver Control, follow the procedures outlined below:

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to ISB mode.

NOTE

BANDWIDTH switch is disabled in ISB mode. Channels enabled and their bandwidths are controlled by the channel enable switches (table 1, items 8 through 11).

CH A1 (USB) - (2.85 kHz, carrier +250 Hz to +3100 Hz).

CH B1 (LSB) - (2.85 kHz, carrier -250 Hz to -3100 Hz).

CH A2 (UUSB) - (2.85 kHz, carrier +3190 Hz ro +6040 Hz).

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.7 ISB Operation - Remote

CH B2 (LLSB) - (2.85 kHz, carrier -3190 Hz to -6040 Hz).

d. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

e. Set appropriate AGC switch (channel A1, B1, A2, B2) to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. FAST equals 15 to 30 milleseconds.
   3. MED equals 70 to 150 milliseconds.
   4. SLOW equals 1 to 2 seconds.

f. Set RF GAIN control to full gain (clockwise).

g. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to appropriate channel (whichever channel to be monitored by the operator). Adjust PHONES level control for comfortable listening level. The PHONES switch may be set to monitor CH A1, CH B1, CH A2, CH B2, or to monitor all (ALL CH) channels simultaneously.

h. With SQUELCH control full ccw, set SPEAKER switch to appropriate channel and ADJUST AF GAIN control for a comfortable listening level. With no signal input, adjust SQUELCH control until noise just squelches. The SPEAKER switch may be set to monitor CH A1, CH B1, CH A2, CH B2, or to monitor all (ALL CH) channels simultaneously.

3.2.8 NET DATA Operation
3.2.8.1 LOCAL Operation

NOTE

NET DATA is a special mode used when the receiver is operating in a data network system such as TADIL A or LINK 11. It should not be used for normal operations.

To operate the receiver locally in NET DATA mode and with no special options or applications, refer to operation section, in the Receiver instruction book.

3.2.8.2 Remote Operation

Check that power is applied to the HF-8054A Receiver to be controlled (receiver PWR switch set to on) and that the receiver is set for remote control (receiver CONT switch to REM).

To operate the HF-8054A Receiver remotely in NET DATA mode using the HF-8094 Receiver Control, follow the procedures outlined below:

3. OPERATING PROCEDURES
3.2 Normal (Local) Operating Procedures
3.2.8 NET DATA Operation
3.2.8.1 LOCAL Operation

a. Set PWR switch on (pressed and latched inward).
b. Set CONT switch to NORM position.
c. Set MODE switch to ISB mode.

NOTE

BANDWIDTH switch is disabled in NET DATA mode. Channels enabled and their bandwidths are controlled by the channel enable switches (table 1, items 8 through 11).

CH A1 (USB) - (2.85 kHz, carrier +250 Hz to +3100 Hz).

CH B1 (LSB) - (2.85 kHz, carrier -250 Hz to -3100 Hz).

CH A2 (UUSB) - (2.85 kHz, carrier +3190 Hz to +6040 Hz).

CH B2 (LLSB) - (2.85 kHz, carrier -3190 Hz to -6040 Hz).

d. Set FREQUENCY KHZ thumb-wheel controls to desired operating frequency.

e. Set appropriate AGC switch (channel A1, B1, A2, B2) to desired AGC decay time.
   1. OFF, AGC is disabled.
   2. FAST equals 15 to 30 milliseconds.
   3. MED equals 70 to 150 milliseconds.
   4. SLOW equals 1 to 2 seconds.

f. To monitor audio with headphones, connect headphones to PHONES jack. Set PHONES switch to appropriate channel (whichever channel to be monitored by the operator). Adjust PHONES level control for comfortable listening level. The PHONES switch may be set to monitor CH A1, CH B1, CH A2, CH B2, or to monitor all (ALL CH) channels simultaneously.

g. With SQUELCH control full ccw, set SPEAKER switch to appropriate channel and adjust AF GAIN control for a comfortable listening level With no signal input, adjust SQUELCH control until noise just squelches. TheSPKR switch may be set to monitor CH A1, CH B1, CH A2, CH B2, or to monitor all (ALL CH) channels simultaneously.

3. OPERATING PROCEDURES
3.3 SELF-TEST
3.3.1 Receiver Control

The self-test function in the receiver control may be enabled while the unit is operating in a system without disturbing any of the other equipment in the system. See receiver control instruction book, operation section for further detail.

3.3.2 Built-In Test (BIT) Operation - Receiver.

The HF-8054( ) Receiver has many BIT features used in detecting and isolating faults.

In the HF-8054A Receiver, all fault and performance monitor information is available in the serial monitor data. Also, the remote control interface includes integral parity error, framing error and sequence error detection. For a complete description of each of these, refer to paragraph 4.3.7.5 in the Receiver instruction book, operation section.

4. REMOTE OPERATION. 4.1. General

To operate the HF-8054A Receiver from an HF-8094 Receiver Control or a processor, the CONT switch on the receiver is set to the REM position. This transfers control to the remote control device except for audio monitoring. The local operator is still able to monitor audio levels, audio signals, and set speaker squelch using the receive front panel meter, controls, and speaker.

The MON position on the receiver CONT switch sets the receiver to local control and sets the monitor bit in the monitor data. This can be used, as an example, to set the receiver front panel data into a preset table in a processor. The MON position has no function when used with the HF-8094 Receiver Control.

4.2 Operating Procedures Using the HF-8094 Receiver Control

With the exception of setting the receiver control CONT switch to the NORM position and the HF-8054A Receiver CONT switch to the REM position, operating procedures for the HF-8094 Receiver Control are identical to operating the local receiver. When in remote operation, the RCV FAULT is cleared by changing a frequency digit on the HF-8094 Receiver Control Front Panel.

4.3 Operating Characteristics.

4.3.1 Receiver Control

A detailed description of the operating characteristics o f the HF-8094 Receiver Control, including control and monitoring data signalling methods, are contained in the HF-8094 instruction book, operation section.

HF-80 RECEIVER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

THEORY

Printed in Australia

523-1003190-0012M1

1 October, 1981

table of contents

THEORY

1. GENERAL

This section provides the functional theory of the HF-80 Receiver Systems. Simplified block diagram, Figure 1, shows the basic system with main and optional equipment. The theory is discussed down to equipment level. Detailed theory of each equipment modules and circuit cards is included in the individual equipment instruction books.

Controls and monitors of the HF-8054A receiver, HF-8094 receiver control, HF-8060 preselector and HF-80 remote display are shown in the operation section of this instruction book.

The following description contains references to the HF-8054A block diagram, figure 2. The HF-8054A Receiver is locally or remotely controlled depending on the setting of the CONT switch. When the CONT switch is in the REM position, the HF-8054A Receiver is controlled by the HF-8094 Receiver Control a processor, or other compatible control through REMOTE connector J14 on the rear panel of the HF-8054A Receiver.

When operated remotely, the controls and monitors of the receiver control take over from the controls and monitors of the receiver.

When the HF-8060 Preselector is used, the control of tuning and filtering functions is initiated by the respective receiver or receiver control.

The Master Control Switch (CPN 631-1096-001) when used allows the receiver system or part of the systems to be controlled from either of two locations.

Where space diversity system is employed, two or more receivers are tuned to the same signal and their audio or if outputs are combined in such a way as to make use of the signal with the highest signal-to-noise ratio.

Tests conducted in the 2- to 30MHz range indicate that, with antenna spacings of the order of 3- to 10-wavelengths, signals from connected receivers tend to fade more or less independently. If a receiver is connected to each antenna, and the audio or if outputs are correctly utilized, signal loss due to fading may be minimized.

Receivers connected for space diversity operation are normally operated from a common AGC bus whose potential is derived from the separate AGC outputs of the connected receivers. In this way the receiver(s) whose signals are the strongest at the moment, dominate the system, and the other receiver(s) are biased to a reduced gain condition. This automatically reduces the receiver gain and its contribution of noise to the combined output.

2. FUNCTIONAL THEORY.

Refer to figure 2. The HF-8054( ) Receiver is frequency-controlled directly from the front panel of the receiver or receiver control. Bcd frequency signals from the front panel are applied directly to the frequency synthesizer A16 through A23 and to the control A10. The bcd frequency signals applied are used to establish the frequency of the vfo output (109.35 to 79.350 01 MHz) from the synthesizer and to control the band-switch output from the control card.

The operating mode of the HF-8054( ) Receiver is also controlled directly from the front panel. Mode signals from the front panel are applied directly to receive audio card and receive if card. These signals control all mode switching. Placing the MODE switch in CW or AM position enables the BANDWIDTH switch and requires an if filter to be selected. Operation in CW and AM mode is only through channel A1 and the selected filter. When MODE switch is in ISB, or NET DATA position, any/all channels (A1, B1, A2, B2) can be enabled by setting the applicable enable switch(es) to the ON position. When enabled, the selected channel(s) use the associated if/af circuits.

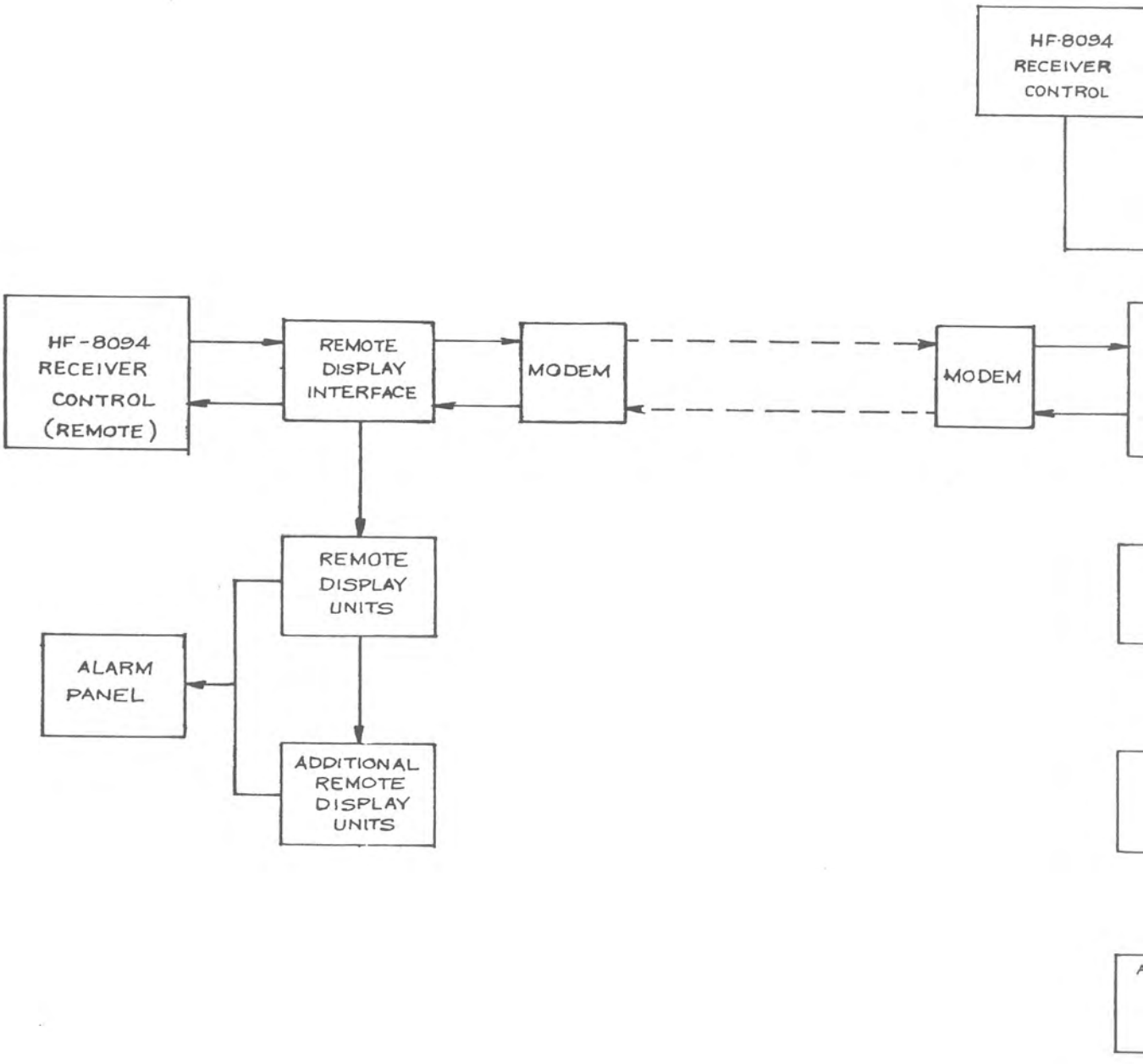
The HF-8054A Receiver receives rf signals at the RF IN jack. These signals are supplied to rf translator module A9 where they are mixed with the vfo injection signal and a fixed 118.8MHz injection signal to supply a 9.45-MHz receiver if signal to channel A if A8. In the channel A1 if card, the signal is mixed with a fixed 9.9 MHz injection signal to produce a final if of 450 kHz. This signal is filtered and detected on the applicable if card and the resulting audio signal is supplied to receive audio A25/A26. The receive audio is amplified and supplied to the speaker, phones, and receive audio line outputs.

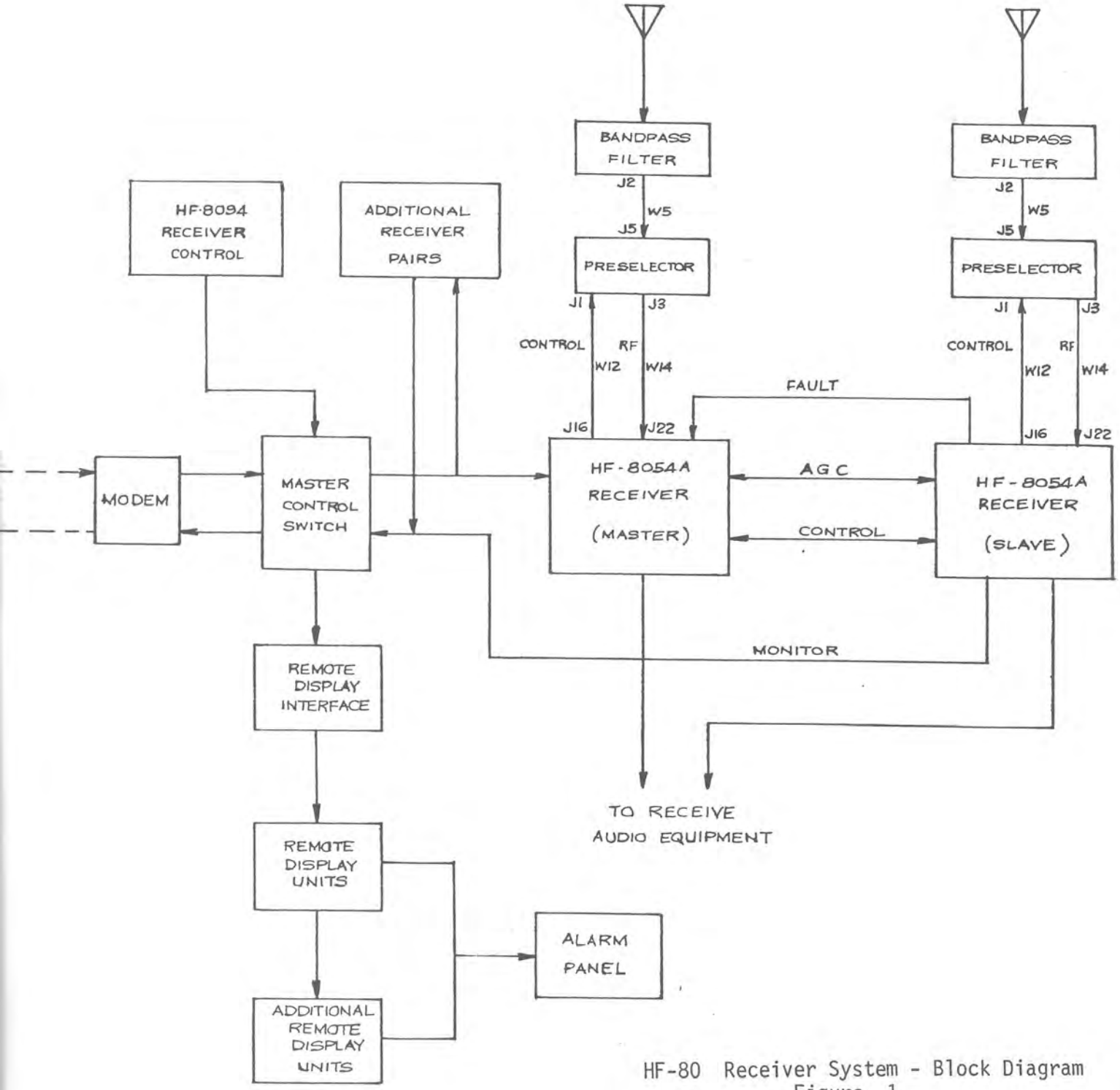
In the ISB mode, the 450-kHz IF USB signal is supplied to the channel A1 if circuits, the 450-kHz if LSB signal is supplied to the channel B1 if circuits, the 450-kHz if UUSB signal is supplied to the channel A2 if circuit, and the 450-kHz if LLSB signal is supplied to the channel B2 if circuit. The detected USB/LSB audio signals are supplied to the receive audio A25 and the detected UUSB/LLSB audio signals are supplied to the receive audio A26. Receiver audio A25/A26 provides separate phones, receive line audio outputs, and separate audio inputs to the speaker amplifier.

In the AM or CW mode, the 450-kHz if signal (USB) is supplied to the channel A1 if circuit. It is filtered by a selectable bandwidth filter and detected. The detected AM/CW signal is supplied to receive audio A25.

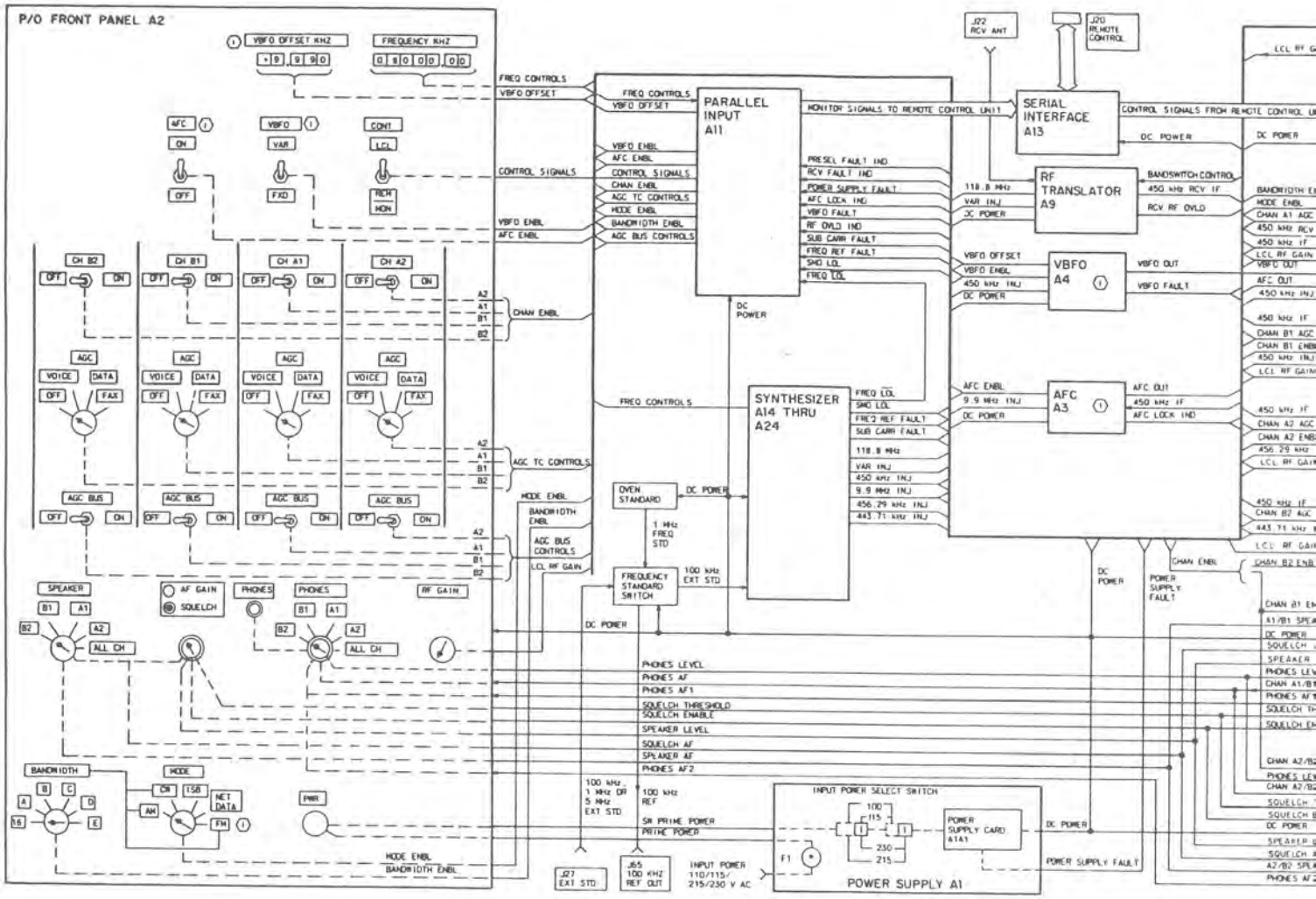
When set to CW and with the VBFO option installed, an offset tone can be provided for A1 CW operation by setting the VBFO switch to VAR. The tone is variable up to +/- 9990 Hz in 10-Hz increments and is set with the VBFO OFFSET KHz controls on the front panel.

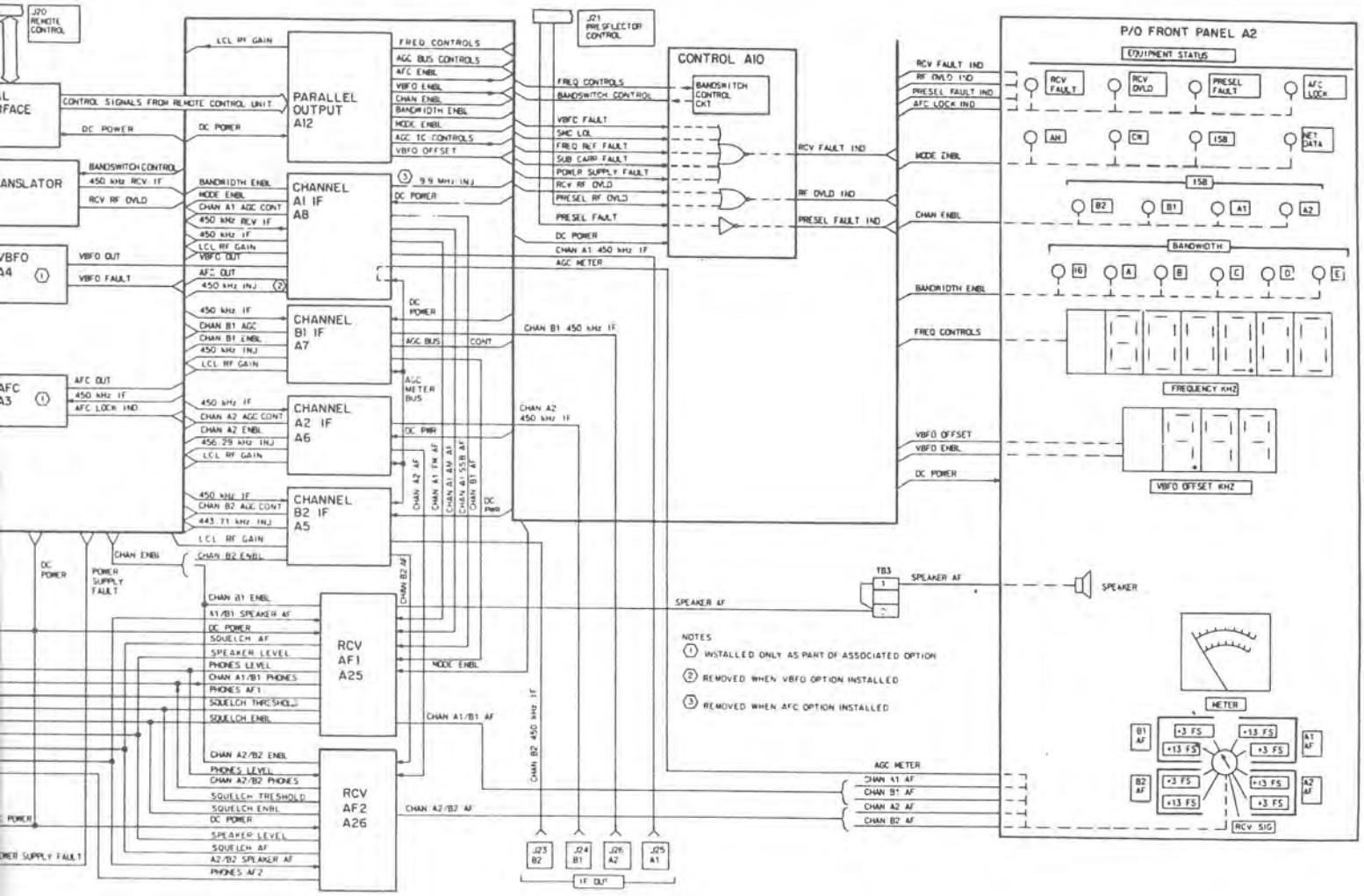
With the AFC option installed and the AFC switch ON, the receiver will lock on to any received carrier within +/- 50 Hz of the tuned carrier frequency and as weak as -126dB mW.


HF-8094
RECEIVER
CONTROL
HF-8094
RECEIVER
CONTROL
(REMOTE)
REMOTE
DISPLAY
INTERFACE
MODEM
MODEM
REMOTE
DISPLAY
UNITS
ALARM
PANEL
ADDITIONAL
REMOTE
DISPLAY
UNITS



HF-80 Receiver System - Block Diagram
Figure 1


P/O FRONT PANEL A2
VBFO OFFSET KHZ
FREQUENCY KHZ
AFC
VBFO
CONT
ON
VAR
LCL
OFF
FXD
REM
MON
CH B2
CH B1
CH A1
CH A2
AGC
VOICE
DATA
FAX
AGC BUS
SPEAKER
AF GAIN
SQUELCH
PHONES
RF GAIN
ALL CH
BANDWIDTH
MODE
AM
USB
LSB
NET DATA
FM
PWR
FREQ CONTROLS
VBFO OFFSET
CONTROL SIGNALS
VBFO ENBL
AFC ENBL
CHAN ENBL
AGC TC CONTROLS
MODE ENBL
BANDWIDTH ENBL
AGC BUS CONTROLS
LCL RF GAIN
PARALLEL INPUT A11
MONITOR SIGNALS TO REMOTE CONTROL UNIT
PRESEL FAULT IND
RCV FAULT IND
POWER SUPPLY FAULT
AFC LOCK IND
VBFO FAULT
RF OVLD IND
SUB CARR FAULT
FREQ REF FAULT
SHO LOL
FREQ LOL
DC POWER
SERIAL INTERFACE A13
CONTROL SIGNALS FROM REMOTE CONTROL UNIT
J22 RCV ANT
J20 REMOTE CONTROL
RF TRANSLATOR A9
118.8 MHz
VAR INJ
BANDSWITCH CONTROL
450 kHz RCV IF
RCV RF OVLD
VBFO A4
VBFO OUT
AFC A3
AFC OUT
450 kHz IF
AFC LOCK IND
9.9 MHz INJ
SYNTHESIZER A14 THRU A24
450 kHz INJ
456.29 kHz INJ
443.71 kHz INJ
OVEN STANDARD
1 MHz FREQ STD
FREQUENCY STANDARD SWITCH
100 kHz EXT STD
POWER SUPPLY FAULT
PHONES LEVEL
PHONES AF
PHONES AF1
SQUELCH THRESHOLD
SQUELCH ENABLE
SPEAKER LEVEL
SQUELCH AF
SPEAKER AF
PHONES AF2
100 kHz, 1 MHz OR 5 MHz EXT STD
100 kHz REF
SW PRIME POWER
PRIME POWER
INPUT POWER SELECT SWITCH
100
115
230
215
POWER SUPPLY CARD A1A1
F1
POWER SUPPLY A1
J27 EXT STD
J65 100 KHZ REF OUT
INPUT POWER 110/115/ 215/230 V AC



HF-8054 Receiver - Block Diagram
Figure 2

2. FUNCTIONAL THEORY.

2.1 Receive Function.

The theory of the receive function is described in detail in the HF-8054A instruction book, theory section. This includes description of frequency setting, filtering, AFC and vbfo options and four-channel operation.

2.2 Mode and Operating Controls.

The mode and operation controls consist of the front panel switches. The HF-8054( ) Receiver has a frequency contol. speaker control, squelch control, AGC control, local/remote control, af gain control, phones with level adjust, rf gaincontrol, bandwidth control, mode control, and power switch. The HF-8094 Receiver Control provides identical front panel controls for remote operation of the same functions, with the exception of squelch control.

2.2.1 Mode and Bandwidth.

This discussion is based on the following configured receiver:

a. A 4-position MODE switch: AM, CW, ISB and NET DATA.

b. A 6-position BANDWIDTH switch.

c. Filter card A8A2 installed with filters A, B, C, D, and E,

d. Full 4-channel ISB configuration with channel A1 and A8, channel B1 if A7, channel A2 if A6, channel B2 if A5, channel A1/B1 audio A25, and channel A2/B2 audio A26 installed.

Selection of AM, CW, and ISB on the MODE switch provides enable signals for audio, channel and bandwidth functions.

AM selection enables AM audio and enables the BANDWIDTH selection switch, which in turn enables the 16kHz or one other optional filters for the desired bandwidth. CW selection enables channel A1 SSB audio, and also enables the BANDWIDTH selection switch, hence providing the desired optional bandwidth. ISB selection enables the channel enable switches. In turn, selection of the desired channel enables the respective channel audio module.

When an external controlling device is used, the same mode and bandwidth operations apply, except the control signals are supplied as serial data to serial interface A13 and converted from serial data to parallel data in parallel output A12. The outputs of parallel output A12 are supplied to the internal control circuits of the receiver.

2. FUNCTIONAL THEORY.
2.2 Mode and Operating Controls.
2.2.2 Audio

Line audio is supplied by line audio amplifiers and then through line transformers in receive audio A25 and A26. Output connections for each channel are as follows

	J14	J15	TB1	TB2
Channel A1	-30		-1	
	-31		-2(CT)	
	-32		-3	
Channel B1	-26		-4	
	-54		-5(CT)	
	-55		-6	
Channel A2		-30		-1
		-31		-2(CT)
		-32		-3
Channel B2		-26		-4
		-54		-5(CT)
		-55		-6

Line outputs are 600 ohm balanced.

The HF-8054( ) Receiver audio can be monitored at the PHONES jack, at the internal speaker, at an external speaker, or through an external line audio circuit from TB1 and/or TB2.

Phones audio is supplied by the headphone audio amplifier in receive audio A25 and A26. PHONES switch A2S19 selects audio channel (A1, A2, B1, B2, or all). Speaker audio is supplied by the line audio amplifier in receive audio A25 and A26. SPEAKER switch A2S15 selects audio channel (A1, B1, A2, B2, or all). The speaker amplifier output is supplied through J14-19 to TB3-2, and speaker amplifier common is supplied through J14-17 to TB3-3. If all channels are selected (SPEAKER switch in ALL CH position), channels A1, B1, A2, and B2 recieve audio are all supplied as described above. For internal speaker, TB3-2 is jumpered to TB3-1 and speaker audio is supplied from TB3-1 through P12-1 to loudspeaker LS1, common from TB3-3 through P12-2 to loudspeaker LS1. For external speaker, TB3-2 is connected directly to external speaker (jumper between TB3-2 and TB3-1 is removed) and speaker audio is supplied from TB3-2 to external loudspeaker, common from TB3-3 is connected directly to external loudspeaker common. Speaker audio is volume-controlled by AF GAIN control A2A 6A.

SQUELCH control A2S16B-A2S16C enables/disables squelch and controls the squelch threshold level. In the full counterclockwise position, a ground squelch disable signal is supplied to the squelch output switch in receive audio A25 (AF1), disabling squelch control. In any other positon of the SQUELCH control , squelch switch A2S16C is open and a squelch threshold signal is applied with maximum squelch threshold applied at full clockwise position. Squelch threshold level is controlled by A2S16B and supplied to the squelch circuits in the receive audio

2. FUNCTIONAL THEORY.
2.2 Mode and Operating Controls.
2.2.2 Audio

A25 card (AF1). Remote squelch is not available in the HF-8054A Receiver.

2.2.3 IF/RF Gain Control.

If/rf gain of the HF-8054( ) Reciever is controlled by pin diode attenuators located along the signal path in the rf and if amplifiers. The attenuators are controlled by three gain control inputs:

a. AGC detector

b. Local (front panel) rf gain control

c. Remote rf gain control.

The if/rf gain control circuits provide an output signal that is proportional to the gain reduction imposed by the gain control circuit. This signal is available on the rear panel of the receiver. This AGC signal line can be used to feed in an external gain control signal, such as when two receivers are cross-coupled for diversity operation.

Each of the if amplifiers (channel A1, B1, A2, and B2) has an independent if AGC circuit so that, in ISB operation, the audio and if output signal levels of each if are independent of the signal levels in the opposite sideband. When the signal level in either if reaches a level approximately 20 dB above AGC threshold, an rf AGC voltage is fed to rf translator A9 through gating diodes.

An AGC bus is provided to permit AGC cross-coupling of two or more channels. When enabled, the AGC bus will project the AGC signal of the channel (with AGC bus enabled) having the highest AGC level.

The AGC attack and decay times are dependent on the change in signal level and the AGC time selected. Refer to table 1 for the selected attach and decay times. In the OFF position, the AGC action for the channel is completely disabled.A crowbar decay time of 10 to 13 milliseconds is used in NET DATA mode where the normal AGC decay times are too slow. The crowbar action is initiated either by a decrease in received signal of about 20 dB or by application of an end of message signal.

Where the receiver is using remote control with AGC disabled, if/rf gain is controlled by the remote rf gain input. This control voltage has the same sensitivity as the AGC output voltage (50 mV/dB) and originates in a d/a converter circuit in parallel output card A12. The digital input to the d/a converter is a 5-bit binary signal that provides a total gain control range of 93 dB in 3-dB steps.

RF GAIN control A2R11 controls attenuation of pin diode attenuators in the if amplifiers and rf translator.

2. FUNCTIONAL THEORY.
2.2 Mode and Operating Controls.
2.2.3 IF/RF Gain Control.

AGC switches control each channel's AGC decay time in the receiver. With AGC switch in the OFF position, logic 1 is supplied on the AGC1 and AGC2 control lines. With AGC switch in the FAST or DATA position, logic 0 is supplied on the AGC1 and AGC2 control lines. With AGC switch in the MED or FAX position, logic 0 is supplied on the AGC1 control line and logic 1 is supplied on the AGC2 control line. With AGC switch in the SLOW or VOICE position, logic 1 is supplied on the AGC1 control line and logic 0 is supplied on the AGC2 control line.

TABLE 1 : AGC TIME CONSTANTS

AGC MODE	ATTACK TIME	DECAY TIME
FAST	20 ms max	15 to 30 ms
MEDIUM	20 ms max	70 to 150 ms
SLOW	20 ms max	1 to 2 seconds
DATA	20 ms max	15 to 30 ms
VOICE	20 ms max	1 to 2 seconds
FAX	2 seconds max	3 to 6 seconds

2.2.4 Frequency Control.

The receiver frequency is controlled by parallel bcd frequency inputs to the frequency synthesizer. These parallel bcd inputs are supplied directly from the front panel or from a remote control through serial interface A13 and parallel output A12.

Parallel bcd frequency inputs in 10-Hz steps are supplied directly from thumb-wheel switches on A2A3 through P2 and J11 to J7., J8, and P11. If remote control is used parallel frequency inputs are supplied directly from the parallel output card through J9 to J7, J8, and P11.

Parallel 1-kHz to 20-MHz bcd inputs supplied to J7 are also supplied through buffer/drivers in control A10, through J7 and P7 to J46, through rf filters to preselector connector J16. The parallel bcd inputs supplied at J7 are also band decoded, and band signals are supplied from J8 to J6 and rf translator module A9.

2.3 Remote Control Operation.

The HF-8094 Receiver Control unit is designed as a companion to the HF-8054A Receiver. This control unit provides all the functions required to remotely control and monitor the operation of the receiver. The control unit generates the serial data required to control the receiver, and accepts serial monitor data from the receiver for display of the current operating status. When remote processor control of the receiver is desired, the processor must generate the serial data characters required to contol the receiver and interpret the monitor data from the receiver. In processor control applications, the receiver control interface requirements are similar to a serial data terminal in operation, with

2. FUNCTIONAL THEORY.
2.3 Remote Control Operation.

formatted messages from the processor controlling operation of the receiver and messages from the receiver to the processor reporting operating status of the receiver. An RS-232C serial, asynchronous, input/output interface capability is required in the processor for remote control of the receiver. The following paragraphs describe the characteristics applicable to remote control of the receiver and operation of the remote circuits in the receiver.

2.3.1 General

Two methods of serial data signalling are available. Each method is switch selectable on the serial interface card. The two methods are frequency-shift keyed audio tones (FSK) and RS-232C data logic levels. In conjunction with selection of the RS-232C signalling, switching is available to invert the polarity of the RS-232C data for compatability with the logic polarity and voltage levels defined in MIL-STD-188C.

Two separate sets of data lines are used for serial control of the exciter. One set, called the control bus, is used to receive command data. The other set, called the monitor bus, is used to transmit status information. When using FSK signalling, the control and monitor buses are balanced 600-ohm audio lines. When switched for RS-232C signalling, the control and monitor buses are unbalanced line to ground. The data transmission rate on the control and monitor buses are switch selectable on the serial interface card. Transmission rates are 75, 109,150,300, 600, 1200, 2400, 4800, 9600, and 19,200 bauds. The usable data rates for the FSK signalling method are limited to not more than 600 buads. Each remote receiver must be set for the same data rate and parity as the associated receiver control or processor.

Data transmitted and received on the control and monitor buses is serial, asynchronous, and organized in one of two formats, ASCII or 8-bit character. In the ASCII format, the characters are made up of 9, 10, or 11 bits, consisting of one start bit, seven data bits, one parity bit (optional) and one or two (optional) stop bits, in that order. The ASCII characters are then organized into 13 character words. In the 8-bit character format, the characters are made up of 11 bits, consisting of one start bit, eight data bits, one parity bit, and one stop bit, in that order. The 8-bit characters are then formed into five character words. Control data bits are determined by settings of the front panel switches and controls on the receiver control, or by program control for processor control applications. Monitor data bits are determined by the current operational status of the receiver.

Except for those monitor bits that have no corresponding control functions (such as fault bits and performance monitoring bits), the control and monitor words have identical data formats. The formats are summarized in figures 3, 4 and 5.

Detailed explanation of data signalling is contained in the operations section of the HF-8054A receiver instruction book, and in the theory section of the HF-8094 receiver control instruction book.

2. FUNCTIONAL THEORY.
2.3 Remote Control Operation.
2.3.2 Receiver Serial Control Operation.
2.3.2.1 Control Inputs.

Control data signals generated by the HF-8094 Receiver Control are applied to the receiver as control information. These control signals are transferred over the control bus in serial format. If the receiver CONT switch is in the REM position, the serial information received controls the operation of the receiver.

Control data is applied to a serial data processor on the receiver serial interface card. Word and status information is decoded from the control data and is used to determine strobe address information. The control data is then applied to the data input of four word serial-to-parallel converters on the receiver parallel output card. Each serial-to-parallel converter is enabled before it accepts and processes the control data. This occurs when the strobe address input is decoded and an enable signal is generated by the word enable circuit.

The serial-to-parallel converters decode the serial input information and convert it to parallel output levels. These outputs provide all control signals necessary to control the receiver remotely. The outputs are also supplied to the parallel input card where they are processed and returned to the receiver control or processor as monitor data. This provides an indication on the front panel of the receiver control or to the processor of the control information received by the receiver. When the receiver CONT switch is in the LCL or MON position, the register outputs of the parallel output card are disabled, and the internal parallel control lines are controlled by the receiver front panel controls.

2.3.2.2 Monitor Outputs.

When the receiver CONT switch is in the REM position, monitor signals indicating frequency, rf gain, AGC, bandwidth, mode, and related control and enable signals are applied, in parallel, from the receiver parallel output card to the receiver parallel input card for processing and application to the receiver serial interface card. Fault and performance monitor indications are applied from appropriate areas of the receiver to the receiver parallel input card for processing and application to the receiver serial interface card. The receiver serial interface card output to the receiver control is a series of monitor words in serial format.

Four separate words are required to supply a complete status report ot the remote control. These four words are independent of each other, thus can be transmitted at any time and in any sequence.

Monitor (and control) word timing is accomplished by a crystal-controlled oscillator on the receiver serial interface card. A divider reduces the frequency to the desired values. Switching permits selection of the baud rate for clock inputs to the various circuits. Selection is from 75, 109, 150, 300, 600, 1200, 2400, 4800, 9600 and 19,200 bauds.

2. FUNCTIONAL THEORY.
2.3 Remote Control Operation.
2.3.2 Receiver Serial Control Operation.
2.3.2.2 Monitor Outputs.

Monitor information (performance monitors and faults) from the receiver cards is fed to multiplexers on the receiver parallel input card. This monitor data is clocked out through the receiver serial interface card, which shifts the serial data through the FSK keyer or RS-232C driver circuit to the external monitor bus and receiver control.

With the receiver CONT switch in the LCL or MON position, operation of the monitor circuits is identical to that described above. However, the outputs of the storage registers on the parallel output card (which store the receiver control data) are disabled and the internal control line (mode, frequency, bandwidth, etc) are controlled by the receiver front panel controls Thus, the receiver front panel controls determine reciver operation and their contol signals are applied to the parallel input card for processing and application to the receiver control as monitor data. Because of this, the monitor data from the receiver always contains the applied operational status of the receiver whether it is operated locally or remotely.

The LCL and MON positions of the CONT switch are identical, except that in the LCL position the local control bit of the monitor data is set to logic 1. In the MON position, both the local control bit and the monitor data bit of monitor data are set to logic 1. The monitor bit is used as a flag in processor control applications, indicating that some programmed action needs to be initiated by the processor control.

2.4 Frequency Synthesizer.
2.4.1 General

The frequency synthesizer used in the HF-8054( ) Receiver can be accurately tuned in 1-, 10-, or 100-Hz steps. The tuning increment is determined by the use and placement of the associated frequency decade circuit cards. The frequency synthesizer uses a 9.9 MHz tcxo (temperature-compressed crystal oscillator) as a base for generating the required synthesizer frequencies. Using dividers and multipliers, the synthesizer produces the following fixed frequencies:

a. 9.9-MHz injection frequency

b. 118.8-MHz injection frequency.

c. 100-kHz synthesizer reference frequency.

d. 450-kHz USB and LSB injection frequency.

e. 456.29 UUSB injection frequency.

f. 443.71-kHz LLSB injection frequency.

Using the 100-kHz synthesizer reference frequency and the associated decades, the

2. FUNCTIONAL THEORY.

2.4 Frequency Synthesizer.

2.4.1 General

variable injection frequency for the selected output frequency is generated. The variable injection frequency is 109.350.000 to 79,350.001 MHz (the higher the selected output frequency, the lower the variable injection frequency).

2.5 Monitor Functions

Local monitors in the receiver consist of LED's on LED STATUS DISPLAY A2A1 and frequency display A2A3, and the front panel meter indications. All front panel monitor information and some additional monitor information is contained in the monitor data supplied by the HF-8054A Receiver to a control/display station. Likewise, some control information is supplied to the HF-8054A Receiver from a control station. Using the 8-bit character word format or 7-bit ASCII word format, monitor information supplied to the parallel input card is transmitted to a control/display station and control information supplied from the parallel output card is received from a control station. (Refer to table 2 for location of signals in control/monitor word format.)

2.5.1 Fault and Status Indicators

All fault and status indicators are lit by a logic 1 signal to LED status display A2A1. Refer to the LED status display section in part 2 of the HF-8054A instruction book for detailed information.

2.5.2 Mode Indicators

All mode indicators are lit by a logic 1 signal to LED status display A2A1. Refer to LED status display section in part 2 of the HF-8054A instruction book for detailed information.

2.5.3 ISB Channel Enable Indicators

All ISB channel enable indicators are lit by a logic 1 signal to LED status display A2A1. Refer to LED status display section in part 2 of the HF-8054A Instruction book for detailed information. ISB channel indicators will light only in ISB or NET DATA modes as the enabling logic 1 pull-up is removed in all other settings of the mode switch.

2.5.4 BANDWIDTH Indicators

All BANDWIDTH Indicators are lit by a logic 1 signal to LED status display A2A1. Refer to LED status display section in part 2 of the HF-8054A instruction book for detailed information. BANDWIDTH indicators will light only in AM or CW modes as the enabling logic 1 pull-up is removed in all other settings of the MODE switch.

2. FUNCTIONAL THEORY.
2.5 Monitor Functions

Table 2. Location of Signals in Control/Monitor Words.

SIGNAL	8-BIT CHARACTER			7-BIT ASCII		
	WORD	CHARACTER	BIT	WORD	FUNCTIONAL CHARACTER	WT
Fault and Status Indicators						
AFC lock	4	5	6	4	10	2
Receive fault	4	2	6	4	4	2
• Power supply fault	4	4	5	4	8	1
• Synth reference fault	4	3	1	4	7	1
• Synth fault (smo lol)	-	-	-	-	-	-
• Vbfo synth fault	4	4	6	4	8	2
• Subcarr fault	4	4	7	4	8	4
• (Ext) receive fault	-	-	-	-	-	-
Receive overload	4	2	5	4	4	1
Preselector fault	4	5	4	4	11	8
Mode Indicators						
FM	-	-	-	-	-	-
AM	2	5	7	2	10	4
ISB	2	5	5	2	10	1
CW	2	5	6	2	10	2
NET DATA	2	5	8	2	10	8
ISB Channel Enable Indicators						
CH A1	2	5	2	2	11	2
CH B1	2	5	3	2	11	4
CH A2	2	5	1	2	11	1
CH B2	2	5	4	2	11	8
BANDWIDTH Indicators						
16	2	4	7	2	8	4
A	2	4	8	2	8	8
B	2	3	5	2	6	1
C	2	3	6	2	6	2
D	2	3	7	2	6	4
E	2	3	8	2	6	8
FREQUENCY KHZ BCD Signals						
1 Hz (1)	1	5	1	1	11	1
1 Hz (2)	1	5	2	1	11	2
1 Hz (4)	1	5	3	1	11	4
1 Hz (8)	1	5	4	1	11	8
10 Hz (1)	1	5	5	1	10	1
10 Hz (2)	1	5	6	1	10	2
10 Hz (4)	1	5	7	1	10	4
10 Hz (8)	1	5	8	1	10	8
100 Hz (1)	1	4	1	1	9	1
100 Hz (2)	1	4	2	1	9	2
100 Hz (4)	1	4	3	1	9	4
100 Hz (8)	1	4	4	1	9	8
1 kHz (1)	1	4	5	1	8	1
1 kHz (2)	1	4	6	1	8	2
1 kHz (4)	1	4	7	1	8	4

2. FUNCTIONAL THEORY.
2.5 Monitor Functions

Table 2. Location of Signals in Control/Monitor Words (Cont).

SIGNAL	8-BIT CHARACTER			7-BIT ASCII		
	WORD	CHARACTER	BIT	WORD	FUNCTIONAL CHARACTER	WT
1 kHz (8)	1	4	8	1	8	8
10 kHz (1)	1	3	1	1	7	1
10 kHz (2)	1	3	2	1	7	2
10 kHz (4)	1	3	3	1	7	4
10 kHz (8)	1	3	4	1	7	8
100 kHz (1)	1	3	5	1	6	1
100 kHz (2)	1	3	6	1	6	2
100 kHz (4)	1	3	7	1	6	4
100 kHz (8)	1	3	8	1	6	8
1 MHz (1)	1	2	1	1	5	1
1 MHz (2)	1	2	2	1	5	2
1 MHz (4)	1	2	3	1	5	4
1 MHz (8)	1	2	4	1	5	8
10 MHz (1)	1	2	5	1	4	1
10 MHz (2)	1	2	6	1	4	2
VBFO OFFSET KHZ BCD Signals						
10 Hz (1)	3	3	1	3	7	1
10 Hz (2)	3	3	2	3	7	2
10 Hz (4)	3	3	3	3	7	4
10 Hz (8)	3	3	4	3	7	8
100 Hz (1)	3	3	5	3	6	1
100 Hz (2)	3	3	6	3	6	2
100 Hz (4)	3	3	7	3	6	4
100 Hz (8)	3	3	8	3	6	8
1 kHz (1)	3	2	1	3	5	1
1 kHz (2)	3	2	2	3	5	2
1 kHz (4)	3	2	3	3	5	4
1 kHz (8)	3	2	4	3	5	8
SIGN	3	2	5	3	4	1
Remote monitors Not Used Internally						
10 Hz LOL	4	3	7	4	6	4
100 Hz LOL	4	3	6	4	6	2
1 kHz LOL	4	3	5	4	6	1
10 kHz LOL	4	3	4	4	6	8
100 kHz LOL	4	3	3	4	6	4
1/10 MHz LOL	4	3	2	4	6	2
Channel A1 AF PM	4	2	2	4	5	2
Channel B1 AF PM	4	2	3	4	5	4
Channel A2 AF PM	4	2	1	4	5	1
Channel B2 AF PM	4	2	4	4	5	8
Channel A1 AGC PM	4	4	2	4	9	2
Channel B1 AGC PM	4	4	3	4	9	4
Channel A2 AGC PM	4	4	1	4	9	1
Channel B2 AGC PM	4	4	4	4	9	8
RF PM	4	5	7	4	10	1
External Standard	4	5	5	4	10	4

2. FUNCTIONAL THEORY.
2.5 Monitor Functions
2.5.5 FREQUENCY KHZ and VBFO OFFSET KHZ Displays

All FREQUENCY KHZ and VBFO OFFSET KHZ displays are lit by the bcd supplied as the frequency control signals to the frequency synthesiser and/or the vbfo card. These bcd's are supplied from the frequency switchboard A2A3 and dvbfo switchboard A2A4, to the associated control circuits and the frequency display A2A5. In the HF-8054A receiver, the frequency control signals may also be supplied by the parallel output card and are supplied to the parallel input card.

2.5.6 Metering

The Front panel meter is controlled by the METER switch. METER switch A2A2S1 in the HF-8054() has nine positions: B2 AF: +13FS and +3FS; B1 AF: +13FS and +3FS; A1 AF: +13FS and +3FS; A2 AF: +13FS and +3FS; and RCV SIG.

2.5.7 Remote Monitors Not Used Internally

Remote monitors in the HF-8054A consist of performance monitors which indicate by logic level the status of specific areas of the HF-8054A. All of these monitors indicate by presence of a logic 1 that the circuit is operational.

2.6 Power Distribution

Primary power distribution in the HF-8054() Receivers is controlled by power supply A1. Input power to the power supply is connected to A1J1 on the rear panel, supplied through A1F1 (rear panel), A1S15 (front panel), and A1S1 (rear panel) to the input power transformer (P/O A1). Power supply A1 uses rectifiers and regulators to produce the following base voltages: +5,+8,+15,+18,+24 and -15 V dc.

These voltages are supplied to cards and modules in the receiver and are the only voltages used, except for the following special applications.

Primary input power to the receiver control can be either 100,115,215, or 230 V ac. Input power select switch S1 on power supply A1 must be set to the position that corresponds to the primary input power used. The input ac voltage is converted to regulated dc outputs to supply the various circuits. Voltages used in the receiver control are: +5,+8,+24,-15,+15, and +18 V dc. A zener-regulated circuit on parallel output A12 develops +5.6 V dc from the +15 V dc input for use by several logic components on the card.

2.7 Space Diversity Systems using Remote Controlled Master Receiver to Slave Receiver.

This system provides conplete control of the system from a receiver control.

When the master and slave receiver CONT switches are in the REM position, all front panel control information is supplied from the receiver control to the master receiver. The master receiver then retransmits this control information

2. FUNCTIONAL THEORY.
2.7 Space Diversity Systems using Remote Controlled Master Receiver to Slave Receiver.

to the slave receiver(s). Front panel controls that are remotely controlled are mode, bandwidth, frequency, AGC, AFC, rf gain, vbfo, etc.

The master-receiver receiver fault out is interconnected to the slave-receiver fault in to summarise the system receiver fault signals in the slave-receiver monitor bus. The front panel RCV FAULT indicator on the master receiver indicates when a fault occurs in the master receiver only. The front panel RCV FAULT indicator on the slave receiver indicates when a fault occures in either receiver.

2.7.1 Normal Configuration (Refer to figure 3)

This configuration of the space diversity receiving system provides control information from the receiver control. This control information is supplied to and through the master receiver to the slave receiver. When supplied to the slave receiver, the slave receiver initiates monitor data and supplies status information to the receiver control. The status information to the receiver control is the status of the space diversity receiving system. Note the slave-receiver monitor outputs are a summary of the receiver control, master-receiver, and slave-receiver control signals and faults.

2.7.2 Polling Configuration (Refer to figure 4)

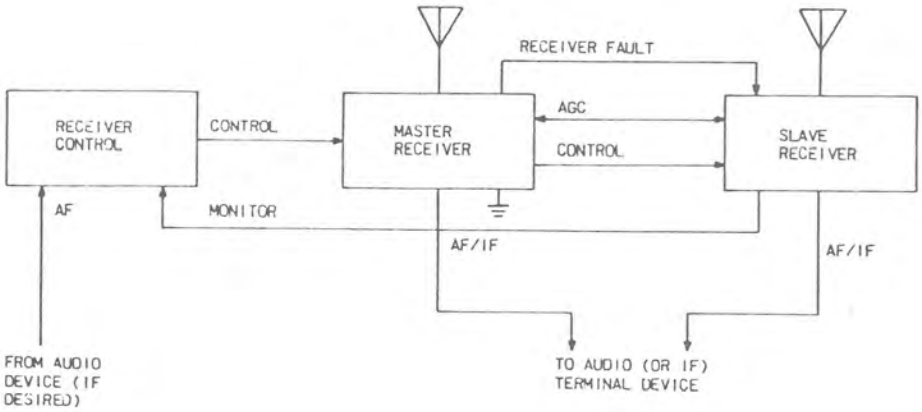
This configuration of the space diversity receiving is essentially the same as the one discussed in paragraph 2.7.1. The only difference between this configuration and the normal configuration is that the monitor bus (control signals) from the master receiver is also supplied to the receiver control monitor bus. When in polling mode, this prevents the polling operation from requesting status of another receiver or diversity pair until after the slave-receiver monitor word is transmitted to the receiver control. The slave-receiver monitor signal (system summary) is displayed by the polling status display device.

2.8 Preselector Theory

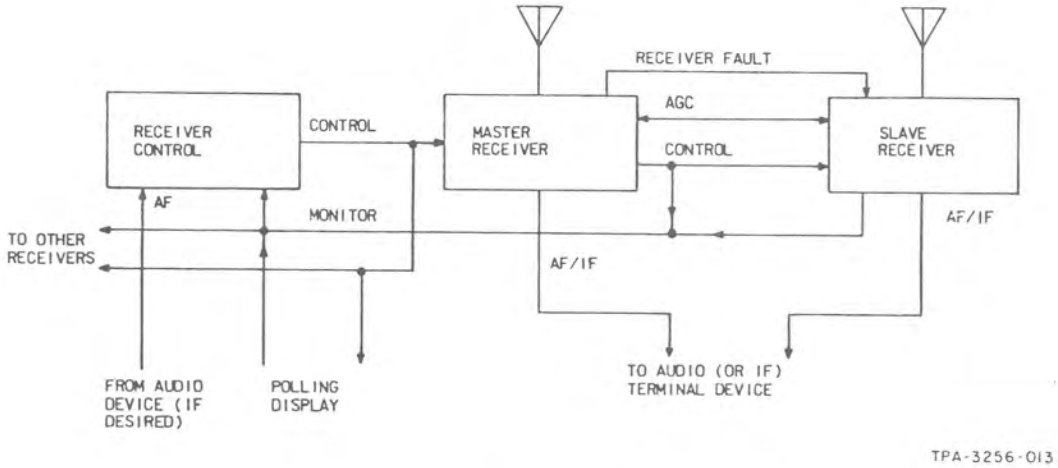
The HF-8060 Preselector contains an rf amplifier and a 3 pole filter which is servo tuned to the operating frequency received in bcd parallel form. Protection circuits disconnect the filter when overloading signals are received.

18 frequency lines are applied to line receivers on interface card A2 and the receiver outputs are applied to digital-to-analog (d/a) converter A3. The frequency range is covered in four frequency bands (table 3). A digital logic circuit on A3 converts the five mose significant frequency lines to appropriate frequency band signals B1 through B4. A fifth signal, B0, when active, indicates that out-of-band frequency information has been received.

2. FUNCTIONAL THEORY.



Remote-Controlled Master Receiver to Slave Receiver (Normal Configuration), Block Diagram
Figure **3**



Remote-Controlled Master Receiver to Slave Receiver (Polling Configuration), Block Diagram
Figure **4**

2. FUNCTIONAL THEORY.
2.8 Preselector Theory

The frequency band signal and a timing signal from tune logic A4 energise band-switch motor B2 to select the proper frequency band in 3-pole filter assembly A8. The frequency, in digital form, is converted to a dc voltage within A3 and is compared with the output of follow potentiometer R1. The error signal is amplified by servo amplifier card A5. Servo motor B1 drives R1 to a null condition where the potentiometer voltage is equal to the d/a converter voltage. Since the filter-tuning capacitor is driven with the potentiometer, and the resonant frequency is proportional to shaft rotation, the filter is tuned to the operating frequency.

TABLE 3 : OPERATIONAL FREQUENCY BANDS

BAND	FREQUENCY BAND LIMITS
0	Below 2.000 MHz (unfiltered)
1	From 2.000 to 3.999 MHz
2	From 4.000 to 7.999 MHz
3	From 8.000 to 15.999 MHz
4	From 16.000 to 31.999 MHz

Protection against damage due to strong rf inputs (such as from nearby transmitters) is provided by rf overload protection circuits. When input signals exceed safe levels (more than 200 volts at 10 percent off tuned frequency or less voltage at closer frequencies), rf detectors within A8 and relay module A7 produce signals which are applied to protection circuits within A4 to de-energise relay A7K1, disconnecting the filter from the RCV IN signal at J5. When the strong rf input signal drops to a safe level, the HF-8060 is automatically reconnected to the antenna.

2.8.1 Tuning Theory

Detailed theory of tuning sequence of the HF-8060 preselector contained in the theory section of the HF-8060 instruction book.

2.8.2 Signal Flow Theory

Detailed theory of signal flow is contained in the theory section of the HF-8060 instruction book.

2.8.3 Power Distribution Theory

Source power is applied through POWER switch S2 from POWER input connector J6. Transformer primary ac voltage-switch S1 has a section that connects either two primary windings in parallel for 100/115-V ac operation, or two primary windings in series for 215/230-V ac operation. For each of the two voltage ranges, the other switch selects a voltage tap corresponding to normal or low-voltage operation. A double-pole switch, S2, and a single fuse, F1, control the voltage

2. FUNCTIONAL THEORY.
2.8 Preselector Theory
2.8.3 Power Distribution Theory

applied to the transformer.

In chassis-assembly A1, four full-wave rectifiers, capacitor filters, and solid-state circuits are used to generate regulated voltages at +24,+15,+5, and -15 V dc. Two voltages, +15, and -15 V dc, are used to generate +5 V dc and -8 V dc within digital-to-analog converter card A3. These voltages are used in d/a conversion, and on filter assembly A8 to excite servo-follow potentiometer R1.

Voltages of +15, +5 and +1.5 V dc (from a resistive voltage divider on sideboard assembly A1A2) are applied to CONTROL connector J1 for strapping to power pull-up resistors and threshold buses as required.

2.9 HF-80 Remote Display

The remote display consists of an interface unit which decodes the serial data on the control bus into parallel format for display by the addressed display module and up to sixteen (16) display modules. Up to four (4) display modules may be implemented in a single module frame and four (4) module frames comprise a fully implemented display system.

Functional theory is discussed in the 10kW Transmitter part of this book, and in the HF-8111 Remote Display instruction book 523-1003164.

HF-80 RECEIVER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

MAINTENANCE

Printed in Australia

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MAINTENANCE

1. GENERAL

This section presents information necessary to maintain the HF-80 receiver system. Testing and troubleshooting procedures isolate a fault in the system to a particular equipment. Refer to the appropriate equipment instruction book for fault isolation and repair of the faulty equipment.

2. TEST EQUIPMENT

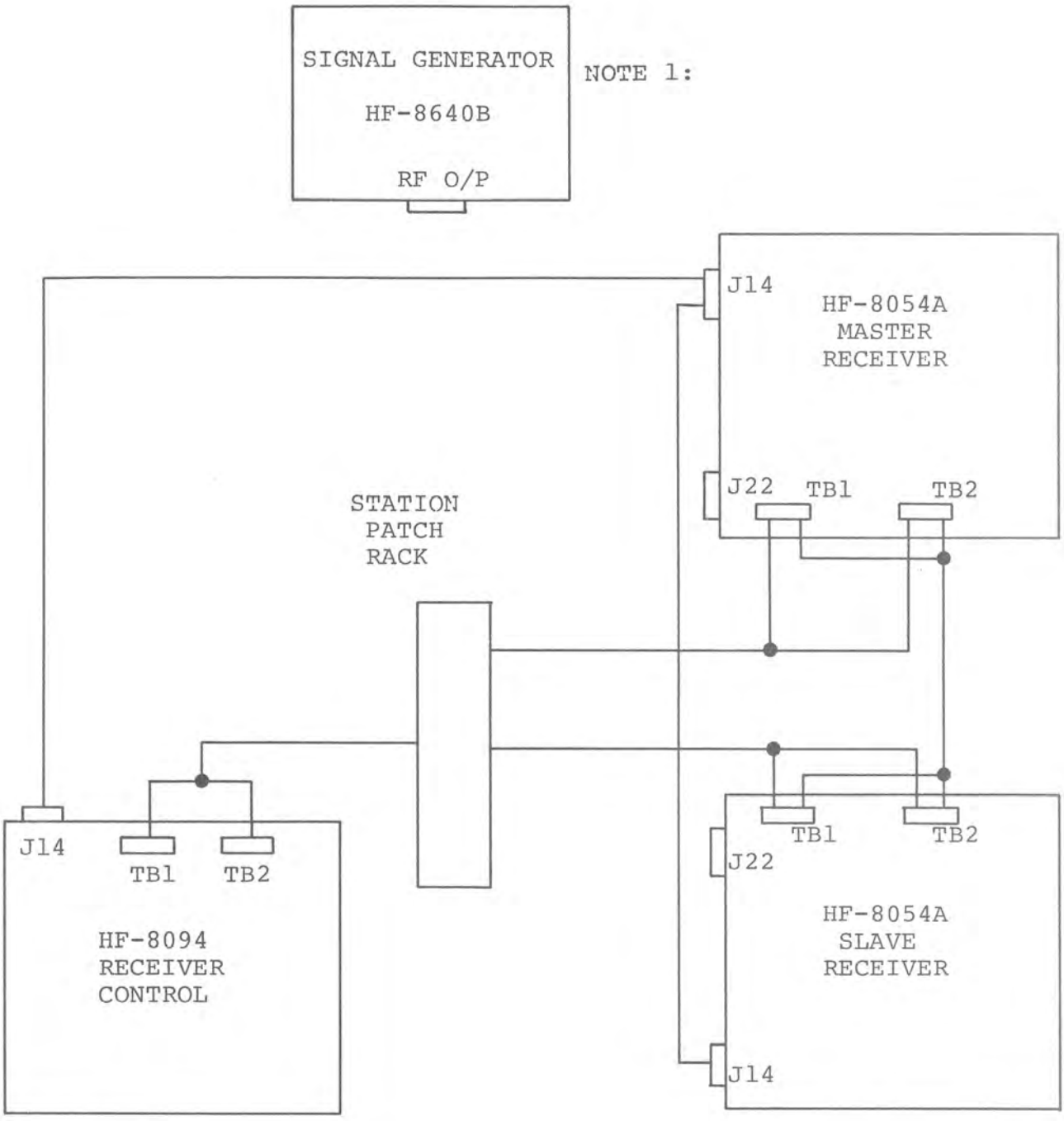
The test equipment required to test, troubleshoot and align the HF-80 receiver system is listed in table 2.

3. TESTING AND TROUBLESHOOTING 3.1 Preliminary Checks

Before performing the system testing and troubleshooting procedures, check the system for proper cabling, grounding and bonding.

3.2 Testing and Troubleshooting Procedures

Perform the procedures in table 1. Refer to the test setup diagram (Figure 1) and connect the equipment as shown. The first part of the testing and troubleshooting procedures is for the HF-80 receiver system with the HF-8054A receiver in local control. The second part of the testing and troubleshooting procedures is for the HF-80 receiver system with the HF-8054A receiver in remote control using the HF-8094 receiver control unit.



NOTE 1: O/P AT SIGNAL GENERATOR SHOULD BE APPLIED TO J22 OF THE MASTER OR SLAVE RECEIVER AS REQUIRED DURING TEST.

HF-80 Receiver System,
Test Setup Diagram
Figure 1

TABLE 1 TESTING AND TROUBLESHOOTING PROCEDURES

TEST	PROCEDURE	NORMAL	IF INDICATION IS ABNORMAL
1. Preliminary power settings	CAUTION Ensure the LINE SELECTOR Switches located on the rear panel of the HF-8054A Receiver and the HF-8094 Receiver Control are set to the same voltage as the primary power source voltage. a) Set all the LINE SELECTOR switches for the correct primary source voltage.		
2. Preliminary control settings (Master and slave receivers)	a) Meter switch to A1 CH A1 AGC switch to FAST CH A1 Enable switch to ON CH A1 AGC Bus switch to OFF VBFO switch to FXD CONT switch to LCL Speaker switch to A1 Squelch control fully CCW AF Gain control to midrange RF Gain fully CW Mode switch to ISB Frequency kHz switch to 14444.40 PWR to OFF (press inward until switch is released and latched in the outward position).		

Table 1-Testing and Troubleshooting Procedures,-Cont'd)

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
3. Power turn-on. (Master and HF- slave receivers)	a) Set the HF-8054A PWR switch to ON (press inward and latch).	HF-8054A RCV FAULT indicator 8054A. lights	Replace/ Repair
		HF-8054A ISB indicator lights	Replace/ Repair HF-8054A
		HF-8054A A1 indicator lights HF-8054A.	Replace/ Repair
		HF-8054A Frequency reads 14444.40	Replace/ Repair HF-8054A
	b) Change one digit of the HF-8054A Frequency kHz switches and then reset frequency to 14444.40.	HF-8054A RCV FAULT indicator extinguisher	Replace/ Repair HF-8054A
4. Local Audio (Master receiver)	a) Perform the line audio checks/ adjustments to the Master receiver, outlined in para. 4.1 of the Maintenance section in the HF-8054() receiver manual. Checks/adjustments must also be made to channels A1, B1, A2 and B2	Within parameters of 4-1	Replace/ Repair HF-8054A
5. Local Audio (slave receiver)	a) Repeat procedure 4.a for slave receiver	Within parameters of 4-1	Replace/ Repair HF-8054A
6. Local control (Master receiver)	a) Switch Mode switch to AM, CW, ISB and NET DATA sequentially	AM, CW, ISB and NET DATA status indicators should light and correspond with mode selected	Replace/ Repair HF-8054A

	b) Mode switch to CW or AM switch bandwidth switch to 16, A, B, C, D and E sequentially.	16, A,B,C, D, and E status indicators should light and correspond with bandwidth selected.	Replace/ Repair HF-8054A
	c) Mode switch to ISB switch channel enable switches A1,B1,A2 and B2 on and off alternately.	A1,B1,A2 and B2 status indicators should light as their enable switches are turned on.	Replace/ Repair HF-8054A
7. Local control (slave receiver)	a) Repeat procedures 6a,b and c for slave receiver	As for 6a, b and c	Replace/ Repair HF-8054A
8. Remote preliminary control settings	a) Switch HF-8054A Master and Slave receivers CONT switches to REM. b) On HF-8094:- Meter Switch to A1, CH A1 AGC Switch to FAST CH A1 Enable Switch to ON CH A1 AGC Bus Switch to OFF. AFC Switch to OFF. VBFO Switch to FXD CONT Switch to NORM. Speaker Switch to A1. Squelch Conrol fully CCW. AF Gain control to midrange. RF Gain Fully CW. Mode Switch to ISB, Frequency kHz Switches to 14444.40 PWR to OFF (press inwards until switch is released and latched in the outward position).		

9. Remote power turn-on	a) Set the HF-8094 PWR switch to ON (press inward and latch). Set address switch to the address of receiver being tested.	HF-8094 ISB indicator lights. HF-8094 A1 indicator lights. Frequency kHz display reads 14444.40	Replace/ Repair HF-8094 Replace/ Repair HF-8094. Replace/ Repair HF-8094
10. Remote Audio	a) Apply audio O/P from Master HF-8054A to audio I/P of HF-8094. Perform the line audio checks/adjustments to the HF-8094 as outlined in para.4-2 of the Maintenance Section in the HF-8094 Receiver Control manual. Checks/adjustments must be made to channels A1, B1, A2, and B2. NOTE: For these tests disregard first part of first sentence in 4.2 a. which reads "with the receiver control disconnect from all other equipment." NOTE: RF Signal Generator should be connected to Master Receiver RF input J22 for these checks/adjustments.	Within parameters of 4-2	Replace/ Repair HF-8094.
11. Remote Control	a) Perform procedures 6a, b and c on HF-8094A with Unit in Remote Control.	As for 6a, b and c. Indicators on Master, Slave receivers and HF-8094 should correspond to switches selected.	Replace/ Repair HF-8094
	b) Change Frequency kHz Switch on HF-8094 to 25555.50.	HF-8054A Master Slave receivers and HF-8094 Frequency displays should read 25555.50.	Replace/ Repair HF-8094.

Table 2-Test Equipment and Tools

ITEM	MINIMUM SPECIFICATIONS	REPRESENTATIVE
RF Signal Generator	1-30 MHz	HP-8640B-001

HF-80 RECEIVER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

PARTS LIST

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PARTS LIST

HF-80 RECEIVER SYSTEMS

PART NO	INDENT	DESCRIPTION	SEE NOTE BELOW
NPN	1	HF-80 Receiver System	
622-3475-003	2	Receiver, HF-8054A 4 Channel	
622-3477-001	2	Receiver Control, HF-8094	
622-3386-001	2	Preselector, HF-8060 (option)	
241-M004-010	2	High Pass Filter	
	2	HF-80 Remote Display, Comprising:	
631-0954-001	3	Module Frame	
631-1024-001	3	Display Module	
631-0955-001	3	Interface Unit	
631-1018-00X	3	Cables Kit	
631-1027-00X	3	Front Panel	
631-1143-001	2	Fault Alarm Panel	2
631-1096-001	2	Master Control Switch	2
9584-613-0200	2	Data Modem (Philips TMC)	
631-1151-00X	2	Power Distribution Unit	2
-	2	Balun (A.E.A. TYPE UBT -57)	
631-0964-00X	2	Power Point Bracket Assembly	2
021-M011-XXX	2	Equipment Console	1
021-M012-XXX	2	Equipment Cabinet	1
631-0961-001	2	Cable Assembly, W5	1
631-0962-001	2	Cable Assembly, W12	1
631-0961-002	2	Cable Assembly, W14	1

NOTES:

1. For further detail, see Kits section of this book.
2. For further detail, see Part 4 of this book.

KITS

HF-80 RECEIVER SYSTEMS

for

AUSTRALIAN ARMY

Rockwell International

KITS

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CABLE ASSEMBLY W5, RF INPUT TO PRESELECTOR (631-0961-001)

1. DESCRIPTION

Cable Assembly W5, Collins Part Number 631-0961-001 is a coaxial cable type RG-58C/U, fitted with rf-BNC connectors.

The W5 cable assembly connects the rf input from the antenna,balun or filter (J2) to the Preselector (J5).

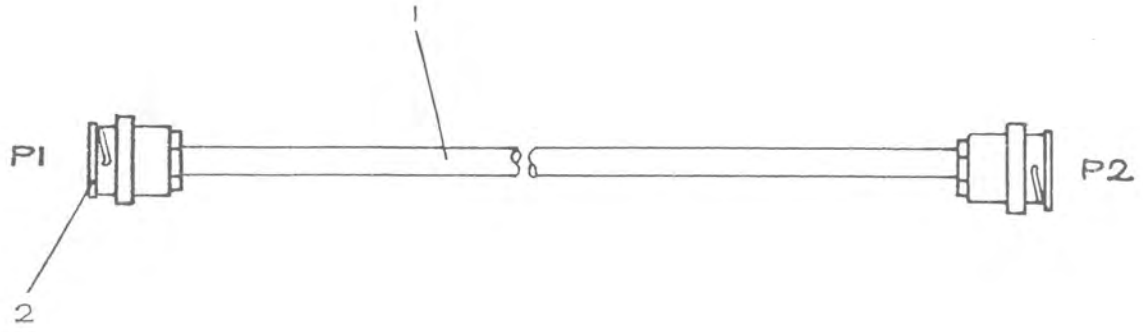
2. PARTS LIST/DIAGRAM

Figure 1 and Table 1 provide identification, requisition details and parts location details for maintenance purposes.

CABLE ASSEMBLY W5, RF INPUT TO PRESELECTOR (631-0961-001)
2. PARTS LIST/DIAGRAM

Table 1. Cable Assembly W5, Parts List

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSEMBLY
1	631-0961-001	1	Cable Assy W5, RF Input to Preselector	1
1	D25-0042-000	2	Cable, Coaxial, RG-58C/U 3M LG	1
2	357-X026-020	2	Connector , RF-BNC	2



Cable Assembly W5, Parts List

CABLE ASSEMBLY W12 - RECEIVER TO PRESELECTOR (631-0962-001)

1. DESCRIPTION

The Collins Part Number 631-0962-001 cable assembly consists of a 31-wire cable and two type D sub-miniature connectors (one 37-pin and one 50-pin).

The W12 cable assembly connects the receiver to the preselector. The 37-pin connector mates with receiver J16 and the 50-pin connector mates with the preselector J1.

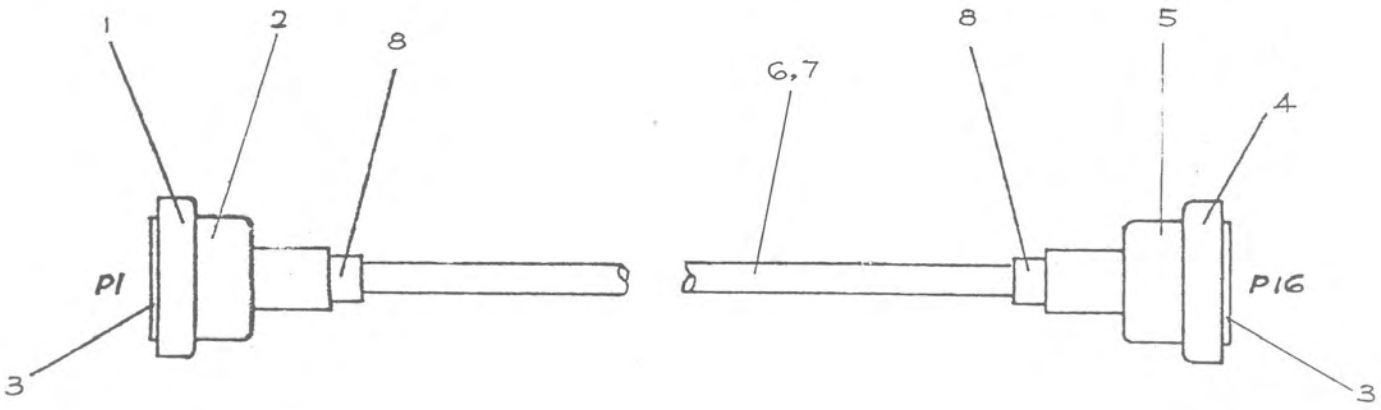
2. PARTS LIST/DIAGRAM

Figure 1 and Table 1 provide identification, requisition details and location of parts for maintenance purposes.

Table 1 Cable Assembly W12 Parts List

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSEMBLY
1	631-0962-001	1	Cable ¼assy, W12, Receiver to Preselector	1
1	C71-0922-050	2	Connector, Type 50S	1
2	C71-0396-050	2	Backshell	1
3	C71-0946-040	2	Contact Socket	52
4	C71-0922-040	2	Connector, Type 37S	1
5	C71-0396-040	2	Backshell	1
6	424-0859-150	2	Cable, 1600 mm lg	1
7	439-4031-000	2	Wire, Elec, A22TA00X0XXX, 122 mm	1
8	152-M001-090	2	Sleeving, Heat Shrink, 153 mm lg	1

CABLE ASSEMBLY W12 - RECEIVER TO PRESELECTOR (631-0962-001)
2. PARTS LIST/DIAGRAM



Cable Assembly W12, Parts List

CABLE ASSEMBLY W14, RF INPUT TO RECEIVER (631-0961-002)

1. DESCRIPTION

Cable assembly W14 Collins part number 631-0962-002 is a coaxial cable type RG-58C/U, fitted with rf-BNC connectors.

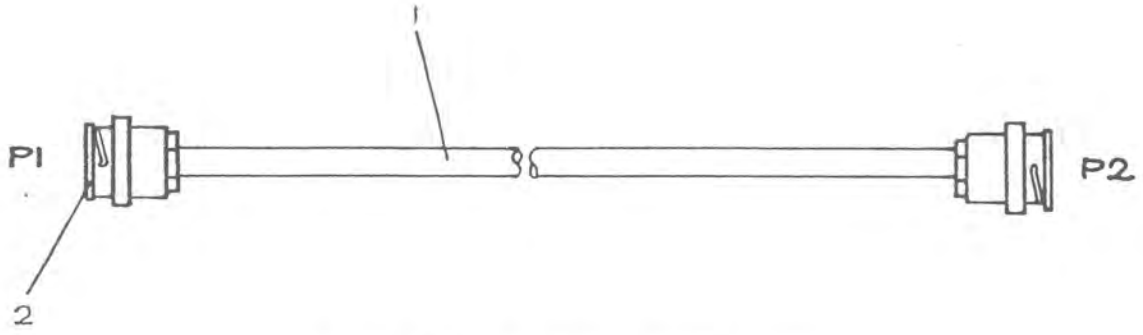
The W14 cable assembly connects the Preselector J1 to the Receiver J16.

2. PARTS LIST/DIAGRAM

Figure 1 and Table 1 provide indentification, requisition details and parts location details, for maintenance purposes.

Table 1. Cable Assembly W14 - Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSEMBLY
1	631-0961-002	1	Cable Assy W14 Preselector to Receiver	1
1	D25-0042-000	2	Cable Coaxial RG-58C/U 1800 mm lg	2
2	357-X026-020	2	Connector, RF-BNC	2



Cable Assembly W14, Parts List

PART 4.

PART 4 COMMON EQUIPMENT

INTRODUCTION

The equipments included in Part 4 of this instruction book are;

631-1151-00X Power Distribution Unit,
631-0964-00X Power Point Bracket Assembly,
631-1096-00X Master Control Switch,
631-1143-00X Fault Alarm Panel
021-M011-XXX Equipment Console
021-M012-XXX Equipment Cabinet

These units are employed in 10-kW Transmitter Systems, 1-kW Transmitter Systems and HF-80 Receiver Systems. As a consequence, each equipment variation part number reference contains a differentiating status number (-001, -002, etc.), and is shown in the parts list with a differentiating code. (A, B, etc).

The function and operation of each equipment is included in the Description text.

HF-80 COMMON EQUIPMENT

for

AUSTRALIAN ARMY

Rockwell International

COMMON EQUIPMENT

Printed in Australia

523-1003194-0012M1

1 October, 1981

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POWER DISTRIBUTION UNIT (631-1151-00X)

1. DESCRIPTION

The 631-1151-00X Power Distribution Unit is a rack mounted unit. It provides 240V ac mains input connection facility, an earthing bar, mains circuit breakers for each of the equipments mounted in a particular cabinet or console, and one standard Australian power outlet. The circuit breakers and power outlet are front panel mounted.

Outlines of the equipment and its components are shown in figure 1. The equipment cover is retained in positions by four screws accessed from the rear of the panel.

The two left hand circuit breakers are identified by engravings on the panel. The standard engravings and their respective part number (dash number) identifications are shown in table 1. Current ratings (ac) of the respective circuit breakers are also listed in Table 1. The right hand circuit breaker controls the power outlet.

Table 1. Power Distribution Unit - Circuit Breaker Identification.

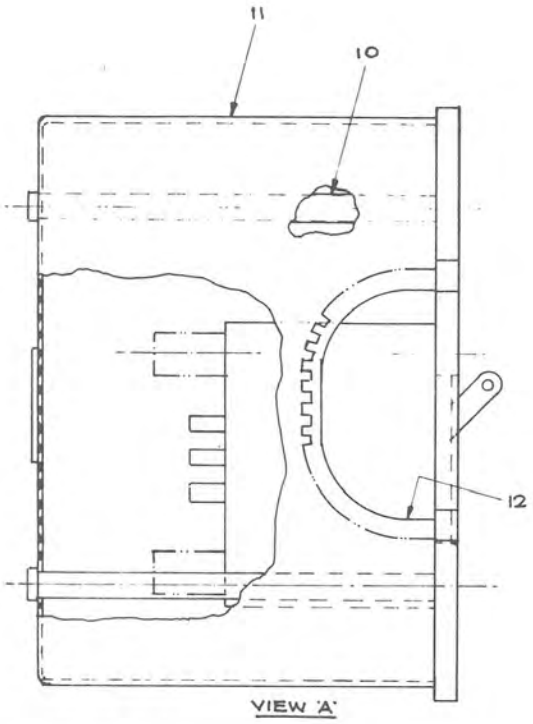
Collins Part No.	C.B.1. (left hand) Identification	Rating	C.B.2. (centre) Identification	Rating
631-1151-001	EQPT	5A	-	-
631-1151-002	RX1	5A	RX2	5A
631-1151-003	EXC1	5A	EXC2	5A
631-1151-004	RX CON	5A	TX CON	5A
631-1151-005	PA	20A	EXC	5A

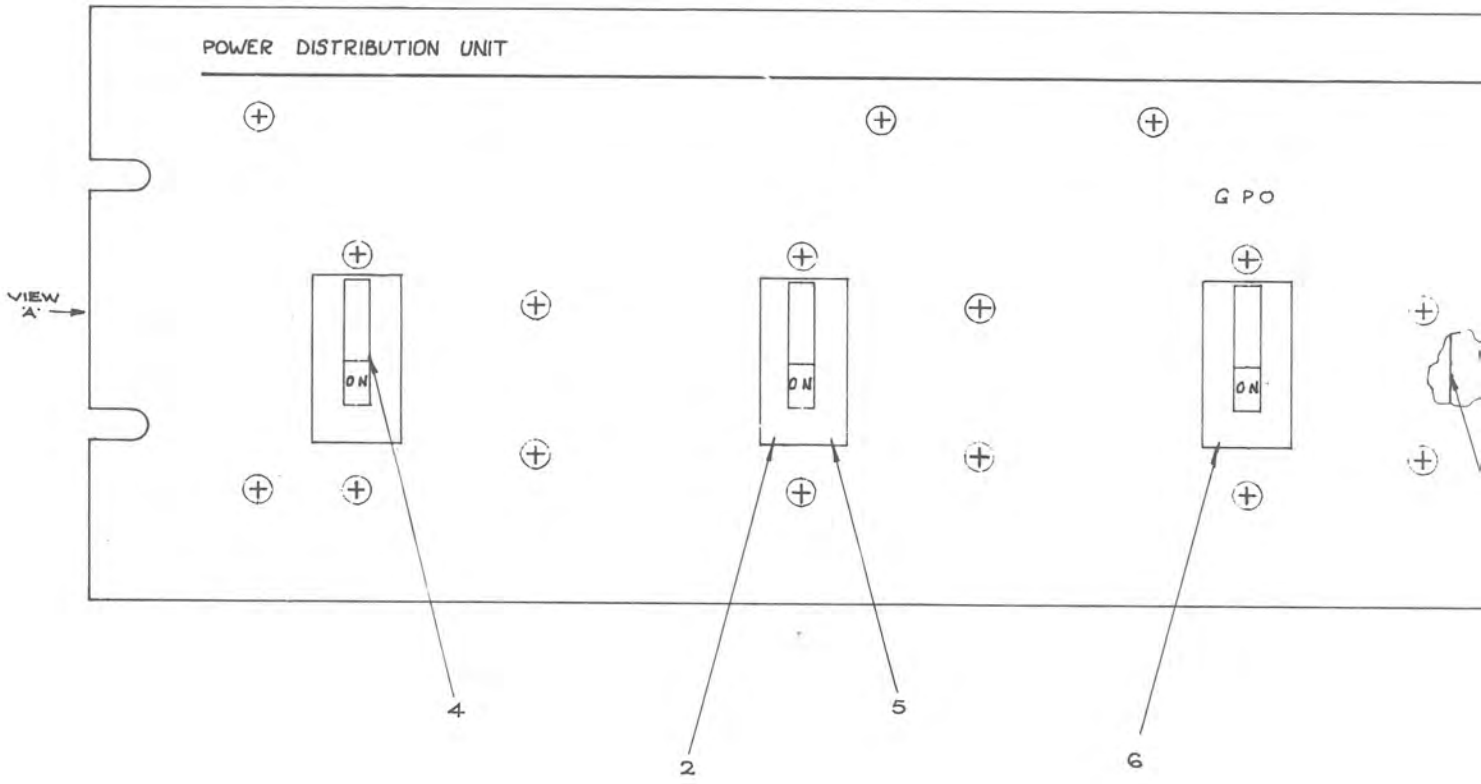
2. PARTS LIST

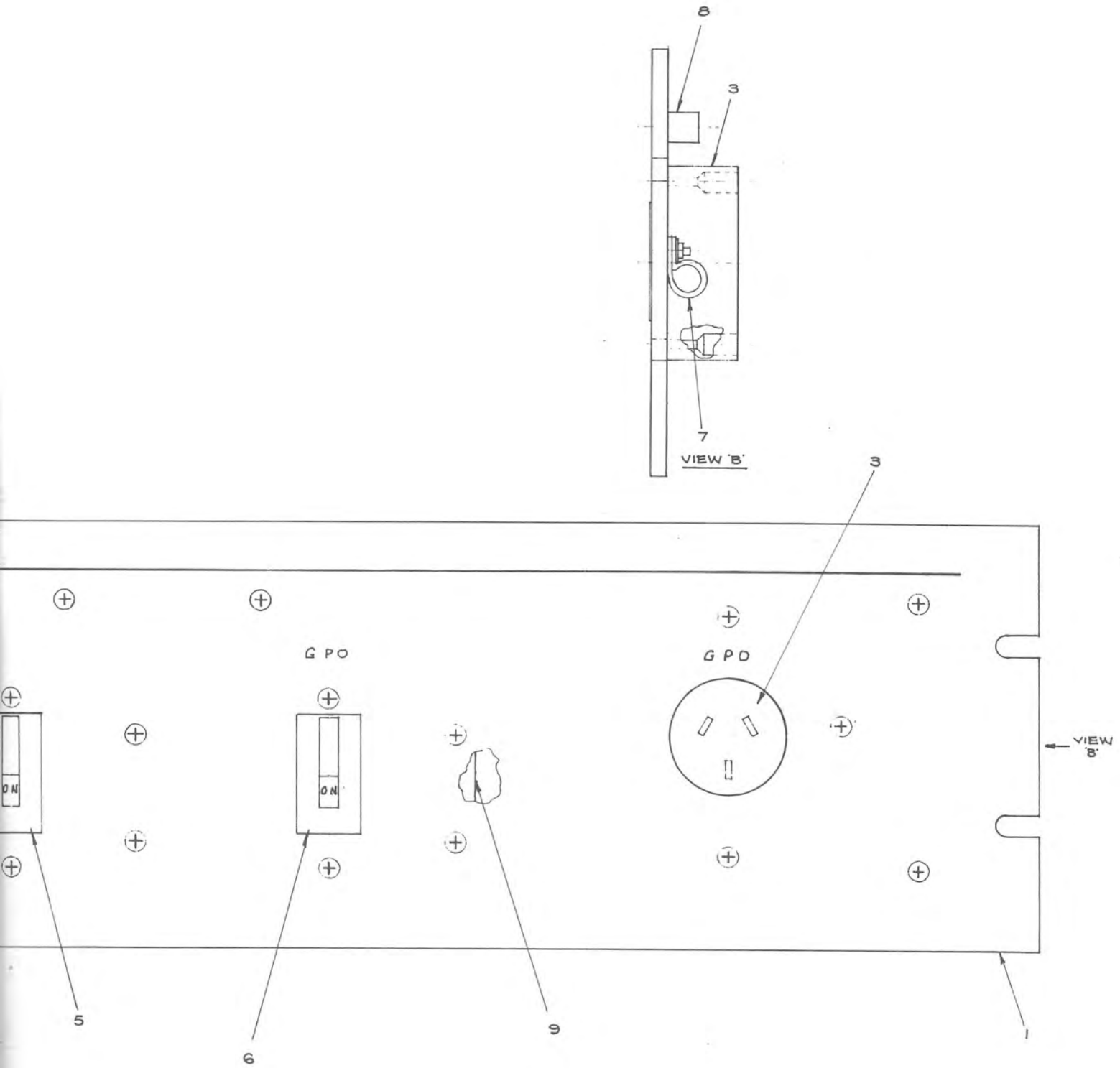
Figure 1 and Table 2 provide identification and location information for the requisition and maintenance of the equipment.

PART 4 COMMON EQUIPMENT

POWER DISTRIBUTION UNIT
(631-1151-00X)
2. PARTS LIST







Power Distribution Unit - Parts List
Figure 1

POWER DISTRIBUTION UNIT
(631-1151-00X)
2. PARTS LIST

Table 2. Power Distribution Unit - Parts List

Fig-Item	Part No.	Indent	Description	Units per assy.	Usable on code
1-	631-1151-001	1	Power Distribution Unit	1	A
	631-1151-002	1	" " "	1	B
	631-1151-003	1	" " "	1	C
	631-1151-004	1	" " "	1	D
	631-1151-005	1	" " "	1	E
1	631-1166-001	2	Front Panel	1	
2	631-0996-001	2	Blank Plate	1	A
	342-0170-000	2	Screw, 6-32 UNC-2A x 1/2 PFH (AP)	2	A
	310-0046-000	2	Washer, Flat No.6 (AP)	2	A
	310-0286-000	2	Washer, Lock No.6 (AP)	2	A
	313-0045-000	2	Nut, 6-32 (AP)	2	A
3		2	Connector, Receptacle, Elec. (Clipsal 415)	1	
	342-0068-000	2	Screw, 6-32 UNC-2A x 7/8 PFH (AP)	2	
	310-0282-000	2	Washer, Lock No.6 (AP)	2	
	313-0045-000	2	Nut, 6-32 (AP)	2	
4	260-M005-030	2	Circuit Breaker, 5A	1	ABCD
	260-M005-040	2	Circuit Breaker, 20A	1	E
	342-0061-000	2	Screw, 6-32 UNC-2A x 5/16 PFH (AP)	2	
	004-0250-000	2	Lug	4	AE
	004-0250-000	2	Lug	6	BCD
5	260-M005-030	2	Circuit Breaker, 5A	1	BCDE
	342-0061-000	2	Screw, 6-32 UNC-2A x 5/16 PFH (AP)	2	BCDE
6	260-M005-010	2	Circuit Breaker, 10A	1	
	342-0061-000	2	Screw, 6-32 UNC-2A x 5/16 PFH (AP)	2	
7	150-M001-100	2	Clip, Cable	1	
	342-0066-000	2	Screw 6-32 UNC-24 x 3/4 PFH (AP)	1	
	310-0046-000	2	Washer, Flat No.6 (AP)	1	
	310-0282-000	2	Washer, Lock No.6 (AP)	1	
	313-0045-000	2	Nut, 6-32 (AP)	1	
8	NPN	2	Earth Bar		
	342-0066-000	2	Screw, 6-32 UNC-24 x 3/4 PFH (AP)	2	
	310-0282-000	2	Washer, Lock No.6 (AP)	2	
	313-0045-000	2	Nut, 6-32 (AP)	2	
	NPN	2	Adapter Plate	2	
	NPN	2	Screw, 5/32 PFH Slot HD	2	

POWER DISTRIBUTION UNIT
(631-1151-00X)
2. PARTS LIST

Table 2. Power Distribution Unit - Parts List (contd.)

9		2	Terminal, Block (UTILUX XCCX)	3
		2	Terminal, (UTILUX H3560)	3
		2	Terminal, Push on (UTILUX H3561)	1
	342-0065-000	2	Screw, 6-32 UNC-24 x 5/8 PFH (AP)	6
	310-0046-000	2	Washer, Flat, No.6	6
	310-0282-000	2	Washer, Lock, No.6 (AP)	6
	313-0045-000	2	Nut, 6-32 (AP)	6
10	606-0270-003	2	Post, Hex	4
	342-0065-000	2	Screw, 6-32 UNC-24 x 5/8 PFH (AP)	4
11	606-0315-001	2	Cover, Distribution Unit	1
	310-0282-000	2	Washer, Lock, No.6 (AP)	4
	343-0328-000	2	Screw, 6-32 UNC-24 x 1/4 PPH (AP)	4
12	150-0173-000	2	Grommet	2
	005-1540-000	2	Cement	AR
13	631-1167-001	2	Label, Caution	1
	005-1540-000	2	Cement (AP)	AR

POWER POINT BRACKET ASSEMBLY. (631-0964-00X)

1. DESCRIPTION

The Power Point Bracket Assembly, Collins part number 631-0964-00X is a multiple 3 pin power outlet (Australian pattern) contained in a steel enclosure. It is mounted by a pair of brackets to the inside of an equipment cabinet or console in a position determined by other equipment installed in the cabinet or console.

The power point bracket assembly is provided with 2-metre length flexible power input lead(s), and is wired according to Australian standard AS3000. The top cover contains six Australian standard flush-mounted power outlets, which provide power to the equipments within the cabinet.

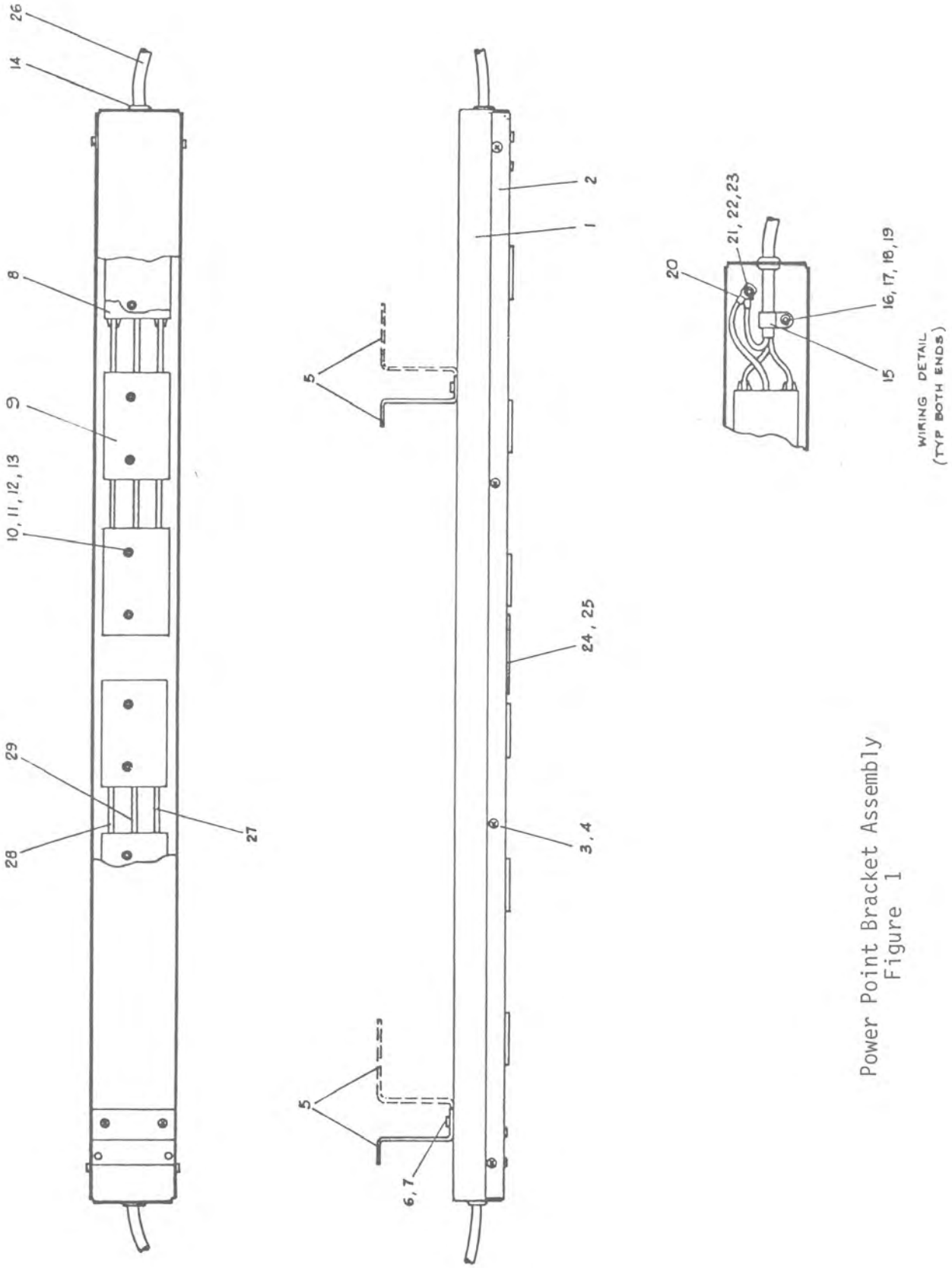
Three versions of power point bracket assembly are available, namely part numbers 631-0964-001, 631-0964-002 and 631-0964-003. The -001 version has two leads which provide input power from two sources, eg. the two equipment circuit breakers contained in the Collins part number 631-1151-00X Power Distribution Unit. Three power outlets are connected to each of the power inputs. In the -002 and -003 versions the one power input provided is connected to all six outlets. The -001 and -002 versions are provided with mounting brackets suited to equipment cabinets. The -003 version is fitted with brackets for mounting in equipment consoles.

The top cover is retained by eight screws (with washers) located around the sides of the assembly.

2. PARTS LIST

Figure 1 and Table 1 provide identification and location information for the requisition and maintenance of the assembly.

POWER POINT BRACKET ASSEMBLY.
(631-0964-00X)
2. PARTS LIST



Power Point Bracket Assembly
Figure 1

POWER POINT BRACKET ASSEMBLY.
(631-0964-00X)
2. PARTS LIST

Table 1. Power Point Bracket Assembly - Parts List.

Fig-Item	Part No.	Indent	Description	Units per Assy.	Usable on Code
1-	631-0964-001	1	Power Point Bracket Assy.	1	A
	631-0964-002	1	" " " "	1	B
	631-0964-003	1	" " " "	1	C
1	631-0964-101	2	Base	1	
2	631-0964-103	2	Cover	1	
3	343-0168-000	2	Screw, 6-32 UNC, 2A x 5/16 in PPH (AP)	8	
4	3 -0 -000	2	Washer, Flat, size 6 (AP)	8	
5	631-0964-104	2	Bracket, Mounting	2	AB
	631-0964-105	2	Bracket, Mounting	2	C
6	343-0186-000	2	Screw, 8-32 UNC, 2A x 5/16 in PPH (AP)	4	
7	310-0048-000	2	Washer, Flat, size 8 (AP)	4	
8	368-M024-010	2	Socket	6	
9	631-0964-110	2	Plate, Retaining	6	
10	343-0194-000	2	Screw, 8-32 UNC 2A x 1-1/8 in PPH (AP)	12	
11	313-0017-000	2	Nut, 8-32 UNC (AP)	12	
12	310-0048-000	2	Washer, Flat, size 8 (AP)	12	
13	310-0283-000	2	Washer, Lock, size 8 (AP)	12	
14	201-M001-200	2	Grommet	2	A
	201-M001-200	2	Grommet	1	BC
15	150-M001-070	2	Clamp, Cable	2	A
	150-M001-070	2	Clamp, Cable	1	BC
16	343-0168-000	2	Screw, 6-32 UNC 2A x 5/16 in PPH (AP)	2	A
	343-0168-000	2	Screw, 6-32 UNC 2A x 5/16 in PPH (AP)	1	BC
17	310-0046-000	2	Washer, Flat, size 6 (AP)	2	A
	310-0046-000	2	Washer, Flat, size 6 (AP)	1	BC
18	313-0045-000	2	Nut, 6-32 UNC	2	A
	313-0045-000	2	Nut, 6-32 UNC (AP)	1	BC
19	310-0071-000	2	Washer, Lock, size 6	2	A
	310-0071-000	2	Washer, Lock, size 6 (AP)	1	BC
20	304-0250-000	2	Terminal, Lug	4	A
	304-0250-000	2	Terminal, Lug	2	BC
21	343-0228-000	2	Screw, 10-32 UNF 2A x 1/2 PPH (AP)	2	A
	343-0228-000	2	Screw, 10-32 UNF 2A x 1/2 PPH (AP)	1	BC
22	313-0018-000	2	Nut, 10-32 UNF (AP)	4	A
	313-0018-000	2	Nut, 10-32 UNF (AP)	2	BC

POWER POINT BRACKET ASSEMBLY.
(631-0964-00X)
2. PARTS LIST

Table 1. Power Point Bracket Assembly - Parts List.(contd.)

23	373-8040-000	2	Washer, Lock, size 10, Ext. Star (AP)	4	A
	373-8040-000	2	Washer, Lock, size 10, Ext. Star (AP)	2	BC
24	631-1215-001	2	Label, Caution	1	A
	631-1215-002	2	Label, Caution	1	BC
25	005-1540-000	2	Cement	AR	
26	424-M017-018	2	Cable, Elec, 3 Core, 5M LG	1	AC
	424-M017-018	2	Cable, Elec, 3 Core, 2M LG	1	B
27	439-M000-070	2	Wire, Hook-up, Blue, 0.5M LG	1	
28	439-M000-020	2	Wire, Hook-up, Brown, 0.5M LG	1	
29	439-M000-060	2	Wire, Hook-up, Green, 0.5M LG	1	

MASTER CONTROL SWITCH (631-1096-00X)

1 DESCRIPTION

The HF-80 Remote Control System allows a single HF-8093 Exciter Controller or HF-8094 Receiver Controller to control up to 16 Exciters or Receivers on a single Control/Monitor Bus. This Control/Monitor bus comprises a Control pair and a Monitor pair, such that the initial control digital words are transmitted by the Controller to address a particular unit (Exciter or Receiver). In this configuration, the system may be controlled by only one Controller at any time. The function of the 631-1096-00X Master Control Switch is to allow Control from either one of two controllers. Control may be exercised to any unit from only one Controller at any time. However, the Master Control Switch allows any or all the units to be controlled from either Controller, as desired.

This allows, for example, all operational units to be controlled from a central communication control centre, whilst routine or repair maintenance is performed under control of an extended local control controller at the station. It also allows, in the event of an emergency situation such as a link failure from the Remote Control Centre, all units be switched to local control (at the station) by pressing a single switch (designated MASTER CONTROL).

Since the Master Control Switch provides two separate control/monitor busses, the Remote Display System at the location of the Master Control Switch may monitor the status of units under the control of either controller, by selection of the Interface Monitor Switch (ie. LOCAL/REMOTE).

Changeover of the individual units from one Control/Monitor bus to the other is achieved by the use of Relays. The status of each unit is shown by the individual respective front panel switch (LOCAL OR REMOTE).

Five versions are available (dash numbers -001 to -005), containing respectively 4, 6, 7, 8 and 12 armature relays for control of the respective quantity of exciters or receivers. More plug-in relays may be added to increase the capability to the full 16.

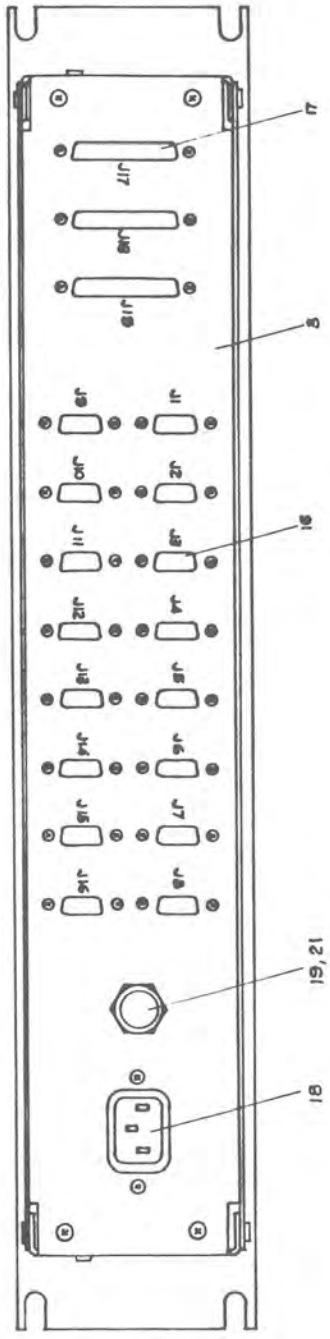
The equipment is powered by 240 V AC.

2 PARTS LIST

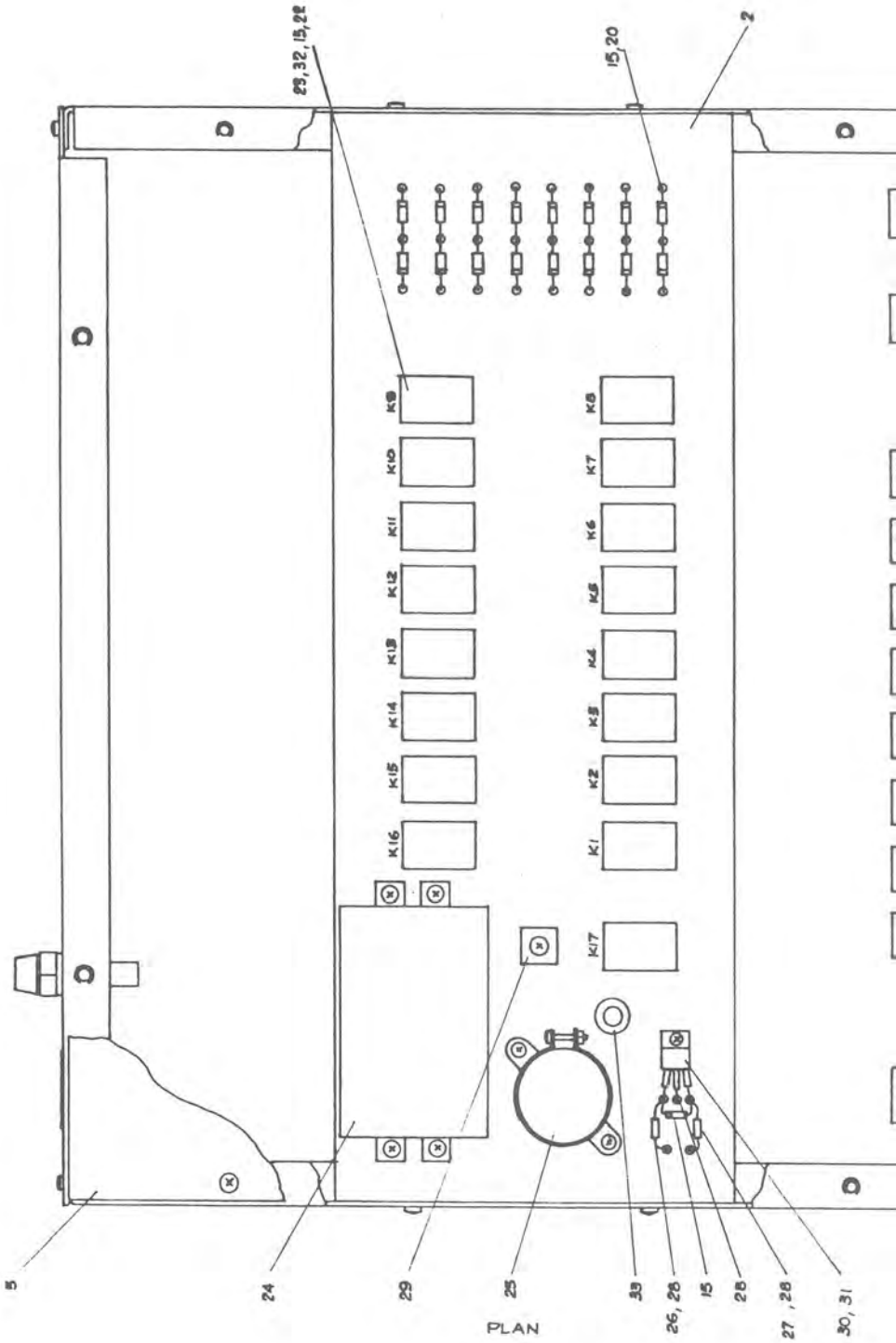
Figure 1 and Table 1 provide identification and location information for requisition and maintenance of the equipment.

PART 4 COMMON EQUIPMENT

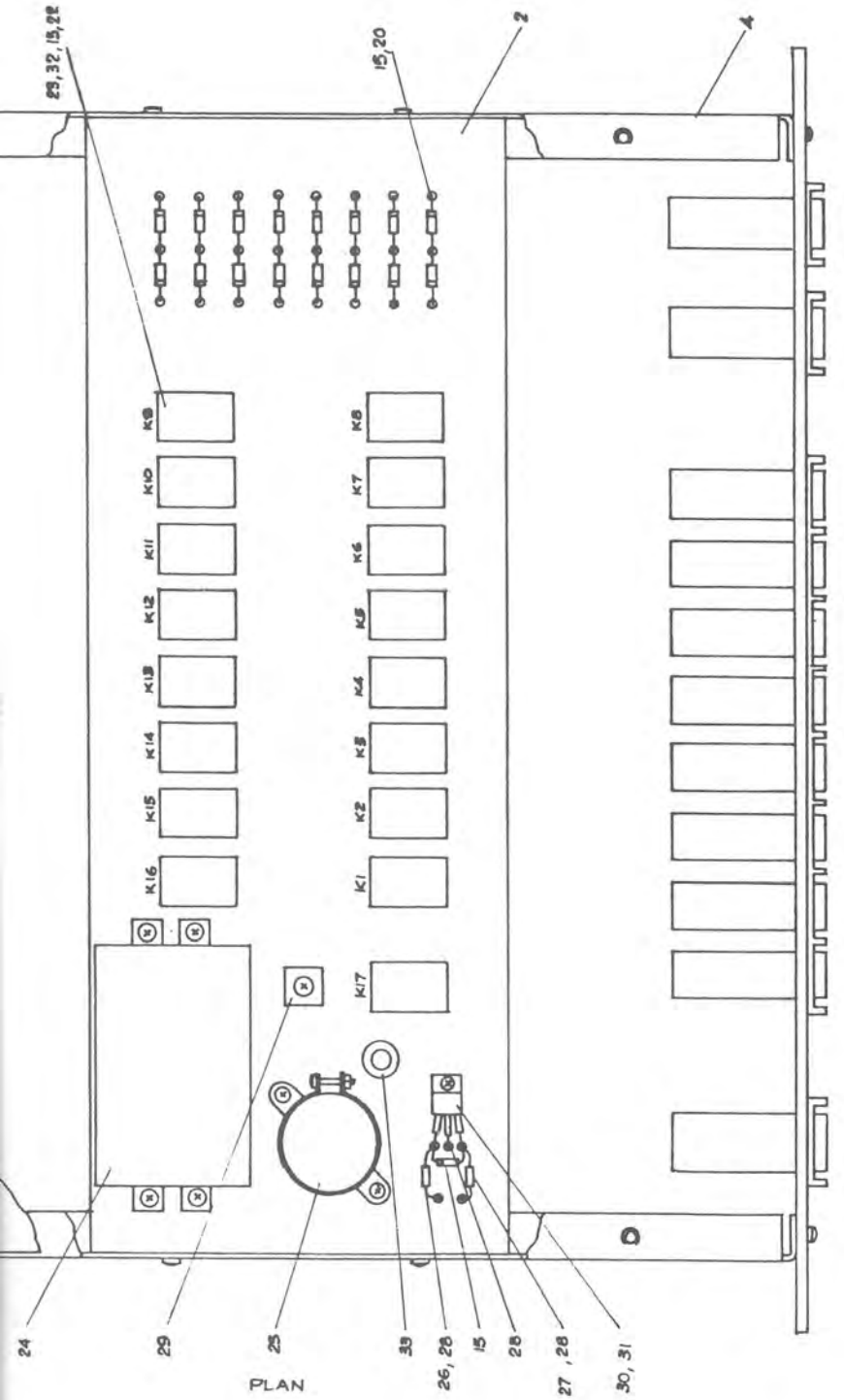
MASTER CONTROL SWITCH
(631-1096-00X)
2 PARTS LIST

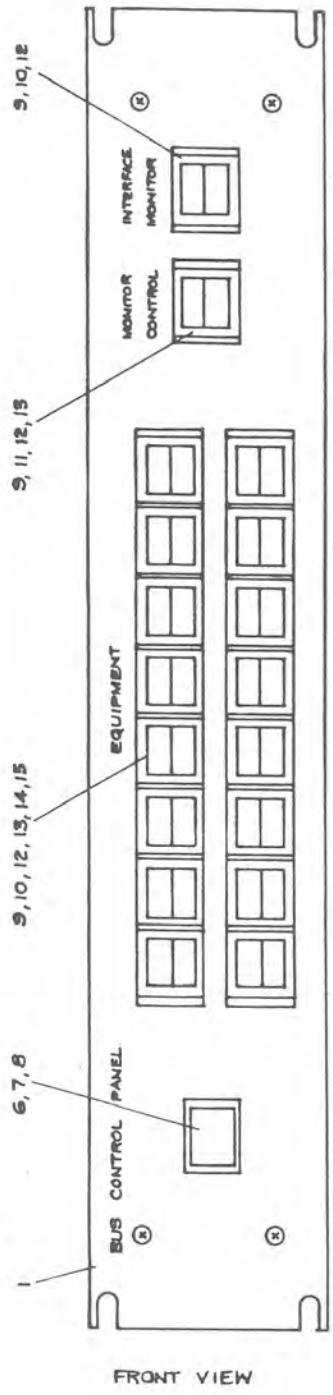


REAR VIEW



PLAN





Master Control Switch
Figure 1

MASTER CONTROL SWITCH
(631-1096-00X)
2 PARTS LIST

Table 1. Master Control Switch - Parts List.

Fig-Item	Part No.	Indent	Description	Units per Assy.	Usable on Code
1-	631-1069-00X	1	Master Control Switch	1	ABCDE
1	631-1090-001	2	Panel, Front	1	
	343-0171-000	2	Screw, 6-32 UNC-2A x 1/2 PPH (AP)	4	
	310-6360-000	2	Washer, Flat, No. 6 (AP)	4	
	310-0071-000	2	Washer, Lock, No. 6 (AP)	4	
	310-0045-000	2	Nut, 6-32 UNC (AP)	4	
2	631-1091-001	2	Shelf	1	
	343-0169-000	2	Screw, 6-32 UNC-2A x 3/8 PPH (AP)	4	
	310-6360-000	2	Washer, Flat, No.6 (AP)	4	
	310-0071-000	2	Washer, Lock, No.6 (AP)	4	
	310-0045-000	2	Nut, 6-32 UNC (AP)	4	
3	631-1092-001	2	Panel, Rear	1	
	343-0169-000	2	Screw, 6-32 UNC (AP)	4	
	310-6360-000	2	Washer, Flat, No.6 (AP)	4	
	310-0071-000	2	Washer, Lock, No.6 (AP)	4	
	310-0045-000	2	Nut, 6-32 UNC (AP)	4	
4	631-1094-001	2	Panel, Side	2	
5	631-1095-001	2	Plate, Cover	2	
	343-0225-000	2	Screw, 10-32 UNC-2A x 5/16 PPH (AP)	12	
	310-0049-000	2	Washer, Flat, No. 6 (AP)	12	
	310-0073-000	2	Washer, Lock, No.10 (AP)	12	
6	266-T011-010	2	Switch, Elec.	1	
7	266-T011-020	2	Cover, Switch	1	
8	266-T011-040	2	Lamp, 28V	1	
9	266-U017-010	2	Switch, Elec.	18	
10	308-M002-010	2	Button Cap	17	
11	308-M002-020	2	Button Cap	1	
12	262-M021-010	2	Lamp, Indicating	10	A
	262-M021-010	2	Lamp, Indicating	14	B
	262-M021-010	2	Lamp, Indicating	16	C
	262-M021-010	2	Lamp, Indicating	18	D
	262_M021-010	2	Lamp, Indicating	26	E
13	266-M011-010	2	Barrier, Switch, End	8	
14	266-M011-020	2	Barrier, Switch, Centre	14	
15	C53-6442-040	2	Diode, 1N4004	50	
16	C71-1037-000	2	Connector	16	
	343-0133-000	2	Screw, 4-40 UNC-2A x 1/4 PPH (AP)	32	
	310-0278-000	2	Washer, Lock, No.4 (AP)	32	
	313-0132-000	2	Nut, 4-40 UNC (AP)	32	

MASTER CONTROL SWITCH
(631-1096-00X)
2 PARTS LIST

Table 1. Master Control Switch - Parts List.(contd)

17	C71-0032-000	2	Connector	3	
	343-0133-000	2	Screw, 4-40 UNC-2A x 1/4 PPH (AP)	6	
	310-0278-000	2	Washer, Lock, No.4 (AP)	6	
	313-0132-000	2	Nut, 4-40 UNC (AP)	6	
NI	426_M001-010	2	Cable, Elec, Power	1	
18	368-M023-010	2	Connector, Power	1	
	343-0134-000	2	Screw, 4-40 UNC-2A x 5/16 PPH (AP)	2	
	310-0278-000	2	Washer, Lock, No.4 (AP)	2	
	313-0132-000	2	Nut, 4-40 UNC (AP)	2	
19	B65-1171-000	2	Holder, Fuse	2	
20	306-1851-000	2	Terminal	24	
21	B64-0710-000	2	Fuse, 3AG, 500MA	1	
22	220-M001-020	2	Socket, Relay	17	
	343-0134-000	2	Screw, 4-40 UNC-2A x 5/16 PPH (AP)	17	
	310-0278-000	2	Washer, Lock, No.4 (AP)	17	
	313-0132-000	2	Nut, 4-40 UNC (AP)	17	
23	220-M002-020	2	Retainer, Relay	4	A
	220-M002-020	2	Retainer, Relay	6	B
	220-M002-020	2	Retainer, Relay	7	C
	220-M002-020	2	Retainer, Relay	8	D
	220-M002-020	2	Retainer, Relay	12	E
24	662-M014-010	2	Transformer, Power	1	
	343-0225-000	2	Screw, 10-32 UNC-2A x 5/16 PPH (AP)	4	
	310-0049-000	2	Washer, Flat, No.10 (AP)	4	
	310-0073-000	2	Washer, Lock, No.10 (AP)	4	
	313-0019-000	2	Nut, 10-32 UNC (AP)	4	
25	183-M005-010	2	Capacitor, C1	1	
26	913-M006-120	2	Capacitor, C2	1	
27	913-M006-300	2	Capacitor, C3	1	
28	306-2223-100	2	Terminal	3	
29	353-U004-010	2	Rectifier, Bridge	1	
	343-0136-000	2	Screw, 4-40 UNC-2A x 7/16 PPH (AP)	1	
	310-0045-000	2	Washer, Flat, No.4 (AP)	1	
	310-0278-000	2	Washer, Lock, No.4 (AP)	1	
	313-0132-000	2	Nut, 4-40 UNC (AP)	1	
30	306-2608-060	2	Terminal	2	
31	351-N001-170	2	Integrated circuit, regulator	1	
	343-0134-000	2	Screw, 4-40 UNC-2A x 5/16 PPH (AP)	1	
	310-0045-000	2	Washer, Flat, No.4 (AP)	1	
	310-0278-000	2	Washer, Lock, No.4 (AP)	1	
	313-0132-000	2	Nut, 4-40 UNC (AP)	1	

MASTER CONTROL SWITCH
(631-1096-00X)
2 PARTS LIST
Table 1. Master Control Switch - Parts List.(contd)

32	970-M001-240	2	Relay, Armature	4	A
	970-M001-240	2	Relay, Armature	6	B
	970-M001-240	2	Relay, Armature	7	C
	970-M001-240	2	Relay, Armature	8	D
	970-M001-240	2	Relay, Armature	12	E
33	201-M001-040	2	Grommet	1	

FAULT ALARM PANEL
1 DESCRIPTION

Each HF-80 Remote Display System Module provides an alarm output on the rear of the Remote Display Shelf. These alarm outputs provide a path to ground (supply negative) in the event of a fault shown on that module, as a result of a unit fault. These alarm outputs are summed and taken to the Fault Alarm Panel (F.A.P.). The F.A.P. contains a Visual (lamp) and aural (buzzer) alarm output in the event of any fault output appearing from the Remote Display System. The Switch on the F.A.P. has three positions, labelled ENABLE, DISABLE and TEST.

In the ENABLE position, any fault will give a Visual and Aural Alarm output. The Aural alarm is removed by setting the switch to the DISABLE position, but the Visual alarm remains. When the fault has been cleared, or when no fault exists, and the switch is in the DISABLE position, the Aural Alarm is given, but the Visual Alarm is off. This ensures that the operator correctly resets the Alarm after clearance of a fault.

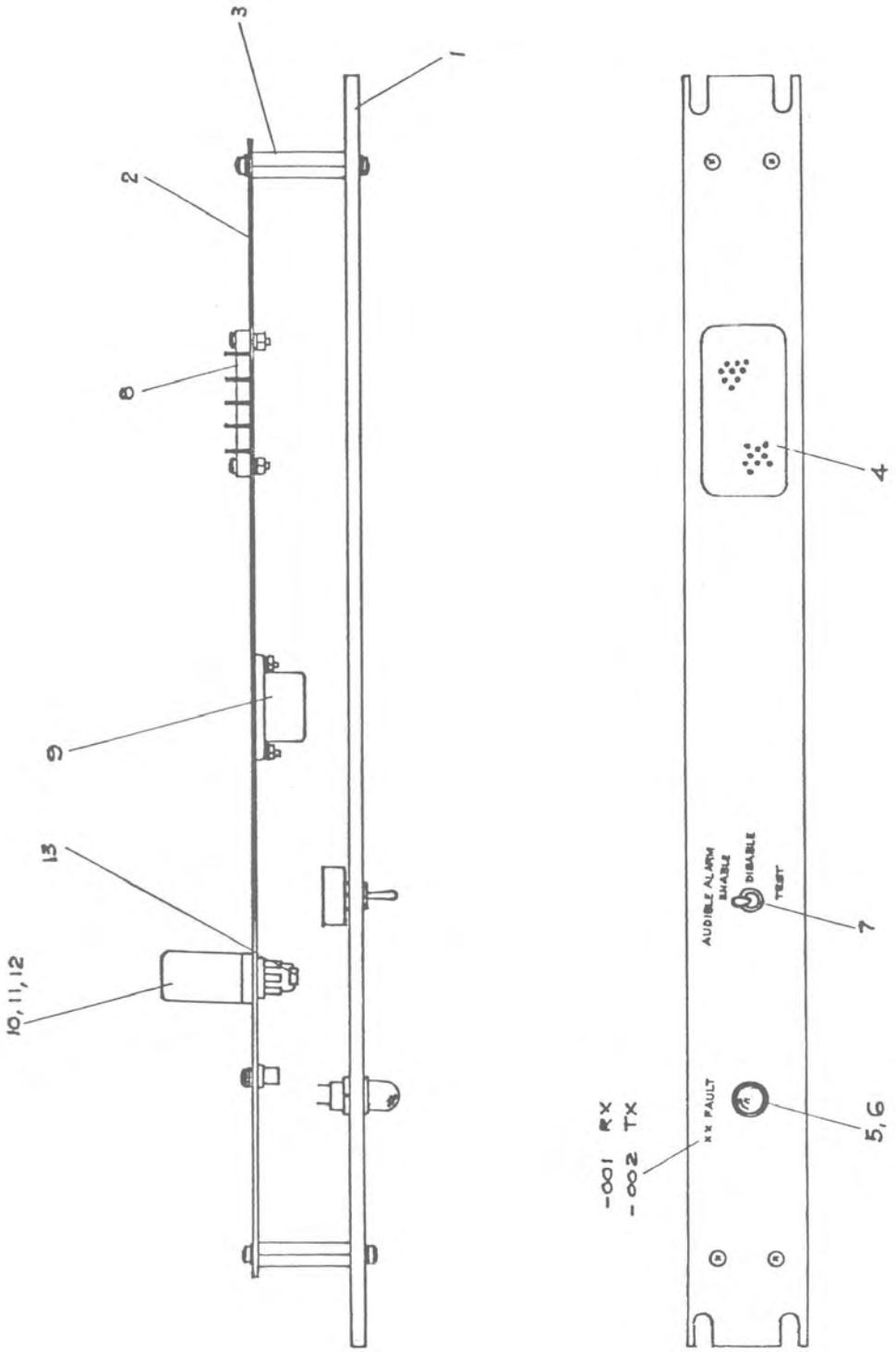
The momentary action TEST position allows the operator to check the alarms on the panel.

The 12V DC power for the unit is derived from the Remote Display Unit.

2. PARTS LIST

Figure 1 and Table 1 provide identification and location information for requisition and maintenance of the equipment.

FAULT ALARM PANEL
2. PARTS LIST



Fault Alarm Panel
Figure 1

FAULT ALARM PANEL
2. PARTS LIST

Table 1 - Fault Alarm Panel - Parts List

Fig-Item	Part No	Indent	Description	Units per Assy.	Usable on Code.
1-	631-1143-001	1	Fault Alarm Panel, Receiver	1	A
	631-1143-002	1	Fault Alarm Panel, Transmitter	1	B
1	631-1144-001	2	Panel, Front	1	A
	631-1144-002	2	Panel, Front	1	B
2	631-1207-001	2	Panel, Rear	1	
3	606-0207-013	2	Spacer, Hex	4	
	343-0168-000	2	Screw, 6-32 UNC-2A x 5/16 PPH (AP)	8	
	310-0046-000	2	Washer, FLat, No. 6 (AP)	8	
	310-0071-000	2	Washer, Lock, No. 6 (AP)	8	
4	631-0978-001	2	Grill	1	
	005-1540-010	2	Adhesive (AP)	AR	
5	262-2828-030	2	Lampholder	1	
6	262-0309-000	2	Lamp	1	
7	266-T006-120	2	Switch	1	
8	367-M008-020	2	Terminal Board	1	
	343-0171-000	2	Screw, 6-32 UNC-2A x 1/2 PPH (AP)	4	
	310-0046-000	2	Washer, Flat, No. 6 (AP)	4	
	310-0071-000	2	Washer, Lock, No. 6 (AP)	4	
	313-0045-000	2	Nut, 6-32 UNC (AP)	4	
9	274-M005-010	2	Buzzer	1	
	343-0126-000	2	Screw, 2-56 UNC-2A x 3/8 PPH (AP)	2	
	310-6320-000	2	Washer, Flat, No. 2 (AP)	2	
	310-0070-000	2	Washer, Lock, No. 2 (AP)	2	
	313-0037-000	2	Nut, 2-56 UNC (AP)	2	
10	970-M001-040	2	Relay		1
11	220-M002-010	2	Retainer, Relay		1
12	220-M001-010	2	Socket, Relay		1
	343-0134-000	2	Screw, 4-40 UNC-2A PPH x 5/16 PPH (AP)		1
	310-0045-000	2	Washer, Flat, No. 4 (AP)		1
	310-0279-000	2	Washer, Lock, No. 4 (AP)		1
	313-0043-000	2	Nut, 4-40 UNC (AP)		1
13	353-P206-020	2	Diode		1
	343-0188-000	2	Screw, 8-32 UNC-2A x 7/16 PPH (AP)		
	373-0003-000	2	Washer, Lock, Int Star, No.8 (AP)		1

EQUIPMENT CONSOLE (021-M011-XXX)-
1. DESCRIPTION

The 021-M011-XXX Equipment Console is a rack-mounting enclosure for the HF-80 equipment.

The bottom plate is provided with holes for mounting to the floor. Levelling screws are also available. A writing shelf with laminated plastic top surface is fitted at the front of the cabinet. Side panels may be omitted when two or more consoles are to be installed closely side by side. The door is louvred and removable, by release of three captive screws.

Dimensions of the console are:

Width : 586mm (23 in),

Height : 1546mm (61 in),

Depth : 1175mm (46 in)) (including shelf)

Finish : light grey polyurethane enamel.

Figure 1 provides outline details.

Table 1, 2 and 3 show the normal arrangement of equipment installed for 10kW and 1kW transmitter and receiver purposes respectively. The actual (physical) vertical arrangements of equipment in the racks are as shown.

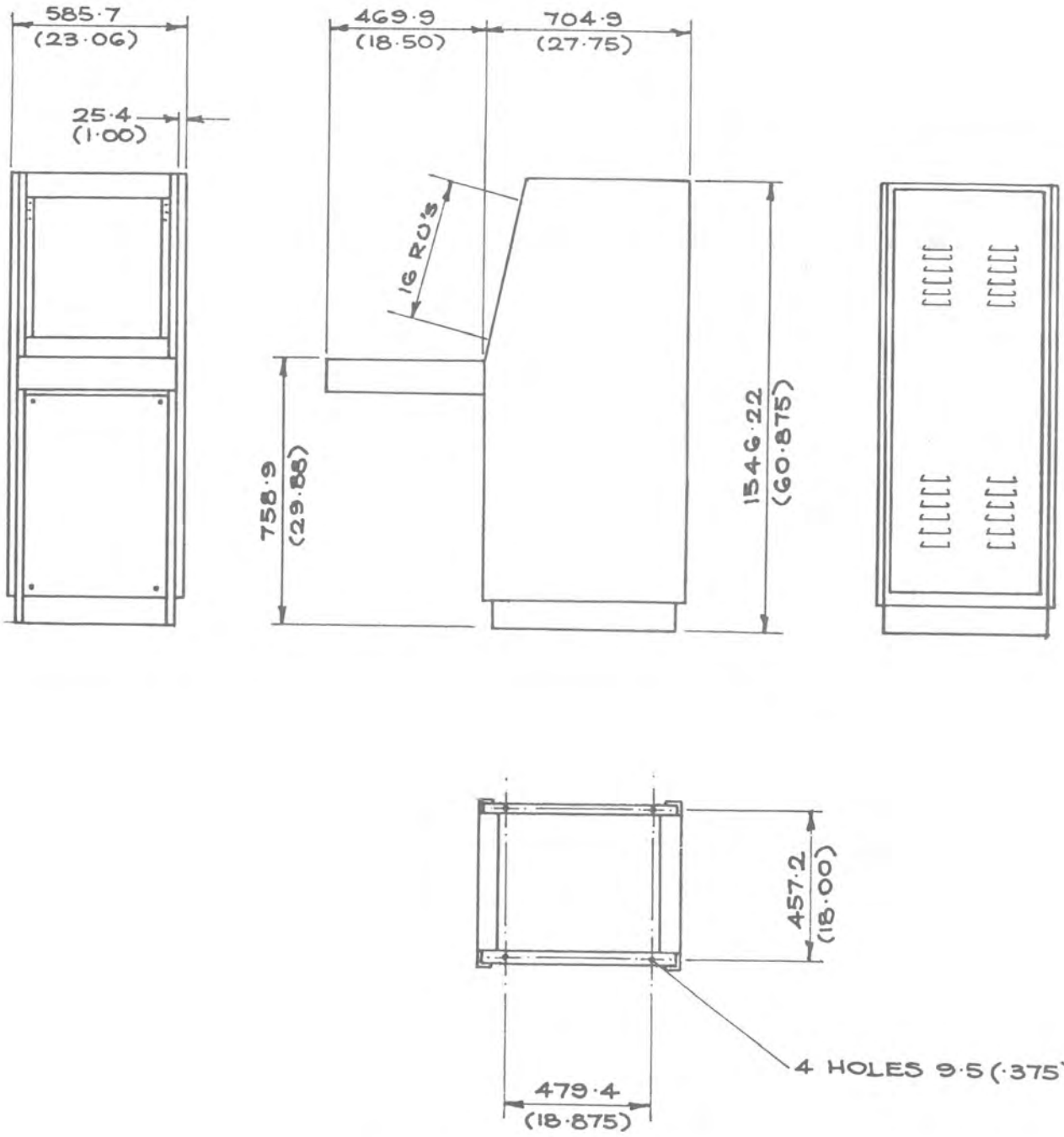
TABLE 1. EQUIPMENT ARRANGEMENT 10 kW TRANSMITTER CONTROL

EXTENDED LOCAL CONTROL		REMOTE CONTROL	
Blank panel		Blank panel	
Audible alarm panel		Audible alarm panel	
Remote Display	) as	Remote Display	) as
Remote Display	) required	Remote Display	) required
Master Control Switch		Exciter Control	

TABLE 2 EQUIPMENT ARRANGEMENT FOR 10kW TRANSMITTER CONTROL

EXTENDED LOCAL CONTROL		REMOTE CONTROL	
Blank panel		Blank panel	
Audible Alarm Panel		Audible Alarm Panel	
Remote display	) as	Remote display	) as
Remote display	) required	Remote display	) required
Master Control Switch		Exciter Control	
Exciter Control			

EQUIPMENT CONSOLE (021-M011-XXX)-
1. DESCRIPTION



Equipment Console Outline
Figure 1

EQUIPMENT CONSOLE (021-M011-XXX)-
1. DESCRIPTION

TABLE 3 EQUIPMENT ARRANGEMENTS FOR RECEIVER CONTROL.

Blank Panel
Alarm Panel
Remote Display Unit
Remote Display Unit
Master Control Switch *
Receiver Control

* Installed when extended local control is required

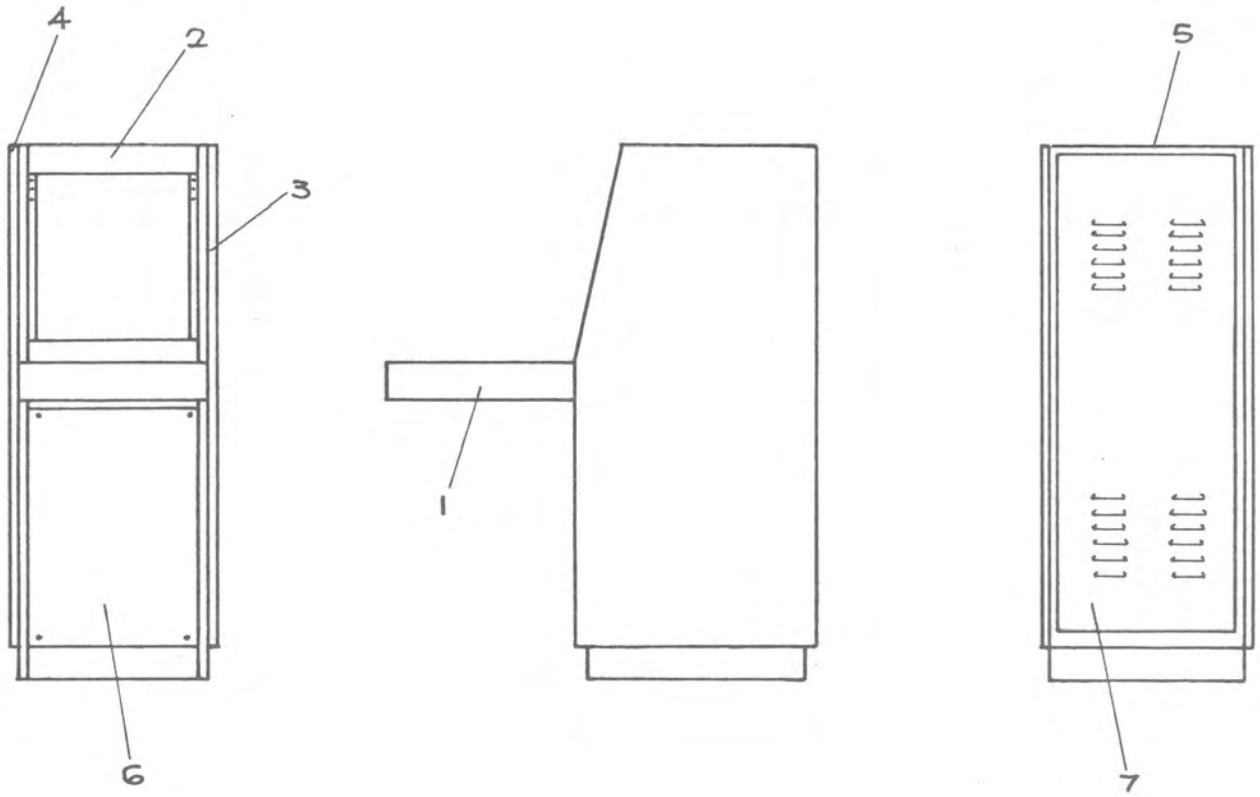
EQUIPMENT CONSOLE (021-M011-XXX)
2. PARTS LIST

Figure 2 and Table 4 provide identification and location information for the requisition and maintenance of the console and its components.

TABLE 4 EQUIPMENT CONSOLE - PARTS LIST

FIG-ITEM	PART No	IDENT	DESCRIPTION	UNITS PER ASSY
2-		1.	Equipment Console	1
1	NPN	2	Writing Shelf	1
2	021-M011-010	2	Console Assy C/with Side Panels, Top Panel, Lower Front Panel, and Door, fitted	1
3	021-M011-020	3	Side Panel, Right Hand	1
4	021-M011-030	3	Side Panel, Left Hand	1
5	NPN	3	Top Panel	1
6	021-M011-040	3	Lower Front Panel	1
7	021-M011-050	3	Door, W/Mounting	1
NI	NPN	2	Joining Hardware Set	1
NI	NPN	2	Levelling Screws, Set	1
NI	021-M011-060	2	45 Degree Corner	A/R

EQUIPMENT CONSOLE (021-M011-XXX)-
2. PARTS LIST



Equipment Console
Figure 2

EQUIPMENT CABINET (021-M012-XXX)
1. DESCRIPTION

EQUIPMENT CABINET (021-M012-XXX)

1. DESCRIPTION

The 021-M012-XXX Equipment Cabinet is a rack-mounting enclosure for the HF-80 equipment.

The bottom plate is provided with holes for mounting to the floor. Levelling screws are also available. Side panels may be omitted when two or more cabinets are to be installed closely side by side. The rear door is louvred and hinged. The top panels (two) are perforated for ventilation.

Dimensions of the cabinet are:-

Width 535mm (21 in),
Depth 781mm (30.75 in),
Height 1753mm (69 in)

Finish: light grey polyurethane enamel.

Figure 1 provides outline details.

Tables 1, 2 and 3 show the normal arrangement of equipment installed for 10 kW and 1 kW transmitter and receiver purposes respectively. The actual (physical) vertical arrangements of equipment in the racks are as shown.

Table 1 EQUIPMENT ARRANGEMENTS FOR 10 kW TRANSMITTER CONTROL

WITH PRESELECTOR	WITHOUT PRESELECTOR
Preselector	Exciter
Exciter	Blank panel
Blank panel	Exciter
Blank panel	Blank panel
Blank panel	Blank panel
Power Distributor Unit	Blank panel
	Power Distribution Unit

TABLE 2 EQUIPMENT ARRANGEMENTS FOR 1 kW TRANSMITTER CONTROL

WITH PRESELECTOR	WITHOUT PRESELECTOR
Blank (Balun behind)	Blank (Balun behind)
Preselector	Exciter
Exciter	Blank panel
Blank panel	Blank panel
Power Amplifier	Power Amplifier
Power Supply	Power Supply
Power Distribution Unit	Power Distribution Unit

EQUIPMENT CABINET (021-M012-XXX)

1. DESCRIPTION

TABLE 3 EQUIPMENT ARRANGEMENTS FOR RECEIVER CONTROL

WITH PRESELECTOR	WITHOUT PRESELECTOR
Preselector	Receiver
Receiver	Receiver
Preselector	Receiver
Receiver	Receiver
Blank panel	Blank panel
-lank panel	Blank panel
Power Distribution Unit	Power Distribution Unit

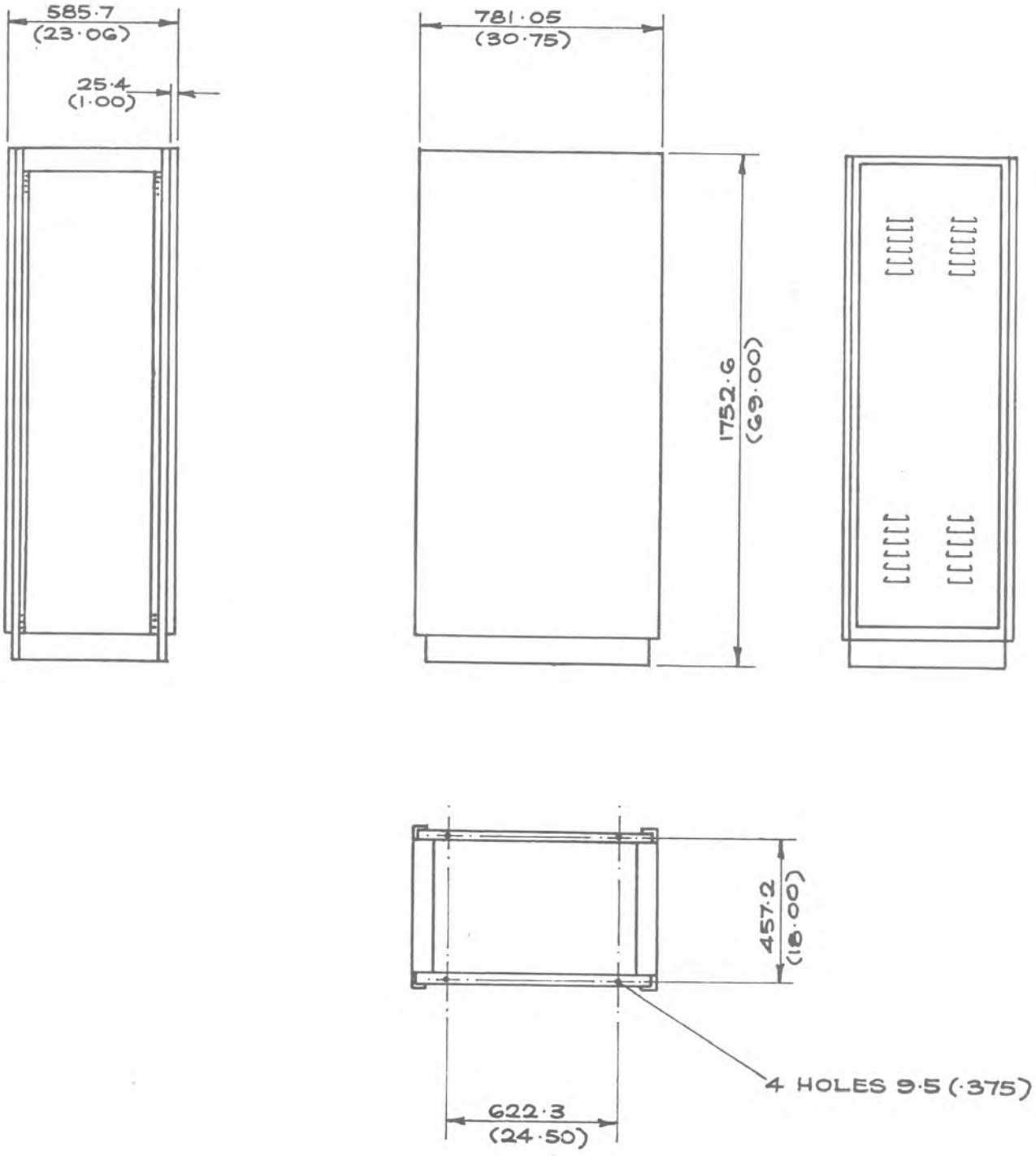
2. PARTS LIST

Figure 2 and Table 4 provide identification and location information for the requisition and maintenance of the cabinet and its components.

TABLE 4 EQUIPMENT CABINET PARTS LIST

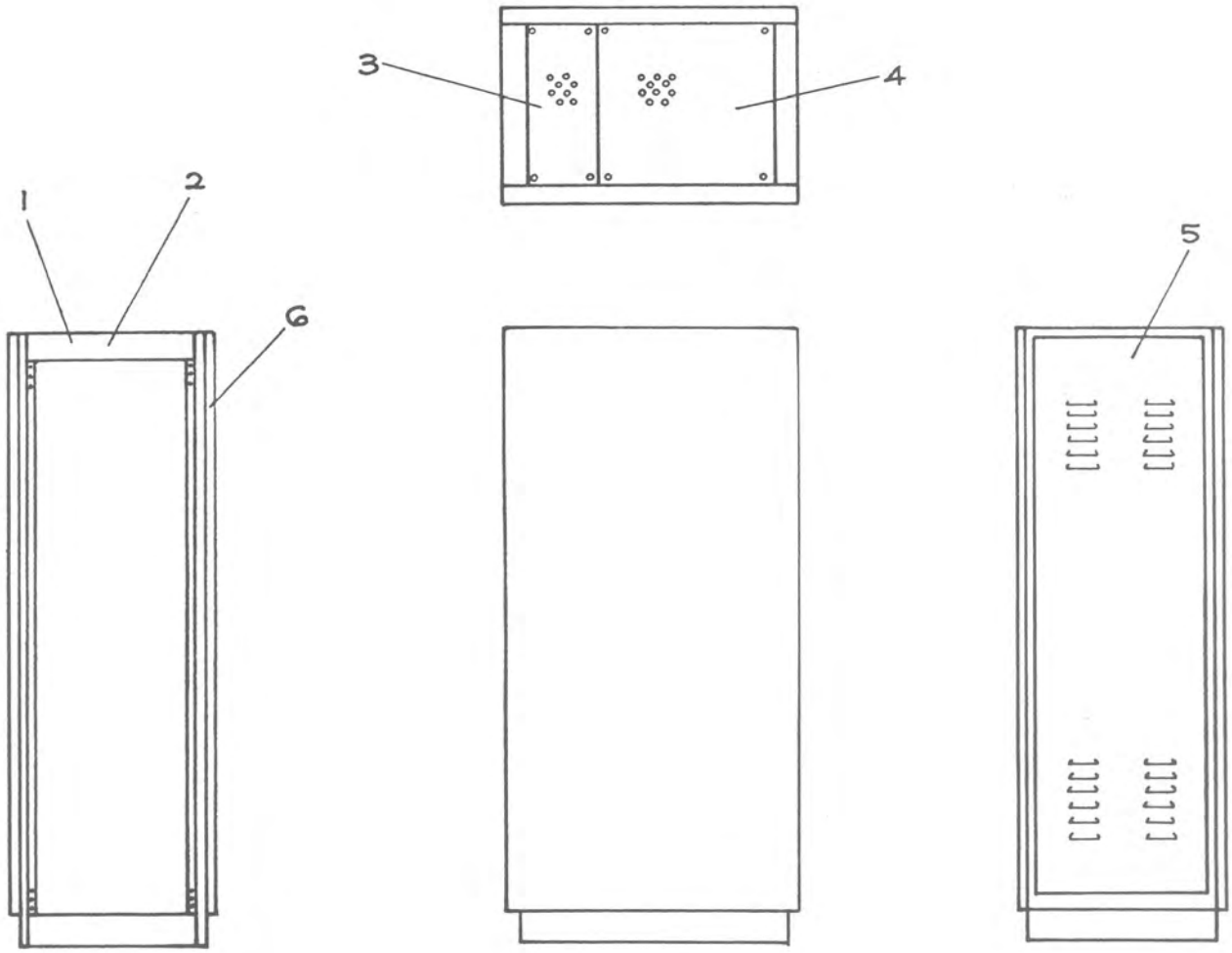
FIG-ITEM	PART NO	IDENT	DESCRIPTION	UNITS PER ASSEMBLY
2-		1	Equipment Cabinet	1
1	021-M012-010	2	Frame and Top Panels, Assy - 20, -030, -040	1
2	021-M012-020	3	Frame	1
3	021-M012-030	3	Panel, Top, 6 in	1
4	021-M012-040	1	Panel, Top 21 in	1
1	021-M012-090	2	Frame and Top Panels Assy, incl. -080, -030, -040	1
2	021-M012-080	3	Special Frame	1
3	-21-M012-030	3	Panel, Top, 6 in	1
4	021-M012-040	3	Panel, Top, 21 in	1
1	021-M012-110	2	Frame and Top Panels assy, incl. -100, -030, -040	1
2	021-M012-100	3	Special frame	1
3	021-M012-030	3	Panel, Top 6 in	1
4	021-M012-040	3	Panel, Top 21 in	1
5	021-M012-050	2	Door, Louvred W/Lock	1
6	021-M012-060	2	Panel, Perforated, 30% open	1
7	021-M012-070	2	Side Panel	1
8	NPN	2	Levelling Screws, set	1

EQUIPMENT CABINET (021-M012-XXX)
1. DESCRIPTION



Equipment Cabinet Outlines
Figure 1

EQUIPMENT CABINET (021-M012-XXX)
1. DESCRIPTION



Equipment Cabinet
Figure 2

CA-8011
Cable Retractor
(622-3420-001)

Rockwell International

instructions

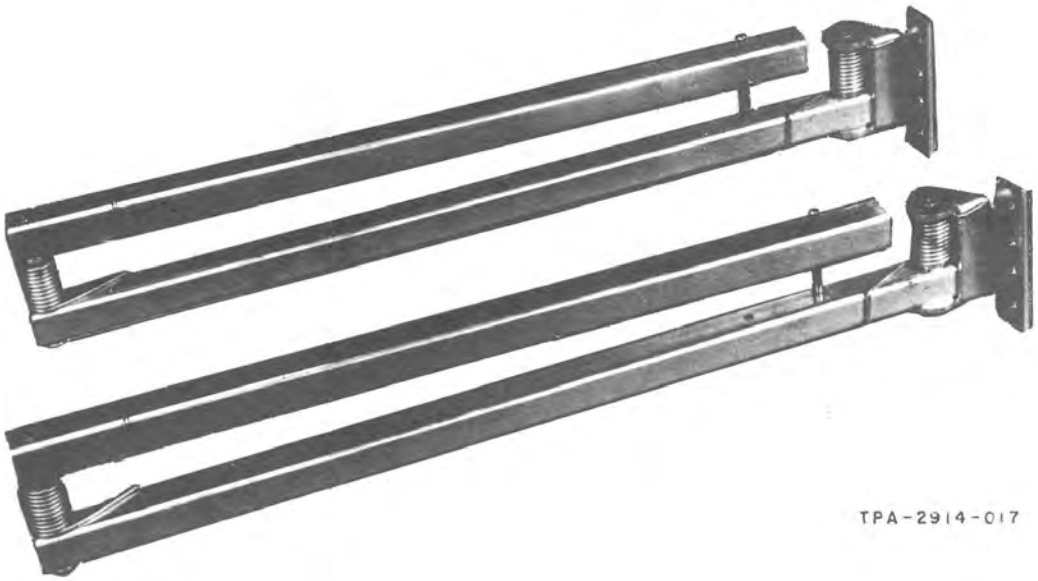
Collins Telecommunications Products Division

Printed in USA

523-0770906-001211
15 January 1981

1. DESCRIPTION

The CA-8011 Cable Retractor, Collins part number 622-3420-001, (figure 1) provides automatic retraction of interconnecting cabling for slide-mounted HF-80 equipment.



CA-8011 Cable Retractor
Figure 1

2. PARTS LIST

Table 1 will assist in identification and requisition of parts for maintenance of the equipment.

Table 1. AC-8011 Cable Retractor, Parts List.

ITEM	COLLINS PART NO	QUANTITY
Cable retractor	015-1035-010	1

CA-8027 Cabinet Blower (622-3469-XXX)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0770902-001211
15 January 1981

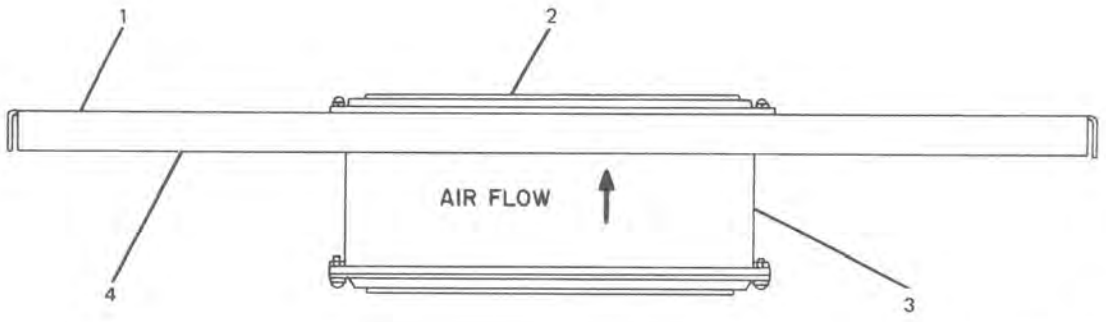
1. DESCRIPTION

The CA-8027 Cabinet Blower, Collins part number 622-3469-001, -002, provides cooling air for HF-80 equipment mounted in CA-8020, CA-8020A, and CA-8020B equipment cabinets. The CA-8027 replaces the top cover on the cabinets. Blowers with CPN 622-3469-001 operate on 115 V ac, 60 Hz. Blowers with CPN 622-3469-002 operate on 230 V ac, 60 Hz.

2. PARTS LIST

Figure 1 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.

CODE	MANUFACTURER'S NAME AND ADDRESS
81349	MILITARY SPECIFICATION
82877	ROTRON INC 7-9 HASBROUCK LANE WOODSTOCK NY 12498
96906	MILITARY STANDARD



CA-8027 Cabinet Blower, Parts Location
Figure 1

Table 1. CA-8027 Cabinet Blower, Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	622-3469-001	1	CABINET, BLOWER ASSEMBLY CA-8027	REF	A
	622-3469-002	1	CABINET, BLOWER ASSEMBLY CA-8027	REF	B
1	635-2103-000	2	PLATE,IDENT	1	
	M24243-1B302	2	RIVET,BLIND AL, 0.094 DIA X 0.212 (81349) 305-2087-010 (AP)	2	
2	476323	2	GUARD,FINGER (82877) 009-1801-050	2	
	MS35649-284	2	NUT,PLAIN,HEX SST, 8-32 (96906) 313-0017-000 (AP)	12	
	MS35338-137	2	WASHER,LOCK SST, 0.168 ID X 0.296 OD (96906) 310-0072-000 (AP)	12	
	MS15795-807	2	WASHER,FLAT CRES, 0.196ID X 0.390 OD (96906) 310-0779-070 (AP)	8	
	MS51957-45	2	SCREW,MACH SST, 8-32 X 1/2 (96906) 343-0189-000 (AP)	12	
3	020188	2	FAN,PROP (82877) 009-1801-020	1	A
3	020190	2	FAN,PROP (82877) 009-1801-040	1	B
4	634-5446-001	2	PANEL,CABINET	1	

CA-8030 Slide Mounting Kit (622-3418-001)

Rockwell International

instructions

Collins Telecommunications Products Division

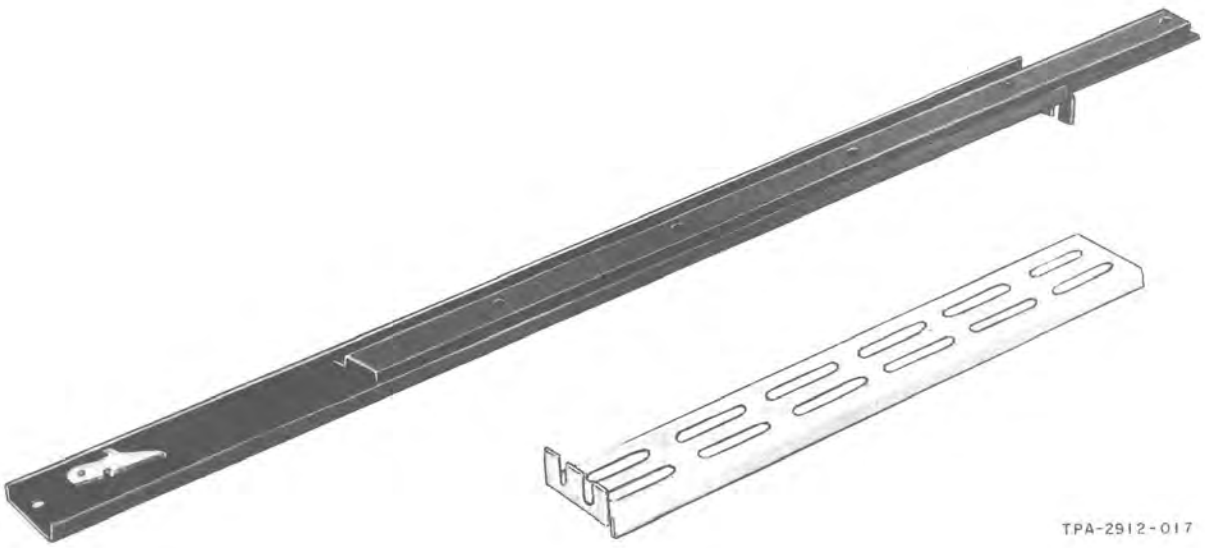
Printed in USA

523-0770903-001211
15 January 1981

1. DESCRIPTION

The CA-8030 Slide Mounting Kit, Collins part number 622-3418-001, (figure 1) is a mounting support with solid bearing slides for easy access. The CA-8030 was designed for use with 483-mm (19-in) rack-mounted HF-80 receivers, receiver/exciters, and control equipment in the CA-8020, CA-8020A, and CA-8020B cabinets.

Slide kit, Collins part number 637-4725-001, is an extension for the CA-8030 slide mounting to be used when mounting the HF-8060 preselector in one of the HF-80 equipment cabinets.

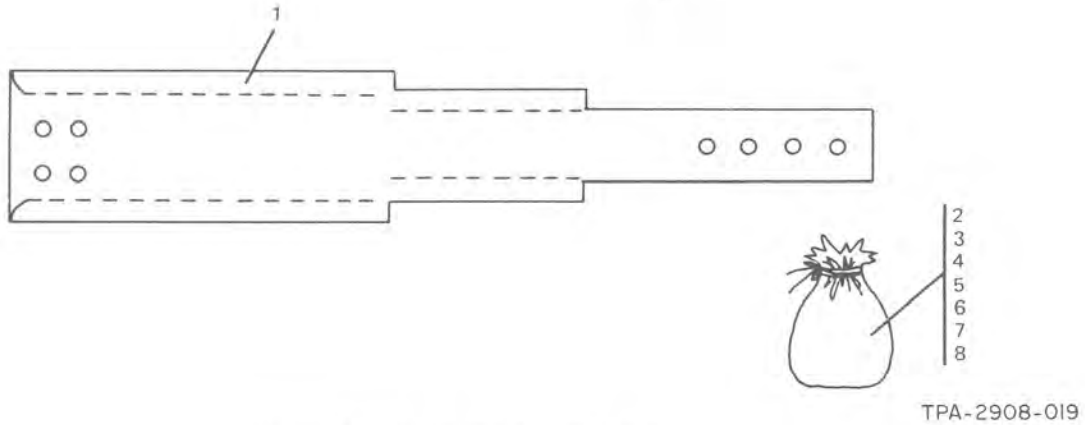


CA-8030 Slide Mounting Kit
Figure 1

2. PARTS LIST

Figures 2 and 3 and tables 1 and 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 1 and 2.

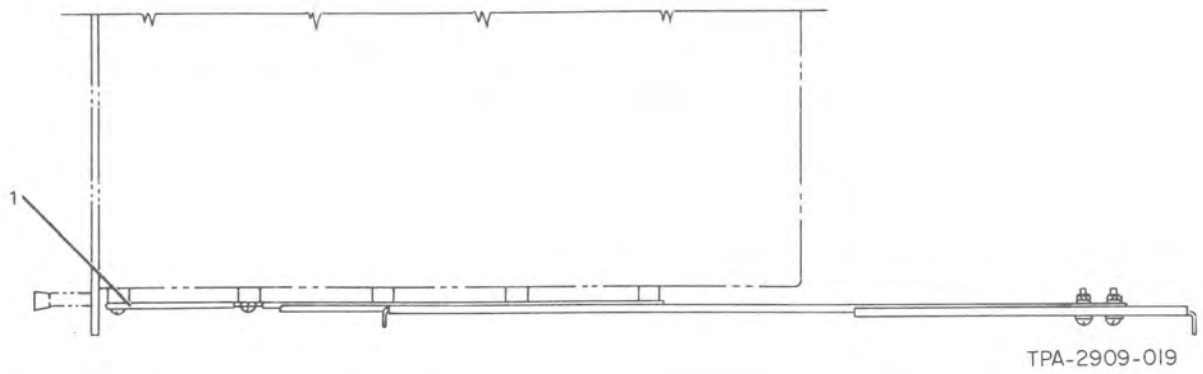
CODE	MANUFACTURER'S NAME AND ADDRESS
08664	ACCO INDUSTRIES INC BRISTOL DIV 40 BRISTOL ST WATERBURY CT 06720
53823	BARNES ENGINEERING CO 1645 S CLAUDINA WAY ANAHEIM CA 92805
70276	ALLEN MFG CO P O DRAWER 570 HARTFORD CT 06101
96906	MILITARY STANDARD



CA-8030 Slide Mounting Kit, Parts Location
Figure 2

Table 1. CA-8030 Slide Mounting Kit, Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-					
	622-3418-001		KIT, SLIDE CA-8030	1	
1	EST22PL	2	SLIDE,BRG SOLID (53823) 015-3725-010	2	
	324-1694-240	2	SCREW,CAP,BTN STL, 8-32 X 3-8 (70276) (AP)	4	
2	024-0061-000	2	KEY,SCH SCR (08664)	1	
3	MS51958-59	2	SCREW,MACH SST, 10-32 X 1/4 (96906) 343-0224-000	8	
4	324-1694-240	2	SCREW,CAP,BTN STL, 8-32 X 3-8 (70276)	4	
5	MS35650-304	2	NUT,PLAIN,HEX SST, 10-32 (96906) 313-0019-000	8	



Slide Mounting Extension for HF-8060, Parts Location
Figure 3

Table 2. Slide Mounting Extension for HF-8060, Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
3-	637-4725-001	1	KIT, SLIDE HF-8060	REF	
1	EST22PL	2	SLIDE,BRG SOLID (53823) 015-3725-010	2	
	324-1694-250	2	SCREW,CAP,BTN STL, 10-32 X 7-8 (70276) (AP)	10	
	637-4710-001	2	SPACER (AP)	10	

CA-8031
Slide Mounting Kit
(622-3419-001)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0770904-001211
15 January 1981

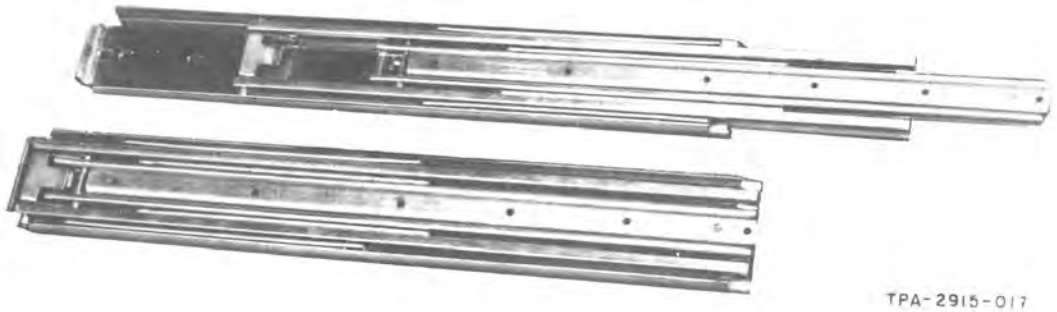
1. DESCRIPTION

The CA-8031 Slide Mounting Kit, Collins part number 622-3419-001, (figure 1) is a mounting support, with slides for easy access. The CA-8031 was designed for use with the HF-80 1-kW power amplifier and 1-kW power supply in the CA-8020, CA-8020A, and CA-8020B equipment cabinets.

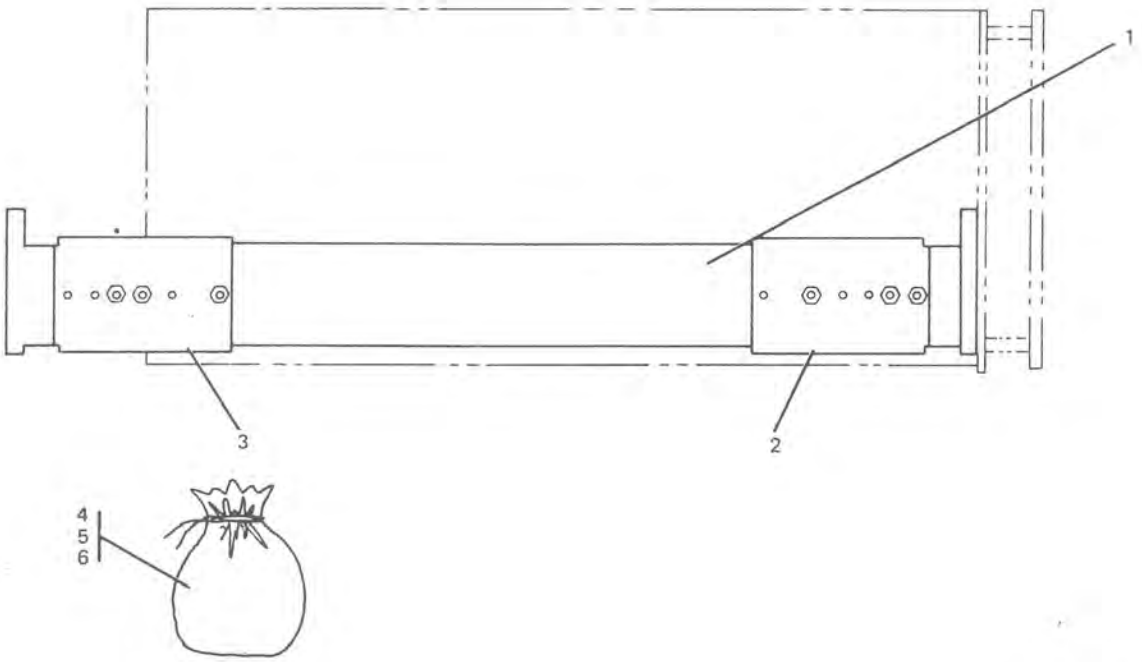
2. PARTS LIST

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.

CODE	MANUFACTURER'S NAME AND ADDRESS
70318	ALLMETAL SCREW PRODUCTS CO INC 821 STEWART AVE GARDEN CITY NY 11530
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
83508	GRANT HARDWARE CO 7 HOOVER AVE HAVERSTRAW NY 10927
96906	MILITARY STANDARD



CA-8031 Slide Mounting Kit
Figure 1



CA-8031 Slide Mounting Kit, Parts Location
Figure 2

Table 1. CA-8031 Slide Mounting Kit, Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
2-	622-3419-001	1	KIT, SLIDE MOUNTING CA-8031	REF	
1	3335-24	2	SLIDE (PAIR) (83508) 015-3728-010	1	
	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,MACH SST, 8-32 X 1-1/4 (96906) 343-0187-000 (AP)	12	
2	635-9736-002	2	BRACKET,SLIDE-LH	2	
	MS35650-304	2	NUT,PLAIN,HEX 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	
	MS51960-65	2	SCREW,MACH SST, 10-32 X 1/2 (96906) 342-0224-000 (AP)	6	
3	635-9736-001	2	BRACKET,SLIDE-RH	2	
	MS35650-304	2	NUT,PLAIN,HEX 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	
	MS51960-65	2	SCREW,MACH SST, 10-32 X 1/2 (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	
6	310-0730-010	2	WASHER,FLAT STL, 0.191 ID X 0.375 OD (79807)	16	

CA-8032
Long Slide Mounting Kit
(622-3493-001)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0770905-001211
15 January 1981

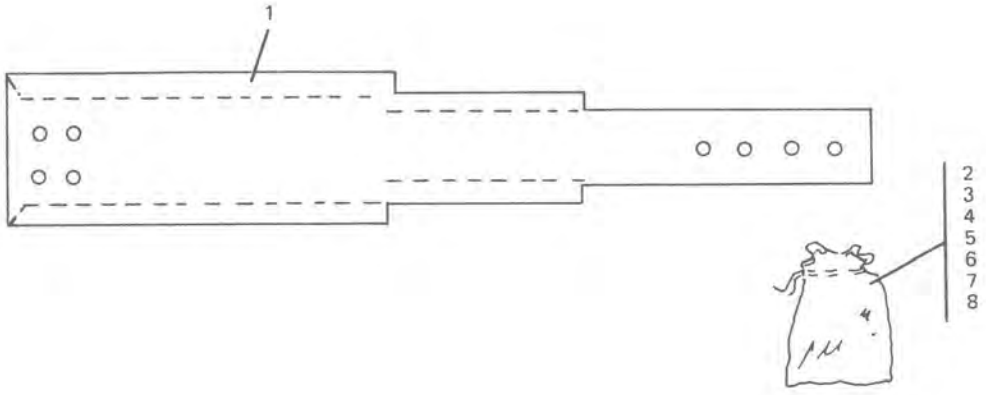
1. DESCRIPTION

The CA-8032 Long Slide Mounting Kit, Collins part number 622-3493-001, is a long mounting support, with solid bearing slides for easy access. The CA-8032 was designed for use with the 483-mm (19-in) rack-mounted four-channel HF-80 exciter in the CA-8020, CA-8020A, and CA-8020B equipment cabinets.

2. PARTS LIST

Figure 1 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.

CODE	MANUFACTURER'S NAME AND ADDRESS
53823	BARNES ENGINEERING CO 1645 S CLAUDINA WAY ANAHEIM CA 92805
70276	ALLEN MFG CO P O DRAWER 570 HARTFORD CT 06101
96906	MILITARY STANDARD



CA-8032 Long Slide Mounting Kit, Parts Location
Figure 1

Table 1. CA-8032 Long Slide Mounting Kit, Parts List.

FIG-ITEM	PART NO	INDENT	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-	622-3493-001	1	KIT,SLIDE CA-8032	REF	
1	EST24PL	2	SLIDE,BRG,SOLID (53823) 015-3725-020	2	
	324-1694-240	2	SCREW,CAP,BTN STL, 8-32 X 3-8 (70276) (AP)	6	
2	646-6887-001	2	SPACER	2	
3	MS51958-67	2	SCREW,MACH SST, 10-32 X 1 (96906) 343-0231-000	4	
4	324-1694-240	2	SCREW,CAP,BTN STL, 8-32 X 3-8 (70276)	6	
5	MS35650-304	2	NUT,PLAIN,HEX SST, 10-32 (96906) 313-0019-000	8	
6	MS35338-138	2	WASHER,LOCK SST, 0.194 ID X 0.334 OD (96906) 310-0284-000	16	
7	MS15795-808	2	WASHER,FLAT CRES, 0.227ID X 0.533 OD (96906) 310-0779-080	36	
8	MS51958-61	2	SCREW,MACH SST, 10-32 X 3/8 (96906) 343-0226-000	12	

TS-8022 Extender Card (622-3430-001)

Rockwell International

instructions

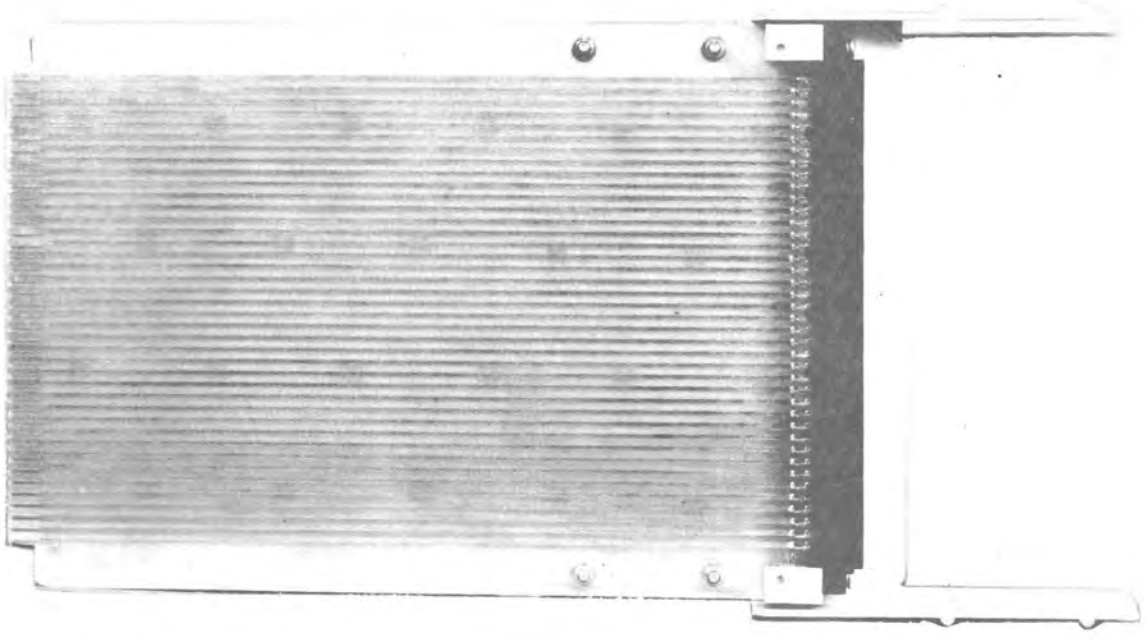
Collins Telecommunications Products Division

Printed in USA

523-0767969-002211
2nd Edition, 1 June 1978

1. DESCRIPTION

TS-8022 Extender Card 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 first edition dated 1 June 1977.

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 planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

3. PARTS LIST/DIAGRAMS

This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. The Collins 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	COLLINS 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

TS-8010 Card Extender Kit (622-3431-001, -002)

Rockwell International

instructions

Collins Telecommunications Products Division

Printed in USA

523-0767968-003211
3rd Edition, 1 January 1981

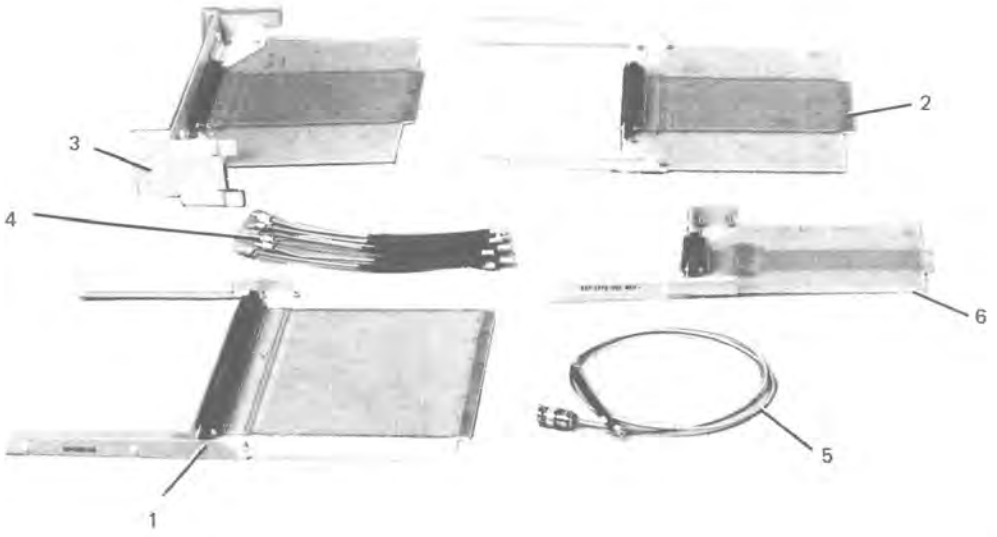
1. DESCRIPTION

The TS-8010 Card Extender Kit 622-3431-001, -002 contains all cables and extender cards necessary for extending cards and modules in the HF-80 series receivers, exciters, and controls. These extenders enable 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.

The TS-8010 622-3431-001 contains all cables and extenders necessary for testing and troubleshooting the HF-80 series receivers, exciters, receiver-exciters, and controls; and the 851S-( ) series receivers.

The TS-8010 622-3431-002 contains only those extenders necessary for testing and troubleshooting the HF-80 series controls.

Refer to figure 1 and table 1 for the complement of these card extender kits.



TS-8010 Card Extender Kit
Figure 1

NOTICE: This section replaces second edition dated 1 June 1978.

Table 1. TS-8010 Card Extender Kit Complement.

ITEM NO	COLLINS PART NUMBER	DESCRIPTION	622-3431-	
			001	002
1	635-0913-001	130-pin edge-on extender	X	X
2	635-0915-001	56-pin edge-on extender	X	X
3	635-0915-002	Rf module extender	X	
4	635-9686-001	Subminiax coax extender	7	
5	635-9686-002	Subminiax coax/BNC extender	X	
6	637-2843-001	Synthesizer extender	X	

2. REPAIR

Repair of the TS-8010 Card Extender Kit is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for planar card repair procedures.

3. PARTS LIST/DIAGRAMS

This paragraph assists in identification, requisition, and issuance of parts, and in maintenance of the equipment. The Collins part number and description for each nonstandard replacement part are listed in table 2.

All pins and shields of the extenders are one-to-one connections; therefore a schematic diagram of the extenders is not shown.

Table 2. TS-8010 Card Extender Kit Parts List.

DESCRIPTION	COLLINS PART NUMBER
130-pin edge-on extender	635-0913-001
Card guide (mounts inside extender frames)	150-0810-040
Connector	372-2274-060
Printed wiring board	600-1993-770
Extender frame (left)	635-9683-001
Extender frame (right)	635-9683-002
56-pin edge-on extender	635-0915-001
Card guide (mounts inside extender frames)	150-0810-040
Connector	372-7515-040
Printed wiring board	600-1993-771
Extender frame (left)	635-9685-001
Extender frame (right)	635-9685-002

Table 2. TS-8010 Card Extender Kit Parts List (Cont).

DESCRIPTION	COLLINS PART NUMBER
Rf module extender	635-0915-002
Connector	372-7515-040
Printed wiring board	600-1993-771
Extender frame	635-9681-001
Subminiax coax extender	635-9686-001
Rf connector	357-7207-010
Rf connector	357-7207-020
Coaxial cable, RG-316/U	425-0146-010
Subminiax coax/BNC extender	635-9686-002
Rf connector	357-7207-010
Rf connector, BNC	357-7279-010
Coaxial cable, RG-316/U	425-0146-010
Synthesizer extender	637-2843-001
Card guide (mounts inside extender brackets)	150-0810-030
Connector	372-7515-050
Printed wiring board	600-1993-050
Extender bracket (left)	637-1775-001
Extender bracket (right)	637-1776-001