



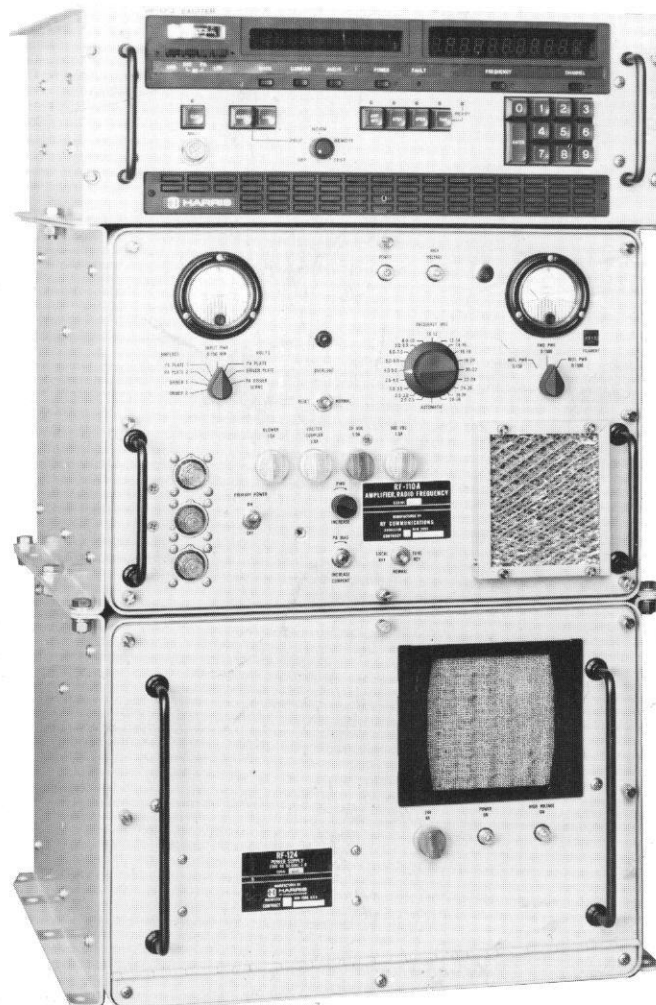
HARRIS

RF COMMUNICATIONS

RF-130-01/-02

1 KW HF TRANSMITTER

INSTRUCTION MANUAL



The 1310 and the 590 power up on separate 110v line inputs. Note both the 590 and 1310 can be set for 230, so make sure they are configured for 110/115 vac. The power amplifier does take the ac input through the 3 pronged plug and then supplies it to the power supply. Power supply should be configured for 208vac three phase, power amplifier must be configured the same way. Part number for mic is 919-5000.

RF-130 interconnecting cables including RF-1310A, RF-110A, RF-124, RF-601A, RF-601A/C

Cable part # Designator From TO

10121-6619 W1 exciter to pa RF coax RF-1310A J1 RF-110A J9

10121-7303 W2 control I/O RF-1310A J11 RF-110A J7

399-0027 W3 power supply I/O RF-110A J1 RF-124 J1

399-0028 W5 Antenna coupler control I/O RF-110A J6 RF-601A/C J1

6724-0005 coupler control to coupler RF-601A/C J2 RF-601 J1

10254-0030 B to D interlock jumper RF-110A J8 none

Mating connector part # PA connector/purpose

10075-0513 J2 transmitter interface

10075-0726 J5 PA/PS primary power input

10075-0448 J6 antenna coupler control I/O

10075-0446 J7 exc/pa control I/O

10075-0766 J8 Accessory I/O

Regards,

Here is the list of equipment:

2-RF-112A power supply's

1-RF-127 Antenna coupler

2-RF-110A HF Amplifiers

1-RF-1310 Exciter

1-RF-590 Receiver

Okay you have 2 1Kw. units that couple thru the coupler for 2 KW

and

I believe that they were remote Audio fed thru Remote Phone Patch Aux sources. 220 volt operation maybe....

Wire 230vac single phase hot side of power source, black wire, to pin A.
230 VAC common line of power source , white wire to pin B.
gnd line to case of P5
change primary fuses F1, F2, F3 to 25 amp fuses.
change 1A1T1 wiring to
short 1 to 4
short 3, 6, 7, 10
short 9 to 12
inpur to 1 and 12

——Original Message——

From:
Sent: 1
To: tne
Subjec

I LOCATED A RF 124 POWER SUPPLY FOR 230V 1 PHASE SERVICE (THE SITE AT THE
RED CROSS DOES NOT SUPPORT 3 PHASE), WHAT PINS ON THE INPUT POWER JACK RF110A DO
I USE FOR L1 L2 AND NETURAL(GROUND) FOR SINGLE PHASE HOOKUP IS THERE ANY
WIRING CHANGES REQUIRED INSIDE THE RF110A? I HAVE SOME BOOKS ORDERED BUT I DON'T
HAVE THEM YET.

Because the power amplifier can be a central point in complex installations, the number of interconnections depends on user requirements.

A complete set of mating connectors is supplied in the ancillary kit. For pin number/function data refer to the RF-110A Manual.

To configure the power amplifier, set up the jumpers as shown in table 2-10. Refer to table 2-11 and figure 2-10 for primary power source, power supply, and primary power strapping data.

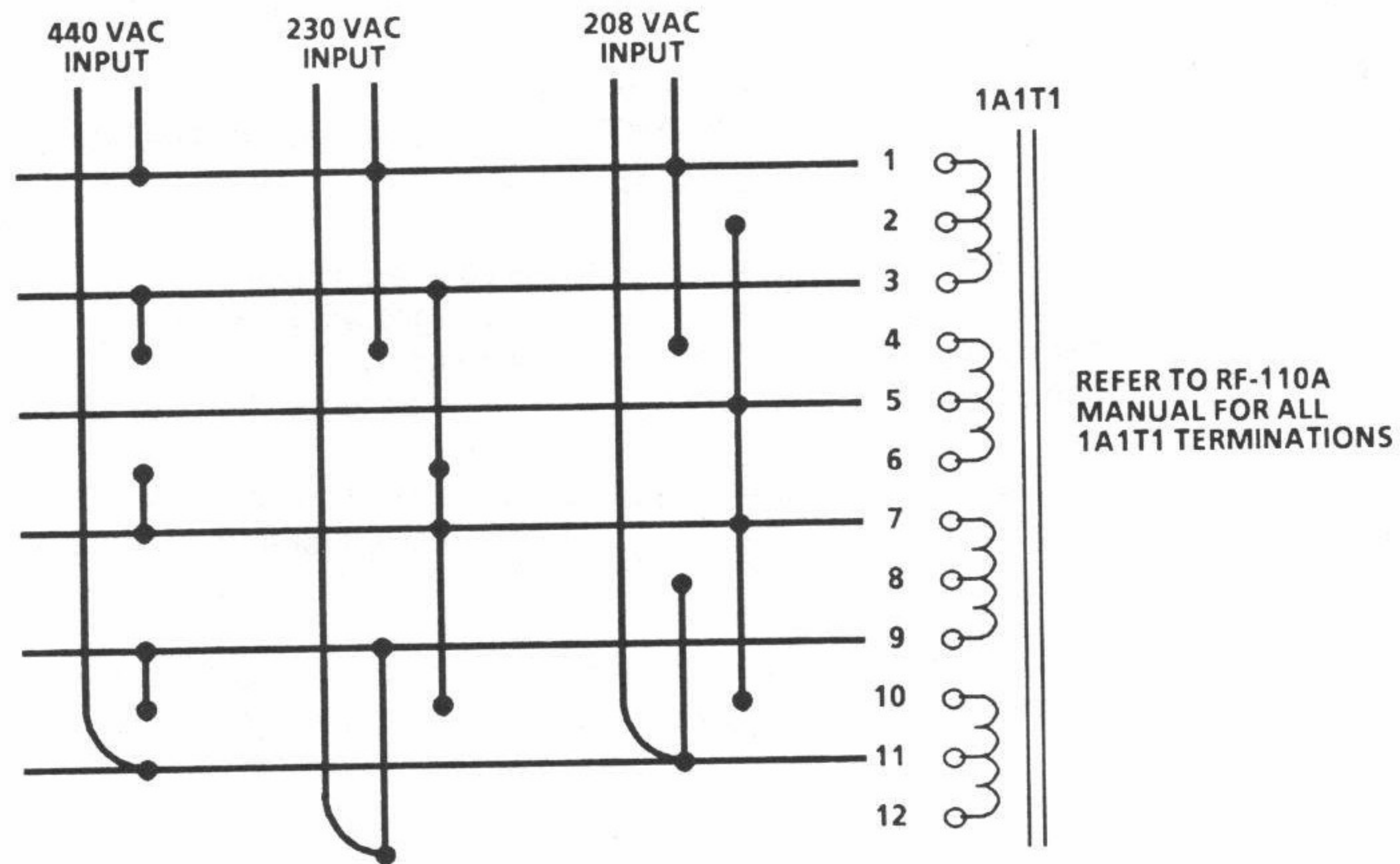
Table 2-10. RF-110A Radio Frequency Amplifier Jumpers

Jumper	From	To	Comments
KEYLINE*	J8-B	J8-D	Cable W9
	or J2-b	J2-d	Cable W7

* Connection required to key PA from exciter.

Table 2-11. RF-110A Primary Power Source and Power Supply Data

Primary Power	RF-110A Configuration	Power Supply Data
440 Vac, 3-phase, 60 Hz	1A1T1 strapped for 440 Vac; 1A1P5 installed on 1A1TB2; 7 amp time delay fuses in 1A1XF1, 1A1XF2, 1A1XF3.	RF-112A Power Supply 2A2P2 installed on 2A2TB1
208 Vac, 3-phase, 60 Hz	1A1T1 strapped for 208 Vac; 1A1P5 installed on 1A1TB2; 15 amp fuses installed in 1A1XF1, 1A1XF2, 1A1XF3.	RF-112A Power Supply 2A2P1 installed on 2A2TB1
230 Vac, single phase, 50/60 Hz	1A1T1 strapped for 230 Vac; 1A1P5 installed on 1A1TB2; 25 amp fuses installed in 1A1XF1, 1A1XF2, 1A1XF3.	RF-124 Power Supply



*ACO-012

Figure 2-10 RF-110A Primary Power Strapping Data

2.7 POWER SUPPLY CONFIGURATION

The transmitter is operated from one of three ac primary power sources with a supply of at least 4.5 kW capacity.

CAUTION

Ensure power supply is correct for supply voltage and frequency before turning on equipment. Make sure that all equipments are grounded through a common bus.

- 208 V line-to-line $\pm 10\%$, 48 to 63 Hz, three-phase, three-wire (RF-112A Power Supply).
- 440 V line-to-line $\pm 10\%$, 48 to 63 Hz, three-phase, three-wire (RF-112A Power Supply).
- 230 V $\pm 10\%$, 48 to 63 Hz, single-phase (RF-124 Power Supply).

2.7.1 RF-112A, 3-Phase, 208/440 VAC Configuration

The RF-112A Power Supply is factory wired for 440 V or 208 V operation as ordered by the customer. To verify that the appropriate jumper is installed at TB1, refer to table 2-11.

WARNING

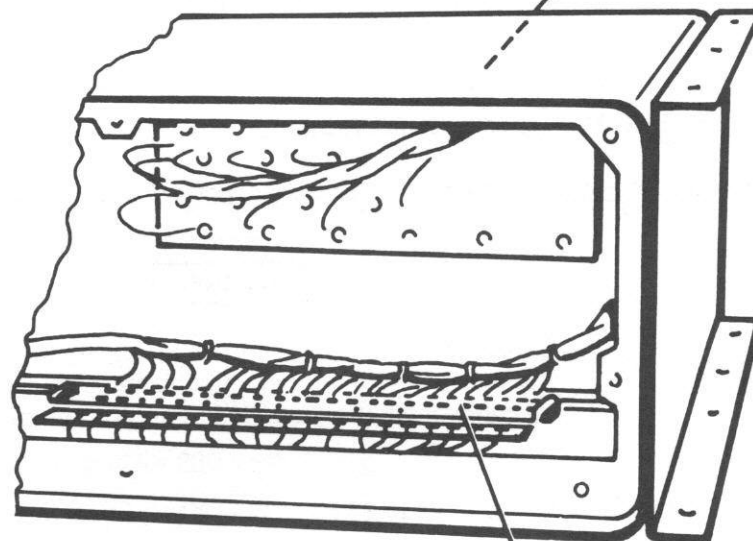
Always remove primary power at the source and use shorting stick to verify that no lethal voltages are present before making contact with any power supply components.

If a change in primary power is desired an alternative jumper is included in the ancillary kit. For 208/440 Vac conversions, install appropriate jumper (391-8200 for 208 Vac, or 391-8300 for 440 Vac) at TB1 as shown in figure 2-11.

No jumper change is required on the RF-110A, but wiring on transformer 1A1T1 primary must be changed. Refer to table 2-11 for this and for corresponding fuse changes required in the RF-110A.

T1/T2
THESE TRANSFORMERS
ARE AN INTEGRAL PART
OF THE CASE ASSY.
JUMPERING IS DONE AT
TB1.

NOTE
WHEN JUMPERS ARE CHANGED
VERIFY CORRESPONDING FUSE
CHANGES ARE ALSO MADE AT
THE RF-110A (SEE 1932-0005
MANUAL)



TB1 AND EITHER:
● 208 VAC JUMPER ASSY
P/N 391-8200
OR
● 440 VAC JUMPER ASSY
P/N 391-8300

112A-11

Figure 2-11. 208/440 VAC Jumper Details

2.7.2 RF-124, single phase, 230 VAC Configuration

The RF-124 Power Supply is factory wired for 230 V operation, but can be strapped for any of four primary line voltages:

- 208 Vac (for low line conditions)
- 218 Vac
- 230 Vac
- 242 Vac (for high line conditions)

WARNING

Always remove primary power at the source and use shorting stick to verify that no lethal voltages are present before making contact with any power supply components.

To verify terminal board connections for primary voltages, refer to figure 2-12.

2.8 CABLING

Differences in system configurations and variations among installations will control the number and length of cables connected to the transmitter.

See figure 2-13 for cable interconnections for the transmitter.

Additional cables and connectors required to connect accessories are shipped with the accessories selected.

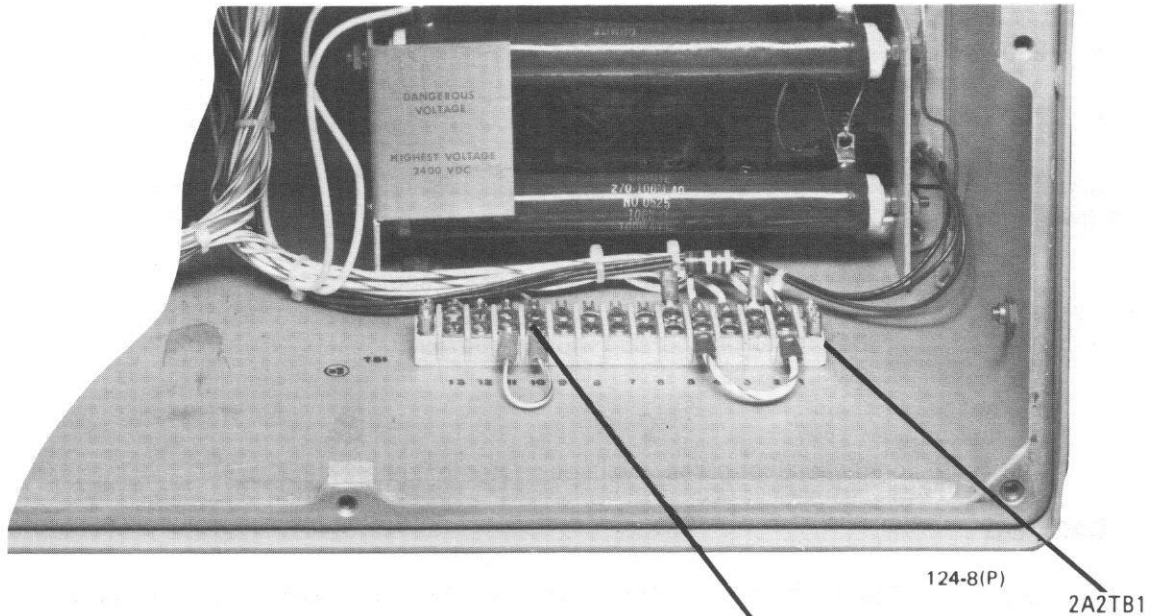
Table 2-12 gives cable designations and from/to information.

2.8.1 Supplied Cables

Cables W1, W2, and W3, supplied with the transmitter, interconnect the exciter, power amplifier, and power supply. Length of supplied cables is adequate for stack or rack units. For more widely separated units, cables must be user-fabricated.

See table 2-13 for cable W2 details.

See table 2-14 for cable W3 details.



WARNING

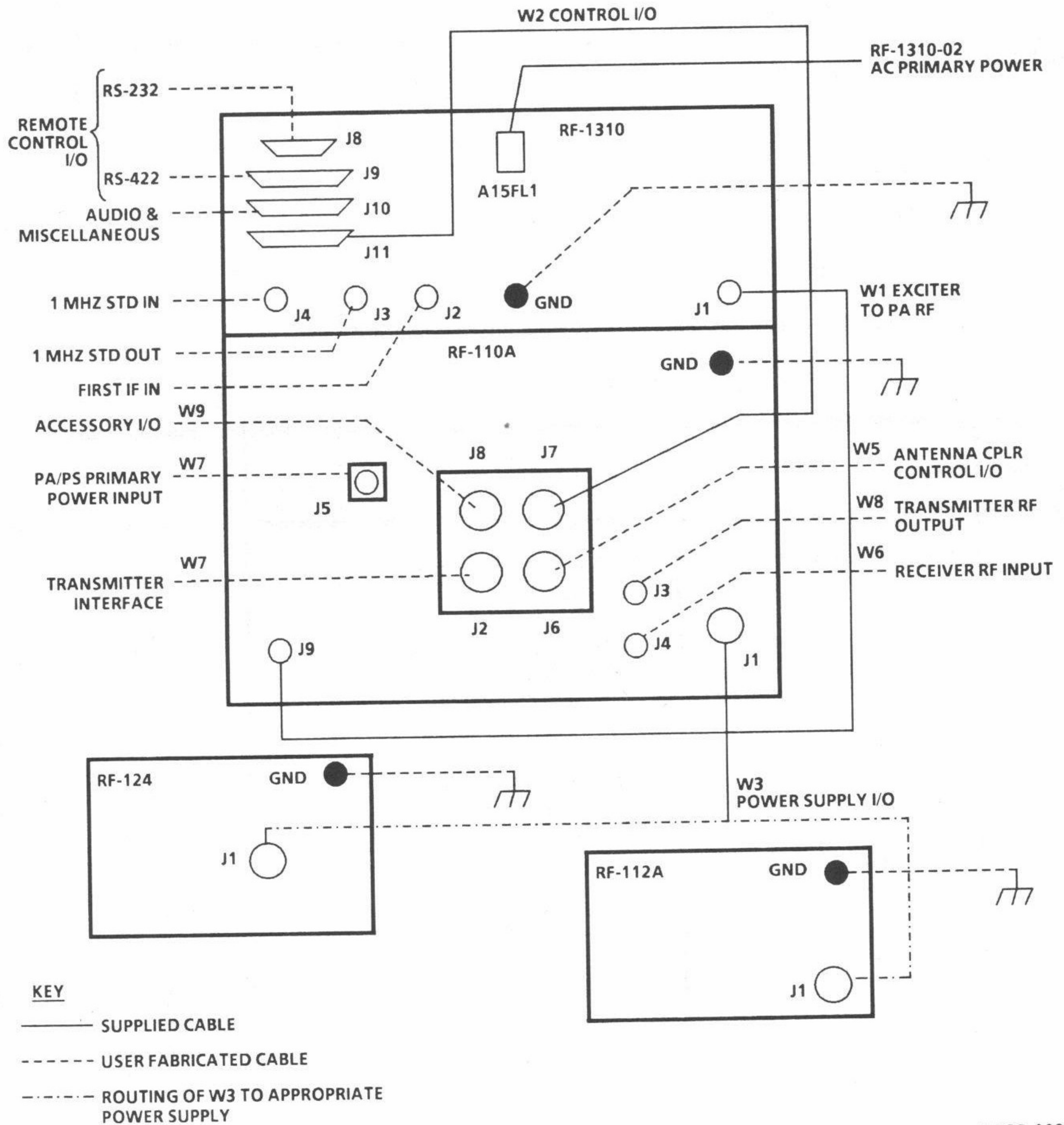
ALWAYS REMOVE PRIMARY POWER AT THE SOURCE AND USE A SHORTING STICK TO VERIFY THAT NO LETHAL VOLTAGES ARE PRESENT BEFORE MAKING CONTACT WITH ANY POWER SUPPLY COMPONENTS

2A2T1 PRIMARY VOLTAGE DESIRED	CONNECT LEADS BETWEEN 2A2T1-1 AND 2A2TB1-	2A2T2 PRIMARY VOLTAGE DESIRED	CONNECT LEADS BETWEEN 2A2T2- COMMON AND 2A2TB1-
242 VAC	3	242 VAC	13
230 VAC	4	230 VAC	12
218 VAC	1	218 VAC	11
208 VAC	5	208 VAC	9

NOTE

WHEN THE PRIMARY VOLTAGE IS CHANGED, VERIFY CORRESPONDING FUSE CHANGES ARE ALSO MADE AT THE RF-110A (SEE 1932-0005 MANUAL)

Figure 2-12. Primary Voltage Connection Details



*ACO-003

Figure 2-13. Transmitter Interconnection Diagram

2.8.2 User-Fabricated Cables

Cables W4-W9, and others, connect to customer equipment and are user-fabricated. When the system is ordered, these cables can be factory-fabricated at additional charge. Ancillary kits provided with the transmitter include connectors for these cables.

See these tables for cable details:

Table 2-15, Cable W4

Table 2-16, Cable W5

Table 2-17, Cable W7

Table 2-18, Cable W9

Tables 2-19 through 2-22 provide additional information on user-fabricated cables and connectors.

Table 2-12. Cable Designation and From/To Correlation

Cable	From	To	Remarks	Cable Type
W1	EXC, J1	PA, J9	Exciter RF output Cable (supplied).	Coaxial RG-223/U
W2	PA, J7	EXC, J11	Control Cable (supplied). Refer to table 2-13.	Multi-conductor external shield
W3	PA, J1	PS, J1	PS input/output cable (supplied). Refer to table 2-14.	Multi-conductor external shield
W4	PA, J5	Primary Power Source	Only PA mating connector to J5 is supplied. Refer to table 2-15.	Multi-conductor external shield
W5	PA, J6	Optional RF-601A/C Control Unit	Supplied with RF-601A. Refer to table 2-16.	Multi-conductor external shield
			NOTE Cable W5 is supplied when RF-601A is shipped with RF-130. When RF-601A is ordered separately, the cable is designated W1.	

Table 2-12. Cable Designation and From/To Correlation (Continued)

Cable	From	To	Remarks	Cable Type
W6	PA, J4	Optional Receiver Antenna Connector	Receiver RF from antenna relay in PA. Only the mating connector is supplied.	Coaxial RG-8A/U
W7	PA, J2	Selected XMTR Interface	Only mating connector (to J2) is supplied. Refer to table 2-17.	Multi-conductor external shield
W8	PA, J3	Selected Antenna System	Only mating connector (to J3) is supplied. Connect to 50-ohm antenna.	Coaxial RG-8A/U
W9	PA, J8	Selected Accessory	Only mating connector (to J8) is supplied. Refer to table 2-18.	Multi-conductor external shield

Table 2-13. Cable W2, PA J7 to Exciter J11, Pin Number/Function

EXC J11 Pin No.	PA J7 Pin No.	Function	Remarks	J11 In./Out.
36	A	Band Code Line 1	Determines frequency band at which PA will operate.	O
18	B	Band Code Line 2		O
1	C	Band Code Line 3		O
35	D	Band Code Line 4		O
3	E	Band Code Line 5		O
13	G	CW/RATT Ground	Grounding Pin G transfers final amplifier bias from class AB to class B, for CW or RATT operation. Averaging circuit is removed from APC detector.	O

Table 2-13. Cable W2, PA J7 to Exciter J11, Pin Number/Function (Continued)

EXC J11 Pin No.	PA J7 Pin No.	Function	Remarks	J11 In./ Out.
8	H	Chassis Ground	Ground return.	
11	J	+28 V Interlock	+28 V output except when keying is inhibited; used to inhibit exciter keying.	I
6	K	Ground Keyline	Grounding Pin K will uninhibit driver and final amplifiers.	I/O
16	M	+28 V Standby and Operate	Applying +28 V to Pin M will turn on PA filament and bias supplies.	O
19	N	+20 V Operate	Applying +20 V at Pin N will turn on all high voltages.	O
37	P	Ground Pulse	Momentary ground will initiate automatic tune.	O
12	T	+20 V Carrier Insert	+20 V is present at J7-T when PA front panel key switch is placed at TUNE KEY position, or when an associated antenna coupler (e.g., RF-601A) requests tune carrier. Used by an exciter to deliver a steady carrier Tune Signal for tuning antenna coupler.	I
--	U	115 Vac Remote*	115 Vac supplied to transmitter interface connector from exciter for auxiliary use.	I

Table 2-13. Cable W2, PA J7 to Exciter J11, Pin Number/Function (Continued)

EXC J11 Pin No.	PA J7 Pin No.	Function	Remarks	J11 In./ Out.
26	V	Reserved	Wired.	---
---	X	Reserved	Wired.	---
---	Z	Chassis Ground	Redundant chassis ground	---
23	c	CW/RATT Key	CW/RATT keyline from exciter	I
7	d	APC	Average Power Control line from PA.	I
15	e	PPC*	Peak Power Control line from PA.	I
---	f g	Remote 600 ohm LSB/ISB input*	Balanced LSB/ISB audio from transmitter interface to exciter.	I
17	h	Shield Ground	Shield ground for APC line (d) and PPC line (e).	---
---	j	Reserved	Wired.	---
30	k	PTT +12 V Key	Push-to-talk, +12 V from transmitter interface to exciter.	I
9	n	Floating 12 Vdc	12 V source to transmitter interface.	O
---	q r	Remote 600 ohm USB/AM/ISB input*	Balanced USB/AM/ISB audio from transmitter interface to exciter USB/AM/ISB audio input.	I
---	s	Reserved	Wired.	---

* Note: Minimum wire size 22 on all, (*) denotes shielded wire.

Table 2-14. Cable W3, PA J1/PS J1 Pin Number/Function

NOTE

The remarks column information applies to the RF-112A, RF-124, or equivalent power supply.

Pin No.	Function	Remarks	Min. Wire Size
A	Phase A Primary Power Input	Delivers Phase A power to PS.	14
B	Phase B Primary Power Input	Delivers Phase B power to PS.	14
C	Phase C Primary Power Input	Delivers Phase C power to PS.	14
D	Phase B-T2 Primary Power Input	Used by PS to develop blower power and 115 Vac for auxiliary equipment.	22
E	Phase A-T2 Primary Power Input	Used by PS to develop blower power and 115 Vac for auxiliary equipment.	22
F	115 V Common	115 Vac from PS for auxiliary equipment and bandswitch motor.	22
G	115 V Hot	115 Vac from PS for auxiliary equipment and bandswitch motor.	22
H	24 V Switched	Jumpering J1-H to J1-J activates PS inverter which provides PA blower power by the PA standby relay. Inverter creates 115 Vac, 400 Hz at J1-K and J1-L.	22
J	24 V Hot	Jumpering J1-H to J1-J activates PS inverter which provides PA blower power by the PA standby relay. Inverter creates 115 Vac, 400 Hz at J1-K and J1-L.	22
K	115 Vac, 400 Hz Hot	From inverter in PS to blower and time meter in PA.	22

Table 2-14. CABLE W3, PA J1/PS J1 Pin Number/Function (Continued)

Pin No.	Function	Remarks	Min. Wire Size
L	115 Vac, 400 Hz Common	From inverter in PS to blower and time meter in PA.	22
M	+500 Vdc	Driver plate and screen voltage from PS.	22
N	Common Ground	High voltage ground return.	22
P	Power Supply Interlock	Goes to ground via PS panel interlock switch and thermal switch.	22
R	+2250 Vdc	PA tube plate voltage from PS.	18

Table 2-15. Cable W4, PA J5 Pin Number/Function

Pin No	Function	Remarks	Minimum Wire Size
A	Phase A primary power input	Filtered by line filter 1A2FL1.	12 (600 V)
B	Phase B primary power input	Filtered by line filter 1A2FL1.	12 (600 V)
C	Phase C primary power input	Filtered by line filter 1A2FL1. Not used for single phase.	12 (600 V)

Table 2-16. Cable W5, PA J6 Pin Number/Function

Pin No.	Function	Remarks	Minimum Wire Size
A	Chassis Ground	Ground return	22
B	Keyline Ground	Grounding J6-B will uninhibit the driver and final amplifiers. (J8-B to D or J2-b to D jumper required).	22
E	Ground Pulse	Momentary ground for antenna coupler (RF-601A) to initiate automatic tune cycle.	22
F	Tune Ground	Grounding J6-F will limit PA power output to 200 watts nom. (with proper APC connections to external exciter).	22
G H I	Spares	Wired	22
J	Coupler Interlock	Grounding J6-J will inhibit keying.	22
L M	115 Vac Hot 115 Vac Common	115 Vac, single phase auxiliary power for antenna coupler.	22

Table 2-17. Cable W7, PA J2 Pin Number/Function

Pin No.	Function	Remarks	Minimum Wire Size
A	Chassis Ground	Chassis ground return.	22
B	Floating 12 Vdc (+)	12 Vdc source to transmitter interface.	22
C	Chassis Ground	Redundant ground.	
D	115 Vac Common	115 Vac common.	22
E	Reserved	Reserved, wired input.	22
F	Reserved	Reserved, wired input.	22
G	PTT +12 V Key	Push-to-talk +12 V from transmitter interface.	22
H	115 Vac Remote	115 Vac hot line to transmitter interface.	22
S	CW/RATT Key	Remote CW/RATT Keyline from exciter.	22
T	Remote 600 ohm	Balanced Audio input	22
U	LSB/ISB Input	(LSB/ISB) from exciter.	Shielded Pair
V	Remote 600 ohm	Balanced Audio input	22
W	USB/ISB input	(USB/AM) from exciter.	Shielded Pair
Z	Floating 12 Vdc (-)	12 Vdc Source to transmitter interface.	22
a	Ground Interlock	Coupler ground interlock (if used).	22
b*	Ground Keyline	Ground keyline to/from exciter and coupler.	22
d*	Keyline Interlock	Power amplifier keyline interlock.	22

*Note: J2-b to d or J8-B to D must be jumpered to key the PA from the exciter.

Table 2-18. Cable W9, PA J8 Pin Number/Function

Pin No.	Function	Remarks	Min. Wire Size
A	Chassis Ground	Ground return.	22
B	Ground Keyline	J8-B and J8-D (or J2-b and J2-d) must be jumpered to key PA from the exciter.	22
C	+28 Vdc	+28 Vdc for accessory use.	22
D	Keyline Interlock	J8-B and J8-D (or J2-b and J2-d) must be jumpered to key PA from the Exciter.	22
E	CW/RATT	Grounding J8-E will transfer PA bias from class AB to Class B for CW or RATT Operation.	22

Table 2-19. RF-1310 Coaxial Connectors

Conn.	Function	Signal	Type
J1	RF Output	2.0 - 30 MHz, nominal 150 mW PEP, 50 ohms	BNC
J2	External IF In	455 kHz, 50 ohms, 22 mV _{rms}	BNC
J3	Internal Frequency Standard Output	Approximately .5 - 1 V _{rms} /50 ohms 1, 5, or 10 MHz Determined by standard installed	BNC
J4	External Frequency Standard Input	1, 5, or 10 MHz - Depends on Internal Standard. Approximately .5 - 1 V _{rms} /50 ohms.	BNC

Table 2-20. RF-1310 Connector J8 - RS-232 Remote Control Signals

Pin	Signal	Input/ Output	Description
1	SHIELD (GND)		Shield Connection
2	RS-232 OUT	O	RS-232 Transmit
3	RS-232 IN	I	RS-232 Receive
4	FSK OUT (-)	O	FSK Modem, 600 ohms
5	FSK IN (+)	I	FSK Modem, 600 ohms
6	ID0	I	Remote Identification, Bit 0
7	RS-232 SIG GND		Signal Ground
8	ID1	I	Remote Identification, Bit 1
9	ID4	I	Remote Identification, Bit 4
10	BAUD 1	I	Remote Baud Rate, Bit 1
11	BAUD 2	I	Remote Baud Rate, Bit 2
12	NC		
13	NC		
14	NC		
15	ID3	I	Remote Identification, Bit 3
16	ID2	I	Remote Identification, Bit 2
17	ID5	I	Remote Identification, Bit 5
18	ID6	I	Remote Identification, Bit 6
19	GND		Ground
20	NC		
21	NC		
22	BAUD 3	I	Remote Baud Rate, Bit 3
23	BAUD 0	I	Remote Baud Rate, Bit 0
24	NC		
25	NC		

Table 2-21. RF-1310 Connector J9 - RS-422 Remote Control Signals

Pin	Signal	Input/ Output	Description
1	NC		
2	NC		
3	BUS REQUEST	I	Tristate Request
4	RS-422 OUT (+)	O	RS-422 Transmit
5	NC		
6	RS-422 IN (+)	I	RS-422 Receive
7 thru 18	NC		
19	GND	O	
20	RS-422 IN (-)	I	RS-422 Receive
21	BUS AVAILABLE	O	Tristate Confirm
22 thru 36	NC		
37	RS-422 OUT (-)	O	RS-422 Transmit

Table 2-22. RF-1310 Connector J10 - Miscellaneous Signals

Pin	Signal	Input/ Output	Description
1	Rear Serial	O	TTL Levels
2	Data Spare		
3	Rear Serial Clock	O	TTL Levels; occurs only when data is sent
4	Fault	O	TTL HI = Fault LED On
5	REMOTE IN 1	I	Remotely Monitored Input, TTL
6	INTERNAL KEY	O	TTL LO = Exciter Keyed
7	AUX PTT KEY	I	LO = Key Down
8	Spare		
9	AUX CW KEY	I	TTL LO = Key Down
10	NC		
11	NC		
12	AUX AUDIO 2	I	600 ohms Balanced; 0 dBm, Nominal
13	NC		
14	LSB AUDIO INPUT	I	600 ohms, Balanced Transformer; 0 dBm, Nominal
15	XMIT MUTE	O	TTL LOW = System Keyline Active
16	REM OUT 0	O	Remotely Controlled Output, TTL
17	FSK KEY	I	RS-232 FSK Data Input

Table 2-22. RF-1310 Connector J10 - Miscellaneous Signals (Continued)

Pin	Signal	Input/ Output	Description
18	SERIAL ENABLE 1	O	Strobes Rear Serial Data Into External Device
19	PRIMARY FAIL	O	+5 V = Primary Failure
20	REMOTE In 0	I	Remotely Monitored Input, TTL
21	GND		Audio Shield Ground
22	AUX AUDIO 1	I	600 ohms Balanced; 0 dBm, Nominal
23	AUX AUDIO 1	I	600 ohms Balanced; 0 dBm, Nominal
24	CW SIDE TONE	O	Approximately 1200 Hz; 50 mV _{rms} /2000 ohms
25	GND		Audio Shield Ground
26	USB AUDIO INPUT	I	600 ohms Balanced Transformer; 0 dBm, Nominal
27	NC		
28	USB AUDIO INPUT	I	600 ohms Balanced Transformer; 0 dBm, Nominal
29	AUX AUDIO 2	I	600 ohms Balanced; 0 dBm, Nominal
30	NC		
31	REMOTE OUT 1	O	Remotely Controlled Output, TTL
32	SERIAL ENABLE 2	O	Strobes Rear Serial Frequency Data into External Device
33	LSB AUDIO IN CENTER TAP		Transformer Center Tap
34	USB AUDIO IN CENTER TAP		Transformer Center Tap
35	LSB AUDIO INPUT	I	600 ohms Balanced Transformer; 0 dBm, Nominal
36	AUX AUDIO 3	I	600 ohms Balanced; 0 dBm, Nominal
37	AUX AUDIO 3	I	600 ohms Balanced; 0 dBm, Nominal

2.9 INITIAL POWER-UP

Follow these procedures in the order given to power up the transmitter when the system is first installed.

NOTE

These procedures assume that the installer has followed the recommendations of paragraphs 2.1 through 2.8 and fully completed transmitter installation. Don't begin these power-up procedures until the system components are properly installed, configured, and connected.



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RF COMMUNICATIONS

RF-1310 SERIES EXCITER

INSTRUCTION MANUAL



Table 2-3. Connector J8 - RS-232 Remote Control Signals

Connector Pin	Signal	Exciter Input or Output	Description
J8-1	SHIELD (GND)		Shield Connection
J8-2	RS-232 OUT	O	RS-232 Transmit
J8-3	RS-232 IN	I	RS-232 Receive
J8-4	FSK OUT (-)	O	FSK Modem, 600 ohms
J8-5	FSK IN (+)	I	FSK Modem, 600 ohms
J8-6	ID0	I	Remote Identification, Bit 0
J8-7	RS-232 SIG GND		Signal Ground
J8-8	ID1	I	Remote Identification, Bit 1
J8-9	ID4	I	Remote Identification, Bit 4
J8-10	BAUD 1	I	Remote Baud Rate, Bit 1
J8-11	BAUD 2	I	Remote Baud Rate, Bit 2
J8-12 through J8-14	NC		
J8-15	ID3	I	Remote Identification, Bit 3
J8-16	ID2	I	Remote Identification, Bit 2
J8-17	ID5	I	Remote Identification, Bit 5
J8-18	ID6	I	Remote Identification, Bit 6
J8-19	GND		Ground
J8-20, J8-21	NC		
J8-22	BAUD 3	I	Remote Baud Rate, Bit 3
J8-23	BAUD 0	I	Remote Baud Rate, Bit 0
J8-24, J8-25	NC		

(J8 is a 25 pin D connector, PN J22-0035-001)

Table 2-4. Connector J9 - RS-449 Remote Control Signals

Connector Pin	Signal	Exciter Input or Output	Description
J9-1, J9-2	NC		
J9-3	BUS REQUEST	I	Tristate Request
J9-4	RS-422 OUT (+)	O	RS-422 Transmit
J9-5	NC		
J9-6	RS-422 IN (+)	I	RS-422 Receive
J9-7 through J9-18	NC		
J9-19	GND	O	
J9-20	RS-422 IN (-)	I	RS-422 Receive
J9-21	BUS AVAILABLE	O	Tristate Confirm
J9-22 through J9-36	NC		
J9-37	RS-422 OUT (-)	O	RS-422 Transmit

(J9 is a 37 pin D connector, PN J22-0035-002)

Table 2-5. Connector J10 - Audio and Miscellaneous Signals

Connector Pin	Signal	Exciter Input or Output	Description
J10-1	Rear Serial Data	O	TTL Levels
J10-2	Spare		
J10-3	Rear Serial Clock	O	TTL Levels; occurs only when data is sent
J10-4	Fault	O	TTL HI = Fault LED On
J10-5	REMOTE IN 1	I	Remotely Monitored Input, TTL
J10-6	INTERNAL KEY	O	TTL LO = Exciter Keyed
J10-7	AUX PTT KEY	I	LO = Key Down
J10-8	Spare		
J10-9	AUX CW KEY	I	TTL LO = Key Down
J10-10, J10-11	NC		
J10-12	AUX AUDIO 2	I	600 Ohms Balanced; 0 dBm, Nominal
J10-13	NC		
J10-14	LSB AUDIO INPUT	I	600 Ohms, Balanced Transformer; 0 dBm, Nominal
J10-15	XMIT MUTE	O	TTL LOW = System Keyline Active
J10-16	REM OUT 0	O	Remotely Controlled Output, TTL
J10-17	FSK KEY	I	RS-232 FSK Data Input
J10-18	SERIAL ENABLE 1	O	Strobes Rear Serial Data into External Device
J10-19	PRIMARY FAIL	O	+ 5 V = Primary Failure
J10-20	REMOTE IN 0	I	Remotely Monitored Input, TTL
J10-21	GND		Audio Shield Ground
J10-22, J10-23	AUX AUDIO 1	I	600 Ohms Balanced; 0 dBm, Nominal
J10-24	CW SIDE TONE	O	Approximately 1200 Hz; 50 mV _{rms} /600 ohms
J10-25	GND		Audio Shield Ground
J10-26	USB AUDIO INPUT	I	600 Ohms Balanced Transformer; 0 dBm
J10-27	NC		
J10-28	USB AUDIO INPUT	I	600 Ohms Balanced Transformer; 0 dBm, Nominal
J10-29	AUX AUDIO 2	I	600 Ohms Balanced; 0 dBm, Nominal
J10-30	NC		
J10-31	REMOTE OUT 1	O	Remotely Controlled Output, TTL
J10-32	SERIAL ENABLE 2	O	Strobes Rear Serial Frequency Data into External Device
J10-33	LSB AUDIO IN CENTER TAP		Transformer Center Tap
J10-34	USB AUDIO IN CENTER TAP		Transformer Center Tap
J10-35	LSB AUDIO INPUT	I	600 Ohms Balanced Transformer; 0 dBm, Nominal
J10-36, J10-37	AUX AUDIO 3	I	600 Ohms Balanced; 0 dBm, Nominal

(J10 is a 37 pin D connector, PN J22-0035-002)

Table 2-6. Connector J11 - System and PA Connections

Connector Pin	A18A2 Signal Names (10121-6370 Version)	A18A2 Signal Names (10121-6350 Version)	Exciter Input or Output
J11-1	PA BND SW CODE C	PA BND SW CODE C	O
J11-2	STANDBY READBACK	NC	I
J11-3	PA BND SW CODE A	PA BND SW CODE E	O
J11-4	NC	NC	I
J11-5	TUNE CMD 1	BYPASS REQUEST	I
J11-6	SYS KEY	SYS KEY	I/O
J11-7	10 KW FORWARD (APC)	APC	I
J11-8	CHASSIS GND	NC	
J11-9	PTT RTN	PTT RTN	O
J11-10	NC	NC	I
J11-11	PA READY	SYSTEM KEY LINE INTLK	I
J11-12	TUNE ENABLE	SYS TUNE PWR REQUESTS	O
J11-13	NC	PA CLASS	O
J11-14	PA BYPASS	BYPASS	I
J11-15	PPC	NC	I
J11-16	STBY CMD	STBY CMD	O
J11-17	NC	NC	
J11-18	PA BND SW CODE D	PA BND SW CODE B	O
J11-19	OPER CMD	OPER CMD	O
J11-20	NC	NC	
J11-21	10 KW REFLECTED	NC	
J11-22	TGC	NC	I
J11-23	CW/KEY	CW/KEY	I
J11-24	FAULT	PA FAULT	I
J11-25 through J11-28	N/C	N/C	
J11-29	OPER READBACK	NC	I
J11-30	NC	PTT KEY (FLOAT + 12 V)	I
J11-31	NC	NC	
J11-32	TUNE CMD 2	NC	I
J11-33, J11-34	NC	NC	
J11-35	PA BND SW CODE B	PA BND SW CODE D	O
J11-36	PA BND SW CODE E	PA BND SW CODE A	O
J11-37	INHIBIT	SYSTEM RETUNE CMD	O

J11 is a 37 pin D connector, PN J22-0035-002)

NOTE

The signal names shown in table 2-6 are the most commonly used signal names for the two versions of the A18A2 System Interface. Some signal names may change at the exciter/ PA interface. Consult the appropriate system manual for specific system signals.

2.7 INITIAL SETUP AND ADJUSTMENTS

The advanced design of the RF-1310 Exciter minimizes initial setup and adjustment procedures. The initial setup and adjustment should include:

- Connecting memory backup battery
- Adjusting front panel display brightness
- Adjusting LSB and USB audio input levels
- Adjusting VOX sensitivity and threshold
- Adjusting maximum rf output level
- Setting system interface switches
- Setting remote control interface configuration (if used)

Some adjustments may be system specific. Consult the specific system manual for additional setup and adjustment procedures before attempting to operate the exciter in a transmitting system.

CAUTION

Do not short out the memory backup battery terminals. This could result in severe circuit damage.

2.7.1 Connecting Memory Backup Battery

A ni-cad battery is used to keep the RAM memory alive when power is removed from the exciter. The backup battery is located on the A14 Control Board assembly. The backup battery jumper must be inserted between E1 and E2 on the A14 Control Board assembly to activate the keep alive circuit. See subsection A14 for location of the assembly and the jumper.

2.7.2 Adjusting Front Panel Display Brightness

Potentiometer R29 on Front Panel Driver Board assembly A13A2 is used to adjust the brightness of the vacuum fluorescent displays. R29 can be accessed by removing the top chassis cover or tilting the front panel assembly forward. R29 can be adjusted with a small screwdriver and is identified in subsection A13.

2.7.3 USB and LSB Audio Level Adjust

USB and LSB audio levels are adjustable from the front panel. Adjustment potentiometers are accessed through holes located next to the USB and LSB meter select pushbutton switches on the front panel.

Turn the potentiometer to full clockwise (cw) for full rf power output with -26 to +10 dBm audio input (ALC on). If ALC is off, adjusting the potentiometer counterclockwise (ccw) will reduce audio gain and rf power output level.

2.7.4 VOX Adjustments

Vox operation is an option, selectable during programming on the A14 Control Board assembly. See subsection A14 for explanation of VOX option selection.

VOX sensitivity and hangtime are adjusted on the A5A1 Audio 1 assembly. VOX is adjusted by R41 and hangtime is adjusted by R46. See subsection A5A1 for adjustment locations and VOX circuit description.

The sensitivity adjustment (R41) sets the threshold to where the audio input will key the exciter. Sensitivity can be adjusted so that the exciter will be keyed by an audio input level between -26 and + 10 dBm. Hangtime is the length of time the exciter remains keyed after the audio input drops below the VOX threshold. The hangtime can be adjusted from 0.1 to 3.0 seconds.

2.7.5 RF Output Adjust

The maximum RF output is adjustable over an 8 dB range. R26 on the Converter assembly A2 is normally set so the exciter has a nominal 100 mW output. The location of R26 is shown in subsection A2.

2.7.6 System Interface Switches and Adjustments

All of the switch settings and adjustments on the System Interface Assembly A18 are system specific. See the specific system manual in order to determine what the switch settings and adjustments should be. Switches and adjustments are described in subsection A18.

2.7.7 Remote Control Interface Configuration

For remote control interface configuration setup procedure, see unit instruction subsection A17.

2.7.8 Signal Generator Mode

The exciter may be used as a frequency synthesized signal generator. This feature can be used to check the exciter's own performance or to troubleshoot other equipment. It provides a nominal 100 mW rf output from 0.1 to 30 MHz. Frequency and rf output power reduction are front panel selectable.

To select signal generator mode, set switch A18A1S1-4 SIG GEN/NORM to OPEN. See subsection A18A1 for the location of the switch.

3.3.2.2.3 Carrier Suppression Level Selection

The operator can select one of three carrier suppression levels when in the USB, LSB, 2ISB, or 4ISB modes. The choices in these modes are -16 dB, -26 dB, and -infinity or, optionally, -10 dB, -20 dB, and -infinity. Selections are made by pressing and holding the CARRIER switch until the desired level appears on the display above the switch, and then releasing the switch. For -infinity, the operator selects the blank display. Carrier suppression is automatically set at -6 dB for the MCW and AM operating modes. The CARRIER display is blank when operating in FM, FSK, CW, or AFSK modes.

3.3.2.2.4 Audio Source Selection

The RF-1310 Exciter has a total of six audio inputs. They include the front panel microphone jack and five rear panel 600-ohm input ports LSB, USB, AUX 1, AUX 2, and AUX 3. Allowable audio sources are limited by the selected mode listed in table 3-1.

Table 3-1. Audio Source Selection

Mode	Selectable Audio Inputs
USB	MIC, AUX 1, AUX 2, AUX 3, and USB.
LSB	MIC, AUX 1, AUX 2, AUX 3, and LSB.
2ISB, 4ISB	Same as for USB and LSB modes. Same source can be used for both side bands.
FM	MIC, AUX 1, AUX 2, AUX 3, and LSB.
CW, MCW, FSK	No audio inputs are selected for these modes. Display will be blank.
AFSK	AUX 1, AUX 2, AUX 3, and USB.
AM	MIC, AUX 1, AUX 2, AUX 3, and USB.

To select an audio source for USB, LSB, FM, AFSK, or AM modes, simply press and hold the AUDIO switch until the desired source appears on the display above the switch. For the 2ISB and 4ISB modes, the display will list two audio sources. The source for USB will be displayed on the right, the source for LSB will be displayed on the left. The sources displayed will be those last used in the USB and LSB modes. To change the selection for the 2ISB and 4ISB modes, the operator must place the exciter in the individual operating modes.

3.3.2.2.5 RF Power Control

The operator can reduce the system rf output level by up to 50 dB. The amount of attenuation is displayed above the RF POWER switch. A 00 display indicates that the system output is at its nominal level. To change the display the operator must:

- a. Press and release the RF POWER switch. The LED next to the indicator will light.
- b. Use the keypad to change the display. Digits are entered from left to right and are dimmed to half brightness as they are changed.
- c. Press and release the ENTER key to complete the entry. The display will return to full brightness.

3.3.2.2.6 CLIP Switch

Clipping is used to limit the peak amplitude of the audio signal so the HF radio signal will have a higher average power level. The clipping feature can be selected in the USB, LSB, 2ISB, 4ISB, and AM modes. The feature may not be selected in the FM, FSK, AFSK, CW, and MCW modes. The CLIP pushbutton switch on the exciter front panel is used to enable and disable the clipping circuit. The LED above the switch is lit when the circuit is enabled.

The gain of the clipping amplifier is adjustable, thereby yielding a variable clipping level from 3 dB to 15 dB. Detailed discussion of the clipping circuit and clipping level adjustments are described in subsection A5A2.

3.3.3 Power Amplifier Control

The AMP OFF, STBY, OPER, and TUNE switches are used to control the power amplifier (PA). LEDs above the switches indicate the status of the PA. System response to these controls will depend upon the particular application. The AMP OFF switch is used to turn the PA off. The PA will be forced to AMP OFF status when the exciter is turned on. Pressing and releasing the STBY switch places the PA in standby. The OPER switch is used to change the PA status to operational. Most power amplifiers require a warmup period before they become operational. The length of the warmup period and the way the PA responds to the OPER switch is system dependent.

The TUNE switch is used to initiate a tune sequence in the PA and antenna coupler if used. The meaning of TUNE and READY indicators is system dependent. Generally, these indicators are both off when the exciter is turned on. After a frequency has been selected and the PA is operational, the tune sequence can be initiated. In most systems, the TUNE indicator will be lit during the tuning sequence. Upon completion of the sequence, the TUNE indicator turns off and the READY indicator comes on.

In some systems, the TUNE indicator is used to show the state of the Tune Power Request Line. In these systems, the TUNE indicator will be lit during the tuning sequence and when the coupler is requesting tuning power.

3.4 PROGRAMMING CHANNELS

Follow the instructions below to program channels:

- a. Select PROG position on rotary switch.
- b. Press CHANNEL button, and select channel number via keyboard.
- c. Press any of the following buttons to select desired conditions in any order:
 - FREQUENCY (Keyboard selectable)
 - MODE (Scroll function)
 - CARRIER (If valid for mode chosen, scroll function)
 - AUDIO (If valid for mode chosen, scroll function)
 - RF POWER (Keyboard selectable)
 - CLIP (If valid for mode chosen)

For example, to program channel 4 to the following conditions, perform steps a through k:

- FREQUENCY = 10.015 MHz
 - MODE = USB
 - CARRIER = -16 dB
 - AUDIO = MIC
 - RF POWER = -5 dB
 - CLIP = ON
- a. Select PROG position on rotary switch.
 - b. Press CHANNEL button. Use keyboard to enter 04. Press ENTER.
 - c. Press FREQUENCY button. Use keyboard to enter 1001500. Press ENTER.
 - d. Press MODE button. Scroll to USB.
 - e. Press CARRIER button. Scroll to -16 dB.
 - f. Press AUDIO button. Scroll to MIC.
 - g. Press RF POWER button. Use keyboard to enter 05. Press ENTER.
 - h. Press CLIP button if LED is not already on.
 - i. Press LOAD button. Channel 4 has now been programmed.
 - j. To program another channel, press CHANNEL button, and begin process again with new parameters.
 - k. To conclude programming, place rotary switch in any other position.

Programmed channels are stored in a battery backed up CMOS RAM. At powerup, the microprocessor checks the validity of the RAM and alerts the operator in case of failure by displaying a message on the alphanumeric display on the exciter front panel. Loss or damage to data for any single channel can be detected on powerup, and will cause a reinitialization of that channel to a default of 00.00000 MHz, USB, carrier suppression at - infinity, power reduction 00 dB. Such a frequency will disable keylines, so that the operator will note the channel was lost.

3.4.1 Recall Function

The recall function allows the operator to view the stored parameters of any channel while programming other channels, without affecting the contents of any channel.

To use RECALL, the exciter must be in the PROG mode. To view the contents:

- a. Press CHANNEL.

- b. Enter the channel number via the keyboard.
- c. Press RECALL.

The display will be updated to the contents of the recalled channel.

3.5 REMOTE

The REMOTE position on the rotary switch puts the exciter into remote control. When switched into REMOTE, the exciter is set up to the parameters last used in REMOTE, and put into standby. When the exciter is under remote control, all pushbuttons are ignored except the ENTER button. If the exciter is under remote control and the ENTER button is held depressed for several seconds, the alphanumeric display will momentarily show both the baud rate and address that the exciter is configured to for remote control purposes.

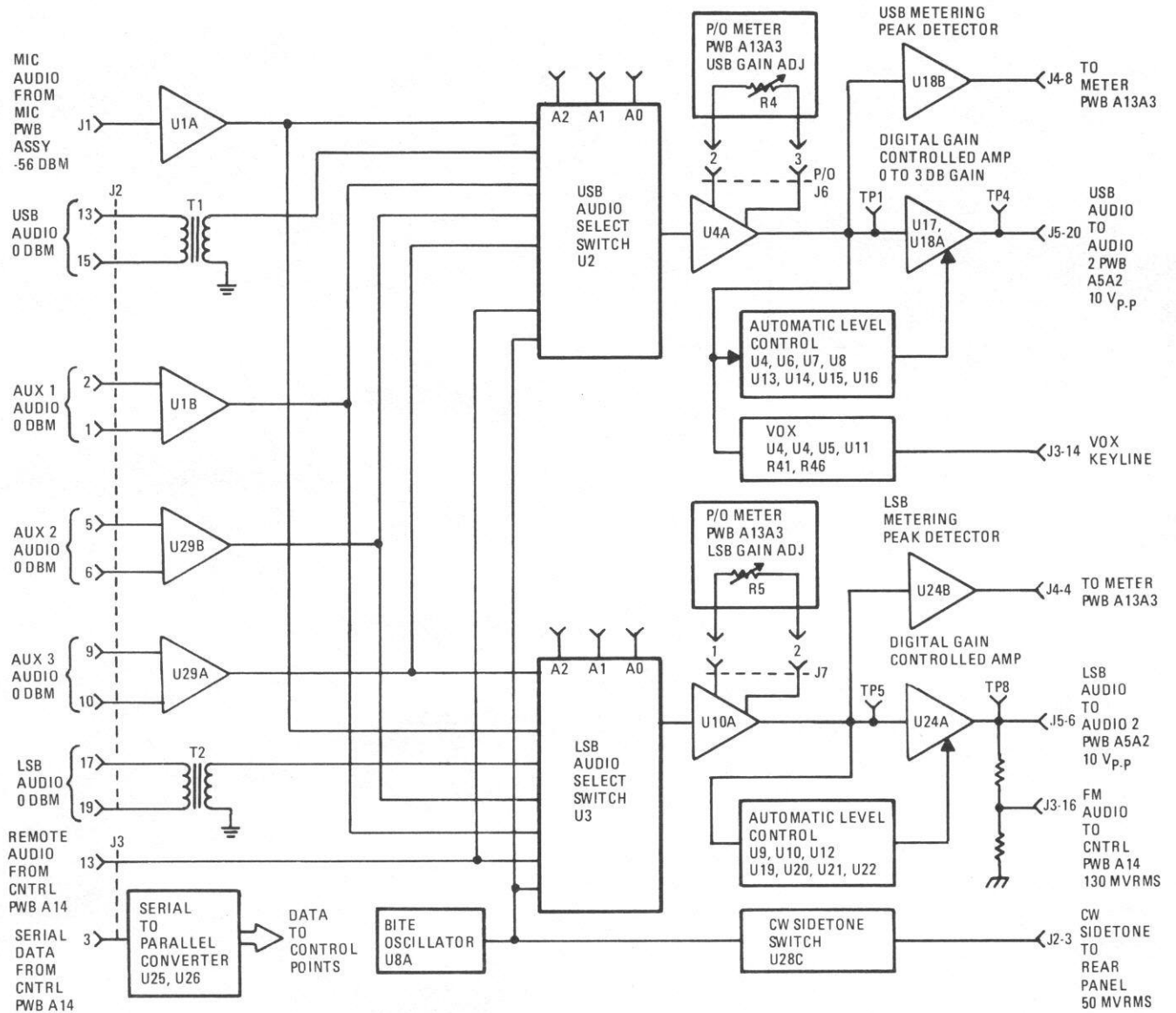
3.6 RF-1310 TEST MODE

The test mode is entered by selecting the TEST position on the exciter rotary switch. Unless in Amp Off state, the exciter immediately enters standby status, then goes into self test, starts a lamp test on the front panel, and performs the following checks:

- a. Processor program ROM validity
- b. Processor RAM memory functionality
- c. Synthesizer lock and data word tests
- d. A/D measurement test
- e. IF signal path checks
- f. RF signal path checks
- g. System interface assembly test
- h. Remote test

The alphanumeric display informs the operator of test results by displaying the faulty module number and a fault code for that module, or the message "TEST PASSED". If all tests pass, but the exciter is using the secondary frequency standard, the alphanumeric display shows "PRI FREQ STD FAIL". The STBY or AMP OFF LEDs remain lit after execution of BITE. Turn selector switch to NORMAL to return to regular exciter operation. The Maintenance section of this manual details the BITE tests as well as the module fault codes.

A5A1 AUDIO 1 ASSEMBLY



AUDIO 1 ASSEMBLY A5A1

1. GENERAL DESCRIPTION

Audio 1/Audio 2 Assembly A5 consists of the following two PWBs:

- Audio 1 Motherboard Assembly A5A1 (10121-5410)
- Audio 2 Assembly A5A2 (10121-5450)

Figure 1 shows the relative position of the A5A1 assembly in the exciter chassis

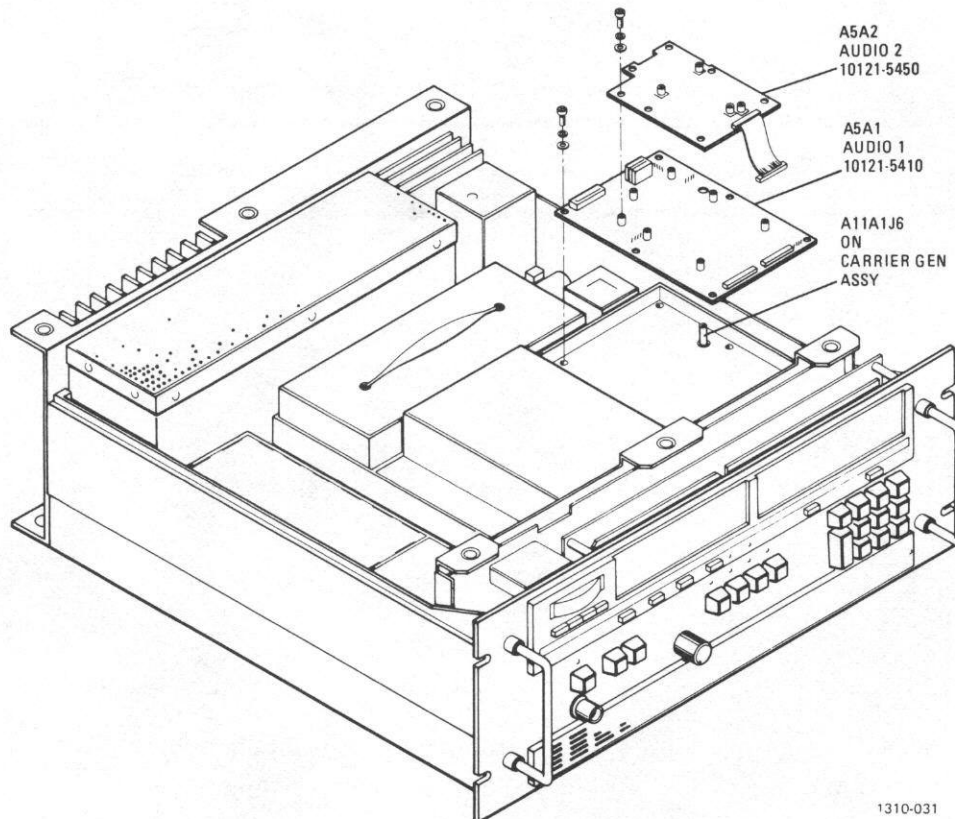


Figure 1. Audio 1 Motherboard Assembly

Audio 1 assembly A5A1 serves as the input to the exciter signal path. It supplies a processed audio output for each sideband to the balanced modulators of the A5A2 assembly. The Audio 1 assembly circuits provide the following functions:

- Audio source selection for each sideband signal path.
- ALC/Manual gain control for each sideband
- VOX operation (USB path only)
- Logarithmic detection of audio levels for metering
- BITE oscillator/CW sidetone generation
- FM audio output (LSB path only)

2. INTERFACE CONNECTIONS

Table 1 details the various input/output connections and other relevant data.

Table 1. Audio 1 Assembly A5A1 Interface Connections

Connector	Function	Characteristics
J1-1	MIC Input	150-ohm nominal; -56 dBm nominal
J1-2	Index Key	
J1-3	MIC GND Return	
J2-1	AUX 1 Audio	600-ohm balanced; 0 dBm nominal
J2-2	AUX 1 Audio	600-ohm balanced; 0 dBm nominal
J2-3	CW Sidetone	600-ohm unbalanced; 50 mV _{rms}
J2-4	Ground	
J2-5	AUX 2 Audio	600-ohm balanced; 0 dBm nominal
J2-6	AUX 2 Audio	600-ohm balanced; 0 dBm nominal
J2-7	Spare	
J2-8	Ground	
J2-9	AUX 3 Audio	600-ohm balanced; 0 dBm nominal
J2-10	AUX 3 Audio	600-ohm balanced; 0 dBm nominal
J2-11	Spare	
J2-12	Spare	
J2-13	USB Audio	600-ohm balanced; 0 dBm nominal
J2-14	USB Audio CT	
J2-15	USB Audio	600-ohm balanced, Trans.; 0 dBm nominal
J2-16	Spare	
J2-17	LSB Audio	600-ohm balanced, Trans.; 0 dBm nominal

Table 1. Audio 1 Assembly A5A1 Interface Connections (Cont.)

Connector	Function	Characteristics
J2-18	LSB Audio CT	
J2-19	LSB Audio	600-ohm balanced, Trans.; 0 dBm nominal
J2-20	Spare	
J3-1	Rear Serial Data	0 - 5 Vdc Logic
J3-2	Serial Clock	0 - 5 Vdc Logic
J3-3	A5 Serial Check	0 - 5 Vdc Logic
J3-4	Rear Serial Enable	0 - 5 Vdc Logic
J3-5	Spare	
J3-6	USB ALC BITE	
J3-7	USB IF BITE	
J3-8	LSB ALC BITE	
J3-9	LSB IF BITE	
J3-10	Rem. Line Audio GND	
J3-11	Spare	
J3-12	Spare	
J3-13	Spare	
J3-14	VOX Keyline	0 Vdc Active
J3-15	Ground	
J3-16	FM Audio	130 mV _{rms} nominal
J3-17	Spare	
J3-18	Power, -15 Vdc	
J3-19	Internal Keyline	0 Vdc Active
J3-20	Power, + 15 Vdc	
J3-21	Spare	
J3-22	Clip Enable	+ 5 Vdc Enables clipping
J3-23	Spare	
J3-24	Spare	
J4-1	Log Amp Input	
J4-2	Spare	
J4-3	Ground	
J4-4	LSB Meter Dc	
J4-5	Spare	
J4-6	Spare	
J4-7	Log Amp Output	

Table 1. Audio 1 Assembly A5A1 Interface Connections (Cont.)

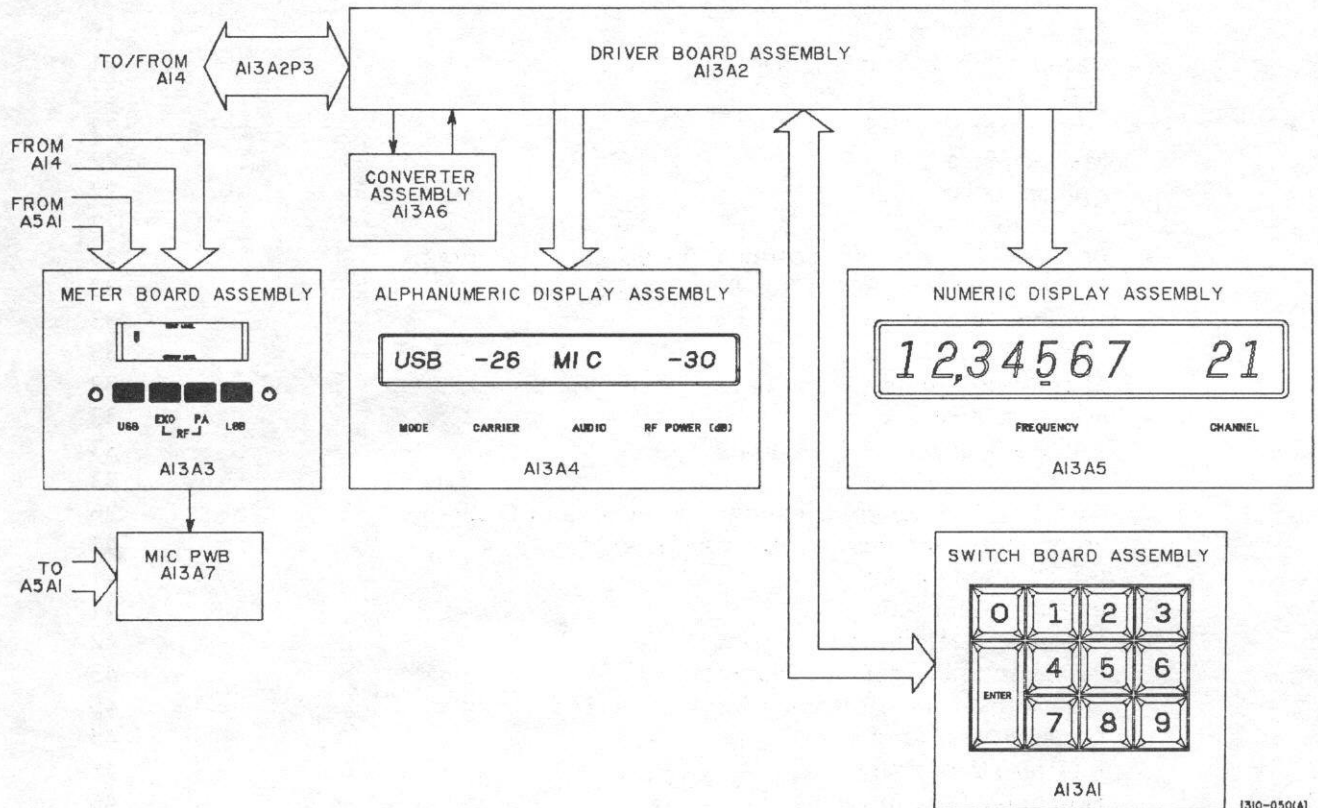
Connector	Function	Characteristics
J4-8	USB Meter Dc	
J5-1	Clip Enable	+ 5 Vdc Enable clipping
J5-2	Spare	
J5-3	LSB Carrier Select	+ 5 Vdc Enables LSB carrier
J5-4	Spare	
J5-5	Spare	
J5-6	LSB Audio	10 V _{p-p} , nominal
J5-7	Spare	
J5-8	Spare	
J5-9	LSB IF BITE	
J5-10	USB IF BITE	
J5-11	Power, + 5 Vdc	
J5-12	LSB ALC BITE	
J5-13	USB ALC BITE	
J5-14	Spare	
J5-15	Power, -15 Vdc	
J5-16	Spare	
J5-17	Power, + 15 Vdc	
J5-18	Ground	
J5-19	USB Carrier Select	+ 5 Vdc enables USB carrier
J5-20	USB Audio	10 V _{p-p} , nominal
J6-1	Index Key	
J6-2	USB Audio Gain	
J6-3	USB Audio Gain USB Return	
J7-1	LSB Audio Gain	
J7-2	LSB Audio Gain LSB Return	
J7-3	Index Key	

3. A5A1 CIRCUIT DESCRIPTIONS

Figure 2 is a block diagram of the Motherboard circuit.

A13

FRONT PANEL ASSEMBLY



8. MICROPHONE ASSEMBLY A13A7

8.1 General Description

Microphone Assembly A13A7 includes the front panel microphone jack and three simple LC filter circuits. Filtering is provided for the AUDIO, CW KEY, and PTT signals. Two connectors on the PWB accept cables that carry the AUDIO signal to the A5A1 assembly and the CW KEY and PTT signals to the A13A3 assembly.

8.2 Interconnection

The interconnections of the A13A7 assembly with the other assemblies in the exciter are summarized in table 16.

Table 16. Microphone Assembly A13A7 Interconnections

Connector and Pin	Signal Name	Description
J1-A	GND	Ground
J1-B	N/C	Not connected
J1-C	PTT	PTT key signal
J1-D	AUDIO	Microphone audio in
J1-E	CW KEY	CW key signal
J1-F	N/C	Not connected
J2-1	GND	Ground
J2-2	INDEX KEY	Connector alignment key
J2-3	CW KEY	CW key signal to Meter Board
J2-4	PTT	PTT key signal to Meter Board
J3-1	AUDIO	Audio to A5A1 assembly (-56 dB nominal)
J3-2	AUDIO KEY	Audio ground
J3-3	INDEX KEY	Connector alignment key

8.3 Circuit Description

Microphone Assembly A13A7 circuit includes three separate LC filters; one each for the AUDIO, CW KEY, and PTT signals.

8.4 Parts List, Component Locations, and Schematic Diagram

All replaceable components of the microphone Assembly A13A7 are listed in table 17. Component locations are shown in figure 21. The Microphone Assembly schematic diagram is shown in figure 22.

Table 17. Microphone Assembly A13A7 Parts List

Ref. Desig.	Part Number	Description
A13A7	10121-2900	MICROPHONE ASSEMBLY
C1	M39014/02-1310	CAP .1UF 10% 100V CER-R
C2	M39014/02-1310	CAP .1UF 10% 100V CER-R
C3	M39014/02-1310	CAP .1UF 10% 100V CER-R
J1	J-0339	CONN AUDIO 6 PIN
J2	J46-0032-004	CONN,4 PIN
J3	J46-0032-004	CONN,4 PIN
L1	MS75085-8	COIL 120UH 10% FXD RF
L2	MS75085-2	COIL 39UH 10% FXD RF
L3	MS75085-2	COIL 39UH 10% FXD RF

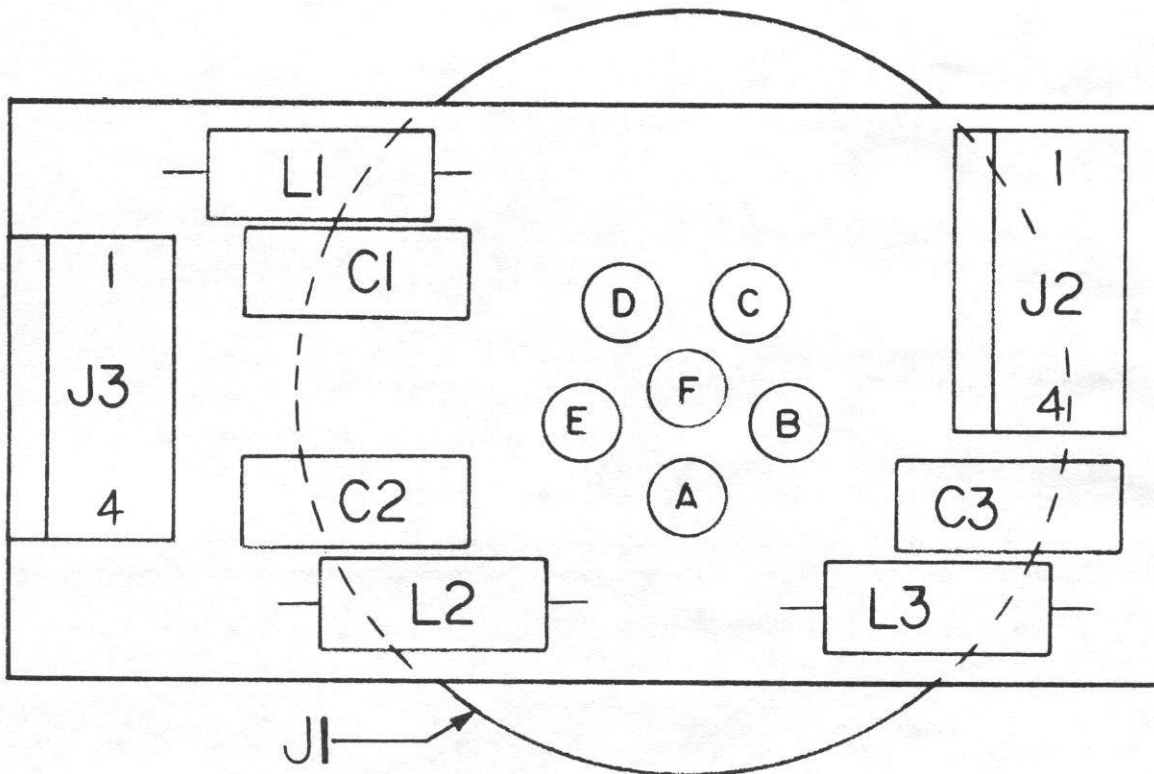


Figure 21. Microphone Assembly A13A7 Component Locations Diagram (10121-2900)

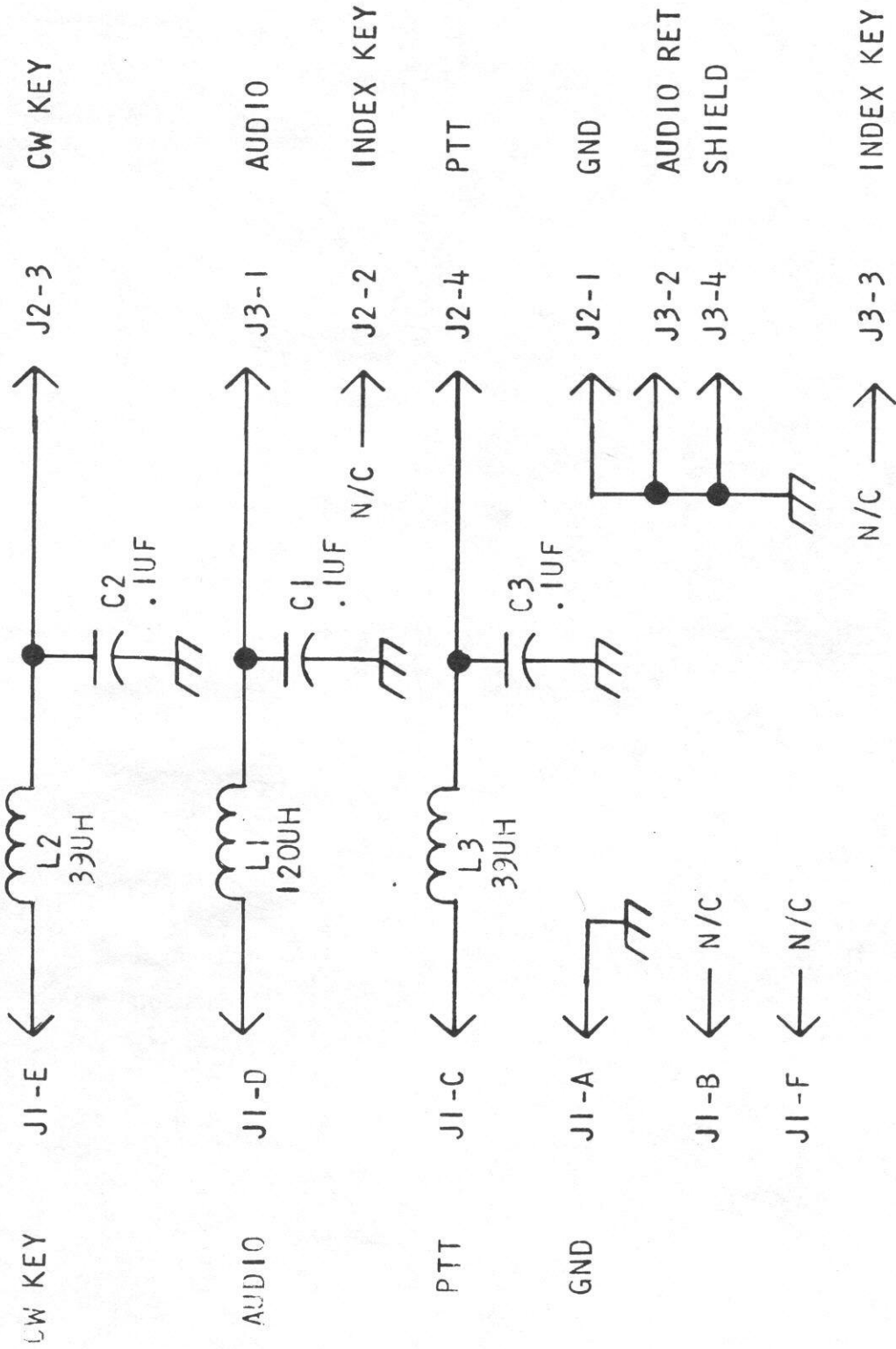


Figure 22. Microphone Assembly A13A7 Schematic Diagram (10121-2901 Rev. B)



HARRIS
RF COMMUNICATIONS

RF-110A

RADIO FREQUENCY AMPLIFIER

INSTRUCTION MANUAL



Table 2-1. RF-110A Primary Source and Power Supply Data

When Desired Primary Power Is	RF-110A Configuration Description Is	Power Supply Data
440 Vac, 3-phase, 60 Hz	1A1T1 is strapped for 440 Vac; 1A1P5 is installed on 1A1TB2; 7 ampere time delay fuses are installed in 1A1XF1, 1A1XF2 and 1A1XF3.	If RF-112A Power Supply is used, jumper 2A2P2 is installed on 2A2TB1.
208 Vac, 3-phase, 60 Hz	1A1T1 is strapped for 208 Vac; 1A1P5 is installed on 1A1TB2; 15 Ampere time delay fuses are installed in 1A1XF1, 1A1XF2 and 1A1XF3.	If RF-112A Power Supply is used, jumper 2A2P1 is installed on 2A2TB1.
208 Vac, 3-phase, 50 Hz	1A1T1 is strapped for 208 Vac; 1A1P5 is installed on 1A1TB2; 20 Ampere time delay fuses are installed in 1A1XF1, 1A1XF2 and 1A1XF3.	If RF-112A Power Supply is used, jumper 2A2P1 is installed on 2A2TB1.
115 Vac, 3-phase, 400 Hz	1A1T1 is strapped for 115 Vac; 1A1A8P1 is installed on 1A1TB1; 1A1A8P2 is installed on 1A1TB2. High Voltage Lead is connected to 1A1E33; connector, part no. 391-9040, is installed on 1A2J1. 30A Time Delay fuses installed in 1A1XF1, 1A1XF2 and 1A1XF3.	RF-111A Power Supply is used.
208/230 Vac, single phase, 50/60 Hz	1A1T1 is strapped for 230 Vac or 208 Vac; 1A1P5 is installed on 1A1TB2; 30 Ampere time delay fuses are installed in 1A1XF1, 1A1XF2 and 1A1XF3.	RF-124 Power Supply is used.

NOTE

**FUSE REQUIREMENTS FOR 50 Hz OR 60 Hz
PRIMARY POWER OPERATION**

For 208V 3-phase primary power operation, the primary power fuses 1A1F1, 1A1F2, and 1A1F3 on the RF-110A front panel are either 15 amp slow-blow, or 20 amp slow-blow, depending on the frequency of the primary power. Install 15 amp (buss FNW-15), (RF part number; F10-0002-015) fuses for operation on 60 Hz mains. Install 20 amp, slow-blow fuses (buss FNW-20), (RF part number; F10-0002-020) for operation on 50 Hz mains.

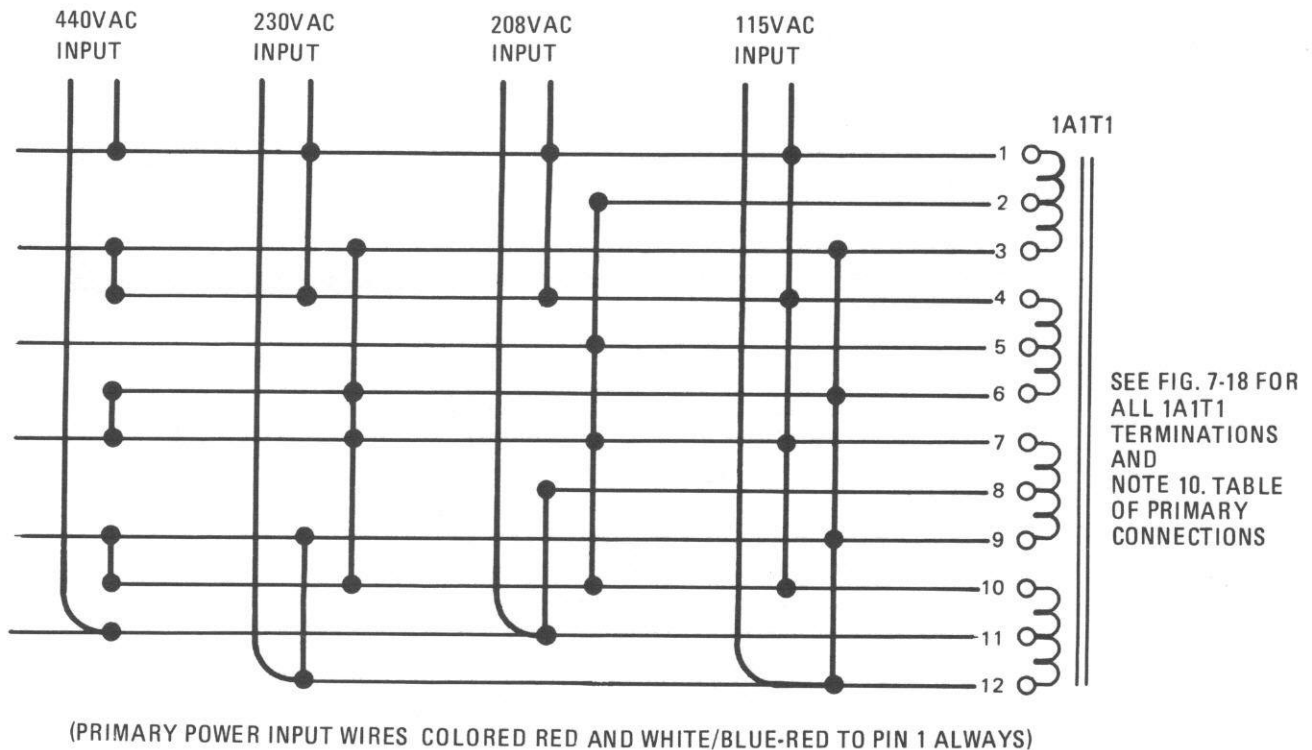
2.4 RF-110A INTERCONNECTION REQUIREMENTS

There are five basic interconnections required for the RF-110A to perform its intended function. These are:

- Primary power input connection
- Power supply unit connection
- RF input connection
- RF output connection
- External control connection

The RF-110A can serve as a central interconnection point in complex installations involving remote operator positions, transmitter/operator switchboards, remote automatic antenna couplers, etc. Consequently, the actual number of interconnections will depend on user requirements.

A complete set of mating connectors is supplied in the ancillary kit. Tables 2-2 through 2-7 list connector pin number/function correlation data. Figure 7-23 shows the appropriate case assembly connector data. Note that most of the connections entering Transmitter Interface Connector 1A2J2 are jumpered through the RF-110A to Exciter Input/Output Connector 1A2J7, for use by an external exciter.



110A-10(1)

Figure 2-3. RF-110A Primary Power Strapping Data

Table 2-2. RF-110A Primary Supply Connector 1A2J1 Pin Number/Function Correlation

1A2J1 Pin No.	Function	Remarks	Suggested Minimum Wire Size
A	Phase A Primary Power Input	Delivers Phase A power to Power Supply.	14
B	Phase B Primary Power Input	Delivers Phase B power to Power Supply.	14
C	Phase C Primary Power Input	Delivers Phase C power to Power Supply.	14
D	Phase B-T2 Primary Power Input	Used by Power Supply to develop blower power and 115 Vac for auxiliary equipment.	22
E	Phase A-T2 Primary Power Input	Used by Power Supply to develop blower power and 115 Vac for auxiliary equipment.	22
F	115 V Common	115 Vac from Power Supply for auxiliary equipment and bandswitch motor.	22
G	115 V Hot	115 Vac from Power Supply for auxiliary equipment and bandswitch motor.	22
H	24 V Switched	Jumpering J1-H to J1-J activates Power Supply inverter which provides RF-110A blower power. This is accomplished by the RF-110A standby relay. Inverter creates 115 Vac, 400 Hz at J1-K and J1-L.	22
J	24 V Hot	Jumpering J1-H to J1-J activates Power Supply inverter which provides RF-110A blower power. This is accomplished by the RF-110A standby relay. Inverter creates 115 Vac, 400 Hz at J1-K and J1-L.	22
K	115 Vac, 400 Hz Hot	From inverter in Power Supply to blower and time meter in RF-110A.	22
L	115 Vac, 400 Hz Common	From inverter in Power Supply to blower and time meter in RF-110A.	22
M	+ 500 Vdc	Driver plate and screen voltage from Power Supply.	22
N	Common Ground	High voltage ground return.	22
P	Power Supply Interlock	Goes to ground via Power Supply panel interlock switch and thermal switch.	22
R	+ 2250 Vdc	RF-110A tube plate voltage from Power Supply.	18

NOTE

If an RF-112A or RF-124 Power Supply is used, Cable Assembly W3, Part Number 399-0027, prefabricated for use between the Power Supply and RF-110A, is available.

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Table 2-3. RF-110A Transmitter Interface Connector 1A2A1J2
Pin Number/Function Correlation

1A2A1J2 Pin No.	Function	Remarks	Suggested Minimum Wire Size
A	Chassis Ground	Chassis ground return	22
B	12 Vdc (+)	12 Vdc source to transmitter interface (12 Vdc when loaded).	22
C	Chassis Ground	Redundant ground.	
D	115 Vac Common	115 Vac common (spare when RF-111A Power Supply is used).	22
E	Reserved	Reserved, wired input (to 1A2A1J7-s).	22
F	Reserved	Reserved, wired input (to 1A2A1J7-j).	22
G	PTT + 12 V Key	Push-to-talk + 12 V from transmitter interface.	22
H	115 Vac Remote	115 Vac hot line to transmitter interface via exciter (spare when RF-111A Power Supply is used).	22
S	CW/RATT Key	CW/RATT Keyline to exciter.	22
T	Remote 600 ohm/	Balanced Audio input (LSB) to exciter	22
U	LSB Input		Shielded pair
V	Remote 600 ohm	Balanced Audio input (USB/AM/RATT) to exciter.	22
W	USB/AM/RATT input		Shielded pair
Z	12 Vdc (-)	12 Vdc Source to transmitter interface (12 Vdc when loaded).	22
a	Ground Interlock	Coupler ground interlock (if used).	22
b	Ground Keyline	Ground keyline to/from exciter and coupler.	22
d	Keyline Interlock	Power amplifier keyline interlock.	22

Table 2-4. RF-110A Primary Power Input Connector 1A2J5
Pin Number/Function Correlation

1A2J5 Pin No.	Function	Remarks	Suggested Minimum Wire Size
A	Phase A primary power input	Filtered by line filter 1A2FL1.	12 (600 V)
B	Phase B primary power input	Filtered by line filter 1A2FL1.	12 (600 V)
C	Phase C primary power input	Filtered by line filter 1A2FL1.	12 (600 V)

Table 2-5. RF-110A Antenna Coupler Connector 1A2A1J6 Pin Number/Function Correlation

1A2A1J6 Pin No.	Function	Remarks	Suggested Minimum Wire Size
A	Chassis Ground	Ground return.	22
B	Keyline Ground	Grounding J6-B will key the driver and final amplifiers. (J8-B to D or J2-b to d jumper is required.)	22
E	Ground Pulse	Momentary ground used by antenna coupler (RF-601A) to initiate automatic tune cycle.	22
F	Tune Ground	Grounding J6-F will limit the RF-110A power output to 200 watts (with proper APC connections to external exciter).	22
G H I	Spares	Pins G, H, and I are wired spares.	22
J	Coupler Interlock	Grounding J6-J will inhibit RF-110A keying.	22
L M	115 Vac Hot 115 Vac Common	115 Vac, single phase auxiliary power for antenna coupler.	22

Table 2-6. RF-110A Exciter Input-Output Connector 1A2A1J7 Pin Number/Function Correlation

1A2A1J7 Pin No.	Function	Remarks	Suggested Minimum Wire Size
A	Band Code Line 1	Determines the frequency band at which the RF-110A will operate.	22
B	Band Code Line 2		22
C	Band Code Line 3		22
D	Band Code Line 4		22
E	Band Code Line 5		22
F	Spare		22
G	CW/RATT Ground	Grounding Pin G will transfer final amplifier bias from class AB to class B, for CW or RATT operation. Averaging circuit is removed from the APC detector.	22
H	Chassis Ground	Ground return.	22
J	+ 28 V Interlock	+ 28 V output except when keying is inhibited; used to inhibit exciter keying.	22
K	Ground Keyline	Grounding Pin K will key the driver and final amplifiers. (Jumper from J8-B to D or J2-b to d is required).	22

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Table 2-6. RF-110A Exciter Input-Output Connector 1A2A1J7 Pin Number/Function Correlation (Cont.)

1A2A1J7 Pin No.	Function	Remarks	Suggested Minimum Wire Size
M	+ 28 V Standby and Operate	Applying + 28 V to Pin M will turn on RF-110A filament and bias supplies.	22
N	+ 20 V Operate	Applying + 20 V at Pin N will turn on all high voltages.	22
P	Ground Pulse	Momentary ground used by antenna coupler RF-601A to initiate automatic tune cycle.	22
R	115 Vac Hot	115-Vac, single-phase output for external exciter.	22 Shielded
S	115 Vac Common	115-Vac, single-phase output for external exciter.	22 Shielded
T	+ 20 V Carrier Insert	+ 20 V is present at J7-T When RF-110A front panel key switch is placed at TUNE KEY position, or when an associated antenna coupler (e.g., RF-601A) requests tune carrier. Used by an exciter to deliver a steady carrier Tune Signal for tuning an antenna coupler.	22
U	115 Vac Remote	115 Vac supplied to the transmitter interface connector from the exciter for auxiliary use.	22 Shielded
V	Reserved	Reserved, wired input (to 1A1J5-F).	22
X	Reserved	Reserved, wired input (to 1A2A1J2-J).	22
Z	Chassis Ground	Redundant chassis ground.	22
c	CW/RATT Key	CW/RATT keyline to exciter.	22
d	APC	Average Power Control line from RF-110A.	22 Shielded
e	PPC	Peak Power Control line from RF-110A.	22 Shielded
f	Remote 600 ohm	Balanced LSB audio from transmitter interface to the exciter.	22 Shielded
g	LSB input		
h	Shield Ground	Shield ground for APC line (d) and PPC line (e).	
j	Reserved	Reserved, wired to 1A2A1J2-F input.	22
k	PTT + 12 V Key	Push-to-talk, + 12 V from transmitter interface to the exciter.	22
n	12 Vdc (-)	12 V source to transmitter interface.	22

Table 2-6. RF-110A Exciter Input-Output Connector 1A2A1J7 Pin Number/Function Correlation (Cont.)

1A2A1J7 Pin No.	Function	Remarks	Suggested Minimum Wire Size
p	Remote 600 ohm USB/AM input	Balanced USB/AM audio from transmitter interface to exciter USB/AM/ISB audio input.	22 Shielded
r			
s	Reserved	Reserved, wired to 1A2A1J2-E input.	22

Table 2-7. RF-110A Accessory Connector 1A2A1J8 Pin Number/Function Correlation

1A2A1J8 Pin No.	Function	Remarks	Suggested Minimum Wire Size
A	Chassis Ground	Ground Return.	22
B	Ground Keyline	J8-B and J8-D (or J2-b and J2-d) must be jumpered in order to key the RF-110A.	22
C	+ 28 Vdc	+ 28 Vdc for accessory use.	22
D	Keyline Interlock	J8-B and J8-D (or J2-b and J2-d) must be jumpered in order to key the RF-110A.	22
E	CW/RATT	Grounding J8-E will transfer PA bias from class AB to class B, for CW or RATT operation.	22

CAUTION

When the RF-110A auxiliary voltage outputs are used to power external equipment, be sure that total current drain for all external equipment does not exceed the RF-110A capability. The total drain on the auxiliary outputs should not exceed the following:

115 Vac single phase	1.6 Amperes (185 watts)
28 Vdc	0.5 Amperes
12 Vdc	0.9 Amperes

Table 2-8 lists the four basic control functions needed by the RF-110A. These functions are intended to be supplied by the mode selector switch on the exciter with which the RF-110A is used. This type of interconnection will yield the simplest operating procedure for the overall system because operation remains essentially the same as it would for the exciter alone.

If control independent of the exciter is more desirable, it can be obtained with a simple control box shown in figure 2-4.



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RF-590 RECEIVER

INSTRUCTION MANUAL



2.6 INPUT/OUTPUT CONNECTIONS

The RF-590 is a complete receiver independent of all other equipment. It requires only the appropriate power and antenna connections. All other input/output connectors are used to expand and integrate features of the receiver or the system. RF-590 input and output connectors are shown and their uses explained in figure 2-4.

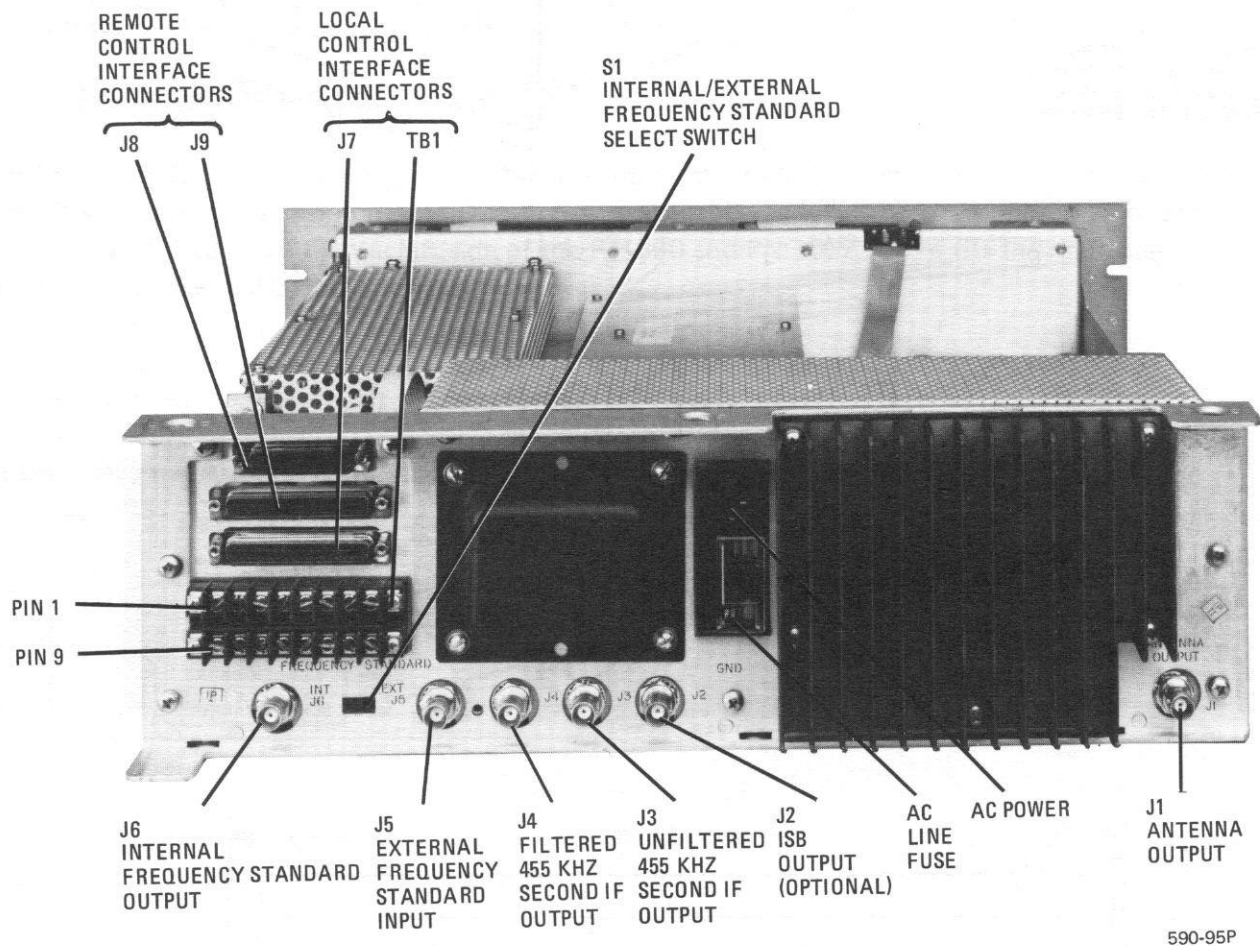


Figure 2-4. RF-590 Rear Panel

All RF type connectors are standard BNC, 50 ohm connections. Table 2-2 details the RF-590 local control functions available at TB1. Table 2-3 details the RF-590 local control functions available at J7. (Note that all of the TB1 inputs/outputs also appear at J7). Table 2-4 details the RF-590 remote control connectors J8 (RS-232) and J9 (RS-422).

Table 2-2. RF-590 Local Interface Terminal Board TB1

Pin	Function
TB-1	GND
TB-2	USB AGC Dump
TB-3	USB AGC In
TB-4	Combined AGC
TB-5	ISB AGC Out
TB-6	ISB AGC Dump
TB-7	ISB AGC In
TB-8	Fault
TB-9	USB Line Audio
TB-10	USB Line Audio CT
TB-11	USB Line Audio
TB-12	USB AGC Out
TB-13	ISB Line Audio
TB-14	ISB Line Audio CT
TB-15	ISB Line Audio
TB-16	EXT Mute

Table 2-3. RF-590 Local Control Interface Connector J7

Connector and Pin	Function
J7-1	Remote Out 1
J7-2	GND
J7-3	Scan Step
J7-4	Remote Out 0
J7-5	Stop Scan
J7-6	Spare (To Control Board)
J7-7	Ext. Mute

Table 2-3. RF-590 Local Control Interface Connector J7 (Cont.)

Connector and Pin	Function
J7-8	ISB Line Audio
J7-9	ISB Line Audio CT
J7-10	ISB Line Audio
J7-11	USB AGC Out
J7-12	USB Line Audio
J7-13	USB Line Audio CT
J7-14	USB Line Audio
J7-15	Ext. Audio In
J7-16	Ext. Speaker GND
J7-17	Ext. Speaker Out
J7-18	Ext. Speaker Out
J7-19	Ext. Speaker GND
J7-20	Strobe 2
J7-21	Spare (To Control Board)
J7-22	Remote Out 2
J7-23	Strobe 1
J7-24	Clock
J7-25	Data
J7-26	Fault
J7-27	ISB AGC In
J7-28	ISB AGC Dump
J7-29	ISB AGC Out
J7-30	Combined AGC
J7-31	USB AGC In
J7-32	USB AGC Dump
J7-33	GND

Table 2-3. RF-590 Local Control Interface Connector J7 (Cont.)

Connector and Pin	Function
J7-34	Ext. Speaker GND
J7-35	Ext. Speaker Out
J7-36	Ext. Speaker Out
J7-37	Ext. Speaker GND

Table 2-4. RF-590 Remote Control Interface Connectors J8 and J9

Connector and Pin	Function
J8-1	Shield
J8-2	Tx Data 232/188C
J8-3	Rx Data 232/188C
J8-4	FSK -
J8-5	FSK +
J8-6	ID0
J8-7	GND
J8-8	ID1
J8-9	ID4
J8-10	BR1
J8-11	BR2
J8-12	N/C
J8-13	N/C
J8-14	Spare
J8-15	ID3
J8-16	ID2
J8-17	ID5
J8-18	ID6
J8-19	GND

Table 2-4. RF-590 Remote Control Interface Connectors J8 and J9 (Cont.)

Connector and Pin	Function
J8-20	Spare
J8-21	Spare
J8-22	BR3
J8-23	BR0
J8-24	N/C
J8-25	N/C
J9-3	Bus Req.
J9-4	RS-422 Out +
J9-6	RS-422 In +
J9-19	GND
J9-20	RS-422 In -
J9-21	Bus Available
J9-37	RS-422 Out -
NOTE	
All other J9 pins are spares with no internal connections.	

2.7 RF-590 FUNCTIONAL CHECKOUT PROCEDURE

The following is a local control functional test to determine the satisfactory operation of the RF-590. The following equipment (or equivalent) is required.

- HP-8640B Signal Generator
- HP-5383A Frequency Counter

The following paragraphs briefly describe RF-590 operation. The operator may find it useful to read section 3, Operation, prior to or concurrently with this procedure. Connect the above equipment as shown in figure 2-5.