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SLC, UT

OPERATOR – MAINTENANCE
INSTRUCTION MANUAL/TM-0210 (REV 5)
(For Units with Serial Nos. above 1850)

SR-206, SR-210
SR-206MS, SR-210MS
SR-206MD, SR-210MD
HF SSB TRANSCEIVER

SERIAL NO. 1102 CAMPER **MAY 1973**



SCIENTIFIC RADIO SYSTEMS INC.
367 ORCHARD STREET
ROCHESTER, NEW YORK U.S.A.

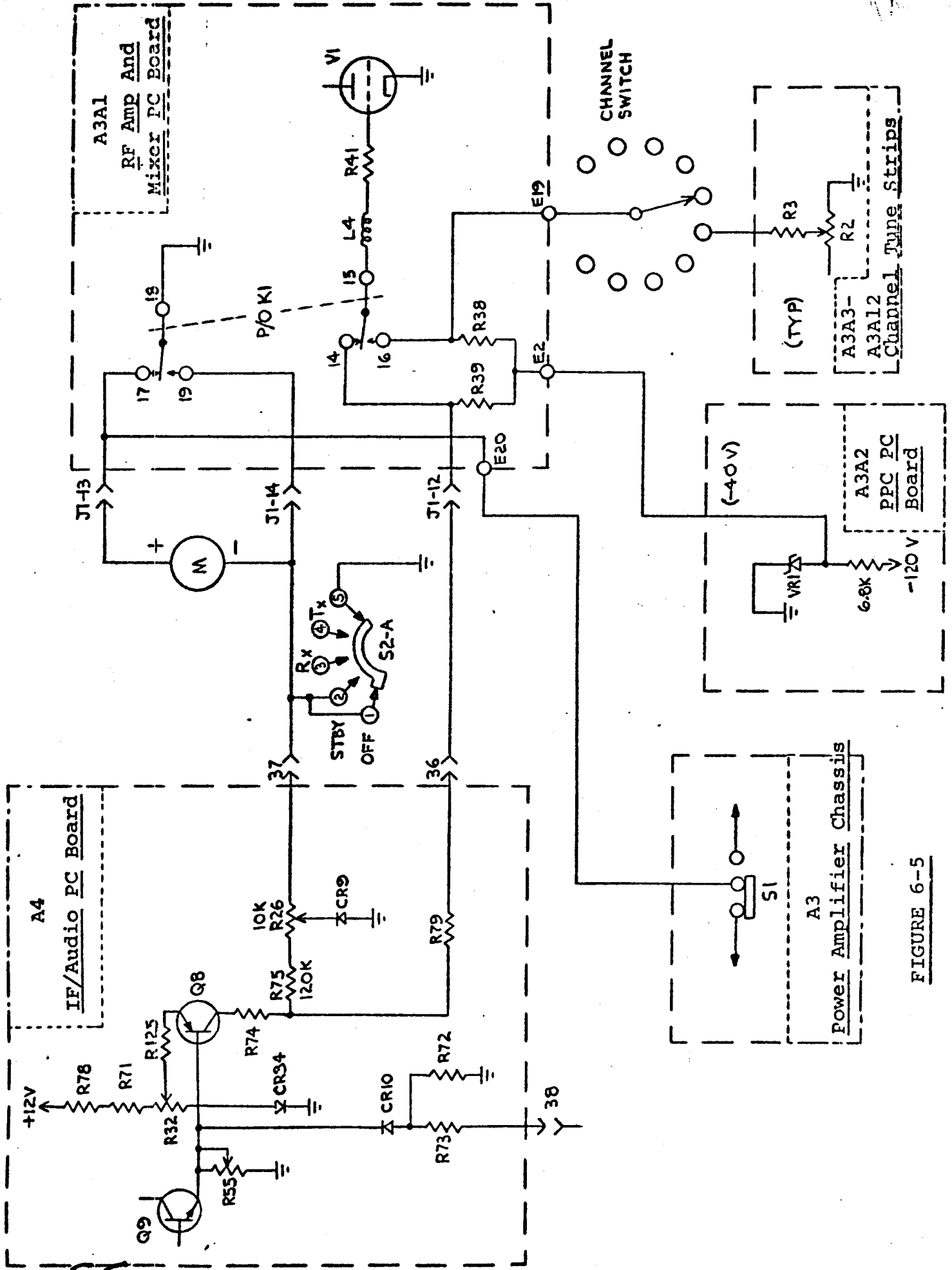


FIGURE 6-5

Transceiver Meter Circuit

WARRANTY

Scientific Radio Systems, Inc. Warrants the equipment described in this manual to be free from defects in material and workmanship. This warranty applies to equipment installed and operated under conditions normal to which the equipment is designed and applies for a period of one year from date of delivery. Scientific Radio Systems, Inc. will repair or replace parts which prove to be defective during the warranty period, provided they are, at our option, returned to Scientific Radio Systems. No other warranty is expressed or implied.

CORRESPONDENCE

-and-

PARTS ORDERING

Whenever writing about or ordering parts for this unit, always refer to the equipment model and serial numbers, and the approximate date of purchase. Special parts should be ordered by SRS Part Number and Schematic Designation. Standard parts can be obtained from your local distributor.

RETURN of EQUIPMENT

No parts shall be returned to Scientific Radio Systems, Inc. unless the return has been authorized by SRS.

WARNING

VOLTAGES DANGEROUS TO LIFE EXIST
WITHIN THIS EQUIPMENT. ONLY
QUALIFIED TECHNICIANS SHOULD BE
AUTHORIZED FOR REPAIR OR ALIGNMENT.

AT INSTALLATION INSURE THAT THE
EQUIPMENT IS PROPERLY CONNECTED
TO EARTH GROUND (WATER PIPE OR
SIMILAR GROUND BUS).

EVEN WITH ONLY TOP AND BOTTOM
COVERS REMOVED DANGEROUS VOLTAGES
EXIST. IN CERTAIN STAGES OF DIS-
ASSEMBLY HIGH VOLTAGES EXIST THAT
ARE DANGEROUS TO LIFE. REMOVE ALL
POWER PRIOR TO SERVICING.

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SECTION I

GENERAL INFORMATION

1.1 FUNCTIONAL DESCRIPTION.

The Transceiver described in this instruction manual is a general purpose HF SSB (high frequency single sideband) equipment suitable for use in base station, mobile or marine application. Basically the Transceiver is a ten-channel equipment but it is available in six and four channel models as well. Any ten frequencies in the 1.6 to 30.0 MHz frequency range can be set up with no restrictions on frequency spacing. Modes of operation are compatible AM (AME) and single sideband suppressed carrier. Optional accessories permit operation in selectable sideband mode (U/L) Frequency Shift Keying (FSK), CW, Voice Privacy, two frequency simplex and reduced carrier (16 db down). Power output is 150 watts PEP and 100 watts average. The entire Transceiver is self-contained and is modular in its construction. Power supplies are available for either 115/230 volts 50/60 Hz or 12/24 VDC.

1.2 ACCESSORIES OR OPTIONAL ITEMS.

- 1.2.1 AR-276 - Card Extender, 22-pin, (one pair).
- 1.2.2 AR-277 - Card Extender, 15-pin, (one pair).
- 1.2.3 SR-610M - Ten channel tapped coil automatic antenna coupler.
- 1.2.4 AR-250 - AC Power Supply; 115/230 volts 47/63 Hz or AR-250S 115V sine/square wave.
- 1.2.5 AR-260 - DC Power Supply; 12/24 volts DC.
- 1.2.6 AR-230 - Selectable Sideband Module.
- 1.2.7 AR-231 - Vox Module.
- 1.2.8 AR-232 - CW Module.
- 1.2.9 AR-233 - Squelch Module.
- 1.2.10 AR-234 - Noise Limiter Module.
- 1.2.11 AR-235 - Voice Privacy Module.
- 1.2.12 AR-236 - Teletype Keyer and Converter Module (FSK).
- 1.2.13 AR-237 - Blower Kit.
- 1.2.14 AR-238 - Telegraph Key.

General Information

1. 2. 15 AR-240 - Desk Type Dynamic Microphone.
1. 2. 16 AR-241 - Telephone Desk Set with Cradle.
1. 2. 17 AR-242 - Desk Type Ceramic Microphone.
1. 2. 18 AR-243 - Headphones.
1. 2. 19 AR-244 - Headphone with boom mike.
1. 2. 20 AR-246 - Rack Mounting Kit for 19" rack with chassis slides.
1. 2. 21 AR-251 - Mobile Shock Mounts (4).
1. 2. 22 SR-1600 - Remote Audio Control - for remote audio control only. Does not include remote channel or mode selection.
1. 2. 23 SR-1601 - Remote Control Unit (AC) - full remote control of all functions.
1. 2. 24 SR-1602 - Remote Control Unit (DC) - full remote control of all functions.
1. 2. 25 SR-1610 - Remote Control Unit Marine (AC) - full remote, auto mode programming.
1. 2. 26 Channel Module Kits for Additional Channels:

SR-206/SR-210

AR-222-A	Channel Kit for 1.6 to 2.5 MHz
AR-222-B	Channel Kit for 2.5 to 3.5 MHz
AR-222-C	Channel Kit for 3.5 to 5.5 MHz
AR-222-D	Channel Kit for 5.5 to 8.0 MHz
AR-222-E	Channel Kit for 8.0 to 12.0 MHz
AR-222-F	Channel Kit for 12.0 to 18.0 MHz
AR-222-G	Channel Kit for 18.0 to 24.0 MHz
AR-222-H	Channel Kit for 24.0 to 30.0 MHz

SR-206M/SR-210M (Marine)

AR-222-A	Channel Kit for 1.6 to 2.0 MHz
AR-222-B	Channel Kit for 2.0 to 2.25 MHz
AR-222-C	Channel Kit for 2.25 to 2.5 MHz
AR-222-D	Channel Kit for 2.5 to 3.0 MHz
AR-222-E	Channel Kit for 3.0 to 3.5 MHz
AR-222-F	Channel Kit for 3.5 to 4.0 MHz
AR-222-G	Channel Kit for 4.0 to 5.0 MHz
AR-222-H	Channel Kit for 5.0 to 6.0 MHz
AR-222-J	Channel Kit for 6.0 to 7.0 MHz
AR-222-K	Channel Kit for 7.0 to 8.0 MHz
AR-222-L	Channel Kit for 8.0 to 10.0 MHz
AR-222-M	Channel Kit for 10.0 to 12.0 MHz
AR-222-N	Channel Kit for 12.0 to 14.0 MHz
AR-222-P	Channel Kit for 14.0 to 16.0 MHz
AR-222-Q	Channel Kit for 16.0 to 18.0 MHz
AR-222-R	Channel Kit for 18.0 to 20.0 MHz

AR-222-S	Channel Kit for 20.0 to 22.0 MHz
AR-222-T	Channel Kit for 22.0 to 24.0 MHz
AR-222-U	Channel Kit for 24.0 to 26.0 MHz
AR-222-V	Channel Kit for 26.0 to 28.0 MHz
AR-222-W	Channel Kit for 28.0 to 30.0 MHz

1.2.27 Antennas:

AR-247	Doublet
AR-248	75 foot Long Wire
AR-249	150 foot Long Wire
AR-267	9 foot Whip Antenna
AR-268A	16 foot Fiberglass Whip (flange base)
AR-268B	16 foot Fiberglass Whip (feedthru base)
AR-269A	35 foot Fiberglass Whip (feedthru base)
AR-269B	35 foot Fiberglass Whip (flange base)

1.2.28 Cables:

W-001	RG-8A/U Coaxial cable.
W-002	RG-58/U Coaxial cable.
W-004	Multi-conductor cable for connecting Transceiver to Antenna Coupler or Linear Amplifier.
W-006	Multi-conductor cable for connecting Transceiver to Remote Control.
W-007	AC line cord.
W-008	DC power cable.

1.2.29 Plugs:

P00300	Connector, PL-259 UHF Type for RG-8A/U cable
P00301	Reducing adapter for using P00300 with RG-58/U (W13004)
P00302	PL-258 Dual Male Adapter for PL-259
210012	Connector, UG-941A N Type

1.3 SPECIFICATIONS - SR-206, SR-210 SSB TRANSCEIVER.

<u>Frequency Range</u>	1.6000 to 30.0000 MHz
<u>Number of Channels</u>	SR-206 - Six Simplex SR-210 - Ten Simplex A suffix (MS) describes marine simplex and (MD) marine half duplex (two frequency simplex)
<u>Channel Frequency Limitations</u>	None within 1.6 to 30 MHz. Any mix of simplex and half duplex is possible - any frequency in any channel is possible. (M) FCC Type Accepted 2 to 22 MHz

General Information

<u>Modes of Operation</u>	USB (suppressed carrier) LSB (suppressed carrier) (optional) AME (compatible AM) CW FSK USB reduced carrier Voice Privacy (optional)
<u>Input Power</u>	115/230 volt (switch selected) 47/63 Hz, 350 W max. 12/24 volt DC (with DC power supply) 115V sine or square wave (switch selected)
<u>Temperature Range</u>	-30°C to +50°C

TRANSMITTER

<u>Power Output</u>	AME - 37 watt carrier (average) SSB - 150 watts PEP CW - 100 watts (average) FSK - 100 watts (average)
<u>Output Impedance</u>	50 ohms nominal
<u>Frequency Stability</u>	± 1 pp 10^6
<u>Duty Cycle</u>	Continuous operation (key down) at 100 watts average power output
<u>Harmonic Suppression</u>	40 db
<u>Undesired Sideband</u>	-50 db
<u>Carrier Suppression</u>	-50 db
<u>Intermodulation Distortion</u>	-30 db (relative to PEP)

RECEIVER

<u>Circuit</u>	Double conversion superheterodyne
<u>Input Impedance</u>	50 ohms nominal
<u>Frequency Stability</u>	± 1 pp 10^6
<u>Selectivity</u>	
Wide Band (SSB) (FL1002)	3 kHz - 6 db 7 kHz - 60 db
Narrow Band (SSB) (FL1007)	2.1 kHz - 6 db 6.0 kHz - 60 db

AM (optional filter) (FL1008)	6 kHz - 6 db 25 kHz - 60 db
<u>Sensitivity</u>	
AM	1.5 microvolt for 10 db S+N/N at 30% modulation
SSB	0.5 microvolt for 10 db S+N/N
<u>AGC</u>	Threshold 2.5 microvolts fast attack slow release flat within 6 db from 10 to 500,000 microvolts
<u>Audio Response</u>	300 Hz to 3000 Hz ±1 db
<u>Audio Output</u>	4 watts
<u>Audio Distortion</u>	5% at 2 watts output

1.4 LIST OF ASSEMBLIES AND SUBASSEMBLIES.

UNIT	DESCRIPTION
1	Transceiver Assembly
1A1	Main Frame Assembly
1A1A1	Audio Distribution and Programming PC Board
1A1A2	Audio Output PC Board
1A2	Matching Network Module
1A2A3 thru 1A2A12	Harmonic Trap Modules
1A3	RF Amplifier Module
1A3A1	RF Amplifier & Mixer PC Board
1A3A2	Power Control PC Board
1A3A3 thru 1A3A12	Channel Tuning PC Board
1A3A13	Duplex Switching PC Board
1A3A14	Automatic Carrier Control PC Board
1A4	IF/Audio PC Module
1A5	Power Supply Module (AC or DC)
1A5A1	Regulator/Filter PC Board
1A6	Frequency Generator PC Module
1A6A1 thru 1A6A10	Channel Oscillator PC Module
1A6A11	Clarifier PC Module (option)
1A7	Multiple Option PC Module
1A7A1	CW PC Module
1A7A2	Vox PC Module
1A7A3	Special Option
1A7A4	Squelch PC Module
1A8	Duplex Frequency Generator PC Module
1A9	FSK Keyer/Converter PC Module
1A10	Special Option PC Module
1A11	Voice Privacy PC Module

General Information

UNIT	DESCRIPTION
2	Antenna Coupler (option)
3	Antenna
4	Remote Control (option)

1.5 EQUIPMENT SUPPLIED.

The following items are supplied with each Transceiver. Optional items are supplied as ordered and are listed on the packing list for each shipment.

QTY	PART NO.	DESCRIPTION
1	SR-206/SR-210 (M)	Transceiver
1	MP0502	Alignment Tool
1	MP0504	Contact Removal Tool
1 set	FXXXXXX	Spare Fuses
1	DS1001	Spare Lamp
1	TM-0210	Technical Manual

Also furnished are all mating plugs and/or connectors required to mate with the equipment and/or options as supplied including a standard microphone or optional Handset or Deskset.

1.6 EQUIPMENT REQUIRED BUT NOT FURNISHED.

1.6.1 Antenna Coupler. - Unless the Transceiver is used with a broadband antenna or with a fan doublet if multi-channel operation is required an antenna coupler is required. Any of the following may be used.

1.6.1.1 SR-606 - Six Channel Modular Automatic Coupler.

1.6.1.2 SR-610 - Ten Channel Modular Automatic Coupler.

1.6.1.3 SR-610M - Ten Channel Tapped Coil Coupler.

1.6.2 Cable. - When the Transceiver is used with an antenna coupler, two cables are required for interconnection. One will be the coaxial cable (either RG-8A/U or RG-58/U) connection between the Transceiver and the Antenna Coupler and the other is the multi-conductor cable between the Transceiver and the Antenna Coupler. Terminals and plugs for the cable are supplied with the Transceiver and the Antenna Coupler.

1.6.3 Antenna. - An antenna is required for use with this Transceiver. Any broadband antenna with a VSWR (Voltage Standing Wave Ratio) of 2:1 or better with a nominal impedance of 50 ohms is suitable. If only a single frequency is used a doublet antenna can be used

if it is adjusted to the proper length for the frequency used. For multi-channel use with an antenna coupler any of the following antennas may be used. The long wire antennas are furnished with halyards and insulators. The whip antennas are furnished with mounting bases and mounting hardware:

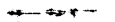
- 1. 6. 3. 1 AR-248 - 75 foot longwire
- 1. 6. 3. 2 AR-249 - 150 foot longwire
- 1. 6. 3. 3 AR-228 - 9 foot stainless steel whip
- 1. 6. 3. 4 AR-229 - 16 foot fiberglass whip
- 1. 6. 3. 5 AR-269 - 35 foot fiberglass whip

1. 7 ANTENNAS.

1. 7. 1 The antenna used with this Transceiver will be an important factor in the performance of the system. The Transceiver is designed to provide optimum performance when connected to a resonant antenna or resonant antenna system with an impedance of 50 ohms and a VSWR which does not exceed 2:1. For single channel operation a doublet or an inverted "V" type of antenna can be used. When either of these types of antennas are used they should be arranged so they are located broadside to the general direction of the receiving station. The same applies to a long wire arranged horizontally. The reason for this is that the radiation from the end of a doublet or inverted "V" is minimum and it is maximum at right angles. For a long wire antenna which is less than a wavelength the maximum radiation is at right angles to the direction of the wire. Horizontal antennas are generally better suited for long distance or sky wave propagation than are vertical or whip antennas. Whip antennas are omni-directional and are suited to ground wave operation or to very long distance operation where minimum radiation angle may enhance performance. In every case, long distance operation will depend upon the conditions of radio wave propagation which in turn depends upon the time of day, the season and the sunspot activity cycle (eleven years). In general better performance is obtained with higher frequencies during daylight hours and lower frequencies at night. Similarly higher frequencies are more effective during winter than summer. For longer distances higher frequencies are more effective than lower frequencies. Maximum usable frequencies (MUF) are shown for typical conditions for a location of 39 degrees North latitude and a 300 mile path.

	<u>Sunspot Min (1954 & 1964)</u>	<u>Sunspot Max. (1958 & 1968)</u>
Daylight - Summer	6 MHz	9 MHz
Night - Summer	3 MHz	6 MHz
Daylight - Winter	8 MHz	14 MHz
Night - Winter	4 MHz	6 MHz

Further information on predicting maximum usable frequencies and propagation conditions is available from the U. S. Government Printing Office under the title Handbook for CRPL Ionospheric Predictions based on Numerical Methods of Mapping Handbook 90.



SECTION II

INSTALLATION

2.1 UNPACKING AND INSPECTION.

Remove all packing material and carefully lift the unit from the box. The Transceiver and each item should be carefully inspected for physical damage. If any damage is noted, save all packing material and immediately notify the transporter. Before any packing material is discarded all items supplied should be checked against the packing list accompanying the shipment. The items listed in paragraph 1.5 are provided with all transceivers regardless of options or modifications ordered.

2.2 MOUNTING.

The Transceiver is shipped with mounting feet suitable for convenient setup on any flat surface such as a desk or bench. Rack mounting kits are available for Transceiver installation in a 19 inch rack. The kit supplied is AR-246. Figure 2-2A shows dimensions of Transceiver and mounting information for mobile installations.

2.3 WIRING AND CABLING.

Figure 2-3A is a system block diagram indicating major cabling and Figure 2-3B shows typical mobile and base station installations. External connections required for proper operation are shown in Figure 2-3C. Cable clamps for strain relief are supplied and may be mounted in the locations shown. For use without accessories, only input power and antenna connections must be made.

2.3.1 Power Supply. - Connection to the Power Supply is made directly to the module through the rear panel. For the AC supply a standard line cord is supplied. The DC supply requires external wiring to the supplied high current four-pin connector. In the AC case insure that the 115/230V or SINE/SQUARE switch, located on the bottom of the supply or rear panel, is in the proper position (shipped as 115V or SINE). For the DC supply 12 or 24V wiring changes are required. (Refer to Section 4.10, Figures 4-10A, 4-10B.)

2.3.2 Microphone, Headphone and CW Key Connections. - The front panel connector supplies, carbon or dynamic microphone input, headset output and keyline. Equipment supplied is wired for proper operation. For wiring refer to Section IV, Figure 4-3A. CW key connections may also be made on the rear panel (ref Figure 2-3C).

CAUTION

CW keying requires a dry contact key.

2.3.3 Accessory Connections. - Available outputs and connections for accessories are referenced on Figure 2-3C and detailed on Figure 4-3A. Connectors and terminal lugs are supplied for all connections. Connector configurations are shown in Figure 2-3E.

2.4 TYPICAL ANTENNA INSTALLATION. (Refer to Paragraph 1.7.1)

2.4.1 Doublet Antenna. - Figure 2-4A gives the necessary information for calculating the length of a doublet antenna in feet or in meters. A VSWR meter such as the Microwave device Model 261.1 or the Bird Thru-line Wattmeter should be placed in the coaxial line to enable the antenna to be cut precisely to frequency. A VSWR of 2:1 or better should be obtained for optimum performance. The doublet antenna is used for only one frequency.

2.4.2 Inverted "V" Antenna. - Figure 2-4A shows the formula for calculating an inverted "V" antenna. Like the doublet, this antenna is suitable for one frequency only and it should be adjusted in length for a VSWR of 2:1 or better.

2.4.3 Long Wire Antennas. - For base station application using several frequencies, an antenna coupler and long wire antenna are recommended. Figure 2-4B shows a typical installation of this type. In some cases where it is difficult to obtain a good ground by means of a ground stake, a counterpoise consisting of three copper wires spread under and to the sides of the long wire antenna will usually improve performance. When an antenna is installed on a roof top where a good ground is not available a wire counterpoise should be used.

2.4.4 Mobile or Marine Installations. - For mobile or marine installations a whip or vertical antenna is normally used. The antenna coupler should be mounted as close as possible to the antenna and the antenna coupler should be grounded through a short ground strap to a metal portion of the car or boat. Figure 2-4C shows typical mobile and marine installations.

2.5 CRYSTAL INFORMATION AND CHANNEL TUNING.

2.5.1 Channel Crystals. - The Transceiver uses a separate channel crystal for each transmit frequency. This normally functions as the receive crystal, however on transceivers with the half duplex option, a separate receive crystal is used for each receive frequency or channel. The location of the crystals on the frequency generator boards are shown in Figures 2-5A and 2-5B.

2.5.1.1 Determination of crystal frequency. - The channel frequency is determined by adding 1.500000 MHz for a 1.5 MHz IF or 1.400000 MHz for a 1.4 MHz IF to the operating carrier frequency. For example, a set to be tuned to a carrier frequency of 3.50000 MHz would require a channel oscillator crystal of 5.000000 MHz for a 1.5 MHz IF or 4.900000 MHz

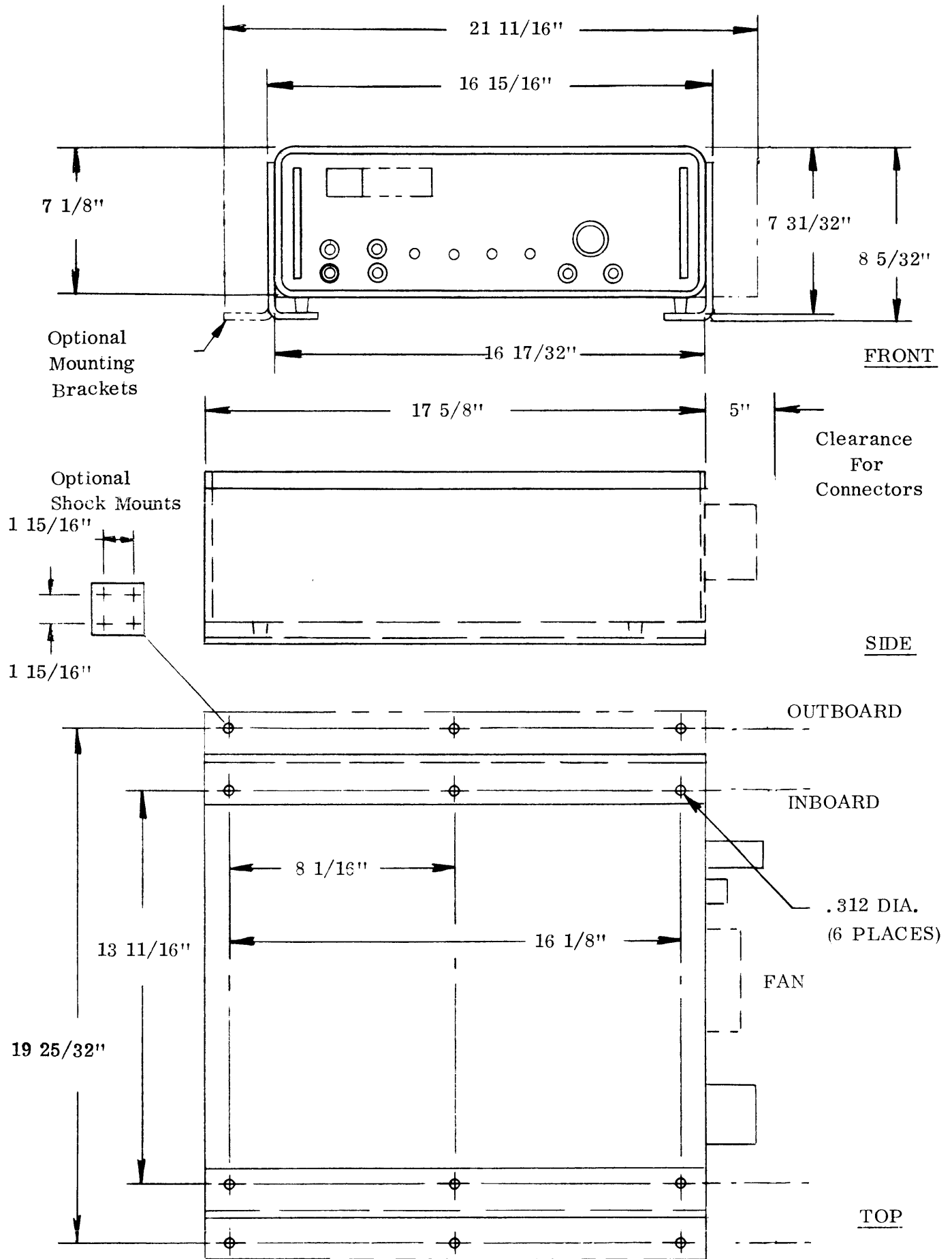
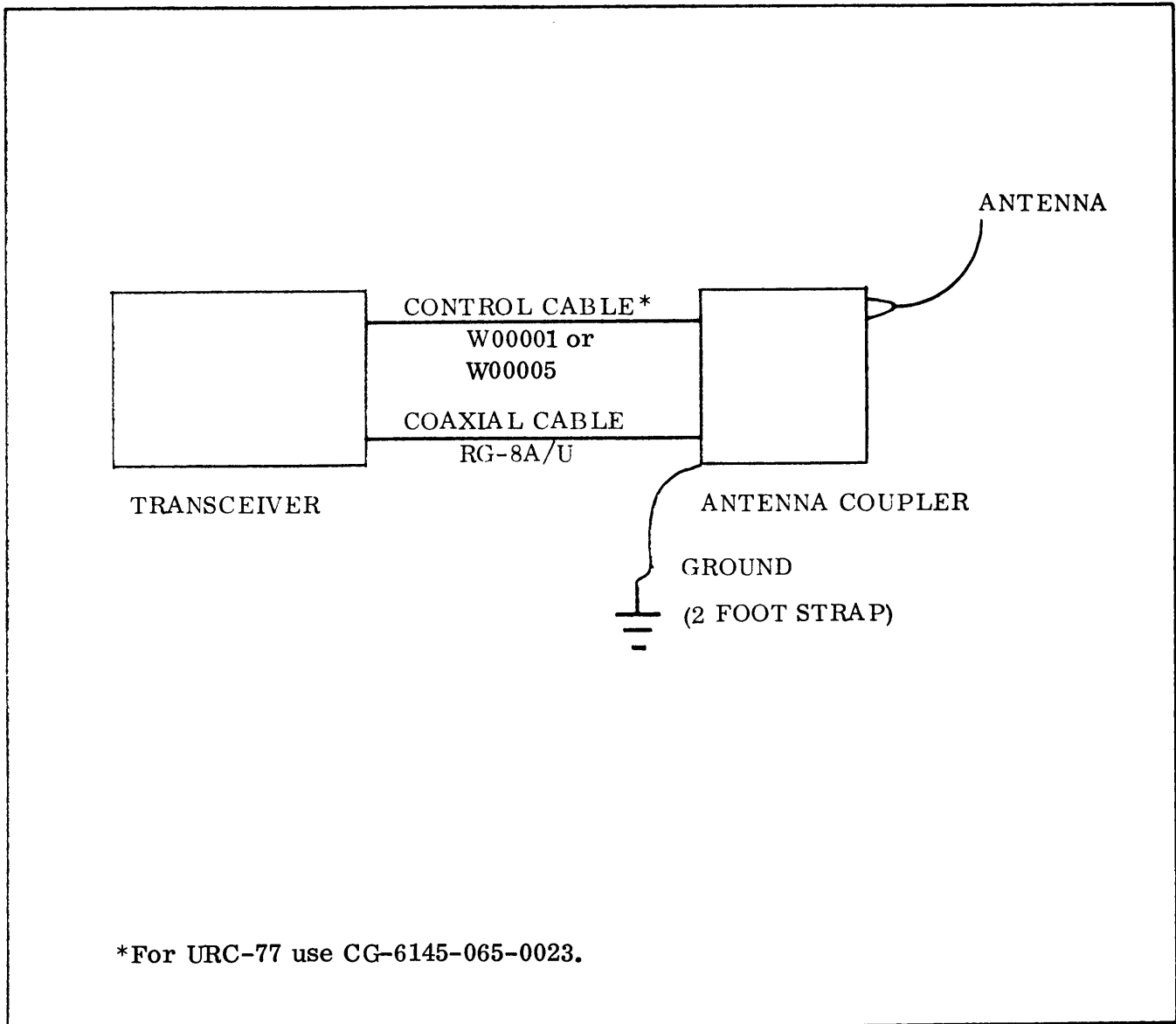
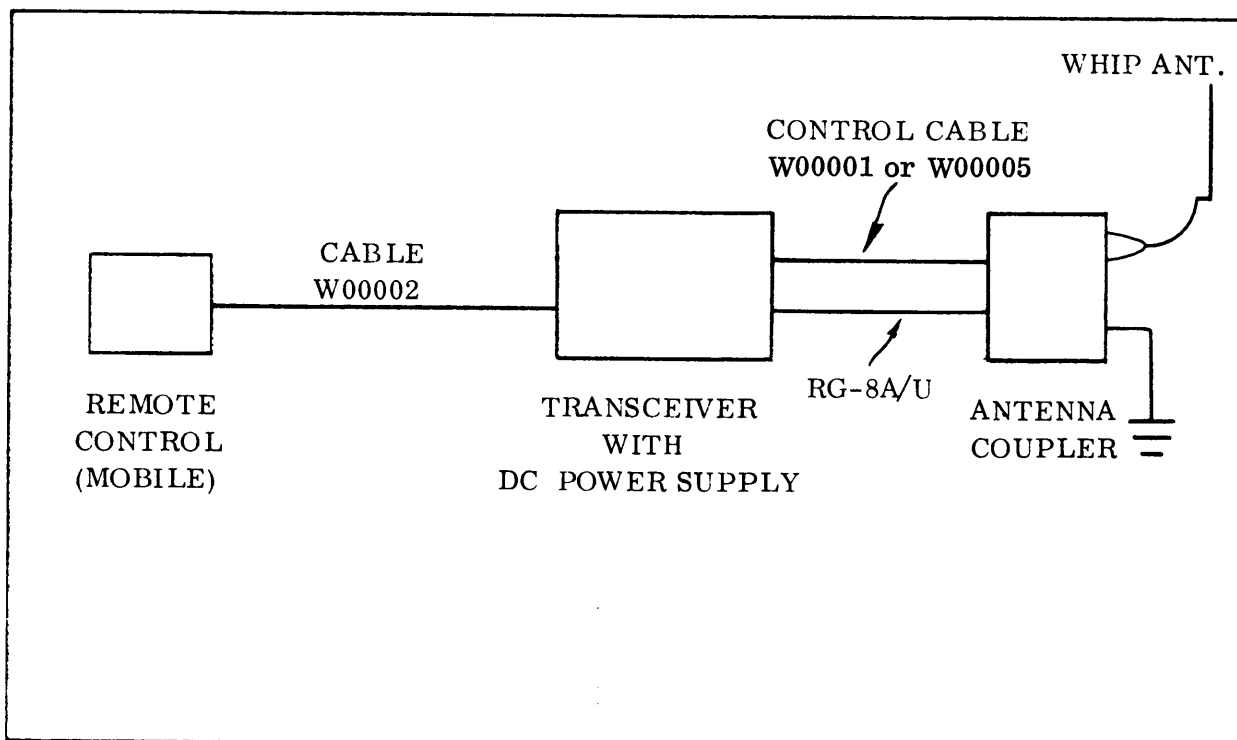


Figure 2-2A. 206/210(M) -

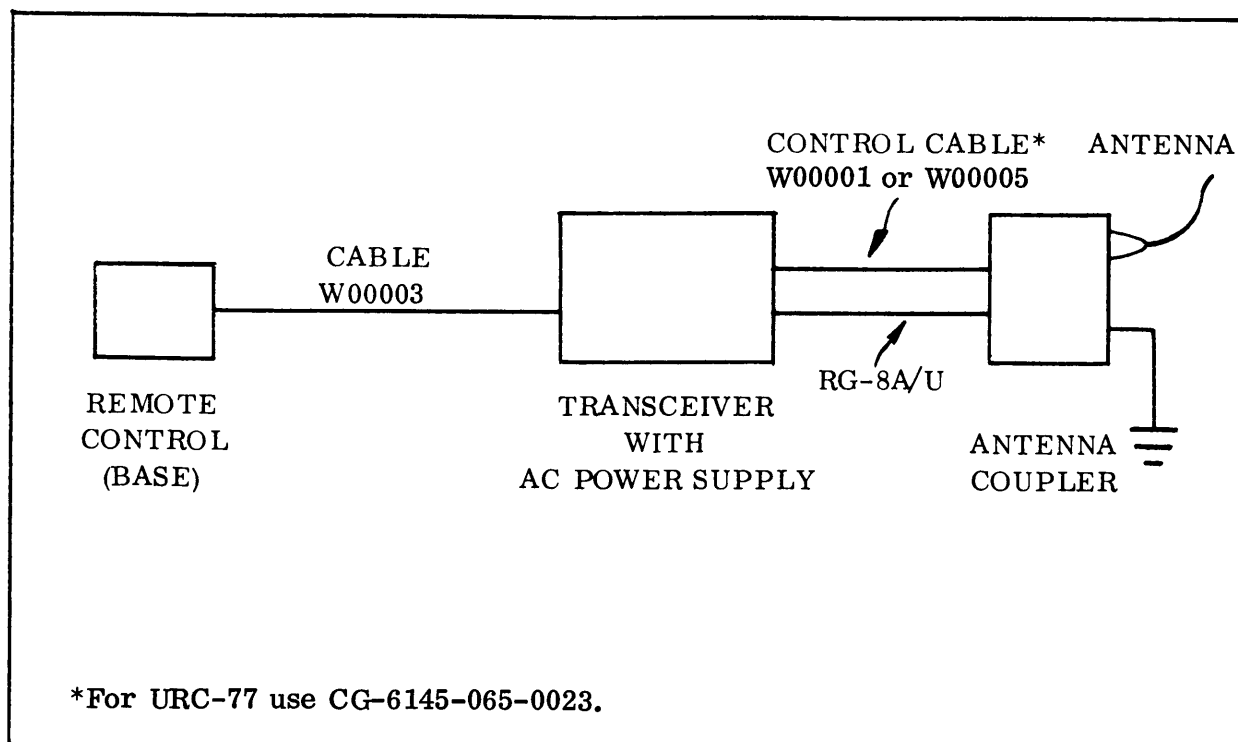
Mounting Dimensions



CONNECTIONS REQUIRED FOR TRANSCEIVER
WHEN USED WITH SINGLE ENDED ANTENNA



TYPICAL MOBILE INSTALLATION
BLOCK DIAGRAM - WITH REMOTE



*For URC-77 use CG-6145-065-0023.

TYPICAL BASE STATION INSTALLATION
BLOCK DIAGRAM - WITH REMOTE

Figure 2-3B. Typical Installations

Installation

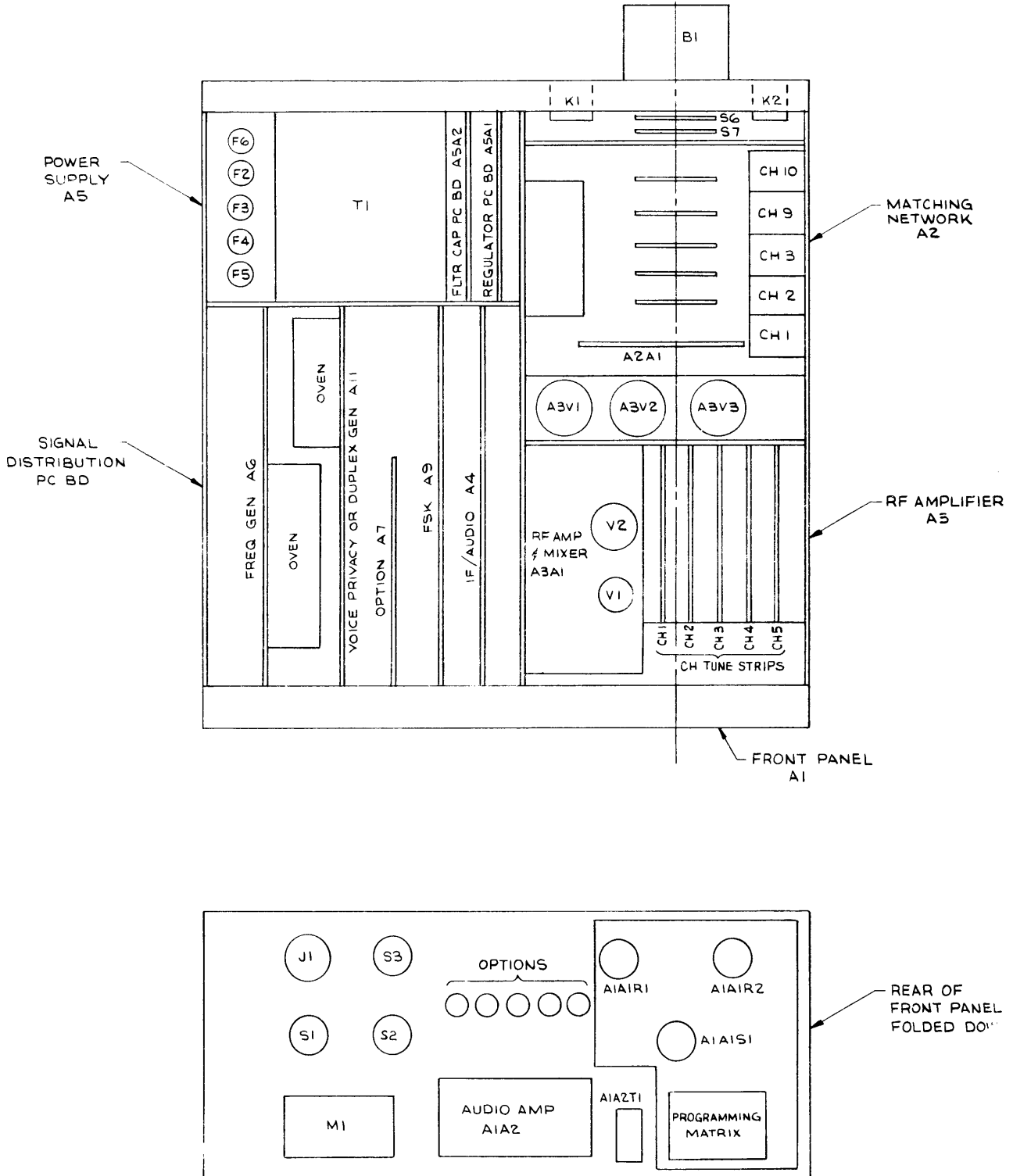


Figure 2-3C-1. Major Assembly Locations

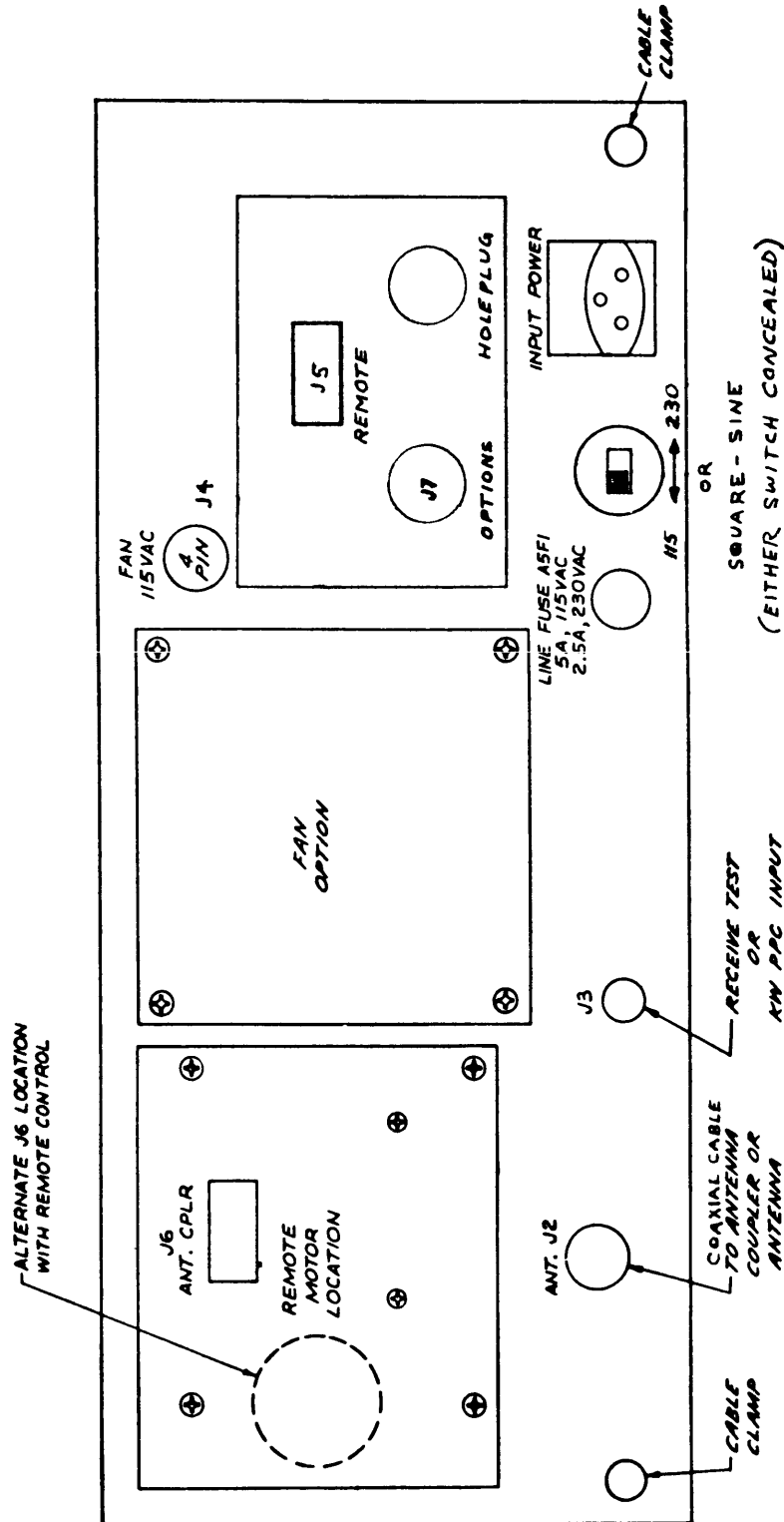
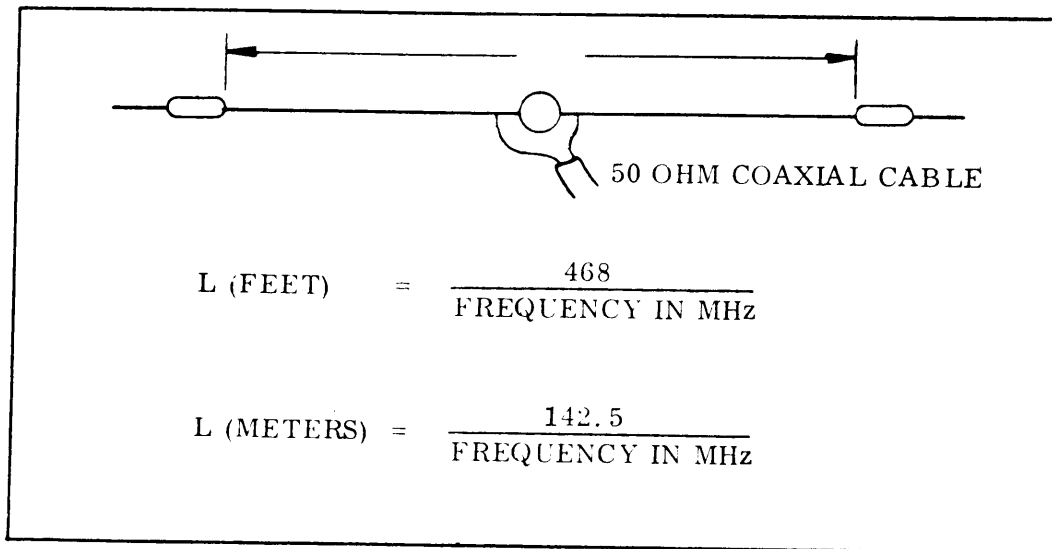


Figure 2-3C-2. Rear Panel Connections 206(M)/210(M)

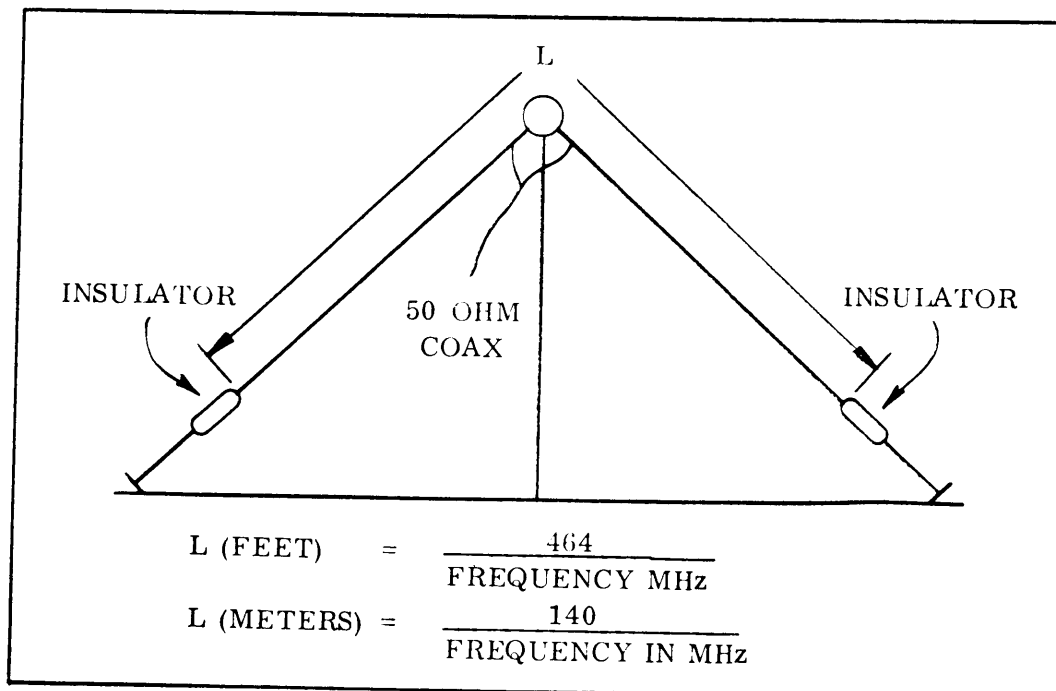
<u>DESIGNATOR</u>	<u>FUNCTION</u>	<u>PART NUMBER</u>
J1	<u>Microphone</u>	J00201
J2	<u>Antenna</u> , type UHF or type N (UG-680/U)	J00300 210023
J3	<u>Rx Test</u> , or <u>KW PPC</u>	J00100
J4	<u>Fan</u> , 4 pin	J00200
J5	<u>Remote</u> , 36 pin or 36 pin (MS-3102A-28-15S)	J00253 J00255
J6	<u>Ant. Coupler</u> , 36 pin or 17 pin (MS-3102A-20-29S)	P00253 J00254
J7	<u>Options</u> , 12 pin	X00200

Figure 2-3E. External Connector Configurations
(Figures 2-3C-3 and 2-3D deleted)

DOUBLET AND INVERTED "V" ANTENNAS



DESIGN PROCEDURE FOR CALCULATING DOUBLET ANTENNA



DESIGN PROCEDURE FOR CALCULATING
INVERTED "V" ANTENNA

NOTE: LSB Crystals are deleted in marine transceiver and replaced with a channel oscillator module.

Refer to Figure 4-8B for Marine Strapping Options

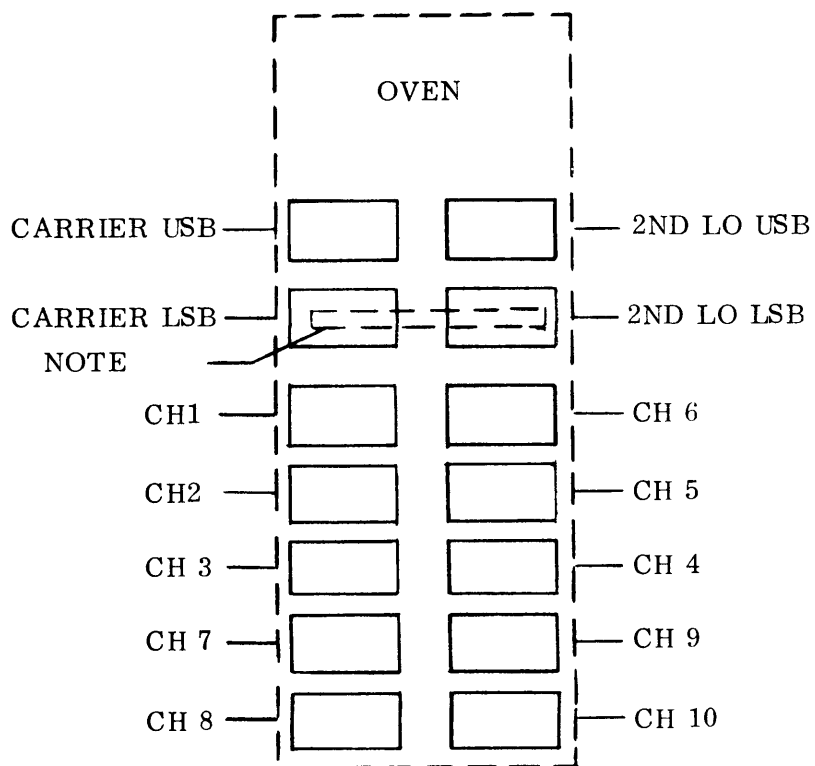


Figure 2-5A. Frequency Generator 1A6, Crystal Location Diagram
(View from Printed Wiring Side)

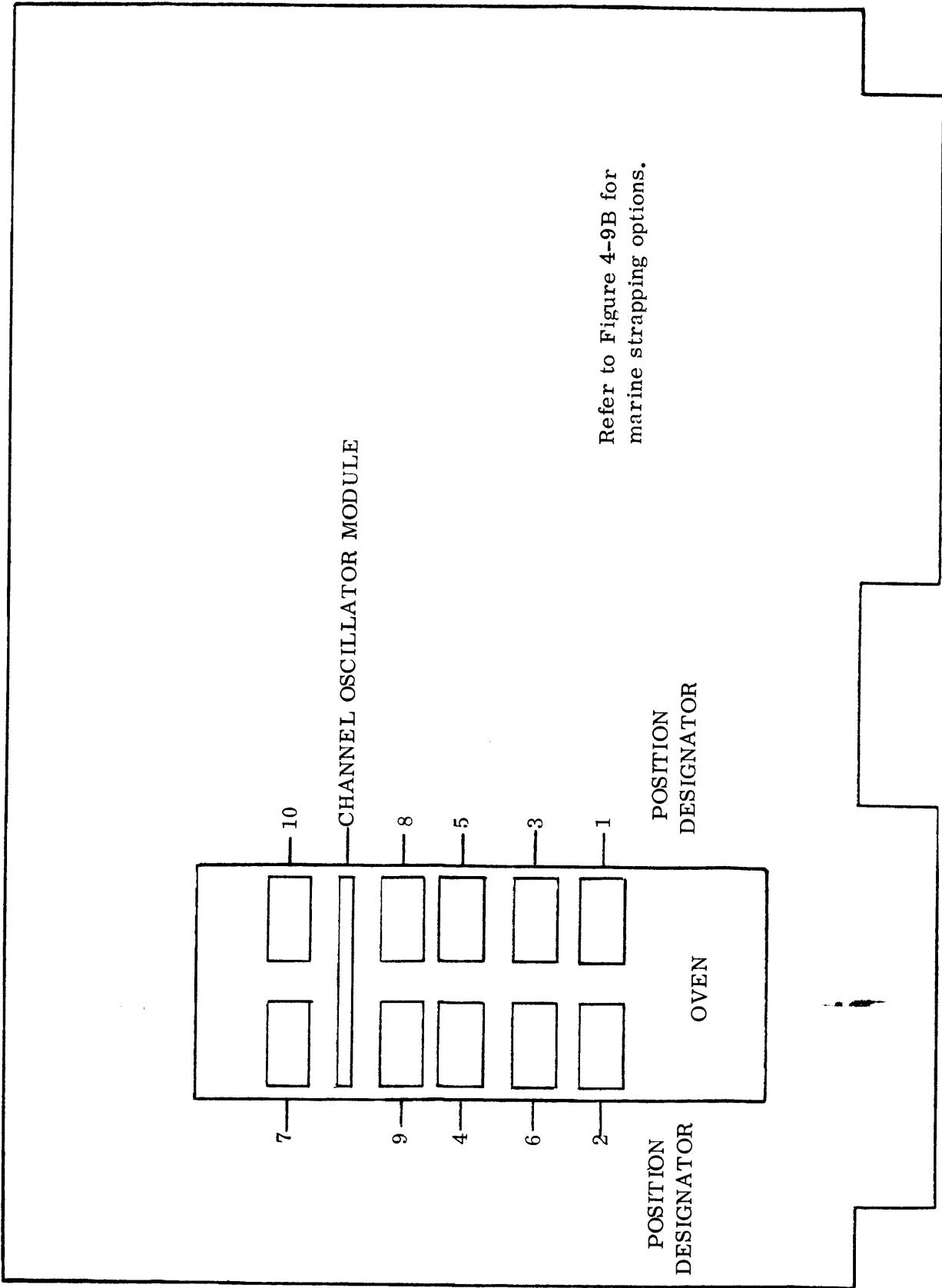


Figure 2-5B. Duplex Generator 1A8, Crystal Location Diagram (View from Component Side)

for a 1.4 MHz IF. For combinations of channels which result in a transmit or receive spur, alternate IF frequencies of $\pm .020000$ MHz (± 20 kHz) are available. Use of these alternates requires an appropriate correction of the crystal frequency by ± 20 kHz.

2.5.1.2 Crystal specifications. - Table 2-1 lists the important characteristics of the channel 2ND LO and carrier oscillator crystals. It is strongly recommended however, that due to the high quality of the Transceiver, crystals be ordered from the manufacturer.

TABLE 2-1A. OSCILLATOR CRYSTAL SPECIFICATIONS

Part Number	CHANNEL	2ND LO (Local oscillator)		CARRIER
	Y20001	without clarifier capability	with clarifier option capability	Y10100
Holder Type	-----All HC-6/U-----			
Oven Temperature	-----All 75° C-----			
Frequency Tolerance	-----All $\pm .0002\%$ -----			
Frequency Stability over Oven Stability Range of $\pm 1^\circ\text{C}$	-----All ± 1 ppm-----			
Mode of Oscillation	Fundamental Parallel Resonant	Fundamental Parallel Resonant	Fundamental Series Resonant	Fundamental Parallel Resonant
Capacitance Load	32.0 \pm 0.5 pf	32.0 \pm 0.5 pf	NA	20 pf
Shunt Capacitance	-----All 7 pf-----			
Shock, Vibration, Aging - per Mil Spec	CR-68/U	CR-68/U	CR-68/U	CR-47A/U
Equivalent Series Resistance	per CR-68/U	150 Ω max.	150 Ω max.	7500 Ω max.

2.5.2 Tuning Procedures - New Frequencies. -

2.5.2.1 Channel band arrangements. -

2.5.2.1.1 RF Amplifier Channel Strips. - The plug in cards located on the RF Amplifier assembly contain the tuned circuits required for receive, and the tuned circuit which tunes

TABLE 2-1B. IF FREQUENCY AND CHANNEL CRYSTAL ALTERNATIVES

FILTER BANDWIDTH	IF FREQ kHz	CARRIER FREQ kHz	2ND LO* FREQ MHz	CHANNEL XTAL fc = CHANNEL FREQ	MODE
2.9 kHz	1500	453.250	1.953250	fc + 1500 kHz	USB
2.9 kHz	1520	453.250	1.973250	fc + 1520 kHz	USB
2.9 kHz	1480	453.250	1.933250	fc + 1480 kHz	USB
2.9 kHz	1500	456.750	1.956750	fc + 1500 kHz	LSB
2.9 kHz	1520	456.750	1.976750	fc + 1520 kHz	LSB
2.9 kHz	1480	456.750	1.936750	fc + 1480 kHz	LSB
2.9 kHz	1400	453.250	1.853250	fc + 1400 kHz	USB
2.9 kHz	1420	453.250	1.873250	fc + 1420 kHz	USB
2.9 kHz	1380	453.250	1.833250	fc + 1380 kHz	USB
2.9 kHz	1400	456.750	1.856750	fc + 1400 kHz	LSB
2.9 kHz	1420	456.750	1.876750	fc + 1420 kHz	LSB
2.9 kHz	1380	456.750	1.836750	fc + 1380 kHz	LSB
2.4 kHz	1500	453.650	1.953650	fc + 1500 kHz	USB
2.4 kHz	1520	453.650	1.973650	fc + 1520 kHz	USB
2.4 kHz	1480	453.650	1.933650	<u>fc + 1480 kHz</u>	USB
2.4 kHz	1500	456.350	1.956350	fc + 1500 kHz	LSB
2.4 kHz	1520	456.350	1.976350	fc + 1520 kHz	LSB
2.4 kHz	1480	456.350	1.936350	<u>fc + 1480 kHz</u>	LSB
2.4 kHz	1400	453.650	1.853650	fc + 1400 kHz	USB
2.4 kHz	1420	453.650	1.873650	fc + 1420 kHz	USB
2.4 kHz	1380	453.650	1.833650	fc + 1380 kHz	USB
2.4 kHz	1400	456.350	1.856350	fc + 1400 kHz	LSB
2.4 kHz	1420	456.350	1.876350	fc + 1420 kHz	LSB
2.4 kHz	1380	456.350	1.836350	fc + 1380 kHz	LSB

* Refer to table 2-1A.

the output of the 12BY7A on transmit. Each strip or card covers a band of frequencies which can be extended to a new band by adding three jumpers. For marine radios the number of bands are increased and jumpers are not required for banding. Each of the jumpers adds a fixed capacitor to one of the tuned circuits. For example: band 1 will tune from 2.0 to 2.5 MHz without the jumpers. When the jumpers are added it will tune from 1.6 to 2.0 MHz. Table 2-2A shows the band arrangement for the channel strips and Figure 4-4F-1 shows the jumper locations.

TABLE 2-2A. SIMPLEX CHANNEL STRIP DATA
(See Figure 4-4F-1)

BAND DESIGNATOR	BAND (MHz)	RANGE (MHz)	JUMPER B
A1	1.6-2.5	1.6-2.0	IN
A2	-----	2.0-2.5	OUT
B1	2.5-3.5	2.5-3.0	IN
B2	-----	3.0-3.5	OUT
C1	3.5-5.5	3.5-4.5	IN
C2	-----	4.5-5.5	OUT
D1	5.5-8.0	5.5-6.5	IN
D2	-----	6.5-8.0	OUT
E1	8.0-12.0	8.0-10.0	IN
E2	-----	10.0-12.0	OUT
F1	12.0-18.0	12.0-15.0	IN
F2	-----	15.0-18.0	OUT
G1	18.0-24.0	18.0-21.0	IN
G2	-----	21.0-24.0	OUT
HI	24.0-30.0	24.0-27.0	IN
H2	-----	27.0-30.0	OUT

TABLE 2-2B. DUPLEX CHANNEL STRIP DATA
(See Figure 4-4F-2)

Bands B through S require no jumpers to provide sub-bands. Jumpers for duplex only are necessary. (Refer to Table 2-3 or 2-4 for band assignments.)

BAND DESIGNATOR	RANGE (MHz)	JUMPERS	
		DUPLEX	SIMPLEX
B thru S	2 - 22	C, two places A, two places	A only, two places

Installation

2.5.2.1.2 PA Matching Network (A2). - Reference Figures 4-5A, B, C.

The power amplifier matching network consists of an input capacitor (C6, C7) an inductor (L5, L6) and an output capacitor (C8, C9) arranged in a Pi configuration. An optional second harmonic trap (C14, L7) is connected across the output capacitor. The magnitude of the inductance is varied in a coarse manner by choosing the tap on L6 and is adjusted to its exact value by means of C12, C13. Switch S1-A selects the input capacitor and S1-C and S1-D the output module assembly. The output module assembly consists of C8, C9, C12, C13, C14 and L7. Switch S1-E is an open seeking wafer that effectively connects a 33 ohm resistor across all of the second harmonic traps except the one in use.

The values and part numbers for the components used may be found in tables 2-3 and 2-4. The proper matching network coil tap may be found by referring to Table 2-3. The number of the tap is illustrated in figure 2-6, the coil assembly view. The range of the taps is referenced to the segment edges, the exact tap for a specific frequency may be found by interpolation.

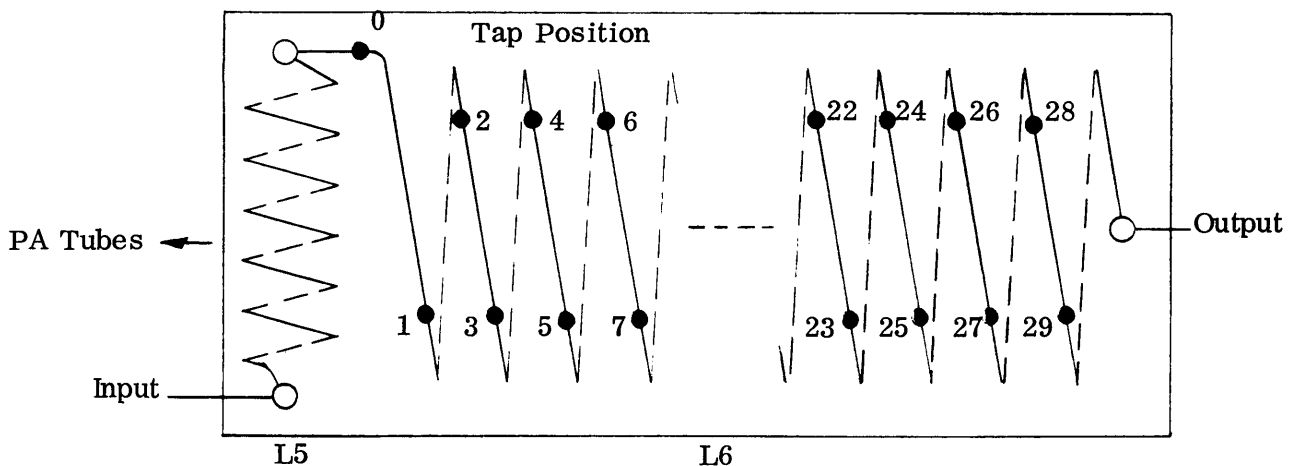


Figure 2-6. Coil Assembly, Top View

2.5.2.1.3 Channel Oscillator 206/210. - The band arrangements for the channel oscillator are shown in table below. The table identifies the type of oscillator unit that must be used for a particular frequency. Further information may be found in the parts list.

OSCILLATOR FREQUENCY BAND ARRANGEMENT

FREQUENCY RANGE (MHz)	CHANNEL OSCILLATOR BOARD TYPE
1.6-3.5	Low - A
3.5-12.0	Low - B
12.0-18.0	High - A
18.0-30.0	High - B

Channel Oscillator 206M/210M. - No bands are required. A single programmed oscillator is used. See steps below for wiring information.

2.5.2.2 Tuning Procedure. - The initial steps in the tuning procedure when the Transceiver is being set to a new frequency are as follows:

- a. Install the new crystal in the proper location on the frequency generator board, refer to figure 2-5A and the duplex frequency generator board (where used) refer to figure 2-5B. For duplex operation refer to figures 4-8B and 4-9B for jumper locations selecting duplex channels. Any channel may be made duplex by appropriate jumper selection.
- b. For a 206/210, determine from table above if channel oscillator board must be changed. Make change if required.

For a 206M/210M the following procedure must be observed.

(1) Determine whether each channel is simplex or duplex. Refer to Figure 4-8B for Frequency Generator jumper location and Figure 4-9B for Duplex Generator jumper location. Where configuration is unknown, the Frequency Generator board is wired for simplex and the Duplex Generator board is wired for duplex.

(2) Determine whether each channel frequency is above or below 7 MHz. Refer to the figures in (1) above for jumper location for frequency selection. Both the Frequency Generator and Duplex Generator boards are supplied (if use unknown) with the jumpers connected for operation below 7 MHz. All then required for operation above 7 MHz is the cutting of the appropriate jumper.

(3) Determine whether in duplex the transmit frequency is higher or lower than the receive frequency. The appropriate jumper on figures referenced in (1) above must be selected as follows. For ship stations the transmit frequency is lower than the

Installation

receive frequency. For shore stations the reverse is true. The following switching functions are required:

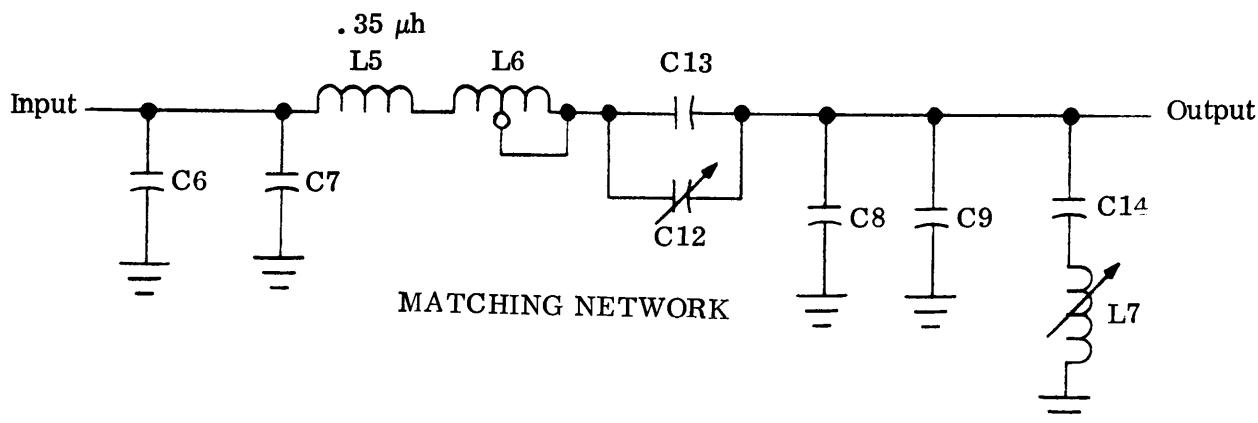
Frequency Generator Board	+ RX, \neq TX	\neq RX, + TX
Duplex Generator Board	\neq RX, + TX	+ RX, \neq TX

The boards are normally supplied as ship stations. They may be converted to shore stations by the changing of two jumpers. An alternative method is to interchange the appropriate crystals on the two boards. *

- c. Determine from table 2-2 for a 206/210 whether or not a different channel strip must be inserted or, if not, the jumper must be added or removed. Make the change if needed. Channel strips for the 206M/210M may be selected from table 2-5B.
- d. Duplex switching for the 206M/210M within the channel strips is determined by the ship or shore criteria mentioned above. Refer to Figure 4-4F-3 for jumper location on the Duplex Switching board. The switching board is normally supplied for ship stations and wired to receive the function + TX, \neq RX which allows reception of a frequency lower than the transmit frequency.
- e. Determine from tables 2-4, 2-5A and 2-5B what matching network components are required. Make the required changes. Determine from table 2-3 what tap is required. Make the required change. Be sure that the solder is removed from the previous tap position and check new tap connection to be sure solder is not shorting two turns together.

WARNING

Be sure that the set is turned off, short one of the 6146 tube caps to the chassis, and short L6 of the matching network to the chassis before any changes are made. Re-install the PA shields after the changes have been made.



* When a receive clarifier is required, +RX, TX is required for the Frequency Generator Board. Therefore for duplex channels the transmit crystal must be on the Duplex Generator Board.

TABLE 2-3. MATCHING NETWORK COMPONENT SELECTION.

Frequency MHz	BAND DESIGNATOR	C6 (pf)	C7 (pf)	C12 (pf)	C13 (pf)	Less				with harmonic trap				L6 (fig. 2-6) TAP POSITION
						Harmonic Trap		with harmonic trap		with harmonic trap		with harmonic trap		
						C8 (pf)	C9 (pf)	C8 (pf)	C9 (pf)	C8 (pf)	C9 (pf)	C14 (pf)	L7 (μ h)	
1.6-2.0	A	560	180	1200-2525	390	2000	1500	1500	1500	1500	510	2, 3-4, 4	20-26	
2.0-2.25	B	560	180	1200-2525	390	2000	1500	1500	1200	1200	750	1, 4-2, 3	18-24	
2.25-2.5	C	470	---	1200-2525	390	1500	620	1500	---	---	470	1, 4-2, 3	17-24	
2.5-3.0	D	390	---	800-1970	150	1500	330	1200	---	---	470	.95-1.7	16-22	
3.0-3.5	E	330	---	615-1600	---	1500	---	820	270	270	360	.95-1.7	15-19	
3.5-4.0	F	220	---	615-1600	---	910	100	680	30	30	270	.95-1.7	12-17	
4.0-4.5	G1	220	---	615-1600	---	910	100	680	82	82	220	.95-1.7	13-18	
4.5-5.0	G2	180	---	425-1260	68	910	---	560	130	130	180	.95-1.7	11-14	
5.0-5.5	H1	180	---	425-1260	68	910	---	680	68	68	150	.95-1.7	12-15	
5.5-6.0	H2	150	---	425-1260	---	680	120	560	---	---	160	.65-1.1	10-13	
6.0-7.0	J	120	---	425-1260	---	680	22	470	39	39	120	.65-1.1	8-11	
7.0-8.0	K	100	---	180-690	120	470	120	330	---	---	180	.4-, 7	6-10	
8.0-9.0	L1	100	---	180-690	120	470	130	330	82	82	150	.4-, 7	7-10	
9.0-10.0	L2	68	---	180-690	68	470	---	330	100	100	120	.4-, 7	6-8	
10.0-11.0	M1	68	---	180-690	68	470	---	330	---	---	91	.4-, 7	7-9	
11.0-12.0	M2	56	---	180-690	47	360	62	270	---	---	82	.4-, 7	5-7	
12.0-13.0	N1	56	---	180-690	47	360	47	300	---	---	75	.4-, 7	5-8	
13.0-14.0	N2	39	---	100-500	68	330	---	270	---	---	120	.24-, 38	4-7	
14.0-15.0	P1	39	---	100-500	68	330	---	180	---	---	100	.24-, 38	5-8	
15.0-16.0	P2	33	---	100-500	47	300	---	180	56	56	91	.24-, 38	4-6	
16.0-17.0	Q1	33	---	100-500	47	220	68	180	---	---	75	.24-, 38	4-6	
17.0-18.0	Q2	27	---	100-500	33	220	62	160	---	---	68	.24-, 38	3-5	
18.0-19.0	R1	27	---	100-500	33	270	---	150	---	---	62	.24-, 38	3-5	
19.0-20.0	R2	22	---	100-500	22	220	39	130	20	20	56	.24-, 38	2-4	
20.0-21.0	S1	22	---	100-500	11	270	---	130	10	10	51	.24-, 38	2-4	
21.0-22.0	S2	22	---	100-500	11	270	---	130	10	10	51	.24-, 38	2-4	
22.0-24.0	T												0-2	
24.0-26.0	V												0-2	
26.0-28.0	W												0-1	
28.0-30.0	X												0	

TABLE 2-4. CHANNEL KIT COMPONENTS

FREQUENCY MHZ	206/210		206M/210M		MATCHING NETWORK COMPONENTS			
	BAND	CH STRIPS*	CH OSC.	BAND	CH STRIPS*	C6	C7	OUTPUT NETWORK**
1.6-2.0	A	200390-1	200580-1	-	-----			
2.0-2.25	A	200390-1	200580-1	B	200393-1	C00014	C00009	210206-1
2.25-2.5	A	200390-1	200580-1	C	200393-2	C00014	C00009	210206-2
2.5-3.0	B	200390-2	200580-1	D	200393-3	C00013	-----	210206-3
3.0-3.5	B	200390-2	200580-1	E	200393-4	C00012	-----	210206-4
3.5-4.0	C	200390-3	200580-2	F	200393-5	C00011	-----	210206-5
4.0-4.5	C	200390-3	200580-2	G1	200393-6	C00016	-----	210206-6-1
4.5-5.0	C	200390-3	200580-2	G2	200393-6	C00016	-----	210206-6-2
5.0-5.5	C	200390-3	200580-2	H1	200393-7	C00009	-----	210206-7-1
5.5-6.0	D	200390-4	200580-2	H2	200393-7	C00009	-----	210206-7-2
6.0-7.0	D	200390-4	200580-2	J	200393-8	C00008	-----	210206-8
7.0-8.0	D	200390-4	200580-2	K	200393-9	C00017	-----	210206-9
8.0-9.0	E	200390-5	200580-2	L1	200393-10	C00007	-----	210206-10-1
9.0-10.0	E	200390-5	200580-2	L2	200393-10	C00007	-----	210206-10-2
10.0-11.0	E	200390-5	200580-2	M1	200393-11	C00006	-----	210206-1101
11.0-12.0	E	200390-5	200580-2	M2	200390-11	C00006	-----	210206-11-2
12.0-13.0	F	200390-6	200580-3	N1	200393-12	C00018	-----	210206-12-1
13.0-14.0	F	200390-6	200580-3	N2	200393-12	C00018	-----	210206-12-2
14.0-15.0	F	200390-6	200580-3	P1	200393-13	C00005	-----	210206-13-1
15.0-16.0	F	200390-6	200580-3	P2	200393-13	C00005	-----	210206-13-2
16.0-17.0	F	200390-6	200580-3	Q1	200393-14	C00019	-----	210206-14-1
17.0-18.0	F	200390-6	200580-3	Q2	200393-14	C00019	-----	210206-14-2
18.0-19.0	G	200390-7	200580-4	R1	200393-15	C00020	-----	210206-15-1
19.0-20.0	G	200390-7	200580-4	R2	200393-15	C00020	-----	210206-15-2
20.0-21.0	G	200390-7	200580-4	S1	200393-16	C00004	-----	210206-16-1
21.0-22.0	G	200390-7	200580-4	S2	200393-16	C00004	-----	210206-16-2
22.0-24.0	G	200390-7	200580-4	T	200393-17			
24.0-26.0	H	200390-8	200580-4	V	200393-18			
26.0-28.0	H	200390-8	200580-4	W	200393-19			
28.0-30.0	H	200390-8	200580-4	X	200393-20			

* Add (I) to number for image trap where required

**Add (T) for harmonic trap

After these major changes have been accomplished the Transceiver is ready to be tuned.

- a. Set the function switch to receive. Set the channel switch to the desired channel. Connect a signal generator to J3, the receive test jack on the rear panel. ~~If the channel strip has an image trap (ie., the presence of four coils on the channel strip), set the signal generator frequency to be twice the first IF frequency above the desired receive frequency. For example, if the IF frequency is 1500 kHz, set the frequency to be 3 MHz above the receive frequency.~~ Adjust the generator level to obtain an indication on the front panel meter. Adjust A3A_L1 for minimum indication, increasing the level as required to maintain a small indication on the meter. Set the generator frequency to the desired receive frequency, adjust the level to obtain an indication on the meter, peak L2 and L3 for maximum indication, adjusting the level to keep the indication at a small reading.
- b. Remove the signal generator from J3, set its frequency to the first IF frequency. Remove A3A1P1 from A1J10. J10 is located on the signal distribution board. Connect the generator to A3A1P1. Adjust the AM modulation on the generator for approximately 100% modulation. Connect a dummy load having a rating of 100 watts to J2 (ANT).
- c. Set the function switch to transceiver and key the transmitter. Set the signal generator level to obtain some indication on the output meter (the slide switch S1 located in the PA tube compartment must be set in the relative power output position). Peak A3A_L4, for maximum indication. If the channel being aligned is a duplex channel, also peak A3A_C6, C10 for maximum indication. Unkey transceiver.
- d. Turn transceiver off by means of function switch and remove main power plus from rear of transceiver. Remove PA shield. Connect the signal generator to terminal 11 of S1-C. Set its frequency to twice the transmitter output frequency. Connect a high frequency oscilloscope or an RF voltmeter to the junction of C12, C13 and C8, C9. Adjust the signal generator level to obtain an indication. Tune L7 for minimum indication. Remove the signal generator and oscilloscope or voltmeter. Replace PA shields.

CAUTION

Insure that equipment is de-energized prior to performing this step.

- e. Re-connect power to transceiver. Turn function switch to transceive. Connect signal generator to A3A1P1 as in step b.
- f. Key the transmitter and adjust A2A_C12 for maximum indication on the front panel meter. If a peak cannot be obtained, move the tap on A2L6 in the appropriate direction. If C12 is at maximum capacity (maximum CCW), more inductance is required and the tap should be moved toward the rear. If the reverse is true it should be moved toward the rear.

Installation

- g. When tuning adjustments have been completed and re-checked, set the signal generator output level for -60 dbm output ($225 \mu\text{V}$), remove the AM modulation. Adjust R2 on the channel strip card for half scale output on the front panel meter.
- h. With the signal generator connected as in step f. , check the other channels. The output indication should be half scale. If not, adjust R2 on the appropriate channel strip. Unkey the transceiver.
- i. Re-connect A3A1P1 to A1J10. Switch the channel switch to a channel programmed for AM full carrier operation. Key the Transceiver. The front panel indication should be half scale. If not, adjust the carrier control, A3A14R11, of the ACC (A3A14) board for half scale indication. If a power meter or RF voltmeter is available, the above adjustment should be made for a power output of 32 watts or 40 volts RMS across 50 ohms. Switch the channel switch to a channel programmed for the reduced carrier mode. Adjust the Reduced Carrier control, A3A14R5, for an output of 2 to 5 watts (10 to 15.8 volts RMS) across 50 ohms.
- j. Remove A3A1P2 from J9. J9 is located on the signal distribution board. Connect a frequency counter to J9. The Transceiver should be turned on in the receive position for at least 20 minutes and preferably one hour. If the channel being adjusted is not a duplex channel, adjust the trimmer on the Frequency Generator module to obtain the correct channel oscillator output frequency. This is the frequency marked on the crystal.

Where a duplex frequency generator (A8) board is supplied determined from 2.5.2.2 b. , which channel oscillator is on which board. As above the frequency is measured at J9. However the source may be either the Frequency Generator (A6) or Duplex Frequency Generator (A8) board. To align those transmit frequencies not used in receive also, adjust the appropriate trimmer while in the transmit mode.

NOTE

For alignment of the Duplex Generator Board,
board extenders are required.

- k. The Transceiver is now tuned for proper operation into a 50 ohm load. If the set will be used without an antenna coupler, C13 should be repeaked with the antenna system connected so that the PA stage will be resonant. Since the antenna is reactive it will somewhat detune the PA, the load presented to the PA must have a VSWR of less than 2:1.

2.5.3 Automatic Mode Programming (Marine). - In a transceiver equipped with a Programmable Audio Distribution Board 1A1A1 but no front panel mode switch, mode may be programmed on an individual channel basis. Refer to Section 4.3.8, page 4-2 and Figure 4-3A and 4-3D for details of programming.

SECTION III

OPERATION

3.1 OPERATING PRECAUTIONS.

CAUTION

Even with only top and bottom covers removed dangerous voltages exist. In certain stages of disassembly high voltage exist that are DANGEROUS to life. Remove all power prior to servicing.

The Transceiver contains protective devices which prevent damage in the case of an operational fault. However, to insure reliable, trouble-free operation, operate the Transceiver with a properly tuned antenna and insure that input voltages are within their ratings.

3.2 OPERATING CONTROLS.

All controls required for normal operation are located on the front panel.

3.2.1 Basic Controls. - *Options depending on function required.

CHANNEL SELECTOR switch	Selects the assigned frequency of operation (and mode-optional) and pre-tuned output networks.
FUNCTION SELECTOR switch	Selects one of four operational conditions:
OFF	All power removed
STANDBY	Crystal ovens and filaments on
RECEIVE	Receive mode only
TRANSCEIVE	Transmit mode upon keyline closure.
*MODE SELECTOR switch	Selects one of five operational modes:
LSB	Lower sideband suppressed carrier (optional)
USB	Upper sideband suppressed carrier
AM	Amplitude modulation equivalent (upper sideband and carrier)

Operation

MODE SELECTOR switch (continued)

CW	Continuous Wave, tone offset from carrier by 1 KC
FSK	Frequency shift keying in TRANSCIVE Frequency shift conversion in RECEIVE.
TRANSMIT AUDIO	Adjust the transmitter for rated output. Clockwise rotation increases output. Meter indication should be over 100 on voice.
RECEIVE AUDIO	Adjust speaker and headset volume for comfortable listening. Clockwise rotation increases volume.
*PHONE PATCH switch	Provides for four to two wire conversion in RECEIVE and TRANSMIT. In TRANSMIT the transmitter is also keyed. In OFF, normal four wire operation is available.
*SPEAKER switch	Provides for INternal, EXternal and OFF modes of operation of the internal speaker amplifier.
*LOCAL - REMOTE switch	Provides front panel switching of audio and keying functions to a remote location when using a Transceiver without a mode switch, ie., automatic channel mode programming.

3.2.2 Accessory Controls

Internal

CATHODE CURRENT/RELATIVE POWER

Located on the underside of the RF Amplifier module in the PA section. It selects the function the front panel meter monitors in transmit. Normal function monitored is Relative Power output.

KEYLINE

On the program matrix board on the inside of the front panel is a pin (P)12 which when grounded keys the transmitter when in the transceive mode.

AM TUNE

On the program matrix board above a ground on (P)11 not only keys the transmitter but also provides carrier output.

Front Panel Options

CC = Clockwise, CCW = Counterclockwise

CLARIFIER

Provides vernier/off adjustment of the receive frequency. CCW rotation increases frequency.

RF GAIN

Provides manual RF gain to the receiver front end. CW rotation decreases sensitivity.

VOX

Provides for vernier control of the voice operated transmit function. CW increases sensitivity, CCW is push-to-talk.

NOISE BLANKER

Provides vernier/off adjustment of the blanking level. CCW is minimum sensitivity.

SQUELCH

Provides for vernier control of receive voice sensing. CW decreases sensitivity. CCW is OFF.

PRIVACY

Refer to Privacy Addendum. (supplied with Privacy Option)

Remote Transmit Level and
Remote Receive Level

Provides adjustment of input and output levels of the remote 600 ohms inputs to be adjusted independent of local level setting. Transmit is adjusted for a meter reading >100 . Receive is adjusted for 0 dbm output.

3.3 OPERATING PROCEDURES.

3.3.1 Oven Warm-up. - To insure operation within the specified frequency tolerance, allow a 20-minute warm-up prior to operation. The standby mode minimizes power drain while retaining oven power. FCC TYPE ACCEPTED EQUIPMENT REQUIRES 20 MIN.

3.3.2 Receive RF Gain Control (Option). - When operating on a channel with strong adjacent channel interference producing noticeable distortion, reduce the receiver sensitivity (gain) with this manual control.

3.3.3 Transmit Audio Control. - With the control set at its normal position, approximately 2 o'clock, normal inputs will provide full power output. A control increase with normal signal will not increase power due to power feedback control. Meter reading is >100 .

3.3.4 Input Power. - Transceivers may be supplied with either 115/230 VAC, 115 VAC sine or square wave, 12 VDC or 24 VDC. To prevent damage, insure that the power

Operation

source to which the equipment is connected is the same for which the equipment is wired.

3.4 PERIODIC OPERATOR MAINTENANCE.

Design of the Transceiver requires no periodic operator maintenance other than cleaning of the filter when the blower option is used. The filter may be removed by removal of the blower mounting screws. The filter may be washed in warm soapy water. Insure that the filter is dry prior to re-installation on the radio.

SECTION IV

PRINCIPLES OF OPERATION

4.1 FUNCTIONAL DESCRIPTION.

The radio described in the following sections is a dual conversion superheterodyne transmitter-receiver capable of operation in single sideband and amplitude modulation voice communication modes and CW or Frequency Shift Keying data modes. Up to ten crystal controlled channels are available in both simplex and half duplex. Power output is 150 watts PEP or 100 watts average.

4.2 SIGNAL FLOW BLOCK DIAGRAM.

Refer to Figure 4-2A, Transceiver Block Diagram for the subsequent discussion.

4.2.1 Receive. - The received signal from the antenna is routed through A1K1, the antenna switching relay, through A3A1K1, the TR Relay to A3A1V1 the RF Amplifier. V1 is also used in the transmit function as an amplifier. A tube is used, because of its superior signal handling capability and its availability resulting from use in transmit. A transistor FET "front end" is available as an option. A3A1V1 drives A3A1Q1, the receive mixer, the output of which is a 1.5 MHz or alternate 1.4 MHz intermediate frequency. Conversion to the 455 kHz IF and then audio detection takes place in the IF/Audio Module A4 via CR1-CR4, FL1 or FL2, U1-U3 and audio amplifiers Q17-Q23. The speaker amplifier is A1A2.

4.2.2 Transmit. - Input audio signals are converted to the 455 kHz IF and filtered by A4U5 and A4FL1. Bi-directional mixer A4CR1-CR4 up converts to 1.5 MHz or alternate 1.4 MHz which is supplied to amplifier A3A1Q3 and then to transmit mixer A3A1U1. RF Amplifier A3A1U2 provides necessary drive, through A3A1K1 the TR Relay, to A3A1V1, A3A1V2 and power amplifiers A3V1-V3. The matching network A2 provides matching between the plates of the power amplifier and a 50 ohm antenna. RF power to the antenna connector is controlled by the antenna switching relay A1K1.

4.3 MAIN FRAME.

The main frame contains all wiring and circuitry necessary to interface the Transceiver modules A2 through A11 as listed in 1.4. The main frame designator is A1.

Operation

- 4.3.1 Four Channel Transceiver. - The Transceiver is available in four, six and ten channel models; however, since the four channel model is not available with all of the options it is treated in a separate instruction manual.
- 4.3.2 Six Channel Transceiver. - The basic parts of the main frame are shown on Figure 4-3A, Main Frame Interconnection Diagram. Important sections and their functions are described beginning with 4.3.5.
- 4.3.3 Ten Channel Transceiver. - In terms of additional components or wiring there is no difference between the six and ten channel transceiver. The difference occurs in the plug-in modules A2, A3 and A6, and A8 where duplex is supplied.
- 4.3.4 Ten Channel Transceiver with Half Duplex Function. - For ten channel duplex operation a modified Signal Distribution board is supplied. For duplex operation, the Voice Privacy option is not available. In its place (and location) an additional ten crystal oven and duplex frequency generator board is inserted. Channel information is obtained from the same channel switch wafer, A1A1S1. Channel information may be programmed to accommodate either simplex or half duplex on any channel. Mode may also be programmed to channel selection.
- 4.3.5 Main Frame Electronics Front Panel. - The front panel contains all necessary operator controls and inputs including the Audio Distribution and Programming PC Board A1A1 and Audio Output PC Board A1A2. Controls, their function and purpose, are discussed in paragraph 3.2.1.
- 4.3.6 Main Frame Electronics Rear Panel. - Additional components and input/output functions are included on the rear panel. All terminal strips and connectors providing for remote inputs and Antenna Coupler channeling information is also located there. Components on the rear panel are shown on Figure 4-3A, Main Frame Interconnection Diagram, including A1K1, the antenna switching relay and optional A1K2, the Remote Motor Switching relay. Two Figure 4-3A schematics are supplied. They contain the various combinations possible of front and rear panel controls that may be supplied for various system requirements.
- 4.3.7 Signal Distribution Printed Circuit Board. - The signal distribution board provides all interfaces between modules, front panel and rear panel. The necessary basic plug-in modules on this board are the Frequency Generator (A6) and the IF/Audio (A4) modules. All options with the exception of Remote plug into this board. Reference Figure 4-3A for pin and connector assignment. Figure 4-3C indicates location of connectors for basic and option plug-in modules.
- 4.3.8 Audio Distribution Printed Circuit Board (A1A1). - The Audio Distribution board, A1A1, is shown schematically on Figure 4-3A and pictorially on Figure 4-3D. The audio distribution board accepts local microphone, remote and phone patch audio inputs and by Transmit Audio level control R2 sets the drive level to the transmit balanced modulator. Receive Audio as set by R1, is also supplied to the local speaker, handset or remote or

phone patch. Remote and phone patch operation is at the balanced 600 ohm 0 dbm level through T1 and T2. Remote audio is a four-wire system whereas the phone patch provides switching of a two-wire input. Phone patch transmit, also keys the transmitter. Board A1A1 also contains the Transmit-Receive lights which indicate the status of the transceiver. These lights also serve for receiver tuning in the FSK mode. Channel oscillator switching information is derived by S1, a part of the channel selection switch.

Where automatic mode programming is provided, selection of any mode may be preselected on a channel basis. Programming is accomplished as follows (refer to Figure 4-3D). (P)1 through (P)10 on the program matrix designate channel position and (P)13 through (P)18 channel mode. By soldering a jumper from (P)1 through (P)10 to (P)13 through (P)18 channel mode is set. Example, a jumper from (P)1 to (P)16 provides the AM mode in channel 1. (P)11 and (P)12 are test functions that may be established by the placement of a jumper to chassis ground. Operation of mode selection is as follows:

- a. LSB - +12V on (P)13 activates LSB oscillators on the Frequency Generator (A6) board (206/210 only) via CR11.
- b. USB (reduced carrier, -16 db) - +12V on (P)14 activates USB oscillators on the Frequency Generator (A6) board, via CR13, the reduced carrier gate on the ACC (A3A14) board via CR12 and the carrier reinsertion gate on the IF/Audio (A4) board via CR38.
- c. USB (suppressed carrier -50 db) - +12V on (P)15 activates the USB oscillators on the Frequency Generator (A6) board via CR14.
- d. AM (carrier -3 db to -6 db) - +12V on (P)16 activates the carrier reinsertion gate on the IF/Audio (A4) and the ACC (A3A14) boards via CR20, the USB oscillators on the Frequency Generator (A6) board via CR15 and receive carrier injection disable gate on the Frequency Generator (A6) via Q4 and CR14. Q4 is on in receive only.
- e. CW - +12V on (P)17 activates the CW Oscillator (A7A1) via CR18, increase peak power control (PPC) time constants on PPC control (A3A2) board via CR21, activates the USB oscillators on the Frequency Generator (A6) board via CR16 and disables the microphone input via CR21, R8 and Q1.
- f. FSK - +12 on (P)18 activates the FSK (A9) board via CR19, increases PPC time constants on PPC control (A3A2) board via CR22, activates the USB oscillators on the Frequency Generator (A6) board via CR17, disables the microphone input via CR22, R8 and Q4, and turns Q3 off via CR29 and Q2 thereby providing receive/transmit lamp control to the FSK (A9) board for tuning and indication purposes. +12V is also supplied to the lamps via CR34 and CR35.

Functions of other components on the A1A1 board are as follows: CR24 and CR25 provide clipping of the input signal on overload conditions. CR27 and CR28 disable

Operation

the microphone gate Q1 in push-to-talk (PTT) or VOX operation. CR38 isolates the microphone from the phone patch keyline thereby disabling the microphone input when phone patch is used.

4.3.9 Audio Output Printed Circuit Board (A1A2). - The Audio Output board is shown schematically on Figure 4-3E and pictorially on Figure 4-3F. The Audio Output board, also located on the front panel provides the gain necessary to deliver 4 watts to the speaker. The speaker is driven by Q4 and Q5, push-pull amplifiers which in turn are driven by emitter followers Q2 and Q3. Q1 provides the phase splitting necessary without a transformer input. CR2 and CR3 provide temperature compensation for output quiescent current control.

4.4 RF AMPLIFIER MODULE (1A3).

The RF Amplifier Module contains several basic sub-units or functions, the RF Amplifier/Mixer PC Board, the channel switch assembly, the power amplifier, and the PPC power control, PC board, the channel tuning boards and the Duplex Switching board (206M/210M). (See Figures 4-4A through 4-4F.)

4.4.1 Channel Switch Assembly. - The channel switch assembly contains all the switching, up through the grids of the 6146B power amplifier tubes necessary when switching to a specific channel. S2B and S2C select the input tuned circuit of V1, S2D connects R2, the transmit gain adjustment pot in the circuit, S2E and S2F select the input and output tuned circuits of V2. In the 206M/210M S2G and S2H are provided to switch the marine channel strip to duplex. Also located on the assembly are the 22 pin connectors into which the individual channel strips and the duplex switching board plug in. These channel strips contain L1, L2, L3 and L4 and associated components necessary for channel tuning.

4.4.2 RF Amplifier/Mixer Board (A3A1). - On receive, the RF signal from the antenna passes through the antenna switching relay A1K1 through J2 to K1, the Transmit/Receive relay. K1 is shown in the receive position. K1 connects the signal to S2B. The received signal passes through a tuned circuit to the grid of V1 the RF amplifier stage. This tube is used on both receive and transmit. After amplification by V1 the signal is applied through C4 to G1 of Q1, a dual gate FET, which functions as the receive mixer. The channel oscillator injection signal, at a frequency 1.5 MHz or alternate 1.4 MHz above the receive frequency, is amplified by Q2 and applied to G2 of Q1. Q2 is a broadband amplifier which requires no tuning. Circuitry consisting of R5, R6, R7, CR1, CR3 and C3 serves the dual function of biasing Q1 on in receive and off in transmit, and in addition effectively connects C3 in the circuit on receive. This is required since the input capacitance of V2 is lower in receive since it is biased off. The output of Q1 is applied to a double tuned circuit, tuned to IF frequency, comprised of T1 and T2 and associated components. This double tuned circuit functions on receive and transmit. The output on receive is taken from a link on T1 and goes to the IF/Audio board A6.

In the transmit mode the signal at 1500 kHz or alternate 1400 kHz comes in from the IF/Audio board through T1, T2 to T1 of Q3, a dual gate FET, which is biased on on in transmit

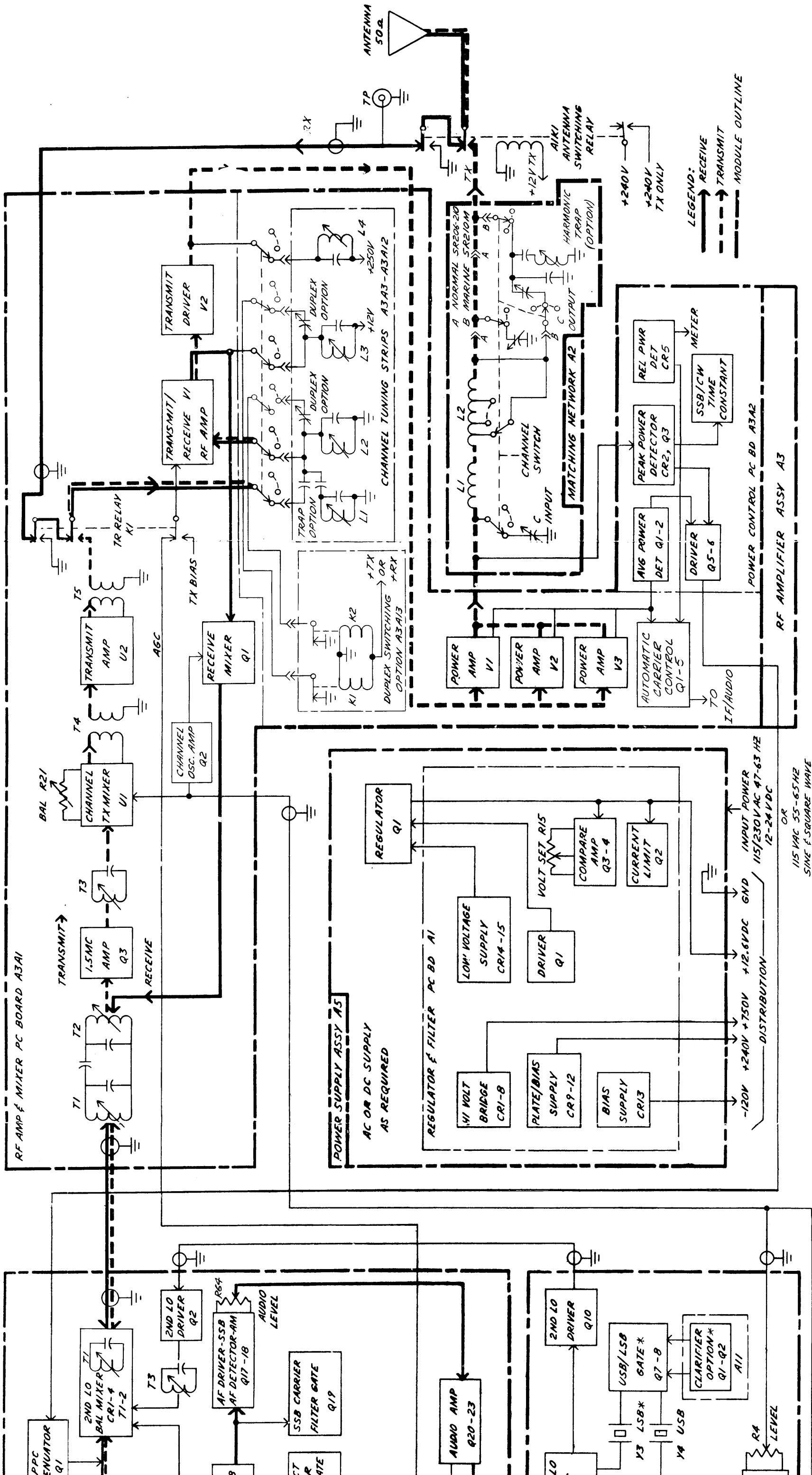


Figure 4-2A. Transceiver, Block Diagram

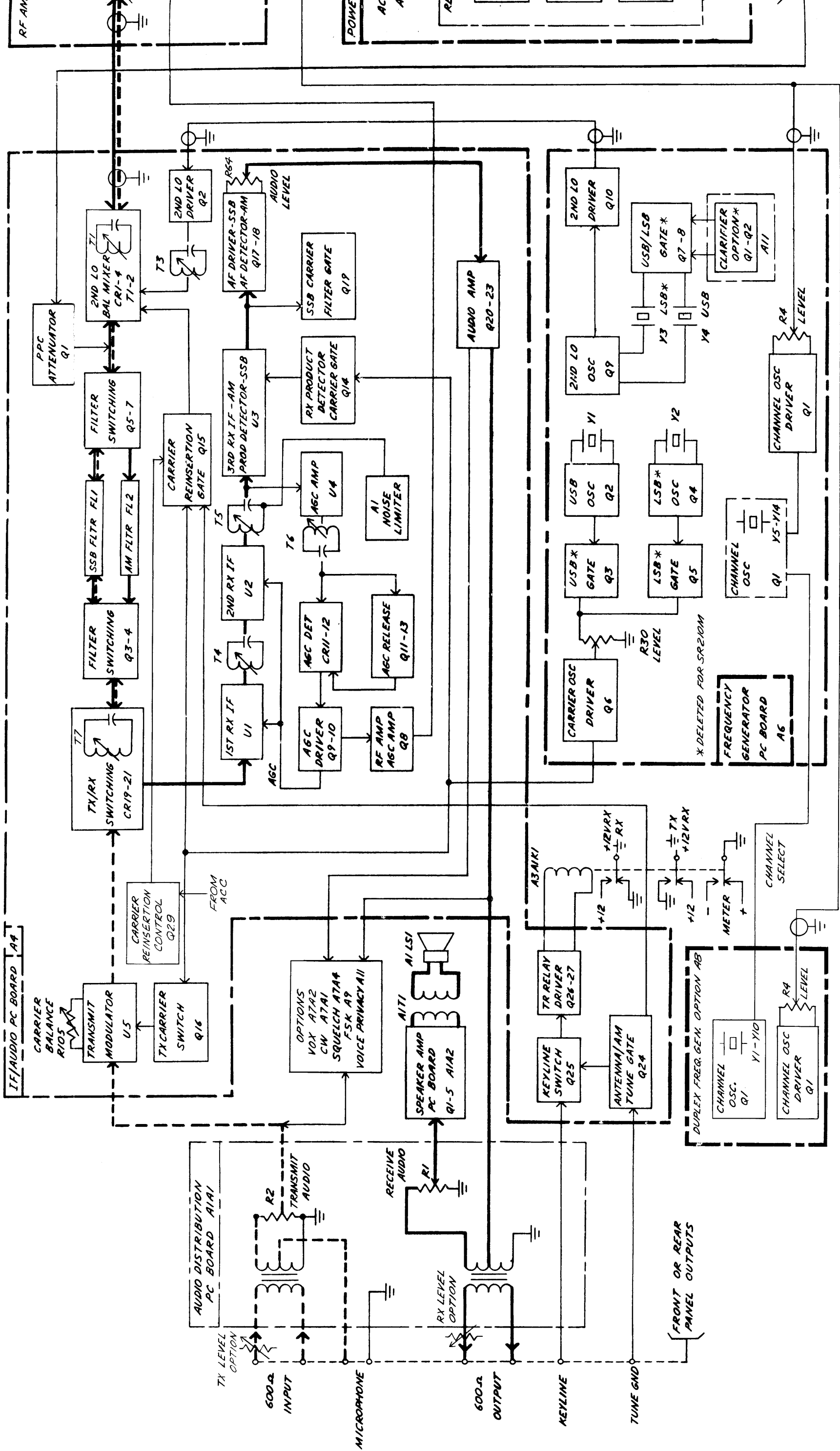
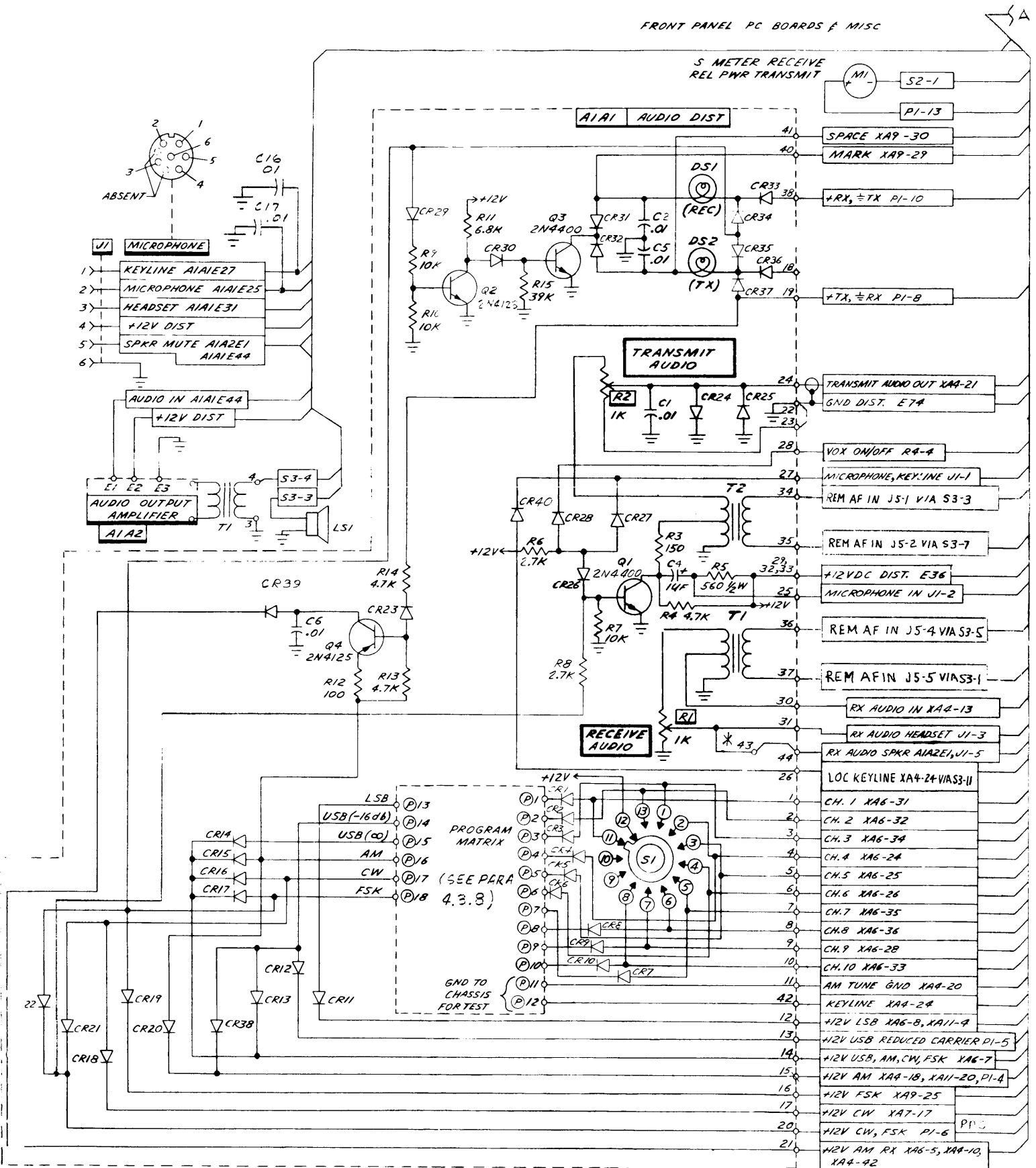


Figure 4-3A-1. Deleted.

FRONT PANEL PC BOARDS & MISC



*Remove jumper from E43 & E44 for speaker muting with Deskset Option.

Figure 4-3A-2. Main Frame Interconnection Diagram, Types SR-206/210

THEORY OF OPERATION

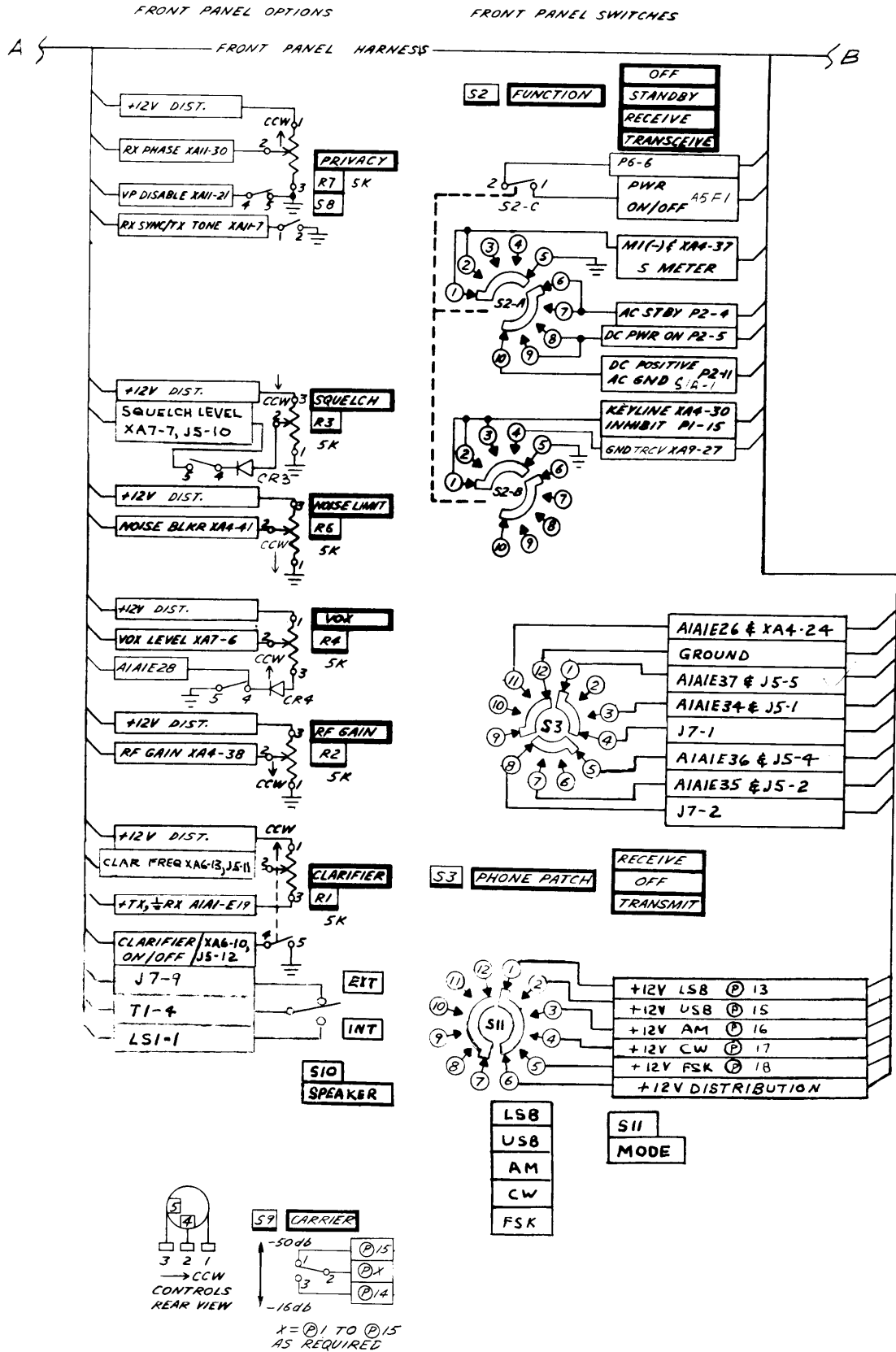


Figure 4-3A-2. Main Frame Interconnection Diagram, Types SR-206/210

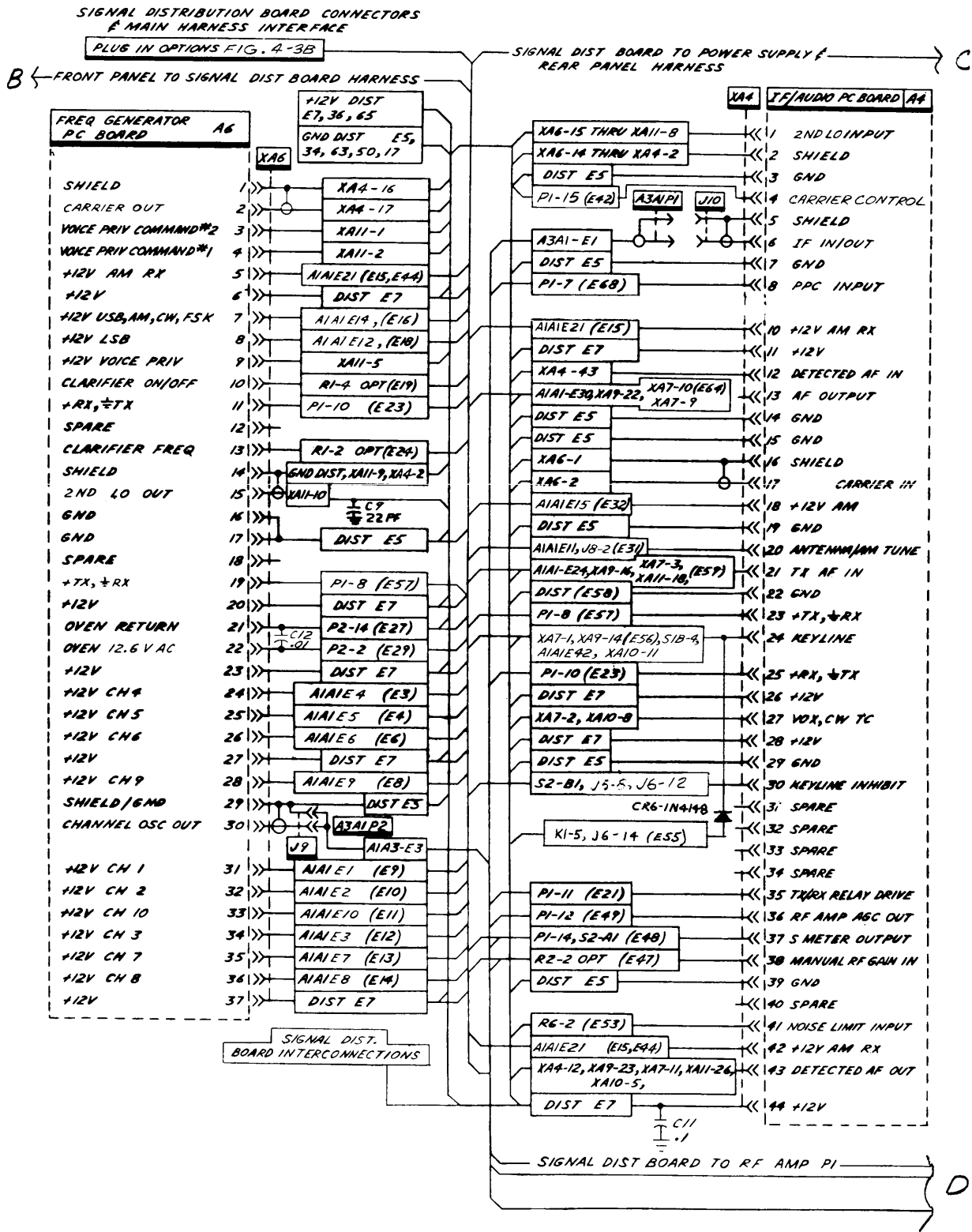


Figure 4-3A-2. Main Frame Interconnection Diagram, Types SR-206/210

THEORY OF OPERATION

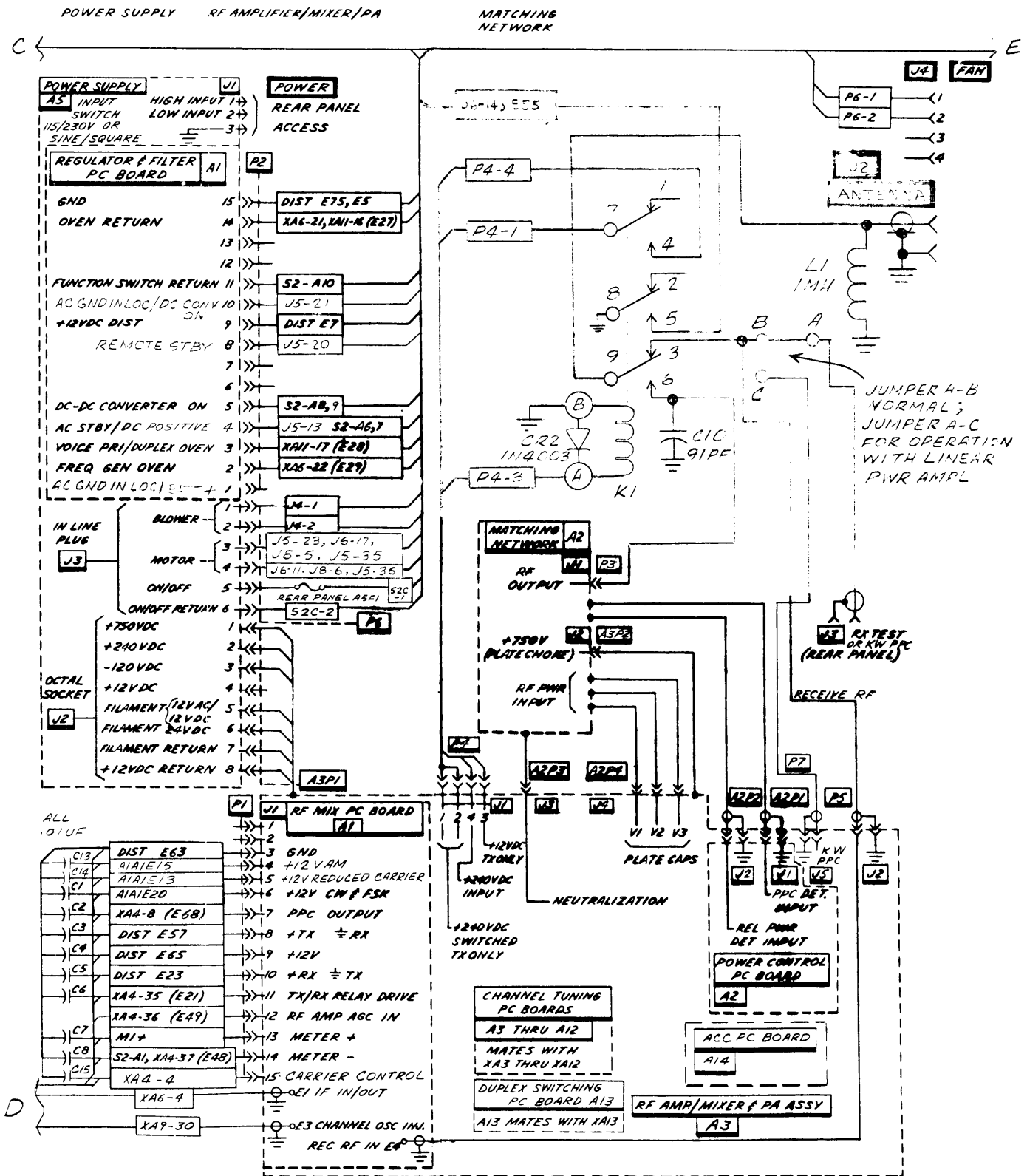


Figure 4-3A-2. Main Frame Interconnection Diagram, Types SR-206/210

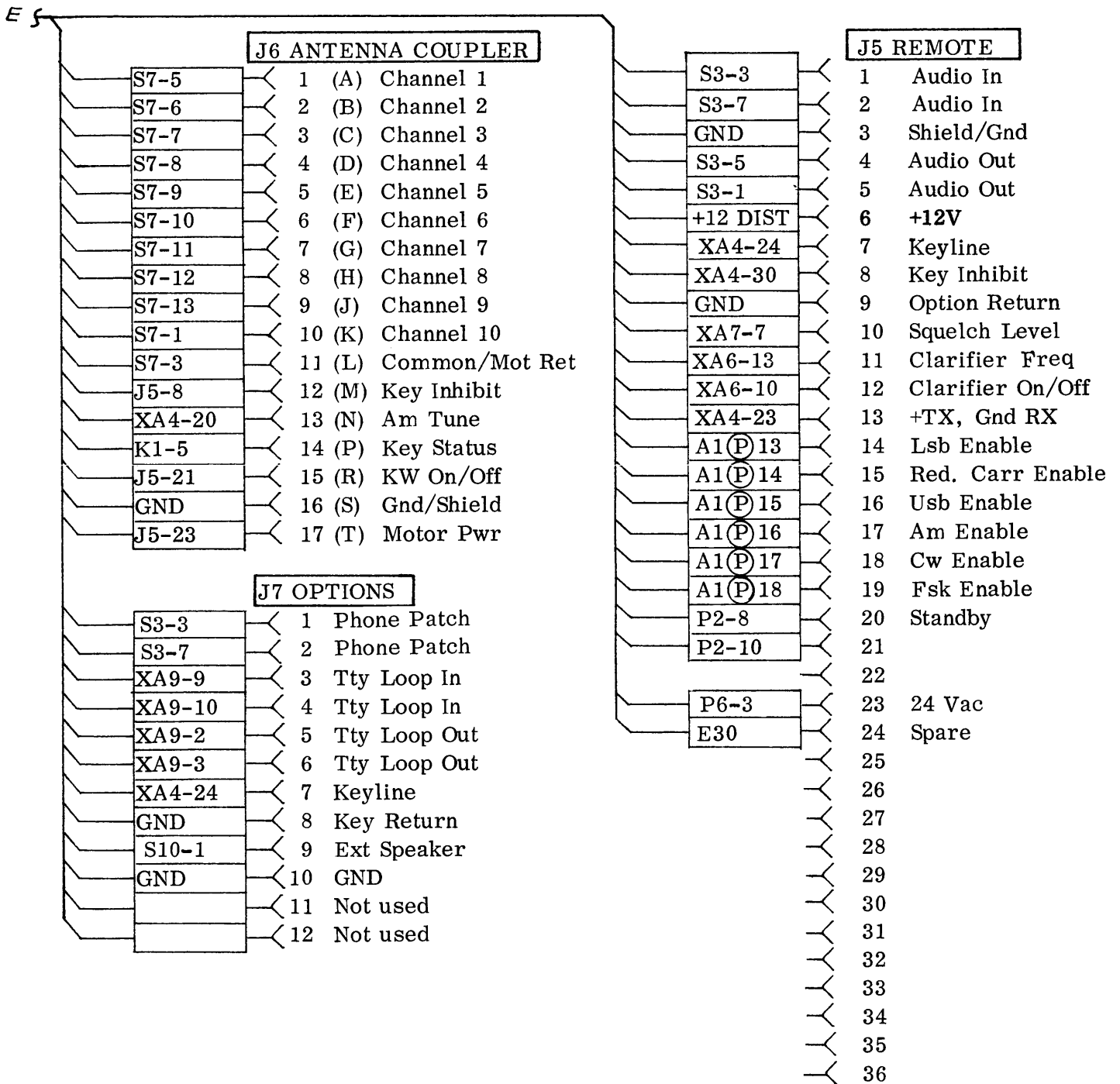


Figure 4-3A-2. Main Frame Interconnection Diagram, Types SR-206/210

CONNECTED AS SHOWN;
IF TS, XA11 IS CONNECTED

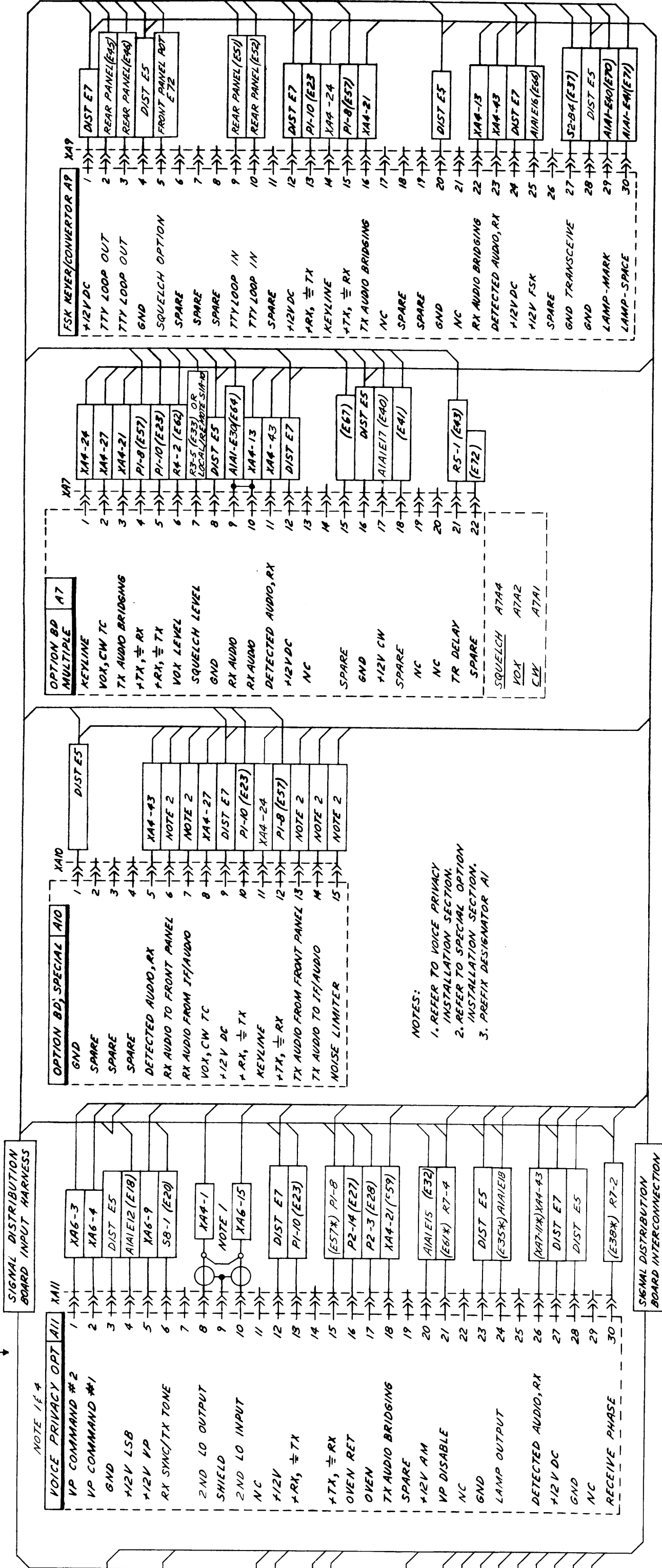


Figure 4-3B. Main Frame Options Interconnection Diagram

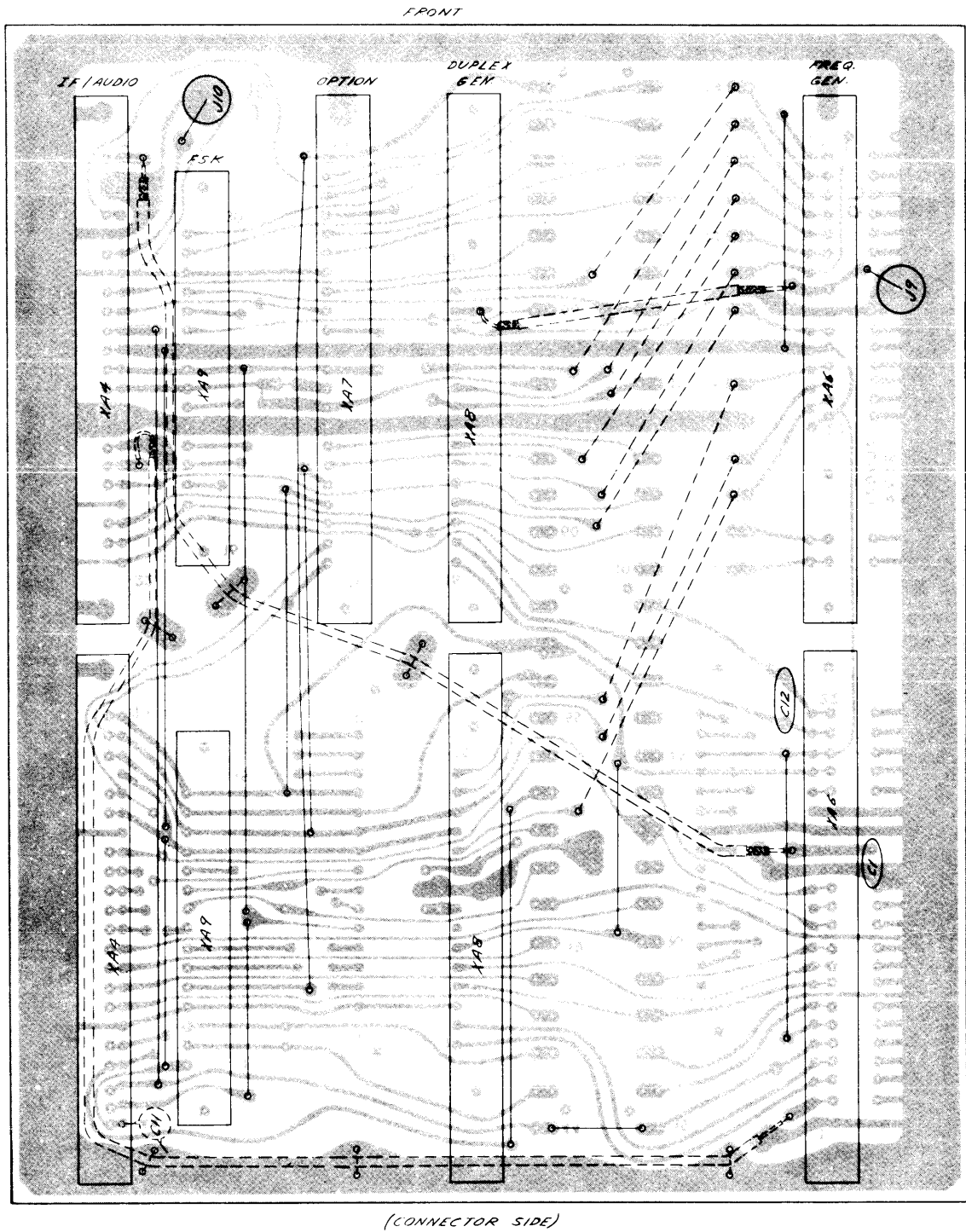


Figure 4-3C-2. Signal Distribution Board Duplex

Program Matrix Connections

Wire P1 thru P10 as required

to P-13 for LSB

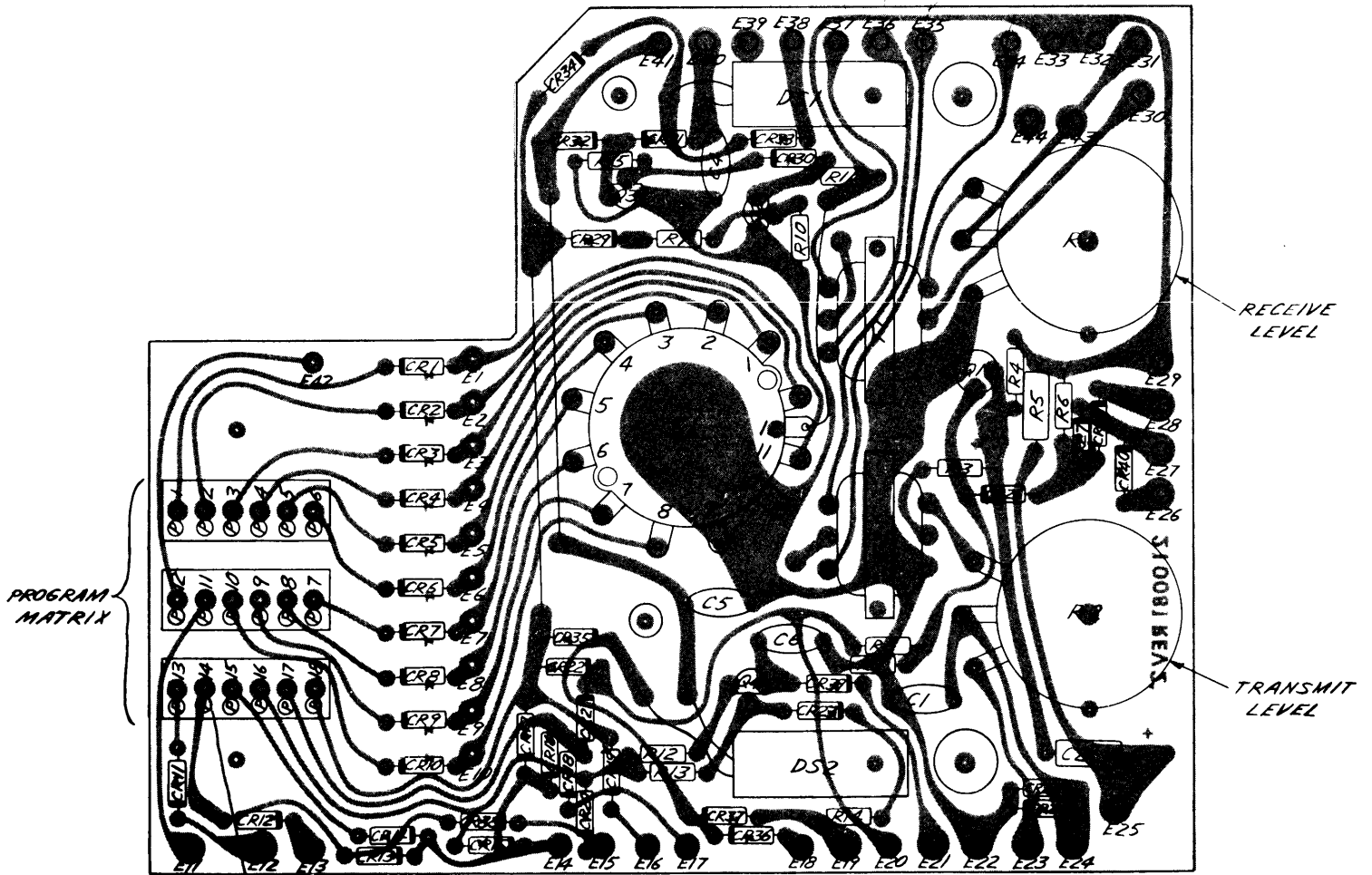
P-14 for USB reduced carrier (-16db)

P-15 for USB

P-16 for AM

P-17 for CW

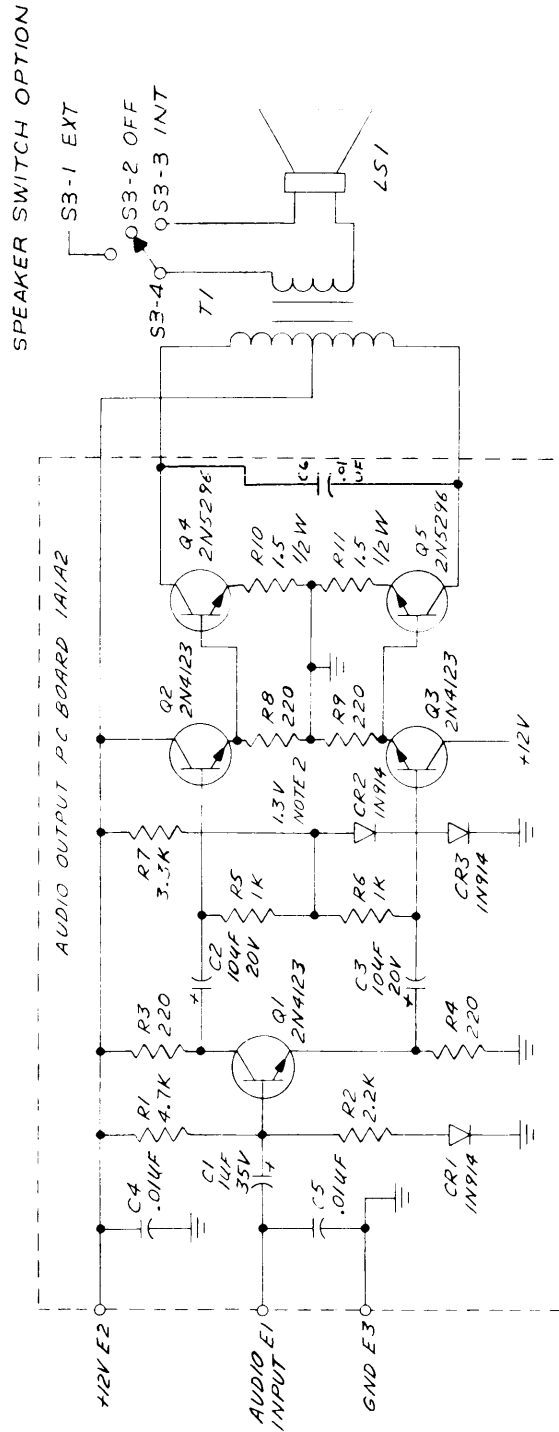
P-18 for FSK



NOTE: For E designator functions refer to Figure 4-3A.

Reduced carrier

Figure 4-3D Audio Distribution PC Board Assembly



- NOTES:**
1. Unless otherwise specified:
Resistances are in ohms
Resistors are 1/4W, 5%
 2. Voltage dependent on diode mfg.
Adjust R7 for 1.3 volts.
 3. Ref. Designator 1A1A2.

Figure 4-3E. Audio Output, Schematic Diagram

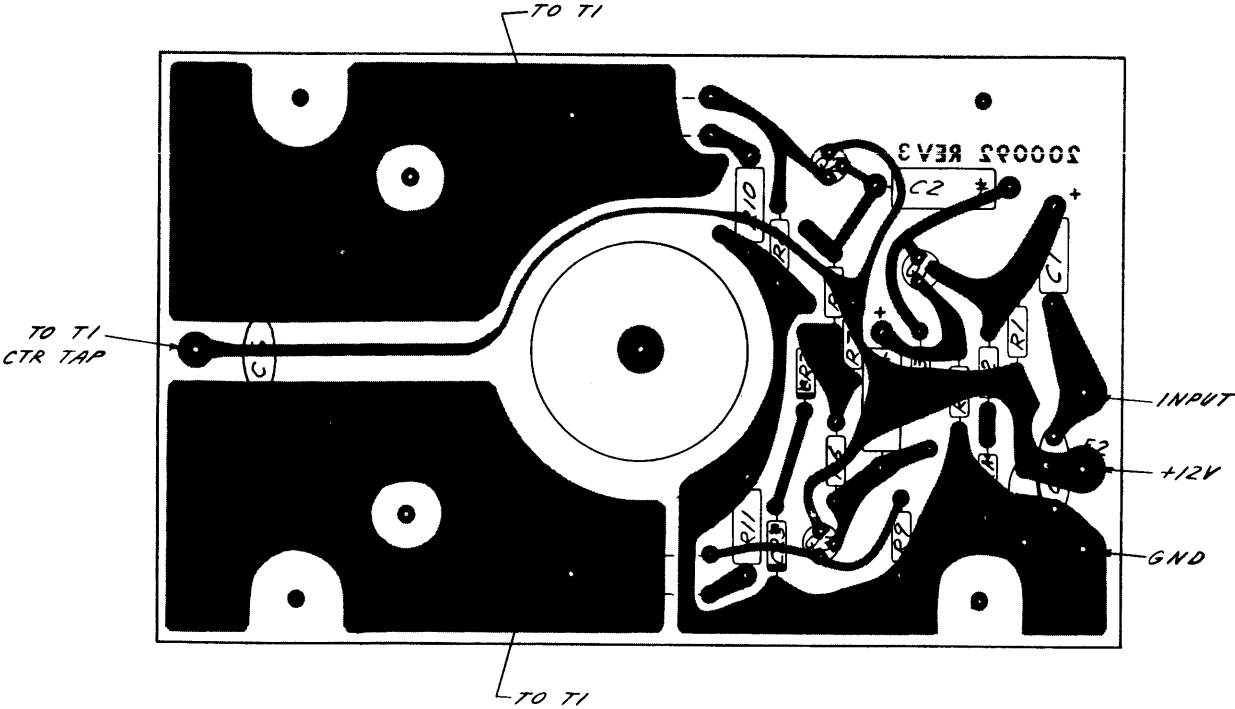


Figure 4-3F. Audio Output Assembly

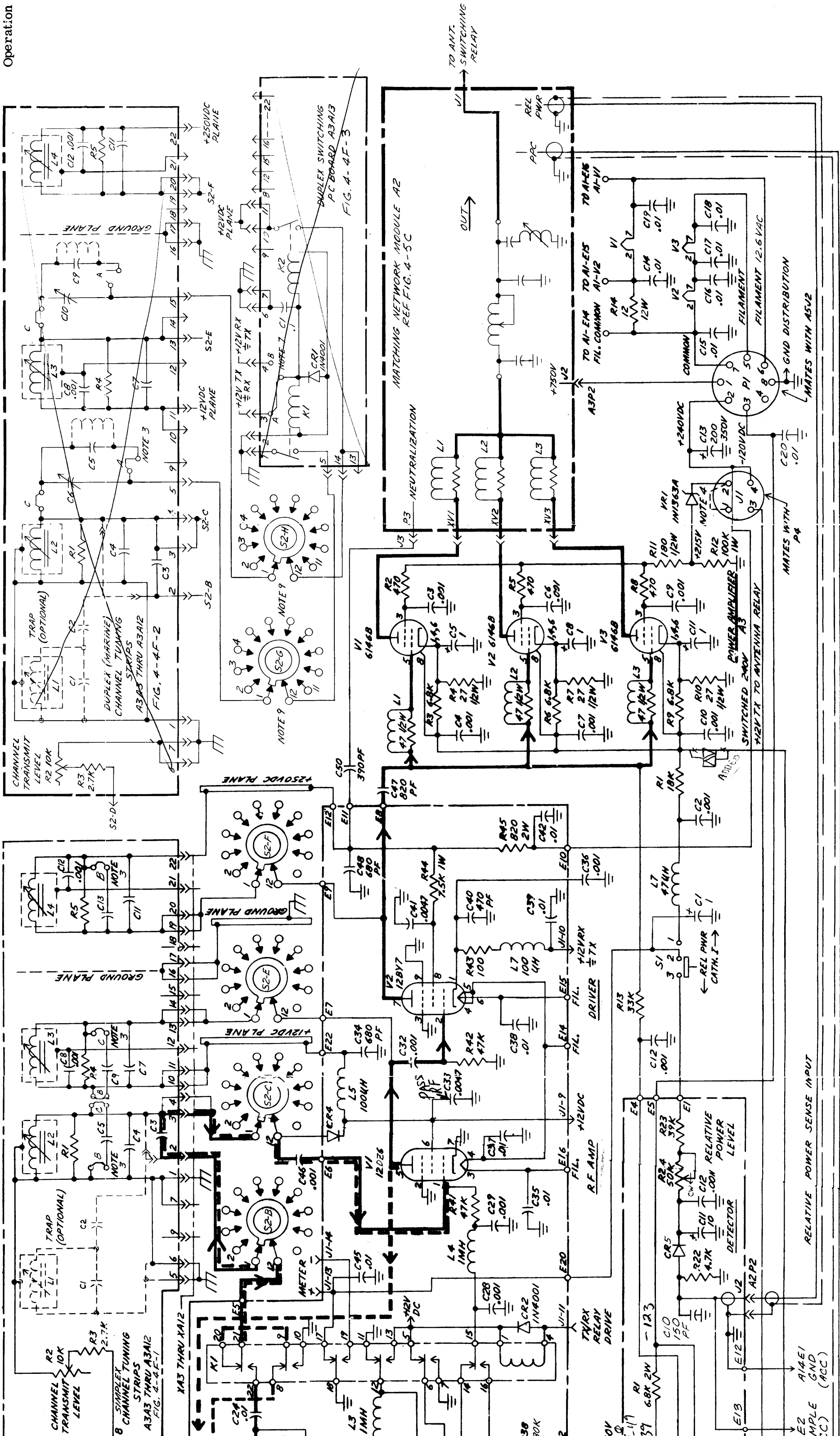
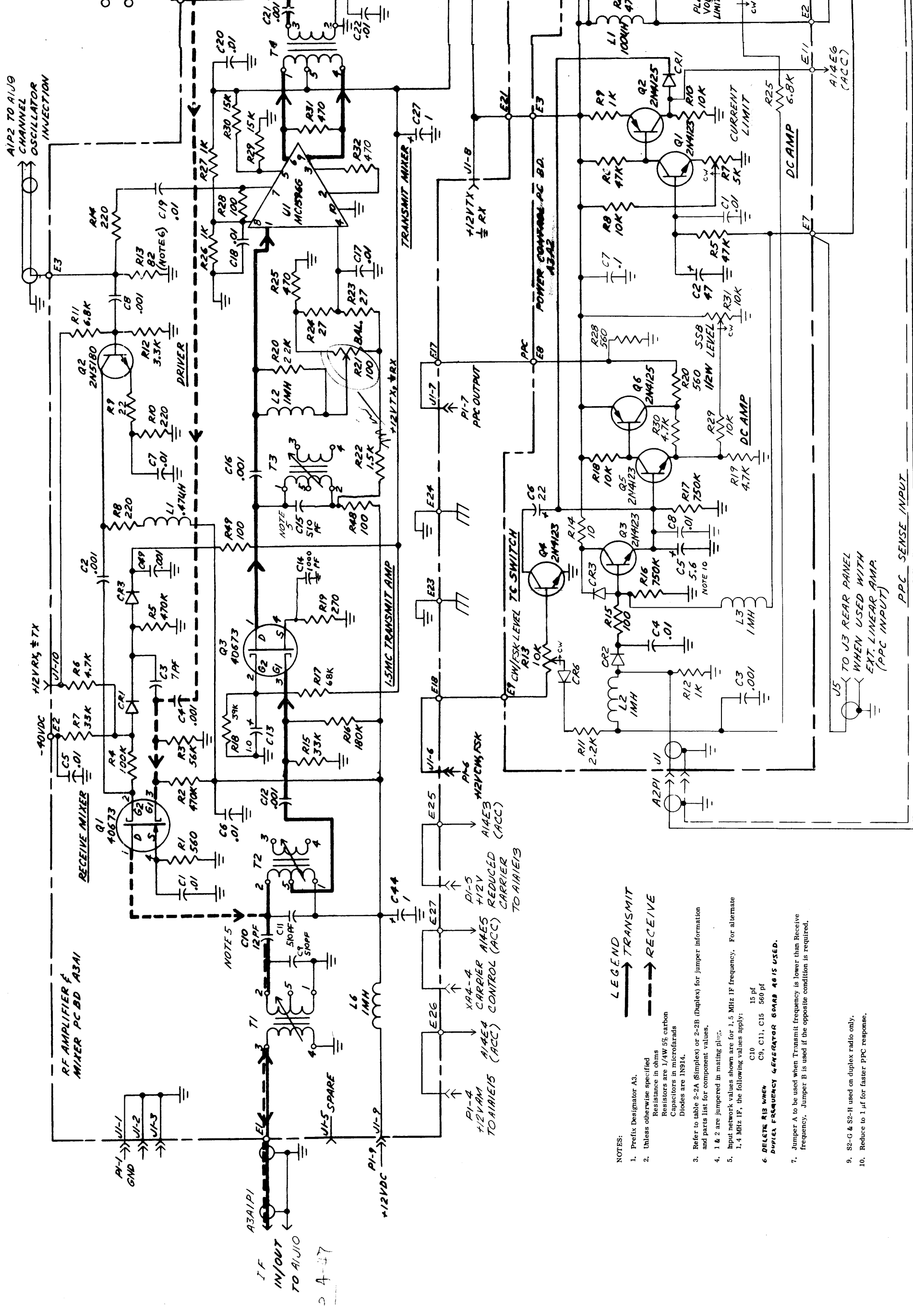


Figure 4-4A. RF Amplifier, Schematic Diagram



LEGEND
 ———→ TRANSMIT
 - - - - -→ RECEIVE

- NOTES:
- Prefix Designator A3.
 - Unless otherwise specified:
 Resistors are 1/4W 5% carbon
 Capacitors in microfarads
 Diodes are 1N914.
 - Refer to table 2-A (Simplex) or 2-B (Duplex) for jumper information and parts list for component values.
 - 1 & 2 are jumpered in mating plug.
 - Input network values shown are for 1.5 MHz IF frequency. For alternate 1.4 MHz IF, the following values apply:
 C10 15 pf
 C9, C11, C15 560 pf
 - DELETE R18 WHEN DUPLX FREQUENCY GENERATOR BOARD 4015 IS USED.**
 - Jumper A to be used when Transmit frequency is lower than Receive frequency. Jumper B is used if the opposite condition is required.
 - S2-G & S2-H used on duplex radio only.
 - Reduce to 1 μf for faster PPC response.

J5 TO J3 REAR PANEL
 WHEN USED WITH
 EXT. LINEAR AMP.
 (PPC INPUT)
 PPC SENSE INPUT

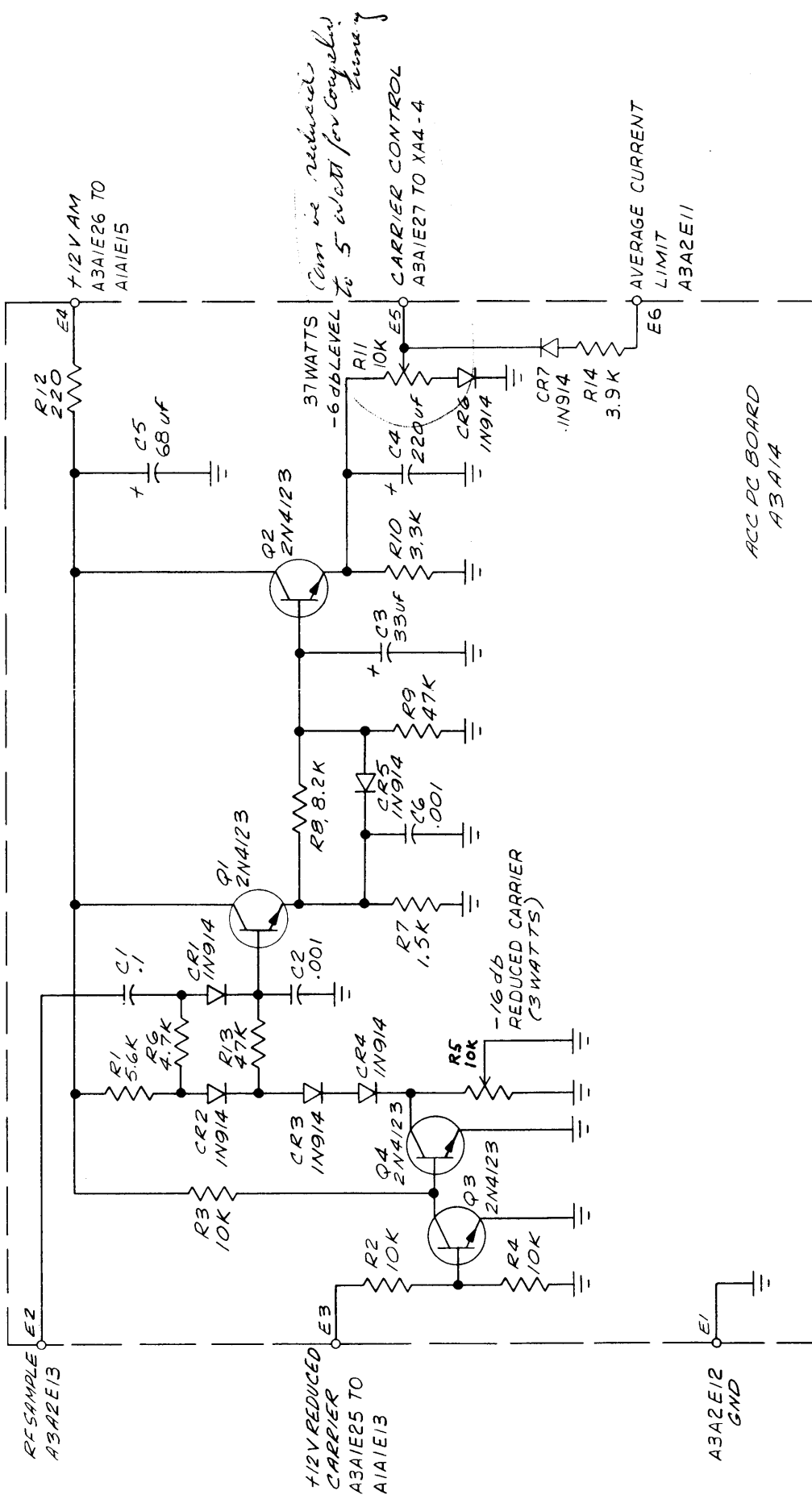


Figure 4-4A-1. Automatic Carrier Control Schematic Diagram

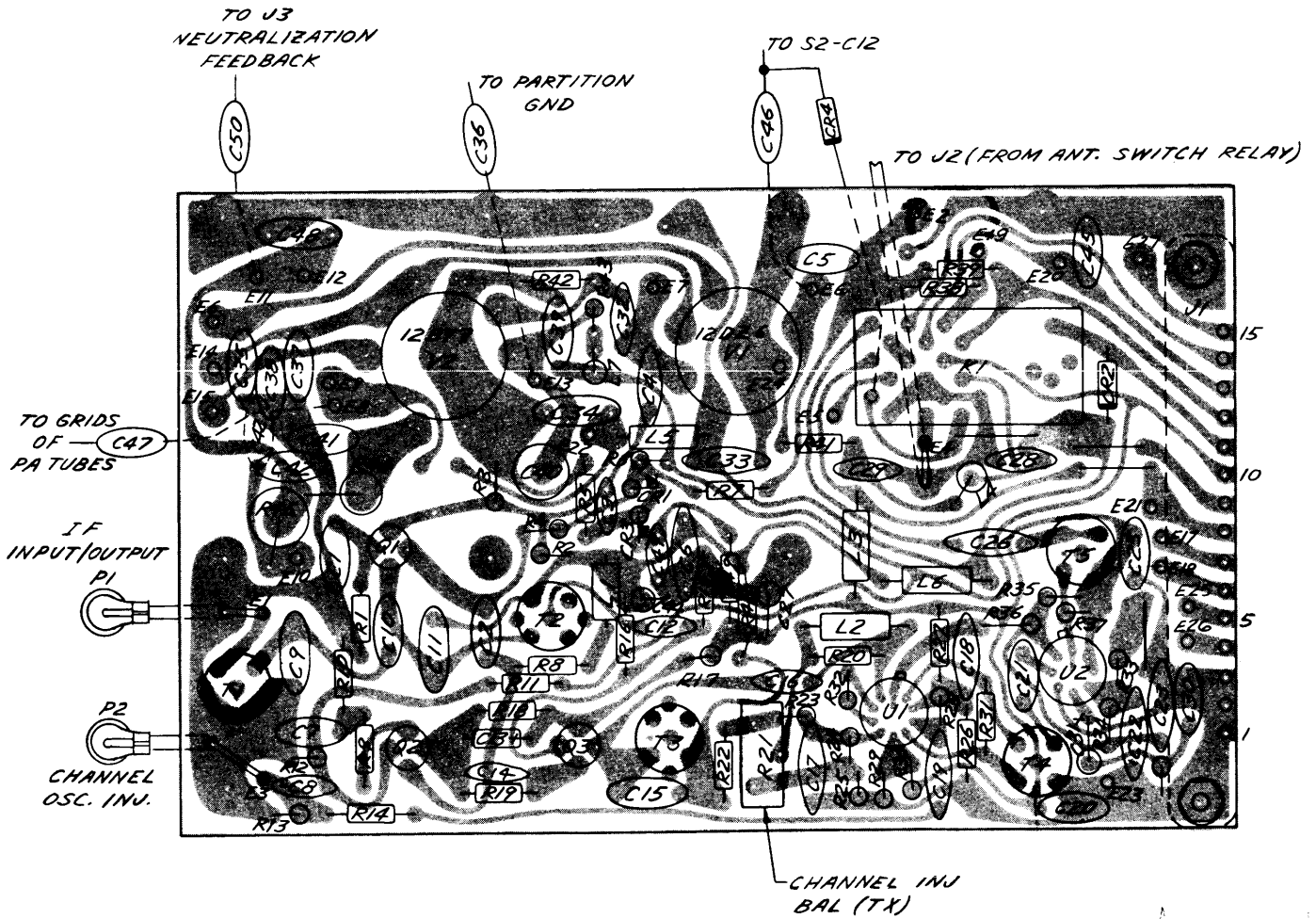


Figure 4-4B. RF Amplifier and Mixer PC Board Assembly

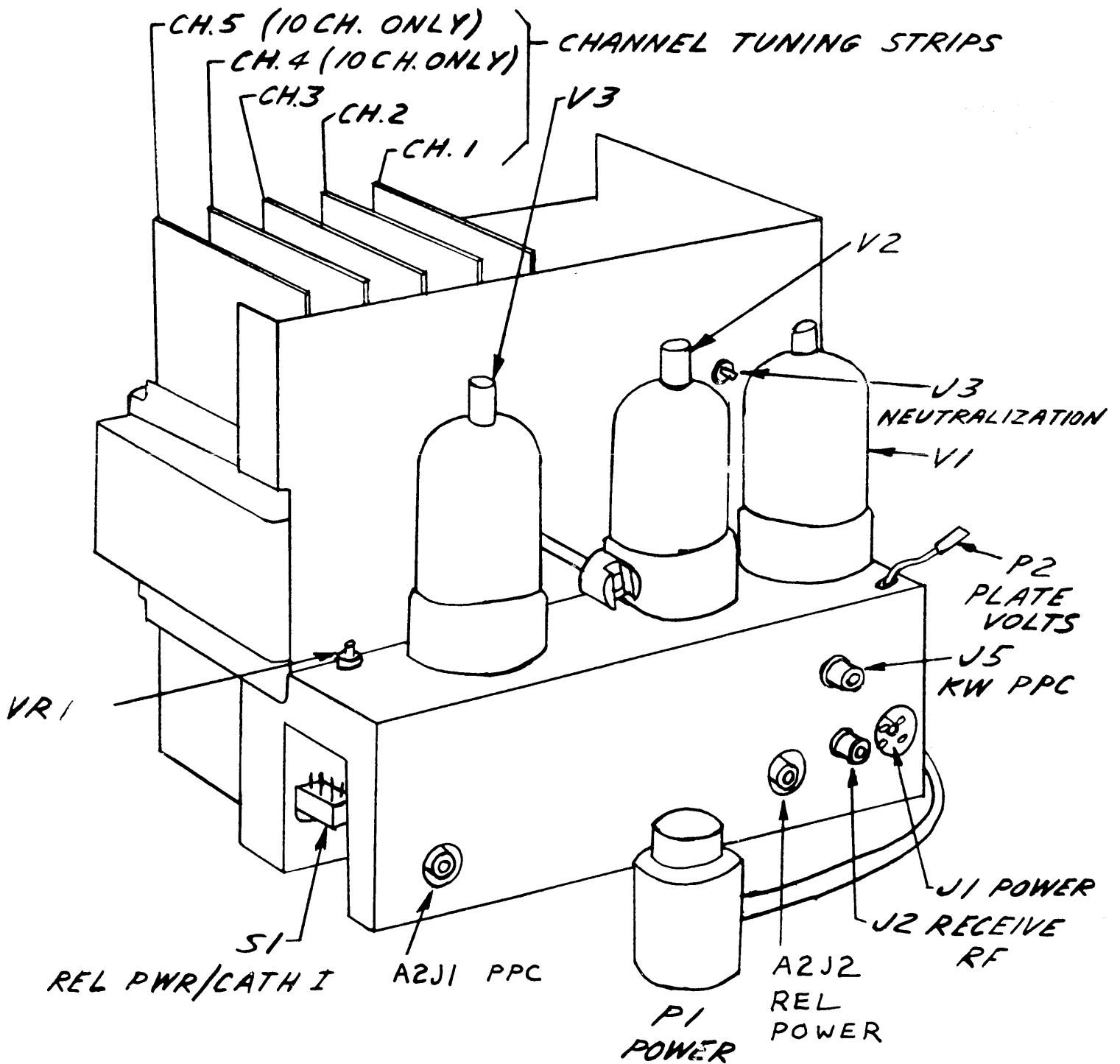


Figure 4-4C. RF Amplifier Module Assembly, Rear View

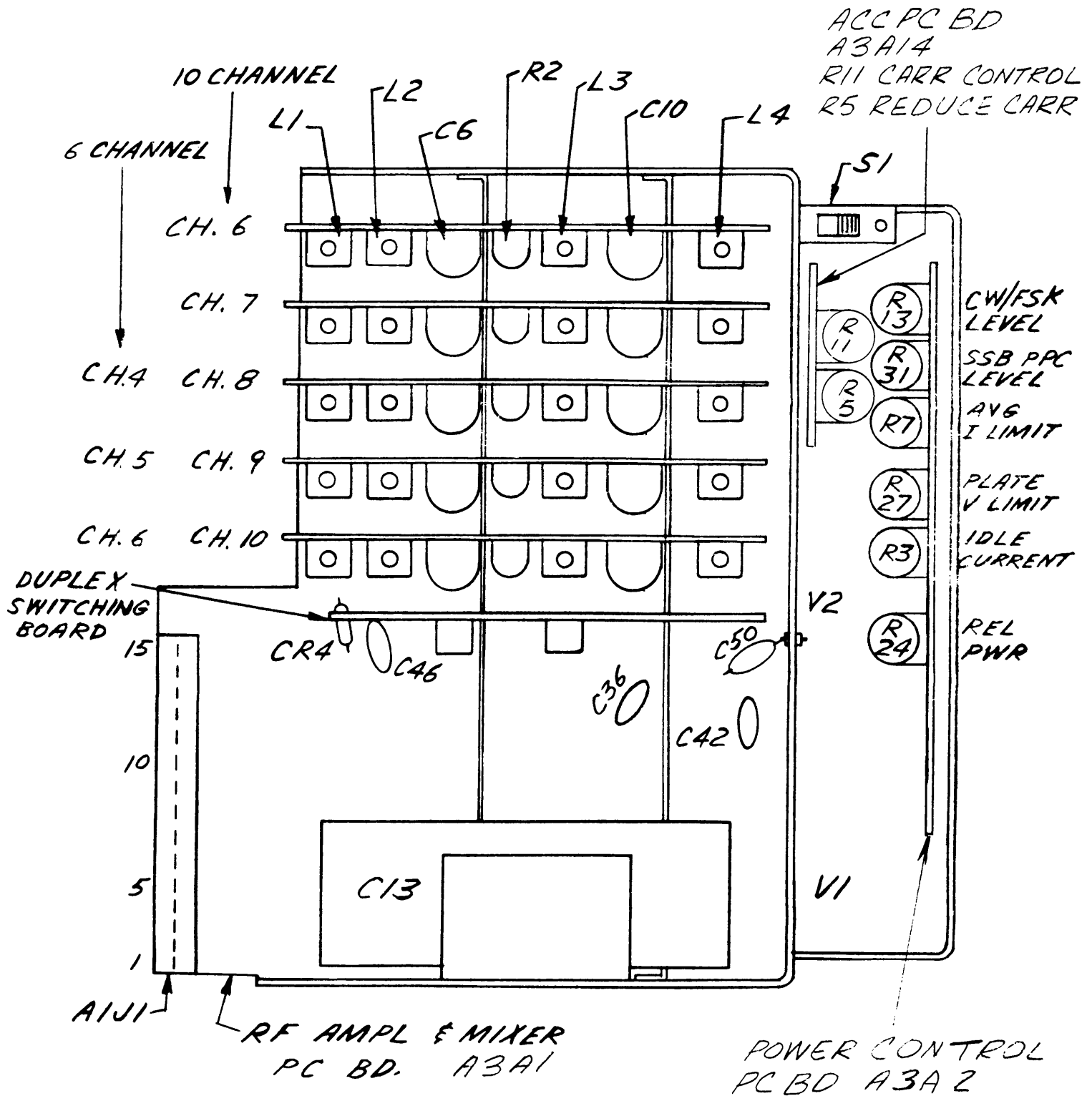


Figure 4-4D. RF Amplifier Module Assembly, Bottom View

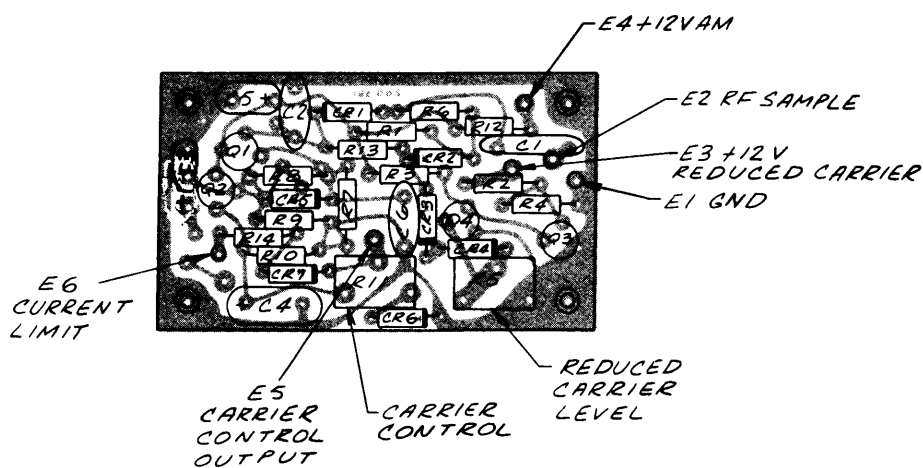
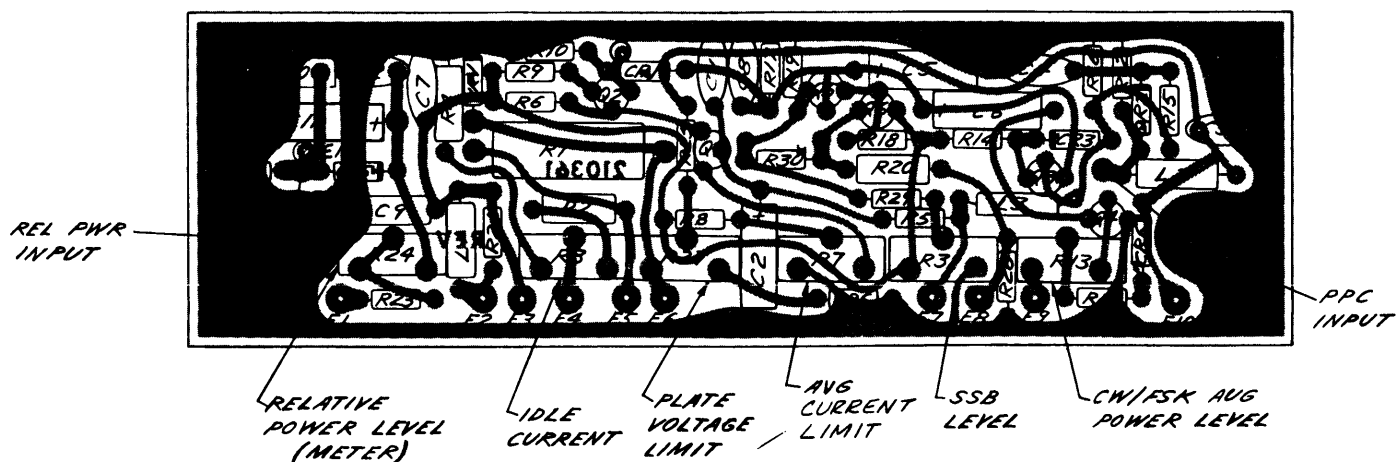
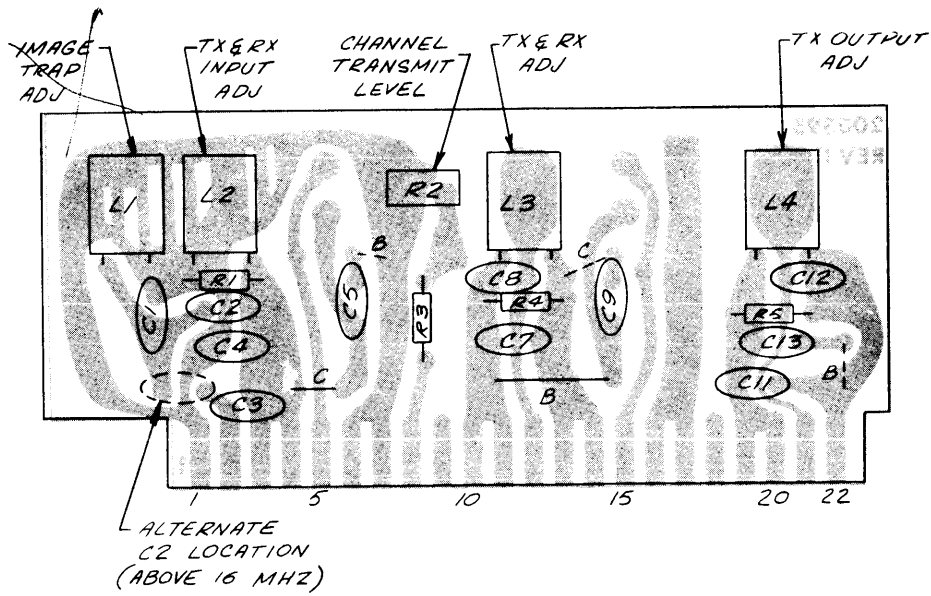
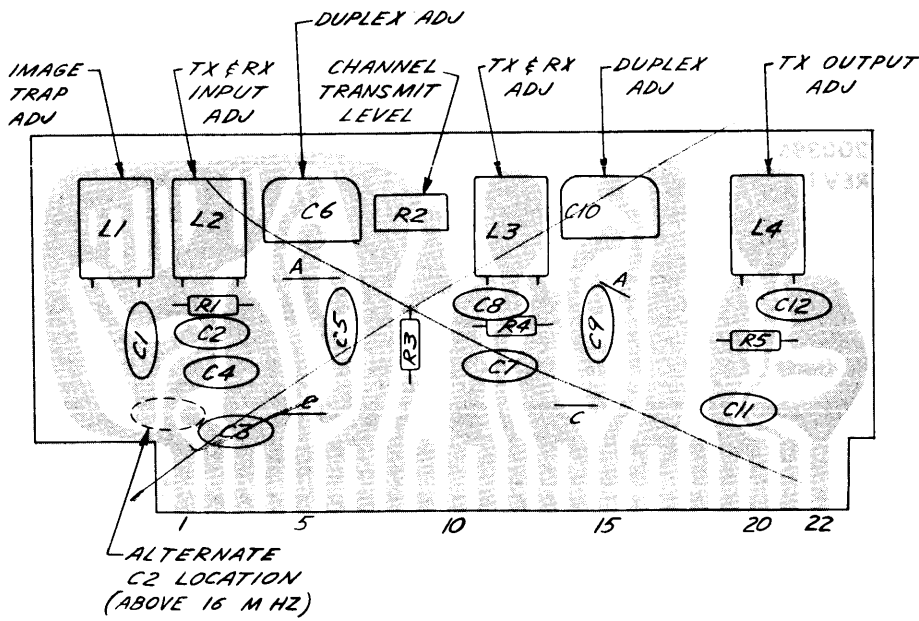


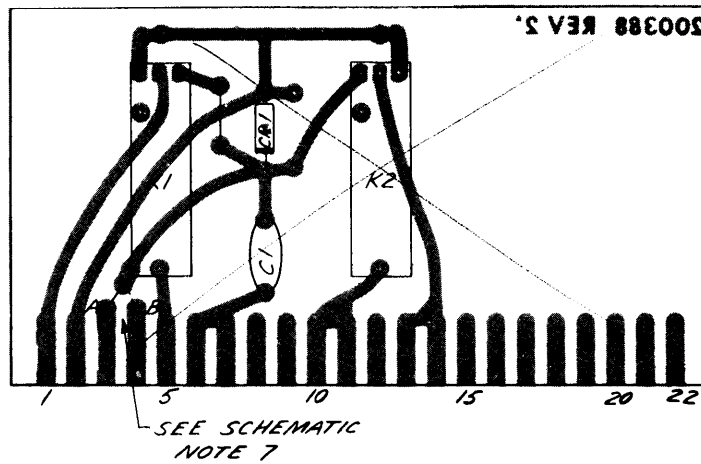
Figure 4-4E. Power Control and Automatic Carrier Control
PC Board Assemblies



SIMPLEX
FIGURE 4-4F-1



DUPLEX
FIGURE 4-4F-2



DUPLEX
SWITCHING
FIGURE 4-4F-3

Figure 4-4F. Channel Tune PC Board Assembly -
Simplex and Duplex and Duplex Switching

and off in receive. It is amplified, passed through a 1500 kHz or 1400 kHz tuned circuit to U1, the transmit mixer. U1 is a MC1596G, an IC operating as a balanced mixer with a high degree of injection frequency balance. The IF signal is mixed with the injection signal which is at a frequency 1500 kHz or alternate 1400 kHz above the desired output frequency. R21 adjusts the balance of the mixer to null out the injection frequency. The mixer output is amplified by U2 and applied to K1. T4 and T5 are broadband transformers. The output at this point consists of the desired signal plus the other mixing product at a frequency 2.8 to 3 MHz above the desired. The tuned circuits in the channel strips eliminate the unwanted mixing product. The signal passes through K1 which on transmit connects the output of T5 to S2-B. The tuned circuits associated with L2 and L3 of the channel strips operate on receive and transmit. The tuned circuit associated with L4, at the output of V2 functions only on transmit. The output of V2 is coupled through C47 to the grids of the 6146B PA tubes. V2 is biased off on receive since its cathode resistor is connected to the +12V Receive/ground on transmit line. The bias on V1 is adjusted by the channel transmit level control located on the channel tuning strips on transmit and supplied by the RF Amplifier AGC on receive.

Neutralization of the PA is supplied through C50 to C48, the low side of the interstage tuned circuit associated with the plate of V2. The phase reversal produced cancels out the direct plate to grid feedback.

The transmit/receive relay also furnishes +12 receive/ground transmit and +12 transmit/ground receive signals to other modules in the transceiver to accomplish required switching functions. The relay is operated by a ground supplied from A4, the IF/Audio board.

A solid state FET amplifier is available as an option that can be inserted to replace V1, the RF Amplifier. With this option the receiver is completely solid-state.

4.4.3 Power Amplifier. - The power amplifier stage consists of three type 6146B tetrode vacuum tubes, V1, V2 and V3, connected in parallel. Grid bias is provided by Idle Current Control R3 on the PPC (A2) board. Bias control R3 is adjusted for a no signal cathode idling current of 25 ma per tube, which operates the tube class AB1.

An indication of cathode current is obtained by measuring the voltage drop across cathode resistors R4, R7 and R10. The voltage appearing at the cathode connection of these resistors is applied to a metering circuit at the junction of isolating resistor R3, R6 and R9. The metering circuit consists of series limiting resistor R1, RF filter L7, C1 and C2, meter switch S1, and front panel meter M1. Cathode voltage is also applied to the PPC (A2) board, which will be discussed in subsequent paragraphs. An indication of 50 on the front panel meter corresponds to a total idling current of 75 ma, or 25 ma per tube. The slide switch S1 of A3 must be in the cathode current position to make the measurement but must be returned to the REL PWR position for normal operation.

The RF signal input to the power amplifier is applied via the three grid circuit parasitic suppressors, L1, L2 and L3. A screen bias voltage of +215 VDC is applied to the power amplifier tubes by resistors R2, R5 and R8. The screen bias is obtained by dropping the

Operation

+240 VDC supply voltage through Zener diode VR1. This supply voltage is switched by antenna relay K1 so that it is present only when the Transceiver is keyed. Thus the power amplifier tubes have screen voltage only when the Transceiver is keyed.

4.4.4 Power Control (PPC) Board (A3A2). - Peak power control of the amplifier is achieved by sampling the power amplifier cathode current and RF plate voltage. Current is sampled by sensing the voltage across cathode resistors R4, R7 and R10. This voltage also contains RF envelope information as the result of filtering by C5, C8 and C11 and is applied to the PPC DC Amplifier Q3, Q5 and Q6, the output of which is supplied to the IF/Audio (A4) board as a control voltage. At the same time C3 and C4 of the matching network sample the RF plate voltage which is fed to the PPC board where it is detected and filtered by CR2 and C4 and added to the current sense input.

PPC threshold is set by R31, SSB LEVEL control. The normal method of setting is to adjust R31 for 125 watts PEP output on voice and on the lowest power output channel. R27 PLATE VOLTAGE LIMIT, is then adjusted for 150 watts PEP output on voice and on the highest output channel. RF plate control is a secondary protective loop however it may be used to minimize output variation from channel to channel. The combination of current and voltage sensing provides less than 1 db change in output for a 10 db change in input signal.

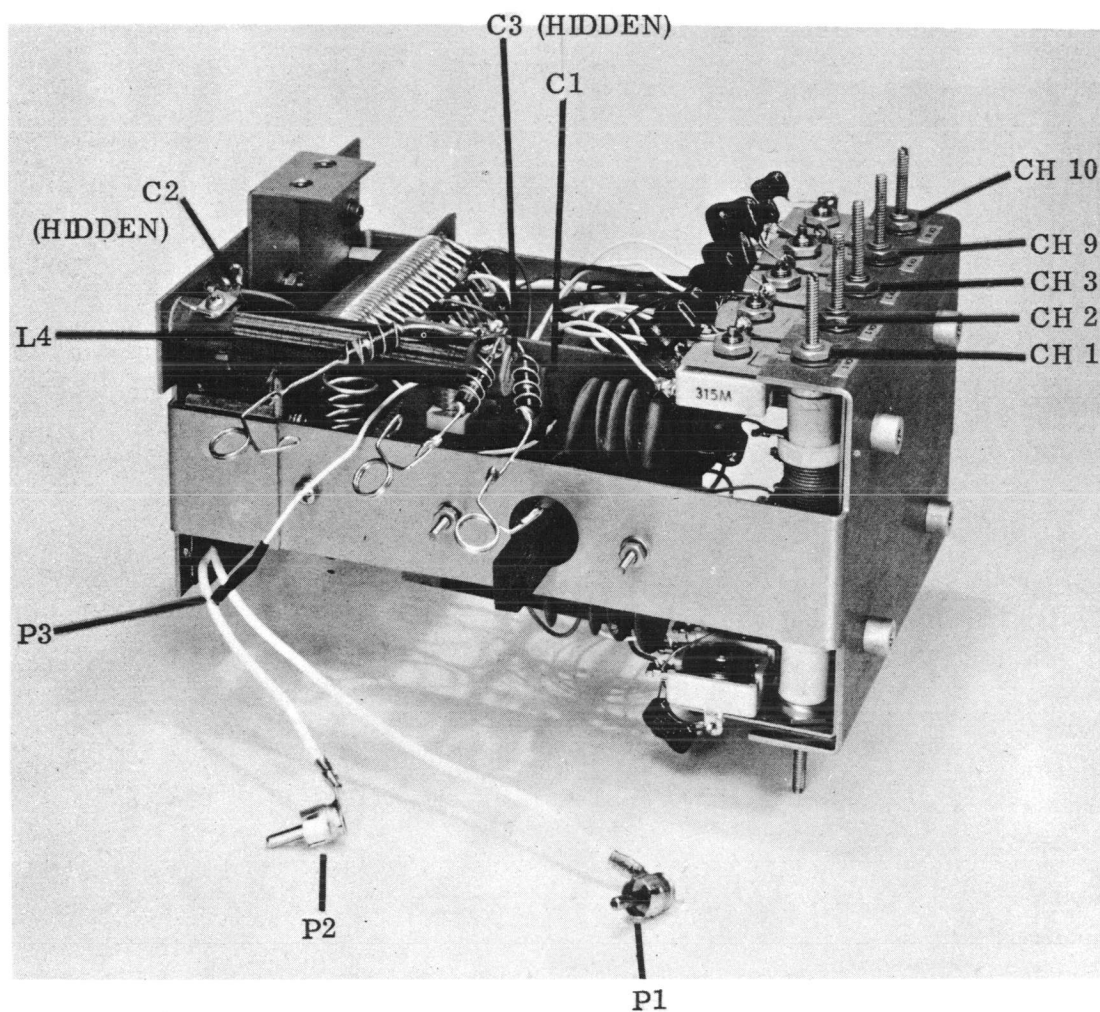
NOTE

The PPC Loop may be set up using a two tone input signal and the results above noted. However a two tone signal does not have the characteristics of voice. To prevent flat topping with its inherent splatter adjust the PPC loops on voice only.

The time constant of the PPC Loop is established by C5. By reducing C5 from 5.6 to 1 μ f faster loop response and a decreased peak to average output ratio results. The time constant is such that the PPC loop responds to the syllabic rate of voice. During CW and FSK modes of transmission C6 is added to C5 by Q4 to increase the time constant and make the loop average responding. At the same time R13, CW/FSK LEVEL control allows the average output to be set at any level up to 100 watts peak by prebiasing the detector diode CR2 and the DC Amplifier.

As a further precaution against overdriving the Power Amplifier, the RF voltage at the cathodes of the Power Amplifier tubes is filtered to produce a voltage proportional to cathode current. This voltage is amplified by Transistor Q1 and Q2 in the Power Control Board and combined with the PPC voltage by diode CR1. Thus if the peak cathode current of the power amplifier tubes exceeds the maximum design value, the power control circuit automatically reduces the drive.

An indication of relative power output is obtained by detecting a sample of the transceiver output voltage and applying this signal to the front panel meter. The circuit of diode CR5 is the relative power detector. The output of this circuit is applied through the REL PWR/CATHODE CURRENT switch 1A3S1, to meter M1.



- P1 - PPC (To A3A2J1)
- P2 - Relative Power (To A3A2J2)
- P3 - Neutralization (To A3J3)

Figure 4-5A. Matching Network Module Assembly, Front View

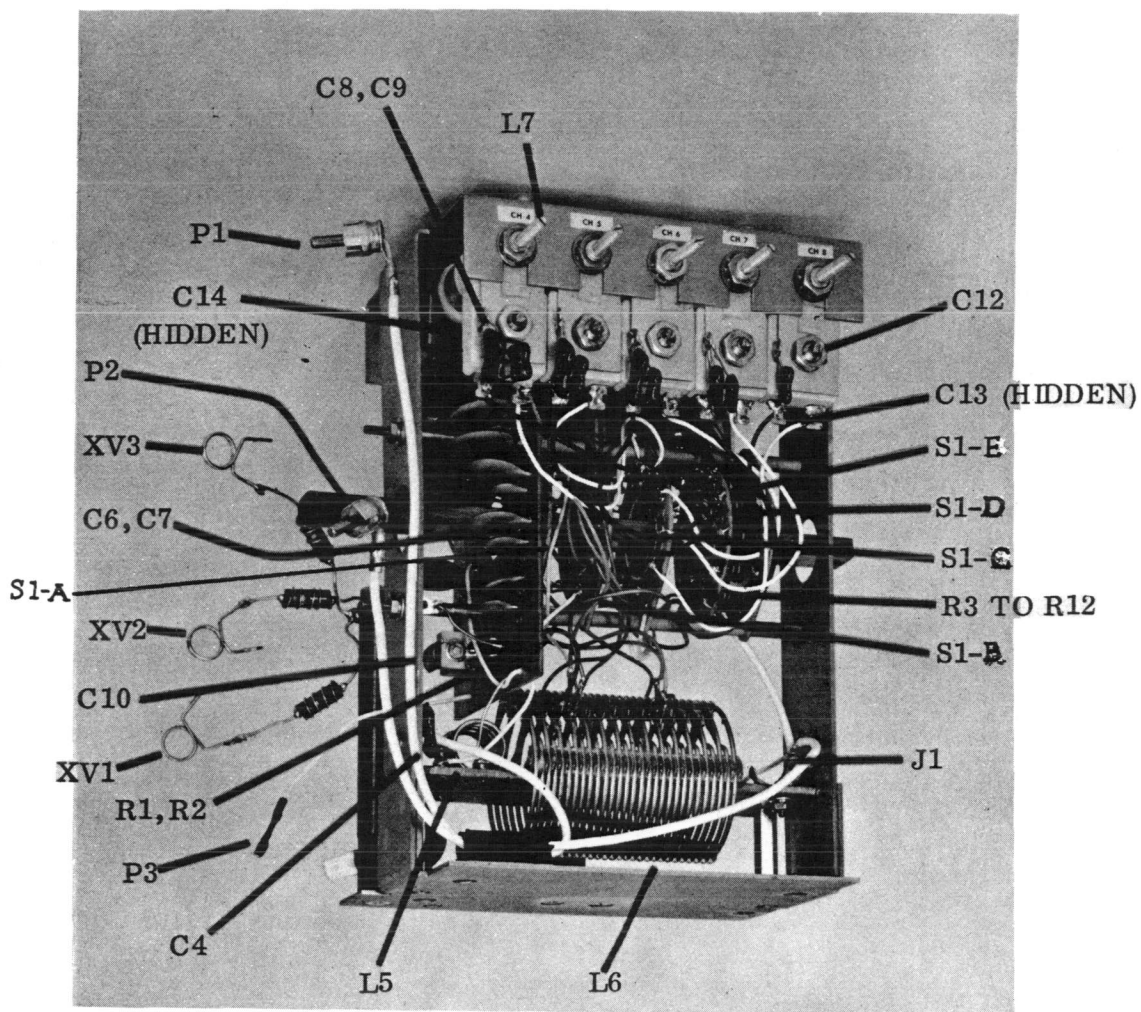
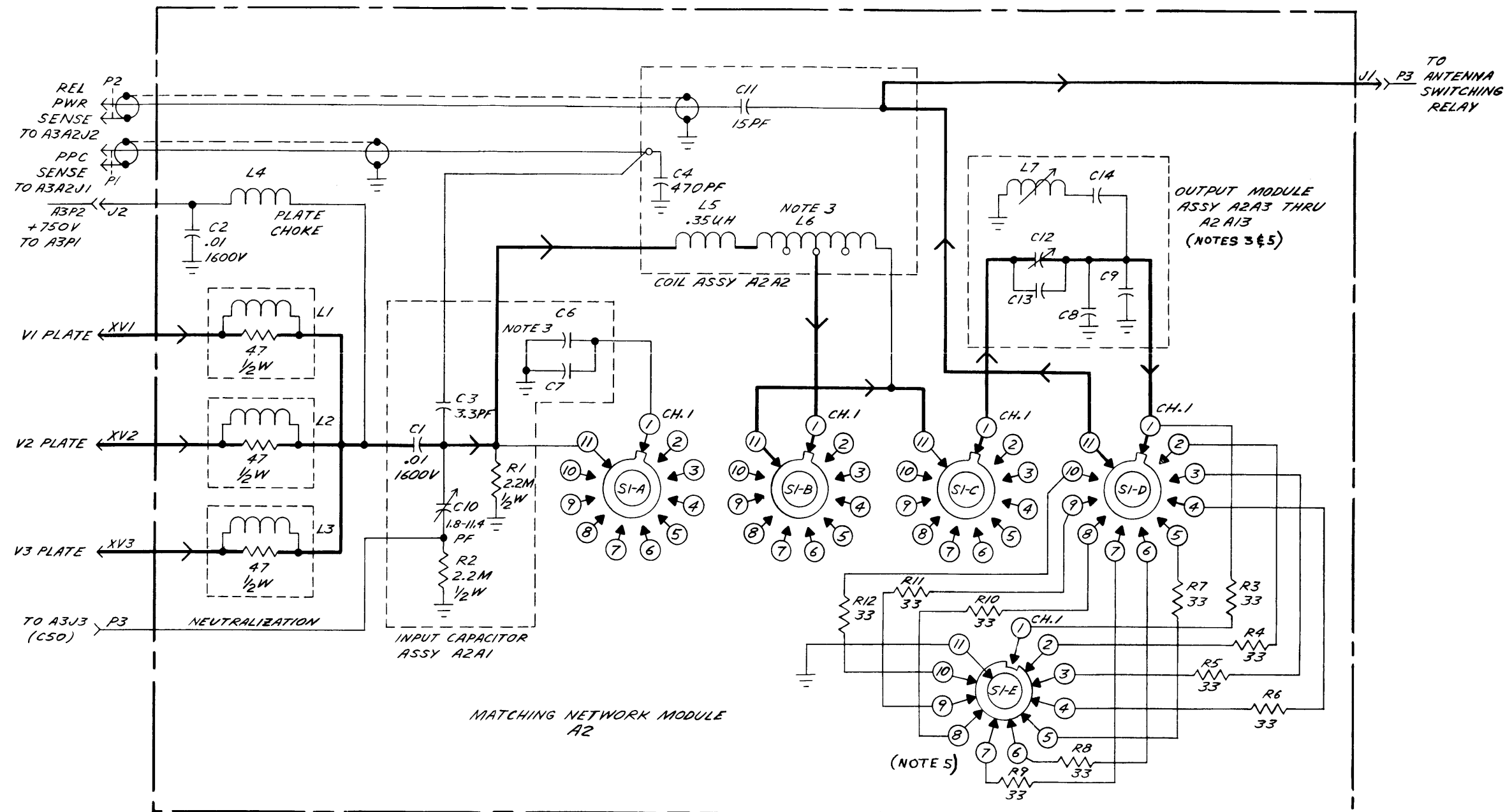


Figure 4-5B. Matching Network Module Assembly, Bottom View



NOTES:

1. Capacitor values, in positions 1, 2, 3, 4, 5 & 6 on S1-A, S1-B and S1-C, C6, C7, C8, C9 and tap position of L6 are determined by channel frequency.
2. Components in position 7, 8, 9 & 10 on S1-D, S1-E and S1-F are selected per Note 1. These components are used on 10 channel transceivers only.
3. Output module component values C8, C9, C12, C13, C14 and L7; tap position of L6; and input capacitor values C6 & C7 are determined by channel frequency. SEE TABLE 2-3.
4. The taps are coded, CH 1 brown, CH 2 red, CH 3 orange, etc., normal color code.
5. C14, L7, R3-R12, & S1-E DELETED WHEN HARMONIC TRAP IS NOT USED.

Figure 4-5C. Matching Network, Schematic Diagram

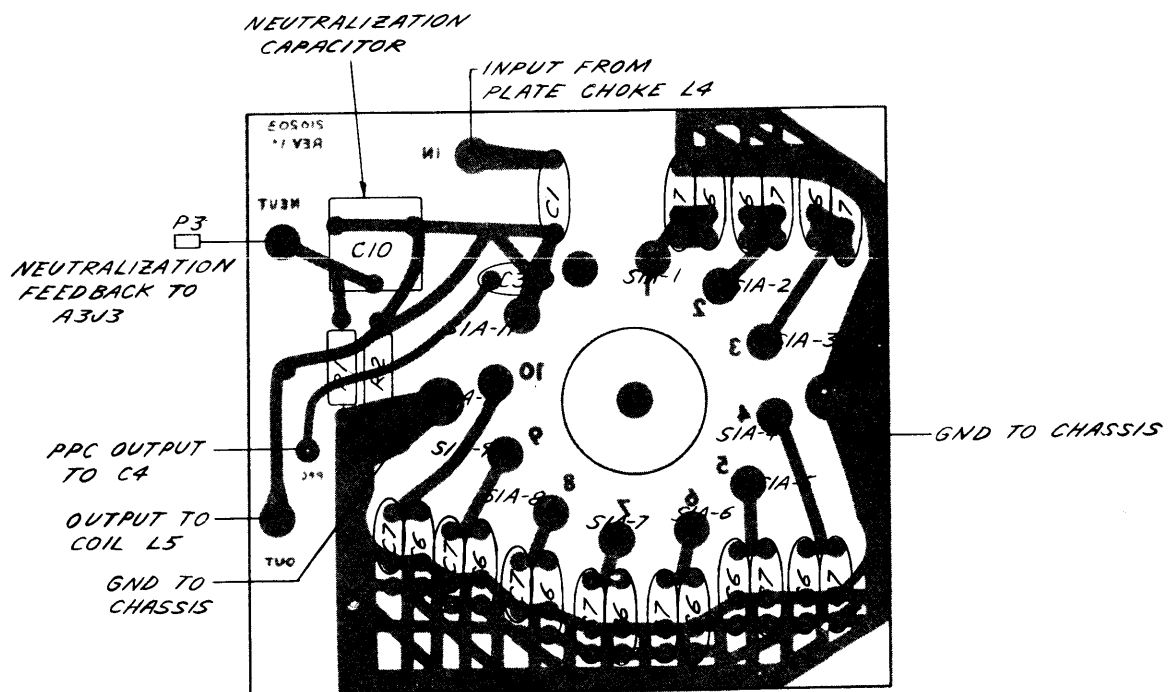
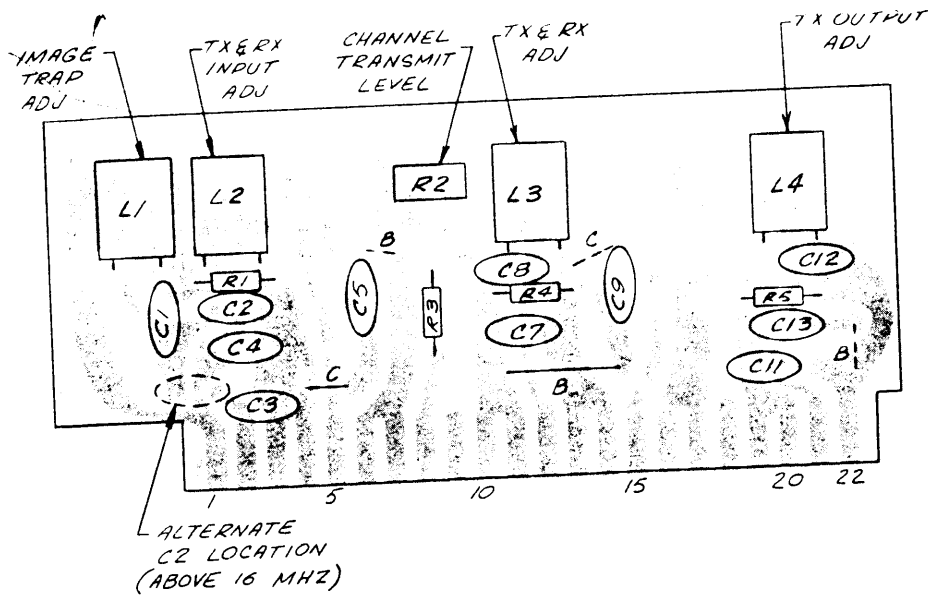
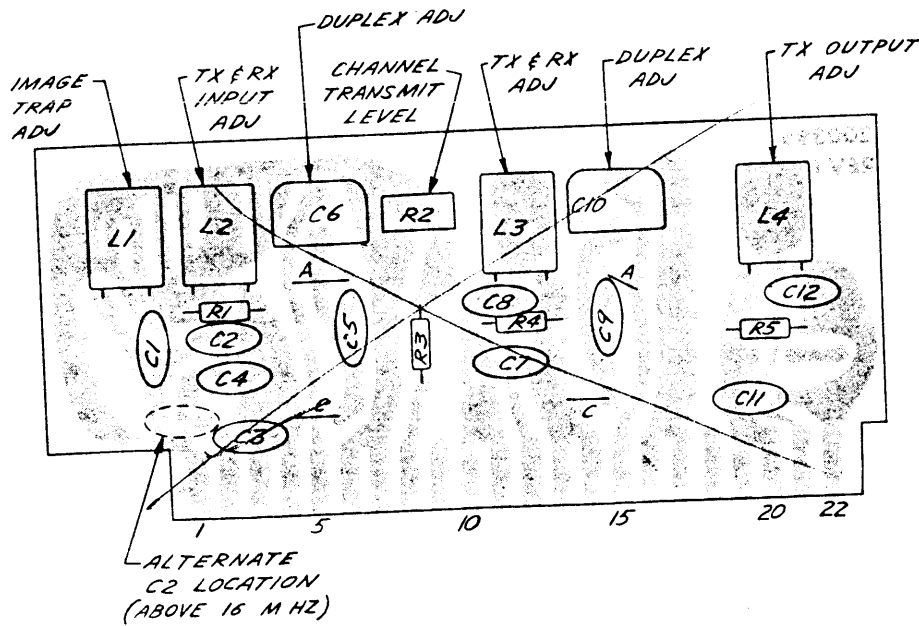


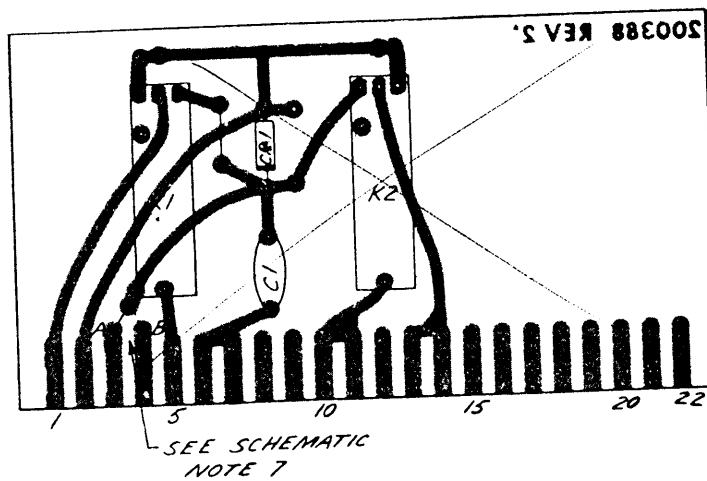
Figure 4-5D. Matching Network PC Board Assembly



SIMPLEX
FIGURE 4-4F-1



DUPLEX
FIGURE 4-4F-2



DUPLEX
SWITCHING
FIGURE 4-4F-3

Figure 4-4F. Channel Tune PC Board Assembly -
Simplex and Duplex and Duplex Switching

4.4.5 Channel Tuning Boards (A3A3 thru A3A12). These boards in any combination up to ten provide the necessary tuned circuits for the transmit and receive functions. L2, C4 and L3, C8 are used in receive with L4, C11 added in transmit. Various strapping options are available

- a. Simplex boards - C5, C9 and C13 are added to the tuned circuit when the jumpers shown in Figure 4-4F-1 are installed. The bands so formed are tabulated in table 2-2. Also available at the input is L1, C1 and C2, the image trap option. The image trap is tuned to a frequency two times the IF frequency above the carrier frequency. C3, C4 and C5 values given in the parts listed are modified when an image trap is supplied. Consult the manufacturer when an image trap is to be added in the field.
- b. Duplex boards - Jumpers C to L2 and L3 are cut when the duplex board is to be operated simplex. Jumpers A to C6 and C10 are required for additional capacity across either C6 or C10. The combination of these jumpers allows K1 and K2 of the duplex switching board to switch the C6, C5 and C10, C9 combinations across L2 and L3 to lower the tuned frequency. A board with jumpers A and C is the basic duplex board, the bands of which are defined in table 2-4B. The basic board however may be converted to a basic simplex configuration which the bands defined in table 2-2A and having component values of the simplex board by jumpers as shown in figure 4-4F-1. Jumpers B thereby are used to split bands as indicated in in table 2-2A. C6 and C10 are deleted in this configuration.

The dashed inductors across C5 and C9 are for special applications where the duplex frequencies are very close. In this case C5 and C9 are replaced by an inductor to cancel out some of the capacity of C6 and C10.

C2 of the image trap has two locations as shown by the dual position arrows on the schematic. For frequencies below 16 MHz C2 is connected to the input, pin 2. Above 16 MHz C2 is connected to pins 3 and 4. This provides the capability of greater selectivity of the front end at higher frequencies by minimizing the detuning effects of the image trap.

4.4.6 Duplex Switching Board (A3A13). K1 and K2 are reed relays which on a transmit/receive command switch capacitors across the L2, L3 tuned circuits to lower the frequency. Jumper A is for ship stations (TX frequency lower) and jumper B is shore stations (TX frequency higher).

4.4.7 Automatic Carrier Control (ACC) Board (A3A14). In the AME mode of transmission, to insure output stability of the carrier signal the ACC samples the RF output voltage from A3A2C10 of the power control board and processes it as follows: In the AME mode the board receives +12V from A1A1E15 the programming board. The board therefore has power in the AM and reduced carrier mode. The RF signal is envelope detected by CR1 and CR2. Q1 acts as an emitter follower. R8, C3 and CR5 provide modulation wiping of the detected signal ie provide a DC output proportional to carrier only. Q2 and C4 provide final filtering and the drive level necessary for operation. R11 is the carrier output control

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Operation

and is adjusted for an output of 32 watts (62 watts maximum). Current limit amplifier A3A2Q2 sampling is accomplished via R14 and CR7 and provides additional protection in the event of a failure of the normal ACC control. Average current is limited therefore by the setting of A3A2R7 the current limit control for both SSB and AM operation. In the reduced carrier mode, R5 artificially generates a DC voltage so that carrier is reduced to 2 to 5 watts. R5 is shorted out in AM by Q4. CR3, CR4 and CR6 provide temperature compensation.

4.5 POWER AMPLIFIER MATCHING NETWORK (1A2).

The plate supply and loading for the power amplifier tubes is provided by the 1A2 Matching Network. Plate parasitic suppressor chokes L1, L2, and L3 are connected to plate supply choke L4 which is connected to the +750 supply. Reference figures 4.5A, 4.5B, 4.5C.

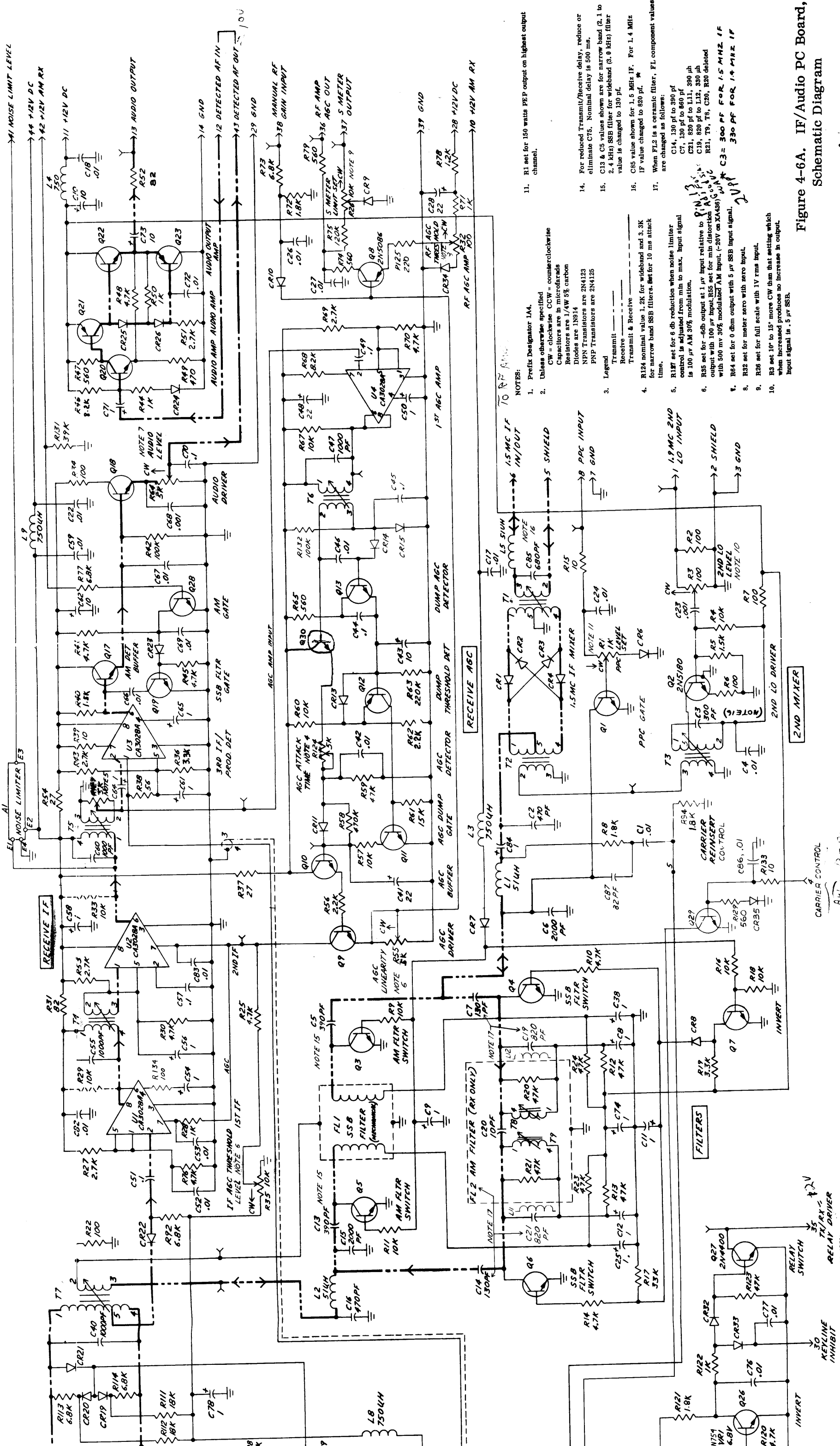
Matching the plate impedance of the transceiver is accomplished by the Pi Network consisting of input capacitors C6 and C7, Series Coils L5 and L6, Series Capacitors C12 and C13, and Output Capacitors C8 and C9. A second harmonic trap consisting of L7 and C14 attenuates the second harmonic output of the transceiver. The input capacitor is selected by S1-A, and the output module assembly by S1-C and S1-D. The output module assembly consists of C8 and C9, C12 and 13, and C14 and L7. S1-E an open seeking wafer connects a damping resistor across each of the second harmonic traps except the one in use.

Neutralization of the power amplifier is accomplished by feedback from the plate circuit, through neutralizing capacitor C10, blocking capacitor C1, to the plate circuit of 1A3A1V2 on the RF Amplifier and Mixer Board.

4.6 IF/AUDIO MODULE (A4).

The IF/Audio Module A4, shown schematically in Figure 4-6A and pictorially in Figure 4-6B, provides input and output signal processing from audio to the 1.5 MHz or alternate 1.4 MHz intermediate IF frequency. In transmit it accepts a 0 dbm, reduced to 100 mv by Transmit Audio level control, audio signal and converts it to a IF signal at -48 dbm. In receive it accepts a nominal 250 μ v IF signal and converts it to a 0 dbm audio signal. Refer to Figure 4-6A for the following discussion.

Transmit. - Audio and carrier from the frequency generator board are mixed in U5, the transmit balanced modulator. T7 provides selective tuning and matching to the SSB filter input FL1. FL1 is nominally a 2.9 kHz mechanical filter. A 2.1 kHz filter is available as an option. This filter provides nominal opposite sideband rejection of 50 db. After filtering the 455 kc sideband signal is up converted to 1.5 MHz or alternate 1.4 MHz by by-directional double balanced mixer T1, T2, CR1-CR4. Output is nominally -48 dbm to the RF Amplifier module. Transmit peak power control (PPC) is applied to Q1 to maintain output power at 150 watts PEP. As a safety feature, power amplifier cathode current is also sensed and added to PPC to provide average power control (APC) as a threshold type power compression. In this fashion the power amplifier is protected against both over voltage and over current. R1 controls the level of PPC compression.



- NOTES:
1. Prefix Designator 1A4.
 2. Unless otherwise specified CW = clockwise CCW = counterclockwise. Capacitors are in microfarads. Resistors are 1/4W 5% carbon.
 3. Legend: Transmit --- Receive --- Transmit & Receive ---
 4. R124 nominal value 1.2K for wideband and 3.3K for narrow band SSB filters. Set for 10 ms attack time.
 5. R127 set for 6 db reduction when noise limiter control is adjusted from min to max. Input signal is 100 μ V AM 30% modulation.
 6. R35 set for -6db output at 1 μ V input relative to 100 μ V input. R55 set for min distortion output with 500 mV 30% modulated AM input. (-20V on XA458) $C3 = 300$ PF FOR 1.5 MHz IF $C3 = 330$ PF FOR 1.4 MHz IF
 7. R64 set for 0 dbm output with 5 μ V SSB input signal.
 8. R62 set for meter zero with zero input.
 9. R28 set for full scale with 1V rms input.
 10. R3 set 10° to 15° more CW than that setting which when increased produces no increase in output. Input signal is 5 μ V SSB.
11. R1 set for 150 watts PEP output on highest output channel.
14. For reduced Transmit/Receive delay, reduce or eliminate C75. Nominal delay is 500 ms.
15. C13 & C5 values shown are for narrow band (2.1 to 2.4 kHz) SSB filter for wideband (8.9 kHz) filter value is changed to 130 pF.
16. C85 value shown for 1.5 MHz IF. For 1.4 MHz IF value changed to 820 pF.
17. When FI2 is a ceramic filter, FI component values are changed as follows:
 C14, 130 pF to 390 pF
 C7, 130 pF to 460 pF
 C21, 800 pF to 111, 390 μ h
 C19, 800 pF to 112, 390 μ h
 R21, T9, T6, C20, R20 deleted
 C3 = 300 PF FOR 1.5 MHz IF
 C3 = 330 PF FOR 1.4 MHz IF

Figure 4-6A. IF/Audio PC Board, Schematic Diagram

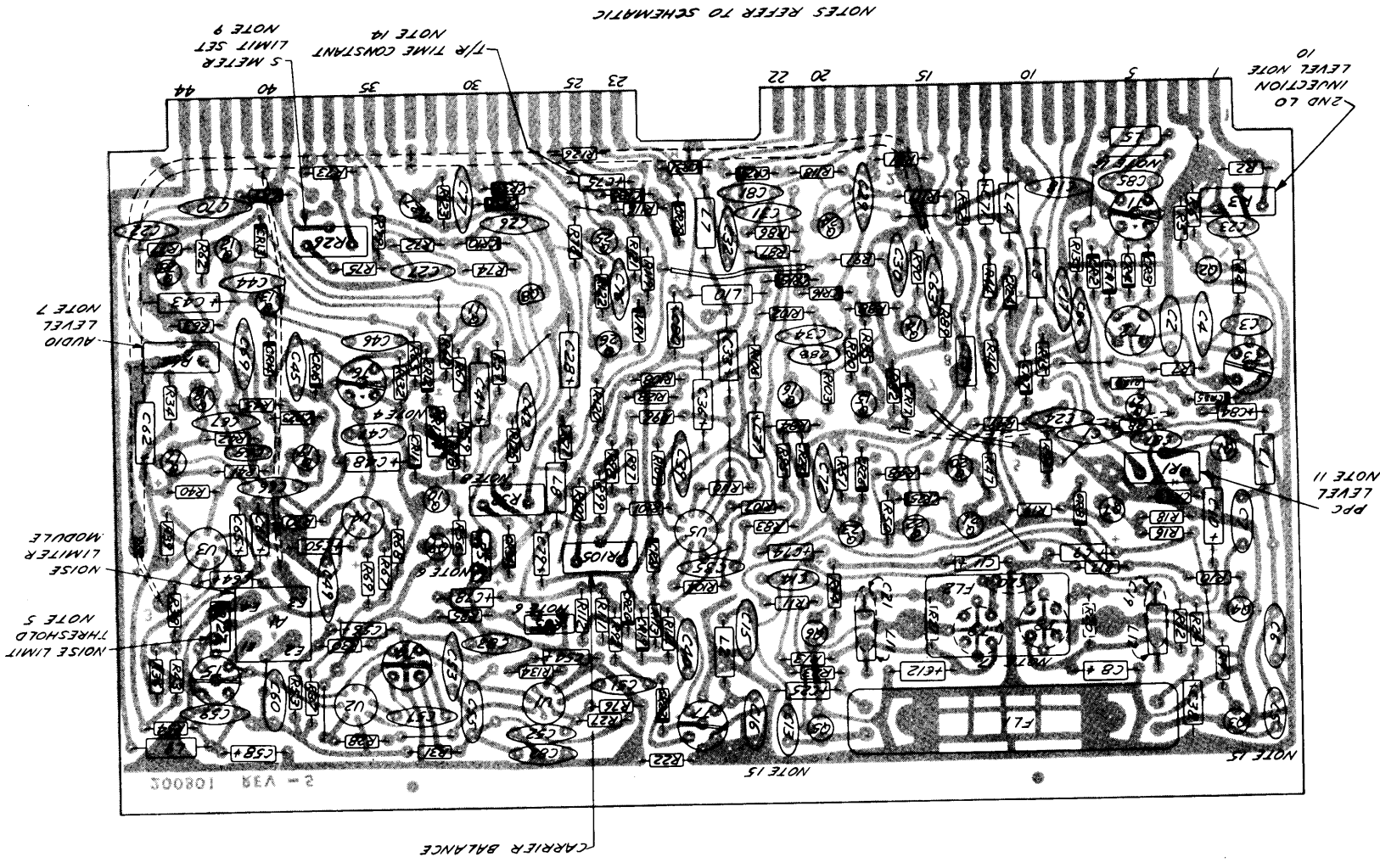
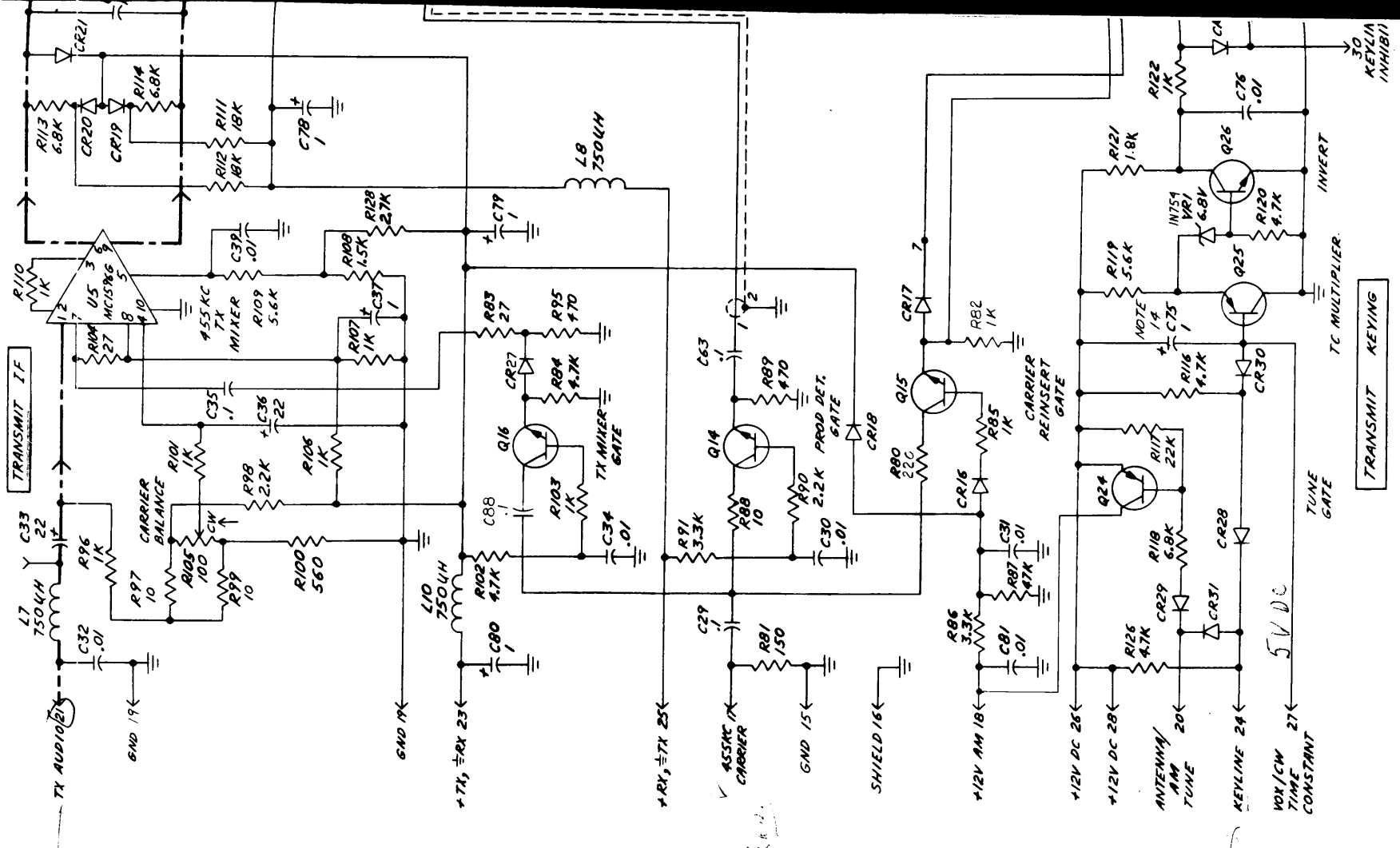


Figure 4-6B. IF/Audio PC Board Assembly



FAUPT
FIG. 4-6B

FIG. 4-6B

For the AM and reduced carrier mode of transmission Q29 acts as a gain control element controlling the carrier reinsertion to the second mixer input. Drive signal is obtained from the Automatic Carrier Control board A3A14.

Q2 is the second LO injection buffer amplifier. It provides the drive necessary for the 1.5 MHz mixer. R3 sets the injection level.

No additional stages on the IF/Audio board are required for signal processing. The receive IF which bridges the transmit modulator, is placed in full AGC compression while in transmit.

Additional transmit functions are performed by Q24-Q27. Q24 provides for carrier reinsertion upon grounding of the ANTENNA/AM TUNE line. This line, available at a remote antenna coupler, provides for tune power, approximately 32 watts, for antenna coupler alignment. Q25, C75 and R119 provide a 500 ms transmit to receive delay when the keyline is open. This may be reduced by removal of C75. Q26 is an inverter and Q27 the TR relay driver. The keyline inhibit line grounds the base of Q27 and prevents the transmitter from becoming energized when, in OFF, STANDBY or RECEIVE and when the Antenna Coupler is tuning.

When in receive, the IF signal from the RF Amplifier is applied to bi-directional double balanced mixer T1, T2, CR1-CR4. A receive filter is selected, depending on mode, by Q3-Q7. Filter cut off is accomplished by shunting, with the filter being cut off grounded at both the input and output. The AM filter normally supplied is a double tuned circuit T8, T9. A mechanical 6 kc AM filter is available as an option.

The filter output is applied to IF amplifiers U1 and U2. This IF output drives U3, the SSB product detector and AM third IF amplifier and U4, the AGC IF amplifier. At maximum gain (below AGC threshold), IF to audio gain is approximately 75 db. In SSB product detector injection is supplied by carrier gate Q14. In AM, injection is removed by disabling the oscillator in the frequency generator module A6. U3 output is buffered by Q17-Q18 which in conjunction with C67 provides envelope AM detection. In SSB, Q19 shunts RF products out by grounding C66. Audio amplifier Q20-Q23 provides the necessary output for delivering a 0 db line output and speaker amplifier driving power.

AGC amplifier U4 drives both AGC detector CR12, CR11, C41, and AGC dump detector Q13, C43. The purpose of the second AGC detector is to allow a dual AGC decay time constant. Upon removal of an input signal C41 discharges through R58. The time constant is several seconds. However, when the second detector AGC voltage across C43, whose decay is faster but amplitude larger, falls below the reference set by R60 and R62, Q11 fires and C41 now decays to zero in approximately 200 ms. This in effect gives an AGC time constant of five seconds but lasting for only 1.2 seconds and prevents the AGC voltage,

Operation

in SSB, from following the syllabic rate. Q8, the front end AGC amplifier supplies AGC voltage to A3A1V1 and the S meter for signal strength indication.

4.7 FREQUENCY GENERATOR MODULE (A6). SELECTABLE SIDEBAND

For 206/210, Upper and Lower sideband and Voice Privacy capability the Frequency Generator module, shown schematically in Figure 4-7A and pictorially in Figure 4-7B, provides all injection frequencies necessary for transceiver operation. Q2 and Q4 are the USB and LSB carrier oscillators are activated depending on mode. The two separate oscillators are gated by Q3 and Q5. Q6 is the output driver to the IF/Audio module. CR5-6 and CR15-16 provide internal AGC control of level. R15 and R24 equalize level output. R30 adjusts output level.

In AM transmit, AM equivalent is used rather than true AM, ie. carrier plus only one sideband. The USB carrier oscillator is on in AM. However, AM receive is true envelope detection. To prevent product detection occurring, Q2 is turned off in receive only by CR4. The second LO oscillator Q9 is buffered by driver Q10. USB and LSB crystal selection is provided by gates Q7 and Q8. R46 adjusts output level.

4.7.1 Clarifier Module (A6A11). - The Clarifier Module shown in Figure 4-7A operates in conjunction with second LO oscillator Q9. By appropriate USB/LSB selection by Q2 and Q3, VARICAP diodes CR2 and CR9 are placed in series with the crystals and allow, through front panel control, a range of ± 150 Hz on the second LO injection frequency. This permits operation with stations off frequency. The clarifier is normally enabled in receive only but may be supplied as a transmit/receive function. Q1 is the gate which enables the clarifier.

4.7.2 Channel Oscillator Module. - Each channel oscillator, A6A1 through A6A10, shown schematically in Figure 4-7A is a separate module DC controlled by the channel selector switch. Four bands cover the oscillator range of 3.1 to 31.5 MHz. Channel frequency bands are:

- 1.6 - 3.5 MHz Low Band A
- 3.5 - 12.0 MHz Low Band B
- 12.0 - 18.0 MHz High Band A
- 18.0 - 30.0 MHz High Band B

Channel frequency is set by C1, available from the side without module removal. All oscillators are sampled across a common load, R1 and R2, and amplified by driver Q1. R4 adjusts output level on all channels.

4.8 FREQUENCY GENERATOR MODULE (A6). DUPLEX

For 206M/210M Upper Sideband only and duplex capability the Frequency Generator module shown schematically in Figure 4-8A and pictorially in Figure 4-8B provides all injection frequencies necessary for simplex transceiver operation. Q2 is the carrier oscillator with Q3 the output driver. CR2 and CR3 provide amplitude level control with R15 and R16 providing output level adjustment. In the AM receive mode Q2 is disabled by CR4.

Operation

IF BOARD

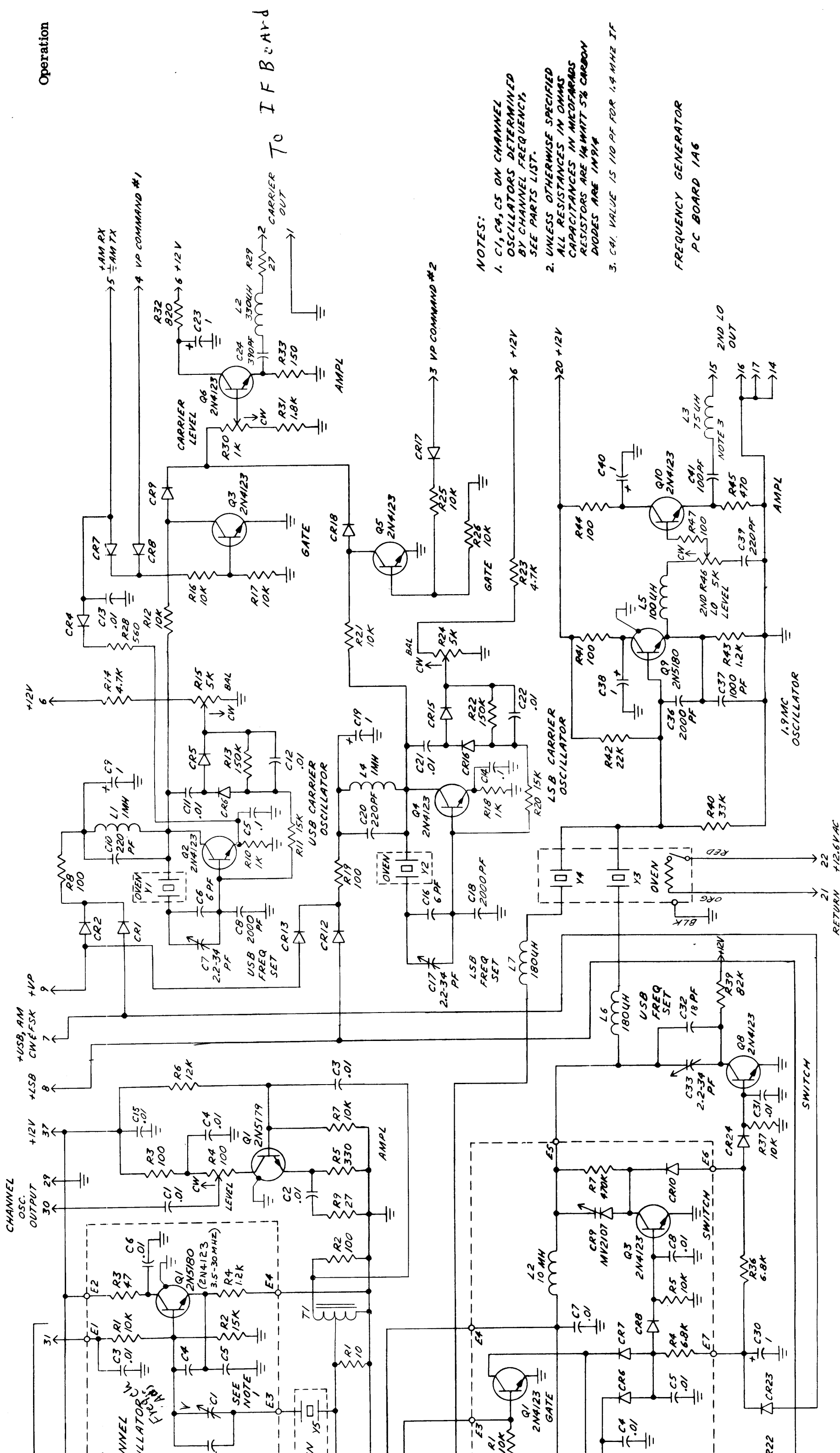
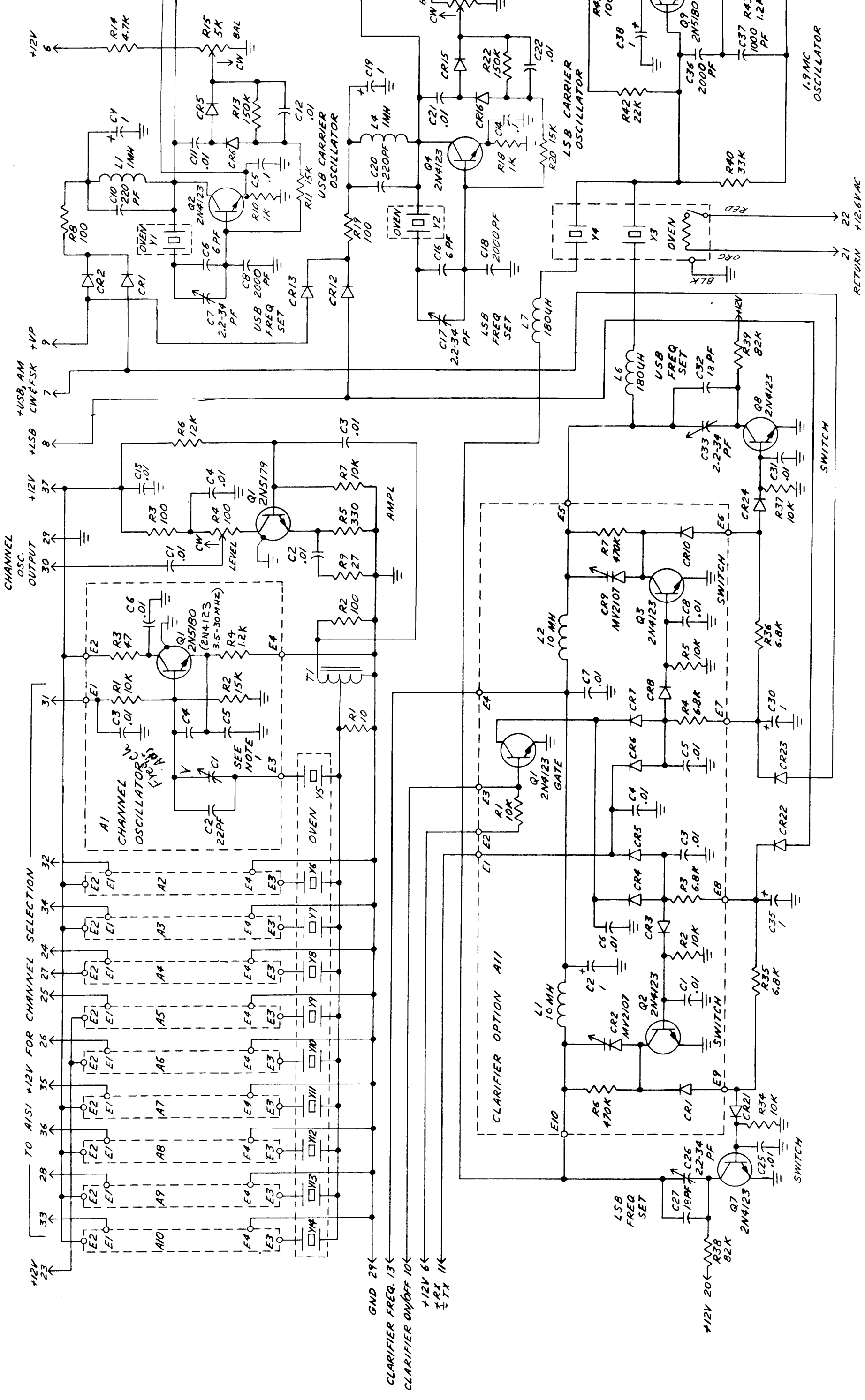
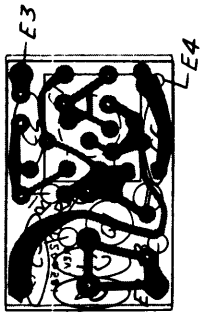
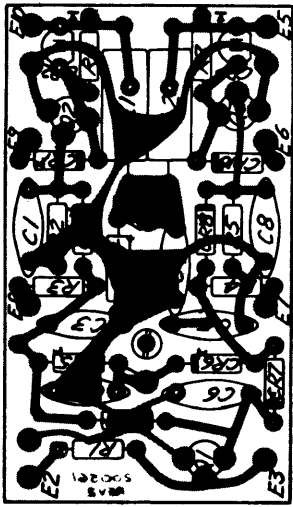


Figure 4-7A. Frequency Generator PC Board (Simplex), Schematic Diagram





Channel Oscillator Module



Clarifier Option

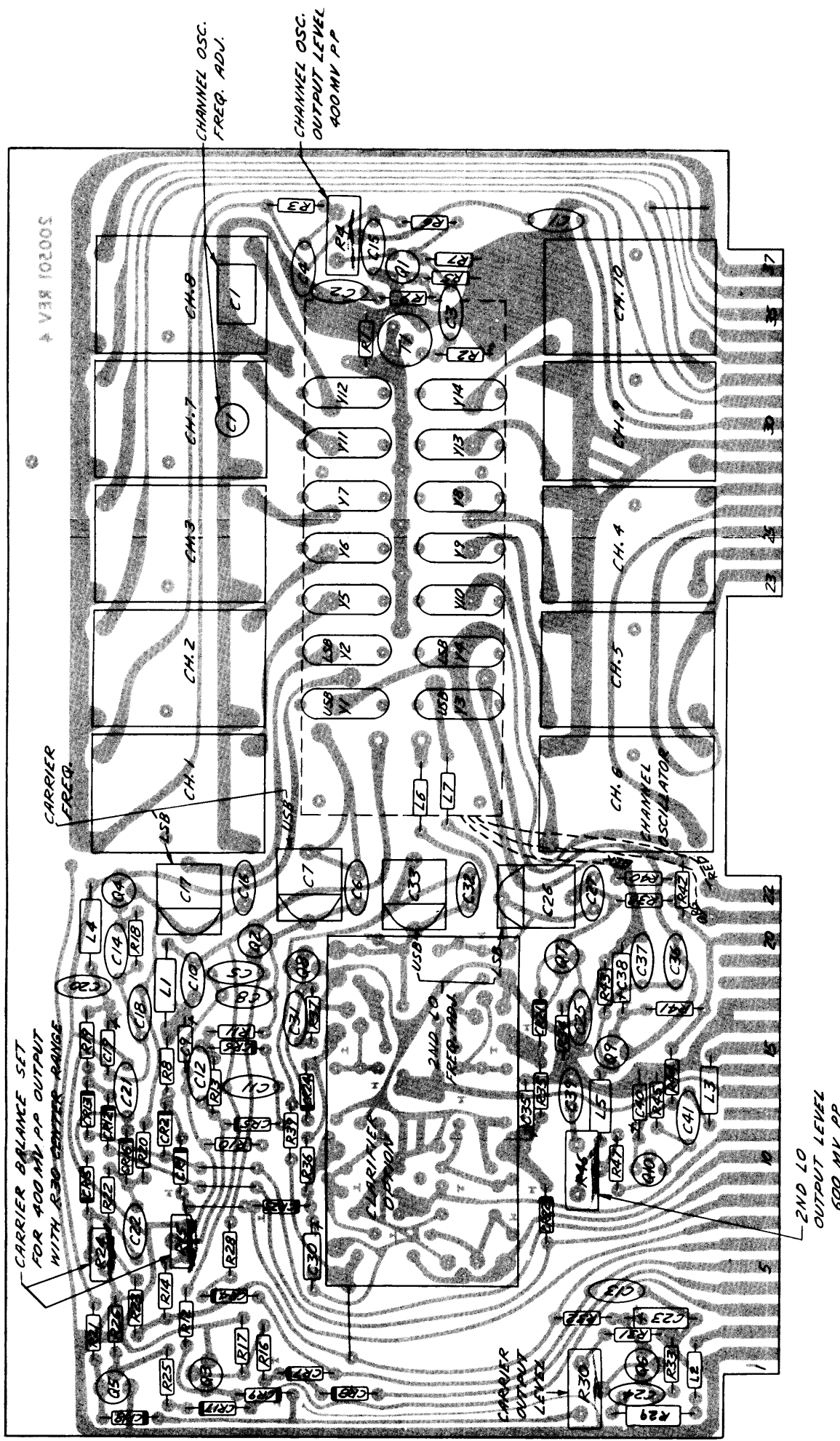
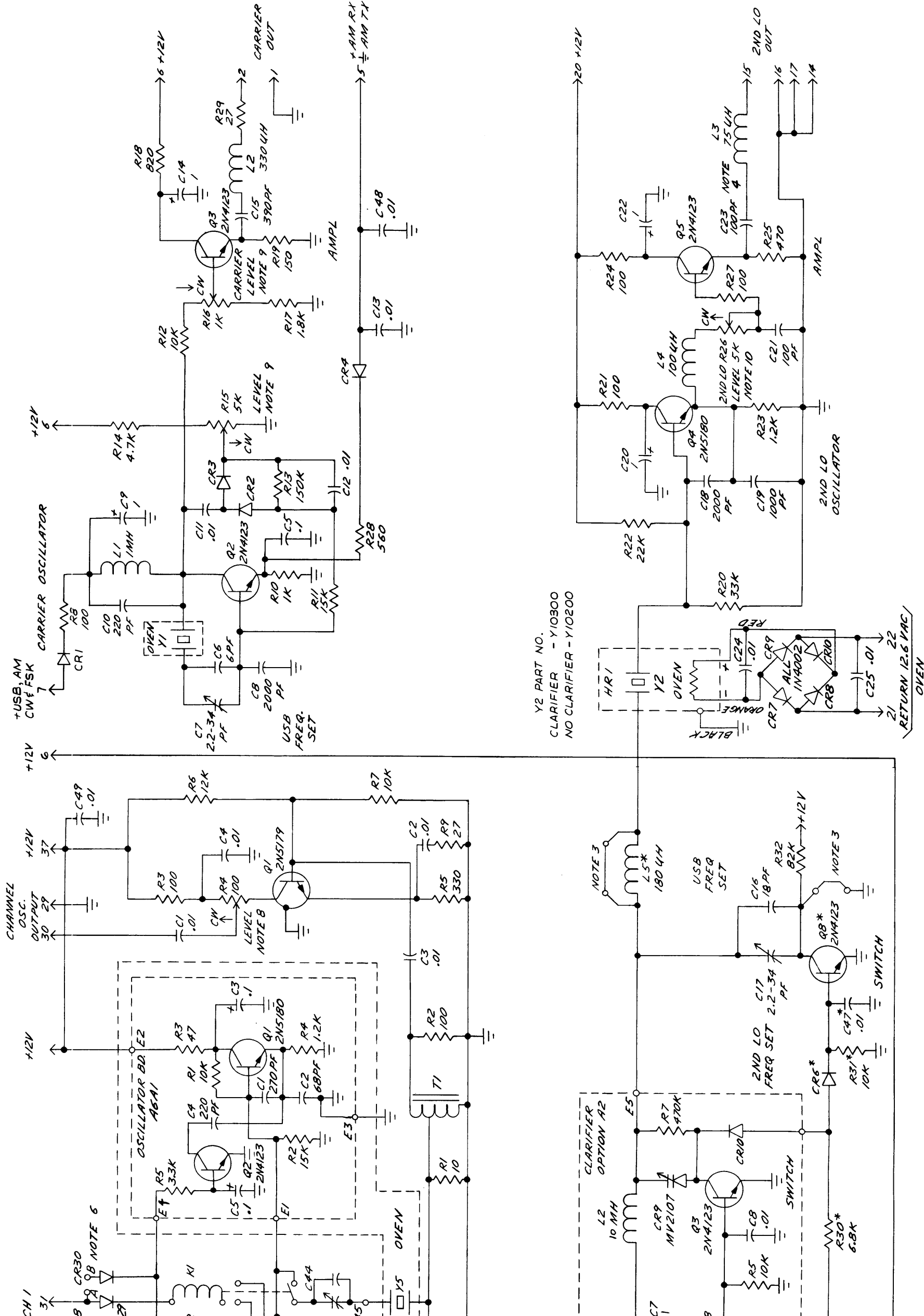


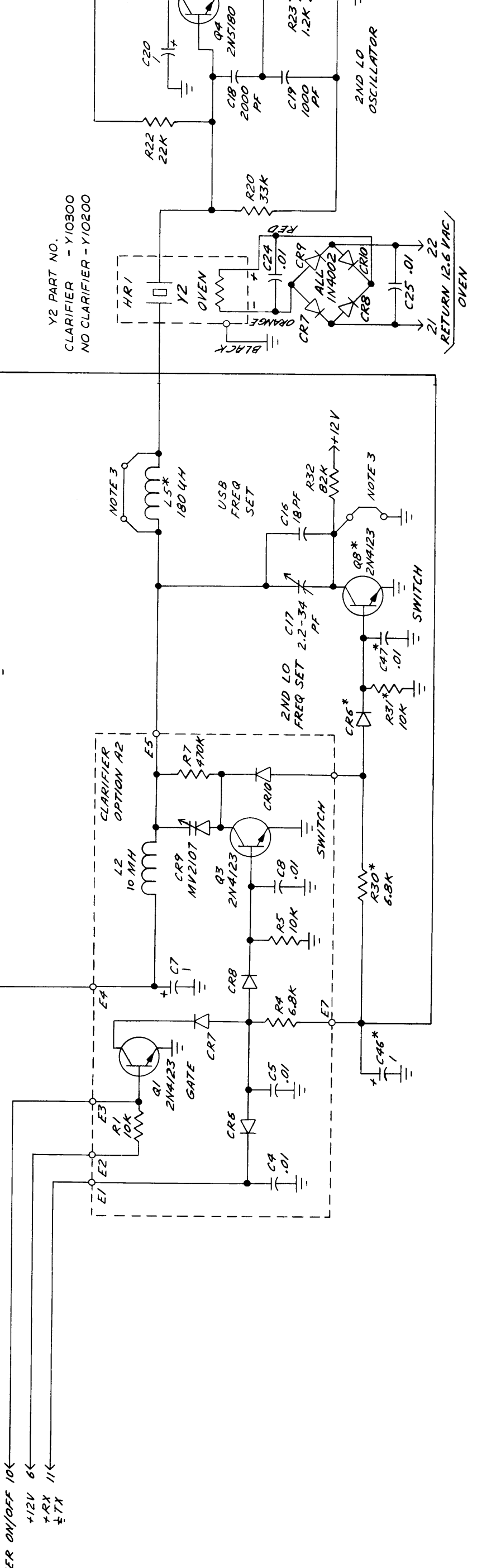
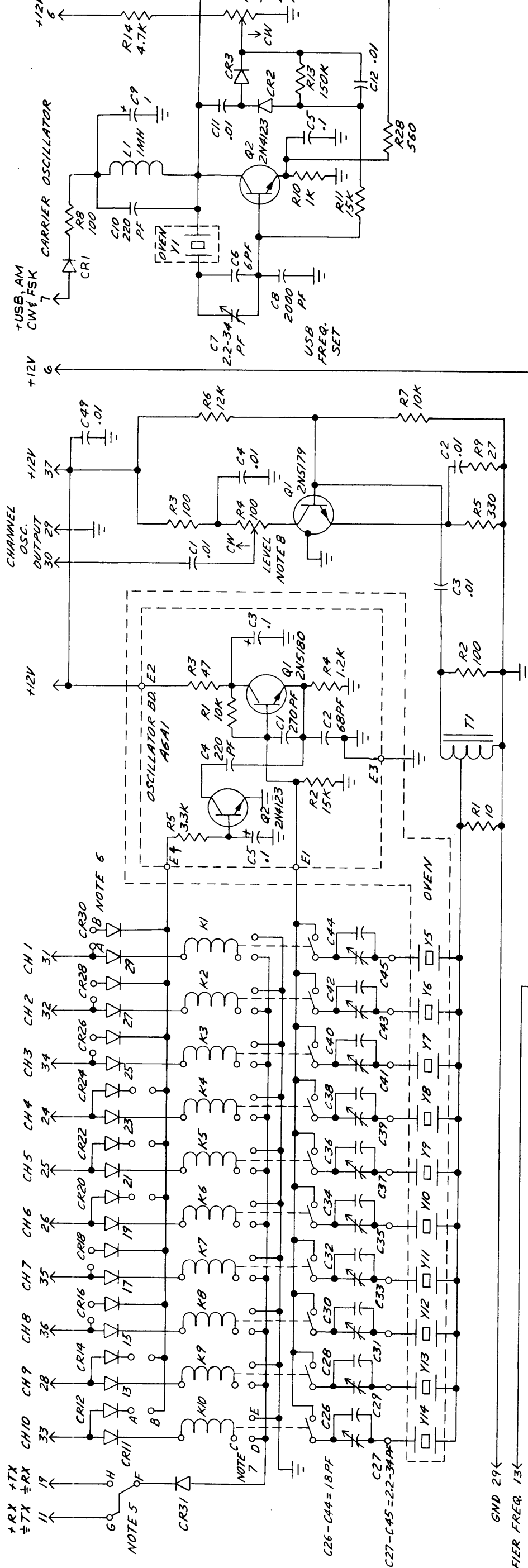
Figure 4-7B. Frequency Generator PC Board (Simplex) Assembly



NOTES:

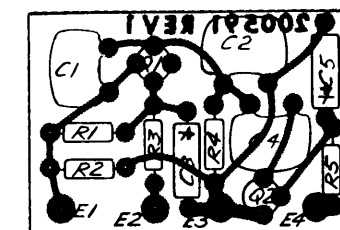
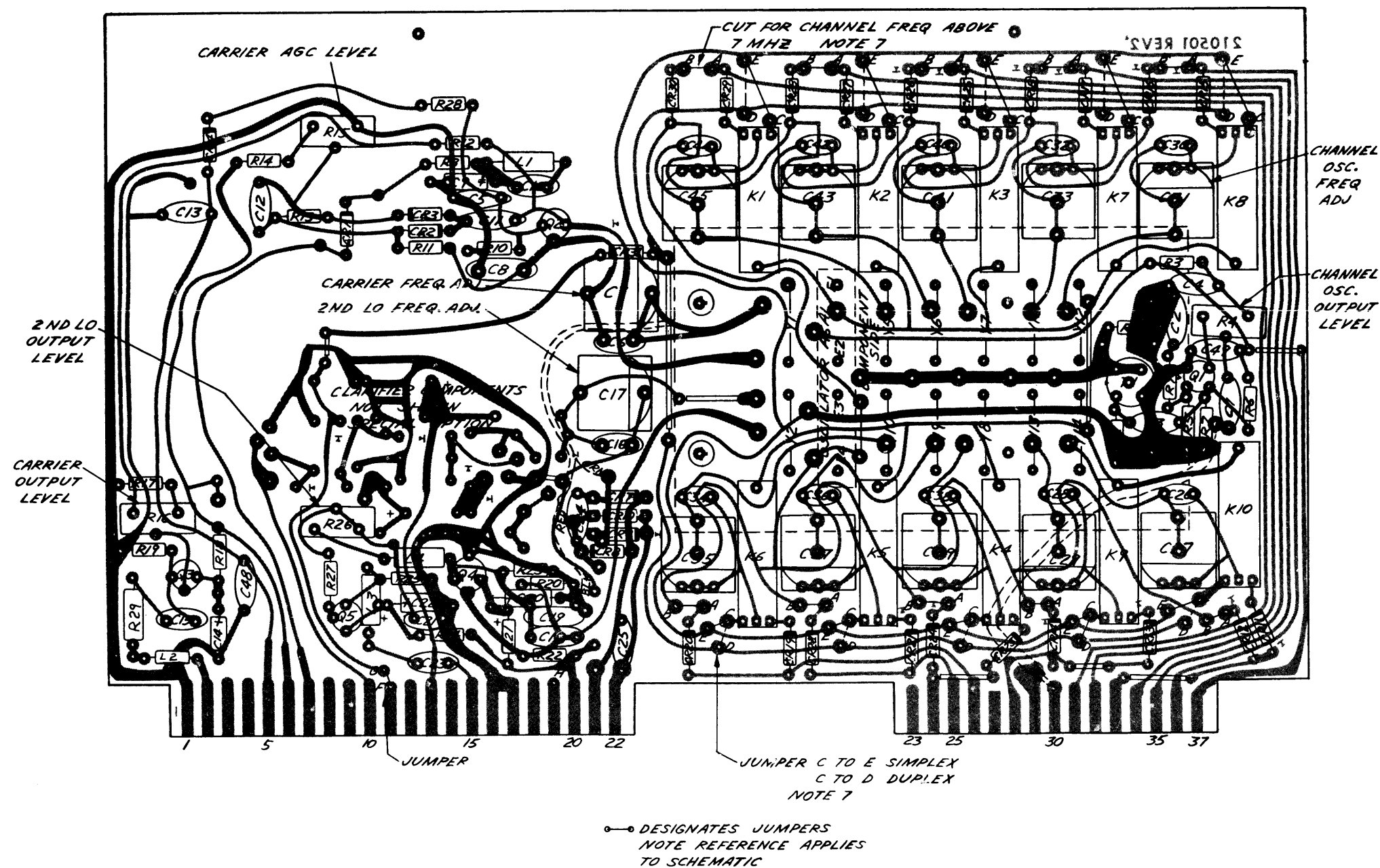
1. Prefix Designator 1A6.
2. Unless otherwise specified Resistance in ohms 1/AW 5% carbon Capacitors in microfarads Diodes are 1N914.
3. Without Clarifier option, jumpers deleting L5 and Q8 are added. Components marked with an asterisk (*) are also deleted.
4. C23 value change to 110 pf with 1.4 MHz IF.
5. Jumper F to G.
6. Jumper A to B, CH1 thru CH10 as required for channel frequencies below 7 MHz.
7. Jumper C to E, CH1 thru CH10 as required, for simplex operation. Jumper C to D, CH1 thru CH10, as required for duplex operation.
8. Set R4, CH osc. level for 400 mv pp on lowest channel.
9. With R16 set mid-range, adjust R15 for 400 mv pp output.
10. Set R26 for 600 mv pp output.

Figure 4-8A. Frequency Generator PC Board (Duplex), Schematic Diagram



GND 29
 CLARIFIER FREQ. 13
 CLARIFIER ON/OFF 10
 +12V 6
 +RX 11
 ±TX

RETURN 12.6 VAC / OVEN



Oscillator A6A1 (inside oven)

Figure 4-8B. Frequency Generator PC Board (Duplex) Assembly

L2 and C13 on the output of Q3 provide harmonic rejection. Q4 is the second LO oscillator with its driver Q5. Output level is set by R26. C3 and L3 on the output provide harmonic rejection.

4.8.1 Clarifier Option. - Although not normally supplied a clarifier, ± 150 Hz, is available. Parts and wiring information is shown on Figures 4-8A and 4-8B. A parallel mode crystal is normally supplied. To increase the frequency deviation a series mode crystal is used with the clarifier option.

4.8.2 Channel Oscillator (A6A1). - A single channel oscillator is used for all channels. It is contained within the oven for maximum stability. Below channel frequencies of 7 MHz additional feedback is supplied by C4 which is programmed and switched by Q2. Simplex/duplex operation is also programmable. Channel frequency adjustment may be made from the side of the transceiver. See section 2.5.2.2, Configuration B. Refer to section 2.5.2.2 for programming information.

4.9 DUPLEX FREQUENCY GENERATOR MODULE (A8).

The Duplex Generator module is shown schematically in Figure 4-9A and pictorially in Figure 4-9B. It is the source of additional channel frequencies where duplex is required. Q1 is the output driver and level adjustment is R4. Since this output is in parallel with the Frequency Generator (A6) board, the output levels are dependent on each other. The output is adjusted for 400 mv peak to peak output on the lowest channel.

4.9.1 Channel Oscillator A8A1. - This is identical to the oscillator used in the Frequency Generator board. C4 and Q2 provide additional feedback at channel frequencies below 7 MHz. The oscillator may be programmed for any channel operation. Refer to Figures 4-9A, 4-9B and Section 2.5.2.2 for programming information.

NOTE

Where the Duplex Frequency Generator Board is supplied but not used (future use only) the oven may be disabled for power conservation. See Figures 4-9A, 4-9B.

4.10 POWER SUPPLY (A5).

Both AC and DC power supplies are available for the Transceiver. The AC power supply operates from primary power of 117/234 VAC nominal, and has taps for 105, 117, 129 VAC as well as 210, 234, and 258 VAC. The DC supply operates from nominal voltages of either 13.5 VDC and 27 VDC. An alternate AC supply is available which permits operation from either a 115V rms sine or square wave, switch selectable, when the rear panel hole plug is removed.

4.10.1 AC Power Supply. - The AC Power Supply consists of a power transformer T1, which supplies 12.6 VAC for tube heaters and ovens, 24 VAC for the remote control motor and Antenna Coupler, and all the voltages required for the rectifiers of the regulator

Operation

and filter PC board assembly A5A1. Refer to schematic diagram Figure 4-10B. Line switch S2 is used to connect the double primaries of T1 either in parallel, for 117 VAC operation, or in series for 234 VAC operation, or in the case of sine/square operation (fig. 4-10A) switches taps on the primary and secondary. If the nominal line voltage is either 10% high or low reconnect the taps as shown on the schematic.

The regulator/filter board contains four rectifier circuits and a regulator. Diodes CR1 through CR8 comprise the rectifier for the +750 VDC power amplifier plate voltage. Diodes CR9 through CR12 provide the +240 VDC for the driver plate supply and Power Amplifier screen supply. It should be noted that the 250 UF filter capacitor 1A3C13 for this supply is housed in the RF Amplifier chassis. Diode CR13 is the rectifier for the -140 VDC supply.

Diodes CR14 and CR15 provide unregulated DC for the series regulator circuit. The regulator consists of series pass transistor Q1, mounted on the chassis, and differential amplifier and driver, transistors Q1 through Q4 on the Regulator board A5. Potentiometer R15 is used to adjust the output of the regulator to +12.6 VDC.

In the standby mode of Transceiver operation, a ground level is applied on pin 4 of the regulator/filter board. A ground on this line shunts base drive from Transistor Q1 through Diode CR16. With base drive removed from driver Transistor Q1, the regulator is turned off, and voltage is removed from the 12.6 VDC regulated supply output.

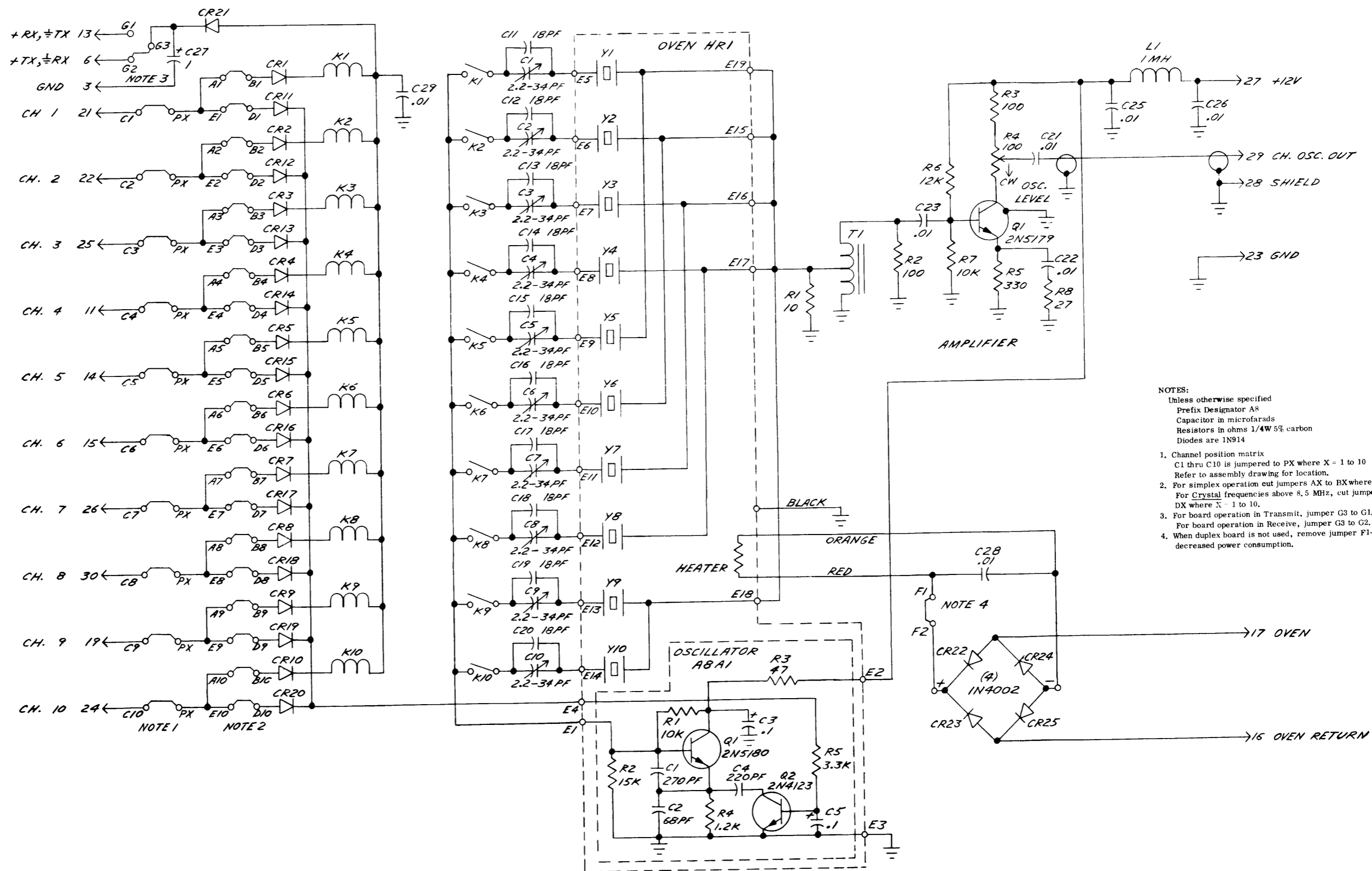
4. 10. 2 DC Power Supply. - Information pertaining to the DC Power Supply is supplied as an Addendum to this manual when either the DC module is supplied when ordered or supplied at a later date. The DC Power Supply is directly interchangeable with the AC Supply without wiring changes. Input power required for full output capability is 12 VDC at 30 amps or 24 VDC at 15 amps.

4. 11 MULTIPLE OPTION BOARD MODULE.

The multiple option board, A7, is shown schematically on Figures 4-11A through 4-11C. The options, as described herewith, are plug-in and may be used in any combination. No further system changes are necessary to incorporate any or all of the options. All that is required is the plugging in of option board into XA7 on the Signal Distribution board. All front panel wiring information is given on Figure 4-11E. Assembly information for all modules is given in Figure 4-11D.

4. 11. 1 CW Module 1A7A1 (Basic Option Board). - The CW module consists of a 1 KC RC Oscillator Q1-Q4 followed by Amplifier-Driver Q5-Q7. Keying is supplied to the keyline and Q9 with R9, R10 and C5 providing pulse shaping to eliminate key clicks. Q8 acts as a switch which by shorting R8 to ground begins oscillation. The transmit tone level is controlled by the front panel transmit audio control. Receive volume is set by R20 and also the front panel receive audio control. Refer to Figure 4-11A.

The keyline also actuates the TR delay as set by the front panel TR Delay control. This front panel control provides variable resistance to ground. This voltage division



- NOTES:
 Unless otherwise specified
 Prefix Designator A8
 Capacitor in microfarads
 Resistors in ohms 1/4W 5% carbon
 Diodes are 1N914
1. Channel position matrix
 C1 thru C10 is jumpered to PX where X = 1 to 10
 Refer to assembly drawing for location.
 2. For simplex operation cut jumpers AX to BX where X = 1 to 10
 For Crystal frequencies above 8.5 MHz, cut jumpers EX to DX where X = 1 to 10.
 3. For board operation in Transmit, jumper G3 to G1.
 For board operation in Receive, jumper G3 to G2.
 4. When duplex board is not used, remove jumper F1-F2 for decreased power consumption.

Figure 4-9A. Duplex Frequency Generator PC Board, Schematic Diagram

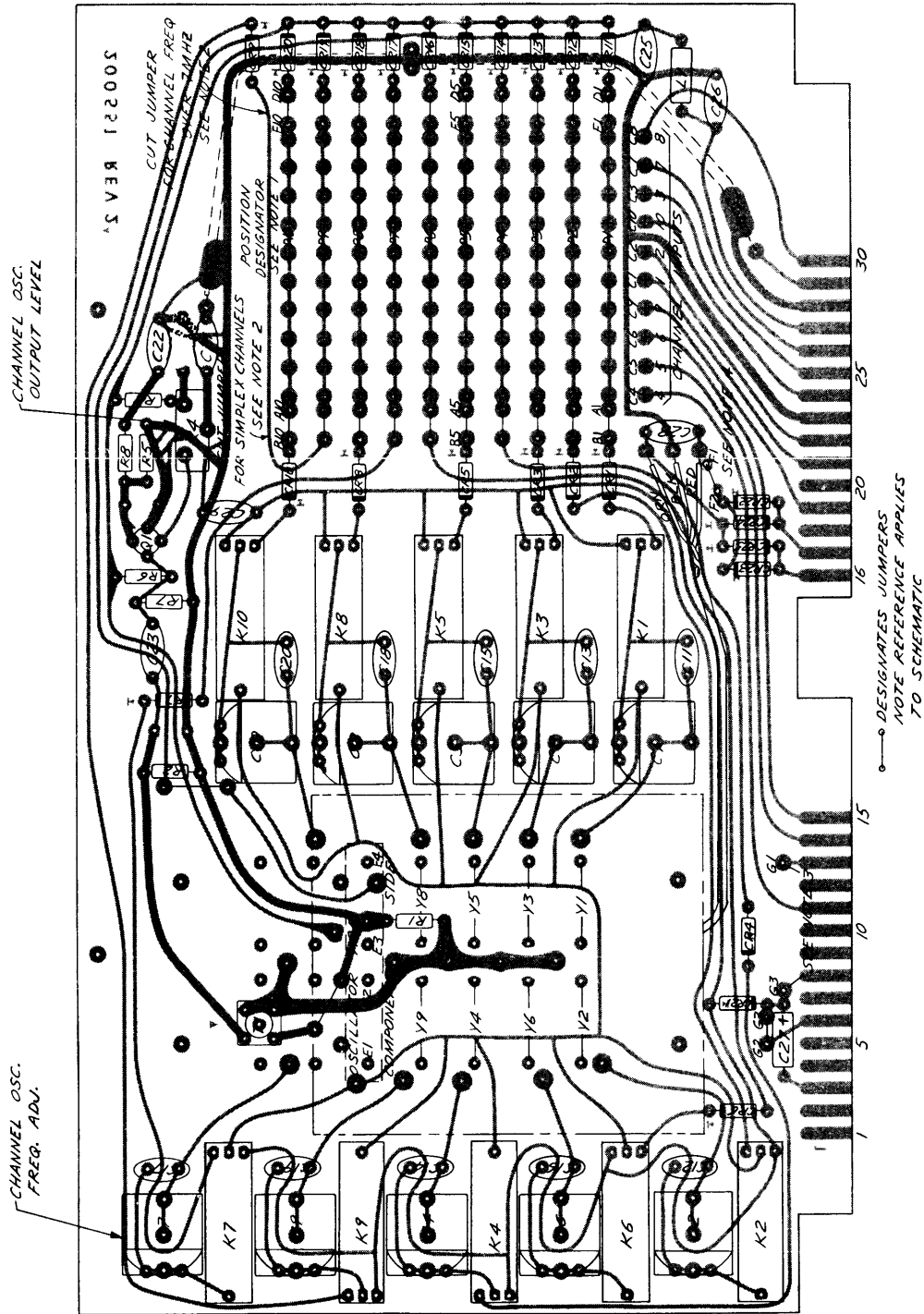


Figure 4-9B. Duplex Frequency Generator PC Board Assembly

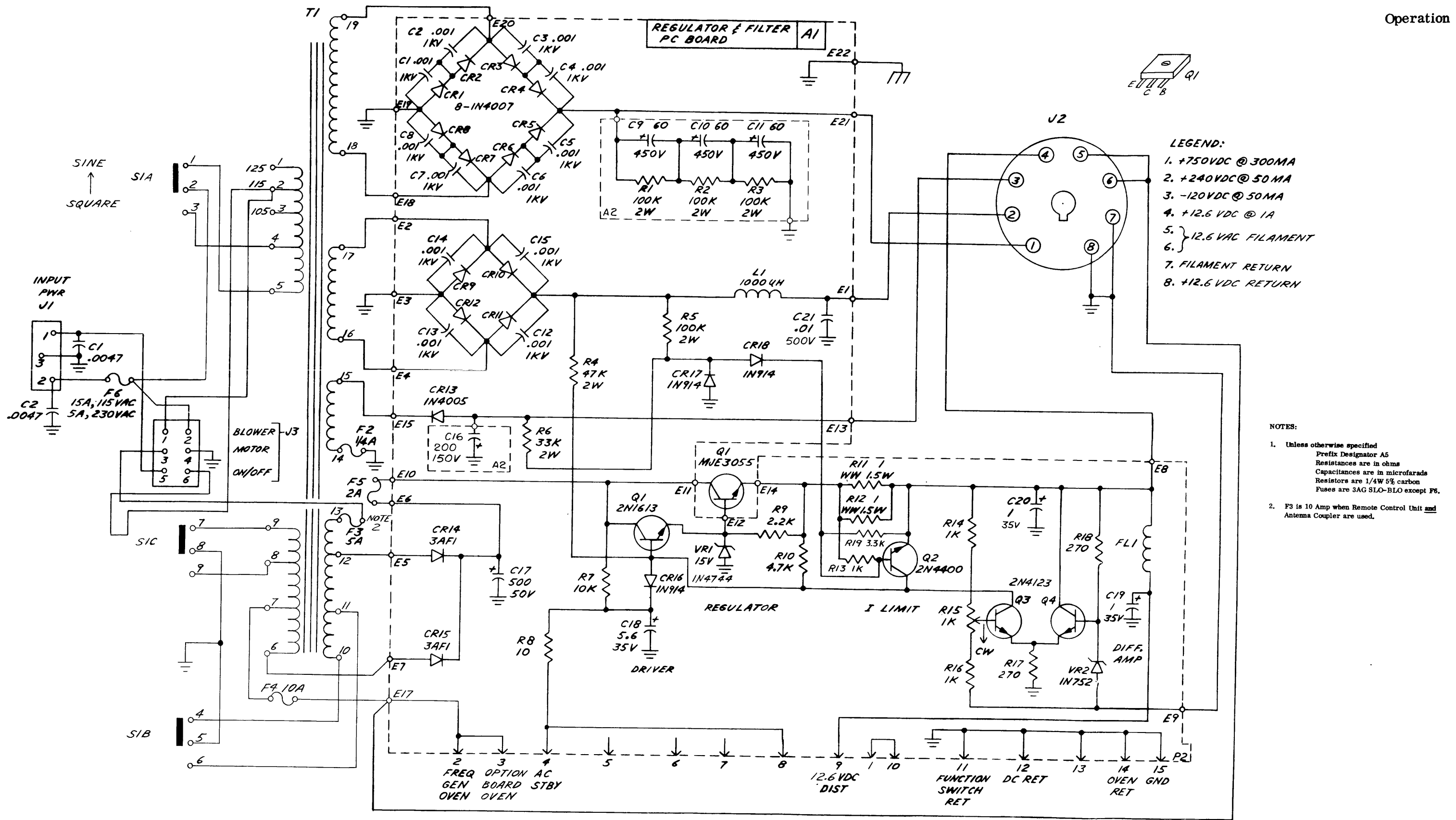


Figure 4-10A. AC Power Supply (SINE/SQUARE) Schematic Diagram

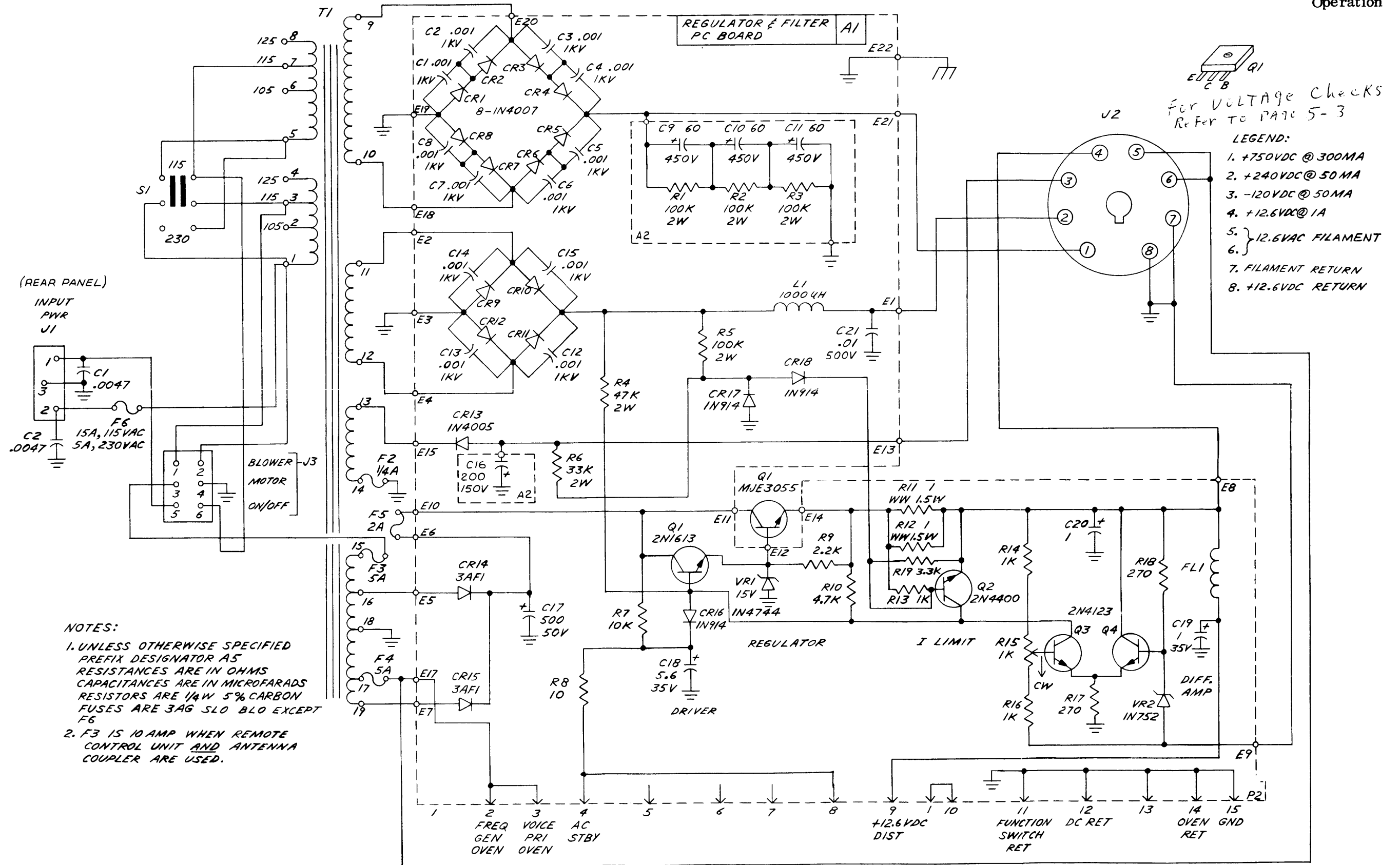


Figure 4-10B. AC Power Supply (115/230 VAC) Schematic Diagram

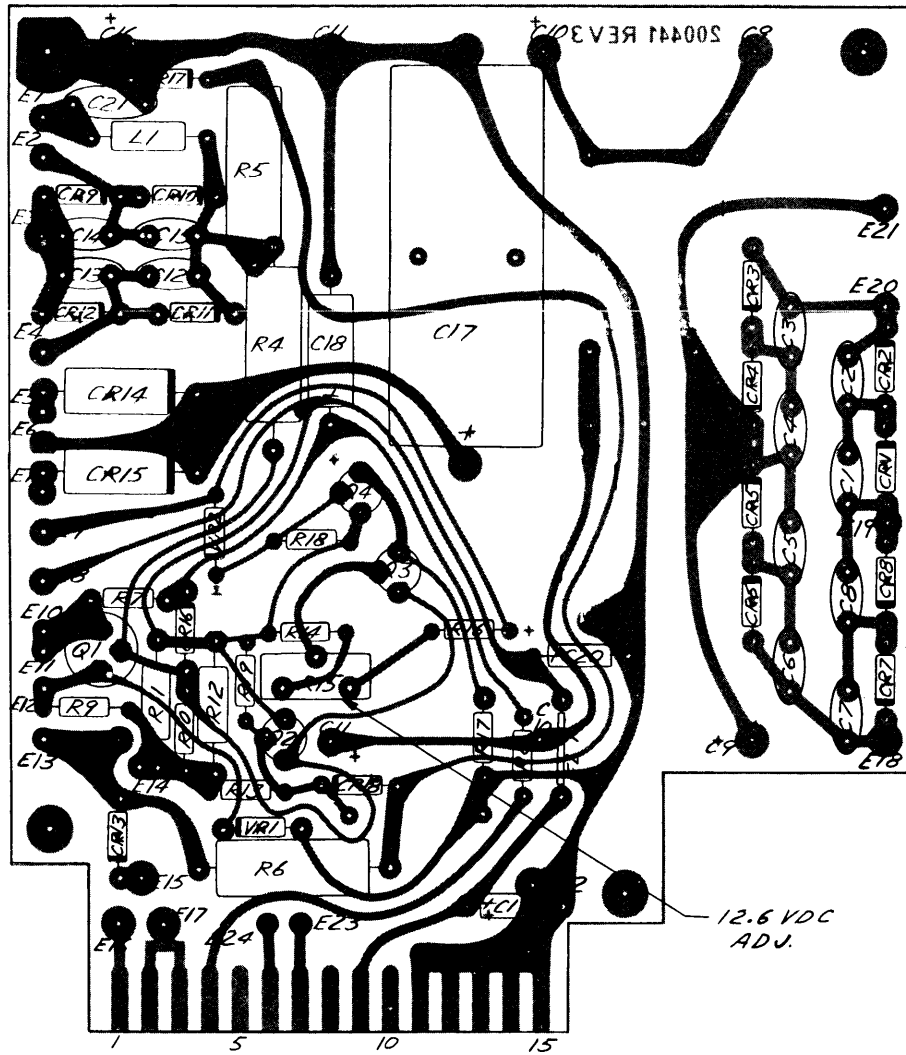


Figure 4-10C. Power Supply Regulator PC Board Assembly

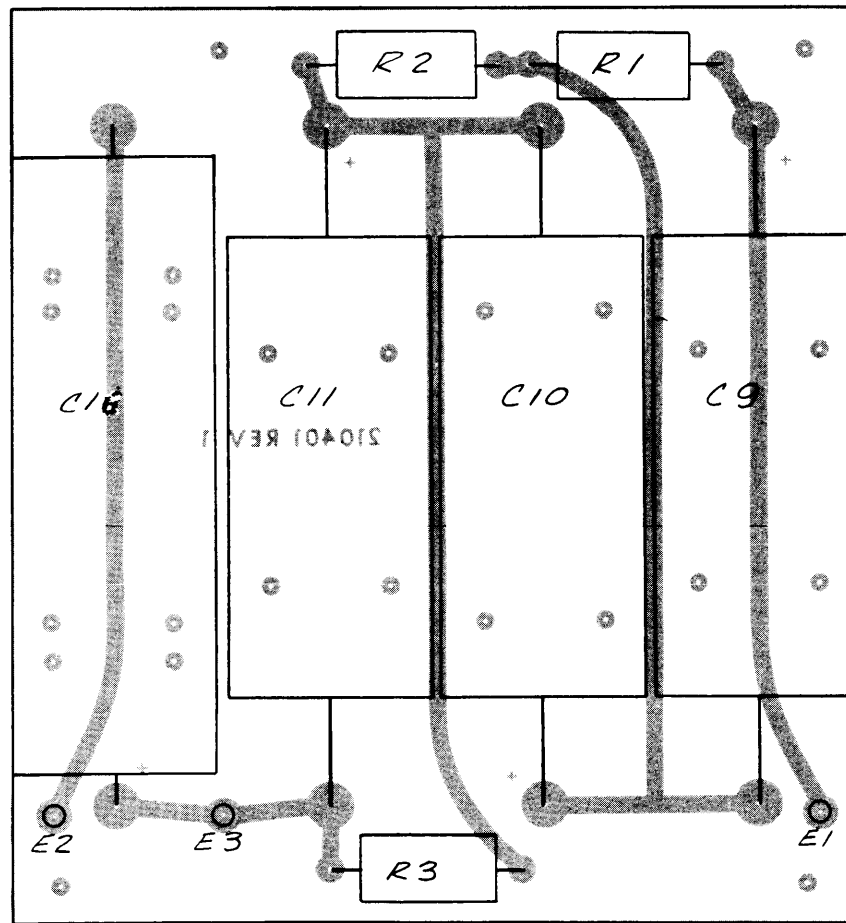
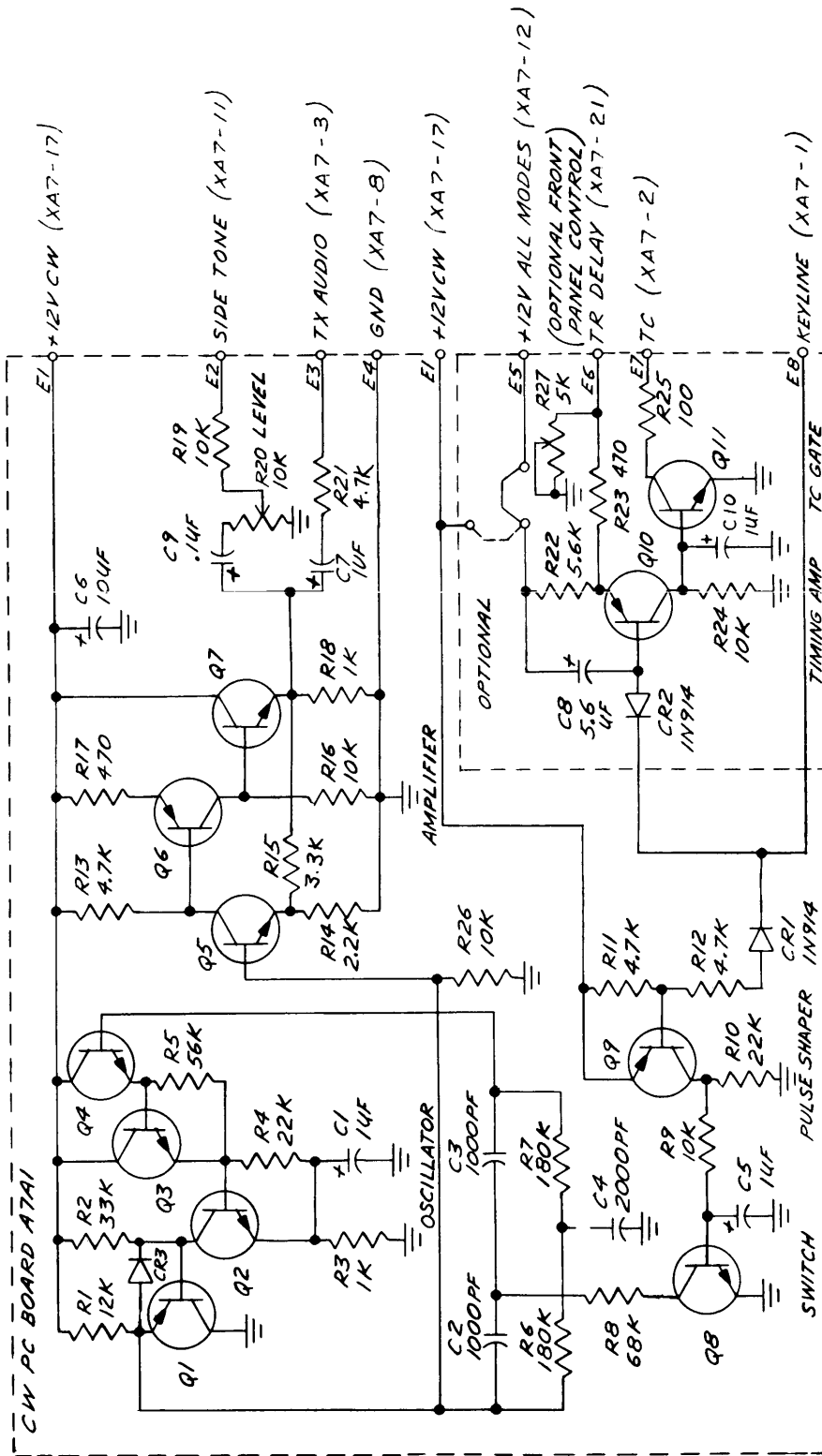


Figure 4-10D. Power Supply Filter PC Board Assembly



NOTES:

1. Unless otherwise specified:

Resistances are in ohms

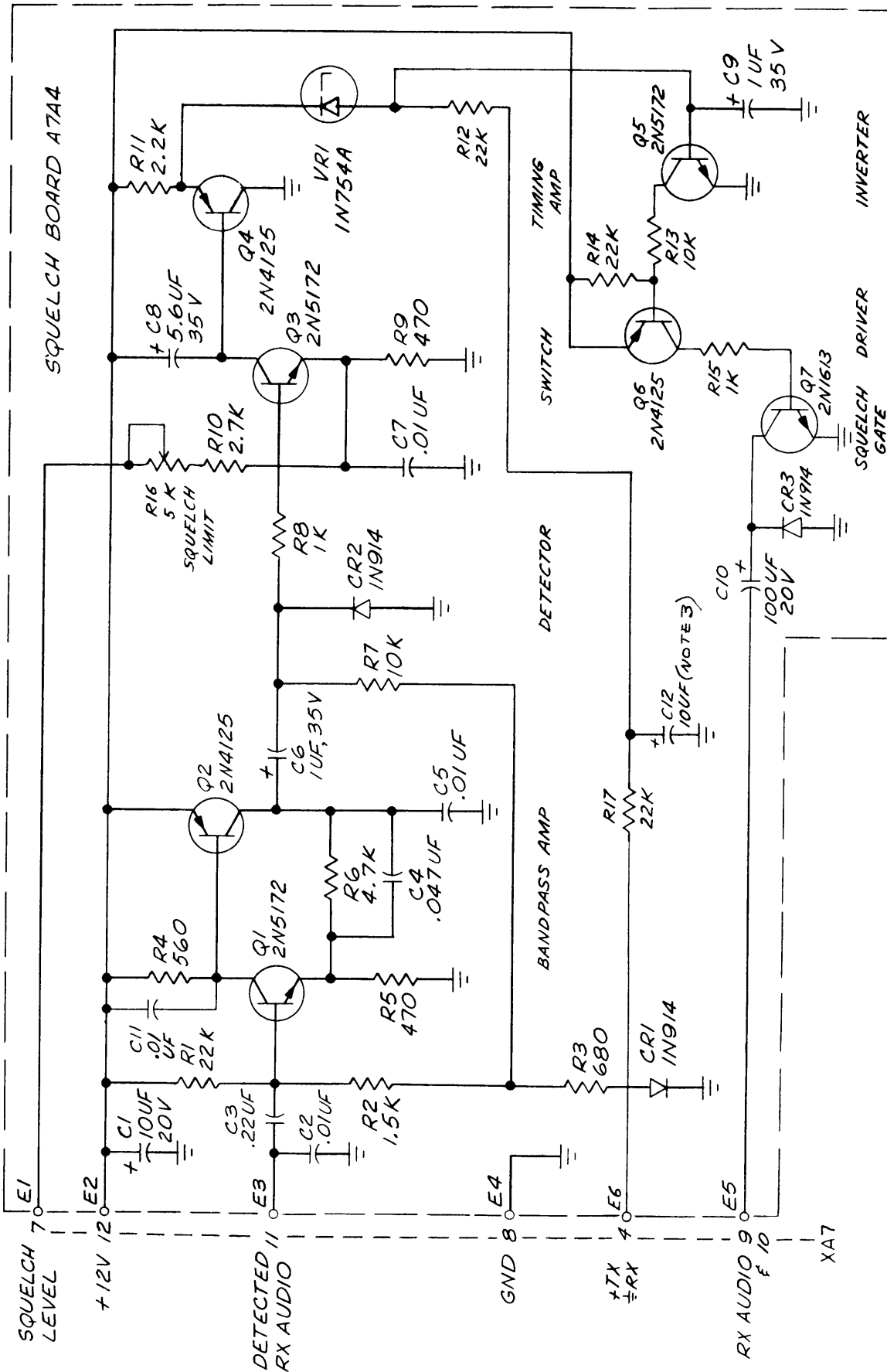
Resistors are 1/4W, 5% Carbon

Transistors are PNP - 2N4125

NPN - 2N5172

2. Ref. Designator A7A1.

Figure 4-11A. CW PC Board, Schematic Diagram



NOTES:

1. Unless otherwise specified Resistances are in ohms
2. Ref. Designator A7A4.
3. C12 is a jumper when cw sidetone is required.

Figure 4-11B. Squelch PC Board, Schematic Diagram

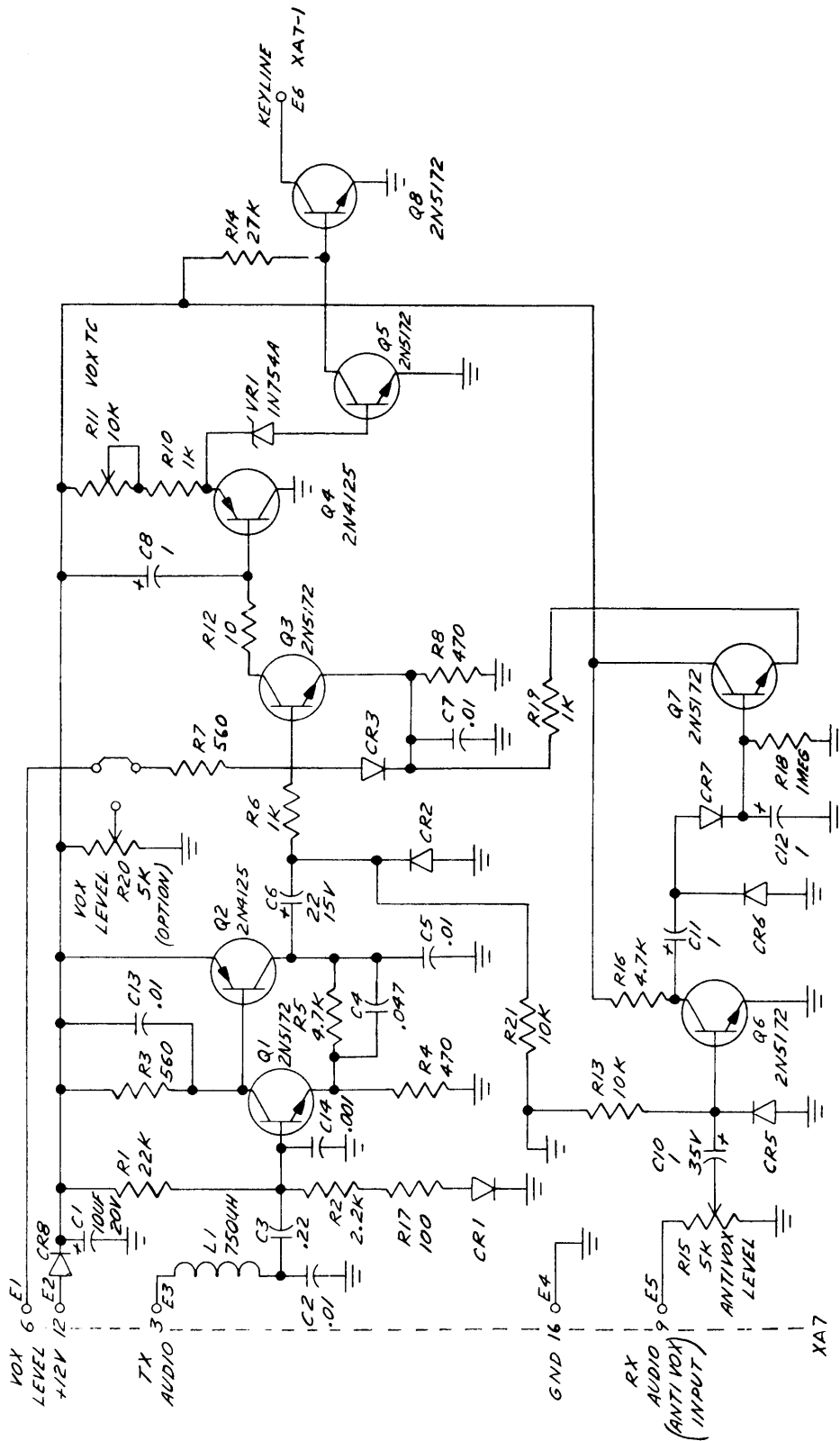


Figure 4-11C. VOX PC Board, Schematic Diagram

NOTES: 1. Unless otherwise specified:

Resistances are in ohms

Resistors are 1/4W, 5% Carbon

Capacitances are in Microfarads

Diodes are 1N914

Ref. Designator A7A2.

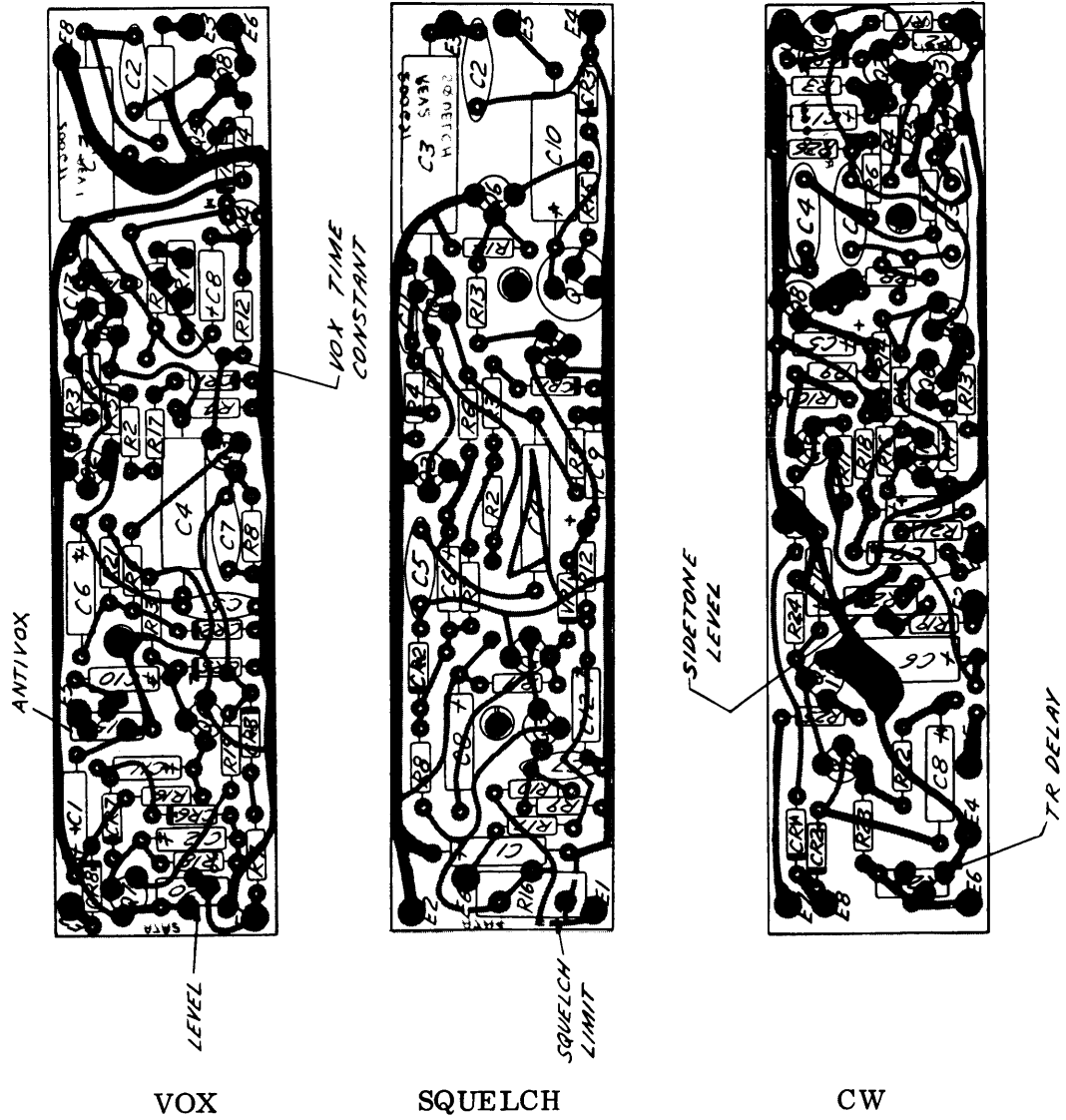


Figure 4-11D. Vox , Squelch, CW PC Board Assembly

Operation

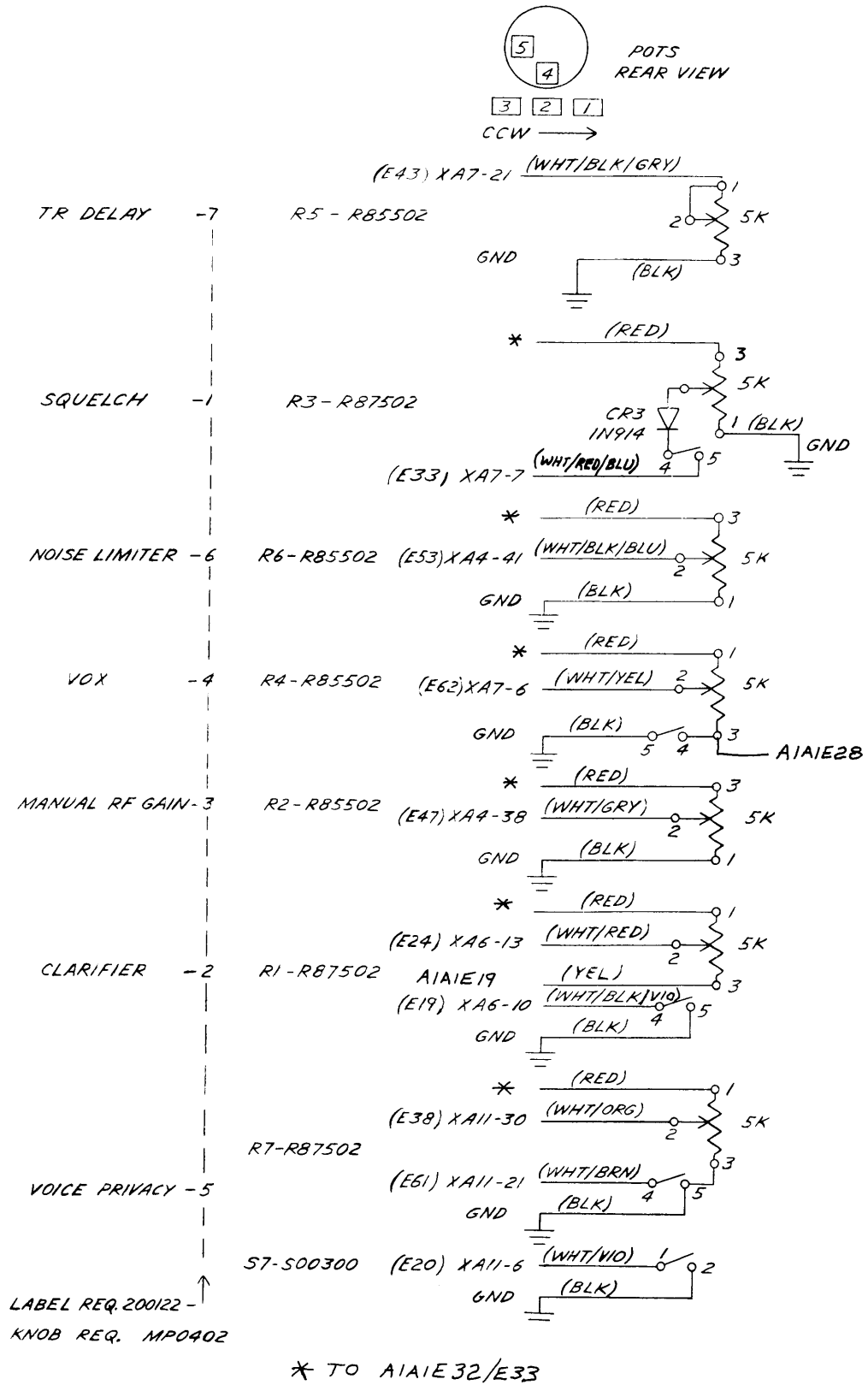


Figure 4-11E. Front Panel Options - Wiring Diagram

establishes a threshold to which C8 must change after a keyline ground is removed. Q9 collector current saturates Q11 which in turn activates the keyline release time constant of 500 ms which is permanently designed into the IF/Audio Module. With the jumper to +12V, all modes, as shown the TR delay is activated in all modes. To reduce delay to the minimum turn the TR Delay control maximum counterclockwise.

4. 11. 2 Squelch Module 1A7A4 (Basic Option Board). - The function of the squelch option, located on the multiple option board A7, is to eliminate the necessity of listening to noise in the absence of a desired signal. Refer to schematic diagram, 4-11B.

Q1 and Q2 comprise a bandpass amplifier having a maximum response between 400 and 800 Hz, the frequency range over which the majority of voice energy exists in sideband communications. Voice signals are detected by CR2 and drive switch Q3 discharging timing capacitor C8. Squelch threshold is established by a front panel control supplying bias to the emitter of Q3.

Each voice pulse discharges C8. Charging rate is determined by R11 and the Beta of Q4. In the absence of voice C8 will charge until VR1 fires (approximately 1 sec.) turning on Q5 and Q6 which activate squelch transistor Q7. The audio output signal in the absence of voice is therefore shunted to ground. Squelched audio is suppressed 20 db.

Front panel control R3 provides threshold control with maximum CCW being off. CW position of the control gives maximum sensitivity, CCW minimum. In the maximum CW position all noise signals will unsquelch the receiver.

4. 11. 3 VOX Module 1A7A2 (Basic Option Board). - The function of the VOX option, located on the multiple option board A7, is to eliminate the necessity of manually keying the transmitter during voice operation. Refer to schematic, Figure 4-11C.

Q1 and Q2 comprise a bandpass amplifier having a maximum response between 400 and 800 Hz, the frequency range over which the majority of voice energy exists in sideband communications. Voice signals are detected by CR2 and drive switch Q3 discharging timing capacitor C8. VOX threshold is established by a front panel control supplying bias to the emitter of Q3.

Each voice pulse discharges C8, thereby shorting the keyline. Charging rate is determined by R11 and the Beta of Q4. In the absence of voice C8 will charge until Q4 cuts off (adjustable from .1 to 1 sec by R11) turning off Q5 which deactivates the keyline.

Front panel control R4 provides threshold control with maximum CCW being off (push-to-talk). CCW position of the control gives minimum sensitivity, CCW maximum. In the maximum CW position all input signals will key the transmitter.

An antivox circuit, Q6 and Q7, is also incorporated. Adjustment of R15 desensitizes the VOX action in the presence of microphone feedback from the internal speaker.

ADDITIONAL OPTIONS

4. 12 NOISE LIMITER MODULE 1A4A1 (IF AUDIO BOARD).

The function of the noise limiter, located on the IF Audio Module A4, is to prevent noise pulses from de-sensitizing the transceiver and to reduce undesirable noise from the receiver audio outputs. Refer to schematic diagram, Figure 4-12.

CR1 and CR2 detect negative and positive signals respectively and through C1R1 and C2R2 time constants generated DC voltage on C1 and C2 proportional to the average input signal. Noise pulses, both positive and negative, are therefore clipped by CR2 and CR1 relative to the average signal. Since noise pulses come in many variations of amplitude, frequency and duration a variable time constant is necessary to provide effective limiting over all operation conditions. FET Q1 provides the variable resistance required by front panel control R6. In the maximum CCW position the Noise Limiter is disabled. Maximum limiting occurs at the CW position. The limiting threshold is established by R127 on the IF Audio Board.

4. 13 VOICE PRIVACY OPTION 1A11. (206/210 ONLY)

The voice privacy option is a printed wiring board module which plugs in to the signal distribution board. It provides a single scrambling pattern for the Transceiver. The method used is not merely inversion nor is it band splitting. A careful record of each code assigned to a customer is maintained by the factory so that each customer has a unique code or sets of codes by scrambling pattern and by frequency. Due to the requirement for privacy and the proprietary nature of the voice privacy method no circuit or block diagram details are given here. Should any difficulty occur a return authorization will be granted by the factory and the necessary repairs made for a nominal charge.

4. 14 FSK OPTION 1A9.

Information pertaining to the FSK Keyer/Converter module is supplied as an Addendum to this manual in the event that the module is either supplied with the Transceiver or supplied at a later date. The module supplies an 850 Hz shift signal in transmit, either 2000 or 2550 Hz center frequency. In receive it demodulates the same signal and supplies loop closures by means of a solid-state switch. Nominal keying speed is 100 words per minute .

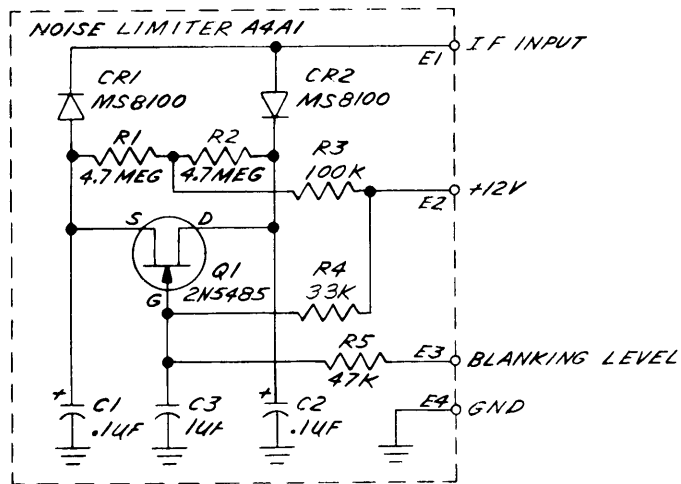
Inputs/outputs are 20/60 ma. at 120 VDC to drive a normal teletype loop. The module is supplied with a plug-in box (3"x 2"x 4") which attaches to the rear of the Transceiver and provides adjustable resistances for loop current control. No wiring is necessary for installation of this option.

In addition, with the use of the voice privacy module, scrambled teletype may be sent and received.

4.15 REMOTE OPTIONS.

A number of remote options are available. Installation and interconnections are covered in the Remote Manual supplied. The remotes available are listed in Section 1.2 of this manual. Figure 4-15 is a simplified schematic of the remote interface.

The only remote option incorporated as part of this manual is the local portion of the marine remote which allows for automatic mode programming. It consists of a motor, B1, relay K2 and switch assembly S6 and S7 (refer to schematic 4-3A and figure 4-16). The assembly attaches to the rear of the Transceiver from the inside and couples to the channel switch shaft of the matching network through a unidirectional roller bearing. With the remote motor attached, clockwise rotation only is possible. The wafer switches associated with the motor, control the antenna coupler position and the motor position as determined by the remote control. Alignment of the wafers are necessary for proper transceiver and coupler tracking. Refer to Section 5.4 for switch alignment procedure.



NOTE:

1. UNLESS OTHERWISE SPECIFIED:
RESISTANCES ARE IN OHMS.
RESISTORS ARE $\frac{1}{4}$ W 5% CARBON.
2. REFER TO IF AUDIO SCHEMATIC
FOR INTERFACE INFORMATION.
3. REF. DESIGNATOR A4A1

Figure 4-12. Noise Limiter, Schematic Diagram

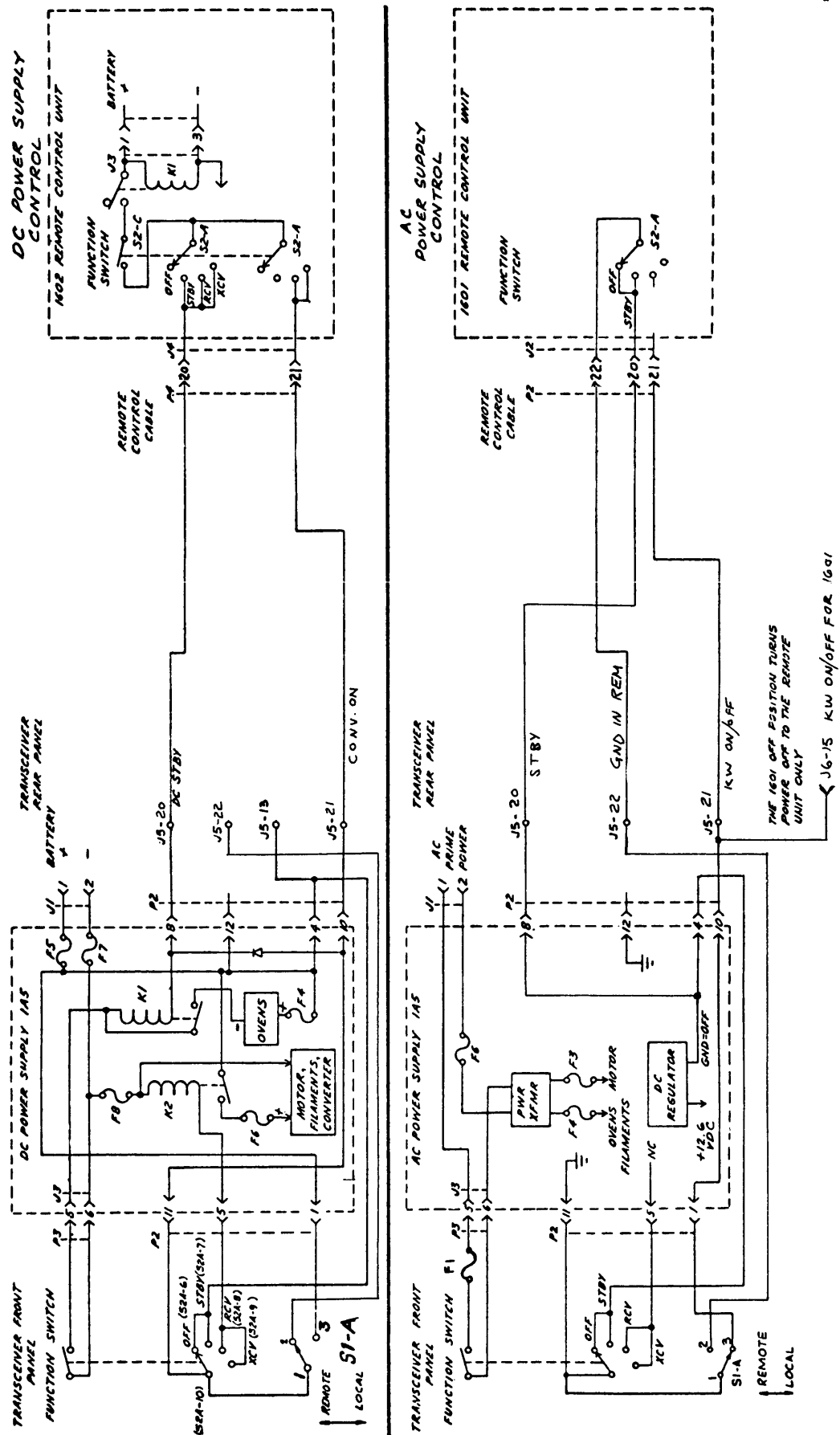


Figure 4-15. AC/DC Remote Control, Simplified Schematic Diagram

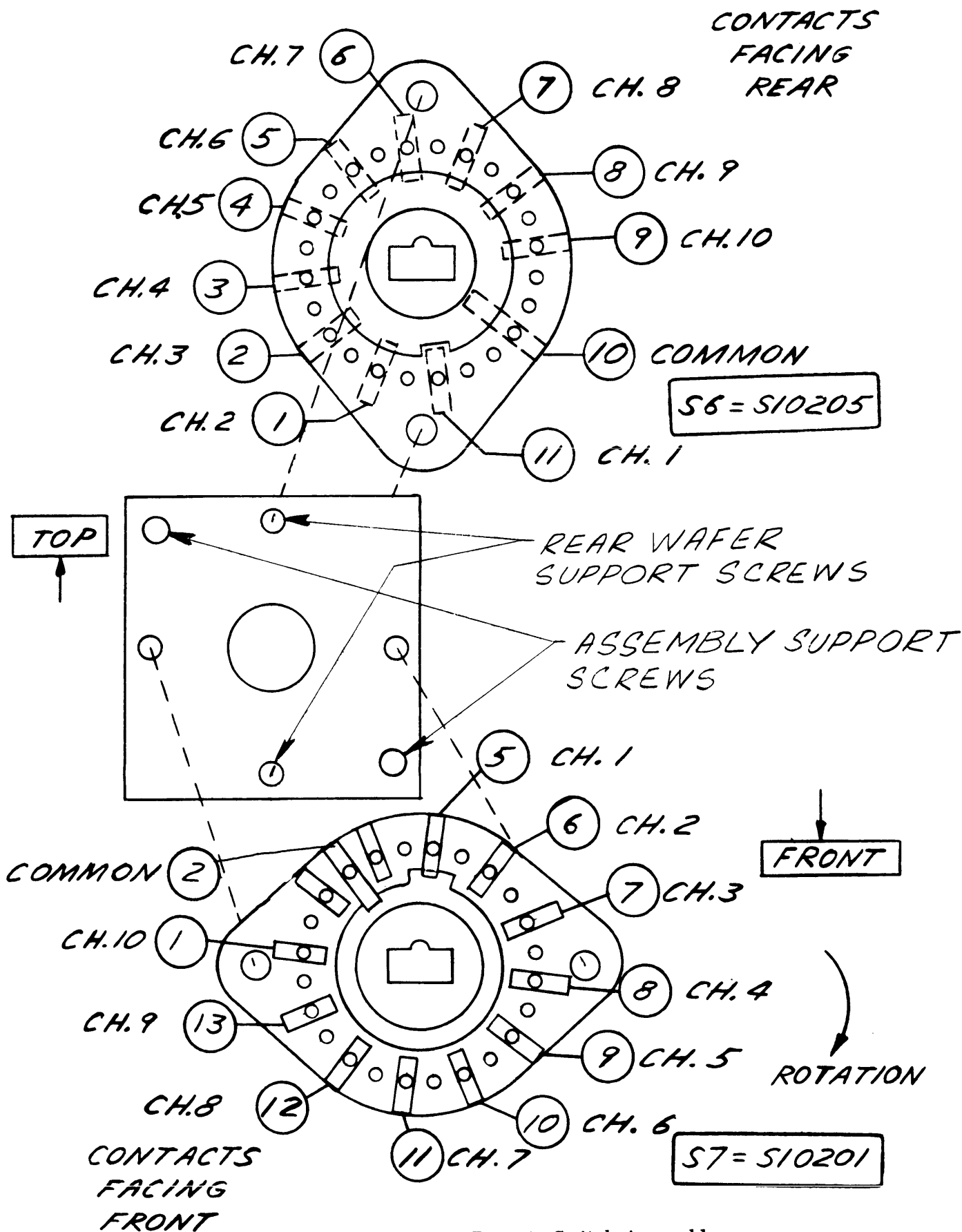


Figure 4-16. Marine Remote Switch Assembly

SECTION V

MAINTENANCE

5.1 GENERAL.

5.1.1 Visual Inspection. - Periodically the covers should be removed from the chassis and the chassis should be visually inspected. Loose hardware should be tightened. Accumulated dirt should be removed. connections to the rear panel terminals should be secure and cables should be inspected for damage. The air screen, if the set has a fan should be cleaned. The fingers on the plug-in PC boards should be cleaned using a suitable solvent. A general visual inspection should be made to locate any cracked or burned parts or any other evidence of physical damage.

5.1.2 Lamp and Fuse Replacement. - Lamp and fuse replacement should only be made using the types and ratings given in the parts list. Damage to the Transceiver could result if this recommendation is not followed.

5.1.3 Meter Monitoring. - The front panel meter may be used as a diagnostic tool to locate gross malfunctions or indicate that preventive maintenance is required. In the receive mode the meter indicates relative signal strength. Normally atmospheric noise will cause a deflection on the meter. A major change can indicate a change in receiver gain or the necessity of resetting AGC adjustments.

With A3S1 in the CATHODE CURRENT position and the Transceiver in the transmit mode the meter indicates total cathode currents of the three 6146B driver tubes or the magnitude of the peak RF output. When monitoring cathode current, a major change may indicate that a PA tube has deteriorated. The relative power position of A3S1 provides an indication of the peak power output and may also be used as a check of proper equipment operation.

5.1.4 Frequency Check and Netting. - If a precision frequency counter is available the crystal oscillators should be set as described in Section 2.5. There may be occasions however, when the transceiver is communicating with a set that does not have the high stability of this transceiver. If each set has a clarifier these may be adjusted so that each receives a proper signal. If not the channel oscillator frequency may be adjusted so that clear intelligence is obtained.

Maintenance

5.2 TROUBLE ANALYSIS.

5.2.1 Test Equipment. - A sophisticated transceiver such as this unit would require a fairly extensive supply of test equipment if all of the circuits in the various modules were to be completely aligned. The modular construction of the transceiver, allows the equipment to be repaired with a minimum of difficulty. Modules may be easily replaced and sent back to the manufacturer for repair. Diagnostic testing is also simplified by the modular approach.

As a minimum, for diagnosing and testing, the following test equipment is suggested:

Vacuum Tube Voltmeter - HP410-C or equivalent
Dummy Load, 50 ohm, 150 watt
Audio Oscillator

In addition the following test equipment would be desirable:

Signal Generator with Attenuator - HP606 or equivalent
Oscilloscope - any oscilloscope, preferably with a frequency response capability in the HF range
RF Voltmeter - Boonton 91DA or equivalent

5.2.2 Receiver Problems. - The most significant indication of a receiver problem is a loss of sensitivity. If the loss is only on one channel the trouble is either in the frequency generator board or in the RF Amplifier Module. Check for presence of channel injection signals to the RF Amplifier module. If present, the trouble is in the RF Amplifier module, probably in one of the channel strips. If the signal is absent on all channels, the trouble most likely is in the IF/Audio Board. This may be verified if a signal generator is available by injection a modulated signal into J10 of the signal distribution board at a frequency of 1500 kHz (or alternate 1400 kHz). If no output is obtained from the speaker but AGC indication is obtained on the front panel meter the trouble is most likely in the Audio Output amplifier board. This may be verified by connecting an audio oscillator to the input of the Audio Output board.

5.2.3 Transmitter Problems. - A complete loss of output on one of the channels should first be investigated by determining if the receiver is functioning properly. If it is then the trouble may be in the 12BY7A driver stage tuned circuit located on the channel strip card. Another cause may be the Pi Network. Inspect for broken wires, a bad wafer switch or a cracked or shorted capacitor.

If the transmitter does not function on any of the channels but does on receive the trouble is most likely in the RF Amplifier PC board. Inspect for broken or damaged components, measure voltages, replace tubes, FET's and perform other routine diagnostic tests to locate the trouble.

5.3 TROUBLE SHOOTING.

The following is a procedure that may be followed to evaluate the probable location of a suspected failure. Qualified personnel only should make adjustments if required. The

indiscriminate adjustment of transceiver controls will only result in less than maximum performance.

5.3.1 Equipment (Typical Mfg. Model). -

- a. RF Signal Generator, 400 kc to 32 MHz (HP 606)
- b. Oscilloscope, 35 MHz (Tektronix 453)
- c. AC/DC Voltmeter, 30 MHz (HP 410C)
- d. Dummy Load, 50 Ohm, 150 W
- e. Frequency Counter 30 MHz, 50 MV Sensitivity

5.3.2 Standard Tests. -

- a. Check all switches for proper location.
- b. Check all channels for receiver noise (speaker) and transmitter power output (front panel meter indication on voice or AM). This also checks the normal transmit/receive function (front panel lights).
- c. Check all fuses.
- d. Check all connections including plug in printed circuit boards.
- e. Observe that all tubes have filament voltage by their glow.
- f. Check all voltages, $+800 \pm 50$ VDC (plate), $+265 \pm 20$ DC (screen) -123 ± 5 DC (bias) -40 VDC ± 2 (AGC) $+12.6$ VDC (regulated), 12 VAC (ovens and filaments).

Voltages except the -40 VDC screen and regulated 12V may be conveniently measured on the octal socket on the bottom of the power supply (J2). Remove the plug and measure as follows:

Pin 1	Plate, 800 ± 50 VDC
Pin 3	Bias, -123 ± 5 VDC
Pin 5-6	Filaments, $12 \pm .5$ VAC
Pin 7-8	Ground

Reconnect the power supply plug J2. The -40 ± 2 VDC may be measured on the bottom of the signal distribution board on XA4-36. The 12.6 VDC regulated may be measured on XA4-44. Screen voltage of $+265 \pm 20$ VDC may be measured on A3J1 pin 1 or 2.* (Reference Figure 4-4C for location.) The plate, screen and bias voltage are not critical and may fluctuate considerably. A malfunction will result in a gross change in voltage.

- g. Check Carrier, 2nd LO and channel oscillator outputs and frequency (Frequency Generator Board).

*Also measure on the anode of A3VR1 the power amplifier screen voltage. The voltage should be measured 39 volts less than the measurement on A3J1. To measure the screen voltage, the transceiver must be in transmit and keyed.

Maintenance

- h. Check for receiver sensitivity, all channels. (Clearly audible tone with $.5 \mu\text{v}$ input.) Also check AGC action to 100 mv input and observe front panel meter indication.
- i. Check PA cathode idle current (zero signal transmit) for 50 on front panel meter with A3S1 (on bottom of RF Amplifier) in cathode current position.
- j. Check for power output, all channels (50 to 80V on voice or 1/2 to full scale on front panel meter).

The above tests will normally determine whether the problem is transmit or receive associated and will give an indication of the module at fault. To further pin point the area of difficulty the following may be performed.

5.3.3 Transmit Problem. -

Remove A3A1P1 from A1J10 of the signal distribution board and inject in A3A1P1 a 1500 (or alternate 1400) kHz 100% modulated IF frequency at -60 dbm ($220 \mu\text{v}$). Check power output on all channels. If all channels are OK, the problem is the IF/Audio Board or audio input circuitry. If there is no output, the problem is either in the RF Amplifier or Matching Network. If there is no output on only one channel, the problem is in the channel tuning strip.

5.3.4 Receive Problem. -

In A1J10 mentioned above inject a 1 mv single frequency at 1500 (or alternate 1400) kHz into the IF/Audio. An output in SSB verifies that the IF/Audio is performing normally and the problem is probably associated with the receive mixer in the RF Amplifier.

5.3.5 Troubleshooting Chart. -

The following chart may be used as an aid in locating malfunctions.

SYMPTOM	LOCATION	PROBABLE CAUSE
Fails to turn on.	Power Supply, A5 Main Frame, A1	<ol style="list-style-type: none"> 1. A5F1 or F6 open. 2. A5J2, poor connection. 1. A1S2-C defective.
Low or no high voltage.	Power Supply, A5 Matching Network, A2	<ol style="list-style-type: none"> 1. A5C9, 10, 11 defective. 2. CR1 through CR8 defective. 3. Open A5T1 winding. 1. A2L4 open.
Low or no 250V	Power Supply, A5	<ol style="list-style-type: none"> 1. A5CR9 through CR12 defective. 2. Open A5T1 winding. 3. A5L1 defective.
Low or no 12V regulated	Main Frame, A1 RF Amplifier, A3	<ol style="list-style-type: none"> 1. Defective contacts on AIK1. 1. A3C13 defective.
Turns on but unable to transmit or receive (no oven or filament voltage)	Power Supply, A5	<ol style="list-style-type: none"> 1. A5F5 open. 2. Loss of +250V. 3. AC standby line grounded (A5A1P2-4) 4. Regulator circuit defective (A5Q1) 5. Open A5T1 winding. 1. Short to ground on +12V distribution wiring.
No receive audio and no noise.	Main Frame, A1 Power Supply, A5 RF Amplifier, A3	<ol style="list-style-type: none"> 1. A5F4 open. 2. Open A5T1 winding. 1. A3A1V1, V2; A3V1, V2, V3 open filament.
No receive audio but normal receiver noise	IF Audio, A4 Freq Generator, A6 Audio Output Amplifier, A1A2 Audio Distribution, A1A1 Main Frame, A1 RF Amplifier, A3	<ol style="list-style-type: none"> 1. Defective board. 1. No injection oscillator outputs. 1. Defective board. 1. Defective board. 1. Defective AIK1. 1. Defective A3AIK1.

SYMPTOM	LOCATION	PROBABLE CAUSE
No receive audio and reduced receiver noise	RF Amplifier, A3 Freq. Generator, A6 IF/Audio, A4	<ol style="list-style-type: none"> 1. Defective A3A1 board. 1. No channel oscillator injection. 1. Defective mixer or filter.
No channel oscillator output	Freq. Generator, A6 or Duplex Generator A8	<ol style="list-style-type: none"> 1. Programming error 2. Defective crystal or oscillator.
No carrier oscillator output	Freq. Generator, A6	<ol style="list-style-type: none"> 1. Mode is AM receive. 2. Defective oscillator or XTAL. 3. Programming error.
No 2nd LO oscillator output	Freq. Generator, A6	<ol style="list-style-type: none"> 1. Defective oscillator or XTAL. 2. Programming error.
Channel oscillator frequencies 200 Hz to 2000 Hz too high	Freq. Generator, A6 or Duplex Generator, A8	<ol style="list-style-type: none"> 1. Defective oven.
Won't key (transmit)	Main Frame, A1 IF Audio, A4 RF Amplifier, A3	<ol style="list-style-type: none"> 1. Shorted keyline inhibit line. 1. Defective Q25 or associated circuitry. 1. Defective A3A1K1.
No transmit output	Main Frame, A1 IF/Audio, A4 RF Amplifier, A3	<ol style="list-style-type: none"> 1. Audio Distribution (A1A1) board defective. 2. A1K1 (ANT Relay) defective. 1. Defective balanced modulator, U5. 2. No 2nd LO injection. 3. No carrier injection. 4. FL1 (SSB filter) defective. 5. Output mixer defective. 1. No channel oscillator injection. 2. A3A1K1 defective. 3. A3A1V1 or V2 defective. 4. A3V1, V2 or V3 defective. 5. A3A3 through A3A12, channel tune strips defective.

SYMPTOM	LOCATION	PROBABLE CAUSE
AM but no receive SSB	IF Audio, A4 Freq. Generator, A6	<ol style="list-style-type: none"> 1. No carrier injection. 2. Defective carrier gate. 1. Defective command diodes CR1 and 4.
No cathode current indication	RF Amplifier, A3	<ol style="list-style-type: none"> 1. No 250V screen volts. 2. VR1 open. 3. No 750 plate volts. 4. Meter circuit defective.
High cathode current indication	RF Amplifier, A3	<ol style="list-style-type: none"> 1. No grid bias. 2. C1 open. 3. Antenna open or short. 4. Oscillation - <ol style="list-style-type: none"> a) not neutralized, b) C10 shorted.
No TX indication in REL PWR position (S1)	RF Amplifier, A3	<ol style="list-style-type: none"> 1. Shorted antenna. 2. Defective meter circuit.
No RX indication	IF Audio, A4	<ol style="list-style-type: none"> 1. Defective meter circuit, Q8.
Full scale meter deflection in RX	All	<ol style="list-style-type: none"> 1. No +12V.
Speaker hum or buzzing	Power Supply, A5 RF Amplifier, A3	<ol style="list-style-type: none"> 1. C16 open. 1. C13 open.
High power output and low cathode current as measured on front panel meter	RF Amplifier, A3	<ol style="list-style-type: none"> 1. Shorted C5, C8, or C11

5.4 ALIGNMENT PROCEDURE.

The following procedure covers the full alignment of the transceiver. There are certain adjustments which are clearly identified by an asterisk as factory adjustments, these should only be made after a repair has been made and then only in the section of the transceiver directly affected.

When connecting or disconnecting test leads to terminals or pins, the transceiver should be turned off and careful attention should be paid to ensure that adjacent terminals or pins are not shorted together by the test leads.

The following test equipment is recommended if all of the tests or alignments are to be performed:

- a. RF Signal Generator - HP606B, or equivalent.
- b. Peak Reading RF Voltmeter - HP410C, or equivalent.
- c. Oscilloscope - 35 MHz bandwidth.
- d. Frequency Counter, 0-30 MHz, 50 mv sensitivity.
- e. Dummy Load, 150 watt rating.

It is recognized that while it is desirable that this test equipment be available, quite likely it will not be. Each individual situation will be different. It is obviously impossible to write a procedure that will cover all test equipment situations, however many adjustments may be made using only the indications available on the front panel meter and the audio output from the speaker. The following is a brief discussion of what might be accomplished using only the above.

Receive - If the transceiver is connected to an antenna, normally background noise is sufficient to give a tuning indication. The tuning adjustments on the channel tune boards may be peaked listening to background noise or, if the background noise is strong enough, observing the front panel signal strength meter. The IF tuned circuits are relatively broad and do not require critical adjustment. These may be set as above if a replacement has been made. The criteria should be that if the set has good inherent sensitivity and clarity of reception it should not be re-adjusted. The channel oscillator tuning adjustments may be adjusted when listening to a signal from a transceiver of comparable stability by adjusting for the most natural sounding speech.

Transmit - In transmit a signal for peaking the transmitter tuned circuits may be artificially created (in the AM mode) by setting A4R3, the second L. O. injection level to obtain a front panel indication of about 1/4 scale. A4R3 should be re-set approximately 3/4 CW when adjustments are completed.

Maintenance

The AM carrier level may be set by adjusting A3A14R11 for mid-scale (approximately 44 volts output) on the front panel meter. PPC adjustments may be made by talking loudly into the microphone using a repetitive word such as one, two or three and adjusting the SSB control A3A2R31 so that the meter does not reach full scale on peaks. The current limit control, A3A2R7 may be set by loudly whistling into the microphone with the transmit audio set maximum CW for several seconds at a time and adjusting for a meter indication of approximately 110.

Other innovations may be made if the purposes of the controls are clearly understood. Reference should be made to the theory of operation and schematics.

When making tuning adjustments to the channel tune PC board assembly, and a duplex channel is being aligned it is essential that the receive adjustments be made first if the transmit frequency is below the receive frequency. If the reverse is true, the transmit adjustments should be made before the receive adjustments.

5.4.1 Receive Alignment. -

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5.4.1.1 Power Supply Regulator and Filter PC Board (A5A1) Adjustment. - Connect the DC probe of the HP410C to the +12.6 volt DC distribution at XA4-11, set the function switch to receive, adjust R15 for +12.6 volts as read on the HP410C.

5.4.1.2 Channel Tune Board (A3A3 through A3A12) Receive Adjustments. - Set the function switch to receive. Set the channel switch to the desired channel. Connect a signal generator to J3, the receive test jack on the rear panel. ~~(If the channel strip has an image trap (ie., the presence of four coils on the channel strip), set the signal generator frequency to be twice the first IF frequency above the desired receive frequency. For example, if the IF frequency is 1500 kHz, set the frequency to be 3 MHz above the receive frequency.)~~ Adjust the generator level to obtain an indication on the front panel meter. ^{For image trap only} Adjust L1 for minimum indication, increasing the level as required to maintain a small indication on the meter. Set the generator frequency to the desired receive frequency, adjust the level to obtain an indication on the meter, peak L2 and L3 for maximum indication, adjusting the level to keep the indication at a small reading, approximately 10 on the relative power scale. ~~If a duplex channel is being tuned and the receive frequency is lower than the transmit frequency, the proper adjustments are C6 and C10. L2 and L3 should first be adjusted in transmit before C6 and C10 are adjusted.~~ Repeat for all channels being aligned. Fig 4-4F
P 4-33

5.4.1.3 IF Audio Board (A4) Receive Adjustments. - ^{SSB mode} Connect the equipment as in 5.4.1.2.
NOTE (IF Freq. = 1.430 MHz) ^{USE J3 (or IF J2) used Remover}
a. * Insert the IF Audio board in board extenders. Adjust T1, T7, T4, T5 and T6 for maximum indication, maintaining the indication at approximately 10. If applicable, T8 and T9 should also be peaked. ^{Fig 4-6B P. 4-49 (P. 2-6 LOCATION)}
b. * With the equipment connected as in a., set the level of the signal generator to obtain a reading of 10 on the meter. Increase level of generator by 20 db. Adjust R3 to again

* Factory adjustment - adjust only if the component being adjusted has been replaced.

- obtain a reading of 10 on the meter. This reduces the mixer gain to the point where it is sensitive to the tuning of T3. Adjust T3 for maximum indication. Reduce generator level by 20 db, adjust R3 to the point where maximum indication is obtained or the indication increases very slowly as R3 is rotated.
- c. Decrease the signal generator input to zero. Adjust R32, the RF AGC threshold control, for a zero indication on the front panel meter.
- d. Connect a 600 ohm resistor to the audio output terminals of J5 on the rear panel. This may be omitted if the 600 ohm output is not used. Refer to the main frame diagram for the type of transceiver being tested to determine the proper terminals. Connect the oscilloscope to XA4-43 if the 600 ohm output is not used or if used connect it across the 600 ohm resistor. If the transceiver has a remote-local front panel switch set it to remote and set the Remote Receive level control to maximum. Set the transceiver to receive in the AM mode by one of the following methods:
- (1) 206/210 - set mode switch to AM.
 - (2) RT-1033/URC-77 - set to any channel programmed for AM or if no channels are programmed for AM, follow procedure of (3).
 - (3) Remove the 455 Hz injection by shorting XA4-17 to ground. Activate the AM detector by jumpering XA4-10 to XA4-11.
 - (4) 206M/210M - if the transceiver has a mode switch, set it to AM. If it does not follow procedure of (2) or (3).

Set the signal generator level to 100 microvolts and AM modulation to 30% at 1 kHz. Observing the output signal with an oscilloscope adjust* R127, the internal noise limiter adjustment for a 6 db reduction in output signal when the front panel noise limiter control is set for maximum compression. If the IF Audio board does not have the noise limiter option, R127 should be set at approximately mid-range.

- e. * Set the signal generator level to 100 microvolts. Observe the output level on the oscilloscope. Decrease the level to 1 microvolt. Adjust R35, the IF AGC Threshold controls, for 1/2 the output observed with the 100 microvolt input.
- f. Set the signal generator level to 5 microvolts. Adjust R64, the audio level control, to obtain 0 dbm in output as observed on the oscilloscope, or if the 600 ohm output is not used, adjust R64 for satisfactory speaker volume. 0 dbm is 2.2 volts peak to peak or 0.775 volts RMS.
- g. * Set the signal generator level to 0.5 volts. Adjust R55 AGC Linearity for minimum distortion (-20V on XA4-36). Set R26, the S Meter limit set for full scale meter indication.

* Factory adjustment - adjust only if the component being adjusted has been replaced.

5.4.1.4 Frequency Generator (A6) PC Board (Simplex) Receive/Transmit Adjustments. - The Simplex Frequency Generator Board channel oscillators are at the same frequency on receive and transmit and therefore all adjustments may be made in receive. Before making any adjustments it is essential that it be known what the correct crystal output frequencies are. If they are not known they may be determined by removing the oven cover and noting the crystal frequencies marked on the crystals.

- a. Connect the AC probe of the HP410C from ground to XA6-2. Set the function switch to receive, allow at least 30 minutes warm up. Switch the Voice Privacy off if transceiver has a Voice Privacy option. Set R30 Carrier Level to mid-range. Switch to USB, adjust R15 for 140 mv output as read on the HP410C. Switch to LSB, adjust R24 for 140 mv output. Connect frequency counter from ground to XA6-2. Switch to LSB, adjust C17 for correct frequency. Switch to USB, adjust C7 for correct frequency. Ref. Table 2-1B for frequencies available.
- b. Connect the AC probe of the HP410C from ground to XA6-15. Switch clarifier off if the transceiver has the clarifier option. Adjust R46 for 210 mv output. Connect frequency counter from ground to XA6-15. Adjust C33 for correct frequency. Switch to LSB, adjust C26 for correct frequency. Ref. Table 2-1B.
- c. Connect the frequency counter from ground to XA6-30. Starting with the channel switch in channel 1, adjust all trimmer capacitors for the correct output frequency. These capacitors are accessible through holes on the side panel and are clearly marked. Remove the frequency counter and connect the AC probe of the HP410C to XA6-30. Adjust R4 to obtain an output of 140 mv on the lowest output channel.

5.4.1.5 Frequency Generator (A6) PC Board (Duplex) Receive/Transmit adjustments. - The Frequency Generator PC Board (Duplex) channel oscillators are used for both transmit and receive if the channel is a simplex channel. If the channel is a duplex channel the A6 board normally has the transmit crystals and the A8 board (Duplex Frequency Generator PC Board) the receive crystals.

Knowledge of the channel oscillator crystal frequencies is essential before adjustments may be made. If not known they may be determined by removing the oven cover.

- a. Connect the AC probe of the HP410C from ground to XA6-2. Set the function switch to receive. Allow at least 30 minutes warm-up. Set R16 to mid-range. Adjust R15 for 140 mv output. Connect frequency counter from ground to XA6-2. Adjust C7 for correct frequency. Ref. Table 2-1B.
- b. Connect the AC probe of the HP410C to XA6-15. Switch the clarifier off if the transceiver has a clarifier option. Adjust R26 for 210 mv output. Connect the frequency counter from ground to XA6-15. Adjust C17 for the correct frequency. Ref. Table 2-1B.
- c. Connect the frequency counter from ground to XA6-30. If the transceiver has no duplex channels, set the function switch to receive. Starting with channel 1 adjust

all trimmer capacitors for the correct output frequency. These capacitors are clearly marked and are accessible through holes in the side panel.

If the transceiver has duplex channels, the frequencies must be adjusted in the transmit mode as follows:

- (1) Remove A3A1P1 (located on the signal distribution board) from A1J10. This prevents the PA from putting out power when the transceiver is keyed.
 - (2) Switch the function switch to transceive. Key the transmitter, adjust all trimmers for the correct output frequency. Unkey transmitter, replace A3A1P1 in A1J10.
- d. Connect the AC probe of the HP410C to XA6-30. If the transceiver has no Duplex Frequency Generator PC Board (A8) the channel oscillator output level is adjusted as follows:
- (1) Switch the mode switch to receive. Set R4 to obtain an output of 140 mv on the lowest output channel.

If the transceiver has a Duplex Frequency Generator PC Board (A8) the channel oscillator output level is adjusted as follows:

- (1) Turn A8R4 fully clockwise. This is located on the Duplex Frequency Generator Board.
- (2) Remove A3A1P1 from J10. Set transceiver to Channel 1. Key transmitter, note output level. Repeat for all channels, noting the output level on all channels. Adjust R4 for 140 mv on the lowest output channel

5.4.1.6 Duplex Frequency Generator (A8) PC Board Receive Adjustments. - The Duplex Frequency Generator PC Board normally has the receive crystals in a duplex transceiver. Knowledge of the crystal frequencies is essential before adjustments may be made. If not known they may be determined by removing the oven cover.

- a. Insert A8 in card extenders. Connect the frequency counter from ground to XA6-30. Set the function switch to receive, allow at least 30 minutes warm-up. Adjust the appropriate trimmer capacitors for the correct output frequency on each duplex channel.
- b. Adjustment of R4, the output level adjust is made as a part of the adjustments covered in 5.4.1.5.

5. 4. 2 Transmit Adjustments. -

5. 4. 2. 1 Channel Tune Board (A3A3 through A3A12) Transmit Adjustments. - Remove A3A1P1 from A1J10. A1J10 is located on the Signal Distribution Board. Connect the signal generator to A3A1P1. Set the frequency to the first IF frequency, and output level to zero. Connect a dummy load having a rating of 150 watts to J2 (ANT). Connect the AC probe of the HP410C across the dummy load using a Tee or suitable adapter.

a. Adjustments for sets not having duplex channels:

- (1) Set to channel 1, transceive mode and key. Set signal generator level to obtain an output voltage reading of approximately 40 volts on the HP410C. Adjust L4 for maximum output. It should be noted that L1, L2, and L3 are adjusted on receive and it is presumed that this has been accomplished before making transmit adjustments.
- (2) Set the signal generator level for -60 dbm (224 μ v). Adjust R2 for 40 volts output. This adjustment should not be made at this time if the RF Amplifier Mixer (A3A1) PC Board or the Matching Network (A2) have not been aligned or are to be re-aligned. First align A3A1 and A2, then adjust R2. Repeat steps 1 and 2 for all channels.

b. Adjustments for transceivers having duplex channels. - For the simplex channels (channels not configured for duplex), follow the procedure of a, steps(1) and (2). For the duplex channels use one of the following procedures, depending on whether the transmit frequency is above or below the receive frequency.

Transmit frequency below receive frequency: Switch to the first duplex channel. Set the signal generator output level to obtain a reading of 40 volts on the HP410C. Adjust C6, C10 and L4 for maximum output. L1, L2, and L3 must previously have been adjusted for correct alignment on receive following the procedure of section 5. 4. 1. 2. Adjust R2 for 40 volts output following procedure step (2) of a. Repeat for all duplex channels.

Transmit frequency above receive frequency:

- (1) Adjust L1 for minimum receiver response at the image frequency following the procedure of 5. 4. 1. 2.
- (2) Adjust L2, L3, and L4 for maximum transmitter output.
- (3) Adjust R2 for 40 volts output as in step (2) of a.
- (4) Adjust C6 and C10 for correct alignment on receive following the procedure of 5. 4. 1. 2.

Repeat for all duplex channels.

- 5.4.2.2 Matching Network (A2) Adjustment. - Ref. 2.5.2.2 for frequency change and alignment.

CAUTION

Insure that equipment is de-energized prior to performing this step.

- a. This step is omitted if the transceiver does not have harmonic traps. Turn transceiver off by means of function switch and remove main power plug from rear of transceiver. Remove PA shield. Connect the signal generator to terminal 11 of S1-C. Set its frequency to twice the transmitter output frequency. Connect a high frequency oscilloscope or an RF voltmeter to the junction of C12, C13 and C8, C9. Adjust the signal generator level to obtain an indication. Tune L7 for minimum indication. Repeat for all channels. Remove the signal generator and oscilloscope or voltmeter. Replace PA shields.
- b. Turn function switch to standby. Remove A3A1P1 from A1J10. Connect the signal generator to A3A1P1, set the generator frequency to the IF frequency and level to zero. Connect the dummy load to J2 (ANT). Connect the AC probe of the HP410C across the dummy load using a Tee or suitable adapter. Set function switch to transceive. Set to channel 1. Key transmitter. Set generator level to obtain an output of approximately 40 volts. Adjust C12 for maximum output. Repeat for all channels.
- c. If the neutralizing capacitor C10 has been replaced it should be set near minimum capacity (approximately 4/5 open). Normally this is sufficient for proper operation since the adjustment is not very critical. If any instability problems exist, particularly on high frequency channels a slight re-adjustment of this capacitor will be sufficient.

- 5.4.2.3 IF/Audio PC Board (A4) Transmit Adjustments. -

- a. * Set the function switch to standby. Connect the dummy load and HP410C as in 5.4.2.1. Switch the mode switch to upper or lower sideband, or if the transceiver is programmed, switch to any SSB channel. Key transmitter. Adjust R105, the carrier balance control, for minimum output as observed on the 1 volt scale of the HP410C.

- 5.4.2.4 RF Amplifier and Mixer (A3A1) PC Board Transmit Adjustments. -

- a. * Remove the channel oscillator injection by removing A3A1P2 and A1J9. Connect the signal generator to A3A1P2. Set the channel switch to the highest frequency channel. Set the signal generator frequency to the transmitter output frequency, not the normal channel oscillator frequency. Set the signal generator level to 0 dbm (226mv). Connect the dummy load and HP410C as in 5.4.2.1. Set the function switch to transceive and key transmitter. Adjust the balance control R21 for minimum output. Re-connect A3A1P2 to A1J9.

* Factory adjustment, adjust only if repair has been made.

Maintenance

- b.* Remove A3A1P1 from A1J10. Connect the signal generator to A3A1P1. Set its frequency to the first IF frequency. Connect Dummy Load and HP410C as in 5.4.2.1. Set the function switch to transceive and key transmitter. Adjust generator level to obtain approximately 40 volts on HP410C. Adjust T1, T2, and T3 for maximum output. Reconnect A3A1P1.

5.4.2.5. POWER CONTROL PC BOARD (A3A2) ADJUSTMENTS.

- A. Connect dummy load and HP410C as in 5.4.2.1. Remove A3A1P1 from A1J10. Set function switch to transceive. Set to any channel. Switch A3S1, the Rel PWR/Cath I switch to the Cath I position. Key transmitter. Adjust the idle current control, R3, for a reading of 50 on the front panel meter. Switch A3S1 back to the Rel PWR position.

- 32 VDC ON PIN 5 of finals

- B. Connect the microphone or handset to the microphone input jack, J1. Connect the oscilloscope to monitor the output across the dummy load. Switch the function switch to SSB or if the transceiver is programmed, switch to any SSB channel. Set R27 max. CCW. Set A4R1 (located on the IF/Audio PC Board) at mid-range. Set the front panel transmit audio control approximately 3/4 rotation clockwise. Speak into the microphone and observe output on oscilloscope. Set R31, the SSB level control, so that flat topping does not occur on voice peaks. Set R27 so that it just starts to reduce the level of the peaks, then rotate R27 approximately 10% CCW.

CHECK ON SCOPE for flat tops & peak watt meter

- C. Connect an audio oscillator set to 1 KHz to XA4-21. The average power level circuit will limit average power output to any desired level. R7 adjusts that level. Normally this is set to limit the level to 100 watts (71 volts RMS as measured on HP410C) however, it can be set lower if desired. This circuit is relatively slow acting and takes 2 to 3 seconds to react to an overload, which means that R7 must be set to a position, the output level observed, and then to a new position until the desired level is obtained. This may be accomplished as follows:

1. Set R7 maximum counterclockwise.

2. Set function switch to transceive. Key transmitter. Set the audio oscillator level 20 db above the level which gives 32V output on the HP410C. Rotate R7 clockwise a few degrees, and observe what the output voltage settles to on the HP410C. Keep rotating R7 clockwise until the desired average power level output is reached.

37 watts after peak

Power will peak then come back to 37 watts

- D. If the transceiver has a CW or FSK module, switch mode switch to CW or FSK. Connect dummy load and HP410C as in 5.4.2.1. Set the function switch to transceive. Key transmitter for relatively short periods of time (approximately 1/2 second on, 1/2 second off). Adjust R13 for 71 volts output. If the transceiver is keyed continuously the average power control will limit output power.

5.4.2.6 Automatic Carrier Control (A3A14) PC Board. -

- a. Connect the dummy load and HP410C as in 5.4.2.1. Switch the mode switch to AM or if transceiver is programmed switch to an AM channel. Set function switch to transceive. Key transmitter. Adjust R11 for 43 volts (37 watts) output on HP410C.
- b. If the transceiver is programmed for reduced carrier operation, or if a reduced carrier option is included, switch to a reduced carrier channel or set option switch to reduced carrier. Key transmitter, adjust R5 for 12 volts (3 watts) output.

5.4.3 Motor Control Wafer Alignment. - The following is the procedure to align the motor control wafer with the channel switch position. Remove the matching network module from the transceiver. Remove the center shaft of the matching network and place between the motor drive assembly and the PA module. Loosen the two screws supporting the switch assembly and rotate until the tab on the rotor of the front wafer is centered about the stator contact on which it is positioned. Ref. Figure 4-16.

CAUTION

Do not rotate the channel knob or matching network wafers while the shaft is disconnected. A 180 degree misalignment may result. The symptom will be, when in remote and selecting a channel, the transceiver will program to the wrong channel.

Tighten the screws supporting the switch assembly and go to remote. Select a channel and observe where the front wafer stops. If it does not stop centered about a stator contact loosen the two screws supporting the rear wafer. Reposition this wafer until the front wafer stops centered about a stator contact. Tighten the supporting screws and reassemble the transceiver.

5.5 PERFORMANCE TESTS AND ADJUSTMENTS.

5.5.1 General. - Alignment and Adjustments should be made only when necessary and only according to instructions. There are many circuits which are not merely adjusted for maximum output but for other and more critical parameters. Caution should be observed at all times to avoid contacting high voltages. In particular the PA screens should be left on at all times unless a repair is being made in that section. +250V is present, however, in the RF Amplifier module and care should be taken to avoid contact.

5.5.2 Receiver Gain and Sensitivity. -

5.5.2.1 IF/Audio Board, 1A4. - The following adjustments may be periodically made:

- a. Meter Zero - Remove the antenna and terminate the antenna jack with 50 ohm termination. With the transceiver in the LSB or USB receiver mode, adjust 1A4R32 for 0 indication on the front panel meter. Replace the antenna. The front panel meter will normally indicate due to atmospheric noise.

Maintenance

- b. Second LO Level - 1A4R3 controls the drive to the balanced 1500/455 kHz balanced mixer. This is a factory adjustment but if a repair has been made in this circuit, it should be adjusted to the point where the receive gain no longer increases. A steady signal must be present.
- c. AF Level - 1A4R64 controls the audio level into the audio output amplifier. It should be set so that no apparent distortion occurs under strong signal conditions when the front panel receive audio level control is fully on.

5.5.2.2 Frequency Generator Board, 1A6. -

- a. Channel Oscillator Level - This adjustment, 1A6R4, should not be normally necessary but if a repair has been made it should be set to give a nominal output level from the 1A6 module of 400 mv, peak-to-peak.
- b. Carrier and 2nd LO Oscillator Levels - Adjustments should only be made if a repair has been made. Carrier level is adjusted for 400 mvpp 2nd LO level is 600 mvpp. Refer to appropriate schematic for R designators.

5.5.3 RF Amplifier Module, 1A3. - There are no receive adjustments to be made in the RF Amplifier module other than the tuning on the channel strips which was previously covered in Section 2.5 and the tuning of T1 and T2 which are factory adjustments.

5.5.4 Transmitter Gain and Power Output. - The normal gain and tuning adjustments for the transmitter are covered in Section 2.5 and 5.4, however, there are certain adjustments that may be periodically necessary.

- a. PA Bias - With the transmitter keyed in the SSB mode, and the transmit audio at minimum, adjust 1A3A2R3, the PA bias control for a reading of 50 on the front panel meter, 1A3S1 must be in the cathode current position. This should correspond to 25 ma per tube. The individual currents may be measured by measuring the voltage at each cathode and computing the current. If any of the tubes are significantly different it may indicate a tube should be replaced.
- b. Carrier Balance - This adjustment can only be made if some means of monitoring the carrier is available. Another receiver tuned to the carrier frequency might be used or an oscilloscope coupled to the grid of the PA tubes might be used. This adjustment should only be made if it has been determined that the carrier has been unbalanced by a necessary repair or an accidental mis-adjustment of the carrier balance control, 1A4R105. If it is certain that a reliable indication of carrier balance is available, 1A4R105 should be adjusted for minimum output.
- c. AM Carrier Level - A3A14R11 sets the level of the AM carrier on transmit. It should be set to a level of half scale on the front panel meter with 1A3S1 in the Relative Power Output position. A3A14R5 sets the Reduced Carrier Level. Meter indication is not available therefore an external watt meter is required. Setting is 3-5 watts.

- d. Peak Power Output - The front panel meter gives a relative indication of peak power output but on voice peaks it will not respond quickly enough to indicate when full power output is obtained. It is set in the factory to indicate full scale with a two-tone signal of 150 watts PEP. On voice it will normally indicate about 2/3 scale when full power output is obtained.

5.6 DISASSEMBLY OF TRANSCEIVER.

The Transceiver is designed so that it can be completely disassembled for troubleshooting or parts replacement using the cross-recessed screwdriver supplied. The sequence of disassembly is important and should be strictly followed to prevent equipment damage. Figures 5-1 through 5-8 pictorially describe the following steps. An asterisk (*) designates additional steps required for the AN/URC-77.

5.6.1 Step 1. - Power Plug and Top Cover.

- a. Remove the power cord at the rear of the set.
- b. Remove the six (6) or eighteen (18)* screws holding the top cover and lift the cover up and off.

5.6.2 Step 2. - PC Boards and Retainer.

- a. Loosen two (2) screws either side of the retainer. Lift up to remove. DO NOT REMOVE SCREWS.
- b. Remove two (2) PC Board retaining straps if provided. Six (6)* screws.
- c. Remove each PC board by grasping the guides and lifting upward.

5.6.3 Step 3. - Bottom Cover.

- a. Remove three (3) cover screws on left side.
- b. Rotate the set onto its left side and remove the remaining three (3) or nine (9)* cover screws. Remove cover.

5.6.4 Step 4. - Power Supply.

- a. Unplug the octal plug.
- b. Unplug the 15 pin Harness connector.
- c. Unplug the in-line motor/fan connector.
- d. Remove the four (4) or eight (8)* screws securing the power supply, 4 bottom, 4* top.
- e. Lift the power supply out through the TOP of the set.

Maintenance

5.6.5 Step 5. - Matching Network.

- a. Remove the four (4) screws holding the top screen and lift screen off.
- b. Remove the four (4) screws holding the bottom screen and lift screen off.
- c. Remove the two (2) outside screws holding the top bracket. Unplug the Hi Voltage pin connector on the plate choke, neutralization pin connector on the wall of the PA, and the three (3) tube caps.
- d. Remove the coupling screw from the switch shaft. Rotate channel knob so that slot on coupling is vertical. Push shaft to maximum forward position.
- e. Unplug the PPC plug, the relative power plug on the wall of the PA, and the quick disconnect RF output connector.
- f. Remove the four (4) screws holding the network on the center portion of the set.
- g. Remove the four (4) screws holding the network to the side panel and lift the network out through the TOP of the set.

5.6.6 Step 6. - RF Amplifier.

- a. Unplug the Channel Oscillator Injection plug and the IF input plug from the signal distribution board.
- b. Unplug the 15 pin PC harness plug.
- c. Unplug the RF input plug KW PPC input (if present), and the 4 pin plug.
- d. Remove the front panel coupling screw and slide the coupling forward on the switch shaft.
- e. Remove six (6) screws holding the amplifier to the center partition of the set.
- f. Remove eight (8) screws holding the amplifier to the side panel and the bottom ground strap to the rear panel (two (2) screws) if present and lift the amplifier out through the BOTTOM of the set.

5.6.7 Step 7. - Front Panel.

- a. Remove the center partition retaining screw.
- b. Turn the set to normal position.
- c. Remove the six (6) screws from the side panels and carefully rotate the front panel face down.

5.7 E. F. JOHNSON CONNECTOR REPAIR

E. F. Johnson connectors are the rectangular black plastic connectors used on the rear of the equipment. A special technique is used to disassemble these connectors.

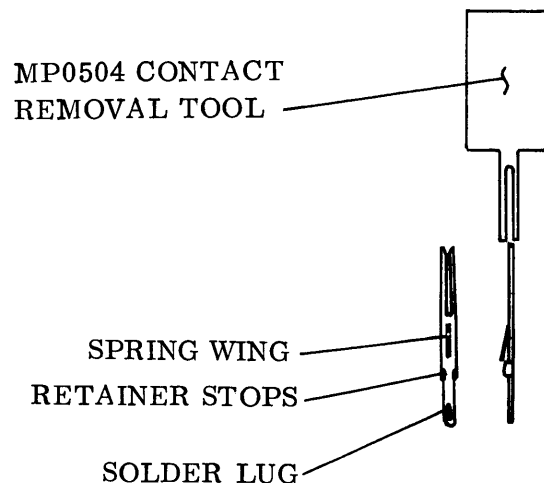
TOOLS: SRS part number MP0504 Contact Removal Tool is used to remove pins from their shell.

CONNECTOR ARRANGEMENT: Male and female connectors can be used as either jacks or plugs, depending on whether they are fastened to a chassis or to a cable clamp/shell on a cable. A female connector, such as SRS part number J00253, has a full body (contacts completely enclosed on the sides) and uses bifurcated (split) contacts as shown below. A male connector, such as SRS part number P00253, has a body which is recessed to expose pins which are solid blades (not bifurcated). A spring wing on the side of the contact snaps in place when the pin is installed in the connector shell.

REMOVAL OF PINS: Male and female pins are easily removed with the MP0504 tool. Insert the bifurcated end of the tool over the mating end of the connector pin as illustrated below. Press the tool into the cross recess in the connector shell lightly until you feel the spring wing compress. **DO NOT FORCE PIN OUT WITH TOOL.** With wing compressed, the pin is withdrawn by pulling gently on its wire lead or pulling on the pin with a pair of needle-nose pliers.

CONNECTING WIRES TO PINS: Strip wire 1/8-inch, form loop in wire, and crimp loop over contact lug with wire in line with pin. Solder sparingly.

INSERTION OF PINS: Push pin firmly in place in shell until spring wing snaps in place. If a pin is reused, it may be necessary to bend the spring wing out slightly before installation.



SECTION VI

PARTS LIST

ASSEMBLY: Transceiver

PREFIX DESIGNATOR: 1

REF DESIG	DESCRIPTION	PART NO.
	Alignment Tool	MP0502
	Contact Removal Tool	MP0504
<u>OR</u>	Microphone, Carbon	MK1001
	Microphone, Dynamic	MK1004
	Front Panel Hole Plug	MP0362
	RF Amplifier Front Panel Coupling	200113
A1	Main Frame Assembly 206/210	200100
	<u>OR</u> 206M/210M	210100
A2	Matching Network Module 206/210	200200
	<u>OR</u> 206M/210M	210200
A3	RF Amplifier Module 206/210	200300
	<u>OR</u> 206M/210M	210300
A4	IF/Audio Module	200800
A5	Power Supply Module AC 115/230	200400
	<u>OR</u> AC sine/square	210400
	<u>OR</u> DC 12/24	200450
A6	Frequency Generator Module	
	6 Channel 206	200506
	10 Channel 210	200510
	6 Channel 206M	210506
	10 Channel 210M	210510
A7	Option Module (Squelch, VOX, CW)	200600
A8	Duplex Frequency Generator Module	200550
A9	FSK Keyer/Converter Module	200710
A10	Special Option Module	-----
A11	Voice Privacy Module	200730

Parts List

ASSEMBLY: Main Frame

PREFIX DESIGNATOR: 1A1

REF DESIG	DESCRIPTION	PART NO.
A1	Programmed Audio Distribution PC Board	210080
A2	Audio Output PC Board	200090
B1	Motor, 24 VAC (Remote Only)	B00003
C1	Cap, Cer, .01 μ f, 10%, 500V	C10100
C2	Cap, Cer, .01 μ f, 10%, 500V	C10100
C3	Cap, Cer, .01 μ f, 10%, 500V	C10100
C4	Cap, Cer, .01 μ f, 10%, 500V	C10100
C5	Cap, Cer, .01 μ f, 10%, 500V	C10100
C6	Cap, Cer, .01 μ f, 10%, 500V	C10100
C7	Cap, Cer, .01 μ f, 10%, 500V	C10100
C8	Cap, Cer, .01 μ f, 10%, 500V	C10100
C9	Cap, Mica, 22 μ f, 5%, 500V	C05220
C10	Cap, Mica, 91 μ f, 5%, 500V	C05910
C11	Cap, Cer, .1 μ f, +80-20%, 25V	C11000
C12	Cap, Cer, .01 μ f, 10%, 500V	C10100
C13	Cap, Cer, .01 μ f, 10%, 500V	C10100
C14	Cap, Cer, .01 μ f, 10%, 500V	C10100
C15-C17	Cap, Cer, .01 μ f, 10%, 500V	C10100
CR1	Diode, Si, 1N4148	CR4148
CR2	Rect, Si, 1N4003	CR4003
CR3	Diode, Si, 1N4148	CR4148
CR4	Diode, Si, 1N4148	CR4148
CR5	Rect, Si, 1N4003	CR4003
CR6	Diode, Si, 1N4148	CR4148
J1	Connector, Microphone	J00201
J2	Receptacle, UHF/N (UG-680/U)	J00300/210023
J3	Receptacle, Phono	J00100
J4	Receptacle, 4 Pin	J00200
J5	Socket, 36 Pin	J00253
	<u>OR</u> Connector, 35 Pin (MS-3102A-28-15S)	J00255
J6	Socket, 36 Pin	P00253
	<u>OR</u> Connector, 17 Pin (MS-3102A-20-29S)	J00254
J7	Socket, 12 Pin	X00200
J9	Connector, Phono	J00101
J10	Connector, Phono	J00101
K1	Relay, 3PDT, 12 VDC	K10008
K2	Relay, 3PDT, 12 VDC (Remote only)	K10002

Main Frame Assembly 1A1 (continued)

REF DESIG	DESCRIPTION	PART NO.
L1	Choke, RF, 1 MH	L11102
L2	Choke, RF, 1 MH	L10102
M1	Meter, 100 μ a	M10001
MP1	Knob, Channel Select	MP0400 <u>OR</u> 210029-3
MP2	Knob, Mode, Function, Speaker, Phone Patch, Remote, Audio	MP0401 <u>OR</u> 210029-2
MP3	Knob, Option	MP0402 <u>OR</u> 210029-1
MP4	Lens, Red	MP0212
MP5	Lens, Green	MP0213
MP6	Terminals, Crimp	H00340
MP7	Connector, PC Board, 22 Pin	X00801
MP8	Connector, PC Board, 15 Pin	X00800
P1	Plug, PC Board, 15 Pin	200004
P2	Connector, PC Board, 15 Pin	X00802
P3	Lug, Quick Disconnect	P00155
P4	Connector, 4 Pin	P00200
P5	Plug, Phono	P00101
P6	Plug, 6 Pin	P00205
P7	Plug, Microphone, mates with J1	P00201
P8	Connector UHF, mates with J2 <u>OR</u> N (UG-941A)	P00300 210012
P9	Plug, 36 pin, mates with J5 <u>OR</u> plug, 35 pin (MS-3108B-28-15P)	P00253 P00255
P10	Plug, 36 pin, mates with J6 <u>OR</u> plug, 17 pin (MS-3108B-20-29P)	J00253 P00254
P11	Plug, 12 Pin, mates with J7 (TTY)	P00205
P13	Plug, 4 pin, mates with J4 (Fan)	P00200
P14	Plug, Phono, mates with J3	P00101
Q1	Transistor, Triac	Q00003
R1	Res, Var, 5K, 1/2W, w/switch	R87502
R2	Res, Var, 5K, 1/2W	R85502
R3	Res, Var, 5K, 1/2W, w/switch	R87502
R4	Res, Var, 5K, 1/2W, w/switch	R87502

Parts List

Main Frame Assembly 1A1 (continued)

REF DESIG	DESCRIPTION	PART NO.
R5	Res, Var, 5K, 1/2W	R85502
R6	Res, Var, 5K, 1/2W	R85502
R7	Res, Var, 5K, 1/2W, w/switch	R87502
R8	Res, Var, 5K, 1/2W	R85502
R9	Res, Var, 2.5K, 1/2W	210027
R10	Res, Var, 2.5K, 1/2W	210027
R11	Res, Comp, 100K, 1/4W, 5%	R20104
R12	Res, Comp, 100Ω, 1/4W, 5%	R20101
S1	Switch, Wafer (Remote/Local)	S10006
S2	Switch, Wafer (Function)	S10003
S3	Switch, Wafer (Phone Patch)	S10004
S4	Switch, Slide, (Tune/Operate)	S00202
S5	Switch, Slide (SPKR ON/OFF)	S00202
S6	Switch, Wafer Section (Motor Control 206M/210M)	S10205
S10	Switch, Toggle, Min, SPDT	S00312
S11	Switch, Rotary, MODE	S10002
S7	Switch, Wafer Section (ANT command)	S10201
XA4	Connectors, PC Board, 22 Pin (two each)	X00801
XA6	Connectors, PC Board, 22 Pin (two each)	X00801
XA7	Connectors, PC Board, 22 Pin	X00801
XA8	Connectors, PC Board, 22 Pin (two each)	X00801
XA9	Connectors, PC Board, 15 Pin (two each)	X00800
XA11	Connectors, PC Board, 15 Pin (two each)	X00800

ASSEMBLY: Audio Distribution PC Board

PREFIX DESIGNATOR: 1A1

REF DESIG	DESCRIPTION	PART NO.
A1	Audio Dist. (Programmed) PC Board Assembly	210080
C1	Cap, Cer, .01 μ f, 10%, 500V	C10100
C2	Cap, Cer, .01 μ f, 10%, 500V	C10100
C4	Cap, Tant, 1 μ f, 35V, 10%	C41056
C5	Cap, Cer, .01 μ f, 10%, 500V	C10100
C6	Cap, Cer, .01 μ f, 10%, 500V	C10100
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
CR4	Diode, Si, 1N914	CR9140
CR5	Diode, Si, 1N914	CR9140
CR6	Diode, Si, 1N914	CR9140
CR7	Diode, Si, 1N914	CR9140
CR8	Diode, Si, 1N914	CR9140
CR9	Diode, Si, 1N914	CR9140
CR10	Diode, Si, 1N914	CR9140
CR11	Diode, Si, 1N914	CR9140
CR12	Diode, Si, 1N914	CR9140
CR13	Diode, Si, 1N914	CR9140
CR14	Diode, Si, 1N914	CR9140
CR15	Diode, Si, 1N914	CR9140
CR16	Diode, Si, 1N914	CR9140
CR17	Diode, Si, 1N914	CR9140
CR18	Diode, Si, 1N914	CR9140
CR19	Diode, Si, 1N914	CR9140
CR20	Diode, Si, 1N914	CR9140
CR21	Diode, Si, 1N914	CR9140
CR22	Diode, Si, 1N914	CR9140
CR23	Diode, Si, 1N914	CR9140
CR24	Diode, Si, 1N914	CR9140
CR25	Diode, Si, 1N914	CR9140
CR26	Diode, Si, 1N914	CR9140
CR27	Diode, Si, 1N914	CR9140
CR28	Diode, Si, 1N914	CR9140
CR29	Diode, Si, 1N914	CR9140
CR30	Diode, Si, 1N914	CR9140
CR31	Diode, Si, 1N914	CR9140
CR32	Diode, Si, 1N914	CR9140
CR33	Diode, Si, 1N914	CR9140
CR34	Diode, Si, 1N914	CR9140
CR35	Diode, Si, 1N914	CR9140

Parts List

Audio Dist. (Programmed) PC Board Assy. 1A1 (continued)

REF DESIG	DESCRIPTION	PART NO.
CR36	Diode, Si, 1N914	CR9140
CR37	Diode, Si, 1N914	CR9140
CR38	Diode, Si, 1N914	CR9140
CR39	Diode, Si, 1N914	CR9140
CR40	Diode, Si, 1N914	CR9140
DS1	Lamp, 14 VDC, T-3 1/4	DS1001
DS2	Lamp, 14 VDC, T-3 1/4	DS1001
MP1	Lampholder	X00500
MP2	Lampholder	X00500
MP3	Lamp shield	MP0208
MP4	Lamp shield	MP0208
Q1	Transistor, Si, NPN, 2N4400	Q44000
Q2	Transistor, Si, NPN, 2N4123	Q41230
Q3	Transistor, Si, NPN, 2N4400	Q44000
Q4	Transistor, Si, PNP, 2N4125	Q41250
R1	Res, Var, 1K, 2W	R80102
R2	Res, Var, 1K, 2W	R80102
R3	Res, Comp, 150, 1/4W, 5%	R20151
R4	Res, Comp, 4.7K, 1/4W, 5%	R20472
R5	Res, Comp, 560, 1/2W, 5%	R30561
R6	Res, Comp, 2.2K 1/4W, 5%	R20222
R7	Res, Comp, 10K, 1/4W, 5%	R20103
R8	Res, Comp, 2.2K 1/4W, 5%	R20222
R9	Res, Comp, 10K, 1/4W, 5%	R20103
R10	Res, Comp, 10K, 1/4W, 5%	R20103
R11	Res, Comp, 6.8K, 1/4W, 5%	R20682
R12	Res, Comp, 100, 1/4W, 5%	R20101
R13	Res, Comp, 4.7K, 1/4W, 5%	R20472
R14	Res, Comp, 4.7K, 1/4W, 5%	R20472
R15	Res, Comp, 39K, 1/4W, 5%	R20393
S1	Switch, Wafer	S10005
T1	Transformer, Audio, 600:600	T10300
T2	Transformer, Audio 600:600	T10300

ASSEMBLY: Audio Output PC Board

PREFIX DESIGNATOR: 1A1

REF DESIG	DESCRIPTION	PART NO.
A2	Audio Output PC Board Assembly	200090
C1	Cap, Tant, 1 μ f, 35V, 10%	C41056
C2	Cap, Tant, 10 μ f, 20V, 10%	C41064
C3	Cap, Tant, 10 μ f, 20V, 10%	C41064
C4	Cap, Cer, .01 μ f, 10%, 500V	C10100
C5	Cap, Cer, .01 μ f, 10%, 500V	C10100
C6	Cap, Cer, .01 μ f, 10%, 500V	C10100
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
LS1	Speaker, 3 x 5, 16 Ω , 4W	LS1001
Q1	Transistor, Si, NPN, 2N4123	Q41230
Q2	Transistor, Si, NPN, 2N4123	Q41230
Q3	Transistor, Si, NPN, 2N4123	Q41230
Q4	Transistor, Si, NPN, 2N5296	Q52960
Q5	Transistor, Si, NPN, 2N5296	Q52960
R1	Res, Comp, 4.7K, 1/4W, 5%	R20472
R2	Res, Comp, 2.2K, 1/4W, 5%	R20222
R3	Res, Comp, 220, 1/4W, 5%	R20221
R4	Res, Comp, 220, 1/4W, 5%	R20221
R5	Res, Comp, 1K, 1/4W, 5%	R20102
R6	Res, Comp, 1K, 1/4W, 5%	R20102
R7	Res, Comp, 3.3K, 1/4W, 5%	R20332
R8	Res, Comp, 220, 1/4W, 5%	R20221
R9	Res, Comp, 220, 1/4W, 5%	R20221
R10	Res, Comp, 1.5, 1/2W, 5%	R301R5
R11	Res, Comp, 1.5, 1/2W, 5%	R301R5
T1	Transformer, Audio	T10400

Parts List

ASSEMBLY: Matching Network Module
Reference 2-3B, 2-4

PREFIX DESIGNATOR: 1A2

REF DESIG	DESCRIPTION	PART NO.
	Module Assembly	210200
A1	Input Capacitor PC Board Assembly	210203
A2	Pi Network Assembly	200205
A3 thru A12*	Output Module Assembly, as listed below:	
	2.0-2.25 MHz	210206-1**
	2.25-2.5 MHz	210206-2
	2.5-3.0 MHz	210206-3
	3.0-3.5 MHz	210206-4
	3.5-4.0 MHz	210206-5
	4.0-4.5 MHz	210206-6-1
	4.5-5.0 MHz	210206-6-2
	5.0-5.5 MHz	210206-7-1
	5.5-6.0 MHz	210206-7-2
	6.0-7.0 MHz	210206-8
	7.0-8.0 MHz	210206-9
	8.0-9.0 MHz	210206-10-1
	9.0-10.0 MHz	210206-10-2
	10.0-11.0 MHz	210206-11-1
	11.0-12.0 MHz	210206-11-2
	12.0-13.0 MHz	210206-12-1
	13.0-14.0 MHz	210206-12-2
	14.0-15.0 MHz	210206-13-1
	15.0-16.0 MHz	210206-13-2
	16.0-17.0 MHz	210206-14-1
	17.0-18.0 MHz	210206-14-2
	18.0-19.0 MHz	210206-15-1
	19.0-20.0 MHz	210206-15-2
	20.0-21.0 MHz	210206-16-1
	21.0-22.0 MHz	210206-16-2

* Components that follow marked with an asterisk, comprise an output module assembly.

** Add (T) for inclusion of harmonic trap.

C1	Cap, Cer, .01 μ f, 1.6 KV	C00001
C2	Cap, Cer, .01 μ f, 1.6 KV	C00001
C3	Cap, Cer, 3.3 pf, 5%, 1 KV, NPO	C00015
C4	Cap, Mica, 470 pf, 5%, 500V	C06471
C6	Cap, Cer, 5%, 1 KV as listed below	
	2.0-2.5 MHz, 560 pf	C00014
	2.5-3.0 MHz, 470 pf	C00013

Matching Network Module 1A2 (continued)

REF DESIG	DESCRIPTION	PART NO.
	3.0-3.5 MHz, 390 pf	C00012
	3.5-4.0 MHz, 330 pf	C00011
	4.0-5.0 MHz, 220 pf	C00016
	5.0-6.0 MHz, 180 pf	C00009
	6.0-7.0 MHz, 150 pf	C00008
	7.0-8.0 MHz, 120 pf	C00017
	8.0-10.0 MHz, 100 pf	C00007
	10.0-12.0 MHz, 68 pf	C00006
	12.0-14.0 MHz, 56 pf	C00018
	14.0-16.0 MHz, 39 pf	C00005
	16.0-18.0 MHz, 33 pf	C00019
	18.0-20.0 MHz, 27 pf	C00020
	20.0-22.0 MHz, 22 pf	C00004

C7 Cap, Cer, 5%, 1 KV, as listed below:

2.0-2.5 MHz, 180 pf	C00009
2.5-30.0 MHz, None Required	-----

The values of C8 and C9 in brackets are the values required without harmonic traps. Reference Table 2-3.

C8* Cap, Mica, 5%, 500V, as listed below:

2.0-2.5 MHz 1500 pf (2000 pf)	C06152 (C06202)
2.5-3.0 MHz 1500 pf (1500 pf)	C06152 (C06152)
3.0-3.5 MHz 1200 pf (1500 pf)	C06122 (C06152)
3.5-4.0 MHz 820 pf (1500 pf)	C06821 (C06152)
4.0-5.0 MHz 680 pf (910 pf)	C06681 (C06911)
5.0-5.5 MHz 560 pf (910 pf)	C06561 (C06911)
5.5-6.0 MHz 680 pf (910 pf)	C06681 (C06911)
6.0-7.0 MHz 560 pf (680 pf)	C06561 (C06681)
7.0-8.0 MHz 470 pf (680 pf)	C06471 (C06681)
8.0-12.0 MHz 330 pf (470 pf)	C05331 (C06471)
12.0-13.0 MHz 270 pf (360 pf)	C05271 (C05361)
13.0-14.0 MHz 300 pf (360 pf)	C05301 (C05361)
14.0-15.0 MHz 270 pf (330 pf)	C05271 (C05331)
15.0-16.0 MHz 180 pf (330 pf)	C05181 (C05331)
16.0-17.0 MHz 180 pf (300 pf)	C05181 (C05301)
17.0-18.0 MHz 180 pf (220 pf)	C05181 (C05221)
18.0-19.0 MHz 160 pf (220 pf)	C05161 (C06221)
19.0-20.0 MHz 150 pf (270 pf)	

Parts List

Matching Network Module 1A2 (continued)

REF DESIG	DESCRIPTION	PART NO.
	20.0-21.0 MHz 130 pf (220 pf)	C05131 (C05221)
	21.0-22.0 MHz 130 pf (270 pf)	C05131(C05271)
C9*	Cap, Mica, 5%, 500V as listed below:	
	2.0-2.25 MHz 1500 pf (1500 pf)	C06152 (C06152)
	2.25-2.5 MHz 1200 pf (1500 pf)	C06122 (C06152)
	2.5-3.0 MHz ---- (620 pf)	(C06621)
	3.0-3.5 MHz ---- (330 pf)	(C05331)
	3.5-4.0 MHz 270 pf (----)	C05271
	4.0-4.5 MHz 30 pf (100 pf)	C05300 (C05101)
	4.5-5.0 MHz 82 pf (100 pf)	C05820 (C05101)
	5.0-5.5 MHz 130 pf (----)	C05131
	5.5-6.0 MHz 68 pf (----)	C05680
	6.0-7.0 MHz ---- (120 pf)	(C05121)
	7.0-8.0 MHz 39 pf (22 pf)	C05390 (C05220)
	8.0-9.0 MHz ---- (120 pf)	(C05121)
	9.0-10.0 MHz 82 pf (130 pf)	C05820 (C05131)
	10.0-11.0 MHz 100 pf (----)	C05101
	11.0-12.0 MHz ---- (----)	
	12.0-13.0 MHz ---- (62 pf)	(C05620)
	13.0-14.0 MHz ---- (47 pf)	(C05470)
	14.0-16.0 MHz ---- (----)	
	16.0-17.0 MHz 56 pf (----)	C05560
	17.0-18.0 MHz ---- (68 pf)	(C05681)
	18.0-19.0 MHz ---- (62 pf)	(C05621)
	19.0-20.0 MHz ---- (----)	
	20.0-21.0 MHz 20 pf (39 pf)	C05200 (C05390)
	21.0-22.0 MHz 10 pf (----)	C05100
C10	Cap, Air, Var, 2-11 pf	C60003
C11	Cap, Mica, 15 pf, 5%, 500V	C05150
C12*	Cap, Mica, Var, 500V, as listed below:	
	2.0-3.0 MHz, 1200-2525 pf	C63007
	3.0-3.5 MHz, 800-1970 pf	C63008
	3.5-5.0 MHz, 615-1600 pf	C63001
	5.0-8.0 MHz, 425-1260 pf	C63006

Matching Network Module 1A2 (continued)

REF DESIG	DESCRIPTION	PART NO
	8.0-14.0 MHz, 180-690 pf	C63002
	14.0-22.0 MHz, 100-500 pf	C63003
C13*	Cap, Mica, 5%, 500V, as listed below:	
	2.0-3.0 MHz, 390 pf	C05391
	3.0-3.5 MHz, 150 pf	C05151
	3.5-5.0 MHz, None Required	-----
	5.0-6.0 MHz, 68 pf	C05680
	6.0-8.0 MHz, None Required	-----
	8.0-10.0 MHz, 120 pf	C05121
	10.0-12.0 MHz, 68 pf	C05680
	12.0-14.0 MHz, 47 pf	C05470
	14.0-16.0 MHz, 68 pf	C05680
	16.0-18.0 MHz, 47 pf	C05470
	18.0-20.0 MHz, 33 pf	C05330
	20.0-21.0 MHz, 22 pf	C05220
	21.0-22.0 MHz, 11 pf	C05110
C14*	Cap, Mica, 5%, 500V, as listed below:	
	2.0-2.25 MHz, 510 pf	C06511
	2.25-2.5 MHz, 750 pf	C06751
	2.5-3.5 MHz, 470 pf	C06471
	3.5-4.0 MHz, 360 pf	C05361
	4.0-4.5 MHz, 270 pf	C05271
	4.5-5.0 MHz, 220 pf	C05221
	5.0-5.5 MHz, 180 pf	C05181

Parts List

Matching Network Module 1A2, (continued)

REF DESIG	DESIGNATION	PART NO.
	5.5-6.0 MHz, 150 pf	C05151
	6.0-7.0 MHz, 160 pf	C05161
	7.0-8.0 MHz, 120 pf	C05121
	8.0-9.0 MHz, 180 pf	C05181
	9.0-10.0 MHz, 150 pf	C05151
	10.0-11.0 MHz, 120 pf	C05121
	11.0-12.0 MHz, 91 pf	C05910
	12.0-13.0 MHz, 82 pf	C05820
	13.0-14.0 MHz, 75 pf	C05750
	14.0-15.0 MHz, 120 pf	C05121
	15.0-16.0 MHz, 100 pf	C05101
	16.0-17.0 MHz, 91 pf	C05910
	17.0-18.0 MHz, 75 pf	C05750
	18.0-19.0 MHz, 68 pf	C05680
	19.0-20.0 MHz, 62 pf	C05620
	20.0-21.0 MHz, 56 pf	C05560
	21.0-22.0 MHz, 51 pf	C05510
J1	Lug, Quick Disconnect	J00155
J2	Lug, Quick Disconnect	J00155
L1	Choke, Parasitic, Plate Coupling	L20002
L2	Choke, Parasitic, Plate Coupling	L20002
L3	Choke, Parasitic, Plate Coupling	L20002
L4	Choke, Plate Feed	L20001
L5	Coil, RF, Fixed	L20005
L6	Coil, RF, Tapped	L20004
L7*	Coil, RF, Var, as listed below:	
	2.0-2.25 MHz, 2.3-4.4 μ h	L32008
	2.25-3.0 MHz, 1.4-2.3 μ h	L32007
	3.0-6.0 MHz, .95-1.7 μ h	L32006
	6.0-8.0 MHz, .65-1.1 μ h	L32005
	8.0-14.0 MHz, .4-.7 μ h	L32004
	14.0-22.0 MHz, .24-.38 μ h	L32003
P1	Plug, Phono	P00101
P2	Plug, Phono	P00101

Matching Network Module 1A2,

(continued)

REF DESIG	DESCRIPTION	PART NO.
R1	Res, Comp, 2.2 meg, 1/2W, 5%	R30226
R2	Res, Comp, 2.2 meg, 1/2W, 5%	R30226
R3	Res, Comp, 33, 1/2W, 5%	R30330
R4	Res, Comp, 33, 1/2W, 5%	R30330
R5	Res, Comp, 33, 1/2W, 5%	R30330
R6	Res, Comp, 33, 1/2W, 5%	R30330
R7	Res, Comp, 33, 1/2W, 5%	R30330
R8	Res, Comp, 33, 1/2W, 5%	R30330
R9	Res, Comp, 33, 1/2W, 5%	R30330
R10	Res, Comp, 33, 1/2W, 5%	R30330
R11	Res, Comp, 33, 1/2W, 5%	R30330
R12	Res, Comp, 33, 1/2W, 5%	R30330
S1-A	Switch, Wafer Section	S10200
S1-B	Switch, Wafer Section	S10200
S1-C	Switch, Wafer Section	S10200
S1-D	Switch, Wafer Section	S10200
S1-E	Switch, Wafer Section	S10205

NOTE

R1-R12 and S1-E are deleted when
harmonic trap is not used.

Parts List

ASSEMBLY: RF Amplifier Module

PREFIX DESIGNATOR: 1A3

REF DESIG	DESCRIPTION	PART NO.
-	RF Amplifier Module Assembly	
	6 channel	200300-6
	10 channel	200300-10
	10 channel Duplex	200300-10D
A1	RF Amplifier & Mixer PC Board Assembly	200370
A2	Power Control PC Board Assembly	210360
A3 thru A12	Channel Tuning PC Board Assembly, as listed below:	
	Simplex, 206/210, Reference Table 2-5A	
	1.6-2.5 MHz	200390-1
	2.5-3.5 MHz	200390-2
	3.5-5.5 MHz	200390-3
	5.5-8.0 MHz	200390-4
	8.0-12.0 MHz	200390-5
	12.0-18.0 MHz	200390-6
	18.0-24.0 MHz	200390-7
	24.0-30.0 MHz	200390-8
	Duplex, 206M/210M, Reference Table 2-5B	
	2.0-2.25 MHz	200393-1
	2.25-2.5 MHz	200393-2
	2.5-3.0 MHz	200393-3
	3.0-3.5 MHz	200393-4
	3.5-4.0 MHz	200393-5
	4.0-5.0 MHz	200393-6
	5.0-6.0 MHz	200393-7
	6.0-7.0 MHz	200393-8
	7.0-8.0 MHz	200393-9
	8.0-10.0 MHz	200393-10
	10.0-12.0 MHz	200393-11
	12.0-14.0 MHz	200393-12
	14.0-16.0 MHz	200393-13
	16.0-18.0 MHz	200393-14
	18.0-20.0 MHz	200393-15
	20.0-22.0 MHz	200393-16
A13	Duplex Switching PC Board Assembly	200387
A14	Automatic Carrier PC Board Assembly	200381
C1	Cap, Tant, 1 μ f, 35V, 10%	C41056
C2	Cap, Cer, .001 μ f, 10%, 500V	C10010

RF Amplifier Module 1A3 (continued)

REF DESIG	DESCRIPTION	PART NO.
C3	Cap, Cer, .001 μ f, 10%, 500V	C10010
C4	Cap, Cer, .001 μ f, 10%, 500V	C10010
C5	Cap, Tant, 1 μ f, 35V, 10%	C41056
C6	Cap, Tant, 1 μ f, 35V, 10%	C41056
C7	Cap, Cer, .001 μ f, 10%, 500V	C10010
C8	Cap, Tant, 1 μ f, 35V, 10%	C41056
C9	Cap, Cer, .001 μ f, 10%, 500V	C10010
C10	Cap, Cer, .001 μ f, 10%, 500V	C10010
C11	Cap, Tant, 1 μ f, 35V, 10%	C41056
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Elect, 200 μ f, 350V	C70004
C14	Cap, Cer, .01 μ f, 10%, 500V	C10100
C15	Cap, Cer, .01 μ f, 10%, 500V	C10100
C16	Cap, Cer, .01 μ f, 10%, 500V	C10100
C17	Cap, Cer, .01 μ f, 10%, 500V	C10100
C18	Cap, Cer, .01 μ f, 10%, 500V	C10100
C19	Cap, Cer, .01 μ f, 10%, 500V	C10100
C20	Cap, Cer, .01 μ f, 10%, 500V	C10100
•		
J1	Connector, Phono, PC Board	J00200
J2	Connector, Phono, Bulkhead	J00100
J3	Terminal, Feedthru	E10004
J5	Connector, Phono, Bulkhead	J00100
L1	Choke, Parasitic, Grid Coupling	L20003
L2	Choke, Parasitic, Grid Coupling	L20003
L3	Choke, Parasitic, Grid Coupling	L20003
L7	Choke, RF, 47 μ h	L10470
P1	Plug, Octal, 8 Pin	P00701
P2	Lug, Quick Disconnect	P00155
R1	Res, Comp, 18K, 1/4W, 5%	R20183
R2	Res, Comp, 470, 1/4W, 5%	R20471
R3	Res, Comp, 6.8K, 1/4W, 5%	R20682
R4	Res, Comp, 27, 1/2W, 5%	R30270
R5	Res, Comp, 470, 1/4W, 5%	R20471
R6	Res, Comp, 6.8K, 1/4W, 5%	R20682
R7	Res, Comp, 27, 1/2W, 5%	R30270
R8	Res, Comp, 470, 1/4W, 5%	R20471

Parts List

RF Amplifier Module 1A3 (continued)

REF DESIG	DESCRIPTION	PART NO.
R9	Res, Comp, 6.8K, 1/4W, 5%	R20682
R10	Res, Comp, 27, 1/2W, 5%	R30270
R11	Res, Comp, 180, 1/2W, 5%	R30181
R12	Res, Comp, 100K, 1W, 5%	R40104
R13	Res, Comp, 33K, 1/4W, 5%	R20333
R14	Res, WW, 12, 12W, 5%	R90002
S1	Switch, Slide DPDT	S00202
S2	Switch, Detent Assembly	S10S07
S2-B	Switch, Wafer Section	S10005
S2-C	Switch, Wafer Section	S10005
S2-D	Switch, Wafer Section	S10005
S2-E	Switch, Wafer Section	S10005
S2-F	Switch, Wafer Section	S10005
S2-G	Switch, Wafer Section	S10005
S2-H	Switch, Wafer Section	S10005
V1	Tube, Power 6146B	V6146B
V2	Tube, Power 6146B	V6146B
V3	Tube, Power 6146B	V6146B
VR1	Diode, Zener, 1N1363A	VR1363
XA3	Connector, PC Board, 15 Pin	X00803
XA4	Connector, PC Board, 15 Pin	X00803
XA5	Connector, PC Board, 15 Pin	X00803
XA6	Connector, PC Board, 15 Pin	X00803
XA7	Connector, PC Board, 15 Pin	X00803
XA8	Connector, PC Board, 15 Pin	X00803
XA9	Connector, PC Board, 15 Pin	X00803
XA10	Connector, PC Board, 15 Pin	X00803
XA11	Connector, PC Board, 15 Pin	X00803
XA12	Connector, PC Board, 15 Pin	X00803
XA13	Connector, PC Board, 15 Pin	X00803
XV1	Tube Socket, Octal	X00701
XV2	Tube Socket, Octal	X00701
XV3	Tube Socket, Octal	X00701

ASSEMBLY: RF Amplifier & Mixer PC Board

PRE FIX DESIGNATOR: 1A3A1

REF DESIG	DESCRIPTION	PART NO.
C1	Cap, Cer, .01 μ f, 10%, 500V	C10100
C2	Cap, Cer, .001 μ f, 10%, 500V	C10010
C3	Cap, Mica, 7 pf, 5%, 500V	C04070
C4	Cap, Cer, .001 μ f, 10%, 500V	C10010
C5	Cap, Cer, .01 μ f, 10%, 500V	C10100
C6	Cap, Cer, .01 μ f, 10%, 500V	C10100
C7	Cap, Cer, .01 μ f, 10%, 500V	C10100
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 510 pf, (for 1.4 MHz IF 560 pf)	C06511 (C06561)
C10	Cap, Mica, 12 pf, (for 1.4 MHz IF 15 pf)	C05120 (C05150)
C11	Cap, Mica, 510 pf, (for 1.4 MHz IF 560 pf)	C06511 (C06561)
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
* C13	Cap, Tant, 0.1 μ f, 35V, 10%	C41048
C15	Cap, Mica, 510 pf, (for 1.4 MHz IF 560 pf)	C06511 (C06561)
C16	Cap, Cer, .001 μ f, 10%, 500V	C10010
C17	Cap, Cer, .01 μ f, 10%, 500V	C10100
C18	Cap, Cer, .01 μ f, 10%, 500V	C10100
C19	Cap, Cer, .01 μ f, 10%, 500V	C10100
C20	Cap, Cer, .01 μ f, 10%, 500V	C10100
C21	Cap, Cer, .001 μ f, 10%, 500V	C10010
C22	Cap, Cer, .01 μ f, 10%, 500V	C10100
C23	Cap, Cer, .01 μ f, 10%, 500V	C10100
C24	Cap, Cer, .01 μ f, 10%, 500V	C10100
C25	Cap, Cer, .001 μ f, 10%, 500V	C10010
C27	Cap, Tant, 1 μ f, 35V, 10%	C41056
C28	Cap, Cer, .001 μ f, 10%, 500V	C10010
C29	Cap, Cer, .001 μ f, 10%, 500V	C10010
C30	Cap, Mica, 270 pf, 5%, 500V	C05271
C31	Cap, Cer, 1 μ f, 35V, 10%	C41056
C32	Cap, Cer, .001 μ f, 10%, 500V	C10010
C33	Cap, Cer, .0047 μ f, 10%, 500V	C10047
C34	Cap, Mica, 680 pf, 5%, 500V	C06681
C35	Cap, Cer, .01 μ f, 10%, 500V	C10100
C36	Cap, Cer, .001 μ f, 10%, 500V	C10010
C37	Cap, Cer, .01 μ f, 10%, 500V	C10100
C38	Cap, Cer, .01 μ f, 10%, 500V	C10100
C39	Cap, Cer, .01 μ f, 10%, 500V	C10100
C40	Cap, Cer, 470 pf \pm 10%, Feedthru	C00003
C41	Cap, Cer, .0047 μ f, 10%, 500V	C10047
C42	Cap, Cer, .01 μ f, 10%, 500V	C10100
C44	Cap, Tant, 1 μ f, 35V, 10%	C41056
C45	Cap, Cer, .01 μ f, 10%, 500V	C10100
* C14	Cap, Mica, 1000pf, 5%, 500V	C06102

Parts List

RF Amplifier & Mixer PC Board 1A3A1 (continued)

REF DESIG	DESCRIPTION	PART NO.
C46	Cap, Cer, .001 μ f, 10%, 500V	C10010
C47	Cap, Mica, 820 pf 5%, 500V	C06821
C48	Cap, Mica, 680 pf, 5%, 500V	C06681
C49	Cap, Cer, .001 μ f, 10%, 500V	C10010
C50	Cap, Mica, 390 pf, 5%, 500V	C05391
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Rectifier, 1N4001	CR4001
CR3	Diode, Si, 1N914	CR9140
CR4	Diode, Si, 1N914	CR9140
K1	Relay, 6 PDT, 12 VDC	K10001
L1	Choke, RF, 0.47 μ h	L10R47
L2	Choke, RF, 1 mh	L10102
L3	Choke, RF, 1 mh	L10102
L4	Choke, RF, 1 mh	L10102
L5	Choke, RF, 100 μ h	L10101
L6	Choke, RF, 1 mh	L10102
L7	Choke, RF, 100 μ h	L10101
Q1	Transistor, FET, 40823	Q40823
Q2	Transistor, NPN, 2N5180	Q51800
Q3	Transistor, FET, 40823	Q40823
R1	Resistor, Comp, 560, 1/4W, 5%	R20561
R2	Resistor, Comp, 470K, 1/4W, 5%	R20474
R3	Resistor, Comp, 56K, 1/4W, 5%	R20563
R4	Resistor, Comp, 100K, 1/4W, 5%	R20104
R5	Resistor, Comp, 470K, 1/4W, 5%	R20474
R6	Resistor, Comp, 4700, 1/4W, 5%	R20472
R7	Resistor, Comp, 33K, 1/4W, 5%	R20333
R8	Resistor, Comp, 220, 1/4W, 5%	R20221
R9	Resistor, Comp, 22, 1/4W, 5%	R20220
R10	Resistor, Comp, 220, 1/4W, 5%	R20221
R11	Resistor, Comp, 6800, 1/4W, 5%	R20682
R12	Resistor, Comp, 3300, 1/4W, 5%	R20332
R13	Resistor, Comp, 82, 1/4W, 5%	R20820
R14	Resistor, Comp, 220, 1/4W, 5%	R20221
R15	Resistor, Comp, 33K, 1/4W, 5%	R20333
R16	Resistor, Comp, 180K, 1/4W, 5%	R20184

RF Amplifier & Mixer PC Board 1A3A1 (Continued)

REF DESIG	DESCRIPTION	PART NO.
R17	Resistor, Comp, 68K, 1/4W, 5%	R20683
R18	Resistor, Comp, 39K, 1/4W, 5%	R20393
R19	Resistor, Comp, 270, 1/4W, 5%	R20271
R20	Resistor, Comp, 22K, 1/4W, 5%	R20223
R21	Resistor, Var, 100, 1/4W, 20%	R88101
R22	Resistor, Comp, 1500, 1/4W, 5%	R20152
R23	Resistor, Comp, 27, 1/4W, 5%	R20270
R24	Resistor, Comp, 27, 1/4W, 5%	R20270
R25	Resistor, Comp, 470, 1/4W, 5%	R20471
R26	Resistor, Comp, 1000, 1/4W, 5%	R20102
R27	Resistor, Comp, 1000, 1/4W, 5%	R20102
R28	Resistor, Comp, 100, 1/4W, 5%	R20101
R29	Resistor, Comp, 15K, 1/4W, 5%	R20153
R30	Resistor, Comp, 15K, 1/4W, 5%	R20153
R31	Resistor, Comp, 470, 1/4W, 5%	R20471
R32	Resistor, Comp, 470, 1/4W, 5%	R20471
R33	Resistor, Comp, 3.9K, 1/4W, 5%	R20392
R34	Resistor, Comp, 2200, 1/4W, 5%	R20222
R35	Resistor, Comp, 1200, 1/4W, 5%	R20122
R36	Resistor, Comp, 3900, 1/4W, 5%	R20392
R37	Resistor, Comp, 470, 1/4W, 5%	R20471
R38	Resistor, Comp, 180K, 1/4W, 5%	R20184
R39	Resistor, Comp, 39K, 1/4W, 5%	R20393
R41	Resistor, Comp, 47K, 1/4W, 5%	R20473
R42	Resistor, Comp, 47K, 1/4W, 5%	R20473
R43	Resistor, Comp, 100, 1/4W, 5%	R20101
R44	Resistor, Comp, 7.5K, 1W, 5%	R40752
R45	Resistor, Comp, 820, 2W, 5%	R50821
R47	Resistor, Comp, 27, 1/4W, 5%	R20270
R48	Resistor, Comp, 100, 1/4W, 5%	R20101
R49	Resistor, Comp, 100, 1/4W, 5%	R20101
T1	Transformer, IF	T10004
T2	Transformer, IF	T10004
T3	Transformer, IF	T10004
T4	Transformer, Wideband	T10200
T5	Transformer, Wideband	T10200
U1	Integrated Circuit, MC1596G	U1596G
U2	Integrated Circuit, CA3028A	U3028A

Parts List

RF Amplifier & Mixer PC Board 1A3A1 (continued)

REF DESIG	DESCRIPTION	PART NO.
V1	Tube, Electron, 12DZ6	V12DZ6
V2	Tube, Electron, 12BY7A	V12BY7
XK 1	Socket, Relay	X00300
XV1	Socket, Tube, 7 Pin	X00200
XV2	Socket, Tube, 9 Pin	X00201

ASSEMBLY: Power Control PC Board

PREFIX DESIGNATOR: 1A3A2

REF DESIG	DESCRIPTION	PART NO.
C1	Cap, Cer, .01 μ f, 10%, 500V	C10100
C2	Cap, Tant, 47 μ f, 6V, 10%	C44761
C3	Cap, Cer, .001 μ f, 10%, 500V	C10010
C4	Cap, Cer, .01 μ f, 10%, 500V	C10100
C5	Cap, Tant, 5.6 μ f, 35V, 10%	C45656
C6	Cap, Tant, 22 μ f, 15V, 10%	C42263
C7	Cap, Cer, .1 μ f, +80 -20%, 25V	C11000
C8	Cap, Cer, .01 μ f, 10%, 500V	C10100
C9	Cap, Cer, .01 μ f, 10%, 500V	C10100
C10	Cap, Mica, 150 pf, 5%, 500V	C05151
C11	Cap, Tant, 10 μ f, 20V, 10%	C41064
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
CR4		
CR5	Diode, Si, 1N914	CR9140
CR6	Diode, Si, 1N914	CR9140
L1	Choke, RF, 100 μ h	L10101
L2	Choke, RF, 1 mh	L10102
L3	Choke, RF, 1 mh	L10102
Q1	Transistor, NPN, 2N4123	Q41230
Q2	Transistor, PNP, 2N4125	Q41250
Q3	Transistor, NPN, 2N4123	Q41230
Q4	Transistor, NPN, 2N4123	Q41230
Q5	Transistor, NPN, 2N4123	Q41230
Q6	Transistor, PNP, 2N4125	Q41250
R1	Res, Comp, 6.8K, 2W, 5%	R50682
R2	Res, Comp, 15K, 1/2W, 5%	R30153
R3	Res, Var, 10K, 1/4W, 20%	R88103
R4	Res, Comp, 12K, 1/2W, 5%	R30123
R5	Res, Comp, 47K, 1/4W, 5%	R20473
R6	Res, Comp, 47K, 1/4W, 5%	R20473
R7	Res, Var, 5K, 1/4W, 20%	R88502
R8	Res, Comp, 10K, 1/4W, 5%	R20103
R9	Res, Comp, 1K, 1/4W, 5%	R20102
R10	Res, Comp, 10K, 1/4W, 5%	R20103
R11	Res, Comp, 2.2K, 1/4W, 5%	R20222

Parts List

Power Control PC Board 1A3A2 (continued)

REF DESIG	DESCRIPTION	PART NO.
R12	Res, Comp, 1K, 1/4W, 5%	R20102
R13	Res, Var, 10K, 1/4W, 20%	R88103
R14	Res, Comp, 10 , 1/4W, 5%	R20100
R15	Res, Comp, 100 , 1/4W, 5%	R20101
R16	Res, Comp, 750K, 1/4W, 5%	R20754
R17	Res, Comp, 750K, 1/4W, 5%	R20754
R18	Res, Comp, 10K, 1/4W, 5%	R20103
R19	Res, Comp, 4.7K, 1/4W, 5%	R20472
R20	Res, Comp, 560, 1/2W, 5%	R30561
R21	Res, Comp, 470, 1/4W, 5%	R20471
R22	Res, Comp, 4.7K, 1/4W, 5%	R20472
R23	Res, Comp, 39K, 1/4W, 5%	R20393
R24	Res, Var, 50K, 1/4W, 20%	R88503
R25	Res, Comp, 6.8K, 1/4W, 5%	R20682
R26	Res, Comp, 22K, 1/4W, 5%	R20223
R27	Res, Var, 10K, 1/4W, 20%	R88103
R28	Res, Comp, 560, 1/4W, 5%	R20561
R29	Res, Comp, 10K, 1/4W, 5%	R20103
R30	Res, Comp, 4.7K, 1/4W, 5%	R20472
R31	Res, Var, 10K, 1/4W, 20%	R88103
VR1	Diode, Zener, 1N4754	VR4754

ASSEMBLY: Automatic Carrier Control
PC Board Assembly

PRE FIX DESIGNATOR: 1A3A14

REF DESIG	DESCRIPTION	PART NO.
C1	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C2	Cap, Cer, .001 μ f, 10%, 500V	C10010
C3	Cap, Tant, 33 μ f, 10V, 10%	210002
C4	Cap, Tant, 220 μ f, 10V, 10%	210004
C5	Cap, Tant, 68 μ f, 15, 10%	210006
C6	Cap, Cer, .001 μ f, 10%, 500V	C10010
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
CR4	Diode, Si, 1N914	CR9140
CR5	Diode, Si, 1N914	CR9140
CR6	Diode, Si, 1N914	CR9140
CR7	Diode, Si, 1N914	CR9140
Q1	Transistor, Si, NPN 2N4123	Q41230
Q2	Transistor, Si, NPN 2N4123	Q41230
Q3	Transistor, Si, NPN, 2N4123	Q41230
Q4	Transistor, Si, NPN, 2N4123	Q41230
R1	Resistor, Comp, 5.6K, 1/4W, 5%	R20562
R2	Resistor, Comp, 10K, 1/4W, 5%	R20103
R3	Resistor, Comp, 10K, 1/4W, 5%	R20103
R4	Resistor, Comp, 10K, 1/4W, 5%	R20103
R5	Resistor, Comp, Var, 10K, 1/4W, 20%	R88103
R6	Resistor, Comp, 4.7K, 1/4W, 5%	R20472
R7	Resistor, Comp, 1.5K, 1/4W, 5%	R20152
R8	Resistor, Comp, 8.2K, 1/4W, 5%	R20822
R9	Resistor, Comp, 47K, 1/4W, 5%	R20473
R10	Resistor, Comp, 3.3K	R20332
R11	Resistor, Comp, Var, 10K, 1/4W, 20%	R88103
R12	Resistor, Comp, 220, 1/4W, 5%	R20221
R13	Resistor, Comp, 47K, 1/4W, 5%	R20473
R14	Resistor, Comp, 3.9K, 1/4W, 5%	R20392

ASSEMBLY: Channel Tuning PC Board Assy. PREFIX DESIGNATOR: 1A3A3-1A3A12
Duplex with Image Trap

REF DESIG	DESCRIPTION	PART NO.
<u>2.0 - 2.25 MHz</u>		200393-1
C3	Cap, Mica, 110 pf, 5%, 500V	C05111
C4	Cap, Mica, 680 pf, 5%, 500V	C06681
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 820 pf, 5%, 500V	C06821
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 68 pf, 5%, 500V	C05680
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L2	Inductor, Var, 4.4-10 μ h	L30005
L3	Inductor, Var, 4.4-10 μ h	L30005
L4	Inductor, Var, 33-70 μ h	L31008
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682
<u>2.25 - 2.50 MHz</u>		200393-2
C3	Cap, Mica, 100 pf, 5%, 500V	C05101
C4	Cap, Mica, 680 pf, 5%, 500V	C06681
C5	Cap, Mica, 56 pf, 5%, 500V	C05560
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 820 pf, 5%, 500V	C06821
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 56 pf, 5%, 500V	C05560
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 47 pf, 5%, 500V	C05470
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L2	Inductor, Var, 4.4-10 μ h	L30005
L3	Inductor, Var, 4.4-10 μ h	L30005
L4	Inductor, Var, 33-70 μ h	L31008
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682

Parts List

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>2.5 - 3.0 MHz</u>		200393-3
C1	Cap, Mica, 180 pf, 5%, 500V	C05181
C2	Cap, Mica, 39 pf, 5%, 500V	C05390
C3	Cap, Mica, 91 pf, 5%, 500V	C05910
C4	Cap, Mica, 750 pf, 5%, 500V	C06751
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 510 pf, 5%, 500V	C06511
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 68 pf, 5%, 500V	C05680
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, 2.0-5.3 μ h	L30004
L2	Inductor, Var, 2.0-5.3 μ h	L30004
L8	Inductor, Var, 4.4-10 μ h	L30005
L4	Inductor, Var, 16.5-35 μ h	L31007
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682
<u>3.0 - 3.49 MHz</u>		200393-4
C1	Cap, Mica, 150 pf, 5%, 500V	C05151
C2	Cap, Mica, 39 pf, 5%, 500V	C05390
C3	Cap, Mica, 91 pf, 5%, 500V	C05151
C4	Cap, Mica, 560 pf, 5%, 500V	C06561
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 620 pf, 5%, 500V	C06621
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 39 pf, 5%, 500V	C05390
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, 2-5.3 μ h	L30004
L2	Inductor, Var, 2-5.3 μ h	L30004
L3	Inductor, Var, 2-5.3 μ h	L30004
L4	Inductor, Var, 13-29 μ h	L31007
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>3.5 - 3.999 MHz</u>		200393-5
C1	Cap, Mica, 110 pf, 5%, 500V	C05111
C2	Cap, Mica, 51 pf, 5%, 500V	C05510
C3	Cap, Mica, 82 pf, 5%, 500V	C05820
C4	Cap, Mica, 470 pf, 5%, 500V	C06471
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 470 pf, 5%, 500V	C06471
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 75 pf, 5%, 500V	C05750
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, 2-5.3 μ h	L30004
L2	Inductor, Var, 2-5.3 μ h	L30004
L3	Inductor, Var, 2-5.3 μ h	L30004
L4	Inductor, Var, 7.5-17 μ h	L31006
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682
<u>4.0 - 4.99 MHz</u>		200393-6
C1	Cap, Mica, 82 pf, 5%, 500V	C05820
C2	Cap, Mica, 47 pf, 5%, 500V	C05470
C3	Cap, Mica, 68 pf, 5%, 500V	C05680
C4	Cap, Mica, 330 pf, 5%, 500V	C05331
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 390 pf, 5%, 500V	C05391
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 33 pf, 5%, 500V	C05330
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, 2-5.3 μ h	L30004
L2	Inductor, Var, 2-5.3 μ h	L30004
L3	Inductor, Var, 2-5.3 μ h	L30004
L4	Inductor, Var, 7.5-17 μ h	L31006

Parts List

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>4.0 - 4.99 MHz (continued)</u>		
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682
<u>5.0 - 5.999 MHz</u>		200393-7
C1	Cap, Mica, 39 pf, 5%, 500V	C05390
C2	Cap, Mica, 22 pf, 5%, 500V	C05220
C3	Cap, Mica, 39 pf, 5%, 500V	C05390
C4	Cap, Mica, 150 pf, 5%, 500V	C05151
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 220 pf, 5%, 500V	C05221
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 56 pf, 5%, 500V	C05560
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, 4.4-10 μ h	L30005
L2	Inductor, Var, 2-5.3 μ h	L30004
L3	Inductor, Var, 2-5.3 μ h	L30004
L4	Inductor, Var, 3.5-8.5 μ h	L31005
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R4	Res, Comp, 22K, 1/4W, 5%	R20223
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682
<u>6.0 - 6.99 MHz</u>		200393-8
C1	Cap, Mica, 130 pf, 5%, 500V	C05131
C2	Cap, Mica, 47 pf, 5%, 500V	C05470
C3	Cap, Mica, 33 pf, 5%, 500V	C05330
C4	Cap, Mica, 100 pf, 5%, 500V	C05101
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 180 pf, 5%, 500V	C05181
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
C11	Cap, Mica, 39 pf, 5%, 500V	C05390
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, .9-2.3 μ h	L30003
L2	Inductor, Var, 2-5.3 μ h	L30004
L3	Inductor, Var, 2-5.3 μ h	L30004
L4	Inductor, Var, 3.5-8.5 μ h	L31005
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R4	Res, Comp, 22K, 1/4W, 5%	R20223
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682
<u>7.0 - 7.99 MHz</u>		200393-9
C1	Cap, Mica, 82 pf, 5%, 500V	C05820
C2	Cap, Mica, 39 pf, 5%, 500V	C05390
C3	Cap, Mica, 33 pf, 5%, 500V	C05330
C4	Cap, Mica, 68 pf, 5%, 500V	C05680
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 130 pf, 5%, 500V	C05131
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, .18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 30 pf, 5%, 500V	C05300
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, .9-2.3 μ h	L30003
L2	Inductor, Var, 2-5.3 μ h	L30004
L3	Inductor, Var, 2-5.3 μ h	L30004
L4	Inductor, Var, 3.5-8.5 μ h	L31005
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R4	Res, Comp, 18K, 1/4W, 5%	R20183
R5	Res, Comp, 6.8K, 1/4W, 5%	R20682
<u>8.0 - 9.99 MHz</u>		200393-10
C1	Cap, Mica, 120 pf, 5%, 500V	C05121
C2	Cap, Mica, 47 pf, 5%, 500V	C05470
C3	Cap, Mica, 30 pf, 5%, 500V	C05300
C4	Cap, Mica, 120 pf, 5%, 500V	C05121

Parts List

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>8.0 - 9.99 MHz (continued)</u>		
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 150 pf, 5%, 500V	C05151
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 51 pf, 5%, 500V	C05510
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, .9-2.3 μ h	L30003
L2	Inductor, Var, .9-2.3 μ h	L30003
L3	Inductor, Var, .9-2.3 μ h	L30003
L4	Inductor, Var, 1.7-3.9 μ h	L31004
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R5	Res, Comp, 10K, 1/4W, 5%	R20103
<u>10.0 - 11.99 MHz</u>		200393-11
C1	Cap, Mica, 68 pf, 5%, 500V	C05680
C2	Cap, Mica, 33 pf, 5%, 500V	C05330
C3	Cap, Mica, 22 pf, 5%, 500V	C05220
C4	Cap, Mica, 56 pf, 5%, 500V	C05560
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 120 pf, 5%, 500V	C05121
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 12 pf, 5%, 500V	C05120
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, .9-2.3 μ h	L30003
L2	Inductor, Var, .9-2.3 μ h	L30003
L3	Inductor, Var, .9-2.3 μ h	L30003
L4	Inductor, Var, 1.7-3.9 μ h	L31004
R2	Res, Var, 10K, 1/4W, 20%	R89103

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>10.0 - 11.99 MHz (continued)</u>		
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R5	Res, Comp, 10K, 1/4W, 5%	R20103
<u>12.0 - 13.99 MHz</u>		
C1	Cap, Mica, 56 pf, 5%, 500V	C05560
C2	Cap, Mica, 30 pf, 5%, 500V	C05300
C3	Cap, Mica, 20 pf, 5%, 500V	C05200
C4	Cap, Mica, 30 pf, 5%, 500V	C05300
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 56 pf, 5%, 500V	C05560
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C11	Cap, Mica, 39 pf, 5%, 500V	C05390
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, .9-2.3 μ h	L30003
L2	Inductor, Var, .9-2.3 μ h	L30003
L3	Inductor, Var, .9-2.3 μ h	L30003
L4	Inductor, Var, .9-2.1 μ h	L31003
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R4	Res, Comp, 18K, 1/4W, 5%	R20183
R5	Res, Comp, 15K, 1/4W, 5%	R20153
<u>14.0 - 15.99 MHz</u>		
C1	Cap, Mica, 47 pf, 5%, 500V	C05470
C2	Cap, Mica, 27 pf, 5%, 500V	C05270
C3	Cap, Mica, 18 pf, 5%, 500V	C05180
C4	Cap, Mica, 15 pf, 5%, 500V	C05150
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 27 pf, 5%, 500V	C05270
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021

Parts List

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>14.0 - 15.99 MHz</u> (continued)		
C11	Cap, Mica, 10 pf, 5%, 500V	C05100
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, .9-2.3 μ h	L30003
L2	Inductor, Var, .9-2.3 μ h	L30003
L3	Inductor, Var, .9-2.3 μ h	L30003
L4	Inductor, Var, .9-2.3 μ h	L30003
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R4	Res, Comp, 22K, 1/4W, 5%	R20223
R5	Res, Comp, 15K, 1/4W, 5%	R20153
<u>16.0 - 18.0 MHz</u>		200393-14
C2	Cap, Mica, 56 pf, 5%, 500V	C05560
C3	Cap, Mica, 15 pf, 5%, 500V	C05150
C4	Cap, Mica, 82 pf, 5%, 500V	C05820
C5	Cap, Mica, 18 pf, 5%, 500V	C05180
C6	Cap, Mica, Var, 6-25 pf	210021
C7	Cap, Mica, 22 pf, 5%, 500V	C05220
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 18 pf, 5%, 500V	C05180
C10	Cap, Mica, Var, 6-25 pf	210021
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
L1	Inductor, Var, .9-2.3 μ h	L30003
L2	Inductor, Var, .5-1.2 μ h	L30002
L3	Inductor, Var, .9-2.3 μ h	L30003
L4	Inductor, Var, .48-1.0 μ h	L31002
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R4	Res, Comp, 22K, 1/4W, 5%	R20223
R5	Res, Comp, 15K, 1/4W, 5%	R20153

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>18.0 - 20.0 MHz</u>		200393-15
C1	Not Used	
C2	Cap, Mica, 33 pf, 500V, 5%	C05330
C3	Cap, Mica, 22 pf, 500V, 5%	C05220
C4	Cap, Mica, 56 pf, 500V, 5%	C05560
C5	Cap, Mica, 18 pf, 500V, 5%	C05180
C6	Cap, Cer, Var, 6-25 pf,	210021
C7	Cap, Mica, 43 pf, 500V, 5%	C05430
C8	Cap, Cer, .001 pf, 500V, 10%	C10010
C9	Cap, Mica, 18 pf, 500V, 5%	C05180
C10	Cap, Cer, Var, 6-25 pf	210021
C11	Cap, Mica, 24 pf, 500V, 5%	C05240
C12	Cap, Cer, .001 μ f, 500V, 10%	C10010
L1	Inductor, Var, 0.9-2.3 μ h	L30003
L2	Inductor, Var, 0.5-1.2 μ h	L30002
L3	Inductor, Var, 0.5-1.2 μ h	L30002
L4	Inductor, Var, 0.48-1.0 μ h	L31002
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R4	Not Used	
R5	Not Used	
<u>20.0 - 22.5 MHz</u>		200393-16
C1	Not Used	
C2	Cap, Mica, 33 pf, 500V, 5%	C05330
C3	Cap, Mica, 22 pf, 500V, 5%	C05220
C4	Cap, Mica, 47 pf, 500V, 5%	C05470
C5	Cap, Mica, 18 pf, 500V, 5%	C05180
C6	Cap, Cer, Var, 6-25 pf	210021
C7	Cap, Mica, 33 pf, 500V, 5%	C05330
C8	Cap, Cer, .001 μ f, 500V, 10%	C10010
C9	Cap, Mica, 18 pf, 500V, 5%	C05180
C10	Cap, Cer, Var, 6-25 pf	210021
C11	Cap, Mica, 12 pf, 500V, 5%	C05120
C12	Cap, Cer, .001 μ f, 500V, 10%	C10010
L1	Inductor, Var, 0.9-2.3 μ h	L30003
L2	Inductor, Var, 0.5-1.2 μ h	L30002
L3	Inductor, Var, 0.5-1.2 μ h	L30002
L4	Inductor, Var, 0.48-1.0 μ h	L31002

Parts List

Channel Tuning PC Board (D U P L E X) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>20.0 - 22.5 MHz</u> (continued)		
R2	Res, Var, 10K, 1/4W, 20%	R89103
R3	Res, Comp, 2.7K, 1/4W, 5%	R20272
R4	Not Used	
R5	Not Used	

ASSEMBLY: Channel Tuning PC Board Assembly
SIMPLEX without Image Trap

PREFIX DESIGNATOR: 1A3A3-
1A3A12

Image Trap components and changes page 6-39.

REF DESIG	DESCRIPTION	PART NO.
<u>1.6 - 2.5 MHz</u>		200390-1
C3	Cap, Mica, 120 pf, 5%, 500V	C05121
C4	Cap, Mica, 680 pf, 5%, 500V	C06681
C5	Cap, Mica, 270 pf, 5%, 500V	C05271
C7	Cap, Mica, 820 pf, 5%, 500V	C06821
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 270 pf, 5%, 500V	C05271
C11	Cap, Mica, 47 pf, 5%, 500V	C05470
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Mica, 68 pf, 5%, 500V	C05680
L2	Inductor, Var, 4.4-10 μ h	L30005
L3	Inductor, Var, 4.4-10 μ h	L30005
L4	Inductor, Var, 33-70 μ h	L31008
R2	Resistor, Var, 10K, 1/4W, 20%	R89103
R3	Resistor, Comp, 2.7K, 1/4W, 5%	R20272
R4	Resistor, Comp, 15K, 1/4W, 5%	R20153
R5	Resistor, Comp, 6.8K, 1/4W, 5%	R20682
<u>2.5 - 3.5 MHz</u>		200390-2
C3	Cap, Mica, 100 pf, 5%, 500V	C05101
C4	Cap, Mica, 620 pf, 5%, 500V	C06621
C5	Cap, Mica, 110 pf, 5%, 500V	C05111
C7	Cap, Mica, 680 pf, 5%, 500V	C06681
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 180 pf, 5%, 500V	C05181
C11	Cap, Mica, 33 pf, 5%, 500V	C05330
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Mica, 39 pf, 5%, 500V	C05390
L2	Inductor, Var, 2.0-5.3 μ h	L30004
L3	Inductor, Var, 2.0-5.3 μ h	L30004
L4	Inductor, Var, 16.5-35 μ h	L31007
R2	Resistor, Var, 10K, 1/4W, 20%	R89103
R3	Resistor, Comp, 2.7K, 1/4W, 5%	R20272
R5	Resistor, Comp, 6.8K, 1/4W, 5%	R20682

Parts List

Channel Tuning PC Board Assy (SIMPLEX) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>3.5 - 5.5 MHz</u>		200390-3
C3	Cap, Mica, 68 pf, 5%, 500V	C05680
C4	Cap, Mica, 330 pf, 5%, 500V	C05331
C5	Cap, Mica, 68 pf, 5%, 500V	C05680
C7	Cap, Mica, 390 pf, 5%, 500V	C05391
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 100 pf, 5%, 500V	C05101
C11	Cap, Mica, 27 pf, 5%, 500V	C05270
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Mica, 51 pf, 5%, 500V	C05510
L2	Inductor, Var, 2.0-5.3 μ h	L30004
L3	Inductor, Var, 2.0-5.3 μ h	L30004
L4	Inductor, Var, 7.5-17 μ h	L31006
R2	Resistor, Var, 10K, 1/4W, 20%	R89103
R3	Resistor, Comp, 2.7K, 1/4W, 5%	R20272
R5	Resistor, Comp, 6.8K, 1/4W, 5%	R20682
<u>5.5 - 8.0 MHz</u>		200390-4
C3	Cap, Mica, 30 pf, 5%, 500V	C05300
C4	Cap, Mica, 120 pf, 5%, 500V	C05121
C5	Cap, Mica, 39 pf, 5%, 500V	C05390
C7	Cap, Mica, 150 pf, 5%, 500V	C05151
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 39 pf, 5%, 500V	C05390
C11	Cap, Mica, 30 pf, 5%, 500V	C05300
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Mica, 30 pf, 5%, 500V	C05300
L2	Inductor, Var, 2.0-5.3 μ h	L30004
L3	Inductor, Var, 2.0-5.3 μ h	L30004
L4	Inductor, Var, 3.5-8.5 μ h	L31005
R2	Resistor, Var, 10K, 1/4W, 20%	R89103
R3	Resistor, Comp, 2.7K, 1/4W, 5%	R20272
R4	Resistor, Comp, 22K, 1/4W, 5%	R20223
R5	Resistor, Comp, 6.8K, 1/4W, 5%	R20682

Channel Tuning PC Board Assy (SIMPLEX) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>8.0 - 12.0 MHz</u>		200390-5
C3	Cap, Mica, 30 pf, 5%, 500V	C05300
C4	Cap, Mica, 130 pf, 5%, 500V	C05131
C5	Cap, Mica, 33 pf, 5%, 500V	C05330
C7	Cap, Mica, 120 pf, 5%, 500V	C05121
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 39 pf, 5%, 500V	C05390
C11	Cap, Mica, 12 pf, 5%, 500V	C05120
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Mica, 39 pf, 5%, 500V	C05390
L2	Inductor, Var, .9-2.3 μ h	L30003
L3	Inductor, Var, .9-2.3 μ h	L30003
L4	Inductor, Var, 1.7-3.9 μ h	L31004
R1	Resistor, Comp, 15K, 1/4W, 5%	R20153
R2	Resistor, Var, 10K, 1/4W, 20%	R89103
R3	Resistor, Comp, 2.7K, 1/4W, 5%	R20272
R4	Resistor, Comp, 10K, 1/4W, 5%	R20103
R5	Resistor, Comp, 10K, 1/4W, 5%	R20103
<u>12.0 - 18.0 MHz</u>		200390-6
C3	Cap, Mica, 15 pf, 5%, 500V	C05150
C4	Cap, Mica, 30 pf, 5%, 500V	C05300
C5	Cap, Mica, 33 pf, 5%, 500V	C05330
C7	Cap, Mica, 22 pf, 5%, 500V	C05220
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 33 pf, 5%, 500V	C05330
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Mica, 39 pf, 5%, 500V	C05390
L2	Inductor, Var, .9-2.3 μ h	L30003
L3	Inductor, Var, .9-2.3 μ h	L30003
L4	Inductor, Var, .9-2.1 μ h	L31003
R2	Resistor, Var, 10K, 1/4W, 20%	R89103
R3	Resistor, Comp, 2.7K, 1/4W, 5%	R20272
R4	Resistor, Comp, 22K, 1/4W, 5%	R20223

Parts List

Channel Tuning PC Board Assy (SIMPLEX) 1A3A3-1A3A12 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>18.0 - 24.0 MHz</u>		200390-7
C3	Cap, Mica, 12 pf, 5%, 500V	C05120
C4	Cap, Mica, 33 pf, 5%, 500V	C05330
C5	Cap, Mica, 24 pf, 5%, 500V	C05240
C7	Cap, Mica, 20 pf, 5%, 500V	C05200
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 24 pf, 5%, 500V	C05240
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Mica, 24 pf, 5%, 500V	C05240
L2	Inductor, Var, .5-1.2 μ h	L30002
L3	Inductor, Var, .5-1.2 μ h	L30002
L4	Inductor, Var, .48-1.0 μ h	L31002
R2	Resistor, Var, 10K, 1/4W, 5%	R89103
R3	Resistor, Comp, 2.7K, 1/4W, 5%	R20272
<u>24.0 - 30.0 MHz</u>		200390-8
C3	Cap, Mica, 12 pf, 5%, 500V	C05120
C4	Cap, Mica, 43 pf, 5%, 500V	C05430
C5	Cap, Mica, 24 pf, 5%, 500V	C05240
C7	Cap, Mica, 30 pf, 5%, 500V	C05300
C8	Cap, Cer, .001 μ f, 10%, 500V	C10010
C9	Cap, Mica, 20 pf, 5%, 500V	C05200
C11	Cap, Mica, 7 pf, 5%, 500V	C05070
C12	Cap, Cer, .001 μ f, 10%, 500V	C10010
C13	Cap, Mica, 27 pf, 5%, 500V	C05270
L2	Inductor, Var, .25-.65 μ h	L30001
L3	Inductor, Var, .25-.65 μ h	L30001
L4	Inductor, Var, .25-.50 μ h	L31001
R2	Resistor, Var, 10K, 1/4W, 20%	R89103
R3	Resistor, Comp, 2.7K, 1/4W, 5%	R20272

SIMPLEX CHANNEL TUNE STRIP Changes and Additions for Image Trap

REF DESIG	DESCRIPTION	PART NO.
<u>1.6 - 2.5 MHz</u>	Image Trap Not Required	
<u>2.5 - 3.5 MHz</u>	Image Trap Not Required	
<u>3.5 - 5.5 MHz</u>	Image Trap Not Required	
<u>5.5 - 8.0 MHz</u>		
C2	Cap, Mica, 20 pf, 500V, 5%	C05200
C3	Cap, Mica, 39 pf, 500V, 5%	C05390
C4	Cap, Mica, 100 pf, 500V, 5%	C05101
L1	Inductor, Var, 7.5-17 μ h	L31006
<u>8.0 - 12.0 MHz</u>		
C2	Cap, Mica, 22 pf, 500V, 5%	C05220
C4	Cap, Mica, 82 pf, 500V, 5%	C05820
L1	Inductor, Var, 4.4-10 μ h	L30005
<u>12.0 - 18.0 MHz</u>		
C2	Cap, Mica, 56 pf, 500V, 5%	C05560
C3	Cap, Mica, 22 pf, 500V, 5%	C05220
L1	Inductor, Var, .9-2.3 μ h	L30003
R1	Res, Comp, 18K, 1/4W, 5%	R20183
<u>18.0 - 24.0 MHz</u>		
C2	Cap, Mica, 33 pf, 500V, 5%	C05330
C3	Cap, Mica, 22 pf, 500V, 5%	C05220
L1	Inductor, Var, .9-2.3 μ h	L30003
<u>24.0 - 30.0 MHz</u>		
C2	Cap, Mica, 22 pf, 500V, 5%	C05220
C3	Cap, Mica, 15 pf,	C05150
L1	Inductor, Var, .9-2.3 μ h	L30003

ASSEMBLY: Duplex Relay PC Board Assy. PREFIX DESIGNATOR: 1A3A13

REF DESIG	DESCRIPTION	PART NO.
C1	Cap, Cer, .1 μ fd, +80 -20%, 25V	C11000
CR1	Rect, Si, 1N4001	CR4001
K1	Relay, Reed, Form A	210020
K2	Relay, Reed, Form A	210020

Parts List

ASSEMBLY: IF/Audio PC Board Assy.

PRE FIX DESIGNATOR: 1A4

REF DESIG	DESCRIPTION	PART NO.
	IF Audio PC Board Assy.	200800
A1	Noise Limiter PC Board Assy.	200880
C1	Cap, Cer, .01 μ f, 10%, 500V	C10100
C2	Cap, Mica, 470 pf, 5%, 500V	C06471
C3	Cap, Mica, 330 pf, 5%, 500V	C05330
C4	Cap, Cer, .01 μ f, 10%, 500V	C10100
C5	Cap, Mica, 130 pf (with 2.9 kc Filter)	C05131
C5	Cap, Mica, 390 pf (with 2.1 kc Filter)	C05391
C6	Cap, Mica, 2000 pf, 5%, 500V	C06202
C7	Cap, Mica, 130 pf (with LC AM Filter)	C05131
C7	Cap, Mica, 560 pf (with Ceramic AM Filter)	C06561
C8	Cap, Tant, 1 μ f, 35V, 10%	C41056
C9	Cap, Tant, 1 μ f, 35V, 10%	C41056
C10	Cap, Tant, 10 μ f, 20V, 10%	C41064
C11	Cap, Tant, 1 μ f, 35V, 10%	C41056
C12	Cap, Tant, 1 μ f, 35V, 10%	C41056
C13	Cap, Mica, 130 pf (with 2.9 kc Filter)	C05131
C13	Cap, Mica, 390 pf (with 2.1 kc Filter)	C05391
C14	Cap, Mica, 130 pf (with LC AM Filter)	C05131
C14	Cap, Mica, 390 pf (with Ceramic AM Filter)	C05391
C15	Cap, Mica, 2000 pf, 5%, 500V	C06202
C16	Cap, Mica, 470 pf, 5%, 500V	C06471
C17	Cap, Cer, .01 μ f, 10%, 500V	C10100
C18	Cap, Cer, .01 μ f, 10%, 500V	C10100
C19	Cap, Mica, 820 pf (delete when cer fltr is used (FL2))	C06821
C20	Cap, Mica, 10 pf (delete when cer fltr is used (FL2))	C05100
C21	Cap, Mica, 820 pf (delete when cer fltr is used (FL2))	C06821
C22	Cap, Cer, .01 μ f, 10%, 500V	C10100
C23	Cap, Cer, .001 μ f, 10%, 500V	C10010
C24	Cap, Cer, .01 μ f, 10%, 500V	C10100
C25	Cap, Tant, 1 μ f, 35V, 10%	C41056
C26	Cap, Cer, .01 μ f, 10%, 500V	C10100
C27	Cap, Cer, .01 μ f, 10%, 500V	C10100
C28	Cap, Tant, 22 μ f, 15V, 10%	C42263
C29	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C30	Cap, Cer, .01 μ f, 10%, 500V	C10100
C31	Cap, Cer, .01 μ f, 10%, 500V	C10100
C32	Cap, Cer, .01 μ f, 10%, 500V	C10100
C33	Cap, Tant, 22 μ f, 15V, 10%	C42263
C34	Cap, Cer, .01 μ f, 10%, 500V	C10100
C35	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C36	Cap, Tant, 22 μ f, 15V, 10%	C42263

IF/Audio PC Board Assembly 1A4 (continued)

REF DESIG	DESCRIPTION	PART NO.
C37	Cap, Tant, 1 μ f, 35V, 10%	C41056
C38	Cap, Tant, 1 μ f, 35V, 10%	C41056
C39	Cap, Cer, .01 μ f, 10%, 500V	C10100
C40	Cap, Mica, 1000 pf, 5%, 500V	C06102
C41	Cap, Tant, 22 μ f, 15V, 10%	C42263
C42	Cap, Cer, .01 μ f, 10%, 500V	C10100
C43	Cap, Tant, 10 μ f, 20V, 10%	C41064
C44	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C45	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C46	Cap, Cer, .01 μ f, 10%, 500V	C10100
C47	Cap, Mica, 1000 pf, 5%, 500V	C06102
C48	Cap, Tant, 22 μ f, 15V, 10%	C42263
C49	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C50	Cap, Tant, 1 μ f, 35V, 10%	C41056
C51	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C52	Cap, Cer, .01, 10%, 500V	C10100
C53	Cap, Cer, .01, 10%, 500V	C10100
C54	Cap, Tant, 1 μ f, 35V, 10%	C41056
C55	Cap, Mica, 1000 pf, 5%, 500V	C06102
C56	Cap, Tant, 1 μ f, 35V, 10%	C41056
C57	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C58	Cap, Tant, 1 μ f, 35V, 10%	C41056
C59	Cap, Cer, .01 μ f, 10%, 500V	C10100
C60	Cap, Mica, 1000 pf, 5%, 500V	C06102
C61	Cap, Tant, 1 μ f, 35V, 10%	C41056
C62	Cap, Tant, 10 μ f, 20V, 10%	C41064
C63	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C64	Cap, Tant, 1 μ f, 35V, 10%	C41056
C65	Cap, Tant, 1 μ f, 35V, 10%	C41056
C66	Cap, Cer, .01 μ f, 10%, 500V	C10100
C67	Cap, Cer, .01 μ f, 10%, 500V	C10100
C68	Cap, Cer, .001 μ f, 10%, 500V	C10010
C69	Cap, Cer, .01 μ f, 10%, 500V	C10100
C70	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C71	Cap, Tant, 1 μ f, 35V, 10%	C41056
C72	Cap, Cer, .01 μ f, 10%, 500V	C10100
C73	Cap, Tant, 10 μ f, 20V, 10%	C41064
C74	Cap, Tant, 1 μ f, 35V, 10%	C41056
C75	Cap, Tant, 1 μ f, 35V, 10%	C41056
C76	Cap, Cer, .01 μ f, 10%, 500V	C10100
C77	Cap, Cer, .01 μ f, 10%, 500V	C10100
C78	Cap, Tant, 1 μ f, 35V, 10%	C41056
C79	Cap, Tant, 1 μ f, 35V, 10%	C41056
C80	Cap, Tant, 1 μ f, 35V, 10%	C41056

Parts List

IF/Audio PC Board Assembly 1A4 (continued)

REF DESIG	DESCRIPTION	PART NO.
C81	Cap, Cer, .01 μ f, 10%, 500V	C10100
C82	Cap, Cer, .01 μ f, 10%, 500V	C10100
C83	Cap, Cer, .01 μ f, 10%, 500V	C10100
C84	Cap, Tant, 1 μ f, 35V, 10%	C41056
C85	Cap, Mica, 820 pf (for 1.4 MHz IF)	C06821
C85	Cap, Mica 680 pf (for 1.5 MHz IF)	C06681
C86	Cap, Cer, .01 μ f, 10%, 500V	C10100
C87	Cap, Mica, 82 pf, 10%, 500V	C05820
C88	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
CR4	Diode, Si, 1N914	CR9140
CR6	Diode, Si, 1N914	CR9140
CR7	Diode, Si, 1N914	CR9140
CR8	Diode, Si, 1N914	CR9140
CR9	Diode, Si, 1N914	CR9140
CR10	Diode, Si, 1N914	CR9140
CR11	Diode, Si, 1N914	CR9140
CR13	Diode, Si, 1N914	CR9140
CR14	Diode, Si, 1N914	CR9140
CR15	Diode, Si, 1N914	CR9140
CR16	Diode, Si, 1N914	CR9140
CR17	Diode, Si, 1N914	CR9140
CR18	Diode, Si, 1N914	CR9140
CR19	Diode, Si, 1N914	CR9140
CR20	Diode, Si, 1N914	CR9140
CR21	Diode, Si, 1N914	CR9140
CR22	Diode, Si, 1N914	CR9140
CR23	Diode, Si, 1N914	CR9140
CR24	Diode, Si, 1N914	CR9140
CR25	Diode, Si, 1N914	CR9140
CR26	Diode, Si, 1N914	CR9140
CR27	Diode, Si, 1N914	CR9140
CR28	Diode, Si, 1N914	CR9140
CR29	Diode, Si, 1N914	CR9140
CR30	Diode, Si, 1N914	CR9140
CR31	Diode, Si, 1N914	CR9140
CR32	Diode, Si, 1N914	CR9140
CR33	Diode, Si, 1N914	CR9140
CR34	Diode, Si, 1N914	CR9140
CR35	Diode, Si, 1N914	CR9140

IF/Audio PC Board Assembly 1A4 (continued)

REF DESIG	DESCRIPTION	PART NO.
FL1	Filter, Mechanical, 2.9 kHz, SSB	FL1002
FL1	Filter, Mechanical, 2.1 kHz, SSB	FL1007
FL2	Filter, Mechanical, 6 kHz, AM (option item)	FL1003
FL2	Filter, Cer. (option item)	FL1008
L1	Choke, RF, 51 μ h	L10510
L2	Choke, RF, 51 μ h	L10510
L3	Choke, RF, 750 μ h	L10751
L4	Choke, RF, 750 μ h	L10751
L5	Choke, RF, 51 μ h	L10510
L7	Choke, RF, 750 μ h	L10751
L8	Choke, RF, 750 μ h	L10751
L9	Choke, RF, 750 μ h	L10751
L10	Choke, RF, 750 μ h	L10751
L11	Choke, RF, 390 μ h (use only with cer fltr (FL2))	L10391
L12	Choke, RF, 330 μ h (use only with cer fltr (FL2))	L10331
Q1	Transistor, Si, NPN, 2N4123	Q41230
Q2	Transistor, Si, NPN, RF, 2N5180	Q51800
Q3	Transistor, Si, NPN, 2N4123	Q41230
Q4	Transistor, Si, NPN, 2N4123	Q41230
Q5	Transistor, Si, NPN, 2N4123	Q41230
Q6	Transistor, Si, NPN, 2N4123	Q41230
Q7	Transistor, Si, NPN, 2N4123	Q41230
Q8	Transistor, Si, PNP, Hi Volt, 2N5086	Q50860
Q9	Transistor, Si, NPN, 2N4123	Q41230
Q10	Transistor, Si, NPN, 2N4123	Q41230
Q11	Transistor, Si, NPN, 2N4123	Q41230
Q12	Transistor, Si, PNP, 2N4125	Q41250
Q13	Transistor, Si, NPN, 2N4123	Q41230
Q14	Transistor, Si, NPN, 2N4123	Q41230
Q15	Transistor, Si, NPN, 2N4123	Q41230
Q16	Transistor, Si, NPN, 2N4123	Q41230
Q17	Transistor, Si, NPN, 2N4123	Q41230
Q18	Transistor, Si, NPN, 2N4123	Q41230
Q19	Transistor, Si, NPN, 2N4123	Q41230
Q20	Transistor, Si, NPN, 2N4123	Q41230
Q21	Transistor, Si, PNP, 2N4125	Q41250
Q22	Transistor, Si, NPN, 2N4123	Q41230
Q23	Transistor, Si, PNP, 2N4125	Q41250
Q24	Transistor, Si, PNP, 2N4125	Q41250
Q25	Transistor, Si, PNP, 2N4125	Q41250
Q26	Transistor, Si, NPN, 2N4123	Q41230

Parts List

IF/Audio PC Board Assembly 1A4 (continued)

REF DESIG	DESCRIPTION	PART NO.
Q27	Transistor, Si, NPN, Low Sat, 2N4400	Q44000
Q28	Transistor, Si, NPN, 2N4123	Q41230
Q29	Transistor, Si, NPN, 2N4123	Q41230
Q30	Transistor, Si, NPN, 2N4123	Q41230
R1	Res, Comp, Var, 1K, 1/4W, 20%	R88102
R2	Res, Comp, 100 , 1/4W, 5%	R20101
R3	Res, Comp, Var, 100, 1/4W, 20%	R88101
R4	Res, Comp, 10K, 1/4W, 5%	R20103
R5	Res, Comp, 1.5K, 1/4W, 5%	R20152
R6	Res, Comp, 100 , 1/4W, 5%	R20101
R7	Res, Comp, 100 , 1/4W, 5%	R20101
R8	Res, Comp, 1.8K 1/4W, 5%	R20182
R9	Res, Comp, 10K, 1/4W, 5%	R20103
R10	Res, Comp, 4.7K, 1/4W, 5%	R20472
R11	Res, Comp, 10K, 1/4W, 5%	R20103
R12	Res, Comp, 47K, 1/4W, 5%	R20473
R13	Res, Comp, 47K, 1/4W, 5%	R20473
R14	Res, Comp, 4.7K, 1/4W, 5%	R20472
R15	Res, Comp, 10 , 1/4W, 5%	R20100
R16	Res, Comp, 10K, 1/4W, 5%	R20103
R17	Res, Comp, 33K, 1/4W, 5%	R20333
R18	Res, Comp, 10K, 1/4W, 5%	R20103
R19	Res, Comp, 3.3K, 1/4W, 5%	R20332
R20	Res, Comp. 47K, 1/4W, 5%	R20473
	(delete when FL2 is a cer fltr)	
R21	Res, Comp, 47K, 1/4W, 5%	R20473
	(delete when FL2 is a cer fltr)	
R22	Res, Comp, 100 , 1/4W, 5%	R20101
R23	Res, Comp, 47K, 1/4W, 5%	R20473
R24	Res, Comp, 47K, 1/4W, 5%	R20473
R25	Res, Comp. 4.7K, 1/4W, 5%	R20472
R26	Res, Comp, Var, 10K, 1/4W, 20%	R88103
R27	Res, Comp, 2.7K, 1/4W, 5%	R20272
R28	Res, Comp, 1K, 1/4W, 5%	R20102
R30	Res, Comp, 4.7K, 1/4W, 5%	R20472
R31	Res, Comp, 82 , 1/4W, 5%	R20820
R32	Res, Comp, Var, 100K	R88101
R34	Res, Comp, 100 , 1/4W, 5%	R20101
R35	Res, Comp, Var, 10K, 1/4W, 20%	R89103
R36	Res, Comp, 3.3K, 1/4W, 5%	R20332
R37	Res, Comp, 27K, 1/4W, 5%	R20270
R38	Res, Comp, 56K, 1/4W, 5%	R20560
R39	Res, Comp, 10K, 1/4W, 5%	R20100
R40	Res, Comp, 1.5K, 1/4W, 5%	R20152

IF/Audio PC Board Assembly 1A4 (continued)

REF DESIG	DESCRIPTION	PART NO.
R41	Res, Comp, 4.7K, 1/4W, 5%	R20472
R42	Res, Comp, 100K, 1/4W, 5%	R20104
R43	Res, Comp, 2.7K, 1/4W, 5%	R20272
R44	Res, Comp, 1K, 1/4W, 5%	R20102
R45	Res, Comp, 4.7K, 1/4W, 5%	R20472
R46	Res, Comp, 8.2K 1/4W, 5%	R20822
R47	Res, Comp, 560 , 1/4W, 5%	R20561
R48	Res, Comp, 4.7K, 1/4W, 5%	R20472
R49	Res, Comp, 470 , 1/4W, 5%	R20471
R50	Res, Comp, 1K, 1/4W, 5%	R20102
R51	Res, Comp, 2.7K, 1/4W, 5%	R20272
R52	Res, Comp 82, 1/4W, 5%	R20820
R53	Res, Comp, 2.7K, 1/4W, 5%	R20272
R54	Res, Comp, 27 , 1/4W, 5%	R20270
R55	Res, Var, 5K, 1/4W, 20%	R89502
R56	Res, Comp, 2.2K, 1/4W, 5%	R20222
R57	Res, Comp, 10K, 1/4W, 5%	R20103
R58	Res, Comp, 470K, 1/4W, 5%	R20474
R59	Res, Comp, 47K, 1/4W, 5%	R20473
R60	Res, Comp, 10K, 1/4W, 5%	R20103
R61	Res, Comp, 15K, 1/4W, 5%	R20153
R62	Res, Comp, 2.2K, 1/4W, 5%	R20222
R63	Res, Comp, 220K, 1/4W, 5%	R20224
R64	Res, Comp, Var, 5K	R88502
R65	Res, Comp, 560, 1/4W, 5%	R20561
R66		
R67	Res, Comp, 10K, 1/4W, 5%	R20103
R68	Res, Comp, 8.2K, 1/4W, 5%	R20822
R69	Res, Comp, 2.7K, 1/4W, 5%	R20272
R70	Res, Comp, 4.7K, 1/4W, 5%	R20472
R71	Res, Comp, 1.0K, 1/4W, 5%	R20102
R72	Res, Comp, 1.8K, 1/4W, 5%	R20182
R73	Res, Comp, 6.8K, 1/4W, 5%	R20682
R74	Res, Comp, 560, 1/4W, 5%	R20561
R75	Res, Comp, 120K, 1/4W, 5%	R20123
R76	Res, Comp, 4.7K, 1/4W, 5%	R20472
R77	Res, Comp, 6.8K, 1/4W, 5%	R20682
R78	Res, Comp, 1.2K, 1/4W, 5%	R20122
R79	Res, Comp, 560 , 1/4W, 5%	R20561
R80	Res, Comp, 220, 1/4W, 5%	R20221
R81	Res, Comp, 150, 1/4W, 5%	R20151
R82	Res, Comp, 1K, 1/4W, 5%	R20102
R83	Res, Comp, 27, 1/4W, 5%	R20270

Parts List

IF/Audio PC Board Assembly 1A4 (continued)

REF DESIG	DESCRIPTION	PART NO.
R84	Res, Comp, 4.7K, 1/4W, 5%	R20472
R85	Res, Comp, 1K, 1/4W, 5%	R20102
R86	Res, Comp, 3.3K, 1/4W, 5%	R20332
R87	Res, Comp, 47K, 1/4W, 5%	R20473
R88	Res, Comp, 10, 1/4W, 5%	R20100
R89	Res, Comp, 470, 1/4W, 5%	R20471
R90	Res, Comp, 2.2K, 1/4W, 5%	R20222
R91	Res, Comp, 3.3K, 1/4W, 5%	R20332
R92	Res, Comp, 6.8K, 1/4W, 5%	R20682
R93		
R94	Res, Comp, 1.8K, 1/4W, 5%	R20182
R95	Res, Comp, 470, 1/4W, 5%	R20471
R96	Res, Comp, 1K, 1/4W, 5%	R20102
R97	Res, Comp, 10, 1/4W, 5%	R20100
R98	Res, Comp, 2.2K, 1/4W, 5%	R20222
R99	Res, Comp, 10, 1/4W, 5%	R20100
R100	Res, Comp, 560, 1/4W, 5%	R20561
R101	Res, Comp, 1K, 1/4W, 5%	R20102
R102	Res, Comp, 4.7K, 1/4W, 5%	R20472
R103	Res, Comp, 1K, 1/4W, 5%	R20102
R104	Res, Comp, 27, 1/4W, 5%	R20270
R105	Res, Var, 100, 1/4W, 20%	R88101
R106	Res, Comp, 1K, 1/4W, 5%	R20102
R107	Res, Comp, 1K, 1/4W, 5%	R20102
R108	Res, Comp, 1.5K, 1/4W, 5%	R20152
R109	Res, Comp, 5.6K, 1/4W, 5%	R20562
R110	Res, Comp, 1K, 1/4W, 5%	R20102
R111	Res, Comp, 18K, 1/4W, 5%	R20183
R112	Res, Comp, 18K, 1/4W, 5%	R20183
R113	Res, Comp, 6.8K, 1/4W, 5%	R20682
R114	Res, Comp, 6.8K, 1/4W, 5%	R20682
R115		
R116	Res, Comp, 4.7K, 1/4W, 5%	R20472
R117	Res, Comp, 22K, 1/4W, 5%	R20223
R118	Res, Comp, 6.8K, 1/4W, 5%	R20682
R119	Res, Comp, 5.6K, 1/4W, 5%	R20562
R120	Res, Comp, 4.7K, 1/4W, 5%	R20472
R121	Res, Comp, 1.8K, 1/4W, 5%	R20182
R122	Res, Comp, 1K, 1/4W, 5%	R20102
R123	Res, Comp, 47K, 1/4W, 5%	R20473
R124	Res, Var, 5K, 1/4W, 20%	R88502
R125	Res, Comp, 220, 1/4W, 5%	R20221
R126	Res, Comp, 4.7K, 1/4W, 5%	R20472
R127	Res, Var, 5K, 1/4W, 20%	R89502

IF/Audio PC Board Assembly 1A4 (continued)

REF DESIG	DESCRIPTION	PART NO.
R128	Res, Comp, 2.7K, 1/4W, 5%	R20272
R129	Res, Comp, 560, 1/4W, 5%	R20561
R130		
R131	Res, Comp, 39K, 1/4W, 5%	R20393
R132	Res, Comp, 100K, 1/4W, 5%	R20104
R133	Res, Comp, 10, 1/4W, 5%	R20100
R134	Res, Comp, 100, 1/4W, 5%	R20101
T1	Transformer, Broadband, IF	T10006
T2	Transformer, Broadband IF	T10200
T3	Transformer, IF	T10004
T4	Transformer, 455 kHz, IF	T10002
T5	Transformer, 455 kHz, IF	T10002
T6	Transformer, 455 kHz, IF	T10002
T7	Transformer, 455 kHz, IF	T10003
T8	Transformer, 455 kHz, Filter (delete when FL2 is a ceramic fltr)	T10002
T9	Transformer, 455 kHz, Filter (delete when FL2 is a ceramic fltr)	T10002
U1	Integrated Circuit, CA3028A	U3028A
U2	Integrated Circuit, CA3028A	U3028A
U3	Integrated Circuit, CA3028A	U3028A
U4	Integrated Circuit, CA3028A	U3028A
U5	Integrated Circuit, MC1596G	U1596G
VR1	Zener, 1N754	VR7540

Parts List

IF/Audio PC Board Assembly 1A4 (continued)

ASSEMBLY: Noise Limiter PC Board Assy. PREFIX DESIGNATOR: 1A4A1

REF DESIG	DESCRIPTION	PART NO.
C1	Cap, Tant, .1 μ f, 35V, 20%	C41048
C2	Cap, Tant, .1 μ f, 35V, 20%	C41048
C3	Cap, Tant, 1 μ f, 35V, 10%	C42056
CR1	Diode, Hot Carrier, MS8100	CR0200
CR2	Diode, Hot Carrier, MS8100	CR0200
Q1	Transistor, FET, 2N5485	Q54850
R1	Resistor, Comp, 4.7 meg., 1/4W, 5%	R20475
R2	Resistor, Comp, 4.7 meg., 1/4W, 5%	R20475
R3	Resistor, Comp, 100K, 1/4W, 5%	R20104
R4	Resistor, Comp, 33K, 1/4W, 5%	R20333
R5	Resistor, Comp, 47K, 1/4W, 5%	R20473

ASSEMBLY: Power Supply, AC

PREFIX DESIGNATOR: 1A5

REF DESIG	DESCRIPTION	PART NO.
	Power Supply Module	200400
A1	Regulator Filter PC Board Assembly	200440
C1	Cap, Cer, .0047 μ f, 10%, 500V	C10047
C2	Cap, Cer, .0047 μ f, 10%, 500V	C10047
F2	Fuse, 1/4A, SLO-BLO	F20025
F3	Fuse, 5A, SLO-BLO (with Remote 10A)	F20500 (F21000)
F4	Fuse, 10A, SLO-BLO	F21000)
F5	Fuse, 2A, SLO-BLO	F20200
F6	Fuse, 15A	F11500
J1	Socket, Prime Pwr, 3 Wire	J00203
J2	Socket, Octal, 8 Pin	X00701
J3	Receptacle, Socket, In-Line	J20205
Q1	Transistor, Si, Pwr, MJE-3055	Q00001
S1	Switch, Slide, TPDT (Sine/Square Only)	200203
	<u>OR</u> Switch, Slide, DPDT (115/230 VAC)	200200
T1	Transformer, Pwr, 115/230	T00100
	<u>OR</u> Sine/Square	T00104
XF2	Fuseholder	X00400
XF3	Fuseholder	X00400
XF4	Fuseholder	X00400
XF5	Fuseholder	X00400
A2	Filter PC Board Assembly	210402

Parts List

Power Supply, AC, 1A5 (continued)

ASSEMBLY: Regulator Filter PC Board Assy

PREFIX DESIGNATOR: 1A5A1

REF DESIG	DESCRIPTION	PART NO.
C1	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C2	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C3	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C4	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C5	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C6	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C7	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C8	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C12	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C13	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C14	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C15	Cap, Cer, .001 μ f, 1 KV, 10%	C10010
C17	Cap, Elec, 500 μ f, 50V	C70003
C18	Cap, Tant, 5.6 μ f, 35V, 10%	C45656
C19	Cap, Tant, 1.0 μ f, 35V, 10%	C41056
C20	Cap, Tant, 1.0 μ f, 35V, 10%	C41056
C21	Cap, Cer, .01 μ f, 10%, 500V	C10100
CR1	Diode, Si, Rect, 1N4007, 1A, 1000V	CR4007
CR2	Diode, Si, Rect, 1N4007, 1A, 1000V	CR4007
CR3	Diode, Si, Rect, 1N4007, 1A, 1000V	CR4007
CR4	Diode, Si, Rect, 1N4007, 1A, 1000V	CR4007
CR5	Diode, Si, Rect, 1N4007, 1A, 1000V	CR4007
CR6	Diode, Si, Rect, 1N4007, 1A, 1000V	CR4007
CR7	Diode, Si, Rect, 1N4007, 1A, 1000V	CR4007
CR8	Diode, Si, Rect, 1N4007, 1A, 1000V	CR4007
CR9	Diode, Si, Rect, 1N4005, 1A, 600V	CR4005
CR10	Diode, Si, Rect, 1N4005, 1A, 600V	CR4005
CR11	Diode, Si, Rect, 1N4005, 1A, 600V	CR4005
CR12	Diode, Si, Rect, 1N4005, 1A, 600V	CR4005
CR13	Diode, Si, Rect, 1N4005, 1A, 600V	CR4005
CR14	Diode, Si, Rect, 3AF1, 3A, 100V	CR3AF1
CR15	Diode, Si, Rect, 3AF1, 3A, 100V	CR3AF1
CR16	Diode, Si, 1N914	CR9140
CR17	Diode, Si, 1N914	CR9140
CR18	Diode, Si, 1N914	CR9140

Power Supply, AC, 1A5 (continued)

REF DESIG	DESCRIPTION	PART NO.
FL1	Choke, Ferrite Bead	FL0002
L1	Choke, RF, 1 mh	L10102
Q1	Transistor, NPN, 2N1613	Q16130
Q2	Transistor, NPN, 2N4400	Q44000
Q3	Transistor, NPN, 2N4123	Q41230
Q4	Transistor, NPN, 2N4123	Q41230
R4	Res, Comp, 47K, 2W, 5%	R50473
R5	Res, Comp, 100K, 2W, 5%	R50104
R6	Res, Comp, 33K, 2W, 5%	R50333
R7	Res, Comp, 10K, 1/4W, 5%	R20103
R8	Res, Comp, 10 , 1/4W, 5%	R20100
R9	Res, Comp, 2.2K, 1/4W, 5%	R20222
R10	Res, Comp, 4.7K, 1/4W, 5%	R20472
R11	Res, W. W., 1 , 1.5W, 5%	R90001
R12	Res, W. W., 1 , 1.5W, 5%	R90001
R13	Res, Comp, 1K, 1/4W, 5%	R20102
R14	Res, Comp, 1K, 1/4W, 5%	R20102
R15	Res, Var, 1K, 1/4W, 20%	R88102
R16	Res, Comp, 1K, 1/4W, 5%	R20102
R17	Res, Comp, 270, 1/4W, 5%	R20271
R18	Res, Comp, 270, 1/4W, 5%	R20271
R19	Res, Comp, 3.3K, 1/4W, 5%	R20332
VR1	Diode, Zener, 15V, 1W, 1N4744	VR4744
VR2	Diode, Zener, 5.6V, 400 mw, 1N752	VR7520

ASSEMBLY: Filter PC Board Assy.

PREFIX DESIGNATOR: 1A5A2

C9	Cap, Elec, 60 MF, 450V	C70001
C10	Cap, Elec, 60 MF, 450V	C70001
C11	Cap, Elec, 60 MF, 450V	C70001
C16	Cap, Elec, 200 μ f, 150V	C70002
R1	Res, Comp, 100K, 2W, 5%	R50104
R2	Res, Comp, 100K, 2W, 5%	R50104
R3	Res, Comp, 100K, 2W, 5%	R50104

Parts List

ASSEMBLY: Power Supply 12/24 VDC

PREFIX DESIGNATOR: 1A5

REF DESIG	DESCRIPTION	PART NO.
	DC Power Supply Module	200550

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For Parts List and Schematic, see Addendum.

ASSEMBLY: Frequency Generator PC Board Assy. PREFIX DESIGNATOR: 1A6
 USB only (Marine)

REF DESIG	DESCRIPTION	PART NO.
	Frequency Generator Board	210500
A1	Duplex Channel Oscillator PC Board Assy.	200590
C1	Cap, Cer, .01 μ f, 10%, 500V	C10100
C2	Cap, Cer, .01 μ f, 10%, 500V	C10100
C3	Cap, Cer, .01 μ f, 10%, 500V	C10100
C4	Cap, Cer, .01 μ f, 10%, 500V	C10100
C5	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C6	Cap, Mica, 6 pf, 5%, 500V	C05060
C7	Cap, Variable, Air, 2.2-34 pf	C60001
C8	Cap, Mica, 2000 pf, 5%, 500V	C06202
C9	Cap, Tant, 1 μ f, 35V, 10%	C41056
C10	Cap, Mica, 220 pf, 5%, 500V	C05221
C11	Cap, Cer, .01 μ f, 10%, 500V	C10100
C12	Cap, Cer, .01 μ f, 10%, 500V	C10100
C13	Cap, Cer, .01 μ f, 10%, 500V	C10100
C14	Cap, Tant, 1 μ f, 35V, 10%	C41056
C15	Cap, Mica, 390 pf, 5%, 500V	C05391
C16	Cap, Mica, 18 pf, 5%, 500V	C05180
C17	Cap, Var, Air 2.2-34 pf	C60001
C18	Cap, Mica, 2000 pf, 5%, 500V	C06202
C19	Cap, Mica, 1000 pf, 5%, 500V	C06102
C20	Cap, Tant, 1 μ f, 35V, 10%	C41056
C21	Cap, Mica, 100 pf, 5%, 500V	C05101
C22	Cap, Tant, 1 μ f, 35V, 10%	C41056
C23	Cap, Mica, 100 pf, 5%, 500V	C05101
C25	Cap, Cer, .01 μ f, 10%, 500V	C10100
C26	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C27	Cap, Var, Air, 2.2-34 pf	C60001
C28	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C29	Cap, Var, Air, 2.2-34 pf	C60001
C30	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C31	Cap, Var, Air, 2.2-34 pf	C60001
C32	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C33	Cap, Var, Air, 2.2-34 pf	C60001
C34	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C35	Cap, Var, Air, 2.2-34 pf	C60001
C36	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C37	Cap, Var, Air, 2.2-34 pf	C60001
C38	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C39	Cap, Var, Air, 2.2-34 pf	C60001

Parts List

Frequency Generator PC Board Assy. (Marine) 1A6 (continued)

REF DESIG	DESCRIPTION	PART NO.
C40	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C41	Cap, Var, Air 2.2-34 pf	C60001
C42	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C43	Cap, Var, Air 2.2-34 pf	C60001
C44	Cap, Cer, 18 pf, N330, 5%, 500V	C00051
C45	Cap, Var, Air 2.2-34 pf	C60001
C46	Cap, Tant, 1 μ f, 35V (Clarifier option only)	C41056
C47	Cap, Cer, .01 μ f, 10% (Clarifier option only)	C10100
C48	Cap, Cer, .01 μ f, 10%, 500V	C10100
C49	Cap, Cer, .01 μ f, 10%, 500V	C10100
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
CR4	Diode, Si, 1N914	CR9140
CR5		
CR6	Diode, Si, 1N914 (Clarifier option only)	CR9140
CR7	Rect, Si, 1N4002, 1.5A, 100V	CR4002
CR8	Rect, Si, 1N4002, 1.5A, 100V	CR4002
CR9	Rect, Si, 1N4002, 1.5A, 100V	CR4002
CR10	Rect, Si, 1N4002, 1.5A, 100V	CR4002
CR11	Diode, Si, 1N914	CR9140
CR12	Diode, Si, 1N914	CR9140
CR13	Diode, Si, 1N914	CR9140
CR14	Diode, Si, 1N914	CR9140
CR15	Diode, Si, 1N914	CR9140
CR16	Diode, Si, 1N914	CR9140
CR17	Diode, Si, 1N914	CR9140
CR18	Diode, Si, 1N914	CR9140
CR19	Diode, Si, 1N914	CR9140
CR20	Diode, Si, 1N914	CR9140
CR21	Diode, Si, 1N914	CR9140
CR22	Diode, Si, 1N914	CR9140
CR23	Diode, Si, 1N914	CR9140
CR24	Diode, Si, 1N914	CR9140
CR25	Diode, Si, 1N914	CR9140
CR26	Diode, Si, 1N914	CR9140
CR27	Diode, Si, 1N914	CR9140
CR28	Diode, Si, 1N914	CR9140
CR29	Diode, Si, 1N914	CR9140
CR30	Diode, Si, 1N914	CR9140
CR31	Diode, Si, 1N914	CR9140
HR1	Oven, 14 Crystal, Proportional Control	HR1004-2

Frequency Generator PC Board Assy. (Marine) 1A6 (continued)

REF DESIG	DESCRIPTION	PART NO.
K1	Relay, Reed, SPST, 12 VDC	210020
K2	Relay, Reed, SPST, 12 VDC	210020
K3	Relay, Reed, SPST, 12 VDC	210020
K4	Relay, Reed, SPST, 12 VDC	210020
K5	Relay, Reed, SPST, 12 VDC	210020
K6	Relay, Reed, SPST, 12 VDC	210020
K7	Relay, Reed, SPST, 12 VDC	210020
K8	Relay, Reed, SPST, 12 VDC	210020
K9	Relay, Reed, SPST, 12 VDC	210020
K10	Relay, Reed, SPST, 12 VDC	210020
L1	Choke, RF, 10 mH	L10103
L2	Choke, RF, 330 μ h	L10331
L3	Choke, RF, 75 μ h	L10750
L4	Choke, RF, 100 μ h	L10101
L5	Choke, RF 180 μ h (Clarifier Option Only)	L10181
Q1	Transistor, NPN, 2N5179	Q51790
Q2	Transistor, NPN, 2N4123	Q41230
Q3	Transistor, NPN, 2N4123	Q41230
Q4	Transistor, NPN, 2N5180	Q51800
Q5	Transistor, NPN, 2N4123	Q41230
Q8	Transistor, NPN, 2N4123 (Clarifier option only)	Q41230
R1	Res, Comp, 10, 1/4W, 5%	R20100
R2	Res, Comp, 100, 1/4W, 5%	R20101
R3	Res, Comp, 100, 1/4W, 5%	R20101
R4	Res, Var, 100, 1/4W, 20%	R88101
R5	Res, Comp, 330, 1/4W, 5%	R20331
R6	Res, Comp, 12K, 1/4W, 5%	R20123
R7	Res, Comp, 10K, 1/4W, 5%	R20103
R8	Res, Comp, 100, 1/4W, 5%	R20101
R9	Res, Comp, 27, 1/4W, 5%	R20270
R10	Res, Comp, 1K, 1/4W, 5%	R20102
R11	Res, Comp, 15K, 1/4W, 5%	R20153
R12	Res, Comp, 10K, 1/4W, 5%	R20103
R13	Res, Comp, 150K, 1/4W, 5%	R20154
R14	Res, Comp, 4.7K, 1/4W, 5%	R20472
R15	Res, Var, 5K, 1/4W, 20%	R88502
R16	Res, Var, 1K, 1/4W, 20%	R88102
R17	Res, Comp, 1.8K, 1/4W, 5%	R20182
R18	Res, Comp, 820, 1/4W, 5%	R20821
R19	Res, Comp, 150, 1/4W, 5%	R20151
R20	Res, Comp, 33K, 1/4W, 5%	R20333

Parts List

Frequency Generator PC Board Assy. (Marine) 1A6 (continued)

REF DESIG	DESCRIPTION	PART NO.
R21	Res, Comp, 100, 1/4W, 5%	R20101
R22	Res, Comp, 22K, 1/4W, 5%	R20223
R23	Res, Comp, 1.2K, 1/4W, 5%	R20122
R24	Res, Comp, 100, 1/4W, 5%	R20101
R25	Res, Comp, 470, 1/4W, 5%	R20471
R26	Res, Var, 5K, 1/4W, 20%	R88502
R27	Res, Comp, 100, 1/4W, 5%	R20101
R28	Res, Comp, 560, 1/4W, 5%	R20561
R29	Res, Comp, 27, 1/4W, 5%	R20270
R30	Res, Comp, 6.8K, 1/4W, 5% (Clarifier option only)	R20682
R31	Res, Comp, 10K, 1/4W, 5% (Clarifier option only)	R20103
R32	Res, Comp, 82K, 1/4W, 5% (Clarifier option only)	R20823
T1	Transformer, Broadband	T10200
Y1	Crystal, USB, Carrier	Y101XX **
Y2	Crystal, USB, 2nd LO	Y102XX **†
Y5	Crystal, Channel	Y20001***
Y6	Crystal, Channel	Y20001***
Y7	Crystal, Channel	Y20001***
Y8	Crystal, Channel	Y20001***
Y9	Crystal, Channel	Y20001***
Y10	Crystal, Channel	Y20001***
Y11	Crystal, Channel	Y20001***
Y12	Crystal, Channel	Y20001***
Y13	Crystal, Channel	Y20001***
Y14	Crystal, Channel	Y20001***

**Frequency Assignment per channel frequency requirement. When ordering, specify all channel carrier frequencies being used. Refer to Table 2-1A, 2-1B.

† For clarifier option use Y103XX.

***Frequency is specified as desired channel carrier frequency +IF FREQ (MHz).

Example: SSB, USB apparent carrier or AM true carrier frequency of 4.00000 MHz equals CHANNEL CRYSTAL FREQUENCY of 4,00000 + 1.500000 or 5.500000 MHz. (+1.400000 for 1.4 MHz IF.)

When ordering new channel crystals specify whether you are ordering

CHANNEL CRYSTAL FREQUENCY OR
CHANNEL CARRIER FREQUENCY

Frequency Generator PC Board Assy. (Marine) 1A6 (continued)

ASSEMBLY: Duplex Channel Oscillator PC Board Assy PREFIX DESIGNATOR 1A6A1

REF DESIG	DESCRIPTION	PART NO.
--	Channel Oscillator	200590
C1	Cap, Mica, 270 pf, 5%, 500V	C05271
C2	Cap, Mica, 68 pf, 5%, 500V	C05680
C3	Cap, Tant, 0.1 μ f, 35V, 20%	C41048
C4	Cap, Mica, 220 pf, 5%, 500V	C05221
C5	Cap, Tant, 0.1 μ f, 35V, 20%	C41048
Q1	Transistor, NPN, 2N5180	Q51800
Q2	Transistor, NPN, 2N4123	Q41230
R1	Res, Comp, 10K, 1/4W, 5%	R20103
R2	Res, Comp, 15K, 1/4W, 5%	R20153
R3	Res, Comp, 47 , 1/4W, 5%	R20470
R4	Res, Comp, 1.2K, 1/4W, 5%	R20122
R5	Res, Comp, 3.3K, 1/4W, 5%	R20332

Parts List

Frequency Generator PC Board Assy. (Marine) 1A6 (continued)

REF DESIG	DESCRIPTION	PART NO.
<u>CLARIFIER OPTION</u> (factory installed only)		
C4	Cap, Cer, .01 μ f, 10%, 500V	C10100
C5	Cap, Cer, .01 μ f, 10%, 500V	C10100
C7	Cap, Tant, 1 μ f, 35V 10%	C41056
C8	Cap, Cer, .01 μ f, 10%, 500V	C10100
CR6	Diode, Si, 1N914	CR9140
CR7	Diode, Si, 1N914	CR9140
CR8	Diode, Si, 1N914	CR9140
CR9	Diode, Varicap, MV2107	CR0100
CR10	Diode, Si, 1N914	CR9140
L2	Choke, RF, 1 MH	L10102
Q1	Transistor, NPN, 2N4123	Q41230
Q3	Transistor, NPN, 2N4123	Q41230
R1	Res, Comp, 10K, 1/4W, 5%	R20103
R4	Res, Comp, 6.8K, 1/4W, 5%	R20682
R5	Res, Comp, 10K, 1/4W, 5%	R20103
R7	Res, Comp, 470K, 1/4W, 5%	R20474

ASSEMBLY; Frequency Generator PC Board Assy.
Selectable Sideband

PREFIX DESIGNATOR: 1A6

REF DESIG	DESCRIPTION	PART NO.
	Frequency Generator PC Board	
	6 channel	200500-6
	10 channel	200500-10
A1	Clarifier PC Board (Option)	200563
A2 thru A11	Channel Oscillator PC Board as listed below:	
	1.6-3.5 MHz	200580-1
	3.5-12.0 MHz	200580-2
	12.0-18.0 MHz	200580-3
	18.0-30.0 MHz	200580-4
C1	Cap, Cer, .01 μ f, 10%, 500V	C10100
C2	Cap, Cer, .01 μ f, 10%, 500V	C10100
C3	Cap, Cer, .01 μ f, 10%, 500V	C10100
C4	Cap, Cer, .01 μ f, 10%, 500V	C10100
C5	Cap, Cer, .1 μ f, 25V +80-20%	C11000
C6	Cap, Mica, 6 pf, 5%, 500V	C05060
C7	Cap, Air, Var, 2.2-34 pf	C60001
C8	Cap, Mica, 2000 pf, 5%, 500V	C06202
C9	Cap, Tant, 1 μ f, 35V, 10%	C41056
C10	Cap, Mica, 220 pf, 5%, 500V	C05221
C11	Cap, Cer, .01 μ f, 10%, 500V	C10100
C12	Cap, Cer, .01 μ f, 10%, 500V	C10100
C13	Cap, Cer, .01 μ f, 10%, 500V	C10100
C14	Cap, Cer, .1 μ f, 25V, +80-20%	C11000
C15	Cap, Cer, .01 μ f, 10%, 500V	C10100
C16	Cap, Mica, 6 pf, 5%, 500V	C05060
C17	Cap, Air, Var, 2.2-34 pf	C60001
C18	Cap, Mica, 2000 pf, 5%, 500V	C06202
C19	Cap, Tant, 1 μ f, 35V, 10%	C41056
C20	Cap, Mica, 220 pf, 5%, 500V	C05221
C21	Cap, Cer, .01 μ f, 10%, 500V	C10100
C22	Cap, Cer, .01 μ f, 10%, 500V	C10100
C23	Cap, Tant, 1 μ f, 35V, 10%	C41056
C25	Cap, Cer, .01 μ f, 10%, 500V	C10100
C26	Cap, Air, Var, 2.2-34 pf	C60001
C27	Cap, Mica, 18 pf, 5%, 500V	C05180
C28		
C29		
C30	Cap, Tant, 1 μ f, 35V, 10%	C41056
C31	Cap, Cer, .01 μ f, 10%, 500V	C10100

Parts List

Frequency Generator PC Board Assy (Selectable Sideband) 1A6 (continued)

REF DESIG	DESCRIPTION	PART NO.
C32	Cap, Mica, 18 pf, 5%, 500V	C05180
C33	Cap, Air, Var, 2.2-34 pf	C60001
C34		
C35	Cap, Tant, 1 μ f, 35V, 10%	C41056
C36	Cap, Mica, 2000 pf, 5%, 500V	C06202
C37	Cap, Mica, 1000 pf, 5%, 500V	C06102
C38	Cap, Tant, 1 μ f, 35V, 10%	C41056
C39	Cap, Mica, 220 pf, 5%, 500V	C05221
C40	Cap, Tant, 1 μ f, 35V 10%	C41056
C41	Cap, Mica, 100 pf, 5%, 500V	C05101
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3		
CR4	Diode, Si, 1N914	CR9140
CR5	Diode, Si, 1N914	CR9140
CR6	Diode, Si, 1N914	CR9140
CR7	Diode, Si, 1N914	CR9140
CR8	Diode, Si, 1N914	CR9140
CR9	Diode, Si, 1N914	CR9140
CR10		
CR11		
CR12	Diode, Si, 1N914	CR9140
CR13	Diode, Si, 1N914	CR9140
CR14		
CR15	Diode, Si, 1N914	CR9140
CR16	Diode, Si, 1N914	CR9140
CR17	Diode, Si, 1N914	CR9140
CR18	Diode, Si, 1N914	CR9140
CR19		
CR20		
CR21	Diode, Si, 1N914	CR9140
CR22	Diode, Si, 1N914	CR9140
CR23	Diode, Si, 1N914	CR9140
CR24	Diode, Si, 1N914	CR9140
CR25		
CR26		
CR27		
CR28		
HR1	Oven 6 channel thermostat	HR1001
	10 channel thermostat	HR1002

Frequency Generator PC Board Assy (Selectable Sideband) 1A6 (continued)

REF DESIG	DESCRIPTION	PART NO.
L1	Choke, RF, 1 MH	L10102
L2	Choke, RF, 330 μ h	L10331
L3	Choke, RF, 75 μ h	L10750
L4	Choke, RF, 1 MH	L10102
L5	Choke, RF, 100 μ h	L10101
L6	Choke, RF, 180 μ h	L10181
L7	Choke, RF, 180 μ h	L10181
Q1	Transistor, NPN, 2N5179	Q51790
Q2	Transistor, NPN, 2N4123	Q41230
Q3	Transistor, NPN, 2N4123	Q41230
Q4	Transistor, NPN, 2N4123	Q41230
Q5	Transistor, NPN, 2N4123	Q41230
Q6	Transistor, NPN, 2N4123	Q41230
Q7	Transistor, NPN, 2N4123	Q41230
Q8	Transistor, NPN, 2N4123	Q41230
Q9	Transistor, NPN, 2N5180	Q51800
Q10	Transistor, NPN, 2N4123	Q41230
R1	Res, Comp, 10, 1/4W, 5%	R20100
R2	Res, Comp, 100, 1/4W, 5%	R20101
R3	Res, Comp, 100, 1/4W, 5%	R20101
R4	Res, Var, 100, 1/4W, 20%	R88101
R5	Res, Comp, 330, 1/4W, 5%	R20331
R6	Res, Comp, 12K, 1/4W, 5%	R20123
R7	Res, Comp, 10K, 1/4W, 5%	R20103
R8	Res, Comp, 100, 1/4W, 5%	R20101
R9	Res, Comp, 27, 1/4W, 5%	R20270
R10	Res, Comp, 1K, 1/4W, 5%	R20102
R11	Res, Comp, 15K, 1/4W, 5%	R20153
R12	Res, Comp, 10K, 1/4W, 5%	R20103
R13	Res, Comp, 150K, 1/4W, 5%	R20154
R14	Res, Comp, 4.7K, 1/4W, 5%	R20472
R15	Res, Var, 5K, 1/4W, 20%	R89502
R16	Res, Comp, 10K, 1/4W, 5%	R20103
R17	Res, Comp, 10K, 1/4W, 5%	R20103
R18	Res, Comp, 1K, 1/4W, 5%	R20102
R19	Res, Comp, 100, 1/4W, 5%	R20101
R20	Res, Comp, 15K, 1/4W, 5%	R20153
R21	Res, Comp, 10K, 1/4W, 5%	R20103
R22	Res, Comp, 150K, 1/4W, 5%	R20154
R23	Res, Comp, 4.7K, 1/4W, 5%	R20472
R24	Res, Var, 5K, 1/4W, 20%	R89502
R25	Res, Comp, 10K, 1/4W, 5%	R20103

Parts List

Frequency Generator PC Board Assy. (Selectable Sideband) 1A6 (continued)

REF DESIG	DESCRIPTION	PART NO.
R26	Res, Comp, 10K, 1/4W, 5%	R20103
R27		
R28	Res, Comp, 560, 1/4W, 5%	R20561
R29	Res, Comp, 27, 1/4W, 5%	R20270
R30	Res, Var, 1K, 1/4W, 20%	R88102
R31	Res, Comp, 1.8K, 1/4W, 5%	R20182
R32	Res, Comp, 820, 1/4W, 5%	R20821
R33	Res, Comp, 150, 1/4W, 5%	R20151
R34	Res, Comp, 10K, 1/4W, 5%	R20103
R35	Res, Comp, 6.8K, 1/4W, 5%	R20682
R36	Res, Comp, 6.8K, 1/4W, 5%	R20682
R37	Res, Comp, 10K, 1/4W, 5%	R20103
R38	Res, Comp, 82K, 1/4W, 5%	R20823
R39	Res, Comp, 82K, 1/4W, 5%	R20823
R40	Res, Comp, 33K, 1/4W, 5%	R20333
R41	Res, Comp, 100, 1/4W, 5%	R20101
R42	Res, Comp, 22K, 1/4W, 5%	R20223
R43	Res, Comp, 1.2K, 1/4W, 5%	R20122
R44	Res, Comp, 100, 1/4W, 5%	R20101
R45	Res, Comp, 470, 1/4W, 5%	R20471
R46	Res, Var, 5K, 1/4W, 20%	R88502
R47	Res, Comp, 100, 1/4W, 5%	R20101
T1	Transformer, Broadband	T10200
Y1	Crystal, USB, Carrier	Y101XX**
Y2	Crystal, USB, 2nd LO	Y102XX***
Y3	Crystal, LSB, Carrier	Y101XX
Y4	Crystal, LSB, 2nd LO	Y102XX
Y5	Crystal, Channel	Y20001***
Y6	Crystal, Channel	Y20001***
Y7	Crystal, Channel	Y20001***
Y8	Crystal, Channel	Y20001***
Y9	Crystal, Channel	Y20001***
Y10	Crystal, Channel	Y20001***
Y11	Crystal, Channel	Y20001***
Y12	Crystal, Channel	Y20001***
Y13	Crystal, Channel	Y20001***
Y14	Crystal, Channel	Y20001***

**Frequency Assignment per channel frequency requirement. When ordering, specify all channel carrier frequencies being used. Refer to Table 2-1A, 2-1B.

‡ For clarifier option use Y103XX.

***Frequency is specified as desired channel carrier frequency +IF FREQ (MHz).

Example: SSB, USB apparent carrier or AM true carrier frequency of 4.00000 MHz equals CHANNEL CRYSTAL FREQUENCY of 4,00000 + 1.500000 or 5.500000 MHz. (+1.400000 for 1.4 MHz IF.)

When ordering new channel crystals specify whether you are ordering
CHANNEL CRYSTAL FREQUENCY OR
CHANNEL CARRIER FREQUENCY

Frequency Generator PC Board Assy. (Selectable Sideband) 1A6 (continued)

ASSEMBLY: Clarifier PC Board (Option)

PREFIX DESIGNATOR: 1A6A1

REF DESIG	DESCRIPTION	PART NO.
	Clarifier PC Board Assembly	200563
	with Front Panel Control Pot, w/switch	R87502
	Control Knob	MP0402
	Front Panel Label	200122-2
C1	Cap, Tant, 1 μ f, 35V, 10%	C41056
C2	Cap, Cer, .01 μ f, 10%, 500V	C10100
C3	Cap, Cer, .01 μ f, 10%, 500V	C10100
C4	Cap, Cer, .01 μ f, 10%, 500V	C10100
C5	Cap, Cer, .01 μ f, 10%, 500V	C10100
C6	Cap, Cer, .01 μ f, 10%, 500V	C10100
C7	Cap, Cer, .01 μ f, 10%, 500V	C10100
C8	Cap, Cer, .01 μ f, 10%, 500V	C10100
CR1	Diode, Si, 1N914	CR9140
CR2	Varicap Diode, MV2107	CR0100
CR3	Diode, Si, 1N914	CR9140
CR4	Diode, Si, 1N914	CR9140
CR5	Diode, Si, 1N914	CR9140
CR6	Diode, Si, 1N914	CR9140
CR7	Diode, Si, 1N914	CR9140
CR8	Diode, Si, 1N914	CR9140
CR9	Varicap Diode, MV2107	CR0100
CR10	Diode, Si, 1N914	CR9140
L1	Choke, RF, 10 mH	L10103
L2	Choke, RF, 10 mH	L10103
MP1	Screw, Nylon, 2-56 x 3/8	H4206A
MP2	Nut, Nylon, 2-56	H42000
Q1	Transistor, NPN, 2N4123	Q41230
Q2	Transistor, NPN, 2N4123	Q41230
Q3	Transistor, NPN, 2N4123	Q41230
R1	Res, Comp, 10K, 1/4W, 5%	R20103
R2	Res, Comp, 10K, 1/4W, 5%	R20103
R3	Res, Comp, 6.8K, 1/4W, 5%	R20682
R4	Res, Comp, 6.8K, 1/4W, 5%	R20682
R5	Res, Comp, 10K, 1/4W, 5%	R20103
R6	Res, Comp, 470K, 1/4W, 5%	R20474
R7	Res, Comp, 470K, 1/4W, 5%	R20474

Parts List

Frequency Generator PC Board Assy. (Selectable Sideband) 1A6 (continued)

ASSEMBLY: Channel Oscillator PC Board

PREFIX DESIGNATOR: 1A6A2
thru 1A6A11

REF DESIG	DESCRIPTION	PART NO.
	Channel Oscillator PC Board, as listed below:	
	1.6-3.5 MHz	200580-1
	3.5-12.0 MHz	200580-2
	12.0-18.0 MHz	200580-3
	18.0-30.0 MHz	200580-4
C1	Cap, Var, as listed below:	
	1.6-3.5 MHz, 2.2-34 pf	C60001
	3.5-12.0 MHz, 2.2-34 pf	C60001
	12.0-18.0 MHz, 3-17 pf	C61001
	18.0-30.0 MHz, 3-17 pf	C61001
C2	Cap, Mica, 22 pf, N470, 500V, 5%	C00053
C3	Cap, Cer, .01 μ f, 10%, 500V	C10100
C4	Cap, Mica, 5%, 500V, as listed below:	
	1.6-3.5 MHz, 390 pf	C05391
	3.5-12.0 MHz, 270 pf	C05271
	12.0-18.0 MHz, 270 pf	C05271
	18.0-30.0 MHz, 180 pf	C05181
C5	Cap, Mica, 5%, 500V, as listed below:	
	1.6-3.5 MHz, 220	C05221
	3.5-12.0 MHz, 100	C05101
	12.0-18.0 MHz, 100	C05101
	18.0-30.0 MHz, 100	C05101
C6	Cap, Cer, .01 μ f, 10%, 500V	C10100
MP1	Screw, Nylon, 2-56 x 3/8	H4206A
MP2	Nut, Nylon, 2-56	H42000
Q1	Transistor, NPN, 2N5180 (1.6-3.5 mHz) <u>OR</u> Transistor, NPN, 2N4123 (3.5-30 mHz)	Q51800 Q41230
R1	Res, Comp, 10K, 1/4W, 5%	R20103
R2	Res, Comp, 15K, 1/4W, 5%	R20153
R3	Res, Comp, 47, 1/4W, 5%	R20470
R4	Res, Comp, 1.2K, 1/4W, 5%	R20122

ASSEMBLY: Basic Option PC Board

PREFIX DESIGNATOR: 1A7

REF DESIG	DESCRIPTION	PART NO.
A1	Basic Option PC Board	200600
	CW PC Board Assembly	200660
	with Front Panel Control Pot*	R85502
	Control Knob*	MP0402
	Front Panel Label*	200122-7
	*TR Delay Only	
A2	VOX PC Board Assembly	200670
	with Front Panel Control Pot w/switch	R87502
	Control Knob	MP0402
	Front Panel Label	200122-4
A3	Squelch PC Board Assembly	200690
	with Front Panel Control Pot w/switch	R87502
	Control Knob	MP0402
	Front Panel Label	200122-1
	Diode, Si, 1N914	CR9140

NOTE

For Front Panel Interconnections
see Figure 4-9E.

Parts List

Basic Option PC Board 1A7 (continued)

ASSEMBLY: CW PC Board

PREFIX DESIGNATOR: 1A7A1

REF DESIG	DESCRIPTION	PART NO.
	CW PC Board Assembly	200660
C1	Cap, Tant, 1 μ f, 35V, 10%	C41056
C2	Cap, Mica, 1000 pf, 5%, 500V	C06102
C3	Cap, Mica, 1000 pf, 5%, 500V	C06102
C4	Cap, Mica, 2000 pf, 5%, 500V	C06202
C5	Cap, Tant, 1 μ f, 35V, 10%	C41056
C6	Cap, Tant, 10 μ f, 20V, 10%	C41064
C7	Cap, Tant, 1 μ f, 35V, 10%	C41056
C8*	Cap, Tant, 5.6 μ f, 35V, 10%	C45656
C9	Cap, Tant, .1 μ f, 35V, 20%	C41048
C10*	Cap, Tant, 1 μ f, 35V, 10%	C41056
CR1	Diode, Si, 1N914	CR9140
CR2*	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
MP1	(2) Screw, Nylon, 2-56 x 3/8	H4206A
MP2	(2) Nut, Nylon, 2-56	H42000
Q1	Transistor, PNP, 2N4125	Q41250
Q2	Transistor, NPN, 2N5172	Q51720
Q3	Transistor, NPN, 2N5172	Q51720
Q4	Transistor, NPN, 2N5172	Q51720
Q5	Transistor, NPN, 2N5172	Q51720
Q6	Transistor, PNP, 2N4125	Q41250
Q7	Transistor, NPN, 2N5172	Q51720
Q8	Transistor, NPN, 2N5172	Q51720
Q9	Transistor, PNP, 2N4125	Q41250
Q10*	Transistor, PNP, 2N4125	Q41250
Q11*	Transistor, NPN, 2N5172	Q51720
R1	Res, Comp, 12K, 1/4W, 5%	R20123
R2	Res, Comp, 33K, 1/4W, 5%	R20333
R3	Res, Comp, 1K, 1/4W, 5%	R20102
R4	Res, Comp, 22K, 1/4W, 5%	R20223
R5	Res, Comp, 56K, 1/4W, 5%	R20563
R6	Res, Comp, 180K, 1/4W, 5%	R20184
R7	Res, Comp, 180K, 1/4W, 5%	R20184
R8	Res, Comp, 68K, 1/4W, 5%	R20683

* Parts marked with an asterisk are for TR Relay option, not normally supplied with CW.

Basic Option PC Board 1A7 (continued)
CW PC Board

REF DESIG	DESCRIPTION	PART NO.
R9	Res, Comp, 10K, 1/4W, 5%	R20103
R10	Res, Comp, 22K, 1/4W, 5%	R20223
R11	Res, Comp, 4.7K, 1/4W, 5%	R20472
R12	Res, Comp, 4.7K, 1/4W, 5%	R20472
R13	Res, Comp, 4.7K, 1/4W, 5%	R20472
R14	Res, Comp, 2.2K, 1/4W, 5%	R20222
R15	Res, Comp, 3.3K, 1/4W, 5%	R20332
R16	Res, Comp, 10K, 1/4W, 5%	R20103
R17	Res, Comp, 470, 1/4W, 5%	R20471
R18	Res, Comp, 1K, 1/4W, 5%	R20102
R19	Res, Comp, 10K, 1/4W, 5%	R20103
R20	Res, Var, 10K, 1/4W, 20%	R88103
R21	Res, Comp, 4.7K, 1/4W, 5%	R20472
R22*	Res, Comp, 5.6K, 1/4W, 5%	R20562
R23*	Res, Comp, 470, 1/4W, 5%	R20471
R24*	Res, Comp, 10K, 1/4W, 5%	R20103
R25*	Res, Comp, 100, 1/4W, 5%	R20101
R26	Res, Comp, 10K, 1/4W, 5%	R20103
R27*	Res, Var, 5K, 1/4W, 20%	R88502

*Parts marked with an asterisk are for TR Relay option,
not normally supplied with CW.

Parts List

Basic Option PC Board 1A7 (continued)

ASSEMBLY: VOX PC Board

PREFIX DESIGNATOR: 1A7A2

REF DESIG	DESCRIPTION	PART NO.
	VOX PC Board	200670
C1	Cap, Tant, 10 μ f, 20V, 10%	C41064
C2	Cap, Cer, .01 μ f, 10%, 500V	C10100
C3	Cap, Mylar, .22 μ f, 10%, 100V	C20220
C4	Cap, Mylar, .047 μ f, 10%, 100V	C20047
C5	Cap, Cer, .01 μ f, 10%, 500V	C10100
C6	Cap, Tant, 22 μ f, 15V, 10%	C42263
C7	Cap, Cer, .01, 10%, 500V	C10100
C8	Cap, Tant, 1 μ f, 35V, 10%	C41056
C9		
C10	Cap, Tant, 1 μ f, 35V, 10%	C41056
C11	Cap, Tant, 1 μ f, 35V, 10%	C41056
C12	Cap, Tant, 1 μ f, 35V, 10%	C41056
C13	Cap, Cer, .01 μ f, 10%, 500V	C10100
C14	Cap, Cer, .001 μ f, 10%, 500V	C10010
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
CR4		
CR5	Diode, Si, 1N914	CR9140
CR6	Diode, Si, 1N914	CR9140
CR7	Diode, Si, 1N914	CR9140
CR8	Diode, Si, 1N914	CR9140
L1	Choke, RF, 750 μ h	L10751
MP1	(2) Screw, Nylon 2-56 x 3/8	H4206A
MP2	(2) Nut, Nylon 2-56	H42000
Q1	Transistor, NPN, 2N5172	Q51720
Q2	Transistor, PNP, 2N4125	Q41250
Q3	Transistor, NPN, 2N5172	Q51720
Q4	Transistor, PNP, 2N4125	Q41250
Q5	Transistor, NPN, 2N5172	Q51720
Q6	Transistor, NPN, 2N5172	Q51720
Q7	Transistor, NPN, 2N5172	Q51720
Q8	Transistor, NPN, 2N5172	Q51720
R1	Res, Comp, 22K, 1/4W, 5%	R20223
R2	Res, Comp, 2.2K, 1/4W, 5%	R20222
R3	Res, Comp, 560, 1/4W, 5%	R20561
R4	Res, Comp, 470, 1/4W, 5%	R20471

Basic Option PC Board 1A7 (continued)
 VOX PC Board 1A7A2

REF DESIG	DESCRIPTION	PART NO.
R5	Res, Comp, 4.7K, 1/4W, 5%	R20472
R6	Res, Comp, 1K, 1/4W, 5%	R20102
R7	Res, Comp, 560, 1/4W, 5%	R20561
R8	Res, Comp, 470, 1/4W, 5%	R20471
R9		
R10	Res, Comp, 1K, 1/4W, 5%	R20102
R11	Res, Var, 10K, 1/4W, 20%	R89103
R12	Res, Comp, 10, 1/4W, 5%	R20100
R13	Res, Comp, 10K, 1/4W, 5%	R20103
R14	Res, Comp, 27K, 1/4W, 5%	R20273
R15	Res, Var, 5K, 1/4W, 20%	R88502
R16	Res, Comp, 4.7K, 1/4W, 5%	R20472
R17	Res, Comp, 100, 1/4W, 5%	R20101
R18	Res, Comp, 1 meg, 1/4W, 5%	R20105
R19	Res, Comp, 1K, 1/4W, 5%	R20102
R20*	Res, Var, 5K, 1/4W, 20%	R88502
R21	Res, Comp, 10K, 1/4W, 5%	R20103
VR1	Diode, Zener 1N754A	VR7540

*Used in absence of front panel control.

Parts List

Basic Option PC Board 1A7 (continued)

ASSEMBLY: Squelch PC Board

PREFIX DESIGNATOR: 1A7A4

REF DESIG	DESCRIPTION	PART NO.
	Squelch PC Board	200690
C1	Cap, Tant, 10 μ f, 20V, 10%	C41064
C2	Cap, Cer, .01 μ f, 10%, 500V	C10100
C3	Cap, Mylar, .22 μ f, 10%, 100V	C20220
C4	Cap, Mylar, .047 μ f, 10%, 100V	C20047
C5	Cap, Cer, .01 μ f, 10%, 500V	C10100
C6	Cap, Tant, 1 μ f, 35V, 10%	C41056
C7	Cap, Cer, .01 μ f, 10%, 500V	C10100
C8	Cap, Tant, 5.6 μ f, 35V, 10%	C45656
C9	Cap, Tant, 1 μ f, 35V, 10%	C41056
C10	Cap, Tant, 100 μ f, 6V, 10%	C41072
C11	Cap, Cer, .01 μ f, 10%, 500V	C10100
C12	Cap, Tant, 10 μ f, 20V, 10%	C41064
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
MP1	(2) Screw, Nylon, 2-56 x 3/8	H4206A
MP2	(2) Nut, Nylon	H42000
Q1	Transistor, NPN, 2N5172	Q51720
Q2	Transistor, PNP, 2N4125	Q41250
Q3	Transistor, NPN, 2N5172	Q51720
Q4	Transistor, PNP, 2N4125	Q41250
Q5	Transistor, NPN, 2N5172	Q51720
Q6	Transistor, PNP, 2N4125	Q41250
Q7	Transistor, NPN, 2N1613	Q16130
R1	Res, Comp, 22K, 1/4W, 5%	R20223
R2	Res, Comp, 1.5K, 1/4W, 5%	R20152
R3	Res, Comp, 680, 1/4W, 5%	R20681
R4	Res, Comp, 560, 1/4W, 5%	R20561
R5	Res, Comp, 470, 1/4W, 5%	R20471
R6	Res, Comp, 4.7K, 1/4W, 5%	R20472
R7	Res, Comp, 10K, 1/4W, 5%	R20103
R8	Res, Comp, 1K, 1/4W, 5%	R20102
R9	Res, Comp, 470, 1/4W, 5%	R20471
R10	Res, Comp, 2.7K, 1/4W, 5%	R20272
R11	Res, Comp, 2.2K, 1/4W, 5%	R20222
R12	Res, Comp, 22K, 1/4W, 5%	R20223
R13	Res, Comp, 10K, 1/4W, 5%	R20103

Basic Option PC Board 1A7 (continued)
Squelch PC Board 1A7A4

REF DESIG	DESCRIPTION	PART NO.
R14	Res, Comp, 22K, 1/4W, 5%	R20223
R15	Res, Comp, 1K, 1/4W, 5%	R20102
R16	Res, Var, 10K, 1/4W, 20%	R88103
R17	Res, Comp, 22K, 1/4W, 5%	R20223
VR1	Diode, Zener, 1N754A	VR7540

Parts List

ASSEMBLY: Duplex Frequency Generator PC Board Assy. PREFIX DESIGNATOR: 1A8

REF DESIG	DESCRIPTION	PART NO.
--	Duplex Frequency Generator PC Board	210550
A1	Duplex Channel Oscillator PC Board Assy	200590
C1	Cap, Var, 2.2-34 pf	C60001
C2	Cap, Var, 2.2-34 pf	C60001
C3	Cap, Var, 2.2-34 pf	C60001
C4	Cap, Var, 2.2-34 pf	C60001
C5	Cap, Var, 2.2-34 pf	C60001
C6	Cap, Var, 2.2-34 pf	C60001
C7	Cap, Var, 2.2-34 pf	C60001
C8	Cap, Var, 2.2-34 pf	C60001
C9	Cap, Var, 2.2-34 pf	C60001
C10	Cap, Var, 2.2-34 pf	C60001
C11	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C12	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C13	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C14	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C15	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C16	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C17	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C18	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C19	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C20	Cap, Cer, 18 pf, 500V, N150, 5%	C00052
C21	Cap, Cer, .01 μ f, 10%, 500V	C10100
C22	Cap, Cer, .01 μ f, 10%, 500V	C10100
C23	Cap, Cer, .01 μ f, 10%, 500V	C10100
C24	Cap, Cer, .01 μ f, 10%, 500V	C10100
C25	Cap, Cer, .01 μ f, 10%, 500V	C10100
C26	Cap, Cer, .01 μ f, 10%, 500V	C10100
C27	Cap, Tant, 1 μ f, 35V, 10%	C41056
C28	Cap, Cer, .01 μ f, 10%, 500V	C10100
C29	Cap, Cer, .01 μ f, 10%, 500V	C10100
CR1	Diode, Si, 1N914	CR9140
CR2	Diode, Si, 1N914	CR9140
CR3	Diode, Si, 1N914	CR9140
CR4	Diode, Si, 1N914	CR9140
CR5	Diode, Si, 1N914	CR9140
CR6	Diode, Si, 1N914	CR9140
CR7	Diode, Si, 1N914	CR9140
CR8	Diode, Si, 1N914	CR9140
CR9	Diode, Si, 1N914	CR9140
CR10	Diode, Si, 1N914	CR9140

Duplex Frequency Generator 1A8 (continued)

REF DESIG	DESCRIPTION	PART NO.
CR11	Diode, Si, 1N914	CR9140
CR12	Diode, Si, 1N914	CR9140
CR13	Diode, Si, 1N914	CR9140
CR14	Diode, Si, 1N914	CR9140
CR15	Diode, Si, 1N914	CR9140
CR16	Diode, Si, 1N914	CR9140
CR17	Diode, Si, 1N914	CR9140
CR18	Diode, Si, 1N914	CR9140
CR19	Diode, Si, 1N914	CR9140
CR20	Diode, Si, 1N914	CR9140
CR21	Diode, Si, 1N914	CR9140
CR22	Diode, Si, 1N4002, 1.5A, 100V	CR4002
CR23	Diode, Si, 1N4002, 1.5A, 100V	CR4002
CR24	Diode, Si, 1N4002, 1.5A, 100V	CR4002
CR25	Diode, Si, 1N4002, 1.5A, 100V	CR4002
HR1	Oven, 10 Crystal	HR1005-5
K1	Relay, Reed, SPST, 12 VDC	210020
K2	Relay, Reed, SPST, 12 VDC	210020
K3	Relay, Reed, SPST, 12 VDC	210020
K4	Relay, Reed, SPST, 12 VDC	210020
K5	Relay, Reed, SPST, 12 VDC	210020
K6	Relay, Reed, SPST, 12 VDC	210020
K7	Relay, Reed, SPST, 12 VDC	210020
K8	Relay, Reed, SPST, 12 VDC	210020
K9	Relay, Reed, SPST, 12 VDC	210020
K10	Relay, Reed, SPST, 12 VDC	210020
L1	Choke, RF, 1 MH	L10102
Q1	Transistor, Si, NPN, 2N5179	Q51790
R1	Res, Comp, 10 , 1/4W, 5%	R20100
R2	Res, Comp, 100 , 1/4W, 5%	R20101
R3	Res, Comp, 100 , 1/4W, 5%	R20101
R4	Res, Comp, Var, 100 , 1/4W, 20%	R88101
R5	Res, Comp, 330 , 1/4W, 5%	R20331
R6	Res, Comp, 12K , 1/4W, 5%	R20123
R7	Res, Comp, 10K, 1/4W, 5%	R20103
R8	Res, Comp, 27 , 1/4W, 5%	R20270
T1	Transformer, Broadband	T10200

Parts List

Duplex Frequency Generator 1A8 (continued)

REF DESIG	DESCRIPTION	PART NO.
Y1	Crystal, Channel	Y20001
Y2	Crystal, Channel	Y20001
Y3	Crystal, Channel	Y20001
Y4	Crystal, Channel	Y20001
Y5	Crystal, Channel	Y20001
Y6	Crystal, Channel	Y20001
Y7	Crystal, Channel	Y20001
Y8	Crystal, Channel	Y20001
Y9	Crystal, Channel	Y20001
Y10	Crystal, Channel	Y20001

NOTE

For crystal ordering information
see Frequency Generator Crystals.

Duplex Frequency Generator 1A8 (continued)

ASSEMBLY: Duplex Channel Oscillator PC Board Assy. PREFIX DESIGNATOR: 1A8A1

REF DESIG	DESCRIPTION	PART NO.
C1	Cap, Mica, 270 pf, 5%, 500V	C05271
C2	Cap, Mica, 68 pf, 5%, 500V	C05680
C3	Cap, Tant, 0.1 μ f, 35V, 20%	C41048
C4	Cap, Mica, 220 pf, 5%, 500V	C05221
C5	Cap, Tant, 0.1 μ f, 35V, 20%	C41048
Q1	Transistor, NPN, 2N5180	Q51800
Q2	Transistor, NPN, 2N4123	Q41230
R1	Res, Comp, 10K, 1/4W, 5%	R20103
R2	Res, Comp, 15K, 1/4W, 5%	R20153
R3	Res, Comp, 47 , 1/4W, 5%	R20470
R4	Res, Comp, 1.2K, 1/4W, 5%	R20122
R5	Res, Comp, 3.3K, 1/4W, 5%	R20332



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