sunair electronics, inc.
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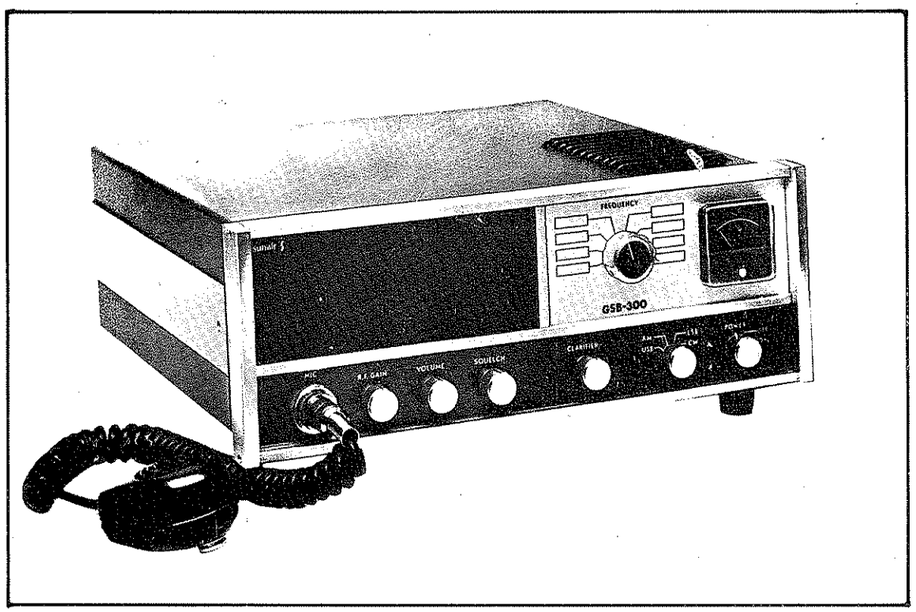

INSTRUCTION MANUAL

SSB
COMMUNICATIONS EQUIPMENT
GSB-300 SYSTEM

NOTICE
Important equipment information may be contained in the addendums located in the last section of this manual.

1st EDITION, 1 JANUARY 1973
MANUAL PART NUMBER 97904

WARRANTY POLICY

MARINE AND GROUND PRODUCTS

Sunair Electronics warrants equipment manufactured by it to be free from defects in material or workmanship, under normal use for which intended, for the lesser of one (1) year from the date of purchase or 18 months from date of shipment by Sunair.

Sunair will repair or replace, at its option, any defective component of the equipment (excluding tubes, crystals, fuses-pilot lights and solid state devices on which the warranty is limited to 90 days and on the conditions herein stated) returned to it at its factory, transportation prepaid, within such warranty period.

For a period of 90 days from date of purchase Sunair will repair any defective equipment returned to it at its factory, transportation charges prepaid. No reimbursement will be made for non-factory repair charges.

This warranty is void if equipment is modified or repaired without authorization, subjected to misuse, abuse, accident, water damage or other neglect, or has its serial number defaced or removed, or if warranty registration card is not returned to Sunair within 10 days of date of purchase.

THIS WARRANTY IS ESPECIALLY IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The obligation and responsibility of Sunair shall be limited to that expressly provided herein and Sunair shall not be liable for consequential or other damage or expense whatsoever therefore or by reason thereof.

Sunair reserves the right to make changes in design or additions to or improvements in its equipment without obligation to install such additions or improvements in equipment theretofore manufactured.

GD-7074

sunair electronics, inc.

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SECTION I

A. INTRODUCTION

The GSB-300 is a modularized high-performance, multi-channel HF SSB transceiver, designed to provide wide range communications capability. It provides up to 8 crystal controlled channels anywhere within the range of 1.6 to 30 MHz. The basic system consists of a single unit, containing receiver/exciter, power supply and power amplifier, capable of providing communication in USB or AM (compatible) modes. However, with the addition of options the GSB-300 may be utilized as a teleprinter, facsimile or data scrambler station; provide communications via telephone lines, operate in CW mode or drive more than one antenna. The versatility of the GSB-300 is nearly unlimited.

B. SPECIFICATION FOR THE GSB-300 TRANSCEIVER

*Frequency Range	2 to 30 MHz
Number of Channels	8 Maximum
Modes of Operation	USB and AM (Compatible) Optional LSB and CW
Input/Output Impedance	50 Ohms Unbalanced
Input Voltage	115/230 VAC ±15% 50-60Hz 12/24 VDC ±15%
Temperature Range	-20°C to +55°C
Humidity	Up to 95% at +55°C
Weight (AC Model)	11.3 Kg (25lb)
Size	(13.3Hx38Wx36D)CM(5¼"x15"x14")
Meter Monitor	Power Output, Rec. Sig., A+, PA Cathode Current.

*9.5 to 12 MHz Guard Frequencies, Extended Range Available to 1.6 MHz

TRANSMITTER:

Power Output	(AC Model).....	SSB: 100W Average AM : 25W Average
	(DC Model).....	SSB: 100W PEP (50W Average) AM : 25W Average
Duty Cycle	(AC Model).....	100%
	(DC Model).....	50%
Intermodulation Distortion..		-30db
Carrier Suppression		-40db
Unwanted Sideband Suppression.		-40db
Harmonic Suppression		-35db (50db with coupler)

RECEIVER:

Sensitivity	SSB: 0.5uv for 10db S+N/N AM : 2.0uv for 10db S+N/N	
Selectivity	SSB: 6db, f_c+300Hz to f_c+3000Hz 60db, f_c-1500Hz to f_c+5000Hz AM : 6db 8kHz 50db 30kHz	
AGC	20db 5 to 100,000 uv	
Audio Output	3W	
Audio Distortion	Less than 10%	
Clarifier Range	±100Hz	
RF Gain Control	60db	
IF & Image Rejection	60db	

C. EQUIPMENT SUPPLIED

Transceiver,GSB-300 with 115 or 230 VAC Power Supply	97892
or	
Transceiver,GSB-300 with 24VDC Power Supply	97892
or	
Transceiver,GSB-300 with 12VDC Power Supply	97892
and	
Power Cord, 115/230 VAC 8'	97901
or	
Power Cord, 12/24 VDC 12'	97899
Microphone, Hand Held	97887
Handbook	97904

D. EQUIPMENT REQUIRED BUT NOT SUPPLIED

Antenna Coupler,GCU-310 Use With 24VDC/115/230VAC GSB-300	99527
or	
Antenna Coupler,GCU-310 Use With 12VDC GSB-300	99526
and C. Jones P-310-CCT-L	
Cable,Coupler Control with Connectors(Specify Length)	99628
and Connector: GSB 7540S - GCU 7535Y	
Cable,Coaxial RG-58A/U with Connectors(Specify Length)	99638
or Cannon CA3106R-18-19S	
Cable,Coaxial RG-8/U with Connectors (Specify Length)	99629

Antenna, Fixed Base 150'	99921
or	
Antenna, Fixed Base 75'	99920
or	
Antenna, Fixed Base 23' Whip with Flange Mount.	71576
or	
Antenna, Marine 23' Whip	71298
Mount, Lay Down with Bracket for Antenna P/N 71298	71299
Antenna, Marine 24' Whip	71286
Mount For Antenna P/N 71286	71287
Antenna, Mobile 16' Whip	71295
Antenna, Mobile 9' Whip	71297
Mount,Bumper, For Antenna P/N 71295 and 71297	71573
Mount,Surface 60° Ball for P/N 71295 and 71297	71574

E. OPTIONAL EQUIPMENT NOT SUPPLIED

32 TO 28V REGULATOR	97832
CW Module	99632
Telegraph Key	97855
Manual Phone Patch Module	99622
Squelch Module	97854
Mobile Mounting Rack	97894
Shockmount Kit	99631
Transistorized Mic	99936
600 Ohm Module, 4 Wire	99416
Handset	99939
Headset	99633
Desk Microphone	99935
Doublet Antenna Kit	99624

Multiple Antenna Output	97877
Wide Band Filter (In Place of Standard Filter)	81828
LSB Filter	81825
Remote Control GRC-350	97903
Remote Control Cable Without Connector	58868
Remote Control Cable (Factory Fabricated)	99626
Teleprinter, GTE-355	
Keyer/Converter GTE-340	
Loop Power Supply GTE-357	
Cable, Interconnecting (GSB-300 to Teleprinter)	97806
Facsimile Machine, GTE-360	
Interconnecting Cable (GSB-300 to Fax)	97805
Voice Data Scrambler GTE-380	
GSB-300 Depot Spares Kit	99528

F. The Sunair GSB-300 has been designed to be a compact and highly dependable system. In addition, special effort has been made to provide a high degree of operator convenience. All functional controls of the GSB-300 are located on the front panel. The control functions and indicators located on the front panel are:

OFF-ON SWITCH. This control activates all receive and low level transmit circuits in the transceiver, and provides primary power to the antenna coupler GCU-310.

MODE SELECTOR. This control selects the desired mode of operation. Either USB and AM or optional LSB and CW.

CLARIFIER. This control varies the pitch of the received sideband signal for optimum clarity.

SQUELCH(Optional). This control silences the receiver audio in the absence of an incoming signal, and sets the threshold of signal strength required for reception.

VOLUME. This control varies the audio gain of the receiver for optimum listening level.

RF GAIN. This control varies the receiver sensitivity for best reception,

CHANNEL. This switch selects the proper band of operation in the transceiver and antenna coupler.

METER. Monitors transmitter output power and signal strength. Also monitors A+ and PA cathode current when meter selector located within transceiver is switched.

INDICATOR. Provides visual indication that on-off switch is turned on.

MICROPHONE CONNECTOR. This connector accepts the hand-held microphone supplied with the GSB-300 or the optional handset and desk microphone.

MANUAL PHONE PATCH (Optional). This switch activates all circuitry required to provide reception and transmission utilizing a two wire telephone system.

The rear panel of the GSB-300 contains:

a. The connector for the coupler control cable.

b. The RF output/input connector or up to three additional connectors for use with multiple antennas.

c. The primary power connector

d. The primary power fuse

e. The two or four wire balanced 600 ohm input/output

f. The CW key jack (optional)

g. The headphone jack (optional)

h. The remote control connector (optional)

Included within the GSB-300 is a modular AC or optional DC power supply, the driver, power amplifier and receiver exciter. The latter consists of six plug-in, and two hard wired printed circuit boards. An additional three plug in boards are supplied with the phone patch, CW, squelch and FSK, FAX interface.

SECTION II
INSTALLATION

A. GENERAL

Adherence to the suggestions and instructions contained in this section will assure an easier and more satisfactory installation of the GSB-300 SSB Communications System.

B. UNPACKING

Unpack and inspect all parts and equipment as soon as received. Do not accept a shipment where there are visible signs of damage to the cartons until a complete inspection is made. If there is shortage or if any evidence of damage is noted, insist on a notation to that effect on the shipping papers before signing the receipt from the carrier.

If concealed damage is discovered after a shipment has been accepted, notify the carrier immediately in writing and await his inspection before making any disposition of the shipment. A full report of the damage should also be forwarded to Sunair. Include the following:

(a) Order number
(b) Model and serial number
(c) Name of transportation agency

When Sunair receives this information arrangements will be made for repair or replacement.

C. INSTALLATION CONSIDERATIONS AND MOUNTING INFORMATION

The satisfactory operation of the equipment will depend upon the care and thoroughness taken during the installation.

IMPORTANT INSTRUCTIONS

1. Installation Procedures and Requirements

   a. Carefully plan radio/coupler/antenna locations, observing the following requirements before starting installation.

   b. Provide best possible RF ground for radio and coupler. Use flat copper strap 1" wide or #6 or larger wire. Connect to ground terminal at rear of transceiver with shieldbraid. Leads to ground system should be as short as possible.

c. Provide maximum separation between coupler output and the radio with its associated wiring. Coupler may be mounted 50 ft. from radio if RG58 rf cable is used, or further if RG8 is used.

d. Antenna lead from antenna coupler to antenna must be insulated for at least 10kv potential. The lead should not run parallel to metal fittings or other metal objects that are bonded to the system ground. The coupler should be as close to the antenna as possible, and never more than 3 ft. as this will decrease antenna effeciency.

e. If the radio is installed on a wood or fiber glass boat, approximately 10 to 12 square feet of metal surface area in contact with the water should be provided for use as an RF ground.

f. Check for correct polarity before applying power.

g. Tune the coupler with the transmitter in the AM mode. Refer to coupler manual for detailed tuning procedure.

h. A thru-line watt meter should be used for coupler tuning. Tune for zero reflected power.

i. Pin 8 of the Antenna Coupler connector (key line) can be wired and routed to the coupler location with the channeling wires, to enable keying the transmitter from the coupler during tuning.

j. During tests on installations, a battery charger, alternator, or generator should be operating to maintain a nominal voltage supply to the transceiver.

Linear amplifiers with low level modulation will oscillate if the RF power output is radiated or conducted into the low level stages. Evidence of this situation would be erratic or excessive power output. This is caused by too close proximity of the coupler output and antenna to the transmitter and or inadequate RF grounds. Carefully following the above procedures should prevent this from occuring.

2. <u>DO NOT</u>

a. Do not tune the transmitter final amplifier to the coupler/antenna system impedance.

b. Do not mount the radio closer than 3 feet to ships compass. The installation should be carefully planned be-

forehand in accordance with drawings on the following pages. After the units have been installed by the procedure shown in the Antenna Coupler Manual supplied with the equipment, it is absolutely necessary to tune the coupler to avoid damage to the power amplifier and for successful communications. The antenna coupler must be final tuned to match the antenna.

3. Type and Location of Antenna to be Installed

It is recommended that a fixed wire antenna with an antenna coupler be used with a fixed station or a marine installation. If this is impractical or undesirable a whip antenna can be used. For mobile use a whip antenna with an antenna coupler must be used.

4. Factors To Consider Before Installing a Fixed Antenna

a. Recommended Length - It is recommended that the longest antenna practical be installed. Sunair has coupler tuning data for 150 and 75 foot end fed wire antennas and also for six recommended whip antennas. Tuning will vary between various installations but the easiest tune-up will result if one of these standards is selected. Consideration should be given to keeping the antenna as far away from metallic stays and masts as possible as their proximity will effect tuning and antenna performance.

b. Location of Antenna Coupler - The antenna coupler should be installed within 3 feet of the antenna.

c. Antenna Kits - See Section I-D for listing of Sunair Antenna Kits.

d. Configuration of Antenna - For best performance from a fixed wire antenna an inverted V or L antenna is recommended as shown in Fig. II-3A. If this type of V antenna is not practical or is undesirable, a single sloping wire should be used with the open end as high as shown in Fig. II-3B. If the end point of the antenna is terminated on a metal mast it should be tied off at least two feet from the mast.

e. If more than one antenna is desired the multiple antenna option provides an additional three output connectors which may feed seperate antenna couplers or a tuned dipole.

5. Factors To Consider Before Installing a Whip Antenna

a. Recommended Antenna - See Section I-D above for listing of Sunair antenna kits.

b. Location of Antenna Coupler - The antenna coupler should be located as close as possible and not exceeding 3 feet from the antenna terminal since the output of the coupler is the beginning of the antenna. The insulation on the antenna feed wire should be capable of withstanding 10kv.

6. Installation of the GSB-300 Transceiver

a. Base Station Installation - The GSB-300 should be installed in a convenient location near the operator. The top should be clear from obstructions by at least 1" to allow proper ventilation. Connect the GSB-300 system as shown in Fig. II-3.

b. Mobile Installation - The GSB-300 is designed to be mounted under the dash of an automobile or truck with mounting cradle #97894 and/or shockmount kit #99631 as shown in Fig. II-4 with the coupler mounted as close as possible to the antenna. Poor performance will result if the coupler feed to the antenna is not kept to less than 1 foot and the wire should not be sandwiched between metal panels but should pass through all metal partitions at right angles through adequate insulation. The antenna feed wire insulation must be adequate for 10kv.

c. Marine Installation - The GSB-300 should be installed in a convenient location near the operator and it can be mounted with Sunair mounting cradle #97894 and/or shockmount kit #99631, as shown in Figure II-5.

d. Mobile and Base Installation - Using Sunair P/N 97894 mounting cradle, as shown in Figure II-2.

D. CABLING

The GSB-300 installation cables should be fabricated according to the interconnecting diagram Fig. II-6. The antenna coupler control connectors are supplied with the GCU-310, a 12' DC, or 8' AC power cord is supplied with the GSB-300. Coaxial cable, coaxial connectors and control cable must be purchased separately. See Sec. ID

The length of the installation cable will depend upon the location of the equipment. When ordering cable separately or factory fabricated cable the following information must be furnished:

a. Cable length from power source to GSB-300

b. Cable length from GSB-300 to GCU-310

c. Cable length from GRC-350 to GSB-300

E. CHECKS AND ADJUSTMENTS AFTER INSTALLATION

1. Turn on the GSB-300 system.

2. Channeling - Check the channeling of the antenna coupler by visual inspection and by listening to the channeling of the unit, while the channel selector is slowly turned from channel 1 to 8 and from 8 to 1 on the GSB-300. Repeat the above procedure if the GSB-300 system is to be operated from a remote position using the GRC-350. Wiring on the coupler wafer switches is color coded: Brown-1, Red-2, and etc.

3. Transmitter Output - AM - Connect a wattmeter and a 50 ohm dummy load to J13, place the mode selector in the AM position. Check the transmitter output on all active channels. The meter located on the front panel will be indicating the transmitter output. A wattmeter reading of 20 to 25 watts is normal. Front panel meter should also deflect and indicate relative power.

4. Transmitter Output - SSB - Set the mode selector to USB position. Press the microphone button and speak into the microphone. Notice there is power output only when speaking into the microphone. The wattmeter should show peak readings of 25 to 30 watts when speaking in a normal tone of voice. Whistling into the microphone (single tone) should result in a power output of 100 watts nominal. Front panel meter should also indicate relative power.

5. Antenna Coupler - Disconnect the wattmeter and connect the antenna coax to J13. Set mode selector to the AM position. It is necessary to tune the coupler using instructions outlined in the Antenna Coupler Manual, to prevent damage to the power amplifier.

6. Squelch (Optional) - Set Squelch knob to CW position. Turn volume up; there should be audio or noise in the

audio system. Then rotate squelch knob CCW. Audio should be silenced if signal is not greater than approximately 50 microvolts.

7. Volume Control - With receiver unsquelched, rotate the volume control clockwise and check for increase in audio output.

8. Clarifier - Select a channel that has SSB traffic, and vary the clarifier slowly until normal voice pitch is heard.

9. RF Gain Control - Slowly rotate RF gain control counter clockwise. A reduction of audio noise should result, and front panel meter should indicate signal strength required to override the reduction of gain.

10. Ignition and Other Noise (Mobile & Marine) - After the GSB-300 system has been checked using battery power, start the engine and turn the equipment on. Check all channels for any ignition interference or generator noise. An ignition noise suppression kit, plus spark plug suppressors, is recommended for reduction of engine electrical noise.

F. MARINE INSTALLATION AND OPERATION

1. Location Selection

a. Locate antenna coupler close to antenna, with the shortest lead possible.

b. Locate GSB-300 for convenient operating position.

c. Protect GSB-300 from sea spray and excessive dampness.

d. Locate all system components at least two feet from the ship's magnetic compass.

2. The Ground System

a. A good "ground" system is essential for the satisfactory performance of the antenna system.

b. The degree of its effectiveness depends on the area in contact with the water.

c. The larger the "ground" area, the lower the resistance, therefore, the lower the losses.

d. The "ground plate" should be fabricated of copper or brass securely fastened to the vessel below the water line.

e. Total exposed area should be no less than 10 to 12 square feet, when used in salt water. Fresh water usage requires two to three times more area.

f. A metal sheathed keel is desirable and may be used as part, or all of the "ground plate", if the area exposed to the water is sufficient.

g. Select a point on the hull or keel line directly below the GSB-300 Transceiver to tie all ground plates and straps together. Use 1/2" brass bolts thru hull or keel. Braze all bolts to plates and straps.

h. All feed-thru bolts may be strapped together, on the inside of the hull to provide maximum exposure for inspection maintenance.

i. Engine blocks, fuel tanks, fresh water tanks and all metal framework should be bonded together in a common

network to prevent electrolysis. Tie this bonded network with additional straps, to the nearest radio ground feedthru bolt. This will reduce noise, electrolysis and improve the efficiency of the antenna system. If copper strap is not available, use #4 AWG wire, or larger for bonding to the ground system.

j. An inadequate ground system may result in transmitter oscillation in the transmit mode on some channels. All available metal objects near the transceiver should be strapped together with the transceiver, and then bonded to the vessel ground system. Necessity for a good ground system for effective communications cannot be overstressed.

3. Power Line Connections

a. The GSB-300 Transceiver has been designed to operate on a nominal voltage source of 12.6 or 24 VDC, negative ground only, and 115/230 VAC 50/60 Hz.

WARNING

b. Connect power leads directly to the battery terminals. Do not connect thru power leads or switches, which are common to other electrical circuits. Following this practice allows the battery to absorb any voltage spikes that may occur on the battery line, thus providing additional transient protection for the transceiver.

c. NOTE: Recommended wire sizes for wiring from radio set to the battery.

12V	Wire Length	24V
See wiring	Up to 10 feet	AWG 12
diagram Fig. II-6	Up to 25 feet	AWG 10

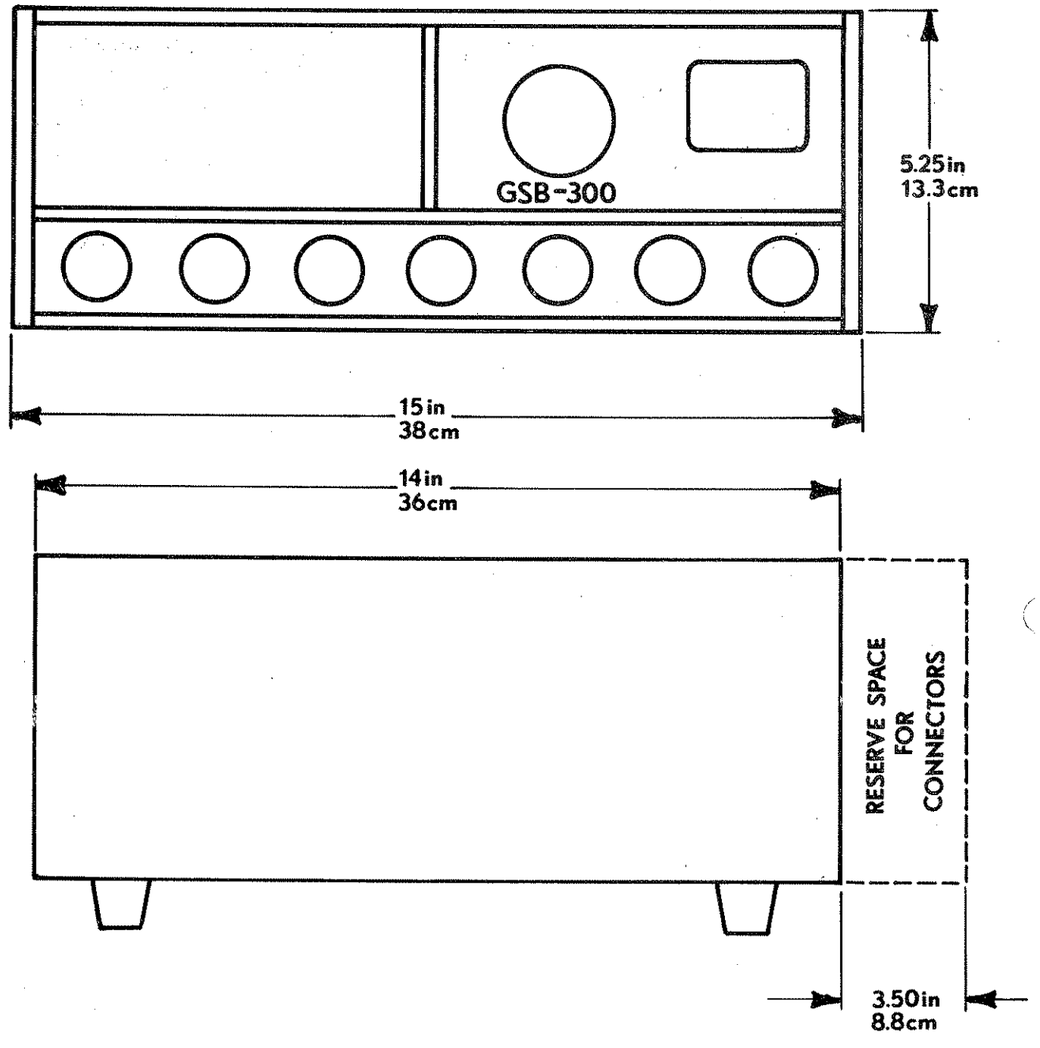
4. Antenna Installation

a. Sunair recommends wherever possible, the use of 75 or 150 foot long wire antenna in conjunction with a GCU-310 Coupler. This configuration offers the best possible performance at all frequencies.

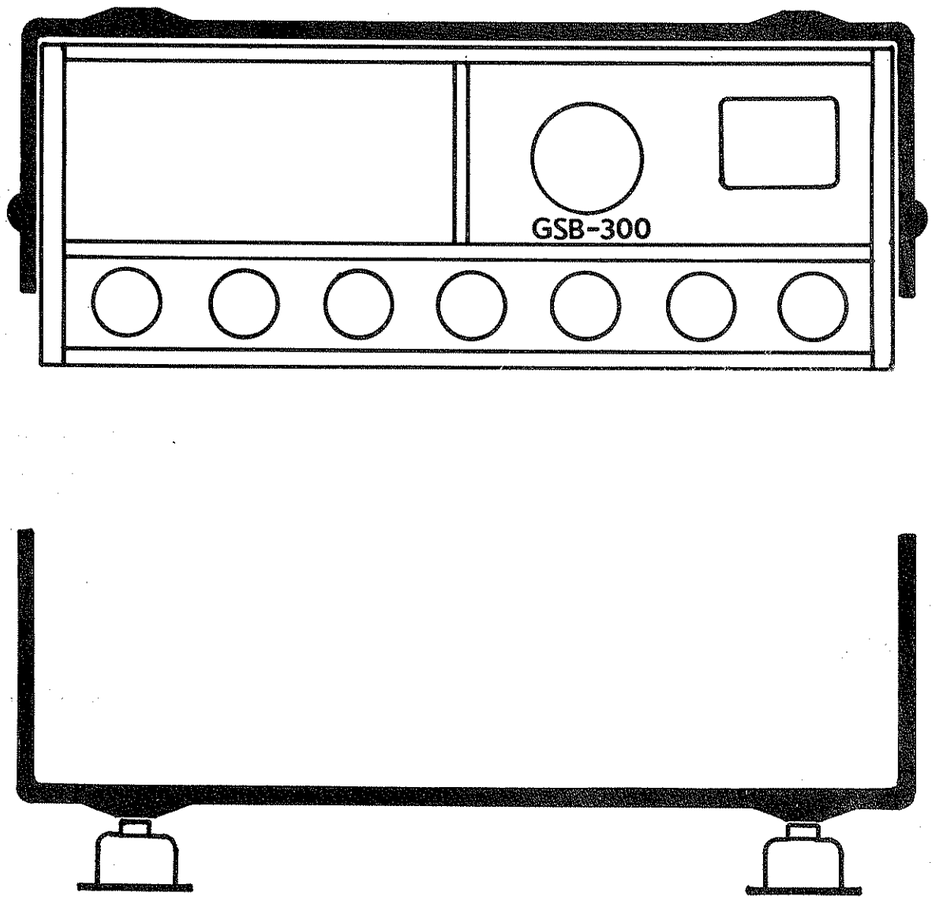
b. Where space limitations do not permit use of a long wire antenna, an alternate antenna system would be the use of a Vertical Whip Antenna, with the GCU-310 Coupler.

c. In all marine antenna installations, it is extremely important that the antenna be mounted as high as possible and clear of all obstructions.

d. If it becomes necessary to mount the antenna coupler on the flying bridge of a wood or fibreglass vessel, it is imperative that all electrical equipment and metal objects, such as steering gear, metal railings, canopy frames and etc., be securely bonded with copper strap or #4 AWG wire or larger to the coupler chassis and the vessels ground system. This is to prevent a high resistance in the ground circuit, which could lead to transmitter oscillation and a serious degrading of optimum system performance.



GSB-300 OUTLINE DIMENSIONS
FIGURE NO II-1



CRADLE MOUNTING DETAIL
FIGURE NO II-2

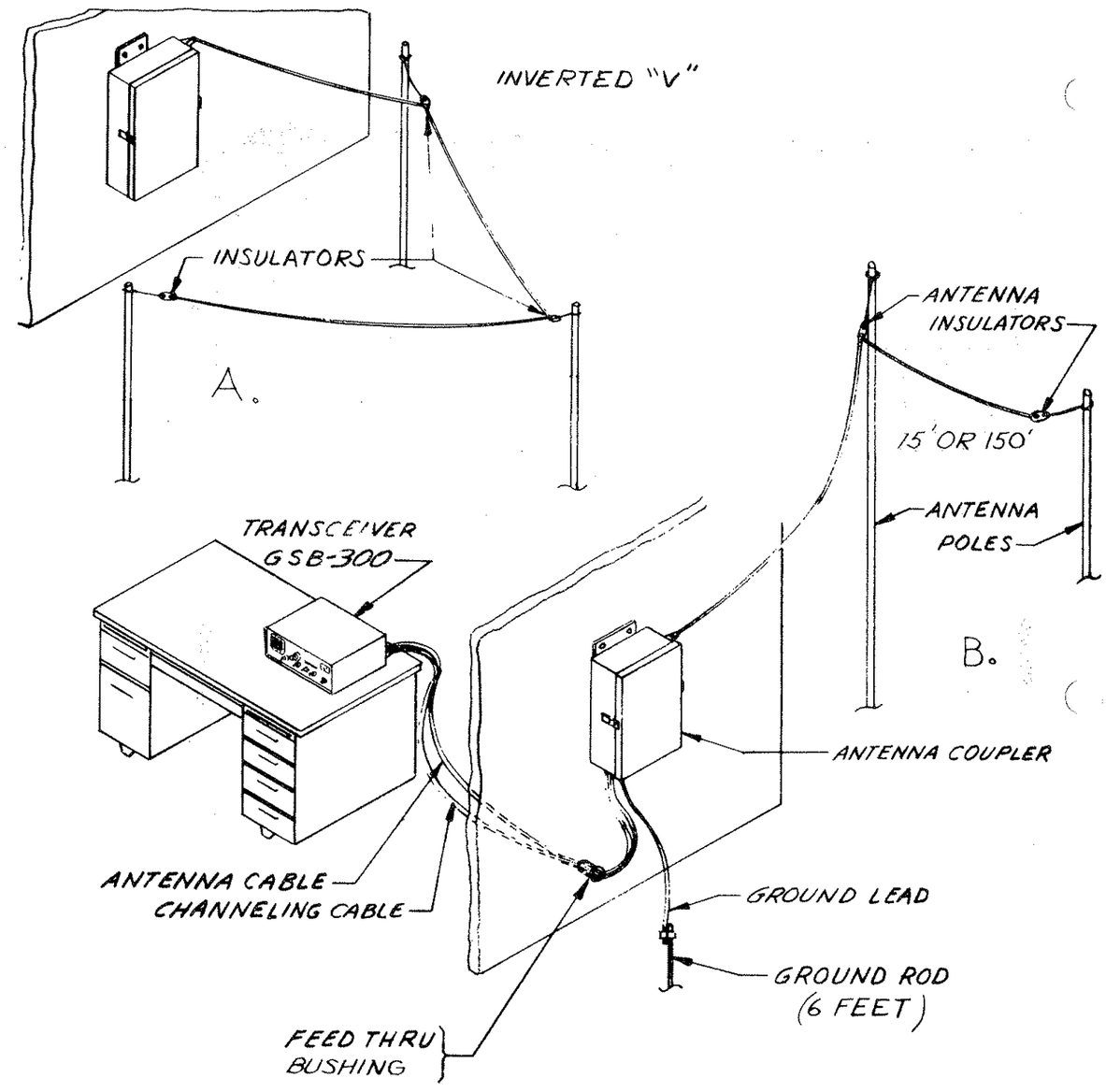


FIGURE NO. II-3
BASE STATION INSTALLATION, TRANSCEIVER

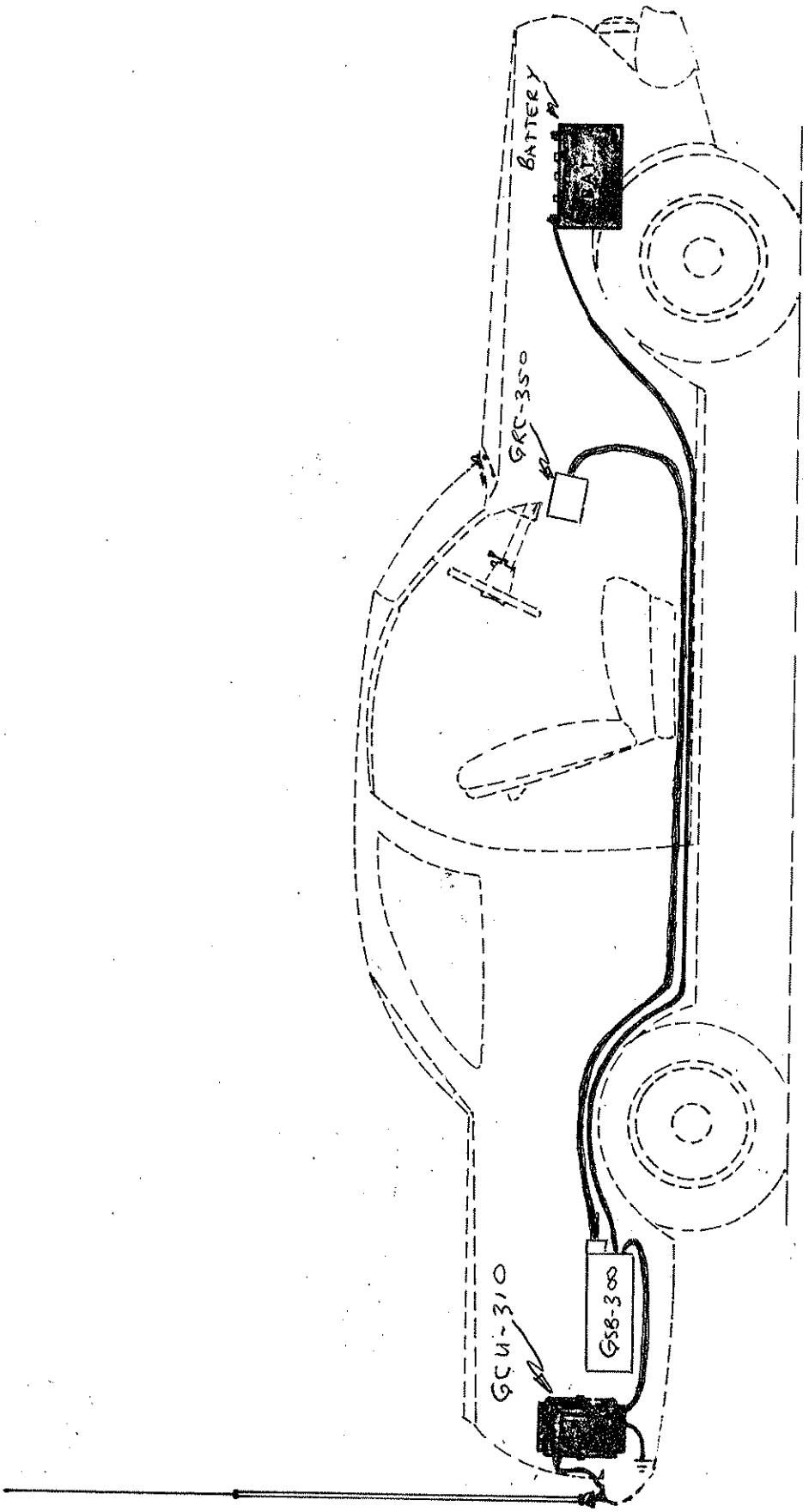


FIGURE NO. II-4

MOBILE INSTALLATION, TRANSCEIVER

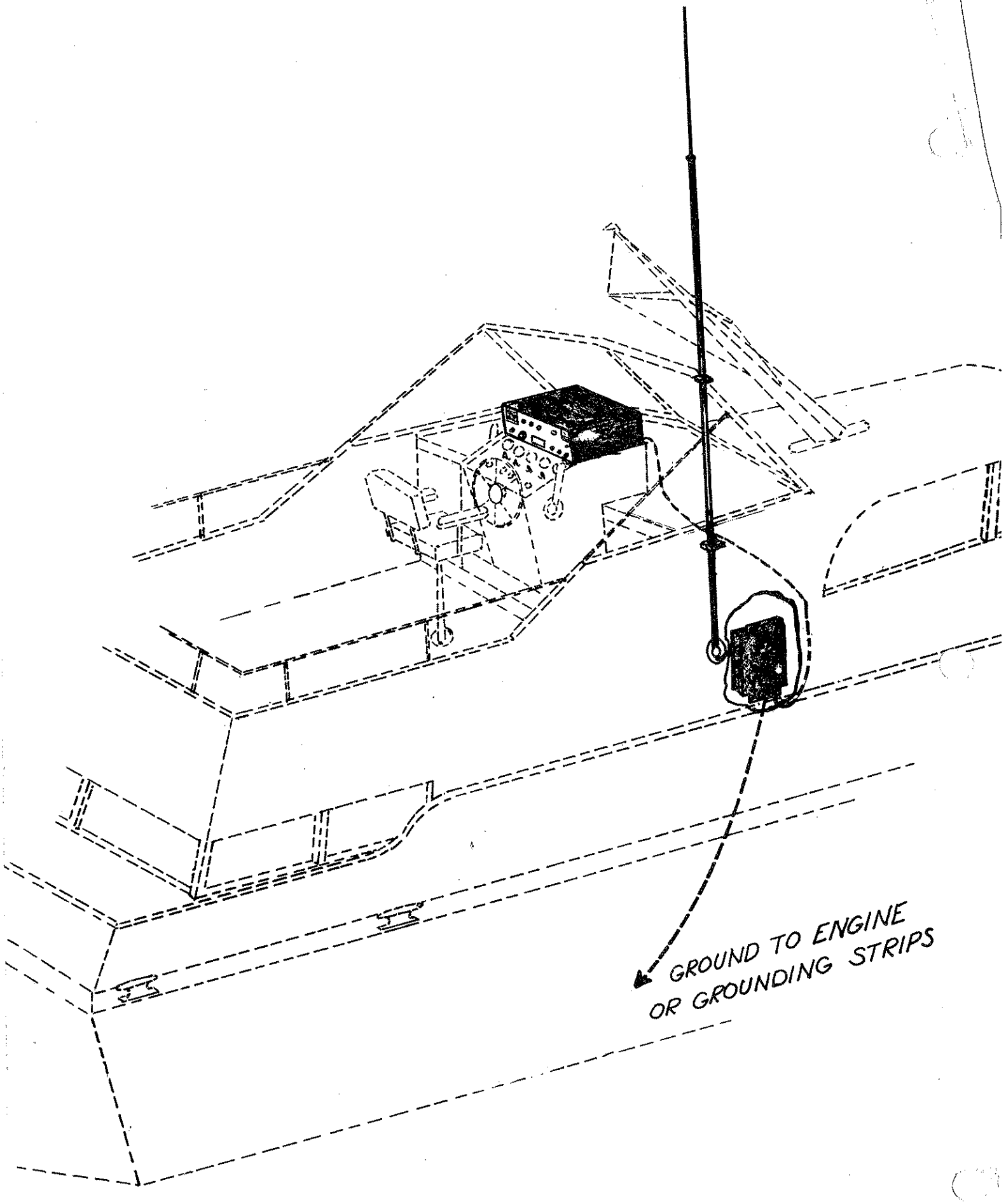


FIGURE NO. II-5
MARINE INSTALLATION, TRANSCEIVER

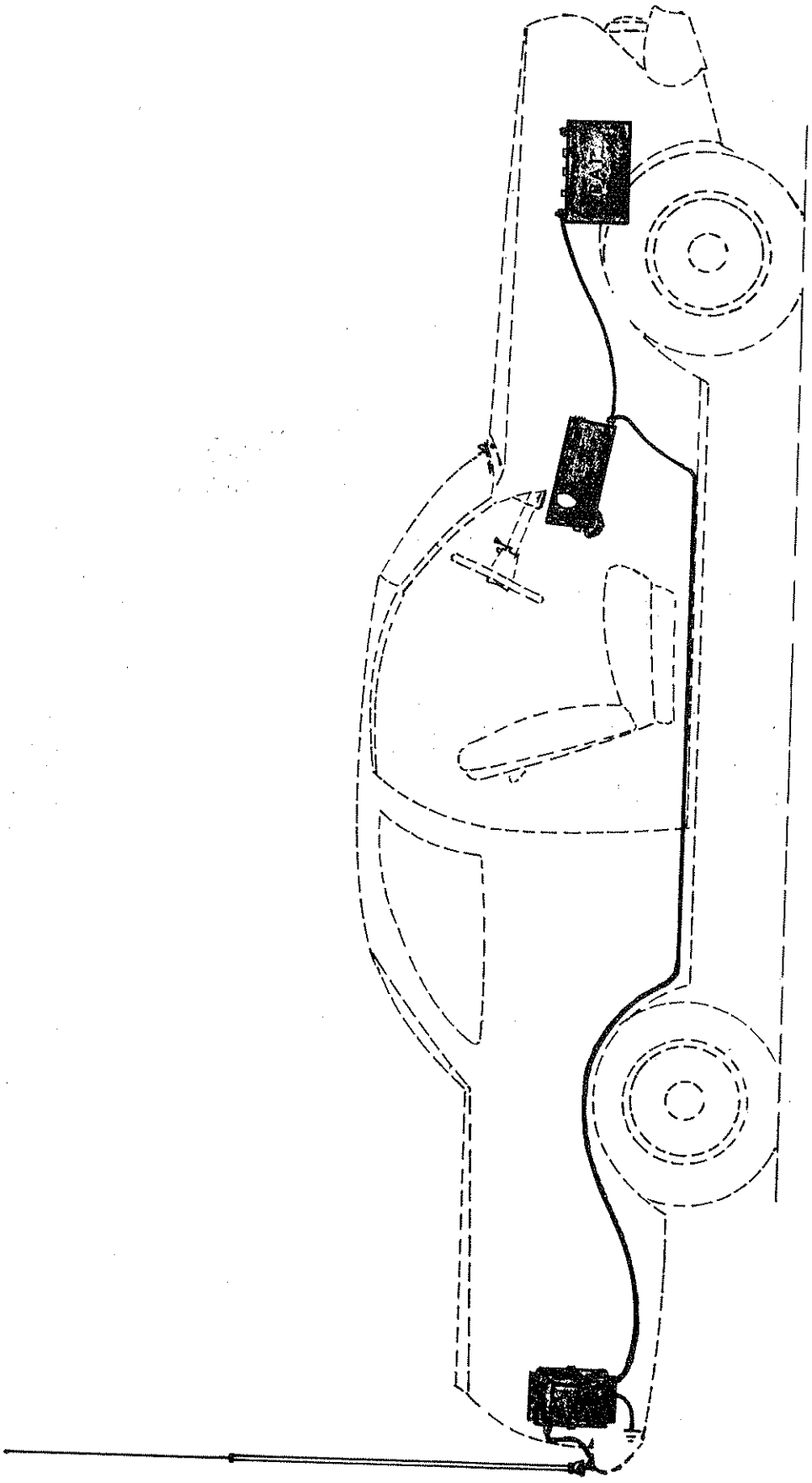


FIGURE NO. II-4
MOBILE INSTALLATION, TRANSCEIVER

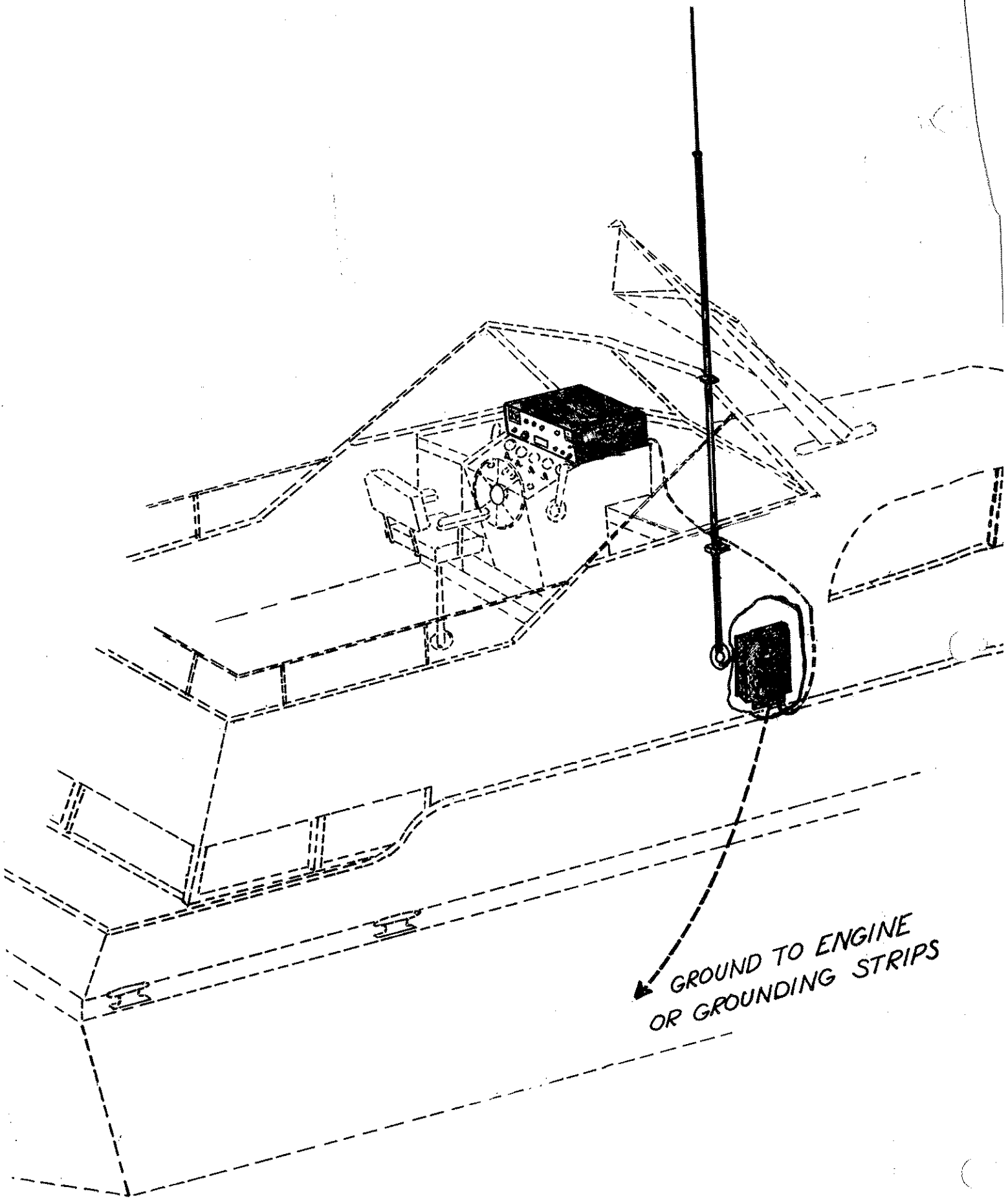
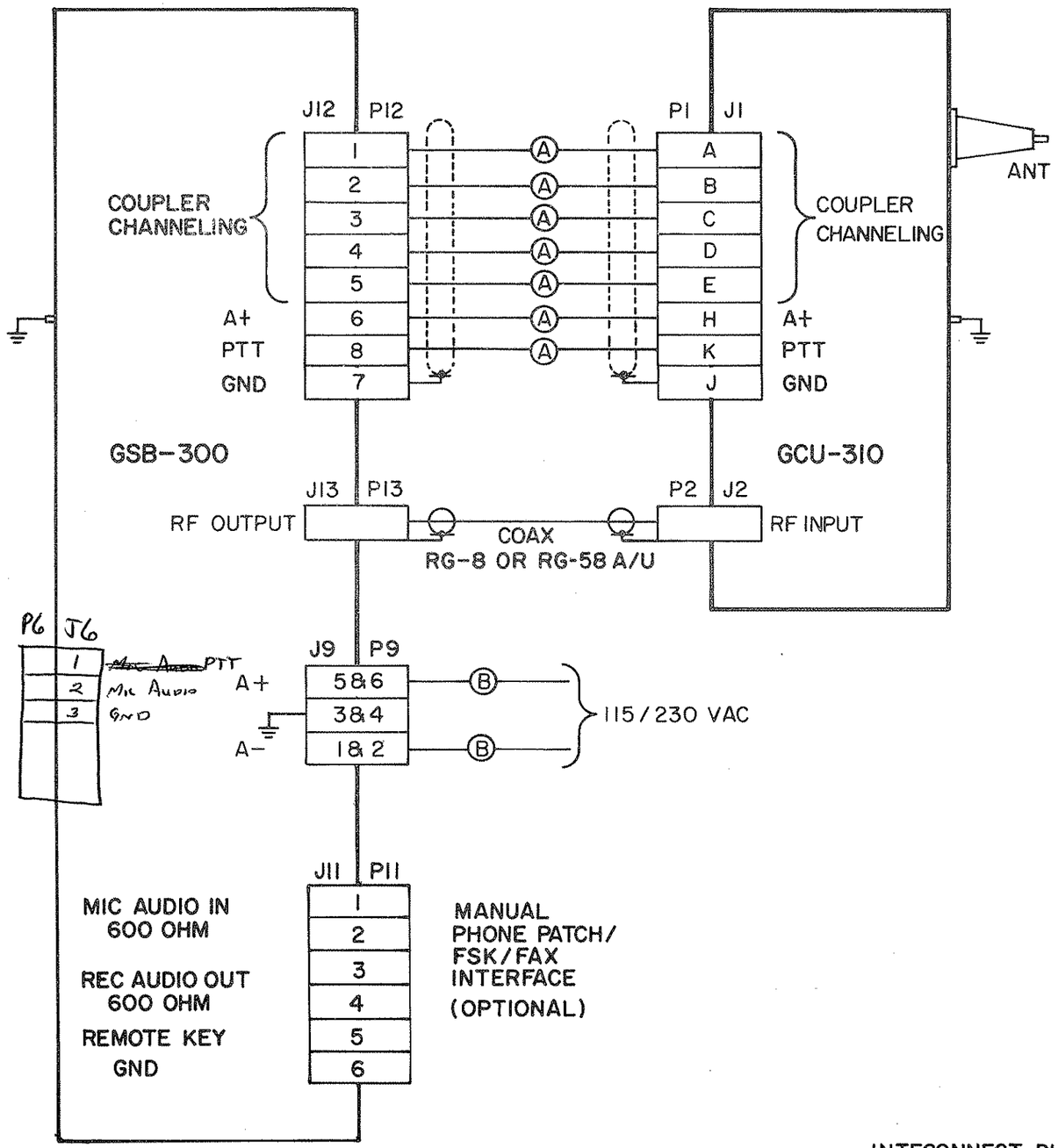


FIGURE NO. II-5
MARINE INSTALLATION, TRANSCEIVER



SIZE	12V	LENGTH	24V	115/230 VAC
A	No 20	LESS THAN 24 FT	No20	No 20
	No 18	MORE THAN 24 FT LESS THAN 39 FT	No 18	No 18
	No 16	MORE THAN 39 FT	No16	No 16
B	SEE NOTE 5	UP TO 10 FT	No 12	3 WIRE A/C POWER CORD
		UP TO 25 FT	No10	No 18

NOTES

1. UNLESS OTHERWISE INDICATED WIRES (INCLUDING SHIELDED SHOULD BE AWG No 24 OR LARGER.
2. ALL SHIELDED WIRE INSULATED TYPE.
3. CAOX CABLE RG-8 OR RG-58 A/U.
4. COUPLER CHANNELING WIRES MAY BE INDIVIDUAL SHIELDED TYPE OR UNSHIELDED WITH CABLE COVERED WITH SHIELDED BRAID.
5. FOR 12V OPERATION No 10 WIRE MAY BE USED IF BUS IS NOT MORE 5 FEET FROM TRANSCEIVER, FOR DISTANCES GREATOR CONNECT No 12 WIRE TO A TERMINAL STRIP AND RUN No 8 AWG TO SHIPS BUS.
6. ANTENNA COUPLER MUST BE ADEQUATELY BOUNDED TO RF GROUND. USE No 10 OR 12 AWG WIRE OR 1 INCH WIDE COPPER STRAP TIED TO SHIPS GROUND.
7. ALL CONNECTORS EXCEPT COAXIAL CONNECTORS SUPPLIED WITH EQUIPMENT.

INTECONNECT DIAGRAM GSB-300 SYSTEM
FIGURE II-6

SECTION III
OPERATION

A. GENERAL

The GSB-300 HF Transceiver is simple to operate, requiring only a knowledge of the type of emission required and channel frequency. All controls are conveniently located on the front panel.

B. OPERATING PROCEDURE

1. Turn the ON-OFF switch to the ON position. Allow a five minute warm-up period for single sideband or one minute for AM operation.

2. Select desired frequency channel

3. Select desired mode of operation. USB, AM or optional LSB, CW.

4. Turn RF GAIN CONTROL fully clockwise

5. Turn VOLUME CONTROL clockwise for desired listening level.

6. In the presence of a strong incoming signal the RF GAIN CONTROL may be rotated counterclockwise to reduce the receiver gain and achieve a better signal to noise ratio.

7. When the mode of reception is single sideband the CLARIFIER CONTROL should be adjusted for best voice clarity.

8. Turn the SQUELCH CONTROL (OPTIONAL) fully clockwise. In the absence of an incoming signal rotate the control slowly counterclockwise until the receiver noise is silenced. The incoming signal, if greater than the noise level will de-activate the squelch circuit for normal reception.

9. The front panel meter will indicate signal strength in the presence of an incoming signal.

10. To transmit, depress the microphone button and talk. Speak loud enough for midscale swings on the front panel meter in sideband operation. The microphone gain potentiometer R-102 may be adjusted for proper modulation.

11. To transmit CW (OPTIONAL) the mode switch must be turned to the CW position and the telegraph key connected to J10. The mode of emission on CW is A3J (Upper sideband).

12. PHONE PATCH OPERATION (OPTIONAL) When this option is installed the system operates normal when the Phone patch switch located on the front panel is in the "OFF" position. When in the "RCV" position the receiver audio is connected to phone line at J11. When the switch is in the "TX" position the audio signal on the phone line is transmitted.

SECTION IV
PRINCIPLES OF OPERATION

A. GENERAL

This Section contains the principles of operation for the GSB-300.

In single sideband (SSB) transmission, only one sideband is used to carry the intelligence. The carrier is suppressed and the unwanted sideband is attenuated, leaving the desired sideband. Thus the entire power capability of the transmitter is utilized to transmit only the necessary portion of the signal. There is no output from the transmitter except when speech modulation is present. For this reason, SSB transmitters are rated in peak envelope power (PEP).

In compatible AM transmission, again only the upper sideband is transmitted. However, the carrier is not suppressed and therefore, is also transmitted. Since only one sideband is transmitted, this form of emission is essentially still single sideband but with a full carrier, which the receiver uses as the reference for detection.

The GSB-300 transmits in two modes, both single sideband: suppressed carrier (A3J) and full carrier (Compatible AM, A3H). In addition to receiving each of the above it will also receive normal AM or double sideband.

The receiver/exciter unit is completely transistorized and, therefore, requires very little power for operation. The power amplifier uses pentodes for final power amplification to 100 watts peak envelope power (PEP). Frequency stability is maintained by crystal-controlled oscillators. The crystals are housed in ovens at a constant +75^{o}C to insure precise frequency stability. A regulated voltage supply for the oscillators further insures frequency stability. A warm-up time of five minutes is required to allow the crystals to reach their operating temperature and the frequency to stabilize. The units can operate on either 12 or 24 VDC nominal voltage, negative ground, or 115 & 230 VAC.

Nominal voltage to most circuits in the receiver/exciter is +10 VDC regulated.

Final power amplification requires +325 VDC, 650 VDC and -65 VDC furnished by the power supply.

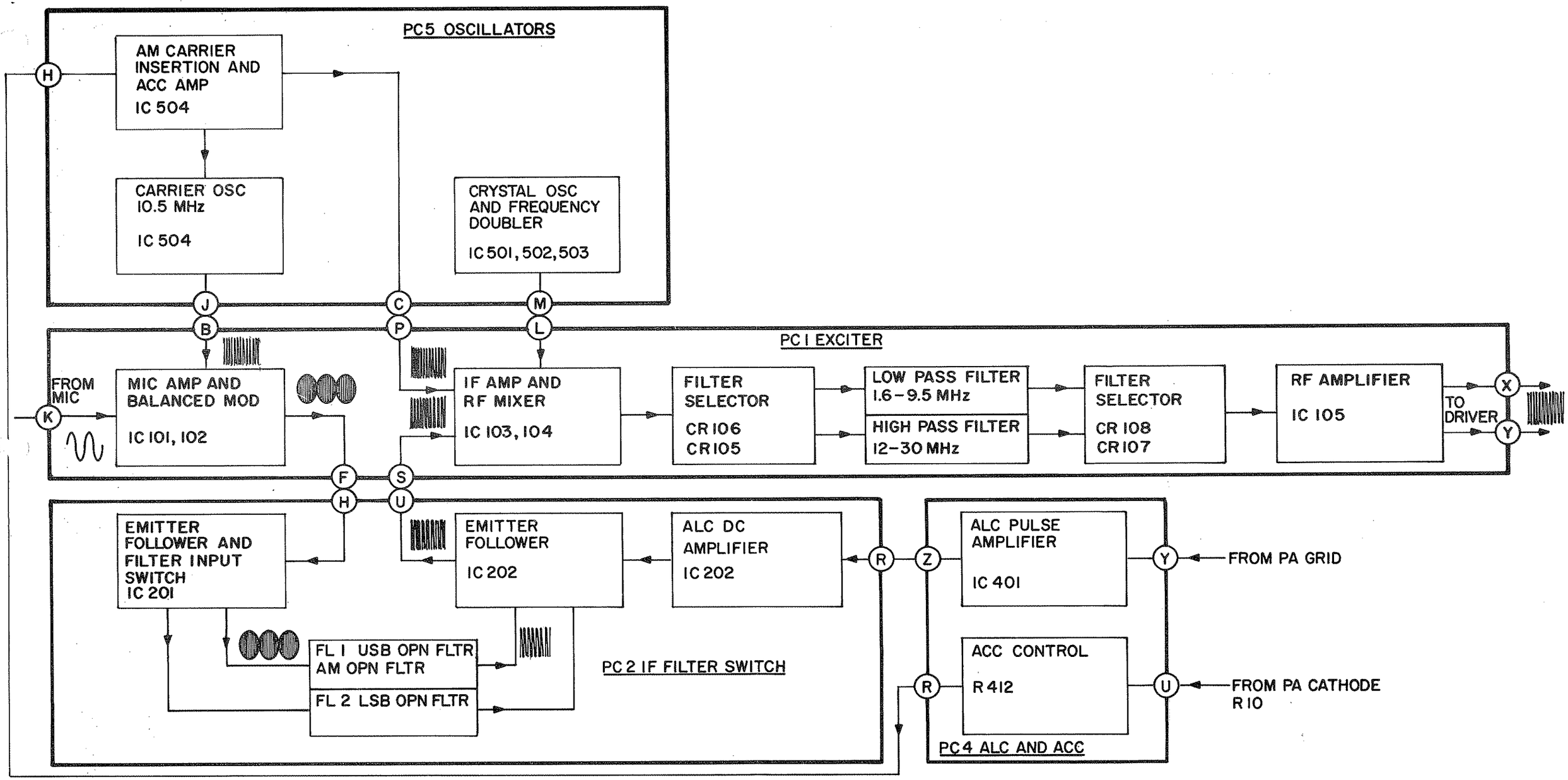


FIGURE IV-1
BLOCK DIAGRAM, EXCITER

B. EXCITER

The receiver/exciter unit contains all transmitter circuitry except for the final power amplifiers, which are contained in the power amplifier section. Figure IV-1 is a block diagram of the basic elements of the exciter. The component numbers in the blocks refer to the symbols on the schematic diagram.

1. Microphone Amplifier (PC-1)

The microphone amplifier provides current for the microphone thru R-102 the audio gain adjustment. Audio amplifier IC102-3 amplifies the voice signal and drives the isolation stage IC101-3 which presents a low source impedance to the balanced modulator. During AM operation, since equal amounts of carrier and sideband must be used to achieve 100% modulation and the overall peak level must not exceed that when operating in SSB, CR102 switches collector loads of amplifier IC102-3 and reduces the gain by 6db.

2. Balanced Modulator (PC-1)

The balanced modulator consists of IC101 and IC102. In the absence of audio modulation the carrier, (10.5 MHz) inserted on bases of the signal switches IC101-1 and IC102-2 is balanced since the quiescent current supplied by IC101-5 and IC102-5 is equalized by the balance adjustment R110 and the inserted carrier present at the collector of IC101-1 is 180° out of phase with the carrier present at the collector of IC102-1. Since these collectors are electrically connected the resultant output across L101 is cancelled. However, in the presence of modulation, the quiescent bias current is changed at the audio rate and each switch IC101-1 and IC102-1 switch the audio envelope to the collector load L101 at the rate of the carrier oscillator frequency. The resultant translated audio modulation consists of a sideband spaced above and below the suppressed carrier frequency by the audio frequency.

3. IF Filter Selector (PC-2)

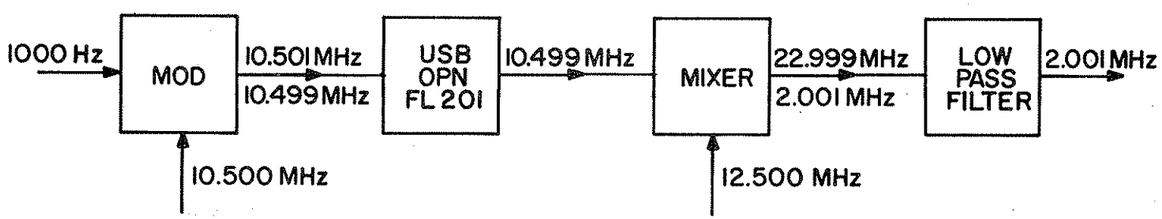
The double sideband signal from the balanced modulator is applied to the base of isolation stage IC201-1. The filter selecting networks, CR205 and IC201-4 for USB and AM OPERATION, CR206 and IC201-3 for LSB OPERATION at the input of FL1 and FL2 respectively only allow signal to pass to the selected filter. In the network that is not selected the diode is reverse biased and blocks the signal path from the emitter of IC201-1 while the transistor is gated "on" and short circuits the input to the filter. This double attenuation

provides excellent isolation between filters. Depending upon the filter selected the resultant output is a single sideband signal. That is, either upper or lower sideband with suppressed carrier. CR214 and CR215 at the output of FL1 and FL2 respectively provide additional isolation since the diode associated with the filter not selected is reverse biased. The single sideband signal is then coupled to isolation stage I202-3.

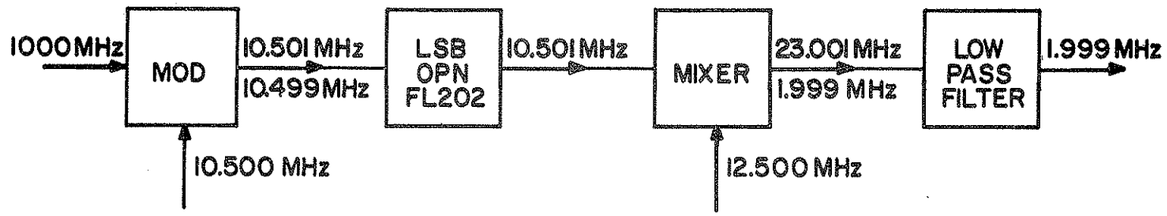
4. Mixer and RF Amp (PC-1)

The single sideband IF signal is coupled from the emitter of IC202-3 to amplifier IC103-3. During either USB or LSB OPERATION the carrier has been suppressed in the balanced modulator; however, in AM OPERATION full carrier is again re-inserted thru CR104. The addition of these two frequencies produces COMPATIBLE AM OPERATION, full carrier with only one sideband. The collector of IC103-3 is coupled to a double balanced single ended mixer. In the absence of either the channel oscillator or the IF signal no output exists at the collectors of IC103-2 and IC104-2. However, when both signals are present the resultant output will be the sum and difference of the channel oscillator and IF frequency. These frequencies are then coupled to a low or high pass elliptical filter thru input and output isolation diodes CR6, CR5 and CR8, CR7. When output frequencies from 2-9.5 MHz are required the low pass filter is activated, when output frequencies from 12 to 30 MHz are required the high pass filter is selected. The desired product from the mixer is always the difference between the channel oscillator and the IF frequency. The frequency translation from audio to single sideband RF is illustrated below.

UPPER SIDEBAND OPERATION



LOWER SIDEBAND OPERATION



The RF frequency passed by the low or high pass filter is amplified by IC-105-3 and 4. The collector transformer then drives the class AB push pull output stage, IC-105-1 and 2. Balanced transformer T103 then couples signal to the grid of the drive V1.

5. ALC PC-2 and PC4

Automatic load control, ALC, is provided by pulse amplifiers IC401-1, IC401-3, and DC amplifier IC202-5. As the peak excursion of the RF signal at the grids of V2 and V3 exceeds the fixed negative bias supplied thru R-12 a negative pulse due to grid current is developed across R-12. L10, and C41 block any RF and only the negative pulse is coupled thru C44 to the base of pulse amplifier IC401-1. The pulse is inverted at the collector of IC401-1 and CR4 short-circuits any negative overshoot. The amplified positive pulse is then applied to the base of isolation stage IC401-3. CR402 and C404 in the emitter circuit produce a pulse with a fast rise, and slow decay time for rapid ALC action and no chopping at low audio modulation frequencies. This pulse is then applied to DC amp IC202-5 which conducts and shunts signal away from the input of IC202-3, reducing the loop gain of the system.

6. ACC PC-5 and PC-4

Automatic Carrier control, ACC, maintains a constant level of carrier output in compatible AM operation. As V2 and V3 conduct due to carrier signals on the grids the DC voltage developed across R10 is coupled thru ACC adjustment R412 to the base of IC504-1.The emitter of IC504-1 forces

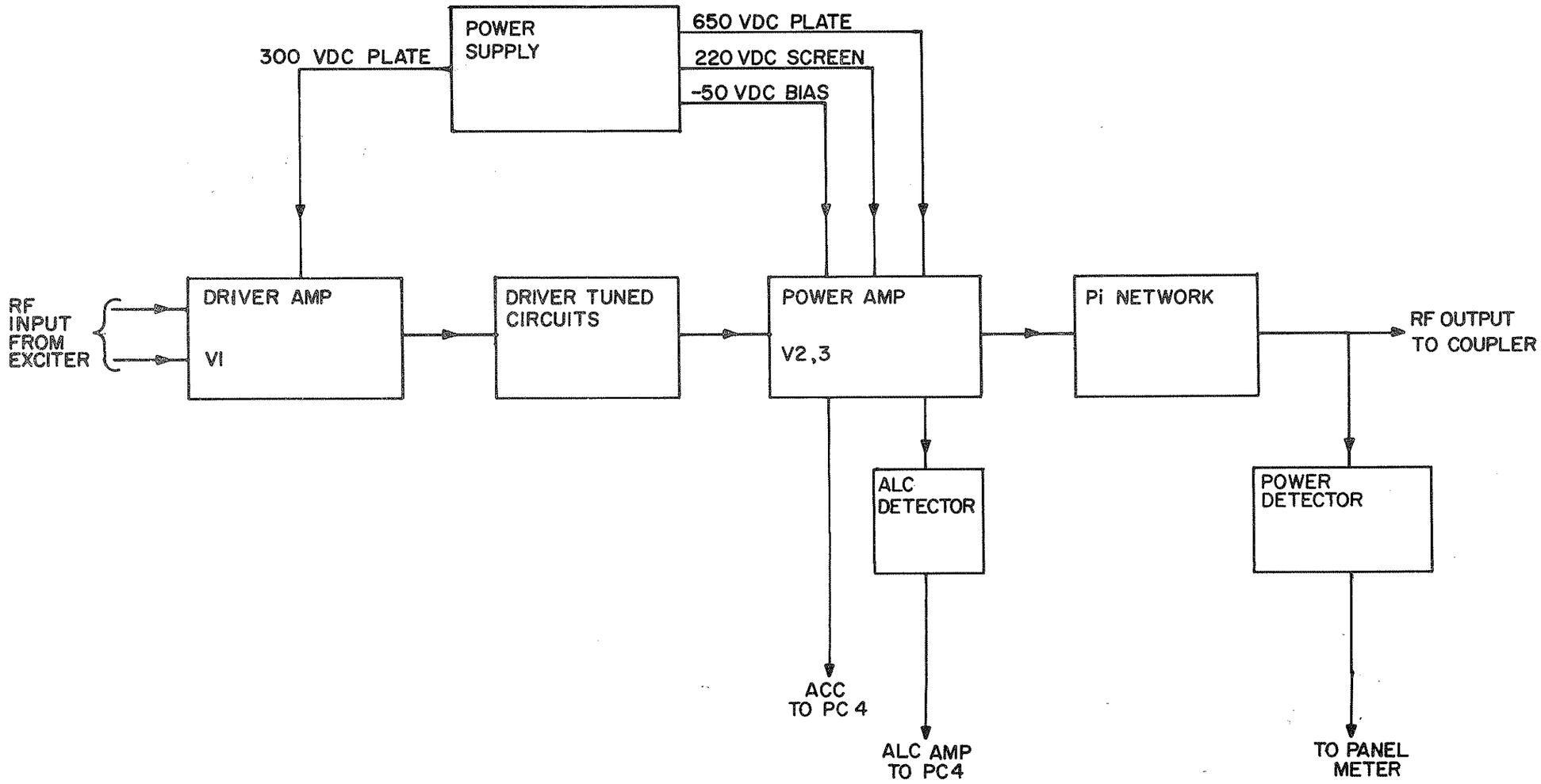


FIGURE IV-2
BLOCK DIAGRAM, POWER AMP/ POWER SUPPLY

IC504-5 to conduct **and reduces** the amount of carrier insertion. Since **the cathode** current thru R10 does change under modulation (Compatible AM OPERATION) the long charge time of C562 and C405 desensitize the ACC to modulation. IC504-1 and IC504-5 further function as a "carrier kill" circuit during SSB operation due to the gating voltage supplied by CR404 or CR405.

C. POWER AMPLIFIER

The function of the power amplifier is to amplify the low level RF signal from the exciter to a power level of 100 watts and present a 50 ohm input impedance to the antenna tuning circuits.

1. Driver, VI

The driver is a class A, tuned RF amplifier. It is primarily a voltage amplifier and raises the low level RF supplied by the exciter approximately 30db to drive final amplifier V2 and V3.

2. Final Amplifier V2, V3

The final or power amplifier consists of two pentodes in parallel. Both tubes operate class AB1 for maximum linearity and efficiency. Since the plate current in class AB flows only slightly more than 180° of the electrical cycle the fly wheel effect of the Pi network in the plate circuits restores the sinusoidal waveform. At the same time this network performs as an impedance transformer, matching the 1000 ohm plate impedance of both tubes to a 50 ohm output impedance. Since this is a power amplifier there is essentially no voltage gain from the grids to the 50 ohm output, but the power level is raised to 100 watts. C17 and C16 provide plate to grid neutralization thru the driver tuned circuits. E1 and E2 function as parasitic suppressions.

D. POWER SUPPLY MODULES

AC POWER SUPPLY MODULE
The AC power supply operates from either 115 or 230VAC, 50-60 Hz. It provides plate, screen and bias voltage, 650, 220 and -65 VDC respectively for V2 and V3. It also provides 300 VDC for the plate and screen of V1. CR1 supplies regulated 10 VDC to the receiver and exciter. CR6 supplies half wave rectified pulses to the channeling motor in the antenna coupler (24V), and 16 VDC for the speaker amplifier is supplied thru L2. All filament and oven heater voltages

are also supplied. The AC power supply essentially consists of a high voltage bridge rectifier CR1 thru 4 with capacitive input Pi filter. A negative half wave rectifier CR5. A low voltage bridge rectifier CR7 thru CR10 with Pi filter and 10V zener regulator.

DC POWER SUPPLY MODULES
The DC power supply modules (12V or 24V) are DC to DC convertors. Transistors Q1 and Q2 in conjunction with T1 comprise the switching circuit and provide the voltages for the power amplifier.

E. RECEIVER, FIGURE IV-3

The receiver operates as a Single Sideband or an AM receiver. The principal difference between the two modes of operation is the IF bandwidth and audio detection.

1. Preselector, PC7

The preselector consists of two band pass filters. For incoming signals from 2 to 9.5 MHz filter select switch wafer SW2 provides gating voltage to diodes CR701 and CR702. For frequencies from 12 to 30 MHz SW2 supplies gating voltage to CR703 and CR704 activating FL702.

2. RF Amplifier and Mixer PC4

The signal from the preselector is coupled to the base of RF AMP thru T401. IC402-3 amplifies the signal and drives the mixer IC402 and IC403. Channel oscillator is injected on the bases of IC402-1 and IC403-2. The tank circuit at the collectors of IC402-2 and IC403-2 tunes to the difference between the oscillator frequency and the incoming RF frequency to produce an IF frequency of 10.5 MHz.

3. IF Filter Selector (PC2)

The IF frequency from the mixer is coupled to emitter follower IC201-1 which in turn drives the selected IF filter. FL201, FL202 or FL203. The output from the selected filter is coupled to emitter follower IC202-4.

4. IF Amplifier, AGC and Detectors (PC3)

The output from emitter follower IC202-4 is coupled to the first IF amplifier IC301. The collector of IC301-2 is tuned to 10.5 MHz and coupled to the second IF amplifier thru emitter follower IC301-3. The output of the second IF amp

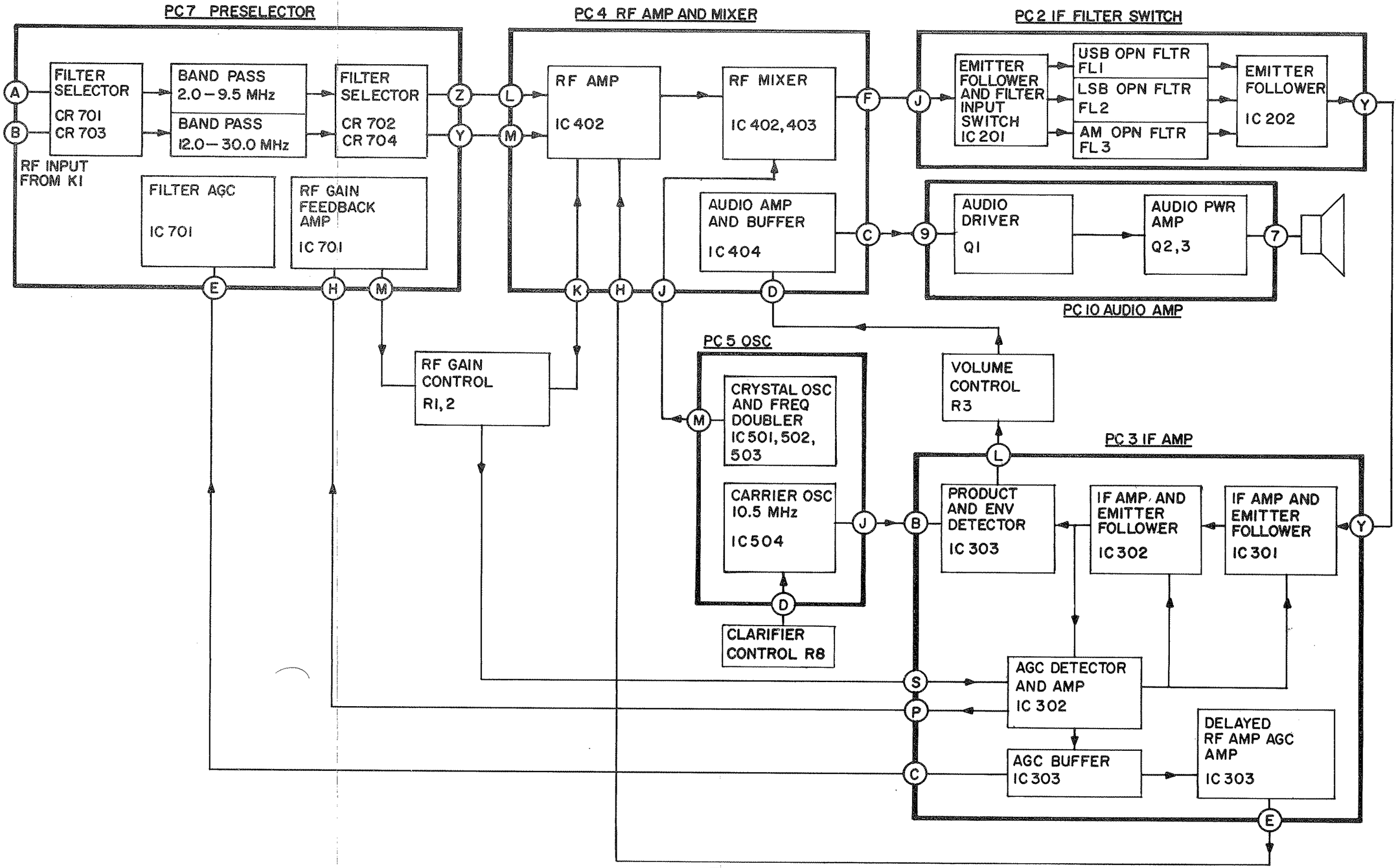


FIGURE IV-3
BLOCK DIAGRAM, RECEIVER

IC302 drives the AGC detector and the product/envelope detector. Diodes CR303 and CR304 detect the IF signal and the resultant DC voltage is amplified by IC302-4 and applied to the bases of IC301-1 and IC302-1 thru CR305. The AGC voltage developed across R325 is also coupled to meter switch SW10 and meter for signal strength indication. The RF GAIN CONTROL and AGC feedback amplifier IC701 apply voltage to the base of IC303-3 which provides AGC voltage and permits a manual reduction of IF gain. The emitter of IC303-3 also supplies AGC voltage to reduce the signal level at the input of the preselector by shunt control IC701-1 and -2. The gain reduction required at the RF amp is provided by IC303-5 and IC403-3. The collector of detector IC303-2 is saturated when operated as an envelope detector and the signal swing drives the collector into cut off. This eliminates one half the RF envelope. Filter capacitor C376 removes the 10.5 MHz component and the resultant audio envelope is coupled to the volume control. When the detector is operated in the SSB mode, CR311 or CR312 switches in collector level R337 and the collector of IC303-2 is now operated in the active region. The carrier oscillator (10.5 MHz) is injected at the base of IC303-4 and the difference frequency between the IF and oscillator is coupled to the volume control.

5. Audio Amplifier (PC4 and PC10)

The volume control drives the audio amplifier IC404-3. The output from IC404-3 is coupled to emitter follower IC404-4, which in turn provides signal for the driver Q1001. The collector of Q1001 is coupled to the bases of the complementary power amplifier Q1002 and Q1003.

F. OSCILLATORS

1. Carrier Oscillator

IC504-4 and Y9 is a Colpitts type oscillator. The output from the oscillator is fed thru isolation stage IC504-3 and series tuned circuit L515 and C560 to the Balanced Modulator and Product detector. During AM transmit the oscillator is also coupled to CR515 and provides AM carrier insertion. IC504-1 and -5 controls the amount of carrier inserted (ACC). During receive operation varactor CR512 is switched into the emitter of the oscillator IC504-4 and slightly change the frequency of the oscillator as R4 the CLARIFIER CONTROL is rotated.

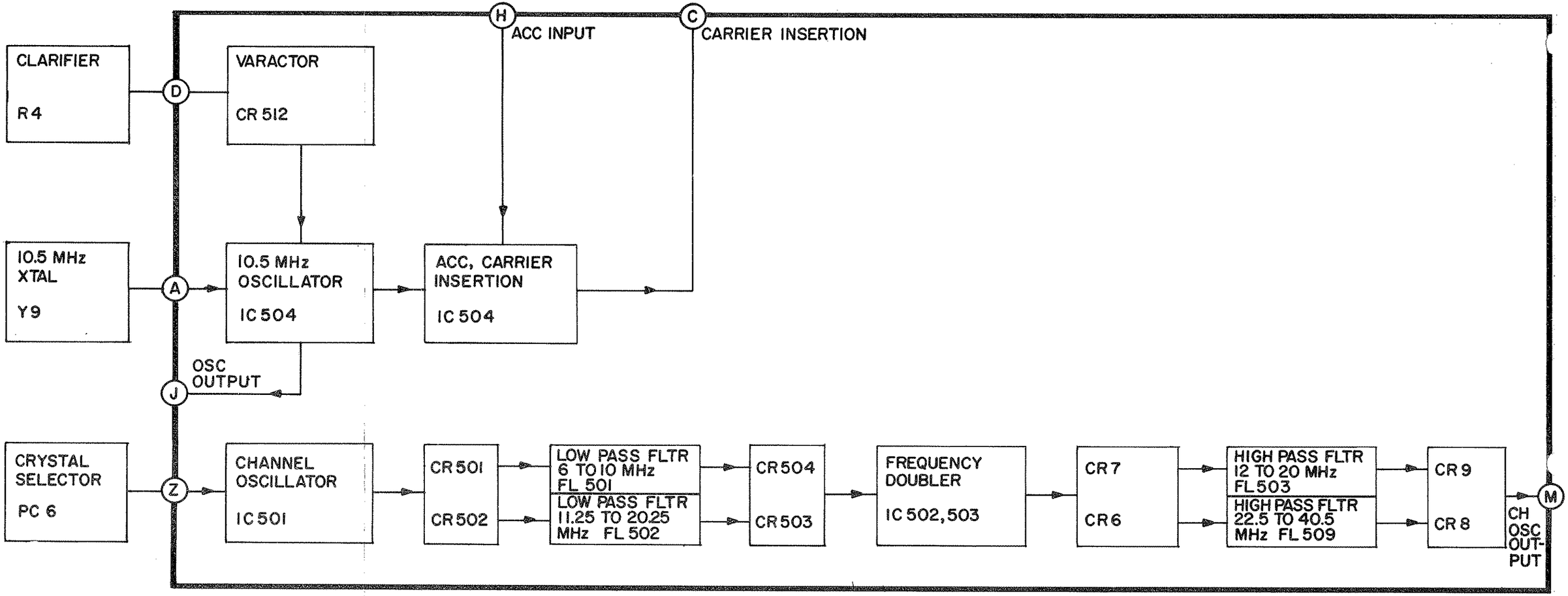


FIGURE IV-4
BLOCK DIAGRAM, OSCILLATORS PC 5

2. Channel Oscillator

PC 6 selects the desired crystal and IC501 oscillates at that frequency. The third harmonics of the crystal frequency is blocked by low pass filters FL501 or FL502 depending upon the band of operation selected by SW2. The fundamental frequency is then coupled to frequency doubler IC502 and IC503. The high pass filters FL503 or FL503 and the balance control now prevent any fundamental frequency to be coupled to the output. The oscillator is then injected into the receive and transmit mixers.

SECTION V

ALIGNMENT PROCEDURE

A. EQUIPMENT REQUIRED

RMS Voltmeter	H.P. Model 400L, or equivalent
RF Signal Generator	H.P. Model 606B, or equivalent
Audio Oscillator	H.P. Model 200CD, or equiv. (2)
Wattmeter (100W)	Bird Model 43, or equivalent
Dummy Load, 50 ohms	Bird Model 81B, or equivalent
Oscilloscope	Tektronix Model 543B, or equiv.
Frequency Counter	H.P. Model 5445L or equivalent
D.C. VTVM	H.P. Model 412A or equivalent
AC or DC Power Source	
Test Cables	
3 Ohm 10W Resistor	

B. RECEIVER ALIGNMENT

Test Set Up

Connect Signal Generator to antenna input, disconnect speaker and connect 3 ohm 10W resistor to audio output. Connect RMS voltmeter and oscilloscope to 3 ohm load.

Turn Power switch ON

Squelch Control full CW (if installed)

RF Gain Control full CW

Volume Control full CW

Set RMS Voltmeter to 1V scale.

Set mode switch to AM.

Set channel selector switch to first active channel.

1. IF Alignment

   a. Set output of signal generator to desired channel frequency. Set modulation to 30% at 1000 Hz.

   b. Increase RF output of signal generator until an indication of not more than 1V is observed in the RMS voltmeter.

c. Adjust C306 and C315 on PC-3 for maximum indication on voltmeter. Reduce output of signal generator to maintain an audio output indication of not more than 1V while tuning C306 and C315.

2. RF Amp and Mixer Alignment

a. Adjust C413 on PC-4 for maximum indication on voltmeter. Reduce output of signal generator to maintain an audio output indication of not more than 1V while tuning C413.

b. Set output of signal generator to half the IF frequency (5.25 MHz), 30% modulation at 1000 Hz and adjust the RF output until an indication of not more than 1V is observed in the RMS voltmeter and oscilloscope.

c. Adjust R426 (Mixer Balance Pot) until a null indication is observed on the oscilloscope.

3. Sensitivity and $\frac{S+N}{N}$ check

a. Set Mode Selector to USB

b. Set signal generator to desired channel frequency and adjust output to .5uv. Modulation switch "OFF"

c. Tune signal generator frequency dial to maximum indication on RMS voltmeter.

d. Remove cable from signal generator, (antenna input); output on voltmeter must be no less than 10db down from reading in c.

e. Increase output of signal generator to 5uv and tune for maximum deflection on RMS voltmeter. RMS voltmeter reading must be not less than 3V.

f. Set mode selector switch to AM.

g. Set output of signal generator to 2uv, 30% modulation at 1000Hz.

h. Tune signal generator frequency dial to maximum indication on RMS voltmeter.

i. Turn modulation switch to "OFF" position: output on voltmeter must be no less than 10db down from reading in step h.

j. Turn modulation to 30% at 1000 Hz and increase output of signal generator to 5uv and tune for maximum deflection on RMS voltmeter. RMS voltmeter reading must be not less than 3V.

k. Repeat step 1 thru 10 for all active channels.

4. AGC-2 Threshold and Distortion Adjustment

a. Set signal generator to 100,000 Mv, 30% modulation at 1000 Hz.

b. Adjust volume control for 3.0V RMS on meter.

c. Adjust R331 so that a 10db decrease in RF input results in no change in audio output and minimum sine wave distortion is observed and maximum (S+N)/N is observed at 300 uv input.

5. RF Gain and Meter Function Check

a. Set signal generator output to 100,000 uv, 30% modulation at 1000 Hz.

b. Adjust volume control for 3.0V RMS on meter.

c. Turn RF Gain control full CCW.

d. Audio output should be reduced by at least 40db from reference and front panel meter reading should be near maximum deflection.

e. Switch front panel meter selector switch to A+. Meter reading should be within the two red test marks.

f. Set meter selector switch to normal.

6. Oscillator Balance Adjustment

a. Turn channel selector switch to lowest available frequency.

b. Set signal generator output to 10.5 MHz minus 1/2 the channel oscillator frequency.

c. Adjust oscillator balance control R523 for minimum audio output on RMS voltmeter. Signal generator output should be at least 40db above reference.

7. Squelch Threshold Adjustment (Option)

a. Squelch control full CCW

b. RF Gain full CW

c. Volume Control full CW

d. Increase signal generator output until RMS voltmeter indicates audio output.

e. Adjust R1202 so that squelch breaks at not more than 50 uv signal level.

8. Phone Patch Adjustment (Option) 600 ohm in/out

a. RF Gain control full CW

b. Set Phone Patch selector switch to "RECEIVE"

c. Connect 600 ohm load to Phone Line terminals on rear of radio and connect RMS voltmeter across lead.

d. Set signal generator output to 100 uv.

e. Adjust R1319 for a "0" dbm reading on voltmeter.

C. <u>OSCILLATORS ALIGNMENT</u>

1. Connect 50 ohm load to antenna output

2. Set mode selector switch to USB

3. Connect frequency counter to Pin "J" of PC-5.

4. Key transmitter

5. Adjust C633 until the frequency is within ±5 Hz of 10.5 MHz and unkey transmitter.

6. Turn clarifier control from one extreme to the other. Frequency difference from one extreme to the other should be not less than 200 Hz.

7. Set channel selector switch to first active channel.

8. Connect frequency counter to pin "M" of PC-5.

9. Adjust C601 thru C608 until frequency is within 5 Hz of assigned frequency plus 10.5 MHz for channels 1 thru 8.

D. EXCITER AND P.A. ALIGNMENT

1. Test Set Up

   a. Connect antenna output to wattmeter and 50 ohm load.

   b. Connect oscilloscope to antenna output connector

   c. Set channel selector switch to first active channel.

   d. Turn power switch ON.

   e. Turn mode selector switch to USB.

   f. Key transmitter.

   g. Adjust Transmit Bias Pot on Power Supply for approximately 1.3 volts DC reading across each of the 33 ohm P.A. cathode resistors.

2. Driver and P.A. Alignment

   a. Set mike gain control pot R102 full CCW

   b. Apply single tone audio input until some output is present at the 50 ohm load.

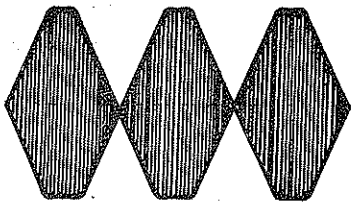
   c. Tune driver coil for maximum power output.

   d. Increase audio input and peak P.A. coil for maximum power output.

   e. Repeat steps 3 and 4 for all active channels.

c. ALC Check

   a. Apply two tone audio input until the output waveform as shown on oscilloscope is flat topped as shown in Fig. 2.



b. Turn mike gain control R102 until wattmeter reads 40W. No severe flat topping should be noticeable.

c. Slowly reduce two tone input signal and notice if ALC is holding the output power to approximately 40W.

4. Carrier Balance Adjustment

a. Remove two tone audio input signal

b. Tune carrier balance control R119 for minimum indication on scope or meter.

c. Meter reading should be at least 40db down from 100W PEP.

5. Balance Mixer and ACC Adjustment

a. Apply single tone audio input until wattmeter reads between 30 and 40W.

b. Tune balance mixer control R134 for maximum indication on wattmeter.

c. Remove audio input signal.

d. Set mode selector switch to AM.

e. Adjust ACC control R412 for a wattmeter reading of approximately 30W.

6. Meter Function Check

a. Set meter selector switch to "Ib"

b. Key transmitter, meter reading should be within the two red marks.

c. Set meter selector switch to "normal"

d. Key transmitter. Meter reading should be "0" on USB without an input signal and approximately 25 on AM

7. Phone Patch (Option) 600 ohm in/out

a. Apply -20 dbm audio to phone input J11

b. Turn mode switch to USB.

c. Set phone patch selector to "Transmit"

d. Adjust R1307 for 100W indication on watt meter

NOTE: R1307 may require readjustment depending upon output from phone lines.

8. CW (Option)

a. Turn mode selector to CW

b. Insert telegraph key into J10

c. Depress telephone key and adjust R1108 for 100W indication on wattmeter.

SECTION VI

TROUBLE SHOOTING AND MAINTENANCE

A. GENERAL INFORMATION

1. When the GSB-300 is removed for maintenance, a visual inspection should be performed to check for broken wires, loose or shorted contacts or damaged components.

2. Malfunctions in the Receiver/Exciter may be isolated quite rapidly by the substitution of circuit boards. However, if no spare boards are available, a general signal tracing procedure in conjunction with the trouble analysis charts may be used. Once the faulty circuit board has been isolated it may be returned to Sunair Electronics for repair or the schematic diagram may be utilized to repair defective boards in the field.

B. RECEIVER

1. Trouble Analysis Chart

Symptom	Probable Cause	Remedy
No audio output on any channel, AM or SSB.	Squelch control on front panel set to quiet receiver.	Turn squelch control full CW
	RF Gain Control set to Max. CCW Position	Turn RF Gain fully CW
	No +10 volts.	Check voltage, turn meter switch to A+
	Channel oscillator defective.	Replace defective circuit board PC5 or component.
	Defective relay K-1	Check relay contacts for continuity, replace if defective.

B. Receiver - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
	Defective volume control	Check resistance, replace if defective.
	Defective circuit boards, PC-2,3,4,7	Substitute circuit boards or test in accordance with Schematic Diagram. Replace defective component or entire circuit board.
No audio output on some channels, AM or SSB.	Defective crystal(s) in channel oscillator	Replace crystal(s)
	Oscillator trimmer circuit (PC-6), defective.	Check components on inoperative channel(s) on PC-6. Replace defective component.
No audio output on AM, SSB normal.	Defective mode switch SW-1.	Check continuity, replace if defective.
	Defective PC-2, PC-3	Substitute circuit boards or test in accordance with Schematic Diagram. Replace defective component or entire circuit board.
No audio output on SSB, AM normal	Defective carrier oscillator (10.5 MHz)	Test in accordance with Schematic Diagram. Replace defective component or entire circuit board. PC-5.
	Defective switching circuits on PC-2.	Test in accordance with Schematic Diagram. Replace defective component or entire board.
	Mixer balance R426 not adjusted properly.	Refer to alignment procedure.

B. Receiver - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
	PC-4 defective (RF amp, mixer or T-401).	Test in accordance with Schematic Diagram. Replace defective component or entire circuit board.
Low gain, unable to meet rated output.	Defective PC-2,3,4,10	Test in accordance with Schematic Diagram. Replace defective component or entire circuit board.
Unable to meet selectivity requirements	AM-FL-203 defective. SSB-FL-201 or FL-202 defective.	Replace filter
AGC defective, audio output increases excessively with an increase in RF signal.	AGC potentiometer not adjusted properly.	Refer alignment procedures.
	Faulty AGC circuits, PC-3	Test in accordance with Schematic Diagram. Replace defective component or entire circuit board (s).
Audio output distorted, unreadable on SSB; AM normal.	Clarifier not adjusted properly.	Adjust R-4 (front panel).
Audio distorted on AM and SSB.	R-331 AGC potentiometer not adjusted properly.	Refer alignment procedures.

C. EXCITER

1. Trouble Analysis Chart

Symptom	Probable Cause	Remedy
No output on any channel, SSB or AM.	No +10 volt	Check voltage regulator. Replace defective part.

C. Exciter - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
	Defective channel or carrier oscillator. PC-5	Test in accordance with Schematic Diagram. Replace defective component.
	Defective PC Boards 1 or 2	Test in accordance with Schematic Diagram. Replace defective part (s) or entire PC Board(s).
	Mixer Balance pot (R134) not adjusted properly.	Refer to Adjustment procedure
	Defective relay K1	Test for continuity, replace if defective.
No output on some channels, SSB, or AM.	Defective crystals.	Test and replace if defective.
	Defective channel oscillator trimmer board. (PC-6)	Test in accordance with Schematic Diagram. Replace defective component.
No output on SSB. No modulation on AM. Carrier normal.	Defective PC-1 audio circuit and balanced modulator.	Test in accordance with Schematic Diagram. Replace defective component or entire circuit board.
No carrier on AM. SSB normal.	Defective mode switch.	Check continuity. Replace if defective.
	Defective PC-5	Test in accordance with Schematic Diagram. Replace defective component or entire circuit board. Adjust R412
	R412 not adjusted properly	

C. Exciter - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
Output on SSB without audio input.	Defective balanced modulator, defective carrier balance pot (R119) not adjusted properly.	Test in accordance with Schematic Diagram. Replace defective component or entire circuit board. Adjust R119.

D. POWER AMPLIFIER

1. Trouble Analysis Chart

Symptom	Probable Cause	Remedy
No output on any channel, tube filaments dark.	Fuse	Check and replace fuse.
	Defective tubes, V-1 V-2 or V-3.	Test and replace
	Defective Power Supply Module	Test and replace defective components or module.
No output on any channel. (DC Unit only) No transformer switching noise. High A+ current.	Defective Q-1 or Q-2 switching transistors.	Test and replace if defective.
	Defective rectifier diodes CR-901 thru CR-904	Test and replace if defective.
	Defective bias rectifier CR-905	Test and replace if defective.
	Defective relay K-901	Test and/or replace.
No output on any channel, tubes lit, switching noise present. (DC unit only)	Defective antenna relay K-1.	Test, burnish contacts or replace.
	Defective tubes V-1, V2 or V-3.	Test and replace if defective.

D. Power Amplifier - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
No output on some channels.	Defective driver tuned circuits.	Test as shown in Schematic Diagram, replace defective components.
	Defective output tuned circuit.	Test as shown in Schematic Diagram, replace defective component.
	Defective contacts on wafers of SW-4-SW-5, SW-6	Check continuity of SW-4-SW-5-SW-6 wafers, replace if defective.
Output low		
	ACC potentiometers not set properly	Adjust potentiometer on PC-4, as shown in alignment procedures.
	Bias adjustment V-2 and V-3 not correct.	Adjust R803 (AC Supply) R906 (DC Supply), as shown, alignment procedures.
	Tubes V-1, V-2 or V-3 defective.	Check tubes, replace if defective.

SECTION VII

FREQUENCY CUSTOMIZING AND OPTION INSTALLATION

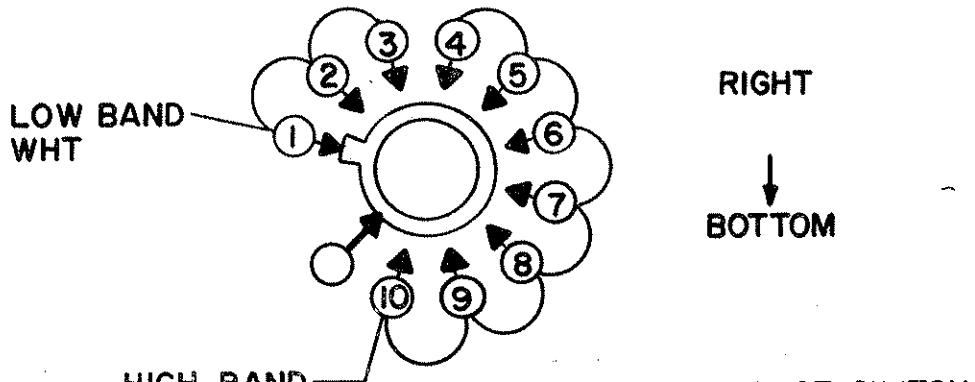
A. GENERAL INFORMATION

All frequency customizing and option installation is performed at the factory when specific frequencies and/or options are ordered. If at a later date frequencies are to be changed or added, or options are desired, the following procedure for ordering and installing parts must be followed.

B. FREQUENCY CUSTOMIZING

1. Components and Assemblies Affected.
   a. SW2 Band Change switch
   b. Z1 thru Z8 Driver Tuned Circuit Assemblies.
   c. Z9 thru Z16 Power Amp Tuned Circuit Assemblies.
   d. Y1 thru Y8 Channel Oscillator Crystals.
   e. Second crystal oven if more than 5 channels are required.

2. Frequency Change/Addition
   If an existing channel frequency must be changed and the new frequency falls within the frequency range of the installed tuned circuit assemblies for that channel, only the channel oscillator crystal has to be changed. (See table VII-1 for frequency range data.) However, the tuned circuit assemblies (Z1 thru Z16) and channel oscillator frequency trimmer (C601 thru C608) for the specific channel must be retuned in accordance with Section V, the alignment procedure.
   If the desired new frequency falls outside the range of the installed tuned circuit assemblies or a channel is to be added, the installed networks Z1 thru Z16 must be removed and new networks must be installed. The band change switch SW2 has to be changed as shown in Figure VII-1.



SW2 BAND CHANGE SWITCH
FRONT VIEW
FIG VII-1

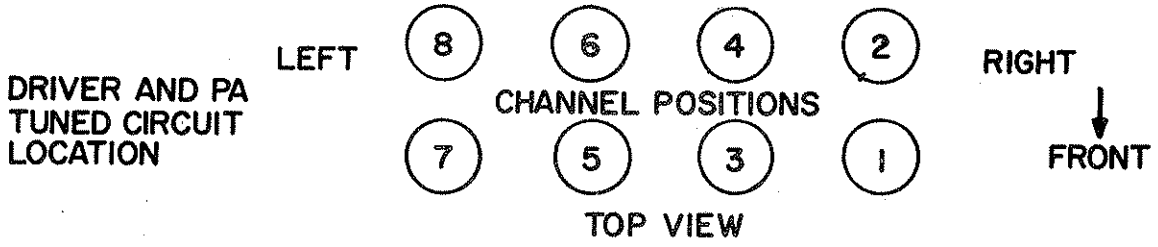
In the configuration shown, the first 3 channels operate in low band (below 9.5 MHz) and the remaining 5 channels operate in high band (above 12.0 MHz). If channel 4 is required to operate in low band, terminals 3 and 4 of SW2 must be connected and the connection between terminals 4 and 5 of SW2 must be cut. Now channels 1 thru 4 operate in low band and channels 5 thru 8 operate in high band. Any configuration of bands can be achieved by the addition and/or removal of jumpers.
The tuned circuit assemblies Z1 thru Z16 according to frequency range are outlined in Table VII-1. The assemblies may be ordered seperately or in kit form. The kits include all wire, hardware and both PA and Driver tuned circuit assemblies.

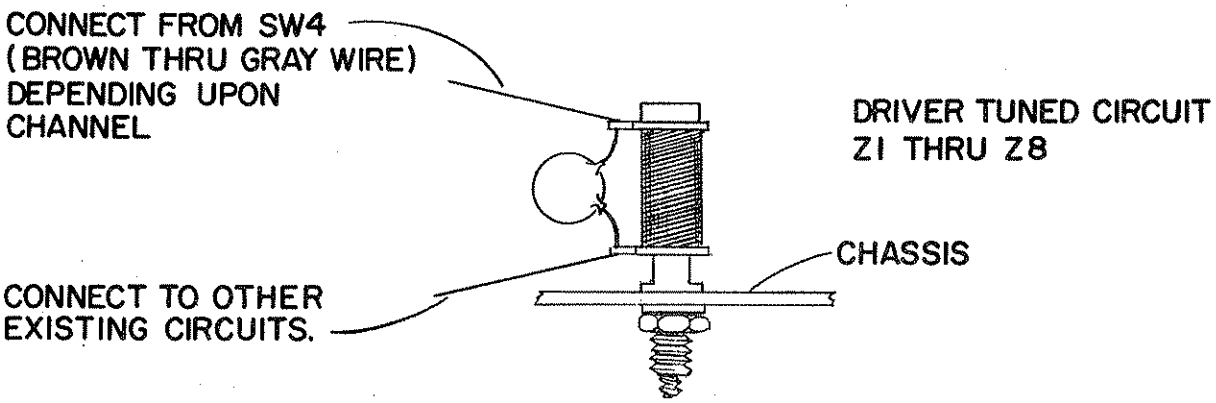
	FREQUENCY RANGE	DRIVER TUNED CIRCUITS Z1 THRU Z8	PA TUNED CIRCUITS Z9 THRU Z16	COMPLETE KIT
LOW BAND	1.6-2.0MHz	97941-1	97942-1	97944-1
	2.0-2.5MHz	-2	-2	-2
	2.5-3.1MHz	-3	-3	-3
	3.1-3.9MHz	-4	-4	-4
	3.9-4.9MHz	-5	-5	-5
	4.9-6.1MHz	-6	-6	-6
	6.1-7.6MHz	-7	-7	-7
	7.6-9.5MHz	-8	-8	-8
HIGH BAND	12.0-14.4MHz	-9	-9	-9
	14.4-17.5MHz	-10	-10	-10
	17.5-22.5MHz	-11	-11	-11
	22.5-30MHz	-12	-12	-12

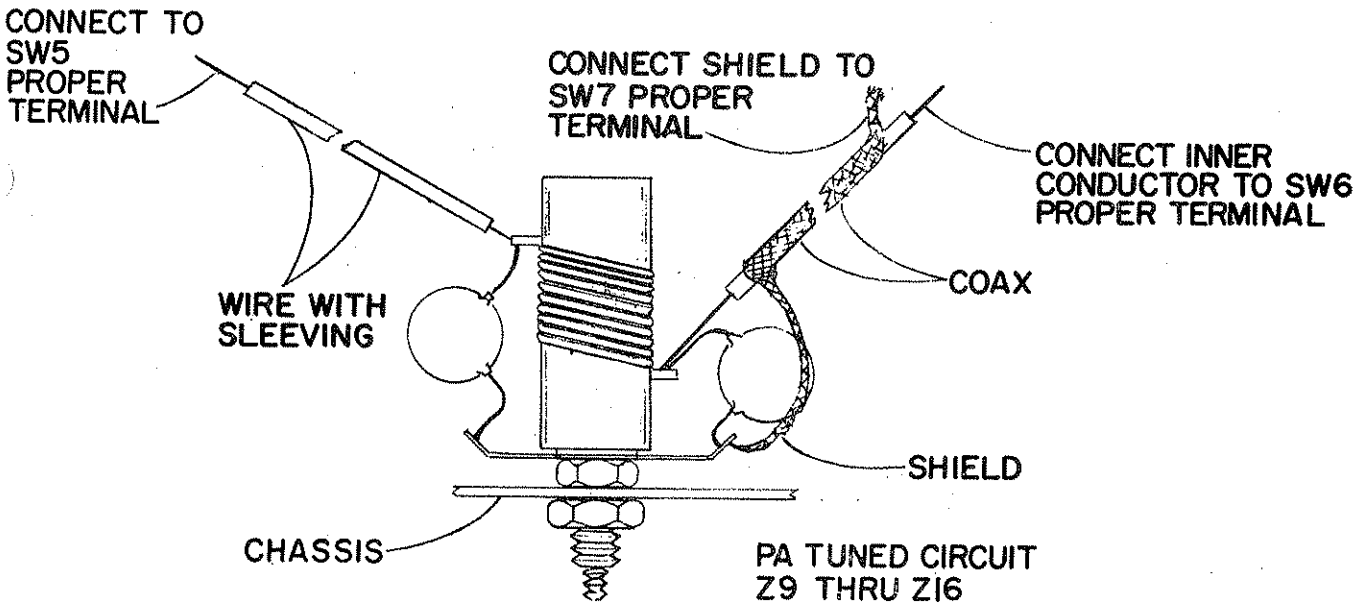
To install Z1 thru Z8 the assembly should be installed in the appropriate channel position. The existing wire(s) from SW-4 retma color coded to correspond to channel position must be soldered to one terminal of Z1 thru Z8 and the other terminal must be connected to the existing buss wire on the installed networks. (See Figure VII-2)
To install Z9 thru Z16 the assembly should be installed in the proper channel position and connected as shown in Figure VII-2. Wires and coax supplied in kits must be cut to proper length, wire routing of installed channels should be used as a guide.

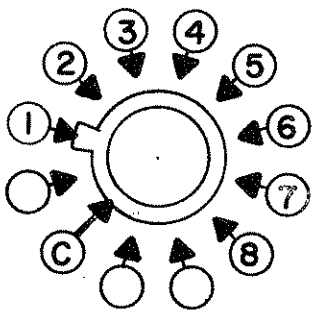
C. CW OPTION

The CW Kit 99632 contains all parts required to install the option. The printed circuit board assy PC11 is installed in









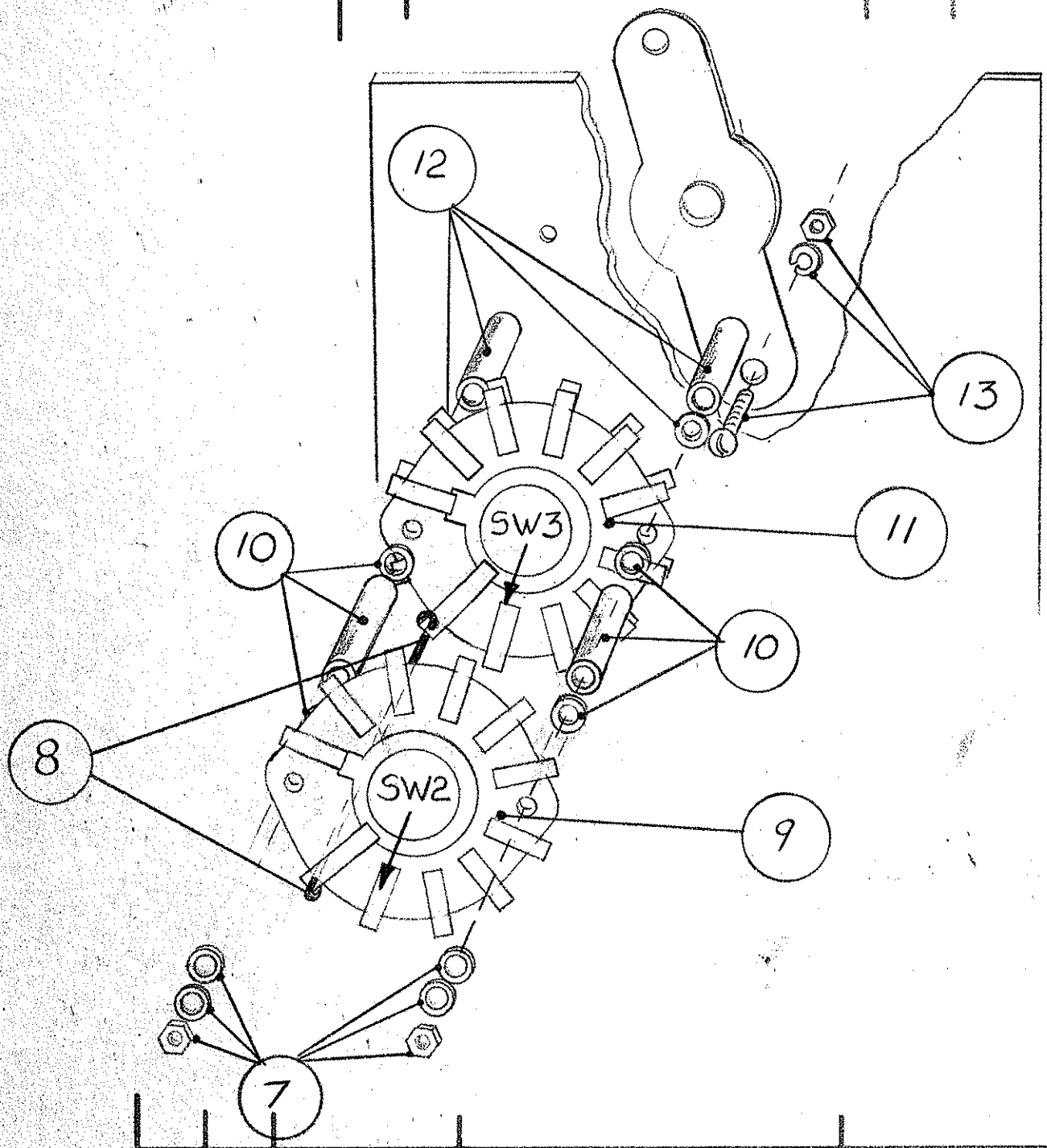
SW5,6,7 TERMINAL CONFIGURATION

TERMINAL NUMBER CORRESPONDS TO CHANNEL NUMBER.

VIEWED FROM FRONT OF RADIO

FIGURE VII-2

APPLICATION		QTY REQD			REVISIONS		
NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY	SYM	DESCRIPTION	DATE	APPROVAL



ITEM	REQD	PART NO.	DESCRIPTION

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES.

FRACTION ± 1/64 | DECIMAL .0 ± .1 | .00 ± .005 | ANGLE 1° ± 1/2°

AUTHENTICATION		
NAME		DATE
DRAWN BY		
CHECKED BY		
APPROVED BY		
PROJECT ENGINEER		

TITLE:
DISASSEMBLY FOR
HALF DUPLEX OPTION

STEPS 7 THRU 13

MATERIAL

FINISH

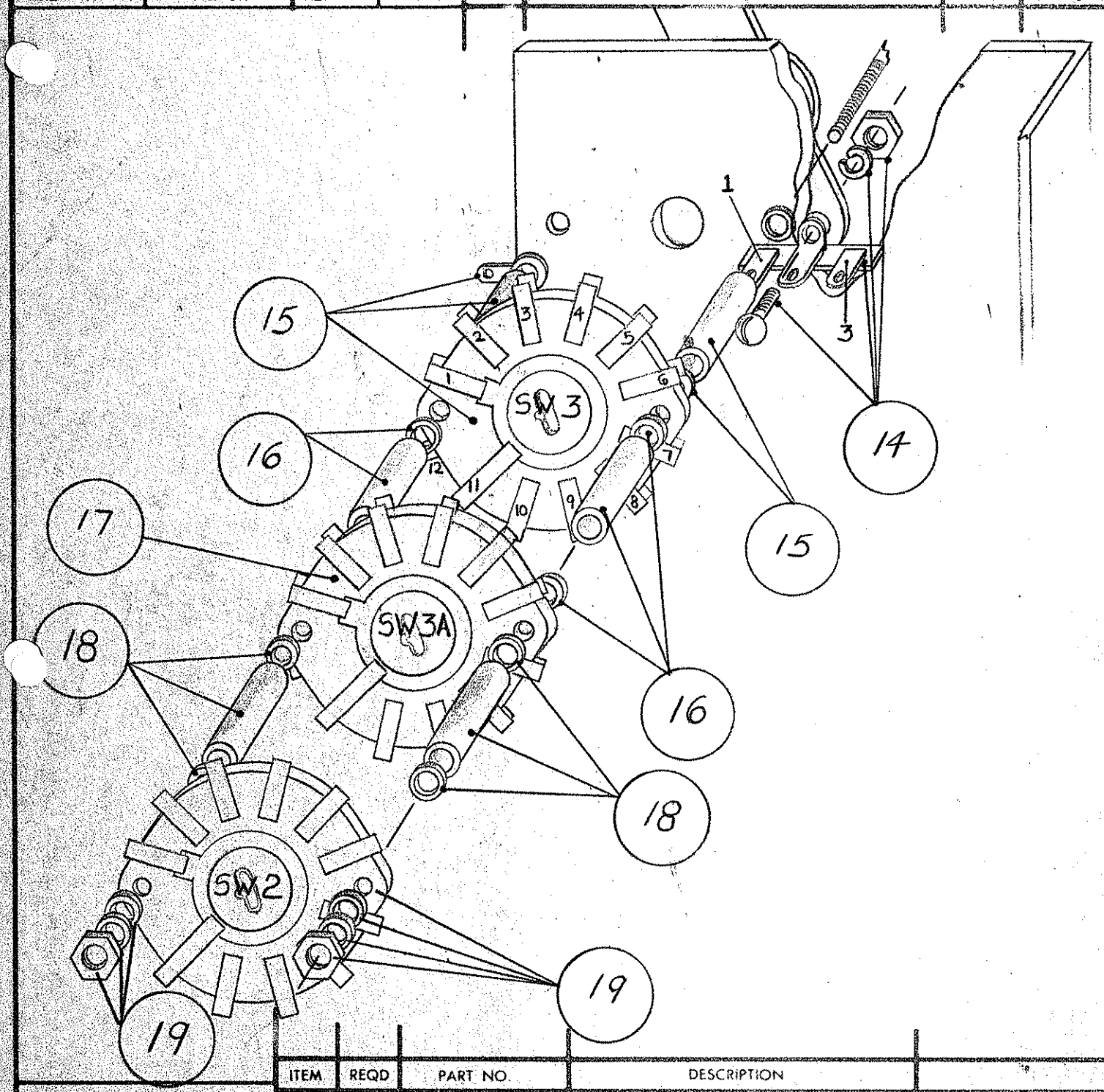
SunAir ELECTRONICS, INC.
3101 SOUTHWEST THIRD AVENUE
FORT LAUDERDALE, FLORIDA, U.S.A.

SIZE	DRAWING NO.	REV.
A	97853	

SCALE

SHEET 2 OF 2

APPLICATION		QTY REQD		REVISIONS			
NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY	SYM	DESCRIPTION	DATE	APPROVAL



ITEM	REQD	PART NO.	DESCRIPTION

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES.

FRACTION ±1/64 | .XX ±.01 | .XXX ±.005 | ANGLE 1° ±1/2°

AUTHENTICATION		
	NAME	DATE
DRAWN BY		
CHECKED BY		
APPROVED BY		
PROJECT ENGINEER		

TITLE: REASSEMBLY OF DRIVER SWITCH ASSY. FOR HALF DUPLEX OPTION. STEPS 14 - 19

MATERIAL

FINISH

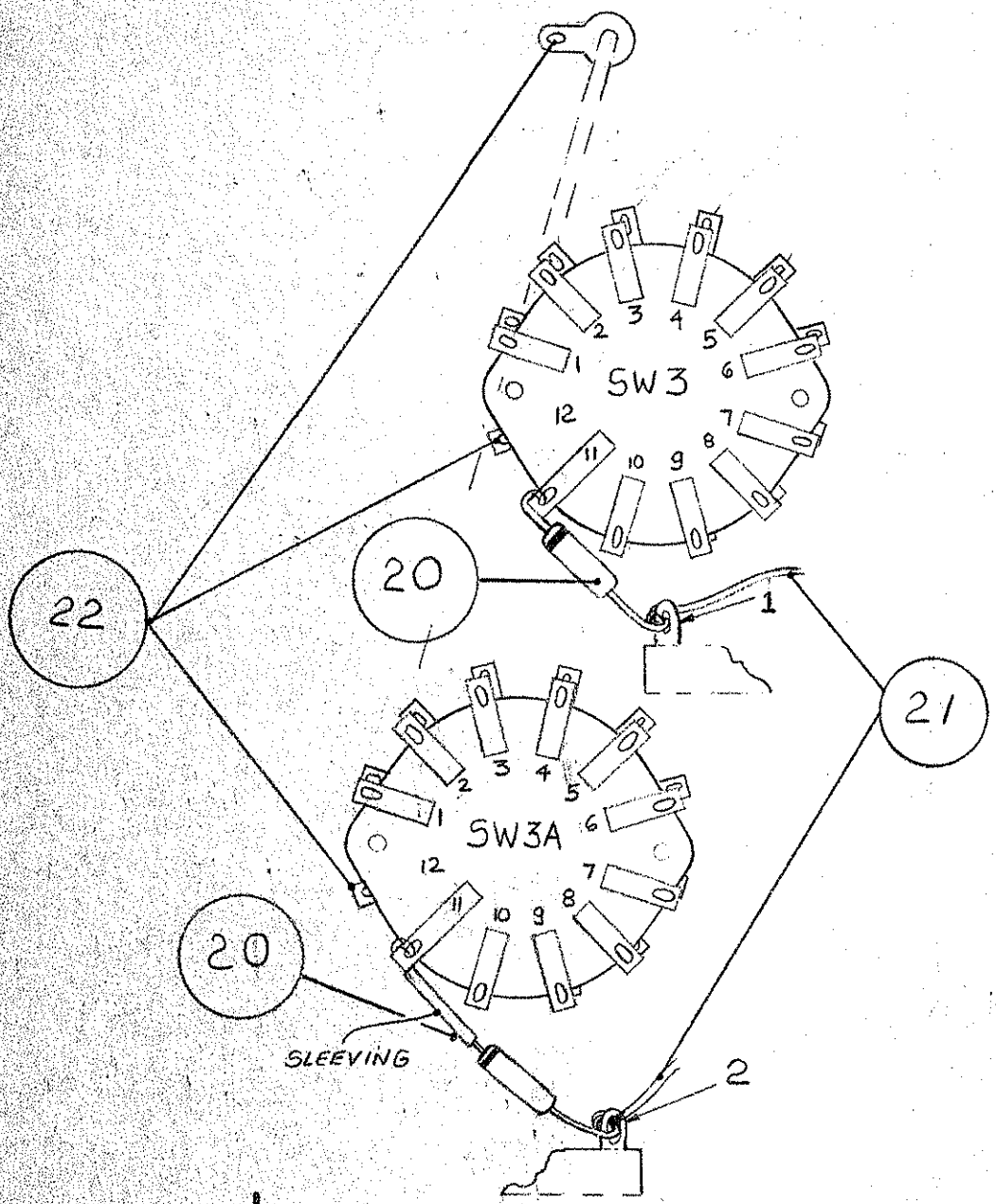
SUNAIR ELECTRONICS, INC.
3101 SOUTHWEST THIRD AVENUE
FORT LAUDERDALE, FLORIDA, U. S. A.

SIZE	DRAWING NO.	REV.
A	97853-1	

SCALE

SHEET 1 OF 2

APPLICATION		QTY REQD			REVISIONS		
NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY	SYM	DESCRIPTION	DATE	APPROVAL



ITEM	REQD	PART NO.	DESCRIPTION

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES.

ANGLE ±1°
FRACTION ±1/64
.XXX ±.005

AUTHENTICATION		
	NAME	DATE
DRAWN BY		
CHECKED BY		
APPROVED BY		
PROJECT ENGINEER		

TITLE: WIRING OF DRIVER SWITCH ASSY, FOR HALF DUPLEX OPTION.

MATERIAL

FINISH

SUNAIR ELECTRONICS, INC.
3101 SOUTHWEST THIRD AVENUE
FORT LAUDERDALE, FLORIDA, U.S.A.

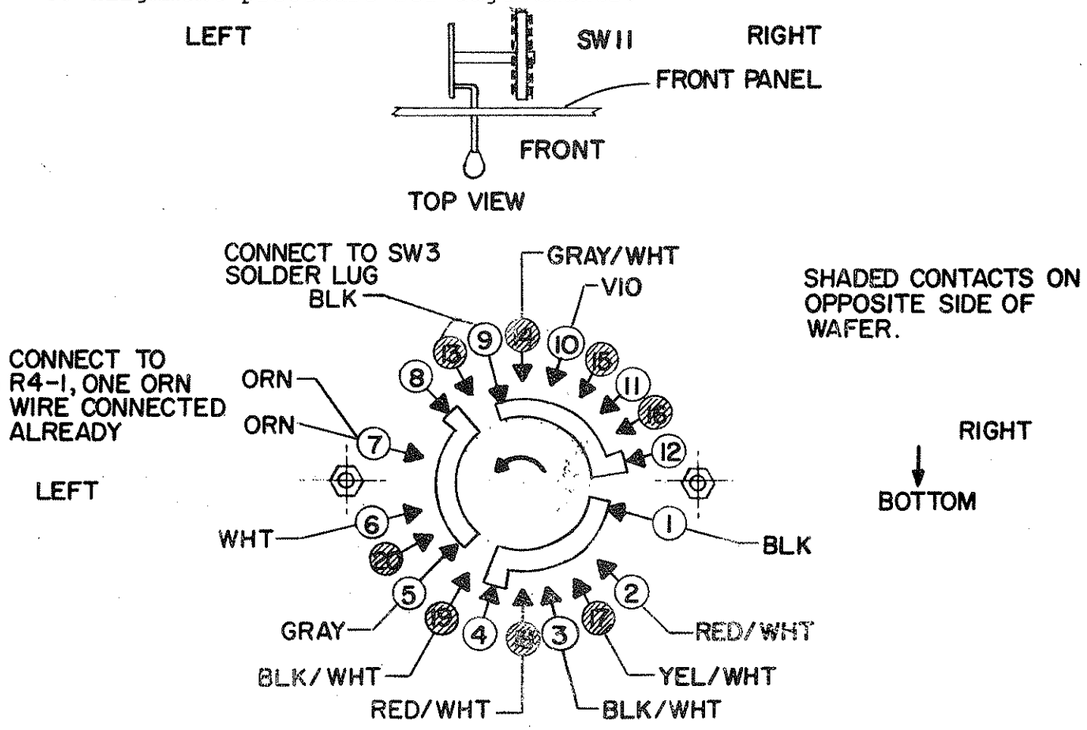
SIZE	DRAWING NO.	REV.
A	97853-1	

SCALE

SHEET 2 OF 2

E. PHONE PATCH OPTION (2 WIRE)

All parts required to install this option are supplied with Kit 99622. The printed circuit board, PC13 is installed in J14 (right side) as shown on bottom view of GSB-300 chassis. The speaker grill installed on the front panel is removed, and the lever switch SW11 is installed and the existing wires are connected as shown in Figure VII-5. The speaker grill and decal are then fastened to the front panel. Jumpers are installed from pin 1 to pin 3 and pin 2 to pin 4 of J11 located on the rear panel labled "600 OHM IN/OUT". Refer to alignment procedure for adjustments.



VIEWED FROM CHASSIS SIDE
FIG VII-5

*Two wires, black (pin 9 & 13) and orange pin 7 are already connected to SW11, all other wires must be connected to the terminals indicated.
The phone line input should be connected to pins 1 and 2 of J11 supplied in kit.

F. 600 OHM OPTION 4 WIRE

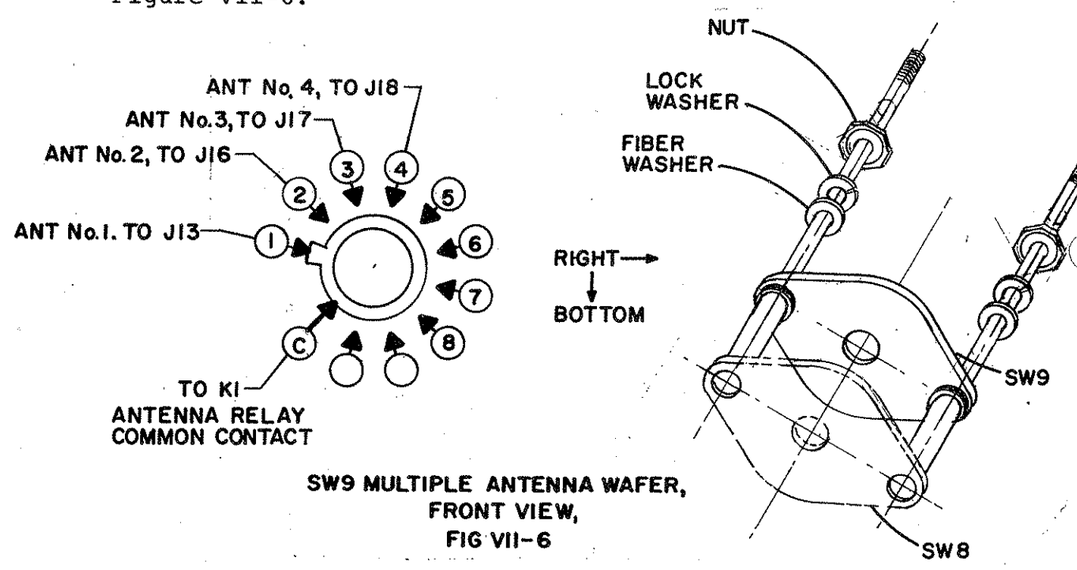
The same procedure as outlined in Par. E. Above should be followed. DO NOT install jumpers on J11.
The 600 ohm input on transmit should be connected to pins 1 and 2 of J11. The 600 ohm output on receive should be connected to pins 3 and 4 of J11 supplied in kit.

G. LSB OPTION

The lower side band filter FL202 must be installed on PC2, IF Filter Switch, in the holes provided.

H. MULTIPLE ANTENNA OPTIONS

Install switch wafer and antenna connector(s) as shown in Figure VII-6.



SW9 MULTIPLE ANTENNA WAFER, FRONT VIEW, FIG VII-6

Remove 2 nuts, 2 lock washers and 2 fiber washers from the rear of switch deck assembly, install SW9, switch wafer as shown in Fig. VII-6 and re-assemble. Disconnect wire with sleeving from J13 and re-connect to terminal "C" of SW9. Connect wire(s) from terminal(s) 1 thru 4 of SW9 to J13, J16, J17, J18 respectively.

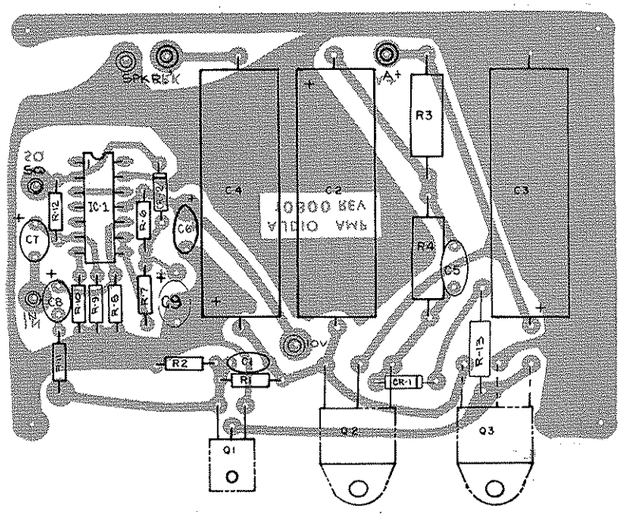
I. REMOTE CONTROL UNIT, GRC-350

The GRC-350 remote control unit provides a means of operating the GSB-300 transceiver via a cable of up to 100 feet in length. The control unit contains all functions necessary for complete control of the transceiver. Squelch is an optional accessory in the remote unit and the squelch option must be installed in the transceiver if remote squelch is required. The CW and phone patch options cannot be operated from the remote control unit.

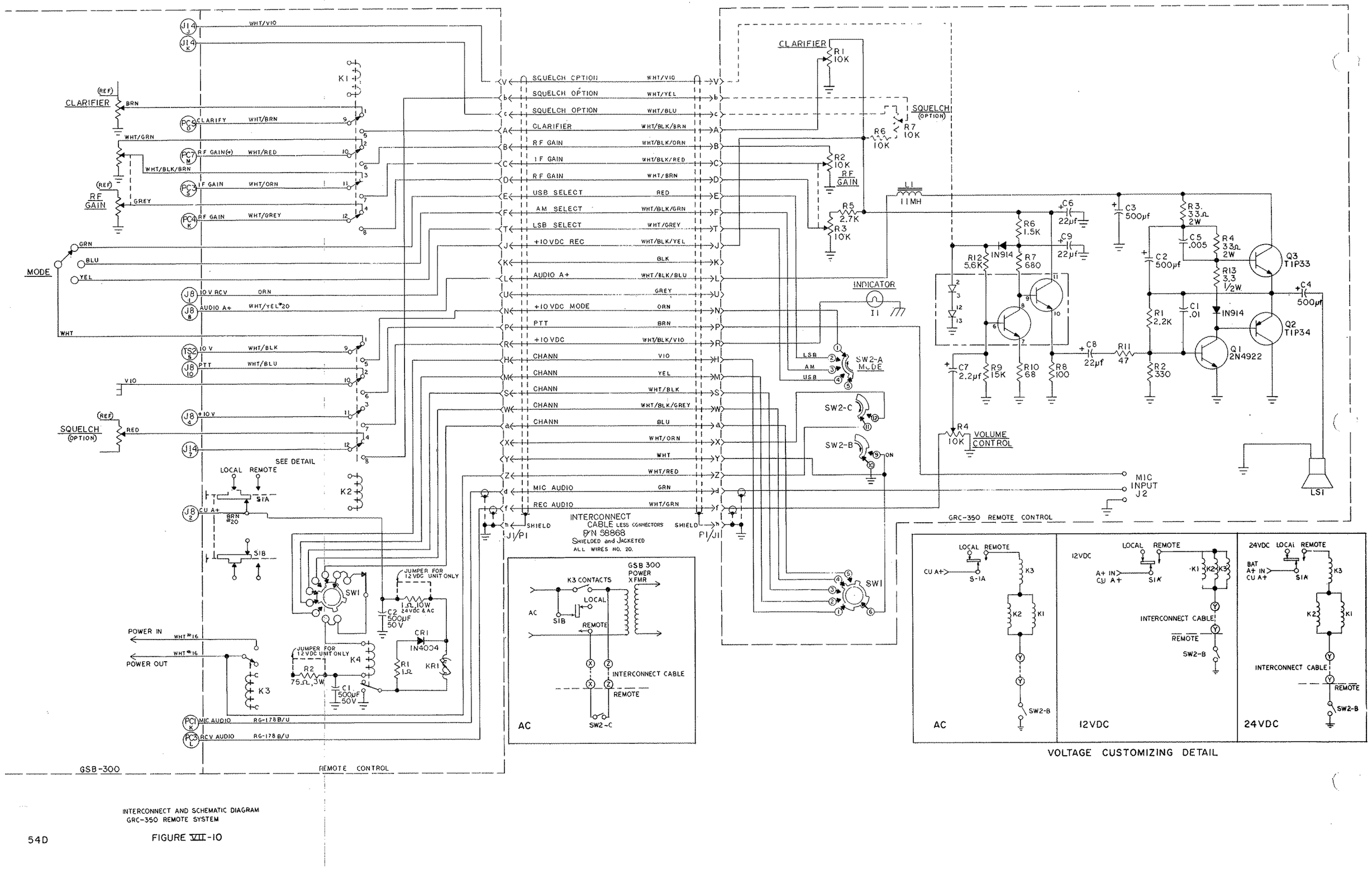
The remote control adaptor is installed on the rear of the transceiver. Transfer of control of the transceiver front panel functions is accomplished in the adaptor and is controlled by the local/remote switch on the adaptor.

Adding the remote control adaptor to the GSB-300 requires wiring changes in the transceiver and is not recommended for field modification.

Installation, interconnect cabling information and the schematic diagram are shown on the following pages.



GRC-350 AUDIO AMPLIFIER BOARD
FIGURE VII-7



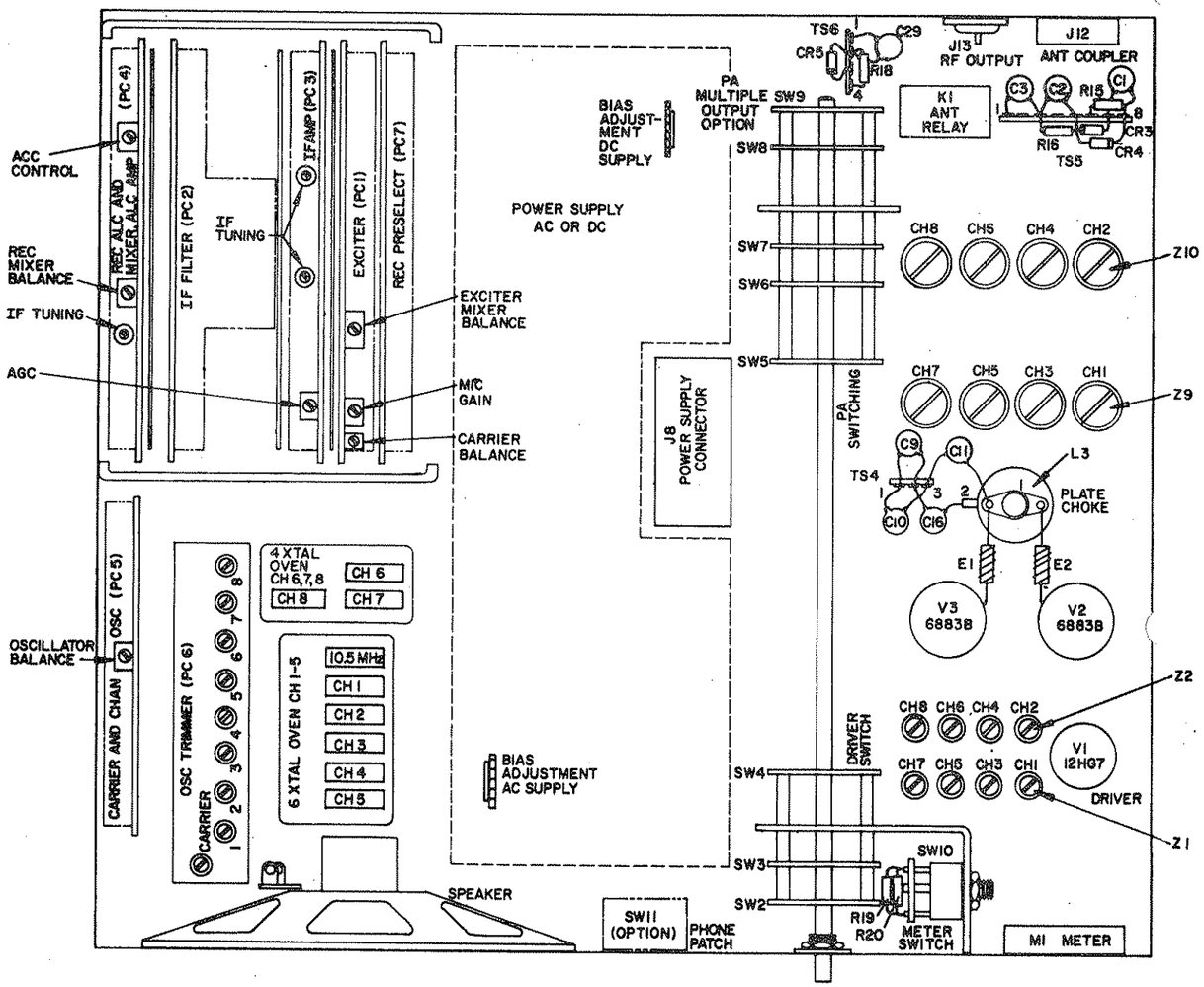
VOLTAGE CUSTOMIZING DETAIL

INTERCONNECT AND SCHEMATIC DIAGRAM
GRC-350 REMOTE SYSTEM

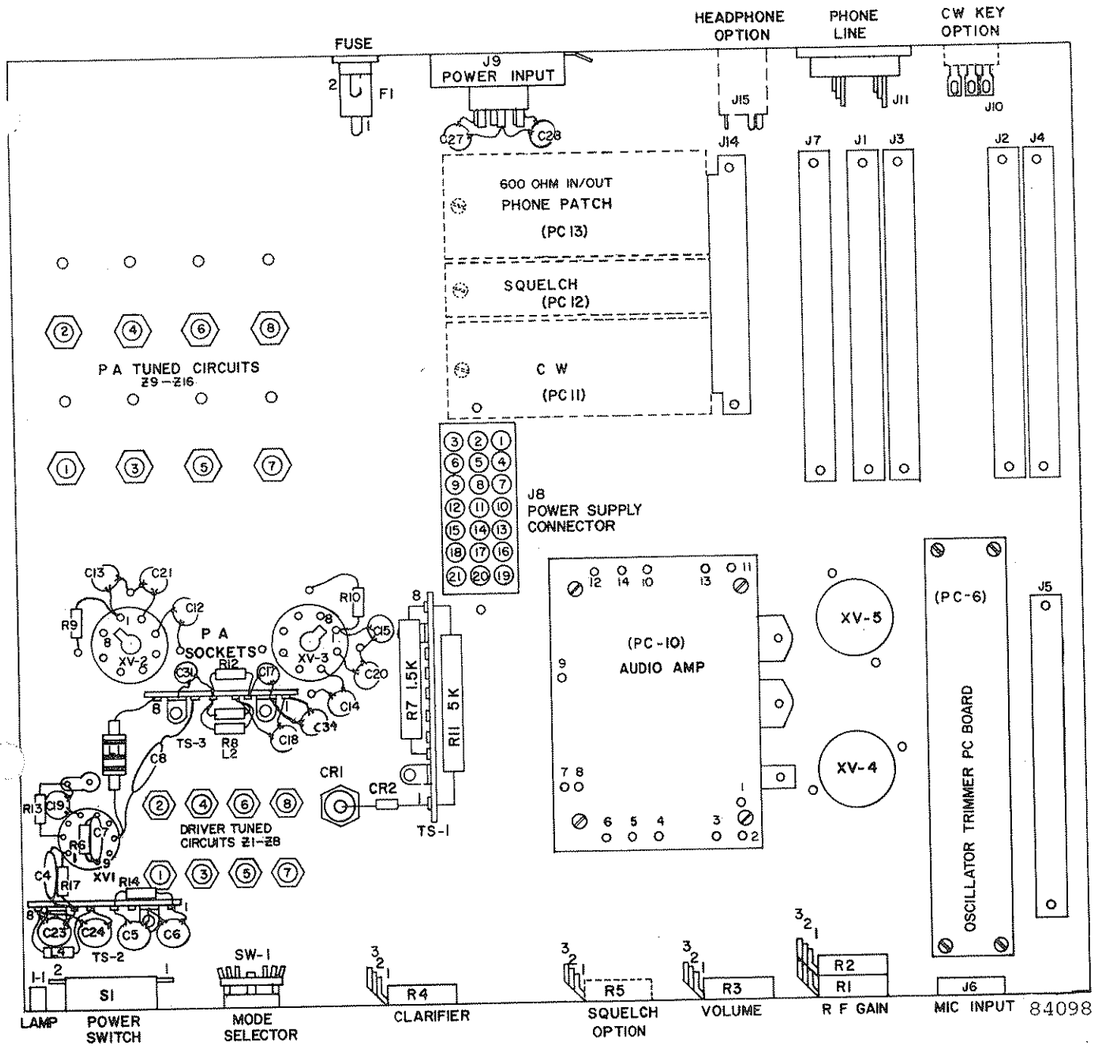
FIGURE VII-10

SECTION VIII

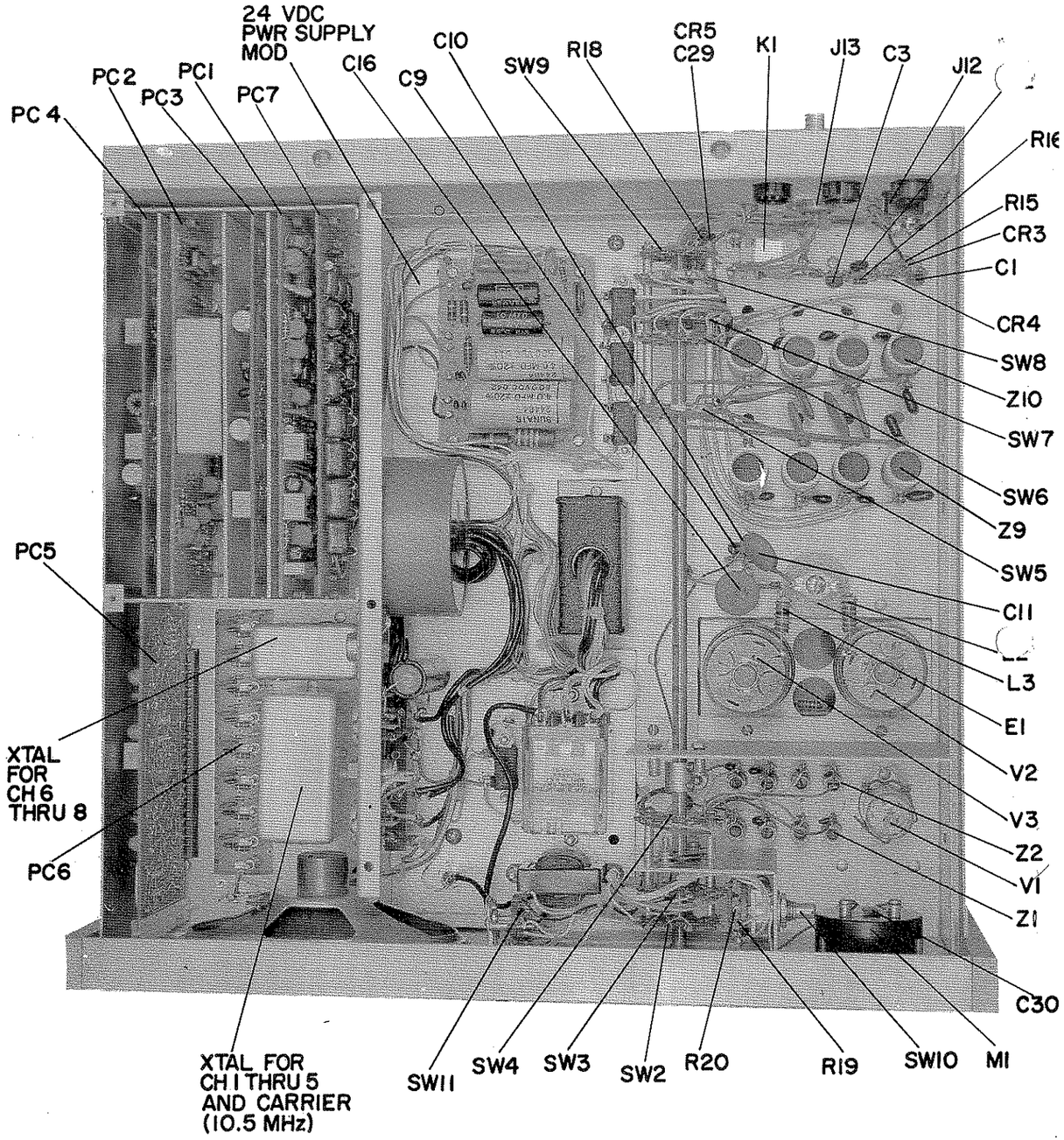
P.C. BOARD OVERLAYS AND SCHEMATIC DIAGRAMS



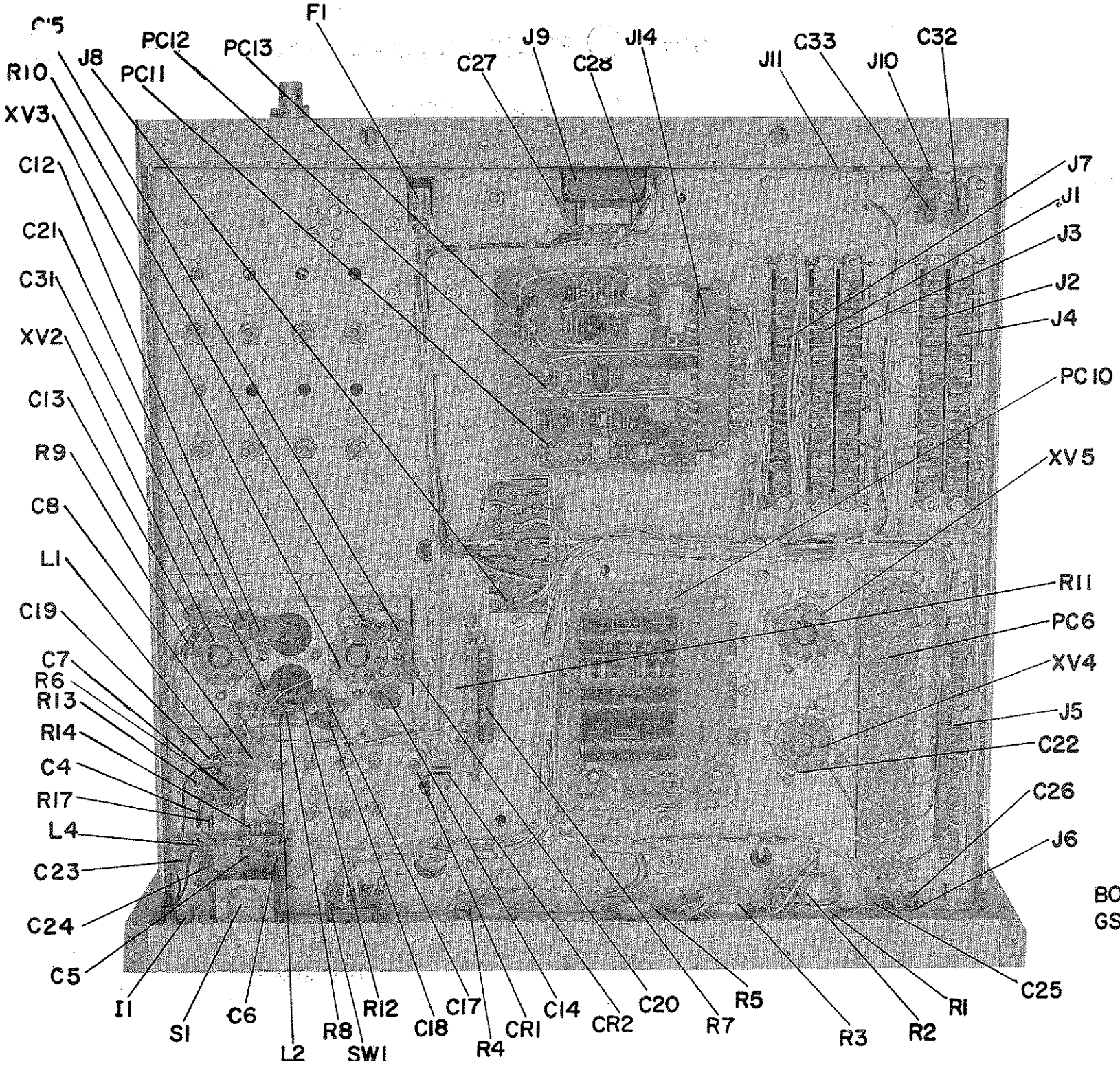
CHASSIS TOP VIEW



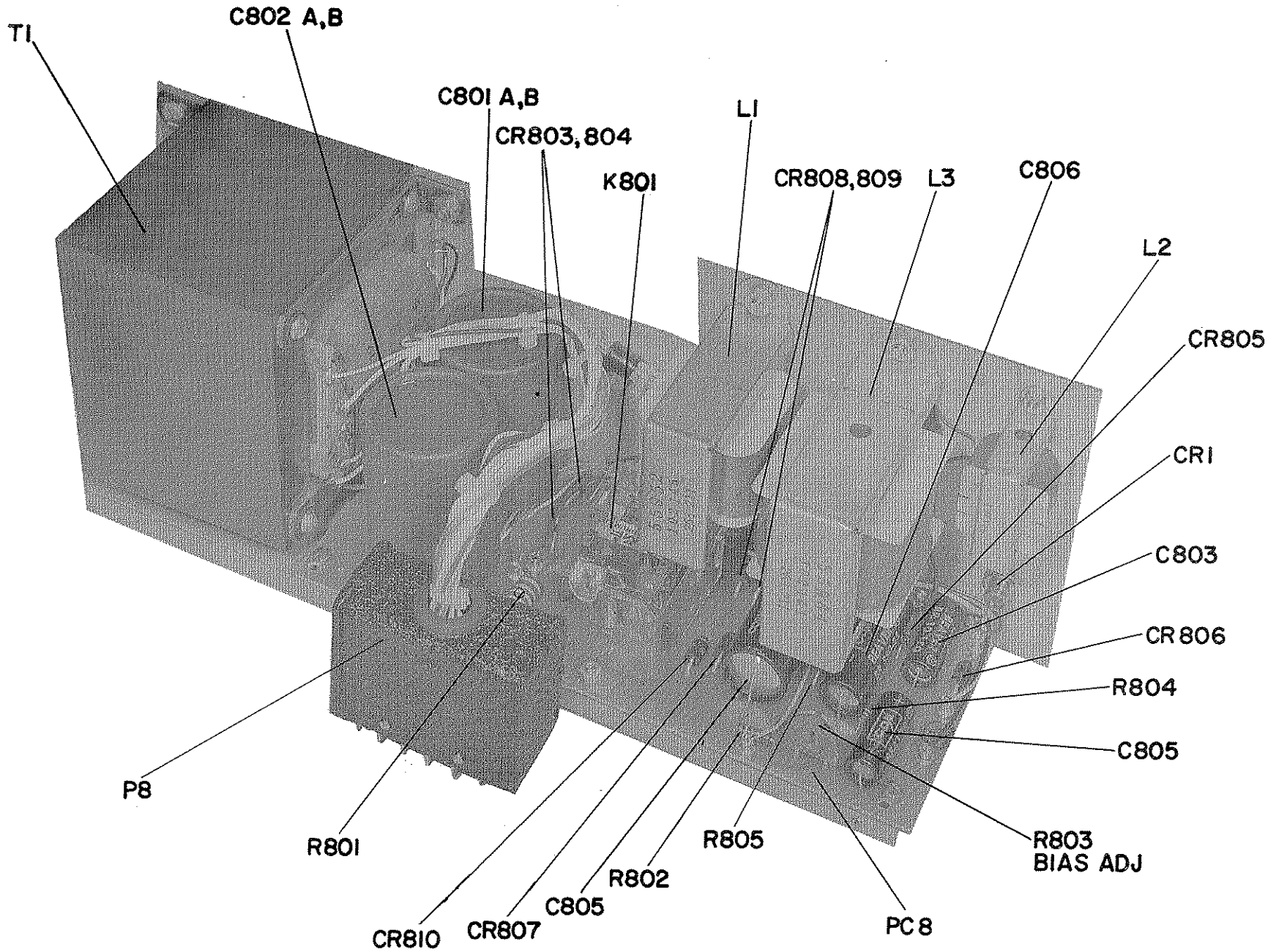
CHASSIS BOTTOM VIEW



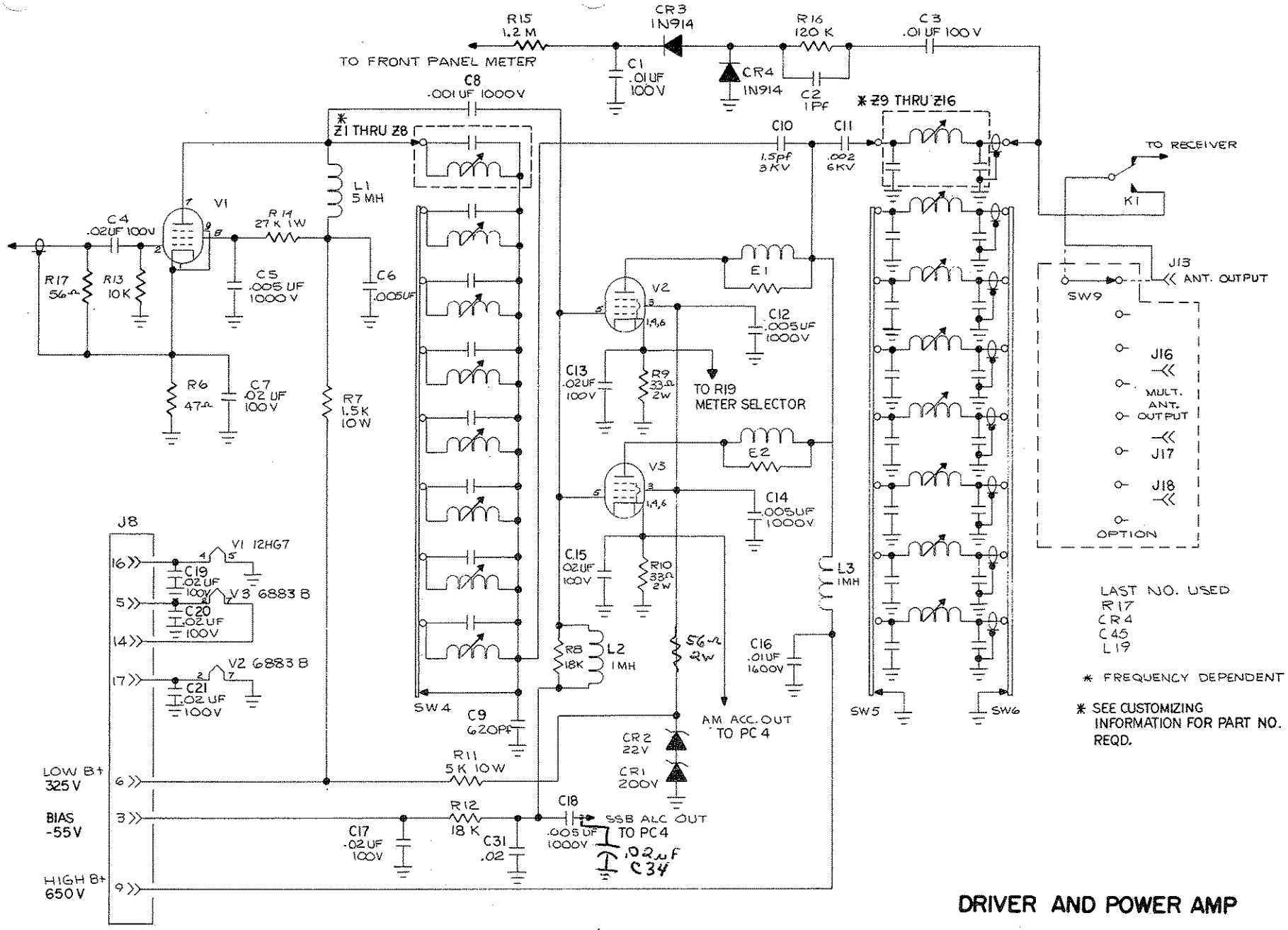
TOP VIEW GSB-300
(WITH 24 VDC POWER SUPPLY MODULE)



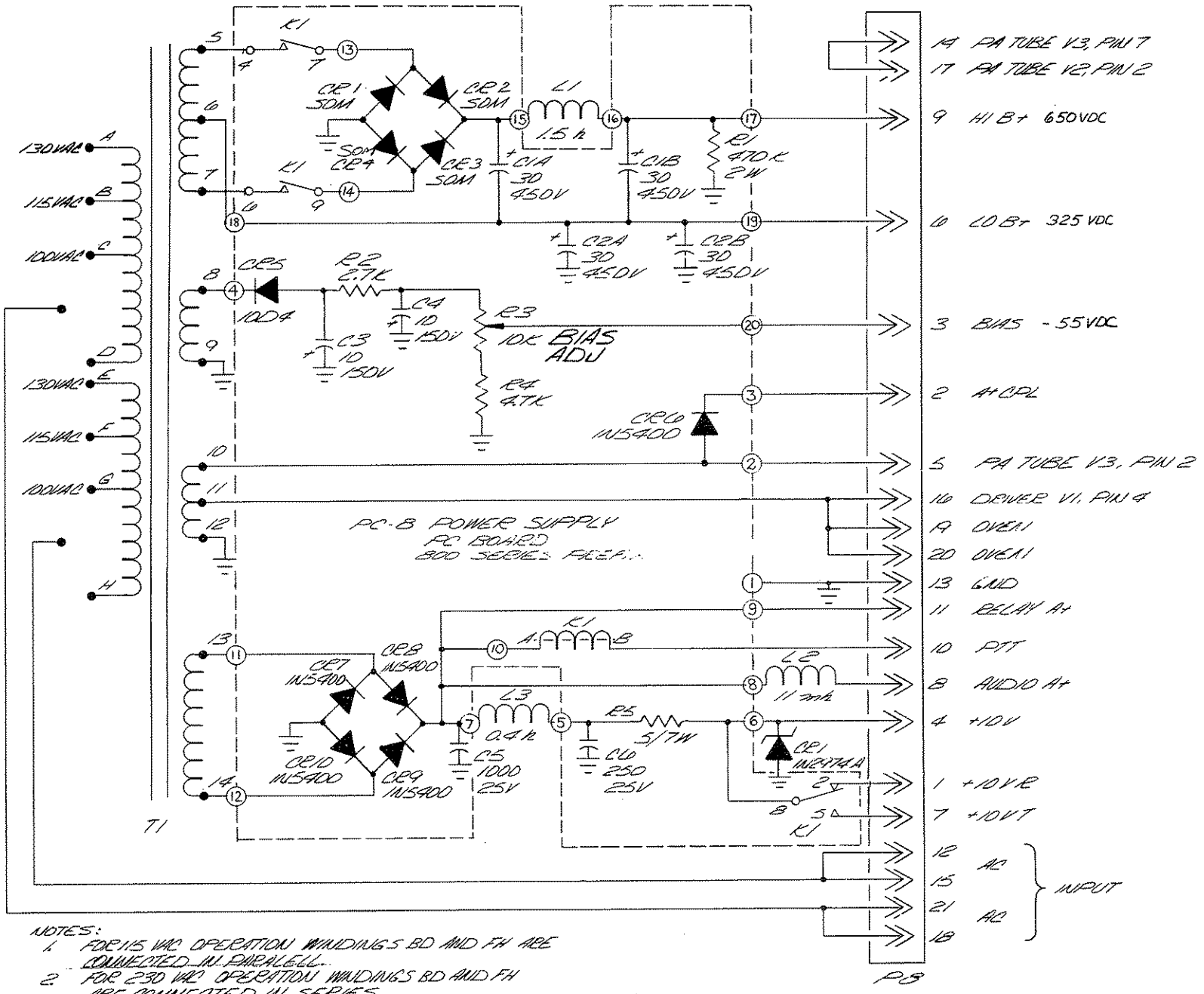
BOTTOM VIEW
GSB-300



AC POWER SUPPLY MODULE 97868

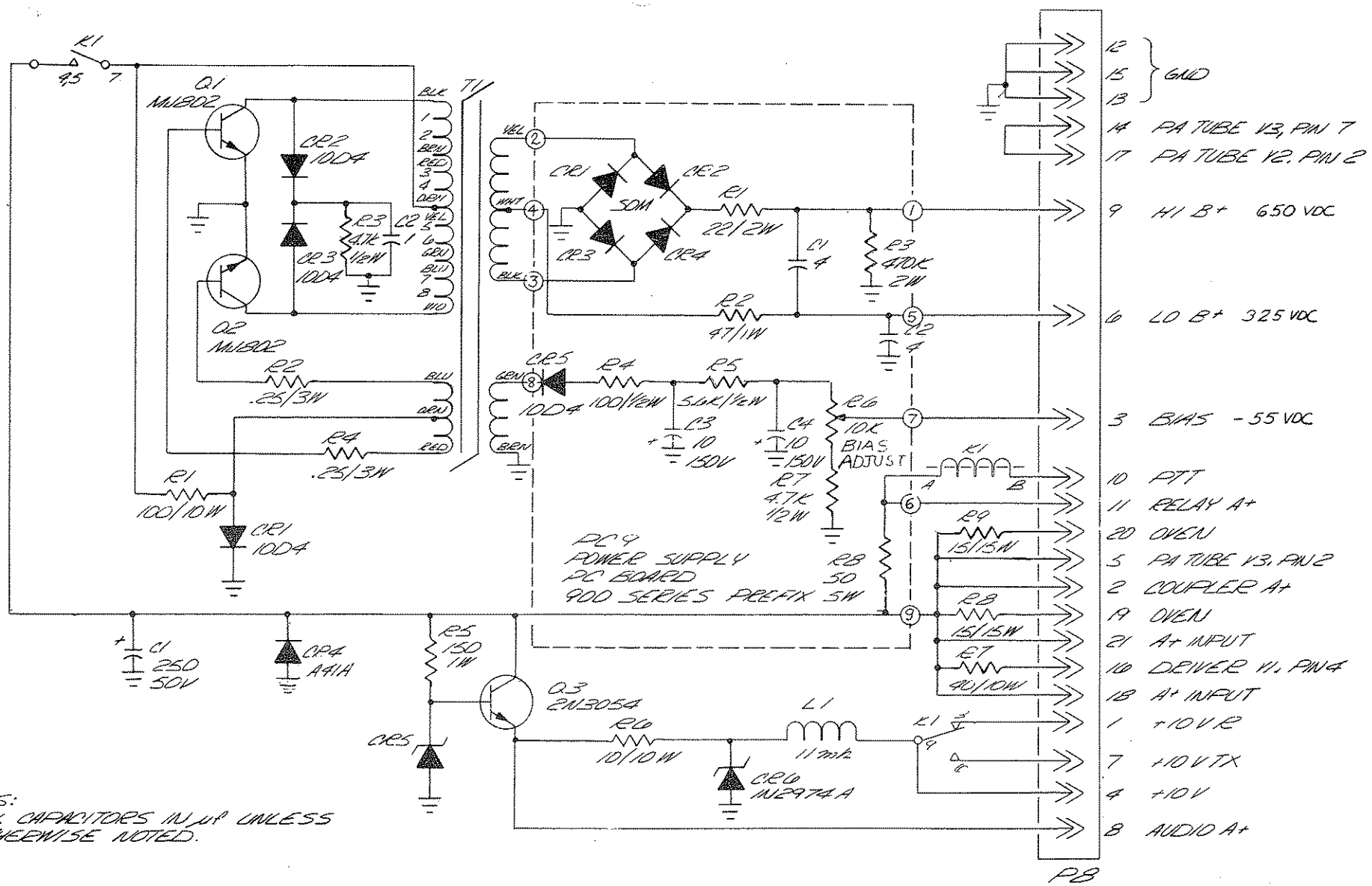


DRIVER AND POWER AMP



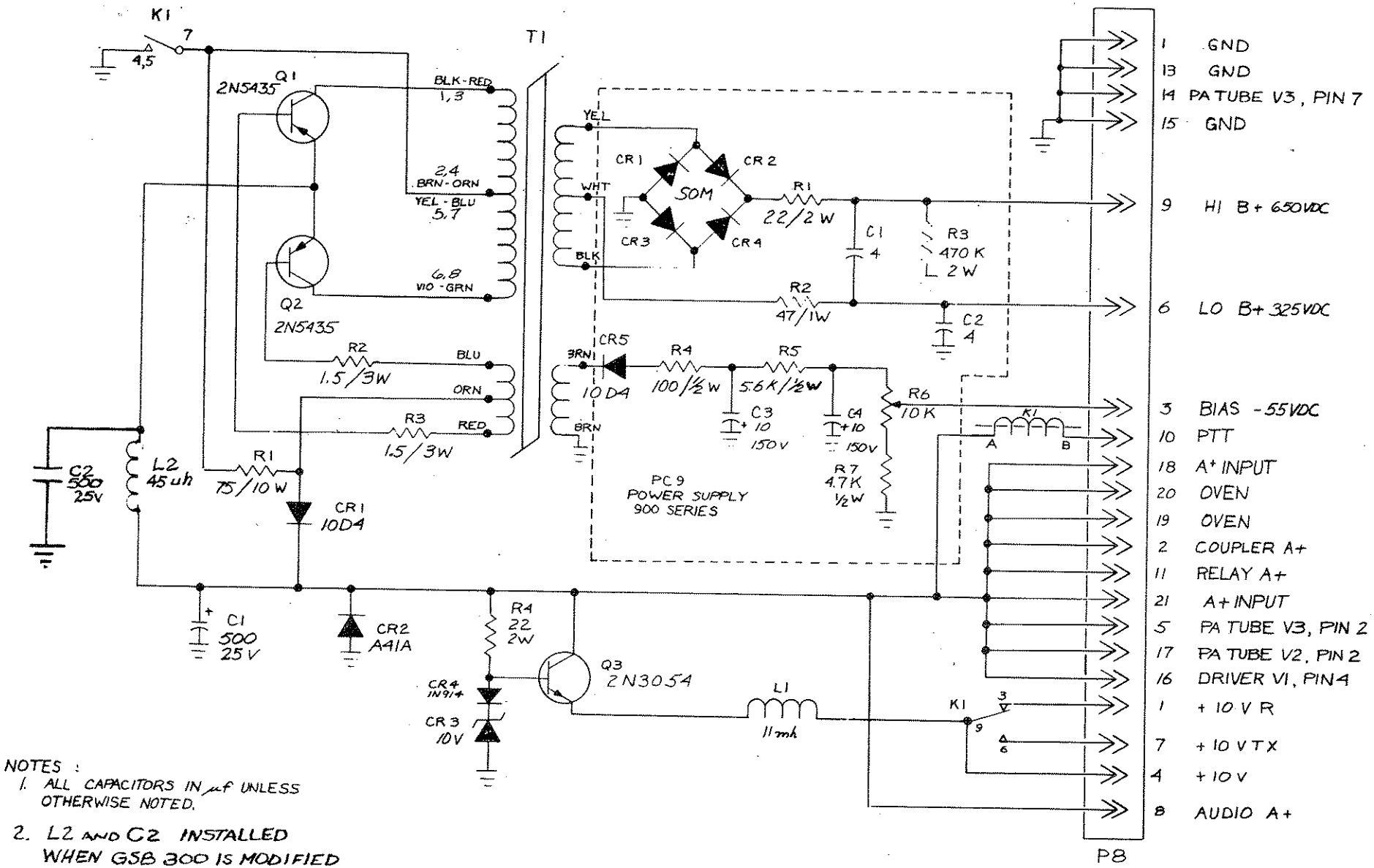
NOTES:
1. FOR 115 VAC OPERATION WINDINGS BD AND FH ARE CONNECTED IN PARALELL.
2. FOR 230 VAC OPERATION WINDINGS BD AND FH ARE CONNECTED IN SERIES.
3. FOR HIGHER OR LOWER INPUT VOLTAGES CONNECT THEIR CORRESPONDING WINDINGS AS PER NOTE 1 OR 2.
4. UNLESS OTHERWISE NOTED ALL CAPACITORS IN μF.

AC POWER SUPPLY MODULE



NOTES:
1. ALL CAPACITORS IN μF UNLESS OTHERWISE NOTED.

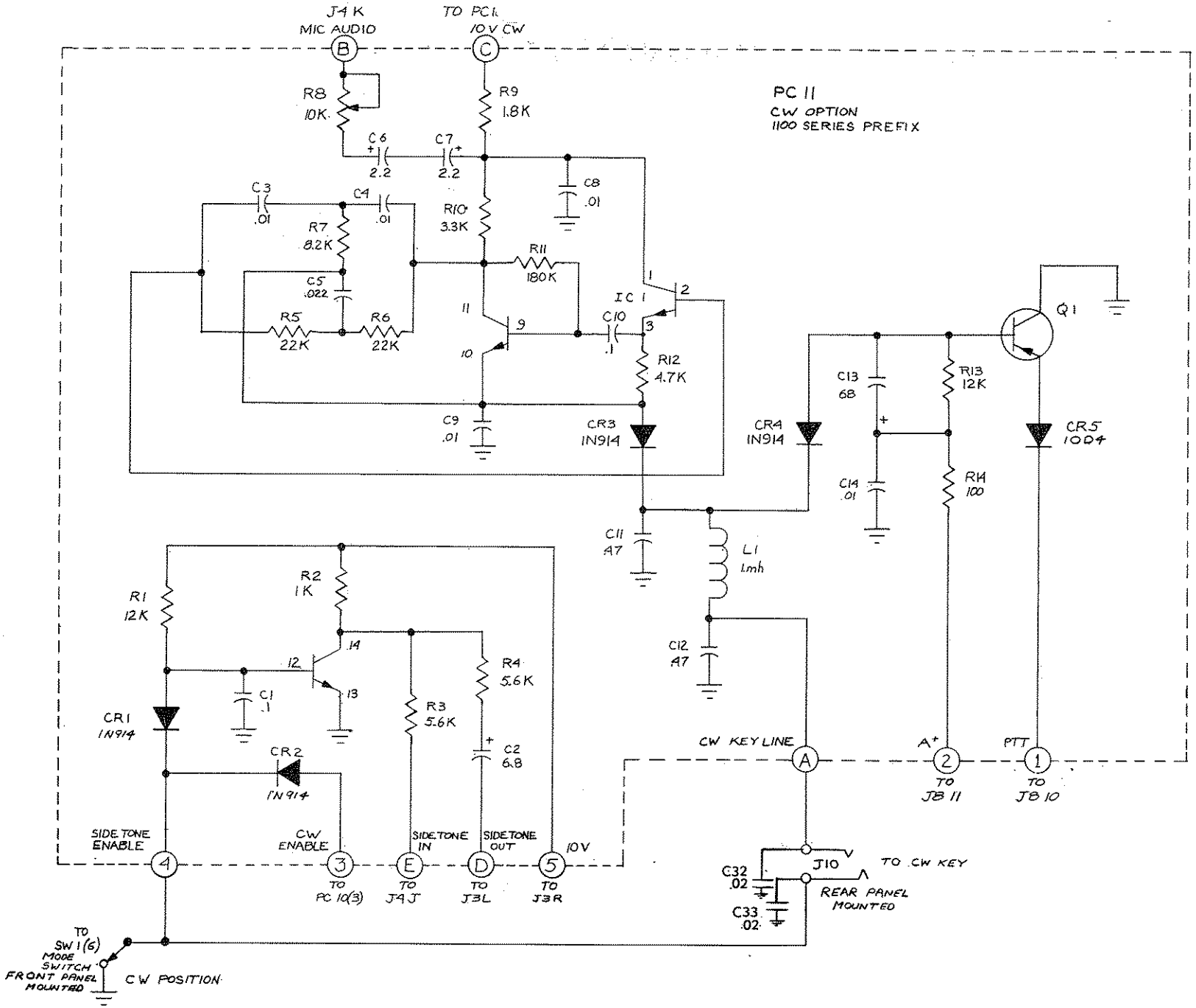
POWER SUPPLY MODULE, 24 VDC



NOTES :

1. ALL CAPACITORS IN μf UNLESS OTHERWISE NOTED.
2. L2 AND C2 INSTALLED WHEN GSB 300 IS MODIFIED TO OPERATE WITH GRC-350 REMOTE CONTROL.

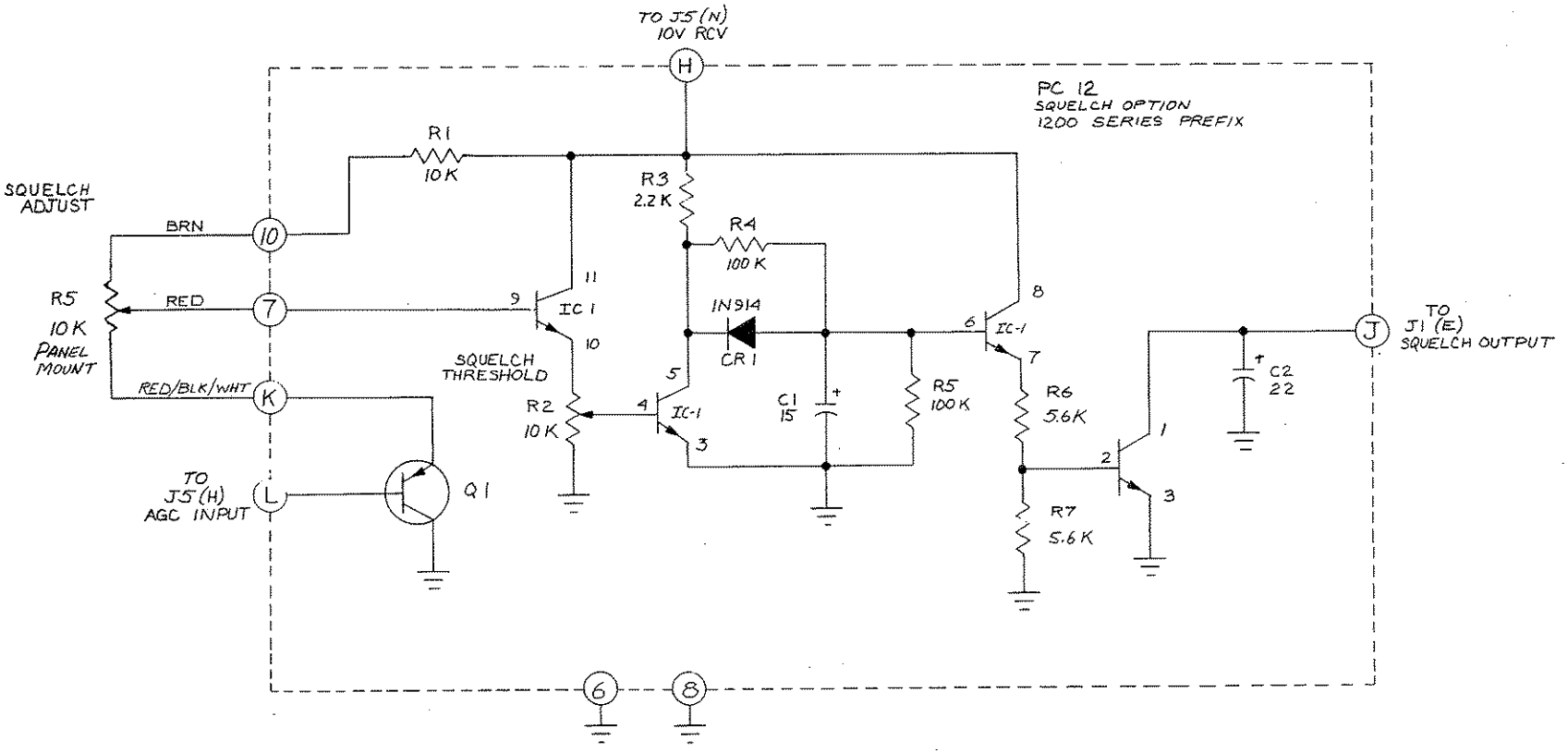
POWER SUPPLY MODULE, 12 VDC



NOTES :

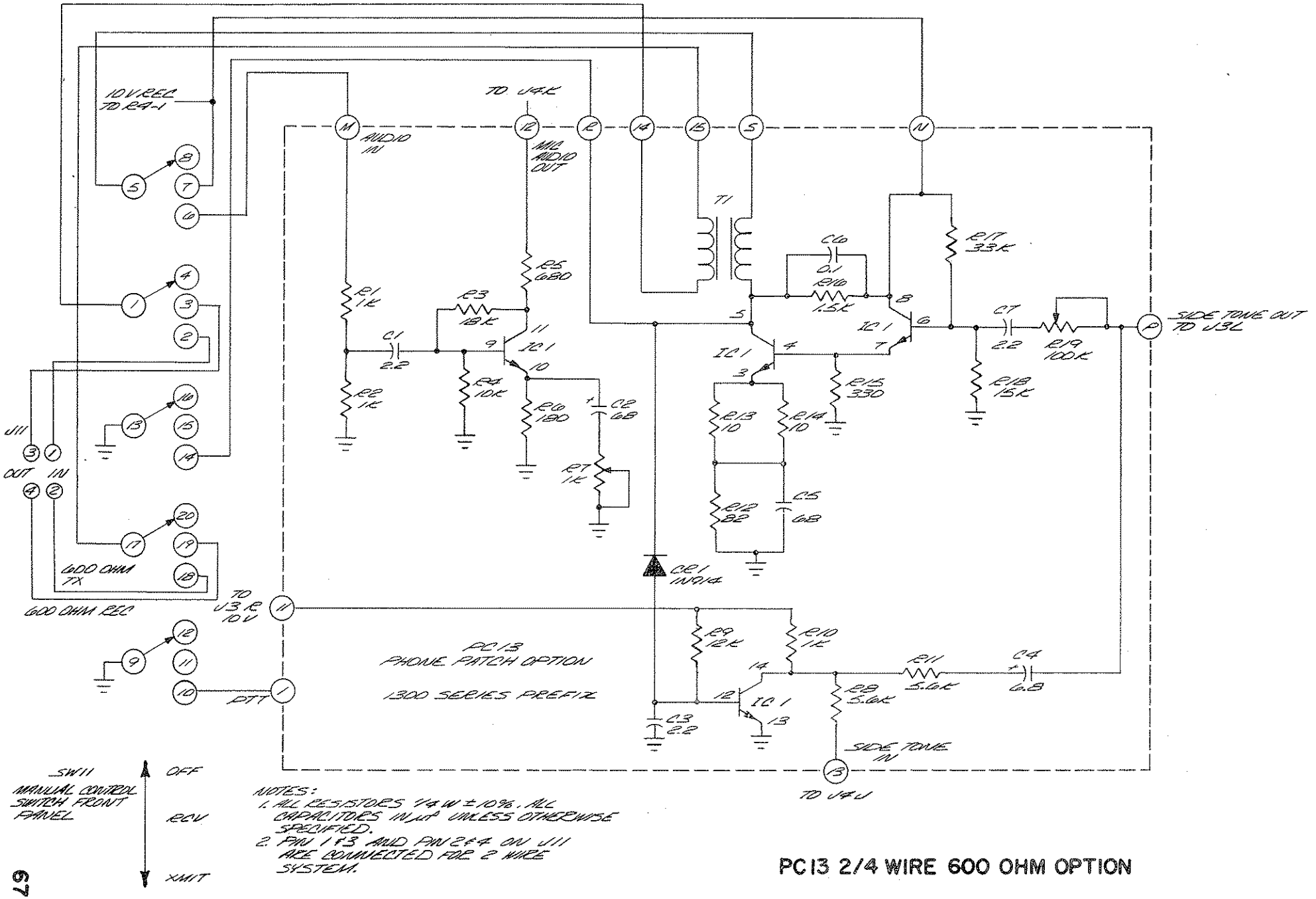
1. ALL RESISTORS 1/4W ±10%
   ALL CAPACITORS IN μf UNLESS OTHERWISE SPECIFIED.

PC II CW OPTION



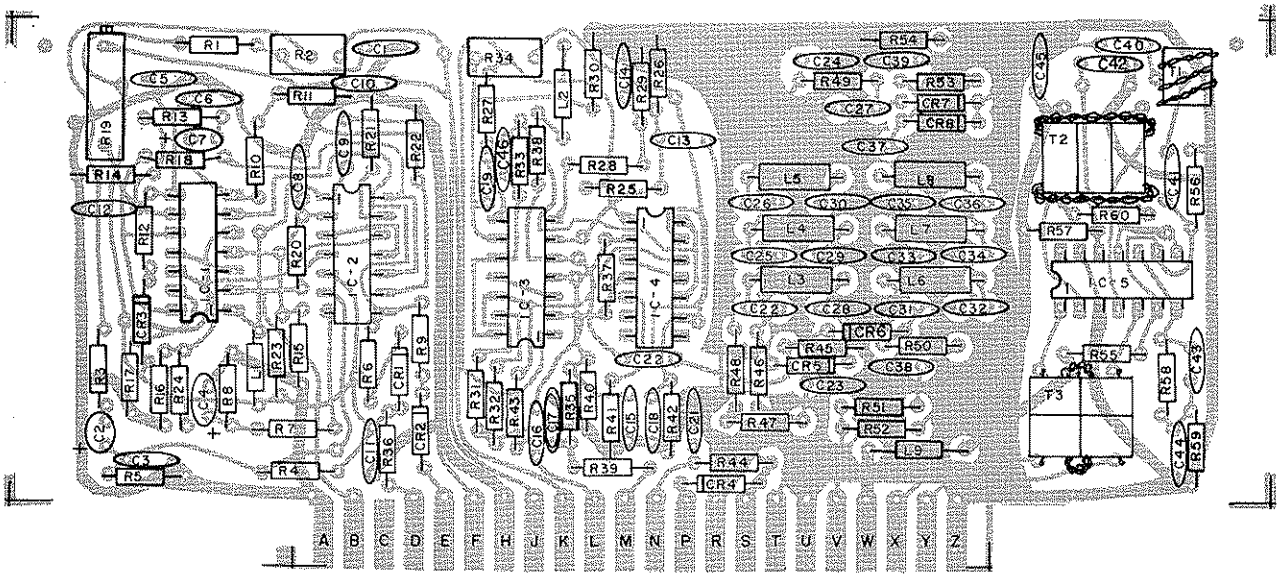
NOTES :
1. ALL RESISTORS ¼ W ± 10%.
ALL CAPACITORS IN μf UNLESS OTHER WISE SPECIFIED.

PC 12 SQUELCH OPTION

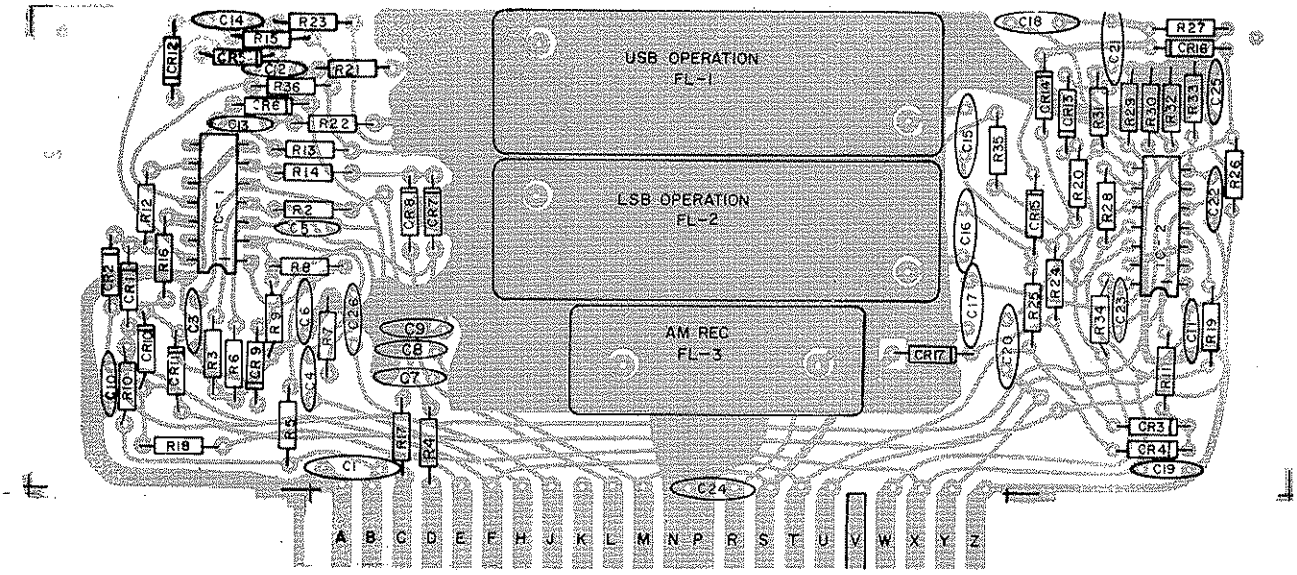


NOTES:
1. ALL RESISTORS 1/4 W ± 10%. ALL CAPACITORS IN μf UNLESS OTHERWISE SPECIFIED.
2. PIN 1 & 3 AND PIN 2 & 4 ON J11 ARE CONNECTED FOR 2 WIRE SYSTEM.

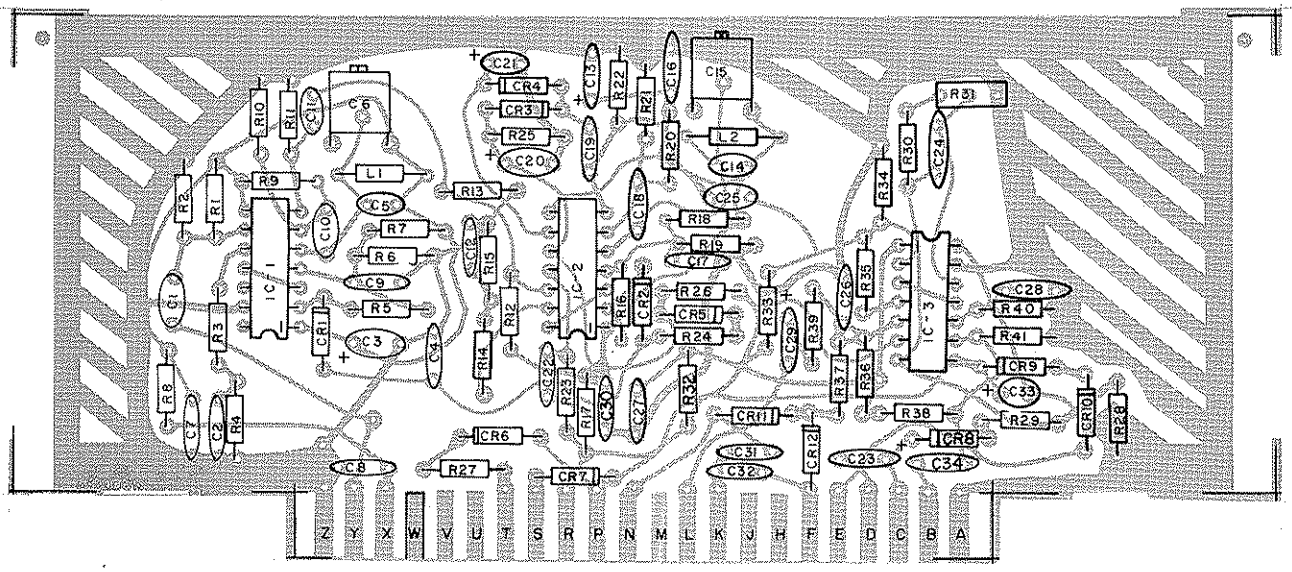
PC13 2/4 WIRE 600 OHM OPTION



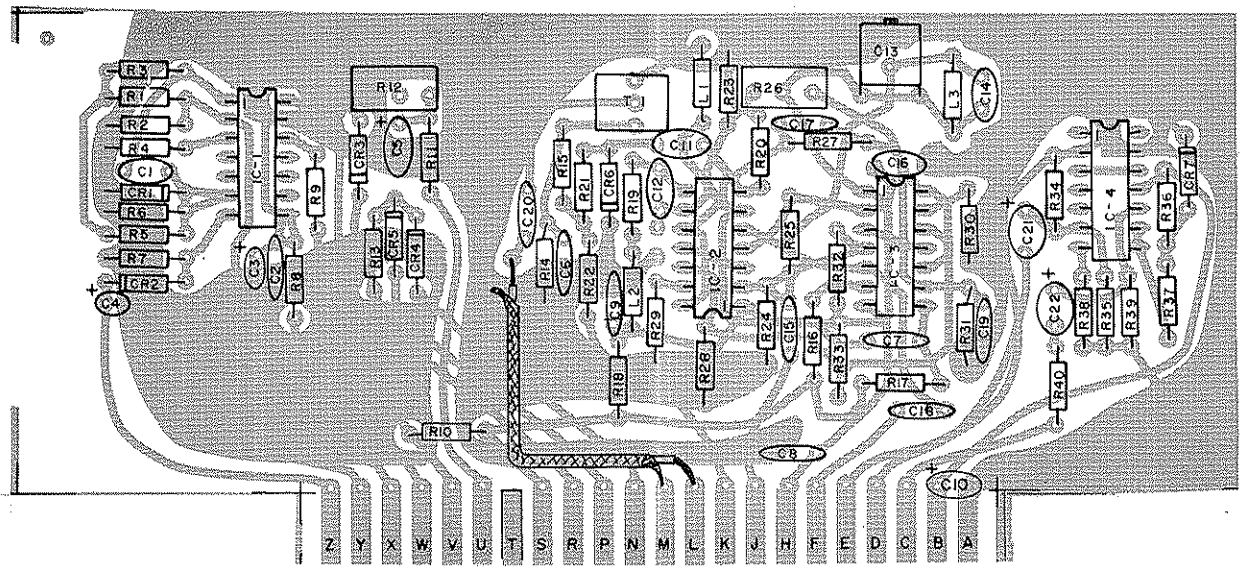
PC 1 EXCITER
100 SERIES PREFIX



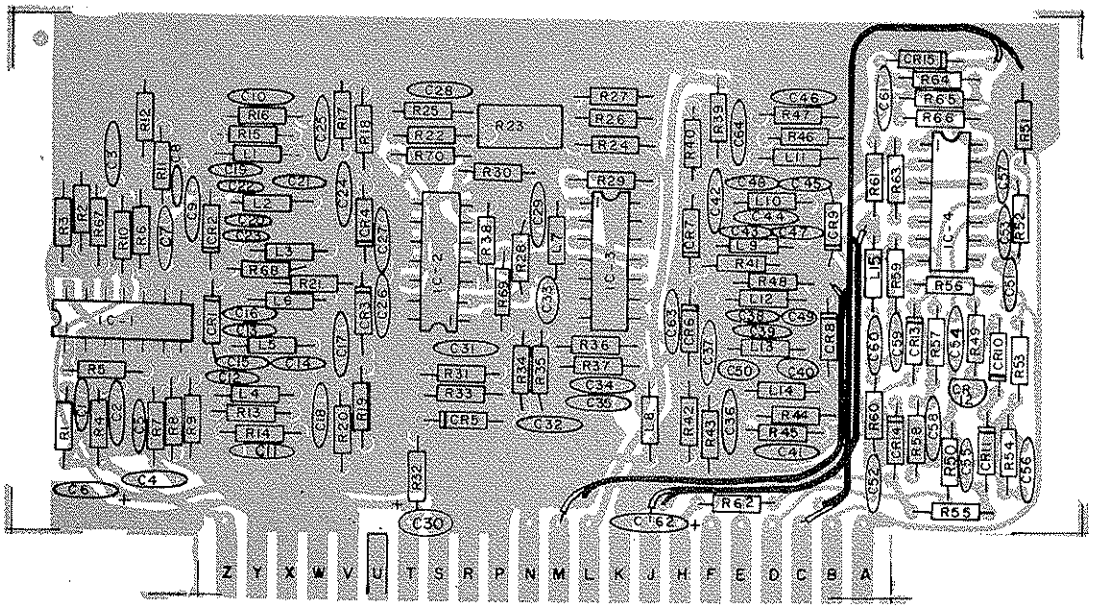
PC 2 FILTER SWITCH
200 SERIES PREFIX



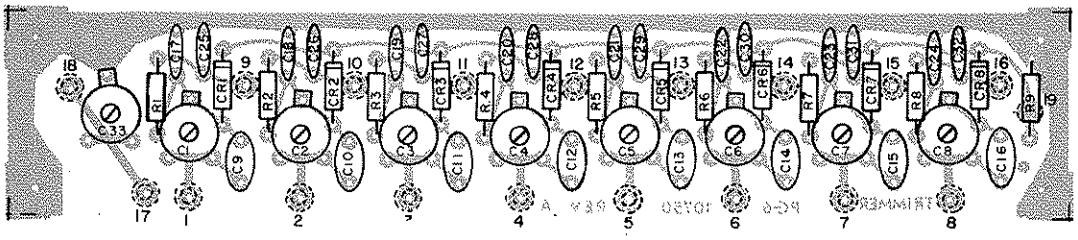
PC3 IF AMP
300 SERIES PREFIX



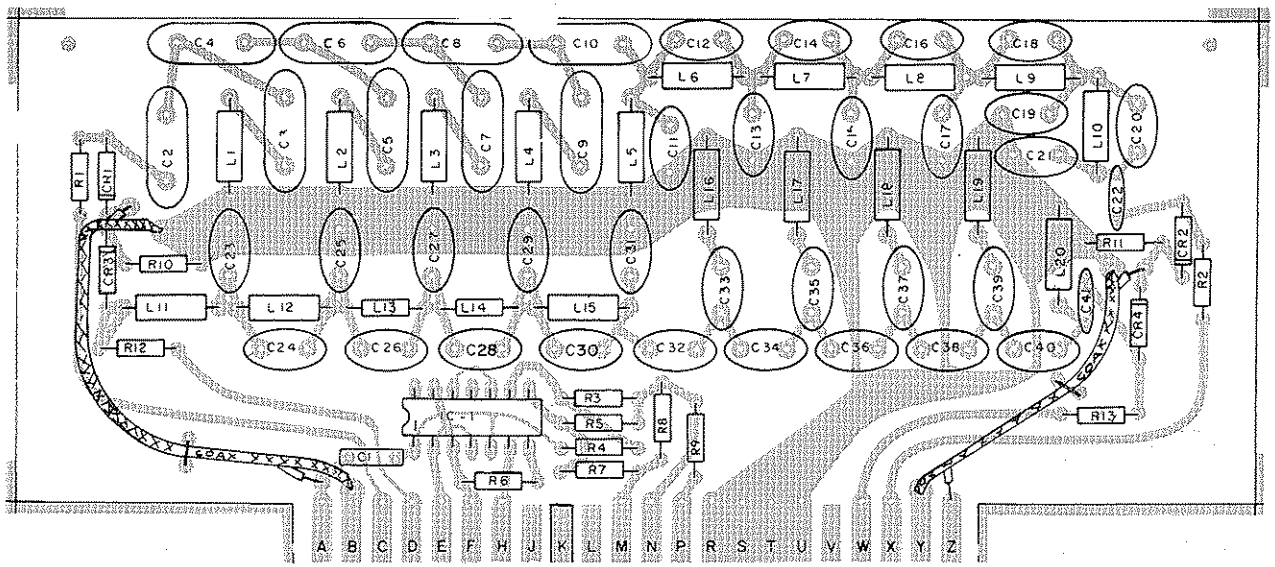
PC4 RF MIXER & ALC
400 SERIES PREFIX



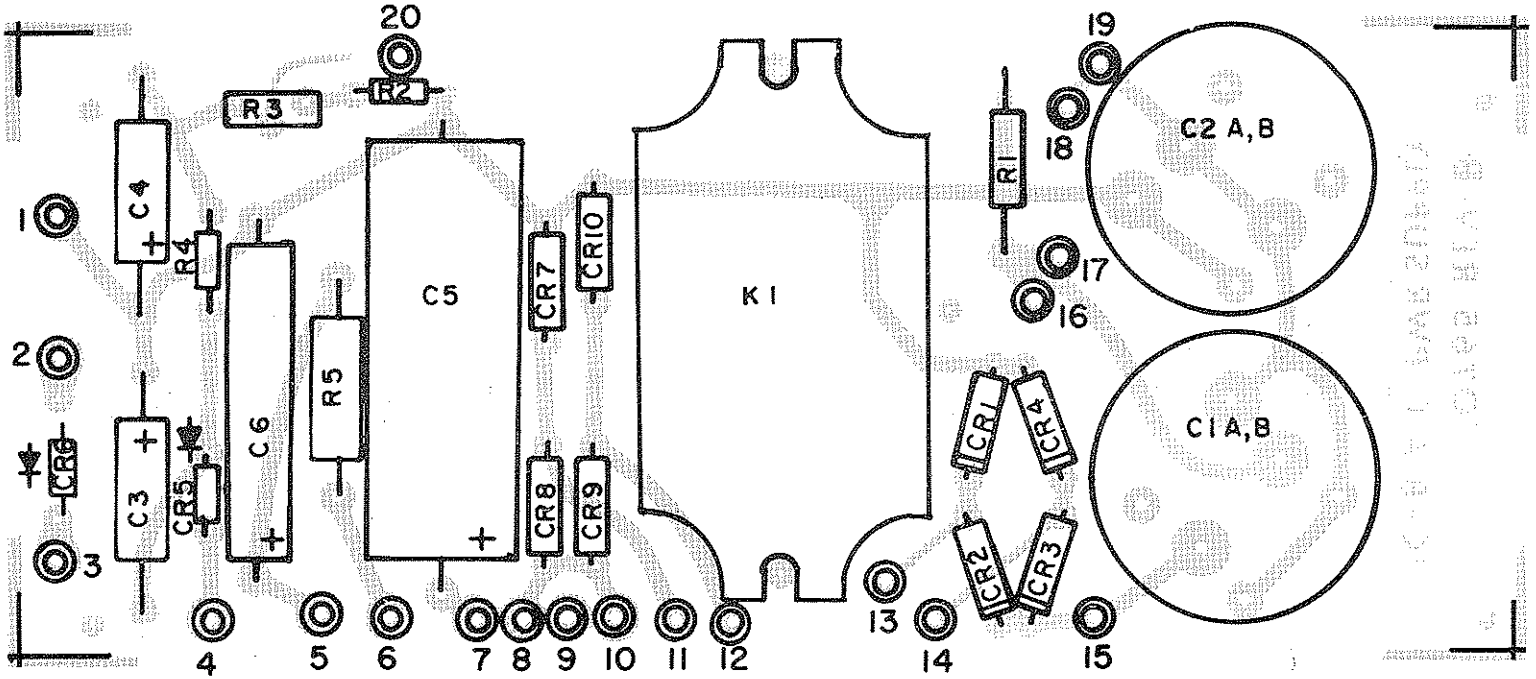
PC 5 OSCILLATORS
500 SERIES PREFIX



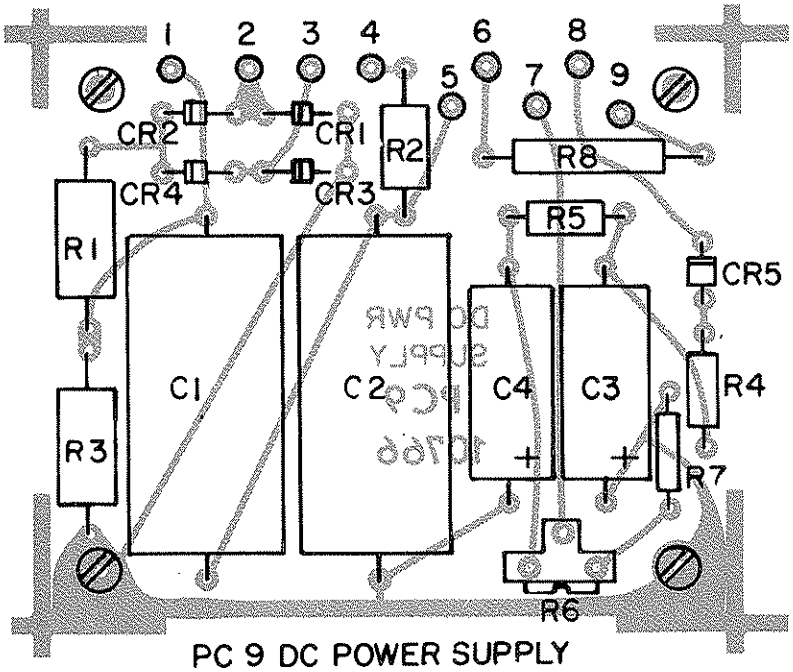
PC 6 TRIMMER
600 SERIES PREFIX



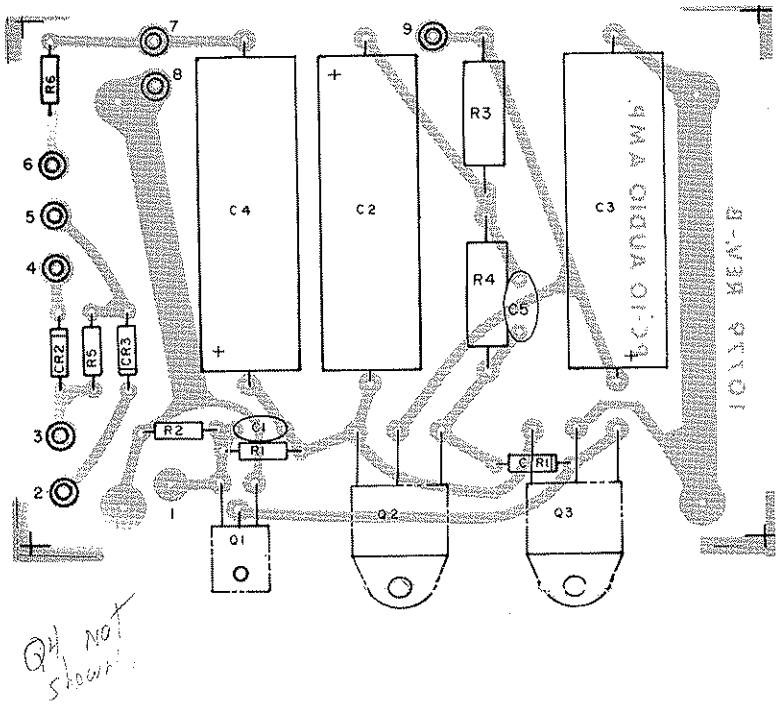
PC 7 RCVR PRESEL
700 SERIES PREFIX



PC 8 AC POWER SUPPLY
800 SERIES PREFIX

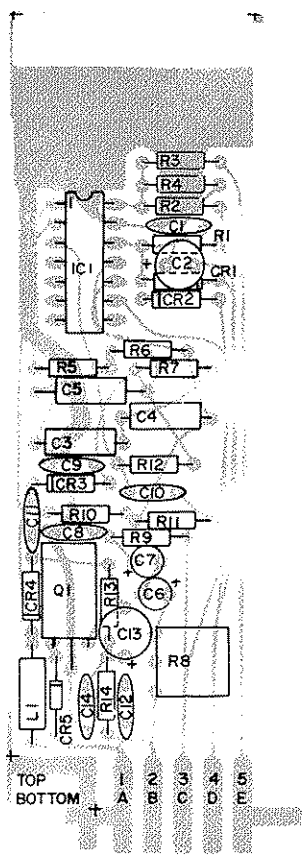


PC 9 DC POWER SUPPLY
900 SERIES PREFIX

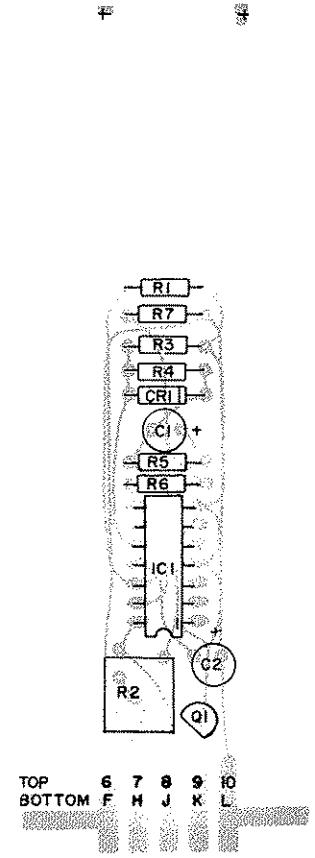


Q1 Not shown

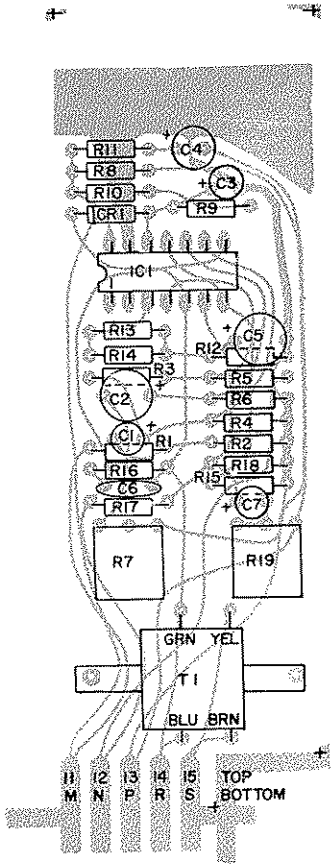
PC10 AUDIO AMP
1000 SERIES PREFIX



PC 11 CW MODULE
1100 SERIES PREFIX



PC 12 SQUELCH
MODULE 1200
SERIES PREFIX



PC 13 2/4 WIRE 600
OHM MODULE 1300
SERIES PREFIX

SECTION IX

PARTS LIST

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
PC1	97859	P.C. BOARD ASSY
PC1	10745	P.C. Board
C101	29666	Capacitor, 22uf, 15V
C102	29642	Capacitor, 2.2uf, 15V
C103	27010	Capacitor, .1uf, 12V
C104	29666	" , 22uf, 15V
C105	29666	" , " "
C106	27345	" , .02uf, 100V
C107	29678	" , 6.8uf, 15V
C108	27321	" , .01uf, 100V
C109	27321	" , " "
C110	27010	" , .1uf, 12V
C111	27321	" , .01uf, 100V
C112	27321	" " "
C113	27321	" " "
C114	27321	" " "
C115	27321	" " "
C116	27321	" " "
C117	27321	" " "
C118	27321	" " "
C119	27321	" " "
C120	27321	" " "
C121	27321	" " "
C122	29367	" , 30pf, 5%, 500V
C123	27321	" , .01uf, 100V
C124	27321	" , " "
C125	29379	" , 24pf, 5%, 500V
C126	29367	" , 30pf, 5%, 500V
C127	29496	" , 47pf, " "
C128	29343	" , 150pf " "
C129	26066	" , 27pf " "
C130	29355	" , 36pf " "
C131	26054	" , 22pf " "
C132	29329	" , 39pf " "
C133	29496	" , 47pf " "
C134	29496	" , " " "
C135	29317	" , 56pf " "
C136	29331	" , 8pf " "
C137	26080	" , 43pf " "
C138	27321	" , .01uf 100V
C139	27321	" , " "
C140	27321	" , " "
C141	27321	" , " "
C142	27321	" , " "
C143	28325	" , 220pf, 5%, 500V
C144	27321	" , .01uf, 100V

CKT. SYM.	PART NO.	DESCRIPTION
C145	27357	Capacitor, .05uf, 25V
C146	29343	" , 150pf, 5%, 500V
CR101	44290	Diode, 1N914
CR102	44290	" "
CR103	44290	" "
CR104	44290	" "
CR105	44290	" "
CR106	44290	" "
CR107	44290	" "
CR108	44290	" "
IC101	44795	Integrated Circuit, CA3086
IC102	44795	" " "
IC103	44795	" " "
IC104	44795	" " "
IC105	44795	" " "
L101	65919	Choke, 150uh, 10%
L102	64886	" , 1.2uh, 5%
L103	64965	" , 4.7uh, 5%
L104	65024	" , 10uh, 5%
L105	64824	" , 8.2uh, 5%
L106	64965	" , 4.7uh, 5%
L107	64965	" , 4.7uh, 5%
L108	65024	" , 10uh, 5%
L109	64886	" , 1.2uh, 5%
R101	17663	Resistor, 680 ohm 10%, 1/4W
R102	34591	Potentiometer, 200 ohm
R103	18320	Resistor, 560 ohm 5%, 1/4W
R104	17077	" , 4.7K " "
R105	18186	" 1.2K 10% "
R106	17089	" 3.3K " "
R107	17273	" 150 ohm 10% "
R108	17156	" 1K " "
R109	17156	" 1K 10%;1/4W(Nominal
R110	17132	" 220 ohm 10%, 1/4W
R111	17663	" 680 " " "
R112	17118	" 100 " " "
R113	18320	" 560 " 5% "
R114	17819	" 1.8K 10% "
R115	17089	" 3.3K " "
R116	18320	" 560 ohm 5%, 1/4W
R117	17091	" 330 ohm 5%, 1/4W
R118	17156	" 1K, 10%, 1/4W
R119	338494	Potentiometer, 10K

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
R120	17429	Resistor, 56 ohm, 10%, 1/4W
R121	17091	" 330 ohm, 5%, 1/4W
R122	17819	" 1.8K, 10%, 1/4W
R123	17077	" 4.7K, 5%, 1/4W
R124	19221	" 5.6K, " "
R125	19219	" 6.8K " "
R126	18667	" 2.7K, 10%, "
R127	18320	" 560 ohm, 5%, 1/4W
R128	19269	" 22 ohm, 10%, 1/4W
R129	18320	" 560 ohm, 5%, "
R130	17089	" 3.3K, 10%, "
R131	18186	" 1.2K, " "
R132	17833	" 390 ohm " "
R133	18655	" 120 ohm " "
R134	34590	Potentiometer, 10K
R135	17883	Resistor, 3.9K, 10%, 1/4W
R136	17716	" 10 ohm, 10%, 1/4W
R137	17118	" 100 ohm " "
R138	18461	" 82 ohm " "
R139	17118	" 100 ohm " "
R140	17077	" 4.7K, 5%, 1/4W
R141	17833	" 390 ohm 10%, 1/4W
R142	17089	" 3.3K, 10%, 1/4W
R143	19219	" 6.8K, 5%, 1/4W
R144	17273	" 150 ohm, 10%, 1/4W
R145	17156	" 1K, 10%, 1/4W
R146	17077	" 4.7K, 5%, 1/4W
R147	17156	" 1K, 10%, 1/4W
R148	17156	" " " "
R149	17077	" 4.7K, 5%, 1/4W
R150	17077	" " " "
R151	17156	" 1K, 10%, 1/4W
R152	17156	" " " "
R153	17077	" 4.7K, 5%, 1/4W
R154	17261	" 470 ohm, 10%, 1/4W
R155	19207	" 8.2K, 5%, 1/4W
R156	17807	" 2.2K " "
R157	19219	" 6.8K, " "
R158	19269	" 22 ohm, 10%, 1/4W
R159	17845	" 270 " " "
R160	18655	" 120 " " "
T101	49109	Transformer, Input
T102	49111	" , Driver
T103	49123	" , Output

CKT. SYM.	PART NO.	DESCRIPTION
PC2	97863	PC BOARD ASSY
PC2	10746	P.C. Board
C201	27357	Capacitor,.05uf, 25V
C202	27321	" ,.01uf, 100V
C203	27321	" , " "
C204	27321	" " "
C205	27321	" " "
C206	27321	" " "
C207	27321	" " "
C208	27321	" " "
C209	27321	" " "
C210	27321	" " "
C211	27321	" " "
C212	27321	" " "
C213	27321	" " "
C214	27321	" " "
C215	27321	" " "
C216	27321	" " "
C217	27321	" " "
C218	27321	" " "
C219	27321	" " "
C220	27321	" " "
C221	27321	" " "
C222	27321	" " "
C223	27321	" " "
C224	27321	" " "
C225	27321	" " "
CR201	44290	Diode, 1N914
CR202	44290	" "
CR203	44290	" "
CR204	44290	" "
CR205	44290	" "
CR206	44290	" "
CR207	44290	" "
CR208	44290	" "
CR209	44290	" "
CR210	44290	" "
CR211	44290	" "
CR212	44290	" "
CR213	44290	" "
CR214	44290	" "
CR215	44290	" "
CR216	44290	" "
CR217	44290	" "

continued

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
FL201	81826	Filter, USB Operation
FL202	81825	" , LSB Operation(optional
FL203	81827	" , AM REC Operation
IC201	44795	Integrated Circuit, CA3086
IC202	44795	" " "
R201		
R202	17235	Resistor, 15K, 10%, 1/4W
R203	17883	" 3.9K, " "
R204	17132	" 220 ohm 10% "
R205	17132	" " " " "
R206	17845	" 270 " " "
R207	17807	" 2.2K, 5%, 1/4W
R208	17481	" 6.8K, 10%, 1/4W
R209	17819	" 1.8K, " "
R210	17156	" 1K, " "
R211	17572	" 18K, " "
R212	17572	" " " "
R213	17089	" 3.3K " "
R214	17572	" 18K " "
R215	17089	" 3.3K " "
R216	17572	" 18K " "
R217	17716	" 10 ohm " "
R218	17156	" 1K " "
R219	17572	" 18K " "
R220	18306	" 5.6K " "
R221	18796	" 68 ohm " "
R222	18796	" " " "
R223	17522	" 180 " " "
R224	18306	" 5.6K " "
R225	18306	" " " "
R226	18306	" " " "
R227	17833	" 390 ohm 10%, 1/4W
R228	17223	" 22K " "
R229	18306	" 5.6K " "
R230	18186	" 1.2K " "
R231	17223	" 22K " "
R232	18306	" 5.6K " "
R233	18186	" 1.2K " "
R234	17041	" 10K " "
R235	17144	" 56K " "
R236	17089	" 3.3K " "

CKT. SYM.	PART NO.	DESCRIPTION
PC3	97862	PC BOARD ASSY
PC3	10747	PC Board
C301	28167	Capacitor, 500pf, 100V
C302	27345	" .02uf, 100V
C303	29666	" 22uf, 15V
C304	27345	" .02uf, 100V
C305	26054	" 22pf, 500V
C306	29549	" , Variable,4-40pf
C307	27345	" .02uf, 100V
C308	27321	" .01uf, 100V
C309	27345	" .02uf, 100V
C310	28167	" 500pf, 500V
C311	29355	" 36pf, 500V
C312	27321	" .01uf, 100V
C313	29666	" 22uf, 15V
C314	26054	" 22pf, 500V
C315	29549	" Variable,4-40pf
C316	27321	" .01uf, 100V
C317	27345	" .02uf, 100V
C318	28167	" 500pf, 100V
C319	28167	" " "
C320	29666	" 22uf, 15V
C321	27917	" .47uf, 35V
C322	27321	" .01uf, 100V
C323	29654	" 68uf, 15V
C324	27345	" .02uf, 100V
C325	29331	" 8pf, 500V
C326	27321	" .01uf, 100V
C327	27321	" " "
C328	27333	" .005uf, 100V
C329	29666	" 22uf, 15V
C330	27321	" .01uf, 100V
C331	27321	" " "
C332	27321	" " "
C333	29642	" 2.2uf, 15V
C334	28167	" 500pf, 100V
CR301	44290	Diode, 1N914
CR302	44290	" "
CR303	40139	" 1N54A
CR304	40139	" "
CR305	44290	" 1N914
CR306	44290	" "
CR307	44290	" "
CR308	44290	" "

continued

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
CR309	44290	Diode, 1N914
CR310	44290	" "
CR311	40510	" 1N914B
CR312	40510	" 1N914B
IC301	44795	Integrated Circuit, CA3086
IC302	44795	" " "
IC303	44795	" " "
L301	64965	Choke, 4.7uh, 5%
L302	64965	" " "
R301	17041	Resistor, 10K, 10%, 1/4W
R302	17807	" 2.2K, 5%, 1/4W
R303	17429	" 56 ohm, 10%, 1/4W
R304	17132	" 220 ohm, 10%, "
R305	17106	" 47K " "
R306	18162	" 8.2K " "
R307	17041	" 10K " "
R308	17091	" 330 ohm 5% "
R309	18318	" 12K 10%, 1/4W
R310	18318	" " " "
R311	18186	" 1.2K " "
R312	17235	" 15K " "
R313	17807	" 2.2K 5% "
R314	17429	" 56 ohm 10% "
R315	17132	" 220 ohm " "
R316	17106	" 47K " "
R317	17091	" 330 ohm 5%, 1/4W
R318	17041	" 10K 10%, 1/4W
R319	18162	" 8.2K " "
R320	18318	" 12K " "
R321	18318	" 12K " "
R322	18186	" 1.2K " "
R323	17091	" 330 ohm 5%, 1/4W
R324	17792	" 33K 10%, 1/4W
R325	17106	" 47K " "
R326	18174	" 15 ohm 10%, 1/4W
R327	17510	" 120K " "
R328	17883	" 3.9K " "
R329	17118	" 100 ohm " "
R330	17792	" 33K " "
R331	34590	Potentiometer, 10K
R332	17091	Resistor 330 ohm, 5%, 1/4W
R333	17792	" 33K, 10%, 1/4W
R334	17120	" 27K " "
R335	18320	" 560 ohm 5% "

CKT. SYM.	PART NO.	DESCRIPTION
R336	17144	Resistor 56K 10%, 1/4W
R337	17089	" 3.3K " "
R338	17235	" 15K " "
R339	17273	" 150 ohm 10%, 1/4W
R340	17091	" 330 ohm 5%, 1/4W
R341	17807	" 2.2K " "
PC4	97856	P.C. BOARD ASSY.
PC4	10748	PC Board
C401	27321	Capacitor, .01uf, 100V
C402	27321	" " "
C403	29678	" 6.8uf, 15V
C404	29678	" " "
C405	29654	" 68uf, 15V
C406	26913	" .02uf, 25V
C407	27321	" .01uf, 100V
C408	27357	" .05uf, 25V
C409	27321	" .01uf, 100V
C410	29666	" 22uf, 15V
C411	27333	" .005uf, 100V
C412	27333	" " "
C413	29549	" Variable, 4-40pf
C414	26054	" 22pf, 500V
C415	27321	" .01uf, 100V
C416	27321	" " "
C417	27321	" " "
C418	27321	" " "
C419	27321	" " "
C420	26913	" .02uf, 25V
C421	29642	" 2.2uf, 15V
C422	29666	" 22uf, 15V
CR401	44290	Diode, 1N914
CR402	44290	" "
CR403	44290	" "
CR404	44290	" "
CR405	44290	" "
CR406	40165	Diode, 10D4
CR407	44290	" 1N914
IC401	44795	Integrated Circuit CA3086
IC402	44795	" " "
IC403	44795	" " "
IC404	44795	" " "

continued

CKT. SYM.	PART NO.	DESCRIPTION
L401	64991	Choke, 1.2uh 5%
L402	64953	" .56uh "
L403	56425	" 4.7uh 10%
R401	17168	Resistor, 82K, 10%, 1/4W
R402	17041	" 10K, " "
R403	18306	" 5.6K " "
R404	17118	" 100 ohm 10%, 1/4W
R405	17039	" 100K " "
R406	17041	" 10K " "
R407	17041	" " " "
R408	17118	" 100 ohm " "
R409	17572	" 18K " "
R410	17819	" 1.8K " "
R411	17821	" 820 ohm " "
R412	34590	Potentiometer, 10K
R413	17572	Resistor, 18K 10%, 1/4W
R414	18318	" 12K " "
R415	18306	" 5.6K " "
R416	18318	" 12K " "
R417	17041	" 10K " "
R418	18174	" 15 ohm 10%, 1/4W
R419	17273	" 150 " " "
R420	17156	" 1K " "
R421	17156	" " " "
R422	18174	" 15 ohm " "
R423	17089	" 3.3K " "
R424	17077	" 4.7K 5%, 1/4W
R425	17118	" 100 ohm 10%, 1/4W
R426	34590	Potentiometer, 10K
R427	17936	Resistor, 47 ohm 10%, 1/4W
R428	17821	" 820 ohm " "
R429	17833	" 390 ohm " "
R430	17833	" " " "
R431	17089	" 3.3K " "
R432	17883	" 3.9K " "
R433	17481	" 6.8K " "
R434	18318	" 12K " "
R435	17235	" 15K " "
R436	17247	" 1.5K " "
R437	17663	" 680 ohm " "
R438	18796	" 68 " " "
R439	17118	" 100 " " "
R440	17936	" 47 " " "
T401	49109	Transformer, Input

CKT. SYM.	PART NO.	DESCRIPTION
PC5	97865	P.C. BOARD ASSY
PC5	10749	P.C. Board
C501	28703	Capacitor 130pf, 5%, 500V
C502	26913	" .02uf, 25V
C503	26913	" " "
C504	25036	" 6pf, 500V
C505	28859	" 10pf, 5%, 500V
C506	29666	" 22uf, 15V
C507	26913	" .02uf, 25V
C508	28129	" 56pf, 5%, 500V
C509	26913	" .02uf, 25V
C510	26913	" " "
C511	26913	" " "
C512	28466	" 75pf, 5%, 500V
C513	28545	" 100pf," "
C514	28088	" 120pf," "
C515	28466	" 75pf," "
C516	28105	" 180pf," "
C517	26913	" .02uf, 25V
C518	26913	" " "
C519	28090	" 150pf, 5%, 500V
C520	28325	" 220pf " 300V
C521	28862	" 240pf " "
C522	28088	" 120pf " 500V
C523	28863	" 270pf " 300V
C524	26913	" .02uf, 25V
C525	26913	" " "
C526	26913	" " "
C527	26913	" " "
C528	26913	" " "
C529	26913	" " "
C530	29666	" 22uf, 15V
C531	26913	" .02uf, 25V
C532	26913	" " "
C533	28387	" 620pf, 5%, 300V
C534	26913	" .02uf, 25V
C535	26913	" " "
C536	26913	" " "
C537	26913	" " "
C538	28545	" 100pf, 5%, 500V
C539	28131	" 110pf, 5%, 500V
C540	28090	" 150pf, " "
C541	26913	" .02uf, 25V
C542	26913	" " "
C543	28105	" 180pf, 5%, 500V

continued

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
C544	28715	Capacitor 200pf, 5%, 300V
C545	28863	" 270pf, " , "
C546	26913	" .02uf, 25V
C547	28090	" 150pf, 5%, 500V
C548	28865	" 330pf, " 300V
C549	28076	" 68pf, " 500V
C550	28090	" 150pf, " "
C551	28863	" 270pf, " 300V
C552	28337	" .47uf, 50V
C553	~~29525~~ 29719	" 9pf, N1500
C554	26913	" .02uf, 25V
C555	28650	" 15pf, 5%, 500V
C556	26913	" .02uf, 25V
C557	26913	" " "
C558	26913	" " "
C559	26913	" " "
C560	28131	" 110pf, 5%, 500V
C561	28863	" 270pf, 5%, 300V
C562	29678	" 6.8uf, 15V
C563	26913	" .02uf, 25V
C564	26913	" " "
CR501	40510	Diode, 1N914B
CR502	40510	" "
CR503	40510	" "
CR504	40510	" "
CR505	44305	Diode, Zener, 1N756
CR506	40510	" 1N914B
CR507	40510	" 1N914B
CR508	40510	" "
CR509	40510	" "
CR510	44290	" 1N914
CR511	44290	" 1N914
CR512	40517	", Varactor, MV2101
CR513	44290	" 1N914
CR514	44290	" "
CR515	44290	" "
IC501	44795	Integrated Circuit CA3086
IC502	44795	" " "
IC503	44795	" " "
IC504	44795	" " "
L501	64915	Choke, 1 uh 5%
L502	64903	" .68uh, 5%
L503	64991	" 1.2uh "
L504	64941	" .47uh "
L505	64939	Choke, .27uh, 5%
L506	64953	" .56uh "
L507	64927	" 1.5uh "
L508	65907	" 15uh 10%
L509	64915	" 1 uh 5%
L510	64927	" 1.5uh 5%
L511	64915	" 1uh 5%
L512	64941	" .47uh 5%
L513	64915	" 1uh 5%
L514	64953	" .56uh 5%
L515	64989	" 2.2uh
R501	17041	Resistor, 10K, 10%, 1/4W
R502	18667	" 2.7K " "
R503	17833	" 390 ohm 10%, 1/4W
R504	17041	" 10K " "
R505	17821	" 820 ohm " "
R506	17118	" 100 ohm " "
R507	17077	" 4.7K 5% 1/4W
R508	17845	" 270 ohm 10%, 1/4W
R509	17261	" 470 ohm " "
R510	17118	" 100 ohm " "
R511	17261	" 470 ohm " "
R512	17429	" 56 " " "
R513	17156	" 1K " "
R514	17845	" 270 ohm 10%, 1/4W
R515	17156	" 1K 10%, 1/4W
R516	17845	" 270 ohm, 10%,1/4W
R517	17845	" " " " "
R518	17156	" 1K " "
R519	17156	" " " "
R520	17845	" 270 ohm " "
R521	18320	" 560 ohm 5%, 1/4W
R522	17077	" 4.7K " "
R523	34590	Potentiometer, 10K
R524	17077	Resistor 4.7K, 5%, 1/4W
R525	17118	" 100 ohm 10%, 1/4W
R526	17118	" " " " "
R527	17663	" 680 " " "
R528	17118	" 100 " " "
R529	18320	" 560 " 5% "
R530	17883	" 3.9K 10%, 1/4W
R531	17716	" 10 ohm " "
R532	17936	" 47 " " "
R533	18320	" 560 " 5%, 1/4W
R534	18186	" 1.2K 10%, 1/4W
R535	17247	" 1.5K " "

continued

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
R536	18289	Resistor 39 ohm 10%, 1/4W
R537	18289	" " " " "
R538	18461	" 82 ohm " "
R539	17845	" 270 " " "
R540	17156	" 1K " "
R541	18320	" 560 ohm, 5%, 1/4W
R542	17156	" 1K 10%, 1/4W
R543	17845	" 270 ohm " "
R544	17156	" 1K " "
R545	17845	" 270 ohm " "
R546	17156	" 1K " "
R547	17845	" 270 ohm " "
R548	18320	" 560 ohm 5%, 1/4W
R549	17041	" 10K 10%, 1/4W
R550	17039	" 100K " "
R551	17223	" 22K " "
R552	17106	" 47K " "
R553	18162	" 8.2K " "
R554	17845	" 270 ohm 10%, 1/4W
R555	17041	" 10K " "
R556	17132	" 220 ohm " "
R557	17118	" 100 ohm " "
R558	18186	" 1.2K " "
R559	17261	" 470 ohm " "
R560	17429	" 56 " " "
R561	17429	" " " " "
R562	17273	" 150 " " "
R563	17273	" " " " "
R564	17273	" " " " "
R565	17156	" 1K " "
R566	17156	" 1K " "
R567	17077	" 4.7K 5%, 1/4W
R568	18320	" 560 ohm " "
R569	17663	" 680 ohm 10%, 1/4W
R570	17716	" 10 " " "
PC6	97866	PC BOARD ASSY.
PC6	10750	PC Board
C601	29537	Capacitor, Variable,1.2-10pf
C602	29537	" " "
C603	29537	" " "
C604	29537	" " "
C605	29537	" " "
C606	29537	" " "
C607	29537	" " "
C608	29537	" " "

CKT. SYM.	PART NO.	DESCRIPTION
C609	29513	Capacitor, 27pf, N220
C610	29513	" "
C611	29513	" "
C612	29513	" "
C613	29513	" "
C614	29513	" "
C615	29513	" "
C616	29513	" "
C617	25775	" , 110pf, 500V
C618	25775	" "
C619	25775	" "
C620	25775	" "
C621	25775	" "
C622	25775	" "
C623	25775	" "
C624	25775	" "
C625	27321	" , .01uf, 100V
C626	27321	" "
C627	27321	" "
C628	27321	" "
C629	27321	" "
C630	27321	" "
C631	27321	" "
C632	27321	" "
C633	29537	Capacitor,Variable,1.2-10pf
CR601	44290	Diode, 1N914
CR602	44290	" "
CR603	44290	" "
CR604	44290	" "
CR605	44290	" "
CR606	44290	" "
CR607	44290	" "
CR608	44290	" "
R601	18306	Resistor, 5.6K, 10%, 1/4W
R602	18306	" " " "
R603	18306	" " " "
R604	18306	" " " "
R605	18306	" " " "
R606	18306	" " " "
R607	18306	" " " "
R608	18306	" " " "
R609	18306	" " " "
PC7	97861	P.C. BOARD ASSY.
PC7	10731	P.C. Board

continued

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
C701	28337	Capacitor, .47uf, 50V
C702	29927	" 1800pf, 5%, 500V
C703	29953	" 5600pf, 5%, 300V
C704	29848	" 1500pf, 5%, 500V
C705	29848	" " " "
C706	29939	" 2400pf " "
C707	29836	" 1300pf " "
C708	29850	" 2000pf " "
C709	29941	" 3000pf " "
C710	29848	" 1500pf " "
C711	27515	" 360pf " "
C712	27498	" 150pf " "
C713	28600	" 390pf " "
C714	29393	" 470pf " "
C715	27503	" 270pf " "
C716	29915	" 620pf " "
C717	29903	" 330pf " "
C718	27632	" 300pf " "
C719	28961	" 510pf " "
C720	29898	" 110pf 5%, 500V
C721	28875	" 820pf 5%, 300V
C722	27345	" .02uf, 100V
C723	27498	" 150pf, 5%, 500V
C724	29874	" 91pf, " "
C725	29898	" 110pf, " "
C726	25828	" 180pf " "
C727	29874	" 91pf " "
C728	27486	" 130pf " "
C729	27498	" 150pf " "
C730	28874	" 68pf " "
C731	29898	" 110pf " "
C732	29886	" 240pf " "
C733	28875	" 820pf " 300V
C734	25804	" 200pf " 500V
C735	25763	" 250pf " "
C736	27632	" 300pf " "
C737	25828	" 180pf " "
C738	29886	" 240pf " "
C739	27515	" 360pf " "
C740	27498	" 150pf " "
C741	27345	" .02uf, 100V
CR701	40510	Diode, 1N914B
CR702	40510	" "
CR703	40510	" "
CR704	40510	" "

CKT. SYM.	PART NO.	DESCRIPTION
IC701	44795	Integrated Circuit CA3086
L701	65127	Choke, 3.9uh 5%
L702	65139	" 5.6uh 5%
L703	65012	" 6.8uh 5%
L704	65127	" 3.9uh 5%
L705	65115	" 3.3uh 5%
L706	65103	" .82uh 5%
L707	64850	" .47uh 5%
L708	64977	" .39uh "
L709	65177	" .68uh "
L710	64836	" 1uh "
L711	65153	" .22uh "
L712	65153	" " "
L713	64862	" .15uh "
L714	64874	" .18uh "
L715	64939	" .27uh "
L716	65177	" .68uh "
L717	64836	" 1uh "
L718	64886	" 1.2uh "
L719	65103	" .82uh "
L720	65103	" " "
R701	17156	Resistor, 1K 10%, 1/4W
R702	17156	" " " "
R703	17077	" 4.7K 5% 1/4W
R704	18318	" 12K, 10% "
R705	18320	" 560 ohm, 5%, 1/4W
R706	17156	" 1K, 10%, 1/4W
R707	17118	" 100 ohm 10%, 1/4W
R708	17156	" 1K, 10%, 1/4W
R709	18667	" 2.7K," "
R710	18320	" 560 ohm, 5%, 1/4W
R711	18320	" " " " "
R712	17156	" 1K, 10%, 1/4W
R713	17156	" " " "

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
PC8	97867	P.C. BOARD ASSY.
PC8	10765	P.C. Board
C801	29587	Capacitor, 30+30uf, 450VDC
C802	29587	" " "
C803	29575	" 10uf, 150VDC
C804	29575	" " "
C805	29551	" 1000uf, 25VDC
C806	29599	" 250uf, 25VDC
CR801	40335	Diode, Hi Volt Rectifier (S0M)
CR802	40335	" "
CR803	40335	" "
CR804	40335	" "
CR805	40165	" 10D4
CR806	40397	" 1N5400
CR807	40397	" "
CR808	40397	" "
CR809	40397	" "
CR810	40397	" "
K801	66705	Relay, 12V
R801	18526	Resistor,470K ±10%, 2W
R802	16578	" 2.7K ±10%, 1/2W
R803	34589	Potentiometer,10K, 1/4W
R804	17077	Resistor, 4.7K ±10% 1/4W
R805	19312	" , 5 ohm ±5%, 7W
PC9	97876	P.C. BOARD ASSY 24V
	97880	P.C. BOARD ASSY 12V
PC9	10766	P.C. Board
C901	24484	Capacitor, 4uf 500VDC
C902	24484	" " "
C903	29575	" 10uf, 150VDC
C904	29575	" " "
CR901	40335	Diode, Hi Volt Rectifier (50M)
CR902	40335	" "
CR903	40335	" "
CR904	40335	" "
CR905	40165	" 10D4
R901	16994	Resistor, 22 ohm ±10%, 2W
R902	16499	" 47 ohm ±10%, 1W

CKT. SYM.	PART NO.	DESCRIPTION
R903	18526	Resistor, 470K ±10%, 2W
R904	17479	" 100 ohm ±10% 1/2W
R905	18588	" 5.6K ±10% 1/2W
R906	34589	Potentiometer, 10K, 1/4W
R907	16920	Resistor, 4.7K ±10%, 1/2W
R908	19063	" 50 ohm, ±10%, 5W only installed in assy 97876
PC10	97870	P.C. BOARD ASSY. Audio Amp.
PC10	10779	P.C. Board
C1001	27321	Capacitor, .01uf 100V
C1002	27307	" 500uf, 15VDC
C1003	29563	" 500uf, 25VDC
C1004	29563	" " "
C1005	27333	" .005uf, 100V
CR1001	44290	Diode, 1N914
CR1002	44290	"
CR1003	44290	"
CR1006	40518	1N4004
Q1001	44549	Transistor, 2N4922
Q1002	44771	" TIP 33
Q1003	44783	" TIP 34
R1001	17807	Resistor, 2.2K ±10%, 1/4W
R1002	17091	" 330 ohm ±10%, 1/4W
R1003	19180	" 33 ohm ±10%, 2W
R1004	19180	" " " "
R1005	17041	" 10K ±10%, 1/4W
R1006	17663	" 680 ohm ±10%, 1/4W
	99632	CW MODULE WITH TELEGRAPH JACK
PC11	10788	P.C. Board
C1101	27010	Capacitor .1uf 12V
C1102	29678	" 6.8uf 15V
C1103	29692	" .01uf, 50V
C1104	29692	" " "
C1105	29707	" .022uf, 50V
C1106	29642	" 2.2uf 15V
C1107	29642	" " "
C1108	27321	" .01uf, 100V
C1109	27321	" " "

continued

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
C1110	27010	Capacitor .1uf, 12V
C1111	28337	" .47uf, 50V
C1112	28337	" " "
C1113	29654	" 68uf, 15V
C1114	27321	" .01uf, 100V
CR1101	44290	Diode, 1N914
CR1102	44290	" "
CR1103	44290	" "
CR1104	44290	" "
CR1105	40165	" 10D4
IC1101	44795	Integrated Circuit CA3086
L1101	64331	Inductor, 1 mh
Q1101	44537	Transistor, 2N4919
R1101	18318	Resistor, 12K, 10% 1/4W
R1102	17156	" 1K " "
R1103	18306	" 5.6K " "
R1104	18306	" " " "
R1105	19271	" 22K, 5%, 1/4W
R1106	19271	" " " "
R1107	19207	" 8.2K " "
R1108	34592	Potentiometer, 10K 20%
R1109	17819	Resistor, 1.8K, 10% 1/4W
R1110	17089	" 3.3K, " "
R1111	17728	" 180K, " "
R1112	17077	" 4.7K " "
R1113	18318	" 12K " "
R1114	17118	" 100 ohm " "
J10	84056	Jack, Telegraph Key
C32	27345	Capacitor, .02uf 100V
C33	27345	" " "
	97854	SQUELCH MODULE
		with front panel control
PC12	10786	P.C. Board
C1201	29680	Capacitor, 15uf 15V
C1202	29666	" 22uf 15V
CR1201	44290	Diode 1N914

CKT. SYM.	PART NO.	DESCRIPTION
IC1201	44795	Integrated Circuit CA3086
Q1201	44678	Transistor, 2N4249
R1201	17041	Resistor, 10K, 10% 1/4W
R1202	34592	Potentiometer, 10K 20%
R1203	17807	Resistor, 2.2K, 10% 1/4W
R1204	17039	" 100K, " "
R1205	17039	" " " "
R1206	18306	" 5.6K " "
R1207	18307	" " " "
R5	31932	Potentiometer, 10K
	34583	Knob
	99416	600 OHM MODULE (4 wire)
	or	
	99622	PHONE PATCH MODULE (2 WIRE)
		with switch,decal and spkr grill
PC13	10787	PC Board
C1301	29642	Capacitor, 2.2uf 15V
C1302	29654	" 68uf, 15V
C1303	29642	" 2.2uf, 15V
C1304	29678	" 6.8uf, 15V
C1305	29654	" 68uf, 15V
C1306	27010	" .1uf, 12V
C1307	29642	" 2.2uf, 15V
CR1301	44290	Diode, 1N914
IC1301	44795	Integrated Circuit, CA3086
R1301	17156	Resistor, 1K, 10%, 1/4W
R1302	17156	" " " "
R1303	17572	" 18K, " "
R1304	17041	" 10K " "
R1305	17663	" 680 ohm" "
R1306	17522	" 180 ohm" "
R1307	34595	Potentiometer, 1K, 20%
R1308	18306	Resistor, 5.6K, 10%, 1/4W
R1309	18318	" 12K, " "
R1310	17156	" 1K " "
R1311	18306	" 5.6K " "
R1312	18461	" 82 ohm " "

continued

CKT. SYM.	PART NO.	DESCRIPTION
R19	17039	Resistor, 100K, 10%, 1/4W
R20	17467	" 330K, 10%, 1/4W
S1	34588	Switch, Power ON-OFF
SW1	34585	Switch, Mode Selector
SW2	33540	Switch, Wafer, Band Selector
SW3	33514	Switch, Wafer, Osc Freq. Selector
SW4	33514	Switch, Wafer, Driver Tuned Ckt Selector
SW5	33526	Switch, Wafer, PA input
SW6	33514	" " , PA output
SW7	33564	" " , Tie Point
SW8	31968	" " , Coupler Channeling
SW9	33540	Switch, Wafer (Mult. Ant. Option)
SW10	34585	Switch, Meter Selector
SW11	34586	Switch, Phone Patch (Option)
V1	76683	Tube, 12H7
V2	76669	" , 6883B
V3	76669	" , 6883B
Y9	81835	Crystal, 10.5 MHz
Y1 thru Y8	81836	Crystal, Channel Frequency
	81823	Oven, 4 Crystal
	81824	Oven, 6 Crystal
	97773	Speaker
	34583-1	Knob, Channel
	34583	Knob, Control

CKT. SYM.	PART NO.	DESCRIPTION

GRC-350 REMOTE CONTROL PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
	97947	Solenoid Adapter, (GRC-350, System)
C1	28089	Capacitor, 500 uF 50V
C2	28089	" " "
CR1	40518	Diode, 1N4004
J1	74740	Connector, 34 Pin
K1	66664	Relay, 4 PDT
K2	66664	" "
K3	66016	" SPST
K4	66016	" "
KR1	34324	Rotary Solenoid
P1	74738	Connector, 34 Pin
R1	17027	Resistor 1 ohm 1W
R2	16944	" 75 " 3W
R3	16968	" 1 " 10W
S1	32534	Switch, Slide DPDT
	97946	Chassis Assembly, Remote (GRC-350, System)
I1	84011	Lamp, Indicator
J	74738	Connector, 34 Pin
J2	74802	Jack, Microphone
L1	55976	Choke, 11 mh
LS1	87204	Speaker, 3 Ohm
P1	74740	Connector, 34 Pin
R1	31944	Potentiometer 10K "A" Taper
R2, 3	34593	" 10K Tandem
R4	31944	" 10K "A" Taper
R5	18667	Resistor 2.7K 10% 1/4W
SW1	33679	Switch, Wafer Channeling
SW2	34618	" " Mode

CKT. SYM.	PART NO.	DESCRIPTION
		SQUELCH OPTION
	34583	Knob, Control
R6	17041	Resistor 10K 10% 1/4W
R7	31932	Potentiometer 10K
PC1	99451	P.C. Board Assembly (Audio Amplifier)
PC1	10800	P.C. Board
C101	27321	Capacitor .01uF 100V
C102	27307	" 500uF 15V
C103	29563	" 500uF 25V
C104	29563	" 500uF 25V
C105	27333	" .005uF 100V
C106	29666	" 22uF 15V
C107	29642	" 2.2uF 15V
C108	29666	" 22uF 15V
C109	29666	" 22uF 15V
CR1	44290	Diode, 1N914
CR2	44290	" "
IC101	44795	Integrated Circuit, CA3086
Q101	44549	Transistor, 2N4922
Q102	44781	" PNP TIP34
Q103	44771	" NPN TIP33
R101	17807	Resistor 2.2K ohm 10% 1/4W
R102	17091	" 330 " 10% 1/4W
R103	19180	" 33 " 5% 2W
R104	19180	" 33 " 5% 2W
R106	17247	" 1.5K " 10% 1/4W
R107	17663	" 680 " 10% 1/4W
R108	17118	" 100 " 10% 1/4W
R109	17235	" 15K " 10% 1/4W
R110	18796	" 68 " 10% 1/4W
R111	17936	" 47 " 10% 1/4W
R112	18306	" 5.6K " 10% 1/4W
R113	18605	" 3.3 " 10% 1/2W
		MAIN CHASSIS, GSB-300
		97874 12 VDC Power Supply, Remote Customizing
C2	29563	Capacitor, 500uF 25V
L2	56372	Inductor, 45 uH

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RECOMMEN D SPARE PARTS LIST

Quantity Required to support 3 to 5 units for 2-4 years				MODEL POWER SUPPLY		Voltage 115/230V	P/N 98029
				SunAir P/N	Description	Unit Price	Total Price
			1	40534	Zener Diode		
			1	49094	Transformer, Power		
			1	66705	Relay		
			2	40335	Diode, SOM		
			2	40397	Diode, 1N5400		
			2	34589	Potentiometer		
			1	29587	Capacitor, 30 + 30uf		
			1	55976	Choke, 11mh		
			1	55964	Choke, .4h		
			1	55952	Choke, 1.5h		
			4	89654	Fuse 1.5A (230VAC)		
			4	89666	Fuse 3A (115VAC)		

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RECOMMENDED SPARE PARTS LIST

Quantity Required to support 3 to 5 units for 2-4 years				MODEL POWER SUPPLY		Voltage 12/24V	98030 (12) P/N 98031 (24)
				SunAir P/N	Description	Unit Price	Total Price
			1	40534	Diode, Zener (24 volt)		
			2	40335	Diode, SOM		
			1	40414	Diode, A41A		
			1	44355	Transistor, 2N3054		
			2	44638	" MJ802 (24 volt)		
			2	44628	" 2N5435(12 volt)		
			1	49135	Transformer		
			1	66717	Relay		
			1	55976	Choke, 11mh		
			1	40505	Zener, Diode (12 volt)		
			1	40511	Zener, Diode (24 volt)		
			2	34589	Potentiometer		
			4	84886	Fuse, 10A (24 volt)		
			4	86030	Fuse, 20A (12 volt)		

SEP 812

SECTION X

DEPOT SPARE PARTS LIST

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RECOMMENDED SPARE PARTS LIST

Quantity Required to support 3 to 5 units for 2-4 years				MODEL GSB-300	Voltage Less Power Supply Spares	P/N 99528	
				SunAir P/N	Description	Unit Price	Total Price
			1	34588	Switch, ON-OFF		
			1	34585	Switch, Mode Selector		
			1	31944	Potentiometer, Volume Control		
			1	34593	" , RF Gain		
			1	31932	" , Clarifier		
			1	66286	Relay, T/R		
			1	81824	Oven, 5 Channel		
			2	81835	Crystal, Carrier 10.5 MHz		
			1	84011	Indicator, Lamp		
			1	84061	Meter		
			1	87773	Speaker		
			3	34583	Knob, Control		
			2	76683	Vacuum Tube, Driver		
			3	76669	" " PA		
			1	56437	Choke, Plate		
			2	40438	Zener Diode		
			2	40490	" "		
			1	97887	Microphone		
			1	34583-1	Knob, Channel		
			1	74802	Connector, Mic		

ADDENDUMS

Information contained in this section supplements the information contained in the manual. References to this section may be indicated where necessary in the manual.

SUNAIR ELECTRONICS, INC.
MANUAL GSB-300

ADDENDUM 1
DATE: 3/13/73

REFERENCE: Clarifier control, R4

ECN: 069-002

PURPOSE: Improve linearity of clarifier control

MANUAL REFERENCE: Parts List, section IX and Depot Spare Parts List, section X.

TEXT: R4 changed from 10K linear P/N 31932 to a 10K A taper P/N 31944
Increase quantity of P/N 31944 from 1 to 2 on Spare Parts List and delete P/N 31932

SUNAIR ELECTRONICS, INC,
MANUAL: GSB-300

ADDENDUM 2
DATE: 6-4-73

REFERENCE: PC-7 Receiver Preselector

ECN: 069-007

PURPOSE: Extended frequency range option of the receiver preselector (1.6 to 2.0 MHz) Assy. 99452.

MANUAL REFERENCE: Receiver-Exciter schematic diagram, section VIII, Parts List, section IX.

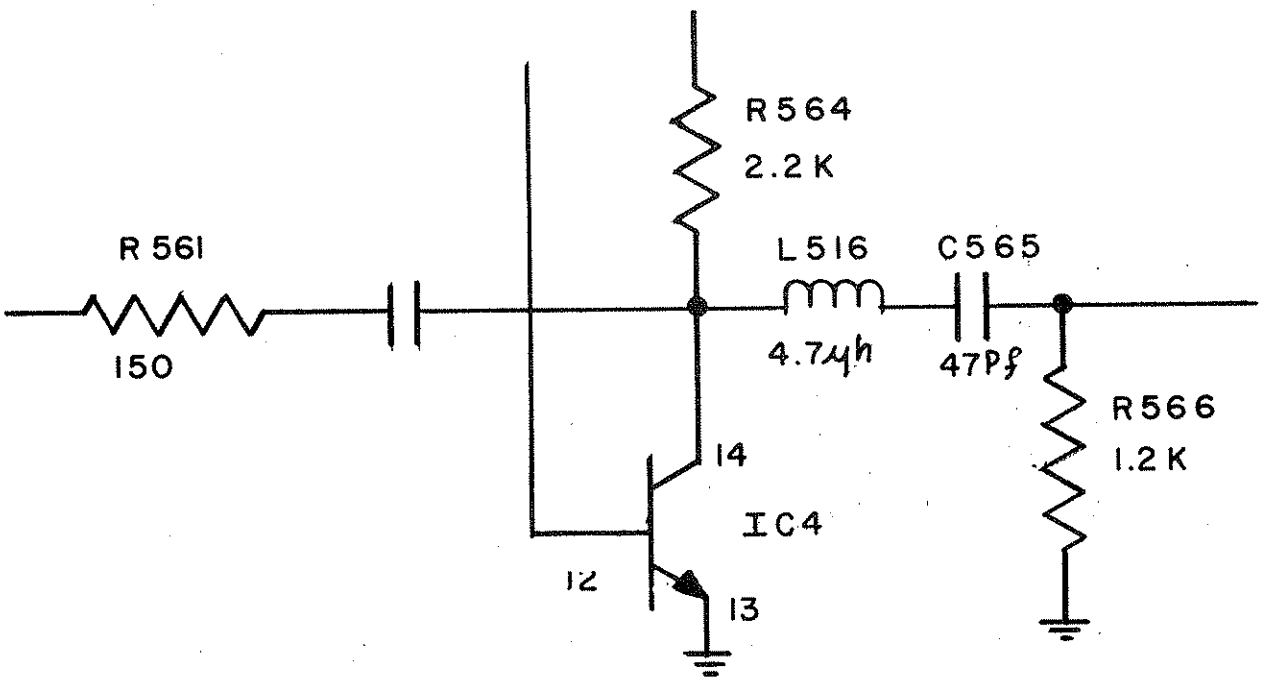
TEXT: Component values of assembly 97861 (PC-7) reference designations C702 thru C710 and L701 thru L705 are changed as follows for assembly 99452.

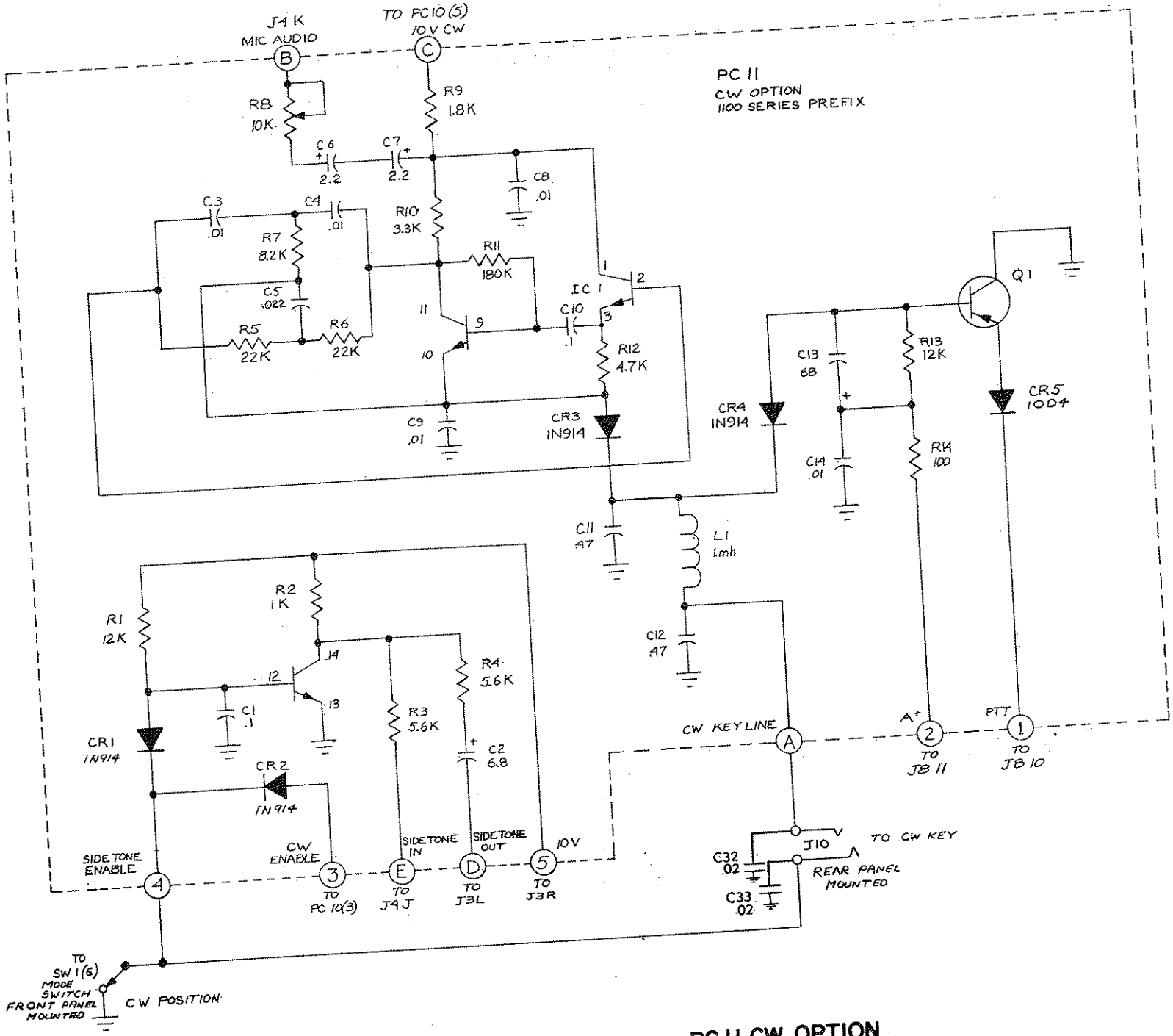
	WAS	P/N	IS	P/N
C702	1800 pf	29927	2200 pf	29965
C703	5600 pf	29953	8200 pf	29862
C704	1500 pf	29848	1800 pf	29927
C705	1500 pf	29848	2200 pf	29965
C706	2400 pf	29939	3000 pf	29941
C707	1300 pf	29836	1800 pf	29927
C708	2000 pf	29850	2700 pf	28124
C709	3000 pf	29941	3300 pf	28125
C710	1500 pf	29848	1800 pf	29927
L701	3.9 uh	65127	4.7 uh	64965
L702	5.6 uh	65139	6.8 uh	65012
L703	6.8 uh	65012	8.2 uh	64824
L704	3.9 uh	65127	5.6 uh	65139
L705	3.3 uh	65115	4.7 uh	64965

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-300

ADDENDUM 3
DATE: 12-26-73

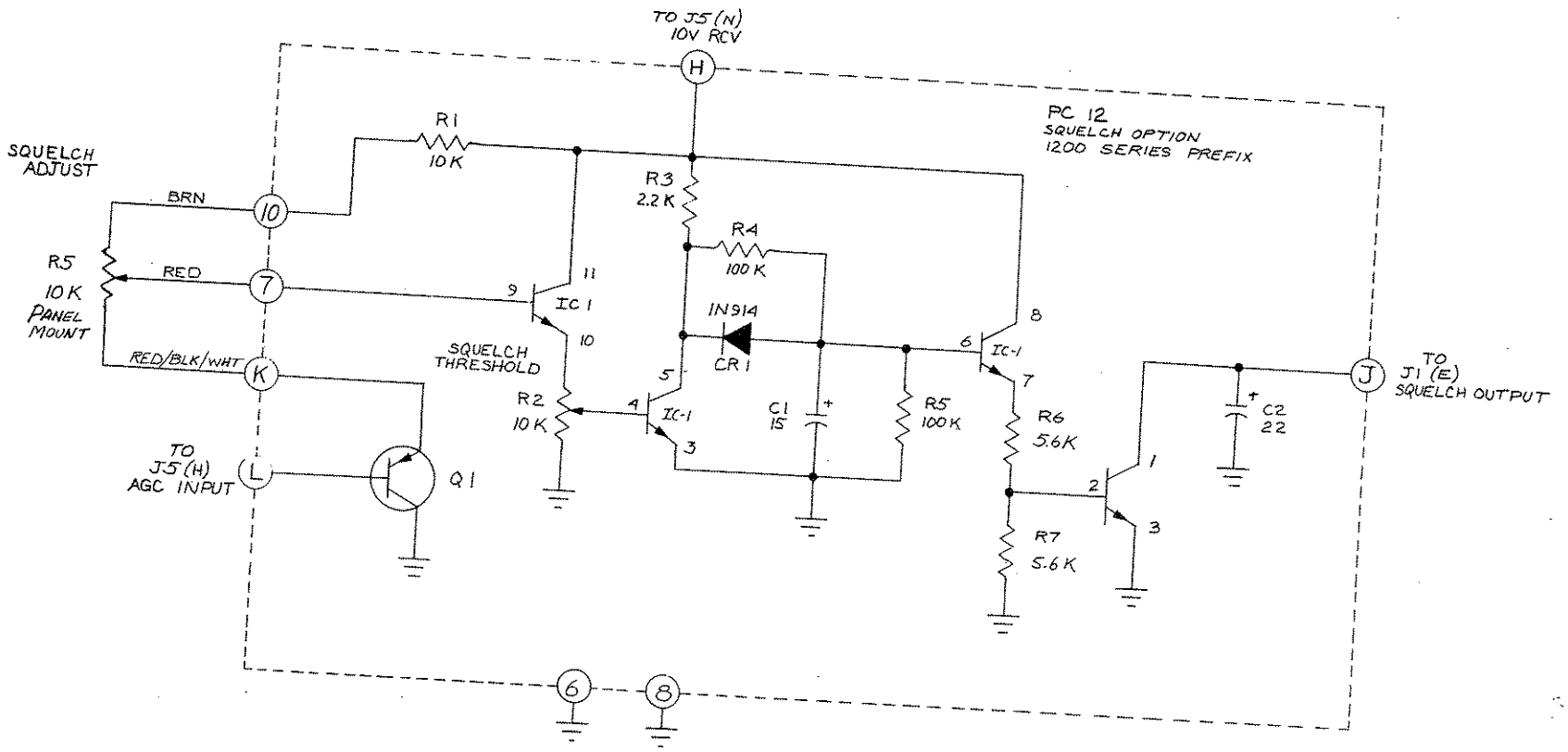
REFERENCE:	PC-5 Oscillator, PC-1 Exciter
ECN:	069-017
PURPOSE:	Eliminate spurious response on AM transmit due to second harmonic of carrier oscillator
MANUAL REFERENCE:	Receiver/Exciter schematic diagram, parts list Section IX
TEXT:	Change R561 from 56 ohm to 150 ohm, 10%, 1/4W, P/N 17273 Change R564 from 150 ohm to 2.2K, 10%, 1/4W, P/N 17807 Delete R565 Change R566 from 1K to 1.2K, 10%, 1/4W, P/N 18186. Delete CR515 Add C565, capacitor, dipped mica, 47pf, 5%, 100V, P/N 28698 Add L516, Choke, 4.7 uh, 5%, P/N 65191 Change R144 from 150 ohm to 2.2K, 10%, 1/4W P/N 17807





NOTES : 1. ALL RESISTORS ¼W ±10%

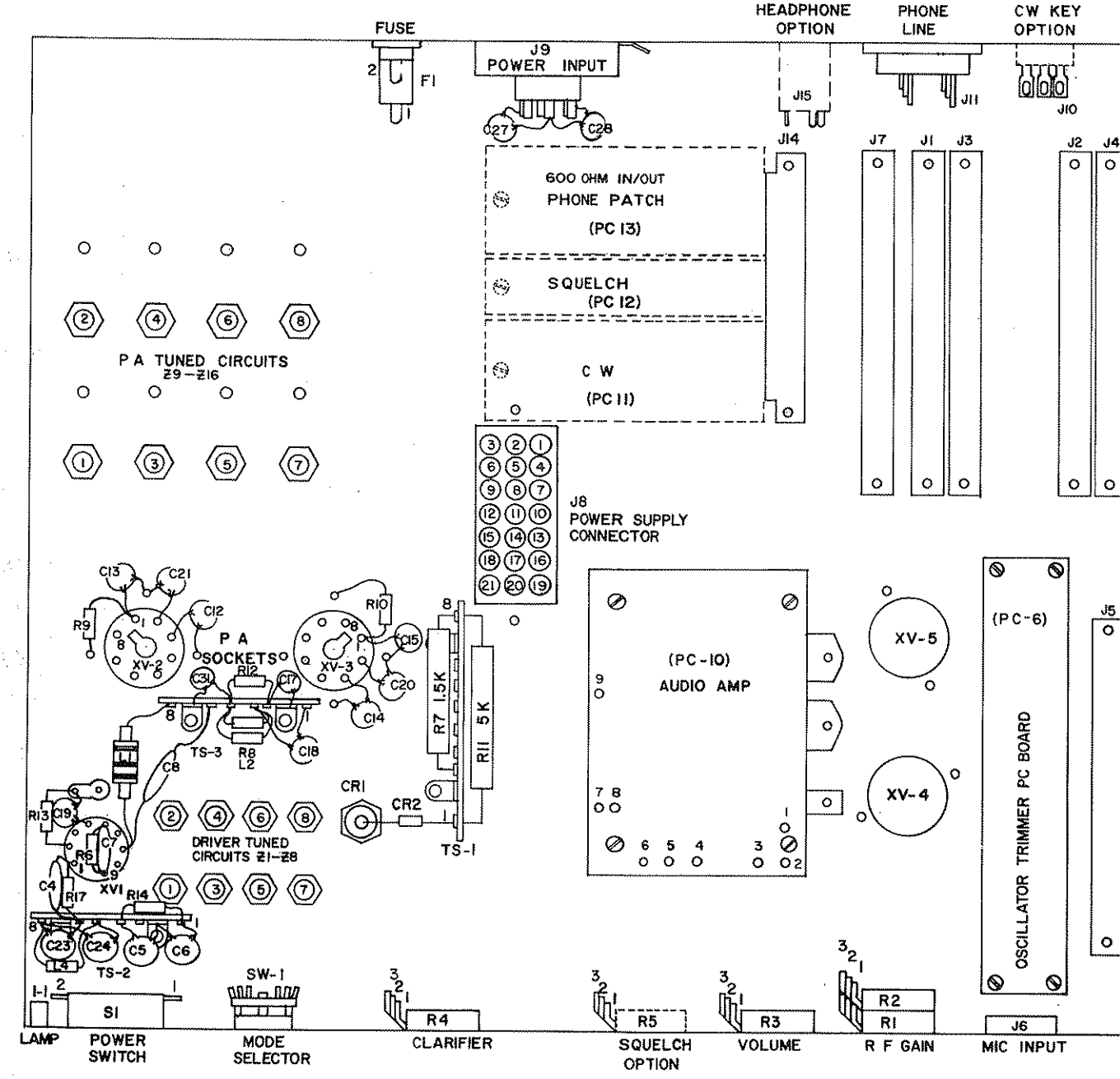
PC 11 CW OPTION



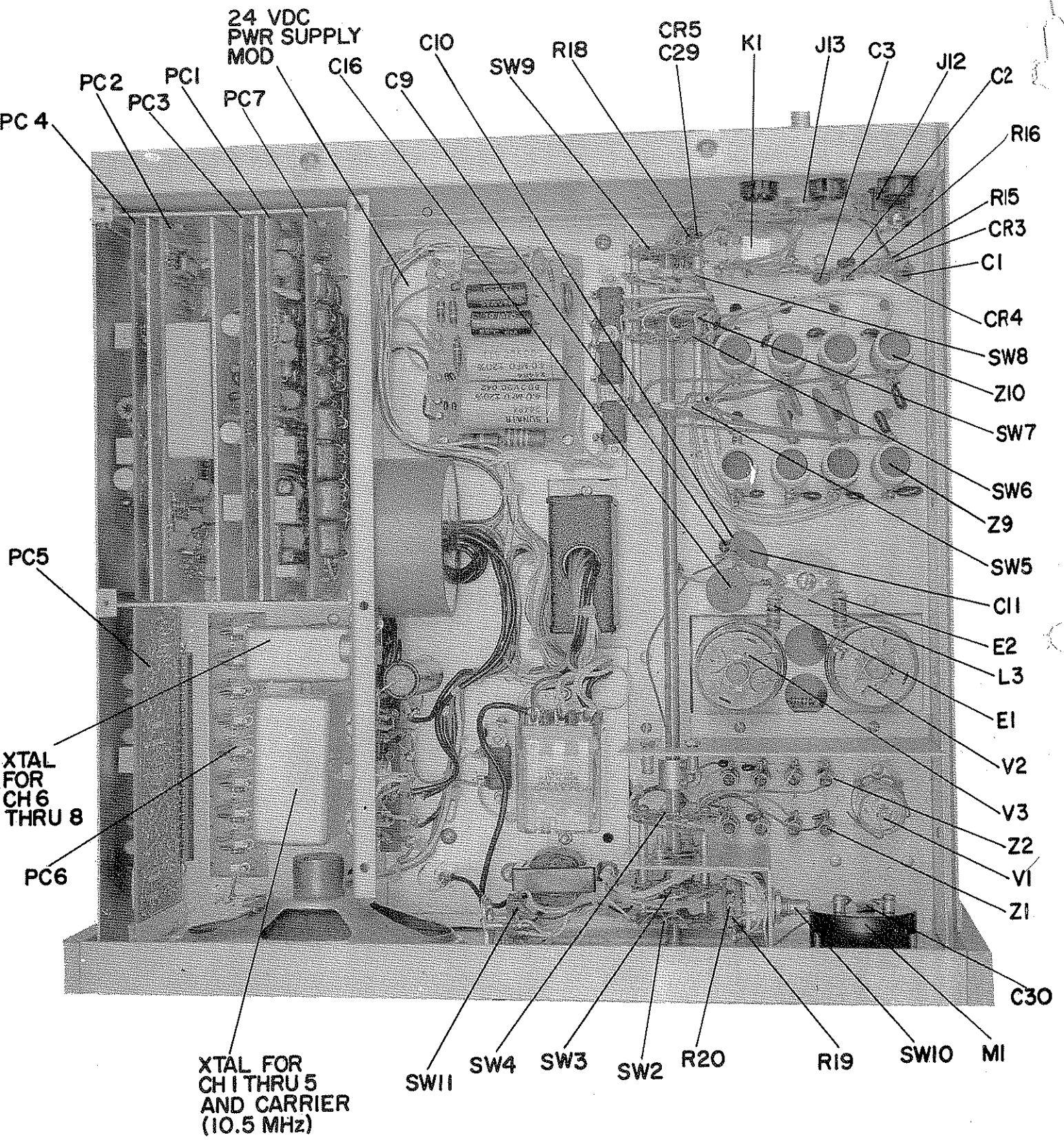
NOTES :

1. ALL RESISTORS ¼ W ± 10%.
   ALL CAPACITORS IN μf UNLESS OTHERWISE SPECIFIED.

PC 12 SQUELCH OPTION



CHASSIS BOTTOM VIEW



TOP VIEW GSB-300
(WITH 24 VDC POWER SUPPLY MODULE)

APPLICATION		QTY REQD		SYM	REVISIONS	DATE	APPROVAL
NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY		DESCRIPTION		
	GSB-300			A	Was ±.0007% Add Note 8.	2-75	009001

CRYSTAL SPECIFICATIONS

1. TYPE: CR-27A/U
2. HOLDER: HC-6/U
3. CRYSTAL FREQUENCY: 6.05 TO 20.25 MHZ = $\frac{\text{CHANNEL FREQ} + 10.50 \text{ MHz}}{2}$ (A)
4. FREQUENCY TOLERANCE: MANUFACTURE TO ±.001% SUNAIR CHECK TO ±.001%
5. OPERATING TEMPERATURE: +75°C ±2°C
6. CAPACITY: 32 pf
7. RESONANCE: PARALLEL
8. (A) AGING: 10 PPM PER YEAR

NOTES:
1. STAMP TOP OF CAN WITH CHANNEL FREQUENCY (1.6 MHZ TO 30.0 MHZ
2. STAMP SIDE OF CAN WITH SUNAIR & 81836
3. STAMP SIDE OF CAN WITH MANUFACTURES IDENTIFICATION MARK & CRYSTAL FREQ.

FEB 13 1975

ITEM	REQD	PART NO.	DESCRIPTION

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES.

ANGLE ±1° FRACT ±1/64 .005 ±1

AUTHENTICATION	NAME	DATE
DRAWN BY	Q.G.	7-17-72
CHECKED BY	[illegible]	7-18-72
APPROVED BY	[illegible]	9-27-72
PROJECT ENGINEER	[illegible]	9-27-72

TITLE: CRYSTAL-CHANNEL

MATERIAL

FINISH

SUNAIR ELECTRONICS, INC.
3101 SOUTHWEST THIRD AVENUE
FORT LAUDERDALE, FLORIDA U.S.A.

SIZE	DRAWING NO.	REV
A	81836	A

SCALE | SHEET 1 OF 1

Mr. Face

SUNAIR ELECTRONICS INC

ENGINEERING CHANGE NOTICE

NUMBER 069-033

DATE 8/14/74

TITLE	MODEL	DWG/NEW REV.	ORIGINATOR EK
Audio Amp P-C Board Assy Oscillators P-C Board Assy Main Chassis Assy.	GSB-300		DATE 8/14/74
	ASSEMBLIES AFFECTED 97870 97865 97890		S/N EFFECTIVE DATE EFFECTIVE

DESCRIPTION OF CHANGE

1. Audio Amp. P.C. Board Assy. (97870C)

   a. Change capacitor C1001 from .05 uf, P/N 27357 to .01 uf, P/N27321
   b. Change diode CR1006 from IN914, P/N 44290 to IN4004, P/N 40518
   c. Change B/M as per marked up prints.

2. Oscillators P C Board Assy (97865C)

   a. Change capacitor C553 from 7pf, P/N 29525 to 9pf, N1500, P/N 29719
   b. Change B/M as per marked up print.

3. Main Chassis Assy (97890C)

   a. Add capacitor C34, .02uf, P/N 27345 form "SSB ALC OUT" to GND (TS-3(1) to TS-3(2))
   b. Change B/M as per marked up print.

REASON FOR CHANGE

1. a) Capacitor C1001 value changed to remove possible oscillations on the audio amplifier.
   b) Diode type changed to increase PIV rating of diode in PTT line
2. Capacitor value changed to increase clarifier range and eliminate possibility of 10.5 MHz oscillator not oscillating when clarifier control is set fully CCW.
3. Add RF bypass to SSB ALC voltage line.

PARTS DISPOSITION	USE AS IS	REWORK	SCRAP	NOTED ABOVE	N A
PARTS - RAW MATERIALS		X			
PROCESS ASSEMBLIES		X			
COMPLETED ASSEMBLIES		X			
FINISHED PRODUCTS		X			

DOCUMENTATION AFFECTED BY THIS CHANGE ACTION
Check in "A" column denotes revision has been completed.
Check in "B" column denotes follow-up action is required.

DESCRIPTION	A	B	RESPONSIBILITY
ENG. DRAWING		X	GB
BILL OF MATERIAL	X		EK
KIT LIST	X		EK
INSTRUCTION MANUAL		X	EK
SERVICE BULLETIN			
PARTS BOOK			
OPERATIONS SHEET		X	RLS
PRODUCTION SAMPLE		X	RLS
BUY CARD		X	GK
PRODUCTION CONTROL		X	FH

APPROVALS

REVIEWER [signature] 8/19/74 DATE

PROJ. ENG. DATE

CHIEF ENG. [signature] DATE

GEN. MGR. [signature] DATE

AUG 21 1974

SUNAIR ELECTRONICS INC

Race

ENGINEERING CHANGE NOTICE

NUMBER 069-035

DATE 10-9-74

TITLE	MODEL	DWG/NEW REV.	ORIGINATOR	DATE
OVEN 6 CRYSTAL	GSB-300	81824 A	RAC	10-8-74
	ASSEMBLIES AFFECTED		S/N EFFECTIVE	DATE EFFECTIVE

DESCRIPTION OF CHANGE

1. Add note to drawing:"Bottom edge even with header to allow pins to fully engage socket".

2. REASON FOR CHANGE
Outer can extended below header preventing pins from fully engaging socket. Oven not securely seated and held, and will come out under severe shock or vibration.

3. REWORK
Vendor will send cans with correct hole placement. Cans will be exchanged when crystals installed. Save original cans and send back to vendor. Cans will have double screw holes until vendor stock depleted. Purchasing will exchange cans.

PARTS DISPOSITION	USE AS IS	REWORK	SCRAP	NOTED ABOVE	N A
PARTS - RAW MATERIALS		X			
IN PROCESS ASSEMBLIES		X			
COMPLETED ASSEMBLIES		X			
FINISHED PRODUCTS	X				

DOCUMENTATION AFFECTED BY THIS CHANGE ACTION
Check in "A" column denotes revision has been completed.
Check in "B" column denotes follow-up action is required.

DESCRIPTION	A	B	RESPONSIBILITY
ENG. DRAWING	X		GB
BILL OF MATERIAL			
KIT LIST			
INSTRUCTION MANUAL			
SERVICE BULLETIN			
PARTS BOOK			
OPERATIONS SHEET			
PRODUCTION SAMPLE			
BUY CARD		X	GK
PRODUCTION CONTROL		X	FH

APPROVALS

REVIEWER [signature] DATE 10/16/74

PROJ. ENG. DATE

CHIEF ENG. [signature] DATE 10/16/74

GEN. MGR. [signature] DATE

OCT 17 1974

SF006

SUNAIR ELECTRONICS INC

ENGINEERING CHANGE NOTICE

NUMBER 069-045

DATE 6-24-75

TITLE

EXCITER BOARD

MODEL	DWG/NEW REV.
GSB-300	

ASSEMBLIES AFFECTED

97859 E

ORIGINATOR E.K.

DATE 6-24-75

S/N EFFECTIVE

DATE EFFECTIVE

DESCRIPTION OF CHANGE

1. Change R123 from 4.7K, 1/4W, P/N 17077 to 820 OHM, 1/4W, P/N 17821.
2. Remove C143, 220pf, DSM, P/N 28325.
3. Remove C146, 150pf, DSM, P/N 29343.
4. Change schematic and BM 97859 as per above changes.

REASON FOR CHANGE:

1. Improve carrier balance.
2,3. Lower exciter gain at high frequencies.

NOTE: PRODUCTION CONTROL, Q.C., PRODUCTION
Rework all in-process or completed assemblies.
All finished products have been reworked by alignment.

PARTS DISPOSITION	USE AS IS	REWORK	SCRAP	NOTED ABOVE	N A
PARTS - RAW MATERIALS					X
IN-PROCESS ASSEMBLIES		X			
COMPLETED ASSEMBLIES		X			
FINISHED PRODUCTS				X	

DOCUMENTATION AFFECTED BY THIS CHANGE ACTION
Check in "A" column denotes revision has been completed.
Check in "B" column denotes follow-up action is required.

DESCRIPTION	A	B	RESPONSIBILITY
ENG. DRAWING		X	LR
BILL OF MATERIAL	X		EK
KIT LIST	X		EK
INSTRUCTION MANUAL			
SERVICE BULLETIN			
PARTS BOOK			
OPERATIONS SHEET		X	RLS
PRODUCTION SAMPLE		X	RLS
BUY CARD			
PRODUCTION CONTROL		X	FH

APPROVALS

REVIEWER Hal Sokolski DATE

PROJ. ENG. DATE

CHIEF ENG. 6/25/75 DATE

GEN. MGR. DATE

JUN 30 1975

SUNAIR ELECTRONICS INC

ENGINEERING CHANGE NOTICE

NUMBER 069-046

DATE 7-1-75

TITLE: IF AMP PC BOARD

MODEL: GSB-300

DWG/NEW REV.:

ASSEMBLIES AFFECTED: 97862 B

ORIGINATOR EK

DATE 7-1-75

S/N EFFECTIVE

DATE EFFECTIVE

DESCRIPTION OF CHANGE

1. Change R3 from 56 ohm, 1/4W to 82 ohm, 1/4W, P/N 18461.
2. Change R4 from 220 ohm, 1/4W to 180 ohm, 1/4W, P/N 17522.
3. Add RFI shield P/N 84065 (one clip only) to back of PC board (right side of board when viewed from circuit side).
4. Change schematic and B/M 97862 as per above changes.

REASON FOR CHANGE:
1,2 Reduce gain of IF amplifier
3 Provide better RF ground to chassis for PC board ground plane and eliminate possibility of carrier oscillator feeding through and creating an erroneous AGC voltage.

NOTE: PRODUCTION CONTROL, Q.C., PRODUCTION
Rework all in-process or completed assemblies.
All finished products have been reworked by alignment.

ARTS DISPOSITION	USE AS IS	REWORK	SCRAP	NOTED ABOVE	N A
ARTS - RAW MATERIALS					X
PROCESS ASSEMBLIES		X			
COMPLETED ASSEMBLIES		X			
FINISHED PRODUCTS				X	

DOCUMENTATION AFFECTED BY THIS CHANGE ACTION
Check in "A" column denotes revision has been completed.
Check in "B" column denotes follow-up action is required.

DESCRIPTION	A	B	RESPONSIBILITY
ENG. DRAWING	X		LR
BILL OF MATERIAL	X		EK
KIT LIST	X		EK
INSTRUCTION MANUAL			
SERVICE BULLETIN			
PARTS BOOK			
OPERATIONS SHEET		X	RLS
PRODUCTION SAMPLE		X	RLS
BUY CARD			
PRODUCTION CONTROL		X	FH

APPROVALS

REVIEWER [signature] 7/1/75 DATE

PROJ. ENG. DATE

CHIEF ENG. [signature] 7/1/75 DATE

GEN. MGR. [signature] 7/3/75 DATE

JUL 07 1975

SF806