sunair electronics, inc.

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Maintenance Manual

SSB COMMUNICATIONS EQUIPMENT

GSB-400

1st Edition, 1 October 1970
Serial No. 101 and Subsequent
Manual Part Number 97802

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SECTION I
GENERAL INFORMATION

A. SYSTEM DESCRIPTION

The Sunair GSB-400 SSB Communication Equipment is a light-weight, 10 channel, single sideband (SSB) and compatible amplitude modulated (AM) transmitting-receiving system designed for long range voice communications in the 2-18 mc frequency range. The system consists of a single unit containing the Receiver/Exciter, Power Amplifier and the Power Supply section. An Antenna Coupler, Sunair P/N 99927, is also available which allows the transmitter to be connected to a variety of antennas.

B. SPECIFICATION FOR GSB-400 HF TRANSCEIVER

Type Accepted under FCC Rules and Regulations, Parts 81, 83, and 85.

Frequency Range	2 to 18 MHz (No channel frequency restrictions).
Number of Channels	10 channels
Modes of Operation	Compatible AM USB LSB
Input Power - Receive only	2.3 amps at 12.6 VDC (ovens on) 1.8 amps at 24 VDC (ovens on) 1.0 amps at 36 VDC (ovens on) 0.5 amps at 115 VAC (ovens on) 0.2 amps at 230 VAC (ovens on)
Transmit 125watts-CW	25.0 amps at 12.6 VDC (ovens on) 13.0 amps at 24 VDC (ovens on) 9.0 amps at 36 VDC (ovens on) 3.8 amps at 115 VAC (ovens on) 2.0 amps at 230 VAC (ovens on)

TRANSMITTER:

Output Power	AM: 125 watts PEP 100% Modulation SSB: 125 watts PEP nominal
Frequency Stability	±20 Hz
Duty Cycle	50%
Output Impedance	50 ohms

RECEIVER:

Input Impedance	50 Ohms
Frequency Stability	Single Frequency Simplex ±20 Hz Dual Frequency Simplex ±.0025%
Clarifier	Adjust Carrier Oscillator for voice clarity ±100 Hz range
Selectivity	AM: 5.5 kHz NMT 6 db 20.0 kHz NLT 60 db SSB: fc +350 Hz to fc +2500 Hz NMT 6 db fc -2150 Hz and fc +5000 Hz NLT 60 db
Sensitivity	AM: NMT 2.0 uv for 6 db (S+N)/N SSB: NMT 1.0 uv for 10 db (S+N)/N
AGC	NMT 10 db change from 10 uv to 100,000 uv input
Audio Output	3W into 3.2 Ohms
Audio Response	NMT 6 db from 350 Hz to 2500 Hz
Audio Distortion	AM: NMT 20% at rated output SSB: Third order 25 db below rated output
Spurious Response	NLT 60 db from .190 MHz to 150 MHz

C. EQUIPMENT SUPPLIED

	Sunair Part No.	Weight
1 GSB-400 SSB Transceiver, 12.6 VDC	97777-12	21 lbs
OR		
1 GSB-400 SSB Transceiver, 24 VDC	97777-24	21 lbs
OR		
1 GSB-400 SSB Transceiver, 36 VDC	97777-36	21 lbs
OR		
1 GSB-400 SSB Transceiver, 115 VAC	97777-115	27 lbs
OR		
1 GSB-400 SSB Transceiver, 230 VAC	97777-230	27 lbs
1 Connector kit	97800	
1 Microphone with plug	97771	
1 Brackets, for installation	10095	
1 Installation/Maintenance Manual	97802	

D. EQUIPMENT REQUIRED BUT NOT SUPPLIED	Sunair Part No.	Weight
1 GCU-1000 Antenna Coupler	99927	6.5 lbs
AND		
1 HF Bare Wire Fixed Antenna Kit - 75 Ft.	99920	
OR		
1 HF Bare Wire Fixed Antenna Kit - 150 Ft.	99921	
OR		
1 Center Loaded Whip Antenna with Mount-Mobile	99928	
OR		
1 Center Loaded Whip Antenna with Mount-Marine (5-18 MHz)	99394	
AND/OR		
1 Center Loaded Whip Antenna with Mount-Marine (2-5 MHz)	99937	
1 Installation Cable (Custom made)		

E. OPTIONAL EQUIPMENT (NOT SUPPLIED)	
1 Transceiver mounting cradle kit (Marine or Mobile)	99393
1 Filter for LSB operation (Installed)	81743
1 Microphone, Desk Type	84147
1 ARC-10 Channel Changing Remote Unit	97799
1 Hand Held Transistorized Microphone	87151

F. DESCRIPTION

1. The Sunair GSB-400 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 by providing a fully functional layout. All operating controls of the GSB-400 transceiver are located on the front panel. These controls are:

   a. ON-OFF-RVC Switch
   b. Channel Selector
   c. Mode Selector
   d. Volume Control
   e. Squelch
   f. Clarifier
   g. Local/Remote Selector

   A half power switch is located on the rear of the unit to be used for antenna coupler tuning during installation.

2. Function of Controls

The ON-OFF-RCV switch applies power to the entire system (on) or to the receiver section only (RCV). The Volume Control is used to adjust the audio level. The Clarifier Control provides the operator an adjustment for obtaining natural voice quality audio. The Squelch Control adjust the signal threshold necessary to activate the receiver. The Mode Selector is used to select the mode of operation desired - Upper Sideband (USB), Lower Sideband (LSB), Compatible Amplitude Modulation (AM) or Intercom (COM). The local/Remote Selector switches between local operation or operation from the ARC-10 Remote Unit.

The Channel Selector is used to select the desired channel. The meter located on the front panel enables the operator to check the operation of the transmitter.

The Input Line Fuse, the HI-LO power switch, the Antenna, Power and Accessory connectors are located on the rear of the unit.

3. Accessories

a. GCU-1000 Antenna Coupler

The GSB-400 can be used with either a long-wire or a whip-type antenna. In any case, a suitable coupling network must be used to provide a proper match between the antenna and transceiver, at the various channel frequencies. The GCU-1000 is a preset and pretuned 10 channel coupler which provides this matching.

b. ARC-10 Remote Control Unit

The GSB-400 system can be operated either by the controls on the front panel of the unit or from a remote position by means of the ARC-10 which contains all of the necessary controls plus speaker required for the operation of the system.

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-400 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 of power input plug with shield-braid. 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 that 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. Initially tune the coupler with the transmitter in the AM mode, low power switch on low power position. After tune up, switch back to high power position and final tune the coupler. 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 7 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. (Keying is accomplished by grounding pin 7.)

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 beforehand 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, 75, 50 and 35 foot end fed wire antennas and also the two 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 metalic 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.

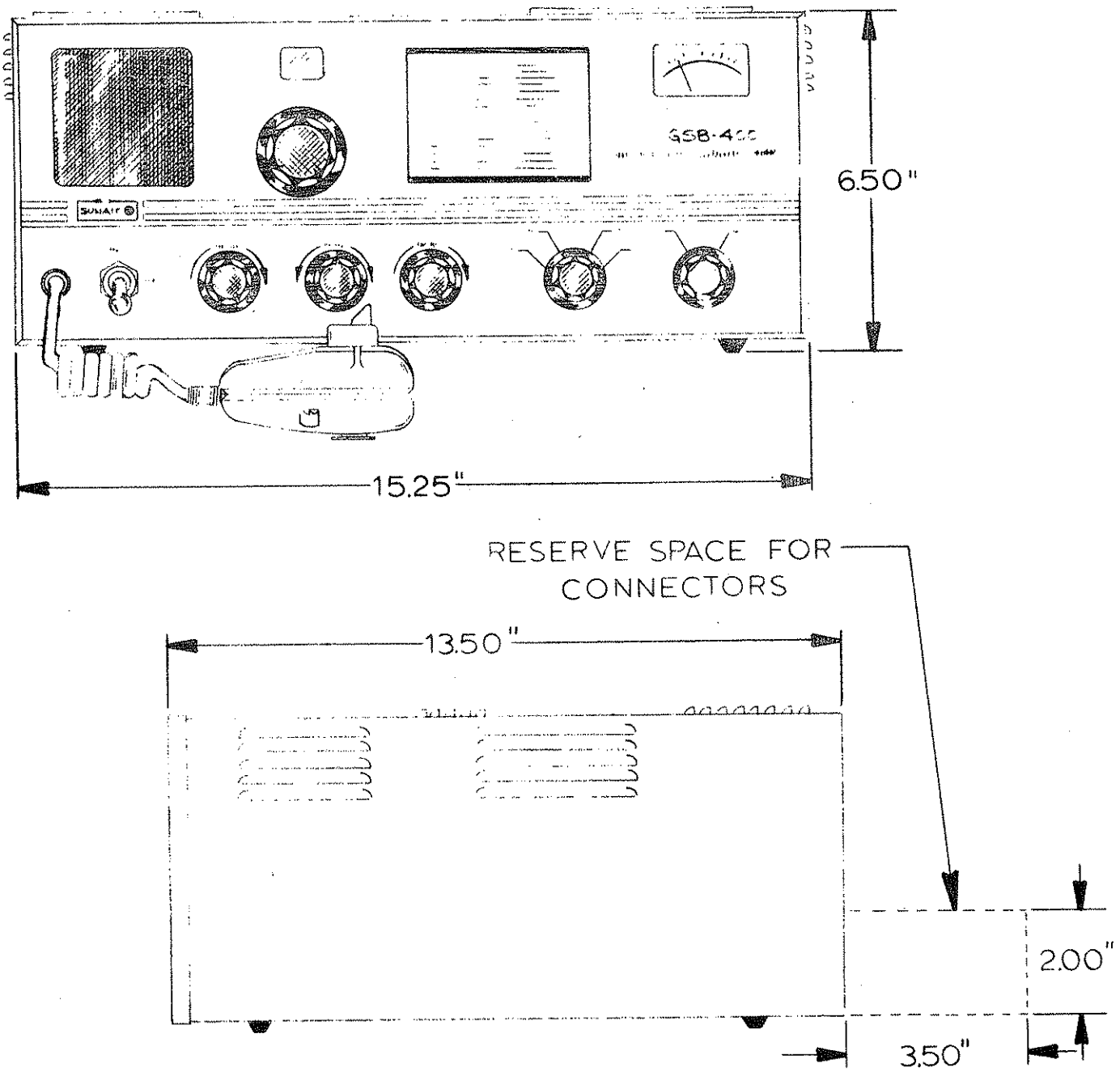
d. Configuration of Antenna - For best performance from a fixed wire antenna an inverted V or L antenna is reccommended as shown in Fig. II-3B. If this type of V antenna is not practical or is undesirable, a single sloping wire should be used with the open end as high as shown in Fig. II-3A. If the end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

5. Factors To Consider Before Installing a Whip Antenna

a. Recommended Antenna - For best results a center loaded high Q whip antenna is recommended. See Section I-D

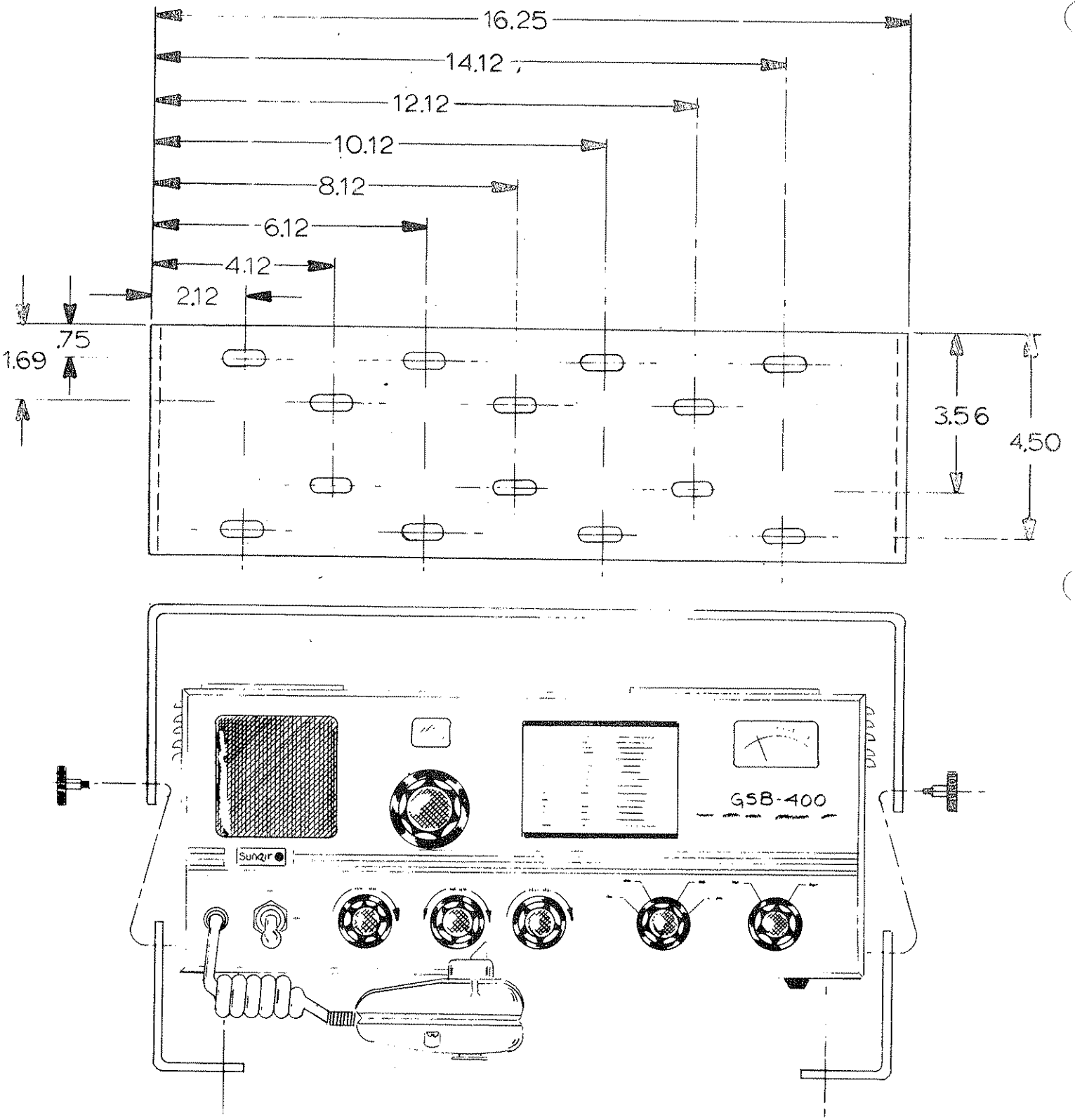
8. Clarifier - Select a channel that has SSB traffic, and vary the clarifier slowly until normal voice pitch is heard.

9. Ignition and Other Noise (Mobile & Marine) - After the GSB-400 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.

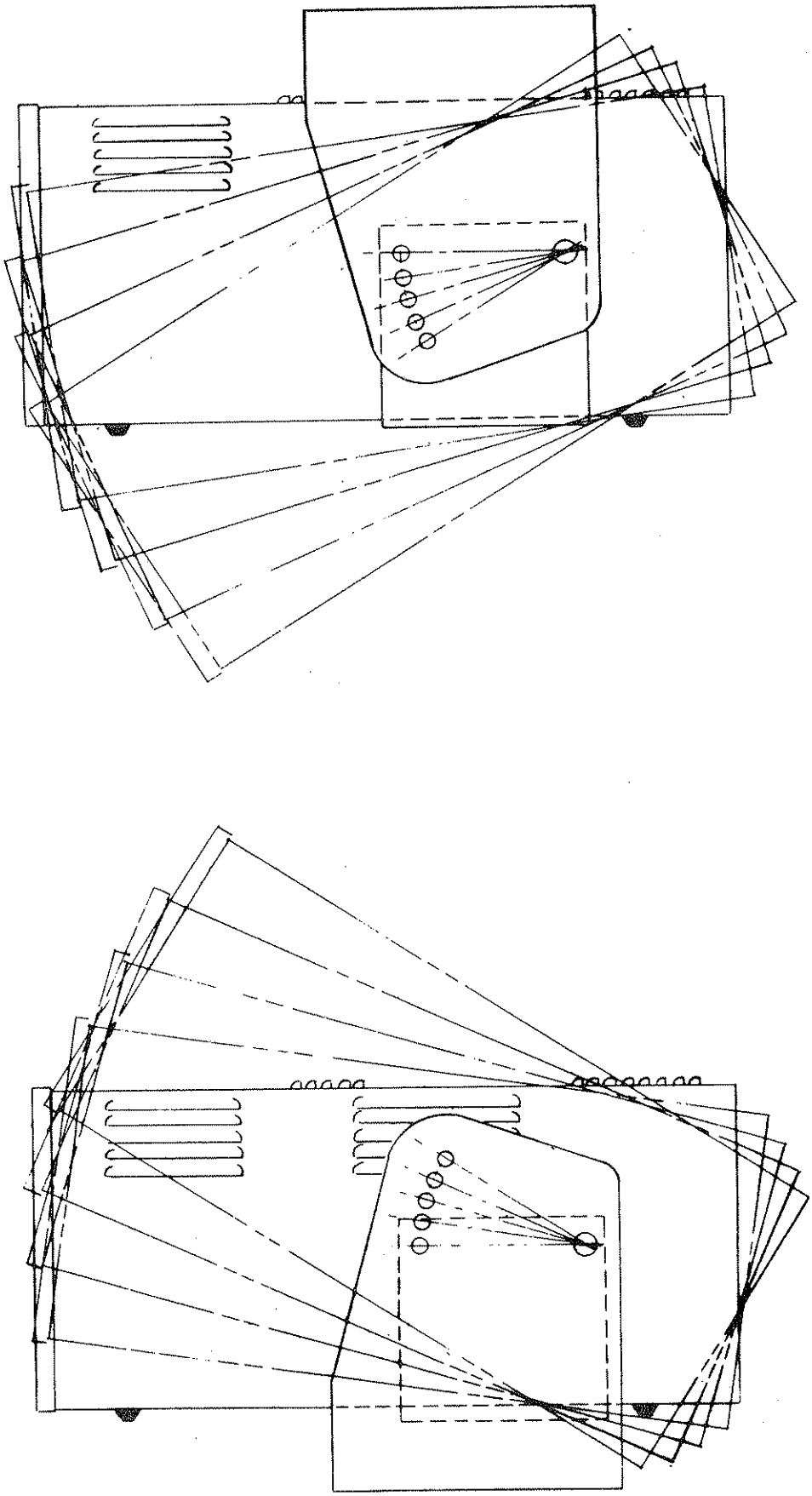


GSB-400 OUTLINE DIMENSIONS
FIGURE NO II-1

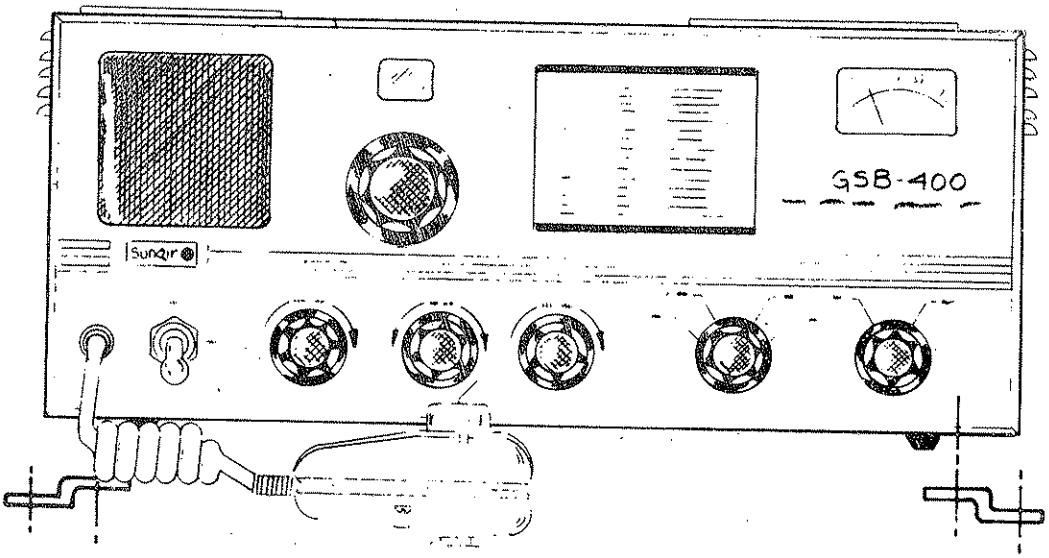
All dimensions in inches.

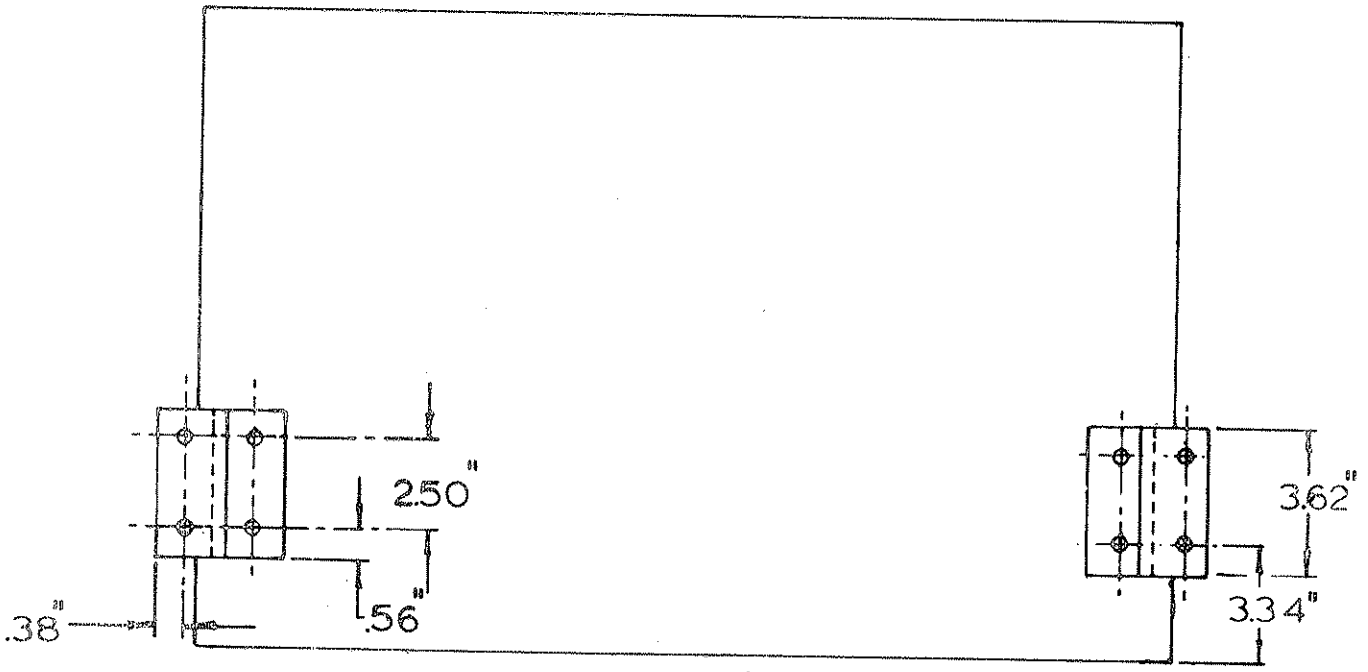


CRADLE MOUNTING DETAIL
FIGURE NO. II-2



GSB-400 CRADLE MOUNTING CONFIGURATIONS
FIGURE NO. II-2a





GSB-400 MOUNTING BRACKET DETAIL
FIGURE NO. II-2b

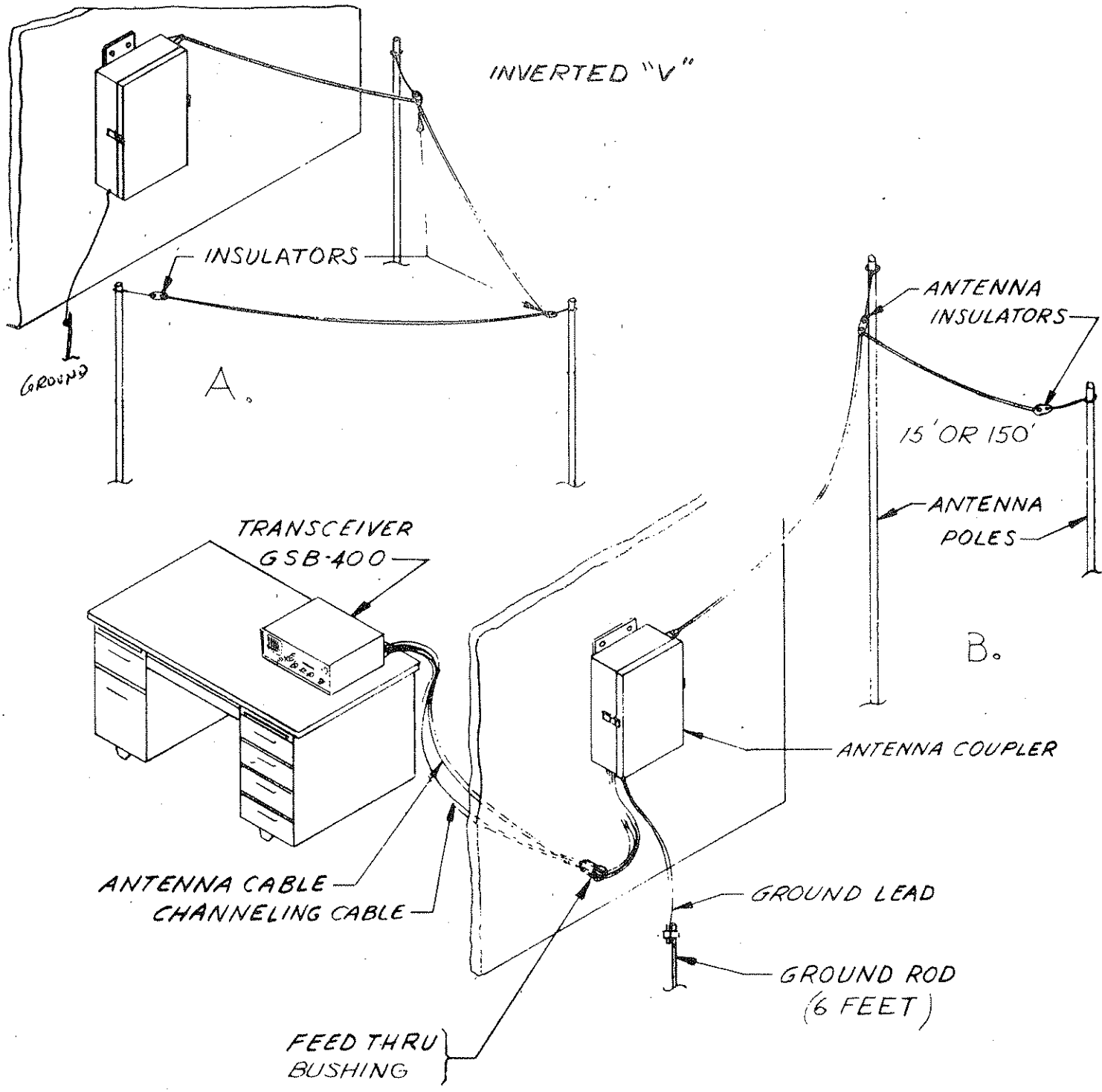


FIGURE NO. II-3
BASE STATION INSTALLATION, TRANSCEIVER

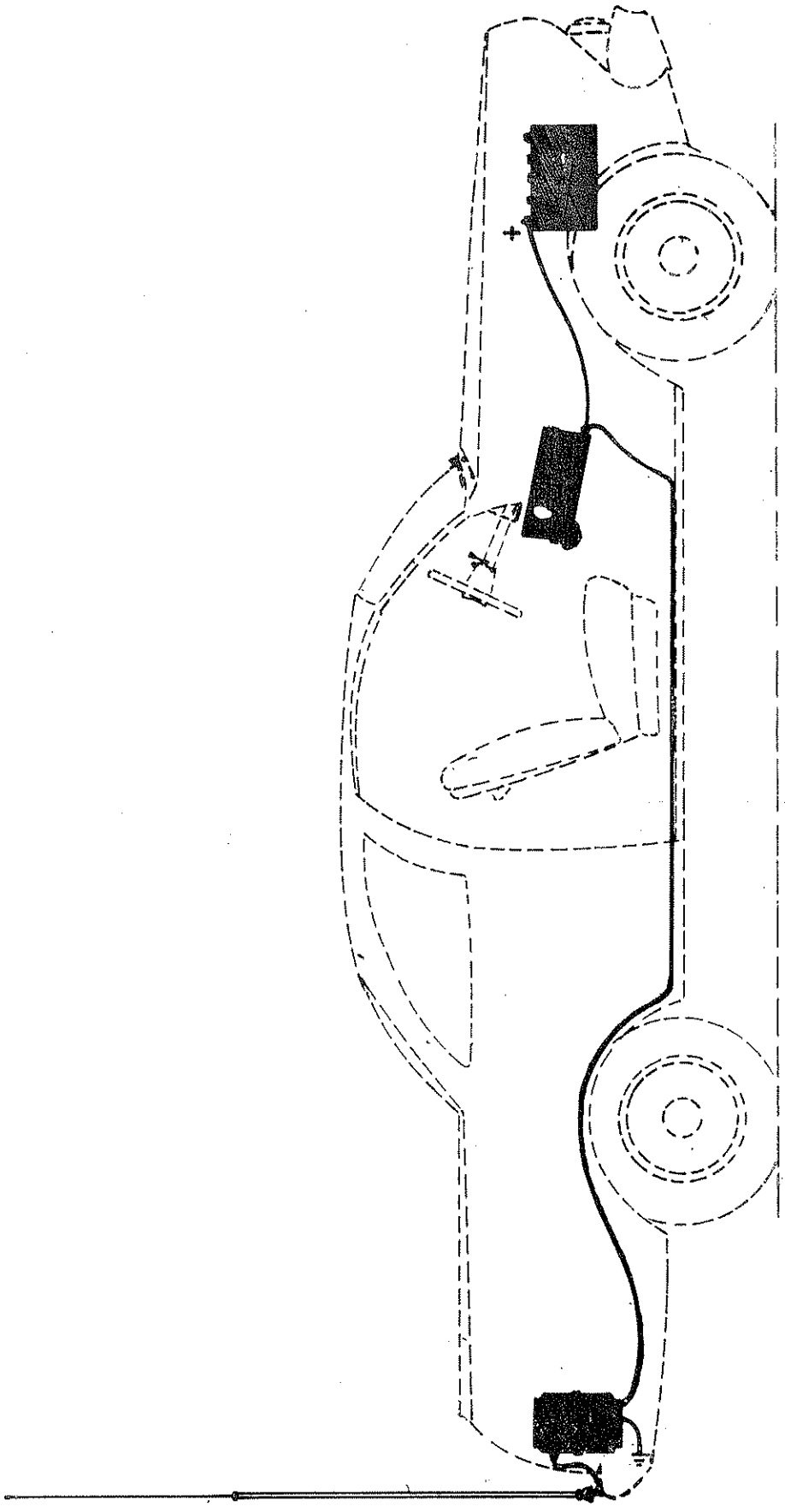


FIGURE NO. II-4

MOBILE INSTALLATION, TRANSCEIVER

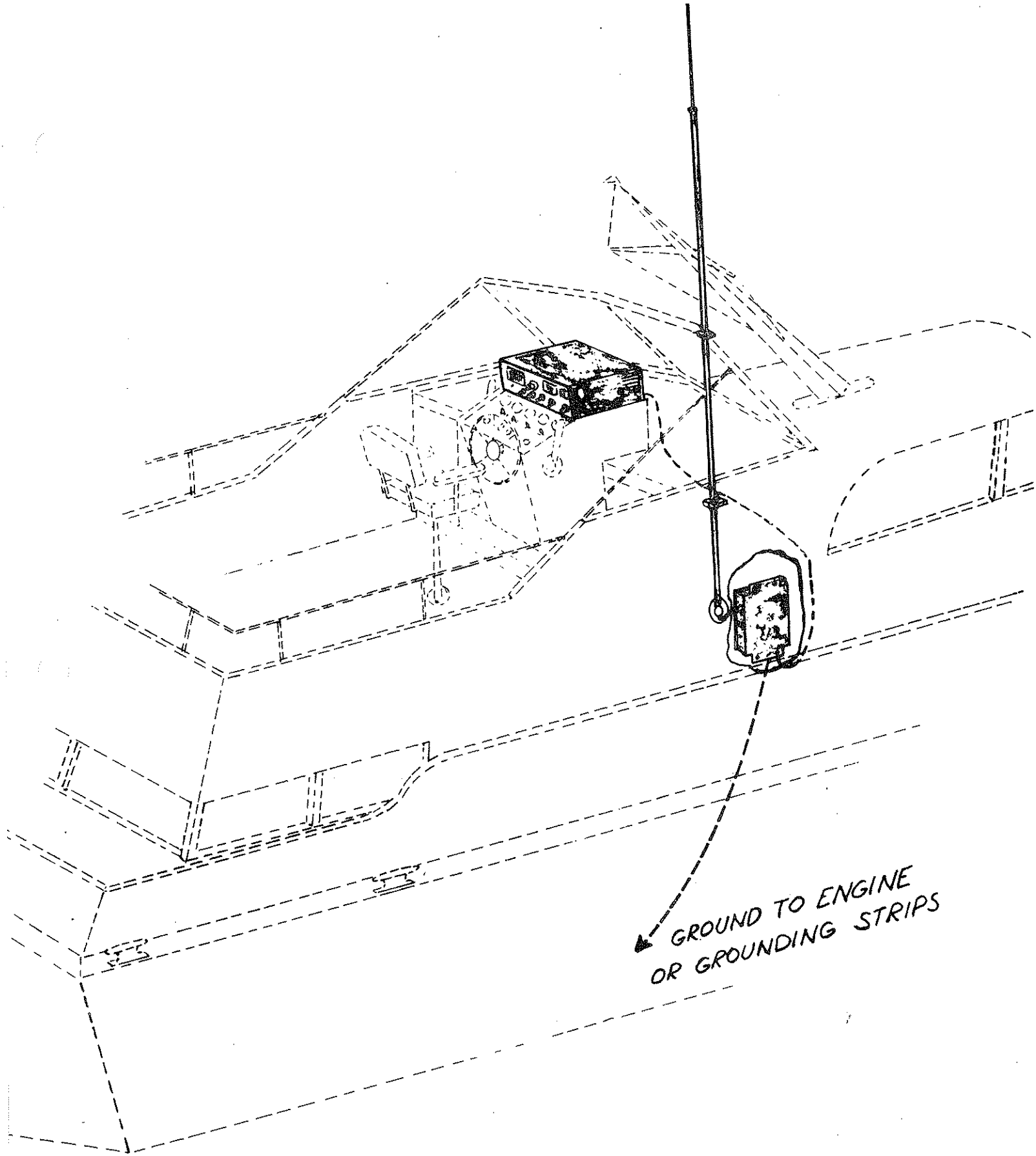


FIGURE NO. II-5
MARINE INSTALLATION, TRANSCEIVER

F. MARINE INSTALLATION AND OPERATION

1. Location Selection

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

b. Locate GSB-400 for convenient operating position.

c. Protect GSB-400 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-400 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-400 Transceiver has been designed to operate on a nominal voltage source of 12.6 V, 24 or 36 V dc, negative ground only, and 115/230 VAC 50/60 Hz. The input power lines are completely isolated from the chassis to eliminate electrolysis action.

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	24/32V
See wiring	Up to 10 feet	AWG 12
diagram pg. II-21	Up to 25 feet	AWG 10

4. Antenna Installation

a. Sunair recommends wherever possible, the use of 35, 50, 75, or 150 foot long wire antenna in conjunction with a GCU-1000 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 Antenna, Sunair P/N 99394, with the GCU-1000 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.

OPERATING INFORMATION

LEGAL OPERATION OF A MARINE TELEPHONE

Requirements:

1. Ships Station License - Available at the Federal Communications Commission located in your area. Or write to the Washington D.C. Central Office. Ask for Form 502.

2. Restricted Radio Operators Permit - Available from the Federal Communications Commission. Examination not required. Request Form 753.

3. Frequency Check - A legal requirement is that transmitter frequency checks be made at the time of installation with this information being entered in the station radio log. Should frequency adjustment be necessary, an FCC first or second class licensed radio technician only is authorized to make such adjustments.

4. Station Identification - Your station must be identified at the beginning and end of each transmission but not necessarily during conversational exchanges. Law prohibits the use of profane language during transmissions. Station log entries are required. Copies of Part 83 of the FCC rules and regulations are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20005.

MARINE RADIO OPERATOR:

Requirements:

1. If your radio telephone is to be used for telephone purposes, your station should be registered with the telephone business office of shore stations WOM (Miami), KMI (Oakland), or WOO(New York), to facilitate billing. However, telephone calls may be made collect without such registration.

2. Application Form TAW 430 is obtained from the telephone business office. Information obtained from this form TAW 430 is listed in the telephone system log books for use by all marine operators.

3. Your first ship station license will probably be an interim license with no call letters. With this license, use the name of your vessel when making radio contact with another vessel or land station.

4. On form TAW 430, line B-2 asks for call letters. Until you receive your permanent call letters, the name of your vessel is used. Line B-3, the rated power of the Sunair GSB-400 System is 125 Watt output PEP. Line B-5 shall be answered No. And line B-6 shall read Sunair Electronics, Inc. GSB-400 System.

* Do not operate transmitter without current Ships Station License. Post your ships radio license in a conspicuous place aboard your vessel.

* Keep a copy of Part 83 of the FCC Rules aboard ship.

* You are required to keep an up-to-date log-book of all radio operating activities. (Part 83.368 of the FCC Rules)

* Monitor 2182 kHz for calls and possible distress signals.

* "MAYDAY" is the distress signal. Use this signal only when your vessel is threatened by grave and imminent danger, and you require immediate assistance.

* "PAN" is the urgency signal. Use this signal only for the safety of persons aboard.

* "SECURITY" is the safety signal. Use this signal only to report hazards to navigation.

LICENSE APPLICATION

NOTES: Formal application for a Ship Station License shall be made on FCC Form 502. An interim Ship Station License is issued when you or your agent appear in person at the nearest Field Engineering Office of the Commission and submit your completed Form 502, together with your request for the Interim License.

The Interim License will permit you to operate your Sunair GSB-400 System for a period of six months from date of issue. With this license you are not assigned a call sign. Use the name of your vessel when making contact with another vessel or land station.

Your Ship Radio Station with call letters assigned to you will be valid for a period of five years from date of issue.

FCC Form 502 must be TYPEWRITTEN. Follow instruction sheet as stated.

ITEM 1 Refers to the name you have given to your vessel. Not the manufacturer's boat name.

ITEM 2 If application is for renewal of modification of your existing license, state your call sign. If you have purchased another vessel that has a call sign, state the vessels old call sign.

ITEMS 3-5 are self-explanatory.

ITEM 6 Self-explanatory: however you must be a citizen of the United States to have Ship's Station License.

ITEMS 7-12D are self-explanatory.

ITEM 13A Check "1600-4000 kHz"; if frequencies above 4000 kHz's are to be used, check 4000-26.000 kHz.

ITEM 13B If you are also applying for Radar, check the proper frequency box.

ITEM 14 Self-explanatory.

ITEM 15 Under Manufacturer, state Sunair Electronics, Inc.; under type name state, GSB-400 System.

ITEMS 16-17 are to be used only if you are a corporation or an association.

NOTE Sign your name and date. Under your signature, check the appropriate classification.

WARNING

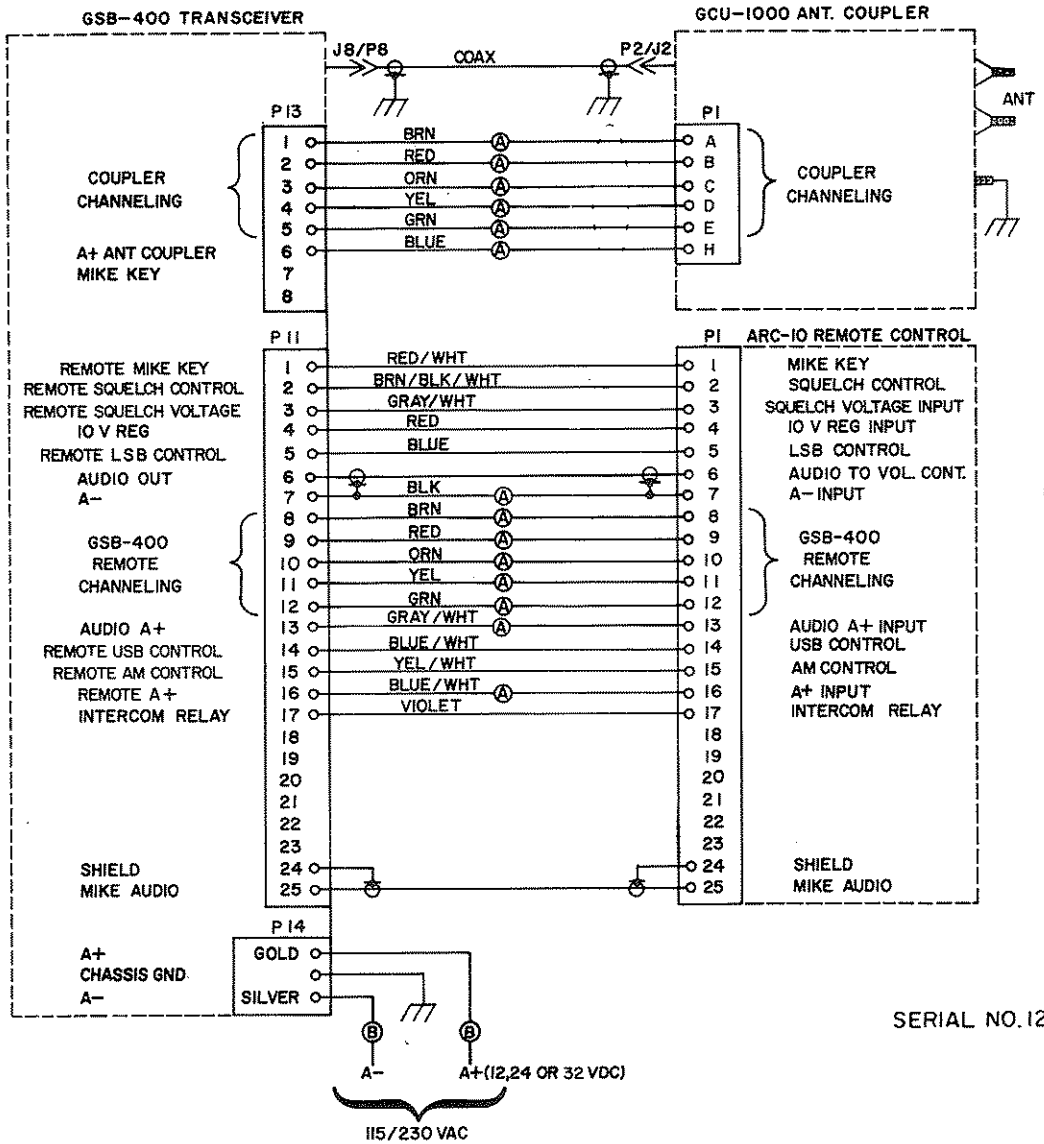
It is against federal law for anyone not possessing a valid 2nd or 1st Class FCC Radiotelephone or Radiotelegraph license to adjust or repair your transmitter. Penalty for violation is station and/or operator license revocation and/or fine or imprisonment, or both.

U.S. MARINE FREQUENCIES

TELEPHONE FREQUENCIES FOR AM AND UPPER SIDEBAND (SSB)		
STATION LOCATION AND CALL SIGN	TRANSMIT	RECEIVE
NEW YORK ---WOO	4091.6 8223.6 12396.5 16526.5	4390.2 8757.6 13175.5 17321.5
SAN FRANCISCO --KMI	4072.4 8204.4 12382.5 16512.5	4371.0 8738.4 13161.5 17307.5
MIAMI ---------WOM	4123.6 4130.0 8262.0 8258.8 12361.5 12358.0 16491.5 16523.0	4422.2 4428.6 8796.0 8792.8 13140.5 13137.0 17286.5 17318.0
PITTSBURGH ---WCM	2782.0	2782.0
MEMPHIS ------WJG	4072.4	4072.4
LOUISVILLE-----WFN	4371.0	4371.0
ST. LOUIS------WGK	6147.5 6455.0 8210.8	6147.5 6455.0 8210.8
MOBILE --------WLO	2430.0	2572.0

SHIP TO SHIP & SHIP TO LIMITED COAST STATIONS UPPER SIDEBAND FREQUENCIES		
TRANSMIT	RECEIVE	AREA
4139.5	4139.5	ALL
4136.3	4136.3	"
6210.4	6210.4	"
6213.5	6213.5	"
6518.6	6518.6	"
8281.2	8281.2	"
8284.4	8284.4	"
12421.0	12421.0	"
12424.5	12424.5	"
12428.0	12428.0	"
16565.0	16565.0	"
16568.5	16568.5	"
16572.0	16572.0	"

SHIP TO SHIP AM FREQUENCIES		
TRANSMIT	RECEIVE	AREA
2003	2003	Great Lakes Only
2142	2142	Pacific Coast-Day Only
2638	2638	All Areas
2738	2738	All Areas Except Great Lakes and Gulf of Mexico
2830	2830	Gulf of Mexico Only



SIZE	12V	LENGTH	24/32 V	115/230 VAC
A	#20	LESS THAN 24 FT.	#20	#20
	#18	MORE THAN 24 FT. LESS THAN 39 FT	#18	#18
	#16	MORE THAN 39 FT.	#16	#16
B	SEE NOTE 6	UP TO 10 FT.	#12	3 WIRE A/C POWER CORD #18
		UP TO 25 FT.	#10	

NOTES:

1. UNLESS OTHERWISE INDICATED WIRES (INCLUDING SHIELDED) SHOULD BE AWG # 24 OR LARGER.
2. ALL SHIELDED WIRE INSULATED TYPE.
3. COAX CABLE RG 58 A/U.
4. COUPLER CHANNELING WIRES MAY BE INDIVIDUAL SHIELDED TYPE OR UNSHIELDED WITH CABLE COVERED WITH SHIELDED BRAID.
5. FOR COUPLER TUNE-UP PURPOSES A TEMPORARY WIRE MAY BE CONNECTED TO P13 PIN 7 AND ROUTED TO COUPLER IN ORDER TO KEY TRANSMITTER. WIRE SHOULD BE REMOVED AFTER TUNE-UP TO AVOID POSSIBLE RF FEEDBACK.
6. FOR 12V OPERATION #10 WIRE MAY BE USED IF BUS IS NOT MORE THAN 5 FEET FROM TRANSCEIVER. FOR DISTANCES GREATER CONNECT #12 WIRE TO A TERMINAL STRIP AND RUN #8 AWG TO SHIPS BUS.
7. ANTENNA COUPLER MUST BE ADEQUATELY BONDED TO RF GROUND. USE #10, OR 12 AWG WIRE OR 1" WIDE COPPER STRAP TIED TO SHIPS GROUND.

SERIAL NO. 121 AND SUBSEQUENT

INTERCONNECT DIAGRAM, GSB-400 SYSTEM
FIGURE II-7

SECTION III
OPERATION

A. GENERAL

The GSB-400 HF Transceiver is simple to operate, requiring only a knowledge of the type of emission required for the channel, either sideband or AM. All controls are located on the front panel.

B. OPERATING CONTROLS

CONTROL	FUNCTION
ON-OFF-RCV	Applies power to entire system or to the receiver section only.
MODE	USB - For upper sideband operation (A3J) AM - For compatible AM operation and full AM reception (A3H) LSB - (Option) For lower sideband operation (Not legal in U.S., Canada, and most other countries) USB-TEL (A3A) Automatically programmed in Transceiver.
CLARIFIER	Used to "clarify" single sideband speech during RECEIVE.
SQUELCH	Adjusts signal threshold necessary to activate receiver
CHANNEL SELECTOR	Selects desired channel. Also, automatically selects AM mode if channel frequency is 2003 kHz, 2182 kHz, or 2638 kHz.

C. OPERATING PROCEDURE

Step 1: Turn the ON-OFF-RCV control ON and allow 5 minutes warm-up for sideband and one minute for AM operation.

Step 2: Select the desired channel with the CHANNEL SELECTOR.

Step 3: Select the proper modulation with the MODE switch.

Step 4: Turn the SQUELCH counterclockwise and adjust the audio GAIN for normal noise output, then slowly adjust the SQUELCH clockwise until the receiver is silent, and then back off on the control slightly.

Step 5: When an RF signal is received, adjust the CLARIFIER for maximum signal clarity.

Step 6: To transmit, depress the microphone button and talk. Speak only loud enough for midscale swings on the REL PWR meter while in SB.

In AM operation, the meter should indicate 1/4 to 1/2 scale when the microphone is keyed. When speaking into the microphone, the meter needle should move just slightly. Excessive meter movement, such as 1 scale division, indicates excessive modulation and R535 should be adjusted for less drive to modulator.

D. LEGAL REQUIREMENTS FOR USE

Legal use of this equipment requires that in the United States and most foreign countries the operator have at least a Restricted Radiotelephone Operator's Permit.

For Sideband operation in the United States, Canada and various other countries, ONLY UPPER SIDEBAND MAY BE USED. Use of Lower Sideband is prohibited.

ONLY AM TRANSMISSIONS ARE PERMITTED ON THE FREQUENCIES 2003, 2182 and 2638 kHz. The mode switching for these frequencies is performed automatically upon channel selection.

SECTION IV
PRINCIPLES OF OPERATION

A. GENERAL

This Section contains the principles of operation for the GSB-400.

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-400 transmits in three modes, all single sideband: suppressed carrier (A3J), full carrier (Compatible AM, A3H) and reduced carrier (Telephone, A3A). In addition to receiving each of the above it will also receive normal AM or double sideband. In the United States, the Federal Communications Commission requires that only full carrier be used on certain frequencies, (2003, 2182, and 2638 kHz). The capability to automatically switch to the AM mode when using these frequencies is provided in the exciter in order to comply with this requirement.

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 125 watts peak envelope power (PEP). Frequency stability is maintained by crystal-controlled oscillators housed in ovens at a constant +65^{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 12,24, or 32 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 +400 VDC, +800 VDC and -65 VDC furnished by the power supply.

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 P.C. Board schematic diagrams.

1. Microphone Amplifier PC-5

The microphone amplifier provides current to the microphone and amplifies the voice signal in Q502 and Q508. Diodes CR501, CR502, and transistors Q507 and Q501 detects and responds to any high input audio signal and will limit the amount of audio input to the balance modulator. This audio AGC circuit allows the GSB-400 to be used with different types of microphones without gain adjustments. Either a carbon or a transistorized microphone may be used. Potentiometer R535 is automatically switched in when AM is selected in order to control the signal level for correct AM modulation percentage. R535 is used to adjust the AM modulation percentage.

2. Balanced Modulator, PC-5

The output of Q508 is connected to the balanced modulator via R511, the audio balance control for the diode quad, M501. Two diodes of the ring modulator are switched on with one-half cycle of the 1650 kHz carrier oscillator and the other two diodes are turned on with the other half cycle. When no audio is present, there is no signal to unbalance the modulator and the output from the modulator amplifier, Q503, is reduced approximately 35 to 40 db below the output when audio is present. The output of Q503 with audio is a double sideband suppressed carrier signal that has been transformed up to 1650 kHz.

3. Carrier Reinsertion, PC-5

For AM operation, it is necessary to reinsert the carrier since it has been suppressed in the balanced modulator.

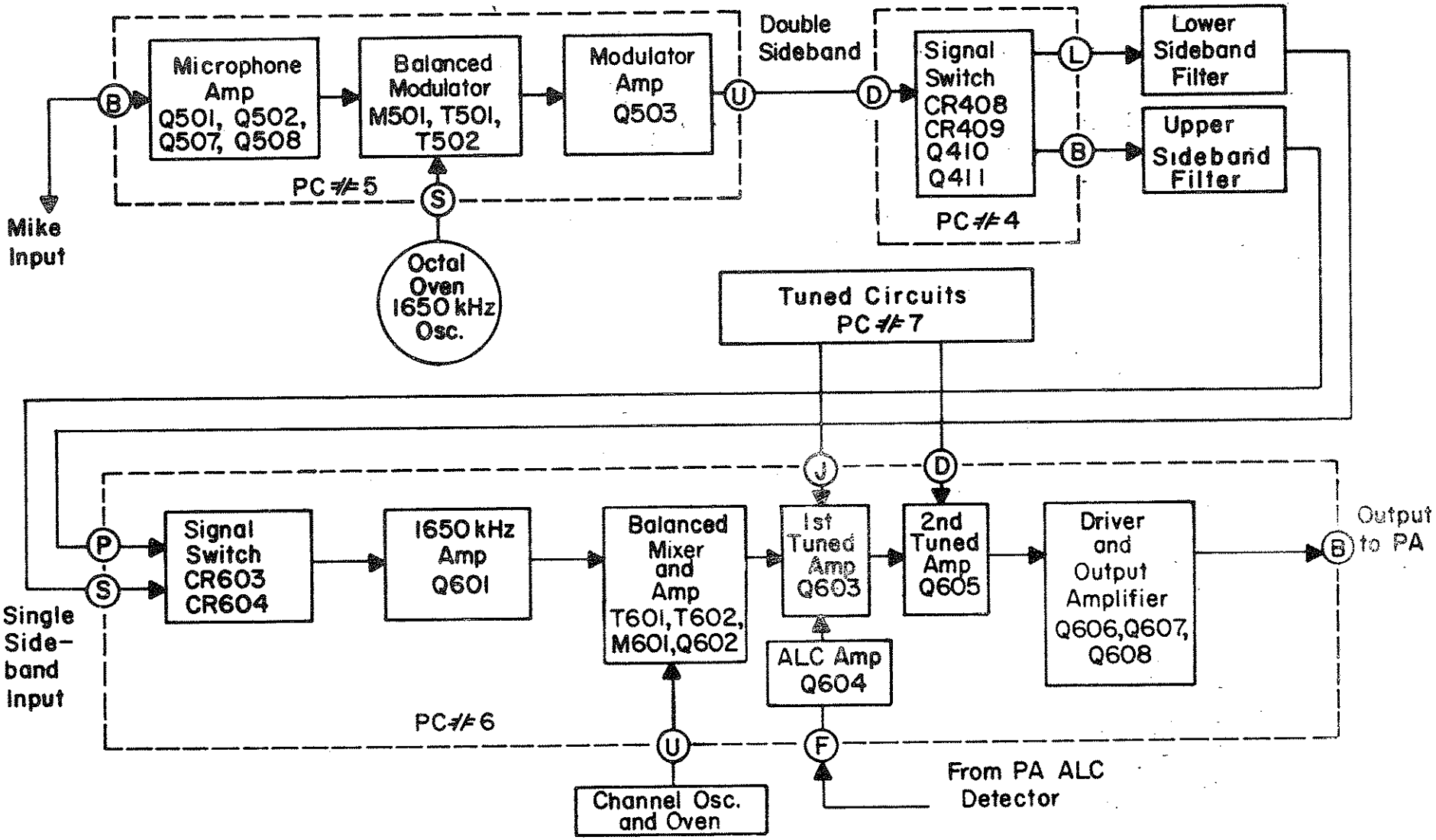


Figure IV-1
Block Diagram, Exciter

This is accomplished by the mode switch applying +10V to Pin "J" which turns on diodes CR505 and CR507 and allows the 1650 kHz carrier to be routed to PC-6, Pin "P". The 1650 kHz re-inserted level is controlled by R521. Since the United States Federal Communications Commission requires AM operation only on 2003, 2182, and 2638 kHz, it is necessary to automatically switch to AM if any of these frequencies are installed and selected by the operator. This is accomplished by connecting the appropriate channel switch position to either Pin "E", "F" or "H" on PC-5. Upon selection of one of the restricted frequencies, the 1650 kHz carrier is automatically reinserted as described above.

Another mode of emission used in the public correspondence AT&T System in the United States is TEL mode (Reduced Carrier). When selected, this allows a small amount of carrier to be transmitted which is used by the ground station to activate an alarm and lock the station receiver to the transmit frequency. For this mode of operation, the carrier is transmitted 16 $\pm$2 db below peak envelope power. The Channel selector switch when in a TEL frequency channel applies +10V to Pin "M", turning on diodes switches CR504 and CR506 and allows the carrier to be routed to PC-6 Pin "P". Carrier level is controlled by R517. Since the TEL mode is selected by the channel selector, mode selection is completely automatic and does not require any mode selection by the operator. The Mode selector switch should be on USB in order for the channel selector to switch automatically between USB (Suppressed Carrier) and TEL (Reduced Carrier).

4. Balanced Mixer, PC-6

The outputs from the two sideband filters are connected to PC-6, Pin "P" for USB operation and Pin "S" for LSB operation. As above, the mode switch applies +10V to diode switches to select the correct filter, CR603 for USB and CR604 for lower sideband. The selected sideband signal is routed to amplifier Q601 whose collector drives transformer T601, whose secondary couples out-of-phase signals to the diode ring M601. The channel oscillator is connected to the center top of the secondary of T601.

The balanced output transformer, T602, will cancel the channel oscillator frequency since equal current flows in both halves of T602 primary. Circuit balance is achieved by the transformer being wound balanced. The output of the mixer

is the sum and difference of the channel oscillator and the 1650 kHz signal component. The tuned amplifiers, Q603 and Q605, whose tuned circuits are on PC-7, are tuned to the difference component of the two frequencies. The source follower, Q606, and amplifier, Q607, Q608 are used as power amplifiers to transform the impedance and drive the power amplifier from a 50 ohm source.

5. ALC Amplifier, PC-6

The ALC amplifier is a PNP device which receives its drive from the ALC detector/amplifier. As the power output of the final amplifier increases, the drive signal on Pin "F" decreases, which increases the conduction of Q604 and drives the collector more positive. This applies degenerative bias to the source of Q603 and reduces the gain of the amplifier and subsequent power output of the system. The opposite events occur when the final amplifier power decreases.

C. POWER AMPLIFIER, Figure IV-2

The purpose of the PA is to amplify the low level signal from the exciter to a power level of 125 watts PEP for sideband operation.

1. Driver, V1201

The exciter signal from the wide-band amplifier in the receiver/exciter unit drives the control grid of the tuned amplifier, V1201. The signal, which has been at a relatively low level throughout the previous portions of the exciter is now amplified approximately 30 db to drive the final amplifier.

2. Power Amplifier, V1, V2

The final power amplifier stage is a linear amplifier operated class AB1 and consists of two tubes, V1 and V2. For linear operation, zero signal tube current is set to 30 ma per tube by adjusting R3. This corresponds to approximately -65 VDC bias level and 0.3 VDC on each cathode. If V1 or V2 is replaced, they should be checked for approximately equal zero signal current. For 125 watts PEP output with a standard two-tone test signal input, the power input to each tube is approximately 90 watts average; 110 ma with plate voltage at 800 VDC.

3. ALC Detector

The automatic level control detector receives its signal from the 50 ohm output of V1 and V2. It functions in two different modes. CR8, Q1401 and Q1402 will function as a wideband detector and DC amplifier which detects and responds to any change in power output from that originally set by adjusting R1404. When this condition is detected the AM ALC detector amplifier, Q1402, puts out a correcting DC voltage that increase or decreases the exciter output and subsequent power of the amplifier. For normal operation R1404 is set to limit the power on AM to 30 watts average. R1402 is set to limit the power output on AM to 125 W PEP when the carrier is modulated 100% with a single audio input tone. CR7 and IC 1401 will function as a peak voltage detector which detects and responds to any change in power output from that originally set by adjusting R1403. For normal operating R1403 is set to limit the power output on SB to 125 W PEP. When the transceiver is operated in the SB mode Q1402 is turned off and does not effect the ALC output voltage.

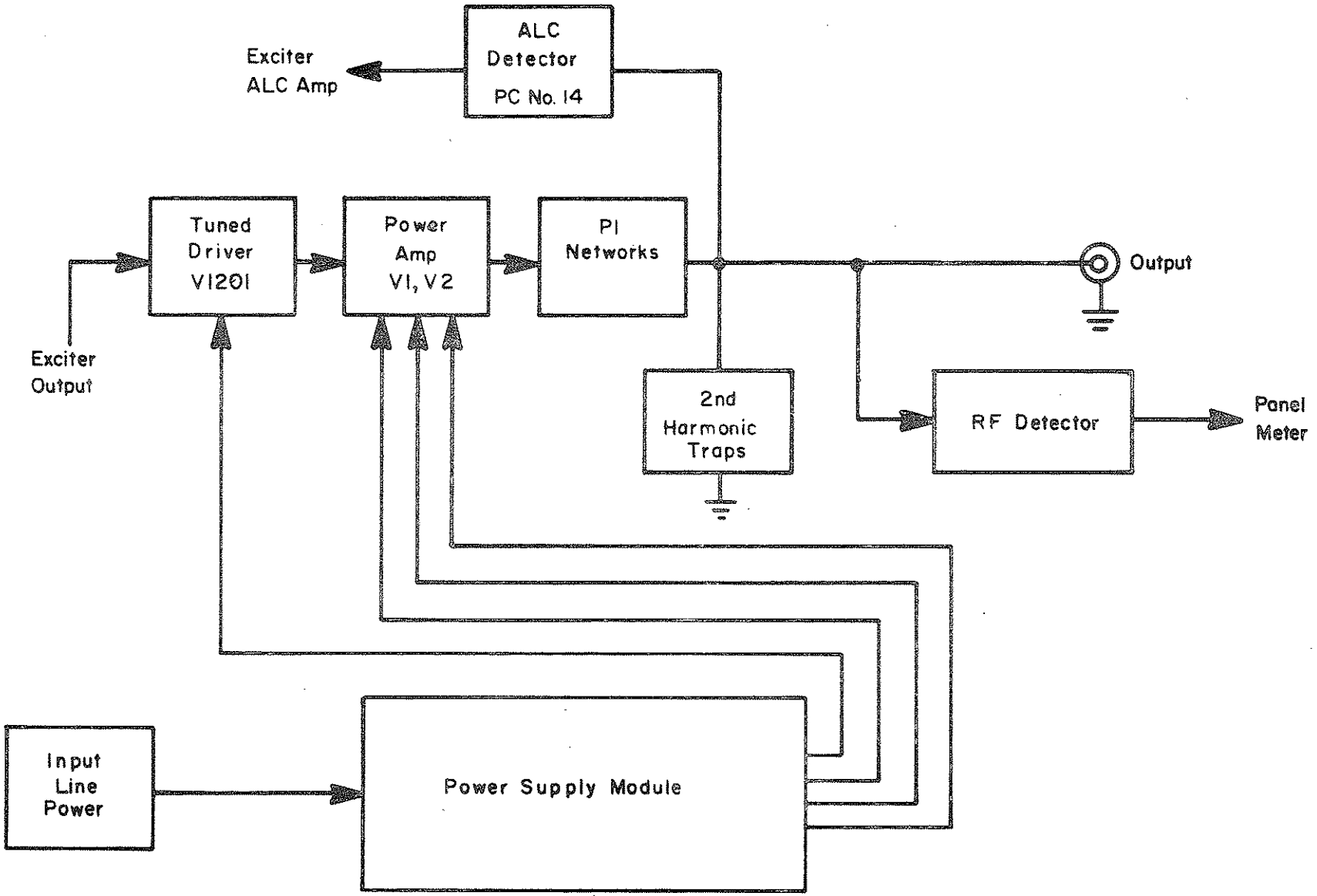
4. Pi Network

The output from amplifiers V1 and V2 is connected to a tuned, capacitive input pi network that transforms the plate impedance to a 50 ohm resistive output and attenuates harmonics of the fundamental frequency. Second harmonic traps are connected to the output to further attenuate the second harmonic to greater than 60db below the fundamental frequency.

D. Power Supply Modules

1. DC Power Supply Module

The power supply is a self contained plug-in module. The GSB-400 can be operated at either 12/24/32 VDC or 115/230 VAC by interchanging power supplies as the basic chassis is independent of voltage. The power supply furnishes high voltages for the driver V1201, and the power amplifier, V1 and V2. A+ is supplied to transistors Q2 and Q3 which are connected to the square loop transformer T1. The transistors and the transformer form an oscillator circuit that oscillates at approximately 1 kHz and couples a square wave output to the bridge rectifiers, CR2001-CR2004 and half wave rectifier,



Power Amplifier / Power Supply, Block Diagram.

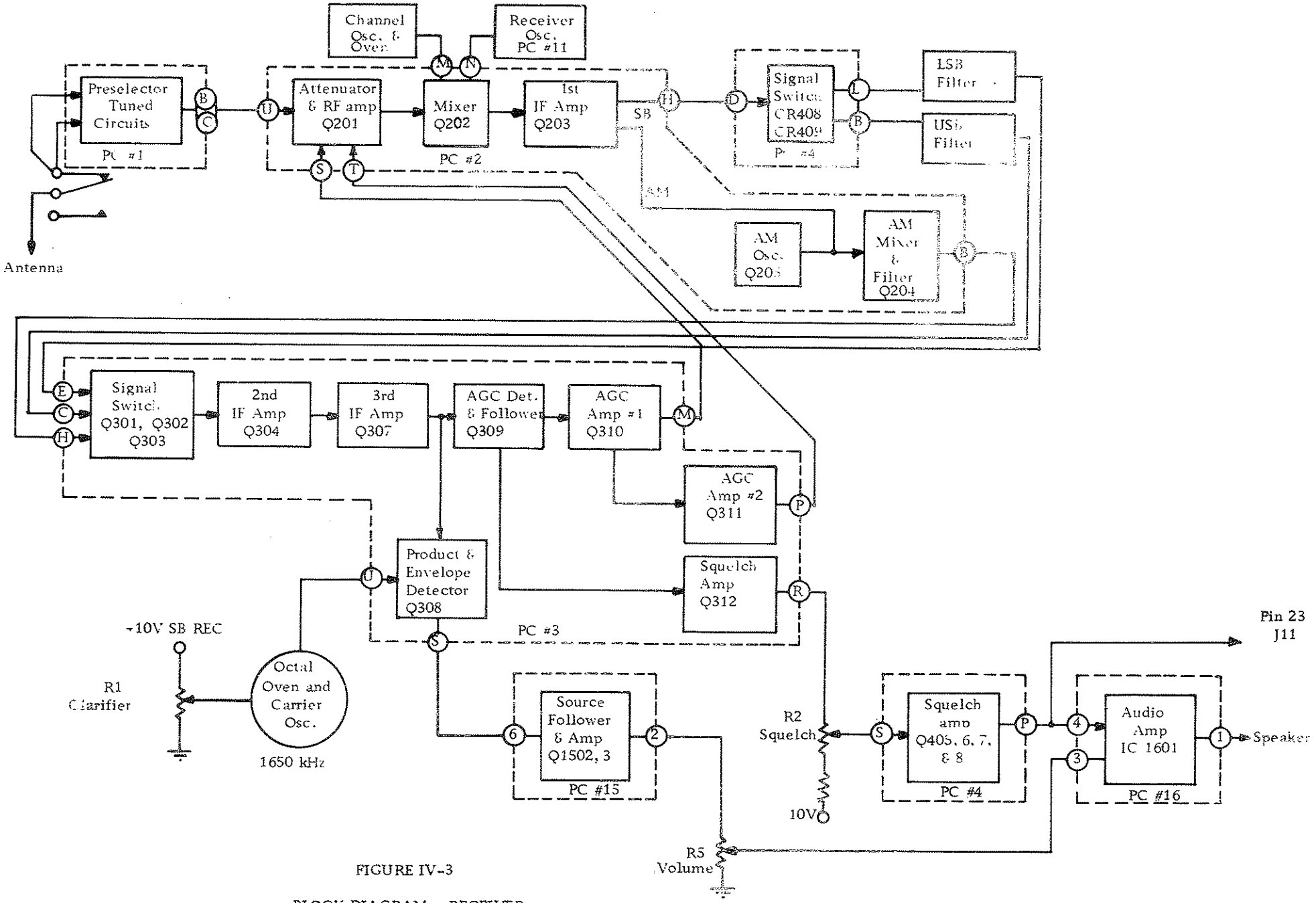


FIGURE IV-3

BLOCK DIAGRAM - RECEIVER

CR2005. The output of the bridge circuit is approximately 800 VDC for the two final amplifiers. The output winding is center tapped and supplies 400 VDC to the driver V1201. High B+ is generated by the oscillator only when the microphone is keyed and relay K1 actuated. The power supply module also supplies the low voltage such as filaments and A+ to the transistor circuits.

2. AC Power Supply Module

The AC Power Supply module is designed to operate from a 115/230 VAC source and will deliver the following output voltages: 800 VDC to V1 and V2; 400 VDC to V1201, -70VDC to V1 and V2; 14 and 28 VAC for filaments and ovens; A+ to the receiver exciter section and antenna coupler.

E. RECEIVER, Figure IV-3

The receiver operates as a single sideband or an AM receiver. The principal difference between the two modes is that double conversion is used for AM, single conversion for SB, and signal demodulation for Am is an envelope detector and a product detector is used for SB.

The receiver oscillator frequency is crystal controlled and, depending upon the number of two frequency simplex channels installed in the radio, is derived from the transmit oscillator, receiver oscillator or a combination of both. The oscillator theory is contained in Section E.

1. Preselector Tuned Circuits, PC-1

A three section tuned circuit selects the signal for each channel and is contained on PC-1. The input signal from the antenna relay is connected directly to PC-1 via two coax cables and pins on each end of the board and presented to all of the input diodes. The channel switch applies +10V to the selected channel which forward biases one set of diodes and reverse biases all others and allows the signal to pass only through the selected three section filter which is tuned to the channel frequency. The output diodes are connected to Pins "B" and "C" and are selected and reverse biased the same as the input diodes.

2. RF Amplifier Mixer, PC-2

The output from the preselector tuned circuits is connected to Pin "U" of PC-2 and goes through a variable attenuator which is controlled by AGC #2 amplifier. High level signals

therefore are attenuated before they reach the base of the RF amplifier, Q201, which is an untuned broad band amplifier whose gain is controlled by AGC #1 amplifier. The output of the RF amplifier is connected to mixer Q202. Mixing action takes place in the FET amplifier and the difference product, 1650 kHz, is selected by the drain tuned circuits.

3. First IF Amplifier, AM Conversion, PC-2

The output of the mixer is connected to Q203, the first IF amplifier. Two outputs are taken from Q203, one from the drain is routed to PC#4 for USB or LSB selection and the output from the source is connected to Q204, the AM mixer-filter. Q206 serves as the oscillator ON-OFF switch. When the mode switch is in the SB position, +10V is applied to Pin "E", which turns on Q206, grounds the drain of Q205 and inhibits the AM oscillator. For AM operation, Q206 is off which allows Q205, the AM oscillator (1195 or 2105 kHz) to start. The receiver AM output from Q204 is connected to Q206 along with oscillator signal. The difference frequency (1650-1195 = 455 kHz or 2105-1650 = 455 kHz) is selected in the collector load, which is a 455 kHz band-pass filter. In order to reduce the effects of oscillator harmonics, the AM oscillator frequency may be 1195 kHz or 2105 kHz, depending upon channel frequency.

4. IF Amplifiers, PC-3

The SB output from Q203 is switched by the circuitry on PC-4 and is routed through the selected SB filter to PC-3, Pin "E", for LSB operation and Pin "C" for USB operation. The output of the AM filter Q206 is connected directly to Pin "H". The mode selector switch applies +10V to one of the three transistor switches Q301, Q302, or Q303. The selected transistor is forward biased allowing the signal to appear at the emitters along with the turn-on DC voltage which back biases the unselected transistor switches. Q304, the second IF amplifier, and Q307, the third IF amplifier, increase the signal level sufficiently for the detector and AGC system. Q307 has two drain loads, one for SB tuned to 1650 kHz and the other for AM tuned to 455 kHz. The correct load is selected by diodes CR301 and CR302. For SB operation, the mode switch applies 10V to Pin "K" which forward biases CR301 and connects the 1650 kHz load to Q307. The 10V on Pin "K" turns on Q305

which removes the base drive from Q306 which turns off the transistor and removes the forward bias from CR302 and isolates the 455 kHz load from Q307. The signal is then routed to the AGC detectors, CR303 and CR304, and audio detector, Q308.

5. AGC and Detector, PC-3

The AGC system controls the gain of the second IF amplifier, Q304, the RF amplifier, Q201, and the input attenuator. The input attenuator AGC is voltage delayed and does not take effect until after AGC-1 has reduced the gain of Q304 and Q201. The two diodes CR303 and CR304 form a voltage doubler detector to rectify the IF output and is amplified by Q309, Q310 and Q311. R330 controls the point that Q311 begins conduction by taking current through the attenuator diodes and increases the signal loss through the attenuator. The squelch amplifier, Q312, also receives its drive from Q309, the detector emitter follower. The emitter of Q312 is connected to the panel mounted squelch control potentiometer which sets the level of squelch operation.

The detector, Q308, receives its signal from the third IF amplifier, Q307. For SB operation, the input is 1650 kHz and the detector serves as a square law product detector which requires an input from the 1650 kHz carrier oscillator for detection. The resultant outputs are the audio signals and multiples of the 1650 kHz oscillator. The high frequencies are filtered out by pi-filter C329, R326 and C330, leaving only the audio component. R336 in the source of Q308 is set for optimum dynamic range capability of Q308. For AM operation, the 1650 kHz oscillator is turned off and Q308 serves as an envelope detector conducting only on positive half cycles. The pi-filter removes the 455 kHz component leaving the audio envelope which is taken from Pin "S" and connected to the gate of the source follower, Q1502.

6. Squelch and Audio Amplifier, PC-4 and PC-16

The wiper arm of the squelch control potentiometer is connected to Q405 base and provides the DC control voltage for operation of the squelch system. An increase in signal level or a resetting of the potentiometer toward A+ will cause the base voltage of Q405 to increase which makes the emitter of Q406 increase until the diode CR411

starts to conduct and the collector toQ406 will decrease. Q407 starts to cut off which removes drive from Q408. This reduces the current through Q408 which reduces the voltage across CR411 and allows Q406 to conduct harder. This regenerative action continues until Q408 is turned off and the voltage on Pin 4 of PC-16, increases enough to turn on the audio amplifier, integrated circuit, IC1601. When the signal decreases below the threshold the reverse action occurs but not in a regenerative fashion and therefore is slower.

The audio amplifier is an integrated circuit and supplies more than 4 watts of audio power to the speaker. Receiver audio is connected to Pin 3 from the arm of audio potentiometer.

The sidetone from the exciter is also amplified by the audio amplifier. The desired sidetone level is set by R423. The speaker is opened during transmit but the sidetone can be heard at the remote station and likewise if the transmission originates at the remote unit, the remote speaker is silenced but sidetone is heard at the transceiver.

F. OSCILLATORS

The standard transceiver has three oscillators, a 1650 kHz carrier oscillator, a oven controlled transmit oscillator and a receive oscillator. The oven controlled transmit oscillator may contain up to ten crystals which can be used in both the receive and transmit mode if the frequencies are the same, commonly termed "simplex". However, if one or more channels have differenct receive and transmit frequencies, commonly termed "two frequency simplex" the transmit frequency will be housed in the oven controlled transmit oscillator and the receive frequency crystal will be housed in the receiver oscillator located in the bottom of the chassis.

1. Carrier Oscillator 1650 kHz, PC-10

The carrier oscillator and crystal are housed in an octal plug-in oven immediately behind the front panel. The oven temperature is maintained at +65°C over an ambient range of -54°C to +55°C. Since the oscillator is also in the oven, frequency stability is maintained within two cycles over the above temperature range. Warm-up time of the oven from -54°C to oscillator stabilization time is about 6 minutes.

The carrier oscillator is activated during both receive and transmit, being used in the balanced modulator for transmit and the product detector for receive. In order to provide a tunable oscillator during the receive function for natural voice clarity on SB, provision is made to vary the oscillator by a front panel control labeled "Clarifier". The clarifer circuit is activated only during receive and will not affect the oscillator frequency during transmit.

During the receive function, +10V is applied to pin 4 of the octal socket through R7 and CR5 which back biases CR1001 and shunts the 1650 kHz crystal to ground through L1, C37, and the varicap, CR6. The "Clarifier" control, R1, can now vary the oscillator $\pm$100 Hz about the 1650 kHz center frequency. During transmit, 10V is removed from pin 4 and applied to pin 8 through R6 and CR4. This voltage turns on CR1001 and connects the 1650 kHz crystal to ground through C1001 which bypasses and inactivates the "Clarifier" control. The oscillator is set on frequency by C1003 (accessible through inner enclosure cover) while in the transmit mode. The oscillator supply voltage is also applied by the switching voltage through L1001.

2. Transmit Channel Oscillator, PC-8, PC-9

The channel oscillator and crystals are housed in the 10 crystal rectangular oven mounted to the chassis. The oven temperature is maintained at +65^{o}C over the ambient range of -54^{o}C to +55^{o}C. Since the oscillator is also housed in the oven, stability is maintained to within $\pm$20 Hz. The oscillator is an integrated circuit connected as a wideband amplifier with feedback. The feedback loop gain is controlled by the channel crystals which allow the oscillator gain to exceed unity only at the resonant frequency of the crystal. The crystal channel selection and crystal trimmer circuitry are contained on PC-9, mounted directly below the oven on the bottom of the chassis. The channel switch applies 10V from the program board to the selected channel.

This turns on one of the diodes, CR901-CR910, back biasing the other diodes and connects the selected crystal into the circuit of the oscillator feedback loop. Correct crystal capacity and frequency trimming are provided by three capacitors for each channel mounted on PC-9. The 36pf capacitor is a temperature compensating

type. The trimmer capacitor, 2-8pf, allows the channel crystal to be set to the exact frequency. The oscillator may be used for both receive and transmit, if the channel frequency is the same (simplex)

3. Receive Oscillator, PC-11

This oscillator is activated when two-frequency simplex operation is required in the radio. The electrical design of this oscillator is identical to the transmit channel oscillator discussed in Paragraph 2 of this Section. Mechanically, the oscillator is packaged on one PC board and it is mounted on the bottom of the unit.

Only receive two-frequency simplex crystals are installed in the receiver oscillator. That is, all simplex channels (same transmit and receive frequency) utilize a single crystal housed in the oven. The crystals used in the receiver oscillator may not be interchanged with the ones used in the oven oscillators because the receive crystals are cut to operate at 25°C while the oven crystals are cut to operate at 65°C.

G. CHANNEL SWITCHING CONTROL AND SYSTEM WIRING

1. Solenoid Channeling

The basic channel switching functions are controlled by the three wafer switches mounted to the front panel. The first wafer from front, SW1, controls the receiver. SW2, the second wafer, controls the exciter. SW3, the third wafer, controls the antenna coupler channeling.

The solenoid motor located in the antenna coupler is controlled by a coded five wire system connected to the master wafer. A+ voltage is wired to the rotary solenoid and if the transceiver master wafer is rotated to a new position, an A+ return or ground is provided for the solenoid and it rotates, moving its slave wafer, until all five wires are open circuited and current ceases to flow.

2. Receiver/Exciter Control Wiring, Figure IV-5

All receiver/exciter channel control wires from SW1 and

SW2 are terminated on PC15. SW1 controls the receiver and it is connected to PC15 (1-10A) receiver side. SW2 controls the transmitter and it is connected to PC15 (1-10B) transmit side. 10V receive and transmit is supplied to SW1 and SW2 through the change over relay K3 and CR1516. The channel switch SW1 and SW2 must provide +10V to the following functions in the receiver/ exciter.

(1) PC-1, receiver preselector.

(2) PC-9, channel oscillator.

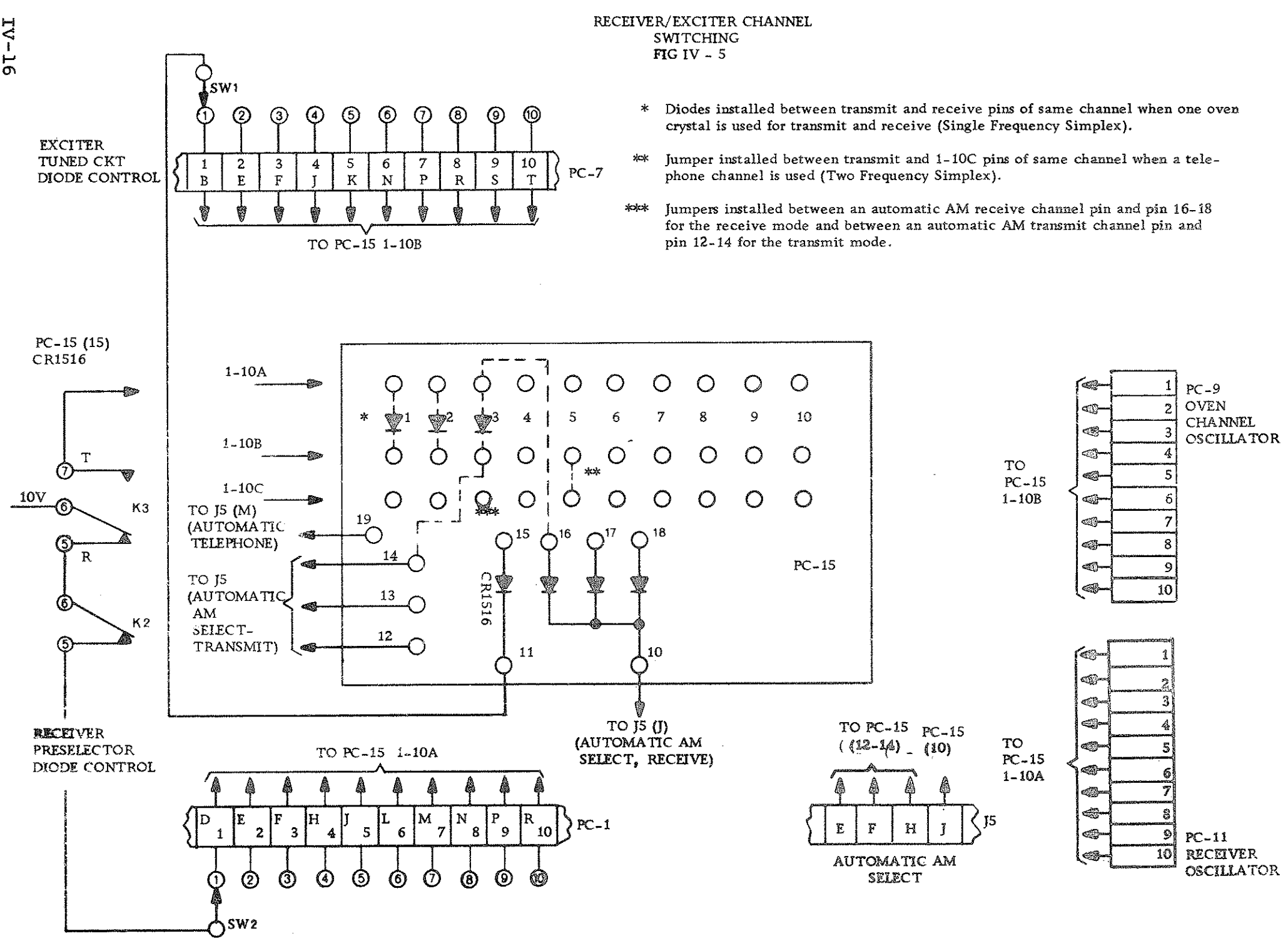
(3) PC-11 receiver oscillator

(4) PC-7, exciter tuned circuits.

(5) PC-5, Pins "E", "F", "H" and "J" for automatic AM selection if 2003, 2182 or 2638 kHz is installed in radio.

When a single frequency simplex channel is installed in the radio, the same crystal is used for both transmit and receive. This crystal is housed in the transmit channel oscillator oven and the selection network is on PC-9. PC-9 control wires are connected to the transmit terminals of PC-15. When relay K3 is in the transmit position, 10V is supplied through diode CR516, switch SW2 to the selected PC-15 transmit terminal and then to PC-9, PC-7 and PC-5, if applicable. When the microphone switch is released, relay K3 returns to the receive position and 10V is now applied to the receive side of PC-15 and subsequently to PC-1 and PC-11. If the channel is single frequency simplex, a diode must be installed between the transmit and receive side on the selected channel. If the channel is two-frequency simplex, the diode is not required and a separate receive crystal is selected when the relay, K3, is de-energized. If the two frequency simplex channel is a TEL channel, a jumper must be installed between the transmit 1-10B and TEL 1-10C pins of the same channel and this will automatically put the transceiver on the TEL mode of operation if the mode selector switch is on USB.

RECEIVER/EXCITER CHANNEL
SWITCHING
FIG IV - 5



* Diodes installed between transmit and receive pins of same channel when one oven crystal is used for transmit and receive (Single Frequency Simplex).

** Jumper installed between transmit and 1-10C pins of same channel when a telephone channel is used (Two Frequency Simplex).

*** Jumpers installed between an automatic AM receive channel pin and pin 16-18 for the receive mode and between an automatic AM transmit channel pin and pin 12-14 for the transmit mode.

SECTION V

GSB-400 SPECIFICATION TEST PROCEDURE

A. GENERAL INFORMATION

1. The checks outlined in this Section should be performed after equipment maintenance or if specification check is desired.

B. EQUIPMENT REQUIRED

1.	RMS Voltmeter	H-P Model 400L, or equivalent
2.	Distortion Analyzer	H-P Model 330C, or equivalent
3.	RF Signal Generator	H-P Model 606B, or equivalent
4.	Frequency Counter	H-P Model 5445L, or equivalent
5.	Audio Oscillator	H-P Model 200CD, or equivalent (2)
6.	Attenuator	Kay Electric Model 30-0, or equivalent
7.	Wattmeter (100W Element)	Bird Model 43, or equivalent
8.	Dummy Load, 50 ohms	Bird Model, 81B, or equivalent
9.	Oscilloscope	Tektronic Model 543B, or equivalent
10.	Peak Detecting Voltmeter	H-P Model 410B, or equivalent

C. OSCILLATOR

1. Channel Oscillator (10 Crystal Oven Unit)

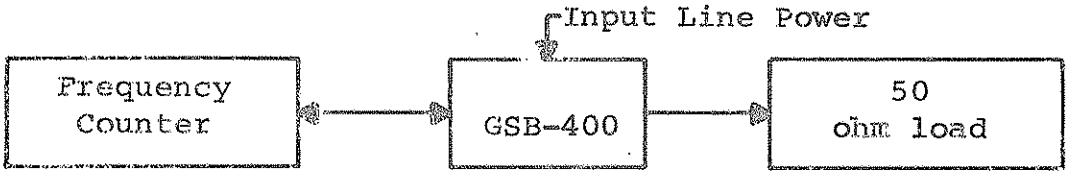


Figure 1

(a) OFF/ON/REC switch in "ON" position.
(b) Channel selector switch in Channel 1 position.
(c) Allow equipment to warm up 15 minutes.
(d) Connect frequency counter to Pin "N" of PC-2.
(e) Key microphone and record frequency.
(f) Turn channel selector switch to successive positions and record frequency.
(g) Frequency readings must be within ±20 Hz of assigned frequency plus 1650 kHz. NOTE: Oscillator should be set to exact channel frequency.

2. Receive Oscillator

(a) Refer to Figure 1 for equipment hook-up.
(b) OFF/ON/REC switch in "REC" position.
(c) Channel selector switch in Channel (5) where Rec. Osc. is used. (Duplex)
(d) Connect frequency counter to Pin "M" of PC-2 and record frequency (ies).
(e) Frequency reading must be within ±50 Hz from assigned frequency plus 1650 kHz.

3. Carrier Oscillator (1650 kHz)

(a) Refer to Figure 1 for equipment hook-up.
(b) ON/OFF/REC switch in "ON" position.
(c) Unit in "receive" mode.
(d) Mode switch in USB, position.
(e) Clarifier in CCW position.
(f) Connect frequency counter to Pin "6" of octal connector, X-3, and record frequency. (Carrier Osc. Plug-in)
(g) Turn clarifier to the extreme CW position and record frequency.
(h) Frequency difference between steps (f) and (g) must not be less than 200 Hz.
(i) Key Microphone
(j) Frequency must not be more than ±2 Hz from 1650 kHz.
(k) Set frequency on 1650,000 kHz. (Inside top of Osc. can)

D. RECEIVER

1. Sensitivity Measurements

(a) SSB

(1) OFF/ON/REC switch to "REC" position.
(2) Channel selector switch in first active channel.
(3) Squelch control full CCW.
(4) LOC/REMOTE in local position.
(5) Connect test equipment as shown in Figure 2.

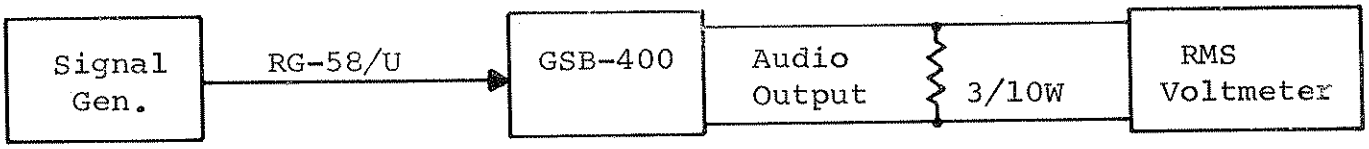


Figure 2

(6) Set RMS voltmeter to 1 volt scale.

(7) Increase volume control until noise is observed on voltmeter.
(8) Turn mode switch to USB.
(9) Set output of signal generator to 1 uv (rms) and tune frequency dial for maximum indication on voltmeter, adjusting volume control to maintain .55V reading.
(10) Remove cable from sig. gen. (antenna input); output on voltmeter must be no less than 10db down from reading in step (9).
(11) Repeat for all active channels. Perform test on one LSB channel if installed.

(b) AM

(1) Follow steps 1 through 7 of Paragraph D-1-a.
(2) Turn mode switch to AM position.
(3) Set output of signal generator to 2uv (rms), 30% modulation, 1000 Hz, and tune frequency dial for maximum indication on voltmeter, adjusting volume control to maintain .55V reading.
(4) Turn modulation on signal generator to "OFF" position; output on voltmeter must be no less than 6 db down from reading in step 3.
(5) Repeat for all channels.

2. Gain Measurements

(a) SSB

(1) Follow steps 1 through 5 of Paragraph D-1-a.
(2) Set RMS voltmeter to 10V scale.
(3) Turn volume control full CW.
(4) Turn mode switch to USB.
(5) Set output of signal generator to 1uv (rms) and tune for maximum deflection on voltmeter; adjust output of generator for 4.0 volt indication on voltmeter. Repeak voltmeter reading with frequency dial.
(6) Output of signal generator must be no more than 10uv rms.
(7) Repeat for all active channels and perform on one LSB channel if installed.

(b) AM

(1) Follow steps 1 through 5 of Paragraph D-1-a and steps 2 and 3 of Paragraph D-2-a.

(2) Turn mode switch to AM position.
(3) Set output of signal generator to 1uv rms; 30% modulation, 1000 Hz and tune for maximum deflection on voltmeter, adjust output of generator for 4.0 volt indication on voltmeter. Repeak meter reading with frequency dial.
(4) Output of signal generator must be no more than 10uv rms.
(5) Repeat for all active channels.

3. Selectivity Measurement

(a) SSB

(1) Follow steps 1 through 4 of Paragraph D-1-a.
(2) Connect test equipment, as shown in Figure 3.

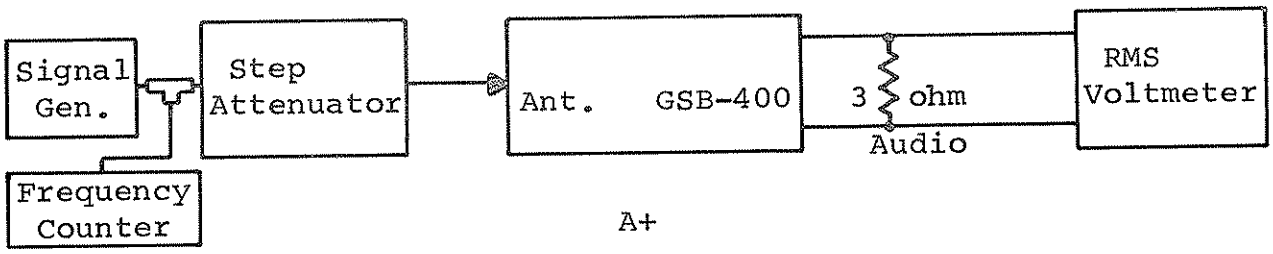


Figure 3

(3) Set RMS voltmeter to 3 volt scale.
(4) Insert 100 db attenuation with step attenuator.
(5) Turn mode switch to USB.
(6) Set signal generator to 100 mv rms and tune for maximum deflection on RMS voltmeter, adjust volume control for convenient reading and record.
(7) Tune signal generator higher in frequency until meter reading is 6 db down from that in step 6. Record the frequency. Tune signal generator lower in frequency until meter reading is down 6 db in step 6. Record the frequency.
(8) The frequency difference between the readings in step 7 must be no less than 2.0 kHz.
(9) Retune signal generator for maximum indication on RMS meter and record reading.
(10) Increase signal input 60db by switching attenuator.
(11) Tune signal generator higher in frequency until voltmeter reading is the same as recorded in step 9. Record the frequency. Tune signal generator lower in frequency until voltmeter reading is the same as recorded in step 9. Record the frequency.

(12) The frequency difference between the readings in step 11 must be no more than 7.0 kHz.

(b) AM

(1) Follow steps 1 through 4 of Paragraph D-1-a and steps 2 through 4 of Paragraph D-3-a.
(2) Turn mode switch to AM position.
(3) Set signal generator to 100 Mv rms, 30% modulation 1000 Hz and tune for maximum reading on RMS voltmeter. Adjust volume control for desired reading and record.
(4) Tune signal generator higher in frequency until meter reading is 6 db down from that in step 3. Turn modulation "OFF" and record frequency. Turn modulation "ON" and tune signal generator lower in frequency until meter reading is 6 db down from that in step 3. Turn modulation "OFF" and record frequency.
(5) The frequency difference between the readings in step 4 must be no less than 5.5 kHz.
(6) Turn modulation "ON" and tune signal generator for maximum indication on voltmeter and record reading.
(7) Repeat steps 10 and 11 of Paragraph D-3-a, but turn modulation off each time frequency is measured.
(8) The frequency difference between the readings in step 7 must be no more than 20 kHz.

4. AGC Range Measurement

(a) SSB

(1) Follow steps 1 through 5 of Paragraph D-1-a.
(2) Set RMS voltmeter to 10 volt scale.
(3) Turn mode switch to USB.
(4) Set signal generator to 1uv and tune for maximum reading on voltmeter.
(5) Increase signal generator output to 100,000uv and set volume control for 4.0 volts on the RMS voltmeter. Reduce generator output to 10uv.
(6) Output measured on voltmeter must be no more than 10db down from 4.0 volts.

5. Audio Response Measurement

(a) SSB

(1) Follow steps 1 through 4 of Paragraph D-1-a.

(2) Connect test equipment as shown in Figure 4.

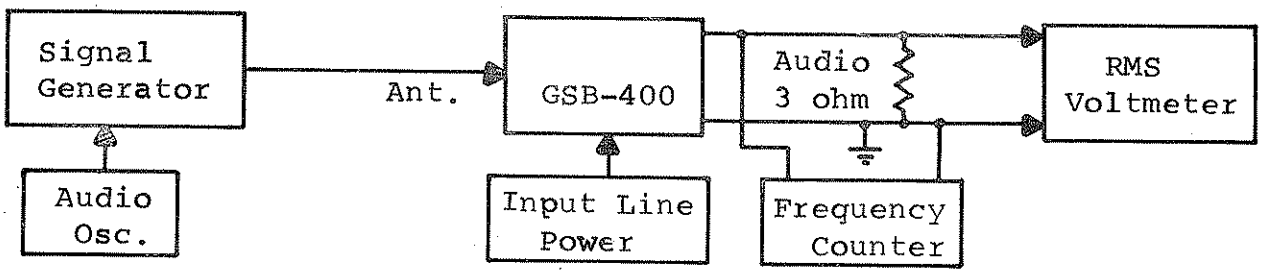


Figure 4

(3) Set RMS voltmeter to 10 volt scale.
(4) Turn mode switch to USB.
(5) Set signal generator to luv rms and tune until frequency counter indicates 1000 Hz. Increase generator output to 50uv rms and adjust volume control until voltmeter indicates 4.0 volts.
(6) Tune signal generator until frequency counter displays 450 Hz. Record voltmeter reading. Tune signal generator until frequency counter displays 2450 Hz. Record voltmeter reading.
(7) Meter readings obtained in step 6 must be no more than 6db down from 4.0 volts.

(b) AM

(1) Follow steps 1 through 4 of Paragraph D-1-a and steps 2 and 3 of Paragraph D-5-a.
(2) Turn mode switch to AM position.
(3) Connect audio oscillator to external modulation on signal generator and set for 30% modulation, 1000 Hz.
(4) Set signal generator on luv and tune for maximum indication on RMS meter. Increase generator output to 50uv rms and set volume control until voltmeter indicates 4.0 volts.
(5) Set audio, oscillator to 350 Hz and record voltmeter reading. Set audio oscillator to 3000 Hz and record voltmeter reading.
(6) Meter readings obtained in step 5 must be no more than 8db down from 4.0 volts.

6. Audio Distortion Measurements

(a) SSB

(1) Follow steps 1 through 4 Paragraph D-1-a.
(2) Connect test equipment, as shown in Figure 5.

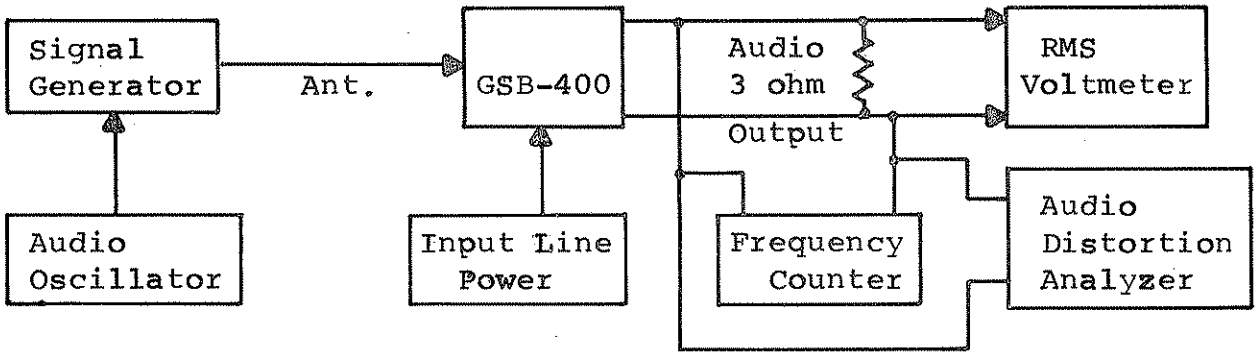


Figure 5

(3) Set RMS voltmeter to 10 scale.
(4) Turn mode switch to USB.
(5) Set signal generator to 1uv and tune until frequency counter displays 1000 Hz. Increase generator output to 100,000uv and set volume control until voltmeter indicates 4.0 volts. Tune signal generator until frequency counter displays 450 Hz. (Do not reset volume control)
(6) Set distortion analyzer for 100% reference indication.
(7) Turn analyzer function switch to distortion and tune analyzer for minimum deflection on analyzer meter. Record reading.
(8) Reading must be no more than 10%.

(b) AM

(1) Follow steps 1 through 4 of Paragraph D-1-a and steps 2 and 3 of Paragraph D-6-a.
(2) Turn mode switch to AM position.
(3) Connect audio oscillator to external modulation on signal generator and set for 85% modulation. 1000 Hz.

(4) Set signal generator to 1uv and tune for maximum indication on RMS meter. Increase generator output to 100,000uv and set volume control until RMS voltmeter indicates 4.0 volts. Change audio oscillator to 350 Hz. (Do not reset volume control)
(5) Set distortion analyzer for 100% reference indication.
(6) Turn analyzer function switch to distortion and tune analyzer for minimum deflection on analyzer meter. Record reading.
(7) Reading obtained must be no more than 20%.

7. Intermediate Frequency Rejection Measurement (1650 kHz)

(a) SSB

(1) Follow steps 1 through 9 of Paragraph D-1-a.
(2) Increase signal generator output 60db and tune frequency to 1650 kHz.
(3) Peak RMS voltmeter with frequency dial on generator.
(4) Meter indication must be no more than reference indication, (0.5V).

8. Image Frequency Rejection Measurement (fc + 3.3 MHz)

(a) SSB

(1) Follow steps 1 through 9 of Paragraph D-1-a.
(2) Increase signal generator output 60db and tune frequency 3300 kHz above highest channel frequency.
(3) Peak RMS voltmeter with frequency dial on generator.
(4) Meter indication must be no more than reference indication, (0.5V).

9. Squelch Sensitivity and Range Measurement

(a) SSB

(1) Follow steps 1 through 9 of Paragraph D-1-a.
(2) Remove cable from antenna coupler. Receiver must not squelch.
(3) Reconnect cable to RF input.
(4) Turn squelch control full CW
(5) Increase signal generator output until voltmeter deflects.
(6) Signal generator output must be within 15 $\pm$5uv rms.

E. TRANSMITTER

1. Power Output Measurement

(a) SSB

(1) Connect test equipment, as shown in Figure 6.
(2) ON/OFF/REC switch in "ON" position.
(3) Channel selector in desired frequency position.
(4) Allow 15 minutes for equipment warm-up.

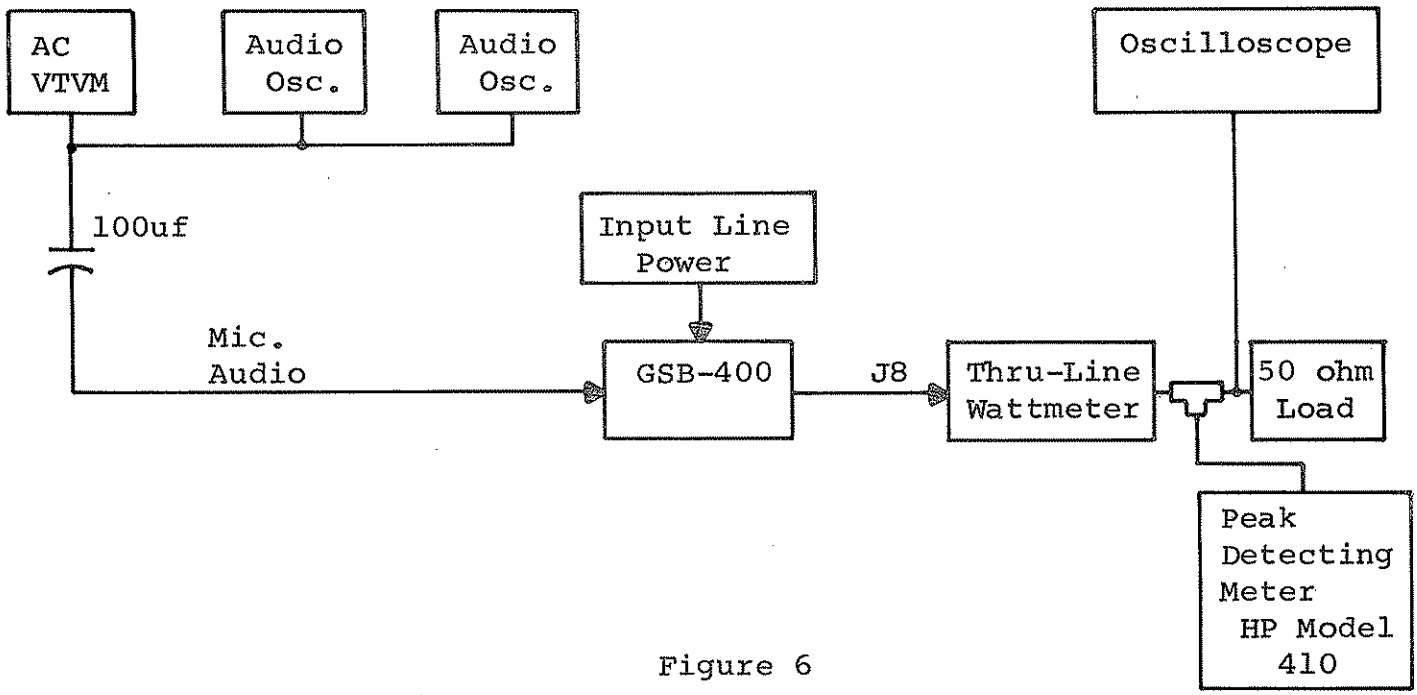


Figure 6

(5) Turn mode switch to USB.
(6) Set audio oscillators to 1800 Hz and 800 Hz respectively.
(7) Adjust combined audio oscillator output for 0.15 volt rms on AC VTVM.
(8) Key transmitter
(9) Record output power (average) indicated for all active channels. Record on one channel LSB if installed. NOTE: HP 410 meter may be used as it is a more accurate indication of peak power than the wattmeter. (79V=125W, 81V=130W, 77V=120W)
(10) Output should be no less than (125W PEP) on any channel. Average power reading wattmeter will indicate 50 watts for equal 2 tone audio input. With one tone removed wattmeter will read 125W average.

(b) AM

(1) Repeat steps 1 through 4 of Paragraph E-1-a.
(2) Turn mode switch to AM.
(3) Remove audio oscillator input from GSB-400.
(4) Key transmitter.
(5) Record output power (average) indicated on wattmeter on all channels or RF voltmeter.
(6) Output should be no less than 30W average.

2. Carrier Attenuation

(a) SSB

(1) Repeat steps 1 through 8 of Paragraph E-1-a.
(2) Record output voltage measured at 50 ohm load.
(3) Remove audio input.
(4) The output measured at 50 ohm load must be less than 40db below the output measured in step 2.

(b) Telephone

(1) Repeat steps 1 through 8 of Paragraph E-1-a.
(2) Turn channel switch to a telephone channel.
(3) Record output volts measured at 50 ohm load.
(4) Remove audio input from Exciter.
(5) The resulting output measured at the 50 ohm load must be no less than 14db and no more than 18db below the output in step 3.

SECTION VI
ADJUSTMENT AND ALIGNMENT PROCEDURE

A. Standard Test Condition

AC Model:	115 VAC	Receiver Current (Ovens On)	0.5 amp
		Transmit 125 WPEP	3.8 amp
	230 VAC	Receiver Current (Ovens On)	0.2 amp
		Transmit 125 WPEP	2.0 amp
DC Model:	12.6 VDC	Receiver Current (Ovens On)	2.3 amp
		Transmit 125 WPEP	25.0 amp
	24.0 VDC	Receiver Current (Ovens On)	1.8 amp
		Transmit 125WPEP	13.0 amp
	36.0 VDC	Receiver Current (Ovens On)	1.0 amp
		Transmit 125 WPEP	9.0 amp

B. Oscillators Alignment

1. Receive Oscillator, Figure 1

   a. Power switch in REC
   b. Channel switch in channel that receiver oscillator is used (Duplex)
   c. Connect frequency counter to pin M of PC-2
   d. Adjust frequency to exact crystal frequency using trimmer on oscillator board.
   e. Repeat for all duplex channels.

2. Carrier Osc. Figure 1

   a. Connect counter to pin 6 of oscillator octal plug, X-3.
   b. Key transmitter and note frequency.
   c. If necessary set frequency of oscillator to 1650 KC $\pm$1Hz by adjusting trimmer in top of can.
   d. Check oscillator without keying transmitter.
   e. Note frequency at either extreme of clarifier range control. Total frequency swing should be 200 or more Hz.
   f. Note that clarifier control does not effect carrier oscillator frequency during transmit mode.

3. Transmitter Oscillator - Figure 1

   a. If desired or if trouble encountered during oscillator tune-up a jumper may be placed on any card connector red

wire to orange wire. This ties the receive A+ and transmit A+ lines together and allows the transmit oscillator to be checked without keying the transmitter.

b. Power switch in REC
c. Channel switch in first active channel.
d. Connect counter to pin N of PC-2. Note: The oven must have been on for at least 15 minutes before recording frequencies.
e. Record frequency - Set to crystal frequency, ±5Hz by adjusting trimmer on PC-9.
f. Check all active channels.

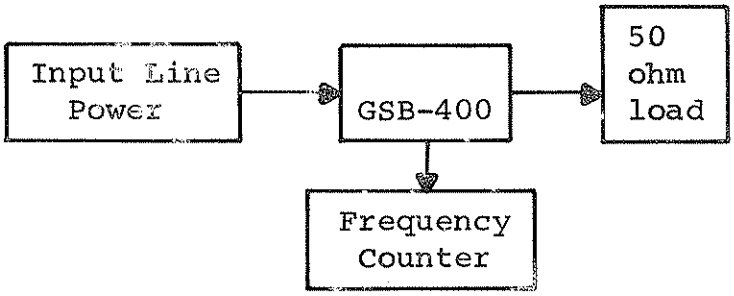
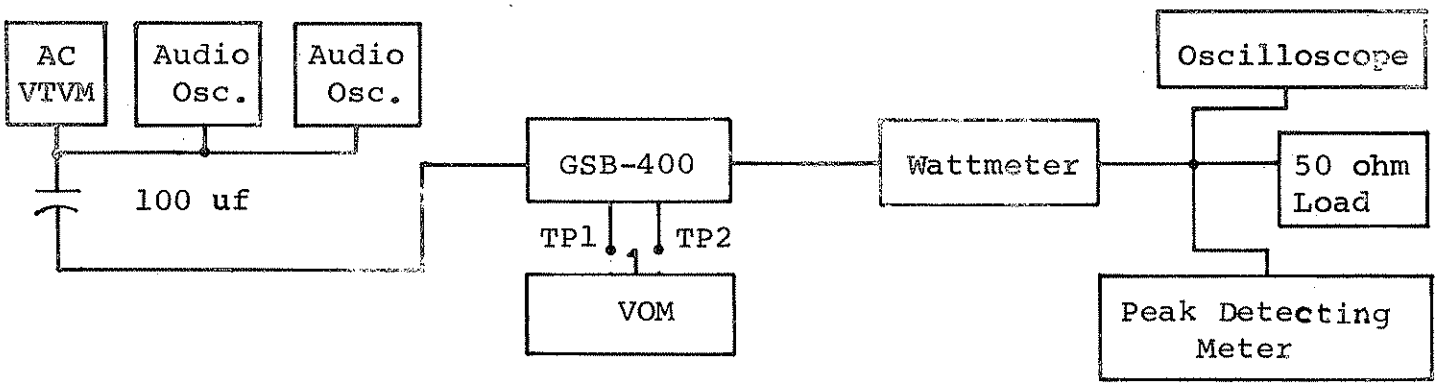


Figure 1

C. Transmitter Alignment

1. Power Amp Bias Current Adjustment

a. Connect equipment as shown in Figure 1a



b. Turn VOM to 2.5V scale, connect to one of cathode bias test points located on top of chassis next to PA tubes.
c. Turn ON/OFF/REC switch to "ON".
d. Turn mode select switch to USB.
e. Turn local-remote switch to "local".
f. Disconnect audio osc. input.
g. Place Hi-Low (S-4) Pwr switch to "Hi" position.
h. Key transmitter and adjust bias pot, R3 for 0.3V DC indication on meter. Check other cathode for 0.3V DC. Tubes should balance to within 0.05 VDC.

2. RF-Tuning: Exciter, Driver and PWR AMP and ALC Adjustment

a. Connect equipment as shown in Fig. 1a.
b. Turn mode switch to "AM".
c. Local remote switch to "Local".
d. Disconnect audio osc. input.
e. Place HI-LOW pwr switch to "HI" position.
f. Remove exciter dust cover and PC-1 from unit, then replace exciter dust cover.
g. Channel unit to lowest frequency used.
h. Turn ALC potentiometers AM(R-1413), SB(R-1411) and AM modulation (R1412) full CCW. (Located on ALC board in bottom of chassis)
i. Key transmitter and tune exciter (PC-7 L-701 through L-720 corresponding to selected channel) and Driver (PC-12, C-1221 through C-1230 corresponding to selected channel) for maximum output on RF meter.
j. Unkey transmitter
k. Turn mode switch to USB and connect audio oscillators 150 mv rms, 800 and 1800 Hz to MIC input.
l. Key transmitter and select fine tuning tap on output coil, L-4, for minimum plate current indicated on VOM and maximum undistorted output indicated on oscilloscope.
m. Turn SB ALC Pot, R-1411, CW until 76-80 VRMS is indicated on RF voltmeter. If at this time any clipping is observed on waveform or plate current is in excess of 120 ma, (1.2VDC) relocate fine tuning tap on output coil until distortion disappears.
n. Unkey transmitter, turn mode switch to "AM", remove audio oscillators.

o. Key transmitter and adjust R(1413) on ALC board for 39V indicated on RF voltmeter or 30W average on wattmeter.

p. Unkey transmitter and channel to successive channels and tune Exc., Driver, and PA as outlined above. It is not necessary to readjust either R-1413 or R-1411 on the ALC board after the desired output on the lowest frequency channel.
q. If any channel at this time is not capable of the minimum output required on AM, the Exciter gain pot, R601 on PC-6, may be increased until ALC action is observed.
r. If the output on the high frequency channels is not the same as the low frequency channels, adjust the compensating capacitors on the ALC detector to flatten the output. One capacitor controls AM, the other, SB.

3. % AM Modulation Adjustment (Figure 1a)

a. Turn mode switch to "AM"
b. Select Highest Frequency channel
c. Disable one audio oscillator, set other audio oscillator to 1000 Hz, 150 mv.
d. Key transmitter and adjust R535 on PC-5 for 100% modulation as indicated on oscilloscope. A further increase (6db) in audio input should not change % modulation.
e. Adjust R-1412 modulation pot on ALC board, clockwise until power just stops to increase. Power output should be double the carrier value.

4. Carrier, Oscillator and Noise Rejection (Figure 1a)

a. Turn mode switch to USB
b. Disable both audio oscillators
c. Select highest frequency channel
d. Key transmitter and adjust R609 (OSC Balance) on PC-6 for minimum signal on oscilloscope. If signal is not more than 40db below rated power output on SB on any channel, gain pot R601 on PC-6 may need to readjusted.

5. Neutralization Adjustment (C45) Figure 1a

a. Turn mode switch to USB
b. Disconnect Exciter RF input on Driver Board PC-12, temporarily.
c. Connect Oscilloscope to plate of Driver pin 7 on PC-12
d. Select highest frequency channel
e. Key transmitter

f. Inject channel frequency from signal generator into RF output. Caution: Use fused generator and connect to tx, after keying.
g. Tune signal generator for maximum output on oscilloscope.
h. Adjust neutralizing cap for minimum signal.
i. Unkey transmitter, disconnect signal generator and channel to unused or blank channels if any and key transmitter. If any power output is observed readjust neutralizing capacitor until no output is observed.
j. Reconnect RF input to Driver.

6. Telephone Adjustment (Figure 1a)

a. Select telephone channel if installed.
b. Turn mode switch to USB.
c. Connect audio oscillators to MIC input.
d. Key transmitter and record output.
e. Remove audio oscillator and record output.
f. Difference in output must be no less than 14db and no more than 18db.
g. Select resistor, R-517 on PC-5, for proper carrier attenuation. (Increase value if less than 14db and decrease if greater than 18db) Nominal values installed is 18k.

7. Second Harmonic Trap Adjustment (Figure 1a)

a. Turn mode switch to AM
b. Remove audio oscillator input
c. Couple field intensity meter or receiver from 50 ohm output, and tune to twice the channel frequency.
d. Key transmitter and adjust L-1301 through L-1310, harmonic traps, for minimum signal.

NOTE: If a channel frequency falls close to the 2nd harmonic frequency of another channel the trap should not be adjusted to exact resonance.

D. Receiver Alignment

Test Set Up

a. Connect signal generator to receiver rf input, disconnect speaker and connect 3 ohm 10W resistor to audio output. Connect rms voltmeter to 3 ohm load.

b. Set power input switch to REC.
c. Set channel selector to lowest frequency channel.
d. Squelch control full CCW.
e. LOC/REMOTE switch in LOCAL.
f. Set rms voltmeter to 1V scale.
g. Set volume control until noise is observed on rms meter.
h. Set mode switch to USB.

1. Mixer and IF

a. Remove PC-3 (IF amp).
b. Connect 2200 ohm resistor from pin T of PC-2 to ±10V.
c. Tune signal generator to 1650 kHz at approx. 1000 uv.
d. Connect scope to pin H of PC-2.
e. Adjust L-211, L-212, L-213 (PC-2) for maximum output at pin H. Reduce signal generator to prevent saturation.
f. Adjust L-207, L-210 for minimum output at pin H. Increase signal generator to maintain visual indication on scope.
g. Repeat step 5 above.
h. Remove 2200 ohm resistor and reinstall PC-3.

2. Preselector, PC-1

a. Same set up as D a-h
b. Tune signal generator to selected channel frequency. Increase signal [illegible]ading is obtained on rms voltmeter.
c. Tune all three coils on each channel for maximum output on meter.
d. Signal generator should be at 1uv after tuning complete. Audio output should be NLT 0.5V rms.
e. Repeat for all active channels.

3. AM and SB Gain Equilization

Set up same as D a-h

a. Connect DC VTVM to pin T of PC-2
b. Set signal generator to 10uv and tune for minimum DC on VTVM. Record voltage.
c. Switch to AM and tune signal generator for minimum DC. Record voltage.
d. If d-c voltages are unequal, adjust C-230 (AM osc injection) until voltages are as close as possible.

4. AGC-2 Threshold and Distortion Adjustment

Set up same as D a-h

a. Set rms voltmeter to 10V scale.
b. Connect scope to audio output.
c. Set signal generator to 100,000 uv.
d. Adjust volume control for 4.0Vrms on meter.
e. Adjust R-330 so that a 10db decrease in r-f input results in no change in audio output and minimum sine wave distortion is observed.

5. Detector Bias Adjustment (Figure 2 Section V)

a. Set mode switch to AM
b. Rms meter connected to audio output and set to 10V scale
c. Connect audio oscillator to signal generator. 1000 Hz. 30% mod.
d. Tune generator to channel frequency.
e. Increase signal to 250,000 uv and set volume to 4.0 volts.
f. Set audio to 350 Hz, 85% mod.
g. Adjust R-336 for minimum sine wave distortion without causing output to decrease more than 2db.

6. Squelch Threshold (Figure 2, Section V)

Set up same as D, a-h except rms meter set to 10v scale, squelch set full CW.

a. Set signal generator to 15uv.
b. Adjust R-415 so that squelch breaks.

SECTION VII
TROUBLE SHOOTING AND MAINTENANCE

A. GENERAL INFORMATION

1. When the GSB-400 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 signal and DC voltage tables provided in this section may be utilized to repair defective boards in the field.

B. EQUIPMENT REQUIRED

1.	RMS Voltmeter	H-P Model 400L, or equivalent
2.	RF Signal Generator	H-P Model 330C, or equivalent
3.	Audio Oscillator	H-P Model 200CD, or equivalent (2)
4.	Wattmeter (100W Element)	Bird Model 43, or equivalent
5.	Dummy Load, 50 ohms	Bird Model 81B, or equivalent
6.	Oscilloscope	Tektronix Model 543B, or equivalent
7.	Multimeter 20K ohms/volt	Simpson Model 260, or equivalent

C. OSCILLATORS

1. Channel Oscillator (10 Xtal Oven Unit or Rec/Osc Unit)

(a) Trouble Analysis Chart

Symptom	*Note 1 Probable Cause	Remedy
No output on any channel	Defective coil L-2, diodes CR1516 or PC-8.	Make voltage checks on L-2, CR1516. Refer to Table VII-1 and schematic diagram. Replace defective component or entire circuit board.

Symptom	Probable Cause	Remedy
No output on some channel(s).	Defective crystal(s), defective wafer SW1, SW2, defective component(s) on PC-9, PC-11.	Replace crystals, check wafer SW1, SW2 contacts for continuity, test PC-9 and PC-11 as shown in schematic diagram. Replace defective component.
Frequency does not meet requirements in Section V-C, Paragraphs 1 and 2.	Capacitor(s) C-901 thru C-910 or C-1101 thru C-1110 not adjusted properly, defective crystal or capacitor on PC-9 or PC-11.	See Section VI-C for alignment procedures test, as shown in schematic diagram. Replace defective component.

Test Point		DC Voltage ±10%	Signal Voltage (RMS)
Integrated Circuit	Pin No.		
IC-801 or IC-1101	1,11	8.0V	-
	2	4.2V	-
	3,14	3.5V	-
	4	4.2V	-
	5, 9	5.8V	-
	6	3.1V	-
	7	2.4V	0.8V
	8	9.5V	-
	10	5.4V	-
	12	2.7V	-
	13	2.0V	-

Table VII-1 - Channel Oscillator Measurements

2. Carrier Oscillator (1650 kHz)

(a) Trouble Analysis Chart

Symptom	Probable Cause	Remedy
No output in receive or transmit.	Defective crystal or circuit board.	Replace crystal or test PC-10, as shown in Table VII-2 and schematic diagram.

2. Carrier Oscillator (1650 kHz) T Trouble Analysis Chart - continued.

Symptom	Probable Cause	Remedy
No output on receive; transmit normal.	Defective diode CR-5, CR-6, L-1, C-37, R8 or R1.	Check components and replace if defective.
	Defective switch Q504 and Q505 on PC-5.	Test as shown in Table VII-7. Replace defective component or entire circuit board.
No output on transmit.	No +10V transmit, diode CR-4 or R-6 defective.	Check voltage on K-3 as shown in schematic diagram. Check diode and resistor. Replace if defective.
Frequency does not meet requirements in Section V-C, Paragraph 3, on transmit.	C-1003 not adjusted properly.	Refer to Section VI-C, alignment procedures.
Frequency does not meet requirements in Section V-C, Paragraph 3, on receive.	R1 not adjusted properly.	Refer to Section VI-C, alignment procedures.

Test Point		DC Voltages ±10%		Signal		AC Voltage ±5%	
Octal Socket	Pin No.	Rec. (USB, LSB)	Transmit	Rec(USB, LSB)	Transmit	Rec.	Transmit
XV-1	2, 3, 5 4 6 7 8	Gnd 3V 36, 24 or 12 Gnd	Gnd Gnd 36, 24 or 12 8.2	0.16V(RMS)	0.85V(RMS)	28	28

Table VII-2 - Carrier Oscillator Measurements

D. 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 CCW
	Squelch threshold R-415 not adjusted properly.	Refer to Section VI-D for alignment and adjustment procedures
	No +10 volts.	Check voltage on CR-1 and CR-412. Replace defective component.
	Channel oscillator defective.	Test as shown in Section VII-C, Paragraph 1 and Schematic Diagram. Replace defective circuit board or component.
	Defective relay K-3	Check relay contacts for continuity, replace if defective.
	Defective volume control	Check resistance, replace if defective.
	Defective circuit boards, PC-2,3,4,	Substitute circuit boards or test as shown in Tables VII-3, 4,5, and Schematic Diagrams. Replace defective component or entire circuit board.

D. Receiver - Trouble Analysis Chart - continued

Sympton	Probable Cause	Remedy
No audio output on some channels, AM or SSB.	Defective crystal(s) in channel oscillator.	Replace crystal(s)
No audio output on some channels, AM or SSB.	Preselector (PC-1) coils misaligned or defective component.	Refer to Section VI-D for alignment procedures or test as shown in Schematic Diagram. Replace defective component.
	Oscillator trimmer circuit (PC-11), (PC-9) defective.	Check components on inoperative channel(s) on PC-9, PC-11. Replace defective component. Refer to Section VII-C, Paragraph 1.
No audio output on AM, SSB normal.	Defective mode switch S-2.	Check continuity, replace if defective.
	Defective PC-2, PC-3 or PC-4.	Substitute circuit boards or test as shown in Tables VII-3,4,5 and Schematic Diagrams. Replace defective component or entire circuit board.
No audio output on SSB, AM normal	Defective carrier oscillator (1650 kHz)	Test as shown in Table VII-2 and Schematic Diagram. Replace defective component or entire circuit board.
	Defective SSB Rec switch Q-504 and Q-505 on PC-5.	Test as shown in Table VII-7 and Schematic Diagram. Replace defective component or entire circuit board.

D. Receiver - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
	Defective switching circuits on PC-4.	Test as shown in Table VII-5 and Schematic Diagram. Replace defective component or entire board.
Sensitivity low (poor noise figure) Unable to meet requirements in Section V-D, Paragraph 1.	Preselector (PC-1) coils misaligned or defective components.	Refer to Section VI-D for alignment procedures or test as shown in Schematic Diagram and replace defective component.
	PC-2 defective (RF amp, mixer or T-201).	Test as shown in Table VII-3 and Schematic Diagram. Replace defective component or entire circuit board.
Low gain, unable to meet rated output. Section V-D, Paragraph 2.	Defective PC-2,3,or 4.	Test as shown in Tables VII-3,4,5 and Schematic Diagrams. Replace defective component or entire circuit board.
Unable to meet selectivity requirements in Section V-D, Paragraph 3.	AM-FL-201 defective. SSB-FL-1 or FL-2 defective.	Replace filter
AGC defective, audio output increases excessively with an increase in RF signal or unable to meet requirements in Section V-D, Paragraph 4.	AGC potentiometer not adjusted properly.	Refer to Section VI-D, alignment procedures.
	Faulty AGC circuits, PC-3 or AGC diodes CR-201 thru CR-204 (PC-2) defective.	Test as shown in Table VII-4 and Schematic Diagram. Check diodes. Replace defective

D. Receiver - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
		component or entire circuit board (s).
Unable to meet audio frequency response requirements in Section V-D, Paragraph 5.	Defective coupling capacitor C404.	Replace capacitor.
	Defective PC-16	Replace defective components or entire circuit board.
Audio output distorted, unreadable on SSB; AM normal.	Clarifier not adjusted properly.	Adjust R-1 (front panel).
Audio distorted on AM and SSB. Unable to meet requirements in Section V-D, Paragraph 6.	R-330 AGC potentiometer not adjusted properly.	Refer to Section VI-D, alignment procedures.
	Q-308 bias not adjusted properly (R-336)	Refer to Section VI-D, alignment procedures.
Unable to meet IF rejection requirements in Section V-D, Paragraph 7.	L-207 or L-210 not adjusted properly.	Refer to Section VI-D, alignment procedures.
Receiver will not quiet when squelch is turned CW. Unable to meet requirements in Section V-D, Paragraph 9.	Defective squelch potentiometer (R-2)	Test and replace if defective.
	R-415 misadjusted.	Refer to Section VI-D, alignment procedures.
	Faulty squelch circuit (PC-3 and PC-4)	Test as shown in Tables VII-4,5 and Schematic Diagram. Replace defective component(s) or entire circuit board.

E. 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.
	Defective channel or carrier oscillator.	Test as shown in VII-C, Paragraphs 1 and 2 and Schematic Diagram. Replace defective component.
	Defective PC Boards 4,5, or 6.	Test as shown in Tables VII-6, 8,9 and Schematic Diagrams. Replace defective part(s) or entire PC Board(s).
	Defective diode CR1516. Defective relay K3.	Test for continuity, replace if defective.
No output on some channels, SSB, or AM.	Defective crystals.	Test and replace if defective.
	Defective channel oscillator (PC-9) trimmer board.	Test as shown in Table VII-1 and Schematic Diagram. Replace defective component.
	Coils L-701 thru L-710 and L-711 thru L-720 not adjusted properly. Defective components on PC-7.	Refer to alignment procedure, Section VI-E. Test and replace defective components.

E. Exciter - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
No output on SSB. No modulation on AM. Carrier normal.	Defective PC-5 audio circuit and balanced modulator.	Test as shown in Table VII-8 and Schematic Diagrams. Replace defective component or entire circuit board.
No carrier on AM. SSB normal.	Defective mode switch.	Check continuity. Replace if defective.
	Open diodes CR-505 or CR-507. Defective switch Q-506.	Test as shown in Table VII-8 and Schematic Diagram. Replace defective component or entire circuit board.
Output on SSB without audio input.	Defective balanced modulator (M-501), defective AM, TEL carrier insertion circuit on PC-5.	Test as shown in Table VII-8 and Schematic Diagram. Replace defective component or entire circuit board.
	Defective mixer, PC-6	Test as shown in Table VII-9 and Schematic Diagram.

F. 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-1201, V-1 or V-2.	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-2 or Q-3 switching transistors.	Test and replace if defective.

F. Power Amplifier - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
	Defective rectifier diodes CR-2001 thru CR-2004.	Test and replace if defective.
	Defective bias rectifier CR-2005	Test and replace if defective.
	Defective relay K-1	Test, burnish contacts, 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-1201, V1 or V-2.	Test and replace if defective.
No output on any channel, tubes lit, switching noise present. (GSB-400 used with ARC-10)	Ledex Motor switching to wrong channel.	Align to proper channel position and tighten coupling between motor and switch. Check A+ at Ledex.
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-9	Check continuity of SW-4-SW-9 wafers, replace if defective.
Output low.	Hi-Low power switch in Low position.	Switch to Hi.
	ALC potentiometers not set properly.	Adjust potentiometers on PC-14, as shown in Section VI-C, alignment procedures.

F. Power Amplifier - Trouble Analysis Chart - continued

Symptom	Probable Cause	Remedy
	Bias adjustment V-1 and V-2 not correct.	Adjust R-3, as shown in Section VI-C, alignment procedures.
	Tubes V-1201, V-1 or V-2 defective.	Check tubes, replace if defective.
Output high.	ALC not adjusted properly or defective ALC circuits, PC-14 or exciter (PC-6)	Adjust potentiometer on PC-14 as shown in Section VI-C, alignment procedures, test ALC detector and amplifier as shown in Schematic Diagram. Replace if defective..

Test Point		DC Voltage ±10%		Signal Volt. & Waveform	
Transistor or FET	Pin No.	SSB	AM	SSB	AM
Q-201 [1]	Emitter	1.75V	1.75V	-	-
	Base	2.55V	2.55V	-	-
	Collector	6.9 V	6.9 V	0.38V	0.38V
Q-202 [2]	Drain	10.0V	10.0V	0.28V	0.28V
	Source	2.25V	2.25V	-	-
	Gate	-	-	2.0V	2.0V
Q-203 [2]	Drain	8.9V	8.9V	0.5V	-
	Source	0.5V	0.5V	-	0.5V
	Gate	-	-	0.12V	0.12V
Q-204 [2]	Emitter	-	1.6V	-	-
	Base	-	2.3V	-	0.22V
	Collector	-	8.7V	-	2.4V
Q-205 [2]	Drain	-	2.9V	-	-
	Source	-	2.6V	-	0.6V
	Gate	-	-	-	-
Q-206 [2]	Emitter	0	0	-	-
	Base	0.7V	0	-	-
	Collector	0	2.9V	-	-

Note 1: DC measurements were taken with no signal input. Signal measurements were taken with 1 MV (rms) input (no modulation) on Pin "U", PC-2; channel oscillator off.

Note 2: DC measurements static. No signal conditions. Signal measurements were taken with 100 uv (rms) no modulation) input on Pin "U", PC-2; channel oscillator on.

Table VII-3 - PC-2 DC and Signal Measurements

Test Point Transistor or FET	Pin No.	DC Voltage ±10% USB	AM	TEL	LSB	Signal Voltage and Waveforms SSB	AM
Q-301	E	3.7 V	3.9 V	3.5 V	4.0 V		
	B	0	0	0	4.7 V		
	C	10.0 V	10.0 V	10.0 V	10.0 V		
Q-302	E	3.7 V	3.9 V	3.5 V	4.0 V		
	B	4.4 V	0	4.2 V	0		
	C	10.0 V	10.0 V	10.0 V	10.0 V		
Q-303	E	3.7 V	3.9 V	3.5 V	4.0 V		
	B	0	4.6 V	0	0		
	C	10.0 V	10.0 V	10.0 V	10.0 V		
Q-304	E	1.45V	1.45V	1.45V	1.45V		
	B	2.25V	2.25V	2.25V	2.25V		
	C	9.3 V	9.3 V	9.3 V	9.3 V	0.23V	0.34V
Q-305	E	0	0	0	0		
	B	0.7 V	0	0.7 V	0.7 V		
	C	0	10.0 V	0	0		
Q-306	E	0	9.5 V	0	0		
	B	0	10.0 V	0	0		
	C	10.0 V	10.0 V	10.0 V	10.0 V		
Q-307	D	8.5 V	8.8 V	8.5 V	8.5 V	1.4 V	1.6 V
	S	0.71V	0.71V	0.71V	0.71V		
	G	-	-	-	-	0.25V	0.25V
			SSB	AM			
Q-308	D		3.9 V	4.2 V		0.46V	0.6 V
	S		1.7 V	1.6 V		0.5 V	-
	G		-	-		0.06V	0.36V
Q-309	E		0.16V	0.16V		-	4.2VDC
	B		0.7 V	0.7 V		-	4.9VDC
	C		10.0 V	10.0 V		-	10.0VDC
Q-310	E		0	0		-	1.2VDC
	B		0	0		-	1.9VDC
	C		9.6 V	9.6 V		-	5.5VDC
*Q-311	E		0	0		-	-
	B		0	0		-	-
	C		0	0		-	-
Q-312	E		0.7 V	0.7 V		-	4.8VDC
	B		0	0		-	0
	C		0	0		-	4.1VDC

Note 1: DC measurements static. No signal conditions.

Note 2: Signal measurements taken with 1 MV (rms) input on Pin "C", PC-3, and Pin "H", PC-2, for SSB and AM respectively, 30% modulation, 1000 Hz on AM.

*Q-311 does not conduct until emitter of previous stage Q-311 reaches 1.4VDC.

Table VII-4 - PC-3 DC and Signal Measurements

Test Point		DC Voltage ±10% (Receive Only)			
Transistor	Pin No.	USB	AM	TEL	LSB
Q-401	E	0	0	0	0
	B	0	0	0	0
	C	0	4.4	0	.6
Q-402	E	0	0	0	0
	B	0	.7	0	0
	C	3.8	0	3.6	0
Q-403	E	0	0	0	0
	B	0	.7	.7	.7
	C	8.2	0	8.2	0
Q-404	E	0	0	0	0
	B	.7	.7	.7	0
	C	0	0	0	8.2
Q-410	E	7.6	0	7.6	0
	B	8.2	0	8.2	0
	C	9.5	9.5	9.5	9.5
Q-411	E	0	0	0	7.6
	B	0	0	0	8.2
	C	9.5	9.5	9.5	9.5
		Front Panel Squelch Control			
		CCW		CW	
Q-405	E	2.2		0	
	B	2.8		.7	
	C	9.5		9.5	
Q-406	E	1.2		.8	
	B	2.2		.3	
	C	1.3		9.5	
Q-407	E	.8		4.2	
	B	1.0		3.8	
	C	9.5		9.5	
Q-408	E	1.3		.8	
	B	.4		1.4	
	C	2.2		.8	

Note 1: DC measurements static: No signal conditions

Table VII-5 - PC-4 DC Voltage measurements

Test Point		DC Voltage ±10% (Transmit Only)			
Transistor	Pin No.	USB	AM	TEL	LSB
Q-401	E	0	0	0	0
	B	.7	.7	.7	.7
	C	0	0	0	0
Q-402	E	0	0	0	0
	B	0	.7	0	0
	C	3.8	0	3.6	0
Q-403	E	0	0	0	0
	B	0	0	0	.7
	C	8.2	8.2	8.2	0
Q-404	E	0	0	0	0
	B	.7	.7	.7	0
	C	0	0	0	8.2
Q-410	E	7.6	7.6	7.6	0
	B	8.2	8.2	8.2	0
	C	9.5	9.5	9.5	9.5
Q-411	E	0	0	0	7.6
	B	0	0	0	8.2
	C	9.5	9.5	9.5	9.5

Note 1: DC measurement static. No signal conditions

Table VII-6 - PC-4 DC Voltage Measurements

Test Point		DC Voltage ±10%			
Transistor	Pin No.	USB	AM	TEL	LSB
Q-504	E	0	0	0	0
	B	0	.7	0	0
	C	9.2	0	9.2	9.2
Q-505	E	8.6	0	8.6	8.6
	B	9.2	0	9.2	9.2
	C	9.5	9.5	9.5	9.5
Q-506	E	0	0	0	0
	B	.7	.7	.7	.7
	C	0	0	0	0

Note 1: DC measurements static. No signal condition in Receive mode only.

Table VII-7 - PC-5 DC Voltage Measurements

Test Point		DC Voltage ±10%			
Transistor or FET	Pin No.	No input signal at Pin "B" PC-5		0.15V (RMS) input signal at Pin "B" PC-5	
Q-501	S	.6		2.2	
	D	1.15		1.15	
	G	1.2		1.2	
Q-502	E	.6		.6	
	B	1.2		1.2	
	C	5.5		5.5	
Q-503	E	.4		.4	
	B	1.0		1.0	
	C	9.2		9.2	
Q-507	E	0		3.3	
	B	0		2.1	
	C	9.5		9.5	
Q-508	E	4.8		4.8	
	B	5.5		5.5	
	C	9.5		9.5	
		USB	AM	TEL	LSB
Q-504	E	0	0	0	0
	B	0	.7	0	0
	C	0	0	0	0
Q-505	E	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
Q-506	E	0	0	0	0
	B	0	0	0	0
	C	2.3	3.4	2.7	2.3

Table VII-8 - PC-5 DC Voltage Measurements

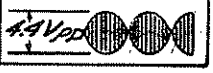
Test Point		DC Volts	Signal Voltage	
		USB, AM, TEL, LSB	USB	LSB
Q-601	E	0.6		
	B	1.2		
	C	9.0		
Q-602	E	0.8		
	B	1.5		
	C	4.8		
Q-603	S	1.6		
	D	6.6		
	G	0		
Q-604	E	9.5		
	B	11.0		
	C	1.4		
Q-605	S	1.7		
	D	7.7		
	G	0		
Q-606	S	1.0		
	D	9.0		
	G	0		
Q-607	E	0.9		
	B	1.5		
	C	9.0		
Q-608	E	0.3		
	B	1.0		
	C	9.2		

Table VII-9 - PC-6 Voltage and Signal Measurements

Test Point			
Tube or Transistor	Pin No.	DC Voltage ±10%	Signal Voltage
V-1201	1	2.0V	-
	2	-	-
	3	-	-
	4	FIL	-
	5	FIL	-
	6	FIL	-
	7	300.0V	-
	8	175.0V	-
	9	2.0V	-
V-1, V-2	1,4,6	.75V	-
	2	FIL	-
	3	+210.0V	-
	5	-50.0V	-
	7	FIL	-

Note 1: DC Measurements static. No signal condition.

Table VII-10 - Power Amplifier DC and Signal Measurements

SECTION VIII

INSTRUCTIONS FOR FREQUENCY OR VOLTAGE CHANGE AND ADDITION OF OPTIONS

A. FREQUENCY CHANGE

1. Receiver/Exciter

The receiver/exciter frequency range is divided into bands. Any frequency within a band may be tuned by retuning the channel coils located on PC-1 for the receiver and PC-7 for the exciter and changing the channel crystal. For changes outside of the installed band, Tables VIII-1 and VIII-2 list the required coil and capacitor combinations.

Crystals must be ordered from Sunair, specifying the part number and required channel frequency. Crystal part numbers are listed in the Parts Section, IX. After installation of the tuned circuit components and crystals, refer to Section VI for the alignment procedure.

> It is absolutely mandatory that only Sunair supplied crystals be used in the transmit oscillator and a frequency counter be used that will allow setting the channel frequency to within ± 2 Hz. Failure to install the correct crystal will result in off frequency operation and degraded performance, in addition to violation of the Commission Rules and Regulations, under which this unit is licensed.

2. Power Amplifier

The frequency dependent components are located in the driver plate circuit, the power amplifier pi-network and the second harmonic traps. Table VIII-3 shows the frequency range and part numbers of the required components. After installing the necessary components, refer to Section VI for the alignment procedure.

RECEIVER RF PRESELECTOR TUNED CIRCUITS PC-1

Frequency Range (MHz)	*L101-L118 **L101-L130	*C101-C106 **C101-C110	*C107-C112 **C111-C120	*C113-C118 **C121-C130	*C119-124 **C131-C140	*C125-C130 **C141-C150	*C131-C136 **C151-C160	*C137-C142 **C161-C170
2.00-2.40	62981-1 Brn	.0033uf 28871	360pf 28727	20pf 28674	330pf 28865	20pf 28674	360pf 28727	.0018uf 28869
2.40-2.88	62981-2 Red	.0027uf 28870	300pf 28864	20pf 28674	270pf 28863	20pf 28674	300pf 28864	.0018uf 28869
2.88-3.46	62981-3 Orn	.0027uf 28870	270pf 28863	18pf 28662	220pf 28861	18pf 28662	270pf 28863	.0018uf 28869
3.46-4.15	62981-4 Yel	.0018uf 28869	220pf 28861	15pf 28650	180pf 28105	15pf 28650	220pf 28861	.0013uf 28868
4.15-5.00	62981-5 Grn	.0018uf 28869	200pf 28715	12pf 28648	150pf 28090	12pf 28648	200pf 28715	.0012uf 28867
5.00-6.00	62981-6 Blu	.0013uf 28868	150pf 28090	10pf 28859	130pf 28703	10pf 28859	150pf 28090	.0012uf 28867
6.00-7.20	62981-7 Vio	.0012uf 28867	130pf 28703	9pf 28636	110pf 28131	9pf 28636	130pf 28703	.0012uf 28867
7.20-8.65	62981-8 Gry	910pf 28866	110pf 28131	7pf 28858	91pf 28860	7pf 28858	110pf 28131	910pf 28866
8.65-10.40	62981-9 Wht	820pf 28399	91pf 28860	7pf 28858	82pf 26652	7pf 28858	91pf 28860	820pf 28399
10.40-12.45	62981-10 Blk	820pf 28399	82pf 26652	5pf 28857	75pf 28466	5pf 28857	82pf 26652	820pf 28399
12.45-15.00	62981-11 Brn Brn	680pf 28428	68pf 28076	5pf 28857	68pf 28076	5pf 28857	68pf 28076	680pf 28428
15.00-18.00	62981-12 Brn Red	430pf 28454	56pf 28129	2.2pf 25000	56pf 28129	2.2pf 25000	56pf 28129	430pf 28454

*ASB-60 Frequency Component
**ASB-125 " "
**GSB-400

Table VIII-1 - Receiver Customizing

FIRST AND SECOND TUNED AMPLIFIER, PC-7						
			Capacitor		Resistor	
Freq. MHz	P/N	Color	P/N	pf	P/N	Ohms
2.0- 2.3	62993-1	Brn	28399	820	17091	330
2.3- 2.6	62993-1	Brn	28624	680	17091	330
2.6- 2.9	62993-2	Red	28624	680	17091	330
2.9- 3.5	62993-2	Red	28612	500	17091	330
3.5- 4.0	62993-3	Orn	28612	500	17091	330
4.0- 4.5	62993-3	Orn	28600	390	17091	330
4.5- 5.2	62993-4	Yel	28600	390	17091	330
5.2- 6.0	62993-4	Yel	27632	300	17091	330
6.0- 6.9	62993-5	Grn	27632	300	17091	330
6.9- 7.9	62993-5	Grn	28595	220	17091	330
7.9- 9.0	62993-6	Blu	28595	220	17091	330
9.0-10.3	62993-6	Blu	28583	180	17091	330
10.3-12.1	62993-7	Vio	28583	180	17091	330
12.1-13.6	62993-7	Vio	27486	130	17091	330
13.6-15.0	62993-8	Gry	27486	130	18253	33
15.0-18.0	62993-8	Gry	27474	100	18253	33

Table VIII-2
Exciter Customizing

Frequency Range (MHz)		DRIVER, V1201	DRIVER, V1202		POWER AMPLIFIER Pi NETWORK					
					Cin			Cout		TRAP
		L1202	(C1231-1240)		(C1301-1310)		L5	(C1311-1320)		(C1321-C1330)
From	To	TAP	P/N	pf	P/N	pf	TAP	P/N	pf	P/N	pf
2.00	2.10	0	28961	510	27785	360	1	24953	800	28875	820
2.10	2.14	"	27591	470		"	"		"		"
2.14	2.20	"	28959	430		"	"		"		"
2.20	2.25	"		"	27761	330	2	25555	680		"
2.25	2.30	"	28600	390		"	"		"		"
2.30	2.40	"	26951	330		"	"		"	28624	680
2.40	2.50	"	27503	270		"	"		"		"
2.50	2.70	"		"	27747	270	3	24915	750		"
2.70	2.90	"	25804	200		"	4	25579	820	27591	470
2.90	3.00	"		"	27723	240	5		"		"
3.00	3.20	"	27486	130		"	"		"		"
3.20	3.40	"		"	27711	220	6	24953	800	27515	360
3.40	3.50	"	28874	68		"	"		"		"
3.50	3.90	"		"	27709	200	7	24915	750	27503	270
3.90	4.10	"		"	27682	170	8	24941	700		"
4.10	4.40	"	Note (1)			"	"		"		"
4.40	4.50	"		"	25892	150	9	24874	620	28583	180
4.50	5.10	1		"		"	"		"	27498	150
5.10	5.60	"		"	25907	120	10	25531	560		"
5.60	5.90	2		"		"	"		"	27474	100
5.90	6.50	"		"	25919	100	11	24202	500		"
6.50	7.10	3		"		"	"		"	25232	75
7.10	7.60	"		"	25921	75	12	25476	360	28874	68
7.60	8.50	4		"		"	"		"		"
8.50	9.10	"		"	28806	62	13	25464	330	26092	47
9.10	10.70	5		"		"	"		"	27606	39
10.70	12.50	6		"	28820	39	14	25440	270	26078	33
12.50	13.60	7		"	28947	27	15	25426	200	26054	22
13.60	15.50	"		"	25969	10	"	25646	100	26030	18
15.50	18.00	8		"	Note (1)		"	25311	30	25995	15

NOTE (1): Use no capacitor, leave circuit open.

DRIVER AND POWER AMPLIFIER CUSTOMIZING CHART

B. VOLTAGE CHANGE

If a voltage change is required, the only change will be in the power supply module because the basic transceiver is completely insensitive to the type of power available, therefore the unit could be changed from a AC to a DC unit by changing the power supply module, fuse and power cord.

If a Power Supply module is to be changed from 115V to 230VAC or 12V to 24V to 32V DC or viceversa some rewiring is to be done as shwon on the schematic diagrams.

C. LSB OPTION INSTALLATION

The filter for the lower sideband option is mounted on the same bracket as the upper sideband operation filter.

Mount filter to bracket, connect 50 ohm coax to input terminal and shield to ground side of filter. Connect other end of coax to J4-B and connect shield to ground bus. Connect 50 ohm coax to output terminal of filter and shield to ground lug. Connect other end of coax to J3-E and shield to ground bus.

SECTION IX

RECOMMENDED SPARE PARTS LIST

The recommended spare parts list contains printed circuit board assemblies which are working, fully fabricated plug-in circuit boards for the receiver/exciter unit. It is recommended that malfunctions be corrected in the receiver/exciter by board replacement and the malfunctioning board be returned to SunAir for repair. See Note below.

However, this handbook contains sufficient trouble shooting and repair information to allow a qualified radio shop to repair printed circuit boards by replacement of components. All parts for the boards are contained in the parts list printed with each schematic drawing.

The spare parts list also contains parts which are mounted on the receiver/exciter chassis.

Spare parts for the power amplifier/ power supply are also contained in this list.

NOTE:

When returning one or more PC Boards, you must ship AIR PARCEL POST consigned to SunAir Electronics, 3101 S. W. 3rd Avenue, Fort Lauderdale, Florida, U.S.A., and plainly mark on all mailing documents:

U. S. GOODS RETURNED FOR REPAIR.
VALUE FOR CUSTOMS - $100.00.

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RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL GSB-400		Voltage ALL	
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
0	1	2	3	24410	Capacitor 1.6KV		
0	1	2	3	28911	Capacitor 6KV		
0	0	1	2	24850	Capacitor, Neutralizing		
0	2	4	8	28894	Capacitor, Trimmer Driver		
0	2	4	8	26822	Capacitor, Variable		
0	1	2	4	74972	Connector, PC		
0	1	2	4	63181	Coil, PA trap		
1	1	2	4	40177	Diode, Zener		
1	1	2	4	40282	Diode, Zener		
5	10	15	25	40510	Diode, Signal		
0	1	2	3	40476	Diode, Varacter		
0	0	1	2	81731	Filter, USB operation		
0	0	1	2	81743	Filter, LSB operation (If Installed)		
0	0	1	1	81810	Filter, AM		
2	3	5	10	84026	Fuse for 12VDC		
2	3	5	10	86030	Fuse for 24VDC		
2	3	5	10	84874	Fuse for 32VDC		
2	3	5	10	89666	Fuse for 115VAC		
2	3	5	10	89654	Fuse for 230VAC		
2	2	4	5	87591	Fuse, Instrument (Audio)		
2	4	6	8	87149	Lamp, Panel		
0	1	1	2	87010	Meter, Panel		
0	0	1	2	97771	Microphone with plug		
0	1	1	2	81858-1	Oven, Carrier Osc.		

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RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL GSB-400		Voltage ALL	
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
0	0	1	2	81808	Oven, Channel Osc.		
0	0	1	2	99792	PC Board #2 Ass'y Complete		
0	0	1	2	99793	PC Board #3 Ass'y Complete		
0	0	1	2	99762	PC Board #4 Ass'y Complete		
0	0	1	2	99795	PC Board #5 Ass'y Complete		
0	0	1	2	99796	PC Board #6 Ass'y Complete		
0	0	1	2	99798	PC Board #8 Ass'y Complete		
0	0	0	1	99799	PC Board #9 Ass'y Complete		
0	0	1	2	99800	PC Board #10 Ass'y Complete		
0	0	1	2	99760	PC Board #11 Ass'y Complete		
0	0	1	2	97767	PC Board #14 Ass'y Complete		
0	0	0	1	99765	PC Board #15 Ass'y Complete		
0	1	1	2	97768-2	PC Board #16 Ass'y Complete		
0	0	0	1	99768	Driver Amp. Ass'y		
0	0	0	1	99769	PA Tuned Ckt. Board Ass'y		
0	0	0	1	97769	ALC Detector Ass'y		
0	0	1	2	34403	Potentiometer, Clarifier		
0	1	2	3	31932	Potentiometer, Squelch Volume		
0	0	1	2	33590	Potentiometer, Bias PA		
0	1	2	3	66286	Relay, Antenna K1		
0	1	2	4	66468	Relay, K2,K3,K4		
1	1	1	2	34336	Switch, ON/OFF/RCV		
0	0	1	1	32534	Switch, HI/LO Power		
0	0	1	1	34300	Switch, Mode		

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RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL GSB-400		Voltage ALL	
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
0	0	1	1	34312	Switch, Local/Remote		
0	0	1	2	33526	Switch, Wafer SW6&9		
0	0	1	1	31968	Switch, Wafer SW3		
0	1	2	3	33540	Switch, Wafer SW1,2,4,5		
0	0	1	2	34348	Switch, Wafer SW7,8		
0	3	6	10	44393	Transistor 2N4303		
0	0	1	2	44329	Transistor, 2N3563		
0	2	5	8	44484	Transistor, 3N128		
0	0	0	1	44575	Transistor, 3N143		
2	4	8	12	44252	Transistor, 2N3646		
2	4	8	12	44434	Transistor, MPS2925		
0	2	4	8	44513	Transistor, 2N5180		
0	2	4	8	76669	Vacuum Tube, Power Amp.		
0	1	2	3	76683	Vacuum Tube, Driver PA		
1	1	1	2	99999	Service Kit, (includes all		
					required tuning tools for		
					Rec/Exc., P.A., Coupler and		
					two P.C. Card Extenders)		

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RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL GSB-400 AC POWER SUPPLY MODULE		Voltage 115/230VAC	
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
0	0	1	2	97762	Complete Power Supply Module	(Specify	AC Voltage)
0	0	0	1	99771	PC#18 Assembly Complete		
0	0	1	1	49032	Transformer, Power T1		
1	1	2	3	44355	Transistor Q1		
1	1	2	2	66456	Relay K1801		
0	0	1	2	28909	Capacitor,60uf, 450V		
0	0	1	2	28876	Capacitor,30uf, 500V		
0	0	1	2	27292	Capacitor,250uf, 50V		
0	0	1	2	24707	Capacitor,50uf, 50V		
0	0	1	2	28923	Capacitor,500uf, 50V		
0	0	1	2	24549	Capacitor, 10uf,150V		
2	4	6	8	40335	Rectifier, CR1801-1804		
2	4	6	8	40397	Rectifier, CR1806-1810		
0	1	1	2	40165	Rectifier, CR1805		
0	1	1	2	40490	Diode, Zener		
0	0	1	1	55988	Choke, Filter L1		

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RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL GSB-400 DC POWER SUPPLY MODULE		Voltage 12,24,32	
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
0	0	1	2	97757	Complete Power Supply Module	(Specify	DC Voltage)
0	0	0	1	97755	PC#20 Assembly Complete		
0	0	0	1	97756	PC#19 Assembly Complete		
0	1	1	2	49020	Transformer, Toroid		
1	1	2	3	44381	Transistor Q1		
2	2	4	6	44628	Transistor Q2,Q3(12V only)		
2	2	4	6	44630	Transistor Q2,Q3(24&32V only)		
1	1	2	2	66016	Relay K1		
0	1	2	4	24484	Capacitor,4uf, 500V		
0	1	1	2	28923	Capacitor,500uf, 50V		
0	1	1	2	24707	Capacitor,50uf, 50V		
2	4	6	8	40335	Rectifier CR 2001-2005		
0	1	1	1	40490	Diode, Zener,CR1901		
0	1	1	1	40505	Diode, Zener,CR1902		
0	2	2	4	40165	Diode CR1, CR2		
0	1	1	2	40509	Diode, Zener CR3		

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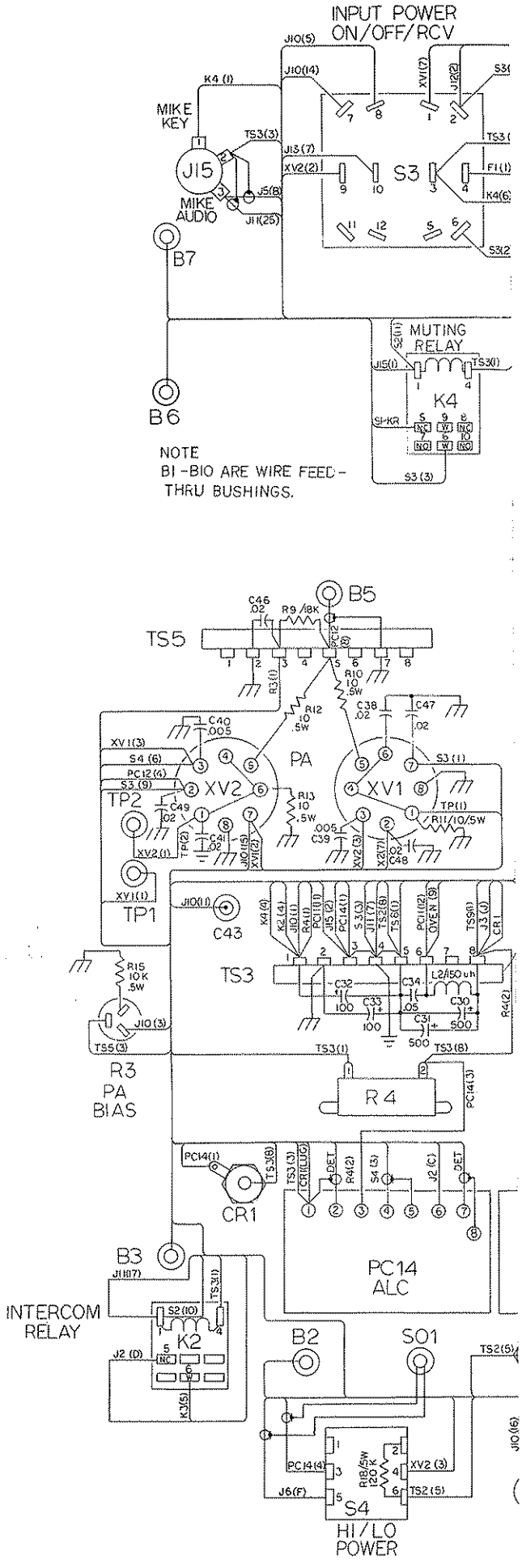
RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL REMOTE CONTROL UNIT ARC-10		Voltage ALL	
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
0	0	1	2	97768-2	PC# 16 Assembly Complete		
0	0	1	1	87204	Speaker		
0	0	1	1	87216	Microphone		
0	0	1	1	34300	Switch, Mode		
0	0	1	1	31932	Potentiometer R1, R2		
0	0	1	1	66468	Relay K1		
0	0	2	4	84001	Lamp		
0	0	1	2	33679	Switch Wafer Channeling		
0	0	1	1	34324	Motor, Solenoid (Installed in GSB-400)		
2	4	5	5	87591	Fuse, 1 1/2A Instrument		

PARTS LIST

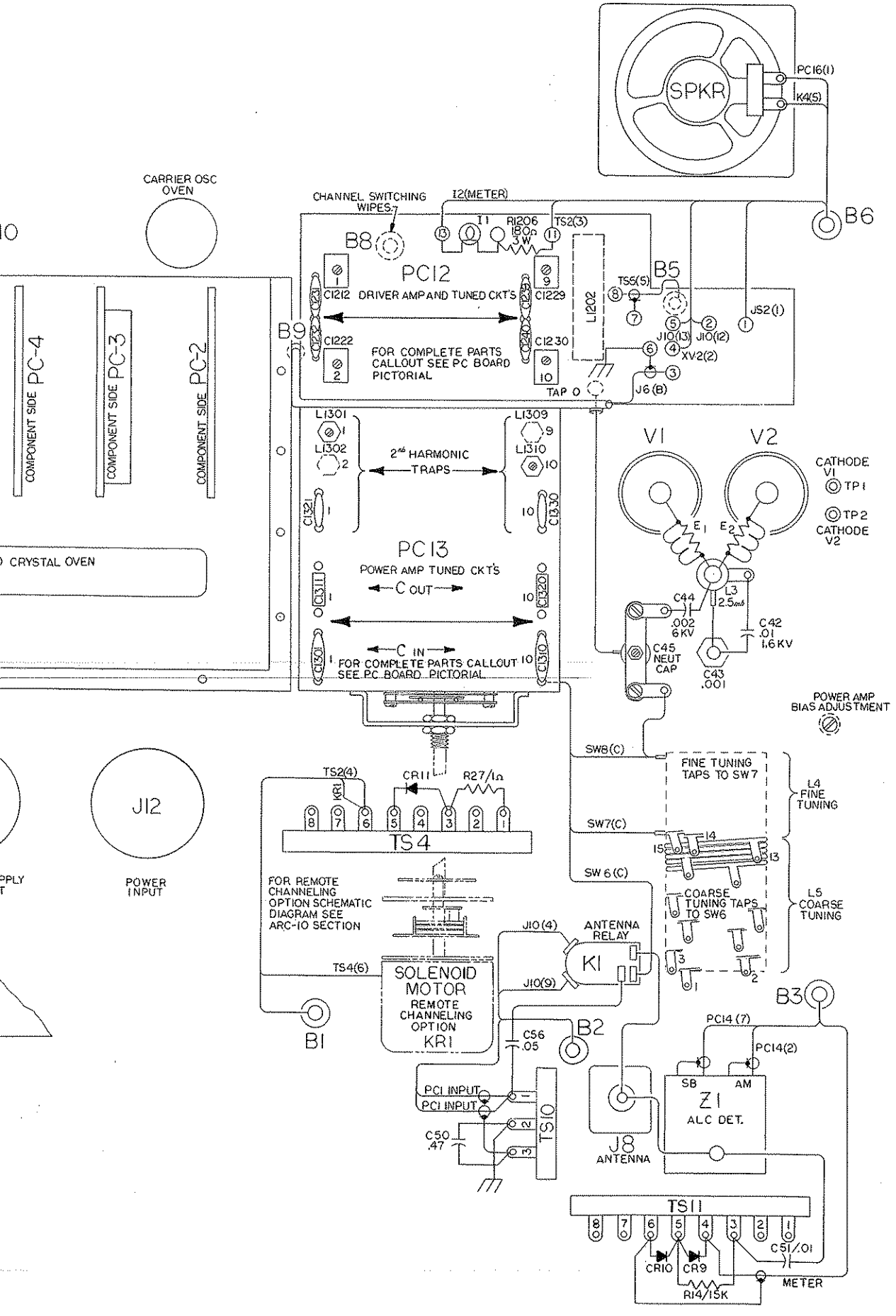
CKT. SYM.	PART NO.	DESCRIPTION
C1 thru C20	27357	Capacitor .05uf 25V
C21 thru C28	28337	" .47uf 50V
C29	27412	" 22uf 15V
C30	27307	" 500uf 15V
C31	27307	" "
C32	28014	" 100uf 50V
C33	28014	" "
C34	27357	" .05uf 25V
C35	27345	" .02uf 100V
C36	27345	" "
C37	27345	" "
C38 thru C56		See Power Amplifier Parts List
C57 thru C59	28337	Capacitor .47uf 50V
C60	27321	" .01uf 100V
C61 thru C70	28337	" .47uf 50V
C71	27357	" .05uf 25V
CR1	40177	Diode, Zener 1N2974A
CR2	40282	" " Z4892
CR3	40282	" " "
CR4	44290	" 1N914
CR5	44290	" 1N914
CR6	40476	" Varactor MV2107
CR7 thru CR10		See Power Amplifier Parts List
CR11	40397	Diode 1N5400
FL-1	81731	Filter, USB Operation
FL-2	81743	Filter, LSB Operation
H1	81858-1	Oven, Carrier Oscillator
H2	81808	Oven, Channel Oscillator, 10 Crystal
I1	87149	Lamp, Panel
I2	87149	Lamp, Panel
J1 thru J7	74972	Connector, Card
J8	74192	" RF Output
J10	75146	" 16 Pin
J11	75225	" Accessories
J12	75160	" Power Supply, Input
J13	75122	" Antenna Coupler
J14	75201	" Input Power
J15	84056	" Microphone
K1	66286	Relay, Antenna
K2	66468	" DPDT
K3	66468	" "
K4	66468	" "
KR1	34324	Solenoid Rotary (Optional)

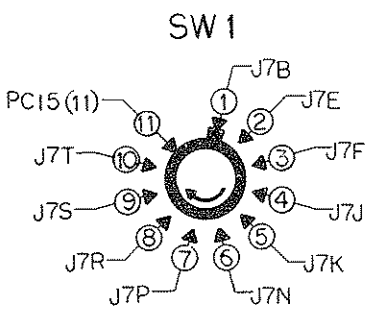
CKT. SYM.	PART NO.	DESCRIPTION
L1	66470	RF Choke 270uh
L2	65919	" " 150uh
L3 thru L6		See Power Amplifier Parts List
M1	87010	Meter, Panel
P8	90873	Connector, Mates J8
P11	75213	" Mates J11
	75237	Hood for 75213
P13	75134	Connector, Mates J13
	74623	Hood for 75134
P14	75172	Connector, Mates J14
	74623	Hood for 75172
R1	34403	Potentiometer, Clarifier 10K
R2	31932	" Squelch 10K
R3	33590	" Bias 10K
R4	18930	Resistor 7.5 ohm 10W
R5	31932	Potentiometer, Volume 10K
R6	18253	Resistor 33 ohm 1/4W
R7	17273	" 150 " "
R8	17792	" 33K " "
R9 thru R23		See Power Amplifier Parts List
R24	18796	Resistor 68 ohm 1/4W
R25	16724	" 10K " 1/2W
R26	17118	" 100 " 1/4W
R27	17027	" 1 " 1W
S1	34312	Switch, Local/Remote
S2	34300	" Mode Selector
S3	34336	" ON/OFF/RCV
S4	32534	" HI/LO
SW1	33540	Control Wafer for Exc.
SW2	33540	" " " Rec.
SW3	31968	Master Wafer for Ant. Coupler
SW4	33540	Switch, Driver Tuned Circuit
SW5	33540	" " " "
SW6	33526	" Pi Network Input
SW7	34348	" Fine Tune Tap Selector
SW8	34348	" Coarse Tune Tap Selector
SW9	33526	" Pi Network Output
XV1 thru XV3	76059	Socket, Octal
Y1 thru Y10	81822	Crystal, Channel +65°C
Y11	81834	Crystal, Carrier, 1650 kHz
	87125	Boot, Lamp Red
	31970	Knob, Volume, Mode, Local Remote and Squelch
	31982	Knob, Channel Selector
	34398	Knob, Clarifier
F1	84026	Fuse, 30A (12V Only)
"	86030	" 20A (24V Only)
"	84874	" 15A (32V Only)
"	89666	" 3A (115V Only)
"	89654	" 1.5A (230V Only)



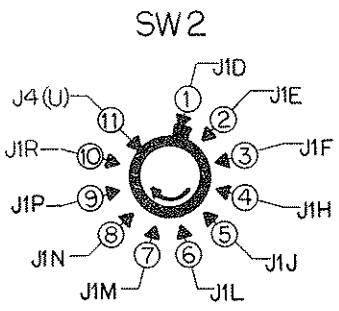
GSB-400 TRANSCEIVER CHASSIS WIRING DIAGRAM BOTTOM

SERIAL NO. 121
AND SUBSEQUENT

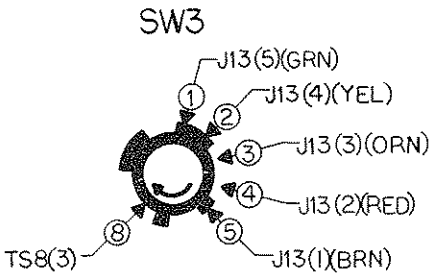

SPKR
PC16(1)
K4(5)
B6
CARRIER OSC OVEN
CHANNEL SWITCHING WIPES
I2(METER)
I1
R1206 150Ω 1W
TS2(3)
B8
PC12
C1212 DRIVER AMP AND TUNED CKT'S
C1229
C1222
C1230
FOR COMPLETE PARTS CALLOUT SEE PC BOARD PICTORIAL
L1202
TS5(5)
B5
JS2(1)
J10(13)
J10(12)
XV2(2)
J6(B)
TAP 0
B9
COMPONENT SIDE PC-4
COMPONENT SIDE PC-3
COMPONENT SIDE PC-2
CRYSTAL OVEN
L1301
L1302
2nd HARMONIC TRAPS
L1309
L1310
C1321
C1330
PC13
POWER AMP TUNED CKT'S
C OUT
C IN
FOR COMPLETE PARTS CALLOUT SEE PC BOARD PICTORIAL
C1311
C1320
C1301
C1310
V1
V2
CATHODE V1
TP1
TP2
CATHODE V2
E1
E2
C44 .002 6KV
L3 2.5mh
C42 .01 1.6KV
C45 NEUT CAP
C43 .001
POWER AMP BIAS ADJUSTMENT
SW8(C)
FINE TUNING TAPS TO SW7
L4 FINE TUNING
SW7(C)
SW6(C)
COARSE TUNING TAPS TO SW6
L5 COARSE TUNING
TS2(4)
KR1
CR11
R27/1Ω
TS4
FOR REMOTE CHANNELING OPTION SCHEMATIC DIAGRAM SEE ARC-10 SECTION
J10(4)
ANTENNA RELAY
K1
TS4(6)
SOLENOID MOTOR
REMOTE CHANNELING OPTION
KR1
J10(9)
B1
B2
B3
C56 .05
PC14(7)
PC14(2)
SB
AM
Z1
ALC DET.
PCI INPUT
PCI INPUT
C50 .47
TS10
J8
ANTENNA
TS11
C51/.01
CR10
CR9
R14/15K
METER
J12
POWER INPUT



EXCITER SWITCHING

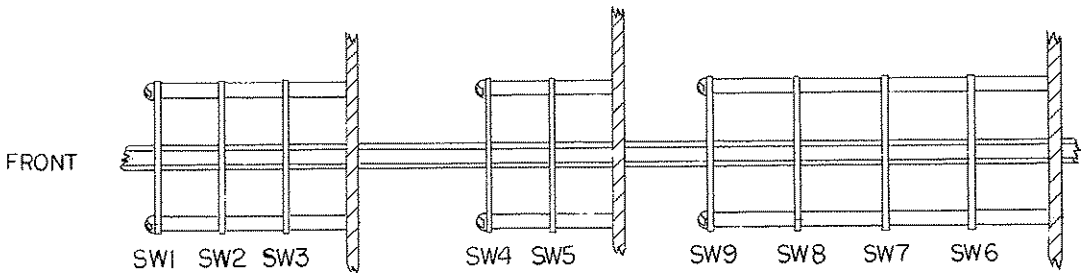


RECEIVER SWITCHING



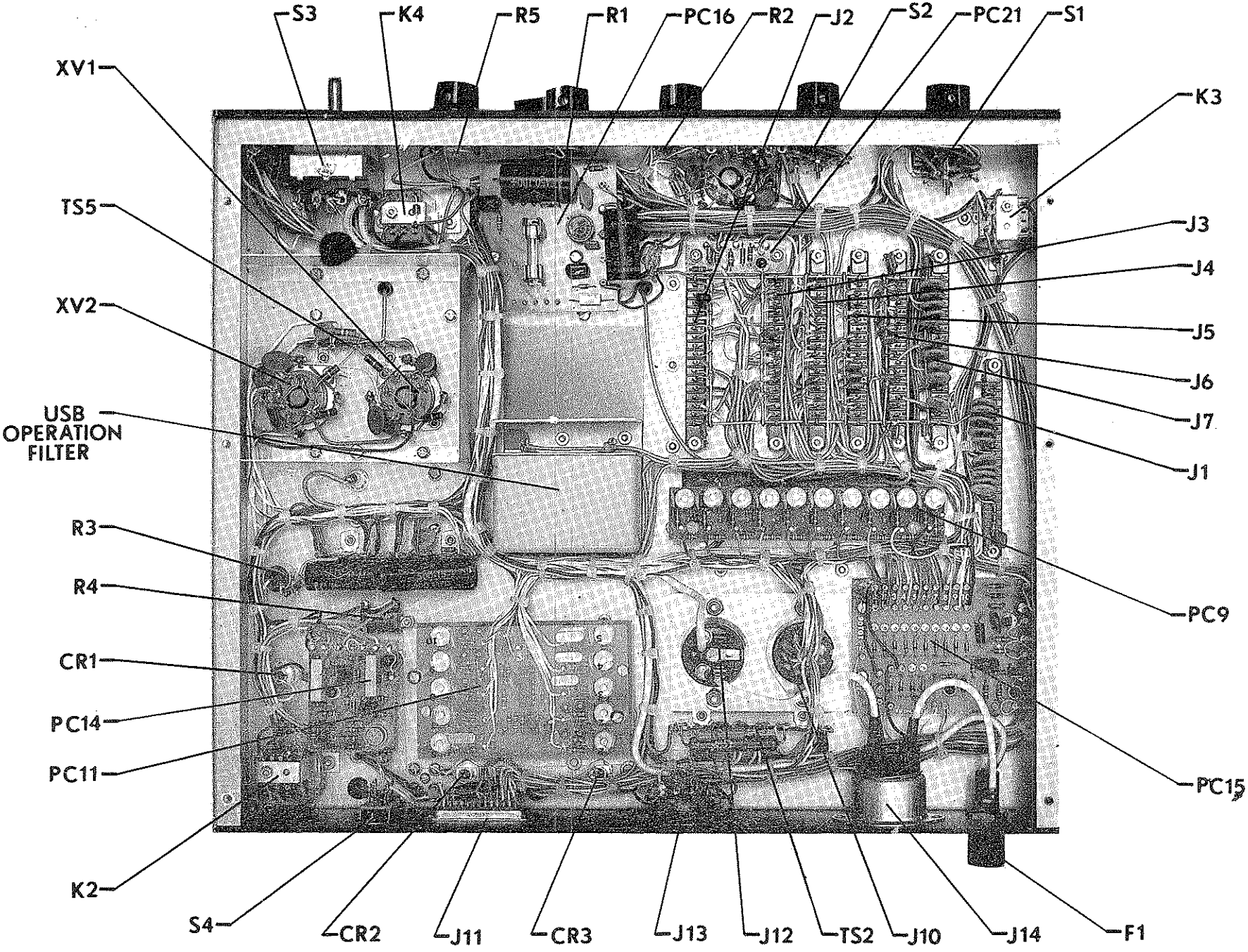
COUPLER CHANNELING
FROM FRONT. SHOWN
IN CHANNEL 1 POS.

SYMBOL	DESCRIPTION
SW1	EXCITER SWITCHING
SW2	RECEIVER SWITCHING
SW3	COUPLER CHANNELING
SW4	DRIVER TUNED CKT
SW5	DRIVER TUNED CKT TAP SELECTOR
SW6	PI NETWORK, INPUT
SW7	PI NETWORK, FINE TUNING
SW8	PI NETWORK, COARSE TUNING
SW9	PI NETWORK, OUTPUT

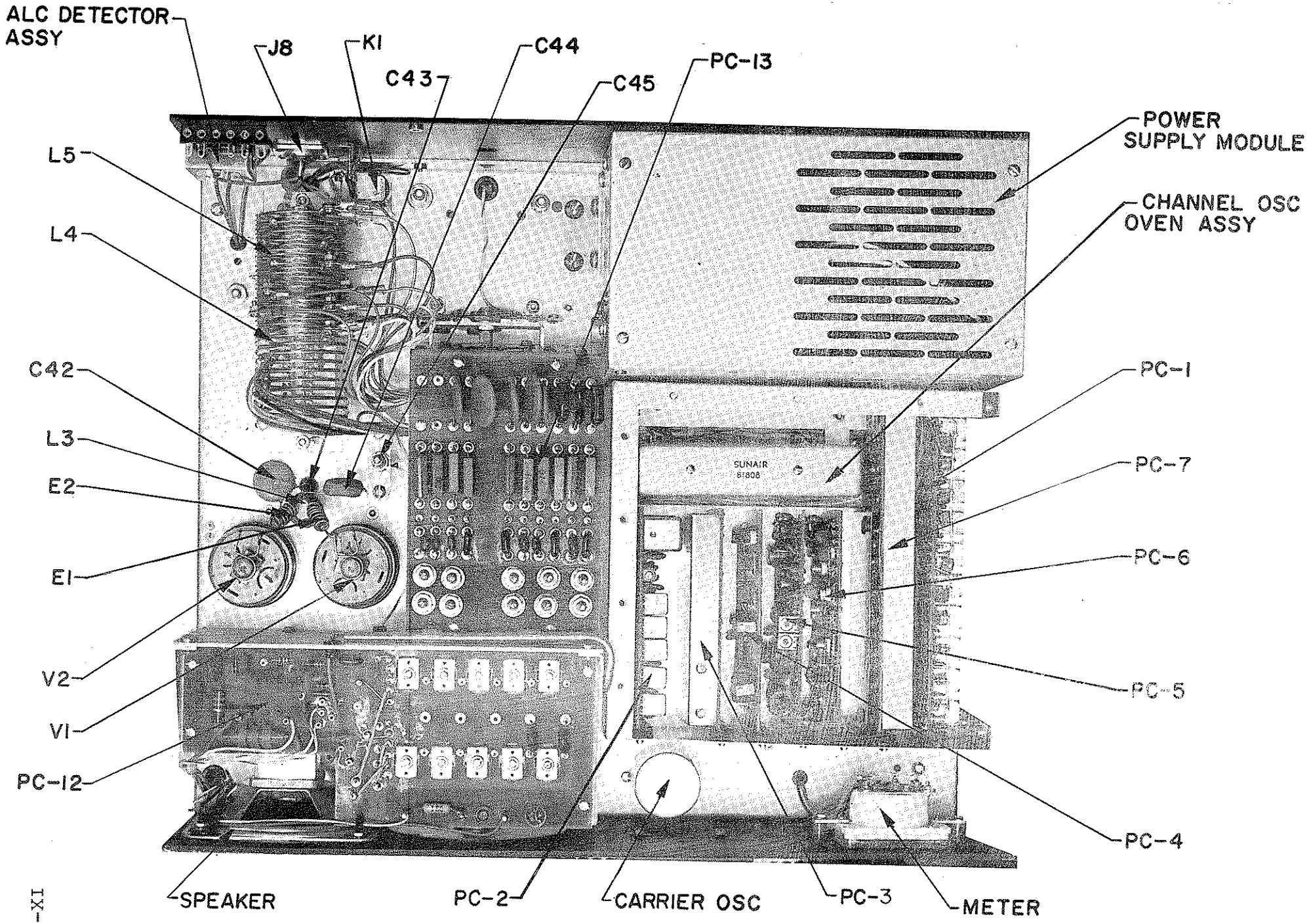


NOTE
FOR SW4 - SW9 CONFIGURATIONS
SEE P.A. SCHEMATIC.

WAFER SWITCHING DIAGRAM

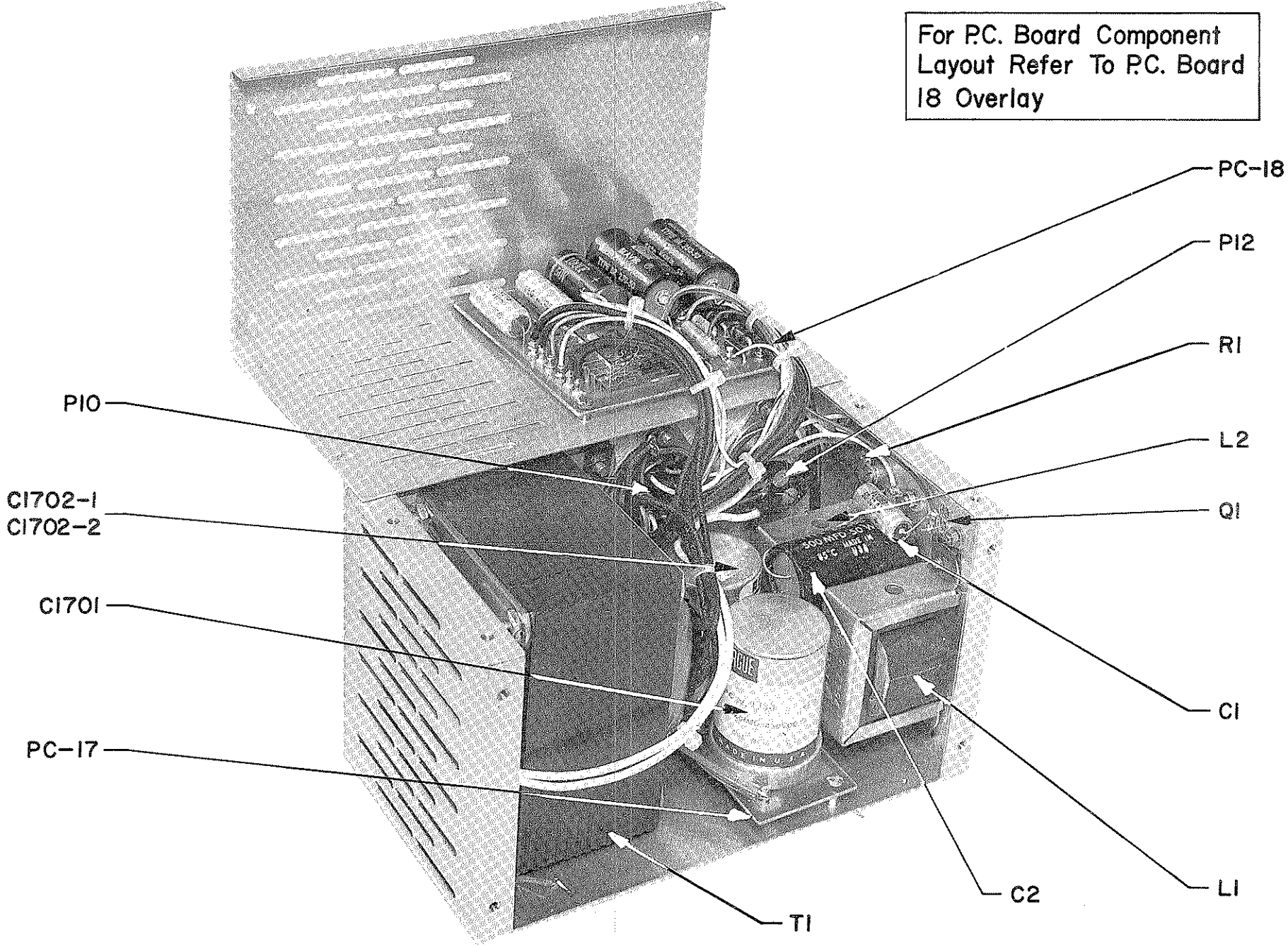


GSB-400 TRANSCEIVER, BOTTOM VIEW

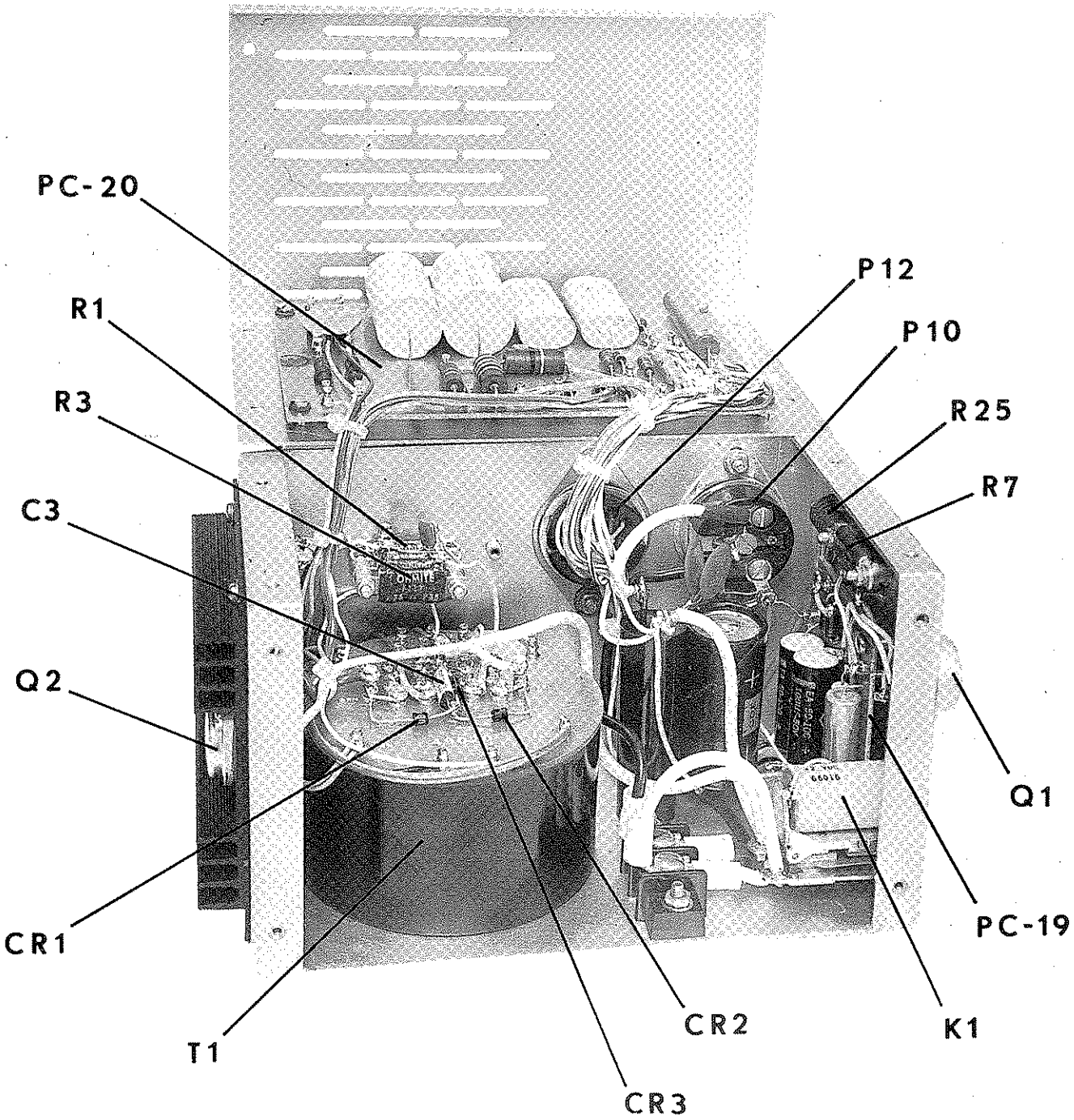


GSB-400 TRANSCEIVER, TOP VIEW

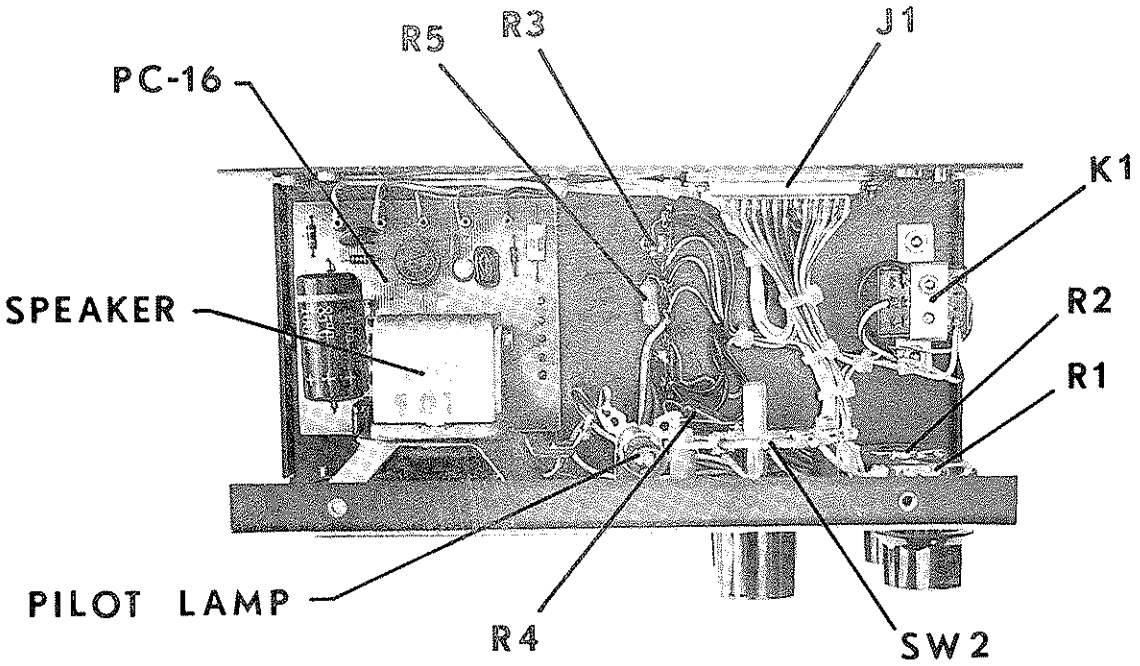
For P.C. Board Component Layout Refer To P.C. Board 18 Overlay



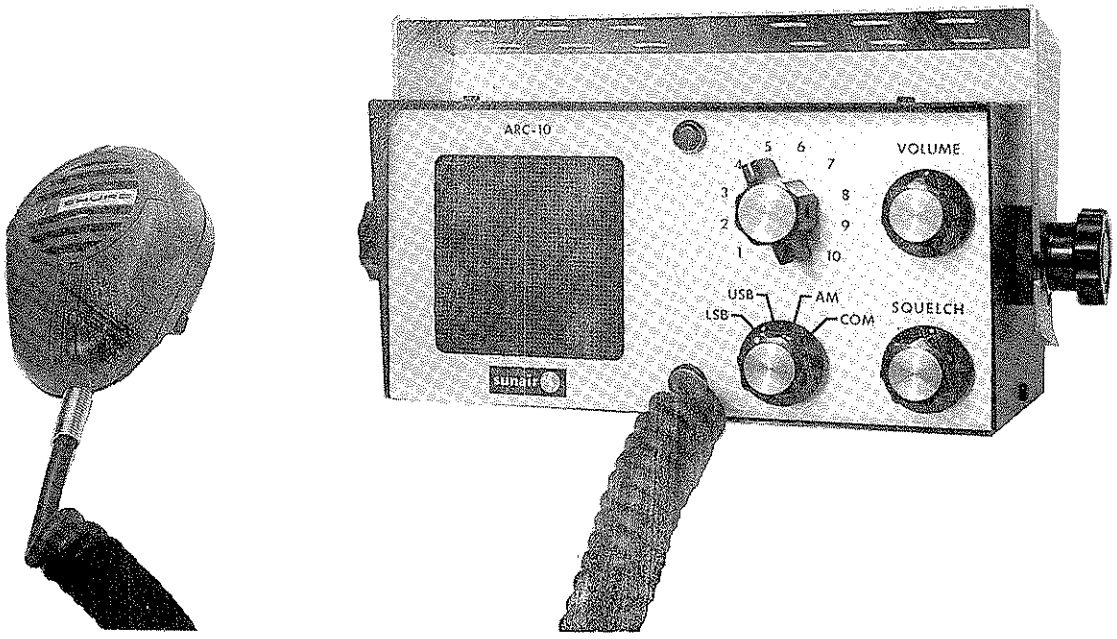
A.C. POWER SUPPLY MODULE



DC POWER SUPPLY MODULE

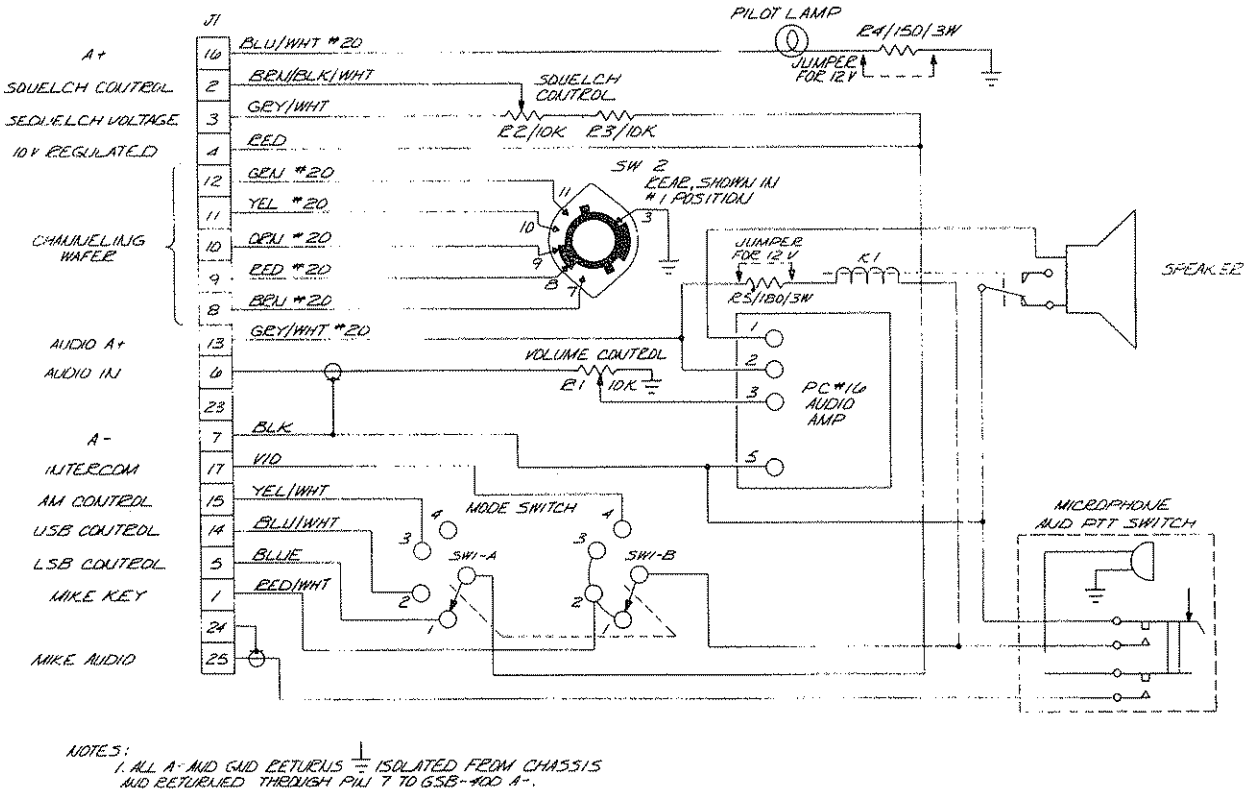


TOP VIEW (INSIDE)



REMOTE CONTROL UNIT
ARC-10

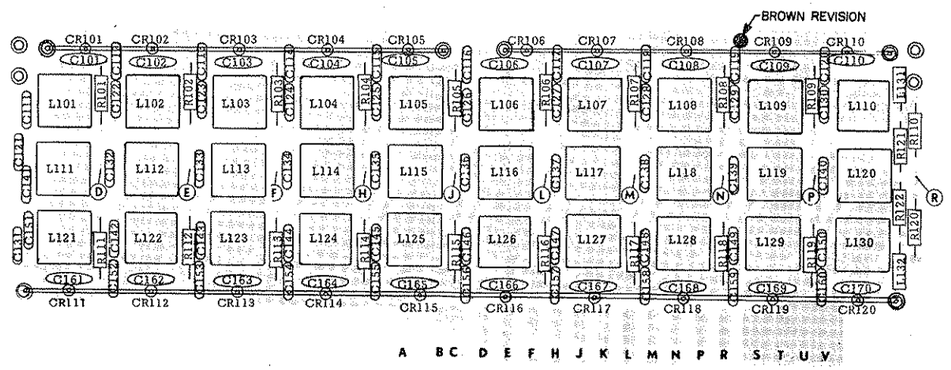
CKT. SYM.	PART NO.	DESCRIPTION
PC#16	97768	P.C. Board Assy with all components
J1	75213	Connector 25 Pin
K1	66468	Relay DPDT
SW1	34300	Switch, Mode Selector
SW2	33679	Master wafer for GSB-400
R1	31932	Potentiometer, Volume 10K
R2	31932	Potentiometer, Squelch 10K
R3	17041	Resistor, 10K 1/4W
R4	16011	" 150 3W
R5	18332	" 180 3W
	87204	Speaker
	87216	Microphone
	84001	Pilot Light
	31970	Knob, Volume, Squelch, Mode
	34520	Knob, Channel Selector

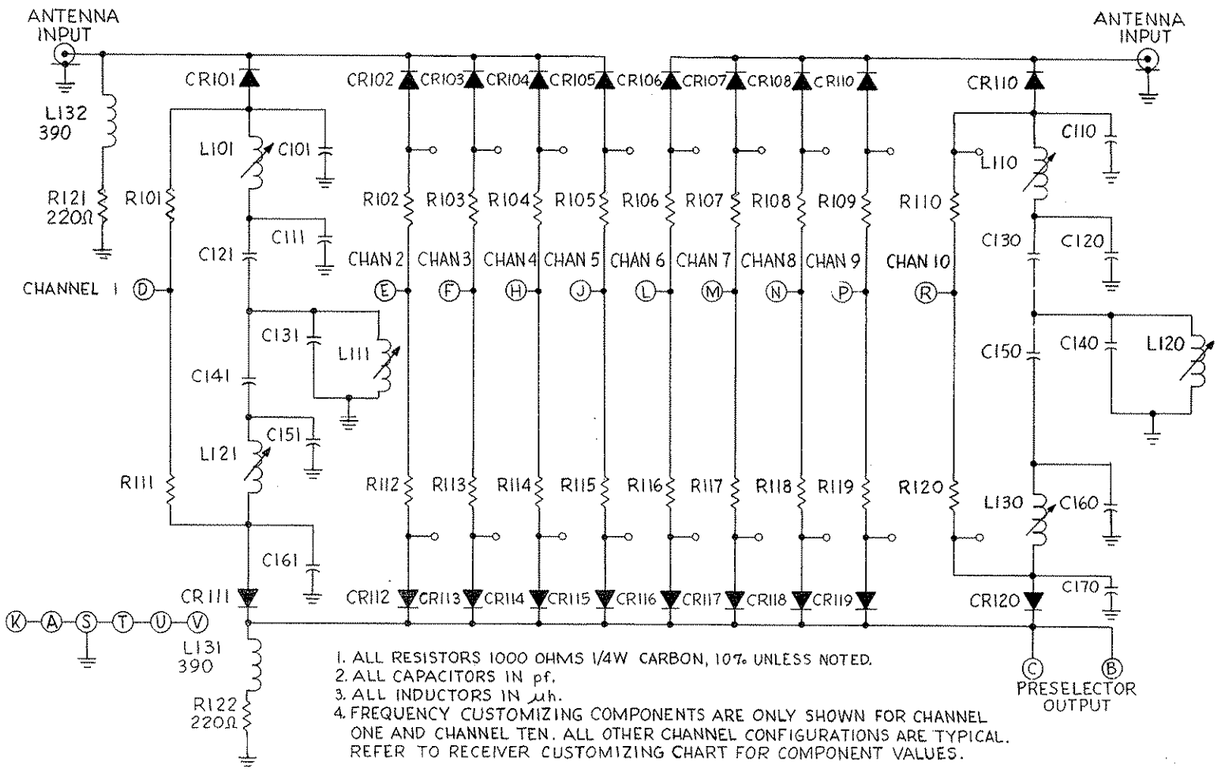


NOTES:
1. ALL A- AND GND RETURNS ⏚ ISOLATED FROM CHASSIS AND RETURNED THROUGH PIN 7 TO GSB-400 A-.

REMOTE CONTROL UNIT ARC-10

CKT. SYM.	PART NO.	DESCRIPTION
	99791	P.C. Board Ass'y. Without Customizing Components
PC1	10209	P.C. Board for 99791
C101 thru C170		Capacitor - Frequency Dependent - See Customizing Chart, Page VIII-2
CR101 thru CR120	40510	Diode 1N9148
L101 thru L130		Coil, Variable - Frequency Dependent - See Customizing Chart - Page 80
L131	64800	Choke, Molded 390uh
L132	64800	Choke, Molded 390uh
R101 thru R120	17156	Resistor 1K ohm 1/4W
R121	17132	" 220 " "
R121	17132	" " " "



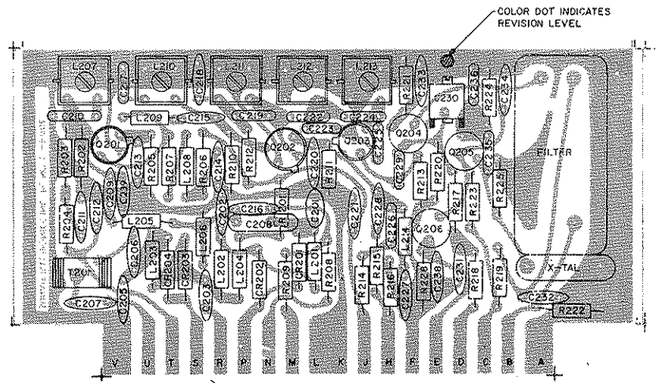


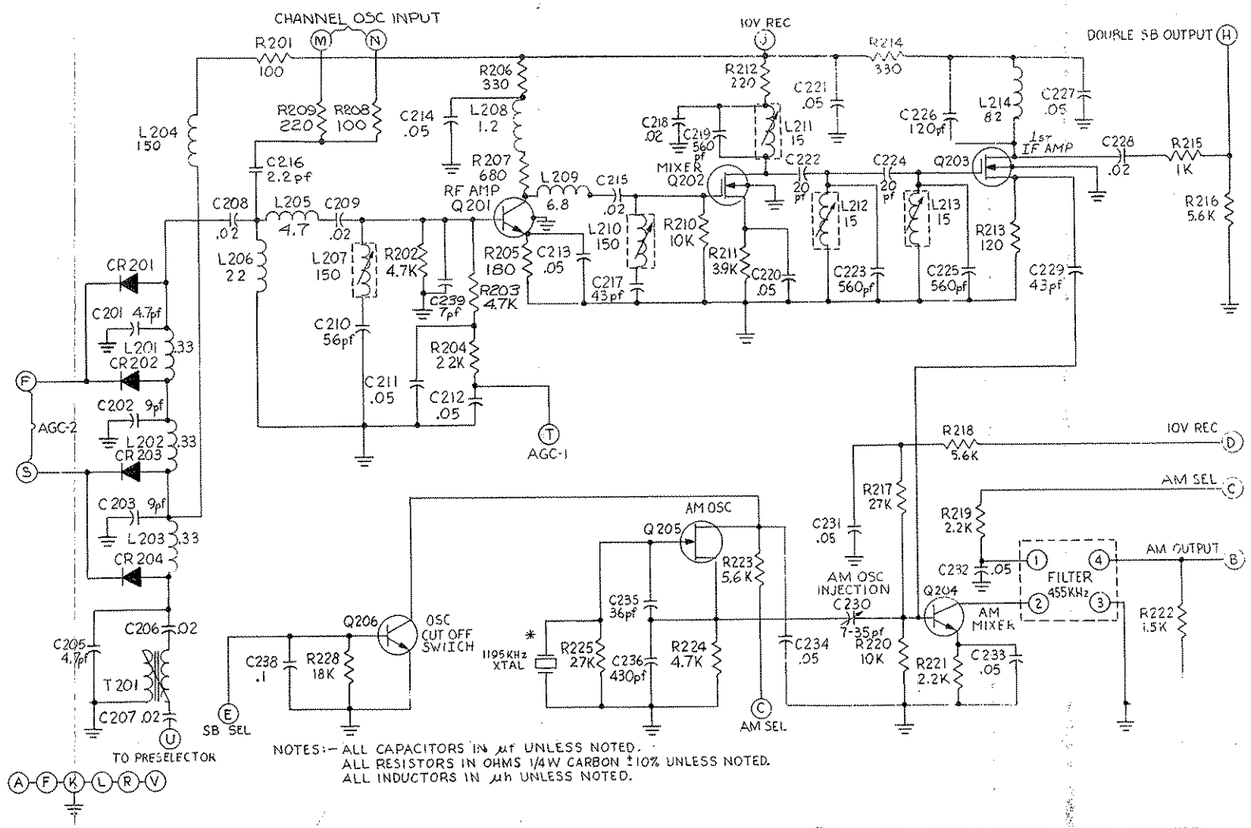
P.C. #1, RECEIVER PRESELECTORS (10 CHAN.

CKT. SYM.	PART NO.	DESCRIPTION		
	99792	P.C. Board Ass'y with all components		
PC #2	10208	P.C. Board for 99792		
C201	25024	Capacitor	4.7pf	500V
C202	28636	"	9.0pf	"
C203	"	"	"	"
C205	25024	"	4.7pf	"
C206	27345	"	.02uf	100V
C207	"	"	"	"
C208	26913	"	.02uf	25V
C209	27345	"	.02uf	100V
C210	28129	"	56pf	
C211	27357	"	.05uf	25V
C212	27357	"	.05uf	25V
C213	"	"	"	"
C214	"	"	"	"
C215	27345	"	.02uf	100V
C216	25000	"	2.2pf	500V
C217	28533	"	43pf	500V
C218	27345	"	.02uf	100V
C219	28569	"	560pf	100V
C220	27357	"	.05uf	25V
C221	"	"	"	"
C222	28674	"	20pf	500V
C223	28569	"	560pf	100V
C224	28674	"	20pf	500V
C225	28569	"	560pf	100V
C226	28088	"	120pf	300V
C227	27357	"	.05uf	25V
C228	27345	"	.02uf	100V
C229	28533	"	43pf	500V
C230	28739	"	Variable 7-35pf	
C231	27357	"	.05uf	25V
C232	"	"	"	"
C233	"	"	"	"
C234	"	"	"	"
C235	28521	"	36pf	500V
C236	28454	"	430pf	100V
C238	27010	"	.1uf	12V
C239	28858	"	7pf	500V
CR201 thru CR204	44290	Diode	1N914	
FL101	81810	Filter, Ceramic	455 kHz	
L201	66420	Choke, Molded	.33uh	
L202	"	" "	"	
L203	"	" "	"	
L204	65919	" "	150uh	
L205	56425	" "	4.7uh	
L206	66406	" "	22uh	
L207	62967	Coil, Variable	150uh	
L208	66391	Choke, Molded	1.2uh	
L209	66418	" "	6.8uh	
L210	62967	Coil, Variable	150uh	
L211	62979	" "	15uh	
L212	"	" "	"	
L213	"	" "	"	
L214	65945	Choke, Molded	82uh	
Q201	44513	Transistor	2N5180	
Q202	44575	FET	3N143	
Q203	44484	FET	3N128	
Q204	44329	Transistor	2N3563	

CKT. SYM.	PART NO.	DESCRIPTION		
Q205	44393	FET	2N4303	
Q206	44252	Transistor	2N3646	
R201	17118	Resistor	100 ohm	1/4W
R202	17077	"	4.7K "	"
R203	17077	"	4.7K "	"
R204	17223	"	22K "	"
R205	17522	"	180 "	"
R206	17091	"	330 "	"
R207	17663	"	680 "	"
R208	17118	"	100 "	"
R209	17132	"	220 "	"
R210	17041	"	10K "	"
R211	17883	"	3.9K "	"
R212	17132	"	220 "	"
R213	18655	"	120 "	"
R214	17091	"	330 "	"
R215	17156	"	1K "	"
R216	18306	"	5.6K "	"
R217	17120	"	27K "	"
R218	18306	"	5.6K "	"
R219	17807	"	2.2K "	"
R220	17041	"	10K "	"
R221	17807	"	2.2K "	"
R222	17247	"	1.5K "	"
R223	18306	"	5.6K "	"
R224	17077	"	4.7K "	"
R225	17120	"	27K "	"
R228	17572	"	18K "	"
T201	99692	Transformer		
*				
Y201	81846	Crystal	1195 kHz	
Y201	81884	"	2105 kHz	

* 1195 kHz or 2105 kHz may be utilized, depending upon channel frequency.



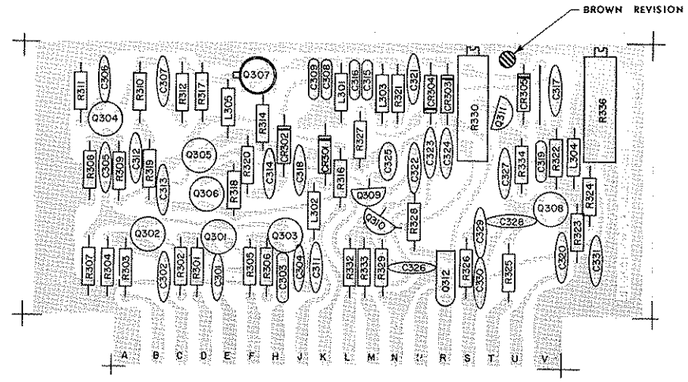


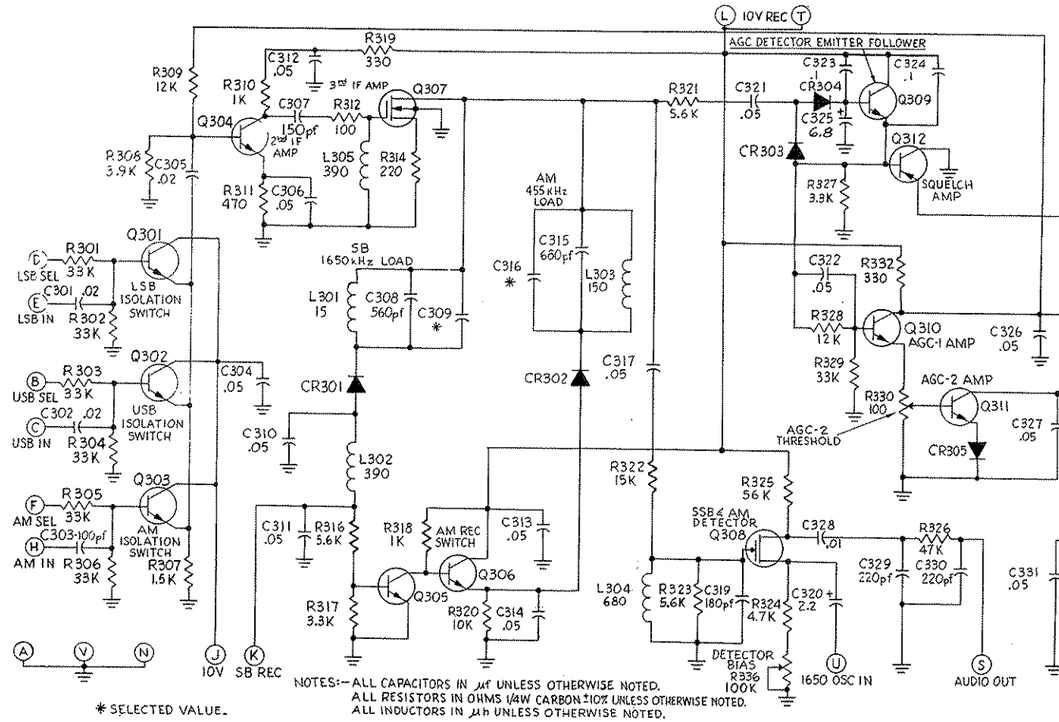
- P.C. #2, RF AMPLIFIER AND MIXER

CKT. SYM.	PART NO.	DESCRIPTION		
	99793	P.C. Board Ass'y. with all Components		
PC #3	10207	P.C. Board for 99793		
C301	27345	Capacitor	.02uf	100V
C302	"	"	"	"
C303	28545	"	100pf	500V
C304	27357	"	.05uf	25V
C305	27345	"	.02uf	100V
C306	27357	"	.05uf	25V
C307	27498	"	150pf	500V
C308	28569	"	560pf	300V
C309		"	Selected Value	
C310	27357	"	.05uf	25V
C311	"	"	"	"
C312	"	"	"	"
C313	"	"	"	"
C314	"	"	"	"
C315	28428	"	680pf	300V
C316		"	Selected Value	
C317	27357	"	.05uf	25V
C319	28105	"	180pf	300V
C320	24472	"	2.2uf	15V
C321	27357	"	.05uf	25V
C322	"	"	"	"
C323	27010	"	.1uf	12V
C324	"	"	"	"
C325	28351	"	6.8uf	15V
C326	27357	"	.05uf	25V
C327	"	"	"	"
C328	27321	"	.01uf	100V
C329	24018	"	220pf	500V
C330	"	"	"	"
C331	27357	"	.05uf	25V
CR301	44290	Diode	1N914	
CR302	"	"	"	
CR303	40139	"	1N54A	
CR304	"	"	"	
CR305	44290	"	1N914	
L301	65907	Choke, Molded	15uh	
L302	64800	" "	390uh	
L303	65919	" "	150uh	
L304	66432	" "	680uh	
L305	64800	" "	390uh	
Q301	44252	Transistor	2N3646	
Q302	"	"	"	
Q303	44329	"	2N3563	
Q304	"	"	"	
Q305	44252	"	2N3646	
Q306	"	"	"	
Q307	44484	FET	3N128	
Q308	44393	FET	2N4303	
Q309	44434	Transistor	MPS2925	
Q310	"	"	"	
Q311	"	"	"	
Q312	44587	"	2N4280	
R301 thru R306	17792	Resistor	33K ohm	1/4W
R307	17247	"	1.5K "	"
R308	17883	"	3.9K "	"
R309	18318	"	12K "	"

CKT. SYM.	PART NO.	DESCRIPTION			
R310	17156	Resistor	1K	ohm	1/4W
R311	18411	"	470	"	"
R312	17118	"	100	"	"
R314	17132	"	220	"	"
R316	18306	"	5.6K	"	"
R317	17089	"	3.3K	"	"
R318	17156	"	1K	"	"
R319	17091	"	330	"	"
R320	17041	"	10K	"	"
R321	18306	"	5.6K	"	"
R322	17235	"	15K	"	"
R323	18306	"	5.6K	"	"
R324	17077	"	4.7K	"	"
R325	17144	"	56K	"	"
R326	17106	"	47K	"	"
R327	17089	"	3.3K	"	"
R328	18318	"	12K	"	"
R329	"	"	"	"	
R330	34233	Potentiometer	100	"	"
R332	17091	Resistor	330	"	"
R333	17156	"	1K	"	"
R334	17118	"	100	"	"
R336	33849-5	Potentiometer	100K	"	"

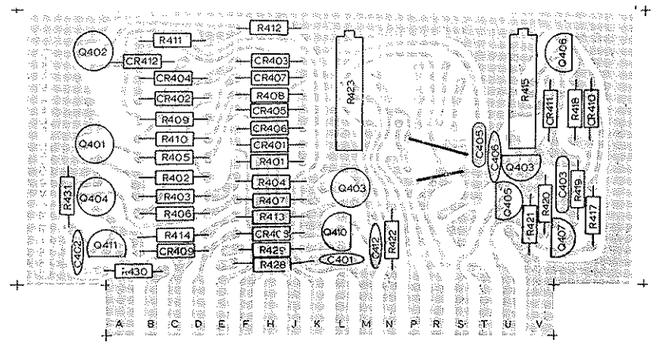
REVISION	DESCRIPTION
BROWN	R323 CHANGED FROM 15K TO 5.6K, C325 CHANGED FROM .22 TO 6.8uf, REMOVED R331 Q303 CHANGED FROM 2N3646 TO 2N3563

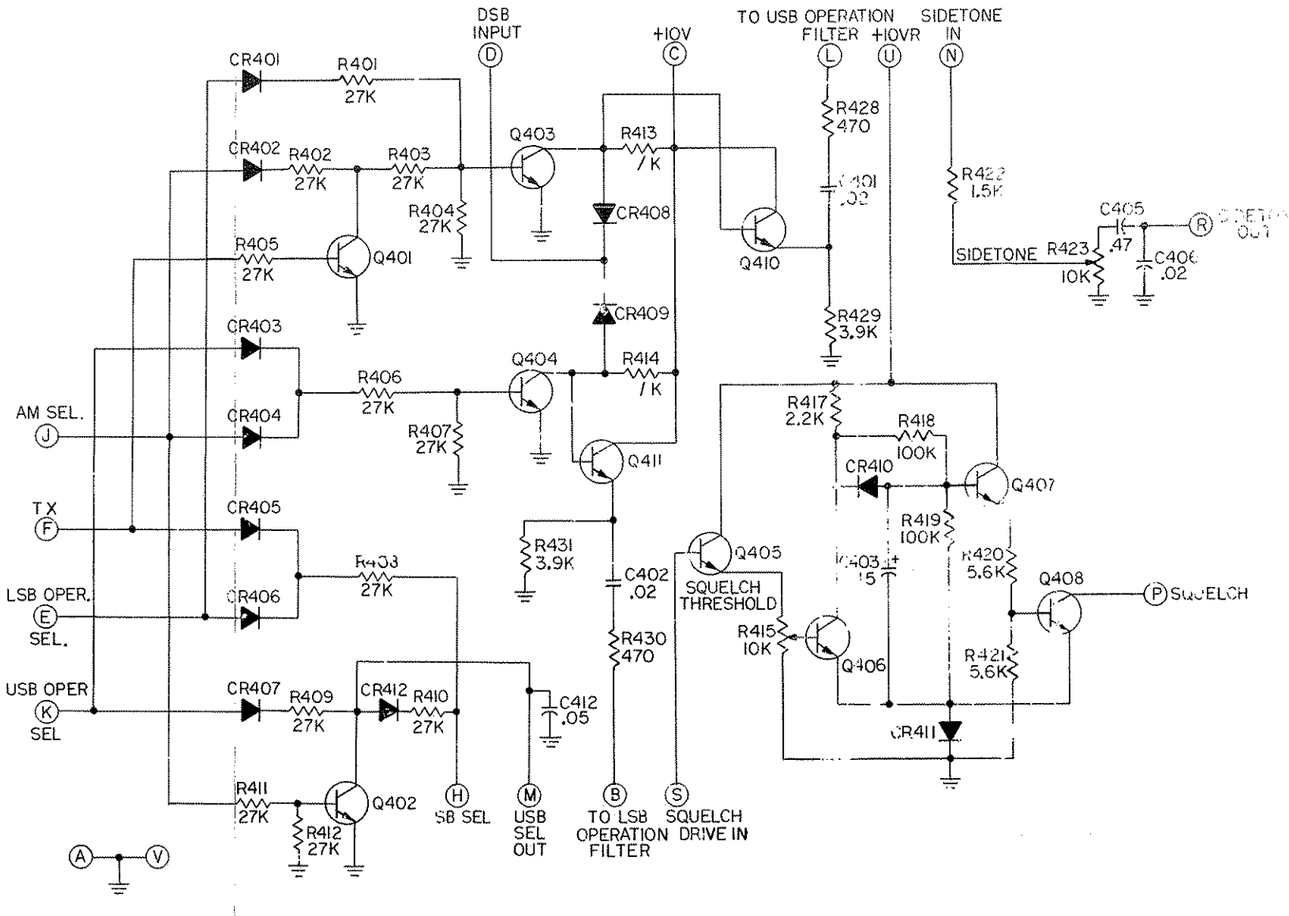




P.C. #3, IF AMPLIFIER AND DETECTOR

CKT. SYM.	PART NO.	DESCRIPTION
	99762	P.C. Board Ass'y with all Components
PC4	10206	P.C. Board for 99762
C401	26913	Capacitor .02uf 25V
C402	26913	" .02uf 25V
C403	27400	" 15uf 35V
C405	28337	" .47uf 50V
C406	26913	" .02uf 25V
C412	27357	" .05uf 25V
CR401 thru CR412	44290	Diode 1N914
Q401 thru Q404	44252	Transistor 2N3646
Q405 thru Q408	44434	" MPS2925
Q410	44434	" MPS2925
Q411	44434	" MPS2925
R401 thru R412	17120	Resistor 27K ohm 1/4W
R413	18162	" 8.2K " "
R414	18162	" 8.2K " "
R415	33849-4	Potentiometer 10K " 1/2W
R417	17807	Resistor 2.2K " 1/4W
R418	17039	" 100K " "
R419	17039	" 100K " "
R420	18306	" 5.6K " "
R421	18306	" 5.6K " "
R422	17247	" 1.5K " 1/4W
R423	33849-4	Potentiometer 10K " 1/2W





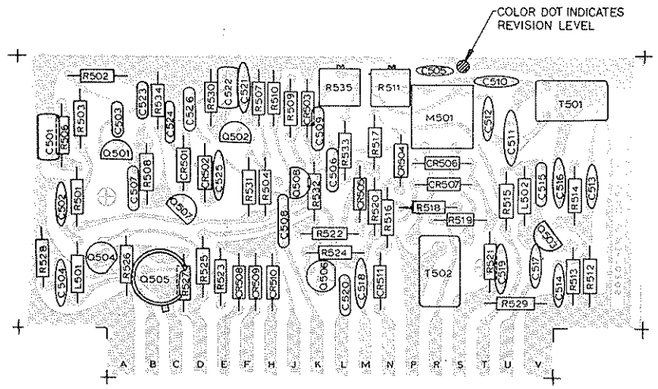
NOTES:
1 ALL CAP IN uf UNLESS NOTED.
2 ALL RES IN OHMS 1/4W CARBON ±10% UNLESS NOTED.

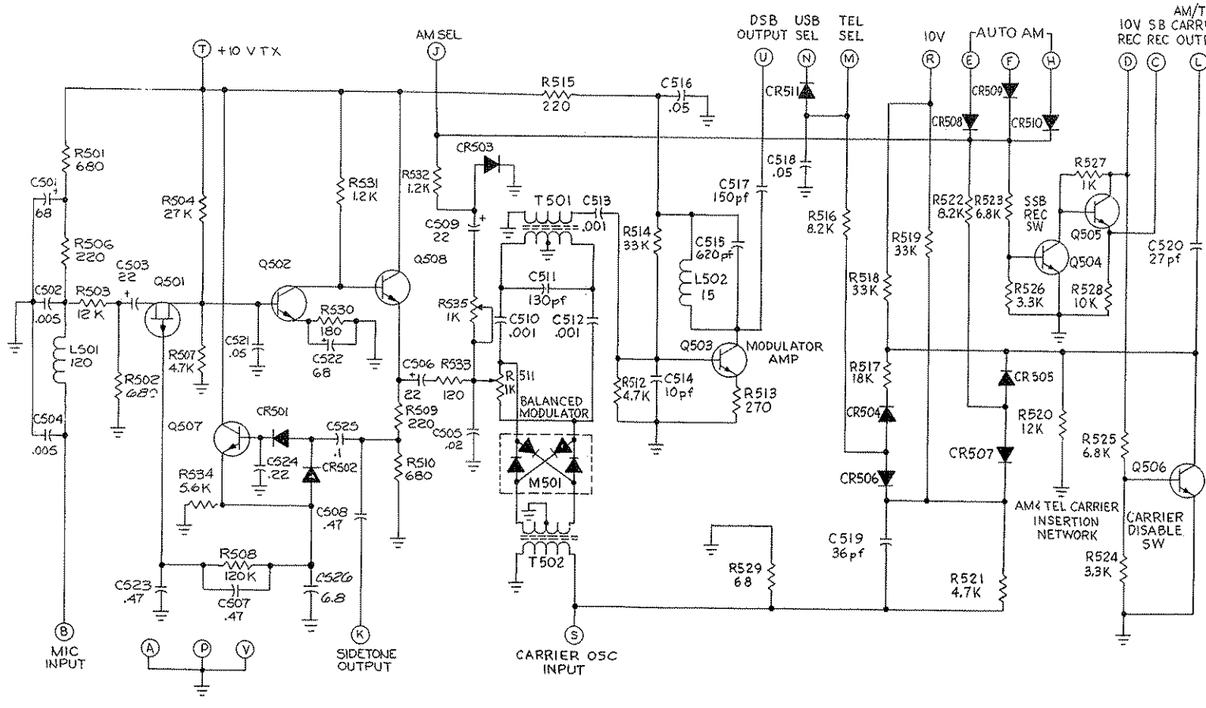
P.C. #4, MODE AND AUDIO

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION		
	99795	P.C. Board Ass'y with all Components		
PC#5	10205	P.C. Board for 99795		
C501	28038	Capacitor,	68uf	15V
C502	27333	"	.005uf	100V
C503	27412	"	22uf	15V
C504	27333	"	.005uf	100V
C505	26913	"	.02uf	25V
C506	27412	"	22uf	15V
C507	28337	"	.47uf	50V
C508	28337	"	.47uf	50V
C509	27412	"	22uf	15V
C510	28208	"	.001uf	100V
C511	27993	"	130pf	
C512	28208	"	.001uf	100V
C513	28208	"	.001uf	100V
C514	26834	"	10pf	
C515	28387	"	620pf	
C516	27357	"	.05uf	25V
C517	24020	"	150pf	
C518	27357	"	.05uf	25V
C519	28478	"	36pf	
C520	28519	"	27pf	
C521	27357	"	.05uf	25V
C522	28038	"	68uf	15V
C523	28337	"	.47uf	50V
C524	28351	"	.22uf	15V
C525	27010	"	.1uf	12V
C526	28753	"	6.8uf	15V
CR501	40139	Diode	1N54A	
CR502	40139	Diode	1N54A	
CR503 thru CR511	44290	Diode	1N914	
L501	65933	Choke	120uh	
L502	65907	Choke	15uh	
M501	40311	Module, Diode Ring		
Q501	44616	Transistor	2N5461	
Q502	44434	"	MPS-2925	
Q503	44434	"	MPS-2925	
Q504	44252	"	2N3646	
Q505	44379	"	40347	
Q506	44252	"	2N3646	
Q507	44434	"	MPS-2925	
Q508	44434	"	MPS-2925	
R501	17663	Resistor	680 OHM	1/4W
R502	17663	"	680 "	"
R503	18318	"	12K "	"
R504	17120	"	27K "	"
R505	17132	"	220 "	"
R507	17077	"	4.7K "	"
R508	17510	"	120K "	"
R509	17778	"	220K "	"
R510	17663	"	680 "	"
R511	34207	Pot.	1K "	

CKT. SYM.	PART NO.	DESCRIPTION		
R512	17077	Resistor	4.7K OHM	1/4W
R513	17845	"	270 "	"
R514	17792	"	33K "	"
R515	17132	"	220 "	"
R516	18162	"	8.2K "	"
R517	17572	"	18K "	"
R518	17792	"	33K "	"
R519	17792	"	33K "	"
R520	18318	"	12K "	"
R521	17077	"	4.7K "	"
R522	18162	"	8.2K "	"
R523	17481	"	6.8K "	"
R524	17089	"	3.3K "	"
R525	17481	"	6.8K "	"
R526	17089	"	3.3K "	"
R527	17156	"	1K "	"
R528	17041	"	10K "	"
R529	18796	"	68 "	"
R530	17522	"	180 "	"
R531	18186	"	1.2K "	"
R532	18186	"	1.2K "	"
R533	18655	"	120 "	"
R534	18306	"	5.6K "	"
R535	34207	Pot.	1K	
T501	99693	Balanced Modulator Output Transformer		
T502	99693	Balanced Modulator Input Transformer		



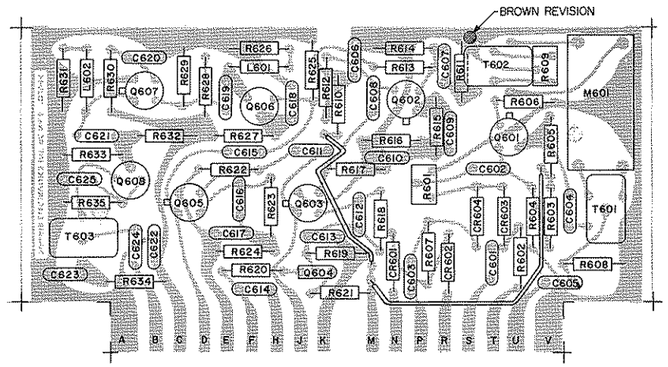


NOTES:
1. ALL CAPACITORS IN μf UNLESS NOTED.
2. ALL RESISTORS IN OHMS 1/4W ±10% UNLESS NOTED.
3. ALL INDUCTORS IN μh UNLESS NOTED.

P.C. #5, BALANCED MODULATOR

CKT. SYM.	PART NO.	DESCRIPTION
	99796	P.C. Board Ass'y with all components
PC#6	10204	P.C. Board for 99796
C601	27333	CAPACITOR .005 uf 100V
C602	27333	" .005 uf 100V
C603	27333	" .005 uf 100V
C604	26913	" .02 uf 25V
C605	28533	" 43 pf
C606	26913	" .02 uf 25V
C607	28533	" 43 pf
C608	28545	" 100 pf
C609	28686	" 33 pf
C610	26913	" .02 uf 25V
C611	28686	" 33 pf
C612	28686	" 33 pf
C613	28337	" .47 uf 50V
C614	25098	" 500 pf
C615	28686	" 33 pf
C616	28686	" 33 pf
C617	26913	" .02 uf 25V
C618	26913	" .02 uf 25V
C619	28703	" 130 pf
C620	26913	" .02 uf 25V
C621	26913	" .02 uf 25V
C622	28337	" .47 uf 50V
C623	28337	" .47 uf 50V
C624	28208	" .001 uf 100V
C625	28868	" 1300 pf
CR601	44290	DIODE, SILICON 1N914
CR602	44290	" " 1N914
CR603	44290	" " 1N914
CR604	44290	" " 1N914
L601	66494	INDUCTOR, 1 mh
L602	66494	" 1 mh
M601	40323	MODULE, DIODE RING
Q601	44513	TRANSISTOR, SILICON 2N5180
Q602	44513	" " 2N5180
Q603	44484	" " 3N128
Q604	44587	" " 2N4288
Q605	44484	" " 3N128
Q606	44393	" " 2N4303
Q607	44513	" " 2N5180
Q608	44331	" " 2N3643
R601	34441	POT 10K ohm .6 W
R602	18318	RESISTOR 12K " 1/4 W
R603	18318	" 12K " " "
R604	17819	" 1.8K " " "
R605	17118	" 100 " " "
R606	17936	" 47 " " "
R607	18318	" 12K " " "
R608	17663	" 680 " " "
R609	34439	POT 100 " .6 W
R610	17156	RESISTOR 1K " 1/4 W
R611	18174	" 15 " " "
R612	17077	" 4.7K " " "
R613	18318	" 12K " " "
R614	18667	" 2.7K " " "
R615	18320	" 560 " " "
R616	18320	" 560 " " "
R617	17675	RESISTOR 150K ohm 1/4W
R618	17845	" 270 " " "
R619	18186	" 1.2K " " "
R620	17106	" 47K " " "
R621	17118	" 100 " " "
R622	17675	" 150K " " "
R623	17845	" 270 " " "
R624	18186	" 1.2K " " "
R625	17675	" 150K " " "
R626	17118	" 100 " " "
R627	17118	" 100 " " "
R628	18318	" 12K " " "
R629	18667	" 2.7K " " "
R630	17118	" 100 " " "
R631	17118	" 100 " " "
R632	17247	" 1.5K " " "
R633	17273	" 150 " " "
R634	18174	" 15 " " "
R635	17716	" 10 " " "
T601	99693	TRANSFORMER, TOROID, TRIFILAR
T602	99693	" " "
T603	99692	" " BIFILAR

REVISION	DESCRIPTION
BROWN	CHANGED R621 FROM 1K TO 100 OHMS.

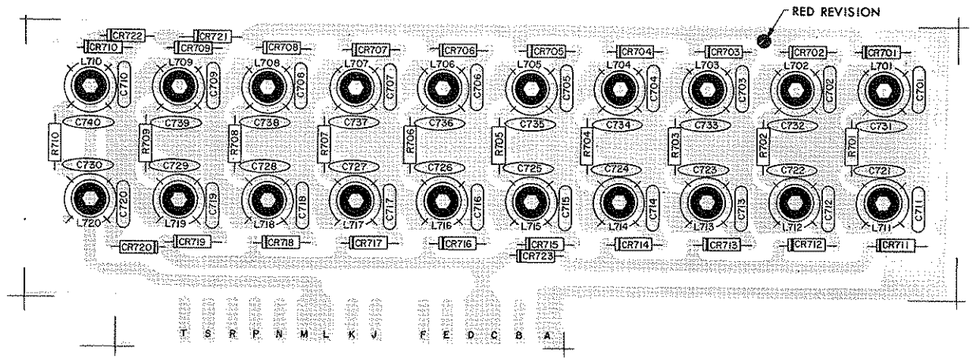


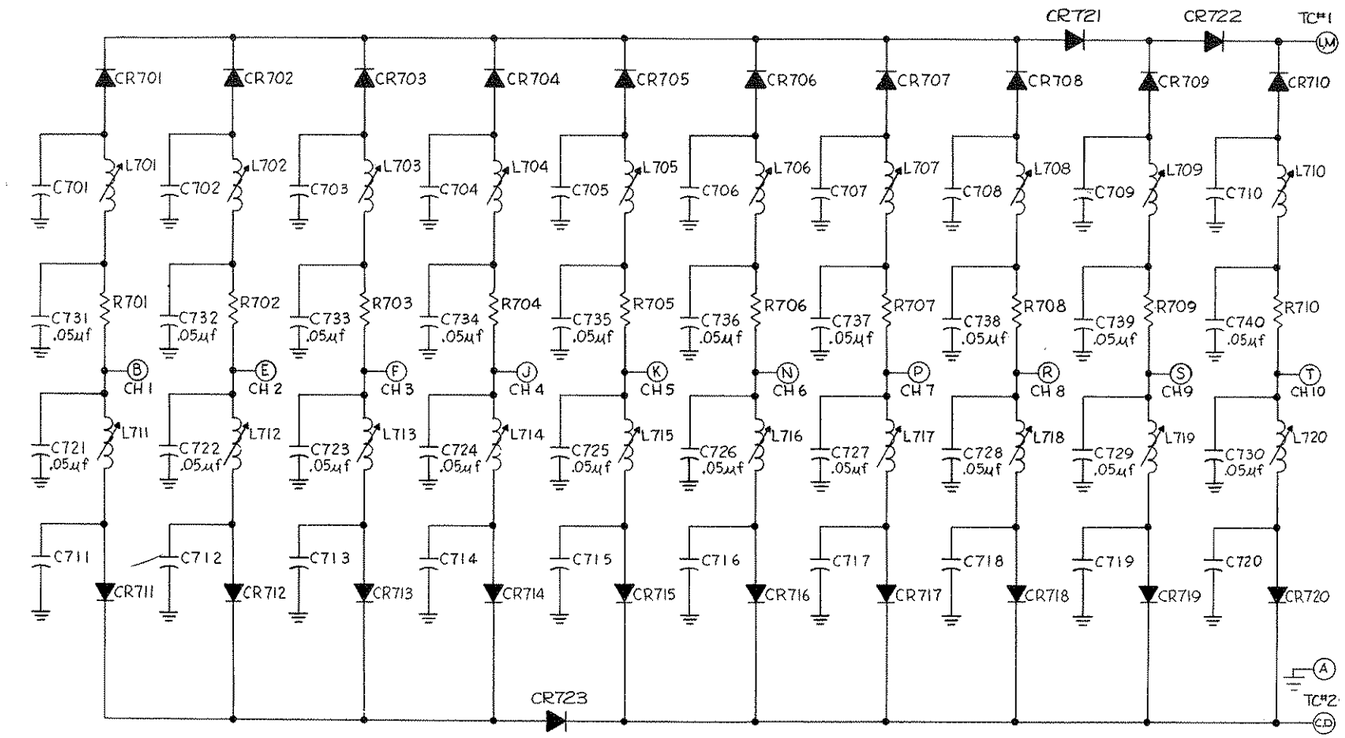
NOTES:
1. ALL CAPACITORES IN μf UNLESS NOTED.
2. ALL RESISTORS IN OHMS 1/4 W CARBON ± 10% UNLESS NOTED.
3. ALL INDUCTORS IN μh UNLESS NOTED.

P.C. #6, EXCITER

CKT. SYM.	PART NO.	DESCRIPTION
	99797	P.C. Board Ass'y. Without Customizing Components
PC7	10203	P.C. Board for 99797
C701 thru C720		Capacitor - Frequency Dependent - See Customizing Chart, Page 81
C721 thru C740	27357	Capacitor .05uf 25V
CR701 thru CR723	40510	Diode 1N914B
L701 thru L720	62993	Coil, Variable - Frequency Dependent - See Customzing Chart, Page 81
R701 thru R710		Resistor - Frequency Dependent - See Customizing Chart, Page 81

REVISION	DESCRIPTION
RED	CR701 THRU CR723 DIODES CHANGED FROM 1N914 (44290) TO 1N914B (40510)

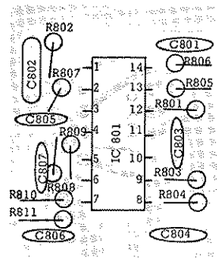




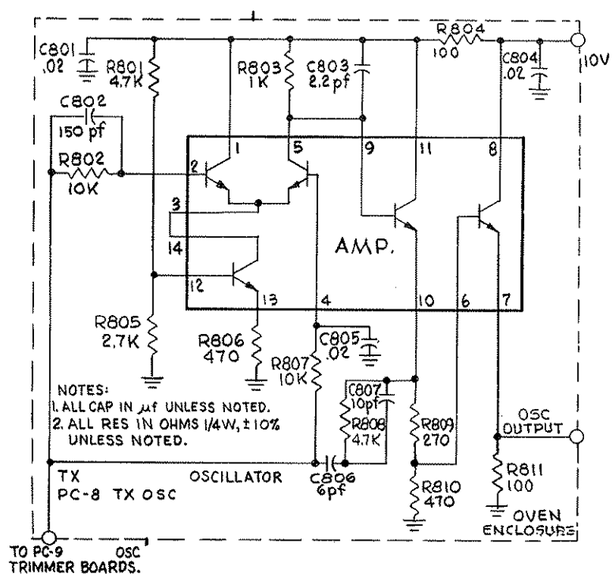
NOTES:
1. L701-L720, C701-C720, R701-R710 FREQUENCY DEPENDENT. SEE CUSTOMIZING CHART.

P.C. #7, EXCITER TUNED CIRCUITS (10 CHAN.)

CKT. SYM.	PART NO.	DESCRIPTION		
	99798	P.C. Board Ass'y. With all Components		
PC8	10210	P.C. Board for 99798		
C801	26913	Capacitor	.02uf	25V
C802	28090	"	150pf	500V
C803	25000	"	2.2pf	100V
C804	26913	"	.02uf	25V
C805	26913	"	"	"
C806	25036	"	6pf	100V
C807	26834	"	10pf	500V
IC801	44551	Integrated Circuit	CA3046	
R801	17077	Resistor	4.7K ohm	1/4W
R802	17041	"	10K "	"
R803	17156	"	1K "	"
R804	17118	"	100 "	"
R805	18667	"	2.7K "	"
R806	18411	"	470 "	"
R807	17041	"	10K "	"
R808	17077	"	4.7K "	"
R809	17845	"	270 "	"
R810	18411	"	470 "	"
R811	17118	"	100 "	"

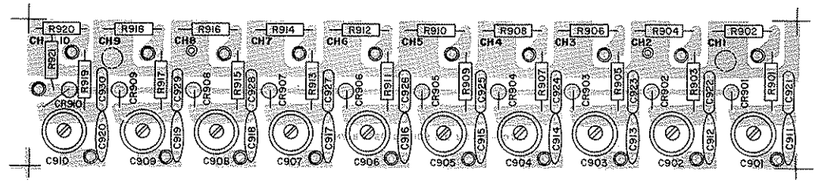


P.C. #8 - TX OSC.

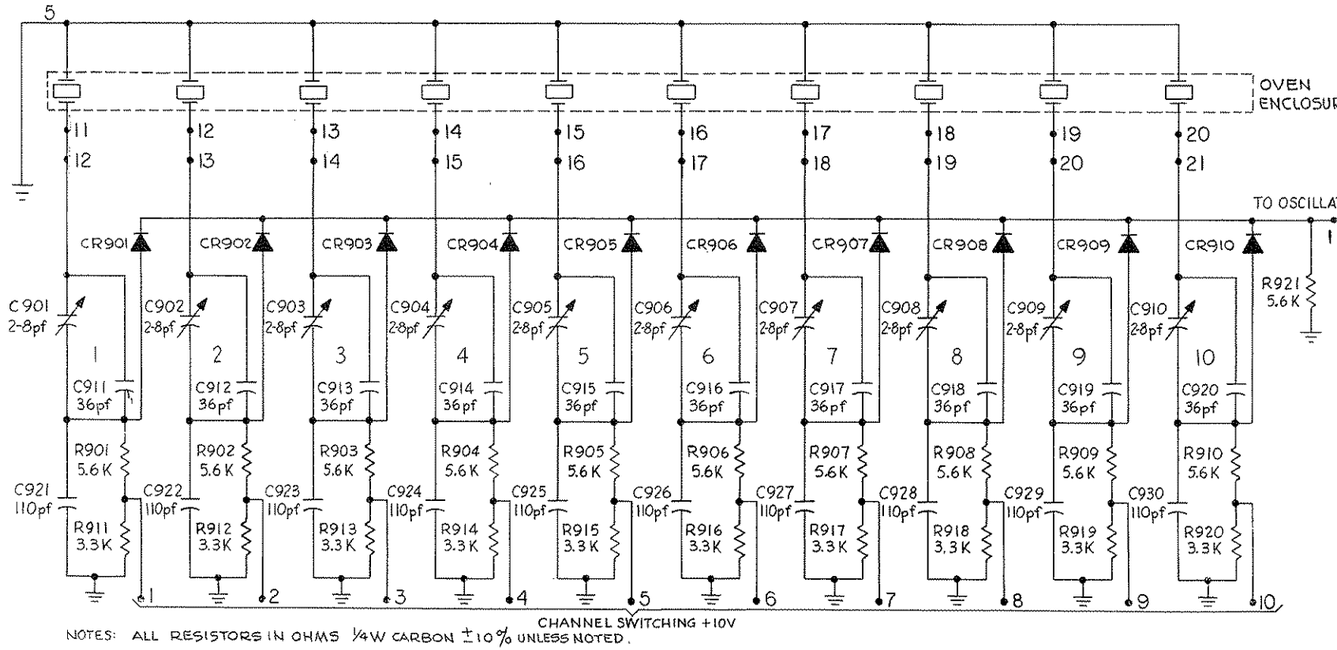


P.C. #8, TX OSC.

CKT. SYM.	PART NO.	DESCRIPTION
	99799	P.C. Board Ass'y. With All Components
PC9	10211	P.C. Board for 99799
C901 thru C910	26822	Capacitor, Variable 2-8pf
C911 thru C920	28478	" 36pf
C921 thru C930	28131	" 110pf
CR901 thru CR910	44290	Diode 1N914
R901 thru R910	18306	Resistor 5.6K ohm 1/4W
R911 thru R920	17089	" 3.3K " "
R921	18306	" 5.6K " "



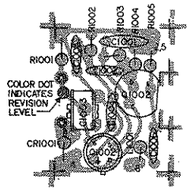
P.C. #9 - TX TRIMMER

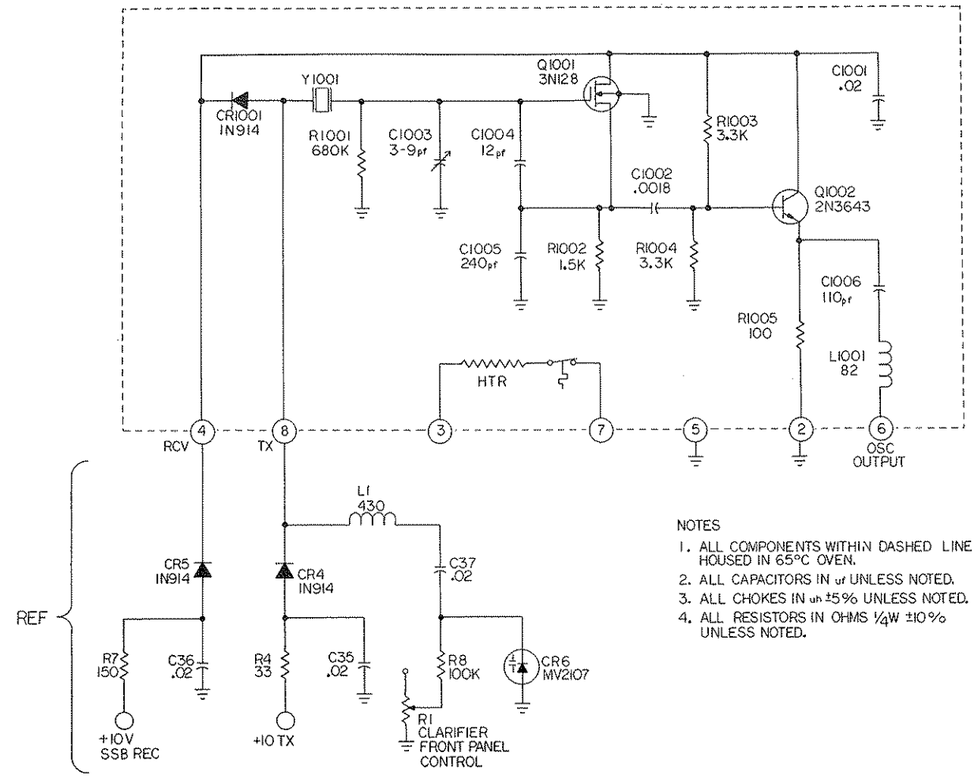


NOTES: ALL RESISTORS IN OHMS 1/4W CARBON ±10% UNLESS NOTED.
IDENTICAL CIRCUITS USED IN RECEIVER OSCILLATOR OPTION WHEN INSTALLED EXCEPT CHANNELS 9 & 10 DELETED.
TX TRIMMER BOARD PC-9. REC ONLY TRIMMER BOARD PC-11.

P.C. #9, TX TRIMMER

CKT. SYM.	PART NO.	DESCRIPTION
	99800	P.C. Board Ass'y with all Components
PC#10	10212	P.C. Board for 99800
C1001	26913	Capacitor, .02uf 25V
C1002	28869	" .0018uf
C1003	28741	" Variable 3-9pf
C1004	28648	" 12pf 500V
C1005	28862	" 240pf 500V
C1006	28131	" 110pf 500V
CR1001	44290	Diode IN914
L1001	65908	Choke, Molded 82uh±5%
Q1001	44484	FET 3N128
Q1002	44331	Transistor 2N3643
R1001	18148	Resistor 680K ohm 1/4W
R1002	17247	" 1.5K " "
R1003	17089	" 3.3K " "
R1004	17089	" 3.3K " "
R1005	17118	" 100 " "
Y1001	81834	Crystal 1650kHz +65°C



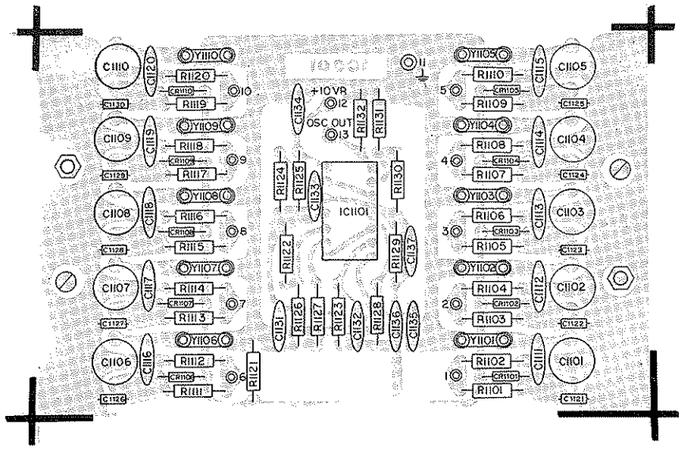


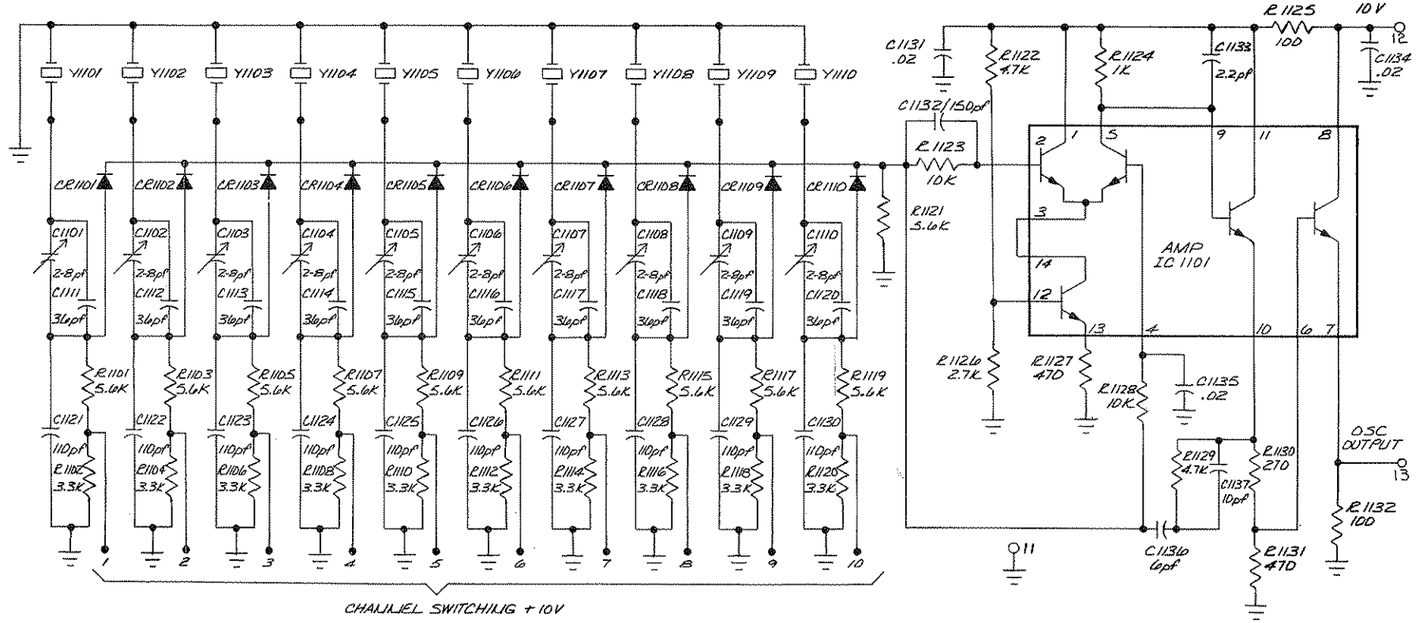
NOTES

1. ALL COMPONENTS WITHIN DASHED LINE HOUSED IN 65°C OVEN.
2. ALL CAPACITORS IN uf UNLESS NOTED.
3. ALL CHOKES IN uh ±5% UNLESS NOTED.
4. ALL RESISTORS IN OHMS 1/4W ±10% UNLESS NOTED.

P.C. #10, 1650 OSCILLATOR

CKT. SYM.	PART NO.	DESCRIPTION	
	99760	P.C. Board Ass'y with all components	
PC#11	10001	P.C. Board for 99760	
C1101 thru C1110	26822	Capacitor, Variable	2-8 pf
C1111 thru C1120	28478	"	36 pf
C1121 thru C1130	28131	"	110 pf
C1131	26913	"	.02 uf 25V
C1132	28090	"	150 pf 500V
C1133	25000	"	2.2 pf 100V
C1134	26913	"	.02 uf 25V
C1135	26913	"	" "
C1136	25036	"	6 pf 100V
C1137	26834	"	10 pf 500V
CR1101 thru CR1110	44290	Diode	1N914
IC1101	44551	Integrated Circuit	CA3046
R1101	18306	Resistor	5.6K ohm 1/4W
R1102	17089	"	3.3K " "
R1103	18306	"	5.6K " "
R1104	17089	"	3.3K " "
R1105	18306	"	5.6K " "
R1106	17089	"	3.3K " "
R1107	18306	"	5.6K " "
R1108	17089	"	3.3K " "
R1109	18306	"	5.6K " "
R1110	17089	"	3.3K " "
R1111	18306	"	5.6K " "
R1112	17089	"	3.3K " "
R1113	18306	"	5.6K " "
R1114	17089	"	3.3K " "
R1115	18306	"	5.6K " "
R1116	17089	"	3.3K " "
R1117	18306	"	5.6K " "
R1118	17089	"	3.3K " "
R1119	18306	"	5.6K " "
R1120	17089	"	3.3K " "
R1121	18306	"	5.6K " "
R1122	17077	"	4.7K " "
R1123	17041	"	10K " "
R1124	17156	"	1K " "
R1125	17118	"	100 " "
R1126	18667	"	2.7K " "
R1127	18411	"	470 " "
R1128	17041	"	10K " "
R1129	17077	"	4.7K " "
R1130	17845	"	270 " "
R1131	18411	"	470 " "
R1132	17118	"	100 " "
Y1101 thru Y1110	81860	Crystal, Channel, 27°C	



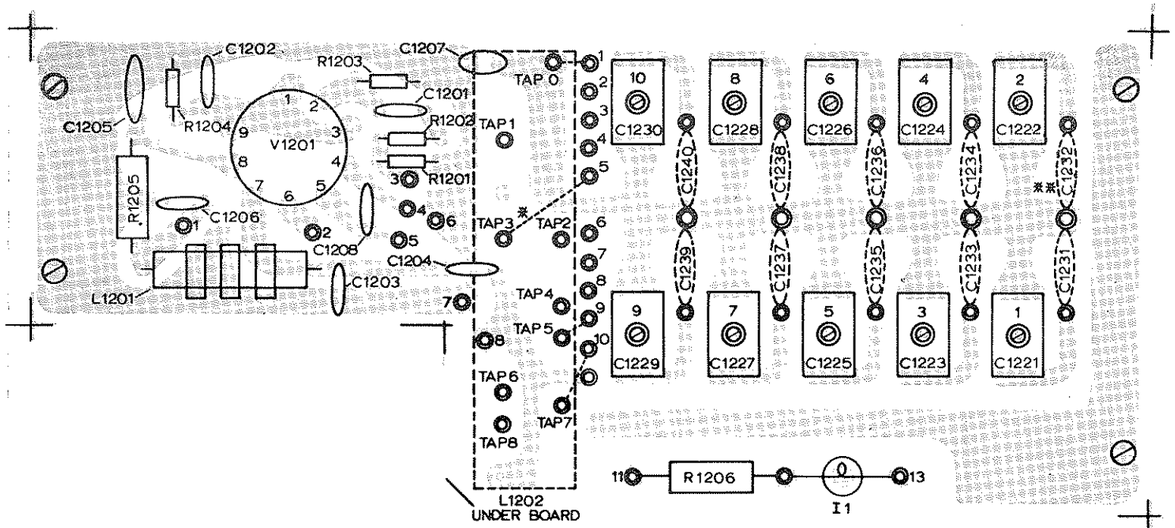


NOTES:
1. ALL RESISTORS IN OHMS 1/4 W CARBON ± 10% UNLESS NOTED.
2. ALL CAPACITORS IN µf UNLESS NOTED.

P. C. #11, RECEIVER OSCILLATOR

CKT. SYM.	PART NO.	DESCRIPTION
C38	27345	Capacitor .02 uf 100V
C39	27656	" .005 uf 1000V
C40	27656	" " "
C41	27345	" .02 uf 100V
C42	24410	" .01 uf 1.6KV
C43	27644	" .001 uf 1000V
C44	28911	" .002 uf 6KV
C45	24850	" Variable 1-30 pf
C46	24458	" .02 uf 150V
C47	27345	" .02 uf 100V
C48	27345	" " "
C49	27345	" " "
C50	28337	" .47 uf 50V
C51	27321	" .01 uf 12V
C52	26822	" Variable 2-8 pf
C53	28246	" .0024 uf
C54	26822	" Variable 2-8 pf
C55	28866	" 910 pf 500V
C56	27357	" .05 uf 25V
C1201	25098	" 500 pf 500V
C1202	27345	" .02 uf 100V
C1203	28634	" 10 pf 500V
C1204	24020	" 150 pf "
C1205	27656	" .005 uf 1000V
C1206	27656	" " "
C1207	28624	" 680 pf 500V
C1221 thru C1230	28894	" Variable 8-60 pf 500V
C1231 thru C1240		Capacitor - Frequency Dependent - See Customizing Chart (Section VIII)
C1301 thru C1330		Capacitor - Frequency Dependent -See Customizing Chart (Section VIII)
CR2	40282	Diode, Zener Z4892
CR3	40282	" " "
CR7 thru CR10	44290	" 1N914
E1	99362	Parasitic Suppressor
E2	99362	" "
K1	66286	Relay
L3	56061	Choke 2.5 mh
L4-L5	62931	Inductor Air Wound
L1201	56384	Choke .5 mh
L1202	62943	Inductor Air Wound
L1301 thru L1310	63181	Coil, Variable
PC#12	10245	P.C. Board Driver Amp
PC#13	10246	P.C. Board P.A. Tuned Ckt.
R3	33590	Potentiometer 10K
R9	17742	Resistor 18K ohm 1/2W
R10	18538	" 10 " "
R11	18538	" " " "
R12	18538	" " " "
R13	18538	" " " "
R14	16607	" 15K " "

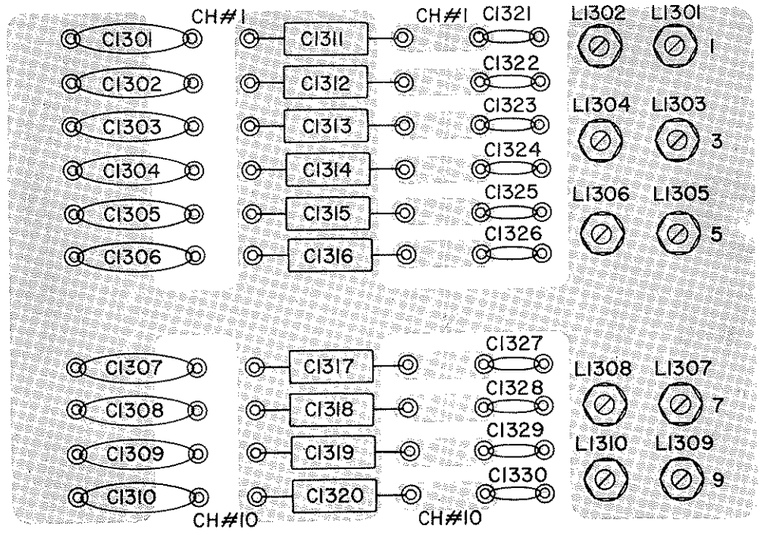
CKT. SYM.	PART NO.	DESCRIPTION
R15	16724	Resistor 10K ohm 1/2W
R16	18875	" 1.5K " 10W
R17	19037	" 1K " 5W
R18	18344	" 120K " 1/2W
R19	16920	" 4.7K " "
R20	17596	" 1.2K " "
R21	18320	" 560 " 1/4W
R22	18954	" 8.2K " 1/2W
R23	17596	" 1.2K " "
R1201	17936	" 47 " 1/4W
R1202	18253	" 33 " "
R1203	17041	" 10K " "
R1204	17936	" 47 " "
R1205	17431	" 27K " 1W
R1206	18332	" 180 " 3W
S4	32534	Switch Slide
SW4	33540	" Driver Tuned Ckt.
SW5	33540	" Driver Tuned Ckt. Tap Selector
SW6	33526	" Pi Network, Input
SW7	34348	" Pi Network, Fine Tuning
SW8	34348	" Pi Network, Coarse Tuning
SW9	33526	" Pi Network, Output
V1	76669	Tube Electron 6883B
V2	76669	" " "
V1201	76683	" " 12HG7
Z1	97769	ALC Detector Ass'y



*JUMPERS USED FROM CHANNEL WIRES TO DESIRED TAP FOR FREQUENCY CUSTOMIZING (SEE DRIVER & PA CUSTOMIZING CHART)

**FIXED CAPACITORS ADDED WHEN REQUIRED FOR FREQUENCY CUSTOMIZING (SEE DRIVER & PA CUSTOMIZING CHART)

P. C. #12, DRIVER AMPLIFIER & TUNED CIRCUIT



P. C. #13, POWER AMPLIFIER TUNED CIRCUIT

DRIVER

FINAL AMPLIFIER

DETECTOR METER DRIVER

TO FRONT PANEL METER

PC-12

PC-13

P.C. 12

P.C. 14

Z1 ALC DETECTOR

TO RECEIVER PC-1

TO ANTENNA SYSTEM J8

TO J10 PINS 4 AND 9

K1

FROM EXCITER J-6 (B)

+300 VDC

V1201 12HG7

C1203 10pf

R1202 33

C1201 500

R1201 47

R1203 10K

L1201 .5mh

R1205 27K/1W

R1204 47

C1202 .02

C1205 .005

C1206 .005

C1207 680

C1204 150pf

SW4

SW5

VARIABLE TAP

L1202 VARIABLE C1221 - C1230

C1231 - C1240 (FIXED)

-52 VDC NOM.

R9 18K 2W

J10(11) FROM PWR SUPPLY +800 VDC

L-3 2.5mh

C43 .001

C42 .01 1.6KV

E1 E2 V1 V2 6883B

+250 VDC

R10 10 1/2W

R11 10 1/2W

R12 10 1/2W

C38 .02

C39 .005

C40 .005

R13 10 1/2W

C41 .02

TP1 BIAS

TP2 BIAS

R19 4.7K 1/2W

R20 1.2K 1/2W

C52 2.8pf

CR7 IN914

R21 560

C53 .0024

SB DETECTOR

A+

OUTPUT

CR8 IN914

AM DETECTOR

R22 8.2K 1/2W

C54 2.8pf

R23 1.2K 1/2W

C55 910pf

1,5,8

R18 120K 1/2W

LO HI

S4A

S4B

CR2 Z4892

CR3 Z4892

R17 1K 5W

R16 1.5K 10W

AM SELECT

ALC DRIVE TO EXCITER J6 (F)

+400 VDC SCREEN & DRIVER PLATE SUPPLY FROM PWR SUPPLY J10(10)

BIAS ADJUST R3 10K

R15 10K 1/2W

BIAS -62 VDC

J1C(3) FROM PWR SUPPLY

NEUT. C45 1-30pf

C44 .002, 4 KV

INPUT C1301 - C1310

L-4 (FINE TUNING)

L-5 (COARSE TUNING)

VARIABLE TAPS

C1321 - C1330 L1301 - L1310 (TRAP)

C1311 - C1320 (OUTPUT)

SW6 SW7 SW8 SW9

C51 .01

R14 15K 1/2W

CR9 IN914

CR10 IN914

C50 .47

C56 .05

TO PWR SUPPLY J10

TS2-3

J10(12)

J10(13)

J10(15)

S3(9)

S3(1)

ON/OFF/RCV SWITCH

V1201

V2

V1

C1208 .02

C47 .02

C48 .02

C49 .02

R1206 180/3W

I1 DIAL LIGHT

I2 METER LIGHT

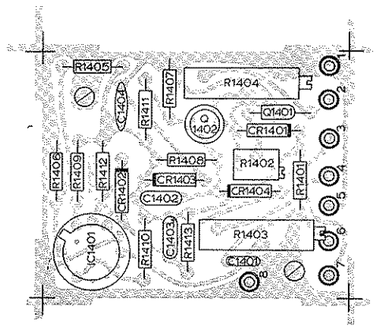
ALL RESISTORS 1/4 W, ALL CAPACITORS IN uF UNLESS OTHERWISE SPECIFIED

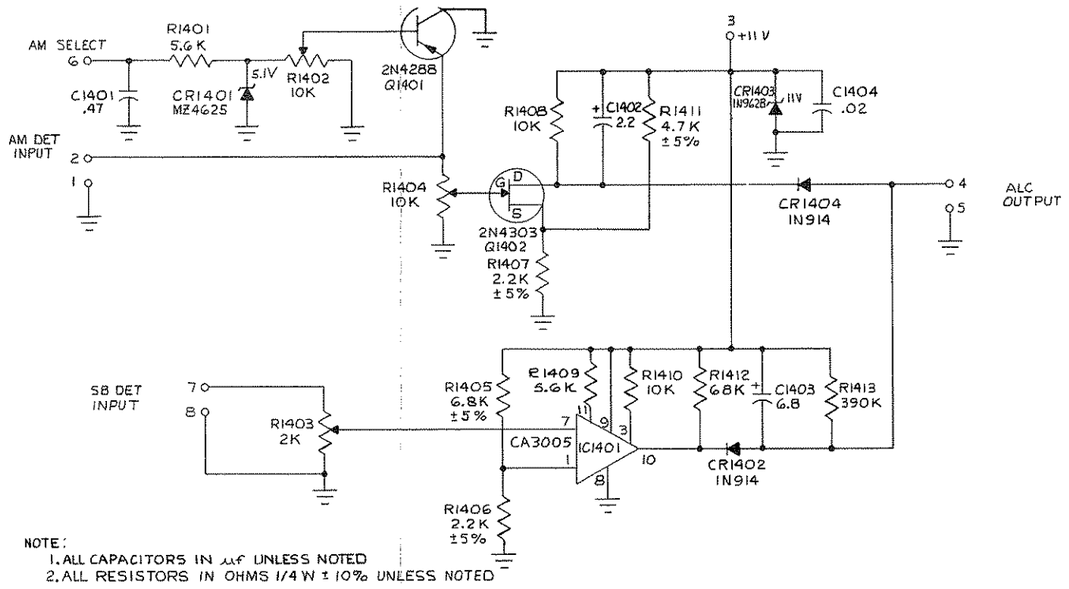
CHASSIS GROUND

A MINUS

* SELECTED VALUE

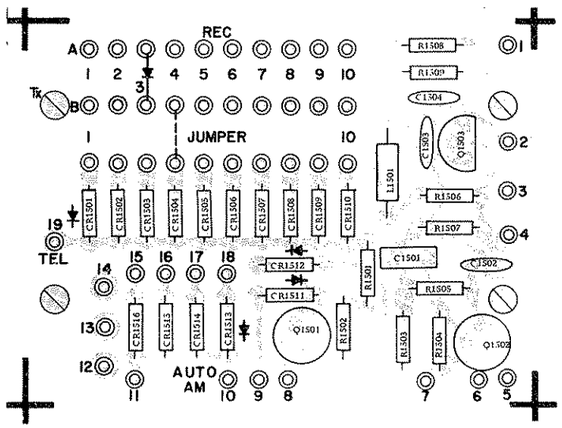
CKT. SYM.	PART NO.	DESCRIPTION
	97767	P.C. Board Ass'y with all components
PC#14	10327	P.C. Board for 97767
C1401	28337	Capacitor .47 uf 50V
C1402	24472	" 2.2 uf 15V
C1403	28753	" 6.8 uf 15V
C1404	26913	" .02 uf 25V
CR1401	40508	Diode, Zener MZ4625
CR1402	44290	" 1N914
CR1403	40464	" Zener 1N962B
CR1404	44290	" 1N914
IC1401	44446	Integrated Circuit CA3005
R1401	18306	Resistor 5.6K ohm 1/4W
R1402	34441	Potentiometer 10K "
R1403	33849-6	" 2K "
R1404	33849-4	" 10K "
R1405	17481	Resistor 6.8K " 1/4W
R1406	17807	" 2.2K " "
R1407	17807	" 2.2K " "
R1408	17041	" 10K " "
R1409	18306	" 5.6K " "
R1410	17041	" 10K " "
R1411	17077	" 4.7K " "
R1412	17352	" 68K " "
R1413	18992	" 390K " "
Q1401	44587	Transistor 2N4288
Q1402	44393	" 2N4303

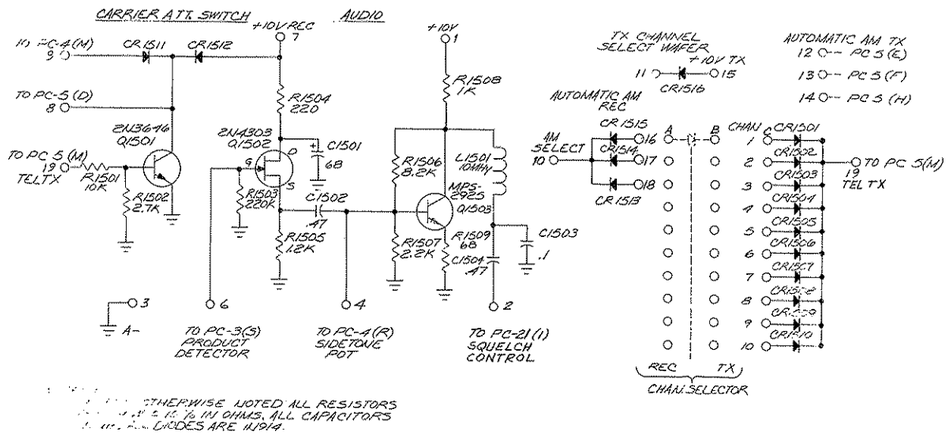




P. C. #14, ALC AMPLIFIER

CKT. SYM.	PART NO.	DESCRIPTION		
	99765	P.C. Board Ass'y with all components		
PC#15	10106	P.C. Board for 99765		
C1501	28038	Capacitor	68 uf	15V
C1502	28337	"	.47 uf	50V
C1503	27010	"	.1 uf	12V
C1504	28337	"	.47 uf	50V
CR1501 thru CR1516	44290	Diode	1N914	
L1501	56413	Choke	10 mh	
R1501	17041	Resistor	10K ohm	1/4W
R1502	18667	"	2.7K "	"
R1503	17778	"	220K "	"
R1504	17132	"	220 "	"
R1505	18186	"	1.2K "	"
R1506	18162	"	8.2K "	"
R1507	17807	"	2.2K "	"
R1508	17156	"	1K "	"
R1509	18796	"	68 "	"
Q1501	44252	Transistor	2N3646	
Q1502	44393	"	2N4303	
Q1503	44434	"	MPS2925	

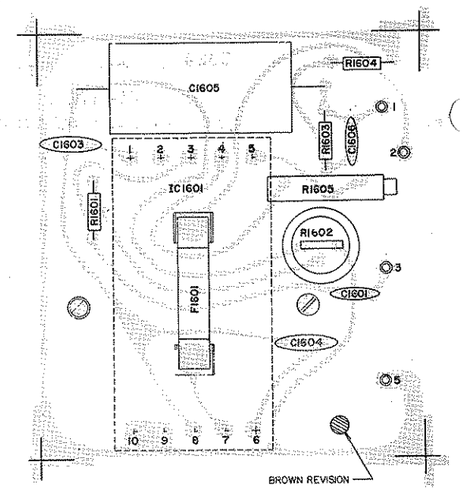


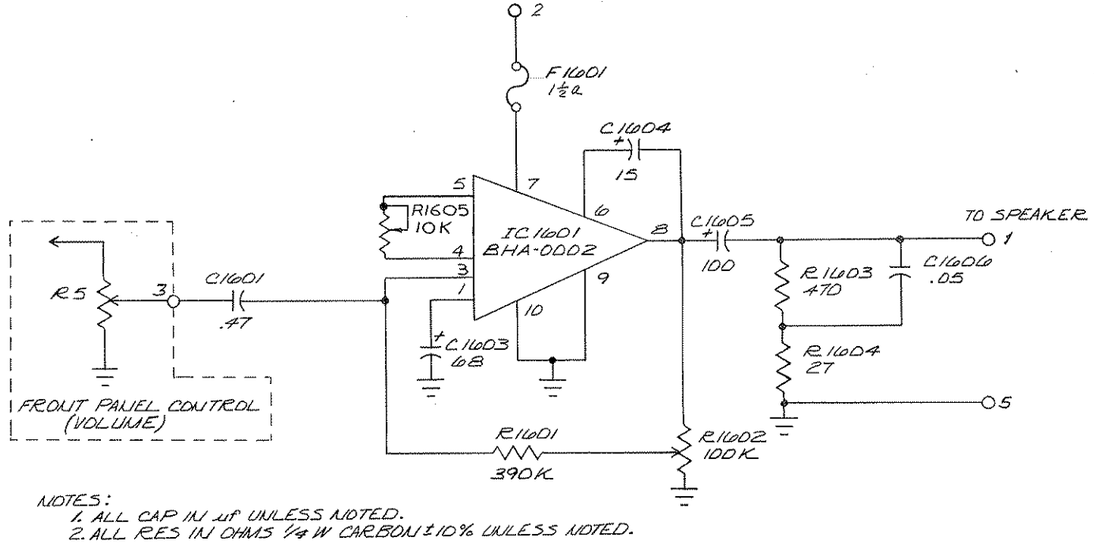


UNLESS OTHERWISE NOTED ALL RESISTORS ARE 1/4 W 10% OHMS, ALL CAPACITORS ARE MFD. ALL DIODES ARE 1N914.

P. C. #15, AUDIO PRE AMP AND CHANNEL CUSTOMIZING

CKT. SYM.	PART NO.	DESCRIPTION
	97768-2	P.C. Board Ass'y with all components
PC#16	10324	P.C. Board for 97768-2
C1601	28337	Capacitor .47 uf 50V
C1603	28038	" 68 uf 15V
C1604	27400	" 15 uf 35V
C1605	28014	" 100 uf 50V
C1606	27357	" .05 uf 25V
F1601	87591	Fuse 1.5 amp
IC1601	44604	Integrated Circuit BHA-0002
R1601	18992	Resistor 390K ohm 1/4W
R1602	34506	Potentiometer 100K " 1/2W
R1603	18411	Resistor 470 " 1/4W
R1604	17259	" 27 " "
R1605	33849-4	Potentiometer 10K " 1/2W



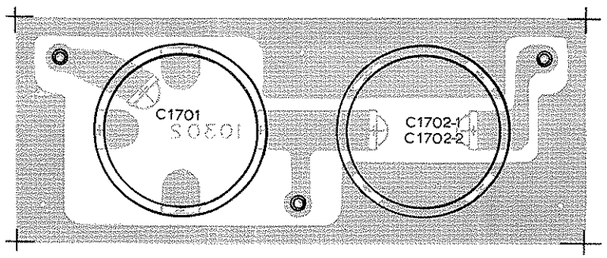


NOTES:
1. ALL CAP IN uf UNLESS NOTED.
2. ALL RES IN OHMS 1/4 W CARBON ±10% UNLESS NOTED.

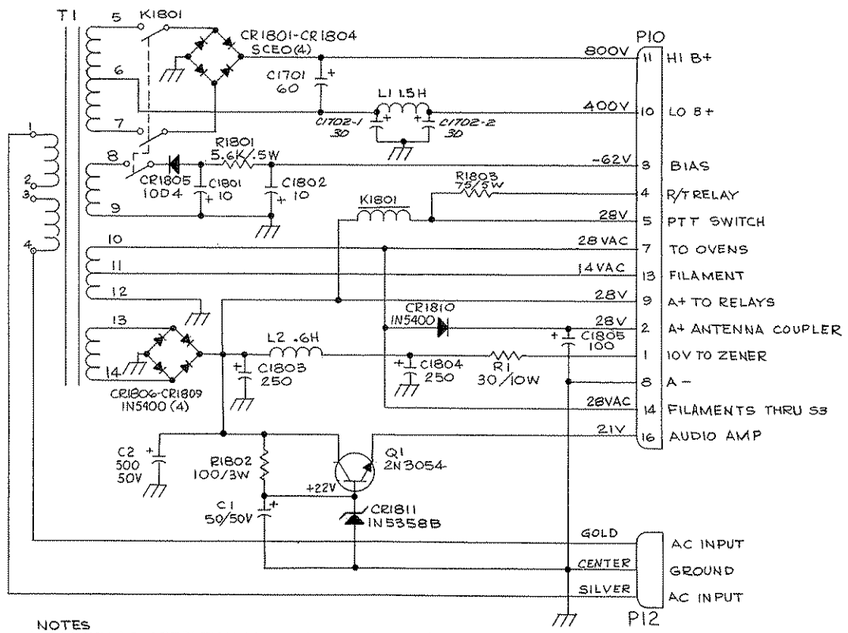
P. C. #16, AUDIO AMPLIFIER

AC POWER SUPPLY

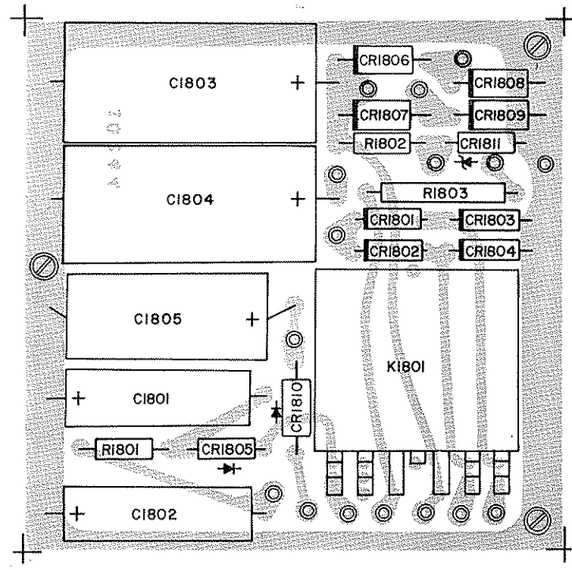
CKT. SYM.	PART NO.	DESCRIPTION	
C1	24707	Capacitor	50uf 50V
C2	28923	"	500uf 50V
C1701	28909	"	60uf 450V
C1702-1			
C1702-2	28876	"	30+30uf 500V
C1801	24549	"	10uf 150V
C1802	24549	"	10uf 150V
C1803	27292	"	250uf 50V
C1804	27292	"	250uf 50V
C1805	28014	"	100uf 50V
CR1801	40335	Diode	SCEO
CR1802	40335	"	SCEO
CR1803	40335	"	SCEO
CR1804	40335	"	SCEO
CR1805	40165	"	10D4
CR1806	40397	"	1N5400
CR1807	40397	"	1N5400
CR1808	40397	"	1N5400
CR1809	40397	"	1N5400
CR1810	40397	"	1N5400
CR1811	40490	" Zener	1N5358B
K1801	66456	Relay	4PDT
L1	55988	Choke	1.5h
L2	55990	"	0.6h
P10	75158	Connector	16 pin
P12	75184	"	3 pin
Q1	44355	Transistor	2N3054
R1	19013	Resistor	30 ohm 10W
R1801	18588	"	5.6K ohm 1/2W
R1802	16308	"	100 ohm 3W
R1803	16138	"	75 ohm 5W
T1	49032	Transformer, Power	
	97761	P.C. #17 Ass'y with all components	
PC#17	10302	P.C. Board for 97761	
	99771	P.C. #18 Ass'y with all components	
PC#18	10244	P.C. Board for 99771	



P. C. #17, HIGH VOLTAGE FILTER, AC POWER SUPPLY



NOTES
1. FOR 115 VAC OPERATION, WINDINGS 1&2 AND 3&4 ARE CONNECTED IN PARALLEL.
2. FOR 230 VAC OPERATION, WINDINGS 1&2 AND 3&4 ARE CONNECTED IN SERIES.
3. UNLESS NOTED ALL CAPACITORS IN μf.

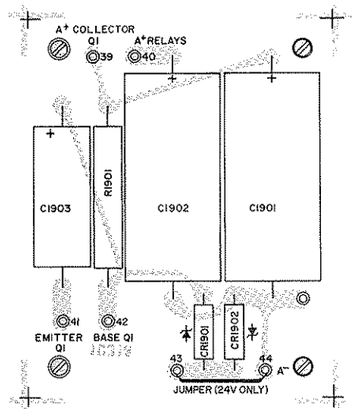


P. C. #18, P. C. BOARD, AC POWER SUPPL

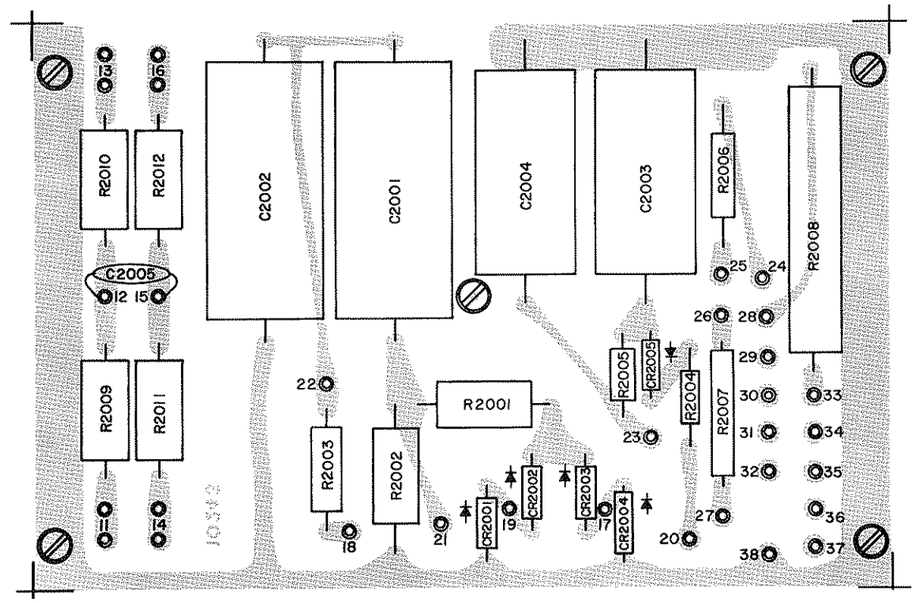
AC POWER SUPPLY MODULE

DC Power Supply Module

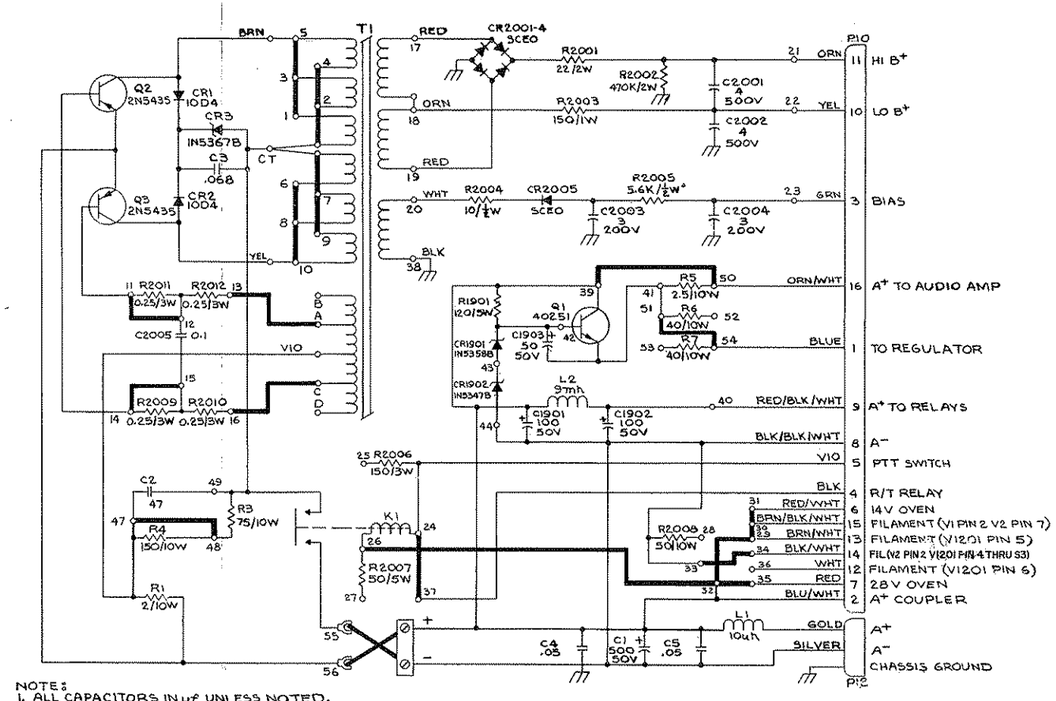
CKT. SYM.	PART NO.	DESCRIPTION
C1	28923	Capacitor 500uf 50V
C2	28337	" 0.47uf " (24 & 32 VDC)
C2	24575	Capacitor 47uf " (12 VDC)
C3	27204	Capacitor 0.068uf 300V
C4	27929	" 0.05uf 100V
C5	27929	" " "
C1901	28014	" 100uf 50V
C1902	28014	" " "
C1903	24707	" 50uf "
C2001	24484	" 4uf 500V
C2002	24484	" " "
C2003	27852	" 3uf 200V
C2004	27852	" " "
C2005	24408	" 0.1uf 75V
CR1	40165	Diode 10D4
CR2	40165	" "
CR3	40509	" Zener 1N5367B
CR1901	40490	" " 1N5358B
CR1902	40505	" " 1N5347B
CR2001 thru CR2005	40335	" SCEO
K1	66016	Relay SPST
L1	56372	Choke 10uh
L2	93772	" 9mh
P10	75158	Connector 16 Pin
P12	75184	" 3 Pin
Q1	44381	Transistor 40251
Q2	44628	" 2N5435 (12 VDC only)
Q3	44628	" " "
Q2	44630	" MJ802 (24 & 32 VDC only)
Q3	44630	" " "
R1	19099	Resistor 2 ohm 10W
R3	19104	" 75 " "
R4	19087	" 150 " "
R5	16918	" 2.5 " "
R6	19001	" 40 " "
R7	19001	" " " "
R1901	18863	" 120 " 5W
R2001	16994	" 22 " 2W
R2002	18526	" 470K " "
R2003	18784	" 150 " 1W
R2004	18538	" 10 " 1/2W
R2005	18588	" 5.6K " "
R2006	16011	" 150 " 3W
R2007	19063	" 50 " 5W
R2008	16841	" 50 " 10W
T1	49020	Transformer, Power
	97756	P.C. #19 Ass'y with all components
PC19	10318	P.C. Board for 97756
	97757	P.C. #20 Ass'y with all components
PC20	10243	P.C. Board for 97757



P.C. #19, VOLTAGE REGULATOR, DC POWER SUPPLY

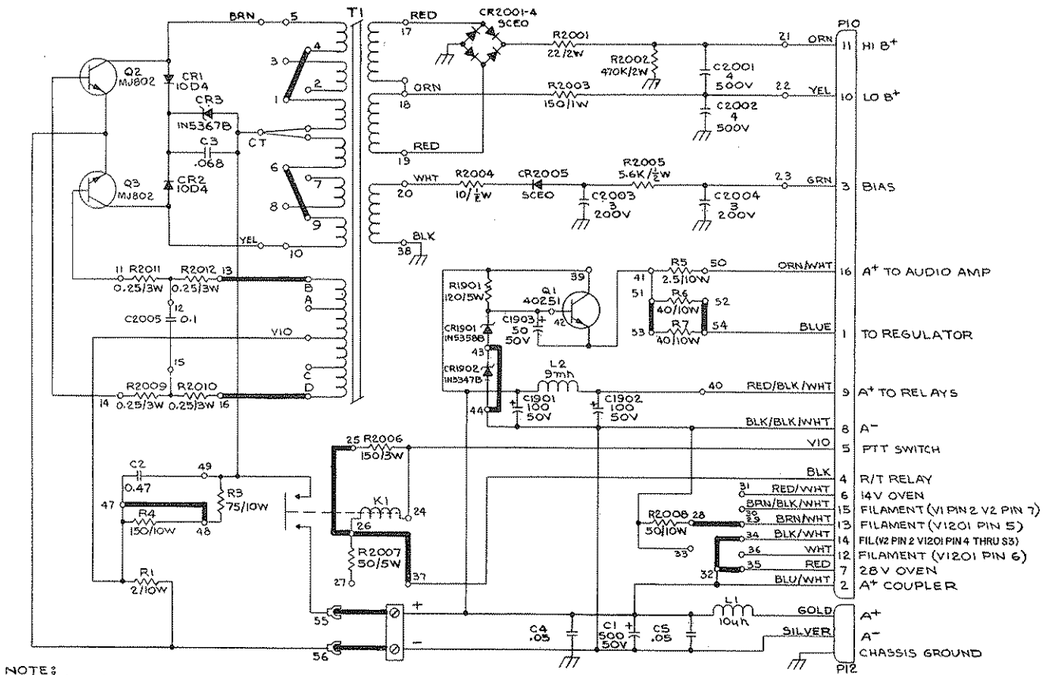


P.C. #20, P.C. BOARD, DC POWER SUPPLY



NOTE:
1. ALL CAPACITORS IN μf UNLESS NOTED.
2. a) TERMINALS 1-10 & A-D ARE LOCATED ON TRANSFORMER T1
   b) TERMINALS 11-38 ARE LOCATED ON P.C.-20
   c) TERMINALS 39-44 ARE LOCATED ON P.C.-19
   d) ALL OTHER TERMINALS ARE CHASSIS COMPONENTS
3. BOLD LINES INDICATE JUMPERS FOR VOLTAGE CUSTOMIZING

12 VDC POWER SUPPLY MODULE SCHEMATIC



NOTE:
1. ALL CAPACITORS IN µf UNLESS NOTED.
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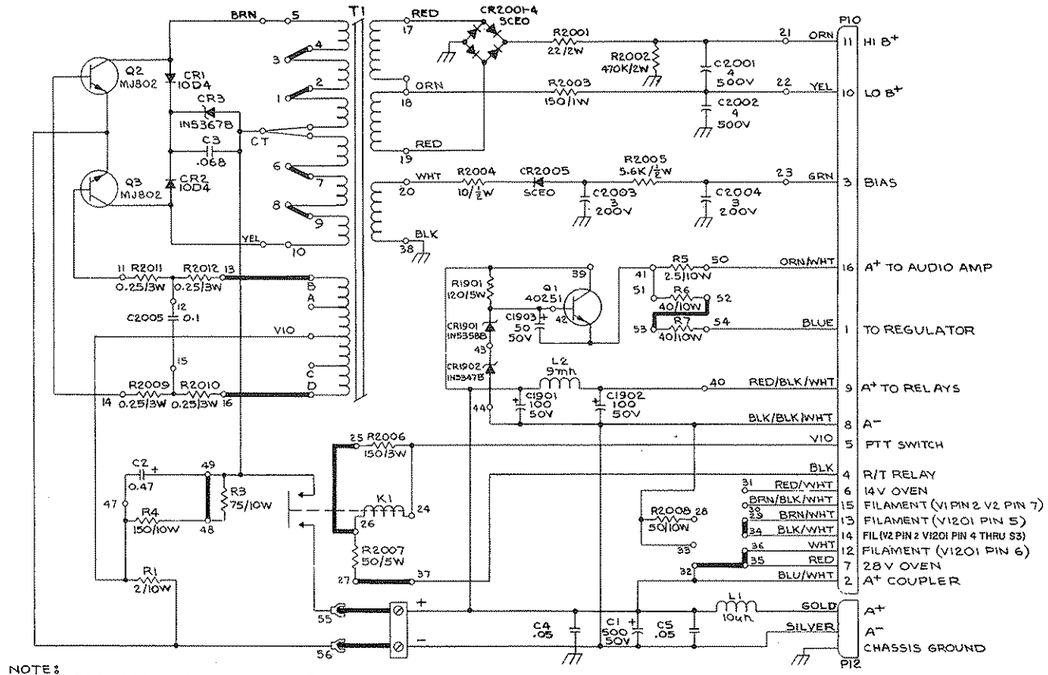
   b) TERMINALS 11-38 ARE LOCATED ON P.C.-20
   c) TERMINALS 39-44 ARE LOCATED ON P.C.-19
   d) ALL OTHER TERMINALS ARE CHASSIS COMPONENTS
3. BOLD LINES INDICATE JUMPERS FOR VOLTAGE CUSTOMIZING

24 VDC POWER SUPPLY MODULE SCHEMATIC



NOTE:
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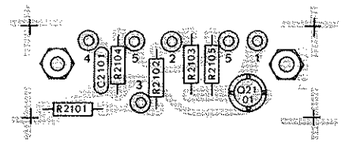
2. a) TERMINALS 1-10 & A-D ARE LOCATED ON TRANSFORMER T1
   b) TERMINALS 11-38 ARE LOCATED ON P.C.-20
   c) TERMINALS 39-44 ARE LOCATED ON P.C.-19
   d) ALL OTHER TERMINALS ARE CHASSIS COMPONENTS
3. BOLD LINES INDICATE JUMPERS FOR VOLTAGE CUSTOMIZING

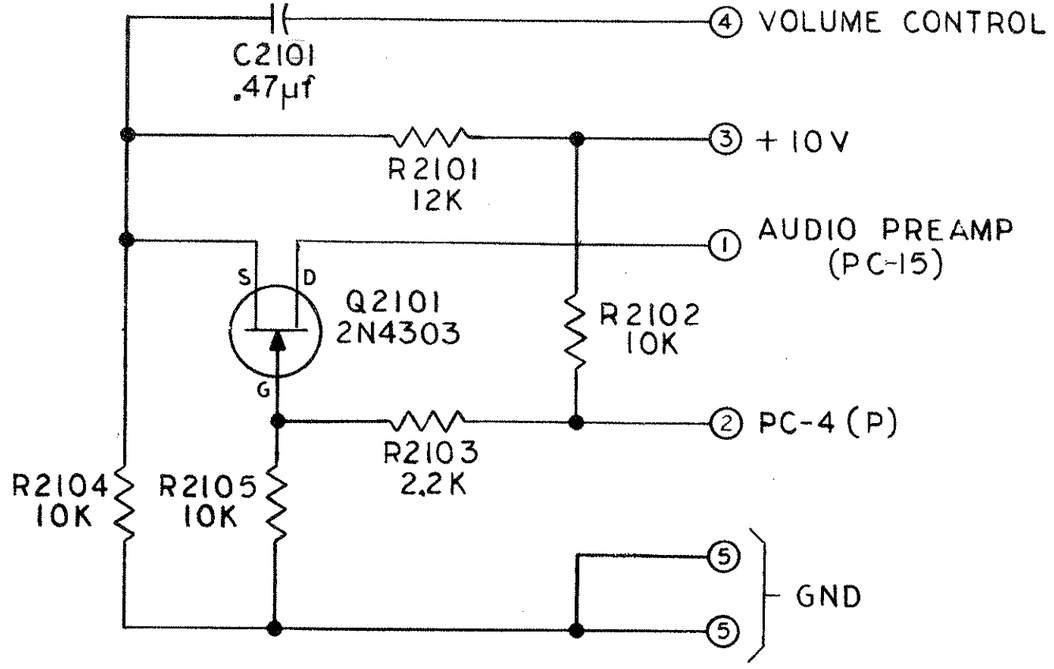
32 VDC POWER SUPPLY MODULE SCHEMATIC

CKT. SYM.	PART NO.	DESCRIPTION
	99396	P.C. Board Ass'y with all components
PC#21	10351	P.C. Board for 99396
C2101	28337	Capacitor, .47uf 50V
Q2101	44393	FET. 2N4303
R2101	18318	Resistor, 12K Ohm 1/4W
R2102	17041	" 10K " "
R2103	17807	" 2.2K " "
R2104	17041	" 10K " "
R2105	17041	" 10K " "

PC-21, SQUELCH CONTROL



PC-21, SQUELCH CONTROL



PC-12 DRIVER

DRIVER

FROM EXCITER J6-B

+300 VDC

C1203 10pf

C1204 150pf

L1202

VAR TAP

L1201 .5mh

SW4

C1221-C1230 VAR

SW5

R1205 27K/1W

C1205 .005

V1201 12HG7

C1201 500 pf

R1202 33

R1203 10K

R1204 47

C1202 .02

R1201 47

C1206 .005

C1231-C1240 FIXED

C1230

C1207 1080 pf

+300 VDC

FINAL AMP

L3 2.5 mh

+800 VDC

C43 .001

C42 .01 1.0 KV.

-52 VDC

C40 .02

E9 18K 1/2 W

E3 10K BIAS CONTROL

E15 10K 1/2 W

V1 6883B

V2 6883B

E1

E2

+250 VDC

R10 10/1/2W

R12 10/1/2W

TP1 BIAS

TP2 BIAS

C38 .02

R11 10 1/2W

C39 .005

C40 .005

R13 10 1/2W

C41 .02

R18/120K 1/2W

HI-LO POWER SWITCH S4A

R17/1K 5W

R16 1.5K 10W

-70 V

+400 V

CR2 Z4B92

CR3 Z4B92

R22 8.2K/1/2W

CR8 1N914

C54 2.8pf

R23 1.2K 1/2W

C55 910pf

E19 4.7K/1/2W

R20/1.2K/1/2W

C52/2.8pf

CR7 1N914

R21 5400

C53 .0024

ALC DET MODULE

INPUT C1301-C1310

SW6

OUTPUT C1311-C1320

SW8

SW7

SW9

VAR TAPS

L4 FINE TUNING

L5 COARSE TUNING

WEST C45 1-30pf

C44 .002/10KV

C1321-C1330 L1301-L1310 TRAP

PC-13

DETECTOR METER DRIVER

C51 .01

R14 15K/1/2W

CR9 1N914

CR10 1N914

M1 PANEL METER

C105/105

R200 100

K1

C50 .05

C50 .47

TO RECEIVER PC-1

TO ANTENNA SYSTEM J8

FROM J12-C AM SELECT

C1401 .47

R1401 5.0K

R1402 10K

Q1401 2N4288

Q1402 2N4303

CR1401 MZ4025

AM DET

R1404 10K

R1408 10K

C1402 22

R1411 4.7K 1.5%

R1407 2.2K 1.5%

+11V

CR1403 1N914B

C1404 .02

TO R-4(2) SEE RECEIVER/EXCITER SCHEMATIC "B" WIRING DIAG.

CR1404 1N914

TO PC 6 (F)

LO HI

HI-LO POWER SWITCH S4B

SB DET

R1403 2K

R1405 16.8K 1.5%

R1409 5.0K

R1410 10K

R1412 68K

C1403 0.8

R1413 390K

CR1402 1N914

CA3005 IC1401

R1406 2.2K 1.5%

PC-14 ALC AMP

7 ON

9 S3

11 REC

1 ON

3 S3

5 REC

V1201

V2

V1

C1208 .02

C49 .02

C48 .02

C47 .02

I1 DIAL LIGHT

R1200 180Ω 3W

I2 METER LIGHT

POWER INPUT CONNECTOR TO TRANSCEIVER

J-14

GOLD SILVER

F1 SEE CHASSIS PARTS LIST FOR RATING

4 ON

OFF S3

2 REC

INPUT

SILVER J-12 GOLD

POWER SUPPLY

OUTPUT

J-10

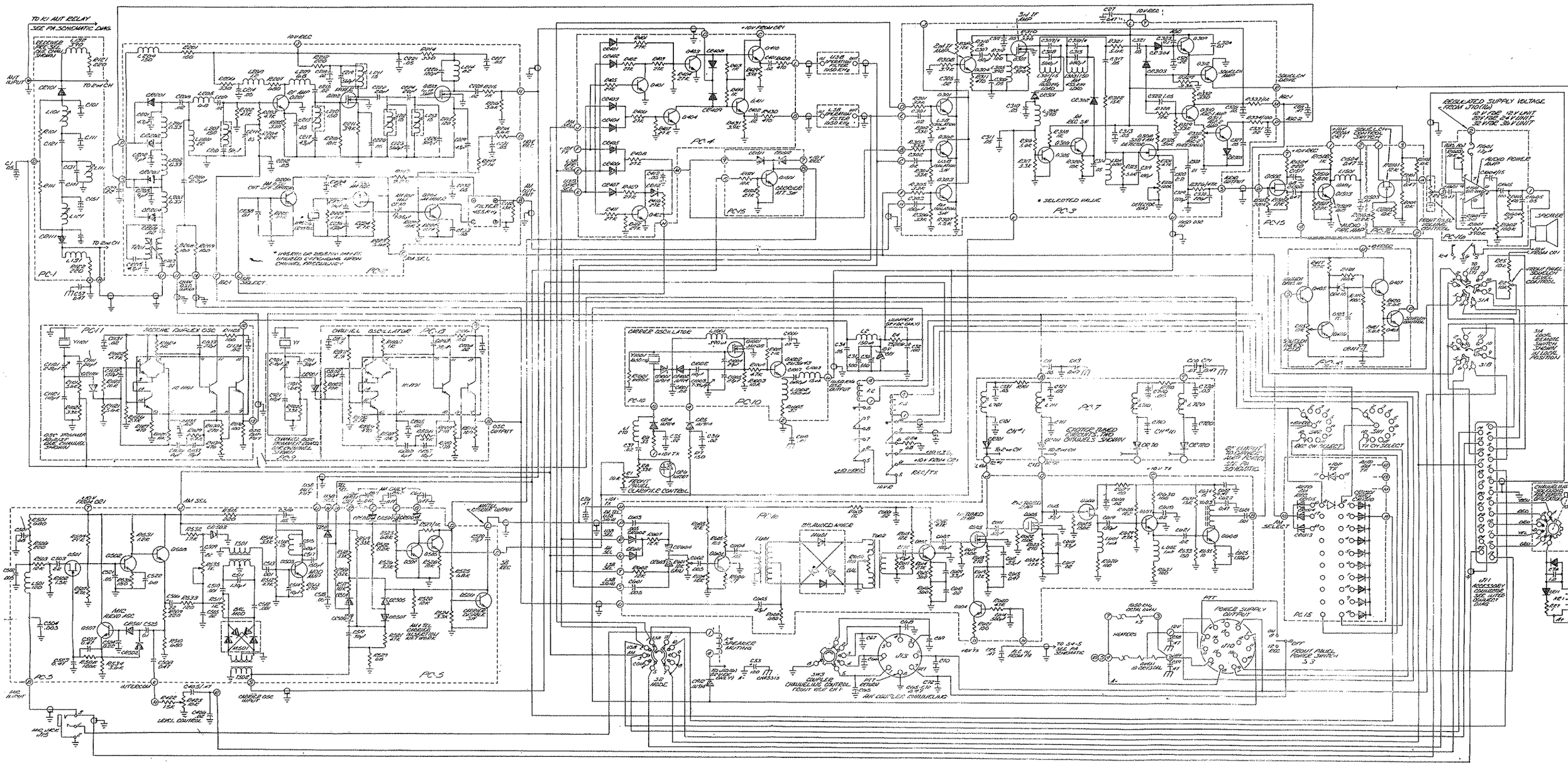
SEE APPROPRIATE POWER SUPPLY SCHEMATIC DRAWING: 12V, 24V, 32V DC OR 115/230V AC.

NOTES:
1. ALL RESISTORS IN OHMS ± 10%, 1/4 W
ALL CAPACITORS IN mf. UNLESS OTHERWISE SPECIFIED.

GSB-400 POWER AMPLIFIER SCHEMATIC
10531 3/16/72

NOTES:

1. ALL RESISTORS IN 1/4 W, ALL CAPACITORS IN uf, ALL INDUCTORS IN uh, UNLESS OTHERWISE NOTED.
2. PC 8 LOCATED IN CHANNEL OVEN.
3. PC 10 MOUNTED IN OCTAL OVEN, X3.



GSB-400 REC/EXC
10634 3/1/72

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-400

ADDENDUM 1
DATE: 6-2-71

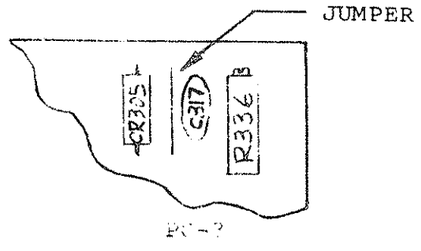
REFERENCE: COMPONENT ADDITION TO PC-3

REVISION: RED

PURPOSE: CHANGE AGC-2 THRESHOLD

MANUAL REFERENCE: SECTION IX, PC-3

TEXT: C-325, 6.8uf, 15V TANT. CAPACITOR, SUNAIR PART NO. 28357
CHANGED TO SUNAIR PART NO. 28753.
REMOVE JUMPER AND REPLACE WITH 47 OHM, 1/4W FIXED COMPOSITION RESISTOR SUNAIR PART NO. 17936 AND REFERENCE DESIGNATION R-331.



SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 2
DATE: 6-2-71

REFERENCE: COMPONENT CHANGE ON PC-7

REVISION: RED

PURPOSE: INCREASE GAIN OF EXCITER OUTPUT, BY USE OF HIGHER CONDUCTANCE DIODE.

MANUAL REFERENCE: SECTION IX, PC-7

TEXT: REPLACE DIODES CR-701 THRU 723 SUNAIR PART #44290 WITH 1N914B SUNAIR PART 40510.

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 3
DATE: 6-16-71

REFERENCE: VOLTAGE REGULATOR ON 12VDC POWER SUPPLY MODULE AND WIRING ON GSB-400 CHASSIS

ECN: 064-008

PURPOSE: IMPROVE REGULATION OF THE +10 VOLTAGE ON THE RECEIVER/EXCITER

MANUAL REFERENCE: SECTION IX, DC POWER SUPPLY MODULE AND CHASSIS WIRING DIAGRAM

TEXT:

I 12VDC POWER SUPPLY MODULE

A) ADD JUMPER BETWEEN TERMINALS #42 & 43 ON PC-19
B) CONNECT EMITTER OF Q1 TO PIN 1 OF P10, REMOVE JUMPER BETWEEN TERMINALS #51 AND 54 AND THE WIRE BETWEEN THE EMITTER OF Q1 AND TERMINAL #41
C) CONNECT COLLECTOR OF Q1 TO PIN 16 OF P10

II DC POWER SUPPLY MODULE (ALL VOLTAGES)

A) MOVE A+ WIRE FOR PC-19 FROM THE JUNCTION OF L1 AND C5 TO THE P12 SIDE OF L1
B) CHANGE R2007 FROM 50/5W TO A 20 OHM/3W RESISTOR SUNAIR P/N 17558

III GSB-400 MAIN CHASSIS (12VDC ONLY)

A) ADD JUMPER BETWEEN TERMINAL 1 & 2 OF R4
B) ADD JUMPER BETWEEN PIN 4 OF K4 AND TERMINAL #2 OF PC-16

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 4
DATE: 6/30/71

REFERENCE: COMPONENT CHANGE ON PC-11, RECEIVER OSCILLATOR

REVISION: BROWN

ECN: 064-010

PURPOSE: IMPROVE OSCILLATOR PERFORMANCE AT LOW FREQUENCIES

MANUAL REFERENCE: SECTION IX, PC-11

TEXT: REPLACE CAPACITOR C1136, 6pf SUNAIR PART #25036 WITH
9pf SUNAIR PART #28636.

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 5
DATE: 10/26/71

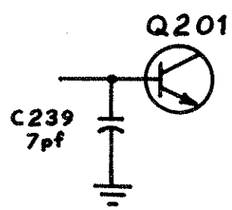
REFERENCE: Component Changes on PC-1, 2, 3

REVISION: PC-1 "Red", PC-2 "Red", PC-3 "Orn"

PURPOSE: Gain and Noise Figure Improvement

MANUAL REFERENCE: Section IX, PC-1, PC-2 and PC-3

TEXT: R 209 Changed from 100 ohm to 220 ohm Sunair Part #17132
R 205 Changed from 330 ohm to 180 ohm Sunair Part #17522
L 205 Changed from 6.8 uh to 4.7 uh Sunair Part #56425
Addition of C 239 7 pf Capacitor Sunair Part #28858
R 323 Selected Value (Nominally 5.6 K)
R 337 Selected Value (Nominally 4.7 K)



SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 6
DATE: 7/30/71

REFERENCE: Carrier oscillator and clarifier

REVISION: Brn (PC #10)

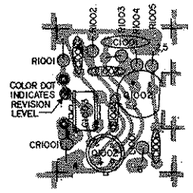
PURPOSE: Improve linearity of clarifier and extend range of frequency adjustment in transmit function.

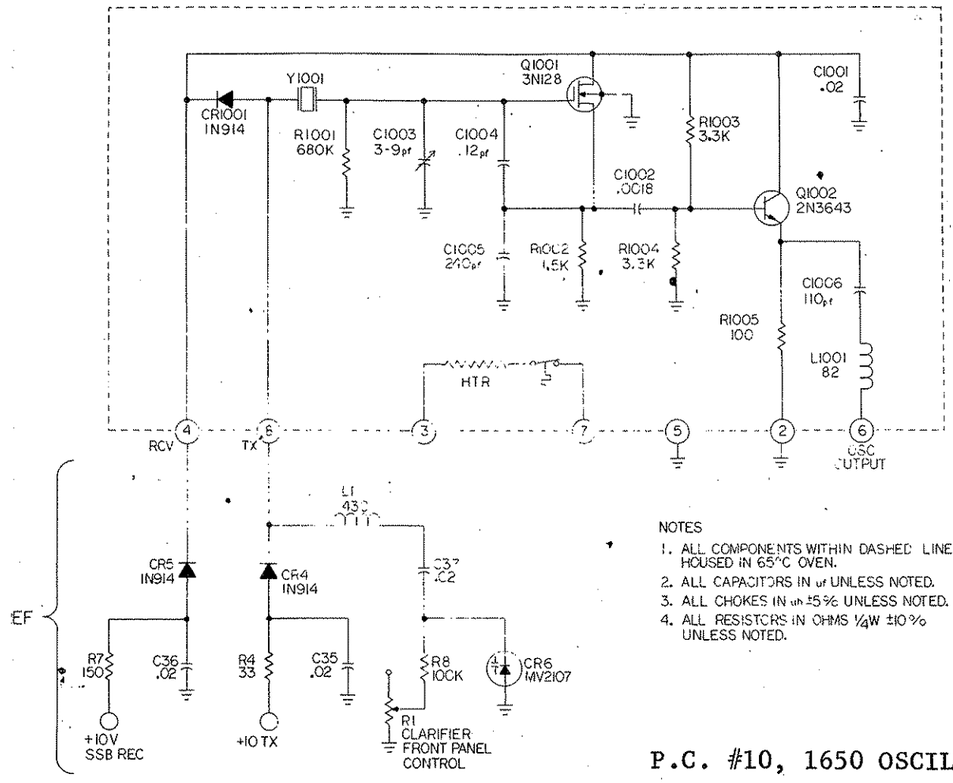
MANUAL REFERENCE: PC #10 and wiring diagram

TEXT:
WIRING DIAGRAM: (Ref. Only)
L_1 changed from 270 uh P/N 66470 to 430 uh ±5% P/N 6591
R8 changed from 33K ohm P/N 17792 to 100K ohm P/N 17039

PC #10 See following schematic diagram and parts list

C1001	26913	Capacitor,	.02uf 25V
C1002	28869	"	.0018uf
C1003	28741	"	Variable 3-9pf
C1004	28648	"	12pf 500V
C1005	28862	"	240pf 500V
C1006	28131	"	110pf 500V
CR1001	44290	Diode	IN914
L1001	65908	Choke, Molded	82uh±5%
Q1001	44484	FET	3N128
Q1002	44331	Transistor	2N3643
R1001	18148	Resistor	680K ohm 1/4W
R1002	17247	"	1.5K " "
R1003	17089	"	3.3K " "
R1004	17089	"	3.3K " "
R1005	17118	"	100 " "
Y1001	81834	Crystal	1650kHz +65°C





NOTES

1. ALL COMPONENTS WITHIN DASHED LINE HOUSED IN 65°C OVEN.
2. ALL CAPACITORS IN uf UNLESS NOTED.
3. ALL CHOKES IN uh ±5% UNLESS NOTED.
4. ALL RESISTORS IN OHMS ¼W ±10% UNLESS NOTED.

P.C. #10, 1650 OSCILLATOR

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 7
DATE: 9/1/71

REFERENCE: High voltage zener diodes on power amplifier.
REVISION: Serial No. 171.
ECN: 064-014

PURPOSE: Zener diode Z4892 P/N 40282 discontinued.

MANUAL REFERENCE: Power amplifier schematic, spare parts list, page IX-2, parts list, page IX-8.

TEXT: CR2 changed from Z4892 P/N 40282 to 1N3008B, P/N 40506.

CR3 changed from Z4892 P/N 40282 to 1N3009B, P/N 40507.

SUNAIR ELECTRONICS, INC.
GSB-400

ADDENDUM 8
DATE: 8/27/71

REFERENCE: Microphone amplifier PC-5
REVISION: (1) Brown (PC-5)
(2) Brown(PC-5) with revision E printed circuit board
ECN: 062-138

PURPOSE: (1) Reduce input sensitivity of audio amplifier
(2) Inprove linearity of amplifier below AGC threshold

MANUAL REFERENCE: PC-5 schematic; installation and checkout procedure page II-5

TEXT: (1) R502 1.5K P/N 17247 changed to 680 ohm P/N 17663
(2) Add capacitor 6.8 uf P/N 28753 from emitter of Q507 to ground

NOTE: The microphone amplifier is equipped with an AGC loop to maintain a constant amplitude audio input to the balanced modulator regardless of microphone gain variations. However the loop gain of the system is high enough, that the aid of a noise cancelling type microphone, in that case, a reduction of R502 reduces the input sensitivity and makes the system less susceptible to ambient noise.

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 9
DATE: 8/27/71

REFERENCE: All amplifier, PC-6

REVISION: Red

ECN: 062-138
PURPOSE: Maintain all operation at below input voltage. Replace transistor Q-604

MANUAL REFERENCE: PC-6 Schematic Diagram

TEXT: Add Zener Diode CR605 P/N 44305 from the emitter of Q604 to ground.
Q604 2N4288 P/N 44587 replaced by P/N 44678

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 10
DATE: 12/1/71

REFERENCE: Replacement of Transistor
REVISION: Yel(PC-3), Brn(PC-14)
ECN: 062-136

PURPOSE: Item discontinued by manufacturer

MANUAL REFERENCE: PC-3 and PC-14

TEXT: Transistor 2N4288 P/N 44587 replaced by 2N4249 P/N 44678

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 11
DATE: 10/19/71

REFERENCE: DC Power Supply Module
ECN: 064-016

PURPOSE: Add Reverse Polarity Protection

MANUAL REFERENCE: DC Power Supply Module

TEXT: Add diode CR4 P/N 40414 from A+ to A-

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 12
DATE: 8/24/72

REFERENCE: PC-20, P.C. Power Supply

REVISION: Brown

ECN 064-022, 064-024
PURPOSE: a) Increase reliability of Power Supply
b) Increase filament voltage on driver amplifier tube

MANUAL REFERENCE: D.C. Power Supply schematic, parts list.

TEXT: a) R2004 changed from 10/10%/½W P/N 18538 to 1K/10%/½W P/N 16748
R2005 changed from 5.6K/10%/½W P/N 18588 to 3.3K/10%/½W P/N 18409
b) R2008 changed from 50/10W P/N 16841 to 40/10W P/N 19300

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 13
DATE: 8/29/72

REFERENCE: GSB-400 chassis wiring

ECN: 064-023

PURPOSE: To eliminate turn on delay in transmit power output

MANUAL REFERENCE: GSB-400 transceiver chassis wiring diagram

TEXT: Remove wire from R4(2) to PC14(3)
Add red wire from PC14(3) to J4(F)

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM #14
DATE: 12/1/72

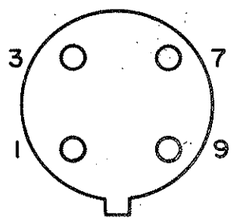
REFERENCE: Balance Modulator, Diode Ring, M501

ECN: 054-038

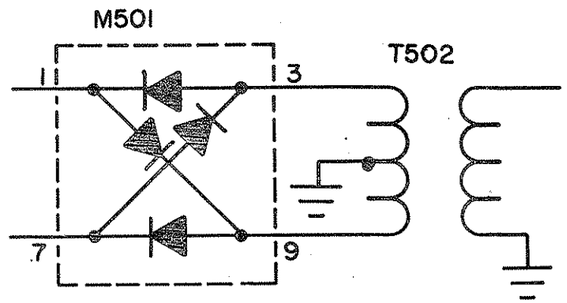
PURPOSE: Module M501, PN 40311, Package Change

MANUAL REFERENCE: PC-5 Schematic Diagram

TEXT: The modulator diode ring package has been changed to a TO-5 package. Schematic diagram and modulator connections are as shown below.



DIODE RING
TO5 PACKAGE
BOTTOM VIEW



NOTE: It will be necessary to form the diode ring leads in order to pair 1 with 7, and 3 with 9 to conform to the p-c board configuration.

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 15
DATE: 12/6/72

REFERENCE: DC Power Supply Modules

ECN: 064-025

PURPOSE: Improve reliability of power supply during low voltage starting condition

MANUAL REFERENCE: DC Power Supply schematics and parts list

TEXT: Add capacitor C6, 1 uf/100V P/N 27230 from collector of Q2 to collector of Q3

SUNAIR ELECTRONICS, INC.
GSB-400

ADDENDUM 16
DATE: 26 Dec. 72

REFERENCE: Component changes on PC-3 IF Amplifier

REVISION: Green

PURPOSE: Eliminate interference with cover

MANUAL REFERENCE: PC-3 IF Amplifier

TEXT: C301, C302 changed from .02uf 100V P/N 27345 to .02uf 25V P/N 26913

C304, C306, C311, C317, C321 changed from .05uf 25V P/N 27357 to .02uf 25V P/N 26913

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 17
DATE: 1/4/73

REFERENCE: Capacitor value change

ECN: 064-027

PURPOSE: Eliminate carrier oscillator feedthrough in the 10 V transmit line

MANUAL REFERENCE: Chassis wiring diagram, page IX-9, parts list, page IX-8, PC-10 schematic.

TEXT: Change capacitor C35, .02 uf/100V P/N 27345 to a 0.47 uf/50V P/N 28337

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 18
DATE: 1/8/73

REFERENCE: RF bypasses

ECN: 064-026

PURPOSE: Eliminate possibility of oscillations on an "AM only" channel during transmit

MANUAL REFERENCE: Chassis wiring diagram, page IX-9, parts list, page IX-8

TEXT: Delete capacitor C61, C62 and C63, 0.47 uf/50V P/N 28337
Add capacitor C72, 0.47 uf/50V P/N 28337 from J2-C to ground
Add capacitor C73 and C74, .05 uf/1KV P/N 25206 from J14 to ground (gold and silver terminals)

SUNAIR ELECTRONICS, INC. ADDENDUM 19

MANUAL: GSB-400 DATE: 4/2/73

REFERENCE:	Component changes on PC-14, ALC Amplifier.
ECN:	064-029
PURPOSE:	Disable SSB ALC amplifier during AM operation.
MANUAL REFERENCE:	PC-14 schematic diagram and parts list.
TEXT:	Add diode CR1405, 1N914 P/N 44290 from R1401 and C1401 to pin 10 of IC1401, cathode connected to IC1401. R1401 changed from 5.6K/10%/¼W P/N 18306 to 1.5K/10%/¼W P/N 17247. CR1401 changed from MZ4625 to 1N751A.

SUNAIR ELECTRONICS, INC. ADDENDUM 20

MANUAL: GSB-400 DATE: 4/27/73

REFERENCE: Balanced Modulator, Diode Ring M501.

ECN: 1841.

PURPOSE: Module M501, P/N 40311 discontinued by manufacturer.

MANUAL REFERENCE: PC-5 schematic diagram and parts list.

TEXT: Change diode ring module M501 to 4 individual diodes CR512 thru CR515, MBD102, P/N 40528.

SUNAIR ELECTRONICS, INC.
MANUAL: GSB-400

ADDENDUM 21
DATE: 6-5-73

REFERENCE:	Component change on antenna coupler connector
ECN:	064-031
PURPOSE:	Eliminate possibility of capacitor failure due to relay inductive transient.
MANUAL REFERENCE:	Chassis wiring diagram, page IX-9, parts list, page IX-8, Rec/Exc schematic diagram.
TEXT:	Change capacitor C71 from .47 uf, 50V P/N 28337 to .02 uf, 150 V P/N 24458.