sunair electronics, inc.

3101 S. W. 3rd Avenue / Fort Lauderdale, Florida 33315, USA

Maintenance Manual

SSB COMMUNICATIONS EQUIPMENT

ASB-125 M

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

1st Edition, 15 December 1970
Serial No. 2001 and Subsequent
Manual Part Number 97787

ILLUSTRATIONS

SECTION I
GENERAL INFORMATION

A. SYSTEM DESCRIPTION

The Sunair ASB-125M 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 Receiver/Exciter audio amplifier unit, and a remote mounted power amplifier power supply unit. An Antenna Coupler, (optional) Sunair P/N 99927, is also available which allows the transmitter to be connected to a variety of antennas.

B. SPECIFICATION FOR ASB-125M 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 (Amplitude Modulation) USB (Upper Sideband) LSB (Lower Sideband)
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)
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)

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 to 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 500,000 uv input (open circuit)
Audio Output	2W into speaker 100 MW headphones
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

1 ASB-125M Composed of receiver/exciter unit and PA/PS unit.

*1 Connector Kit	P/N 99719
1 Microphone	P/N 87216
1 Installation/Maintenance Manual	

* Does not include antenna coupler connectors

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-Marine (2-5 MHz)	99937	
OR		
1 Center Loaded Whip Antenna with Mount-Marine (5 to 18 MHz)	99394	
1 Installation Cable (Custom-made)		

E. OPTIONAL EQUIPMENT (NOT SUPPLIED)

1 Filter for LSB Operation (Installed)	81743

F. DESCRIPTION

1. The Sunair ASB-125M 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 transceiver are located on the front panel. These controls are:

   a. ON-OFF switch
   b. Channel Selector
   c. Mode Selector
   d. Volume Control
   e. Squelch
   f. Clarifier

   A half power switch is located on the PA/PS unit to be used for antenna coupler tuning during installation.

2. Function of Controls

   The ON-OFF switch applies ships power to the transceiver. 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).

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 and the HI-LO power switch, are located on the PA/PS unit.

3. Accessories

a. GCU-1000 Antenna Coupler

The ASB-125M 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.

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 ASB-125M 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 of 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 #8 or larger wire on the coupler. Leads to ground system should be as short as possible.

c. Provide maximum separation between coupler output and the receiver/exciter unit 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. During tests or 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 transmitter or antenna coupler 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. If this is impractical or undesirable a whip antenna can 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, 60, 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 recommended. 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 possible. If the end point of the antenna is terminated on a metal mast is 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 whip antenna is recommended. See Section I-D above for listing of Sunair antenna kits. Two whip antennas are listed, a 2-5 MHz whip and a 5 to 18 MHz whip. It is not absolutely necessary to use two antennas but if optimum performance and range is required and the transmitter frequencies fall in both bands, two antennas would improve performance. The antenna coupler is designed to accept two antennas and can be

programmed to select the proper antenna. If only one antenna is to be installed for frequencies in both bands, the 5-18 MHz whip should be used.

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

D. CABLING

The ASB-125M installation cables must be fabricated according to the interconnection diagram Fig. II-2. The connectors required for the cables are supplied, but individual wires are not. The length of the installation cable will depend on the location of the equipment. No sharp bends should be made in any of the cables.

If factory fabricated installation cables are desired, furnish the following information when ordering:

a. Cable length from power source to PA/PS.

b. Cable length from PA/PS to antenna coupler and receiver/exciter to antenna coupler.

c. Cable length from receiver/exciter to PA/PS.

E. CHECKS AND ADJUSTMENTS AFTER INSTALLATION

1. Turn on the ASB-125M system.

2. Channeling - Check the channeling of the antenna coupler and PA/PS by visual inspection AND by listening to the channeling of the units, while the channel selector is slowly turned from channel 1 to 10 and from 10 to 1 on the receiver/exciter. Wiring on the wafer switches is color coded: Brown-1, Red-2, and etc.

3. Transmitter Output - AM - Connect a wattmeter and a 50 ohm dummy load to J2 of PA/PS, place the mode selector in the AM position. Check the transmitter output on all active channels. The meter located on the rec/exc front panel will be indicating relative transmitter output. The wattmeter reading should read 25 to 35 watts. Speaking into the microphone should cause a small deflection of the panel meter.

4. Transmitter Output - SSB - Set the mode selector to USB position. Press the microphone button and speak into the microphone. Notice there is power output only when speaking into the microphone. The wattmeter should show peak readings of 25 to 30 watts when speaking in a normal tone of voice. Whistling into the microphone (single tone) should result in a power output of 125 watts nominal.

5. Antenna Coupler - Disconnect the dummy load and connect to the antenna coupler rf input. Set mode selector to the AM position and HI-LO power switch to LO. Tune the coupler using instructions outlined in the Antenna Coupler Manual.

6. Squelch - Set Squelch knob to CCW position. Turn volume up; there should be audio or noise in the audio system. Then rotate squelch knob clockwise. Audio should be silenced if signal is not greater than approximately 15 microvolts.

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

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

9. Ignition and Other Noise (Mobile & Marine) - After the ASB-125M 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 electical noise.

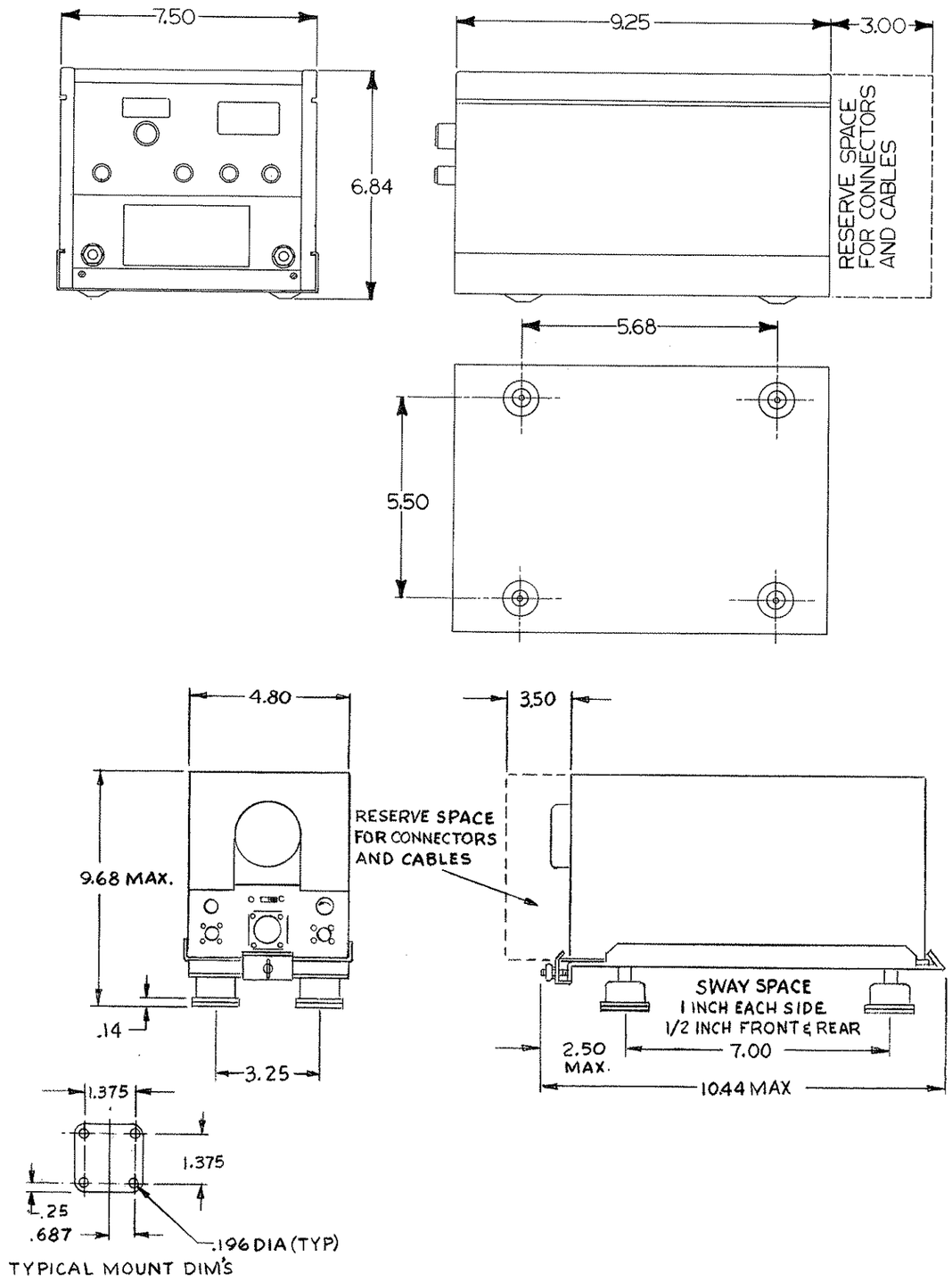
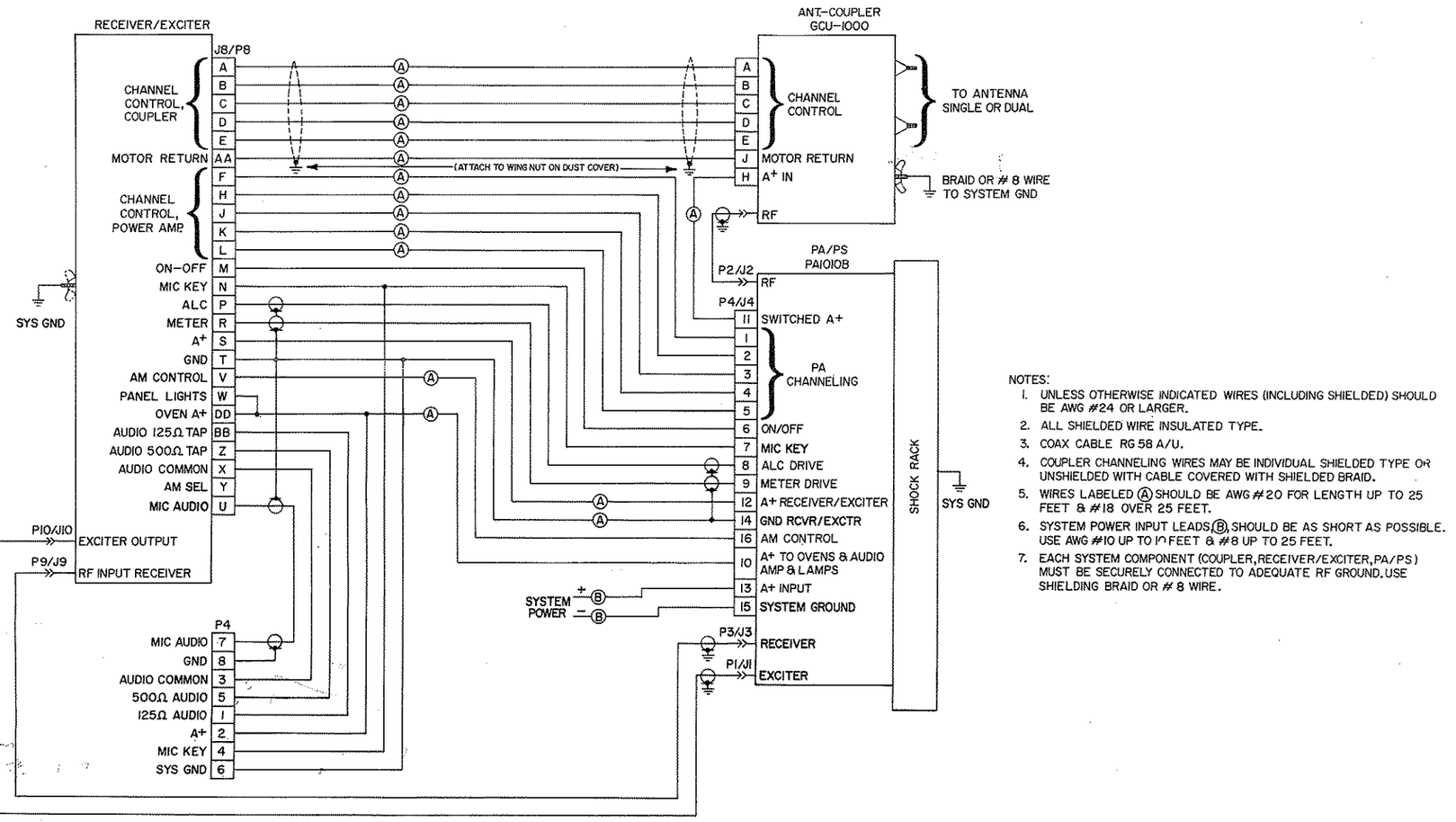


Figure II-1 - MOUNTING DETAIL ASB-125M - PA1010B



NOTES:

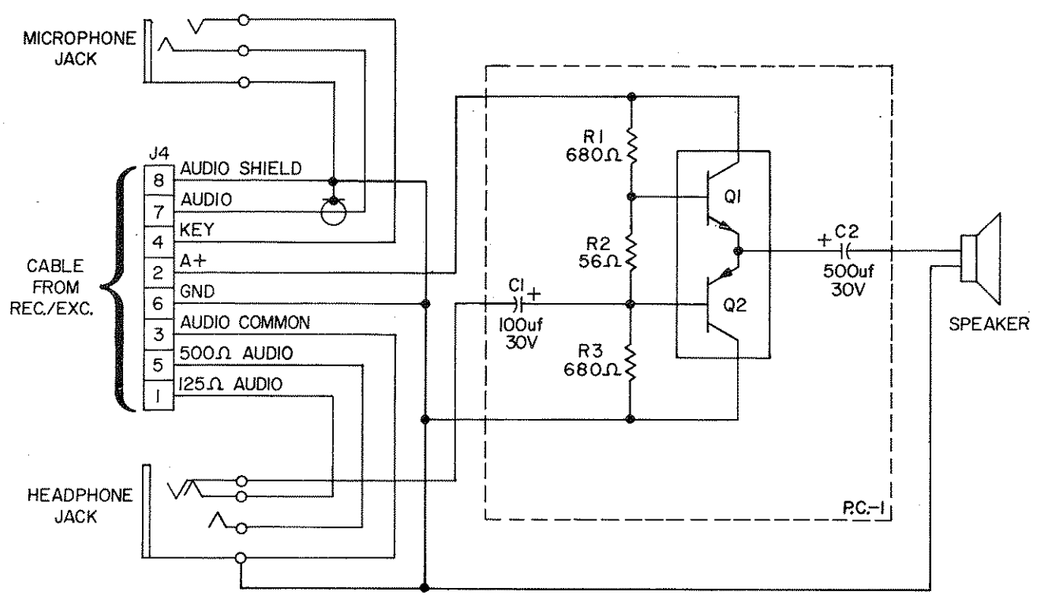
1. UNLESS OTHERWISE INDICATED WIRES (INCLUDING SHIELDED) SHOULD BE AWG #24 OR LARGER.
2. ALL SHIELDED WIRE INSULATED TYPE.
3. COAX CABLE RG 58 A/U.
4. COUPLER CHANNELING WIRES MAY BE INDIVIDUAL SHIELDED TYPE OR UNSHIELDED WITH CABLE COVERED WITH SHIELDED BRAID.
5. WIRES LABELED (A) SHOULD BE AWG #20 FOR LENGTH UP TO 25 FEET & #18 OVER 25 FEET.
6. SYSTEM POWER INPUT LEADS, (B), SHOULD BE AS SHORT AS POSSIBLE. USE AWG #10 UP TO 10 FEET & #8 UP TO 25 FEET.
7. EACH SYSTEM COMPONENT (COUPLER, RECEIVER/EXCITER, PA/PS) MUST BE SECURELY CONNECTED TO ADEQUATE RF GROUND. USE SHIELDING BRAID OR # 8 WIRE.

INTERCONNECT DIAGRAM, MARINE ASB-125M SYSTEM

FIGURE II-2

PARTS LIST

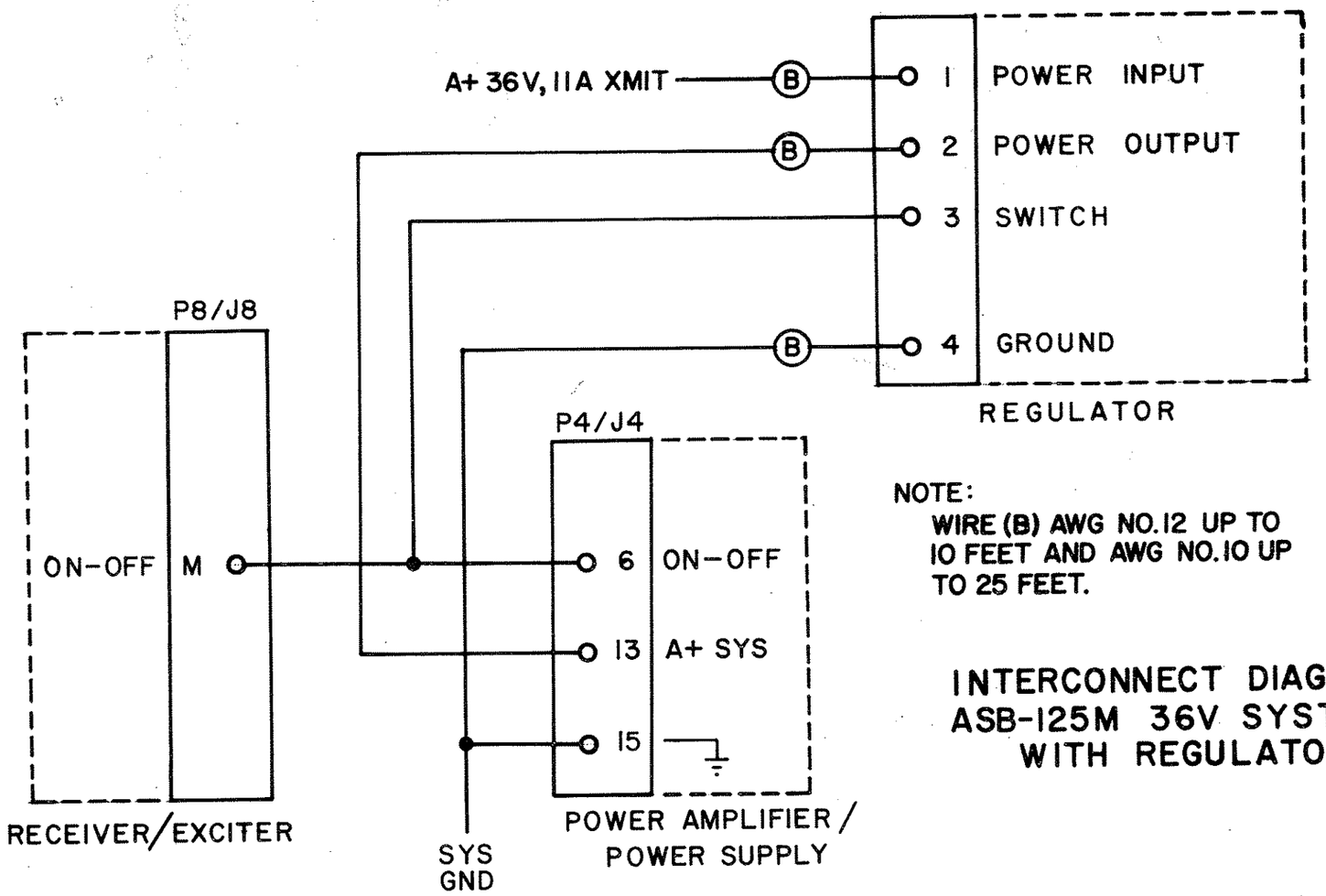
CKT. SYM.	PART NO.	DESCRIPTION
PC1	99704	Complete Audio Amp. Board Ass'y.
	10182	P.C. Board
	10183	Heatsink
C1	24587	Capacitor, Electrolytic, 100 uf, 30V
C2	24537	" " 500 uf, 30V
Q1	44549	Transistor, 2N4922
Q2	44537	" 2N4919
R1	16750	Resistor, Comp., 680, 1/2W, 10%
R2	16889	" " 56, 1/2W, 10%
R3	16750	" " 680, 1/2W, 10%
	84028	Speaker 8 ohm
J4	75158	Connector, Male
P4	75146	Connector, Female



REC./EXC. ENCLOSURE
AUDIO SCHEMATIC DIAGRAM
ASB-125M

FIGURE II-3

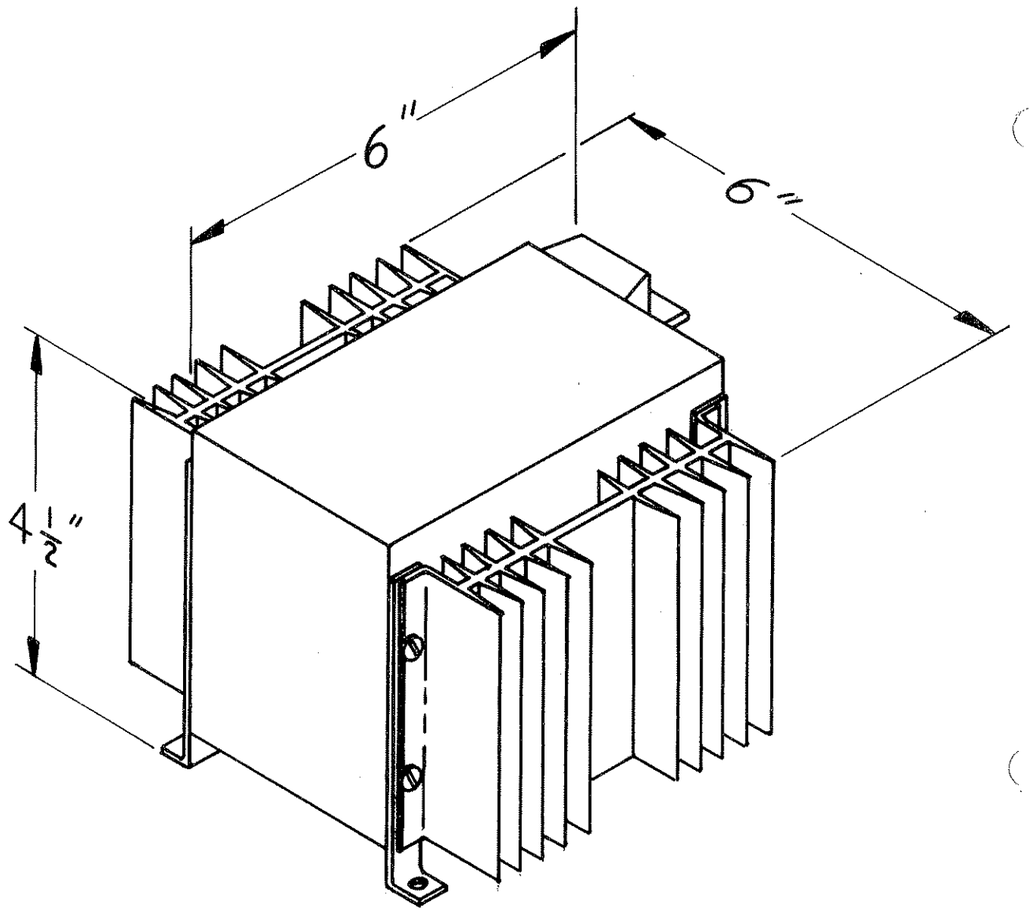
REFER TO INTERCONNECT DIAGRAM,
ASB-125 M SYSTEM,
FIG. II-2



NOTE:
WIRE (B) AWG NO.12 UP TO 10 FEET AND AWG NO.10 UP TO 25 FEET.

INTERCONNECT DIAGRAM,
ASB-125M 36V SYSTEM,
WITH REGULATOR

FIGURE II-5



The regulator should be mounted in an upright position and adequate ventilation should be provided.

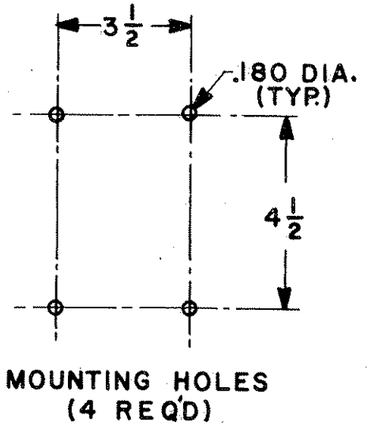


FIGURE II-4

F. MARINE INSTALLATION AND OPERATION

1. Location Selection

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

b. Locate receiver/exciter for convenient operating position and mount PA/PS in a remote location protected from sea spray.

c. Locate all system components at least three 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 antenna coupler 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 #8 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 PA/PS and receiver/exciter should be strapped together with the system, 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 ASB-125M Transceiver has been designed to operate on a nominal voltage source of 12.6 V, 24, or 36 V dc, negative ground only. (36V unit special order)

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, 60, 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 or P/N 99937, 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. Remit completed form and $10.00 fee.

2. Restricted Radio Operators Permit - Available from the Federal Communications Commission. Examination not required. Form 753, $2.50 fee.

3. Frequency Check - A first or second class technician, with a Radio Telephone License, must perform this frequency check after installation.

MARINE RADIO OPERATOR:

Requirements:

1. Your radio telephone must be registered with the telephone business office.

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 ASB-125M System is 125 Watt output PEP. Line B-5 shall be answered NO. And line B-6 shall read Sunair Electronics, Inc., ASB-125M System.

ATTENTION

* Do not adjust or repair transmitter unless you have a proper grade FCC Operators License, that is valid.

* 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

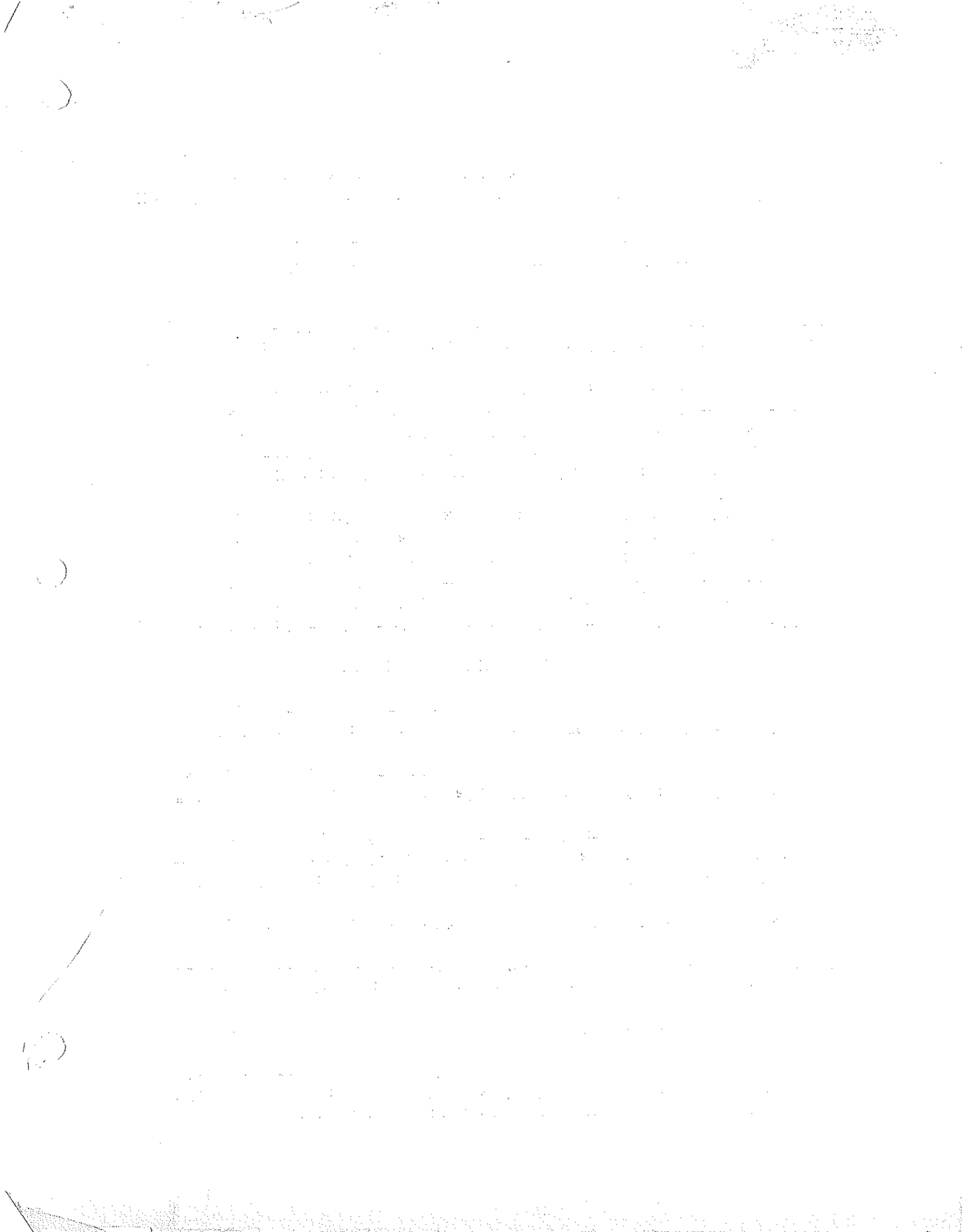
NOTES: Formal application for a Ship Station License shall be made on FCC Form 502. An interim Ship Station License is issued, when you or your agent appear in person at the nearest Field Engineering Office of the Commission and submit your completed Form 502, together with your request for the Interim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

The Interim License will permit you to operate your Sunair ASB-125M 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 or 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 thru 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 thru 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, ASB-125M System.

ITEMS 16 thru 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. Do not forget to enclose you check or money order for $10.00. Make certain no errors are made, as the fee will not be refunded, even if the application is not granted.

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

SECTION III
OPERATION

A. GENERAL

The ASB-125M 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	Applies power to entire system.
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) TEL (A3A) For public correspondence with coast stations.
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. OPERATION PROCEDURE

Step 1: Turn the ON-OFF 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 operation 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 the control slightly.

Step 5: When an RF SSB 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.

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 ASB-125M HF transceiver.

In single sideband (SSB) transmission, only one sideband is used to carry the intelligence. The carrier is suppressed and the unwanted sideband is filtered out, 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 used as the reference for detection.

The ASB-125 operates in two modes - single sideband and compatible AM. In the compatible AM mode, the carrier is reinserted so that the signal can be received by a standard AM receiver for those stations which do not have SSB capability. In the United States, the Federal Communications Commission requires that only this mode 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.

Since the two units are primarily transceivers for light aircraft, size and weight have been kept small. 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 operator on either 14 or 28 VDC nominal voltage, negative ground. Each unit is wired for an A+ voltage of 14 or 28 volts power at the factory and can only be converted by replacing certain components and making several wiring changes. See Section VIII.

Nominal voltage to most circuits in the receiver/exciter is +10VDC regulated by a series transistor regulator.

Final power amplification requires +420 VDC, +840VDC and -32 to -62 VDC furnished by the power supply converter.

B. EXCITER

The receiver/exciter unit contains all transmitter circuitry except for the final power amplifiers, which are contained in the separate power amplifier unit. 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 Amplifiers 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 detect and respond to any high input audio signal and will limit the amount of audio input to the balanced modulator. This audio AGC circuit allows the ASB-125 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 that present 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.

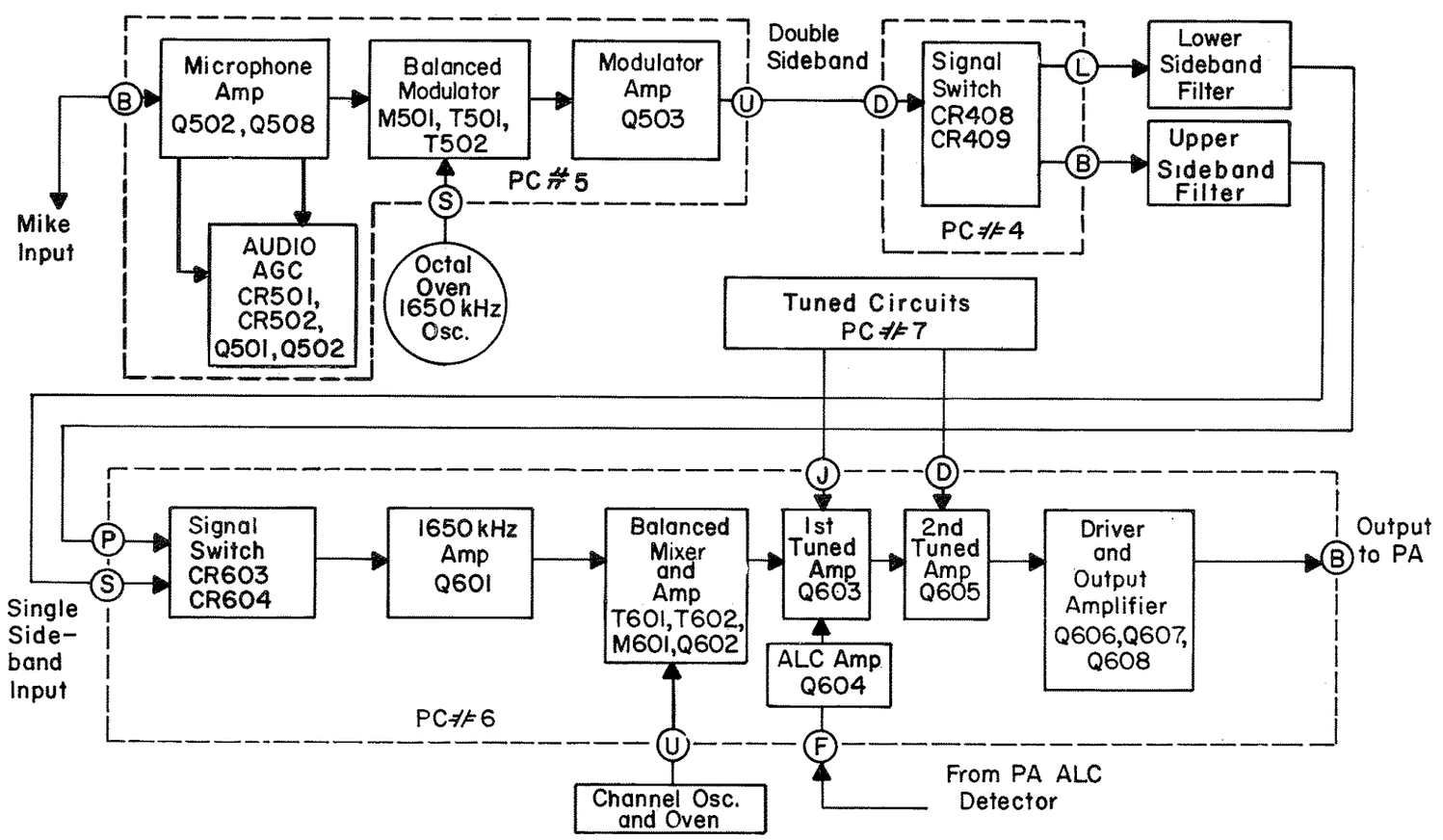


Figure IV-1
Block Diagram, Exciter

3. Carrier Reinsertion, PC-5

For AM operation, it is necessary to reinsert the carrier since it has been suppressed in the balanced modulator. 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 reinserted level is controlled by C519. 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 the TEL mode. When selected, this allows a small amount of carrier to be transmitted which is used by the ground station to activate the ringer and lock the receiver to the transmit frequency. For this mode of operation, the carrier is transmitted 16 $\pm$2 db below peak envelope power. The mode switch when in the TEL position applies +10V to Pin "M", turning on diode switches CR504 and CR506 and allows the carrier to be routed to PC-6, Pin "P". Carrier level is controlled by R517.

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, CR604 for USB and CR603 for lower sideband. The selected sideband signal is routed to amplifier Q601 whose collector drives transformer T601, whose tuned secondary (1650 kHz) couples out-of-phase (Push-Pull) signals to the diode ring M601. The channel oscillator is connected to the center tap 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, and the setting of

R-609. The output of the mixer is the sum and difference of the channel oscillator and the 1650 kHz signal component and is applied to the wide band amplifier Q602. 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, emitter follower, Q607 and amplifier Q608 are used as power amplifiers to transform the impedance and drive the remote 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 located in the power 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/POWER SUPPLY, Figure IV-2

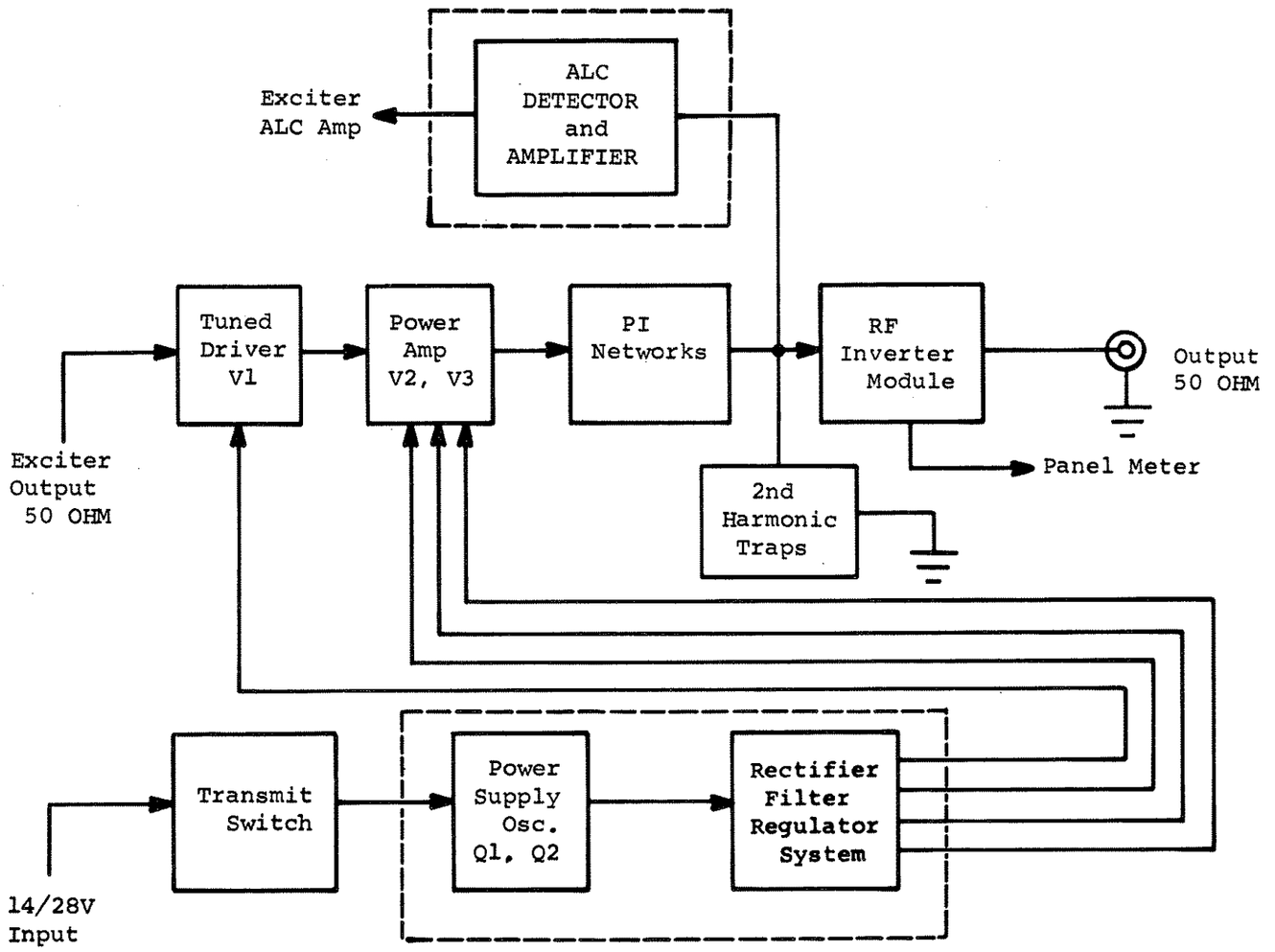
The purpose of the PA/PS unit is to amplify the low level signal from the exciter to a power level of 125 watts PEP for sideband operation and 30 watts average for AM emission.

1. Driver, V1

The exciter signal from the wide-band amplifier in the receiver/exciter unit drives the control grid of the tuned amplifier, V1. 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, V2, V3

The final amplifier stage is a linear amplifier operated class AB1 and consists of two tubes, V2 and V3. For linear operation, zero signal tube current is set to 30 ma per tube by adjusting R110. This corresponds to approximately -50 VDC bias level and 0.3 VDC on each of the two cathodes. If V2 or V3 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 84 watts average; 100 ma with plate voltage at 840 VDC.



Power Amplifier/Power Supply, PA-1010B
Figure IV-2

3. ALC Detector and Amplifier

The ALC detector receives an input from the 50 ohm output of the power amplifier. The peak DC voltage produced by the diodes CR-1405 and CR-1406 is proportional to the power output and frequency compensated by C-1405 and C-1408 for SSB and AM respectively.

The DC voltage from the detector is applied to the ALC amplifiers which operate in two destinct modes. In SSB operation Q-1401 becomes forward biased by the DC output of CR-1406 and keeps Q-1402 cutoff. However, the DC output from CR-1405 is applied to the differential input of IC-1401 thru threshold adjustment R-1403. If the voltage on Pin 7 of IC-1401 exceeds the voltage set by the devider R-1405 and R-1406 on Pin 1, IC-1401 conducts. The negative pulse developed across R-1412 is then coupled thru diode CR-1402 to the ALC amp. on PC-6 resulting in a reduction of output power. If the voltage on Pin 7 of IC-1401 is decreased by the adjustment of R-1403 or there is a decrease in output voltage the output power will increase. In AM operation Q-1401 is initially reverse biased by the voltage on the wiper of R-1402. The DC produced by CR-1406 and applied to the gate of Q-1402, if sufficient to overcome the reverse bias on the source, causes Q-1402 to conduct and a reduction in power results. If the voltage on the gate is decreased by the adjustment of R-1404 the power is increased. Q-1401 now acts as a limiter. As the carrier is modulated the reverse bias on Q-1401 is overcome and the DC level at the gate of Q-1402 is not allowed to increase any further. This causes the AM modulation peaks to double the carrier value or approach to PEP output on SSB. IC-1401 prevents the peaks from increasing beyond the preset level of SSB PEP.

4. Pi Network

The output from amplifiers V2 and V3 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 60 db below the fundamental frequency.

5. Resultant Power Detector

The detector is designed as a standing wave detector and will detect standing waves in the forward and reverse direction with respect to the amplifier output. The two detected signals are added algebraically and connected to the meter in the control panel. Therefore, for 100% reflected power, the detector output

would be zero and the meter would read zero. For a perfect match, the reflected power would be zero and the meter would be driven to maximum deflection.

6. Power Supply

The Power Supply furnishes high voltages for the driver, V1, and the power amplifier, V2 and V3. A+ voltage is supplied to transistors, Q101 and Q102, which are connected to the square loop transformer, T101. The transistors and transformer form an oscillator circuit that oscillates at approximately 1 kHz and couples a square wave output to the bridge rectifiers, CR-101-CR-104, and half wave rectifier, CR-105. The output of the bridge circuit is approximately 840 VDC for the two final amplifiers. The 420 VDC centertap of the output winding supplies 300 VDC to the driver, V1, thru R15. High B+ is generated by the oscillator only when the microphone is keyed and relay K101 actuated. Rectifier CR-105 output is -32 to -62 VDC and is the bias supply for V2 and V3. The 420 VDC output is also regulated by CR-3 and CR-4 at approximately 250 VDC and is the screen grid supply for V2 and V3. Regulating the grid supply results in improved power stability and linearity over input voltage variations.

D. 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 IV-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 BNC connector, J9, is isolated from the chassis and the coax sheilds are then only rf grounded on PC-1. This reduces circulating rf currents and maintains the image frequency greater than 60 db below signal level. The channel switch applies +10V to the selected channel which forward biases one diode and reverse biases all others and allows the signal to pass only

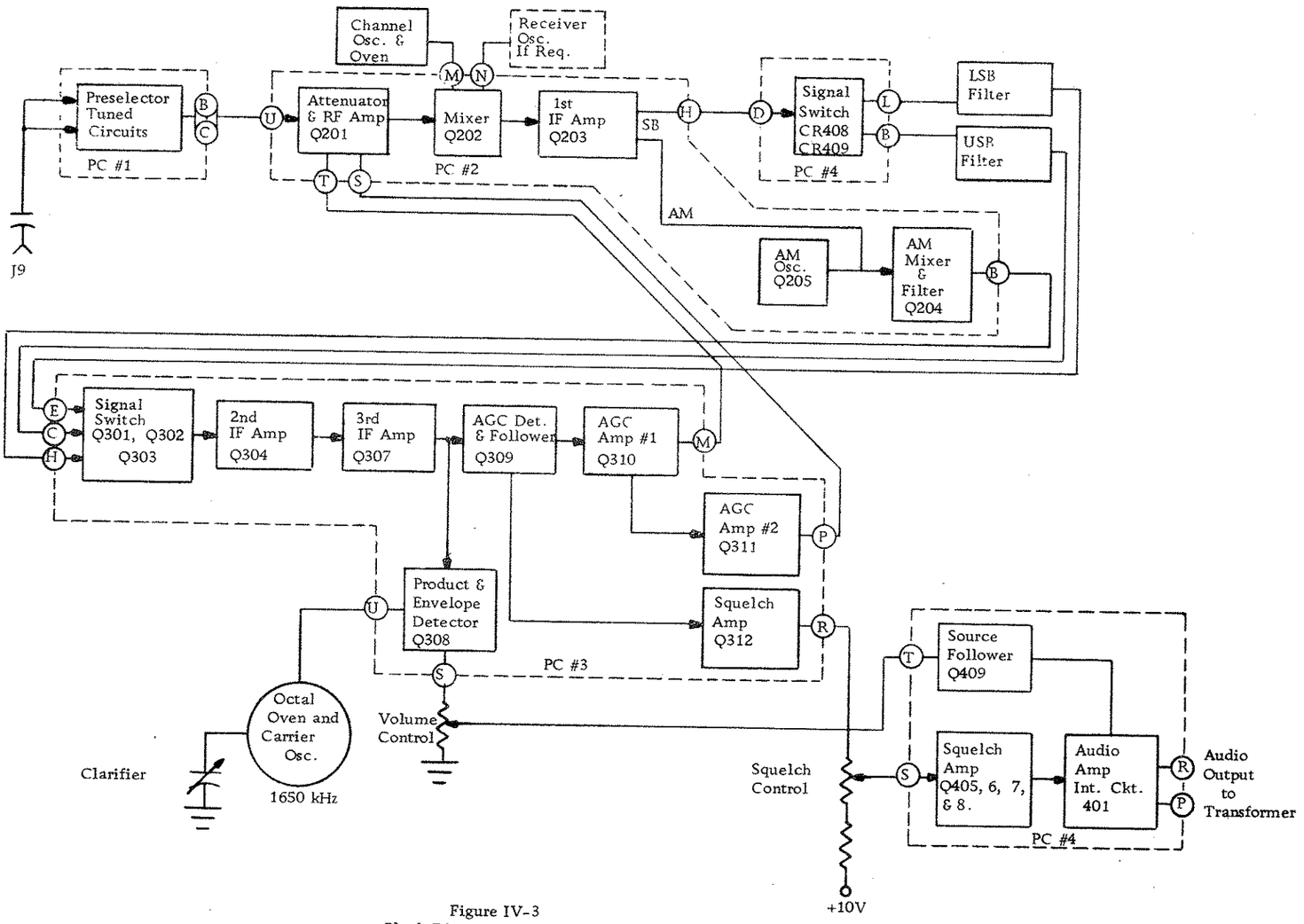


Figure IV-3
Block Diagram - Receiver

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. The oscillator is injected at the base of Q201. (Two oscillators may be installed, dependent upon frequency requirements, see IV-E for description of oscillators). 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. Q206 serves as the oscillator ON-OFF switch. When the mode switch is in the SB position, +.6 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 the 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 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 forard 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 CR-301 and CR-302. For SB operation, the switching ckts. apply 10V to Pin "K" which forward biases CR-301 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 CR-302 and isolates the 455 kHz load from Q-307. The signal is then routed to the AGC detectors, CR-303 and CR-304, and audio detector, Q308.

5. AGC and Detector, PC-3

The AGC system controls the gain of the second If amplifier, Q-304, 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 CR-303 and CR-304 form a voltage doubler detector to rectify the IF output and is amplified by Q309, Q310, and Q311. R-330 controls the point that Q311 begins conducting 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 the 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 top end of the audio control potentiomenter located on the front panel.

6. Squelch and Audio Amplifier, PC-4

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 of Q406 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 11 of the audio amplifier, integrated circuit IC401, increases enough to turn on the amplifier. 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 100 milliwatts of audio power to the audio output transformer. Receiver audio is connected to Pin 10 from the arm of audio potentiometer and through the FET follower. Input to the audio amplifier is approximately 30 to 50 millivolts and output approximately 7 to 10 volts.

The sidetone from the exciter is also amplified by the audio amplifier. The desired sidetone level is set by R423.

E. OSCILLATORS

The standard transceiver has two oscillators, a 1650 kHz carrier oscillator and a channel oscillator used for transmit and receive. The channel 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 different receive and transmit frequencies, commonly termed "two frequency simplex", the number of channels must be reduced accordingly to utilize a maximum of ten crystals. This could be 5 transmit and 5 receive, each a two frequency simplex channel, or 6 and 4, 4 two frequency simplex requiring 8 crystals and two simplex channels requiring two crystals for a total of ten.

However, there is an optional receive oscillator that can house eight crystals that may be installed in the space for the optional lower sideband filter. This increases the transceiver capacity to 18 crystals, which could be 10 transmit channels of which 8 could be two frequency simplex and two simplex or nine two frequency simplex channels with a blank tenth channel as the crystal capacity does not allow for more than 18 crystals.

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". This variable capacitor 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 R5 and CR2 which back biases CR1001 and shunts the 1650 kHz crystal to ground through L1 and C1, the variable "Clarifier" capacitor. The "Clarifier" control can now vary the oscillator ±150 Hz about the 1650 kHz center frequency. During transmit, 10V is removed from pin 4 and applied to pin 8 through R4 and CR3. 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. 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°C. over the ambient range of -54°C. to +55°C. Since the oscillator is also housed in the oven, stability is maintained to within ±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, depending upon the number of crystals required. Programming the oscillator for transmit and/or receive is done on the program board, which will be discussed in the switching section.

3. Receive Oscillator Option, PC-11, PC-12

This oscillator is installed only as an optional accessory when two-frequency simplex operation requires more than 10 crystals in the radio. The electrical design of this oscillator is identical to the channel oscillator discussed in Paragraph 2 of this Section. Mechanically, the oscillator is packaged on two PC boards and housed in a can similar to the SB filter can. It is mounted in the same space as occupied by the lower SB filter, which is also an optional accessory. Therefore, only one or the other may be installed.

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. Additionally, if the total number of crystals does not exceed 10, with some channels being two-frequency simplex, the receive crystal will also be installed in the oven. However, if the total crystal requirements exceed ten, which requires installation of the receiver oscillator function, then all two-frequency simplex receive crystals will be installed in the receiver oscillator module. This could take the form of eight channels, four being two-frequency simplex, for a total of 12 crystals. Then eight crystals would be installed in the oven and four crystals installed in the receiver oscillator module. Of the eight crystals in the oven, all eight would be used for transmit and four of the eight would also serve as the receive crystal for the four single frequency simplex channels. The four two-frequency simplex channel receiver crystals would be installed in the receiver oscillator module. This method would allow the addition of two channels at a later date with no change in the original crystals. This is necessary as the transmit and receive two-

frequency simplex crystals cannot be interchanged because the transmit crystals are cut to operate at +65°C. and the receiver module crystals at +25°C.

The receiver oscillator channel line-up is programmed by the wiring on the program board. Channel A in the receiver oscillator is the lowest channel number two-frequency simplex channel; channel B the next, and so forth up to a maximum of eight receive only crystals.

F. 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, S1A, controls the receiver/exciter. S1B, the second wafer, controls the antenna coupler channeling. S1C, the third wafer, controls the power amplifier channelling.

The solenoid motors located in the power amplifier and antenna coupler are controlled by a coded five wire system connected to the master wafers in the receiver/exciter. The channeling diagram for the PA and coupler is shown in Figure IV-4. A+ voltage is wired to the rotary solenoid and if the receiver/exciter 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 S1-A are terminated on TB4, which is mounted directly under the wafer switches. Switch S1-A is a two-pole, ten-position rotary switch. The pole S1-A, front, (side toward front panel) controls the receiver and is connected to the bottom of the ten pins of TB4 on the receive side. The rear side, S1-A, is the transmit side and is connected to the bottom of the ten pins of TB4 on the transmit side. 10V receive and transmit is supplied to S1-A through diodes CR4 and CR5 and the change-over relay K1. The channel switch S1-A must provide +10V to the following functions in the receiver/exciter:

	R/E-600 R/E-1200 R/E-1300					CU-106,110 CU-1000 GCU-1000					R/E-600 R/E-1200 R/E-1300					PA-1010B				
	Master S1-B					Slave					Master S1-C					Slave				
CHANNEL	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
1	x	o	o	x	x	o	x	x	o	o	x	o	o	x	o	o	x	x	o	x
2	o	o	x	x	o	x	x	o	o	x	o	x	o	x	o	x	o	x	o	x
3	o	x	x	o	x	x	o	o	x	o	o	x	o	o	o	x	o	x	x	x
4	x	x	o	x	x	o	o	x	o	o	o	o	o	o	x	x	x	x	x	o
5	x	o	x	x	o	o	x	o	o	x	o	o	x	x	x	x	x	o	o	o
6	o	x	x	o	o	x	o	o	x	x	x	x	x	x	o	o	o	o	o	x
7	x	x	o	o	x	o	o	x	x	o	x	x	o	o	o	o	o	x	x	x
8	x	o	o	x	o	o	x	x	o	x	o	o	o	x	o	x	x	x	o	x
9	o	o	x	o	x	x	x	o	x	o	o	x	o	o	x	x	o	x	x	o
10	o	x	o	x	o	x	o	x	o	x	o	o	x	x	o	x	x	o	o	x
R/E-600 R/E-1200 R/E-1300	A	B	C	D	E	J8 Pins					F	H	J	K	L					
CU-106,110 CU-1000 GCU-1000	J301 Pins					A	B	C	D	E										
PA-1010B											J4 Pins					1	2	3	4	5

An "x" indicates connection of switch wafer terminals A, B, C, D, or E to pin F.

An "o" indicates connection of switch wafer terminals A, B, C, D, or E together.

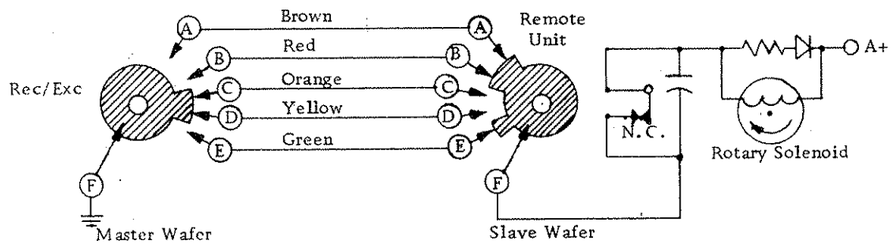
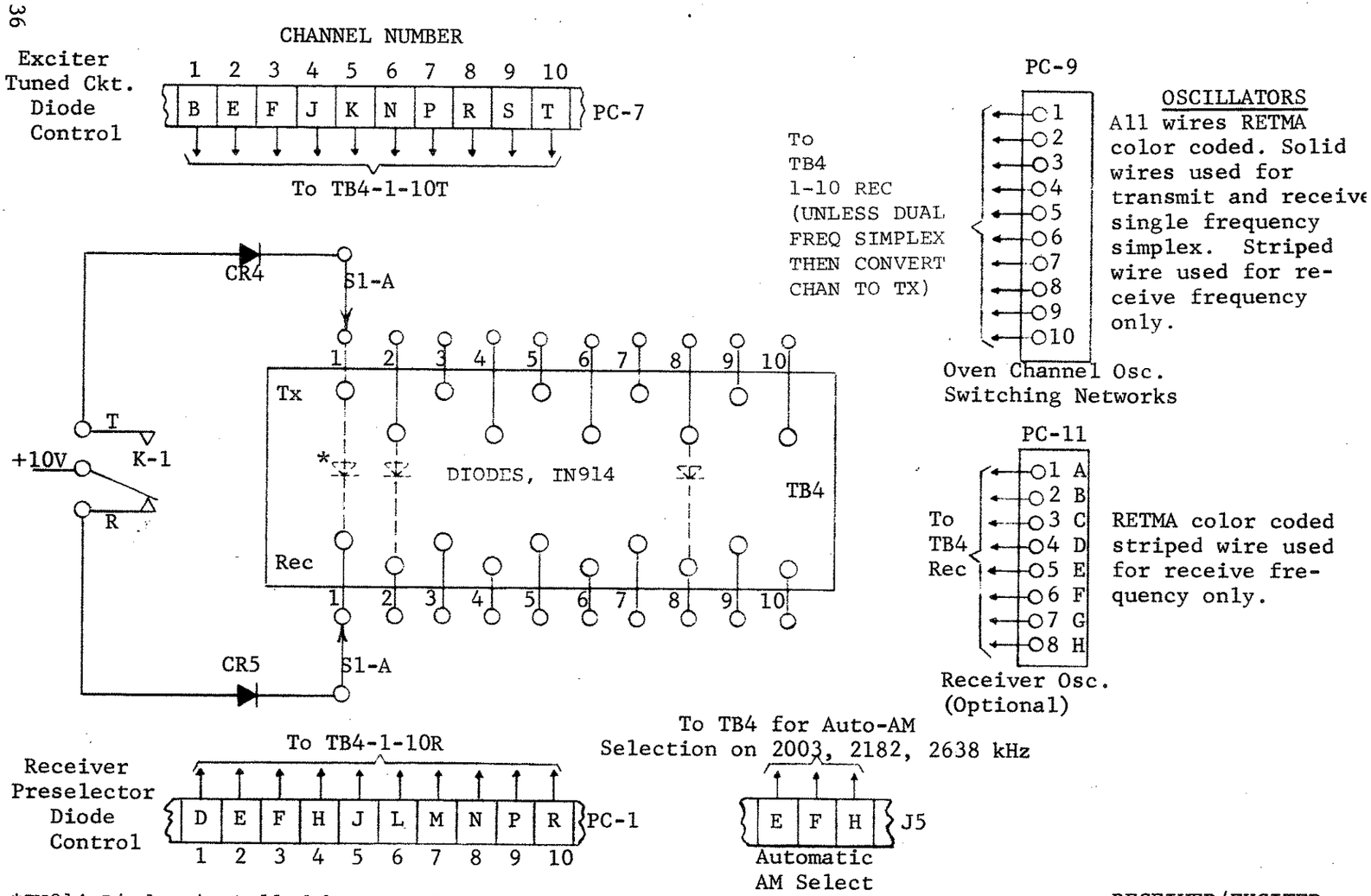


Figure IV-4

Channel Switching Code Diagram



*IN914 Diodes installed between Tx and Rec pins of same channel when one oven crystal is used for Tx and Rec. (Single Frequency Simplex).

RECEIVER/EXCITER CHANNEL SWITCHING FIGURE IV-5

(1) PC-1, receiver preselector

(2) PC-9, channel oscillator.

(3) Receiver oscillator (if installed).

(4) PC-7, exciter tuned circuits.

(5) PC-5, Pins "E", "F", "H" 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 channel oscillator oven and the selection network is on PC-9. PC-9 central wires are connected to the receive terminals of TB-4. When relay K1 is in the transmit position, 10V is supplied through diode CR-4, switch S1A rear and diode CR6-15 to the selected TB-4 transmit terminal and then to PC-9, PC-7, and PC-5, if applicable. When the microphone switch is released, relay K1 returns to the receive position and 10V is now applied to the receive side of TB-4 and subsequently to PC-1. Since the channel is single frequency simplex, a diode must be installed between the transmit and receive side on the selected channel. The diode prevents the tuned ckt. amplifiers on PC-6 from being activated while in receive.

If the channel is two-frequency simplex, the diode is not required and a separate receive crystal is selected when the relay K1 is de-energized. However, the wire from PC-9 is now connected to the transmit side of TB-4, and the receive oscillator PC-11 is connected to the receive side of TB-4. Whether the receive crystal is in the channel oscillator oven or receiver oscillator oven module depends upon the number of channels and crystals installed. See Section IV-E.

SECTION V

SPECIFICATION TEST PROCEDURE

A. GENERAL INFORMATION

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

B. EQUIPMENT REQUIRED

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

C. OSCILLATORS

1. Channel Oscillator (10 Crystal Oven Unit)

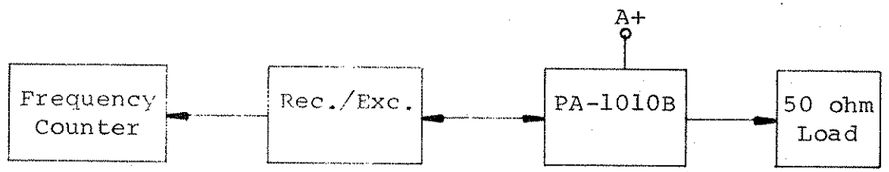


Figure V-1

(a) OFF/ON switch in "ON" position.

(b) Channel selector switch in Channel 1 position.

(c) Exciter Output J10 disconnected from PA-1010B.

(d) Receiver/Exciter in transmit (Refer to Section IV-E for other than one frequency simplex channel frequency assignment).

(e) Allow equipment to warm up 15 minutes.

(f) Connect frequency counter to Pin "N" of PC-2 and record frequency.

(g) Turn channel selector switch to successive positions and record frequency.

(h) Frequency readings must be within ±20 Hz of assigned frequency plus 1650 kHz. NOTE: Oscillator should be set to exact channel frequency.

(i) If this requirement is not met, refer to Section VI-C for alignment or Section VII-C for repair.

2. Receive Oscillator (8 Crystal Positions)

(a) Refer to Figure V-1 for equipment hook-up.

(b) OFF/ON switch in "ON" position.

(c) Channel selector switch in position(s) outlined in Section IV-E.

(d) Receiver/Exciter in "receive".

(e) Connect frequency counter to Pin "M" of PC-2 and record frequency(ies).

(f) Frequency reading(s) must not vary more than ± 0.0025% from assigned frequency plus 1650 kHz.

(g) If this requirement is not met, refer to Section VI-C for alignment or Section VII-C for repair.

3. Carrier Oscillator (1650 kHz)

(a) Refer to Figure V-1 for equipment hook-up. (Exciter output J10 disconnected from PA-1010B.)

(b) OFF/ON switch in "ON" position.

(c) Receiver/Exciter in "receive" mode.

(d) Mode switch in USB, TEL or LSB position.

(e) Clarifier in CCW position.

(f) Connect frequency counter to Pin "6" of XV-1 and record frequency.

(g) Turn clarifier to the extreme CW position and record frequency.

(h) Frequency difference between steps (f) and (g) must not be less than 300 Hz.

(i) Receiver/Exciter in "transmit".

(j) Frequency must not be more than ±2 Hz from 1650 kHz.

(k) If the requirements in steps (h) and (j) are not met, refer to Section VI-C for alignment or Section VII-C for repair.

D. RECEIVER

1. Sensitivity Measurements

a. SSB

(1) OFF/ON switch to "ON" position.

(2) Channel selector switch in desired frequency position.

(3) Squelch control full CCW.

(4) Receiver/Exciter in "receive".

(5) Connect test equipment as shown in Figure V-2.

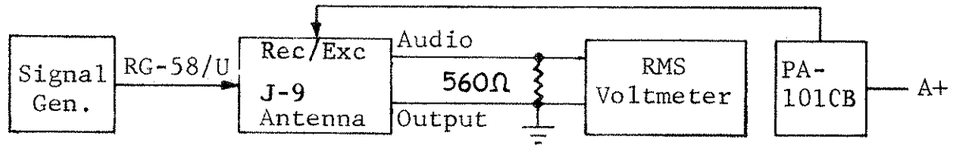


Figure V-2

(6) Set RMS voltmeter to 3 volt scale.

(7) Increase volume control on Receiver/Exciter until noise is observed on voltmeter.

(8) Turn mode switch to USB, TEL or LSB position.

(9) Set output of signal generator to luv (rms) and tune frequency dial for maximum indication on voltmeter, adjusting volume control to maintain 1V reading.

(10) Remove cable from J-9 (antenna input); output on voltmeter must be no less than 10 db down from reading in step (9).

(11) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

b. AM

(1) Follow steps (1) through (7) of Paragraph 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 1V 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) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

2. Gain Measurements

a. SSB

(1) Follow steps (1) through (5) of Paragraph 1-a.

(2) Set RMS volmeter to 10V scale.

(3) Turn volume control full CW.

(4) Turn mode switch to USB, TEL or LSB position.

(5) Set output of signal generator to luv (rms) and tune for maximum deflection on voltmeter; adjust output of generator for 7.1 volt indication on voltmeter. Repeak voltmeter reading with frequency dial.

(6) Output of signal generator must be no more than 5uv (rms).

(7) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

b. AM

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

(2) Turn mode switch to AM position.

(3) Set output of signal generator to 1 uv (rms); 30% modulation, 1000 Hz and tune for maximum deflection on voltmeter, adjust output of generator for 7.1 volt indication on voltmeter. Repeak meter reading with frequency dial.

(4) Output of signal generator must be no more than 10 uv (rms).

(5) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

3. Selectivity Measurement

a. SSB

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

(2) Connect test equipment, as shown in Figure V-3.

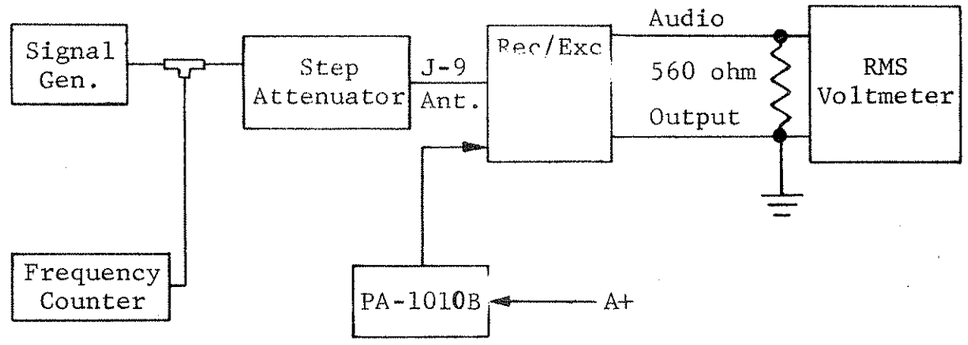


Figure V-3

(3) Set RMS voltmeter to 3 volt scale.

(4) Insert 100 db attenuation with step attenuator.

(5) Turn mode switch to USB, TEL or LSB position.

(6) Set signal generator to 100 MV (rms) and tune for Maximum deflection on RMS voltmeter, adjust volume control for desired 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 from that in step (6). Record the frequency.

(8) The frequency difference between the readings in step (7) must be no less than 2.1 kHz.

(9) Retune signal generator for maximum indication on RMS meter and record reading.

(10) Increase signal input 60 db 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 6.5 kHz.

(13) If the requirements in step (8) and step (12) are not met, refer to Section VI-D for alignment or Section VII-D for repair.

b. AM

(1) Follow steps (1) through (4) of Paragraph 1-a and steps (2) through (4) of Paragraph 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 deflection 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 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.

(9) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

4. AGC Range Measurement

a. SSB

(1) Follow steps (1) through (5) of Paragraph 1-a.

(2) Set RMS voltmeter to 10 volt scale.

(3) Turn mode switch to USB, TEL, LSB position.

(4) Set signal generator to luv (rms) and tune for maximum deflection on voltmeter.

(5) Increase signal generator output to 250,000uv (500,000uv open circuit) and set volume control for 7.1 volt on the RMS voltmeter. Reduce generator output to 5uv (rms).

(6) Output measured on voltmeter must be no more than 10 db down from 7.1 volt.

(7) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

5. Audio Response Measurement

a. SSB

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

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

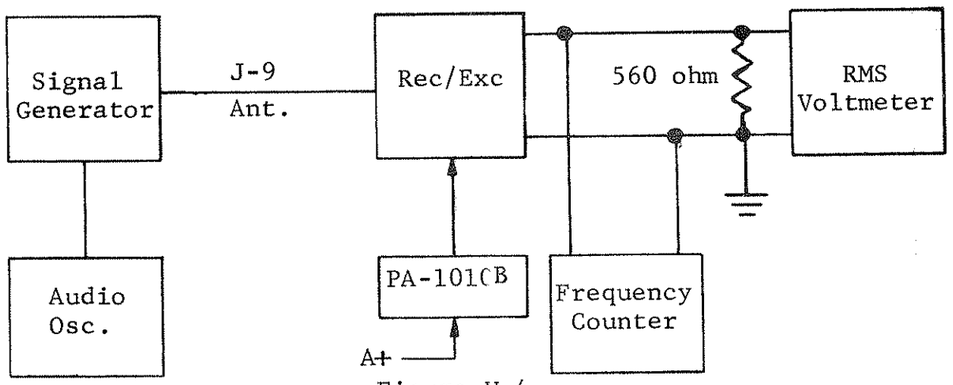


Figure V-4

(3) Set RMS voltmeter to 10 volt scale.

(4) Turn mode switch to USB, TEL or LSB position.

(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 7.1 volts.

(6) Tune signal generator until frequency counter displays 350 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 6 db down from 7.1 volts.

(8) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

b. AM

(1) Follow steps (1) through (4) of Paragraph 1-a and steps (2) and (3) of Paragraph 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 to 1uv (rms) and tune for maximum indication on RMS meter. Increase generator output to 50uv (rms) and set volume control until voltmeter indicates 7.1 volts.

(5) Turn audio oscillator to 350 Hz and record voltmeter reading. Turn audio oscillator to 3000 Hz and record voltmeter reading.

(6) Meter readings obtained in step (5) must be no more than 8 db down from 7.1 volts.

(7) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

6. Audio Distortion Measurements

a. SSB

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

(2) Connect test equipment, as shown in Figure V-5.

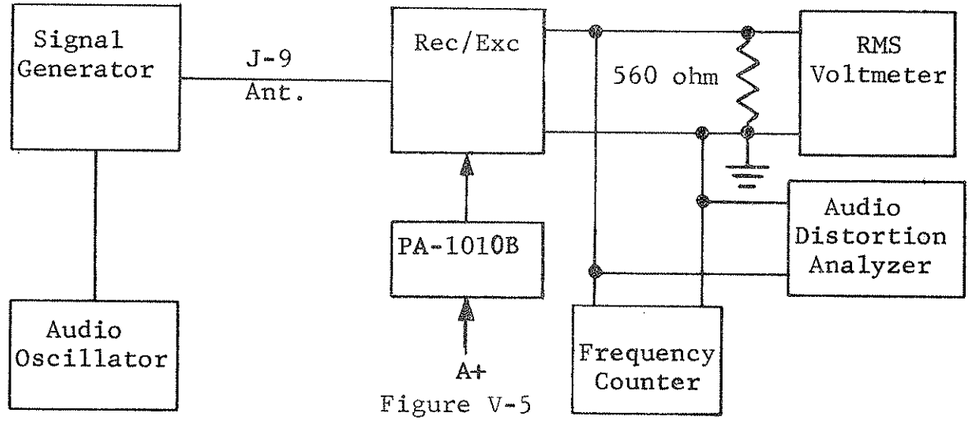


Figure V-5

(3) Set RMS voltmeter to 10 volt scale.

(4) Turn mode switch to USB, TEL or LSB position.

(5) Set signal generator to 1uv (rms) and tune until frequency counter displays 1000 Hz. Increase generator output to 100,000uv and set volume control until voltmeter indicates 7.1 volts.

(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) Repeat steps (5) through (7) at 350 Hz and 2450 Hz.

(9) Readings obtained in steps (7) and (8) must be no more than 10%.

(10) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

b. AM

(1) Follow steps (1) through (4) of Paragraph 1-a and steps (2) and (3) of Paragraph 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 luv (rms) and tune for maximum indication on RMS meter. Increase generator output to 250,000uv (500,000uv open circuit) and set volume control until RMS voltmeter indicates 7.1 volts.

(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) Repeat steps (3) through (6) for 350 Hz and 3000 Hz.

(8) Readings obtained in steps (6) and (7) must be no more than 20%.

(9) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

7. Intermediate Frequency Rejection Measurement (1650 kHz)

   a. SSB

      (1) Follow steps (1) through (9) of Paragraph 1-a.

      (2) Increase signal generator output 60 db 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 (1 volt).

      (5) If this requirement is not met, refer to Section VI-D for alignment or Section VII-D for repair.

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

   a. SSB

      (1) Follow steps (1) through (9) of Paragraph 1-a.

      (2) Increase signal generator output 60 db and tune frequency 3300 kHz above channel frequency.

      (3) Peak RMS voltmeter with frequency dial on generator.

      (4) Meter indication must be no more than reference indication (1 volt).

      (5) If this requirement is not met, refer to Section VII-D for repair.

9. Squelch Sensitivity and Range Measurement

   a. SSB

      (1) Follow steps (1) through (9) of Paragraph 1-a.

      (2) Remove cable from J-9 (antenna input). Receiver must not squelch.

      (3) Reconnect cable to J-9.

      (4) Turn squelch control full CW.

      (5) Increase signal generator output until voltmeter deflects.

(6) Signal generator output should be 15 uv (nominal).

(7) If the requirements in steps (2) and (5) are not met, refer to Section VI-D for alignment or Section VII-D for repair.

E. TRANSMITTER

1. Power Output Measurement

(a) SSB

(1) Connect test equipment, as shown in Figure V-6.

(2) OFF/ON switch in "ON" position.

(3) Channel selector in desired frequency position.

(4) Allow 15 minutes for equipment warm-up.

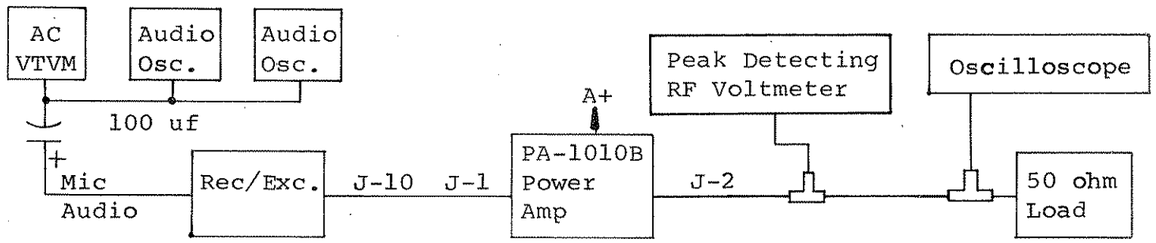


Figure V-6

(5) Turn mode switch to USB or LSB position.

(6) Set audio oscillators to 1800 Hz and 800 Hz respectively.

(7) Adjust combined audio oscillator output to 0.15 volt (rms) on AC VTVM.

(8) Key transmitter.

(9) Record output power (PEP) indicated on RF volt meter on all used channels.

NOTE: $PEP = \frac{(Vrms)^2}{50}$

(10) Output should be no less than 48W (120W PEP) on any channel.

(11) If this requirement is not met, refer to Section VI-E and F for alignment or Section VII-E and F for repair.

b. AM

(1) Repeat steps (1) through (4) of Paragraph 1-a.

(2) Turn mode switch to AM.

(3) Remove audio oscillator input from Receiver/Exciter.

(4) Key transmitter.

(5) Record output power (average) indicated on wattmeter on all channels.

(6) Output should be no less than 30W average.

(7) If this requirement is not met, refer to Section VI-E and F for alignment or Section VII-E and F for repair.

2. Carrier Attenuation

a. SSB

(1) Repeat steps (1) through (8) of Paragraph 1-a.

(2) Record output voltage measured at 50 ohm load.

(3) Remove audio input to Exciter.

(4) The output measured at 50 ohm load must be no less than 40 db below the output measured in step (2).

(5) If this requirement is not met, refer to Section VI-E and F for alignment or Section VII-E and F for repair.

b. Telephone

(1) Repeat steps (1) through (8) of Paragraph 1-a.

(2) Turn mode switch to TEL.

(3) Record output volt 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 14 db and no more than 18 db below the output in step (3).

(6) If this requirement is not met, refer to Section VI-E and F for alignment or Section VII-E and F for repair.

SECTION VI

ADJUSTMENT AND ALIGNMENT PROCEDURES

A. GENERAL INFORMATION

1. The receiver/exciter and power amplifier/power supply are designed for minimum variations in specifications. After the initial factory alignment further alignment is not required unless circuit boards are replaced, channel frequencies are altered, or periodic inspections are scheduled to insure peak performance of the equipment.

2. The procedure outlined in this Section should be utilized whenever alignment or adjustment is required.

B. EQUIPMENT REQUIRED

1.	RF Voltmeter	H-P Model 410B, or equivalent
2.	RMS Voltmeter	H-P Model 400L, or equivalent
3.	Frequency Counter	H-P Model 330C, or equivalent
4.	RF Signal Generator	H-P Model 606B, or equivalent
5.	Audio Oscillator	H-P Model 200CD, or equivalent
6.	Wattmeter (100W Element)	Bird Model 43, or equivalent
7.	Dummy Load (50 ohms)	Bird Model, 81B, or equivalent
8.	Oscilloscope	Tektronix Model, 543B, or equivalent
9.	DC VTVM	H-P Model 412A, or equivalent
10.	Tunable Receiver (4-36 MHz with S Meter) or Field Intensity Meter.	

C. OSCILLATORS

1. Channel Oscillator (10 Crystal Oven Unit)

   (a) For test setup, refer to Section V-C, Paragraph 1.

   (b) Adjust C-901 through C-910 until frequency is within ±5 Hz of assigned frequency plus 1650 kHz.

2. Receive Oscillator (8 Crystal Module Unit)

   (a) For test set up, refer to Section V-C, Paragraph 2.

   (b) Adjust C-1101 through C-1108 until frequency is within ±0.0010% of assigned frequency plus 1650 kHz.

3. Carrier Oscillator (1650 kHz)

   (a) For test setup refer to Section V-C, Paragraph 3.

(b) Adjust trimmer capacitors on rear of C-1 case until the frequency difference with C-1 in CW position and CCW position is not less than 300 Hz.

(c) Refer to Section V-C, Paragraph 3-(h).

(d) Adjust C-1003 until frequency is within ±2 Hz of 1650 kHz.

D. RECEIVER

1. Mixer and IF Alignment

(a) Refer to Section V-D, Paragraph 7-a for equipment hook-up.

(b) Remove PC-3 from receiver/exciter.

(c) Connect 2200 ohm resistor from Pin "T" of PC-2 to +10 volts.

(d) Connect oscilloscope to Pin "H" of PC-2.

(e) Adjust L-211, L-212, L-213 (PC-2) for maximum output at Pin "H", reducing signal generator output to prevent saturation.

(f) Adjust L-207, L-210 for minimum output at Pin "H", increase signal generator to maintain readable presentation on oscilloscope.

(g) Repeat step (e) above.

(h) Remove 2200 ohm resistor from Pin "T" of PC-2.

(i) Reinstall PC-3.

2. Preselector Alignment

(a) Refer to Section V-D, Paragraph 1-a for equipment hook-up.

(b) Adjust coils corresponding to selected channel, L-101 through L-130, for maximum audio output on RMS meter.

3. AM and SSB Gain Equalizations

   (a) Refer to Section V-D, Paragraph 1-a, steps 1 through 8.

   (b) Connect DC VTVM to Pin "T" of PC-2.

   (c) Increase signal generator output to 10 uv and tune for minimum DC on VTVM. Record this voltage.

   (d) Switch to AM position and tune signal generator for minimum DC on VTVM. Record this voltage.

   (e) If the recorded voltages in steps (c) and (d) are unequal, adjust C-230 (AM oscillator injection) until voltages are as equal as possible.

4. AGC-2 Threshold and Distortion Adjustment

   (a) Refer to Section V-D, Paragraph 4-a.

   (b) Adjust R-330 so that a 10 db decrease in signal from 250,000 uv (500,000 uv open circuit) results in no change in output and minimum sine wave distortion is observed.

5. Detector Bias Adjustment

   (a) Refer to Section V-D, Paragraph 5-b.

   (b) Adjust R-336 for minimum sine wave distortion while maintaining output within $\pm$2 db of rated output.

6. Squelch Threshold Adjustment

   (a) Refer to Section V-D, Paragraph 9-a.

   (b) Turn squelch control CW.

   (c) Increase signal generator output until RMS meter indicates audio output.

   (d) Adjust R-415 so that squelch breaks with 7 $\pm$2 uv input signal.

E. EXCITER

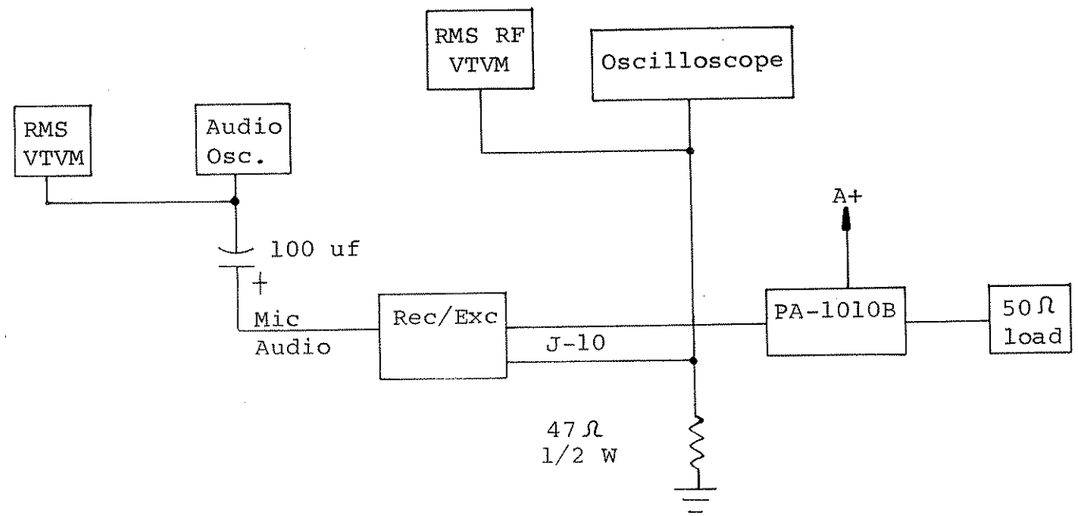


Figure VI-I

1. Modulation Adjustment

(a) Set up equipment as shown in Figure VI-I.

(b) Turn ON/OFF switch to "ON" position.

(c) Allow 15 minutes for equipment warm-up.

(d) Set audio oscillator output for 0.150V rms at 1000 Hz.

(e) Turn mode switch to AM position.

(f) Key transmitter.

(g) Adjust R-535 until signal on oscilloscope is modulated 100%.

2. Balanced Modulator Adjustment

   (a) Set up equipment, as shown in Figure VI-I.

   (b) Refer to Paragraphs 1-(b) through 1-(f).

   (c) Connect oscilloscope to the base of Q-503.

   (d) Adjust R-511 until adjacent peaks at the top and bottom of the wave-form are of equal amplitude (See Figure VI-2).

Figure VI-2
Signal Wavefrom at Base of Q-503

3. Balanced Mixer Adjustment

   (a) Set up equipment, as shown in Figure VI-I.

   (b) Turn channel selector switch to highest transmit frequency.

   (c) Refer to Paragraphs 1-(b) through 1-(e).

   (d) Turn mode select switch to "USB".

   (e) Key transmitter.

   (f) Remove audio oscillator input from Receiver/Exciter.

   (g) Adjust R-609 for minimum output on RF VTVM or oscilloscope.

4. Exciter Tuned Circuit Alignments

   (a) Set up equipment, as shown in Figure VI-I.

   (b) Set channel selector switch to desired frequency.

   (c) Refer to Paragraphs 1-a through 1-f.

   (d) Turn slugs of selected channel coils L701-L710 and L711-L720 all the way into the form.

(e) Slowly turn slugs CCW until signal appears on scope, alternately tune the coils until the oscilloscope shows a peak.

NOTE: Care must be taken not to tune the Exciter to the channel oscillator frequency (1650 kHz) above the transmit frequency.

5. Sidetone Adjustment

(a) For this adjustment, refer to Section II-E.

F. POWER AMPLIFIER (PA-1010B)

CAUTION: VOLTAGES IN THIS UNIT ARE HAZARDOUS TO LIFE.

1. Bias Adjustment

(a) Connect equipment as shown in Figure VI-3.

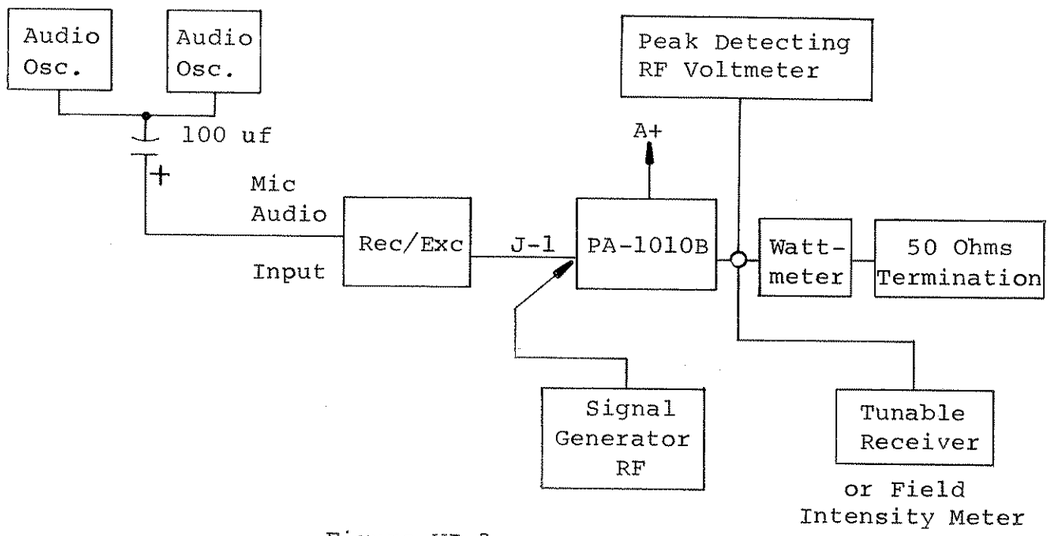


Figure VI-3

(b) Disconnect cable from J-1 of PA-1010B.

(c) Turn OFF/ON switch to "ON".

(d) Allow 15 minutes for equipment warm-up.

(e) Connect DC voltmeter to Pin 1 of V-2.

(f) Turn voltmeter to "3 volt" scale.

(g) Key transmitter.

(h) Adjust R-110 until meter indicates 0.3 volts DC.

(i) Connect DC VTVM to Pin 1 of V1; voltage should be between .25-.35 volts.

2. Driver and Output Coil Tuning.

(a) Connect equipment as shown in Figure VI-3.

(b) Disconnect Receiver/Exciter and connect signal generator to J-1 of PA-1010B.

(c) Turn channel selector to desired channel.

(d) Turn OFF/ON switch to "ON".

(e) Allow 15 minutes for equipment warm-up.

(f) Place HI/LOW switch on PA-1010B in "HI" position.

(g) Key transmitter.

(h) Tune signal generator for maximum output on wattmeter.

(i) Increase or reduce generator output until wattmeter indicates 50W.

(j) Alternately tune driver coil (L-2 through L-11) and output coil (L13 through L22) for peak indication on wattmeter. Reduce generator output to maintain 50W on wattmeter.

3. Neutralizing Capacitor Adjustment

(a) Refer to Figure VI-3 for test set-up.
(b) Place HI-LOW power switch on PA-1010B in "HI" position.
(c) Connect oscilloscope to Pin 3 of the driver V-1.
(d) Select highest frequency channel.
(e) Disconnect exciter output from J-1 of PA-1010B.
(f) Key transmitter.
(g) Inject channel frequency from signal generator into J-2 (RF output) of PA-1010B. Caution: Use fused generator and connect to J-2 after keying, if no power output is observed on the wattmeter.
(h) Adjust C-33 neutralizing capacitor for minimum signal observed on the oscilloscope.
(j) Unkey transmitter and disconnect signal generator from J-2.

4. ALC Adjustment

a. Refer to Figure VI-3 for test set-up.
b. Connect exciter output, J-10 to J-1 PA-1010B.
c. Turn R-1404, AM power adjustment, R-1403, SSB power adjustment and R-1402, AM peak modulation adjustment completely CCW.
d. Turn mode selector to USB or LSB.
e. Turn channel selector to lowest channel frequency used.
f. Key transmitter.
g. Adjust R-1403 (CW) until RF voltmeter indicates 79 volts.
h. Unkey transmitter and turn channel selector to highest frequency; key transmitter.
j. Adjust C-1405 (capacitor on ALC detector toward the inside of power amp.) until voltmeter indicates 79V.
k. Unkey transmitter and channel to lowest frequency.
l. Turn mode switch to AM and remove both audio oscillator inputs.
m. Key transmitter and adjust R-1404 (CW) until RF voltmeter indicates 39V.
n. Unkey transmitter and channel to highest frequency. Key the transmitter and adjust C-1408 (Located on the RF detector toward the outside of the power amp) until voltmeter indicates 39 volts.
o. Connect one audio oscillator to Mic. input and adjust R-1402 CW until the RF voltmeter indicates 79 volts. Then turn R-1402 back 1/2 turn.
p. Unkey transmitter and remove audio osc. input channel to all used frequencies and key transmitter. RF voltmeter should indicate 39V on all channels.

5. Telephone Adjustment

a. Refer to Figure VI-3 for test set-up.
b. Select telephone channel if installed.
c. Turn mode switch to USB.
d. Connect audio oscillators to MIC input.
e. Key transmitter and record output.
f. Remove audio oscillator and record output.
g. Difference in output must be no less than 14 db and no more than 18 db.
h. Select resistor, R-517 on PC-5, for proper carrier attenuation. (Increase value if less than 14 db and decrease if greater than 18 db) Nominal value installed is 18k.

6. Second Harmonic Trap Adjustment

a. Refer to Figure VI-3 for test set-up.
b. Turn mode switch to AM
c. Remove audio oscillator input
d. Couple field intensity meter or receiver from 50 ohm output, and tune to twice the channel frequency.
e. Key transmitter and adjust L-23 through L-32, 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.

SECTION VII

TROUBLE SHOOTING AND MAINTENANCE

A. GENERAL INFORMATION

1. When the Receiver/Exciter or Power Amplifier are 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.

B. EQUIPMENT REQUIRED

1.	RF Voltmeter	H-P Model 410B, or equivalent
2.	RMS Voltmeter	H-P Model 400L, or equivalent
3.	RF Signal Generator	H-P Model 330C, or equivalent
4.	Audio Oscillator	H-P Model 200CD, or equivalent (2)
5.	Wattmeter (100W Element)	Bird Model 43, or equivalent
6.	Dummy Load, 50 ohms	Bird Model 81B, or equivalent
7.	Oscilloscope	Tektronix Model 543B, or equivalent
8.	Multimeter 20K ohms/volt	Simpson Model 260, or equivalent

C. OSCILLATORS

1. Channel Oscillator (10 Xtal Oven Unit or 8 Xtal Rec/Osc Unit)

(a) Trouble Analysis Chart

Symptom	Probable Cause *Note 1	Remedy
No output on any channel.	Defective coil L-2, diodes CR-4, CR-5, or PC-8.	Make voltage checks on L-2, CR-4, CR-5. Refer to Table VII-1 and schematic diagram. Replace defective component or entire circuit board.

Symptom	*Note 1 Probable Cause	Remedy
No output on some channel(s).	Defective crystal(s), defecgive wafer S-1A, defective component(s) on PC-9.	Replace crystals, check wafer S-1A contacts for continuity, test PC-9 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 not adjusted properly, defective crystal or capacitor on PC-9.	See Section VI-C for alignment procedures test, as shown in schematic diagram. Replace defective component.

*NOTE 1: When receive oscillator is checked, PC-8 and PC-9 designations should be changed to PC-12 and PC-11, respectively.

Test Point		DC Voltage ±10%	Signal Voltage (RMS)
Integrated Circuit	Pin No.		
IC-801 or IC-1201	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) - Trouble Analysis Chart - Continued.

Symptom	Probable Cause	Remedy
No output on receive; transmit normal.	Defective diode CR-2, L-1 or C-1.	Check components and replace if defective.
	Defective switch Q-504 and Q-505 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-3 or R-4 defective.	Check voltage on K-1 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.	C-1 not adjusted properly.	Refer to Section VI-C, alignment procedures.

Test Point		DC Voltage +10%		Signal	
Tube Socket	Pin No.	Rec (USB, TEL, LSB)	Transmit	Rec (USB, TEL, LSB)	Transmit
XV-1	2,3,5	Gnd	Gnd		
	4	3V	Gnd		
	6			0.1 V (RMS)	0.33V(RMS)
	7	28 or 14	28 or 14		
	8	Gnd	8.2		

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 Q1 (E) and CR-6. Replace defective component.
	Channel oscillator defective.	Test as shown in Section VII-C, Paragraph 1 and Schematic Diagram. Replace defective circuit board or component.
	Diode CR-5 open.	Check diode, replace if defective.
	Defective relay K-1.	Check relay contacts for continuity, replace if defective.
	Defective colume 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.
No audio output on some channels, AM or SSB.	Defective crystal(s) in channel oscillator.	Replace crystal(s).

D. Receiver - Trouble AnalysisChart - Continued

Symptom	Probable Cause	Remedy
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-9) defective.	Check components on inoperative channel(s) on PC-9. Replace defective component. Refer to Section VII-C, Paragraph 1.
No audio output on AM, SSB normal.	Defective mode switch S-3.	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.
	Defective switching circuits on PC-4.	Test as shown in Table VII-5 and Schematic Diagram. Replace defective component or entire board.

D. Receiver - Trouble Analysis Chart - Continued

Symptom	Probable Cause	Remedy
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 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 transformer T-1.	Replace transformer.
Audio output distorted, unreadable on SSB; AM normal.	Clarifier not adjusted properly.	Adjust C-1 (front panel).

D. Receiver - Trouble Analysis Chart - Continued

Symptom	Probable Cause	Remedy
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.

Test Point		DC Voltage ±10%		Signal Volt. & Waveform	
Transistor or FET	Pin No.	SSB	AM	SSB	AM
Q-201[1]	Emitter	.65V	.65V	-	-
	Base	1.3 V	1.3 V	-	-
	Collector	7.2 V	7.2 V	0.38V	0.38V
Q-202[2]	Drain	9.1 V	9.1 V	0.28V	0.28V
	Source	1.65V	1.65V	-	-
	Gate	-	-	2.0V	2.0V
Q-203[2]	Drain	7.7V	7.7V	0.5V	-
	Source	0.5V	0.5V	-	0.5V
	Gate	-	-	0.12V	0.12V
Q-204[2]	Emitter	-	1.4V	-	-
	Base	-	2.1V	-	0.22V
	Collector	-	7.7V	-	2.4V
Q-205[2]	Drain	-	6.5V	-	-
	Source	-	2.0V	-	0.6V
	Gate	-	-	-	-
Q-206[2]	Emitter	0	0	-	-
	Base	0.7V	0	-	-
	Collector	0	6.5V	-	-

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 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	3.3V	3.3V	3.3V	3.3V		
	B	0	0	0	4.0V		
	C	9.5V	9.5V	9.5V	9.5V		
Q-302	E	1.8V	1.8V	1.8V	1.8V		
	B	1.1V	0	1.1V	0		
	C	9.5V	9.5V	9.5V	9.5V		
Q-303	E	3.3V	3.3V	3.3V	3.3V		
	B	0	4.0V	0	0		
	C	9.5V	9.5V	9.5V	9.5V		
Q-304	E	1.45V	1.45V	1.45V	1.45V		
	B	2.25V	2.25V	2.25V	2.25V		
	C	5.0V	5.0V	5.0V	5.0V	0.23V	0.34V
Q-305	E	0	0	0	0		
	B	0.7V	0	0.7V	0.7V		
	C	0	9.5V	0	0		
Q-306	E	0	8.5V	0	0		
	B	0	9.5V	0	0		
	C	9.5V	9.5V	9.5V	9.5V		
Q-307	D	7.8V	7.8V	7.8V	7.8V	1.4V	1.6V
	S	0.8V	0.8V	0.8V	0.8V		
	G	-	-	-	-	0.25V	0.25V
			SSB	AM			
Q-308	D		4.5V	4.5V		0.46V	0.6V
	S		1.7V	1.6V		0.5V	-
	G		-	-		0.06V	0.36V
Q-309	E		0.16V	0.16V		-	4.2VDC
	B		0.7V	0.7V		-	4.9VDC
	C		9.5V	9.5V		-	9.5VDC
Q-310	E		0	0		-	1.2VDC
	B		0	0		-	1.9VDC
	C		9.0V	9.0V		-	5.5VDC
*Q-311	E		0	0		-	-
	B		0	0		-	-
	C		0	0		-	-
Q-312	E		0.7V	0.7V		-	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 Transistor or FET	Pin No.	DC Voltage ±10% USB	AM	TEL	LSB	Signal Voltage and Waveforms SSB	AM
Q-401	E	0	0	0	0	-	-
	B	0	0	0	0	-	-
	C	0	4.4 V	0	0.6V	-	-
Q-402	E	0	0	0	0	-	-
	B	0	0.7 V	0	0	-	-
	C	3.8 V	0	3.6	0.0V	-	-
Q-403	E	0	0	0	0	-	-
	B	0	0.7 V	0	0.7V	-	-
	C	4.5 V	0	4.5V	0	-	-
Q-404	E	0	0	0	0		
	B	0.7 V	0.7 V	0.7V	0	-	-
	C	0	0	0	4.5V	-	-
Q-405	E	2.2 V	-	-	-	-	-
	B	2.8 V	-	-	-	-	-
	C	9.5 V	-	-	-	-	-
Q-406	E	1.2 V	-	-	-	-	-
	B	2.20V	-	-	-	-	-
	C	1.30V	-	-	-	-	-
Q-407	E	0.8 V	-	-	-	-	-
	B	1.00V	-	-	-	-	-
	C	9.5 V	-	-	-	-	-
			SSB	AM			
Q-408	E		1.30V	-		-	-
	B		0.40V	-		-	-
	C		2.15V	-		-	-
Q-409	S		1.25V	-		0.06V~	-
	D		9.5 V	-		-	-
	G		-	-		0.06V~	-
IC-401	1		4.2 V	-		-	-
	2		1.0 V	-		-	-
	3		1.0 V	-		-	-
	4		9.1 V	-		9.0 V~	
	5,6		0.013V	-		-	-
	7		9.1 V	-		9.0 V~	-
	8,9		9.5 V	-			-
	10		4.9 V	-		0.06V~	-
	11		2.15V	-		-	-
	12		0	-		-	-

Note 1: DC measurements static. No signal conditions.
Note 2: Signal measurements were taken with 20 MV (rms), 1000 Hz injected on Pin "T", PC-4.
Note 3: Q-405 thru Q-408 measurements were taken with R-2 and R-415 full CCW.

Table VII-5 - PC-4 DC and Signal Measurements

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 CR-4. Defective relay K-1.	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.
No output on SSB. No modulation on AM. Carrier normal.	R-511 not adjusted properly.	Adjust R-511 as shown in Section VI-E, alignment procedures.
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.

E. Exciter - Trouble Analysis Chart - Continued

Symptom	Probable Cause	Remedy
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.
	Balanced mixer potentiometer (R-609) not adjusted properly.	Refer to alignment procedures, Section VI-E.
	Defective mixer, PC-6.	Test as shown in Table VII-9 and Schematic Diagram.
No sidetone output.	R-423 not adjusted properly, defective coupling cap.	Refer to Section II-E for adjustment. Test as shown in Tables VII-6, 8 and Schematic Diagrams.

Test Point Transistor		DC Voltage ±10%				Signal Voltage and Waveforms	
or FET	Pin No.	USB	AM	TEL	LSB	SSB	AM
Q-401	Emitter	0	0	0	0	-	-
	Base	0.7V	0.7V	0.7V	0.7V	-	-
	Collector	0	0	0	0	-	-
Q-402	E	0	0	0	0	-	-
	B	0	0.7V	0	0	-	-
	C	3.8V	0	3.6V	0.0V	-	-
Q-403	E	0	0	0	0	-	-
	B	0	0	0	0.7V	-	-
	C	4.5V	4.5V	4.5V	0	2.0V	1.2V
Q-404	E	0	0	0	0	-	-
	B	0.7V	0.7V	0.7V	0	-	-
	C	0	0	0	4.5V	2.0V	-
IC-401	10	-	-	-	-	0.06V	-
	4	-	-	-	-	9.0V	-
	7	-	-	-	-	9.0V	-

Note 1: DC measurements static. No signal conditions.

Note 2: Signal measurements were taken with 0.1V (rms), 1000 Hz input at Pin "B", PC-5.

Table VII-6 - PC-4 DC Voltage and Signal Measurements

Test Point Transistor or FET	Pin No.	DC Voltage ±10% USB	AM	TEL	LSB	Signal Voltage and Waveforms SSB	AM
Q-504	E	0	0	0	0	-	-
	B	0	0.7V	0	0	-	-
	C	9.0V	0	9.0V	9.0V	-	-
Q-505	E	8.5V	0	8.5V	8.5V	-	-
	B	9.0V	0	9.0V	9.0V	-	-
	C	9.5V	9.5V	9.5V	9.5V	-	-
	E	0	0	0	0	-	-
	B	0.7V	0.7V	0.7V	0.7V	-	-
	C	0	0	0	0	-	-

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

Table VII-7 - PC-5 DC 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

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	0.3Vpp	0.3Vpp
Q-602	E	0.8		
	B	1.5		
	C	4.8	.05Vpp	.05Vpp
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	0.2Vpp	0.2Vpp
	G	0		
Q-607	E	0.9		
	B	1.5		
	C	9.0		
Q-608	E	0.3		
	B	1.0		
	C	9.2	4.4Vpp	4.4Vpp

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

F. POWER AMPLIFIER, PA-1010B

1. Trouble Analysis Chart

Symptom	Probable Cause	Remedy
No output on any channel, tube filaments dark.	Fuse	Check and replace fuse.
	Defective power relay, K-1.	Burnish contacts or replace K-1.
	Defective tubes, V-1, V-2 or V-3	Test and replace.
No output on any channel. No transformer switching noise. High A+ current.	Defective Q-101 or Q-102 switching transistors.	Test and replace if defective.
	Defective rectifier diodes CR-101 thru CR-104.	Test and replace if defective.
	Defective bias rectifier CR-105.	Test and replace if defective.
	Defective relay K-101.	Test, burnish contacts, or replace.
No output on any channel, tubes lit, Switching noise present.	Defective antenna relay K-2	Test, burnish contacts or replace.
	Defective Tubes V-1, V-2 or V-3	Test and replace if defective.

F. Power Amplifier - Trouble Analysis Chart - Continued

Symptom	Probable Cause	Remedy
No output on any channel, tubes lit, switching noise present.	Ledex motor not switching or switching to wrong channel.	Align to proper channel position and tighten coupling between motor and switch. Check A+ Ledex.
		Replace motor if defective. Check channel wire system.
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-101.	Check continuity of SW-101 wafers, replace if defective.
Output low.	Hi-Low power switch in low position.	Switch to Hi.
	ALC potentiometers not set properly.	Adjust R-1403, R-1404, as shown in Section VI-F, alignment procedures.
	Bias adjustment V-2 and V-3 not correct.	Adjust R-110, as shown in Section VI-F, alignment procedures.
	Tubes V-1, V-2, or V-3 defective.	Check tubes, replace if defective.
Output high.	ALC not adjusted properly or defective ALC circuits in PA-1010B or exciter (PC-6).	Adjust ALC as shown in Section VI-F, alignment procedures, test ALC detector and amplifiers as shown in Schematic Diagram. Replace if defective.

Test Point			
Tube or Transistor	Pin No.	DC Voltage ±10%	Signal Voltage
V-1	1	1.50V	-
	2	-	-
	3	-	-
	4	FIL	-
	5	0	-
	6	-	-
	7	300.0V	-
	8	175.0V	-
	9	1.50V	-
V-2, V-3	1, 4, 6	.30V	-
	2	FIL	-
	3	+250.0V	-
	5	-50.0V	-
	7	FIL	
	Anode Cap	+840.0V	-

Note 1: DC Measurements static. No signal condition.

Table VII-10 - PA-1010B 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 loated 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	.0033uf 28871	330pf 28865	18pf 28662	300pf 28864	18pf 28662	330pf 28865	.0018uf 28869
2.88-3.46	62981-3 Orn	.0033uf 28871	300pf 28864	15pf 28650	270pf 28863	15pf 28650	300pf 28864	.0018uf 28869
3.46-4.15	62981-4 Yel	.0027uf 28870	240pf 28862	12pf 28648	220pf 28861	12pf 28648	240pf 28862	.0013uf 28868
4.15-5.00	62981-5 Grn	.0018uf 28869	200pf 28715	10pf 28859	180pf 28105	10pf 28859	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	.0013uf 28868	130pf 28703	7pf 28858	120pf 28088	7pf 28858	130pf 28703	.0012uf 28867
7.20-8.65	62981-8 Gry	.0012uf 28867	110pf 28131	5pf 28857	100pf 28545	5pf 28857	110pf 28131	.0012uf 28867
8.65-10.40	62981-9 Wht	910pf 28866	91pf 28860	5pf 28857	91pf 28860	5pf 28857	91pf 28860	910pf 28866
10.40-12.45	62981-10 Blk	820pf 28399	82pf 26652	3pf 28856	82pf 26652	3pf 28856	82pf 26652	820pf 28399
12.45-15.00	62981-11 Brn Brn	680pf 28428	68pf 28076	3pf 28856	68pf 28076	3pf 28856	68pf 28076	680pf 28428
15.00-18.00	62981-12 Brn Red	680pf 28428	56pf 28129	2.2pf 25000	56pf 28129	2.2pf 25000	56pf 28129	680pf 28428

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

Table VIII-1 - Receiver Customizing

ASB-125/60 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	330
15.0-18.0	62993-8	Gry	27474	100	18253	330

Table VIII-2
Exciter Customizing

PA-1010B

POWER AMPLIFIER/POWER SUPPLY

Frequency Range (MHz)			DRIVER TUNED CIRCUIT						FINAL AMPLIFIER PI-NETWORK					TRAP	
			L2-11		C6-15		C16-25		L13-22	C34-43		C44-53		C54-63	
From	To	Band	P/N	ID	P/N	ID	P/N	ID	P/N	P/N	ID	P/N	ID	P/N	ID
2.0	2.3	1	63375	A-4	28624	680 pf	27527	620 pf	64719	27785	360 pf	24915	750 pf	28875	820 pf
2.3	2.6	2	66509	A-9	27527	620	28973	560	64719	27759	300	24941	700	28624	680
2.6	3.0	3	66509	A-9	28612	500	27591	470	64721	27747	270	24953	800	28961	510
3.0	3.4	4	66509	A-9	28959	430	28600	390	64721	27723	240	25579	820	28600	390
3.4	3.9	5	66511	A-8	28600	390	27515	360	64721	27709	200	24941	700	27632	300
3.9	4.5	6	63117	A2R	28959	430	28600	390	64733	27682	170	25555	680	28595	220
4.5	5.2	7	63117	A2R	26951	330	27632	300	64733	25892	150	24185	600	28583	180
5.2	5.9	8	63117	A2R	28595	220	28583	180	64745	25907	120	25529	530	27486	130
5.9	6.8	9	63143	D-6	28595	220	28583	180	64745	25919	100	25505	470	27474	100
6.8	7.9	10	63143	D-6	27498	150	25775	110	64757	28789	82	25490	430	25237	75
7.9	9.0	11	63155	D-5	27498	150	28985	120	64757	28806	62	25488	390	27462	56
9.0	10.3	12	63155	D-5	27486	130	27474	100	64769	25933	50	25464	330	26080	43
10.3	11.8	13	63167	D-4	27474	100	27462	56	64769	28820	39	25452	300	26078	33
11.8	13.6	14	63167	D-4	28997	82	26080	43	64771	25945	30	25373	230	29006	24
13.6	15.5	15	63179	D-3	28874	68	26042	20	64771	28947	27	25426	200	26030	18
15.5	18.0	16	63179	D-3	27450	36	Note (1)		64771	Note (1)		25646	100	26028	12

Note (1): Use no capacitor; leave circuit open.

Table VIII-3 - Power Amplifier Customizing Components

B. VOLTAGE CHANGE

If a voltage change from 14V to 28V or 28V to 14V is required, it is recommended that the unit be returned to the factory. However, the job can be done by a competent service shop if for various reasons the unit cannot be returned. This section outlines the changes that must be made to the receiver/exciter and power amplifier.power supply unit to accomplish the transition.

1. Receiver/Exciter

It is necessary that several components be replaced for the voltage change and some rewiring be done. Component part numbers for 14V or 28V are listed in the Parts List. The components that must be changed are:

(a) Relay K-1 (Tx/Rec. Voltage change-over)

(b) Octal Oven (Houses carrier oscillator)

(c) Resistor R-11 (10V regulator bias resistor)

(d) Resistor R-10 (10V audio regulator dropping resistor)

Additionally, some wiring changes must be made. The transmitter oscillator oven heater is a dual winding, one for 28V and the other for 14V. The connections are on terminals on the bottom of the oven terminal board and are marked accordingly. The front panel lamps are 14V and must be all wired in parallel for 14V operation or a series parallel combination for 28V, as shown in Figure VIII-1.

2. Power Amplifier/Power Supply

The items or components listed below either must be changed or rewired in order to effect a voltage change. The PA/PS schematic drawing indicates the exact change to be made.

Resistors: R-103, R-104, R-19, R-18, R-20

Capacitors: C-101

Fuse: F-1

Transistors: Q-101 and Q-102

Transformer T-1 must be changed and rewired as shown in schematic drawing.

Filaments of V1, V2 and V3 rewired as shown on schematic diagram.

Lamp Connections (all radios wired as shown)

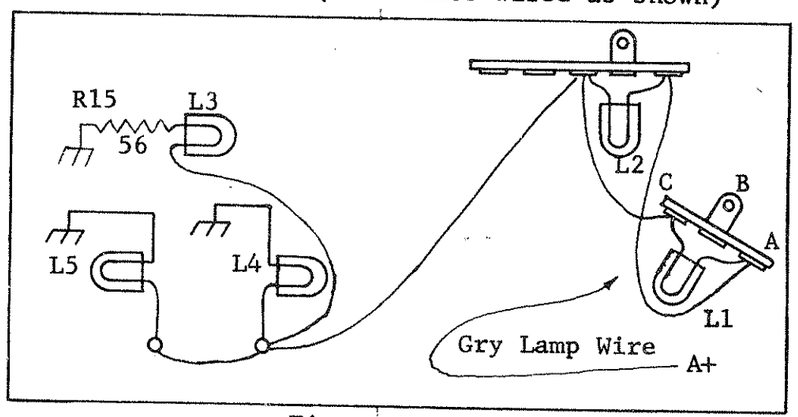


Figure VIII-1
Back Plate, Front Panel

28 Volts: Gry wire to terminal "A"; add 180 ohm, 3W resistor between terminals "A" and "C".

14 Volts: Gry wire to terminal "C", connect terminal "A" to terminal "B" (ground).

C. LSB OPTION INSTALLATION

The filter for the lower sideband option is mounted on the same bracket as the upper sideband operation filter and in the space in which the receiver oscillator option is installed. Therefore, only one of the options, LSB operation or receiver oscillator, may be installed in the same radio.

Remove two screws holding U shaped filter bracket and lift bracket until filter may be fitted in mounting holes, input terminal at top of bracket. Mount filter and add 1.2K ohm resistor as on USB filter. 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. Reinstall U bracket with two screws.

PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
C1	28052	Capacitor 5-125pf
C2	28337	" .47uf 50V
C3	27345	" .02uf 100V
C4	27357	" .05uf 25V
C5	28038	" 68uf 15V
C6	28337	" 0.47uf 50V
C7	28337	" "
C8	26597	" 100uf 15V
C9	28337	" .47uf 50V
C10	27412	" 22uf 15V
C11	27357	" .05uf 25V
C12 thru C14	28337	Capacitor 0.47uf 50V
C15 thru C35	27357	" .05uf 25V
C36	28753	" 6.8uf 15V
CR1	40505	Zener 5W 10V
CR2 thru CR15	44290	Diode, Silicon
CR6	40426	Diode, Zener 1W 9.1V
FL1	81731	Filter, USB Operation
FL2	81743	Filter, LSB Operation
H1	81858-1	Oven, Carrier Osc. 28V Only
H1	81858-2	Oven, Carrier Osc. 14V Only
H2	81808	Oven, Channel, 10 Crystal
I1 thru I5	87149	Lamp, Panel
J1 thru J7	74972	Connector, Card
J8	74984	" Chassis
J9	74374	" RF, Rec.
J10	74374	" RF, Exc.
K1	66377-1	Relay 14V Only
K1	66377-2	" 28V Only
L1	65919	RF Choke 150uh
L2	65945	" " 82uh
M1	87010	Meter, Panel
P8	74996	Connector, Mates With J8
P9	74403	" RF, Mates With J9, J10
P10	74403	" " " " " "
Q1	44355	Transistor, 2N3054
R2	33928	Potentiometer, Squelch 10K
R3	17039	Resistor 100K ohm 1/4W
R4	18253	" 33 " "
R5	17273	" 150 " "
R6	17041	" 10K " "
R8	18186	" 1.2K " "
R9	18186	" " "
R10	18928	" 160 ohm 5W, WW, 28V
R10	16310	" 40 " 3W, WW, 14V
R11	18332	" 180 " 3W, WW, 28V
R11	17558	Resistor 20 ohm 3W, WW, 14V
R13	17845	" 270 " 1/4W
R14	18332	" 180 " 3W, WW
R15	17429	" 56 " 1/4W
SW1-A	34104	Control Wafer for Rec/Exc
SW1-B	33679	Master Wafer for Antenna Coupler
SW1-C	33681	Master Wafer for PA-1010A
SW2	34192	Switch, ON/OFF VOLUME
SW3	34130	Switch, Mode
T1	49018	Transformer, Audio Output
XV1	76059	Socket, Octal
Y1 thru Y10	81822	Crystal, Channel, +65°C
Y11	81834	Crystal, Carrier, 1650 kHz
	87125	Boot, Lamp, Red
	87137	Boot, Lamp, Bue/White
	34142	Knob, Channel
	33980-2	" Mode and Volume
	33980-3	" Clarifier
	33980-1	" Squelch
	10121	Cover, Dust
	10123	Panel, Front
C37 Thru C39	27357	Capacitor, .05uf 25V

SERIAL NO. 2001 AND SUBSEQUENT

SEE ADDENDUM No. 3 FOR LATEST REVISION.

PA-1010B PARTS LIST

CKT. SYM.	PART NO.	DESCRIPTION
C1	27345	Cap. Disc Ceramic .02uf 100V
C2	27345	" " " " "
C3	27656	" " " .005uf 1KV
C4	26834	" " " 10pf 500V
C5	27656	" " " .005uf 1KV
C6 thru C25		" Frequency Dependent
C26	24458	" Disc Ceramic .02uf 150V
C27	27345	" " " .02uf 100V
C28	27345	" " " " "
C29	27656	" " " .005uf 1KV
C30	27656	" " " " "
C31	24410	" " " .01uf 1.6KV
C32	24381	" " " .0015uf 3KV
C33	24850	" Variable Glass 1-30pf 1.5KV
C34 thru C63		" Frequency Dependent
C64	27345	" Disc Ceramic .02uf 100V (28Vonly
C65	27345	" " " " "
C66	27345	" " " " "
C67	27345	" " " " "
C68	24587	" Tantalum 100uf 30V
C69	27230	" Mylar 1uf 100V
C70	27929	" Disc Ceramic .05uf 100V
C71	27929	" " " " "
C72	27292	" Electrolytic, 250uf 50V
C73	27656	" Disc Ceramic .005uf 1KV
C74	25684	" " " .001uf 500V
C75	28923	" Electrolytic, 500uf 50V
C76	27929	" Disc Ceramic .05uf 100V
C77	27929	" " " " "
CR1	40165	Diode, Silicon, 10D4
CR2	40165	" " "
CR3	40282	" Zener, 125V 10W
CR4	40282	" " " "
E1	99362	Parasitic Suppressor
E2	99362	" "
F1	84026	Fuse, 3AG, 30 Amp (14V)
	86030	" 3AG, 20 Amp (28V)
J1	74697	Bulkhead Receptacle, "N", UG-58/U
J2	74192	" " UHF, SO-239
J3	74374	" " BNC, UG-1094/U
J4	74714	" " Power
K1	66016	Relay, A+
K2	66286	" RF
KR1	33617	Rotary Solenoid
L1	56384	Inductor, Pi Wound, .5mh
L2 thru L11		" Frequency Dependent
L12	56061	" Pi Wound, 2.5mh
L13 thru L22		" Frequency Dependent

CKT. SYM.	PART NO.	DESCRIPTION
L23 thru L32	64575	Inductor, Variable, Harmonic Trap
L33	56372	" 45uh
L34	93772	" 9mh
M1	98863	RF Inverter Module
P1	74702	Plug, Cable, "N" UG-536/U
P2	74219	" " UHF PL-259
	74207	" " Reducing Adaptor for RG-58/U
P3	74403	" " BNC UG-88/U
P4	74726	" " Power
R1	18655	Resistor, Comp. 120 ohms 1/4W 10%
R2	18253	" " 33 " " "
R3	17429	" " 56 " " "
R4	17041	" " 10K " " "
R5	17936	" " 47 " " "
R6	17431	" " 27K " 1W "
R7	17742	" " 18K " 1/2W "
R8	18538	" " 10 " " "
R9	18538	" " 10 " " "
R10	18538	" " 10 " " "
R11	18538	" " 10 " " "
R12	18344	" " 120K " " "
R13	17601	" " 10K " 2W "
R14	19037	" WW 1K " 5W "
R15	18875	" " 1.5K " 10W "
R16	17027	" " 1 " 1W "
R17	16968	" " 1 " 10W "
R18	16968	" " 1 " 10W 10%(14V)
R19	16841	" " 50 " " " (28V)
R20	16944	" " 75 " 3W " (28V)
S1	32534	Slide Switch, DPDT, HI-LO Power
SW1	33514	Switch Wafer, Driver
SW2	33540	" " "
SW3	33526	" " PA Pi
SW4	33526	" " " "
SW5	32417	" " Solenoid Slave
V1	76683	Vacuum Tube, 12HG7
V2	76669	" " 6883B
V3	76669	" " "

CKT. SYM.	PART NO.	DESCRIPTION
	99381	14V DC-DC Converter PC Board Assy
	99380	28V " Converter " " "
	10339	P.C. Board
C101	24587	Capacitor, tant, 100uf 30V (14V)
	28337	" Disc .47uf 50V (28V)
C102	24484	" Mylar 4uf 500V
C103	24484	" " " "
C104	29018	" Electrolytic 30uf, 500V
C105	29018	" " " "
C106	27852	" Mylar, 3uf 200V
C107	27852	" " " "
CR101	40335	Diode, SCEO
CR102	40335	" "
CR103	40335	" "
CR104	40335	" "
CR105	40335	" "
*K101	66016	Relay
*Q101	44628	Transistor, 2N5435 (14V)
	44630	" MJ802 (28V)
*Q102	44628	" 2N5435 (14V)
	44630	" MJ802 (28V)
*R101	19104	Resistor WW 75 ohm 10W
*R102	19099	" " 2 " "
R103	16932	" " 0.25 " 3W (14V)
	17297	" " 0.47 " 2W (28V)
R104	16932	" " 0.25 " 3W (14V)
	17297	" " 0.47 " 2W (28V)
R105	16994	" Comp 22 " 2W
R106	18784	" " 150 " 1W
R107	18526	" " 470K " 2W
R108	18538	" " 10 " 1/2W
R109	18588	" " 5.6K " 1/2W
*R110	33590	" Variable 10K " 1/2W
*R111	16724	" Comp 10K " 1/2W
T101	49044	Toroid, Power (14V)
	49056	" " (28V)

* Denotes Parts Not Mounted on P.C. Board

CKT. SYM.	PART NO.	DESCRIPTION
C1	24587	Capacitor, 100uf 30V
C2	24537	" 500uf 30V
J5	74001	Connector, Primary Power
J6	75079	Connector, to Antenna Coupler
J7	74855	Jack, Headphone 74855
J11	84056	Jack, Microphone
P1	74702	Plug, UG-536B/U
P2	90873	" Coax UHF
P3	74403	" UG-88/U
P4	74726	" Power Amp.
P5	74324	" Primary Power
P6	75081	" to Antenna Coupler
P8	75031	" Rec/Exc
P9	74403	" UG-88/U
P10	74403	" UG-88/U
R1	16750	Resistor 680 ohm 1/2W
R2	16886	" 56 " "
R3	16750	" 680 " "
Q1	44549	Transistor 2N4922
Q2	44537	" 2N4919
--	10183	Heat Sink
--	10139	Bracket, Connectors
--	10103	Case, Carrying
--	10289	P. C. Board
--	86121	Speaker

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:

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

sunair

RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL ASB-125/60		Voltage 14 or 28	Rec/Exc
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
1	1	2	3	99792	PC #2 Assembly		
1	1	2	3	99793	PC #3 "		
1	1	2	3	99794	PC #4 "		
1	1	2	3	99795	PC #5 "		
1	1	2	3	99796	PC #6 "		
1	1	2	3	99798	PC #8 "		
1	1	2	3	99799	PC #9 "		
1	1	2	3	99800	PC #10 "		
1	1	2	3	99801	PC #11 "		
1	1	2	3	99802	PC #12 "		
0	0	1	2	74984	Connector, Chassis, J8		
0	1	2	3	34192	Switch, ON/OFF Volume		
0	1	1	2	34130	Switch, Mode		
0	1	1	2	33928	Potentiometer, Squelch		
0	1	1	2	28052	Capacitor, Clarifier		
0	1	2	3	44355	Transistor, Regulator		
1	1	2	3	66377-1	Relay, 14V only		
1	1	2	3	66377-2	Relay, 28V only		
0	0	1	2	49018	Transformer, Audio		
0	0	1	1	81731	Filter, USB Operation		
0	0	1	1	81743	Filter, LSB Operation		
0	1	1	2	81808	Oven, Channel		
0	1	1	2	81858-1	Oven, Octal Plug-in 28V		
0	1	1	2	81858-2	Oven, Octal Plug-in 14V		

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RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL ASB-125/60	Voltage 14 or 28	Rec/Exc & PA	
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
0	1	1	2	81834	Crystal, Carrier +65°C		
2	4	8	16	87149	Lamp, Panel		
0	0	1	2	87010	Meter, Panel		
0	0	1	1	34142	Knob, Channel		
0	0	1	1	33980-2	" Mode and Volume		
0	0	1	1	33980-3	" Clarifier		
0	0	1	1	33980-1	" Squelch		
0	1	2	4	24381	Capacitor, .0015 uf		
0	1	2	3	24850	" Variable, Glass		
4	6	8	10	40335	Rectifier		
0	0	1	1	40165	"		
0	0	1	1	49056	Transformer, Power (28V)		
2	4	6	10	44630	Transistor, Osc. Inv. (28V)		
0	2	2	4	40282	Zener		
1	1	2	4	76683	Vacuum Tube, Driver		
2	2	4	6	76669	" " Output		
2	4	6	10	44628	Transistor, Osc. Inv. (14V)		
0	0	1	1	49044	Transformer, Power (14V)		
1	1	2	3	66286	Relay, Antenna		
1	1	2	4	66016	Relay, Power		
0	1	1	2	33590	Potentiometer, Bias		
0	1	1	2	32534	Switch, Slide		
0	1	1	2	98863	RF Inverter Assembly		
0	1	1	2	33617	Solenoid, Rotary		

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RECOMMENDED SPARE PARTS LIST

Quantity Required for supporting indicated numbers of units per year				MODEL ASB-125/60	Voltage 14 or 28	PA	
1	5	10	25	SunAir P/N	Description	Unit Price	Total Price
0	0	1	2	74714	Connector, Receptacle J4		
0	0	1	2	74697	" " J1		
0	0	1	2	74192	" " J2		
0	0	1	2	74726	Connector, Plug P4		
0	0	1	2	74702	" " P1		
0	0	1	2	74219	" " P2		
0	0	1	2	74207	Reducing Adapter for 74219		
0	0	1	2	84903	Fuse Holder		
5	10	15	20	86030	Fuse, 20A, 28V only		
5	10	15	20	84026	Fuse, 30A, 14V only		
0	0	1	2	97769	ALC Detector Assembly		
1	1	1	2	99999	Service Kit (Includes all required tuning tools for ~~Rec/Exc., PA, Coupler and~~ two P.C. Card Extenders		
0	0	1	2	74374	Connector, Receptacle J3		
0	0	1	2	74403	" Plug P3		
0	0	1	2	99767	ALC Amplifier PC-14		

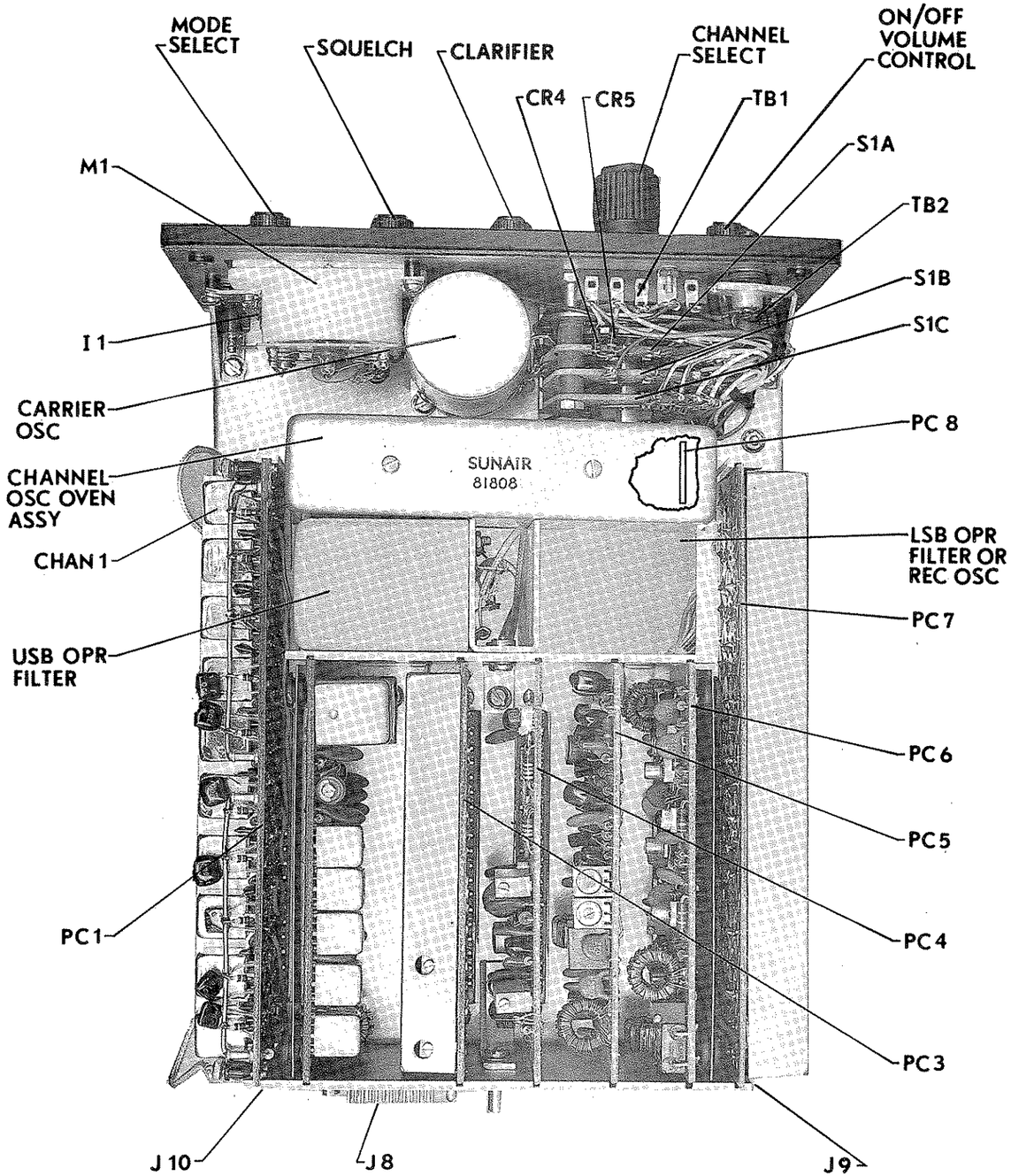


Figure X-1 - RECEIVER/EXCITER, Top View

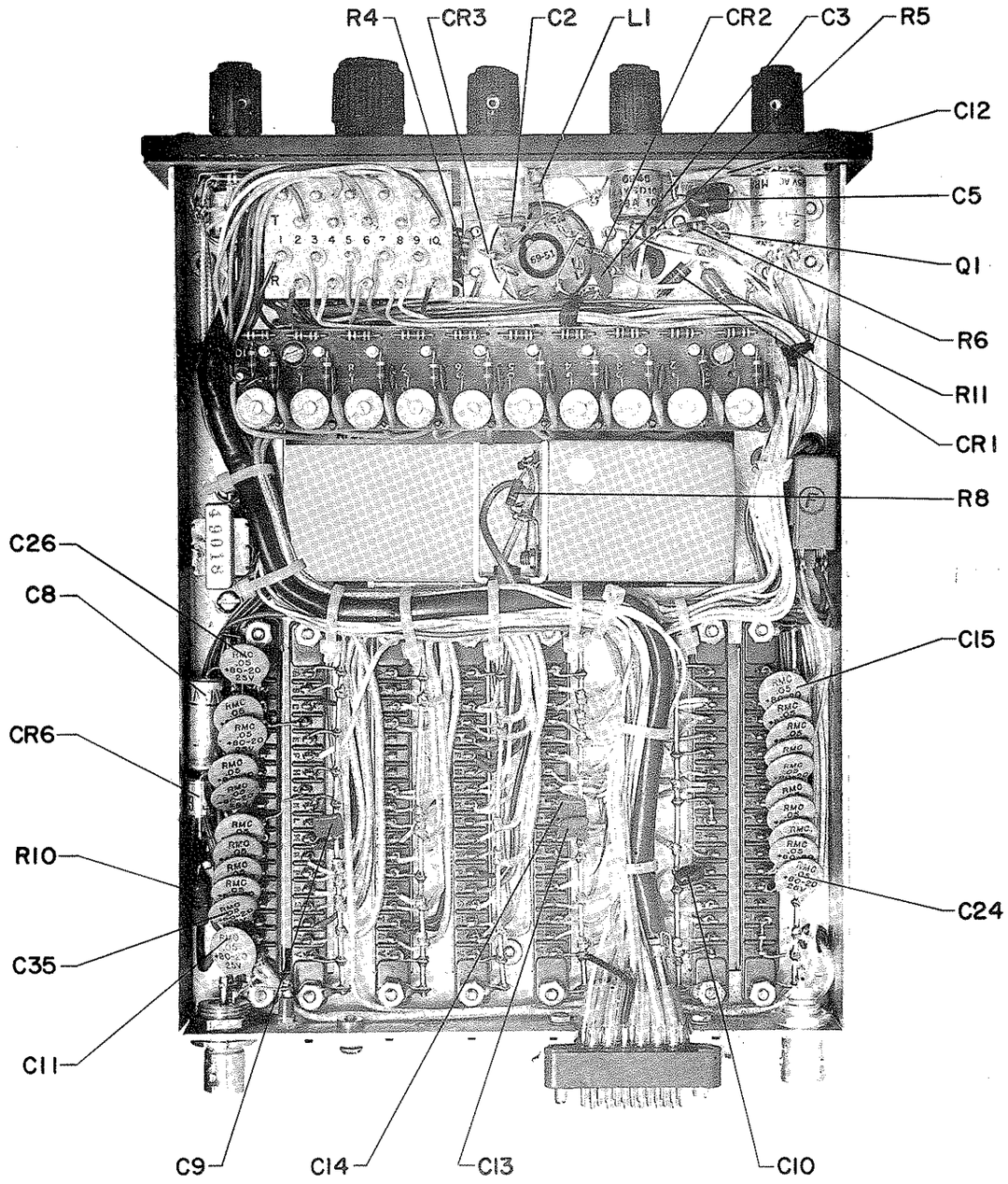


Figure X-2 - RECEIVER / EXCITER, Bottom View

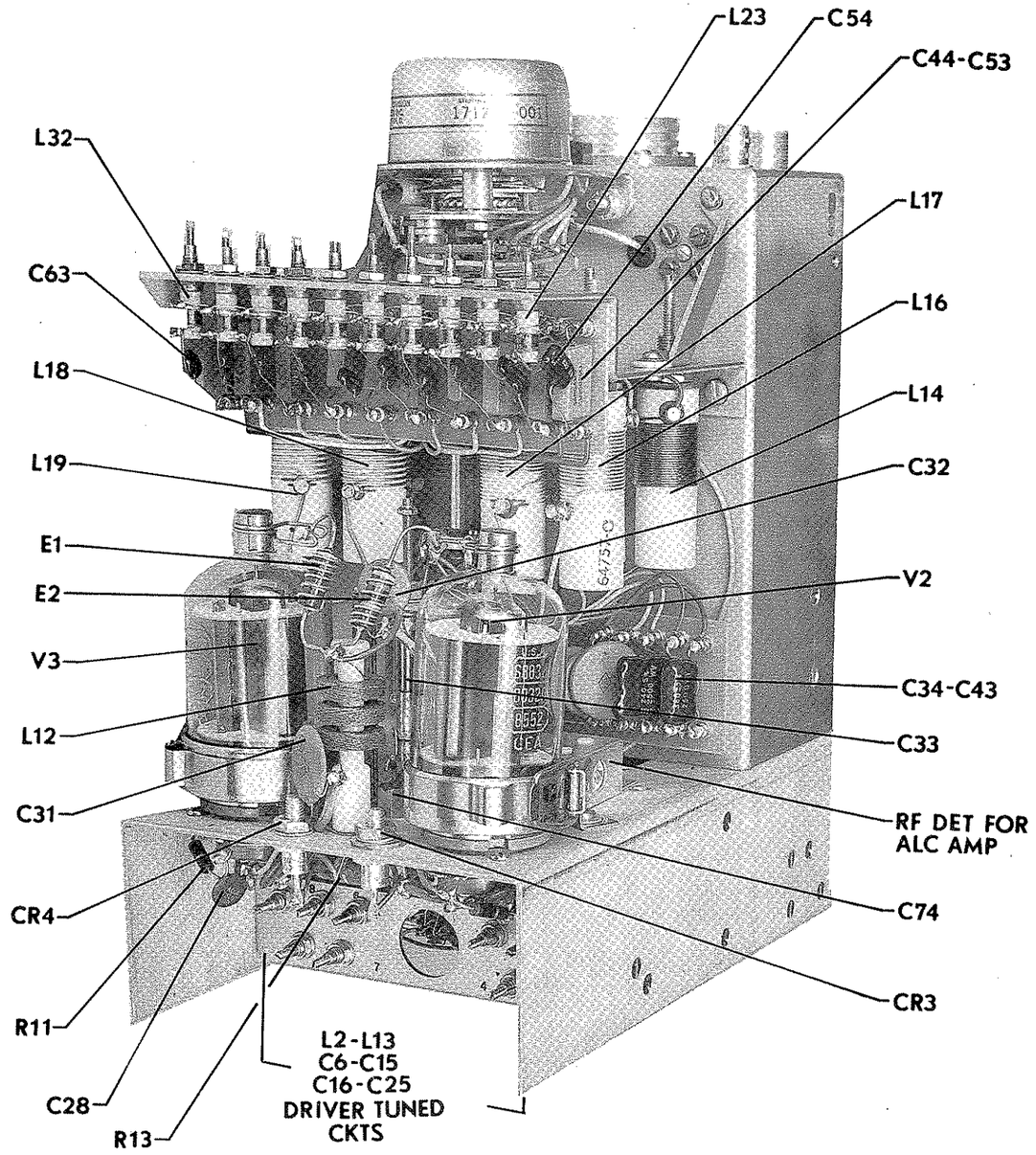


Figure X-3 - PA-1010B, PA/PS, Top View

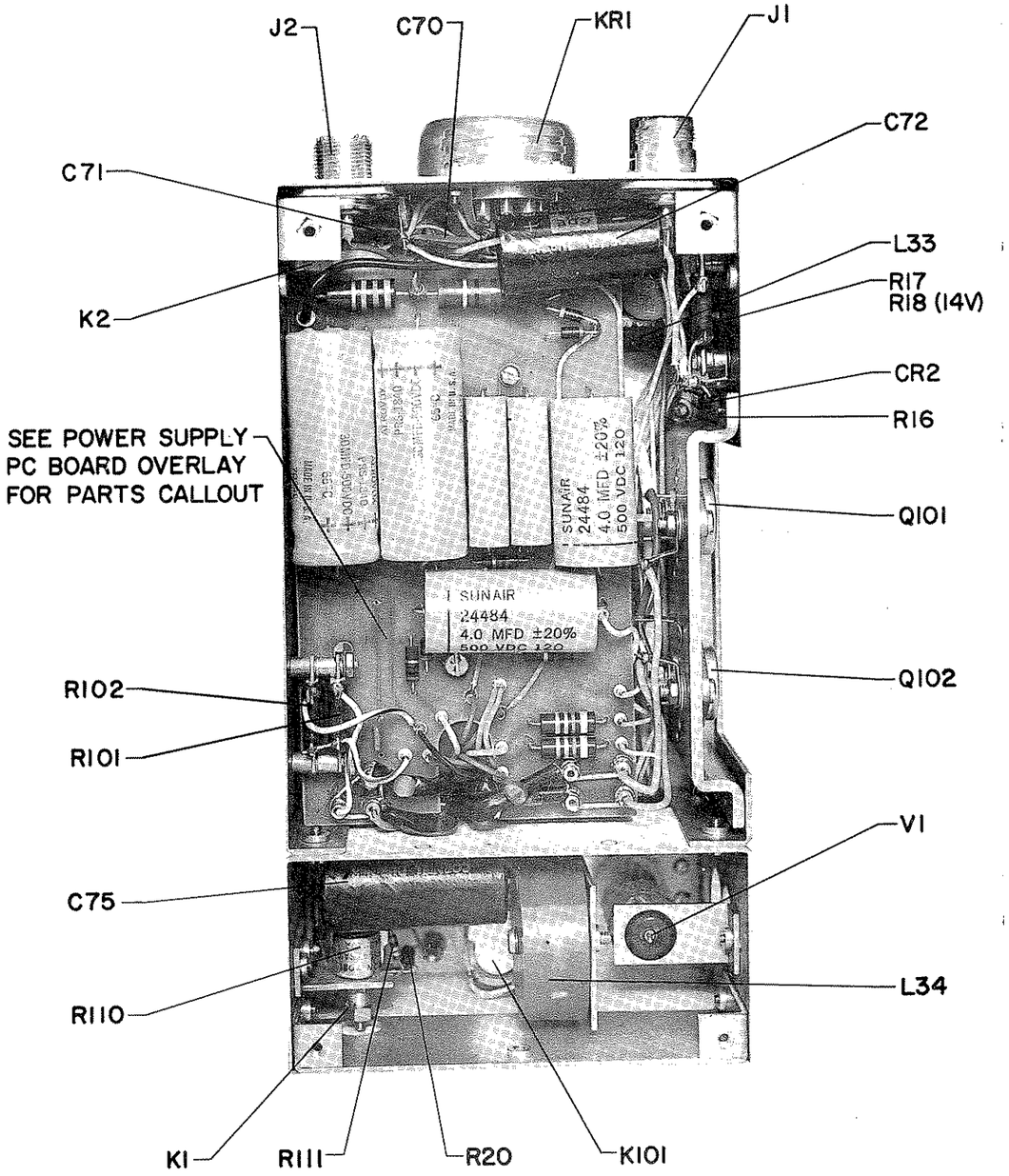
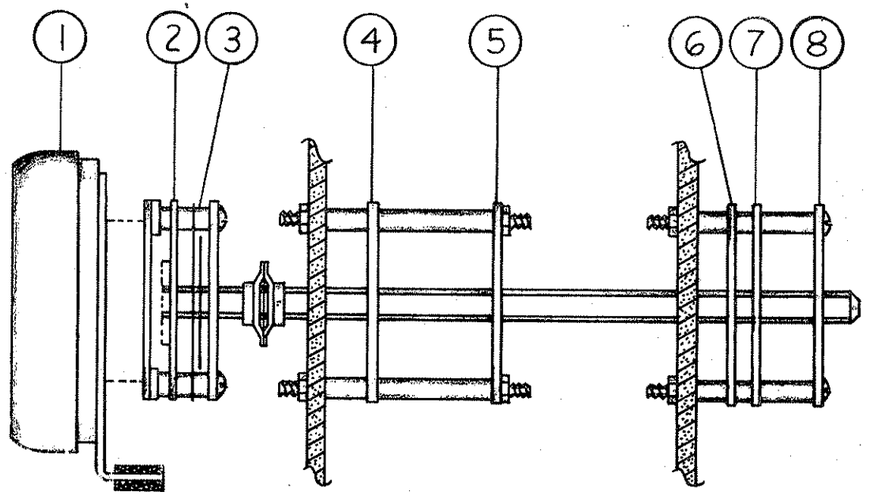


Figure X–4 – PA-1010B, PA/PS, Bottom View



SWITCH DECK ASSEMBLY, POWER SUPPLY/POWER AMPLIFIER

ITEM	SYMBOL	DESCRIPTION
1	KR1	Solenoid, Rotary
2	SW102	Channeling Slave Wafer
3		Detent Assembly
4	SW101e	Pi Network, Output
5	SW101d	Pi Network, Input
6	SW101b	Terminal Wafer
7	SW101c	Driver Tuned Circuit, Output
8	SW101a	Driver Tuned Circuit, Input

Figure X-5 - Wafer Switching Diagrams

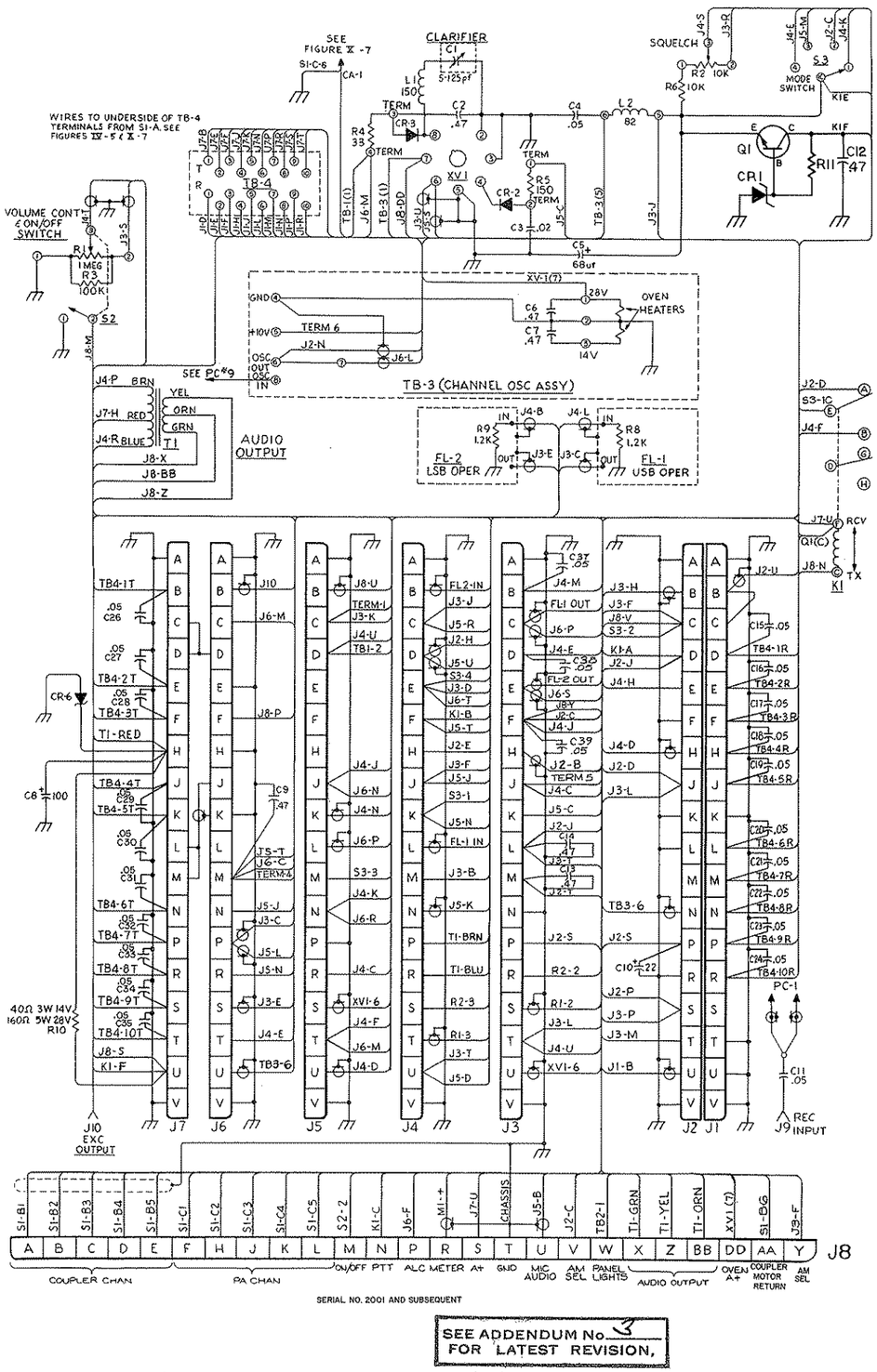


Figure X-6 - RECEIVER/EXCITER CHASSIS WIRING DIAGRAM
(SHEET NO. 1)

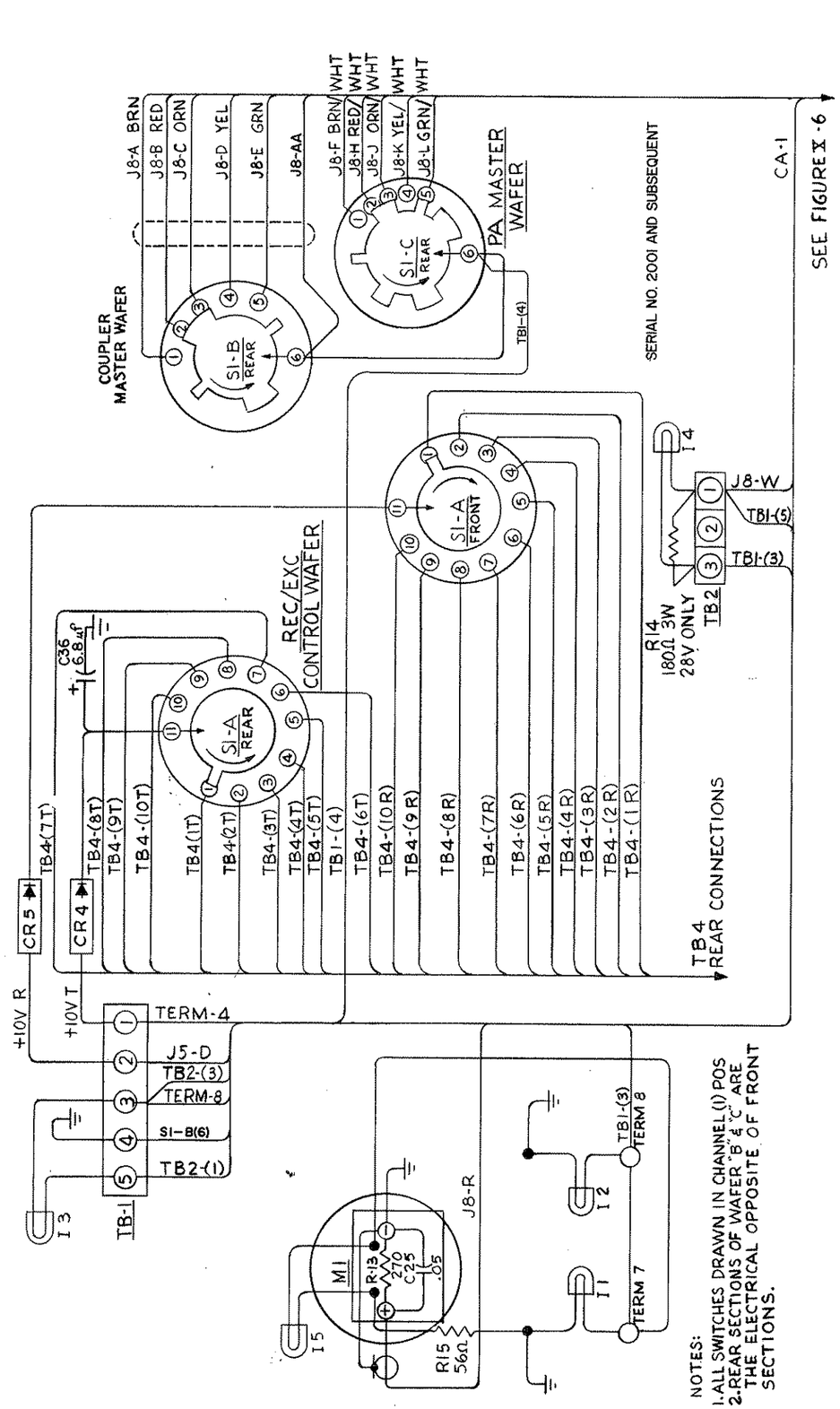
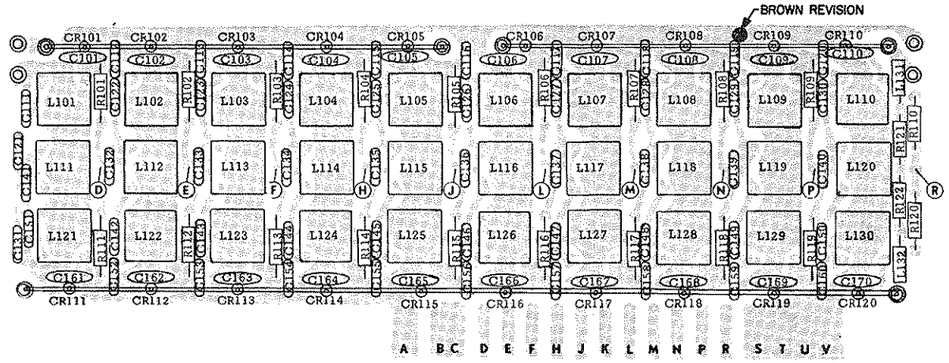


Figure X-7 - RECEIVER/EXCITER CHASSIS WIRING DIAGRAM (SHEET NO. 2)

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 80
CR101 thru CR120	40510	Diode 1N914B
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	" " " "

REVISION	DESCRIPTION
BROWN	CR 101 THRU CR 120 DIODES CHANGED FROM 1N914 (44290) TO 1N914B (40510)



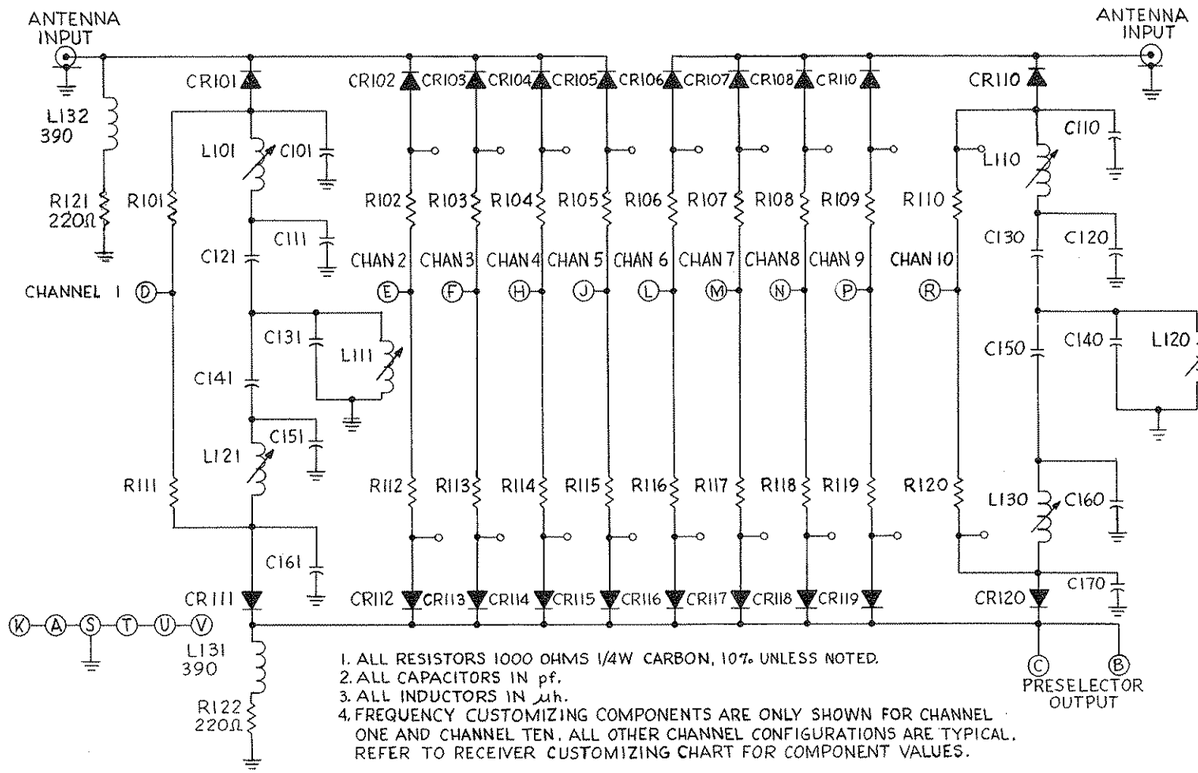
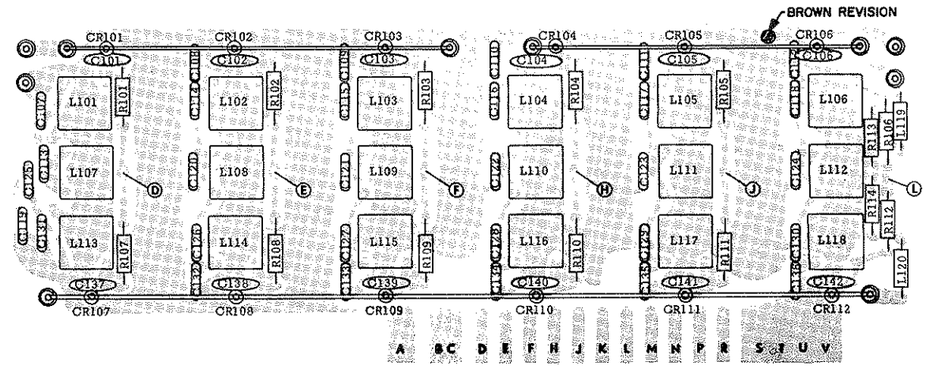


Figure X-8 - P.C. #1, RECEIVER PRESELECTORS (10 CHAN.)

CKT. SYM.	PART NO.	DESCRIPTION
		ASB-60
	99803	P.C. Board Ass'y. Without Customizing Components
PC1	10180	P.C. Board for 99803
C101 thru C142		Capacitor - Frequency Dependent - See Customizing Chart, Page 80
CR101 thru CR112	40510	Diode 1N914B
L101 thru L118		Coil, Variable - Frequency Dependent - See Customizing Chart, Page 80
L119	64800	Choke, Molded 390uh
L120	64800	" " "
R101 thru R112	17156	Resistor 1K ohm 1/4W
R121	17132	" 220 " "
R122	17132	" " " "

REVISION	DESCRIPTION
BROWN	CR 101 THRU CR 112 DIODES CHANGED FROM 1N914 (44290) TO 1N914B (40510)



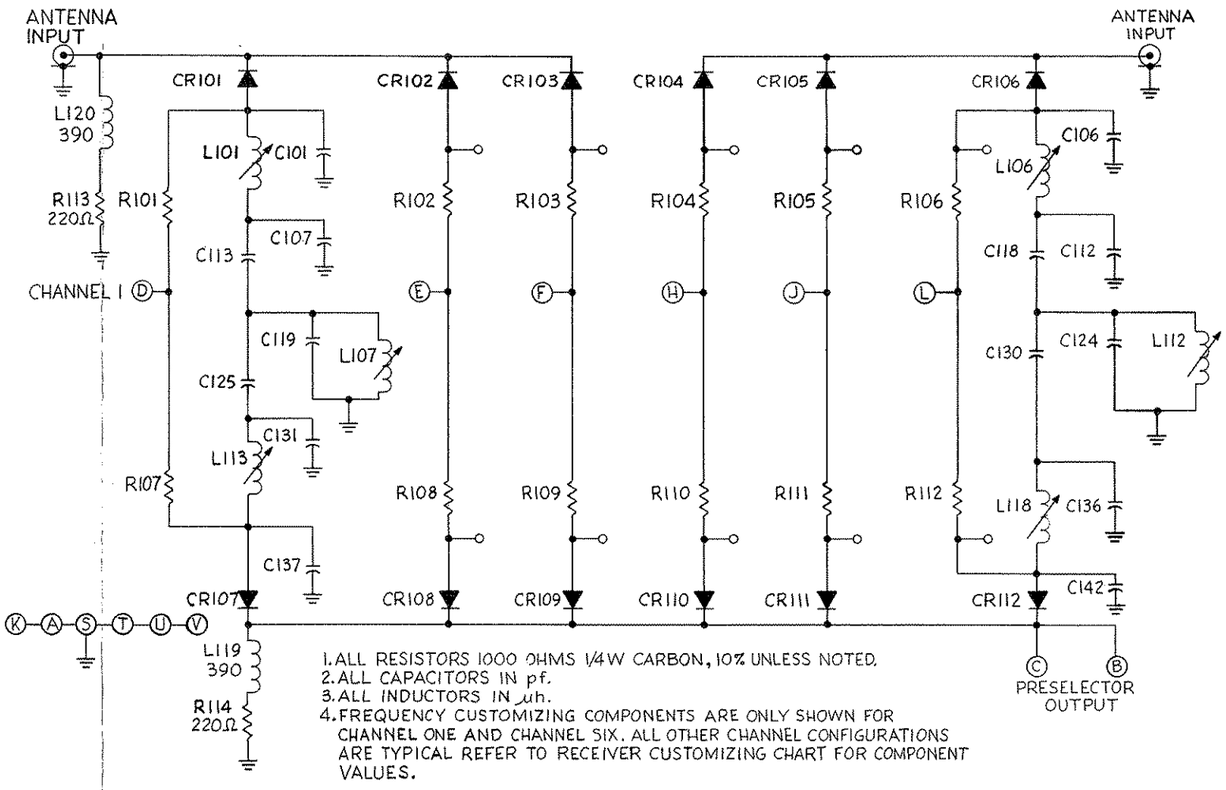
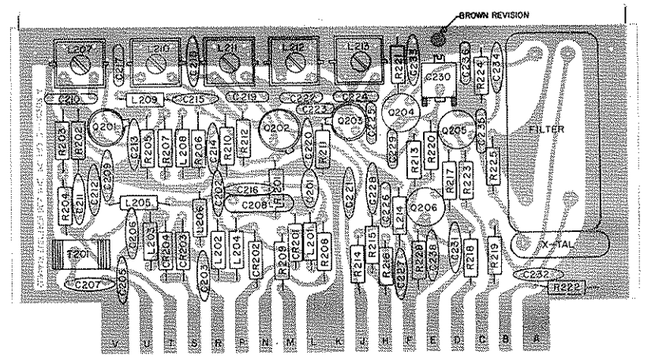


Figure X-9 - P.C. #1, RECEIVER PRESELECTORS (6 CHAN.)

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
CR201 thru CR204	44290	Diode	1N914	
FL101	81810	Filter, Ceramic	455 kHz	
L201	66420	Choke, Molded	.33uh	
L202	"	"	"	
L203	"	"	"	
L204	65919	"	150uh	
L205	66418	"	6.8uh	
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	
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	17091	"	330 "	"
R206	17091	"	330 "	"
R207	17663	"	680 "	"
R208	17118	"	100 "	"
R209	"	"	" "	"
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.



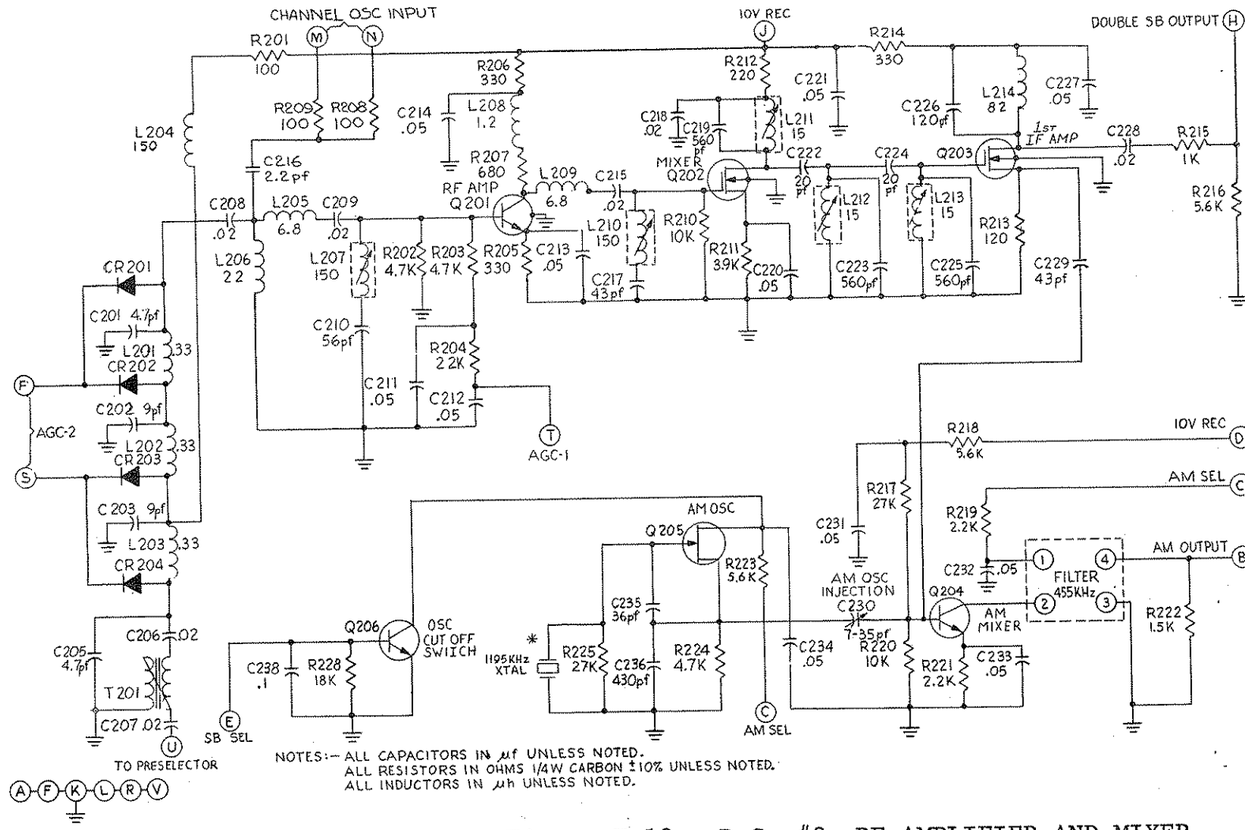
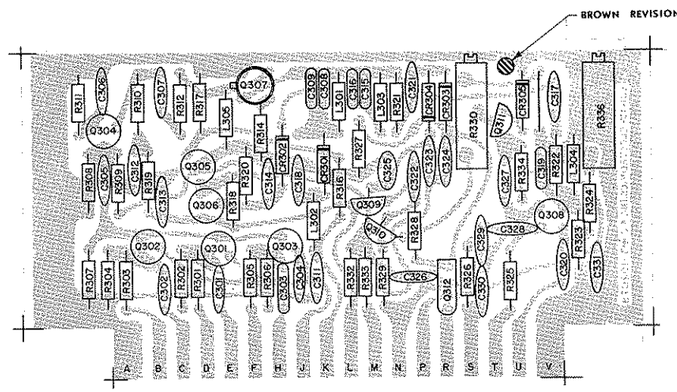
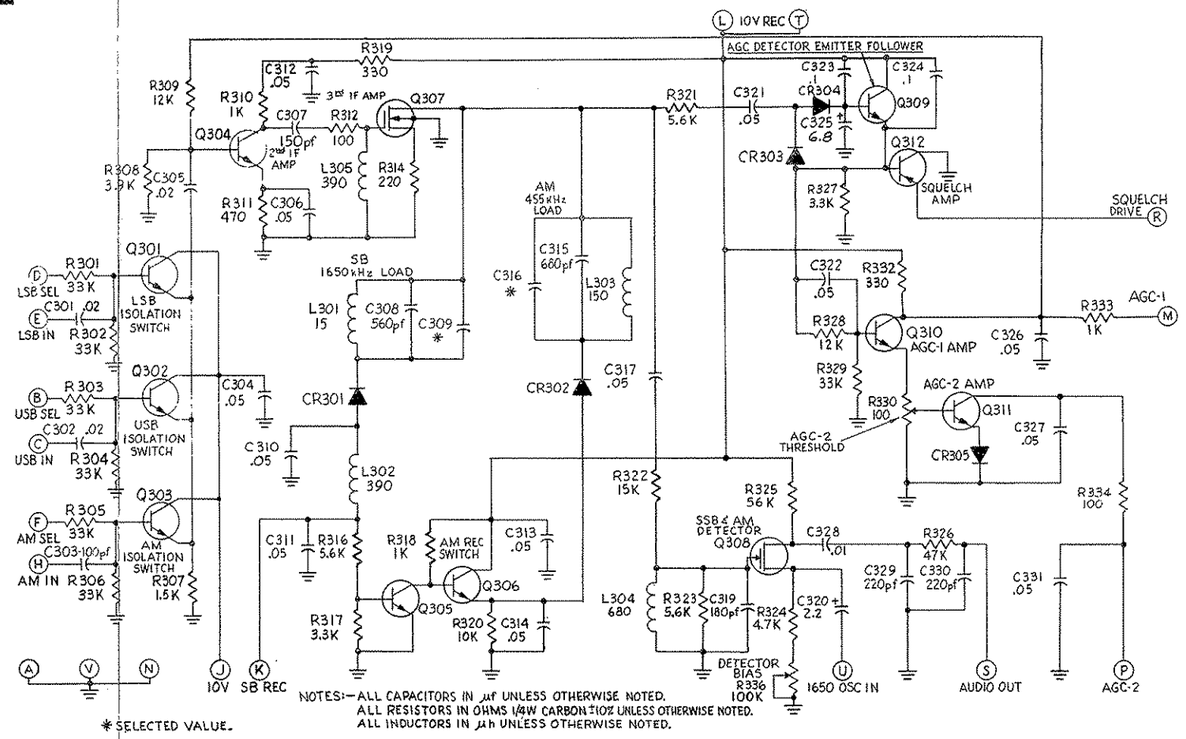


Figure X-10 - P.C. #2, RF AMPLIFIER AND MIXER

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	"	2N4288	
R301 thru R306	17792	Resistor	33K ohm	1/4W
R307	17247	"	1.5K "	"
R308	17883	"	3.9K "	"
R309	18318	"	12K "	"
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





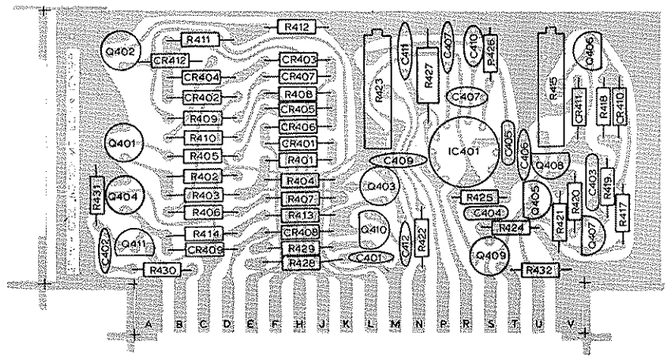
NOTES:- ALL CAPACITORS IN μf UNLESS OTHERWISE NOTED.
ALL RESISTORS IN OHMS 1/4W CARBON ±10% UNLESS OTHERWISE NOTED.
ALL INDUCTORS IN μh UNLESS OTHERWISE NOTED.

* SELECTED VALUE.

Figure X-II - P.C. #3, IF AMPLIFIER AND DETECTOR

SEE ADDENDUM No. ____ FOR LATEST REVISION,

CKT. SYM.	PART NO.	DESCRIPTION
	99794	P.C. Board Ass'y with all Components
PC4	10206	P.C. Board for 99794
C401	26913	Capacitor .02uf 25V
C402	26913	" .02uf 25V
C403	27400	" 15uf 35V
C404	28337	" .47uf 50V
C405	28337	" .47uf 50V
C406	26913	" .02uf 25V
C407	24472	" 2.2uf 15V
C408	26913	" .02uf 25V
C409	27357	" .05uf 25V
C410	24472	" 2.2uf 15V
C411	27357	" .05uf 25V
C412	27357	" " "
CR401 thru CR412	44290	Diode 1N914
IC401	44460	Integrated Circuit, Audio Amp.
Q401 thru Q404	44252	Transistor 2N3646
Q405 thru Q408	44434	" MPS2925
Q409	44393	" FET 2N4303
Q410	44434	" MPS2925
Q411	44434	" "
R401 thru R412	17120	Resistor 27K ohm 1/4W
R413	17156	" 1K " "
R414	17156	" 1K " "
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	18306	" 5.6K " "
R423	33849-4	Potentiometer 10K " 1/2W
R424	18306	Resistor 5.6K " 1/4W
R425	18057	" 470K " "
R426	17077	" 4.7K " "
R427	18849	" 1.2K " 1/2W
R428	18411	" 470 " 1/4W
R429	17883	" 3.9K " "
R430	18411	" 470 " "
R431	17883	" 3.9K " "
R432	17039	" 100K " "



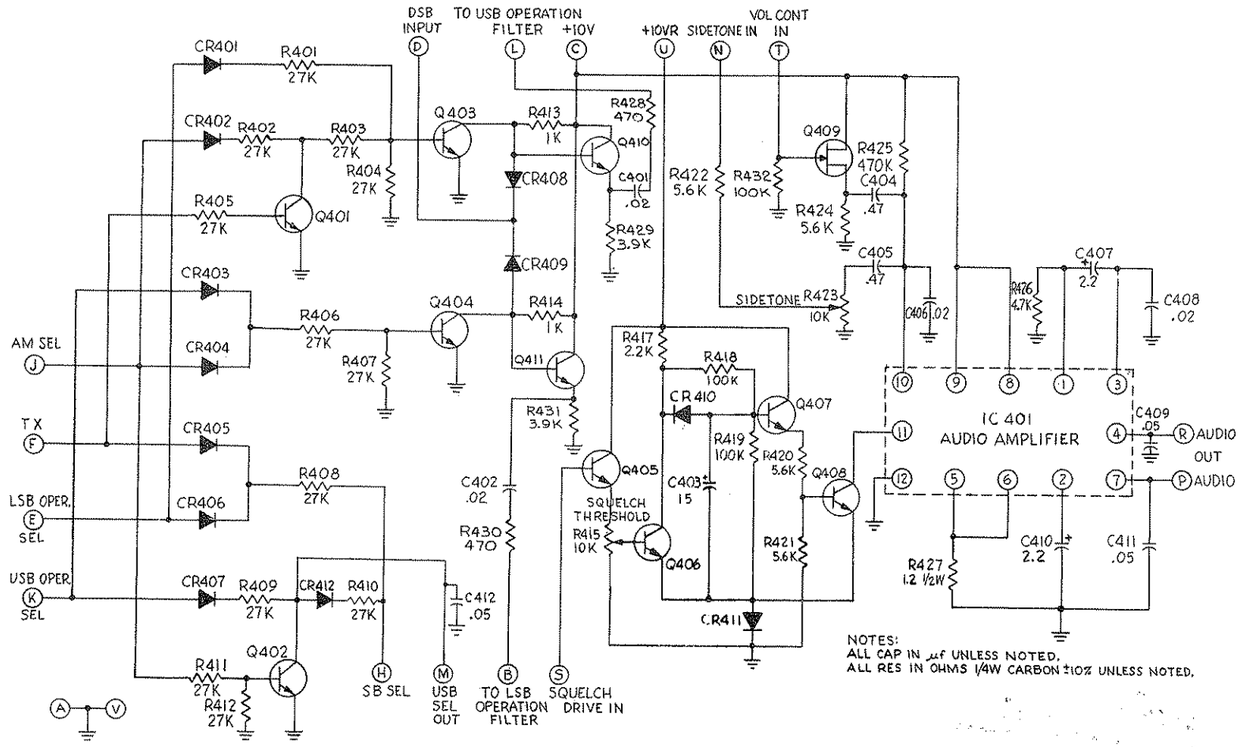
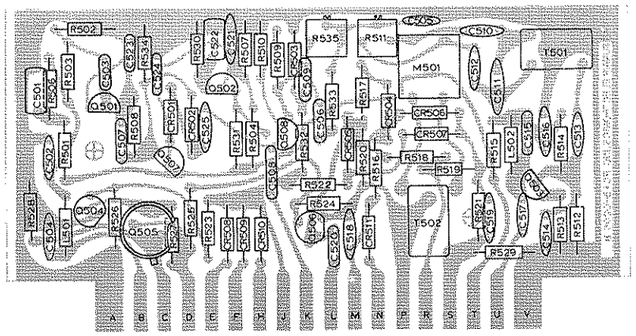
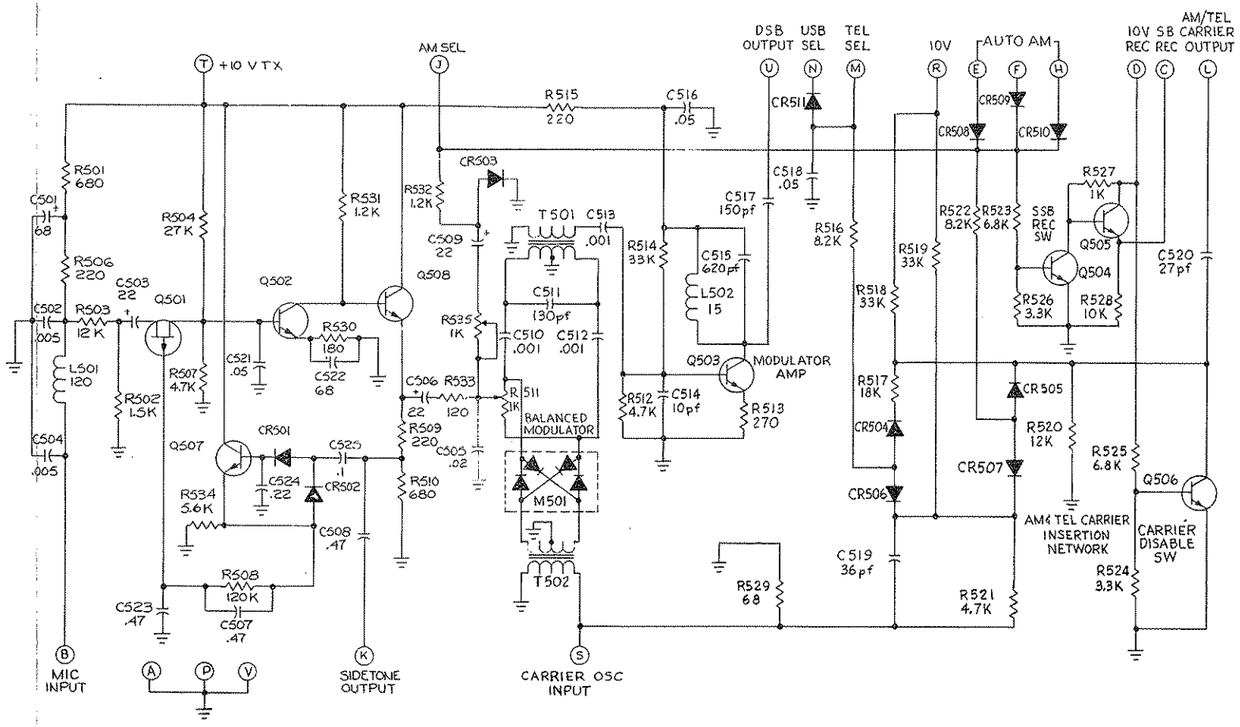


Figure X-12 - P.C. #4, MODE AND AUDI

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
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	17247	"	1.5K "	"
R503	18318	"	12K "	"
R504	17120	"	27K "	"
R506	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 ¼W ±10% UNLESS NOTED.
3. ALL INDUCTORS IN μh UNLESS NOTED.

Figure X-13 - 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.

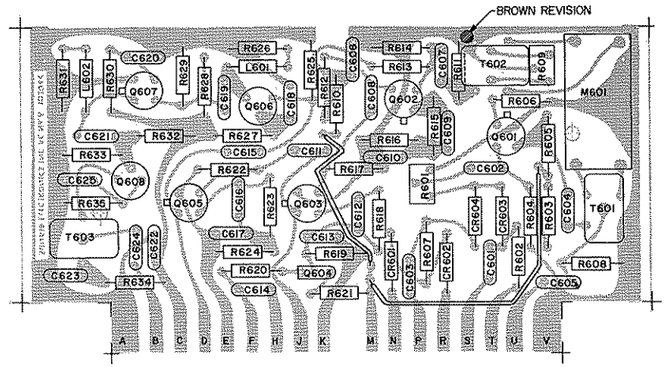
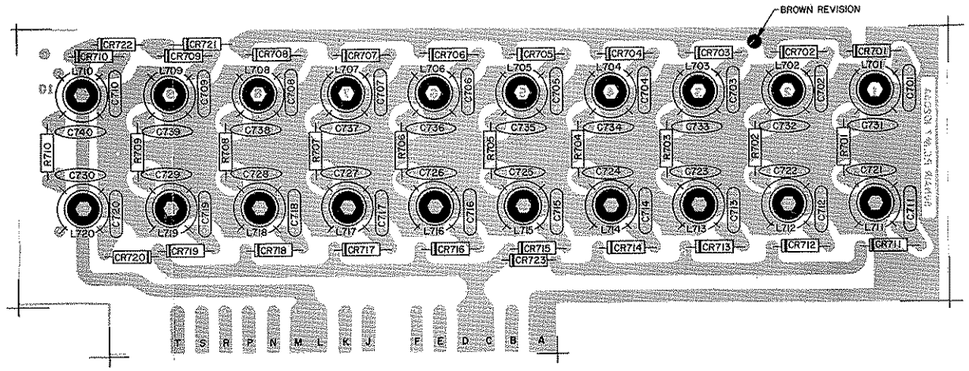
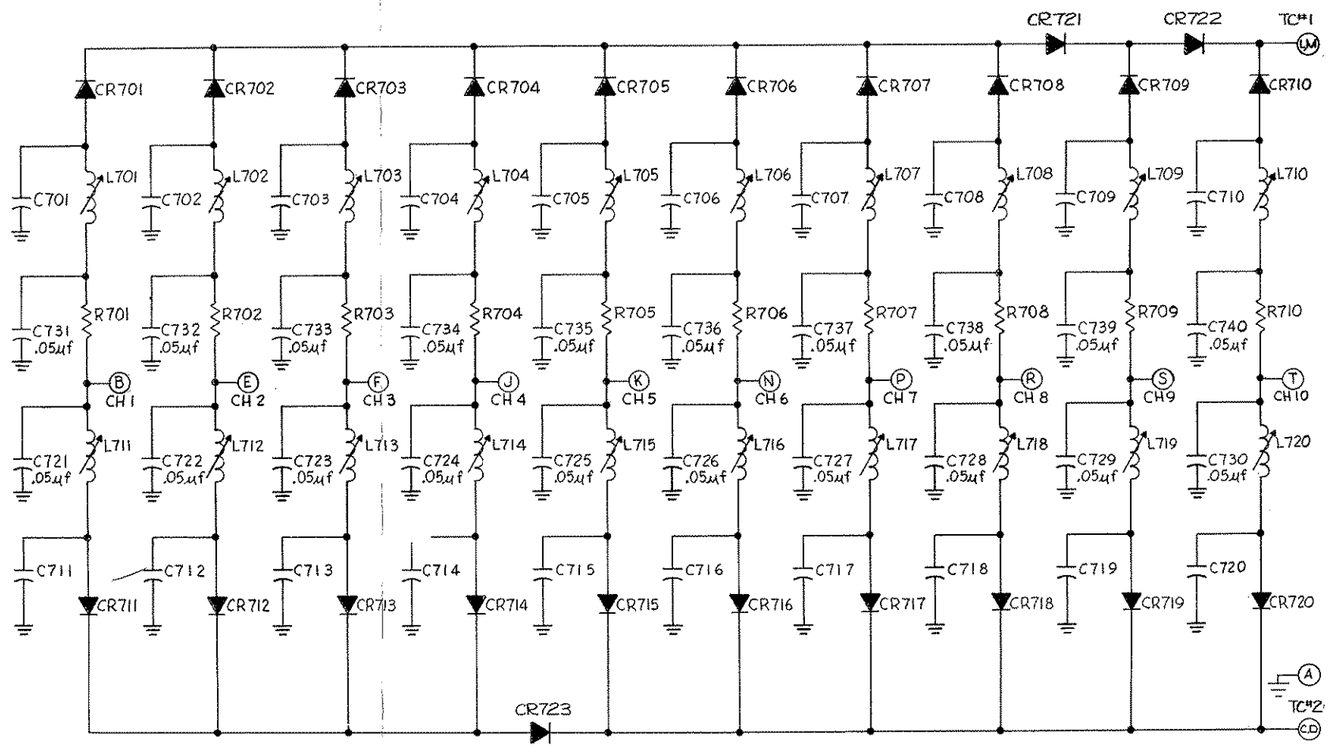


Figure X-14 - P.C. #6, EXCITER

CKT. SYM.	PART NO.	DESCRIPTION
		ASB-125
	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	44290	Diode 1N914
L701 thru L720	62993	Coil, Variable - Frequency Dependent - See Customzing Chart, Page 81
R701 thru R710		Resistor - Frequency Dependent - See Customizing Chart, Page 81

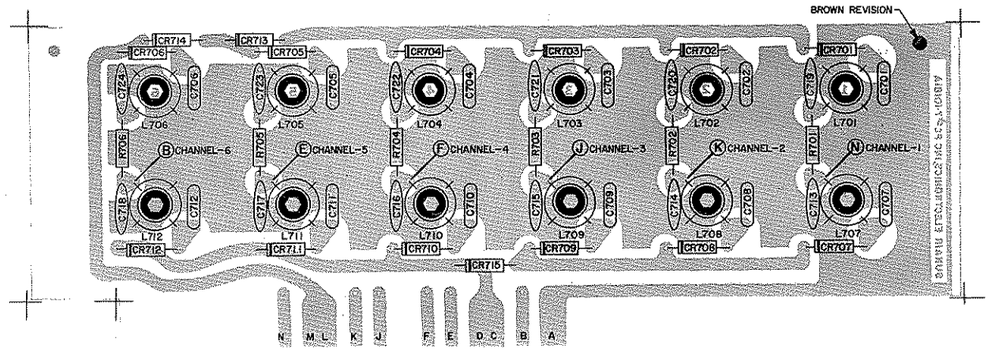


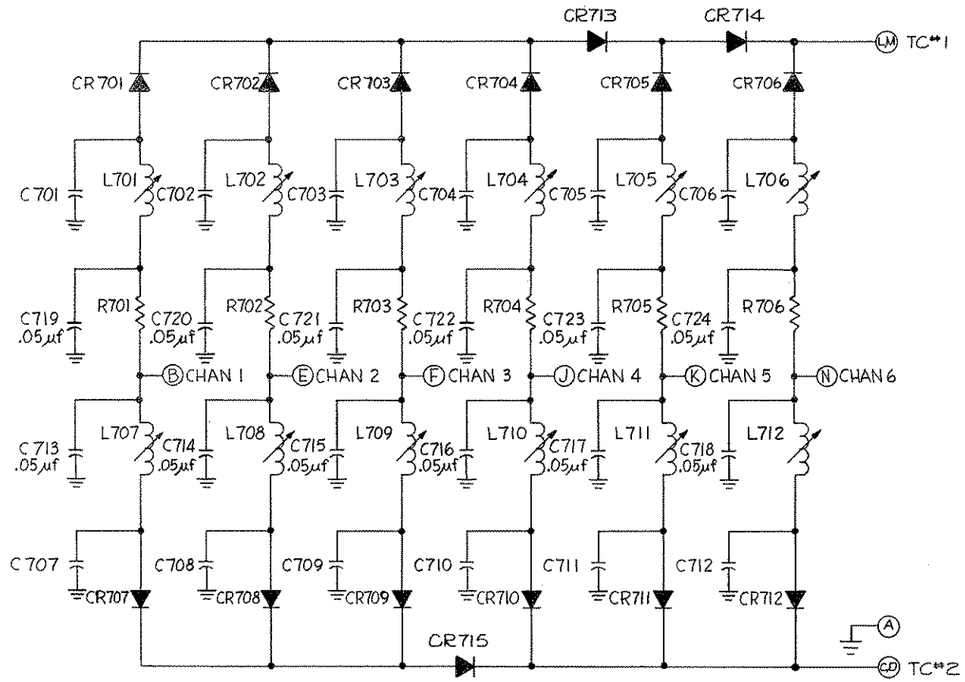


NOTES:
1. L701-L720, C701-C720, R701-R710 FREQUENCY DEPENDENT. SEE CUSTOMIZING CHART.

Figure X-15 - P.C. #7, EXCITER TUNED CIRCUITS (10 CHAN.)

CKT. SYM.	PART NO.	DESCRIPTION
		ASB-60
	99804	P.C. Board Ass'y. Without Customizing Components
PC7	10181	P.C. Board for 99804
C701 thru C712		Capacitor - Frequency Dependent - See Customizing Chart, Page 81
C713 thru C724	27357	Capacitor .05uf 25V
CR701 thru CR715	44290	Diode 1N914
L701 thru L712	62993	Coil, Variable - Frequency Dependent - See Customizing Chart, Page 81
R701 thru R706		Resistor - Frequency Dependent - See Customizing Chart, Page 81



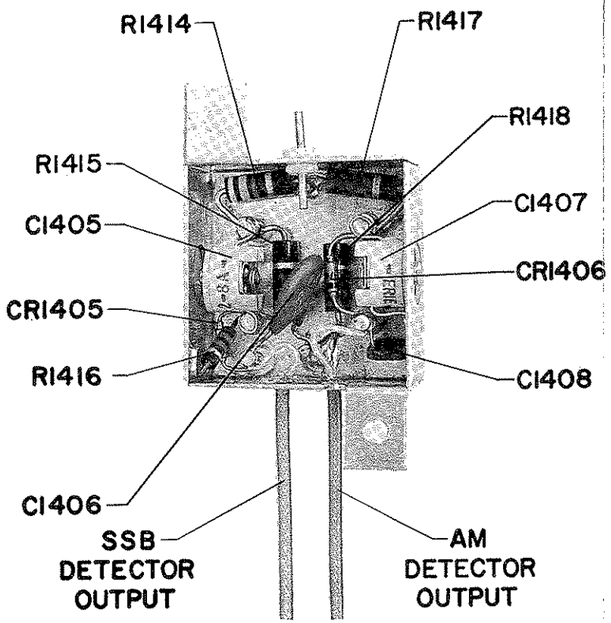


NOTE:
1. L701-L712, C701-C712, R701-R706 FREQUENCY DEPENDENT, SEE CUSTOMIZING CHART.

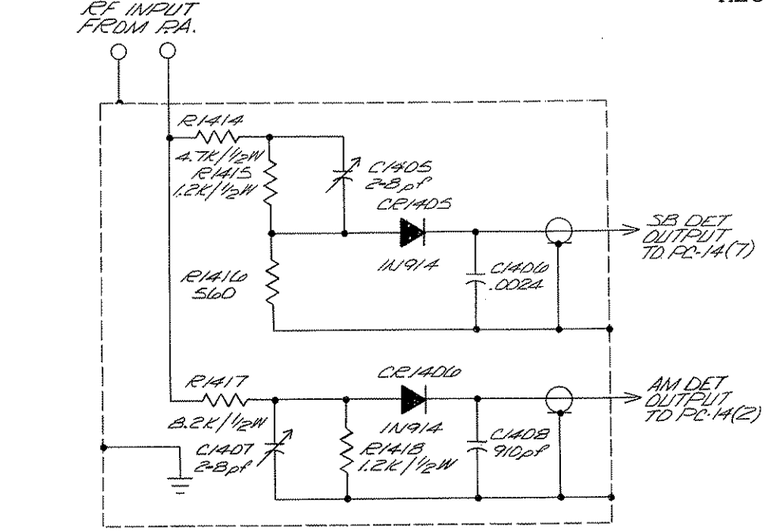
Figure X-16 - P.C. #7, EXCITER TUNED CIRCUITS (6 CHAN.)

SEE ADDENDUM No. 2 FOR LATEST REVISION,

CKT. SYM.	PART NO.	DESCRIPTION
	97769	ALC Detector Ass'y
C1405	27840	Capacitor, Variable, 2-8 pf
C1406	28246	" Disc. .0024 uf
C1407	27840	" Variable 2-8 pf
C1408	28866	" Dip Mica 910 pf
CR1405	44290	Diode, 1N914
CR1406	44290	" "
R1414	16920	Resistor, 4.7K, 1/2W ±5%
R1415	17596	" 1.2K, 1/2W ±5%
R1416	18320	" 560 , 1/2W ±5%
R1417	18954	" 8.2K, 1/2W ±5%
R1418	17596	" 1.2K, 1/2W ±5%

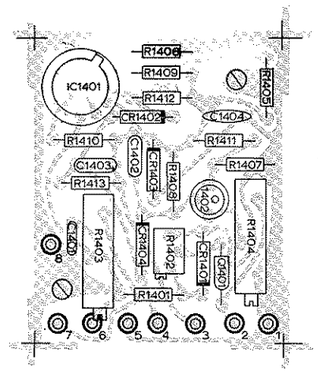


ALC DETECTOR

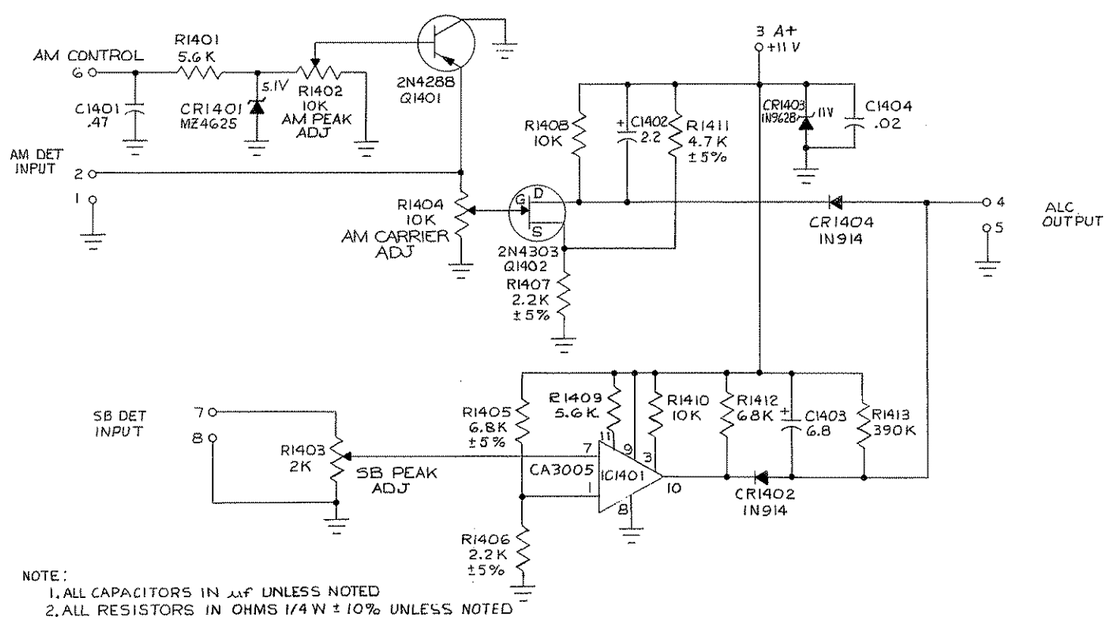


NOTES:
1. COMPONENTS ARE LOCATED INSIDE THE ALC DETECTOR ENCLOSURE.

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 ±5%
R1406	17807	" 2.2K " " ±5%
R1407	17807	" 2.2K " " ±5%
R1408	17041	" 10K " "
R1409	18306	" 5.6K " "
R1410	17041	" 10K " "
R1411	17077	" 4.7K " " ±5%
R1412	17352	" 68K " "
R1413	18992	" 390K " "
Q1401	44587	Transistor 2N4288
Q1402	44393	" 2N4303



ALC AMPLIFIER

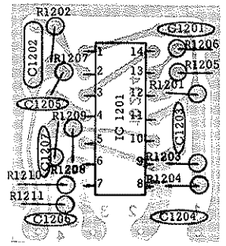


NOTE:
1. ALL CAPACITORS IN µf UNLESS NOTED
2. ALL RESISTORS IN OHMS 1/4 W ± 10% UNLESS NOTED

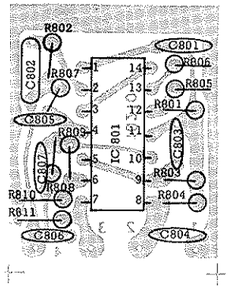
Figure X-17 - ALC DETECTOR AND AMPLIFIER

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 "	"

CKT. SYM.	PART NO.	DESCRIPTION		
	99802	P.C. Board Ass'y. With All Components		
PC12	10224	P.C. Board for 99802		
C1201	26913	Capacitor	.02uf	25V
C1202	28090	"	150pf	500V
C1203	25000	"	2.2pf	100V
C1204	26913	"	.02uf	25V
C1205	26913	"	"	"
C1206	25036	"	6pf	100V
C1207	26834	"	10pf	500V
IC1201	44551	Integrated Circuit	CA3046	
R1201	17077	Resistor	4.7K ohm	1/4W
R1202	17041	"	10K "	"
R1203	17156	"	1K "	"
R1204	17118	"	100 "	"
R1205	18667	"	2.7K "	"
R1206	18411	"	470 "	"
R1207	17041	"	10K "	"
R1208	17077	"	4.7K "	"
R1209	17845	"	270 "	"
R1210	18411	"	470 "	"
R1211	17118	"	100 "	"



P.C. #12 REC. OSC.



P.C. #8 - TX OSC.

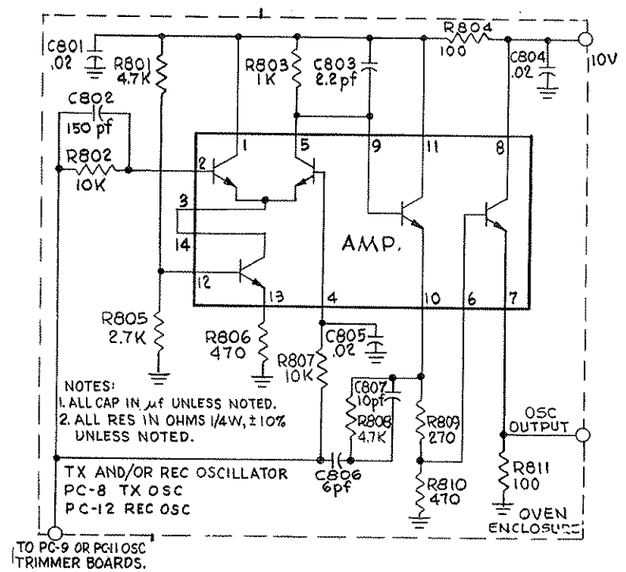
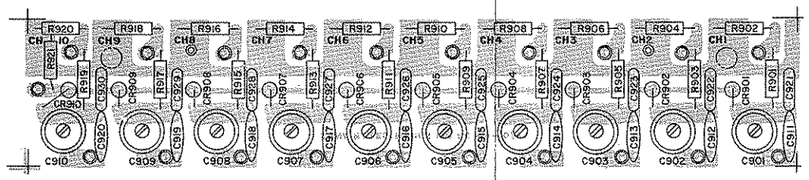


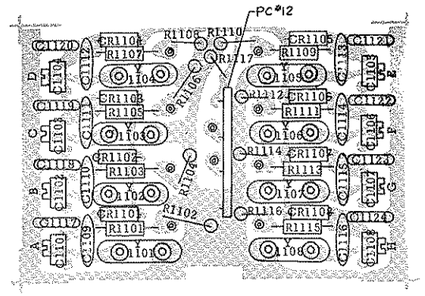
Figure X-18 - P.C. #8, TX OSC. & P.C. #12, REC. OSC.

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 " "

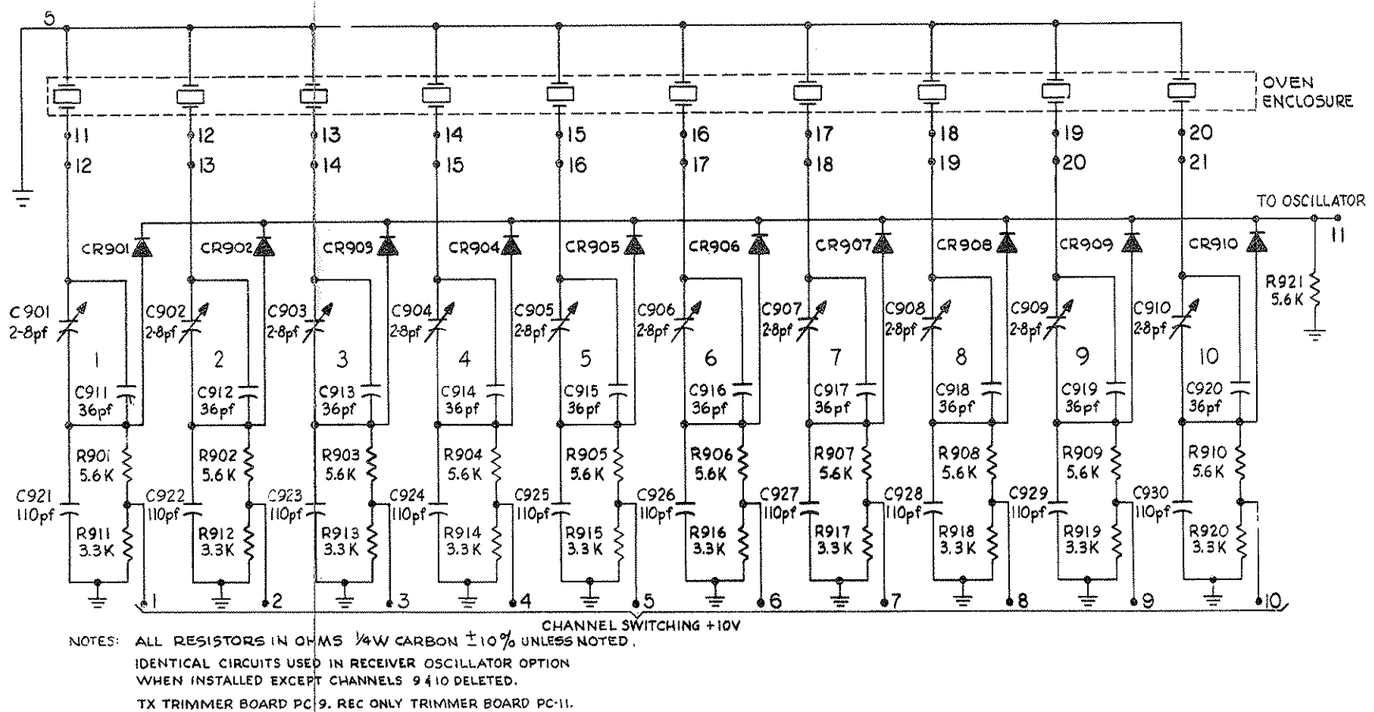
CKT. SYM.	PART NO.	DESCRIPTION
	99708	Rec. Osc. Ass'y. With PC11 & PC12
PC11	10233	P.C. Board
C1101 thru C1108	28741	Capacitor, Variable 3-9pf
C1109 thru C1116	28478	" 36pf
C1117 thru C1124	28131	" 110pf
CR1101 thru CR1108	44290	Diode 1N914
R1101 thru R1115 (odd #s)	18306	Resistor 5.6K ohm 1/4W
R1102 thru R1116 (even #)	17089	" 3.3K " "
R1117	18306	" 5.6K " "
Y1101 thru Y1108	81860	Crystal, Channel, 27°C



P.C. #9 - TX TRIMMER



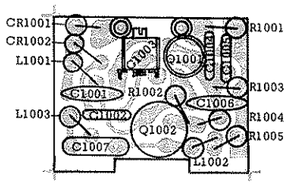
P.C. #11, REC. TRIMMER



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.

Figure X-19 - P.C. #9, TX TRIMMER & P.C. #11, REC. 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	28131	" 110pf 500V
C1003	28739	" Variable 7-35pf
C1004	28519	" 27pf 500V
C1005	28519	" 27pf 500V
C1006	26913	" .02uf 25V
C1007	28428	" 680pf 100V
CR1001	44290	Diode 1N914
CR1002	44290	" 1N914
L1001	64800	Choke 390uh
L1002	65919	" 150uh
L1003	65907	" 15uh
Q1001	44484	FET 3N128
Q1002	44331	Transistor 2N3643
R1001	18148	Resistor 680K ohm 1/4W
R1002	17120	" 27K " "
R1003	17041	" 10K " "
R1004	17077	" 4.7K " "
R1005	18253	" 33 " "
Y1001	81834	Crystal 1650 kHz +65°C



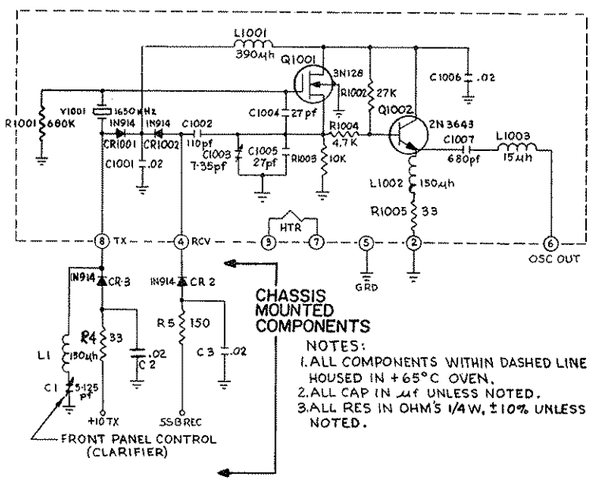
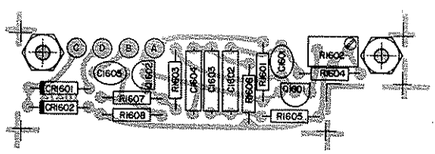


Figure X-20 - P.C. #10, 1650 OSCILLATOR

1000Hz Tone Oscillator Option

CKT. SYM.	PART NO.	DESCRIPTION
	97823	P.C. Board Assy with all Components
PC 16	10474	P.C. Board for 97823
C1601	28753	Capacitor 6.8uf 15V
C1602 Thru C1604	27187	" .01uf 300V
C1605	24472	" 2.2uf 15V
CR1601	40165	Diode 10D4
CR1602	44290	" 1N914
Q1601 Thru Q1602	44434	Transistor MPS 2925
R1601	17247	Resistor 1/4W 10% Carbon 1.5K
R1602	31889	Potentiometer 100 Ohms
R1603	17467	Resistor 1/4W 10% Carbon 330K
R1604	17481	" " " " 6.8K
R1605	18162	" " " " 8.2K
R1606	17481	" " " " 6.8K
R1607	18320	" " " " 560Ohms
R1608	17936	" " " " 47 "
	34575	Switch 2P2T with Red Boot Grayhill 46-200R



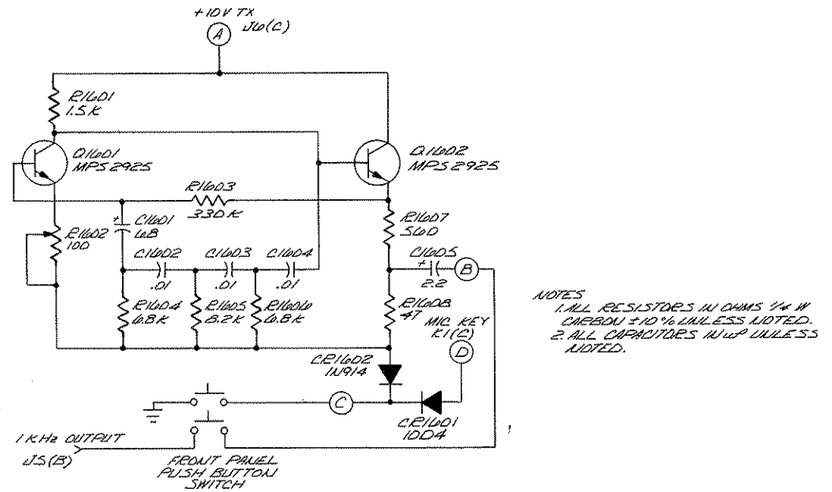


Figure X-21 - 1000 Hz TONE OSCILLATOR

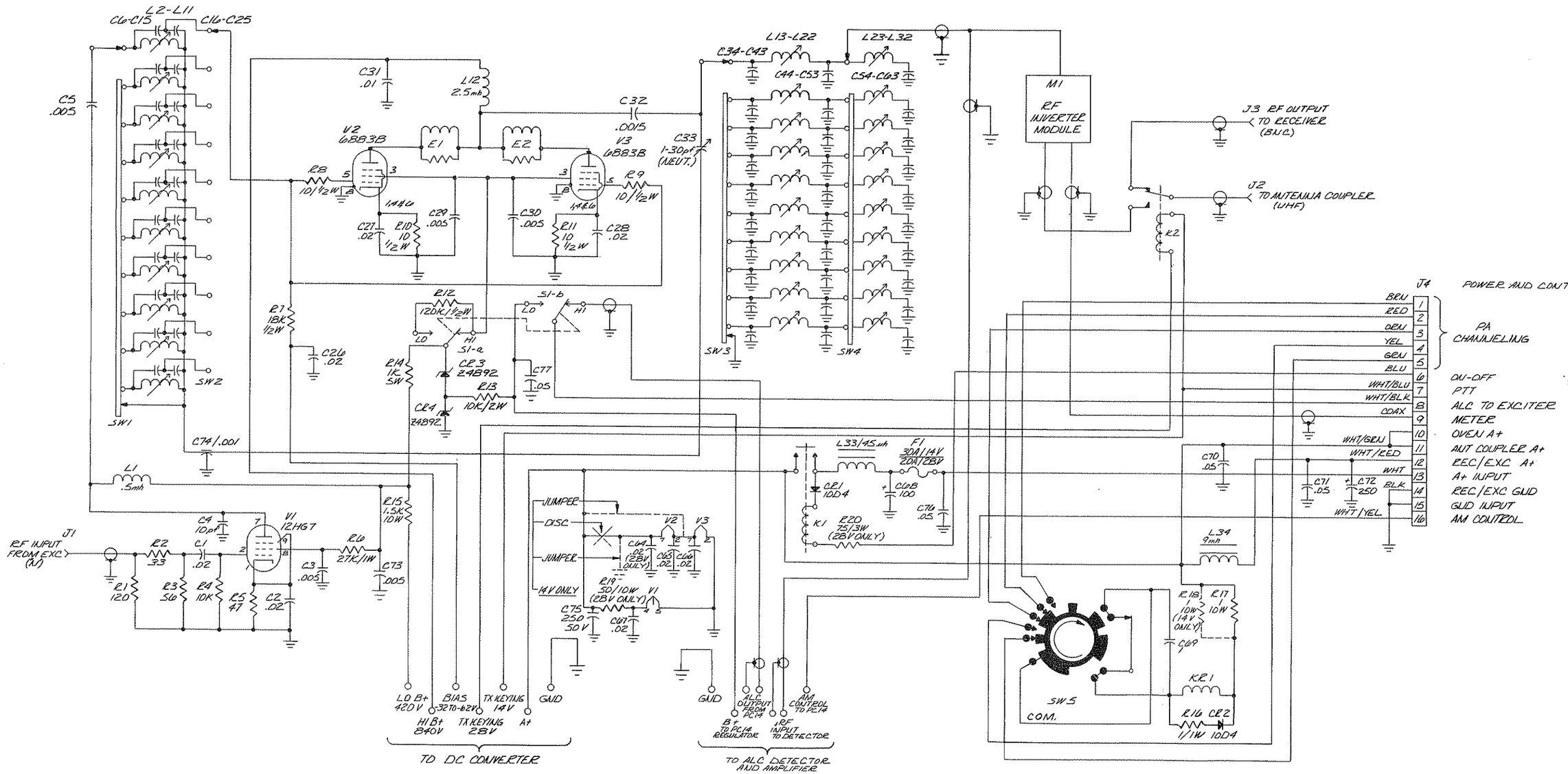


Figure X-22 - DRIVER & POWER AMPLIFIER

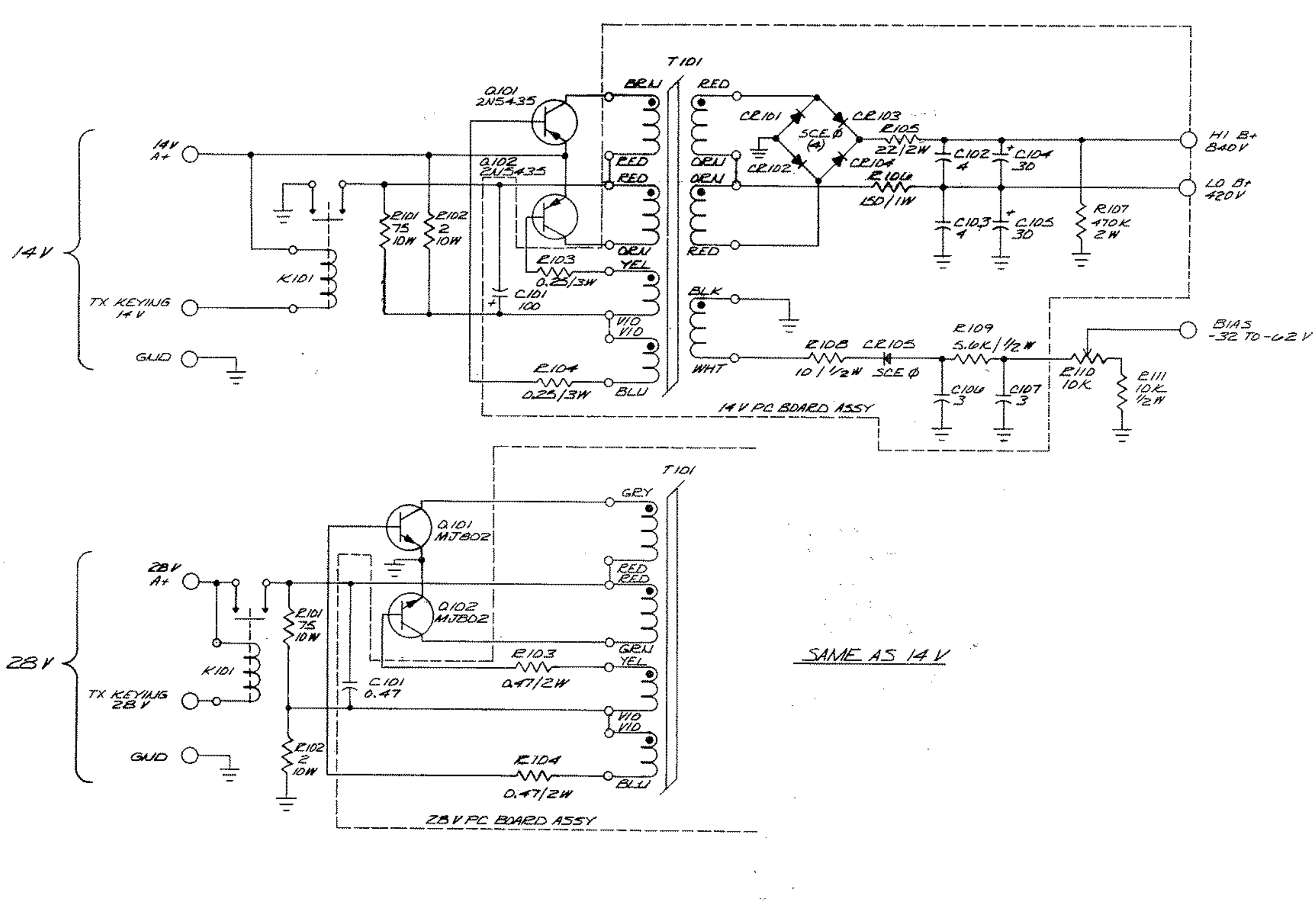
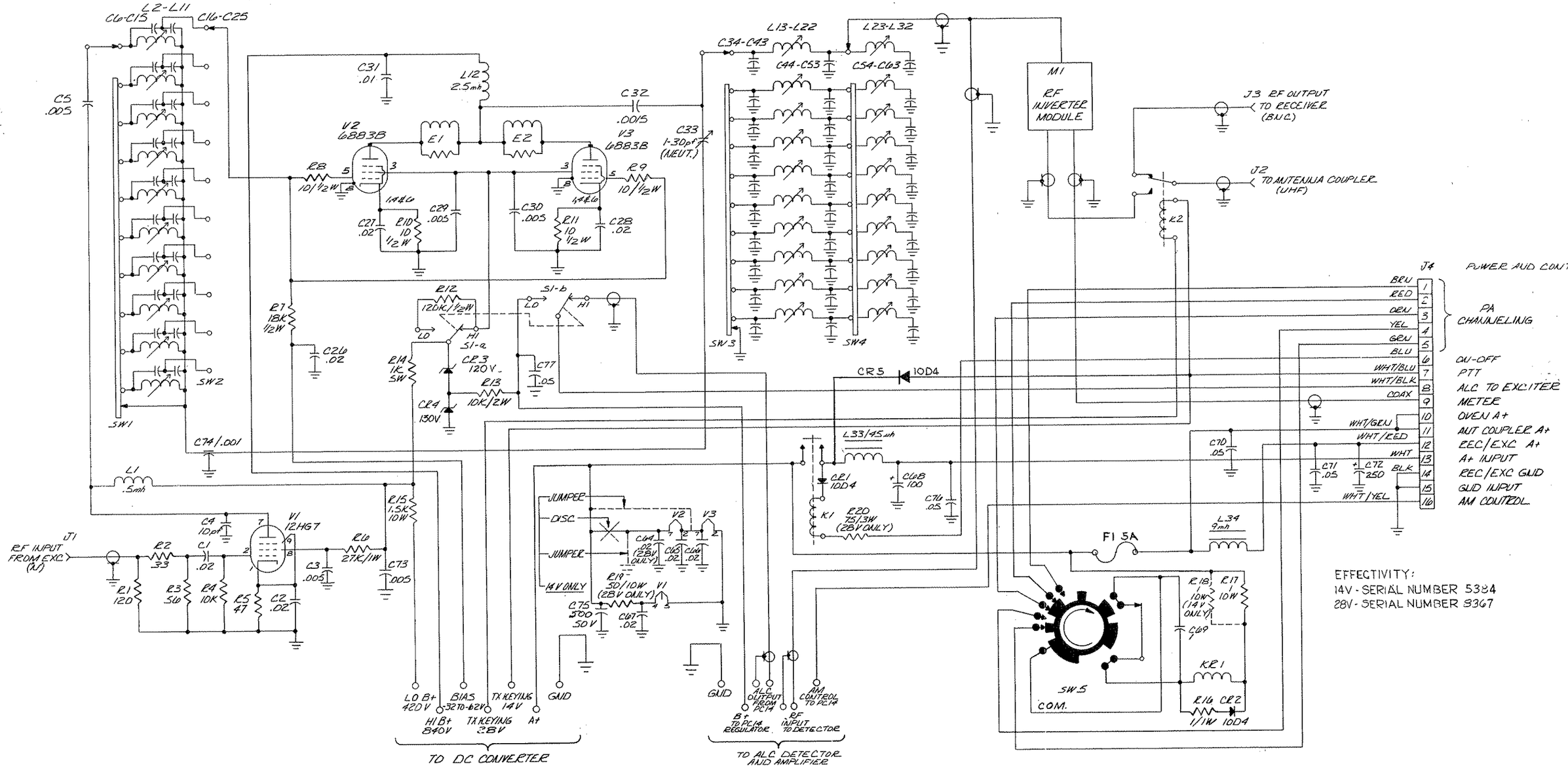
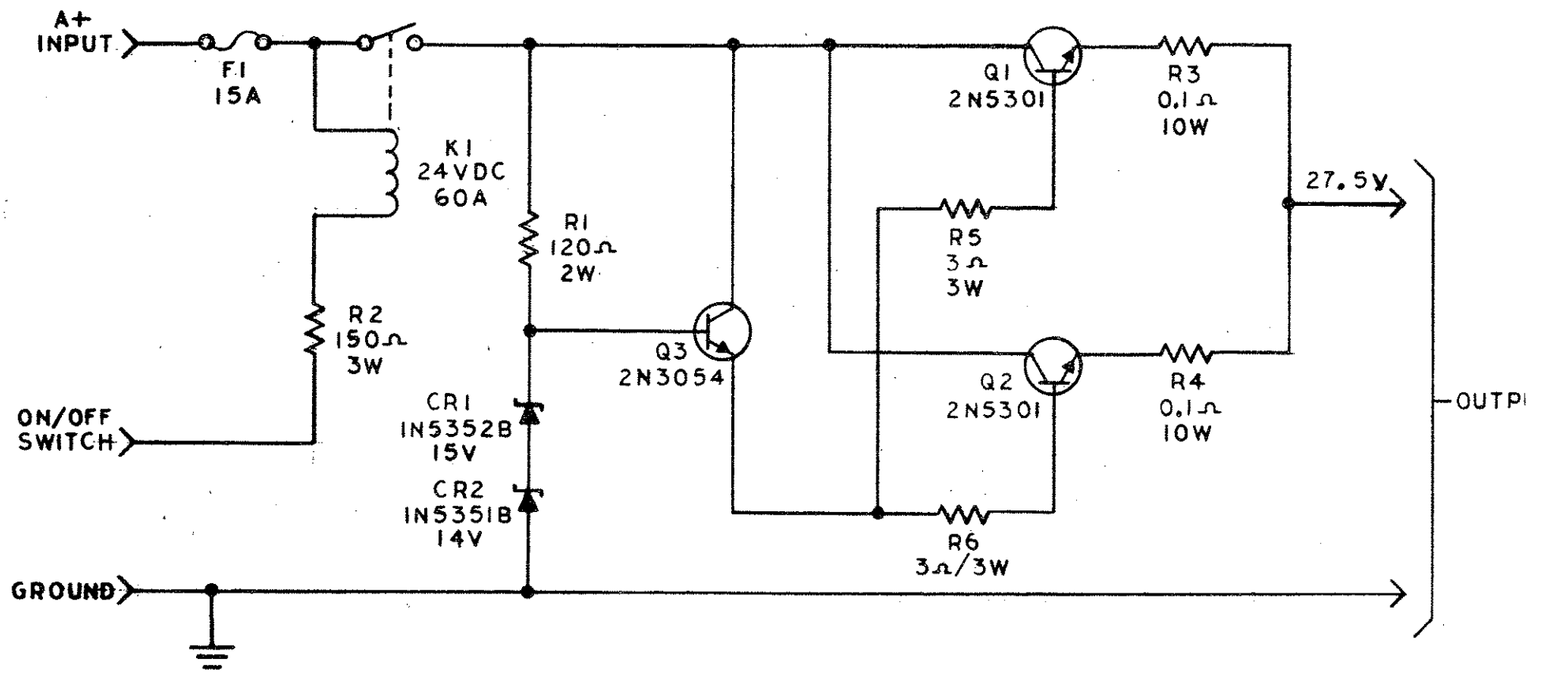


Figure X-23 - POWER SUPPLY



EFFECTIVITY:
14V - SERIAL NUMBER 5384
28V - SERIAL NUMBER 9367

DRIVER & POWER AMPLIFIER



REGULATOR, ASB-125M, SCHEMATIC DIAGRAM

CR1	40511	Diode, Zener, 1N5352B
CR2	40512	Diode, Zener, 1N5351B
F1	84874	Fuse, 15A
K1	66004	Relay, 24VDC, 60A
R1	19453	Resistor, 120 Ohm 2W
R2	16011	" 150 " 3W
R3	19441	" 0.1 " 10W
R4	19441	" 0.1 " "
R5	17924	" 3 " 3W
R6	17924	" 3 " "

Q1	44666	Transistor, 2N5301
Q2	44666	" 2N5301
Q3	44355	" 2N3054
	84903	Fuseholder
	84047	Terminal Block, 4 Terminal
	84836	Terminal Strip, 8 Terminal
	97848	Heat Sink

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: ASB-60/125
ASB130

ADDENDUM 1
DATE: 6-2-71

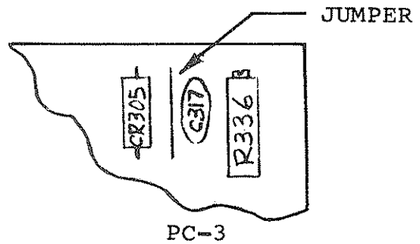
REFERENCE: COMPONENT ADDITION TO PC-3, AND PART NO. CORRECTION.

REVISION: RED

PURPOSE: CHANGE AGC-2 THRESHOLD

MANUAL REFERENCE: PAGE 102

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.



PC-3

SUNAIR ELECTRONICS, INC.
MANUAL: ASB-60/125
ASB130

ADDENDUM 2
DATE: 6-2-71

REFERENCE: COMPONENT CHANGE ON PC-7 ASB-60/125

REVISION: RED

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

MANUAL REFERENCE: PAGE 106, 107, PC-7 EXCITER TUNED CIRCUITS.

TEXT: REPLACE DIODES CR-701 THRU CR-715 (ASB-60 AND CR-701 THRU 723 (ASB-125) SUNAIR PART NO. 44290 WITH 1N914B SUNAIR PART NO. 40510.

SUNAIR ELECTRONICS, INC.
MANUAL: ASB-60/125

ADDENDUM 3
DATE: 6-2-71

REFERENCE: COMPONENT ADDITION TO CHASSIS OF RE-600 AND RE-1200

PURPOSE: CONTROL TAPER OF VOLUME CONTROL

MANUAL REFERENCE: PAGE 85, AND 97

TEXT: ADD 180 K OHM 1/4W FIXED COMP. RESISTOR, REFERENCE DESIGNATION R-16 AND SUNAIR PART NO. 17728, BETWEEN J-4 PIN T AND J3 PIN S OF RE-600 AND RE-1200 CHASSIS.

SUNAIR ELECTRONICS, INC.
ASB-60/125

ADDENDUM 4
DATE: 3/14/72

REFERENCE: INTENTIONALLY BLANK

PURPOSE:

MANUAL REFERENCE:

TEXT:

SUNAIR ELECTRONICS, INC.
ASB-60/125

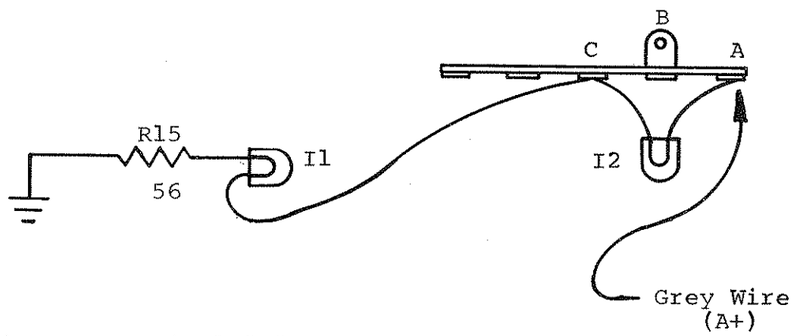
ADDENDUM #5
DATE: 8-23-71

REFERENCE: Deletion of panel lights with metal face plate.

PURPOSE: Unnecessary current consumption.

MANUAL REFERENCE: Pages; 83, 84, 85, 92, 98.

TEXT: Lamp connections (all radios wired as shown).



28 Volts: Grey wire to terminal "A"

14 Volts: Grey wire to terminal "C", connect terminal "A" to terminal "B" (ground).

SUNAIR ELECTRONICS, INC.
ASB-60/125/125M

ADDENDUM #6
DATE: Oct. 1, 1971

REFERENCE: Audio Amplifier

PURPOSE: Improve audio linearity at low A^+ input.

MANUAL REFERENCE: Page 12,87 ASB-60/125; Page 12M ASB-125M

TEXT: Bias resistor R2 changed to 150 ohm 1/2W
Sunair P/N 16580 for 14V operation.

SUNAIR ELECTRONICS, INC.
ASB-60/125/125M

ADDENDUM #7
DATE: 3/10/72

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: Page 85, 97, PC-10

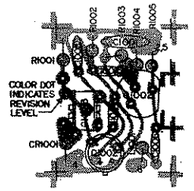
TEXT: Page 85, L1 changed from 150uh P/N 65919 to 220uh ± 5% P/N 65909.

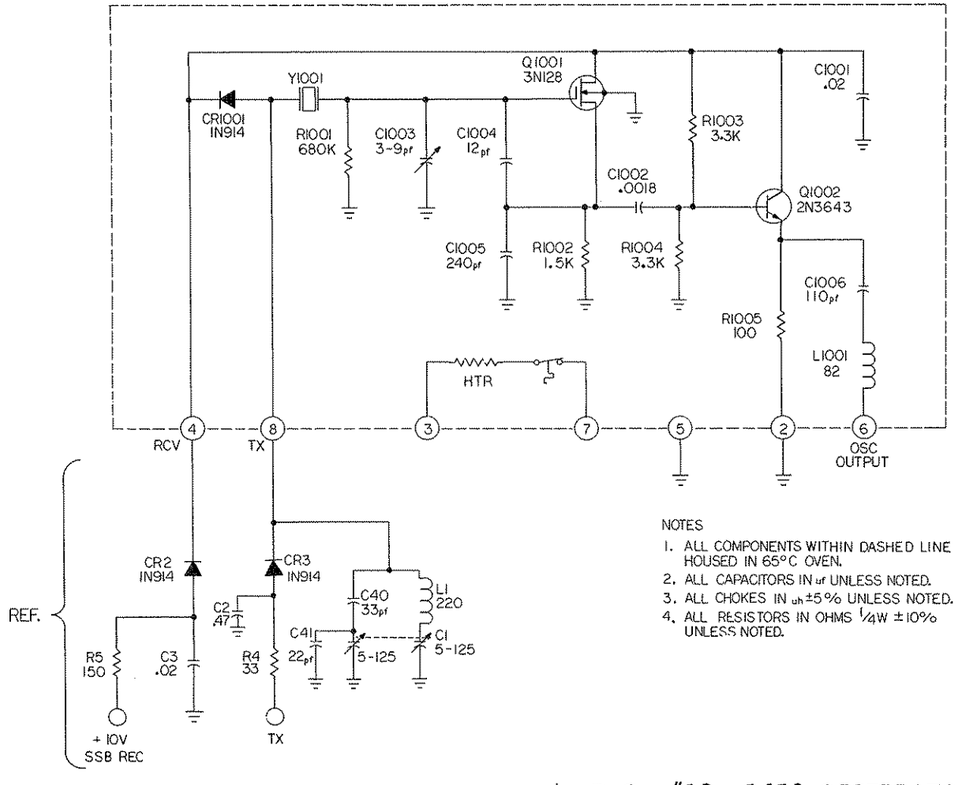
Addition of C40, 33pf capacitor P/N 28686 and C41, 22pf capacitor P/N 28507.

Page 97, "Clarifier" changed as follows;

See following schematic diagram and parts list.

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.

Figure X-20 - P.C. #10, 1650 OSCILLATOR

SUNAIR ELECTRONICS, INC.
ASB-60/125

ADDENDUM 8
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: PC-2, and PC-3 and Receiver Customizing

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: ASB-125

ADDENDUM #9
DATE: 8/23/71

REFERENCE: High Voltage Zener Diodes of PA-1010B

PURPOSE: Zener Diode Z4892 P/N 40282 is discontinued.

MANUAL REFERENCE: PA-1010B Schematic
Page 86,91

TEXT: CR 3 Changed from Z4892 P/N 40282 to 1N3008B, P/N 40506
CR 4 Changed from Z4892 P/N 40282 to 1N3009B, P/N 40507

SUNAIR ELECTRONICS, INC.
ASB-60/125

ADDENDUM 10
DATE: 25 Aug. 71

REFERENCE: Microphone Amplifier PC-5

REVISION: (1) Brown (PC-5)
(2) Brown (PC-5) with revision E printed circuit board

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

MANUAL REFERENCE: PC-5 schematic, installation and check-out procedure (page 15)

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 Q-507 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 in extremely noisy environments and without the aid of a noise cancelling type microphone, output may appear on the relative power meter, in that case, a reduction of R502 reduces the input sensitivity and makes the system less susceptable to ambient noise.

SUNAIR ELECTRONICS, INC.
ASB-60/125

ADDENDUM 11
DATE: 25, Aug. 71

REFERENCE: ALC Amplifier PC-6

REVISION: Red

PURPOSE: Maintain ALC operation at below normal 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.
Q-604 2N4288 P/N 44587 replaced by 2N4249 P/N 44678

SUNAIR ELECTRONICS, INC.
ASB-60/125

ADDENDUM 12
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 ALC amplifier (PC-14)

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

SUNAIR ELECTRONICS, INC.
MANUAL: ASB-60/125 and ASB-125M

ADDENDUM #13
DATE: August 3, 1972

REFERENCE: PA1010B Power Supply

PURPOSE: Improve reliability of power supply during converter start period

MANUAL REFERENCE: Power supply schematic diagram, parts list PC-20 page 87

TEXT: R108, 10 ohm 1/2W resistor is deleted and replaced with 1K ohm 1/2W carbon resistor PN 16748

R109, 5.6K ohm 1/2W resistor is deleted and replaced with 3.3K ohm 1/2W carbon resistor PN 18409

SUNAIR ELECTRONICS, INC.
MANUAL: ASB 60/125

ADDENDUM 14
DATE: Sept. 5, 1972

REFERENCE: ECN 067-002
DC Power Supply PC Board Ass'y 99379(28V) and 99390(14V)

PURPOSE: Reduce turn-on time of power supply and improve reliability

MANUAL REFERENCE: ASB 60/125
Schematic Diagram page 114
Parts list page 87

TEXT: Remove 2 30mf 500V capacitors, C104, C105, from power supply PC board, ass'y 99379 or 99390

SUNAIR ELECTRONICS, INC.
MANUAL: ASB-60/125

ADDENDUM 15
DATE: Oct. 5, 1972

REFERENCE: DCN 145
75pf Capacitor, PA-1010B Customizing
560pf " " "

PURPOSE: Change part number

MANUAL REFERENCE: ASB 60/125
Page 82 PA-1010B Customizing

TEXT: Change P/N 25237 to 25232
P/N 28973 to 28375

SUNAIR ELECTRONICS, INC.
MANUAL: ASB-60/125

ADDENDUM #16
DATE: 12/1/72

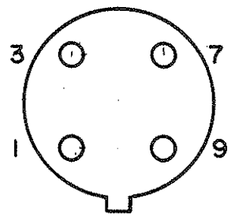
REFERENCE: Balance Modulator, Diode Ring, M501

ECN: 054-038

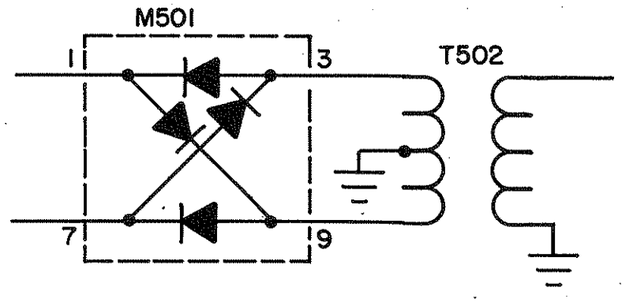
PURPOSE: Module M501, PN 40311, Package Change

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: ASB-125/60

ADDENDUM 17
DATE: 12/6/72

REFERENCE: PA-1010B Power Supply

ECN: 063-018

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

MANUAL REFERENCE: Power Supply schematic page 114, parts list page 87

TEXT: Add capacitor C108, 1 uf/100V P/N 27230 from collector of Q101 to collector of Q102

SUNAIR ELECTRONICS, INC.
ASB-60/125

ADDENDUM 18
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: ASB-60/125

ADDENDUM 19
DATE: 1/15/73

REFERENCE: 1000 Hz tone oscillator

ECN: 062-158

PURPOSE: Set output frequency to 1000±50 Hz

MANUAL REFERENCE: Schematic diagram and parts list, page 112

TEXT: Resistor R1601 changed from 1.5K/10%/¼W P/N 17247 to a 6.8K/10%/¼W P/N 17481

SUNAIR ELECTRONICS, INC.
MANUAL: ASB-60/125

ADDENDUM 20
DATE: 1/11/73

REFERENCE: 10 V Transmit isolation diode

ECN: 062-161

PURPOSE: Removal of diode

MANUAL REFERENCE: Receiver/Exciter chassis wiring diagram, page 98, parts list, page 85

TEXT: Remove diode CR4 and move wire from TB1(1) to S1A rear (11)

SUNAIR ELECTRONICS, INC. ADDENDUM 21

MANUAL: ASB-60/125 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%/$\frac{1}{4}$W P/N 18306 to 1.5K/10%/$\frac{1}{4}$W P/N 17247.
CR1401 changed from MZ4625 to 1N751A.

SUNAIR ELECTRONICS, INC. ADDENDUM 22
MANUAL: ASB-60/125 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.