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THE

GLOBE STAR

65-120

CITIZENS BAND TRANSCEIVER

Form FR-093-L

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GLOBE ELECTRONICS
Division of GC-Textron Electronics, Inc.
WESTERN PLANT: LOS ANGELES 18, CALIFORNIA
MAIN PLANT: ROCKFORD, ILL. U.S.A.

SERVICE ORGANIZATIONS

Should any difficulty be encountered with this equipment, it is suggested that a competent serviceman be consulted.

Authorized service stations, which are qualified to repair all equipment manufactured by Globe Electronics are located throughout the United States. These service stations will perform warranty repairs on all equipment should it fail within the warranty period. Each service organization has been carefully selected for its competence, quality of service, test equipment, and interest in servicing our products.

These service stations receive service bulletins and notice of any engineering changes made to up-grade the equipment. Thus, they are best qualified to service your Globe Star.

Globe Electronics also maintains an efficient service department within the plant for those who wish to return their equipment directly to the factory for servicing.

ORDERING PARTS

When ordering replacement parts, always include the part number, description, model, and serial number of the equipment.

I. FORWARD

PURPOSE

The purpose of this manual is to provide the owner and/or serviceman with detailed information for the installation, operation, and maintenance of this equipment. It is suggested that the installation and operation section of this manual be thoroughly read before any attempt is made to place the unit in operation.

NOTE

This unit complies with Canadian Department of Transportation Radio Standards Specification 136, Issue 1, pertaining to:

"Land and mobile radiotelephone transmitters and receivers operating in the 27 -27.230 MC/S Band at 10 KC/S Channel spacing with transmitter D. C. power input rating of 5 watts or less or carrier power output of 3 watts or less."

II. INSTALLATION AND OPERATION

UNPACKING AND INSPECTION

Carefully unpack and inspect the equipment for any visible damage that may have occurred during shipment, such as dented cabinet, broken tubes, etc. Should any damage be located, report it to the carrier, not the manufacturer. The carrier will supply you with the necessary forms, and assist you in obtaining repairs.

GENERAL

It is suggested that a technically competent technician install or assist in the installation of this equipment. A good initial installation will assure the user better, more reliable communications.

The distance over which you will be able to communicate will be governed largely by the antenna system and type of terrain in your area. Communications in and around large buildings may be restricted as will operation in valleys and low spots.

ANTENNA SYSTEMS

Best all-around operation will be obtained with a ground plane type of antenna for base station use. This type of antenna is omni-directional which makes it ideal for communication with mobile units over a large area.

Directional type antennas may be used to an advantage when communications are to be confined to one direction from the base station. Such an antenna will provide stronger signals when both transmitting and receiving, than the ground plane type. By using a rotator, the antenna may be turned to the direction of desired communications.

There are many other types of antennas available for Citizens Band use. It is recommended that you consult your dealer or serviceman for the type best suited to your needs.

CONTROLS

All the controls necessary for the operation of your unit are located on the front panel. By understanding their functions, you will derive more satisfaction from your unit.

Volume Control and On-Off Switch---This knob controls the volume of the receiver section. In its extreme counterclockwise position, the unit is turned off. Rotation clockwise will turn it on, and will adjust the volume to the desired level.

Squelch Control---In its counterclockwise position, the receiver is unsquelched. That is, your unit works somewhat like an ordinary broadcast radio, receiving noise and static when no stations are being heard. By rotating the knob clockwise, you will reach a point where the noise stops. The receiver is then said to be squelched. In this state, the receiver remains quiet until a station comes on the air. By rotating the control to the point where the receiver is just squelched, very weak stations will unsquelch it. Further rotation past this point will cause only the stronger stations to unsquelch the unit. In some cases, it is desirable to reject weaker, distant stations and allow only stronger close-in stations to be received. With a little practice, you will find the best average setting of this control to suit your operating conditions.

Channel Selector---This control enables you to select any one of five pre-determined channels. Since Citizens Band communications are on a shared basis, it is desirable to be able to change to an alternate, unused channel. The number of channels available (up to five) are determined by the number of crystals you have in your unit.

Microphone Connector---The microphone connector is located on the front panel for convenience. Pressing the button on the microphone allows you to talk, or transmit, and releasing it allows you to receive.

MOBILE INSTALLATION

CAUTION--See Page 6 before operating from 6 or 12 VDC.

Mobile installations present individual problems due to the wide variety of makes, styles, and interior equipment of the vehicles to be used. Use your own ingenuity or have a service organization, experienced in vehicular radio installations, install the unit. A mounting bracket is provided, and two threaded weld-nuts are located on the back panel to aid in the installation.

A D. C. power cable is also provided. This cable has a fuse connector, containing a 10 amp fuse, located in the ungrounded lead.

CAUTION--Be sure that the black lead containing the fuse holder is not grounded. The yellow lead is connected internally to the chassis and cabinet of the unit.

III. MAINTENANCE

SPECIFICATIONS

Receiver:

Sensitivity: Minimum 10 DB signal plus noise to noise ratio at .5 UV. input to antenna.

Selectivity: 6 DB Points- 6 KC
60 DB Points - 25 KC

Squelch: At threshold, receiver will open for carriers of .1 UV. or greater.

Audio Output: At least 2.5 watts with input signal of 3 uv., 30% modulated with 1000 cycles.

Frequency Stability: .005% or better

Image Rejection: 30 DB

Transmitter:

Plate Power Input: At least 5 watts

Modulation: 85 to 100% at average speaking level.

Frequency Stability: .005% or better.

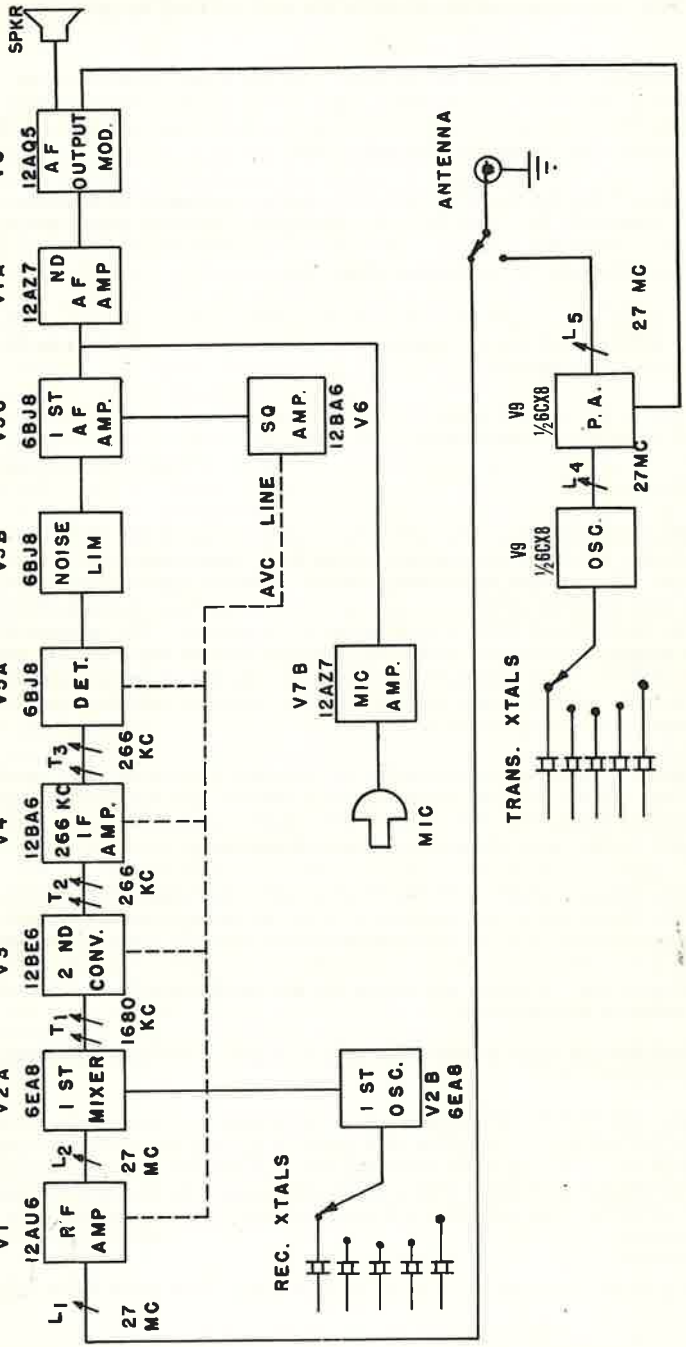
General:

A. C. power Consumption: 50 watts at 117 VAC

D. C. Power Consumption: 5 amps at 12.6 VDC.
10 amps at 6.3 VDC.

Size: 4-1/2" H; 9" W; 9-1/2" D.

Weight 16 Lbs.



BLOCK DIAGRAM

FIG. 1

DESCRIPTION OF EQUIPMENT

Receiver. This equipment has a five channel, crystal controlled receiver. It is a dual conversion, superhetrodyne type, the first I. F. frequency being 1680 KC, and the second I. F. 266 KC. Dual conversion is used to provide better image rejection.

Received signals are amplified by V1, the R. F. amplifier. (Refer to Block Diagram). This stage has a tuned circuit in the grid (L1) and the plate (L2) circuit.

After being amplified, the signal is combined with the signal from the first local oscillator in the mixer stage, V2A. This mixer is the pentode section of a 6EA8 tube, the triode section being used as the first local oscillator. The oscillator is coupled to the mixer within the tube.

The output signal from the mixer is 1680 KC, and is coupled by transformer T1 to the second converter V3. This tube is a pentagrid converter whose frequency is controlled by a 1946 KC. crystal. The difference frequency 266 KC., is coupled by transformer T2 to an I. F. amplifier stage, V4.

The output of V4 is then coupled by T3 to the detector, a diode section of V5. AVC is taken at this point and is supplied through decoupling resistors to V1, V3, V4, and the squelch amplifier.

After detection, a series gate noise limiter is employed. A second diode section of V5 is used to limit the peak voltages caused by noise pulses. From here, the audio signal goes to the first audio amplifier, which is controlled by the squelch amplifier, V6.

When R25, the squelch control, is turned to a squelched position, V6 conducts. When this occurs, a voltage drop exists across R27, thus making the grid of V5 more negative. This causes V5 to reach cut-off. When a signal is received, AVC voltage applied to the grid of V6 causes it to conduct less heavily, decreasing the voltage drop across R27, and allowing V5 to conduct. The amount of AVC voltage required to bias V6 to cut-off is determined by the setting of the squalch control R25, With this type of squelch circuit, the receiver may be adjusted to open for only stronger signals, or may be set to open for very weak signals, depending on the operator's choice.

The audio signal, after being amplified by V5C, is then coupled to V7A, another audio amplifier. From V7A, the audio signal is coupled by means of a couplate to the audio output stage, V8. One side of the output transformer voice coil winding is grounded by the relay when the receiver is operating.

Transmitter-- The transmitter has five crystal controlled channels. An overtone oscillator, V9, drives the power amplifier, V10. By using overtone crystals, only one frequency is used in the entire transmitter, thereby reducing danger of spurious radiation. The output of the transmitter is coupled to the antenna by means of a PI network. Tune-up procedure for the transmitter is included in the alignment section of this manual.

The modulation portion of the transmitter uses V7A and V7B as voltage amplifiers, and V8 as the modulator.

Power Supply--CAUTION: This unit is wired for negative ground D. C. systems when leaving the factory. Converting it to positive ground operation involves a slight change to the wiring of the terminal board in the power supply section. No damage to the unit will occur if it is accidently connected to a D. C. supply of incorrect polarity. The receiver will function properly, but the transmit relay will not key.

For positive ground, reverse relay diode D3 and C-42, A100 MFD @25V capacitor.

Ch-9-R-28745
Ch-11-R-28765

CRYSTALS

Channel selection in this unit is accomplished by means of a special crystal switch. In order to minimize the effects of stray capacity, both sides of the crystals are switched. A crystal will be on the same frequency, regardless of the socket in which it is inserted.

The receiver uses third overtone crystals operating 1680 KC. Above the incoming signal frequency. The transmitter also uses third overtone crystals.

It is recommended that crystals designed specifically for this unit be used. Crystals for one make of equipment will not necessarily operate on the same frequency in other brands of equipment.

RECEIVER ALIGNMENT

GENERAL

The equipment necessary for the alignment of this unit consists of an accurate Signal Generator (preferably crystal controlled) which will cover the frequencies of 1680Kc. and 26.965-27.225Mc., with 400 or 1,000 cycle modulation, a Vacuum Tube Voltmeter, a receiver calibrated within one kilocycle on the Eleven Meter Citizens Band, a Hexagonal I. F. Alignment Tool, and a small screwdriver.

Before starting the alignment procedure, allow sufficient warmup time for the test equipment and the unit (usually five to ten minutes).

I. F. ALIGNMENT

Set the VTVM to read negative voltage and connect it to test point "A" (AVC Buss). Using a .001 MFG capacitor in series with the signal generator output, connect to Pin 2 of V2, the 6EA8 Mixer Tube.

Set the Signal Generator to 1680Kc and adjust the top and bottom slugs of T1, T2, and T3 in that order, for maximum AVC voltage as indicated on the Voltmeter. The Signal Generator output should be reduced as the stages are brought into alignment. The preceding steps should be repeated with minimum signal generator output until the best alignment is indicated.

In cases of severe misalignment, it may be necessary to first align only the 266 Kc. I. F. Transformers. In that case, set the Signal Generator to 266 Kc and couple the output through the capacitor to Pin 7 of V3, the second converter. Align T2 and T3, and then realign all I. F.'s as outlined in the previous paragraph.

In the event no output is obtained when the 1680Kc signal is injected, it may be that the oscillator portion of the second converter stage is not functioning. To check this, tune a receiver to 1946Kc with the unit turned on. If the oscillator is operating, the signal from it should be heard. Removing the 1946Kc crystal should remove the signal from the receiver.

FIRST OSCILLATOR ADJUSTMENT

Set the VTVM to read negative voltage and measure the voltage on Pin 9 of V2, the first oscillator/mixer. A reading of -2 volts or more indicates the oscillator is running. If not, adjust L3 from maximum inductance toward minimum until an increase in meter reading indicates the oscillator has started.

Disconnect the VTVM and tune in the oscillator signal on an accurately calibrated receiver. The signal will be found 1680Kc above the channel in use. (Example--Channel 11, 27.085Mc., will place the receiver oscillator at 28.765Mc.) If the signal does not appear at this point, adjust L3 until it does. When using several channels, it may be necessary to average out the tuning between them in order to keep all crystals within operating frequency tolerances. (± 1Kc)

R. F. ALIGNMENT

Connect the Signal Generator to the antenna input, and the VTVM to test Point "A". Tune the signal generator to the desired channel, and reduce the output until there is just enough indication on the VTVM for tuning purposes. Adjust coils L1 and L2 for maximum reading on the VTVM, repeating the adjustment of each.

TRANSMITTER TUNE UP

OSCILLATOP TUNING

Connect the VTVM, in series with an RFC, to Pin 7 of V10 (the P. A. Grid). With the slug of L4 set for minimum inductance, key the transmitter. Tune the slug for more inductance, until the meter indicates grid drive of approximately 15 to 20 volts. This voltage will not always be the same with different crystals due to the fact that some crystals are more or less active than others.

Press and release the microphone button several times, watching to see that the oscillator starts readily. If starting is erratic, decrease the inductance by rotating the slug. Be sure to check crystals on other channels which may be in the unit.

Adjustment of L4 will vary the oscillator frequency slightly. For this reason, it is desirable to check the frequency after tuning L4. When using more than one channel, it may be necessary to average out the tuning between them in order to keep all crystals within operating tolerances.

POWER AMPLIFIER ADJUSTMENT

After the oscillator is tuned as outlined in the preceding instructions, the power amplifier pinet output circuit should be adjusted.

This is accomplished by inserting a milliammeter in serier with the RFC in the plate circuit of V10, the R. F. Power Amplifier. This is best accomplished by removing one lead of the choke at the point on the terminal strip where it joins with R46. Preset the antenna loading capacitor, C36, by adjusting to near maximum capacity. Key the transmitter and adjust the plate tuning capacitor, C35, for a dip in plate current. Coupling may then be increased by decreasing the capacity of C36. Any change of C36 should be followed by a redipping of C35. Plate power input may be determined by measuring the plate voltage and multiplying by the plate current.

CAUTION --In the United States and Canada, the plate voltage/plate current product should not exceed 5 watts for Class D Citizens Band operation.

TUBE COMPLEMENT

	117VAC/12.6 VDC Model	117VAC/6.3VDC Model	
			RECEIVER
V1	12BA6	6AU6	R. F. Amplifier
V2	6EA8	6EA8	1st Osc/Mixer
V3	12BE6	6BE6	2nd Converter
V4	12BA6	6BA6	266KC I. F. Amplifier
V5	6BJ8	6BJ8	Det/Noise Lim/1st A. F. AMP
V6	12BA6	6BA6	Squelch Amplifier
V7*	12AZ7	12AZ7	Mic Pre-Amp/2nd A. F. AMP
V8*	12AQ5	12AQ5	Audio Output/Mod.
			TRANSMITTER
V9	6CX8	6CX8	Oscillator
			R. F. Power Amplifier
V7*	12AZ7	12AZ7	Mic Pre-Amp/A. F. AMP
V8*	12AQ5	6AQ5	Modulator

*Common to both transmitter and receiver.

PARTS LIST

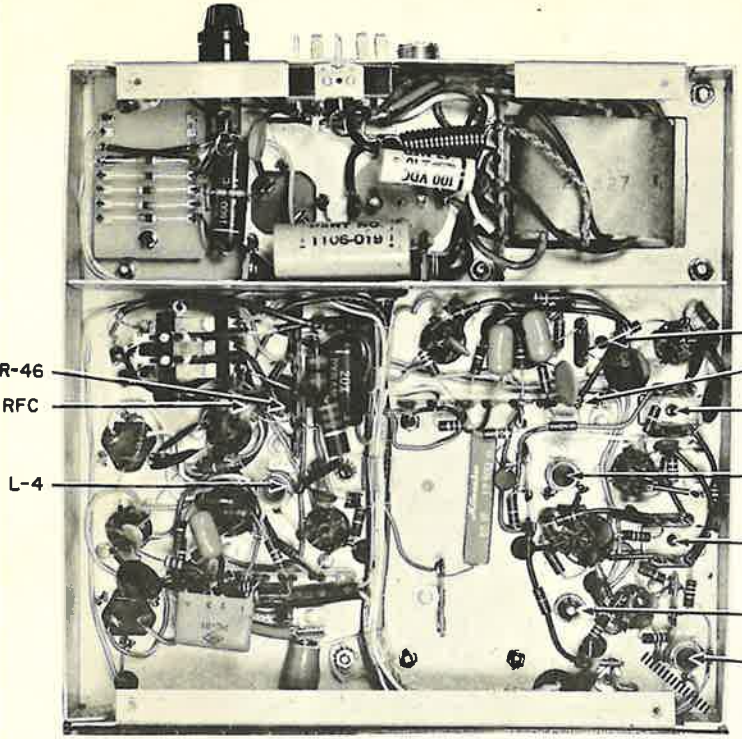
RESISTORS

Circuit Designation	Description	Part Number
R1, R10, R15	180K 1/2 W.	1000-029
R2, R16	150 Ohm, 1/2W.	1000-046
R3	33K 1/2 W.	1000-026
R4, R43	10K 1/2 W.	1000-024
R5, R21, R22, R24	1 Meg. 1/2 W.	1000-023
R6, R30, R37, R42	47K 1/2 W.	1000-002
R7, R23, R46	6.8K 1/2 W.	1000-016
R8, R17	56K 1/2 W.	1000-032
R9, R18, R29	1K 1/2 W.	1000-014
R11	68K 1/2 W.	1000-039
R12	82K 1/2 W.	1000-051
R13	180 Ohm 1/2 W.	1000-052
R14	100K 1/2 W.	1000-009
R19, R20, R27, R21	470K 1/2 W.	1000-021
R25	10K Control	2300-022A
R26	27K 1/2 W.	1000-053
R28	1.2 Meg. 1/2 W.	1000-049
R31	150K 1/2 W.	1000-050
R32	500K Control W/Switch	2300-017C
R33	270K 1/2 W.	1000-030
R34	1.2 K 1/2 W.	1000-020
R35	4.7K 1/2 W.	1000-018
R36	220 Ohm 1/2 W.	1000-012
R38	1K 2 W.	1002-022
R39	2.2 Meg. 1/2 W.	1000-005
R40	2.2K 1/2 W.	1000-006
R44	22K 2 W.	1002-003
R45	22K 1/2 W.	1000-008
R48	12.5K 10W.	1003-007
R49	22 Ohm 1/2 W.	1000-001
R50	7.5 Ohm 10W.	1003-036
R51	3.3 Ohm 1W.	1001-019

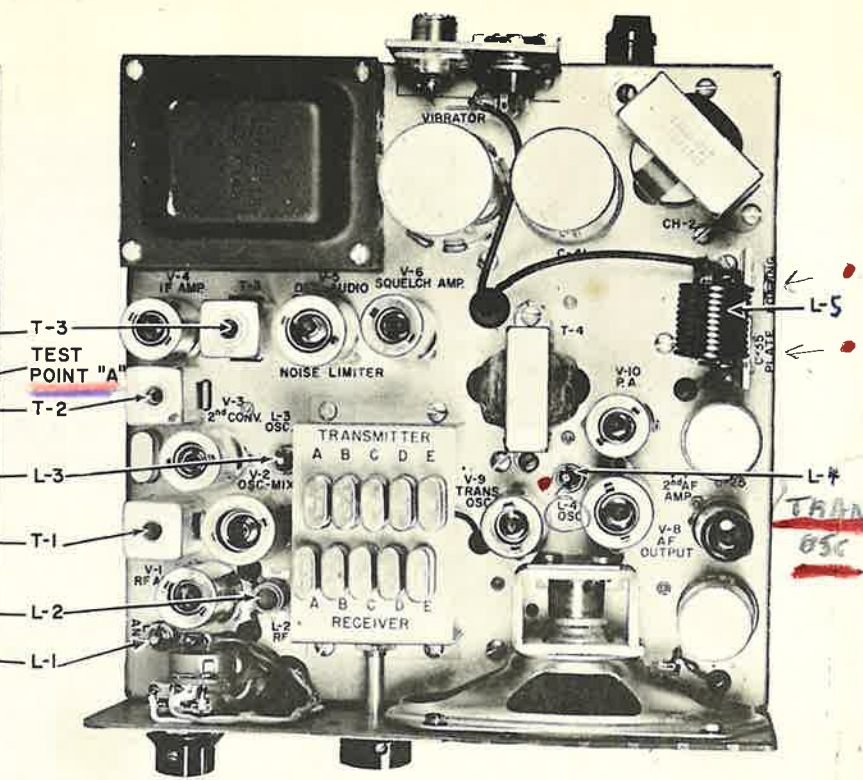
CAPACITORS

C2, C6, C30	50 P.F., 500 V Disc.	1101-042
C2, C3, C34	.001 MFD., 1000V Disc.	1101-019
C4, C5, C7, C8, C10 C11	.005 MFD., 600V Disc	1101-003
C9, C13, C14, C15, C16, C26, C33, C44	.01 MFD., 600 V Disc	1101-037

Circuit Designation	Description	Part Number
C12, C17, C31, C32	.002 MFD., 1000V Disc	1101-045
C37, C38	.02 MFD., 1000V Disc	1101-097
C18	.05 MFD., 600 V Disc	1101-062
C19, C21, C22	.01 MFD., 400 V Tubular	1100-004
C20	.1 MFD, 10V Disc	1101-048
C23	100 PF, 500V Disc	1101-050
C24A, B, C	10-10-10MFD, 350V Elect.	1106-035
C25A, B, C	10-10-10MFD, 350V Elect.	1106-035
C27	.1 MFD, 200V Tubular	1100-001
C28	500 PF, 1000V Disc.	1101-005
C29	.001 MFD, 400V Tubular	1100-016
C35	3-12 PF, Trimmer	1111-007
C36	80-480 PF, Trimmer	1111-006
C39	.47 MFD, 100V Tubular	1100-013
C40	2 x 800 PF, 1000V Disc	1104-002
C41A, B	20-40 MFD, 450V Elect.	1106-020
C42	100 MFD, 25V Elect.	1106-019A
C43	.0033. 1600V Tubular	1100-017
	COILS	
L1	Antenna	1400-128A
L2	R. F. Plate	1400-105
L3	Rec. Osc. Plate	1400-103
L4	Trans. Osc. Plate	1400-106
L5	Pl -Net	1400-120
RFC	120MH R. F. Choke	1301-025
	TRANSFORMERS	
T1	Interstage I. F., 1680Kc	1205-001A
T2	Interstage I. F., 266Kc	1205-006A
T3	Output I. F., 266Kc	1205-007A
T4	Audio Output	1203-011A
T5	Power 117VAC/6VDC	1200-019A
	117VAC/12VDC	1200-018A
Ch1	Choke, Hash Filter	1300-021A
Ch2	Choke, Filter 3.2Hy, 85MA	1300-017
	MISCELLANEOUS	
PC81	Triode Couplate	1109-001
	Fuse, 2A	1500-011
	Fuse, 10A	1500-009
	Cabinet	1700-041A
	Chassis Power Connector	2001-020
	Crystal Selector Switch	2100-045
	Knob, Volume	2600-030
	Knob, Squelch	2600-030
	Knob, Channel Selector	2600-032
	Relay, 3 PDT, 12VDC	3500-015
	Crystal, 1946Kc	3700-151
	Crystal, Rec.	Specify Channel
	Crystal, Trans.	Specify Channel
D1, D2, D3,	Silicon Rectifier, 500MA, 600PIV	3700-153
	Pilot Lamp, 12V	3800-006
	Pilot Lamp, 6V	3800-007
	Microphone	4000-011
	Vibrator, 12V	4001-001
	Vibrator, 6V	4001-002
	Speaker, 3" x 5"	4002-006
	Power Cord 117VAC	9000-079
	Power Cord 12 VDC	9000-080-12
	Power Cord 6VDC	9000-080-6



BOTTOM VIEW OF CHASSIS



TOP VIEW OF CHASSIS

117 V AC / 6.3 V DC POWER SUPPLY