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Sonar Model G Owner's Manual

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INSTRUCTION MANUAL



MODEL G Citizens Band Transceiver



SONAR RADIO CORPORATION

73 Wortman Avenue • Brooklyn, N. Y. 11207

44-010-009A

MODEL "G"
CITIZENS BAND TRANSCEIVER

SONAR RADIO CORPORATION BROOKLYN, NEW YORK, 11207

I N D E X

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
1	SERVICE	1
1 - 1	Warranty	1
1 - 2	Service Policy	1
1 - 3	Changes	1
2	FCC	1
2 - 1	FCC Regulations	1
2 - 2	Model "G"	1
3	DESCRIPTION	2
3 - 1	Specifications	2
3 - 2	General	3
3 - 3	Tube and Diode Complement	3
3 - 4	Crystal Complement	4
3 - 5	Panel Controls	5
4	INSTALLATION	5
4 - 1	Mobile Installation	5
4 - 2	Mobile Noise Suppression	6
4 - 3	Mobile Antenna	7
4 - 4	Marine Antenna and Installation	7
4 - 5	Base Antenna	8
5	OPERATION	8
5 - 1	Transmitter	8
5 - 2	Receiver	9
5 - 3	Crystals	9
6	MAINTENANCE	9
6 - 1	Fuses	9
6 - 2	Alignment - Receiver	10
6 - 3	Alignment - Transmitter	10
6 - 4	Crystal Oscillator - Calibration	11
7	VOLTAGE & RESISTANCE CHART	12
8	PARTS IDENTIFICATION	13
9	PARTS LIST	14
10	SCHEMATIC DIAGRAM	16

MODEL "G" TRANSCEIVER

SECTION 1 - SERVICE

1 - 1. WARRANTY

SONAR RADIO CORPORATION warrants each instrument manufactured by them to be free from defects in material and workmanship. Our liability under this warranty is limited to servicing or adjusting any instrument which is returned to the factory for that purpose and to replacing any defective parts thereof. This warranty on all parts is effective for one year after delivery to the original purchaser, and for free labor and servicing for ninety days after delivery to the original purchaser, provided that all instructions as to installation, use and operation are followed and the fault has not been caused by misuse, accidents, negligence, alteration, unauthorized repairs or has been damaged by excessive input power, lightning or water-flooding. Warranty of parts shall not include pilot lamps.

1 - 2. SERVICE POLICY

If it is necessary to return a MODEL "G" to the factory, a letter should first be sent describing the basic trouble. If an authorized service and sales agency is close to the customer, the customer will be so informed; otherwise, the unit will be returned to the factory. Do not return the unit without factory authorization.

1 - 3. CHANGES

Sonar Radio Corporation reserves the right to modify or change any design or equipment, mechanically or electrically, to any degree as is necessary without Sonar Radio Corporation being liable to modify, change or exchange previously delivered equipment.

SECTION 2 - FCC

2 - 1. FCC REGULATIONS state that the owner of any Citizens Band equipment must have in his possession a current copy of Part 95 of the FCC Rules and Regulations in addition to a Citizen's Band License to operate the same before transmitting any signals.

2 - 2. THE MODEL "G" has been tested prior to shipment to comply with the FCC Rules and Regulations regarding power input, receiver radiation, spurious signal attenuation and frequency stability.

SECTION 3 - DESCRIPTION

3 - 1. SPECIFICATIONS

A. TRANSMITTER:

Input: 5 watts (FCC MAX)
Output: At least 3 watts
Impedance: 50 ohms
Harmonic &
Spurious Output: Attenuated at least 75 db
Modulation: High level class "B", capable of 100% modulation.
Frequency: Any 8 of the 23 assigned Citizens Band channels.
Stability: Better than .005%

B. RECEIVER:

Sensitivity: 1 microvolt for 12 db signal-to-noise ratio
Selectivity: 5 kc at -6 db
Audio output: 4 watts at 1000 cps
Distortion: 10% maximum at 1 watt output
Noise Limiting: Fully automatic circuit featuring gating type circuit.
Squelch: Passes audio when 2 microvolts of signal is presented to antenna input.
Tuning Range: Continuously tunable for all 23 channels; crystal-controlled for any 8 channels.
Stability: Same as transmitter when crystal-controlled.
Remote Speaker: A closed circuit jack is provided for a 4 ohm speaker.

C. POWER SUPPLY:

Input: 120 VAC or 12 VDC depending upon the power cable used. The Model "G" is available for 120 VAC or 6 VDC and only 32 VDC operation.
High Voltage
Rectification: Voltage Doubler
Duty: Continuous operation.

D. SIZE: 4½" high x 8" wide x 10" deep
Weight: 8½ lbs.

E. EQUIPMENT SUPPLIED:

- (1) One pair of crystals
- (2) Push-to-talk microphone w/retractable cord
- (3) Microphone hanger
- (4) DC cord (12 VDC or 6 VDC)
- (5) AC cord (120 VAC)
- (6) Universal Mounting Bracket and hardware
- (7) Channel markers

3 - 2. GENERAL

The Model "G" is an 8 channel crystal-controlled double-conversion receiver and transmitter with provisions to tune all 23 Citizen's Band channels. The Model "G" operates as a mobile installation using 6 VDC or 12 VDC (depending on model) as well as a base station using 120 VAC. The mobile installation may be an automobile, boat or aircraft. Eight crystal-controlled channels give the operator a good choice of channels while the tunable receiver gives the operator the opportunity to monitor any of the 23 channels. The sensitive receiver has a high degree of adjacent channel rejection. The transmitter is fully modulated using restricted audio band-pass. This and class "B" high level modulation give the "voice power" necessary to overcome noisy or crowded conditions.

The panel indicator lamp shows when the Model "G" is turned on. The meter indicates transmitter antenna current. The latter feature indicates modulation peaks and is a tune-up indicator in conjunction with the transmitter tuning and loading controls.

The distances over which the Model "G" will transmit and receive depend upon the antenna, antenna location, local noise conditions and the terrain. At 27 mc polarization is important; when a system is set up, the antennas should be either vertically or horizontally polarized, but never both.

Beam antennas provide greater response in one direction only. Beams would, therefore, be best suited to those fixed installations requiring transmission and reception in one direction only. Operating distances can be doubled with such an arrangement.

3 - 3. TUBE AND DIODE COMPLEMENT

DIAGRAM NO.	T U B E S		CIRCUIT FUNCTION
	6 VDC	12 VDC	
V1	6BA6	12BA6	R. F. Amplifier
V2	6J6	6J6	Mixer
V3	6BE6	6BE6	Converter
V4	6BA6	12BA6	I. F. Amplifier (262 kc)
V5	6AU6	12AU6	Squelch
V6	12AT7	12AT7	A. F. Amplifier
V7	12BH7	12BH7	Audio power output and modulator
V8	6AU8	6AU8	Crystal oscillator, transmit and receive
V9	6AQ5	12AQ5	Final amplifier, transmit
V10	12AX7	12AX7	Noise Limiter
D1	1N295 Germanium Diode		Detector
D2	Silicon Diode		Automatic noise limiter
D3, D4	2 Silicon Diodes		Rectifiers
D5, D6	2 Silicon Diodes		Noise Limiter

3 - 4. CRYSTAL COMPLEMENT

Both receiver and transmitter crystals for the Model "G" are fundamental type crystals operating at one-half the normal frequency. This gives more stable operation as opposed to the one-third overtone type. They are manufactured with 0.050 inch diameter pins on 0.486 inch spacing, to a tolerance of 0.0025%.

Chan. No.	Channel Freq. (mc)	Receiver Crystal Freq. (mc)	Transmitter Crystal Freq. (mc)	Chan. No.	Channel Freq. (mc)	Receiver Crystal Freq. (mc)	Transmitter Crystal Freq. (mc)
1	26.965	13.255	13.4825	13	27.115	13.330	13.5575
2	26.975	13.260	13.4875	14	27.125	13.335	13.5625
3	26.985	13.265	13.4925	15	27.135	13.340	13.5675
4	27.005	13.275	13.5025	16	27.155	13.350	13.5775
5	27.015	13.280	13.5075	17	27.165	13.355	13.5825
6	27.025	13.285	13.5125	18	27.175	13.360	13.5875
7	27.035	13.290	13.5175	19	27.185	13.365	13.5925
8	27.055	13.300	13.5275	20	27.205	13.375	13.6025
9	27.065	13.305	13.5325	21	27.215	13.380	13.6075
10	27.075	13.310	13.5375	22	27.225	13.385	13.6125
11	27.085	13.315	13.5425	23	27.255	13.400	13.6275
12	27.105	13.325	13.5525				

$$\text{RECEIVER CRYSTAL FREQ.} = \frac{\text{CHAN. FREQ. (MC)} - 0.455 \text{ MC}}{2}$$

$$\text{TRANSMITTER CRYSTAL FREQ.} = \frac{\text{CHAN. FREQ.}}{2}$$

ALWAYS GIVE MODEL OF EQUIPMENT WHEN ORDERING CRYSTALS.

3 - 5. PANEL CONTROLS

A. FRONT

VOLUME CONTROL, Power on/off: CW rotation turns set on and increases volume. The use of a Sonar-Call two-tone squelch will require a control setting of about 1 o'clock.

SQUELCH: Adjusts audio gate to cut off when no signal is received. Elimination of noise is achieved by CW rotation. Do not rotate past point of noise elimination, as it will require too strong a signal to open the audio gate.

TUNE - CRYSTAL: Switch selects the mode of receiver frequency selection, either continuously tunable or crystal-controlled.

TUNE: Continuously tunes all 23 channels.

CHANNELS: Switch selects any of the 8 crystal-controlled channels for both receiving and transmitting.

CRYSTAL SPOT: Locate channel on tunable receiver.

B. SIDE

TUNING: Located closest to front panel. This resonates the R. F. power amplifier to frequency.

LOADING: Matches the impedance of the antenna to the R. F. power amplifier.

C. REAR

ANTENNA CONNECTOR: Use matching male connector, type PL259 for RG-8 coaxial cable and PL259 with adapter for RG-58A/U.

EXTERNAL SPEAKER JACK: For external 3.2 ohm P. M. speaker

SONAR-CALL: Socket for Sonar-Call two-tone squelch. The socket is not wired as standard factory equipment.

"S" METER: Adjusts "S" meter for zero.

SECTION 4 - INSTALLATION

4 - 1. MOBILE INSTALLATION

Mount the "U" bracket supplied with the Model "G" under the dash panel using the bracket itself as a location template. Drill holes for the self-tapping type of screw. If possible use nut, bolts and lock washers. A hole is supplied on the rear panel for an additional strap. The use of a wing bolt will facilitate easy removal for servicing. Do not crowd the Model "G"; leave room for ventilation.

The 12 VDC power cord has a cigar lighter receptacle adapter plug. The 6 VDC version of the Model "G" is supplied with wire only and should be connected directly to the electrical system due to the higher input current. In the latter case, be sure to observe polarity.

4 - 2. MOBILE NOISE SUPPRESSION

The Model "G" Gated Noise Limiter is very effective in the reduction of noise, but this alone is not effective against all the different noises in a mobile installation. Particular attention is called to:

A. BONDING. The use of 1" copper braid to interconnect parts of the automobile that can radiate noise such as:

- (1) Hood to firewall
- (2) Rear bumper to body and chassis
- (3) Rear light fixtures to body
- (4) Tailpipe to body
- (5) Either side of muffler to body and chassis
- (6) Chassis to body in several places
- (7) Ignition coil body to firewall

When braid connections are made, be sure to clean the metal "bright" and coat with grease before tightening the connection. This will prevent contact corrosion which is the chief cause of noise.

A very good method for locating noisy fixtures is to put the Model "G" into operation and connect a 25' length of coaxial cable to the antenna connector on the rear of the Model "G". The other end of the coaxial cable should have the center conductor showing for about 1/2". This bare end of the coax will serve as a "noise probe." With the receiver volume turned up and squelch "off", touch the "noise probe" to all parts of the automobile (except the electrical system). A large increase in noise will indicate a noisy section. This section should then be bonded and rechecked. Continue this process until a substantial reduction of noise is achieved. Remember, ungrounded metal parts can radiate noise.

B. IGNITION RADIATION SUPPRESSION requires the use of resistor spark plugs, feed-thru capacitors and distributor suppressors. Of prime importance is a properly adjusted ignition system. The following steps will serve as a guide:

- (1) SPARK PLUGS: Install resistor spark plugs or Belden IRS cable.
- (2) DISTRIBUTOR CAP: Install suppressor resistor or IRS cable between distributor cap and ignition coil.
- (3) GENERATOR: Install a 0.5 mfd coaxial capacitor (Sprague #48018 or equivalent) at the "A" terminal of the generator.
- (4) ALTERNATORS: Require no attention except when the diodes become defective or when the "slip-rings" are dirty.
- (5) IGNITION COIL PRIMARY: Install a 0.1 mfd coaxial capacitor (Sprague #48P9 or equivalent) in the lead from ignition switch to coil. Keep capacitor close to coil terminal. Brighten the metal around the coil mounting bracket to engine block, apply grease and retighten mounting screws.

- (6) (a) REGULATOR FIELD TERMINAL: Connect a 39 ohm resistor in series with a 0.01 mfd ceramic capacitor between the Field terminal and ground.
- (b) ARMATURE TERMINAL: Insert 0.2 mfd coaxial capacitor (Sprague #48P18 or equivalent).
- (c) BATTERY TERMINAL: Repeat (b).
- (7) GAUGES: Install 0.5 mfd, 200 volt capacitors from terminals to ground.
- (8) WHEELS AND TIRES: Inject special graphite powder (available at automotive parts suppliers) into the tires.

CAUTION: Do not connect any capacitor alone from the Field Terminal of the generator to ground. Read (6) (a) carefully.

C. ALTERNATORS

The prime cause of alternator whine is dirty slip-rings and faulty diodes. If further whine is encountered:

- (1) Install a 0.5 mfd coaxial capacitor at the alternator output terminal.
- (2) Install a 0.25 mfd coaxial capacitor at the regulator ignition terminal.
- (3) For extreme cases of whine, install a shielded lead between the alternator and regulator field terminals.

4 - 3. MOBILE ANTENNA

The mobile antenna represents an electrical quarter wave-length at the operation frequency or physically represents 109". Shorter equivalents are the "loaded" type of antenna. This type of antenna can be bottom, center or top-loaded and is usually 5 feet in length. Another loaded type is the spiral-wound antenna.

The best type, without a doubt, is the 109" whip antenna. This is usually mounted on the rear bumper or low on the rear of the body. The shorter antenna is a compromise. Between 14 to 18 feet of RG-58A/U cable is recommended as a low-loss transmission line to provide a low standing-wave ratio.

There are antenna mounts available to suit any installation. The most practical type is the swivel ball mount which is available for body mounting, and the coiled spring type which is used as a bumper mount. In certain instances, both the swivel ball and coil spring are used together.

4 - 4. MARINE ANTENNA AND INSTALLATION.

The antenna system for a boat requires a ground plane antenna. The common name for such an antenna is "coaxial ground plane antenna." The boat ground system which usually consists of a ground plate is not efficient at 27 mc and therefore should not be relied upon for use with a simple whip antenna. This does not hold true if the boat is of all-metal construction.

The same bonding and ignition suppression techniques must be applied to a boat as to an automobile. In many cases a boat requires more work because the engine compartment is of wood, whereas an automobile has a hood and firewall to shield the engine. A boat's wooden engine-compartment requires copper mesh shielding that is adequately connected to a bonded electrical system.

Bonding a boat requires that all metal fittings that come in contact with the electrical system or water be continuously interconnected by 2" wide copper "flashing" strips. The engine shaft will require a "wiper" resting on the shaft and connected to the bonded ground system. This "wiper" is usually a piece of spring steel resting on a cleaned portion of the shaft.

4 - 5. BASE ANTENNA

The transmission line (antenna lead) of a Base installation may be lengthy even though the antenna is only 20' off a roof. In such an installation RG-8U cable (heavier than RG-58A/U) should be used to minimize the transmission line losses.

Base antenna falls into two categories:

- (a) Ground Plane types
- (b) Beam antenna types

Ground plane antennas are omni-directional. Beam antennas are uni-directional. If the Model "G" is used in a restricted direction, a Beam will have a greater advantage since the antenna response will be concentrated in only one direction. The antenna should have an impedance of 50 ohms regardless of the type chosen.

SECTION 5 - OPERATION

5 - 1. TRANSMITTER

Inspect the Model "G" after unpacking. Connect it to the power source and antenna system. Turn the set "ON" and allow three minutes to "warm up." Plug in microphone and depress the microphone push button. The meter should indicate antenna current. Adjust C42 and C43 for maximum indication. The maximum indication should occur at half scale; if not, adjust the coupling between L6A and L6B. All adjustments should be made at channels 9, 10 or 11 in order to insure even output for all channels within $\pm 10\%$.

5 - 2. RECEIVER.

Set the receiver controls as follows:

Volume..... 1/2 CW
Squelch..... full CCW
Crystal (Xtal).... position

Noise should be heard from the loudspeaker or speech when another station is transmitting. The background noise is eliminated by rotating the Squelch control CW until the noise disappears. Any signal on the channel will override the Squelch, but when no signal is present the receiver will be quiet. Do not advance the Squelch too far.

An external speaker jack, located on the rear panel, allows the operator to connect a remote speaker, at the same time disabling the internal speaker.

5 - 3. CRYSTALS

The Model "G" is shipped from the factory with one pair of crystals (transmit and receive). Additional crystals can be purchased and inserted in the remaining 7 positions. It is very important that the crystals be of the type made specially for use in Sonar equipment. NOTE: Crystals other than those designed for Sonar equipment will be off frequency, in violation of the FCC Rules and Regulations. Crystals are available from any Sonar dealer. Insert crystals as follows:

- (1) Remove the line cord from the power source.
- (2) Loosen the four side screws and remove top cover.
- (3) Insert crystals in the proper sockets (see top layout diagram).
- (4) Mark front panel with respective channel markers.

SECTION 6 - MAINTENANCE

6 - 1. FUSES

It is recommended that the Model "G" be checked at least once a year by a licensed technician to insure continuous trouble-free operation.

Fuses are located on the underside of the chassis by first removing the bottom cover. When a fuse "blows", make no attempt to jump the fuse holder with bare wire; this can result in very costly damage. When a replacement fuse "blows", disconnect the set from power and consult the resistance chart. If all resistances check within reason, check the power supply for shorted capacitors or silicon rectifiers.

REPLACEMENT FUSES..... {
6VDC... 20A
12VDC... 7.5A
32VDC... 7.5A
117VAC... 0.7A

6 - 2. ALIGNMENT - RECEIVER

A. EQUIPMENT

- (1) Signal generator covering 262 kc, 455 kc and 27 mc ranges
- (2) Vacuum Tube Voltmeter
- (3) Alignment tool for hexagon cores

B. METHOD

- (1) Set generator to exactly 262 kc.
- (2) Connect generator to pin 7 of V3 (6BE6) through a .01 mfd capacitor.
- (3) Adjust attenuator of generator to 100 microvolts or until a reading of about "S6" is obtained on the panel meter.
- (4) Adjust T2 and T3 for maximum indication and then repeat adjustment.
- (5) Set generator to exactly 455 kc @ 30 microvolts and connect to pin 6 of V2 (6J6) as in (2).
- (6) Adjust L4 until a maximum reading is obtained.
- (7) Adjust T1 for maximum reading.
NOTE: Always reduce attenuator for about "S6" reading and do not allow adjustable cores of T1, T2 or T3 to set in between primary and secondary winding. If in doubt, start adjustment of core from extreme end of the transformer.
- (8) Set generator to 27 mc and search out the signal with channel switch set for channel 9, 10 or 11.
- (9) Adjust L1 and L2 for maximum indication. Generator attenuator should have 1 - 2 microvolt setting.
- (10) If tunable receiver control is in need of adjustment, set generator to channel frequency using a crystal-controlled channel as reference and then switch to "TUNE." Set tunable control to the known channel and slightly adjust L3 for maximum indication.

BE CAREFUL! THE ACTUAL AMOUNT OF ADJUSTMENT NECESSARY

IN ALL OF THE ABOVE IS SMALL SINCE AN ADJUSTMENT CANNOT VARY

TOO MUCH FROM THE ORIGINAL FACTORY SETTING.

6 - 3. ALIGNMENT - TRANSMITTER

A. EQUIPMENT

- (1) VTVM
- (2) 50 ohm dummy load
- (3) 1 megohm resistor

B. METHOD

- (1) Connect 50 ohm dummy load to antenna input connector.
- (2) Set channel switch to channel 9, 10 or 11.
- (3) Plug microphone into microphone jack.
- (4) Connect VTVM probe to Pin 1 or 7 of V9 (12AQ5) through the 1 megohm resistor, making sure that the resistor lead to the tube pin is approximately 1/2" long or less. Set VTVM to 50 VDC range.
- (5) Press microphone button and adjust L7 for maximum VTVM reading, (about -30 VDC or more). Remove probe.
- (6) Adjust C42 and C43 for maximum antenna output indication. If the 50 ohm load is calibrated and metered for output, a 3.0 to 3.5 watt output should be noted.

6 - 4. CRYSTAL OSCILLATORS - CALIBRATION

No attempt should be made to alter the crystal frequency unless an accurate frequency standard is available. The accuracy of such a standard should be at least .001%. The oscillators are adjusted by C23A and C31A.

The crystal oscillators are factory calibrated using zero tolerance standards. Sonar crystals are ground within an allowable tolerance of ± 500 cycles (FCC allows ± 1300 cycles) and plugged into the pre-calibrated oscillators. This assures the operator of being able to purchase Sonar crystals and plug them into his Sonar equipment without having to recalibrate the oscillators. Even under these ideal conditions, a frequency check should be carried out.

When it is necessary to recalibrate the oscillators, C23A and C31A are adjusted so that the eight frequencies average out their error about the exact frequency.

EXAMPLE: Three crystals might read + 340, + 200, + 400 cycles, while the other five crystals read - 20, - 80, - 190, - 270, - 410 cycles.

REMEMBER: DO NOT MAKE UNNECESSARY ADJUSTMENTS UNLESS THE PROPER INSTRUMENTS ARE AVAILABLE!

VOLTAGE CHART 12V OPERATION

NO.	TUBE	POSITION	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V 1	12BA6	TRANSMIT	—	—	—	—	—	—	—	—	—
		RECEIVE	-0.78	0	0	12.6 VAC	+235	+53	0	—	—
V 2	6J6	TRANSMIT	—	—	—	—	—	—	—	—	—
		RECEIVE	+93	+125	6.3 VAC	0	-1.24 *	0	+1.9	—	—
V 3	6BE6	TRANSMIT	—	—	—	—	—	—	—	—	—
		RECEIVE	-7	0	0	6.3 VAC	+250	+60	-0.72	—	—
V 4	12BA6	TRANSMIT	—	—	—	—	—	—	—	—	—
		RECEIVE	-0.72	0	0	12.6 VAC	+250	+74	+0.9	—	—
V 5	12AU6	TRANSMIT	—	—	—	—	—	—	—	—	—
		RECEIVE	-0.73	0	0	12.6 VAC	+18	0	0	—	—
V 6	12AT7	TRANSMIT	+64	+2	+3.5	0	12.6 VAC	+240	0	+2	—
		RECEIVE	+76	+18	+20	0	12.6 VAC	+240	0	+2	—
V 7	12BH7	TRANSMIT	+240	0	+7.2	12.6 VAC	0	+240	0	+7.2	—
		RECEIVE	+240	0	+7.2	12.6 VAC	0	+240	0	+7.2	—
V 8	6AU8	TRANSMIT	—	—	—	—	—	+0.25	-9	+125	+240
		RECEIVE	+4.6	-2.5	+210	6.3 VAC	12.6 VAC	—	—	—	—
V 9	12AQ5	TRANSMIT	-45	0	0	12.6 VAC	+230	+130	-45	—	—
		RECEIVE	—	—	—	—	—	—	—	—	—
V 10	12AX7	TRANSMIT	—	—	—	—	—	—	—	—	—
		RECEIVE	+115	-0.1	+1.1	0	12.6 VAC	+100	0	+1.2	—

LEGEND

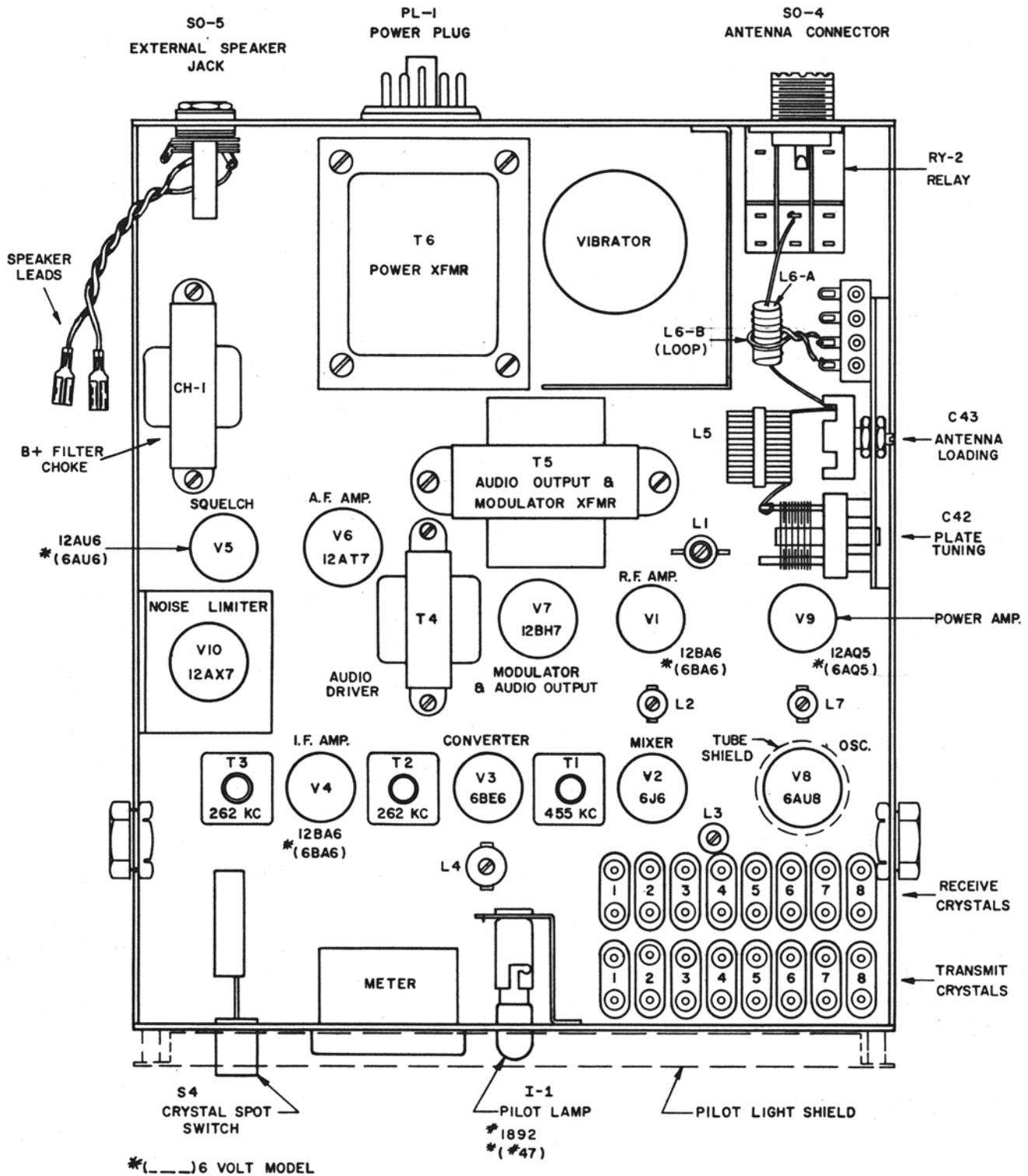
- * R.F. VOLTAGE MEASUREMENT, MADE WITH ADDITIONAL DIODE CONNECTED IN SERIES WITH D.C. PROBE. (MINUS SIDE OF DIODE TO PROBE)
- NOTES
- | | |
|--|--|
| 1. RECEIVE SWITCH IN TUNE POSITION. | 4. VOLTAGE MEASUREMENTS MADE WITH A VTVM (11 MEGOHM INPUT) |
| 2. VOLUME AND SQUELCH CONTROLS AT FULL CCW ROTATION. | 5. ALL VOLTAGE MEASUREMENTS MADE FROM SOCKET PIN TO GROUND (CHASSIS) |
| 3. SET TUNING AT CHANNEL 11. | 6. ALL VOLTAGES D.C. UNLESS OTHERWISE INDICATED. |
| | 7. OPERATING PRIMARY VOLTAGE IS 117 VAC. |
| | 8. VOLTAGE MAY VARY $\pm 15\%$. |

RESISTANCE CHART 12V OPERATION

NO.	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V 1	12BA6	1.2 M	0	0	FIL	30 K	130 K	0	—	—
V 2	6J6	62 K	62 K	FIL	0	470 K	100 K	220	—	—
V 3	6BE6	27 K	0	FIL	FIL	30 K	76 K	1.2 M	—	—
V 4	12BA6	1.1 M	0	0	FIL	29 K	45 K	27	—	—
V 5	12AU6	1.4 M	0	0	FIL	420 K	0	0	—	—
V 6	12AT7	560K	1.6 M	11.5 K	0	FIL	18 K	470 K	220	—
V 7	12BH7	30 K	150	220	FIL	0	30 K	150	220	—
V 8	6AU8	560	100 K	35 K	FIL	FIL	INF	INF	86 K	31 K
V 9	12AQ5	27 K	INF	0	FIL	31 K	80 K	27 K	—	—
V 10	12AX7	500 K	65 K	4.7 K	FIL	FIL	500 K	26 K	4.7 K	FIL

NOTES

- | | |
|--|---|
| 1. POWER SWITCH "OFF". | 4. RECEIVER SWITCH IN TUNE POSITION. |
| 2. "S" METER CONTROL AT FULL CW ROTATION. | 5. ALL RESISTANCE MEASUREMENTS MADE FROM SOCKET PIN TO GROUND (CHASSIS) |
| 3. VOLUME AND SQUELCH CONTROLS AT FULL CCW ROTATION. | 6. ALL RESISTANCE VALUES ARE IN OHMS. |
| | 7. RESISTANCE MAY VARY $\pm 15\%$. |



PARTS IDENTIFICATION
TOP VIEW

PARTS LIST - MODEL "G"

DIAGRAM NO.	DESCRIPTION	SONAR PART NO.	DIAGRAM NO.	DESCRIPTION	SONAR PART NO.
R1, 2, 4, 8, 23, 39, 40, 49, 50	Resistor, Fixed, Composition 100 K Ohm, 10%, 1/2w	01-104-531	R41	Resistor, Variable, Composition 500 K Ohm, Squelech Control	03-504-003
R3	Resistor, Fixed, Composition 2.2 K Ohm, 10%, 1/2w	01-222-531	C1, 2, 4, 29	Capacitor, Fixed, Ceramic 25 MMFD, 1 KVDC, NPO	04-255-001
R5, 44	Resistor, Fixed, Composition 220 Ohm, 10%, 1/2w	01-221-531	C3, 7, 8, 25, 28, 34, 36, 37, 39, 41, 44, 50, 52, 72	Capacitor, Fixed, Ceramic .001 MFD, 500 VDC	04-103-004
R6, 16, 17, 42, 43	Resistor, Fixed, Composition 470 K Ohm, 10%, 1/2w	01-474-531	C5	Capacitor, Fixed, Dur-Mica 50 MMF, 500 VDC	07-505-002
R7, 7A	Resistor, Fixed, Composition 33 K Ohm, 10%, 1w	01-333-531	C6, 9, 10, 13, 14, 15, 16, 45, 47, 56, 60, 61, 62, 70	Capacitor, Fixed, Ceramic .01 MFD, 500 VDC	04-102-012
R9, 18, 28	Resistor, Fixed, Composition 27 K Ohm, 10%, 1/2w	01-273-531	C11, 27	Capacitor, Fixed, Dur-Mica 100 MMFD, 500 VDC	07-104-002
R11, 25, 30, 45	Resistor, Fixed, Composition 47 K Ohm, 10%, 1/2w	01-473-531	C12	Capacitor, Fixed, Dur-Mica 240 MMFD, 300 VDC	07-244-007
R12, 27	Resistor, Fixed, Composition 1 K Ohm, 10%, 1/2w	01-102-531	C12A	Capacitor, Fixed, Ceramic 50 MMFD, 1 KVDC, N750	04-505-011
R13	Resistor, Fixed, Composition 27 Ohm, 10%, 1/2w	01-270-531	C17, 59	Capacitor, Fixed, Mylar .15 MFD, 400 VDC	05-151-001
R14	Resistor, Fixed, Composition 82 K Ohm, 10%, 1/2w	01-823-531	C18	Capacitor, Fixed, Ceramic 470 MMF, 1 KVDC	04-474-010
R15, 35	Resistor, Fixed, Composition 1 M Ohm, 10%, 1/2w	01-105-531	C19, 54, 55, 69	Capacitor, Fixed, Ceramic .005 MFD, 1 KVDC	04-503-008
R19, 36	Resistor, Fixed, Composition 390 K Ohm, 10%, 1/2w	01-394-531	C23, 33, 35	Capacitor, Fixed, Ceramic 10 MMFD, 1 KVDC, NPO	04-105-001
R21	Resistor, Fixed, Composition 33 K Ohm, 10%, 1/2w	01-333-531	C24	Capacitor, Fixed 120 to 125 MMFD (selected at factory)	
R24	Resistor, Fixed, Composition 4.7 K Ohm, 10%, 1w	01-472-631	C31	Capacitor, Fixed, Ceramic 3.9 MMFD, 1 KVDC, NPO	04-396-001
R26	Resistor, Fixed, Composition 56 K Ohm, 10%, 1/2w	01-563-531	C32, 48	Capacitor, Fixed, Ceramic 150 MMF, 1 KVDC	04-154-002
R29	Resistor, Fixed, Composition 560 Ohm, 10%, 1/2w	01-561-531	C38	Capacitor, Fixed, Ceramic 2.2 MMFD (Gimmick)	04-226-007
R31, 34	Resistor, Fixed, Composition 220 K Ohm, 10%, 1/2w	01-224-531	C40	Capacitor, Fixed, Ceramic .001 MFD, 1400 VDC	04-103-016
R32	Resistor, Fixed, Composition 10 M Ohm, 10%, 1/2w	01-106-531	C46, 71	Capacitor, Fixed, Mylar .1 MFD, 200 VDC	05-101-005
R33	Resistor, Fixed, Composition 10 K Ohm, 10%, 1/2w	01-103-531	C49, 53	Capacitor, Fixed, Electrolytic 4 MFD, 10 VDC	06-130-004
R37, 51, 52	Resistor, Fixed, Composition 4.7 K Ohm, 10%, 1/2w	01-472-531	C51A - B	Capacitor, Fixed, Electrolytic 10 + 30 MFD, 350 VDC	06-230-001
R38	Resistor, Fixed, Composition 6.8 K Ohm, 10%, 1/2w	01-682-531	C57, 58	Capacitor, Fixed, Electrolytic 80 MFD, 150 VDC	06-130-035
R46	Resistor, Fixed, Composition 220 Ohm, 10%, 1w	01-221-631	C63	Capacitor, Fixed, Mylar 1.0 MFD, 250 VDC	05-100-023
R53	Resistor, Fixed, Composition 2.2 M Ohm, 10%, 1/2w	01-225-531	C64, 65	Capacitor, Fixed, Ceramic .1 MFD, 100 VDC	04-101-003
R20 S3	Resistor, Variable, Composition 500 K Ohm, Volume Control w/SPST Power On-Off Switch	03-504-018	C66, 67	Capacitor, Fixed, Ceramic .01 MFD, 1 KVDC	04-102-008
R22	Resistor, Variable, Composition 100 K Ohm, "S" Meter Control	03-104-026	C68	Capacitor, Fixed, Dur-Mica 550 MMFD, 300 VDC	07-554-009

