Sonar Model G Owner's Manual

MODEL G

Citizen Band Transceiver

OPERATING INSTRUCTIONS

SONAR RADIO CORPORATION

73 Wortman Avenue • Brooklyn 7, New York

44-010-009

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.

CERTIFICATION

Sonar Radio Corporation of Brooklyn, New York, certifies that the SONAR Model "G" Citizens Band Radio complies with Part 19 of the Rules and Regulations of the Federal Communications Commission regarding frequency, tolerance, stability, modulation, power input, and harmonic radiation.

This certification is void if crystals other than those recommended by Sonar Radio Corporation are installed or the oscillator tuning adjustment seals are broken.

If crystals other than those included in the original purchase are to be added, they must be installed by personnel holding the proper class F.C.C. radio operators license.

GENERAL DESCRIPTION

The SONAR Model "G" is a combination dual-conversion receiver & crystal controller transmitter, with 12VDC and 117VAC for 6VDC and 117VAC power supply incorporated into a single compact unit. The unit is designed for two-way radio communication in the 27 megacycle Class D Citizen's Band. This unit can be installed as a fixed station in the home or office, or as a mobile station in the car, boat or airplane.

Eight crystal controlled channels are provided to give the operator a wide choice of frequencies on which to communicate. Receiver and transmitter channels are changed simultaneously by the channel selector switch. The receiver can be made tunable within the entire band with a turn of the "TUNE-XTAL" switch. Both the receiver and transmitter crystals are of the plug-in type HC/6U holder and can be easily changed or added to provide up to eight channels within the band. An RF output meter enables the operator to determine if the transmitter is functioning properly. Various types of 27 megacycle Citizen's Band antennas may be matched to the Model "G" by use of the antenna peaking adjustment control. The receiver employs eight permeability-tuned, high-Q circuits for greater sensitivity and selectivity. An on/off indicator lamp is located on the front panel. This lamp illuminates the front panel.

The SONAR Model "G" radio is completely hand-wired on an aluminum chassis to provide a highly reliable type of construction. The unit is all aluminum, iridited and treated to operate under all weather conditions, both on land and at sea. It is equipped with a universal mounting bracket to permit almost any type of installation. The case, which is composed of two U-shaped covers is easily removed to facilitate crystal, fuse, tube replacement, internal adjustments and repairs.

The distances over which this unit is effective depends upon the terrain, local noise conditions, and the type of antenna used.

Two car installations using the Sonar Model AN 25 mobile whip antenna should give up to 20 mile coverage. For marine installations, the Model AN-14 antenna will provide coverage even greater than two car installations. This is due to the ideal operating conditions over water.

Ground plane antennas, such as the Model AN13, mounted on a tower at a fixed location should give consistent results up to 40 miles. Under favorable conditions, these distances may be many times greater.

Polarization of the radiated wave is very important at 27 MC. Therefore, since the above antennas as well as other ship antennas normally mounted on vehicles, are vertically polarized, a ground plane antenna (also vertically polarized) should be used at the base station.

When operating two fixed installations over a considerable distance, "beam" antennas can be used to great advantage. These "beam" antennas will not only improve the signal strength in the desired direction, but will also discriminate against unwanted signals from different directions.

Beam antennas may be either vertically or horizontally polarized.

Power Requirements:

6 volts dc at 8 amperes; 12 volts dc at 4 amperes, or 115 volts, 60 cps at 30 watts.

CAUTION: CAUTION:

When inserting power plug into 8 prong Octal socket in the back of the set, make sure to line up Red Dot on power plug with Red Dot on Octal socket to avoid internal damage.

Frequency Coverage:

Twenty-three (23) channels by operating a front panel control. The receiver can also be made tunable by setting a front panel switch and operating the tuning control.

Features:

- Retractable coiled microphone cord; separate microphone hanger.
- Adjustable squelch control; fully Automatic Noise Limiter (eliminates background noises when no message is being received).
- Choice of crystal controlled or tunable receiver.
- "S" meter & power output meter.
- Switch on microphone designed for push-to-talk operation.
- Changing from AC to DC operation is easily accomplished by changing power supply cords.
- Crystal spotting switch.

Equipment Supplied:

One SONAR Model "G" (6 or 12 Volt DC)
One set of crystals
Push-to-talk microphone with retractable cord.
Microphone hanger.
One ac and one dc power supply cord.
Universal mounting bracket; knurled screws.

SPECIFICATIONS

Transmitter:

Power input to final RF Amplifier; 5 watts. (F.C.C. Max.)

Harmonic & Spurious output; Greater than 75 DB. down.

Modulation:

Class B Push Pull
High level plate modulated.
Capable of up to 100% modulation.

FEATURES:

Frequency Stability:
.005% or better, if recommended 1/2 fundamental crystals are used, over the normal operating temperature range.
Frequency Coverage:
Any of the 23 assigned channels, by selection of the appropriate crystals.

RECEIVER:

Sensitivity:
1 microvolt for 10 DB quieting.
Above ratio is for .5 watts audio output.

Selectivity:
$\pm$3KC at 6 DB. down

Audio Power Output:
4 Watts (max)

Audio Distortion:
Less than 10% at 1 watt output.

Noise Limiter:
Fully automatic noise limiting circuit featuring series-type limiting.

Squelch circuit:
Opens audio system to full power when two microvolts of signal over noise level is received.

Tuning Range:
Continuously tunable within the 23 assigned Citizen's Band channels (26.965 to 27.255 mc.) or crystal controlled to any 8 channels within the band.

Frequency Stability:
Same as transmitter, when crystal controlled.

Remote Speaker:
A jack on the rear panel is supplied to plug in an extension speaker.

Crystal Spotting:
Push button energizes transmitter oscillator, while receiver is tuned to that channel using "S" meter as indicator.

"S" Meter:
Indicates signal strength of received signal.

Output Meter:
Indicates relative power output.

Sonar Call:
Socket provided on receiver panel.

Dimensions:

$4\frac{1}{2}$" H x 8" W x 10" D.

Weight:

$8\frac{1}{2}$ lbs.

TUBE AND DIODE COMPLEMENT

TUBES

6 V	12 V	Circuit Function
6BA6	12BA6	R.F. Amplifier
6J6	6J6	H.F. Mixer
6BE6	6BE6	L.F. Converter
6BA6	12BA6	262 K C I.F. Amplifier
12AT7A	12AT7A	A.F. Amplifier
12BH7A	12BH7A	Audio power output and modulator
6AU8A	6AU8A	Crystal oscillator, transmit and receive
6AQ5	12AQ5	Final amplifier, transmitter
6AU6	12AU6	Squelch
IN295A		Detector
IN295A		R.F. Output Detector
2 Silicon Diodes		Rectifiers
2 Silicon Diode & 12AX7		Automatic noise limiter

CRYSTAL COMPLEMENT

Channel	Receiver	Transmitter	Channel Frequency	Receiver Crystal*	Transmitter Crystal*
1	26.510	26.965	12	26.650	27.105
2	26.520	26.975	13	26.660	27.115
3	26.530	26.985	14	26.670	27.125
4	26.550	27.005	15	26.680	27.135
5	26.560	27.015	16	26.700	27.155
6	26.570	27.025	17	26.710	27.165
7	26.580	27.035	18	26.720	27.175
8	26.600	27.055	19	26.730	27.185
9	26.610	27.065	20	26.750	27.205
10	26.620	27.075	21	26.760	27.215
11	26.630	27.085	22	26.770	27.225
* Frequency in Megacycles			23	26.800	27.255

NOTE: The crystals used in the SONAR Model "G" are 1/2 fundamental units with .005% frequency tolerance, .486 inch pin spacing, and .050 inch diameter pins.

For operation on any frequency channel, mating transmitter and receiver crystals must be plugged into corresponding transmitter and receiver crystal receptacles.

Note: The receiver crystal frequency equals the operating frequency minus 455 kc divided by 2.

THEORY OF OPERATION

The SONAR Model "G" is a self-contained 27 megacycle transceiver unit designed to operate from a 6 or 12 volt dc and a 115 volt, 60 cps power source. In either case, the transceiver is comprised of a transmitter, a dual-conversion receiver, and an AC-DC power supply. The transmitter contains a crystal oscillator (6AU8A) and RF power amplifier (12AQ5), a speech amplifier (12AT7), and a modulator stage (12BH7A). Power input to the RF amplifier is 5 watts (maximum legal input). A 1/2 fundamental crystal is used so that the output frequency of the oscillator is directly within the Citizen's Band.

The receiver is a conventional type superheterodyne and is comprised of an RF amplifier (12BA6), H.F. mixer (6J6), local oscillator (1/2 of 6AU8A); L.F. Convertor (6BE6), 262 kilocycle IF amplifier (12BA6), a diode detector (1N295A), an automatic noise limiter circuit

featuring 2 silicon diodes (200 PIV), and a 12AX7 squelch circuit (12AU6), an audio amplifier (12AT7), and an audio power amplifier (12BH7A). The audio amplifiers are common to both the transmitter and receiver. The receiver H.F. oscillator is either crystal controlled or turnable. Changeover from crystal control to a tunable receiver is easily accomplished by setting the RECEIVER "TUNE-XTAL" switch to the "TUNE" position. The receiver can then be tuned to any channel within the band by use of the RECEIVER TUNING control.

The "S" meter circuit aides in tuning a received signal.

The R.F. Power Output Circuit (IN295A, L6B and Meter) aides in tuning up the output circuit to match any 30-70 ohm antenna system. Actual power being constant, different antenna impedances give different meter readings. In different installations the meter is adjusted to about half-scale by sliding L6B along L6A. This will change the coupling of L6B to L6A.

The power supply is essentially a dual type supply incorporating a vibrator (when used with dc), a universal power transformer, two silicon diode rectifiers, and a filter network. Changeover from ac to dc is accomplished merely by plugging in the appropriate power cord.

INSTALLATION

GENERAL

The SONAR Model "G" is completely wired, has all tubes in place, with one set of crystals installed in the position one (1), and is ready for installation and operation as it leaves the factory. A suitable antenna system must be provided for proper operation and the standing-wave ratio checked.

POWER

One of the power cords supplied is for dc operation and is fitted with a plug to be inserted into the cigar lighter receptacle of the vehicle. Be sure that the battery voltage of the vehicle is the same as that of the unit (6 volts for Model G-6 and 12 volts for Model G-12). The other cord supplied is for 120 volts, 60 cps operation. This cord is easily identified by the standard 115-120 volts plug attached to one end. To convert from ac to dc operation simply exchange cords.

NOTE

In the event your vehicle does not have a cigar lighter receptacle accessible, the dc power cord can be modified to accept other type existing dc power receptacles. The cigar lighter plug can be removed and a new plug corresponding to the existing receptacle can be installed on the power cord. However, be sure to observe polarity by connecting the wires originally connected to the center and shell, respectively, of the cigar lighter plug, to the positive and negative terminals, respectively, of the battery.

For six volt operation it is highly recommended that the cigarette lighter plug not be used. The power leads should be connected directly to the ammeter

MOUNTING

The handle affixed to the unit also serves as a mounting bracket. For mobile installations, the handle is easily secured to the bottom of the vehicle dash-board. There are slots in the handle for this purpose. The handle may be removed from the cabinet by removing the knurled thumb screws in the side of the cabinet. A hole is provided on the rear panel should additional support be needed. When used at a fixed or base station the handle can be rotated, so it is under the unit to act as a support to hold the unit in an inclined position.

ANTENNA

The antenna system is very important and can make the difference between a successful and poor two-way radio communication system.

The SONAR MODEL "G" will provide the most efficient operation when connected to an antenna resonated to the center of the 27 megacycle Citizens Band. A resonant quarter wave antenna for this band of frequencies is approximately 8-1/2 feet long. A loaded whip of approximately 4 ft. length may be used.

For fixed or base station use, a ground plane antenna is recommended for best results when working with mobile units. The Sonar Model AN13 is available as a fixed station ground plane antenna. A beam antenna is recommended when working point to point between two fixed stations. Be sure to read Part 19.25 (c) pertaining to Citizen's Band antennas for fixed station use.

Coaxial lead-in cable (52 ohms, RG58U or RG8U) must be used for connection the Model "G" to the antenna. This cable, with connectors, is available from Sonar Radio Corporation in lengths of 50 feet or 100 feet.

GROUND CONNECTION

It is important to have a good ground connection in your installation. In fixed stations, the unit should be grounded with a heavy copper wire to a good earth ground or to a cold water pipe. In car installations, the negative battery terminal, which is usually grounded to the car body, should provide an adequate ground connection. In marine installations, be sure to ground the unit to the ship's ground.

The usual precautions encountered with marine radio installations should be observed.

ANTENNA MATCHING ADJUSTMENT.

It has been found that different Citizens' Band antennas exhibit slightly different impedance characteristics which result in undesired reactance in the line. Consequently, if the transceiver is switched over from a mobile installation to a fixed station, or vice-versa, the unit will not be operated under optimum antenna conditions. However, the Model "G" incorporates an adjustment feature which enables the reactance to be tuned out, resulting in a "matched" line and optimum power output conditions. This adjustment should be performed whenever a different antenna is employed with the unit.

Proceed as follows:

1. Be sure the unit has been correctly installed, including connection to the power source and to the antenna.

2. Apply power to the unit by advancing the VOLUME control clockwise until a click is heard.

3. Plug the microphone plug into the MICROPHONE jack and depress the push-to-talk botton on the microphone. Do not speak into the microphone.

4. By use of a screwdriver, carefully adjust the antenna peaking control at the side of the unit for maximum deflection of the RF output meter on the front panel. The point of maximum deflection indicates when the controls are correctly adjusted. This deflection does not indicate actual power.

NOISE

Normally, noise should not be a problem, due to the built-in automatic noise limiter and squelch control. However, in mobile installations, it is common to experience trouble due to ignition noise, generator and voltage regulator hash, or wheel and tire static generated by the vehicle. The disturbing effect created by these sources can be practically eliminated by the proper use of noise suppressors, by-pass capacitors, front wheel static collectors, and if necessary, anti-static powder can be inserted into the tires through the valve stems. General information concerning the problem of ignition noise and suggested methods of noise suppresion are available in current handbooks.

We recommend the use of a generator-type filter coil assembly for the reduction or elimination of generator whine.

LICENSE REQUIREMENTS

Since the SONAR Model "G" transceiver complies with Part 19 of the Rules and Regulations of the F. C. C., it may therefore be used for all purposes, business or personal, provided the operator is licensed in accordance with Part 19 and the transceiver is used in conformance with the Radio Laws of the United States of America, Rules and Regulations of the F.C.C., and treaties to which the United States is a signatory.

Briefly, the restrictions involved under Part 19 concerning the transmitter are as follows:

1. Power input must not exceed 5 watts (The Model "G" complies with this requirement. DO NOT ATTEMPT to change.)

2. Frequency of transmission must be within the 23 specified channels of the 27 megacycle Citizen's Band. The transmitter is crystal controlled. DO NOT attempt to change to any other type of frequency control.

3. The Model "G" is designed and factory adjusted for better than 75 db harmonic attenation. DO NOT attempt to make any internal changes.

Federal Communications Commission forms must be filled out and submitted to the Commission at Washington, D.C., to obtain the station and operators license necessary for the operation of this equipment.

Obtain and read Part 19 of the F.C.C. Rules and Regulations before filling out forms for your license. A copy of Part 19 may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

Before operating this equipment you must obtain and have in your possession, your station license with assigned call numbers issued by the F.C.C. and a copy of Part 19 of the Rules and Regulations. Failure to comply with the Commissions' Rules and Regulations is a Federal offense.

F.C.C. Rules and Regulations are made and enforced in the public interest, as a necessity and for public safety. Observe them and encourage their observance by others.

IMPORTANT

Any adjustments or repairs of the frequency controlling circuits and/or transmitter crystals of this equipment must be made only by persons having in their possession a valid First or Second Class Radiotelephone operators license issued by the F. C. C.

OPERATION

Operation of the SONAR Model "G" Citizen's Band radio transceiver is relatively simple and is no more difficult than operating an ordinary radio and/or home telephone. Just follow the instructions given below, while observing all precautions and notes. It is recommended that you first listen to the other stations on the band to become familiar with some of the techniques used when operating on the various channels. Most important, be sure to read and observe the LICENSE REQUIREMENTS described previously.

FUNCTION OF CONTROLS

The following paragraphs describe the function of all controls and how they are used when operating the SONAR Model "G" transceiver:

VOLUME CONTROL AND SWITCH

The unit is turned on by rotating the VOLUME control knob, located at the lower center of the front panel, in a clockwise direction, until a click is heard. The pilot lamp on the panel should glow, thus indicating that power has been turned on. Continuing the rotation of this knob in an clockwise direction will increase the volume level of the received signal.

RECEIVER TUNING - CRYSTAL SWITCH

The RECEIVER TUNING - CRYSTAL switch enables the receiver to be crystal controlled (to any of eight preselected channels within the band) or tunable throughout the band. When in the CRYSTAL position, the receiver is crystal controlled to the same frequency as the transmitter and changing the receiver frequency (and the transmitter frequency too) is accomplished with the neighboring CHANNEL selector switch. When in the TUNING position, the frequency is determined by the adjacent RECEIVER TUNING control.

RECEIVER TUNING CONTROL

The RECEIVER TUNING control allows the receiver to be tuned throughout the band just like an ordinary radio tuning control. The control is operative only when the adjacent RECEIVER-TUNING-CRYSTAL SWITCH is in the tune position. The control has a frequency tuning range which covers all 23 Citizen's Band channels.

CHANNEL SELECTOR SWITCH

The CHANNEL selector switch, located at the upper right hand corner of the front panel, selects any one of the eight pre-set channel frequencies. Both transmitting and receiving channels are selected simultaneously by this control (only when the receiver is crystal controlled). When the receiver is being operated tunable the switch changes only the transmitting frequency. However, the correct receiver crystal will automatically be connected, by virtue of the setting of the CHANNEL selector switch, when the receiver is switched back to crystal control. Remember, when the receiver is crystal controlled, any station with which you wish to communicate must be on the same frequency channel as you are. Any of the 23 channels available in the Class D Citizen's Band may be used. However, only eight (8) channels may be set up at any one time for selection with the CHANNEL selector switch.

NOTE

When operating with a tunable receiver, the station with which you wish to communicate does not necessarily have to be on the same channel frequency as you are transmitting on. However, to avoid confusion, or the possibility of "losing" the other station, you should first pre-arrange with the other party as to which channels you wish to operate on. This can eliminate the possibility of much wasted time, and interference to other stations. Experience will soon determine your choice of channels and your operating techniques.

SQUELCH CONTROL

The SQUELCH control, located near the lower left corner of the front panel, is used to eliminate background noise when no signal is being received. There is no impairment to the reception of messages when this control is properly adjusted. Adjust as follows:

With the VOLUME control set at a comfortable listening level (with no signal being received), advance the SQUELCH control in a clockwise direction until the background noise is no longer audible. Do not advance the SQUELCH control beyond this point. The squelch action will in no way effect the desired signal unless this signal is very weak. Occasionally noise pulses and bursts of static will momentarily "open" the squelch circuit and allow this noise to be heard. This does not indicate a malfunction of the unit.

MICROPHONE:

The microphone and the push-to-talk switch located on the side of the microphone are all that have to be operated after the volume control, squelch, and channel selector adjustments have been made. The microphone plug is inserted into the MICROPHONE receptacle on the front panel.

To talk to another station, merely press the button on the side of the microphone and speak into the microphone. Best results will be obtained when speaking in a normal voice with the microphone held about four inches from your lips and at a slight angle. Do not allow air to pass directly into the microphone when you are speaking as this will cause a rushing or whistling noise to be heard at the receiving end. Do not shout into the microphone as this will cause distortion in the transmitted speech and make it very difficult for the other party to understand you. When finished transmitting, release the push-to-talk button.

REMEMBER: The push-to-talk button on the microphone must be pressed when you wish to speak and must be released to listen.

CRYSTAL-SPOTTING SWITCH

The crystal-spotting switch is used to locate a transmit crystal frequency on the tunable receiver dial. This is done when the receiver is being used as a tunable receiver only and provides a method of tuning the receiver to the channel frequency although no signals are being received. To operate this feature, tune the receiver to the approximate channel. Press the push-button and tune the receiver using the "S" meter to indicate proper tuning.

CHANGING CRYSTALS

The SONAR Model "G" is shipped from the factory with one set of crystals for the transmitter and receiver. Since provisions are included in the Model "G" for eight sets of crystals, perform the following whenever you wish to change or add crystals to the unit:

1. Disconnect the power cord from the power source.

2. Remove the U-shaped top case cover by extracting the four screws securing the cover to the chassis.

3. The crystal sockets will be exposed to view. The sockets are shown in the parts layout in pairs from 1 through 8. The numbers 1 through 8 correspond to the eight positions of the CHANNEL selector switch.

4. Install the desired crystals into the sockets in accordance with the channel numbers and frequencies listed previously under "CRYSTAL complement". The crystals must be 1/2 fundamental and should be purchased from your SONAR dealer. After installing the crystals, mark the front panel dial positions of the CHANNEL selector switch with the appropriate channel number.

FUSE REPLACEMENT

In the event a fuse should burn out, it can be replaced as follows:

1. Disconnect the power cord from the power source.

2. Remove the bottom cover plate from the chassis by extracting the four securing screws. The fuseholders will be exposed to view.

3. Replace the appropriate fuse as listed below:

Power Source	Fuse Type
6 volts	20 Amperes - 3 AG
12 volts	7 1/2 Amperes - 3 AG
115 volts	7/10 Amperes - 3 AG

CAUTION CAUTION

In case the replaced fuse blows again, do not attempt to bypass the fuse with a wire. This can cause very costly damage to this equipment. Disconnect the unit from the installation and have it repaired or checked to correct the malfunction.

MAINTENANCE

The Model "G" should provide years of reliable operation with a minimum amount of service. The entire circuit has been designed in such a manner that no components are working near their maximum ratings. It is recommended that the Model "G" be checked periodically by a licensed technician. This check-up should be performed at least once a year. A thorough periodic examination will minimize the probability of having the unit inoperative at an inconvenient time. Included in this instruction book is a voltage and resistance chart, a schematic diagram and a parts layout to aid the service technician in trouble shooting this equipment. DO NOT MAKE INDISCRIMINATE ADJUSTMENTS.

In the event it is deemed necessary to return the equipment to the factory for service it must be done in the following manner. Write and obtain authorization from the factory. Instructions for equipment return will then be forwarded. Always specify the model number, serial number, and the nature of the complaint in any correspondence regarding your unit.

Most component parts used in the Model "G" are standard and readily available at the nearest electronic supply house. Any special components can be obtained from the factory by submitting information regarding part description and circuit location.

VOLTAGE CHART 12 V 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	−0.24	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	−12	+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	——

NOTES

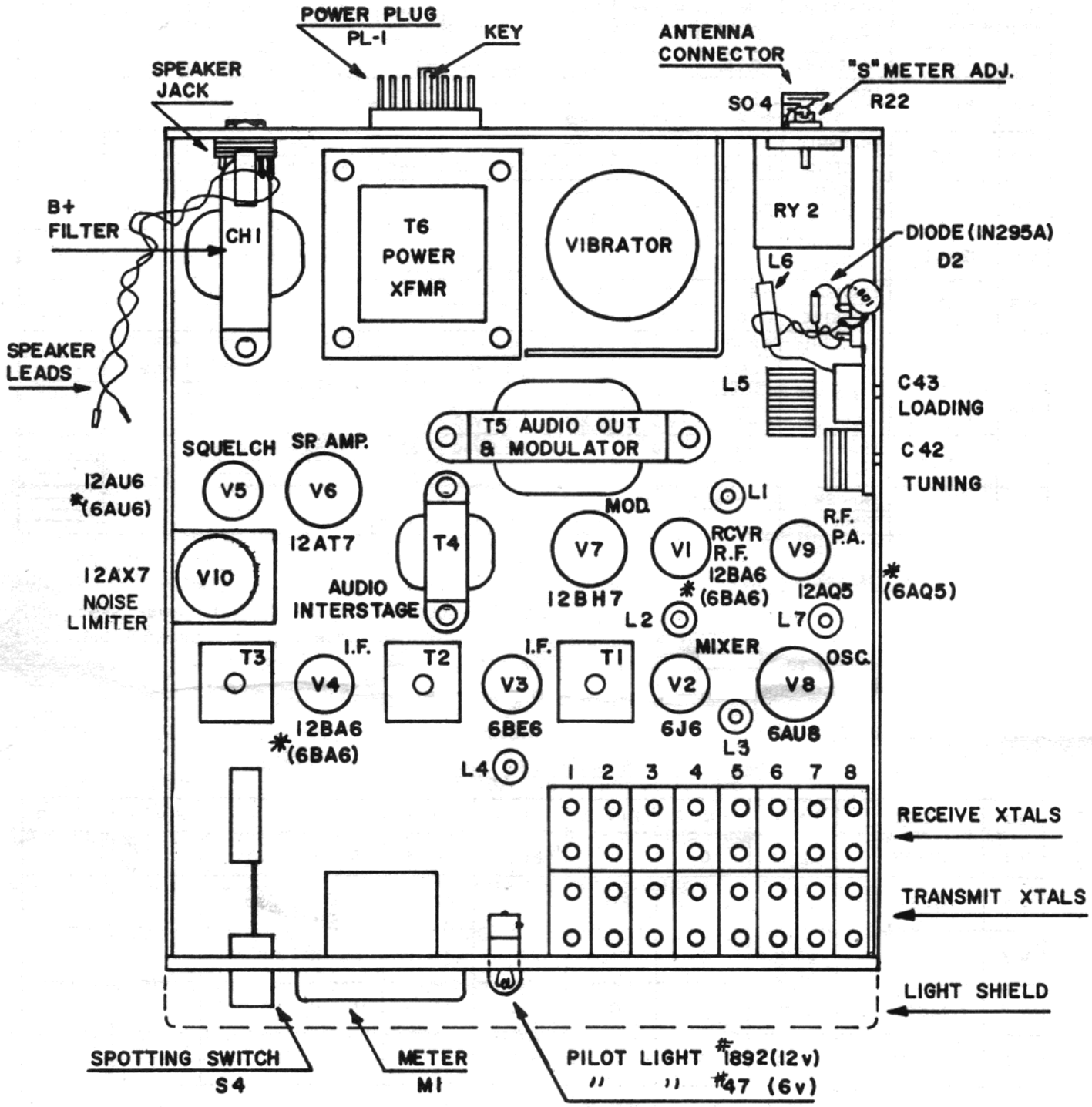
1. A.C. SUPPLY 115 VAC.
2. ALL MEASUREMENTS MADE WITH 11 MEG VTVM.
3. ALL VOLTAGE MEASURED TO CHASSIS (GROUND).
4. VOLUME & SQUELCH CONTROLS ARE CCW.
5. ALL VOLTAGES D.C. UNLESS OTHERWISE SPECIFIED.
6. RECEIVE SWITCH IN TUNE POSITION.
7. SET TUNING AT CHANNEL 11.
8. VOLTAGE MAY VARY ±10%.

RESISTANCE CHART 12 V 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 K		
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	111 K	100		
V 5	12AU6	1.4M	0	0	FIL	420K	0	0		
V 6	12AT7	560K	1.6 M	11.5 K	0	FIL	18 K	470 K	220	——
V 7	12BH7	30 K	0	220	FIL	0	30 K	0	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	370K	100 K	4.7 K	FIL	FIL	500 K	26 K	4.7 K	FIL

NOTES

1. VOLUME & SQUELCH CONTROLS ARE CCW.
2. RECEIVER SWITCH IN TUNE POSITION.
3. ALL MEASUREMENTS MADE TO CHASSIS (GROUND).
4. ALL MEASUREMENTS ARE IN OHMS.
5. ALL MEASUREMENTS MAY VARY ±10%.



*- - - 6 VOLT MODEL

MODEL "G" PARTS LAYOUT

PARTS LIST - MODEL "G"

DIAGRAM NO.	DESCRIPTION	SONAR PART NO.
R1,2,4,8,23,39,49,50,40	100 K 1/2 w. Comp. Res.	01-104-531
R3	2.2 K 1/2 w. Comp. Res.	01-222-531
R44	220 ohm 1/2 w. Comp. Res.	01-221-531
R11,30,45,25	47 K 1/2 w. Comp. Res.	01-473-531
R7,7A	33K 1 w. Comp. Res.	01-333-631
R9,28,18	27 K 1/2 w. Comp. Res.	01-273-531
R12,27	1 K 1/2 w. Comp. Res.	01-102-531
R13	100 ohm 1/2 w. Comp. Res.	01-101-531
R14	82 K 1/2 w. Comp. Res.	01-823-531
R15, 35	1 Meg. 1/2 w. Comp. Res.	01-105-531
R17,42,43,6,16	470 K 1/2 w. Comp. Res.	01-474-531
R21	33 K 1/2 w. Comp. Res.	01-333-531
R37,51,52	4.7 K 1/2 w. Comp. Res.	01-472-531
R26	56 K 1/2 w. Comp. Res.	01-563-531
R31,34	220 K 1/2 w. Comp. Res.	01-224-531
R32	10 Meg. 1/2 w. Comp. Res.	01-106-531
R33	10 K 1/2 w. Comp. Res.	01-103-531
R36,19	390 K 1/2 w. Comp. Res.	01-394-531
R38	6.8 K 1/2 w. Comp. Res.	01-682-531
R46	220 ohm 1 w. Comp. Res.	01-220-631
R47	47 ohm 1 w. Comp. Res.	01-470-631
R24	4.7 K 1 w. Comp. Res.	01-472-631
R20	Vol. Cont. w/SPST 500 K	03-504-018
R22	"S" Meter Cont. 100 K	03-104-009
R41	Squelch Cont. 500K	03-104-009
R5	220 ohm 1/2 w. Comp. Res.	01-221-531
R53	2.2 Meg. 1/2 w. Comp. Res.	01-225-531
C1,2,4,29,12A	25 MMF Ceramic Cond.	04-255-001
C3,7,8,25,28,34,36,37,39, 44,50,52,72,73	.001 MF. Ceramic Cond.	04-103-004
C33,35	10 MMF. Ceramic Cond.	04-105-001
C6,9,10,13,14,15,16,45,47, 56,60,61,62,66,67,70	.01 MF. Ceramic Cond.	04-102-012
C11,27	100 MMF. Mica Cond.	07-104-002
C12	300 MMF. Mica Cond.	07-304-002
C17,59	.15 MF 400 V Paper	05-152-001
C48,32	150 MMF Ceramic Cond.	04-154-002
C19,55,69,54	.005 MF Ceramic Cond.	04-503-006
C5	50 MMF. Mica. Cond.	07-505-002
C38	2.2 MMF (Gimmick) Ceramic Cond.	04-226-007
C41	6.8 MMF Ceramic Cond.	04-686-001
C46,64,65,71	.1 MF Ceramic Cond.	04-101-003
C49,53	4 MF, 10 VDC Electrolytic	06-130-004
C51 A,B	10-30 MF 350 VDC Electrolytic	06-130-001
C57,58	40 MF,250 VDC Electrolytic	06-230-002
C63	1.0 MF 50 v Paper	05-100-002
C23	10 to 14 MMF (Selected at Factory)	
C24	120 to 125 MMF (Selected at Factory)	
C31	3.9 MMF Ceramic Cond.	04-396-001
C30	Variable Cap. (Air) w/Shaft	08-100-001
C42	Variable Cap. (Air) Slotted Shaft	08-150-012
C48	Variable Cap. (Trimmer)	09-210-001
C18	470 MMF Ceramic Cond.	04-474-010
C68	550 MMF Mica Cond.	07-554-002
C40	.001 MF Ceramic Cond.	04-103-015
C23A,31A	Variable Cap. (Trimmer)	09-610-007

PARTS LIST - MODEL "G"

DIAGRAM NO.	DESCRIPTION	SONAR PART NO.
RFC 1	R.F. Choke 21 Micro Henries	22-060-005
RFC 2-3	R.F. Choke 250 Micro Henries	22-060-001
T 1	455 KC IF	22-010-002
T 2-T 3	262 KC IF	22-010-009
T 4	Driver XMFR	14-020-001
T 5	Modulation XMFR	14-050-001
T 6 (6v)	Power XMFR 6vDC or 117 VAC	14-010-018
T6 (12 v)	Power XMFR 12vDC or 117 VAC	14-010-017
D 1-2	Diode IN295	19-050-001
D 3-4	Silicon Rect. 600 PIV	19-040-002
D 5-6	Silicon Rect. 200 PIV	19-040-001
CH 1	Filter Choke	14-070-001
CH 2-3	10 Micro.Henries Hash Choke	22-100-003
L 1	RCV. ANT. Coil	22-030-001
L 2	RCV. RF. Amp. Plate	22-050-001
L 3	RCV. Osc.	22-040-001
L 4	717 KC Osc. Coil	22-040-013
L 5	XMTR. RF. Amp.	22-070-001
L 6A-6B (1 turn hookup wire on L6)	RF Indicator XMFR & Low Pass Filter	22-090-003
L 7	XMTR OSC.	22-040-002
RY 1 (1-2-3) TP/DT	Receive XMIT Relay	16-010-001
RY 2 (1-2-3)	Meter Circuit & Ant.	16-010-001
S 1	Tune XTAL SW	10-030-001
S 2 (A-B)	8 Position Crystal Sw. Ass.	10-030-002
S 3	Power On-Off Switch	On Volume Control
S 4 (A-B)	Crystal Spot Switch	10-040-005
SO-1	117 V AC Power Cable	38-150-001
SO-2	D.C. Cable & Cigarette Plug	38-150-002
SO-5	External Speaker Jack	15-010-003
	Octal Socket Cap w/Cable Clamp	26-040-001
PL-1	Octal Socket	13-030-001
VIB (12v)	Octal Plug	13-070-001
VIB (6v)	Vibrator G1601 12 v	29-030-001
SO-4	Vibrator 1601 6 v	29-030-002
SO-3	Ant. Connector SO-239	15-120-001
MI	Microphone Jack	15-010-001
F-1	0-1 ma "S" Meter Power Indicator	32-010-006
F-1	Fuse - 6 v DC (20 A.)	42-010-001
F-2	Fuse - 12 v DC (7½ A.)	42-010-014
I 1 (6 v)	Fuse - 115 v AC (7/10 A.)	42-010-018
I 1 (12 v)	#47 Lamp 6 v	19-060-001
MIC.	#1892 Lamp 12 v	19-060-002
Spk	Microphone w/plug	43-010-013
V1-V4	3" PM Spk. 4 Ohm	36-043-001
V2	12 BA 6 (12 v), 6BA6 (6 v)	
V3	6J6	
V5	6BE 6	
V6	12AU6 (12 v), 6AU6 (6 v)	
V7	12 AT7	
V8	12BH7	
V9	6AU8	
V10	12AQ5 (12v) 6 AQ5 (6v)	
	12AX7	
	Instruction Book	42-010-009

NOTE