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INSTRUCTION MANUAL



MODEL E Citizens Band Transceiver



SONAR RADIO CORPORATION

73 Wortman Avenue • Brooklyn, N. Y. 11207

44-010-040A

MODEL "E"
CITIZENS BAND TRANSCEIVER

SONAR RADIO CORPORATION BROOKLYN 7, NEW YORK.

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SECTION 1 - WARRANTY AND 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 any equipment 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.

1 - 4. WARRANTY REGISTRATION

Sonar Radio Corporation is under no obligation to extend the above warranty to any unit for which a Sonar Warranty Registration card has not been completed and mailed to the Corporation within 10 days after date of delivery. Warranty is extended to the ORIGINAL PURCHASER ONLY!

SECTION 2 - FCC REGULATIONS

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 "E" 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 10 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 series 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 "E" 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/retractible 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 "E" is an 8 channel crystal-controlled receiver and transmitter with provisions to tune all 23 Citizen's Band channels. The Model "E" 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.

Panel indicator lamps show when the Model "E" is turned on and indicates transmitter antenna current. The latter feature also indicates modulation peaks. The antenna lamp is also a tune-up indicator in conjunction with the transmitter tuning and loading controls.

The distances over which the Model "E" 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	
V 1	6 B A 6	12 B A 6	R. F. Amplifier
V 2	6 J 6	6 J 6	Mixer
V 3	6 B A 6	6 B A 6	First I. F. Amplifier
V 4	6 B A 6	12 B A 6	Second I. F. Amplifier
V 6	12 A T 7 A	12 A T 7 A	A. F. Amplifier
V 7	12 B H 7 A	12 B H 7 A	Audio power output and modulator
V 8	6 A U 8 A	6 A U 8 A	Crystal oscillator, transmit and receive
V 9	6 A Q 5	12 A Q 5	Final amplifier, transmit
V 5	6 A U 6	12 A U 6	Squelch
D 1	IN295 Germanium Diode		Detector
D 3, D 4	2 Silicon Diodes		Rectifiers
D 2	Silicon Diode		Automatic noise limiter

3 - 4. CRYSTAL COMPLEMENT

Both receiver and transmitter crystals for the MODEL "E" 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.

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: Socket for Sonar "S" meter accessory. Model "E" is wired for its instant use.

SECTION 4 - INSTALLATION

4 - 1. MOBILE INSTALLATION

Mount the "U" bracket supplied with the Model "E" under the cash 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 "E"; leave room for ventilation.

One of the cords supplied is for 12 VDC operation and has a cigar lighter on one end. The 6 VDC version of the Model "E" 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 "E" 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 "E" into operation and connect a 25' length of coaxial cable to the antenna connector on the rear of the Model "E". 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 noise limiter "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.