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Sonar Model J-23 Owner's Manual

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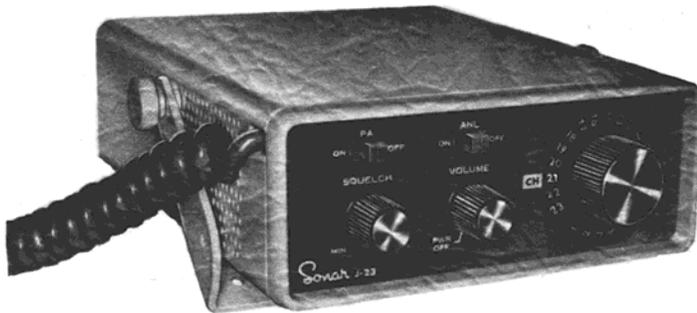
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INSTRUCTION MANUAL



MODEL J-23 Citizens Band Transmitter-Receiver

SONAR RADIO CORPORATION

73 Wortman Avenue • Brooklyn, N. Y. 11207



44-010-056

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 90 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 J-23 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 RULES AND REGULATIONS

2-1. FCC

Your J-23 CB Transceiver is operated under Part 95 of FCC Rules and Regulations. The FCC Regulations state that the owner of any Citizens Band equipment must have in 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. Do not transmit with this equipment until you have received an FCC license for CB. An FCC application has been included with this manual.

2-2. MODEL J-23

The Model J-23 CB Transceiver has been tested and adjusted to conform with FCC Regulations regarding power output, receiver radiation, spurious output attenuation and frequency stability.

SECTION 3 - DESCRIPTION

3-1. SPECIFICATIONS

A. RECEIVER

Sensitivity:	0.7 microvolts for 10 db $\frac{S+n}{N}$ @ 30% modulation
Selectivity:	5 kc @ -6 db 20 kc @ -60 db
Spurious response:	Greater than -50 db
Adjacent Channel Rejection:	60 db
Audio Output:	2 watts @ 1 microvolt R. F. input w/30% modulation
Audio Response:	30-3000 cycles @ -6 db
Automatic Gain Control:	Audio output varies only 6 db when R. F. input varies from 3 micro- volts to 1 volt
Squelch Sensitivity:	Opens at 0.2 microvolts
Automatic Noise Limiter:	Gated series type, automatically adjusted for the elimination of automotive noise pulses

B. TRANSMITTER

R. F. Power Output:	3.2 watts (5 watts in)
R. F. Termination:	50 ohms
Modulation:	100% High level, Class "B"
Spurious Output Suppression:	Better than FCC requirements
Operating Voltage:	13.8 VDC nominal

C. MISCELLANEOUS

DC Power Input:	Receive: 0.25A No Signal 0.65 Max. Signal Transmit: 1.3A w/100% modulation
Temperature Range:	-20° to +150° F
Frequency Stability:	Better than .005%
Size:	6-3/4"W x 2-5/8"H x 8-3/8"D
Weight:	4-1/2 lbs.

NOTE: All measurements made at 13.8 VDC input. Sensitivity measurements will vary 4-6 db depending on local electrical noise.

3-2. GENERAL DESCRIPTION

The Model J-23 is a compact, completely silicon transistorized double-conversion 23 channel crystal-controlled Transmitter-Receiver Unit designed primarily for 12 volt mobile operation. The J-23 can be used as a base station when fitted with an accessory Sonar AC operated power supply. The J-23 is carefully designed and constructed to make operation simple and positive even under severe conditions and to insure continuous trouble-free communication. The AGC and Squelch are immune to noise and input voltage variations. The J-23 is intended for negative or positive grounds.

3-3. EQUIPMENT SUPPLIED

- (1) Model J-23 Citizens Band Transmitter-Receiver
- (2) Mobile Mounting Bracket
- (3) Microphone Hanger Bracket
- (4) Power Cable, 12 VDC
- (5) Dummy Plug for Accessory Socket
- (6) Instruction Manual
- (7) Station License Application
- (8) Warranty Card

3-4. SEMI-CONDUCTOR COMPLEMENT

Q1	40245/37694	R. F. Amp.
Q2	40245/37694	1st Mixer (10.7 mc)
Q3	40245/37694	2nd Mixer (455 kc)
Q4	40245/37694	1st I. F. Amp. (455 kc)
Q5	40245/37694	2nd I. F. Amp. (455 kc)
Q6	40232/40400/37800	Audio Pre-Amp.
Q7	40232/40400/37800	Audio Driver
Q8, 9	40316/37730	Power Amp. (Matched Pair)
Q10	40232/40400/37800	Squelch
Q11	40232/40400/37800	Squelch Switch
Q12, 13, 14	40232/40400/37800	AGC Amp.
Q15	40245/37694	10.245 mc Oscillator
Q16	40245/37694	37 mc Oscillator
Q17	40245/37694	10.7 mc Oscillator
Q18	40245/37694	Transmitter Mixer
Q19	40245/37694	R. F. Amp. Pre-Driver
Q20	40081/37725	R. F. Driver
Q21	40082/37731	R. F. Power Amp.
D1	Silicon Diode	Detector & AGC Source
D2	Silicon Diode	Automatic Noise Limiter
D3	Silicon Diode	Temp. Comp.
D4	Silicon Diode	Squelch Clamp
D5	Zener Diode	Voltage Regulator
D6	Silicon Diode	Voltage Polarity Protection

3-5. FRONT PANEL CONTROLS

- (1) Channel Selector, 23 channel, illuminated
- (2) Volume Control with ON-OFF Power Switch
- (3) Squelch. Rotate clockwise until background noise disappears. A signal greater than 0.2 microvolts will open the squelch.
- (4) Automatic Noise Limiter. May be left in "ON" position with very little loss in audio quality or output power.
- (5) P. A. (Public Address) Switch P. A. "ON", push "Press-to-talk" and speak into microphone. A separate speaker is connected to P. A. jack on rear panel.

DO NOT OPERATE WITHOUT PROPER ANTENNA.

3-6. REAR PANEL JACKS AND PLUGS

- (1) Antenna. 50 ohms
- (2) Power. DC Voltage input from battery or power supply.
- (3) Accessory. Accepts tone squelch system.
- (4) External Speaker. (3.2 ohms)
- (5) P. A. External trumpet type speaker (3.2 ohms)

SECTION 4 - INSTALLATION

4-1. MOBILE INSTALLATION

Fasten the U shaped mobile bracket under the dash panel using self-tapping screws or nuts and bolts. Connect the red power lead to any positive terminal under the dash panel such as the headlight switch, ammeter or cigarette lighter. The negative black lead can be connected to the car frame using any available screw to secure it. For positive grounds, reverse the red and black leads.

4-2. MOBILE NOISE SUPPRESSION

The J-23 Automatic Noise Limiter is very effective for the reduction of automotive noises. However, if a serious noise problem exists, then particular attention should be given to the following:

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 J-23 into operation and connect a 25' length of coaxial cable to the antenna connector on the rear of the J-23. 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 serve only as a guide since many noise suppression kits are available for different makes of engines:
- (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 0.5 mfd coaxial capacitor (Sprague #48P18 or equivalent) at the "A" terminal of generator.
 - (4) ALTERNATORS: Require no attention except when the diodes become defective or when the "slip-rings" are dirty.
 - (5) IGNITION COIL PRIMARY: Install 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 39 ohm resistor in series with 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 0.5 mfd coaxial capacitor at the alternator output terminal.
- (2) Install 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. VOLTAGE REGULATION

All transistorized equipment is sensitive to DC power line changes. Therefore, no mobile installation should be operated without first measuring the battery voltage with the engine at a fast idle. This voltage should not exceed 16 volts on a cold day. Voltages in excess of this could damage the power transistors.

4-4. ANTENNAS

The J-23 is completely pre-tuned at the factory for any 50 ohm 27 megacycle antenna. Tuning is not necessary. However, a check for standing waves should be made to determine the degree of mismatch. Best performance is achieved when the VSWR is 1.5:1 or less. The antenna length may have to be changed to produce low VSWR. Coaxial cable for mobile installations is type #RG-58A/U. Base installations that require more than 25' of coaxial cable should use type #RG-8/U. Using RG-58A/U will result in a very small power loss. The height of a base station antenna is important. The higher the antenna, the greater will be the transmission range. The FCC Rules state that the top of the antenna cannot be more than 20 feet above an existing man-made structure. Such structures include TV antenna towers, buildings, chimneys and water towers. Although the FCC Rules allow wide latitude, it is very important that the antenna be kept clear of surrounding objects even at a small sacrifice in height.

4-5. BOAT 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.

SECTION 5 - OPERATION

5-1. OPERATING INSTRUCTIONS

NOTE: Do not operate the J-23 without a proper antenna.

Operation of the J-23 is simple. Proceed as follows:

- (1) Turn VOLUME Control clockwise. The channel indicator should light and signals or background noise be heard from the speaker.
- (2) Turn Channel Selector to desired channel.
- (3) Transmissions are made by pressing the button on the side of the microphone and speaking into the microphone from a distance of 2 - 3 inches. Shouting only creates unnecessary distortion and should be avoided.
- (4) The Squelch becomes operative by rotating the Control clockwise when no signal is present until the background noise disappears. The J-23 will remain quiet until a signal is received, at which time the Squelch circuit opens to allow audio to pass.

SECTION 6 - CIRCUIT DESCRIPTION

6-1. RECEIVER

The J-23 has a dual-conversion crystal-controlled receiver. A "stiff" AGC system permits constant audio output levels, regardless of signal input level. Q1 (R. F. Amp), Q2 (H. F. Mixer) and Q4 (1st 455 kc IF Amp) are controlled by Q12, Q13 and Q14 (AGC Amplifiers). D1 provides DC signal for the AGC Amplifiers and noise-free compensating voltage for the Automatic Noise Limiter D2. Voltage regulation is provided by R5 and Zener Diode D5. D1 also provides DC Squelch signal for the DC Amplifier Q11. Q11 causes D4 to conduct, thereby cutting off Q6; in this condition, the J-23 Audio Output is squelched. The Squelch system is disabled during transmit.

The Automatic Noise Limiter Diode D2 is a series gate for audio signal. D2 is turned off when a high noise pulse is received.

6-2. TRANSMITTER

The transmitter is frequency-controlled by a heterodyne system where a single crystal (37 mc) is used for both receive and transmit. A fixed 10.7 mc oscillator output (Q17) beats against the 37 mc oscillator output (Q16) in Q18 (mixer) to result in a 27 mc signal. This signal is then amplified by Q19, Q20 and Q21.

The "Push-to-Talk" system operates by grounding the emitter returns of the transmitter or receiver. The microphone switch is used for this purpose. The relay switches antenna input and speaker, thus completing the changeover.

SECTION 7 - MAINTENANCE

7-1. VOLTAGE MEASUREMENTS

See schematic diagram for Voltage Measurements. All voltages are subject to a tolerance of $\pm 20\%$. Measurements were made with a Hewlett-Packard 410C VTVM.

7-2. RECEIVER ALIGNMENT

No alignment should be necessary due to the inherent stability of the tuned coils and transformers used in the J-23. This does not apply to replacement of coils and transformers, in which case the overall alignment procedure is outlined. Only that portion need be used that applies to the replacement part.

A signal is fed (through a capacitor isolated termination) to the base preceding the stage requiring adjustment. The overall receiver performance is evaluated by a signal-to-noise ratio measurement, i. e., modulation + noise, when an input signal of one microvolt has been 30% modulated, and the audio output is monitored with a wattmeter calibrated in "db output."

7-3. TRANSMITTER ALIGNMENT

NOTE: Because of the J-23 design, it should not be necessary to turn any adjustment more than 1/2 turn from the original factory setting. Therefore, do not make any adjustments indiscriminately.

A. PREPARATION

- (1) Turn Channel switch to the undetented blank position between channel 23 and channel 1.
- (2) Set input voltage to 13.8 VDC
- (3) Connect a 50 ohm wattmeter to antenna terminal
- (4) Set up an R. F. Voltmeter for use
- (5) Set up a 27 mc Signal generator with capacitive isolation
- (6) 0-1 Ampere meter

B. ALIGNMENT

- (1) Inject unmodulated 27 mc signal at base of Q19. A 1 volt input should produce full output at 50 ohm load.
- (2) Peak all adjustments between Q19 and the antenna terminal.
- (3) Peak L1, then turn slug CCW for 1/2 the peak measured voltage.
- (4) Turn Channel Switch to Channel 10 position.
- (5) Place R. F. Probe at the secondary of T10 and peak T10.

- (6) Place R. F. Probe at base of Q19 and peak L2.
- (7) Connect 0-1 Ampere meter from P1-6 to P1-5 after removing existing jumper wire.
- (8) L3, C65 and L4 have already been peaked for maximum output in Step (2). The input will be in excess of FCC maximum of 5 watts.
- (9) Turn L3 CW until ammeter reads 0.4A (400 ma). Peak L5 and repeat adjustment of L3.
- (10) No further adjustment is necessary unless a 30 mc Oscilloscope is available, in which case the Modulated Carrier peaks (as observed at the output) should almost double the amplitude of the unmodulated carrier, indicating 100% modulation.
- (11) Remove Ammeter and restore jumper.
- (12) Connect to antenna and check SWR.

MODEL J-23 PARTS LIST

DIAG. NO.	DESCRIPTION	SONAR PART NO.	*LIST PRICE
R1, 57, 62	Resistor, Fixed, Composition 4.7 K Ohm, 10%, 1/2 w	01-472-531	\$0.25
R2, 30	Resistor, Fixed, Composition 15 K Ohm, 10%, 1/2 w	01-153-531	0.25
R3, 8, 12, 42, 53, 64, 70	Resistor, Fixed, Composition 1 K Ohm, 10%, 1/2 w	01-102-531	0.25
R4, 7, 9, 13, 16, 19, 21, 46, 74	Resistor, Fixed, Composition 560 Ohm, 10%, 1/2 w	01-561-531	0.25
R5, 11, 41	Resistor, Fixed, Composition 2.2 K Ohm, 10%, 1/2 w	01-222-531	0.25
R6, 10, 68	Resistor, Fixed, Composition 8.2 K Ohm, 10%, 1/2 w	01-822-531	0.25
R14, 20	Resistor, Fixed, Composition 3.3 K Ohm, 10%, 1/2 w	01-332-531	0.25
R15, 18, 23, 28A, 35, 38, 43, 52, 56, 60, 65	Resistor, Fixed, Composition 10 K Ohm, 10%, 1/2 w	01-103-531	0.25
R17, 22, 67, 75	Resistor, Fixed, Composition 220 Ohm, 10%, 1/2 w	01-221-531	0.25
R24	Resistor, Fixed, Composition 680 K Ohm, 10%, 1/2 w	01-684-531	0.25
R25, 28, 31	Resistor, Fixed, Composition 150 K Ohm, 10%, 1/2 w	01-154-531	0.25
R26, 27, 39	Resistor, Fixed, Composition 18 K Ohm, 10%, 1/2 w	01-183-531	0.25
R28, 48	Resistor, Fixed, Composition Selected at Factory		0.25
R29	Resistor, Variable, Composition 100 K Ohm, Squelch Control	03-104-055	2.00
R30A	Resistor, Fixed, Composition 33 K Ohm, 10%, 1/2 w	01-333-531	0.25
R32	Resistor, Fixed, Composition 2.2 M Ohm, 10%, 1/2 w	01-225-531	0.25
R34	Resistor, Fixed, Composition 390 K Ohm, 10%, 1/2 w	01-394-531	0.25
R36	Resistor, Variable, Composition 100 K Ohm, Volume Control w/Power On-Off Switch(SPST)	03-104-053	2.50
S1			
R37	Resistor, Variable, Composition 4.7 K Ohm, Squelch set control	03-472-056	1.50
R40, 51, 76	Resistor, Fixed, Composition 47 K Ohm, 10%, 1/2 w	01-473-531	0.25
R44	Resistor, Fixed, Composition 6.8 K Ohm, 10%, 1/2 w	01-682-531	0.25
R45	Resistor, Fixed, Composition 56 K Ohm, 10%, 1/2 w	01-563-531	0.25
R47, 58, 59, 61, 63	Resistor, Fixed, Composition 470 Ohm, 10%, 1/2 w	01-471-531	0.25

MODEL J-23 PARTS LIST

DIAG. NO.	DESCRIPTION	SONAR PART NO.	*LIST PRICE
R49	Resistor, Fixed, Wirewound 1 Ohm, 10%, 1/2 w	02-100-121	\$0.25
R50	Resistor, Fixed, Composition 37 Ohm, 10%, 1/2 w	01-370-531	0.25
R54	Resistor, Fixed, Composition 1.5 K, 10%, 1/2 w	01-152-531	0.25
R55, 69	Resistor, Fixed, Composition 62 Ohm, 10%, 1/2 w	01-620-531	0.25
R66	Resistor, Fixed, Composition 150 Ohm, 10%, 1/2 w	01-151-561	0.25
R72	Resistor, Fixed, Composition 18 Ohm, 10%, 1/2 w	01-180-531	0.25
R73	Resistor, Fixed, Composition 27 Ohm, 10%, 1/2 w	01-270-531	0.25
C1, 59, 60, 65	Capacitor, Fixed, Mylar .0022 mf, 20%, 100 VDC	05-223-031	0.50
C2, 4, 5, 5A, 8, 9, 10, 11, 13, 17, 21, 73, 76	Capacitor, Fixed, Mylar .047 MF, 20%, 100 VDC	05-472-027	0.50
C3, 28, 32	Capacitor, Fixed, Electrolytic 5 MF, 15 VDC	06-530-062	1.00
C6, 26, 33, 43, 47, 48, 51, 74	Capacitor, Fixed, Mylar .01 MF, 20%, 100 VDC	05-102-028	0.50
C12, 38, 42, 54, 57, 58, 63	Capacitor, Fixed, Mylar .0033 MF, 20%, 100 VDC	05-333-029	0.50
C14	Capacitor, Fixed, Ceramic 1 MF (Gimmick)	04-106-007	0.50
C15, 16, 19, 20	Capacitor, Fixed, Mylar .1 MF, 20%, 100 VDC	05-101-026	0.50
C18, 69, 70	Capacitor, Fixed, Mylar .0047 MF, 20%, 100 VDC	05-473-030	0.50
C22	Capacitor, Fixed, Dur-Mica 260 MMF, 10%, 500 VDC	07-264-002	0.50
C23	Capacitor, Fixed, Electrolytic 50 MF, 15 VDC	06-530-064	1.00
C24, 25, 29	Capacitor, Fixed, Electrolytic 1 MF, 6 VDC	06-530-061	1.00
C27, 32A	Capacitor, Fixed, Ceramic .001 MF, GMV, 500 VDC	04-103-004	0.50
C30	Capacitor, Fixed, Electrolytic 40 MF, 16 VDC	06-530-048	1.00
C31	Capacitor, Fixed, Electrolytic 50 MFD, 10 VDC	06-530-063	1.00
C34, 35	Capacitor, Fixed, Electrolytic 2 MF, 24 VDC, 15%	06-530-065	1.00
C7, 37, 66	Capacitor, Fixed, Dur-Mica 100 MF, 10%, 500 VDC	07-104-002	0.50
C39	Capacitor, Fixed, Ceramic 25 MMF, 10%, 1 KVDC, NPO	04-255-001	0.50

MODEL J-23 PARTS LIST

DIAG. NO.	DESCRIPTION	SONAR PART NO.	*LIST PRICE
C40, 61, 64	Capacitor, Fixed, Ceramic 40 MF, 10%, 1 KVDC, NPO	04-405-001	\$ 0. 50
C41, 45, 46, 53	Capacitor, Fixed, Dur-Mica 550 MMF, 5%, 100 VDC	07-554-009	0. 50
C44	Capacitor, Fixed, Ceramic 50 MMF, 5%, 1 KVDC, N750	04-505-011	0. 50
C49	Capacitor, Fixed, Ceramic 16 MMF, 10%, 1 KVDC, NPO	04-165-001	0. 50
C50, 55	Capacitor, Fixed, Ceramic 30 MMF, 10%, 1 KVDC, NPO	04-305-001	0. 50
C52	Capacitor, Fixed, Dur-Mica 300 MMF, 5%, 100 VDC	07-304-009	0. 50
C56	Capacitor, Fixed, Dur-Mica 85 MMF, 5%, 300 VDC	07-855-007	0. 50
C62	Capacitor, Fixed, Dur-Mica 150 MMF, 10%, 500 VDC	07-154-002	0. 50
C67	Capacitor, Variable, Compression 55-300 MMF	09-210-028	1. 00
C68	Capacitor, Fixed, Dur-Mica 220 MMF, 5%, 100 VDC	07-224-009	0. 50
C71	Capacitor, Fixed, Ceramic .005MF, +80-20, 100 VDC	04-503-003	0. 50
C72	Capacitor, Fixed, Electrolytic 900 MF, 15 VDC	06-530-066	2. 00
C75	Capacitor, Fixed, Electrolytic 2 MF, 15 VDC(non Polarized)	06-530-067	1. 00
Q1, 2, 3, 4, 5, 15, 16, 17, 18, 19	Transistor, 40245/37694	19-020-044	2. 00
Q6, 7, 10, 11, 12, 13, 14	Transistor, 40232/40400/37800	19-020-043	2. 00
Q8, 9(matched)	Transistor, 40316/37730	19-020-045	4. 00
Q20	Transistor, 40081/37725	19-020-046	5. 00
Q21	Transistor, 40082/37731	19-020-047	10. 00
T1	Transformer, 27 mc input	22-020-033	3. 00
T2	Transformer, 27 mc interstage	22-020-034	3. 00
T3	Transformer, 10. 7 mc interstage	22-010-036	3. 00
T4	Transformer, 455 kc I. F.	22-010-037	3. 00
T5	Transformer, 455 kc I. F.	22-010-038	3. 00
T6	Transformer, 455 kc I. F.	22-010-039	3. 00
T7	Transformer, 455 kc I. F.	22-010-040	3. 00
T8	Transformer, Audio Driver	14-020-012	5. 00
T9	Transformer, Mod. /Audio Out	14-050-012	7. 00
T10	Transformer, 37 mc Osc.	22-040-028	1. 00
T11	Transformer, R. F. Amp. Output	22-020-035	1. 00
L1	Coil, 10. 7 mc Osc.	22-040-027	1. 00
L2	Coil, Transformer Mixer	22-050-021	1. 00

MODEL J-23 PARTS LIST

DIAG. NO.	DESCRIPTION	SONAR PART NO.	*LIST PRICE
L3	Coil, R. F. Output	22-070-022	\$ 1.00
L4	Coil, R. F. Output	22-080-004	1.00
L5	Coil, R. F. Driver Output	22-020-036	1.00
RFC 1	Choke, R. F., 22 uh	22-060-009	0.50
RFC 2, 3	Choke, R. F., 7 uh	22-060-003	0.50
RFC 4	Choke, R. F., 2.2 uh	22-060-021	0.50
RFC 5	Choke, R. F., 1 uh	22-060-023	0.50
CH 1	Choke, Line Filter	14-070-005	3.00
D1, 2	Diode, Silicon	19-080-001	0.75
D3, 4, 6	Diode, Silicon, CER 71	19-040-002	1.00
D5	Diode, Silicon, Zener	19-090-003	2.00
	Cabinet	28-010-021	10.00
	Mobile Mount	28-070-016	3.00
	Panel Bezel	11-011-004	3.00
	Front Panel	11-020-083	2.50
	Knob, Channel Selector, Assembly	51-010-009	1.50
	Knob, Control	33-020-009	0.30
S3, 4	Slide Switch, DPDT	10-020-010	0.40
	Speaker, 3.2 Ohm, 2" x 6"	36-082-611	5.00
K1	Relay, SPDT, 12 VDC	16-030-004	7.50
J3	Jack, Closed Circuit	15-010-011	0.75
J4	Jack, Open Circuit	15-010-012	0.75
J5	Antenna Connector, SO239	15-120-001	0.75
Y24	Crystal, 10.245 mc	40-010-018	4.00
Y25	Crystal, 10.700 mc	40-010-019	4.00
Y1 thru 23	Crystal, Plug-In	40-010-020	4.00
B1	Lamp, 12 V, G-12	19-060-006	0.25
P1	Plug, Power, 8 Pin	13-070-001	0.50
P2	Plug, Accessory, 11 Pin	13-070-002	0.50
	Power Cable, Assembly, 12VDC	59-010-010	4.95
	Switch Ass'bly, Channel Selector	51-010-010	15.00
	Fuse, 1-1/2A, 3AG(quick acting)	42-010-025	0.50
	Spring, Crystal contact	23-020-005	0.50
	Microphone Assembly	57-010-010	17.90
J2	Dummy Plug Assembly	59-010-011	1.00
	Instruction Manual	44-010-056	2.00

*MINIMUM ORDER - \$5.00.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

RECOMMENDED READING

1. "Suppressed Ignition for Two-Way Radio Installations"
The Electric Auto Lite Company
Toledo 1, Ohio

2. "Giving Two-Way Radio Its Voice"
Champion Spark Plug Company
Toledo 1, Ohio

3. "Electronic Equipment Made Easy for the Boat Owner"
by John D. Lenk
John F. Rider Publisher, Inc.
New York, New York

4. "Radio Interference Suppression Bulletin"
Leece-Neville Company
Cincinnati, Ohio

5. "Radio Noise Suppression Bulletin"
Prestolite
Division of Eltra Corporation
Toledo, Ohio
Form G-500