

SBE

®

Sidebander II

(MODEL SBE-12CB)



23 CHANNEL SSB/AM CITIZENS BAND TRANSCEIVER

220 AIRPORT BLVD., WATSONVILLE, CA. 95076

The SBE Sidebender II transceiver is designed and engineered for licensed Class D operation on any of the 23 channels designated as Citizens Band frequencies by the Federal Communications Commission. You are required to read and understand Part 95 of the FCC regulations prior to operation of this unit. Copies of Part 95, covering regulations for the Citizens Band Radio Service are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

You must also obtain a license and call sign before operating your Sidebender II. If you do not have a Class D station license, request an application for a Class D station license for the Citizens Radio Service (FCC form 505) obtainable from any FCC Field office.

WARNING: Transmitter section adjustments must be performed by a qualified technician holding a valid first or second class FCC radiotelephone license.

1.0 GENERAL DESCRIPTION AND SPECIFICATIONS

1.1 The SBE Sidebander II transceiver is a fully solid-state two-way radio intended for use as a Class D station in the Citizens Radio Service. The unit will operate in both a standard full carrier AM mode, as well as fully suppressed A3J Single Sideband mode, upper or lower. The Sidebander II features fully synthesized 23 channel dual conversion receivers for both SSB and AM. The equipment comes complete with microphone, mobile mounting bracket, power cable and crystals installed for all 23 channels.

1.2 General

Channels	23
Frequency Range	26.965 to 27.255 MHz
Frequency Control	Synthesizer
Frequency Tolerance	0.0025%
Frequency Stability	0.001%
Operating Temperature Range	-20°C to 50°C
Humidity	95%
Microphone	Dynamic w/p.t.t. switch and coil cord
Input Voltage	13.8VDC nom. 15.9V max. 11.7V min.
Current Drain	Transmit AM un-mod. carrier, 1.2A SSB, 8W pep output, 2.2A
	Receive Squelched, 0.3A 2W audio output, 1.0A
Size	2.2 1/4 "H, 7 1/2 "W, 9 1/2 "D 2.2 1/4 "H, 7 1/2 "W, 9 1/2 "D
Weight	7 pounds
Antenna Connector	UHF, SO-239

1.3 Transmitter

Power Input	AM, 5 watts SSB, 15 watts, p. e. p.
Modulation	AM, high and low level Class B
Modulation Capability	AM, 100%
Intermodulation Distortion	SSB: 3rd order - 20db 5th order - 25db
Carrier Supression	SSB: -35db
Unwanted Sideband	-40db

Freq. Response	AM and SSB: 350-2500 Hz
Output Impedance	50 ohms, unbalanced
Automatic Load Control	Adjustable, Holds p.e.p. to 1db increase w/10db increase in audio input
SSB Filter	7.8 MHz, crystal lattice type 6db @ 2.1 KHz 50db @ 5.5 KHz
Output Indicator	Backlighted front panel meter

1.4 Receiver

Sensitivity	SSB: 0.5uV for 10db S+N/N AM: Less than 1.0uV for 10db S+N/N
Selectivity	SSB: 6db @ 2.1 KHz, 50db @ 5.5 KHz AM: 6db @ 3.5 KHz, 60db @ 8KHz
Image Rejection	-50db
I. F. Frequency	7.8 MHz, and 455 MHz
Automatic Gain Control	(AGC): Less than 10db increase in audio output for inputs of 1 to 500,000 microvolts.
Squelch	Adjustable. Threshold less than 1uV
Noise Blanker	Series gate type
Clarifier Range	± 700 Hz
Audio Output Power	3 watts into 8 ohms at 10% Distortion
Hum and Noise	-35 db
Built-in Speaker	8 ohms, Round
External Speaker (not supplied)	8 ohms. Disables internal speaker when connected

1.5 PA System

Power Output	10 watts into external speaker
External Speaker for PA	8 ohms. When PA-CB switch is in PA, the PA speaker also monitors the receiver

- 1.6 The Sidebander II complies fully with Part 95 of Volume VI Rules and Regulations of the F. C. C. for Class D mobile operation in the Citizens Band Service.

2.0 INSTALLATION

2.1 Antennas

One of the most important keys to achieve optimum system performance is the installation of a good antenna system. Only a properly matched antenna system will allow maximum power transfer from the 52 ohm transmission line to the radiating element. Most quality antennas previously suitable for use on AM will also be satisfactory for SSB. Due to the nature of an SSB transmitter, the VSWR must be less than 2:1 to insure linear operation of the final amplifier.

The recommended method of antenna tuning is to use an in-line wattmeter or VSWR bridge to adjust the antenna for minimum reflected power on channel 11 in the AM mode. When the antenna system is adjusted for proper matching in the AM mode, no further adjustment for SSB will be necessary.

2.2 Mobile

The Sidebander II is supplied with a universal mounting bracket and microphone holder. The transceiver may be mounted in any plane and on any rigid surface, such as, underneath an automobile dashboard, truck roof or vertically on a boat bulkhead.

DC power should be derived directly from the vehicle's battery in order to minimize voltage losses and ignition interference. The unit is designed for a 12 volt negative ground system. Connect the red wire to the positive (+) battery terminal, black wire to the negative (-). If the transceiver's power lead must be lengthened, use #14 (or larger) wire.

2.2.1 Mobile Antenna

The antenna type best suited for mobile applications is either a base/center loaded or full length quarter wave vertical whip. This type of antenna is non-directional thus assuring minimum signal variation as the vehicle changes direction. If directional capabilities are desired in a mobile installation, it is recommended that only a properly matched pair of antennas and phasing harness be used. A phasing control that allows the operator to

shift antenna phase may also be used providing no reactive component is reflected back to the transmission line. An in-line wattmeter or VSWR bridge may be used to check this characteristic since a reactive component will appear as an increase in the standing wave ratio. A standard antenna connector (type SO-239) is located on the rear panel for convenient connection to a PL-259 cable plug. Type RG-8/U or RG-58/U cable is recommended for transmission line.

2.3 Base Station

For best station operation, the SBE model SBE-3AC Base Station Power Supply is recommended. The supply provides a regulated 13.8 volts DC output with an input voltage of 110-120 volts AC, 50 - 60 Hz.

2.3.1 Base Station Antenna

The Sidebender II may be used with any type of 52 ohm base station antenna. A ground plane vertical antenna will provide the most uniform horizontal coverage. This type of antenna is best suited for communication with a mobile unit. For point-to-point operation where both stations are fixed, a directional beam will usually increase communications range since this type of antenna concentrates transmitted energy in one direction. The beam antenna also allows the receiver to "listen" in only one direction thus reducing interfering signals.

Antenna height is an important factor when maximum range is desired. Keep the antenna clear of surrounding structures or foliage. FCC regulations limit antenna height to 20 feet above an existing structure.

2.4 Public Address

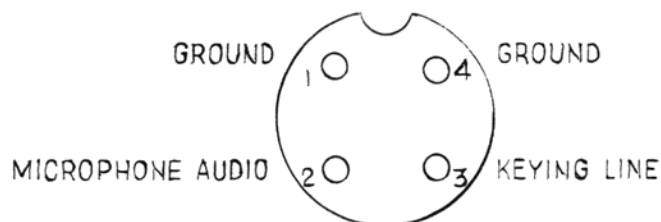
An external 8 ohm, 10 watt speaker may be connected to the phono jack located on the rear panel when the Sidebender II is used as a public address system. The speaker should be directed away from the microphone to prevent acoustic feedback. NOTE: Speakers with less than 10 watt power capability may be damaged in the P. A. mode.

2.5 Remote Speaker

The external speaker jack on the rear panel is used for remote receiver monitoring. The external speaker should have 8 ohms impedance and be able to handle at least 3 watts. When the external speaker is plugged in, the internal speaker is disconnected.

2.6 Alternate Microphones & Installation

For best results the user should select a low impedance dynamic type microphone or a transistorized preamplified microphone. Wiring connections for the alternate microphones are shown in Figure 1 below.



FEMALE MICROPHONE PLUG
REAR VIEW

2.7 Noise Suppression

The ability of the Sidebander II to detect very weak signals will be enhanced if the electrical noise generated by the vehicle is minimized.

The following steps are recommended if excessive electrical noise is present.

Before installing suppression devices, check the condition of the vehicle's ignition wiring. Insure that the spark plug connections are clean and tight and that the wires are seated properly in the distributor cap. Check for wear of the distributor rotor and replace the distributor cap if traces of carbon or signs of arcing are evident. Resistor type spark plugs should be used in place of regular spark plugs. Radio-resistant ignition wire is standard on most late model vehicles and should be installed in vehicles not so equipped.

Alternator noise may be minimized by installation of an alternator line filter available from radio parts distributors.

Installation of bonding straps in the engine compartment will further reduce ignition noise. Install short links of metal strap or heavy shield braid between the engine and frame, engine and fire wall, alternator and frame, exhaust pipe and frame and hood to frame. Extremely high ignition noise levels or noise levels that become worse after a period of time is indicative of deterioration of the vehicle's electrical system.

3.0 OPERATION

3.1 Control Functions

3.1.1 Off/On Volume

Turn clockwise to apply power to the unit and to set the desired listening level.

3.1.2 Squelch

Blanks out unwanted noise when no signals are present. Turn fully counterclockwise then slowly clockwise until the receiver noise disappears. Any signal to be received must now be slightly stronger than the average received noise. Further clockwise rotation will increase the threshold level, which a signal must overcome in order to be heard. Only strong signals will be heard at a maximum clockwise setting.

3.1.3 Noise Blanker Switch

This is a dual purpose control designed to tailor receiver performance for a wide range of operating extremes. When the AM mode is in use, the noise blanker switch is placed in the NB position to eliminate impulse and atmospheric noise so that very weak signals may be copied. The switch may normally be expected to be left in the NB position during AM operation in a mobile installation to reduce alternator and ignition noise. The AM receiver sensitivity is the same in both positions of the switch, however, when the noise blanker is energized in AM, a very slight loss of high voice tones might be noticed. During base station operation, the NB switch may be left off when in the AM mode unless a high atmospheric noise level is present.

In the SSB mode the noise blanker switch functions to switch in a different noise blanker circuit in the NB position. In this case, the noise blanker has no effect on receiver fidelity but instead has the effect of enhancing receiver performance by reduction of incoming noise. During normal operation the NB switch in the SSB mode is always left in the NB position.

3.1.4 Channel

Selects the desired channel for transmission and reception on both AM and SSB. Channels 10 thru 15 and 23 may be used for communications between stations operating under different licenses and between units sharing the same licenses. All other channels, except channel 9, may be used only between units operating under the same license. Channel 9 has been reserved by the FCC for emergency communications or immediate protection of property. Channel 9 may also be used to render assistance to a motorist; it is commonly called the HELP channel. This is an FCC rule and applies to both AM and SSB modes of transmission.

3.1.5 Mode

Selects either of the SSB modes (USB or LSB) or standard double sideband AM. Unless the station with which communications is desired is equipped with SSB, the AM mode is normally used. The mode selector switch changes the mode of operation of both transmitter and receiver simultaneously. An explanation of how to determine which mode to use is contained in the following paragraphs under Operating Procedure.

3.1.6 Clarifier

Allows variation of both the transmitter and receiver operating frequencies above and below the assigned frequency. Although this control is intended primarily to tune in SSB signals, it may be used to optimize AM signals as described in the Operating Procedure paragraphs.

3.1.7 RF Gain

Used to adjust the sensitivity of the receiver during AM or SSB reception. When the control is at it's extreme counterclockwise position, the receiver sensitivity will be minimum. At this setting on the gain control only the very strongest signals will be heard. As the control is rotated clockwise weaker signals and noise will be heard. When the control is at it's full clockwise position, sensitivity of the receiver will be maximum.

3.1.8 PA-CB Switch

Selects the mode of operation. The PA function should not be used unless an external speaker is connected as described in Installation Section of this manual. In the CB position, the PA function is disabled and the unit will transmit and receive on the selected frequency.

3.1.9 Press-To-Talk Microphone

The receiver and transmitter are controlled by the press-to-talk switch on the microphone. Press the switch and the transmitter is activated; release switch to receive. When transmitting, hold the microphone two inches from the mouth and speak clearly in a normal voice.

3.1.10 Meter

Indicates received signal strength, relative output power in AM and SSB modes.

3.2 Operating Procedure

- 3.2.1 There are three types of signals presently in use for communications in the Citizens Band. The Sidebender II receiver is capable of receiving any of these types when the proper mode of operation is selected. When the Sidebender II mode switch is placed in the AM position, standard double sideband full carrier signals will be detected. An SSB signal may be recognized while in the AM mode by its characteristic intermittent pulsing or fluttering and the inability of the AM receiver to produce an intelligible output.

The SSB modes will detect upper sideband and lower sideband to produce an intelligible signal. A single transmitted signal consists only of the upper or the lower sideband and no carrier is transmitted. A double sideband (DSB) signal consists of two sidebands, each sideband being equal in amplitude and equally distant in frequency above and below the operating frequency of the transmitter. The operating frequency is defined as the frequency where the carrier would normally be during AM operation. In AM operation, a carrier, or reference signal, is transmitted along with two sidebands; each sideband being of equal amplitude and equal distance above and below the carrier frequency.

It can be seen that since a single sideband receiver requires only one of the sidebands and no carrier, all modes of transmission may be received since all modes contain at least one sideband. The SSB receiver selects only the required portion of the signal (the sideband) and rejects the carrier and opposite sideband of an AM signal and rejects the opposite sideband of a DSB signal. The method of tuning AM and DSB signals in the SSB mode is explained later on in this chapter.

An SSB signal may only be received when the listening receiver is functioning in the same mode. In other words, an upper sideband signal (USB) may be made intelligible only if the receiver is functioning in the USB position. A lower sideband (LSB) signal will be heard when the receiver is in the USB mode, however, no amount of tuning will make the signal intelligible. The reason for this may be understood if you consider that when in the USB mode, a transmitter's output frequency is in direct proportion to the modulation tone whereas in the LSB mode the transmitter's output frequency is in inverse proportion to the modulating tone. When modulation is applied to the Transmitter's microphone in the USB mode, the transmitter's output frequency is increased whereas in the LSB mode the transmitter's output frequency is decreased. The result in listening to the receiver is that when the mode switch is in the proper position (either USB or LSB), a true reproduction of a single tone of modulation will result, and if the tone is increased in frequency, such as a low pitched whistle to a high pitched whistle, you will hear the increase in the output tone of the receiver. If the incorrect mode is selected, an increase in tone of a whistle applied to the transmitter will cause a decrease in the resultant tone from the receiver. Thus when a voice is used in place of a whistle or tone, in the proper listening mode the voice will be received correctly whereas in the incorrect mode, the voice will be translated backwards and can not be made intelligible by the clarifier control. When listening to an AM or DSB transmission, a correct sideband is heard in either mode since both an upper and lower sideband are received.

Once the desired SSB mode has been selected, frequency adjustment may be necessary in order to make the incoming signal intelligible. The clarifier control allows the operator to vary frequency above and below the exact center frequency of the received signal. If the sound of the incoming signal is

high or low pitched, adjust the clarifier to produce the correct sound. In order to understand the operation of the clarifier, consider it as performing the same function as a phonograph speed control. When the speed is set too high, voices will be high pitched and if set too low, voices will be low pitched. There is only one correct speed that will make a particular record produce the same sound that was recorded. If the record is played on a turntable that rotates in the wrong direction, (opposite sideband) no amount of speed control (clarifier) will produce an intelligible sound.

An AM signal received while listening in one of the SSB modes will produce a steady tone (carrier) in addition to the intelligence unless the SSB receiver is tuned to exactly the same frequency by the clarifier control. For simplicity it is recommended that the AM mode be used to listen to AM signals.

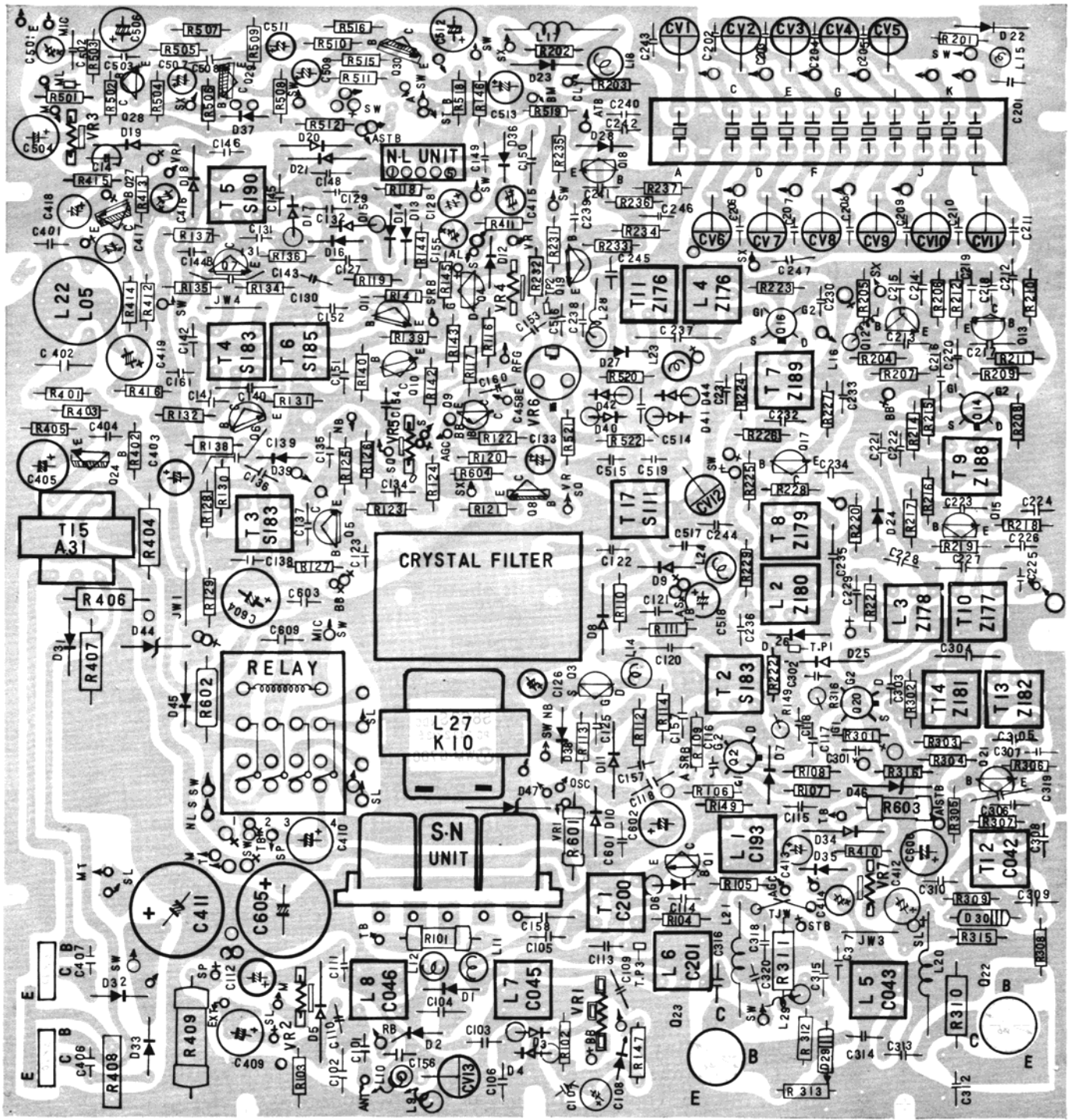
DSB signals may be received in either SSB mode and the clarifier control is adjusted in the same manner as in true single sideband operation.

3.2.2. Operating Procedure to Receive

1. Place CB-PA switch in CB position.
2. Turn the Off/On - Volume control clockwise.
3. Select the desired operating channel.
4. Select the desired mode (AM - USB - LSB).
5. Place noise blanker switch in the "NB" position.
6. Rotate the squelch control clockwise slightly beyond the point where noise disappears.
7. When a signal is heard (SSB only) adjust clarifier for correct voice sound.
8. If the signal is very strong, rotate the RF gain control counterclockwise to reduce interfering weaker signals.

3.2.3. To Transmit

1. Select the desired channel and mode of transmission.
2. Set clarifier control to the centered position.
3. If the channel is clear, depress the push-to-talk switch on the microphone and speak in a normal voice. The output meter will indicate true output power.
4. Release the push-to-talk switch to receive.



SIDEBANDER II

4.0 SERVICE MAINTENANCE

Should your Sidebander II fail to perform as stated in this manual, it is recommended that SBE be contacted in writing. SBE will either authorize return of the unit to the factory or refer you to an authorized SBE repair agency in your area. DO NOT SHIP EQUIPMENT WITHOUT PRIOR WRITTEN AUTHORIZATION FROM SBE. Your letter to SBE must include the following particulars:

1. Model number and serial number of equipment.
2. Date of purchase of equipment.
3. Nature of trouble.
4. Cause of trouble if known.
5. Name of distributor from whom the equipment was purchased.
6. Your return address.
7. Method of shipment by which the equipment should be returned.

In addition, include any information that you feel will be helpful in locating or correcting the problem.

5.0 PARTS ORDERING INFORMATION

When ordering replacement parts, you should direct your order to an SBE distributor or SBE, Replacement Parts Department, 220 Airport Boulevard, Watsonville, California 95076. Please furnish the following information:

1. Quantity required.
2. SBE part number and description.
3. Item or symbol number obtained from parts list, schematic, component location drawing.
4. SBE model number and serial number.

Unless specified, SBE will determine the best method of shipment for the parts involved. All parts will be sent C. O. D. unless ordered through an SBE distributor. NOTE: Minimum parts billing is \$2.50.

SYM.	PART #	DESCRIPTION
C101	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C102	8000-00004-041	Capacitor, Fixed, 150 pfd, 50V, Mica
C103	8000-00004-007	Capacitor, Fixed, 10 pfd, 50V, Mica
C104	8000-00004-027	Capacitor, Fixed, 220 pfd, 50V, Mica
C105	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C106	8000-00004-021	Capacitor, Fixed, 47 pfd, 50V, Mica
C107	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C108	8000-00004-018	Capacitor, Fixed, 0.1 mfd, 50V, Mylar
C109	8000-00011-010	Capacitor, Fixed, 170 pfd, 50V, Mica
C110	8000-00004-040	Capacitor, Fixed, 3 pfd, 50V, Mica
C111	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C112	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C113	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C114	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C115	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C116	8000-00004-007	Capacitor, Fixed, 10 pfd, 50V, Mica
C117	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C118	8000-00004-020	Capacitor, Fixed, 100 pfd, 50V, Mica
C119	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C120	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C121	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C122	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C123	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C124	8000-00004-040	Capacitor, Fixed, 3 pfd, 50V, Mica
C125	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C126	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C127	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C128	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C129	8000-00004-003	Capacitor, Fixed, .04 mfd, 50V, Mylar
C130	8000-00004-018	Capacitor, Fixed, .1 mfd, 50V, Mylar
C131	8000-00011-008	Capacitor, Fixed, 5 pfd, 50V, Mica
C132	8000-00011-008	Capacitor, Fixed, 5 pfd, 50V, Mica
C133	8000-00011-002	Capacitor, Fixed, 2.2 mfd, 16V, Electrolytic
C134	8000-00004-001	Capacitor, Fixed, .01 mfd, 59V, Ceramic
C135	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C136	8000-00004-002	Capacitor, Fixed, 15 pfd, 50V, Mica
C137	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C138	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C139	8000-00004-003	Capacitor, Fixed, .04 mfd, 50V, Mylar
C140	8000-00011-012	Capacitor, Fixed, 1 pfd, 50V
C141	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C142	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C143	8000-00004-003	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C144	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C145	8000-00004-021	Capacitor, Fixed, 47 pfd, 50V, Mica
C146	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C147	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C148	8000-00004-020	Capacitor, Fixed, 100 pfd, 50V, Mica
C149	8000-00011-007	Capacitor, Fixed, .001 mfd, 50V, Mylar

SYM.	PART #	DESCRIPTION
C150	8000-00004-018	Capacitor, Fixed, .1 mfd, 50V, Mylar
C151	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C152	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C153	8000-00004-002	Capacitor, Fixed, 15 pfd, 50V, Mica
C154	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C155	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C156	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C157	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C158	800-00004-020	Capacitor, Fixed, 30 pfd, 50V, Mica
C159	Not Used	
C160	8000-00004-003	Capacitor, Fixed, .04 mfd, 50V, Mylar
C161	8000-00004-003	Capacitor, Fixed, .04 mfd, 50V, Mylar
C162	8000-00004-016	Capacitor, Fixed, 20 pfd, 50V, Mica
C201	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C202	8000-00004-010	Capacitor, Fixed, N750, 22 pfd, 50V, Ceramic
C203	8000-00004-010	Capacitor, Fixed, N750, 22 pfd, 50V, Ceramic
C204	8000-00004-010	Capacitor, Fixed, N750, 22 pfd, 50V, Ceramic
C205	8000-00004-010	Capacitor, Fixed, N750, 22 pfd, 50V, Ceramic
C206	8000-00004-022	Capacitor, Fixed, N470, 30 pfd, 50V, Ceramic
C207	8000-00004-022	Capacitor, Fixed, N470, 30 pfd, 50V, Ceramic
C208	8000-00004-022	Capacitor, Fixed, N470, 30 pfd, 50V, Ceramic
C209	8000-00004-022	Capacitor, Fixed, N470, 30 pfd, 50V, Ceramic
C210	8000-00004-022	Capacitor, Fixed, N470, 30 pfd, 50V, Ceramic
C211	8000-00004-022	Capacitor, Fixed, N470, 30 pfd, 50V, Ceramic
C212	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C213	8000-00011-011	Capacitor, Fixed, 300 pfd, 50V, Mica
C214	8000-00004-020	Capacitor, Fixed, 100 pfd, 50V, Mylar
C215	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C216	8000-00011-008	Capacitor, Fixed, 5 pfd, 50V, Mica
C217	8000-00011-011	Capacitor, Fixed, 300 pfd, 50V, Mica
C218	8000-00004-020	Capacitor, Fixed, 100 pfd, 50V, Mica
C219	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C220	8000-00011-008	Capacitor, Fixed, 5 pfd, 50V, Mica
C221	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C222	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C223	8000-00004-027	Capacitor, Fixed, 220 pfd, 50V, Mica
C224	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C225	8000-00004-013	Capacitor, Fixed, 2 pfd, 50V, Mica
C226	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C227	Not Used	
C228	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C229	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C230	8000-00011-008	Capacitor, Fixed, 5 pfd, 50V, Mica
C231	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C232	8000-00011-009	Capacitor, Fixed, 56 pfd, 50V, Mica
C233	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C234	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C235	8000-00011-012	Capacitor, Fixed, 1 pfd, 500V
C236	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C237	8000-00004-040	Capacitor, Fixed, 3 pfd, 50V, Mica
C238	8000-00004-002	Capacitor, Fixed, 15 pfd, 50V, Mica
C239	8000-00004-002	Capacitor, Fixed, 15 pfd, 50V, Mica

SYM.	PART #	DESCRIPTION
C240	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C241	8000-00004-Q17	Capacitor, Fixed, 500 pfd, 50V, Mica
C242	8000-00004-041	Capacitor, Fixed, 150 pfd, 50V, Mica
C243	8000-00004-010	Capacitor, Fixed, N750, 22 pfd, 50V, Ceramic
C244	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C245	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C246	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C301	8000-00004-024	Capacitor, Fixed, 30 pfd, 50V, Mica
C302	8000-00004-007	Capacitor, Fixed, 10 pfd, 50V, Mica
C303	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C304	8000-00011-013	Capacitor, Fixed, 2 pfd, 500V
C305	8000-00004-027	Capacitor, Fixed, 220 pfd, 50V, Mica
C306	8000-00004-020	Capacitor, Fixed, 100 pfd, 50V, Mica
C307	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C308	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C309	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C310	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C311	8000-00004-043	Capacitor, Fixed, .047 mfd, 50V, Ceramic
C312	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C313	8000-00011-009	Capacitor, Fixed, 56 pfd, 50V, Mica
C314	8000-00004-041	Capacitor, Fixed, 150 pfd, 50V, Mica
C315	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C316	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C317	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C318	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C319	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C320	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C401	8000-00004-015	Capacitor, Fixed, .05 mfd, 50V, Mylar
C402	8000-00004-018	Capacitor, Fixed, .1 mfd, 50V, Mylar
C403	8000-00004-047	Capacitor, Fixed, 10 mfd, 16V, Electrolytic
C404	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C405	8000-00004-044	Capacitor, Fixed, 220 mfd, 16V, Electrolytic
C406	Not Used	
C407	Not Used	
C408	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C409	8000-00004-009	Capacitor, Fixed, 47 mfd, 16V, Electrolytic
C410	8000-00004-009	Capacitor, Fixed, 47 mfd, 16V, Electrolytic
C411	8000-00011-015	Capacitor, Fixed, 470 mfd, 35V, Electrolytic
C412	8000-00011-014	Capacitor, Fixed, 4.7 mfd, 35V, Electrolytic
C413	8000-00004-030	Capacitor, Fixed, 4.7 mfd, 16V, Electrolytic
C414	8000-00004-047	Capacitor, Fixed, 10 mfd, 16V, Electrolytic
C415	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C416	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C417	8000-00004-045	Capacitor, Fixed, .22 mfd, 16V, Electrolytic
C418	8000-00011-003	Capacitor, Fixed, 33 mfd, 16V, Electrolytic
C419	8000-00004-009	Capacitor, Fixed, 47 mfd, 16V, Electrolytic

SYM.	PART #	DESCRIPTION
C501	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C502	8000-00011-006	Capacitor, Fixed, .1 mfd, 12V
C503	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C504	8000-00004-009	Capacitor, Fixed, 47 mfd, 16V, Electrolytic
C505	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C506	8000-00011-003	Capacitor, Fixed, 33 mfd, 16V, Electrolytic
C507	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Celectrolytic
C508	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C509	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C510	Not Used	
C511	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C512	8000-00004-009	Capacitor, Fixed, 47 mfd, 16V, Electrolytic
C513	8000-00004-042	Capacitor, Fixed, 1.0 mfd, 16V, Electrolytic
C514	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C515	Not Used	
C516	8000-00004-020	Capacitor, Fixed, 100 pfd, 50V, Mica
C517	8000-00004-011	Capacitor, Fixed, .001 mfd, 50V, Ceramic
C518	8000-00004-047	Capacitor, Fixed, 10 mfd, 16V, Electrolytic
C601	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C602	8000-00004-044	Capacitor, Fixed, 220 mfd, 16V, Electrolytic
C603	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C604	8000-00004-046	Capacitor, Fixed, 100 mfd, 16V, Electrolytic
C605	8000-00004-049	Capacitor, Fixed, 1000 mfd, 16V, Electrolytic
C606	8000-00004-009	Capacitor, Fixed, 47 mfd, 16V, Electrolytic
C607	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
C608	8000-00004-048	Capacitor, Fixed, .001 mfd, Feed-Thru
C609	8000-00004-001	Capacitor, Fixed, .01 mfd, 50V, Ceramic
CV1	8000-00004-050	Capacitor, 20 pfd, Variable
CV2	8000-00004-050	Capacitor, 20 pfd, Variable
CV3	8000-00004-050	Capacitor, 20 pfd, Variable
CV4	8000-00004-050	Capacitor, 20 pfd, Variable
CV5	8000-00004-050	Capacitor, 20 pfd, Variable
CV6	8000-00004-051	Capacitor, 30 pfd, Variable
CV7	8000-00004-051	Capacitor, 30 pfd, Variable
CV8	8000-00004-051	Capacitor, 30 pfd, Variable
CV9	8000-00004-051	Capacitor, 30 pfd, Variable
CV10	8000-00004-051	Capacitor, 30 pfd, Variable
CV11	8000-00004-051	Capacitor, 30 pfd, Variable
CV12	8000-00004-204	Capacitor, 10 pfd, Variable
CV13	8000-00004-205	Capacitor, 10 pfd, Variable

SYM.	PART #	DESCRIPTION
D1	8000-00011-041	Diode, 10D-4
D2	8000-00011-041	Diode, 10D-4
D3	8000-00004-060	Diode, 1N34A
D4	8000-00004-060	Diode, 1N34A
D5	8000-00004-060	Diode, 1N34A
D6	8000-00004-060	Diode, 1N34A
D7	8000-00011-046	Diode, 1S-1007
D8	8000-00004-063	Diode, 1N60P
D9	8000-00004-060	1N34A
D10	8000-00004-060	1N34A

SYM.	PART #	DESCRIPTION
D11	8000-00004-060	Diode, 1N34A
D12	8000-00011-042	Diode, 1S-2472
D13	8000-00011-042	Diode, 1S-2472
D14	8000-00011-042	Diode, 1S-2472
D15	8000-00004-060	Diode, 1N34A
D16	8000-00011-042	Diode, 1S-2472
D17	8000-00004-060	Diode, 1N34A
D18	8000-00004-060	Diode, 1N34A
D19	8000-00004-060	Diode, 1N34A
D20	8000-00004-060	Diode, 1N34A
D21	8000-00004-060	Diode, 1N34A
D22	8000-00011-046	Diode, 1S-1007
D23	8000-00004-248	Diode, 1S-352M
D24	8000-00011-042	Diode, 1S-2472
D25	8000-00004-060	Diode, 1N34A
D26	8000-00011-042	Diode, 1S-2472
D27	8000-00011-042	Diode, 1S-2472
D28	8000-00011-042	Diode, 1S-2472
D29	8000-00004-184	Diode, 1S-990S
D30	8000-00004-184	Diode, 1S-990S
D31	8000-00011-045	Diode, 1S-1211
D32	8000-00011-041	Diode, 10D-4
D33	8000-00011-041	Diode, 10D-4
D34	8000-00004-060	Diode, 1N34A
D35	8000-00011-044	Diode, VD-121C
D36	8000-00011-042	Diode, 1S-2472
D37	8000-00011-042	Diode, 1S-2472
D38	8000-00011-042	Diode, 1S-2472
D39	8000-00011-042	Diode, 1S-2472
D40	8000-00004-063	Diode, 1N60P
D41	8000-00004-063	Diode, 1N60P
D42	8000-00004-063	Diode, 1N60P
D43	8000-00004-063	Diode, 1N60P
D44	8000-00011-043	Diode, BZ-090
D45	8000-00011-042	Diode, 1S-2472
D46	8000-00011-043	Diode, BZ-090
D47	8000-00011-043	Diode, BZ-090
D48	8000-00011-041	Diode, 10D-4

SYM.	PART #	DESCRIPTION
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FL1	8000-00011-071	Filter, 7.8 MHz
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SYM.	PART #	DESCRIPTION
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J1	8000-00004-069	Connector, Socket, Antenna
J2	8000-00004-070	Connector, Microphone Channis Mount
J3	8000-00004-072	Connector, External Jack, Speaker
J4	8000-00004-071	Connector, P. A. Jack

SYM.	PART #	DESCRIPTION
L1	8000-00011-023	Coil, 27 MHz
L2	8000-00011-024	Coil, 34 MHz
L3	8000-00011-025	Coil, 19 MHz
L4	8000-00011-026	Coil, 15 MHz
L5	8000-00004-075	Coil, 27 MHz
L6	8000-00011-027	Coil, 27 MHz
L7	8000-00004-077	Coil, 27 MHz
L8	8000-00004-078	Coil, 27 MHz
L9	8000-00004-053	Choke, 22 uh
L10	8000-00004-059	Choke, 0.85 uh
L11	8000-00011-018	Choke, RF 150 uh
L12	8000-00011-018	Choke, RF, 150 uh
L13	Not Used	
L14	8000-00011-020	Choke, RF 470 uh
L15	8000-00011-020	Choke, RF 470 uh
L16	8000-00011-017	Choke, 5.5 uh
L17	8000-00011-016	Choke, 0.22 uh
L18	8000-00011-020	Choke, RF 470 uh
L19	Not Used	
L20	8000-00004-025	Choke, 1 uh
L21	8000-00011-016	Choke, 0.22 uh
L22	8000-00011-021	Choke AF
L23	8000-00011-019	Choke, RF 22 uh
L24	8000-00011-019	Choke, RF 22 uh
L25	Not Used	
L26	Not Used	
L27	8000-00011-022	Choke, AF
L28	8000-00004-056	Choke, 15 uh
L29	8000-00004-054	Choke, 3.0 uh
L30	8000-00011-019	Choke, RF 22 uh

SYM.	PART #	DESCRIPTION
PL1	8000-00004-142	Lamp, 16V, 40 MA
PL2	8000-00011-056	Lamp, 14V, 75 MA
PL3	8000-00004-142	Lamp, 16V, 40 MA

SYM.	PART #	DESCRIPTION
Q1	8000-00011-004	Transistor, 2SC710B
Q2	8000-00011-053	Transistor, 3SK41L
Q3	8000-00011-054	Transistor, 2SK31C
Q4	8000-00011-055	Transistor, 2SK34E
Q5	8000-00011-047	Transistor, 2SC710C
Q6	8000-00011-047	Transistor, 2SC710C
Q7	8000-00011-047	Transistor, 2SC710C
Q8	8000-00004-085	Transistor, 2SC458C
Q9	8000-00004-089	Transistor, XA-495C
Q10	8000-00011-047	Transistor, 2SC710C
Q11	8000-00011-047	Transistor, 2SC710C
Q12	8000-00011-048	Transistor, 2SC710D
Q13	8000-00011-048	Transistor, 2SC710D
Q14	8000-00011-053	Transistor, 3SK41L
Q15	8000-00011-047	Transistor, 2SC710C
Q16	8000-00011-053	Transistor, 3SK41L
Q17	8000-00011-047	Transistor, 2SC710C

SYM.	PART #	DESCRIPTION
Q18	8000-00011-048	Transistor, 2SC710D
Q19	8000-00011-047	Transistor, 2SC710C
Q20	8000-00011-053	Transistor, 3SK41L
Q21	8000-00011-048	Transistor, 2SC710D
Q22	8000-00011-051	Transistor, 2SC776(Y)
Q23	8000-00011-052	Transistor, 2SC1239
Q24	8000-00004-085	Transistor, 2SC458C
Q25	8000-00011-050	Transistor, 2SC1061
Q26	8000-00011-050	Transistor, 2SC1061
Q27	8000-00011-049	Transistor, 2SC458LGD
Q28	8000-00004-086	Transistor, 2SD77P
Q29	8000-00004-085	Transistor, 2SC458C
Q30	8000-00004-085	Transistor, 2SC458C

SYM.	PART #	DESCRIPTION
R310	8000-00011-001	Resistor, Fixed, 2.2 ohm, 1/2 watt
R408	8000-00004-091	Resistor, Fixed, 1 ohm, 1 watt
R409	8000-00004-266	Resistor, Fixed, 10 ohm, 2 watt

SYM.	PART #	DESCRIPTION
RL1	8000-00004-141	Relay, 4P-2T

SYM.	PART #	DESCRIPTION
S1		Part of VR11
S2	8000-00004-101	Switch, 2P-2T
S3	8000-00011-092	Switch, 2P-4T
S4	8000-00011-058	Switch, Rotary, 24T
S5	8000-00004-102	Switch, Rotary, 8P-3T

SYM.	PART #	DESCRIPTION
SP1	8000-00011-057	Speaker, 8 ohms

SYM.	PART #	DESCRIPTION
T1	8000-00011-028	Transformer, 27 MHz
T2	8000-00011-029	Transformer, 7.8 MHz, IF
T3	8000-00011-029	Transformer, 7.8 MHz, IF
T4	8000-00011-029	Transformer, 7.8 MHz, IF
T5	8000-00011-030	Transformer, 7.8 MHz, Detector
T6	8000-00011-031	Transformer, 7.8 MHz, Detector
T7	8000-00011-032	Transformer, 34 MHz
T8	8000-00011-033	Transformer, 34 MHz
T9	8000-00011-034	Transformer, 19 MHz
T10	8000-00011-035	Transformer, 19 MHz
T11		Transformer, Z176, 15 MHz
T12	8000-00004-118	Transformer, 27 MHz
T13	8000-00011-036	Transformer, 27 MHz
T14	8000-00011-037	Transformer, 27 MHz
T15	8000-00011-039	Transformer, AF Driver
T16	8000-00011-040	Transformer, AF Output

SYM.	PART #	DESCRIPTION
T17	8000-00011-038	Transformer, 7.8 MHz

SYM.	PART #	DESCRIPTION
VR1	8000-00004-096	Resistor, 10K ohm, Variable
VR2	8000-00004-094	Resistor, 100K ohm, Variable
VR3	8000-00011-083	Resistor, 20K ohm, Variable
VR4	8000-00011-083	Resistor, 20K ohm, Variable
VR5	8000-00004-097	Resistor, 10K ohm, Variable
VR6	8000-00011-084	Resistor, 100K ohm, Variable
VR7	8000-00011-082	Resistor, 1K ohm, Variable
VR8		Resistor, 10K x 2, Variable
VR9		Resistor, 10K x 2, Variable
VR10		Resistor, 5K, Variable
VR11		Resistor, 10K, Variable

SYM.	PART #	DESCRIPTION
X1	8000-00011-059	Crystal, 7.8025 MHz
X2	8000-00011-060	Crystal, 7.5025 MHz
X3	8000-00011-061	Crystal, 7.4825 MHz
X4	8000-00011-062	Crystal, 7.4725 MHz
X5	8000-00011-063	Crystal, 7.4625 MHz
X6	8000-00011-064	Crystal, 11.700 MHz
X7	8000-00011-065	Crystal, 11.750 MHz
X8	8000-00011-066	Crystal, 11.800 MHz
X9	8000-00011-068	Crystal, 11.850 MHz
X10	8000-00011-069	Crystal, 11.900 MHz
X11	8000-00011-070	Crystal, 11.950 MHz

MISCELLANEOUS

SYM.	PART #	DESCRIPTION
	8000-00011-072	Heat Sink, Driver Transistor
	8000-00011-073	Heat Sink, Final Transistor
	8000-00011-074	Heat Sink, Audio Output Transistor
	8000-00004-176	Mount, Feed-Thru Capacitor
	8000-00011-076	Mount, Meter
	8000-00011-077	Cord Retainer, DC
	8000-00004-151	In-Line Fuse Holder
	8000-00004-153	Microphone, Complete
	8000-00004-164	Microphone, Connector
	8000-00011-078	Fuse, 3 Amp
	8000-0000-172	Channel Window
	8000-00011-075	Cabinet
	8000-00011-079	Front, Die Cast
	8000-00011-080	Overlay, Panel "SIDEBANDER II"
	8000-00004-159	Lamp Assembly, Red, Tx
	8000-00004-145	Knob, Channel Selector
	8000-00004-147	Knob, Mode
	8000-00004-148	Knob, Volume & Squelch
	8000-00004-149	Knob, Squelch & RF Gain
	8000-00011-081	Mounting Bracket
	8000-00011-086	Meter
	8000-00011-087	Cover for Crystals
	8000-00011-088	Name Plate, FCC

SYM.	PART #	DESCRIPTION
	8000-00011-089	Mount for Speaker
	8000-00004-171	Bolt, Mounting Bracket
	8000-00004-172	Washer, Mounting Bracket
	8000-00011-091	Insulator, Rubber, Speaker

WARRANTY

Linear Systems, Inc. , wants equipment manufactured by it to be free from defects in material or workmanship and agrees to repair such equipment which under normal use and service, develops defects arising from the fault of the manufacturer. Equipment must be returned transportation prepaid within 90 days from the date of original purchase, and unless the warranty card has been filled in and returned within 10 days of original purchase, the warranty shall be void.

This warranty does not apply to equipment which (1) has been repaired or altered by anyone in any way so as, in our judgment, to injure its stability or reliability, (2) has been subject to misuse, negligence, or accident, (3) has had the serial number altered, defaced or removed, or (4) has been connected, installed, adjusted otherwise than in accordance with our written instructions.

The foregoing is in lieu of any other warranty or liability expressed implied, or statutory and in no event shall Linear Systems, Inc. , assumes nor authorizes any person to assume for it any other obligation or liability in connection with this equipment.

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