Cobra 138XLR / 139XLR Owner's Manual

Cobra 138XLR/139XLR
40-Channel
Solid State Citizens Band
SSB/AM Two-Way Radios

Cobra Communications Product Group

DYNASCAN CORPORATION
6460 W. Cortland Street
Chicago, Illinois 60635

Dear CB'er:

Welcome to the expanding family of users of Cobra Communications equipment.

I hope you will find your Two-Way Radio Communications experience to be as exciting as it is practical. Whatever the purpose of your radio system, Cobra equipment is reliable and a pleasure to use. Dynascan takes special care to provide you with equipment that is compact, handsomely styled, and thoroughly dependable. Many years of valuable experience designing test equipment and other electronic products are behind our two-way communications systems. Premium quality solid-state components and integrated circuits are incorporated into Cobra radios to assure high performance and long life. Special attention is given to each detail to bring you the finest CB radio on the market today because we know that you take pride in your communication equipment.

If you have any comments or suggestions about Cobra, please send them to us. Communications is our business, and it is very important that we communicate with you.

Thank you for your confidence in Cobra two-way radio equipment. We hope you will consider our other fine Cobra products as the need arises.

Sincerely,

Carl Korn

Carl Korn
President

INSTRUCTION MANUAL

for

Cobra 138XLR/139XLR

40-Channel

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THE CB STORY

The Citizens Band lies between the shortwave broadcast and 10-meter amateur radio bands, and was established by law in 1949. The Class D two-way communications service was opened in 1959. (CB also includes a Class A business band and Class C remote control frequencies.) Acquiring the Class D license requires no detailed technical or Morse-code knowledge that is required for a "Ham" license.

In March, 1975, the FCC reduced the cost of a CB license from $20 to $4. One license can be good for any number of sets used by a given family or business. Once you receive your Class D license for your equipment, anyone may use it.

For example, though the equipment must be licensed to someone over 18 years of age, a child can use the equipment to talk to another child, or an employee can use the equipment as part of his or her routine services. However, final responsibility of legal operation rests with the CB licensee.

NOTE

FCC regulations permit only "transmissions" (one party to another) rather than "broadcasts" (to a wide audience). Thus, advertising is not allowed on CB channels because it is *broadcasting.*

HAVE
A GOOD DAY
TODAY
AND
A BETTER DAY
TOMORROW!

Section I
Introduction

The COBRA 138XLR and 139XLR transceivers represent the most advanced SSB/AM two-way radios ever designed for use as Class D stations in the Citizens Radio Service. Both units feature advanced Phase Lock Loop (PLL) circuitry which is used in the AM mode and in the upper and lower single sideband modes, providing complete coverage of all 40 channels shown below.

Channel	Channel Frequency in MHz	Channel	Channel Frequency in MHz
1	26.965	21	27.215
2	26.975	22	27.225
3	26.985	23	27.255
4	27.005	24	27.235
5	27.015	25	27.245
6	27.025	26	27.265
7	27.035	27	27.275
8	27.055	28	27.285
9	27.065	29	27.295
10	27.075	30	27.305
11	27.085	31	27.315
12	27.105	32	27.325
13	27.115	33	27.335
14	27.125	34	27.345
15	27.135	35	27.355
16	27.155	36	27.365
17	27.165	37	27.375
18	27.175	38	27.385
19	27.185	39	27.395
20	27.205	40	27.405

The COBRA 138XLR and 139XLR have vastly superior receivers which include RF gain control, Automatic Noise Limiting, and Noise Blanker circuitry which is effective in both AM and SSB modes. The receivers also feature increased protection against cross modulation and strong adjacent channel signals.

To obtain maximum performance from your transceiver, please read carefully the following descriptions and operating instructions.

FCC WARNING*

1. Operation of this equipment requires a valid Station License issued by the Federal Communications Commission. Do not transmit with your equipment until you have received your License. Illegal operation can result in severe penalties. Be certain you have read Part 95 of the FCC Rules and Regulations, before operating your station.

2. License applications are to be made on FCC Form 505, available from your nearest field office. (A copy of this form is included with your new COBRA transceiver.)

3. You are required to maintain a current copy of Part 95 of the FCC Rules, as part of your Station records. Copies of Part 95 are available from the Superintendent of Documents, GPO, Washington, D.C. 20402.

4. Your Station License is to be posted in accordance with paragraph 95.101 of the Rules and an executed Transmitter Identification Card (FCC Form 452-C) is to be attached to each transmitter. (A copy of this form also is included with your new COBRA transceiver.)

5. FCC Rules require that ALL transmitter adjustments other than those supplied by the manufacturer as front panel operating controls, be made by, or under the supervision of, the holder of an FCC-issued 1st or 2nd Class Radio Operator License.

6. Replacement or substitution, of crystals, transistors, regular diodes or any other part of a unique nature, with parts other than those recommended by Dynascan, may cause violation of the technical regulations of Part 95 of the FCC Rules, or violation of the Type Acceptance requirements of Part 2 of the Rules.

*Excerpted from Part 95 of the FCC Rules and Regulations.

Section II
Specifications

Cobra 138XLR

GENERAL

Channels	40AM, 40LSB, 40USB.
Frequency Range	26.965 to 27.405MHz.
Frequency Control	Phase Lock Loop (PLL) synthesizer.
Frequency Tolerance	0.005%.
Frequency Stability	0.001%.
Operating Temperature Range	-30°C to +50°C.
Microphone	Plug-in type; dynamic with push-to-talk switch and coiled cord.
Input Voltage	13.8 VDC nominal 15.9 V max., 11.7 V min. (positive or negative ground).
Current Drain	*Transmit:* AM full mod., 3A; SSB, 12 watts PEP output, 2.5A. *Receive:* Squelched, 1A; maximum audio output, 2A.
Size	2-3/8"H, 7-7/8"W, 10½"D.
Weight	5 pounds.
Antenna Connector	UHF, S0239.
Semiconductors	45 transistors, 7 field effect transistors, 7 integrated circuits, 52 diodes and 1 light emitting diodes.
Meter	Illuminated; indicates relative power output and received signal strength.

TRANSMITTER

Power Output	AM, 4 watts. SSB, 12 watts, PEP.
Modulation	AM, high- and low-level Class B.
Intermodulation Distortion	SSB: 3rd and 5th order, more than -25dB. 7th and 9th order, more than -35dB.
SSB Carrier Suppression	More than -45dB.
Unwanted Sideband	More than -45dB.
Frequency Response	AM and SSB: 350 to 2500 Hz.
Output Impedance	50 ohms, unbalanced.
SSB Filter	7.8 MHz, crystal lattice type: 6dB @ 4.2 KHz 60dB @ KHz
Output Indicators	Meter shows relative RF output power; transmit light shows when transmitter is in operation.

RECEIVER

Sensitivity	SSB: Less than .25μV for 10dB (S+N)/N at greater than ½-watt of audio output. AM: Less than .75μV for 10dB (S+N)/N at greater than ½-watt of audio output.
Selectivity	SSB and AM: 6dB @ 4.2 KHz, 60dB @ 7.0 KHz.
Cross Modulation	More than 55dB.
Image Rejection	More than 50dB.
IF Frequency	AM and SSB: 7.8 MHz.
Adjacent Channel Rejection	AM: -60dB; SSB: -65dB.
AM and SSB RF Gain Control	Adjustable for optimum signal reception.

Automatic Gain Control	(AGC): Less than 10dB change in audio output for inputs from 10 to 500,000 microvolts.
Squelch	Adjustable; threshold less than .5μV.
Noise Blanker	RF type, effective on AM and SSB.
Voice Lock Range	±600 Hz.
Audio Output Power	3.5 watts into 8 ohms.
Frequency Response	350 to 2500 Hz.
Distortion	Less than 10% at 3.5 watts output.
Built-in Speaker	8 ohms, round.
External Speaker (Not Supplied)	8 ohms; disables internal speaker when connected.

PA SYSTEM

Power Output	3.5 watts into external speaker.
External Speaker for PA	8 ohms (not supplied).

Cobra 139XLR

GENERAL

Channels	40AM, 40LSB, 40USB.
Frequency Range	26.965 to 27.405MHz.
Frequency Control	Phase Locked Loop (PLL) synthesizer.
Frequency Tolerance	0.005%.
Frequency Stability	0.001%.
Operating Temperature Range	-30°C to +50°C.
Microphone	Plug-in type; dynamic with push-to-talk switch and coiled cord.
Power Consumption (120 VAC)	*Transmit:* Full mod., 88 watts. *Receive:* Squelched, 45 watts.
Current Drain (13.8 VDC)	*Transmit:* AM full mod., 3A; SSB, 12 watts PEP output, 2.8A. *Receive:* Squelched, 1A; full audio output, 2A.
Size	5″H, 13½″W, 13″D.
Weight	10 pounds.
Antenna Connector	UHF, S0239.
Meters	Shows relative power output, received signal strength, modulation percentage and SWR.
Semiconductors	48 transistors, 7 field effect transistors, 7 integrated circuits, 58 diodes and 1 light emitting diode.

TRANSMITTER

Power Output	AM, 4 watts. SSB, 12 watts, PEP.
Modulation	AM, high- and low-level Class B.

Intermodulation Distortion	SSB: 3rd and 5th order, more than -25db. 7th and 9th order, more than -35dB.
SSB Carrier Suppression	More than -45dB.
Unwanted Sideband	More than -45dB.
Frequency Response	AM and SSB: 350 to 2500 Hz.
Output Impedance	50 ohms, unbalanced.
SSB Filter	7.8 MHz, crystal lattice type: 6db @ 4.2 KHz 60db @ 7.0 KHz
Output Indicators	Meters show relative RF output power, percentage of modulation and SWR.

RECEIVER

Sensitivity	SSB: Less than .25μV for 10db (S+N)/N at greater than ½-watt of audio output. AM: Less than .75μV for 10dB (S+N)/N at greater than ½-watt of audio output.
Selectivity	SSB and AM: 6dB @ 4.2 KHz, 60dB @ 7.0 kHz.
Cross Modulation	More than 55dB.
Image Rejection	More than 50dB.
IF Frequency	AM and SSB: 7.8 MHz.
Adjacent Channel Rejection	AM: -65db; SSB: -70dB.
AM and SSB RF Gain Control	Adjustable for optimum signal reception.
Automatic Gain Control	(AGC): Less than 10dB change in audio output for inputs from 10 to 500,000 microvolts.

Squelch	Adjustable; threshold less than .5μV.
Noise Blanker	RF type, effective on AM and SSB.
Voice Lock Range	±600 Hz.
Audio Output Power	3.5 watts into 8 ohms.
Frequency Response	350 to 2500 Hz.
Distortion	Less than 10% at 3.5 watts output.
Built-in Speaker	8 ohms.
External Speaker (Not Supplied)	8 ohms; disables internal speaker when connected.
Input Voltage	120 VAC 60 Hz nominal, 132 VAC maximum and 108 VAC minimum.
	13.8 VDC nominal, 15.9 VDC maximum and 11.7 VDC minimum (positive or negative ground).

PA SYSTEM

Power Output	3.5 watts into external speaker.
External Speaker for PA	8 ohms (not supplied).

Section III
Installation

COBRA 138XLR

LOCATION

Plan the location of the transceiver and microphone bracket before starting the installation. Select a location that is convenient for operation and does not interfere with the driver or passengers in the vehicle. In automobiles, the transceiver is usually mounted below the dash panel, with the microphone bracket beside it.

MOUNTING AND CONNECTION

The COBRA 138XLR is supplied with a universal mounting bracket. When mounting the bracket and radio to your car, make sure it is mechanically strong. Also provide a good electrical connection to the chassis of the vehicle. Proceed as follows to mount the transceiver:

1. After you have determined the most convenience location in your vehicle, hold the COBRA 138XLR with mounting bracket in the exact location desired. If nothing will interfere with mounting it in the desired position, remove the mounting bracket and use it as a template to mark the location for the mounting bolts. Before drilling the holes, make sure nothing will interfere with the installation of the mounting bolts.

2. Connect the antenna cable plug to the standard receptacle on the rear panel. Most CB antennas are terminated with a type PL-259 plug and mate with the receptacle.

3. Connect the red DC power input wire (with the fuse) to +13.8 VDC. This wire extends from the rear panel. In automobile installation, +13.8 VDC is usually obtained from the accessory contact on the ignition switch. This prevents the set being left on accidentally when the driver leaves the car and also permits operating the unit without the engine running. Locate the accessory contact on most ignition switches by tracing the power wire from the AM broadcast receiver in the car.

4. Connect the black lead to - 13.8 VDC. This is usually the chassis of the car. Any convenient location with good electrical contact (remove paint) may be used.

5. Mount the microphone bracket on the right side of the transceiver or near the tranceiver, using two screws supplied. When mounting in an automobile, place the bracket under the dash so the microphone is readily accessible.

IGNITION NOISE INTERFERENCE

Use of a mobile receiver at low signal levels is normally limited by the presence of electrical noise. The primary source of noise in automobile installations is from the generator and ignition system in the vehicle. Under most operating conditions, when signal level is adequate, the background noise does not present a serious problem. Also, when extremely low level signals are being received, the transceiver may be operated with vehicle engine turned off. The unit requires very little current and therefore will not significantly discharge the vehicle battery.

Even though the COBRA 138XLR has ANL and NB controls in some installations ignition interference may be high enough to make good communications impossible. The electrical noise may come from several sources. Many possibilities exist and variations between vehicles require different solutions to reduce the noise. Consult your COBRA dealer or a 2-way radio technician for help in locating and correcting the source of severe noise.

ANTENNA

Since the maximum allowable power output of the transmitter is limited by the FCC, the antenna is one important factor affecting transmission distance. Only a properly matched antenna system will allow maximum power transfer from the 50 ohm transmission line to the radiating element. In mobile installations (cars, trucks, boats, etc.), an antenna system that is non-directional should be used.

A vertically polarized, quarter-wavelength whip antenna provides the most reliable operation and greatest range. Shorter, loaded-type whip antennas are more attractive, compact and adequate for applications where the maximum possible distance is not required. Also, the loaded whips do not present the problems of height imposed by a full quarter-wavelength whip.

Mobile whip antennas utilize the metal body of the vehicle as a ground plane. When mounted at a corner of the vehicle they are slightly directional, in the direction of the body of the vehicle. For all practical purposes, however, the radiation pattern is nondirectional. The slight directional characteristic will be observed only at extreme distances. A standard antenna connector (type SO 239) is provided on the transceiver for easy connection to a standard PL 259 cable termination.

If the transceiver is not mounted on a metal surface, it is necessary to run a separate ground wire from the unit to a good metal electrical ground in the vehicle. When installed in a boat, the transceiver will not operate at maximum efficiency without a ground plate, unless the vessel has a steel hull.

Before installing the transceiver in a boat, consult your dealer for information regarding an adequate grounding system and prevention of electrolysis between fittings in the hull and water.

TUNING THE ANTENNA FOR OPTIMUM SWR

Since there is such a wide variety of base and mobile antennas, this section will strictly concern itself to the various types of mobile adjustable antennas.

Because the antenna length is directly related to the channel frequency, it must be tuned to resonate optimally all 40 channels of the transceiver. Channel 1 requires a longer antenna than Channel 40 because it is lower in frequency.

Due to the various methods of adjusting antennas for proper SWR we have chosen what we think is the optimum method:

A. Antennas with adjustment screws (set screws).

1. Start with the antenna extended and tighten the set screw lightly enough so that the antenna can be lightly tapped with your finger for easy adjustment.

2. Set your COBRA 138XLR to Channel 21. Press the PTT (push-to-talk) switch, and tap the antenna (making it shorter). The SWR meter will show a lower reading each time the antenna is tapped. By continuing to shorten the antenna you will notice the SWR reading will reach a low point and then start rising again. This means that you have passed the optimum point for Channel 21. Extend the antenna a short distance and again follow the procedure above.

When the lowest point has been reached, switch to Channel 1 and then to Channel 40 and compare SWR readings. They should be almost equal.

B. Antennas which must be cut to proper length.

1. Follow the same procedure as above, but adjust the length by cutting in 1/8″ increments until a good match is obtained.

   Be very careful not to cut too much at one time, as once it is cut, it can no longer be lengthed.

   The whip is easily cut by filing a notch all way way around and breaking the piece off with pliers.

NOTE

THE PROPER SETTING IS ACHIEVED WHEN THE SWR IS 1.5 OR BELOW, AND WHEN IT HAS THE SAME READING FOR CHANNELS 1 AND 40.

If you are having difficulties in adjusting your antenna, check the following:

A. All doors must be closed when adjusting the antenna.

B. Make sure the antenna base is grounded.

C. Check your coaxial cable routing (it may be pinched when routed into the car).

D. Try a different location on your car (keeping in mind the radiation pattern you wish).

E. Is the antenna perfectly vertical?

F. Try a different location in your neighborhood. Stay away from large metal objects when adjusting (metal telephone or light posts, fences, etc.)

NOTE

THE COBRA 138XLR will operate into an SWR of 2 to 1 indefinitely and sustain open or short-circuit conditions a maximum of 5 seconds at rated operating conditions.

BASE STATION OPERATION
(Operating from 120 VAC House Current)

To operate your transceiver from your home or office, using the regular house current as the power source, you will require the DYNASCAN Model CA-20 PowerPak which has been specially designed for the purpose. It is available as optional equipment from your dealer. It consists of a precision-built AC-DC power converter that delivers the required power for the operation of the transceiver. The CA-20 operates from any 120-volt, 60 Hz power source. Simply connect the red (+) and black (-) leads of the transceiver to the corresponding terminals of the CA-20.

NOTE

Do not attempt to operate this transceiver by connecting directly to 120 volts AC.

When the CA-20 Power-Pak is used with the transceiver for base station operation, any Citizens Band beam, dipole, ground plane or vertical antenna may be used. A ground plane vertical antenna will provide the most uniform horizontal coverage.

BASE STATION ANTENNA

Antenna height is an important factor when maximum range is desired. Keep the antenna clear of surrounding structures or foliage. FCC regulations for base station antenna height are:

1. Omni-directional antennas may not be higher than 60 feet above the ground when using a tower, mast or pole, and no higher than 20 feet above an existing structure.

2. Beam antennas may not be higher than 20 feet above the ground when using a tower, mast, pole, or 20 feet above an existing structure.

These are only general regulations applicable to most but not all parts of the nation. Locations near airports and some military installations are subject to different rules, therefore it is best to contact your nearest Federal Communications office for information regarding your specific area.

COBRA 139XLR

Prior to beginning operation of the transceiver, a basic installation must be prepared. Installation of the transceiver itself is a rather simple procedure.

In selecting the location for the unit, two basic factors must be considered:

1. Access to a 120V, 60Hz power source.

2. The location must be convenient for running the antenna lead-in cable if an outside antenna installation is proposed.

BASE STATION ANTENNA

Since the maximum allowable power output of the transmitter is limited by the FCC, the antenna is one important factor affecting transmission distance. Only a properly matched antenna system will allow maximum power transfer from 50-ohm transmission line to the radiating element. Most quality antennas previously suitable for use on AM also will be satisfactory for SSB. Due to the nature of an SSB transmitter, the VSWR must be kept below 2:1 or instability of the final amplifier might occur.

The recommended method of antenna tuning is to use an in-line watt-meter or VSWR bridge to adjust the antenna for minimum reflected power on channel 21 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.

The radio may be used with any type of 50-ohm base station antenna. A ground plane vertical antenna will provide the most uniform horizontal coverage.

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 interferring 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.

MOBILE OPERATION/EMERGENCY POWER OPERATION

It is possible to operate the COBRA 139XLR from an external 13.8 VDC power supply for emergency power conditions or from an automobile battery for mobile operation (see COBRA 138XLR Installation Section for mobile suggestions). The COBRA 139XLR is supplied with a polarized plug for operation on external DC supply.

The plug is coded as follows:

Negative lead is black.

Positive lead is red and has the in-line fuse holder as an integral part of the positive lead.

COBRA 138XLR & 139XLR

PUBLIC ADDRESS

An external 8 ohm, 4 watt speaker may be connected to the PA speaker jack located on the rear panel when the transceiver is used as a public address system. The speaker should be directed away from the microphone to prevent acoustic feed-back. Physical separation or isolation of the microphone and speaker must be used when operating the PA at high output levels.

REMOTE SPEAKER

The external speaker jack (EXT. SPKR.) 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 4 watts.

When the external speaker is plugged in the internal speaker is disconnected.