Cobra 29 Cobrapak Owner's Manual

CobraPak 29
Citizens Band 2-Way
Mobile/Base Radio System

Cobra Communications Product Group

DYNASCAN CORPORATION
1801 W. Belle Plaine Avenue
Chicago, Illinois 60613

Dear CB'er:

Welcome to the expanding family of Cobra Communications users.

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

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Section I
Introduction

The CobraPak 29 consists of the highly efficient and popular Cobra 29, 23 Channel CB transmitter-receiver; AC-DC conversion unit; extension speaker; SWR meter; controls; and a take-apart antenna, all built into a rugged carrying case.

The CobraPak 29 was designed to provide a compact, trouble-free, complete CB communications system that is not permanently installed. No tools or involved procedures are required for installation or take-down; just clamp the antenna (with wingnuts provided) to the mirror bracket, plug the DC line-cord adapter into the cigarette lighter socket and you are ready to go on the air.

In order to overcome truck noise, the extension speaker provided can be located in any desirable place in the cab, such as the dog house, dash board, seat, etc., or it can be positioned outside temporarily, and used with the microphone and voice amplifier of CobraPak 29 as a public address sytem.

During stop-overs, between truck assignments, the CobraPak 29 can be used in your hotel room or home; just clamp the antenna to any suitable metal pipe, or railing, and plug the AC power cord into an available AC outlet; or the CobraPak 29 can be used as a base station with any permanently installed CB antenna.

In addition to conventional CB radio controls, the CobraPak 29 includes a DYNAMIKE control to enable you to vary the amount your voice modulates the transmitted signal. A small green light flashes brigher or dimmer, depending upon the percentage of voice modulation. An RF gain control can be adjusted to optimize reception in strong signal areas.

The DELTA-TUNE control can be used to fine tune the received signal, thereby eliminating, or at least minimizing interference from powerful adjacent channels. A PWR/S meter indicates relative transmitter power when transmitting, and input signal strength when receiving. The S meter is illuminated when power is on. The CobraPak 29 also includes an SWR meter to enable you to verify at any time, at a glance, whether your antenna is properly installed.

Two replaceable fuses are provided. One fuse is in use when the CobraPak 29 is being powered by a DC source, and both fuses are used when an AC source is used. The case is designed with convenient storage areas for the antenna and for the AC and/or DC line cords when they are not in use.

Due to inclusion of protective circuitry in your Cobra radio, operation of unit with a faulty antenna installation will not damage the radio, as would occur with many other CB radios without such protection.

Section II
Specifications

GENERAL

Channels	23
Frequency Range	26.965 to 27.255 MHz.
Frequency Control	Crystal synthesizer.
Frequency Tolerance	0.005%
Operating Temperature Range	-20°C to +50°C.
Microphone	Plug-in type; dynamic.
Input Voltage	1. 13.8 VDC nom., neg. or pos. ground, polarity-protected. 2. 115 VAC ±10%, 60Hz.
Current Drain	*Transmit:* AM, full mod., 1.5A; *Receive:* Squelched, 0.3A; full audio output, 1.2A.
Fuse Ratings	32 VDC, 2A. 250 VAC, 1A.
Size	16-1/8" x 14-1/16" x 7-1/2".
Weight	15 pounds.
Semiconductors	26 transistors, 31 diodes, 1 integrated circuit.
Signal Strength Meter	Illuminated; indicates power ON, relative power output, and received signal strength.
Antenna	Top-loaded, ¼-wave, heliwhip.
Antenna Connector	UHF, SO239.
SWR Meter	Indicates standing wave ratio.

TRANSMITTER

Power Output	4 watts, nominal.
Modulation	High and low level Class B amplitude modulation.

Modulation Capability	100%, adjustable with DYNAMIKE microphone gain control.
Frequency Response	300-2500 Hz.
Output Impedance	50 ohms, unbalanced.
Output Indicators	S Meter shows relative RF output power; SWR meter indicates standing wave ratio; red lamp indicates transmitter is being operated; green lamp shows modulation.

RECEIVER

Sensitivity	Less than 1μV for 10dB (S+N)/N.
Selectivity	6dB @ 4kHz, 40dB @ 20 kHz.
Image Rejection	30 dB.
I.F. Frequencies	Double conversion, 1st: ll.275 MHz. 2nd: 455 kHz.
Automatic Gain Control (AGC)	Less than 10 db Change in audio output for inputs from 10 to 500,000 microvolts.
RF Gain Control	Adjustable for optimum signal reception.
Noise Blanker	RF type, with balanced diode gate.
ANL Noise Limiter	Audio type, AGC reference.
Delta Tune Range	± 600 Hz, continuously adjustable.
Squelch	Adjustable; threshold less than 1μV.
Audio Output Power	2.5 watts into 8 ohms.
Frequency Response	300-3000 Hz.
Distortion	Less than 10% @ 2.5 watts – 1000 Hz.
External Speaker	8 ohms, 2 watts, 5 watts maximum.

PA SYSTEM

Power Output	3 watts into external speaker.
External Speaker for PA (not supplied; external speaker can be used as a PA speaker)	8 ohms; when PA-CB switch is in PA, the PA speaker also monitors the receiver, separate jack provided.

Section III
General Information

The CobraPak 29 provides high level, trouble-free performance in the Citizens Radio Service which is comprised of the following frequency assignments:

Channel	Channel Frequency in MHz	Channel	Channel Frequency in MHz
1	26.965	12	27.105
2	26.975	13	27.115
3	26.985	14	27.125
4	27.005	15	27.135
5	27.015	16	27.155
6	27.025	17	27.165
7	27.035	18	27.175
8	27.055	19	27.185
9	27.065	20	27.205
10	27.075	21	27.215
11	27.085	22	27.225
		23	27.255

To obtain maximum performance from your CobraPak 29, please read carefully the following descriptions and operating instructions.

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 FCC field office. (A copy of Form 505 is included with your new CobraPak 29.

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 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 CobraPak 29.)

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, regulator 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.

Section IV
Installation

LOCATION

Select a location that is convenient for operation and does not interfere with the driver or passengers in your vehicle, or with the family activity in the home. In automobiles, the CobraPak 29 is usually placed on the seat beside the driver, so that the DC input adapter can reach the cigarette lighter. In 18-wheelers, the same principle applies, but because of the engine noise the speaker is removed from its storage, and placed where desirable by the driver. In the home, any convenient AC outlet can be utilized.

ANTENNA INSTALLATION

After you have determined the most convenient location for your CobraPak 29, remove the antenna from the case and assemble the mast. Make sure that ferrules are fully bottomed in their mating sockets. If both ferrules are not *fully* bottomed in their sockets, the standing wave ratio (SWR) will be too high and will prevent efficient signal radiation.

For mobile use, install the antenna assembly on the outside mirror mount bracket so that the mast is vertical; tighten the wing nuts. With the Allen wrench provided, tighten the set screw so that it bites into the metal of the mirror mount bracket. Connect the antenna cable plug to the receptacle on the rear panel of the CobraPak 29.

POWER CONNECTION

Remove the cigarette lighter and insert the DC power input cord adapter in the cigarette lighter socket.

Rotate the VOLUME control knob to the right (clockwise): if the S meter lamp glows, your CobraPak 29 is ready to operate as described in Section V. If the S meter lamp does not glow, it probably means that the vehicle battery leads are hooked up differently from the battery leads on the vehicle in which you last used your CobraPak 29. In that case you must reverse the polarity of the DC power cord by changing the setting of the +GND- switch on the rear panel.

IGNITION NOISE INTERFERENCE

The presence of electrical noise will normally adversely affect reception when you're operating your mobile receiver at low signal levels. The primary source of electrical noise in such installations is the generator and ignition system in the vehicle. Under most operating conditions, when signal level is adequate, the background electrical noise does not present a serious problem. When extremely low level signals are being received, the transceiver may be operated with vehicle engine turned off. Your CobraPak 29 requires very little current and therefore will not significantly discharge the vehicle battery.

Even though the CobraPak 29 has a selective automatic noise blanker and a selective automatic noise limiter, in some installations ignition interference may be high enough to make communications difficult. The electrical noise may come from several sources. Many possibilities exist and variations between vehicles require different solutions to reduce the electrical noise. Consult your DYNASCAN dealer or a 2-way radio technician for help in locating and correcting the source of severe electrical noise.

ANTENNA MATCHING

The maximum allowable power output of the transmitter is limited by the FCC; therefore, the antenna is a vital factor in transmission distance. Only a properly matched antenna system will allow maximum power transfer from the 50 ohm transmission line to the radiating element or mast.

Your CobraPak 29 is equipped with a loaded-type whip antenna, which is compact and adequate for applications where the maximum possible distance is not required. Loaded whips do not present the problems of clearance imposed by the 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 non-directional. The slight directional characteristic will be observed only at extreme distances.

When installed in a boat, the transceiver may not operate at maximum efficiency without a ground plane, such as the hull of the boat.

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

STANDING WAVE RATIO

Since the maximum transmit power of all CB radios is limited to 4 watts by FCC regulations, it is obviously important that as much as possible of this transmit power be radiated by the antenna mast, or in other words, that as little energy as possible should be wasted in overcoming resistance in faulty connections in the transmission line, and in mismatched antenna systems in general. The transmission line is an electrical conductor which is terminated by the antenna mast at one end, and by the transmitter at the other end. If the impedance of the mast differs from the impedance of the transmission line, some of the electrical energy flowing to the mast will be reflected back toward the source as a *standing wave*. In other words, separate voltage and current waves develop in the antenna system, instead of being radiated in phase (in step), as RF energy, by the antenna mast.

When the antenna is properly installed, the output impedance of the radio will be equal to, that is *match*, the impedance of the transmission line, which in turn matches the mast impedance. Your CobraPak 29 is provided with an SWR meter to enable you to determine visually, at a glance, whether the ratio of standing waves in relation to transmitted RF energy is low enough to allow your signals to be strong enough. An SWR of 2:1 means that about 90 percent of available power is being radiated. An SWR greater than 2:1 (less than 90 percent) will not provide a satisfactory signal.

Every time the antenna location, or installation is changed, an SWR check should be performed as follows:

1. Rotate CAL control fully to the left (counterclockwise).

2. Set FWD/REV switch to FWD.

3. Depress the press-to-talk switch on the microphone to actuate the transmitter. At the same time rotate CAL control slowly clockwise until the SWR meter pointer indicates SET.

4. While still holding the press-to-talk switch depressed, move the FWD/REV switch to REV and note the number indicated by the meter pointer. An indication of "2" (SWR of 2:1 or less is acceptable. An indication greater than 2 means that the antenna is improperly installed. Check your installation, with particular reference to the following:

   a. Three sections of mast properly bottomed.

b. Mast standing vertical on a horizontal mounting base.

c. Set screw biting into mount.

d. Cable connector properly installed and connector sleeve screwed fully down.

BASE STATION
(Operation from 110-120 VAC, House Current)

To operate the CobraPak 29 from your home, hotel, or office, use the regular house current as the power source, and set the AC switch to ON. Install the antenna on the horizontal section of any convenient metal object. A pipe, banister rail, etc., will suffice as a ground plane provided the horizontal section is at least eight feet in length. If there is a Citizens Band beam, dipole, ground plane or vertical antenna available, it can be used instead of the CobraPak 29 antenna.

PUBLIC ADDRESS

An external 8-ohm, 3-watt speaker may be connected to the PA SPKR jack located at the rear panel when the transceiver is used as a public address system. The CobraPak 29 speaker can be used, by transferring the plug from the EXT SPKR jack to the PA jack. The speaker should be directed away from the microphone to prevent acoustic feedback. Physical separation or isolation of the microphone and speaker is important when operating the PA at high output levels.

ALTERNATE MICROPHONES AND INSTALLATION

For best results, the user should select a low-impedance dynamic type microphone or a transistorized microphone. Transistorized type microphones have a low output impedance characteristic. The microphones must be provided with a four-lead cable. The audio conductor and its shielded lead comprise two of the leads. The third lead is for transmit/receive control and the fourth lead is the speaker return lead which disables the speaker during transmit. The microphone should provide the functions shown in schematic below.

4-Wire Mic Cable

Pin Number	Mic Cable Lead
1	Audio Shield
2	Audio Lead
3	Transmit Control
4	Receive Control

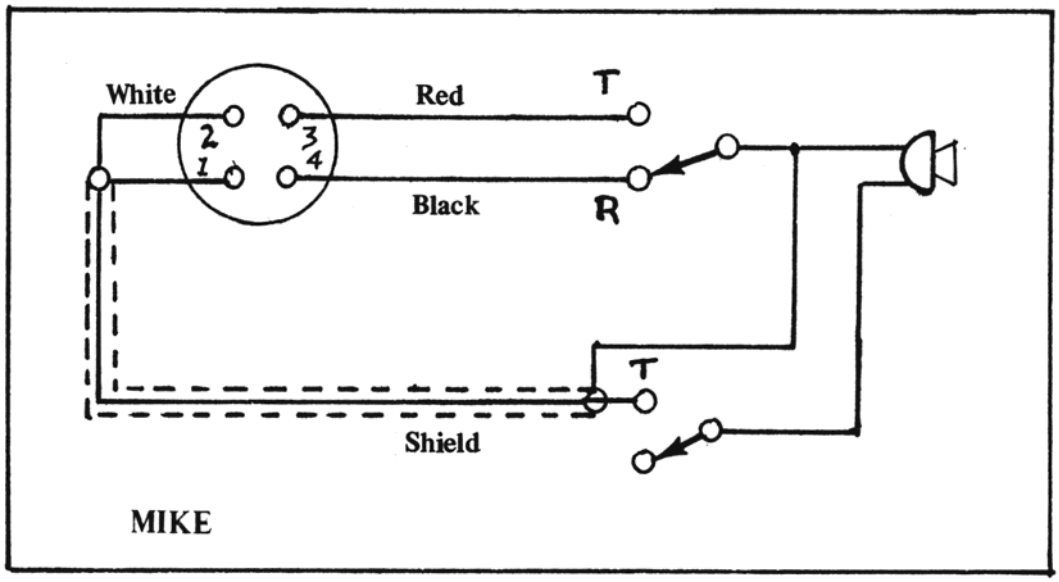


Fig. 1.

If the microphone to be used is provided with pre-cut leads, they must be revised as follows:

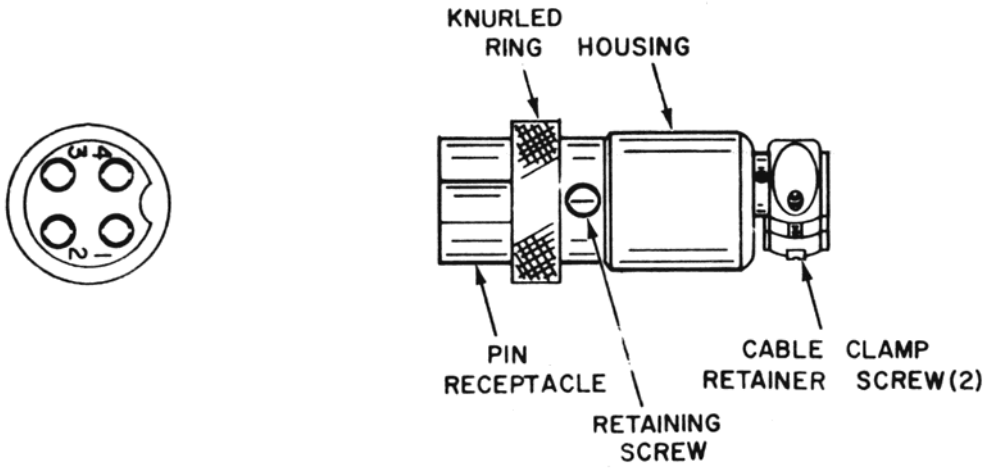
1. Cut leads so that they extend 7/16" beyond the plastic insulating jacket of the microphone cable. (See Fig. 1.)

2. All leads should be cut to the same length. Strip the ends of each wire 1/8" and tin the exposed wire.

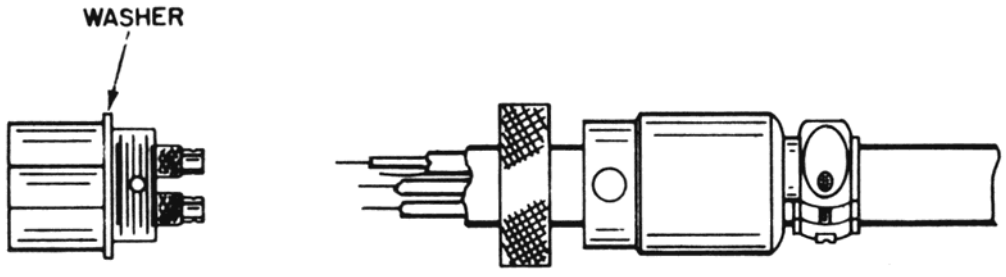
Before beginning the actual wiring, read carefully the circuit and wiring information provided with the microphone you select. Use the minimum heat required in soldering the connections. Keep the exposed wire lengths to a minimum to avoid shorting when the microphone plug is reassembled.

To wire the microphone cable to the plug provided, proceed as follows (see Fig. 2):

1. Remove the retaining screw.
2. Unscrew the housing from the pin receptacle body.
3. Loosen the two cable clamp retainer screws.
4. Feed the microphone cable through the housing, knurled ring and washer as shown in Fig. 2B.



A. MICROPHONE CONNECTOR ASSEMBLY



B. MICROPHONE CONNECTOR DISASSEMBLED FOR WIRING

Fig. 2. Microphone plug wiring

5. The wires must now be soldered to the pins as indicated in the above wiring tables. If a vise or clamping tool is available it should be used to hold the pin receptacle body during the soldering operation, so that both hands are free to perform the soldering. If a vise or clamping tool is not available, the pin receptacle body can be held in a stationary position by inserting it into the microphone jack of the front panel. The numbers of the pins of the microphone plug are shown in Fig. 3, as viewed from the back of the plug. Before soldering the wire to the pins, pre-tin the wire receptacle of each pin of the plug.

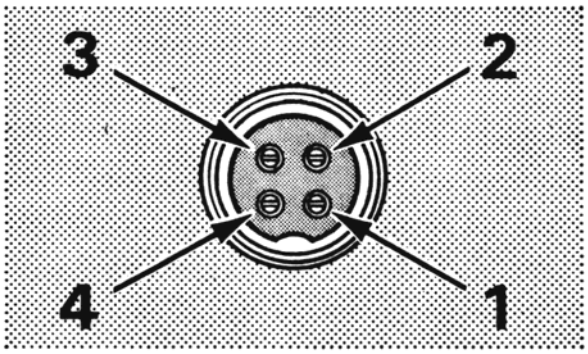


Fig. 3. Microphone plug pin numbers viewed from rear of pin receptacle

Be sure that the housing and the knurled ring of Fig. 2 are pushed back onto the microphone cable before starting to solder. If the washer is not captive to the pin receptacle body, make sure that it is placed on the threaded portion of the pin receptacle body before soldering.

If the microphone jack is used to hold the pin receptacle during the soldering operation, best results are obtained when the connections to pins 1 and 4 are made first and then the connections to pins 2 and 3. Use a minimum amount of solder and be careful to prevent excessive solder accumulation on the pins, which could cause a short between the pin and the microphone plug housing.

6. When all soldering connections to the pins of the microphone plug are complete, push the knurled ring and the housing forward and screw the housing onto the threaded portion of the pin receptacle body. Note the location of the screw clearance hole in the plug housing with respect to the threaded hole in the pin receptacle body. When the housing is completely threaded onto the pin receptacle body, a final fraction of a turn either clockwise or counterclockwise may be required to align the screw hole

with the threaded hole in the pin receptacle body. When these are aligned, the retaining screw is then screwed into place to secure the housing to the pin receptacle body.

7. The two cable clamp retainer screws should now be tightened to secure the housing to the microphone cord. If the cutting directions have been carefully followed, the cable clamp should secure to the insulating jacket of the microphone cable.

8. Upon completion of the microphone plug wiring, the microphone plug is secured to the CobraPak 29 MIC connector as follows:

WARNING: Unplug all power sources.

a. Remove the chassis cover by removing six phillips screws.

b. Disconnect the old microphone connector from the MIC jack on the left side of the receiver-transmitter, and remove the old microphone cable from the chassis cover.

c. Install the new microphone by reversing the procedures described in steps a and b.

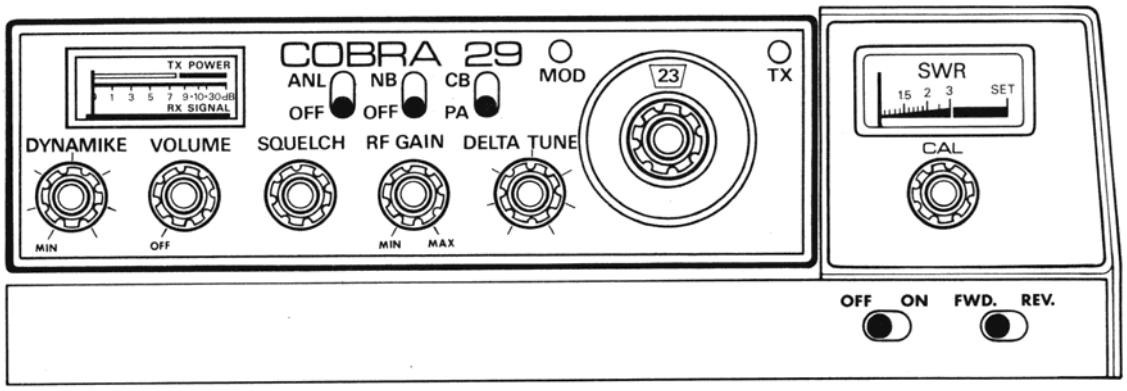
NOTE

The radio will not work unless a microphone is installed in the MIC connector.

Section V
Operation

CONTROLS AND INDICATORS

There are twelve controls and four indicators on the front panel of your CobraPak 29.



A. CONTROL FUNCTIONS

1. **DYNAMIKE.** This control is used to vary the amount of modulation when transmitting. In the public address function, the DYNAMIKE control serves as the volume control.

2. **OFF/ON/VOLUME.** Turn clockwise to apply power to the unit and to set the desired listening level.

3. **SQUELCH.** This control is used to cut off or eliminate receiver electrical noise in the absence of an incoming signal. For maximum receiver sensitivity it is desired that the control be adjusted only to the point where the receiver electrical background noise is eliminated. Turn fully counter-clockwise, then slowly clockwise until the receiver noise disappears. Any signal to be received must now be slightly stronger than the average receiver 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.

4. **RF GAIN.** Adjust as required to optimize signal. This control is used primarily to optimize reception in strong signal areas. Gain is reduced by counterclockwise rotation of the control.

5. **DELTA-TUNE.** For normal operation set the control to the center position. This feature has several uses and can greatly enhance receiver operation. First, if a received signal is slightly off frequency, the DELTA-TUNE control can be used to optimize the received signal level.

   The effectiveness of the DELTA-TUNE feature under these conditions can be observed either by listening for a more readable signal at the speaker or by noting an S-meter reading when the DELTA-TUNE control is operated. Another effective application of this control is in eliminating adjacent-channel interference. If it is verified that an exceptionally high-level signal from an adjacent channel is creating interference on the channel being used, the DELTA-TUNE can be used to minimize or eliminate the interference. Operate the control as required to obtain minimum adjacent-channel interference.

6. **CHANNEL SELECTOR.** This switch selects any one of the twenty-three Citizens Band channels desired. The selected channel is illuminated in the circle portion of the Channel Selector dial.

NOTE

Channel 9 has been reserved by the FCC for emergency communications involving the immediate safety of life of individuals or immediate protection of property. Channel 9 may also be used to render assistance to a motorist. Channel 11 has been reserved as a call channel. After establishing contact on it you should transfer your conversation to another channel.

7. **ANL SWITCH.** Activates the automatic noise limiter in the audio circuits.

8. **NB SWITCH.** Activates the RF noise blanker, which is designed to inhibit repetitive impulse noise, such as ignition interference.

9. **PA-CB SWITCH.** Selects the mode of operation. The PA function should not be used unless an external speaker is connected as described in the INSTALLATION SECTION of this manual. NOTE: In the CB position, the PA function is disabled and the unit will transmit and receive on the selected frequency. In the PA position the transmit function is disabled.

10. **CAL.** This control is used to calibrate the SWR meter preliminary to performing an SWR check.

11. **OFF-ON.** When this switch is set to ON, your CobraPak 29 is adapted for operation from a 120 VAC source. For vehicular use, the setting of the ON switch is unimportant.

12. **FWD/REV.** This switch is set to FWD when the CAL knob is being adjusted to set the SWR meter. To avoid damaging the SWR meter, this switch should be left set at REV, except when it is being used to set the SWR meter.

13. **+GND–.** This slide switch is located on the rear panel, and it is used to adapt the DC power cord wiring to either a positive-grounded or negative-grounded battery.

B. INDICATORS

1. **PWR/S METER.** Shows relative transmitter power when transmitting and input signal strength when receiving. Illuminated when power is on.

2. **MOD LIGHT.** In transmit, this green light flashes at the modulation rate. The brightness of the light is proportional to the percent of modulation.

3. **TX LIGHT.** The red light located to the right of the channel selector is an output indicator device which is activated when the transmitter is keyed.

4. **SWR METER.** This meter is used to check the standing wave ratio on the antenna system.

C. MICROPHONE

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

D. OPERATING PROCEDURE TO RECEIVE

1. Place CB-PA switch in CB position and advance RF GAIN control fully clockwise.

2. Turn the set ON by turning the VOLUME control clockwise, until a click is heard.

3. Set the VOLUME for a comfortable listening level.

4. Listen to the background noise from the speaker. Turn the SQUELCH control slowly clockwise, until the noise just disappears. (No signal should be present.) Leave the control at this setting. The SQUELCH is now properly adjusted. The receiver will remain quiet until a signal is actually received. Do not advance the control too far, or some of the weaker signals will not be heard.

5. Set the CHANNEL selector switch to the desired channel.

E. OPERATING PROCEDURE TO TRANSMIT.

1. Select the desired channel for transmission.

2. If the channel is clear, depress the push-to-talk switch on the microphone and speak in a normal voice. The MOD (green) lamp will light, indicating proportional output power.

F. ACCESSORY CIRCUIT OPERATION

1. **ANL/OFF.** Slide the ANL switch to ANL position. It activates the noise reduction circuits of the automatic noise limiter.

2. **NB/OFF.** If excessive ignition noise interference is present, activate the noise blanker circuitry by placing the NB switch to the NB position.

3. **RF GAIN.** If the signal is very strong, reduce the RF GAIN by rotating the RF GAIN control counterclockwise to optimize the quality of the received signal. Note that the SQUELCH control may require some readjustment with reduced RF GAIN.

4. **PUBLIC ADDRESS (PA) OPERATION.** To use this feature, the external speaker should have a voice coil impedance of 8 ohms and a power-handling capability of at least three watts. Connect speaker to PA SPKR jack on rear panel. The CobraPak 29 speaker is usable as a PA speaker if desired; just transfer speaker plug from EXT SPKR jack to PA SPKR jack.

   Complete elimination of outside signals can be obtained by disconnecting the antenna cable from the transceiver. With the PA speaker connected, be sure there is physical separation between the microphone and the speaker itself. If the speaker is located close to the microphone, acoustic feedback (howl) will result when the PA system is operated at high volume.

WARRANTY SERVICE INSTRUCTIONS

1. Refer to instruction manual for adjustments that may be applicable.

2. Check common electrical parts. Always check instruction manual for applicable adjustments after such replacement.

3. Defective parts removed from units which are within the warranty period should be sent to the factory prepaid with model and serial number of product from which removed and date of product purchase. These parts will be exchanged at no charge.

4. If the above-mentioned procedures do not correct the difficulty, pack the product securely using the same packaging arrangement as supplied by the manufacturer. A detailed list of troubles encountered must be enclosed as well as your name and address. Forward prepaid (express preferred) to the nearest Dynascan authorized communication service agency.

Contact your local Dynascan Distributor for the name and location of your nearest Cobra service agency, or write to:

Cobra Service Department

DYNASCAN CORPORATION

2815 West Irving Park Road
Chicago, Illinois 60618

90-DAY LIMITED WARRANTY

"DYNASCAN warrants that each product manufactured by it will be free from defects in materials and workmanship under normal usage and service for a period of ninety days after its purchase new from an authorized COBRA distributor. Our obligation under this warranty is limited to repairing or replacing any product or component which we are satisfied does not conform with the foregoing warranty and which is returned to our factory or our authorized service contractor, transportation prepaid, and we shall not otherwise be liable for any damages, consequential or otherwise. *The foregoing warranty is exclusive and in lieu of all other warranties (including any warranty of merchantability), whether expressed or implied.* Such warranty shall not apply to any product or component (i) repaired or altered by anyone other than DYNASCAN or its authorized service contractor (except normal tube replacement) without DYNASCAN's prior written approval; (ii) tampered with or altered in any way or subjected to misuse, negligence or accident, (iii) which has the serial number altered, defaced or removed; or (iv) which has been improperly connected, installed or adjusted otherwise than in accordance with DYNASCAN's instructions. DYNASCAN reserves the right to discontinue any model at any time or change specifications or design without notice and without incurring any obligation. *The warranty shall be void and there shall be no warranty of any product or component if a DYNASCAN warranty registration card is not properly completed and postmarked to the DYNASCAN factory within ten days after the purchase of the product new from an authorized COBRA distributor.*

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Communications Product Group

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