

Cobra[®]

Owner's Manual



AMATEUR 10 METER MOBILE RADIO

150 GTL DX

Printed in Philippines
Part No. 480-216-P
Version A

Nothing comes close to a Cobra[®]

English



Our Thanks to You and FCC License Required

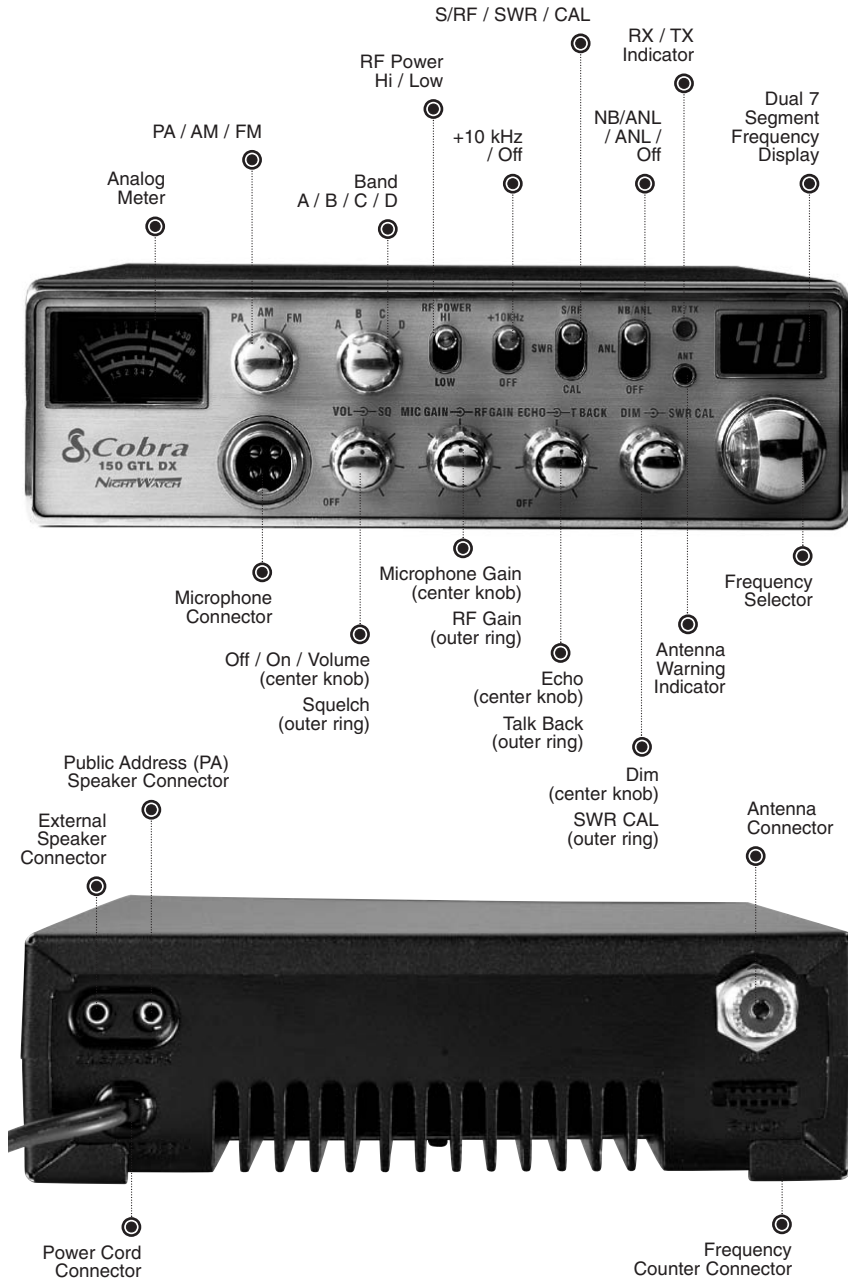
Our Thanks to You

Thank you for purchasing a Cobra amateur mobile radio. Properly used, this Cobra product will give you many years of reliable service.

FCC License Required

The United States Federal Communications Commission (FCC) requires that users of the frequencies on which this radio operates be licensed. See page 16 for licensing and other FCC information.

Controls and Indicators



Microphone



WARNING

RISK OF ELECTRIC SHOCK. DO NOT OPEN. DO NOT REMOVE COVER OR BACK. NO USER SERVICEABLE PARTS INSIDE. REFER TO SERVICING TO QUALIFIED SERVICE PERSONNEL.

Features

- > **341 Operating Frequencies**
Allows operation on all available frequencies.
- > **15 Watts Output Power**
Provides maximum power on AM and FM.
- > **Dual Finals**
Provides steady output power.
- > **Dual Power**
Allows operation on Low and High power.
- > **SWR Calibration**
Allows measurement and adjustment of the antenna system.
- > **Antenna Warning Indicator**
Illuminates when the antenna system needs repair or adjustment.
- > **Echo Control**
Allows control of echo effect.
- > **Talk-Back Control**
Allows user to monitor feedback of output signal.
- > **Large Analog Meter**
Provides high visibility of status meter.
- > **NightWatch™ Panel**
Electroluminescent illumination of front panel for night operation.
- > **4 Pin Front Mic Connector**
Allows convenient installation in-dash.
- > **Frequency Counter Jack**
Allows connection of a 6-digit frequency counter.
- > **Mic Gain Control**
Allows increased voice clarity by dynamically boosting microphone.

This Cobra radio has a superior receiver that includes an RF gain control and noise blanker circuitry as well as an automatic noise limiter. The receiver also features increased protection against cross modulation and strong adjacent signals.

To obtain maximum performance, please read carefully the descriptions and operating instructions in this manual.



Introduction

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Your Mobile Radio

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Specifications

| General | |
|-----------------------------|---|
| Frequency Range | 28.0 to 29.7 MHz |
| Frequency Control | Phase Lock Loop (PLL) synthesizer |
| Frequency Stability | 0.005% |
| Operating Temperature Range | -22°F to 122°F (-6°C to + 50°C) |
| Antenna Impedance | 50 ohms |
| Antenna Connector | Standard SO 239 type |
| Microphone | Plug-in dynamic with Press-To-Talk switch and coiled cord |
| Input Voltage | 13.8 V DC nominal, 15.9 V max., 10.0 V min. (positive or negative ground) |
| Current Drain | Transmit: 3.0 A Receive (squelched): 0.5 A Receive (maximum audio output): 1.2 A |
| Size | 2 $\frac{3}{8}$ " (H) x 7 $\frac{7}{8}$ " (W) x 9 $\frac{3}{4}$ " (D) [6 cm (H) x 20 cm (W) x 24.8 cm (D)] |
| Weight | 4.8 lbs. |
| Meter (3-in-1) | Illuminated – indicates relative output power, received signal strength, and SWR |
| Built-in Speaker | 4 watts |
| Transmitter | |
| Power Output | Low – 4 watts; High – 15 watts |
| Frequency Response | 300 to 3,000 Hz |
| Frequency Tolerance | 500 Hz |
| Transmit Distortion | 2% |
| Spurious Harmonic Emission | -65 dB |
| Output Indicators | Meter shows relative RF output power and SWR. Transmit LED glows red when transmitter is in operation. |
| Antenna Warning LED | Glows red when SWR is greater than 3.0. |



Specifications

| Receiver | |
|---------------------------------|---|
| Sensitivity | AM: 0.5 μ V for 10 dB S/N FM: 0.25 μ V for 12 dB S/N |
| Audio Frequency Response | 300 to 3,000 Hz |
| Maximum Signal to Noise Ratio | 45 dB |
| Image Rejection | 75 dB |
| Adjacent Channel Rejection | 65 dB |
| RF Gain Control (AGC) | 40 dB – adjustable for optimum signal reception |
| Squelch | Adjustable – threshold less than 0.5 μ V |
| Automatic Noise Limiter (ANL) | Switchable |
| Noise Blanker (NB) | Switchable |
| Receive Indicators | Meter shows relative signal strength. Receive LED glows green when receiving a signal. |
| PA System | |
| Power Output | 4 watts into PA speaker |
| Speaker for PA (Not Supplied) | 8 ohms |
| External Speaker | |
| Power Output | 4 watts into external speaker |
| External Speaker (Not Supplied) | 8 ohms |

(Specifications subject to change without notice)

Included in this Package

You should find all of the following items in the package with your radio.

Transceiver



Universal Mounting Bracket



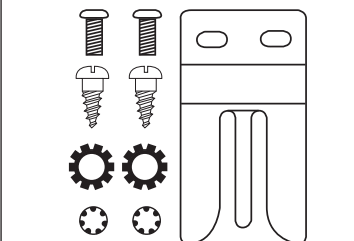
Operating Instructions



Microphone



Microphone Bracket



Installation and Connection

Refer to the illustration on page A3 for connection points on the back of the unit while installing your radio.

--> Location

Plan the location of the transceiver and microphone brackets 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

Your mobile radio 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:

--> Mount the Transceiver

1. After you have determined the most convenient location in your vehicle, hold the mobile radio with the mounting bracket in the exact location desired. If nothing will interfere with mounting it in the desired position, remove the thumbscrews and use the mounting bracket as a template to mark the holes for the mounting screws. Before drilling the holes, make sure nothing behind the surface will be damaged or interfere with the installation.
2. Connect the antenna cable plug to the standard receptacle (ANT) on the rear panel. Most 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 V DC. This wire extends from the rear panel. Connect directly to positive terminal (red) of vehicle's battery.
4. Connect the black lead to -13.8 V DC. 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 either side of the transceiver, using the two screws supplied. When mounting in an automobile, place the bracket under the dash so the microphone is readily accessible.
6. Attach the microphone cable to the connector on the face of the transceiver.



NOTE

If power cables need to be shorter, we recommend attaching a 10 amp fuse to positive cable (red) at least six inches from vehicle's battery.



Installation and Connection

--▶ 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. However, 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 your mobile radio 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 two-way radio technician for help in locating and correcting the source of severe noise.

--▶ Antenna

In addition to transmitter power, the antenna is an 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, 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 non-directional. 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.



Installation and Connection

--▶ Tuning the Antenna for Optimum SWR

Because such a wide variety of base and mobile antennas are available, this section will concern itself only with the usual types of mobile adjustable antennas.

Antenna length is directly related to signal frequency. Therefore, it must be tuned to resonate optimally throughout the frequency range of the transceiver. Lower frequencies require a longer antenna than higher frequencies.

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

A. Antennas with adjustable screws (setscrews).

1. Start with the antenna extended and tighten the setscrew lightly enough so that the antenna can be lightly tapped with your finger for easy adjustment.
2. Set your mobile radio to your desired operating frequency or the center of the range of frequencies you plan to use. Press the PTT (Press-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 the middle frequency.
3. Extend the antenna a short distance and again follow the procedure above.
4. When the lowest point has been reached, switch to 28.0 MHz and then to 29.7 MHz and compare SWR readings. They should be almost equal.

B. Antennas that must be cut to proper length.

1. Follow the procedure as in A above, but adjust the length by cutting in 1/8" increments until a good match is obtained.
2. **Be very careful not to cut too much off the antenna at one time. Once it is cut, it can no longer be lengthened.**
3. The whip is easily cut by filing a notch all the way around, then 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 the low and high frequencies in the range you plan to use.



Installation and Connection

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

1. All doors must be closed when adjusting the antenna.
2. Make sure the antenna base is grounded.
3. Check your coaxial cable routing — it may be pinched where routed into the car.
4. Try a different location on your car — keeping in mind the radiation pattern you want.
5. Make sure the antenna is perfectly vertical.
6. Try a different location in your neighborhood. Stay away from large metal objects (metal utility or light poles, fences, etc.) when adjusting.



NOTE

The radio will operate into a SWR of 2 to 1 indefinitely and sustain an SWR of 20 to 1 for a maximum of 5 minutes at rated operating conditions.

--▶ External Speaker

The external speaker jack (EXT) 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 four watts. When the external speaker is plugged in, the internal speaker is disabled.

--▶ Public Address

To use the transceiver as a public address system, connect an external 8 ohm speaker that is able to handle at least four watts to the PA jack on the rear panel. Direct the speaker 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.

Operation

There are 15 controls and 4 indicators on the front panel of your mobile radio. These are shown in the illustration on page A2 which may be folded out for reference when using this section.



Controls

--▶ Off / On / Volume

Turn clockwise to apply power to the unit and to set the desired listening level. During normal operation, the volume control is used to adjust the output level obtained either at the transceiver speaker or the external speaker, if used.

--▶ Squelch

This control is used to cut off or eliminate receiver background 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 background noise or ambient background noise is eliminated. 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 that a signal must overcome in order to be heard. Only strong signals will be heard at the maximum clockwise setting.

--▶ Microphone Gain

Adjusts the microphone gain in the transmit and PA modes. This controls the gain to the extent that full talk power is available several inches away from the microphone. In the Public Address (PA) mode, the control functions as the volume control for the PA speaker.

--▶ RF Gain

Used to reduce the gain of the RF amplifier when receiving very strong signals.

--▶ PA / AM / FM

Selects the mode of operation. In the **AM** and **FM** positions, the PA function is disabled and the unit will transmit and receive on the internal speaker. In the PA mode, incoming transmissions will be heard through the PA speaker. This allows you to monitor messages while outside of your vehicle. To use the PA feature, a speaker having a voice coil impedance of 8 ohms and a power handling capability of at least four watts should be used. This speaker must be plugged into the PA SPKR jack at the rear of the transceiver. If the public address feature is to be used primarily for outdoor applications, the use of a weatherproof horn-type public address speaker is recommended. The durability of this type speaker plus the inherent efficiency of such a speaker will provide more than adequate results when combined with the high audio output level available from your radio. With the PA speaker connected as outlined previously, be sure that there is physical separation between the microphone and the speaker itself. If the speaker is located too close to the microphone, acoustic feedback will result when the public address system is operated at high volume. A directional-type outdoor speaker reduces the amount of isolation required. Some experimentation will determine the minimum amount of isolation required for a given sound level from the public address system.



NOTE

The microphone gain knob also controls the PA volume when in PA mode.



Controls

--▶ RF Power Hi / Low

Places the transmitter in high power (15 watts) mode when the switch is in the **hi** position and in low power (4 watts) mode when it is in the **low** position.

--▶ S/RF / SWR / CAL

When this switch is in the **S/RF** position, the display meter swings proportionally to the strength of the signal received or the output power being transmitted.

When it is in the **SWR** position, the standing wave ratio is measured on the display meter.

When it is in the **CAL** position, the SWR function can be calibrated on the display meter by adjusting the SWR CAL control to move the needle to the calibration mark on the display meter face.

--▶ Dim

Adjusts the NightWatch™ panel and meter brightness from min. to max. The antenna warning LED is not affected by this control.

--▶ SWR CAL

This control is used in conjunction with the S/RF / SWR / CAL switch to calibrate the standing wave ratio circuit to full scale on the display meter in preparation for measuring the standing wave ratio that the antenna is presenting to the transceiver.

The standing wave ratio can be checked to insure that maximum power is being radiated for the longest signal range. The antenna must be in good condition, properly adjusted and matched to your transceiver. The SWR function of the display meter lets you easily measure your antenna condition. To operate this function, select a frequency near the middle of the range such as 28.850 MHz or the one you plan to use most. With the power on, set the S/RF / SWR / CAL switch to the **CAL** position. Press and hold the microphone Press-To-Talk button and, using the SWR CAL knob, adjust the meter to the **CAL** position indicated on the display meter. Then, while releasing the microphone button, switch the S/RF / SWR / CAL switch to the **SWR** position. Again press and hold the microphone Press-To-Talk button and read the SWR indicated. Lower figures are the better, with 1 being ideal. Generally, readings up to 3 are acceptable, but a reading greater than 3 indicates that you are losing radiated power and antenna adjustment may be advisable.



Controls

--▶ NB/ANL / ANL / Off

When this switch is in the **ANL** position, only the automatic noise limiter in the audio circuits is activated. When the switch is placed in the **NB/ANL** position, the RF noise blanker also is activated. The RF noise blanker is very effective for repetitive impulse noise such as ignition interference. When the switch is in the **off** position, both the noise blanker and the automatic noise limiter are disabled.

--▶ Echo

This control is used to adjust the output level of the echo circuit. It is also detented at the fully counter clockwise position to turn off the echo circuit.

--▶ Talk Back

This control is used to adjust the desired amount of modulation talk back that is present at the speaker during transmit.

Frequency

Three controls and one indicator are used together to set and display the radio frequency on which your mobile radio will receive and transmit signals. In this connection, it is important to understand the frequency bands built into the unit and the way they are displayed on the Dual 7 Segment Display.

The 10 meter frequency range is broken down into four bands on your mobile radio. These are selected using the Band A / B / C / D knob.

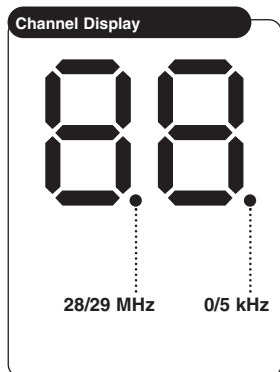
| Band | Frequency Range — MHz |
|------|-----------------------|
| A | 28.000 – 28.495 |
| B | 28.500 – 28.995 |
| C | 29.000 – 29.495 |
| D | 29.500 – 29.700 |

Within each band, frequencies can be selected in 5 kHz increments, such as 28.005 MHz in Band A or 29.455 MHz in Band C. These are selected using the Frequency Selector knob after the band has been chosen.

--> Dual 7 Segment Frequency Display

Frequencies are displayed on the Dual 7 Segment Frequency Display using a combination of numerical figures and decimal points. The figures indicate the first two values after the decimal point in the frequency, such as the 00 in 28.005 MHz. The right hand decimal point in the display indicates whether the third value after the decimal point in the frequency is 0 or 5 — if the right hand decimal is visible on the display, the third value is 5; if it is not visible, the third value is 0. The left hand decimal point in the display (between the two figures) indicates whether the two values before the decimal point in the frequency are 28 or 29 — if the left hand decimal is visible on the display, the first two values are 29; if it is not visible, the first two values are 28. Refer to the examples in the following table.

| Frequency Display | Frequency |
|-------------------|-----------|
| 0 0 | 28.000 |
| 0 0. | 28.005 |
| 0.0 | 29.000 |
| 0.0. | 29.005 |
| 3 5 | 28.350 |
| 4 5. | 28.455 |
| 2.5 | 29.250 |
| 6.3. | 29.635 |



Frequency

--> Band A / B / C / D

This control selects the desired frequency band.

--> Frequency Selector

This detented control is a 360° multi-position switch used to increase or decrease the operating frequency in 5 or 10 kHz steps within the selected band.

--> +10 kHz / Off

When this switch is in the **off** position, the operating frequency is increased or decreased by 5 kHz with each click of the frequency selector knob. When it is in the **+10 kHz** position, faster tuning is available because the operating frequency is increased or decreased by 10 kHz with each click of the frequency selector knob.



Indicators

--▶ Analog Meter

The meter needle swings proportionally to the strength of the incoming signal or RF output power in receive or transmit modes.

When used to tune the antenna or monitor the quality of the coaxial cable and RF electrical connections, the needle swings proportionally to the ratio of standing wave ratio and RF output. If there is any degradation in these, due to humidity, salt, spray, vibration or corrosion, the SWR meter reading will rise, thereby indicating that a problem exists.

--▶ RX / TX Indicator

This indicator glows green when in receive mode and red when in transmit mode.

--▶ Antenna Warning Indicator

This indicator glows red whenever the standing wave ratio is greater than 3 to 1.

Microphone

The receive and transmit modes are controlled by the Press-To-Talk (PTT) switch on the microphone. Press the switch to transmit, release it to receive. When transmitting, hold the microphone two inches from the mouth and speak clearly in a normal voice.

To substitute for the supplied low-impedance (500 ohm) dynamic microphone, see the alternate microphones and installation section on page 17.



Operating to Receive

To begin operating your radio:

1. Be sure the power source, microphone and antenna are properly connected.
2. Turn the unit on by turning the volume knob clockwise and set the volume for a comfortable listening level.
3. Set the PA / AM / FM switch to the desired AM or FM.
4. Set the RF gain control fully clockwise for maximum RF gain.
5. Listen to the background noise from the speaker, then turn the squelch ring 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.
6. Select the desired frequency with the band and frequency selector knobs.
7. Adjust other controls as desired.

Operating to Transmit

To transmit a signal:

1. Select the desired frequency for transmission if different from the one chosen to receive.
2. Set the microphone gain knob fully clockwise.
3. If the frequency is clear, depress the Press-To-Talk switch on the microphone and speak in a normal voice.

Maintenance

The transceiver is specifically designed for the environment encountered in mobile installations. The use of all solid-state circuitry and its light weight result in high reliability. Should a failure occur, however, replace parts only with identical parts. Do not substitute.



NOTE

If the performance described in the operation sections is not obtained, review the installation instructions to insure that proper procedures were followed. If a problem still exists, refer to the product service section on page 23.

Government Regulatory Information

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

Transmitting using this radio requires an Amateur Radio License. If you live in the United States, visit <http://www.fcc.gov> or <http://www.arrl.org> for further licensing information. In Canada, visit <http://strategis.ic.gc.ca> or <http://www.rac.ca/>.

Alternate Microphones and Installation

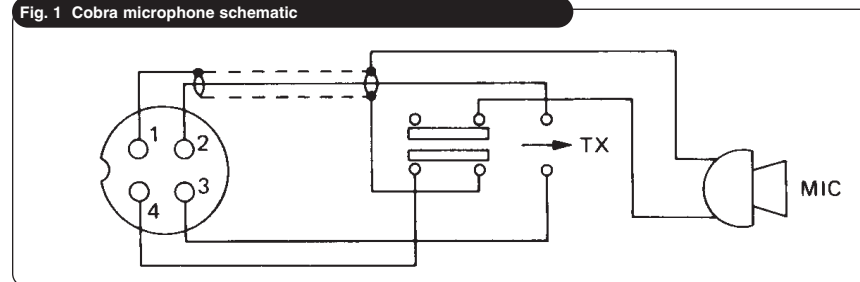
For best results, the user should select a low-impedance dynamic type microphone or a transistorized microphone. Transistorized-type microphones have a low output impedance characteristic. The microphone must be provided with a four-lead cable. The audio conductor and its shielded lead comprise two of the leads. The third lead is for receive control, the fourth is for transmit control.

The microphone should provide the functions shown in the schematic below.

--> 4 Wire Mic Cable

| Pin Number | Mic Cable Lead |
|------------|------------------|
| 1 | Grounding |
| 2 | Audio Lead |
| 3 | Transmit Control |
| 4 | Receive Control |

Fig. 1 Cobra microphone schematic



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 $\frac{7}{16}$ " beyond the plastic insulating jacket of the microphone cable (see Fig. 2).
2. All leads should be cut to the same length. Strip the ends of each wire $\frac{1}{8}$ " 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.

Alternate Microphones and Installation

Fig. 2 Microphone cable preparation

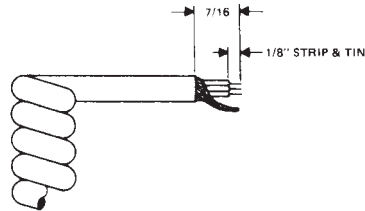


Fig. 3 Microphone plug wiring

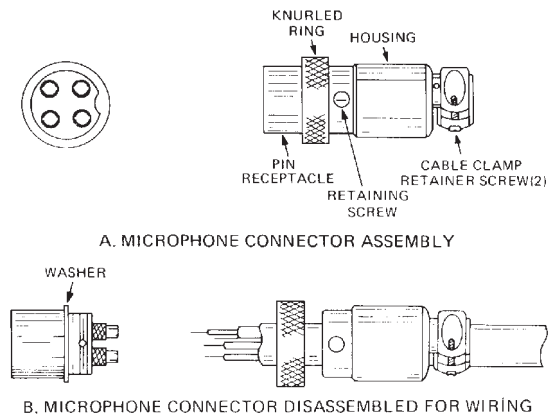
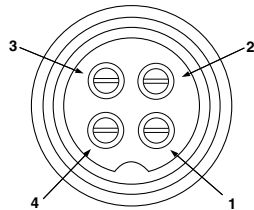


Fig. 4 Microphone plug pin numbers viewed from rear of pin receptacle



Alternate Microphones and Installation

To wire the microphone cable to the plug provided, proceed as follows:

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 Fig. 3B.
5. The wires must now be soldered to the pins as indicated in the wiring table. 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 on the front panel. The numbers of the pins of the microphone plug are shown in Fig. 4, as viewed from the back of the plug. Before soldering the wires to the pins, pre-tin the wire receptacle of each pin of the plug.
Be sure that the housing and the knurled ring of Fig. 3 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 soldering operation, best results are obtained when the connections to pins 1 and 3 are made first and then the connections to pins 2 and 4. Use a minimum amount of solder and be careful to prevent excessive solder accumulation on 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 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 into 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 insulation jacket of the microphone cable.
8. Upon completion of the microphone plug wiring, connect and secure the microphone plug in the transceiver.

**ARRL Q Signals**

The most commonly used are shown **bold**.

Some have slightly modified meanings in everyday usage.

The official list follows.

| | |
|------------|--|
| QRA | What is the name of your station? The name of your station is ____. |
| QRG | Will you tell me my exact frequency (or that of ____)? Your exact frequency (or that of ____) is ____ kHz. |
| QRH | Does my frequency vary? Your frequency varies. |
| QRI | How is the tone of my transmission? The tone of your transmission is ____ (1. Good, 2. Variable, 3. Bad). |
| QRJ | Are you receiving me badly? I cannot receive you. Your signals are too weak. |
| QRK | What is the intelligibility of my signals (or those of ____)? The intelligibility of your signals (or those of ____) is ____ (1. Bad, 2. Poor, 3. Fair, 4. Good, 5. Excellent). |
| QRL | Are you busy? I am busy (or I am busy with ____). Please do not interfere. |
| QRM | Is my transmission being interfered with? Your transmission is being interfered with ____ (1. Nil, 2. Slightly, 3. Moderately, 4. Severely, 5. Extremely). |
| QRN | Are you troubled by static? I am troubled by static ____ (1-5 as under QRM). |
| QRO | Shall I increase power? Increase power. |
| QRP | Shall I decrease power? Decrease power. |
| QRQ | Shall I send faster? Send faster (____ WPM). |
| QRS | Shall I send more slowly? Send more slowly (____ WPM). |
| QRT | Shall I stop sending? Stop sending. |
| QRU | Have you anything for me? I have nothing for you. |
| QRV | Are you ready? I am ready. |
| QRW | Shall I inform ____ that you are calling on ____ kHz? Please inform ____ that I am calling on ____ kHz. |
| QRX | When will you call me again? I will call you again at ____ (on ____ kHz). |
| QRY | What is my turn? Your turn is numbered ____. |
| QRZ | Who is calling me? You are being called by ____ (on ____ kHz). |
| QSA | What is the strength of my signals (or those of ____)? The strength of your signals (or those of ____) is ____ (1. Scarcely perceptible, 2. Weak, 3. Fairly Good, 4. Good, 5. Very Good). |
| QSB | Are my signals fading? Your signals are fading. |

**ARRL Q Signals**

| | |
|------------|--|
| QSD | Is my keying defective? Your keying is defective. |
| QSG | Shall I send ____ messages at a time? Send ____ messages at a time. |
| QSK | Can you hear me between your signals and if so can I break in on your transmission? I can hear you between my signals; break in on my transmission. |
| QSL | Can you acknowledge receipt? I am acknowledging receipt. |
| QSM | Shall I repeat the last message which I sent you, or some previous message? Repeat the last message which you sent me (or message(s) number(s) ____). |
| QSN | Did you hear me (or ____) on ____ kHz? I did hear you (or ____) on ____ kHz. |
| QSO | Can you communicate with ____ direct or by relay? I can communicate with ____ direct (or by relay through ____). |
| QSP | Will you relay to ____? I will relay to ____. |
| QST | General call preceding a message addressed to all amateurs and ARRL members. This is in effect "CQ ARRL." |
| QSU | Shall I send or reply on this frequency (or on ____ kHz)? Send or reply on this frequency (or ____ kHz). |
| QSV | Shall I send a series of Vs on this frequency (or on ____ kHz)? Send a series of Vs on this frequency (or on ____ kHz). |
| QSW | Will you send on this frequency (or on ____ kHz)? I am going to send on this frequency (or on ____ kHz). |
| QSX | Will you listen to ____ on ____ kHz? I am listening to ____ on ____ kHz. |
| QSY | Shall I change to transmission on another frequency? Change to transmission on another frequency (or on ____ kHz). |
| QSZ | Shall I send each word or group more than once? Send each word or group twice (or ____ times). |
| QTA | Shall I cancel message number ____? Cancel message number ____. |
| QTB | Do you agree with my counting of words? I do not agree with your counting of words. I will repeat the first letter or digit of each word or group. |
| QTC | How many messages have you to send? I have ____ messages for you (or for ____). |
| QTH | What is your location? My location is ____. |
| QTR | What is the correct time? The correct time is ____. |
| QTV | Shall I stand guard for you? Stand guard for me. |
| QTX | Will you keep your station open for further communication with me? Keep your station open for me. |
| QUA | Have you news of ____? I have news of ____. |

Limited Two-Year Warranty

--▶ For Products Purchased in the U.S.A.

Cobra Electronics Corporation warrants that its Cobra radios, and the component parts thereof, will be free of defects in workmanship and materials for a period of two years from the date of first consumer purchase. This warranty may be enforced by the first consumer purchaser, provided that the product is utilized within the U.S.A.

Cobra will, without charge, repair or replace, at its option, defective radios, products or component parts, accompanied by proof of the date of first consumer purchase, such as a duplicated copy of a sales receipt.

You must pay any initial shipping charges required to ship the product for warranty service, but the return charges will be at Cobra's expense, if the product is repaired or replaced under warranty.

This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

Exclusions: This limited warranty does not apply: 1) To any product damaged by accident; 2) In the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs; 3) If the serial number has been altered, defaced or removed; 4) If the owner of the product resides outside the U.S.A.

All implied warranties, including warranties of merchantability and fitness for a particular purpose are limited in duration to the length of this warranty. Cobra shall not be liable for any incidental, consequential or other damages; including, without limitation, damages resulting from loss of use or cost of installation.

Some states do not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply to you.

--▶ For Products Purchased Outside the U.S.A.

Please contact your local dealer for warranty information.

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Product Service

If you have any questions about operation or installing your new Cobra product, or if you are missing parts...

Please call Cobra first! DO NOT RETURN THIS PRODUCT TO THE STORE!

--▶ For Products Purchased in the U.S.A.

If your product should require service, please call at 800-638-3680 to obtain a repair authorization number and the address to which to send your radio. This will ensure the fastest turnaround time on your repair.

It will be necessary to furnish the following to have the product serviced and returned.

1. For warranty repair include some form of proof-of-purchase, such as a mechanical reproduction or carbon of a sales receipt. If you send the original receipt, it cannot be returned.
2. Send the entire product.
3. Enclose a description of what is happening with the radio. Include a typed or clearly printed name and address of where the radio is to be returned.
4. Pack radio securely to prevent damage in transit. If possible, use the original packing material.
5. Ship prepaid and insured by way of a traceable carrier such as United Parcel Service (UPS) or Priority Mail to avoid loss in transit.
6. If the radio is in warranty, upon receipt of your radio, it will either be repaired or exchanged.

Please allow approximately three to four weeks before contacting Cobra for status. If the radio is out of warranty, a letter will automatically be sent informing you of the repair charge or replacement charge.

--▶ For Products Purchased in Canada

For out of warranty service, ship this product prepaid to: AVS Technologies Inc., 2100 Trans Canada Hwy S., Montreal, Quebec, H9P 2N4. We reserve the right to repair or replace the radio with an equivalent product. Please include the following information: Date of Purchase, Model Number, Dealer Purchased From, Dealer Address, Dealer Phone Number.

--▶ For Products Used in Canada

Industry Canada Notice

Operation is subject to the following two conditions: 1) this device may not cause interference, and 2) this device must accept any interference, including interference that may cause undesired operation of this device.

--▶ For Products Purchased Outside the U.S.A. or Canada

Please contact your local dealer for product service information.

The Cobra line of quality products includes:

CB Radios

microTALK® Radios

Radar/Laser Detectors

Safety Alert® Traffic Warning Systems

Handheld GPS Receivers

Mobile GPS Navigation Systems

HighGear® Accessories

CobraMarine™ VHF Radios

Power Inverters

Accessories