

**DS350**

# *Command Radio*

**Portable  
Marine Public Safety  
VHF/FM Transceiver**

**PRELIMINARY**  
*with*  
Digital Selective Calling  
and  
Global Positioning System  
Options



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# INTRODUCTION AND DESCRIPTION

The **Command Radio DS350** is a 999-channel, state-of-the-art, microprocessor-controlled, synthesized portable FM transceiver employing the following features:

- DSC** - Digital Selective Calling
- GPS** - Global Positioning System, internal NAV 12
- DTMF** - Dual Tone Multiple Frequency
- CTCSS** - Continuous Tone Controlled Squelch System
- CDCSS** – Continuous Digitally Controlled Squelch System
- WB/NB** – Wide Band/Narrow Band

The unit operates in the 150-174 MHz frequency range with power output selectable between 1W and 5W.

The radio is housed in a ruggedized, shockproof, weather-resistant case and features a built-in lighted multifunction keypad (including DTMF). A large back-lit Liquid Crystal Display (LCD) provides important information such as channel numbers and names, Dual Watch/Channel 16, GPS information (i.e., position and time), onscreen DSC messaging, and other mode selection data.

Additionally, the DS350 offers a secure voice scrambler, NMEA Data I/O port (optional adapter for PC connection), Dual Watch and Programmable Scan functions, Emergency Distress, Group Calling, Call Waiting, and Telephone Interconnect capability.

Power is provided by a high-energy Nickel Metal Hydride (NiMH) battery pack which can be rapidly recharged in 1-2 hours. Optionally, the radio can be powered by five (5) AA-cell alkaline batteries.

## Optional Accessories:

- Carrying Case (CC)
- Remote Speaker/Microphone (SM1)
- Drop-in Quick-Charge Base (BC1)
- 12V DC Power Cable (BA12)
- AA Battery Pack (BPA1)



**Figure 1. Command Radio DS350**

## COMMAND RADIO DS350 SPECIFICATIONS

### **GENERAL:**

Temperature Range	-30° to +60° C		
Frequency Stability	+/- 2.5 PPM		
Frequency Response	24 MHz (150 - 174 MHz )		
Frequency Increments	2500 Hz		

<b>RECEIVER:</b>	<b>WB</b>	<b>NB</b>	<b>Guard</b>
Sensitivity 12 dB SINAD	0.35 $\mu$ V	0.35 $\mu$ V	0.35 $\mu$ V
Selectivity (Adjacent channel)	75 dB	65 dB	65 dB
Spurious Response	70 dB	70 dB	70 dB
Intermodulation	70 dB	65 dB	65 dB
Audio Power	0.5 W	0.5 W	0.5 W
Audio Distortion @ rated $P_o$	5 %	5 %	5 %
FM Hum and Noise	40 dB	34 dB	34 dB
Conducted Emissions	-57 dBm	-57 dBm	-57 dBm

### **TRANSMITTER:**

Carrier Power Output	5W – 1 dB	5W – 1 dB
	1W – 2 dB	1W – 2 dB
Spurious Emissions	-60 dBc	-60 dBc
Audio Distortion	5 %	5 %
Audio Modulation	+/- 5 kHz	+/- 2.5 kHz
FM Hum and Noise	40 dB	34 dB

**Table 1. *Command Radio DS350 Specifications***

# BATTERY AND ANTENNA INSTALLATION

## Battery Pack (BP1)

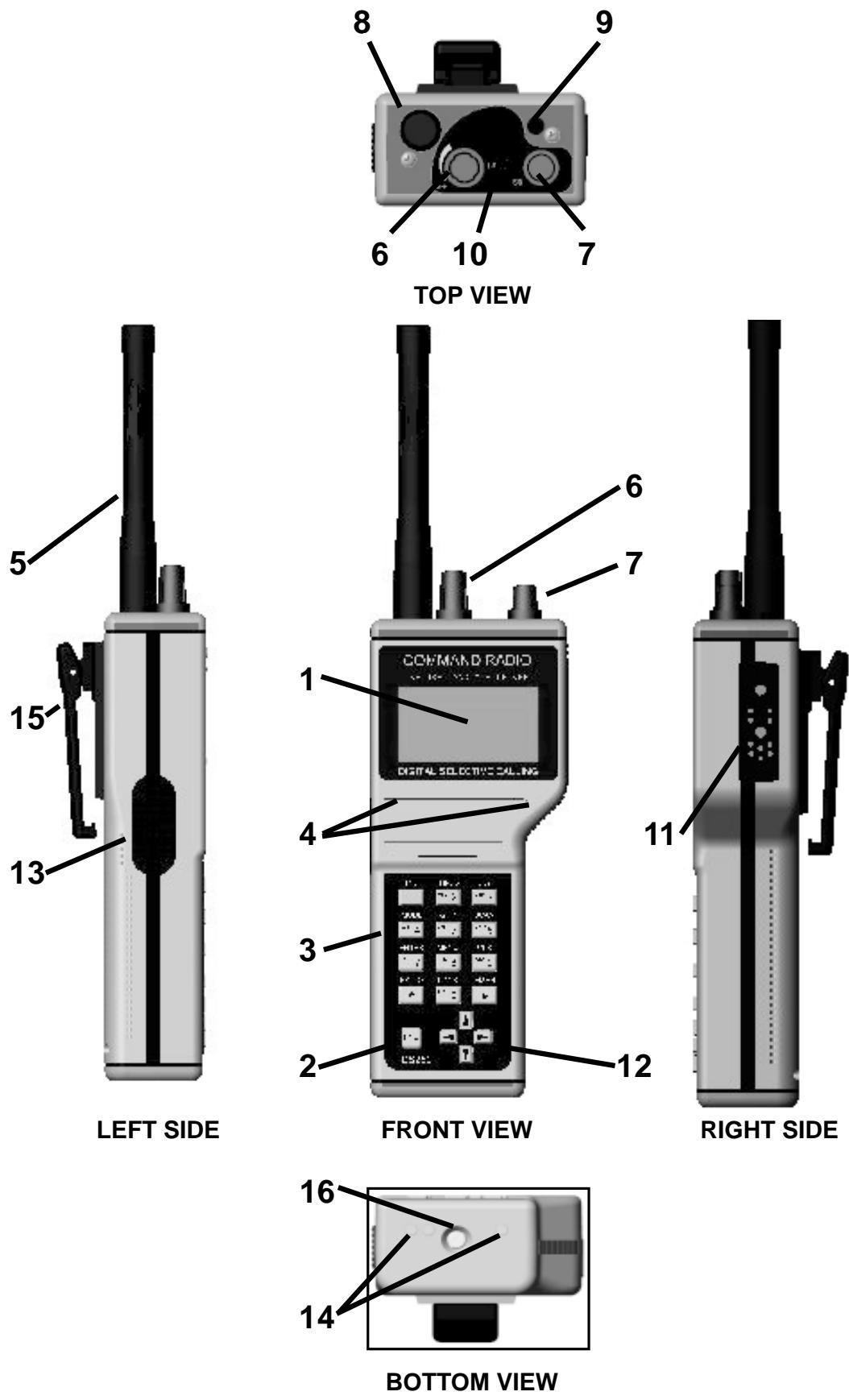
The unit is shipped with the BP1 Battery Pack pre-installed inside the radio case. The BP1 is uncharged upon arrival. It is designed to be recharged inside the radio case. The NiMH batteries are capable, under normal operation and environment conditions, of 500 charge/discharge cycles. Battery pack charging and recharging are covered in the Battery Information section of this manual, page 19. Battery pack replacement is covered in the Simplified Maintenance section of this manual, page 21.

## Antenna

The antenna is a flexible, helical-wound type and is matched, by model number, to the operating frequency range of the unit. The antenna connector is a standard TNC type. To install the antenna, carefully align the antenna connector to the unit connector and push while turning the antenna clockwise until tight. To remove the antenna, reverse the procedure.



**Figure 2. Antenna Installation**



**Figure 3. External Views**

# CONTROLS AND FEATURES

All numbers below (1 through 15) refer to Figure 3 on page 8.

- 1. The LCD Panel** – See Figure 5 on page 10.
- 2. Function Key** – Used to select secondary functions for number keys on the Keypad.
- 3. Keypad** – Used to select primary functions with a single keypress as shown in Table 2 on page 16. The two exceptions are the ENT and CLR keys, which only function when in a menu-type selection mode. The keys are also used to select channels, provide DTMF tones for telephony, and for data entry in setup modes. See Figure 6, page 14.
- 4. Speaker and Microphone**
- 5. Antenna** – Detachable. See Battery and Antenna Installation section, page 7.
- 6. OFF/ON/Volume Control** – See Basic Operation section, page 11.
- 7. Tone/Squelch Control** – See Basic Operation section, page 11.
- 8. Antenna Jack** – TNC type. Accepts item 5, Antenna.
- 9. GPS Antenna Jack** – SMA type.
- 10. TX** – Transmit LED that is lit when transmission occurs.
- 11. Ext. Microphone/NMEA Data Connector** – Used with Remote Speaker / Microphone (optional accessory).
- 12. Scrolling Pad** – Four Arrow keys used to move or scroll the cursor (when menu is activated) and increment/decrement channel numbers (in basic COMM mode).
- 13. PTT Switch** – Used to transmit on selected channel. See Basic Operation section, page 12.
- 14. Battery Charge Contacts** – Used when charging the internal battery. See Battery Information section, page 19.
- 15. Belt Clip** – included accessory.
- 16. Bottom Plate Screw** – Used to replace the battery pack. See Simplified Maintenance section, page 21.

## THE LCD PANEL

- A. Working Channel Number
- B. Group Number
- C. GPS Latitude
- D. GPS Longitude
- E. Working Channel Name
- F. Power Save Mode Annunciator
- G. Dual Watch Channel Name
- H. Dual Watch Channel Number
- I. Annunciator #5
- J. Annunciator #6 = FNC, Function Key
- K. GPS Time of Position
- L. Annunciator #1 = XMIT
- M. Annunciator #2 = LOW Power Mode
- N. Annunciator #3= SCAN mode
- O. Annunciator #4 = Low Battery



Figure 4. LCD Panel Location

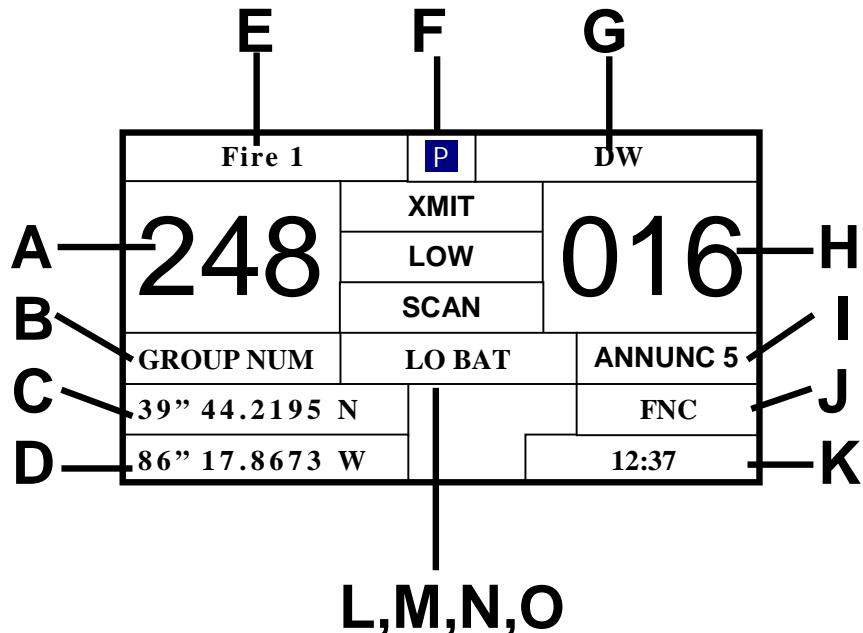


Figure 5. LCD Panel Display

# OPERATION

## BASIC FUNCTIONS

**Note:** All numbers in parentheses refer to Figure 3, page 8.

**Power ON and Volume Control** - Rotate the OFF/ON/Volume knob (6) clockwise from its detented OFF position. The transceiver powers up in the basic COMM mode with the LCD displaying the last used channel numbers and parameters “remembered” from last Power Down. Further rotation of the knob increases the audio output level.

**Power OFF** – Rotate the OFF/ON/Volume knob (6) counterclockwise to the detented OFF position. The LCD goes blank and the unit does not receive any calls. Memory is protected by a separate internal battery.

**Squelch** – With the radio turned ON and volume turned up from minimum, adjust the **SQUELCH/TONE** control knob (7) counterclockwise until, with no signal in, receiver white noise is heard. Re-adjust the knob clockwise slightly just until the receiver noise is muted. This is the point of maximum receiver sensitivity and minimum battery drain for the ambient RF noise level to be “squelched.” If the receiver is in the **SCAN** mode, the knob may need to be turned a little further clockwise to permit proper scanning. In **DSC** or **Telephone** modes, receiver noise may not be present.

**Illumination** - To adjust the LCD and keypad back-lighting, press the



key, then select the “RADIO” sub-menu, then select

“LIGHT CONTROL”. The lights can be turned off or set to illuminate for an interval following a keypress.

**Note: PTT switch does not activate the back-light.**

**Basic COMM Mode** - This is the basic radio communications mode in which the unit operates as a simplex (send and receive occurs

on the same frequency) transceiver with the channel number displayed in large numbers in the upper left of the LCD. All voice communications use this mode. Even DSC calls revert to this mode once the DSC operations are complete and contact is established. The keypad primary functions are available by a single keypress from this mode.

**Changing Channels** – Channel selection is accomplished in three ways:

1. To select a working channel, press the  key. The

Working Channel number blanks to \_\_\_\_\_. Press the 3 digits of the desired channel number in succession on the keypad. The numbers on the display echo each keypress. To select a 1- or 2-digit channel number, enter leading zeros before the channel number (for example “0-0-7” or “0-9-9”).

After entering the 3-digit channel number, press the 

key again. If the selected channel has a preprogrammed name, the channel name shows above the number on the LCD. The transceiver returns to the basic COMM mode.

2. The preprogrammed Emergency channel is selected by

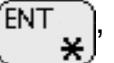
pressing the  key.

3. Select the preprogrammed Priority channel (Channel 16) by

pressing the  key.

**Transmitting** – To transmit, hold the microphone near and slightly to the side of your mouth and press the PTT switch. Speak slowly and clearly at normal conversational level. The XMIT annunciator appears on the LCD and the red TX LED lights to verify transmission. When the message is complete, release the PTT switch.

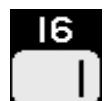
## PLACING A DSC CALL

1. From the basic COMM mode, press the  key and select **DSC CALL**.
2. Using the  and  arrow keys and  select the desired number.
3. When  is pressed, the radio enters an automatic call mode and makes two attempts to establish contact with the number highlighted.
4. The LCD returns to the main display with *DSC Calling* showing where the Time is normally displayed.
5. The *XMIT* annunciator appears on the LCD panel briefly during the two attempts.
6. If the called station responds, the station ID replaces *DSC Calling*. Both units automatically switch to the working channel commanded by the calling unit and voice communication can begin.
7. If the other station is not found, *No Response* replaces *DSC Calling* for approximately 4 seconds, after which the radio and display return to the previous state.

## KEYPAD PRIMARY FUNCTIONS

The keypad primary functions are invoked by pressing the listed key from the basic COMM mode. If the Command Radio DS350 is not in basic COMM mode (i.e., if

the **RADIO** key or the **ENT \*** key or the **PRG 7** key has just been pressed), these keys will function differently. For a summary of all keypad primary and secondary functions, consult Table 2, Keypad Quick Reference, page 18.



Selects channel 16 as the working channel in one key-stroke.



Toggles the transmit power setting between **HI** (5 watts) and **LO** (1 or 2 watts). Only **LOW** power is annunciated on the LCD. With the exception of some channels that are mandated to default to a specific power setting, the transceiver's memory retains the last setting associated with each channel number.



**DUAL WATCH** – Provides instant access from the basic COMM mode to this special scan function for monitoring the current working channel and the priority channel simultaneously.



Toggles between US and International frequency sets.



Activates the GPS features menu.



**SCAN MODE** – Activates user-programmable scan mode.



Brings up a list of special functions. The and keys are used to highlight the desired function and the key selects it.



Toggles the scramble feature.



Allows a user to make a DSC call.



Enables keypad direct channel selection (see Changing Channels).



Locks the keypad to prevent accidental keypresses during handling. The LCD displays when the unit is in LOCK mode.

The keypad is reactivated by pressing the **FNC** key, followed

by the **LOCK** key.



Selects the preset Emergency channel on the working channel.

## KEYPAD SECONDARY FUNCTIONS

These keypad functions only operate when not in basic COMM mode. For a summary of all keypad primary and secondary functions, consult Table 2, Keypad Quick Reference, page 18.



In RADIO mode, use these keys to enter the

desired channel number.



This key is used to select highlighted functions in MENU mode.

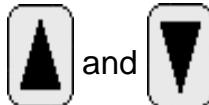


Clears entries or backs up sequences to the previous screen in MENU mode.

## NAVIGATING THE MENU

**MENU**

Pressing the **PRS 7** key on the keypad brings up the following menu



choices. To highlight a choice, use the and arrow keys. To select a highlighted choice, press the **ENT \*** key on the keypad. Menu choices with indented items below it are sub-menus with additional items in each sub-menu that are highlighted and selected in the same way.

**DSC Call** – Presents a user-programmed directory. Selection of a number calls that station.

**Group Call** – displays a separate directory of group ID numbers. When a group number is selected, all the stations in that group are called.

**All Units Call** – calls all station ID numbers in the directory.

**Send Position** – broadcasts your GPS position over the selected channel. Only GPS-equipped transceivers on the same channel can receive your position.

**Rqst Position** – receives GPS position of party you are talking to over the selected channel. Only GPS-equipped transceivers on the same channel can send their position to you.

**Group Position** – xxx

**Radio Controls** – sub-menu containing five items, listed below.

**Power Control** – xxx

**CTCSS Control – xxx**

**DCS Control Dir – xxx**

**Talk Around – xxx**

**Lights Control – xxx**

**Area Call – xxx**

**DSC Msg – xxx**

**Group Msg – xxx**

**All Units Msg – xxx**

**Phone Call – xxx**

**Missed Call List – xxx**

**Options** – sub-menu containing eleven items, listed below.

**DSC ID List – xxx**

**Group List – xxx**

**Phone List – xxx**

**Station List – xxx**

**Current Position – xxx**

**Auto Pos Output – xxx**

**Auto Pos Request – xxx**

**Set Clock – xxx**

**Power Save – xxx**

**User DSC ID – xxx**

**Clone Radio Mem – xxx**

KEY	FNC	PRIMARY FUNCTION (COMM mode)	SECONDARY FUNCTION (RADIO, MENU modes)
	16	Select channel 16 as working channel	Number entry key (1) in RADIO mode
	HI/LO	Toggle transmitter power between 5 watts (HI) and 1 or 2 watts (LO)	Number entry key (2) in RADIO mode
	DW	Activate Dual Watch	Number entry key (3) in RADIO mode
	U / I	Toggle between US and International frequencies	Number entry key (4) in RADIO mode
	GPS	Activate GPS feature	Number entry key (5) in RADIO mode
	SCAN	Activate Programmable Scan Mode	Number entry key (6) in RADIO mode
	MENU	Activate the Menu, DS350 enters MENU mode.	Number entry key (7) in RADIO mode
	SCRM	Activate the Scramble feature	Number entry key (8) in RADIO mode
	DSC	Activate the Digital Selective Calling feature	Number entry key (9) in RADIO mode
	EMER	Select the preset Emergency Channel as working channel	Number entry key (0) in RADIO mode
	RADIO / ENT	Enable keypad direct channel selection, DS350 enters RADIO mode	Select highlighted menu item in MENU mode
	LOCK / CLR	Lock the keypad	Clear an entry or go back to previous menu screen in MENU mode
	FNC	Activate secondary functions on keypad	N/A
	UP	Increment working channel number	Highlight previous menu item in MENU mode
	DOWN	Decrement working channel number	Highlight next menu item in MENU mode
	LEFT	N/A	Navigate left in MENU mode
	RIGHT	N/A	Navigate right in MENU mode

**Table 2. Keypad Quick Reference**

# BATTERY INFORMATION

## CHARGING THE BATTERY

The Battery Pack (BP1) must remain charged. You must use only the BC1 Battery Charger (quick-charge base). Failure to do so could damage the battery and/or unit and void the warranty. The Battery Pack (BP1) must be installed in the DS350 before charging or damage could occur.

To begin, ensure that adequate time is available to allow the unit to completely charge. When the unit is new, it will take approximately 14-16 hours to charge it completely. After 3-5 charge/discharge cycles, the battery pack should recharge in only 1 ½ hours. Follow the following steps to properly charge the battery pack.

1. Ensure that the BC1 Battery Charger is plugged in to an electrical socket. The “power” LED lights up to indicate power on.
2. Ensure that the battery pack is properly fastened in the radio case and that the radio is turned off.
3. Place the DS350 radio in an upright position on the quick-charge base. The “charge” LED should light up on the base.
4. After waiting the prescribed time (based on how new the battery pack is), check that the “charge” LED has turned off and that the “ready” LED is lit.
5. Safely remove the DS350 radio from the quick-charge base. The BC1 Battery Charger may be unplugged from an electrical socket or left plugged in for next use.

For optimum battery performance and longevity, please observe the following guidelines.

***Note: BP1 Battery Packs are not charged when shipped. They should be charged before first use.***

1. Always charge the battery to full capacity (14 – 16 hours). Continue charging for 1 to 3 hours after the BC1 Battery Charger’s display changes from CHARGE to READY.

2. Put the battery pack in use and use as much of its capacity as possible as soon as is practical. A battery pack that is charged and discharged completely will maintain the longest operating time capacity. Also, typically 3 to 5 charge-discharge cycles are required to bring a new battery pack up to its rated capacity.
3. Store and charge the batteries at room temperature (65 to 75° F). Battery packs that have been stored for over a month should be recharged before being put back into service due to chemical self-discharge, which occurs at a rate of approximately 1 % per day. Do not charge cold batteries (32° F or below).
4. Reduced capacity may result from repeated identical shallow discharge-full recharge cycles. If such a condition is suspected, use the battery pack until the transceiver indicates LO BAT (low battery), then fully recharge and discharge again. Repeat this cycle 3 to 5 times. Full rated capacity should then be available.

# SIMPLIFIED MAINTENANCE

## Battery Replacement

The BP1 Battery Pack in your ***Command Radio DS350*** is designed for approximately 500 charge / recharge cycles. When the battery pack no longer fully charges or drains quickly, it may be time to replace it. To ensure that the battery is not viable for further use, please follow guideline 4 in the Battery Information section (page 20) on restoring full charge prior to battery pack replacement. If that procedure does not restore full charge to the unit, follow these steps to replace the battery pack.

1. Turn off the power to the ***Command Radio DS350***. Failure to do so prior to battery pack replacement could result in loss of memory.
2. Remove the screw in the bottom panel of the ***Command Radio DS350*** (see Figure 3, page 8).
3. Remove the bottom panel, being careful not to allow the battery pack to fall out and put stress on the battery pack cord.
4. Unplug the battery pack cord. Discard the old battery pack properly.
5. Attach a new BP1 Battery Pack to the ***Command Radio DS350*** cord. Use of any other battery pack could cause damage to the unit and will void any warranty.
6. Slide the new battery pack into the ***Command Radio DS350***, ensuring that the cord is still connected upon completion.
7. Reattach the bottom panel with the bottom screw, ensuring that the bottom panel rests evenly in the groove provided and that the screw is snugly fastened in the hole in the bottom of the radio.

## Battery Contact Cleaning

It may be necessary to periodically clean the battery contacts on the bottom of the unit to ensure sound electrical contact and facilitate recharging of the battery pack. Use a cotton swab or non-abrasive cloth dipped in isopropyl alcohol or mineral spirits and lightly polish each contact. Dry unit with dry non-abrasive cloth and allow to air-dry completely before next use.

## SIMPLIFIED TROUBLESHOOTING

The following items can be checked in the event of a malfunction, prior to returning the *Command Radio DS350*.

Symptom	Possible Remedy
Dim Display or no display	Low battery charge or replace.
Poor or no reception	Faulty antenna installation attempt to tighten connection.
Does not scan	Adjust squelch.
Low or no sound volume	Adjust volume control setting.
Unable to transmit on a channel	Channel may be receive only. Channel may be busy. Low battery charge or replace.
Function(s) do not work but transmission is possible	LOCK may be engaged deactivate LOCK mode by pressing the  key, then the  key.

**Table 3. Troubleshooting**

Part No. DS 350

Rev. 10-1-1999