

# **Maintenance Manual**

**EDACS<sup>®</sup> DPE-100/200**

**800 MHz Duplex Portable Radio**

## MANUAL REVISION HISTORY

Revision	Date	Reason For Change
R2A	June - 96	Add DPE-200 information
R1A	November - 95	Original

### NOTE

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

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## **SPECIFICATIONS**

### **GENERAL**

FCC Identification Number	AXATR-339-A2
DOC Type Number	TR339
Dimensions (H x W x D):	5" x 2" x 1" (127 x 50.8 x 25.4 mm)
Weight:	8 oz (227 g) (with Medium capacity battery)
Battery Life:	
Extra high capacity battery	Standby: 40 hours (13 hours, DPE-200) Continuous talk time: 1.8 hours
High capacity battery	Standby: 34.5 hours (11 hours, DPE-200) Continuous talk time: 1.5 hours
Maximum Capacity:	
EDACS Systems	43 (64, DPE-200)
Operating Voltage:	6 VDC (nominal)
Operating Temperature Range:	-22°F to + 140°F (-30°C to +60°C)

### **ENVIRONMENTAL**

Standard:	EIA/IS-19-B
High Humidity:	4.2
Vibration:	4.3
Shock	4.4

### **TRANSMITTER (25 kHz Channel)**

Frequency Range (MHz):	806-824
Rated Output Power (Watts):	0.6
RF Output Impedance (Ohms):	50
Frequency Stability (ppm):	1.5%
Conducted and Radiated Spurious (dBc):	-60
FM Hum and Noise (dB):	-30 (-37, DPE-200)
Audio Response (per EIA 603):	max 5%

### **RECEIVER (25 kHz Channel)**

Frequency Range (MHz):	851-870
RF Input Impedance (Ohms):	50
Sensitivity (dB per EIA 603 12 dB SINAD):	-115
Selectivity (dB per EIA 603):	-60
Frequency Stability (ppm):	1.5%
Intermodulation Rejection (dB):	-55
Spurious Rejection (dB):	-60
FM Hum and Noise (dB):	-30 (-37, DPE-200)
Audio Response (per EIA 603):	<5%
Audio Output (Watts):	0.03

## DESCRIPTION

The DPE-100/200 is a synthesized, microprocessor-based, high performance duplex portable FM radio designed to optimize telephone interconnect functionality on EDACS systems. The lightweight DPE-100 provides reliable Telephone Interconnect operation in Enhanced Digital Access Communications System (EDACS) trunking environments. Duplex is provided in EDACS trunked environments while operating in the Telephone Interconnect Mode. Dispatch features such as group calls along with conventional operation is not offered.

The DPE-100/200 radio is manufactured with advanced state-of-the-art technology and designed with a minimum of serviceable parts. It is not practical to service the radio to component level (in the field). Technicians servicing this radio should only be concerned with isolating a problem to software or hardware. Repair is limited to reloading software or replacing the circuit board. There are no alignments or adjustments to be made. This manual provides the instructions for:

- **basic radio operation**
- **programming the radio personality and flash code**
- **isolating a problem to hardware or software**
- **disassembling the radio and replacing the circuit board**

The DPE-200 radio contains a Push-to-Talk (PTT) button located on the top rear cover for interconnect/dispatch operation. The addition of this PTT button permits half duplex individual and group calls.

## RELATED MANUALS

Operator's Manual.....AE/LZT 123 1877  
 Vehicle Handsfree Installation.....AE/LZT 123 1654  
 Vehicle Handsfree User's Guide .....AE/LZT 123 1655  
 EDACS-2 PC Programming Guide.....TQ-3373

## RADIO FEATURES

The lightweight (8 oz) DPE-100/200 provides cellular-like duplex interconnect with the power and efficiency of EDACS trunking. The radio takes advantage of EDACS Infinity™ battery technology and provides up to 40 hours of standby on a single charge. The DPE offers all the duplex interconnect features in a cellular telephone including:

- full duplex interconnect
- familiar telephone - style keypad
- 99-number redial
- last number redial for fast, effortless use

- call length timer
- two-line, 10-character alphanumeric display that's backlit for nighttime use

## USER PROGRAMMABLE FEATURES

- |  |   |
|--|---|
| • <i>Store Telephone Number (name)</i>     | Stores telephone numbers (names) in memory.                                       |
| • <i>Recall Telephone Number (name)</i>    | Recalls telephone numbers (names) from memory.                                    |
| • <i>EDACS System</i>                      | Change current EDACS System.  |
| • <i>Electronic Lock/Call restrictions</i> | Locks the radio to restrict unauthorized use and accepts personal lock code.      |
| • <i>Battery Saver</i>                     | Selects amount of battery savings.  |
| • <i>Ring Volume</i>                       | Changes ring volume and type.   |
| • <i>Ring Tone</i>                         | Selects the ring tone frequency.  |
| • <i>LCD contrast</i>                      | Sets LCD display contrast.  |
| • <i>Answering Methods</i>                 | Selects the type of answering method for incoming calls.                          |
| • <i>Key Burst, Tones, Clicks</i>          | Selects whether keypad numeric keys (0-9, #, *) produce DTMF tones or key clicks. |
| • <i>Microphone Gain</i>                   | Selects the microphone gain.  |
| • <i>Backlight Selector</i>                | Keypad or display illumination to be automatic or switched off.                   |
| • <i>Unanswered Call Counter</i>           | Records the number of unanswered calls.   |
| • <i>Auto Area Code</i>                    | Append an area code for all numbers dialed.                                       |
| • <i>Battery Voltage</i>                   | Shows the input battery voltage to the radio, for example, 6-3 = 6.3 volts.       |
| • <i>Personality Programming</i>           | Indicates the radio is in the PC Programming mode.                                |
| • <i>Total Accumulated Time</i>            | Shows total air time since radio was programmed.                                  |
| • <i>Resettable Accumulated Call Time</i>  | Used to display total air time since last billing period.                         |
| • <i>Last Call Time</i>                    | Shows minutes and seconds of last call made.                                      |
| • <i>Keypad Lock</i>                       | Locks the keypad so unintentional key action has no effect on receiving calls.    |

## PC PROGRAMMABLE FEATURES

The DPE-100/200 is PC Programmable, which allows the radio to be customized or upgraded quickly and easily. All PC programmable functions are controlled by the microprocessor and are field programmable using the EDACS-2 PC Programmer and a compatible DOS based PC. The programmable parameters are stored in a EPROM and accessed by the microprocessor as needed. Refer to the EDACS-2 PC Programming manual for detailed programming instructions.

## CONTROLS AND INDICATORS

The 18-button keypad, the internal speaker and liquid crystal display (LCD) are all located on the front of the radio. Viewed from the front the microphone is located in the lower left corner and the earpiece is located above the display. The antenna is located on top of the radio on the left side.

### Display

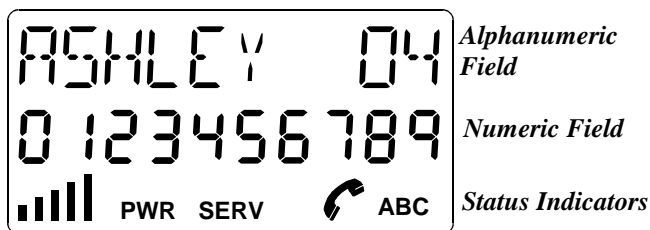




Figure 1 - Display

The **Alphanumeric Field** is on the top line of the display. The Alphanumeric Field displays:

- Names and memory locations, etc.
- Messages, queries, and warnings.
- "Air Time" at end of a call.
- Battery level indicator.

The **Numeric Field** is on the second line of the display. The Numeric Field displays the telephone number entered on the keypad, or recalled from memory.

The **Status Indicators** are on the bottom line of the display. The following is a description of each status indicator

<b>PWR</b>	<b>Power.</b> Indicates that the radio is turned on.
<b>SERV</b>	<b>Service.</b> Indicates control channel.
	<b>In Use.</b> Shown during a call and also while an outgoing call is being connected.
<b>ABC</b>	<b>Alpha Mode.</b> Flashes to indicate that you can enter letters with the numeric keys.
	<b>Signal Strength Indicator.</b> From 0 to 5 bars will be displayed to show signal strength; five bars being the strongest signal.

### Button - DPE-200 only

**PUSH-TO-TALK (PTT)** Located on rear. Enables radio's transmitter. PTT must be held down to transmit during simplex operation.

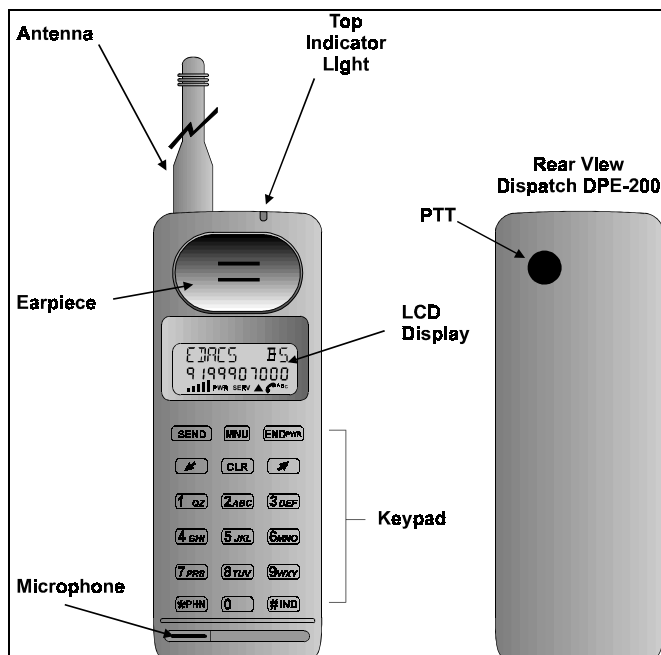


Figure 2 - DPE-100/200 Radio

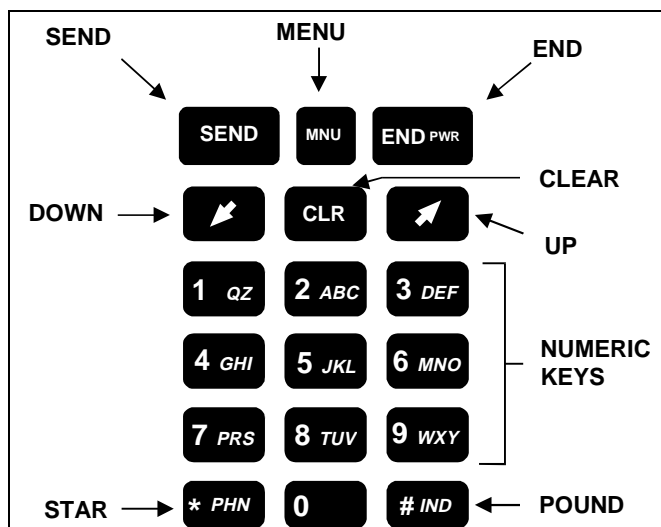


Figure 3 - Keypad

### Illumination

The display and keys are illuminated. The light will be on if the phone is being dialed, or if a key has been pressed. After 10 seconds of inactivity the light will automatically turn off. See the Operator's Manual for further information on this option.

## OPTIONS AND ACCESSORIES

The following is a list of the options and accessories available for the DPE-100/200:

Option/Accessory	Part Number
Vehicle Handsfree	KRY 101 1613
Portable Handsfree Unit	KRY 105 118/03
Power Adapter	BML 161 57
Antenna	KRE 103 1004
120Volt Rapid Charger	BML 161 55
230 Volt Rapid Charger	BML 161 58
Rapid Travel Charger	BML 161 56
Belt Clip Kit (Standard)	SXK 107 1885
Belt Clip Kit Medium Capacity Battery	SXK 107 3360/02
Standard Battery Nickel Metal Hydride (Slimline - 550 mAh)	BKB 193 076
Medium Capacity Battery Nickel Metal Hydride 950 mAh	BKB 193 079
High Capacity Battery Nickel Metal Hydride 1100 mAh	BKB 193 031

### CAUTION

If it becomes necessary to install a belt clip, please note: *it is not possible to remove the belt clip from an Extra High Capacity Battery without damaging the belt clip or the battery.* There is not a problem removing the belt clip from High and Medium Capacity batteries.

## BASIC OPERATION

Turn the radio on by pressing the **(ENDPWR)** key until you hear a beep.

The display illumination comes on. All the status indicators and all the segments in the alphanumeric and numeric fields in the display will flash 3 times. The radio's LID number is displayed briefly:

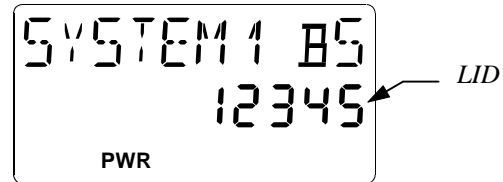


Figure 4 - LID Displayed At Power Up

A battery level indicator is shown in the upper right corner of the display. This can be a value from B0 to B5 in proportion to the battery's voltage level.

Once service is available from an EDACS system, the SERV (Service) indicator comes on, together with a signal strength meter and the CC SCAN goes off in the display. This meter indicates the relative signal strength by displaying from 0 to 5 "bars", with the number of bars being proportional to the signal strength.

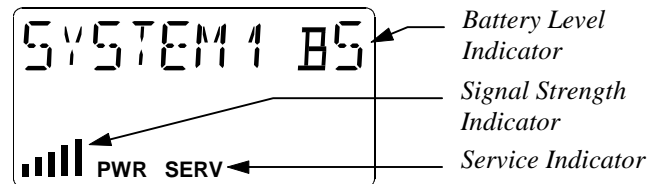


Figure 5 - Service, Signal Strength and Battery Level Indicators

### NOTE

- If the SERV indicator does not come on, you have lost contact with the EDACS system and cannot, therefore, place or receive any calls. Refer to Operators Manual for further information.
- If no signal strength is shown, try moving the radio to obtain a stronger signal. Refer to Operator's Manual for further information.

## PLACING AN INTERCONNECT CALL

1. Enter the desired number on the numeric keys. The digits are shown in the display.

*If you enter a wrong digit or a wrong number*, erase a wrong digit by pressing the **(CLR)** key momentarily. You may delete all wrong digits individually like this, or eliminate all entered digits by holding the **(CLR)** key for approximately 1 second. If you are not in a call, pressing the **(ENDPWR)** key will also delete all entered digits.

2. When you have entered the number, press the **(SEND)** key.

The text "**DIALING**" shows in the display and the *phone* symbol comes on.

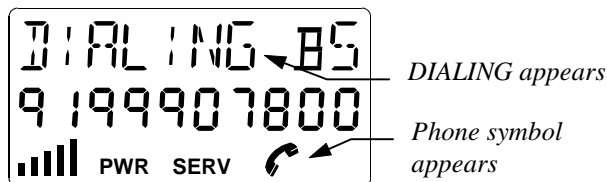


Figure 6 - DIALING and Phone Symbol Appears

When you have made contact with the EDACS system, "**DIALING**" will disappear. The number dialed will remain in the display until any key is pressed, or the call is ended, at which time the minutes and seconds of the call will be displayed. The left two digits show minutes, and the right two digits show the seconds (separated by two dashes). The air time of the outgoing call includes the time taken to connect the call.

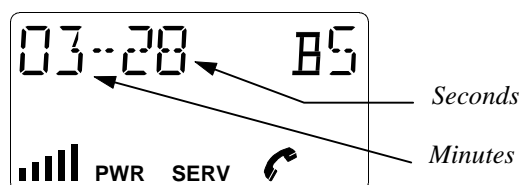


Figure 7 - Length Of Call Displayed

#### NOTE

The air time meter is only a guide; actual time may differ.

- When the conversation is finished, press **ENDPWR**.

**If nobody answers or there is a busy or fast busy tone**, press **ENDPWR**. The telephone number will be retained in the memory and you can easily repeat the call.

### Volume Control

During a conversation you can adjust the volume of the earpiece with the **▲** **▼** keys. Press and hold to increase or decrease the volume. The volume of the keypad tones may be adjusted in the same manner when not in a conversation.

#### NOTE

There are separate volume levels for hand held and handsfree modes for both earpiece/speaker and the keypad tones.

The display will show a line of zeroes representing the volume level. This will remain as set, after the phone is turned off.

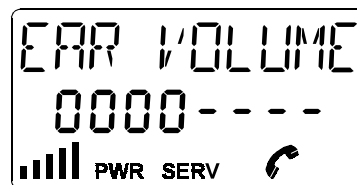


Figure 8 - Adjusting The Volume Of The Earpiece

### Mute Key

During a conversation, the microphone can be deactivated by holding down the **MNU** key. Release the **MNU** key to resume the conversation.

### LAST NUMBER RE-DIAL

- Press **MNU**, then **↔** to scroll to the **RECALL** function.
- Then press **MNU**.

The word **LAST DIAL** will appear and the last dialed number will be displayed.

- Press **SEND** to place the call.

The last number called will remain in the memory even though the radio is turned off.

### A CALL IS UNSUCCESSFUL OR A CALL IN PROGRESS IS INTERRUPTED

An error signal (a short beep) is heard. Observe the signal strength indication in the display. The signal strength should be at least "1". Refer to Appendix 1 in the Operator's Manual for further information.

### ANSWERING AN INTERCONNECT CALL

- When you are being called, the telephone rings according to the setting in the Menu Mode. The top indicator light rapidly flashes Green while "**CALL**" also flashes in the display. Press **SEND** to answer. The *phone symbol* will light up and **CALL** will be removed.
- When the conversation is finished, press **ENDPWR**.

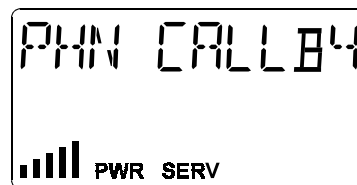


Figure 9 - Receiving A Call



## UNANSWERED CALL COUNTER

If one or more calls have not been answered, the number of unanswered calls will be displayed. For example, **02 CALLS**. The unanswered call counter will reset as soon as you press any key.

## TURNING THE RADIO OFF

Press and hold down the **ENDPWR** key until you hear a beep. If a call is in progress, end the call by pressing and releasing the **ENDPWR** key, wait a few seconds, and then press and hold down the **ENDPWR** key until you hear a beep.

## SERVICE SECTION

This Service Section provides the information necessary for proper care and maintenance to obtain optimum performance of the DPE-100/200 radio. In addition, this section provides the steps to:

- ⇒ Program the radio (personality and flash)
- ⇒ Troubleshoot the radio (determine if a problem is hardware or software)
- ⇒ Disassemble and reassemble the radio
- ⇒ Replace the circuit board

### CAUTION

When using the Troubleshoot Box with a DPE-100/200 radio, never place the **SERVICE** switch in the **12V** position.

### NOTE

As stated previously, field repairs are **limited to removal and replacement of the printed circuit board** and the miscellaneous parts shown in the mechanical breakdown on page 16.

The following is a complete list of the equipment required to program or service the DPE-100/200 radio:

Equipment Description	Part Number
1. Troubleshoot Box (includes): <ul style="list-style-type: none"> <li>• Test Cable</li> <li>• DB9 (male) to DB9 (female) Cable</li> </ul>	<i>KRY 101 1612</i> <i>KRY 101 1612/52</i> <i>KRY 101 1612/53</i>
2. TEK Box and Utility Software (includes): <ul style="list-style-type: none"> <li>• PC Interface Cable</li> <li>• Interface Adapter Cable</li> </ul>	<i>LPP 106 27</i>
3. Alexander 4 Connector	<i>KRY 101 1062</i>
4. No. 6 TORX® driver	<i>customer supplied</i>
5. flat blade screwdriver	<i>customer supplied</i>
6. IBM PC/XT/AT/286/386/486 or any true compatible with MS-DOS version 3.3 or later.	<i>customer supplied</i>

## PREVENTIVE MAINTENANCE

- Keep the exterior of the radio clean. Use a soft damp cloth.
- To ensure efficient power transfer from the battery to the radio, periodically wipe the contacts of the battery and radio to remove dirt or grease. Use a soft dry cloth.

### CAUTION

- If it becomes necessary to install a belt clip, please note; **it is not possible to remove the belt clip from an Extra High Capacity Battery without damaging the belt clip or the battery.** There is not a problem removing the belt clip from High and Medium Capacity batteries.
- Do not carry the radio by the antenna. Do not use chemical cleaners, spray or petroleum based products. They may damage the radio housing.

## PERSONALITY PROGRAMMING

The EDACS-2 PC Programmer (TQ-3373) version 7 or later is used to edit, read or write the personality to the DPE-100 radio. A *personality* is simply a computer file generated (created) by the user of the EDACS-2 program. The computer file (or personality) is downloaded into the radio and contains data that will direct certain operating characteristics of the radio unit.

The EDACS-2 PC Programming software communicates with the radio through the Troubleshoot Box (item 1 in the equipment list). Figure 10 provides a diagram of the Equipment Setup required to PC Program the radio. Refer to the PC Programming manual (TQ-3373) for detailed software operating instruction.

If it becomes necessary to "Swap" the entire software (personality and flash) from one radio to another, the TEK Utility Software is used. With this process a personality from a known good radio is downloaded to the radio in question. However, the TEK Utility cannot be used to edit or read the personality. For more details on the TEK Utility Software, see the FLASH PROGRAMMING Section.

### **Personality Programming Mode**

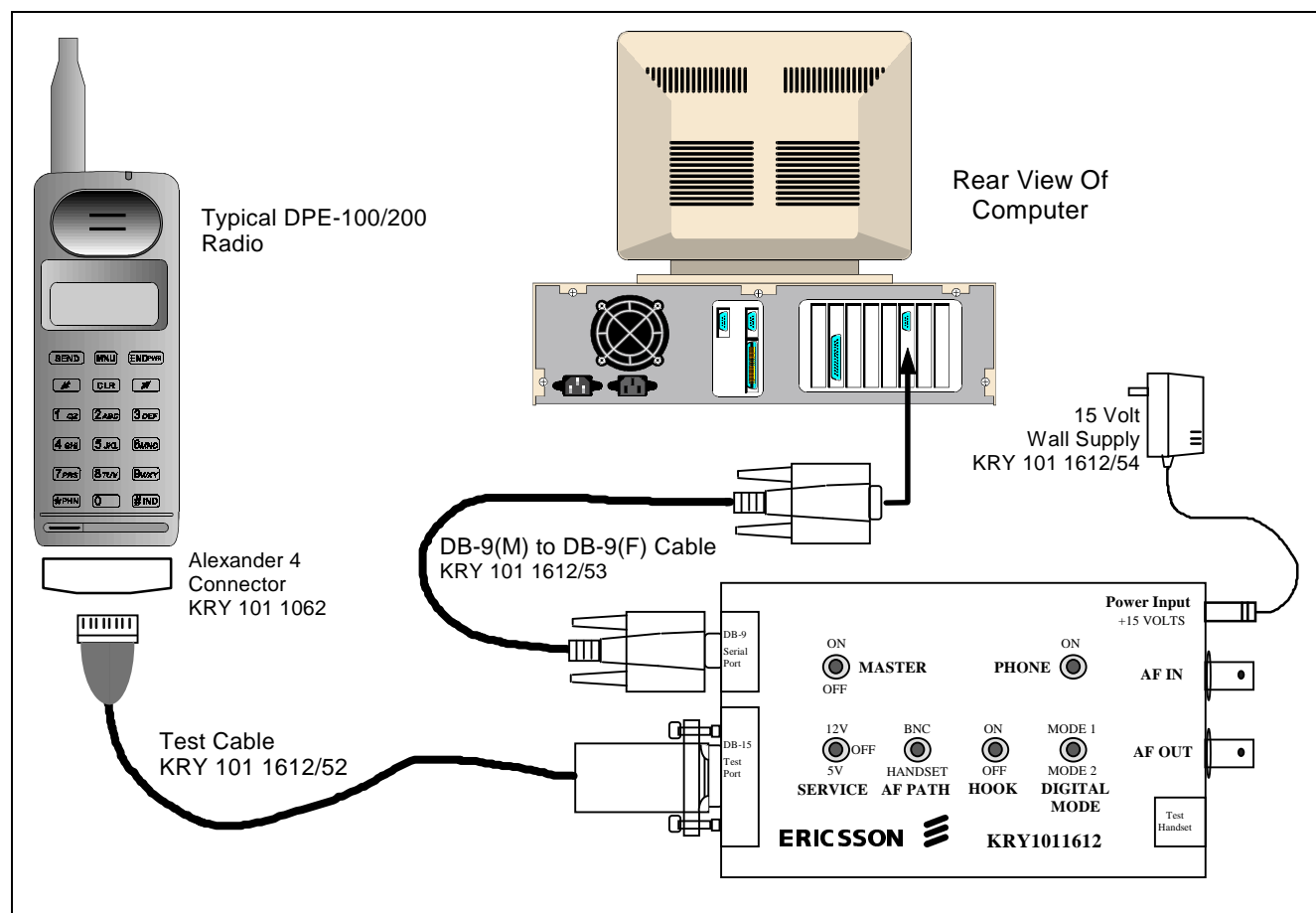
The EDACS-2 PC Programmer cannot communicate with the radio unless the radio is in the Programming Mode. To place the DPE-100/200 radio in Programming Mode:

1. Connect as shown in Figure 10 with all switches on Troubleshoot Box (KRY 101 1612) in down or **OFF** position.

2. Remove battery from DPE-100/200 before programming.
3. Set **MASTER** switch to **ON** position.
4. Turn on radio by pressing **[END PWR]** key.
5. After self-test of radio press **[MNU]** key.
6. Press the **[MNU]** key until *PERS PROG* appears in the display.
7. Press **[MNU]** again and observe that display reads *SURE?*.
8. Press **[MNU]** again and observe that display reads *PROGRAM*.
9. Set the **SERVICE** switch on Troubleshoot Box to the 5V position.

### **CAUTION**

Do not set **SERVICE** switch to the 12V position when using the Troubleshoot Box with the DPE-100/200.



**Figure 10 - Personality Programming Equipment Setup**

- Program the radio as indicated in the PC Programming Software.

**NOTE**

Observe Free Space Calculation for DPE radio.

## FLASH PROGRAMMING

The "FLASH" software is the current version of the DPE-100/200 operating software. Upgrades to the Operating Software can be flashed to the radio.

The FLASH software is loaded into the radio using a Personal Computer, the TEK Box (item 2 from the equipment list) and the TEK Utility Software. The TEK Utility Software can be used to swap the entire software (Personality and FLASH) from one radio to another or, the TEK Utility Software can be used to write the Flash from disk to radio.

## TEK Box And Utility Software

### Installation

- Insert the TEK software disk into the floppy disk drive on the computer (item 6 on the equipment list).
- Type "**X:**" <<enter>>, where "X" is the letter of the disk drive.
- Type "**Install**" <<enter>>.
- The program will attempt to install the executable to the C:\TEK directory. If the directory does not exist the program will prompt to create the directory. Type "**Y**" <<enter>>. The program will copy the executable.

### Equipment Setup

For downloading the Flash software file, setup the items required from the equipment list as shown in Figure 13. For a software exchange, setup the items required from the equipment list as shown in Figure 14.

**NOTE**

Remove battery from radio before any connections.

### Starting The Program

**NOTE**

The TEK Utility Software will not run while in Windows.

Type "**Flasher**" to start the program. The Software Download Screen will appear as shown in Figure 11.

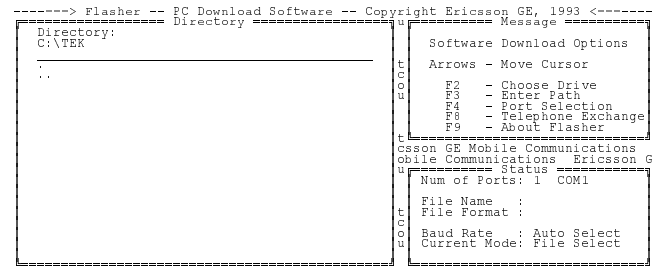


Figure 11 - Software Download

### Changing Drives/Path

Press **F2 - Choose Drive** to select another drive or **F3 - Enter Path** to change the path of the current drive. When downloading a Flash file to the radio, these function keys are used to select the proper drive and path where the Flash file is located.

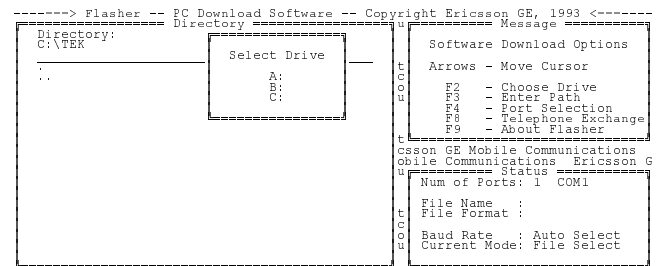


Figure 12 - Change Drive

### Port Selection

Select **F4 - Port Selection** to define COMM port parameters for downloading files. The screen in Figure 15 will appear.

- Change the port selected by pressing "A" until the desired selection is displayed. Be sure the COMM port selected here matches the physical COMM port the programming cable is connected to on the computer.
- Change the baud rate by pressing "F" until the desired baud rate is displayed. The maximum bit rate should be set to 9600 bps.
- It is usually not required to change COMM port hardware settings. But if a problem is suspected, press "G" to change the setup. Refer to the computer manual for proper settings.

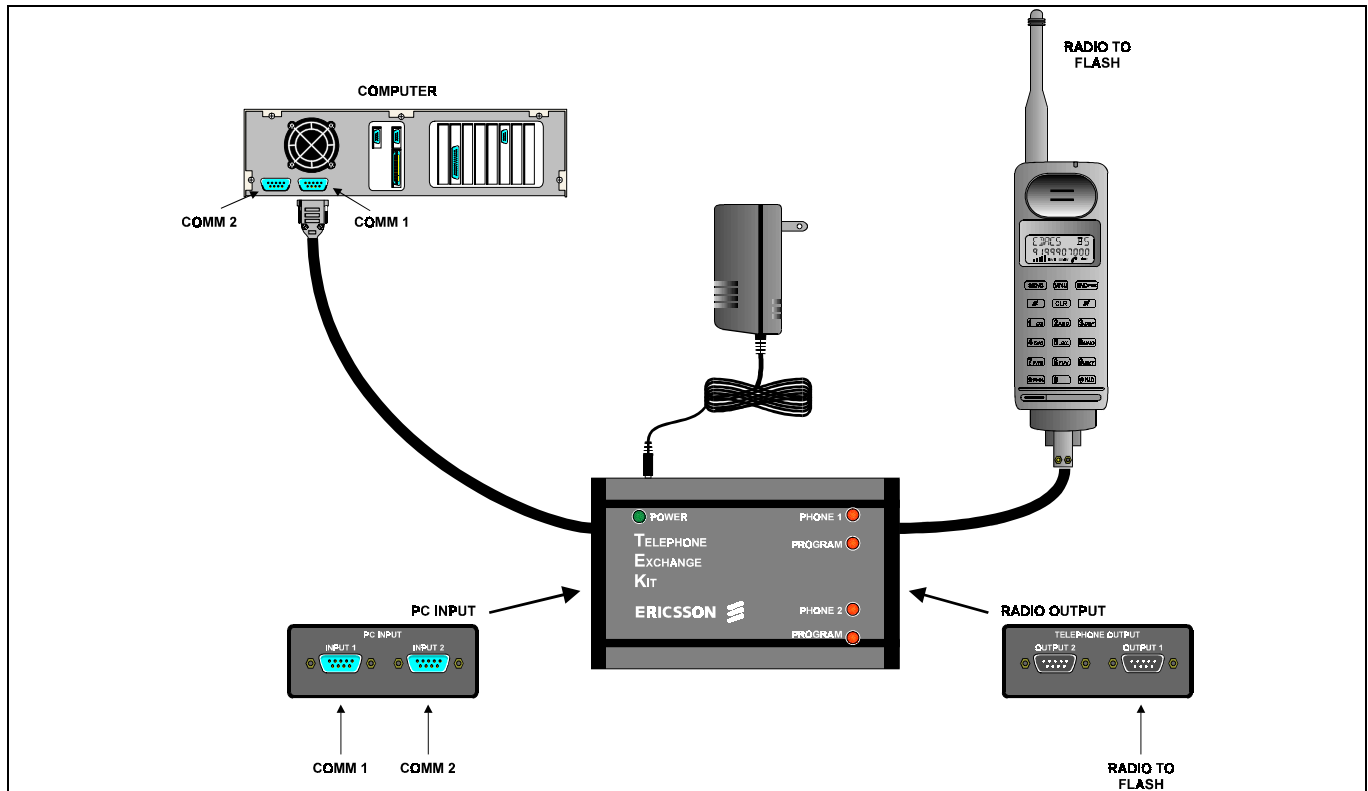


Figure 13 - Flash Download Equipment Setup

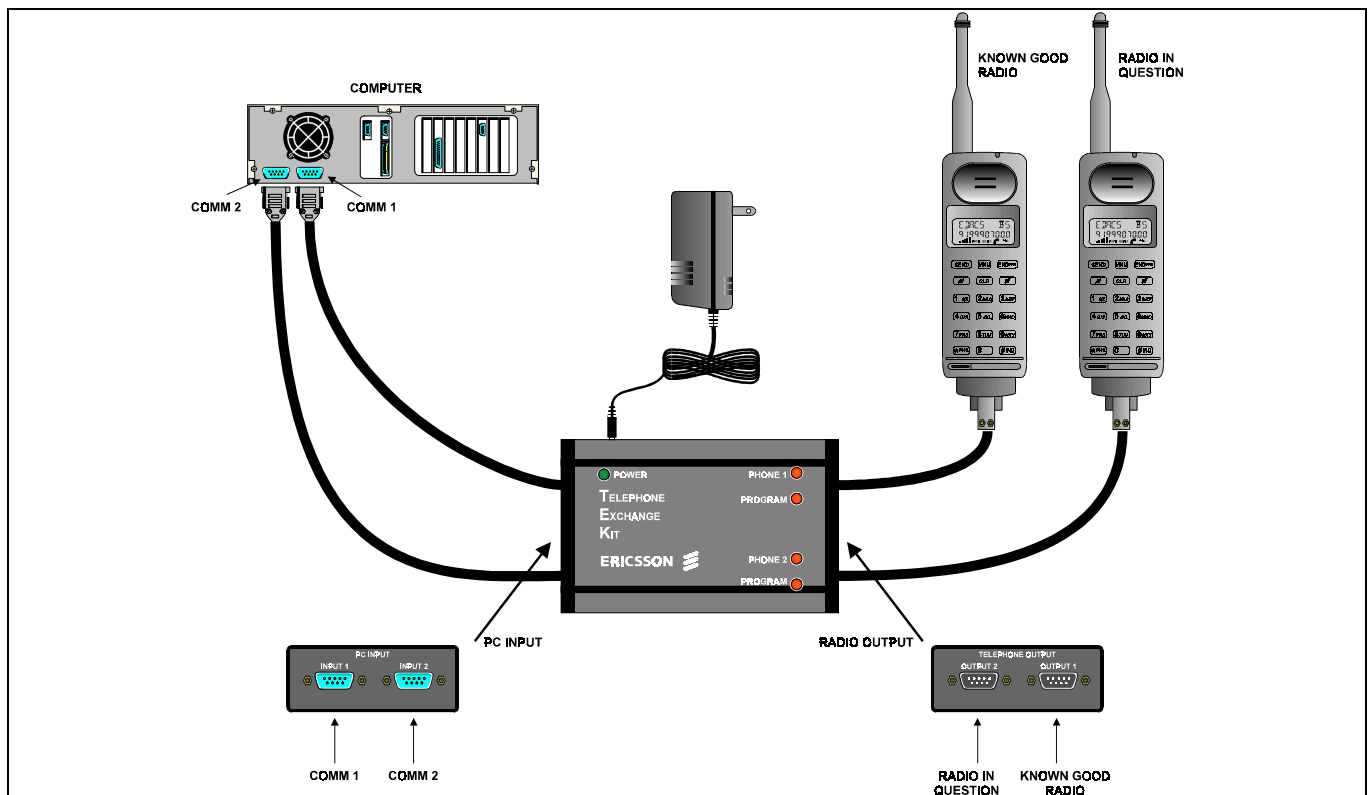
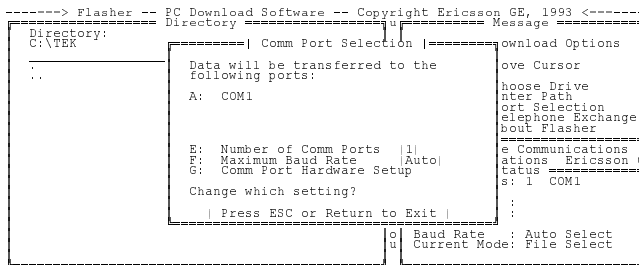




Figure 14 - Software Exchange Equipment Setup

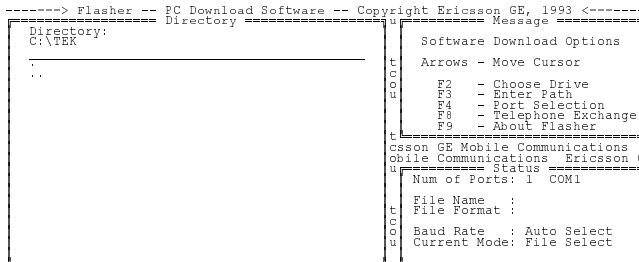


### Figure 15 - COMM Port Selection

## Flash File Download

From the Software Download Screen, shown in Figure 16 use the   arrow keys to highlight the proper Flash file to download. As described previously, change the Drive or Path as required.

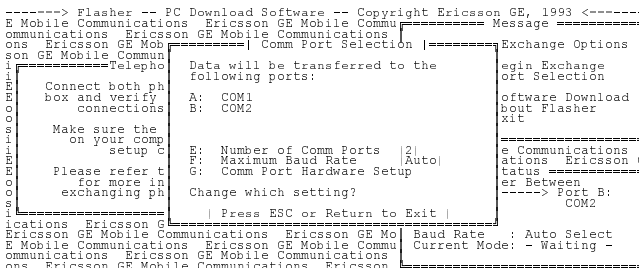
Press **<<enter>>** to start the download. During the download process, a percentage bar provides an indication of the progress of the download.



### Figure 16 - Software Download

## Software Exchange

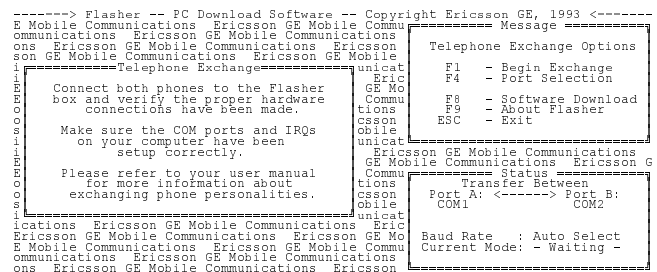
1. From the Software Download Screen shown in Figure 16 Press **F8 - Radio Exchange** and the COMM Port Selection Screen in Figure 17 will appear.



### Figure 17 - Software Exchange COMM Port Selection

2. Be sure the COMM ports selected here correspond to the actual physical COMM ports used on the computer.
3. Be sure all cables are connected as shown in Figure 14.

4. Press **<<enter>>** when the COMM port information is set correct. The Software Exchange Screen shown in Figure 18 will appear.



**Figure 18 - Software Exchange Screen**

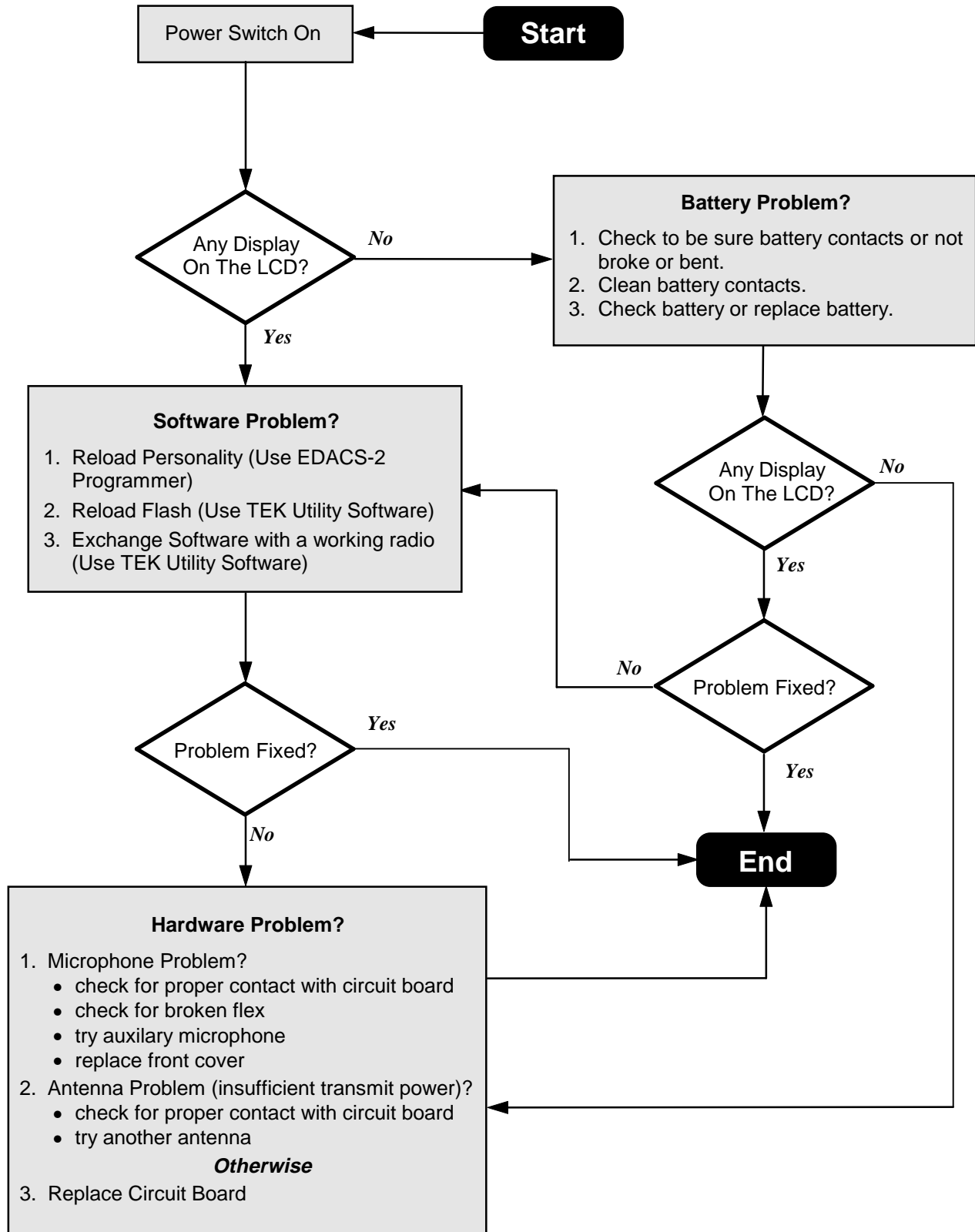
5. Press **F1 - Begin Exchange** to start the software exchange. A percentage bar will provide an indication of the progress of the exchange.

## TROUBLESHOOTING

The DPE-100/200 radio contains only one circuit board. With the exception of the microphone and antenna, all components are contained on a single circuit board. This includes the electrical part of the keypad, the LCD and the speaker.

As mentioned previously, service to this radio is limited to replacing the circuit board or a miscellaneous part not attached to the board. The objective of this section is to guide in quickly isolating a problem to either software, hardware or mechanical.

Follow the Troubleshooting flowchart on the following page. If the problem is software, the problem is fixed by downloading new software. If the problem is hardware, the problem is fixed by replacing the circuit board. If the problem is mechanical, the problem is fixed by replacing the failed part.



### Figure 19 - Troubleshooting Flowchart

## DISASSEMBLY

### Radio Disassembly

1. Be sure radio power is off.
2. Remove the battery from the radio.
3. Remove the antenna from the radio.
4. From the back of the radio, remove the (4) screws using a No. 6 TORX® driver. See Figure 20.
5. Separate the front cover from the metal frame as shown in Figure 21.

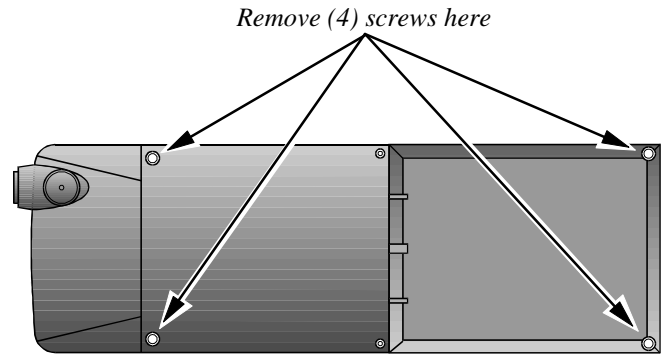


Figure 20 - Rear View Of Radio With Battery Removed

### Circuit Board Removal

1. Use a small flatblade screwdriver (or your thumb), and slip the two metal tabs at (A) back away from the circuit board. Carefully work with each side to slip the board out from under the metal tabs. See Figure 21.
2. Once the circuit board is out from under the metal tabs at (A), slowly lift the bottom of the board out of the metal frame and down, away from the metal tab at (B).

## ASSEMBLY

### Circuit Board Installation

1. Carefully place the circuit board on the metal frame. Speaker should face away from the metal frame.
2. Be sure antenna contact/connector is aligned properly in the metal frame and not bent.
3. Slip the top of the circuit board under the metal tab at (B). Next, using a small flat blade screwdriver (or your thumb) work with both sides of the board to slip the metal tabs at (A) over the board. Press gently on the board at all three tab location to be sure the tabs have locked in place, securing the board. See Figure 21.

### Radio Assembly

1. Mate the front cover to the rear metal frame. Be sure the keypad is aligned properly.
2. Secure front cover to the metal frame using the (4) screws removed previously. The longer screws (with sleeve) should be used the two holes closest to the top of the radio.

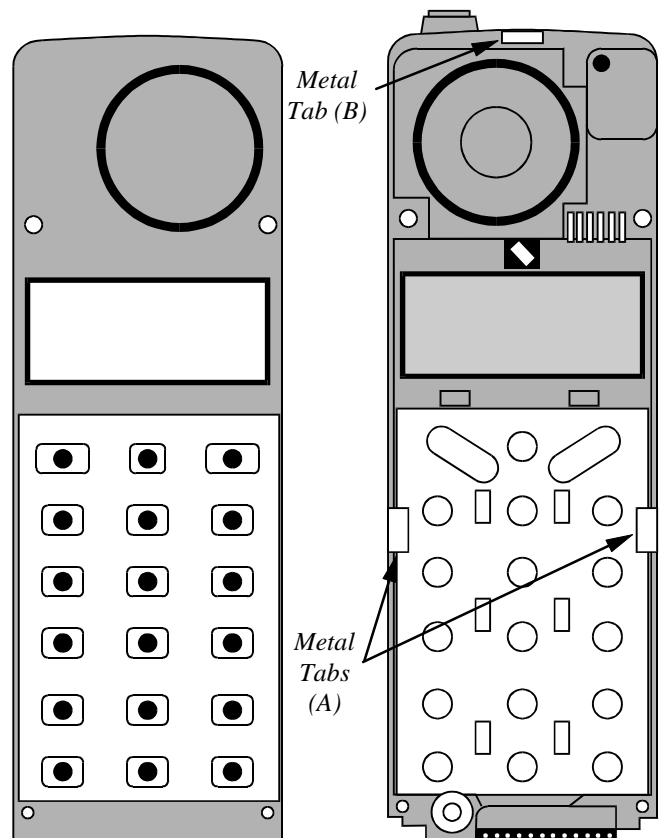
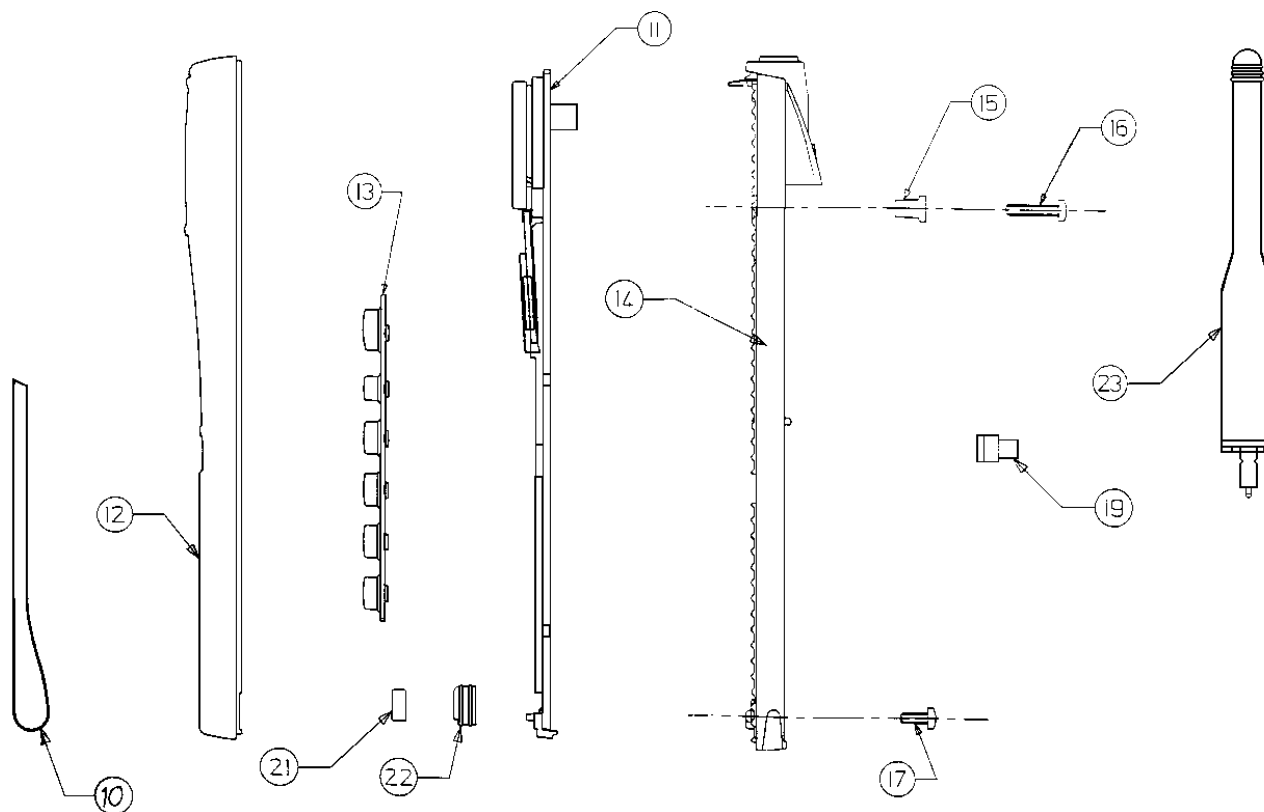


Figure 21 - Front Cover Separated From Metal Frame



Item Number	Part Number	Description
10	SXA 120 4203/2	Flip Cover.
11	ROA 117 2248	Printed Circuit Board
12	SXK 107 3368/55	Front Cover.
13	SXA 120 4202/1	Keypad.
14	SXK 107 1889/6	Rear Metal Frame.
15	SXA 120 973	Sleeve.
16	SXA 120 1029	Screw.
17	SBA 123 020/0050	Screw.
19	SXA 120 1032	Clip.
21	RLC 509 107/2	Transmitter Inset.
22	SXA 120 936	Holder.
23	KRE 103 1004	Antenna, missile style