ERICSSON

LBI-38957

Mobile Communications

PCS™
403-512 MHz
Synthesized Portable Radio

Table of Contents

Maintenace Manual

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PACKAGE NOMENCLATURE

Digits 1 & 2	Digit 3	Digits 4 & 5	Digit 6
Product Code	**Frequency Range**	**Number of Channels**	**Package**
PC	**3** 403-440 MHz	**02** 2 Channels	**S** SCAN
	4 440-470 MHz	**08** 8 Channels	**D** DTMF
	5 470-512 MHz	**16** 16 Channels	

SPECIFICATIONS*

FCC FILING DATA

Transmitter/Receiver FCC Identifier	
403-440 MHz	AXA9MZ-PCSU1
440-470 MHz	AXA9MZ-PCSU2
470-512 MHz	AXA9MZ-PCSU3
FCC Part Numbers	22, 74, 80, 90, 95

GENERAL

Frequency Range	403-512 MHz
RF Power Range	1-4 Watts
Input Voltage	6.0 to 9.0 Volts
Channel Capacity	2, 8, or 16 Channels
Frequency Spread (Full Performance)	
TX	Full Split
RX	20 MHz of Split
Frequency Stability	±5 PPM
Channel Spacing	25 kHz
Dimensions (less antenna) H x W x D	
with 1200 mAh Battery	7.4 x 2.8 x 1.57 inches (18.8 x 7.11 x 4.0 cm)
with 1700 mAh Battery	8.8 x 2.8 x 1.57 inches (22.35 x 7.11 x 4.0 cm)
Weight	
Radio (less battery)	11 ounces
1200 mAh Battery	9 ounces
1700 mAh Battery	13.5 ounces
Ambient Temperature Range	-30° to +60°C (-22° to +140°F)
Battery Drain (7.5 VDC)	
Receiver Standby	70 milliamperes
Receiver Full Audio	250 milliamperes
Transmit (@4 watts)	1.7 amperes
Transmit (@2 watts)	1.3 amperes

Battery Life (between charges)	**1200 mAh**	**1700 mAh**
Hi Power (5-5-90% duty cycle)	8.0 hours	11.0 hours
Lo Power (5-5-90% duty cycle)	9.0 hours	13.0 hours

TRANSMITTER

Power Output	
Hi Power	4 watts
Lo Power	2 watts (adjustable to 1 watt)
Conducted Spurious	-66 dB (-30 dBm)
Modulation Deviation	±5.0 kHz (maximum)
FM Noise (companion receiver method)	-45 dB
Power Adjust Range	1 to 4 Watts
Distortion	5% (maximum)
Deviation Symmetry	0.1 kHz
RF Load Impedance	50 Ohms
Carrier Attach Time	35 milliseconds
Audio Attach Time	35 milliseconds

RECEIVER

Audio Output (EIA)	0.5 Watts (<5% distortion)
Sensitivity	
12 dB SINAD (EIA)	-119 dBm (0.25 µV)
Selectivity	
(EIA 2-signal method)	-65 dBm @ ±25 kHz
Spurious Response	-70 dB
Intermodulation	-65 dB
Hum and Noise	
Squelched	-80 dB
Unsquelched	-48 dB
Modulation Acceptance	±7 kHz
Frequency Response	Within +2 dB and -8 dB of a standard 6 dB/octave de-emphasis curve from 300 to 3000 Hz (EIA).
RF Input Impedance	50 Ohms

* These specifications are intended primarily for use by service personnel. Refer to the appropriate Specification Sheet for complete specifications.

OPTIONS AND ACCESSORIES

BATTERY PACKS

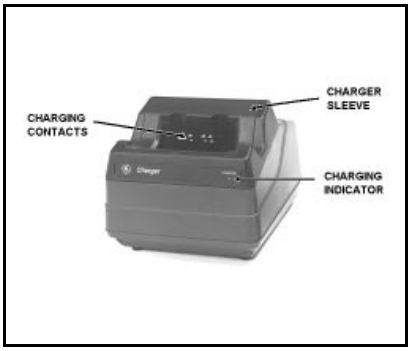
PCPA1J
1200 mAh
(19A705293P1)

PCPA1K
1700 mAh

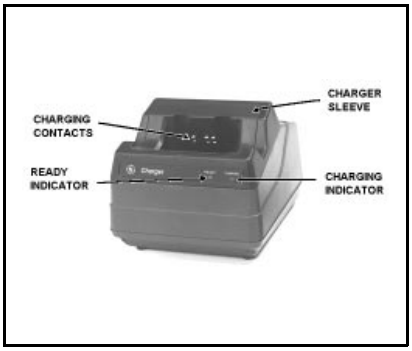
PCPA1L
1700 mAh
(19A705293P3)
Factory Mutual

DESK CHARGERS

Standard
CHISS1 (120 VAC)
CHISS2 (230 VAC)

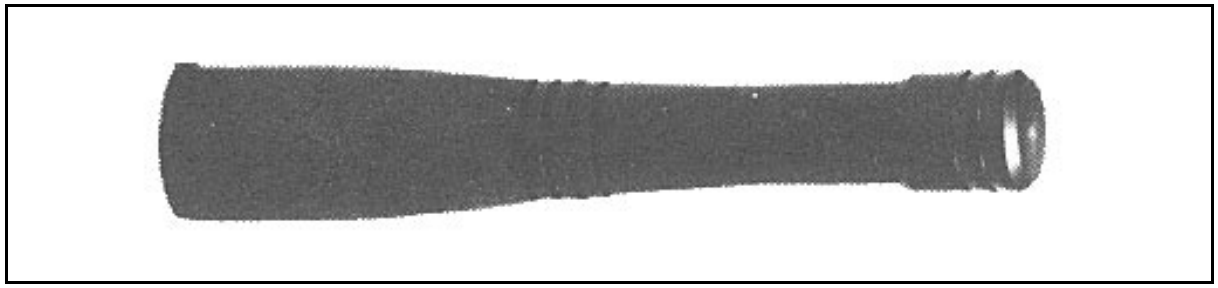


Rapid
CHIRS1 (120 VAC)
CHIRS2 (230 VAC)



ANTENNA (Helical)

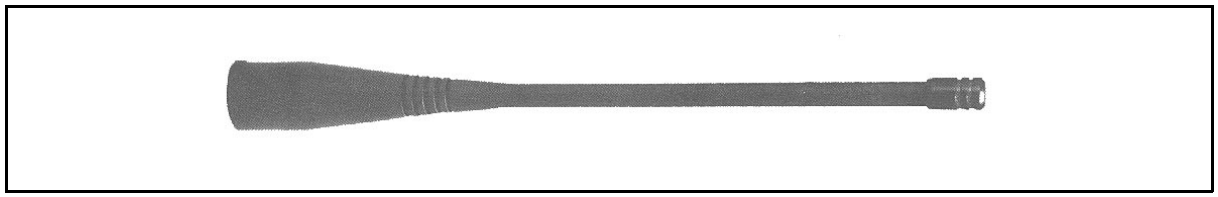
PCNC3C 19B801620P1 (403-440 MHz)
PCNC3D 19B801620P2 (440-470 MHz)
PCNC3F 19B801620P3 (470-512 MHz)



OPTIONS AND ACCESSORIES

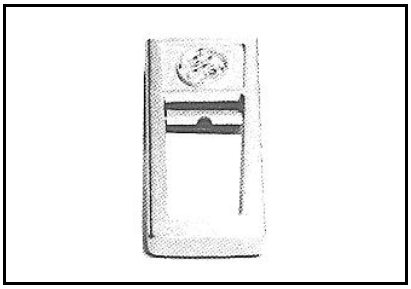
(continued)

ANTENNA (Flexible Whip)
PCNC3A 19B801621P1 (403-470 MHz)
PCNC3B 19B801621P2 (470-512 MHz)

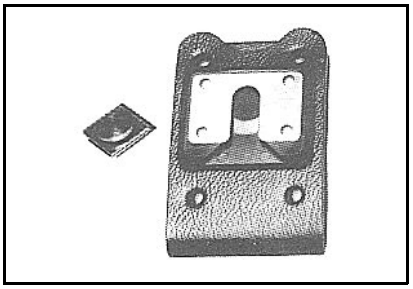


CARRYING ACCESSORIES

Belt Clip
PCHC1C
(Option Package 19B233241G1)
(Modification Kit 19A144704G1)



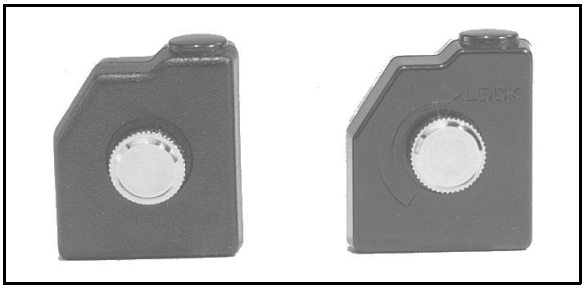
Swivel Plate
PCHC1D
(Belt Loop 19B226627G2)
(Swivel Option 19B233243G1)



Earpiece Kit
PCZM1A (4033570G6)
Incudes PCPA1C

Speaker/Microphone
PCAE1X

Accessories Connector
PCAC1C (19C851752P7)



OPTIONS AND ACCESSORIES

(continued)

CARRYING CASES

PCHC5S
1200 mAh Battery Pack
Full Cover 19D902456P15

PCHC5T
1200 mAh Battery Pack
Retaining Strap 19D902456P7

PCHC5U
1700 mAh Battery Pack
Full Cover 19D902456P18

PCHC5V
1700 mAh Battery Pack
Retaining Strap 19D902456P7

DESCRIPTION

The PCS™ Portable radio is a small, ruggedly constructed, two-way FM radio, housed in an aluminum and Lexan case. The UHF synthesized radios operate in the 403-512 MHz range and they can be purchased with 2-, 8-, or 16-channel operation.

Operating controls for the radio are provided through a rubber keypad on the side and front (a three-button keypad on the Standard version). All keypad switches have a good tactile feel and are sealed to provide weather protection. When turned "ON," the radio powers-up on the last channel used and at the last volume setting. The operating controls, UDC, and battery pack are shown in Figure 1.

All the PCS radios are equipped with a Universal Device Connector (UDC) for connecting external options and for programming the radios. The radios are programmed using a personal computer and programming interface box that connects to the UDC. The UDC is covered with a rubber cover for improved weather protection.

The PCS uses a BNC antenna connector. The antenna base is overmolded to fit flush against the housing for added weather protection.

The radio battery pack securely latches in place at the bottom of the radio. The radio ON/OFF switch is located on the battery pack.

A Liquid Crystal Display (LCD) on the front of the radio shows the selected channel, volume level, SCAN mode (SCN)*, and priority level (P1, P2, or S). The 2-channel radio uses the "P1" and "P2" pixels for high and low transmit power indicators, respectively. In addition, the "S" pixel is used to indicate "Talkaround" mode. The LCD also has a transmit (TX) indicator, a low battery voltage indicator (BAT), and a Type 99 paging (PG) indicator. There are eight (8) levels of volume represented by the four (4) bars in the LCD. Each bar represents two (2) volume levels. The LCD module is backlit for night viewing and is mounted in a rubber seal for weather protection.

The radio is shipped from the factory with the high power level set to 4 watts and the low power level set to 2 watts.

*SCAN applies to the 8- and 16-channel PCS radios.

NOTE

When the battery is low, the low battery indicator (BAT) is displayed on the LCD and an audio alert is sounded every 7.5 minutes. When the battery is sufficiently low to cause improper operation, the radio microprocessor terminates all operation.

RADIO PROGRAMMING

Each of the 8- or 16-channel radios can be programmed for SCAN operation, and HOME Channel or Emergency Channel, in addition to the Tone or Digital Channel Guard, Squelch Tail Elimination (STE), Type 99 Tone Decoding, Automatic Number Identification (ANI), Channel Busy Lock-Out, and HI/LO transmit power level available on the conventional 2-channel radio. These options can be programmed on a channel-to-channel basis. Two different T99 Tone tables can be programmed into the PCS. Each channel is capable of Individual, Group, or Super Group Decode.

Other programmable features include: Carrier Control Timer (CCT), display backlighting, and alert beep options. These features can be programmed, as desired, to meet system requirements.

Refer to the programming manual (TQ3366) for complete programming instructions.

ASSEMBLY

The PCS personal radio consists of an RF board mounted in the rear assembly, an audio/logic board mounted in the front assembly, and a control frame assembly.

The RF board contains all transmit, receive, and synthesizer circuits. The audio/logic board contains all transmit audio and receive audio circuits as well as all logic and control circuits. A microprocessor on the audio/logic board generates and decodes all tones used in Channel Guard or Type 99 tone signalling.

The control frame assembly mounts in the radio front cover and provides the following functions:

- Audio/Logic board interface.
- Microphone and speaker connections.
- Houses the channel up/down, volume up/down, monitor, and PTT switches.

- UDC interface to the outside of the radio for external options and customer programming.
- Houses the LCD module for status display.

Refer to the Interconnection Diagram (listed in the Table of Contents of the Service Section of this manual) for all circuit board and control frame connections.

STANDARD FEATURES

In addition to dual-priority SCAN (in 8- and 16-channel operation), Channel Guard, Digital Channel Guard, STE, ANI, Type 99 Decode, and transmitter power level settings, the PCS radio includes the following standard features:

1. Monitor — Allows the operator to monitor channel activity before transmitting by disabling either Channel Guard or the squelch circuit.

2. Carrier Control Timer — The Carrier Control Timer is programmable from 15 to 225 seconds in 15 second increments or it can be disabled.

3. Channel Busy Lock-Out — This feature prevents the operator from transmitting a message on a busy channel.

4. Radio Memory — The radio memory recalls the last radio status such as the last volume level, channel selected, and SCAN status. These settings are stored in memory while the radio is turned off.

5. Surveillance Feature — The earphone, external microphone input, and PTT options are available for surveillance purposes.

6. Talk Around — Each channel in the 2-channel radio can be put into Talk Around mode. The 8- and 16-channel radios can be programmed for a Talk Around channel.

7. Power Set — The TX power set on the 2-channel radio can be toggled between 2 and 4 watts. Power can be set by the PC programmer for all radios.

8. Audio Alert Beep — Usual alert beeps will not be sounded when this feature is disabled. However, the T-99, P1 priority, and ANI end beeps will be sounded.

9. LCD Backlight — On the 2-channel radio, the backlight can be turned on by pressing the ∧ button. The backlight will remain illuminated as long as the button is pressed and will remain illuminated for 5 seconds after the button has been released (provided the button was pressed for at least 1 second). Backlight will not be turned on when this feature is disabled.

   In the 8- and 16-channel radios, LCD backlighting is turned on every time a control button is pressed (channel select, volume up/down, and monitor) and remains on for another 5 seconds after the control button is released (provided the control button was pressed for at least one second). Backlighting is turned off while transmitting and will illuminate again for 5 seconds after the PTT is released.

10. Self-Test — The PCS radio is equipped with a self-test feature that is performed during power-up of the unit. A good self-test is indicated by a series of three (3) beeps, if enabled, followed by the last radio status on the LCD. All of the display segments are turned on during the three beeps. A bad self-test will cause all display segments to remain on and no beeps will be sounded.

11. Battery Voltage Level — The BAT display is illuminated any time the battery voltage level drops below the low level (6.3 volts). BAT is displayed and continues to be displayed on the LCD until the battery is charged or a fresh battery pack is connected. An audio alert is also sounded every 7.5 minutes while the BAT display is illuminated.

When the battery voltage goes low while transmitting, BAT will be displayed and will continue to be displayed after returning to the receive mode. BAT will be turned off after 5 seconds unless the battery voltage level is also low in the receive mode.

Below 6.3 volts, BAT will continue to be displayed. End of battery is considered to be 5.8 volts. This level will allow at least one hour of EIA operation. The radio will continue to operate at reduced power levels below 5.8 volts. Below 5 volts, radio operation is completely disabled to prevent corruption of the radio personality.

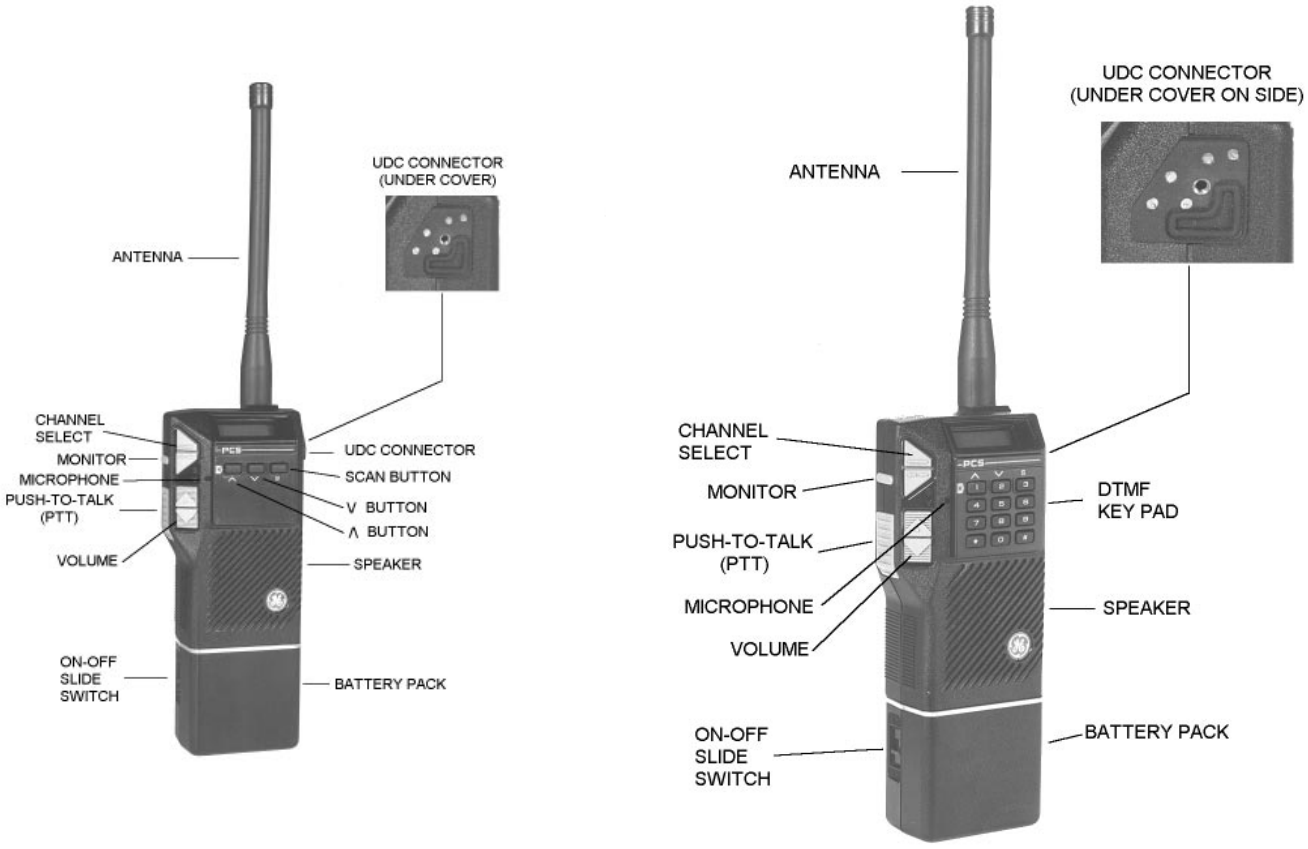


Figure 1 - PCS Operating Controls

The simultaneous flashing of the BAT indicator and the sounding of alert beeps, if programmed, indicates the radio has failed to lock on frequency. Transmission will be terminated any time the radio is in the transmit mode and the synthesizer fails to lock on frequency.

CONTROLS AND INDICATORS

CONTROLS

The radio controls consist of an ON/OFF switch, a MONitor and PTT switch, volume and channel select buttons, SCAN/Talk Around buttons (∧), DELete/Power Set buttons (∨), and ADD/HOME/BACKLIGHT controls (S).

ON/OFF The ON/OFF slide switch on the battery pack, controls power from the battery pack to the radio. When turned "ON," an audible click is heard and a yellow square is visible beneath the switch. The radio assumes the last operating state (i.e., channel volume, etc.). This status will be displayed in the LCD window, indicating power is applied. BE SURE the power switch is fully ON (or fully OFF).

MON The MONitor switch can be programmed for 2 different modes of operation: Channel Guard or Squelch.

Mode 1 (Channel Guard) - Receive Channel Guard can be disabled at any time by briefly pressing (for less than 1 second) and releasing the MONitor/Channel Guard button. The Channel Guard disabled condition is indicated by the flashing volume level bars on the display. After holding the button for more than 1 second, the button becomes a true monitor switch and opens the receiver.

Mode 2 (Squelch) - All channel activity can be monitored by pressing and holding the MONitor button for up to three seconds. After three seconds, Channel Guard is disabled as indicated by the flashing volume bars on the display.

Channel Guard Disable Reset

Common to both CG and Squelch modes, Channel Guard disable reset can also be programmed for either manual or auto operation.

Manual: Once the Receive Channel Guard is disabled, it remains disabled in receive mode regardless of the channel change or PTT.

Auto: Receive Channel Guard will automatically be re-enabled after the PTT is activated.

Channel Guard is always enabled when transmitting, regardless of the Channel Guard switch setting in Receive mode.

Type 99 Reset

When the radio is in Type 99 Monitor mode, pressing and holding the MONitor button for any length of time reverts the radio to Selective mode. See Type 99 section for details.

PTT The radio is keyed by pressing and holding the PTT (Push-to-Talk) button. Regardless of the Channel Guard switch setting (disabled or enabled), Channel Guard is always enabled during transmission (see Channel Guard switch section). This button is also used for selecting the Monitor mode on T99 channel (see Type 99 section).

"S" This button turns the SCAN mode on and off in the 8- and 16-channel radios. It must also be pressed while adding or deleting channels from the Scan list (see ∧ and ∨ sections). On the 2-channel radio, this button puts the radio in Talk Around mode.

∧ This control button is used for three different functions in the 8- and 16-channel radios.

ADD - While the "S" button is pressed, pressing the ∧ button will "add" the selected channel to the Scan list or increase the channel's priority status in the Scan list (e.g., Non-SCAN to Non-Priority, Non-Priority to Priority 2, and Priority 2 to Priority 1). This procedure can only be accomplished when the SCAN mode is off.

HOME - When activated alone (without the SCAN button), this button is used to revert the selected channel to a pre-programmed HOME channel. If SCAN mode is "ON" prior to pressing this key, scanning will stop. However, the radio will resume scanning if the channel, volume, or PTT button is not pressed within 5 seconds.

EMERGENCY - If programmed as an EMERGENCY button and no HOME channel is programmed, press and hold the button for at least one second to transmit the emergency ANI code on the selected channel. If the radio is programmed with a HOME channel, the emergency ANI code

will be transmitted on the HOME channel instead of the elected channel.

If the radio is scanning when the ∧ button is pressed and no HOME channel is programmed, the radio will stop scanning, transmit the emergency ANI code on the selected channel, and resume scanning. If the radio is scanning when the button is pressed and a HOME channel is programmed, the radio will stop scanning, transmit the emergency ANI code on the HOME channel, switch the receive operation to the HOME channel, and resume scanning.

Emergency transmissions can only be disabled by turning the radio off and then back on.

BACKLIGHT - In 2-channel radio operation, this button illuminates the backlight. BACKLIGHT will be illuminated when the button is pressed and will remain on for 5 seconds after the button is released (provided the button was pressed for at least one second).

∨ In 8- and 16-channel radios, while the "S" button is being pressed, activating the ∨ button will remove (delete) the selected channel from the Scan list.

Radio operating status is not altered when this button is activated alone.

In the 2-channel radio, this button toggles the TX power between 2 and 4 watts.

CHAN UP/ DOWN The CHAN UP/DOWN button selects the transmit/receive channel. Communications channels are selected one at a time or progressively by pressing and holding the CHAN UP/DOWN buttons. The next higher channel is always selected (channel 1 follows channel 2, 8, or 16 for 2-, 8-, or 16-channel radios respectively).

VOL ume The VOLume buttons set the receive audio to the desired level while pressing the UP (∧) or DOWN (∨) button. Changing the volume level while the radio is squelched causes the radio to beep, if programmed, at the new selected level. No beep will sound when the radio is already unsquelched. The relative volume level is indicated by the number of bars illuminated in the LCD. There are eight (8) levels of volume indicated by the four (4) bars on the LCD; each bar represents two levels of volume. Pressing and holding the volume buttons continues to increment the volume in the direction indicated on the button.

NOTE

The short beep indicator on volume change will not be sounded when the speaker is already on.

INDICATORS

The LCD shows the SCAN mode (for 8- and 16-channel radios only); P1, P2, and S (Scan list) indicators; channel number; volume level; battery condition; Type 99 Tone decode status; and transmit indicator (see Figure 2). With regards to 8- and 16-channel operation, the LCD is backlit anytime a control button is pressed. Backlighting is always turned ON during transmit and remains on for 5 seconds after the PTT or control button is released, if programmed.

In the 2-channel radio, the high and low power are indicated by the "P1" and "P2" pixels, respectively. The "S" pixel indicates that the radio is in "Talkaround" mode.

NOTE

These options must be enabled by the PC Programmer before indicating status for the 2-channel radio.

The LCD indicators are shown below in the Transmit and Receive mode.

Transmit Mode

TX TX indicates Transmit mode when the PTT button is pressed.

BAT BAT indicates battery voltage is low and the battery pack requires charging. When the battery pack voltage reaches the low level while in the Transmit mode, BAT is illuminated and stays illuminated for another 5 seconds after the radio is returned to the Receive mode. BAT is turned off after five seconds unless the battery pack voltage level is also low in the Receive mode.

Receive Mode

VOL The volume level (eight different levels) is indicated by 4 bars on the LCD; each bar represents 2 volume levels.

PG This display indicates the selected channel programmed to receive Type 99 calls. Upon receipt of a Type 99 call, the PG flag flashes until the Type 99 call decoder is reset.

SCN Indicates that SCAN mode is active in the 8- and 16-channel radios. This is not used in the 2-channel radios.

P1 Priority 1 enabled is represented by this display (in 8- and 16- channel radios). This represents high transmit power in 2-channel radios.

P2 Priority 2 enabled is represented by this display (in 8- and 16- channel radios). This represents low transmit power in 2-channel radios.

S This display indicates that non-priority is enabled in 8- and 16- channel radios. This same display indicates "Talkaround" mode is enabled in the 2-channel radio.

CHAN The transmit/receive channel is indicated by a number in the LCD window.

BAT This is displayed in the LCD window when the battery voltage is low.

Alert Tones

1. Series of 3 beeps: Self-test OK on Power-up.
2. Single beep: Channel or Volume change.
3. Series of beeps:
   - Synthesizer out of lock.
   - No transmit frequency when trying to transmit.
   - Expired CCT.
   - Channel busy indicator when the option is enabled.
   - T99 decode alert. (Service note: This is a change from standard radios.)

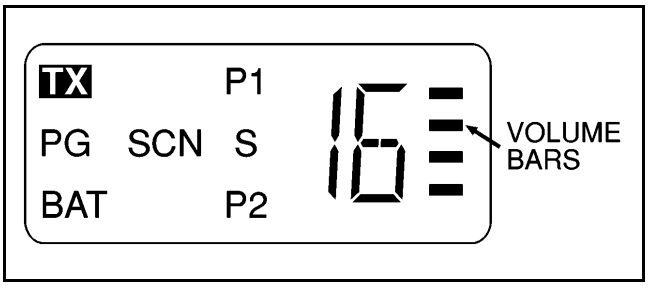


Figure 2 - Liquid Crystal Display (LCD)

Self-Test The radio performs a self-test at power-up each time the radio is turned on. A good (passed) self-test will be indicated by three beeps, if programmed, followed by the last radio status (channel number, volume level, SCAN status, etc.) being displayed in the LCD window. All segments of the display are shown during the three beeps. If the self-test fails, all segments will be illuminated but no beeps will be sounded.

BAT/ALERT Simultaneous flashing of BAT in the LCD and the sounding of alert beeps, if programmed, indicates failure of the synthesizer to lock on frequency. If this happens during transmission, the transmitter will become inhibited and no transmission will be made. The operator should select another channel, recharge the battery pack, or have the unit checked.

RADIO OPERATION

This manual provides only elementary information regarding operation of the PCS personal radio. Refer to Operator's Manual (LBI-38955) for complete operating instructions.

TO RECEIVE A MESSAGE

1. To turn the radio ON, slide the ON/OFF switch on the battery pack to the ON position. A yellow-colored area will be visible beneath the switch.
2. After the radio has passed the self-test, press and hold the VOL UP (∧) or VOL DOWN (∨) button while listening to the beeps (if this feature is programmed). Watch the LCD for the volume level indicators (four bar lines) to select the desired listening level.
3. Press the CHAN UP or CHAN DOWN button to select the operating channel.
4. The radio is now ready to receive messages.

TO SEND A MESSAGE

1. Turn the radio ON and select an operating channel as instructed above in TO RECEIVE A MESSAGE. The current status of the radio is displayed in the LCD window.

2. Press the MONitor button to determine if the channel is in use. Never interrupt another conversation.

3. While holding the radio so that the antenna is vertical, press the PTT switch and speak directly into the grill or across the face of the radio or external microphone. Speak in a normal voice. Release the PTT switch as soon as the message is finished. Messages (responses) cannot be received when the PTT is being pressed.

4. When transmission is desired on a paging channel, the PTT switch must be pressed twice. Press the PTT switch the first time to take the radio out of the paging mode. Press the PTT switch a second time for normal PTT operation. Remember that a PG flag flashes in the LCD window and the radio beeps on the first press of the PTT switch.

   The radio can be returned to the Type 99 paging mode by pressing the MONitor button.

TO PLACE A DTMF CALL

Specific procedures for placing a telephone call from a PCS DTMF radio are determined by the operating system where the radio is used. Consult a system representative for the exact operating procedures for the system.

The keypad on the PCS DTMF radio is not active until the PTT switch is operated. Therefore, the PTT switch must be pressed at all times when operating any button on the DTMF keypad.

OPERATIONAL FEATURES

The radio is PC programmable to power-up in either Selective (paging) or Monitor mode for channels programmed for paging.

When Selective mode is chosen, the radio operates as a tone and voice receiver, and allows only those calls that are tone coded for the radio to be heard. Selecting Monitor mode allows all calls with the correct Channel Guard (if programmed) on the channel to be heard.

In either mode, when a correct T99 and Channel Guard (if programmed and enabled) have been decoded, a series of intermittent beeps will be heard to alert the operator of an incoming call. A slow flashing PG flag will be illuminated on the display to indicate that a call has been received. When Selective mode is chosen, the radio switches automatically to Monitor mode.

At the end of the message, if Selective mode is desired, press and release the MONitor button to reset the Type 99 tone signalling function. The PG pixel on the display will stop flashing at this time.

While in Selective mode, the radio can be put in Monitor mode by pressing and releasing the PTT switch. A series of beeps is sounded while the PTT is pressed, to indicate that no transmission has occurred and the Monitor mode has been selected as indicated by the flashing PG indicator. However, any additional PTT activation will key the transmitter.

The radio is programmable to decode any GE or Motorola decode combinations from any one of two T99 tone tables on a per-channel basis. TX and/or RX Channel Guard can be programmed to any channel with T99.

Type 99 Receive Channel Guard (if programmed) can be disabled, any time, by the procedure explained in the Monitor/Channel Guard section. The volume level bars will flash, indicating that Channel Guard has been disabled.

NOTE

Re-setting Type 99 from Monitor mode to Selective mode does not affect the Channel Guard switch setting.

Automatic Number Identification

Automatic Number Identification (GESTAR) is a 320-millisecond burst of code that is generated at the beginning of each transmission to identify the PCS radio to the base. If programmed, a beep is sounded at the end of ANI transmission to indicate when conversation can begin as the microphone is disabled until the ANI transmission is completed.

Systems with Channel Guard require the ANI be delayed long enough for the system to respond before ANI can be decoded. A programmable delay (0 to 2 seconds) is provided to meet this requirement. A delay of 350 milliseconds, for example, requires the operator to wait for 670 milliseconds after pressing the PTT switch before conversation can be started. The ID message can be programmed to be sent at the end of a transmission, if desired.

Table 1 - PCS Function Guide

FUNCTION	PROGRAMMING	DESCRIPTION	
MONITOR Button		Momentary	Hold Down
	Programmed for Channel Guard	DIS/ENABLE CG	MONITOR
	Programmed for Squelch	MONITOR	DIS/ENABLE CG
Channel Guard Enable	Manual	Must re-enable CG with MON button after transmitting	
	Auto	PTT will re-enable CG	
ANI	Front	Sent at front of message	
	End	Sent at end of message	
	ANI side tone	YES/NO: Tells operator when it is OK to talk. (Only happens when front of message programmed.) Independent of alert beep.	
	Delay	Delay for repeater to decode Channel Guard.	
SCAN	SCAN for CG	YES/NO:	
	SCAN for TX channel	Sel Ch (TX on select channel) RX Ch (TX on received channel)	
	SCAN Hang time	Time receiver remains locked on channel after carrier drops (programmable).	
	Hang after PTT release	YES/NO: If Yes, receiver stays on channel for programmed hang time before SCAN resumes.	
	Beep on P1	YES/NO: Short beep after receiving P1 call. (Independent of audio alert beep.)	
	SCAN Prog Mode	Front- all channels programmed from keypad. Fixed - P1 fixed by PC. Other channels keypad programmed. Selected - P1 follows selected channel. Other channels keypad programmed.	
T-99	Alert Beep	YES/NO: Alert beep rec PG	
	Alert Beep VOL	VOL MAX	
DTMF Auto Dial Table	Number	Number to be dialed with or without *.	
	Start Gap	Delay between * and number.	
	Digit Length	Length of digits.	
	Gap Length	Gap between lengths.	

ANI is enabled on a per-channel basis.

In summary, ANI variables are:

ID Number (0 to 8192)

Start Delay (0 to 2 seconds in 100 msec increments)

Beginning or End of transmission

Alert Beep ON/OFF

Per-channel basis selection (Channel 1 to 16)

Emergency ID

Type 99 Tone

1. Select the appropriate channel to receive Type 99 tone signalling. The PG flag will be displayed on this channel.

2. When receiving a Type 99 call, answer in one of the following two ways:

   a. To reply to a message - After hearing the Type 99 paging tone, press the PTT switch and answer the call. After completing the communication, press the MONitor button to reset the radio for the next call.

   b. To avoid listening to a call - After hearing the Type 99 paging tone, press the MONitor button to reset the radio for the next call.

3. Type 99 operation can be disabled by pressing the PTT switch when the radio is in Selective mode. While the switch is pressed, the radio beeps to indicate that no transmission is occurring.

   After releasing the PTT switch, the PG flag flashes in the LCD window to indicate the radio is now in the Monitor mode (CG or Squelch operation only). Pressing the PTT switch results in a normal transmission.

NOTE

If a Type 99 channel is in the Scan list and SCAN is enabled, the Type 99 tones are ignored.

Scanning is provided on a carrier and Channel Guard basis only!

Channel Busy Lock-Out

This feature is programmable on a per-channel basis. If programmed, the transmit function is inhibited if the carrier is being received with the incorrect Channel Guard. If the correct Channel Guard is being received, transmission will be allowed. If Channel Guard is disabled and a carrier with the incorrect Channel Guard is received, the message will be heard but transmission will still be inhibited. If no Channel Guard is programmed, Channel Busy Lock-Out is made on carrier presence only. Type 99 cannot be programmed on a channel with Channel Busy Lock-Out.

NOTE

Please note that all reference to SCAN, Scan list, etc. applies only to the 8- and 16-channel radios.

The 2-channel radios are not equipped with the SCAN function.

SCAN OPERATION

The SCAN function allows monitoring of up to 8 or 16 receive channels. The scanned channels can be any frequency within the frequency band limits of the radio and can be Channel Guard-protected (tone or digital).

Any channel can be scanned with or without a priority level. One channel can be programmed for Priority 1 (P1) and another for Priority 2 (P2) with any or all remaining channels programmed as Non-Priority channels.

SCAN VOCABULARY

The following are terms frequently used when SCAN is used:

Simple SCAN - Simple SCAN describes the condition that exists when there is no activity on any channel in the Scan list.

Priority SCAN - Priority SCAN describes the condition that exists when SCAN locks on a non-priority channel while sampling the Priority channels.

Channel Guard SCAN - This is the scanning condition where tone or digital Channel Guard must also be detected before locking on any channel.

Selected Channel - This is the last channel that the operator selected with the Channel Select buttons. The channel selection can be done either with SCAN active or inactive. This channel is also shown in the display window in SCAN mode unless activity is detected on another channel being scanned.

Received Channel - The received channel is a channel that has been identified to have the correct carrier and correct Channel Guard (if enabled). The received channel number is shown in the display window.

HOME Channel - This channel is a high priority channel that can be programmed for easy access. This HOME channel is selected by pressing the ∧ button. Pressing this button changes the selected channel to the HOME channel regardless of the current selected channel. If SCAN mode is "ON" prior to pressing this key, scanning will stop. However, if no control button is pressed (channel, volume, or PTT) within 5 seconds, scanning will resume.

Scan List - This is an internal list that is made of channel numbers including their status, that will be scanned when the SCAN mode is turned on. This list is selected by the process explained in the PRE-SCAN OPERATION section of this manual.

Non-SCAN Channel - A non-SCAN channel is a channel that is not in the Scan list determined by the operator. This channel is not normally scanned.

Non-Priority Channel - This channel is on the Scan list as established by the operator. Activity on this channel will be interrupted by activity on either the Priority 1 (P1) or Priority 2 (P2) channel.

Priority 2 Channel (P2) - This channel is also on the Scan list. Activity on this channel will interrupt activity on any non-priority channel. However, activity on this channel will be interrupted only by activity on the Priority 1 (P1) channel.

Priority 1 Channel (P1) - This channel is included on the Scan list and activity on this channel will interrupt and supersede any other channel activity.

Channel Activity - Channel activity is established with the presence of a carrier modulated with a correct Channel Guard (if programmed).

Hang time - Hang time is the time interval that the channel remains locked to a frequency even though no channel activity is present. This condition arises after channel activity has stopped or the PTT has been released. This interval is programmable from 0.3 to 5.0 seconds.

PRE-SCAN OPERATION

A Scan list must be created before SCAN can be used. The Scan list can be established in three (3) different ways. Service Note: The radio will not go into the SCAN mode when no channels are programmed.

1. Front Programmable Option - When programmed, this option allows the operator to modify the Scan list from the front panel of the radio.

   a. "S" and ∧ Keys - When SCAN is off, holding the "S" button down and pressing the button increases the Priority status in the Scan list for the displayed channel. This means that a previous non-SCAN channel will become a non-priority channel, a non-priority channel will become a Priority 2 (P2) channel, and a Priority 2 channel will become a Priority 1 (P1) channel. Changing the SCAN status of any channel to Priority 1 or 2 status removes the previous channel with that status to a non-priority status.

   b. "S" and ∧ Keys - When SCAN is off, holding the "S" button down and pressing the ∧ button removes the selected channel from the Scan list regardless of the priority level of that channel.

2. Field Programmable Option - When selected, this option allows the operator to determine only the non-priority and Priority 2 channels as described above. The Priority 1 (P1) channel can only be selected with a PC programmer.

3. Selected Channel Option - When selected, this option allows the operator to determine the non-priority and Priority 2 channels as above. The Priority 1 channel becomes whatever channel is selected. While in SCAN mode, both the "P1" and the selected channel's actual Scan list priority status (P2, S, or none) will be displayed in the LCD window.

SCAN OPERATING MODES

Simple SCAN

Once SCAN is activated, the radio will perform a Simple SCAN routine. This routine is performed when there is no activity on any of the channels that are in the Scan list.

The scanning list at right, is an example of the routine performed when there are more than four (4) channels in the Scan list.	**np6...np5...np4...np3...P1...P2 ...np2...np1...np6...np5...P1... P2...np4...np3...np2...np1... P1...P2, etc.**

(The abbreviation "np" indicates a non-priority channel, and P1 and P2 indicate Priority 1 and Priority 2, respectively.)

NOTE

Priority channels will continue being scanned during hang time.

The scanning list at right, is an example of the routine performed when there are more than four (4) channels in the Scan list.	**np3...np2...np1...P1...P2...np3 ...np2...np1...P1...P2, etc.**

The preceding scanning orders assume that Priority 1 and Priority 2 channels exist. If they have not been assigned, their positions in the scanning order are eliminated.

PTT — Pressing the PTT switch causes the radio to transmit on the selected channel frequency and to stop the scanning routine. A programmable hang time (0.3 to 5.0 seconds) will start as soon as the PTT switch is released. Scanning will resume at the end of the hang time. The hang time is a PC programmable option and can be enabled or disabled.

Channel Change — Any channel change will change the selected channel and show it in the display window. A channel change will also stop the scanning routine for a fixed, 2-second hang time. If no activity is detected on this new selected channel during this 2-second hang time, scanning will resume.

^ — Pressing this button will revert the radio (selected channel) to a pre-programmed HOME channel and stop the scanning routine automatically.

Priority SCAN

As soon as any activity is detected on a channel, the radio will change the scanning mode from Simple SCAN to Priority SCAN. The new receive channel will appear in the LCD window.

If the receive channel is a Non-Priority channel, both Priority 1 and Priority 2 channels will be sampled (scanned) every 500 milliseconds in the order indicated at the right.	**P1...P1...P2...P1...P1...P2...P1 ...P1...P2, etc.**

- If a Priority 1 channel has not been established, the radio will only break away to sample the Priority 2 channel every 1.0 second.
- If a Priority 1 channel has been established but not a Priority 2 channel, the radio will break away to sample the Priority 1 channel every 500 milliseconds.
- If neither a Priority 1 or Priority 2 channel has been established, the radio will lock on this channel until activity on this channel goes away.
- When the receive channel is a Priority 2 channel, the radio only samples Priority 1 channel every 500 milliseconds.
- When the receive channel is a Priority 1 channel, no other channels will be scanned.

Once activity on the receive channel has ended, a programmable hang time (0.3 to 5.0 seconds) is started. Scanning will resume at the end of the hang time if there is no activity on that channel. The selected channel will appear now on the display. Note that Priority channels will continue being scanned during hang time.

To alert the operator of an incoming call on the Priority 1 channel, an option is available to sound a beep upon receiving this Priority 1 channel.

Scanning for Channel Guard

The scanning for Channel Guard option may be selected if, in addition to carrier activity alone, a correct Channel Guard is also required to lock on a channel when scanning. This option is selected on an individual radio basis.

Scanning Priority channels with the wrong Channel Guard will change the scanning rate as follows:

Priority 1 with wrong Channel Guard: The radio will change its Priority 1 sample rate from 0.5 seconds (.5 seconds) to 2.5 seconds, but it will still sample the Priority 2 channel every 1.0 second.

Priority 2 with wrong Channel Guard: The radio will change its Priority 2 sample rate from 1.0 second to 5.0 seconds, but will continue to sample the Priority 1 channel every 500 milliseconds (.5 seconds).

PTT — The operator has two PC programmable options to select from in regard to transmit channel selection. The operator can choose to transmit on the selected channel or on the receive channel. The transmit channel will be shown on the display. Releasing the PTT switch will unkey the transmitter and start the programmable hang time (0.3 to 5.0 seconds), if enabled. Scanning will resume again at the end of the hang time unless there is activity on that channel.

Channel Change — Any Channel change will change the selected channel. The receive channel, if any, will stop being displayed/heard and replaced by the new selected channel. The scanning routine is temporarily stopped for a fixed 2 seconds and will resume again if there is no activity on the selected channel.

^ — Pressing this button will revert the radio back to the pre-programmed HOME channel and stop the scanning routine automatically.

NOTE

Priority channels will continue to be scanned during hang time.

TONE PROGRAMMING

An IBM-compatible personal computer using MS DOS and a GE Programmer Interface Box plus the proper programming software is used to program the PCS Type 99 tones, Channel Guard tones, and Channel Guard digital codes. The Programmer Interface Box is connected between the UDC on the side of the PCS radio and the back of the personal computer. Refer to Programming Guide TQ3366 for details.

Two sets of Type 99 tones can be programmed in the PCS radio. Any channel can be programmed to decode any call or all calls based on any one of the two tone sets. Individual, group, and super group paging can be used. MOTOROLA formats are also acceptable.

PG is displayed on the LCD when that channel has been programmed to receive Type 99 calls. Both receive and transmit Channel Guard can also be programmed to any channel with Type 99 tone.

An Intermittent beep is sounded to alert the operator of an incoming Type 99 call.

Upon receiving a call, the radio will open the audio and flash the PG indicator until it is reset by momentarily pressing the MONitor button.

NOTE

If a Type 99 channel is in the Scan list and SCAN is enabled, Type 99 tones are ignored. Scanning is done on a Carrier and Channel Guard basis only.

The optional Type 99 programming provides individual, group, and super group call decode. The Motorola-formatted, two-tone, sequential signalling schemes can also be decoded.

In Type 99 tone systems, calls will not be heard from the receiver until the proper two tones are detected. When the second tone is decoded and recognized as correct, an alert tone sounds during the remaining portion of the second tone. The receiver audio path opens and remains open to receive messages until the decoder is reset. The PG indicator will also flash to show a call has been received.

The PCS radio can be programmed with up to two separate tables of tones. Either the GE Type 99 format or the Motorola format can be assigned to each tone table. The tone decoder (individual, group, and super group for GE format or individual, group, and quick call for the Motorola format) can be enabled individually for each channel. Once enabled, one of the two tone tables can be selected for each channel.

The Group Call format allows communication with all radios in a group. The Super Group Call (in GE Tone systems) or Quick Call (in Motorola tone systems) allows communications between all radios in a system.

GE TYPE 99 FORMAT

Tone frequencies in the GE tone system fall within the range of 517.5 to 997.5 Hz.

In the GE tone format, the first tone can be from Tone Group A (for individual or group calls) or from Tone Group C (for super group calls). The second tone may be from Tone Group B (for individual calls) or from Tone Group D (for group or super group calls). The GE tone format is illustrated as follows.

INDIVIDUAL CALL FORMAT	<...1.0 SEC...> 20% TONE A	<...200 MS...> 25% GAP	<...1.0 SEC...> +300%,-0% TONE B
GROUP CALL FORMAT	<...1.0 SEC...> 20% TONE A	<...200 MS...> 25% GAP	<...1.0 SEC...> +300%, -0% TONE D
SUPER GROUP CALL FORMAT	<...1.0 SEC...> 20% TONE C	<...200 MS...> 25% GAP	<...1.0 SEC...> +300%, -0% TONE D

For example, assume the paging number to be 123; the first digit of the paging number is a "1." Look in Table 2 and read down the column labeled "100's Digit" to a "1." Read horizontally across the column labeled "10's Digit." The Tone Group is B. The second digit of the paging number is a "2." The tone designator is B2. Look in Table 3 and down the column labeled "Tone Designator" to find B2. Read horizontally across the column labeled "Tone Frequency." The first tone frequency is 787.5 Hz.

To determine the second tone frequency, look in Table 2 and, as before, find the first digit of the paging number ("1").

The second Tone Group is A. The third digit of the paging number is a "3" and the Tone Designator is A3. In Table 2, read down the column labeled "Tone Designator" and find A3. Read horizontally across the column labeled "Tone Frequency." The second tone frequency is 802.5 Hz.

For different paging numbers, locate the first digit in the "100's Digit" column and determine the tone frequencies as described in the example. For a complete description of tone applications, refer to DATAFILE BULLETIN DF-50003A.

Tone D is the diagonal tone used (in GE systems only) when the first and second tone frequencies are the same. The standard frequency for Tone D is 742.5 Hz, but may be programmed with any tone frequency.

Table 2 - GE Tone Groups

100's Digit	10's Digit For First Tone	1's Digit For Second Tone
0	A	A
1	B	A
2	B	B
3	A	B
4	C	C
5	C	A
6	C	B
7	A	C
8	B	C
9	NOT USED	

MOTOROLA FORMAT

Tone frequencies in the Motorola tone system are within the range of 288.5 to 1433.4 Hz. In the Motorola tone format, the first tone may be one of three tones: A for Individual Call, B for Quick Call, and C for Group Call. The second or final tone is B in all cases.

NOTE

The PCS radio is able to recognize the A, B, and C tones. Individual, Group, and Quick Call formats may be used simultaneously.

The Motorola tone format is illustrated as follows:

INDIVIDUAL CALL FORMAT	<...1.0 SEC...> (Minimum) TONE A	<...NONE...> (Minimum) GAP	<...3.0 SEC...> TONE B
GROUP CALL FORMAT	<...1.0 SEC...> (Minimum) TONE C	<...NONE...> (Minimum) GAP	<...3.0 SEC...> TONE B
SUPER GROUP CALL FORMAT	<.....8 SEC.....> TONE B		

Individual Call

Tables 4 and 5 may also be used to determine the tone frequencies. The first digit of the code determines the Tone Group used in the code (see Table 4). Then Table 5 is used to determine the actual tone frequencies. For a code of 124, the Tone Groups used are shown in Table 4. Tone A and Tone B are both located in Tone Group 1 and Tone B is tone number 4. Refer to the following examples for additional information.

Example 1 - Code 098:

The digit "0" in Table 4 (First Digit of Code) shows the Tone A is in Tone Group 4 and Tone B is in Tone Group 2 (see Table 5).

Tone number 9 in Tone Group 4 is 524.6 Hz.

Tone number 8 in Tone Group 2 is 879.0 Hz.

Example 2 - Code 265:

The digit "2" in Table 4 shows that both Tone A and Tone B are in Tone Group 2.

Tone number 6 in Tone Group 2 is 788.5 Hz

Tone number 5 in Tone Group 2 is 746.8 Hz.

Group Call (Quick Call Format)

In Group Call applications, the Tone Group is determined by Table 6, while the frequency is determined by Table 5. Refer to the following examples.

NOTE

Group Call code numbers range from 00 to 99. However, there are several Group Calls with the same Tone B frequency. This limits the total number of Group Calls to 40.

Example 1- Group Call Code 07 (also code 27 and 37):

The digit "0" in Table 6 shows that Tone B is in Tone Group 2 along with 20 to 29 and 30 to 39. Tone number 7 in Tone Group 2 is 832.5 Hz (see Table 5).

Example 2 - Group Call 98 (also 48 and 88):

The digit "9" in Table 6 shows that Tone B is in Tone Group 4 along with 40 to 49 and 80 to 89. Tone number 8 in Tone Group 4 is 496.8 Hz.

Table 3 - GE Tone Generator Frequencies

TONE GROUP	TONE DESIGNATOR	TONE FREQUENCY (Hz)
A	A0	682.5
	A1	592.5
	A2	757.5
	A3	802.5
	A4	847.5
	A5	892.5
	A6	937.5
	A7	547.5
	A8	727.5
	A9	637.5
B	B0	652.5
	B1	607.5
	B2	787.5
	B3	832.5
	B4	877.5
	B5	922.5
	B6	967.5
	B7	517.5
	B8	562.5
	B9	697.5
C	C0	667.5
	C1	712.5
	C2	772.5
	C3	817.5
	C4	862.5
	C5	907.5
	C6	952.5
	C7	532.5
	C8	577.5
	C9	622.5
DIAGONAL TONE		742.5

Table 4 - Motorola Type Code Numbers

First Digit of Code	Tone Group from which Tone A is Selected	Tone Group from which Tone B is Selected
1	1	1
2	2	2
3	1	2
4	4	4
5	5	5
6	2	1
7	4	5
8	5	4
9	2	4
0	4	2
A	3	3

Table 6 - Motorola Group Call Tone Groups (TG)

GROUP CALL CODE NUMBER	TONE GROUP (TONE B)
00-09	TG2
10-19	TG1
20-29	TG2
30-39	TG2
40-49	TG4
50-59	TG5
60-69	TG1
70-79	TG5
80-89	TG4
90-99	TG4

Table 5 - Motorola Type Code Numbers

TONE NO.	TONE GROUP 1 (Hz)	TONE GROUP 2 (Hz)	TONE GROUP 3 (Hz)	TONE GROUP 4 (Hz)	TONE GROUP 5 (Hz)	TONE GROUP 6 (Hz)
1	349.0	600.9	288.5	339.6	584.8	1153.4
2	368.5	634.5	296.5	358.6	617.4	1185.2
3	389.0	669.9	304.7	378.6	651.9	1217.8
4	410.8	707.3	313.0	399.8	688.3	1251.4
5	433.7	746.8	953.7	422.1	726.8	1285.8
6	457.9	788.5	979.9	445.7	767.4	1321.2
7	483.5	832.5	1006.9	470.5	810.2	1357.6
8	510.5	879.0	1034.7	496.8	855.5	1395.0
9	539.0	928.1	1063.2	524.6	903.2	1433.4
0	330.5	569.1	1092.4	321.7	553.9	1122.5

CHANNEL GUARD

The radio can be programmed for Channel Guard (CTCSS) encode/decode tone frequencies of 67 Hz to 210.7 Hz, including all of the standard EIA frequencies. Each channel can be programmed for encode/decode, encode only, decode only, or for no Channel Guard frequency.

A list of standard tone frequencies is shown in Table 7. A list of digital Channel Guard codes and their equivalents is shown in Table 8.

Table 7 - CG Tone Frequencies

67.0	88.5	110.9	141.3	179.9
71.9	91.5	114.8	146.2	186.2
74.4	94.8	118.8	151.4	192.8
77.0	97.4	123.0	156.7	203.5
79.7	100.0	127.3	162.2	210.7
82.5	103.5	131.8	167.9	
85.4	107.2	136.5	173.8	

Table 8 - Primary & Equivalent Digital Codes

PRIM CODE	EQUIVALENT CODE	PRIM CODE	EQUIVALENT CODE	PRIM CODE	EQUIVALENT CODE
023	340, 766	133	413, 620	237	464, 642, 772
025		134	273	243	267, 342
026	566	135	205, 610	245	370, 554
031	374, 643	136	502, 712	246	542, 653
032	137	142	174, 270	252	661
036	560, 627	143	333	254	314, 612, 706
043	355	144	466, 666	255	425
047	375, 707	145	525	262	316, 431, 730
051	520, 771	147	303, 306, 761	266	655
053		150	256, 703	271	427, 510, 762
054	405, 675	152	366, 415	274	652
056	465, 656	153	606, 630	276	326, 432
060	116, 737	155	233, 660	307	362, 565
065	301	156	517, 741	311	330, 456, 561
066	737	157	322, 503	312	515, 663, 743
067	516, 720	161	345, 532	315	321, 673
071	603, 717, 746	162	416, 553	317	546, 614, 751
072	470, 701	163	460, 607, 654	324	343, 570
073	640	164	207, 732	325	550, 626
074	360, 721	165	354	331	372, 507
075	501, 624	171	265, 426	332	433, 552
076	203, 754	172		344	471,664, 715
104	226, 557	212	253	346	616, 635, 724
107	365	213	263, 736	351	353, 435
114	327, 615	217	371, 453, 530	356	521
115	534, 674	222	445, 457, 575	363	436, 443, 444, 662
117	411, 756	223	350, 475, 750	446	467, 511, 672
122	535	224	313, 506, 574	447	473, 474, 731, 744
123	632, 637	225	536	452	524, 765
125	172	227	261, 567	454	513, 545, 564
127	412, 441, 711	231	504, 631, 636, 745	455	533, 551
130	364, 641	234	423,563, 621	462	472, 623, 725
131	572, 702	235	611, 671, 723	523	647, 726
132	605, 634, 714	236	251, 704, 742	526	562, 645

REPLACEMENT OF BATTERY PACK

CAUTION

The battery pack used with the PCS Personal Radio must be supplied by Ericsson GE and as shown under OPTIONS AND ACCESSORIES listed in the Table of Contents of this manual.

To Remove the Battery Pack from the Radio

(Refer to Figure 3.)

1. Turn the radio OFF by sliding the ON/OFF switch on the battery pack, to the OFF position.

2. Press down on the battery pack release latch and slide the battery pack out in the direction of the release latch.

To Re-Connect the Battery Pack to the Radio

(Refer to Figure 4.)

1. Be sure the ON/OFF switch on the battery is in the OFF position.

2. Align the battery pack with the grooves in the back of the radio and slide the battery pack toward the front of the radio.

3. Insert the battery pack into the grooves until the battery release latch clicks into place.

RECHARGING THE BATTERY PACKS

The radio is equipped with a battery voltage indicator that is displayed in the LCD window when the battery pack voltage reaches a low level and the battery requires charging.

There are several chargers and charge rates available for charging the PCS battery packs. The battery pack may be charged while connected to the radio or removed for charging. For specific instructions regarding the battery charger, refer to the applicable charger Operator's Manual.

INTRINSICALLY SAFE USAGE

Selected personal radios with appropriate factory-installed F4 Options are certified as Intrinsically Safe by the Factory Mutual Research Corporation for use in Class 1, Division 1 or 2, hazardous locations in the presence of Groups C and D atmospheres; or non-incendive Class 1, Division 2, hazardous locations in the presence of Groups A, B, C, and D atmospheres.

Hazardous locations are defined in the National Electrical Code. Useful standards NFPA 437A and NFPA 437M for the classification of hazardous areas may be ordered from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. (See "Battery Pack" section for additional information concerning Ni-Cd batteries.)

Figure 3 - Removing the Battery Pack

Figure 4 - Installing the Battery Pack

Reduced Capacity in Nickel/Cadmium Batteries

Nickel-Cadmium batteries, in some applications, can develop a condition of reduced capacity, sometimes called "Memory Effect." This condition may occur when :

1. The battery is continuously overcharged for long periods of time.

2. A regular duty cycle is performed which allows the battery to expend only a limited portion of its capacity.

If the nickel-cadmium battery is only sparingly or seldom used and is left on continuous charge for one or two months at a time, it could experience reduced capacity. On the first discharging cycle, the output voltage could be sufficiently lowered to reduce the battery's hours of useful service.

The most common method of causing this limited capacity is regularly performing short duty cycles; when the battery is operated so that only a portion (2%) of its capacity is expended. This type of operation can cause the battery to become temporarily inactive and show a severe decrease in the ability to deliver at full-rated capacity.

Any nickel-cadmium battery showing signs of reduced capacity should be carefully checked before being returned under warranty or scrapped. If reduced capacity is a fact, the following procedure may restore capacity:

1. Discharge the multi-cell battery at the normal discharge rate until the output voltage is approximately 1 volt per cell. This equals 6 volts output for current PCS Personal radio batteries.

   Refer to the Typical Ni-Cd cell discharge curve in Figure 5 below. Note the flatness of the discharge voltage. Discharging below the knee of the curve does not give added service. Experience shows discharging below 1.0 volt is not necessary for reconditioning a cell.

2. Charge the cell a full cycle using an appropriate charger.

3. This procedure should be repeated. Performing the rated discharge and charge cycle at least twice should sufficiently restore the battery.

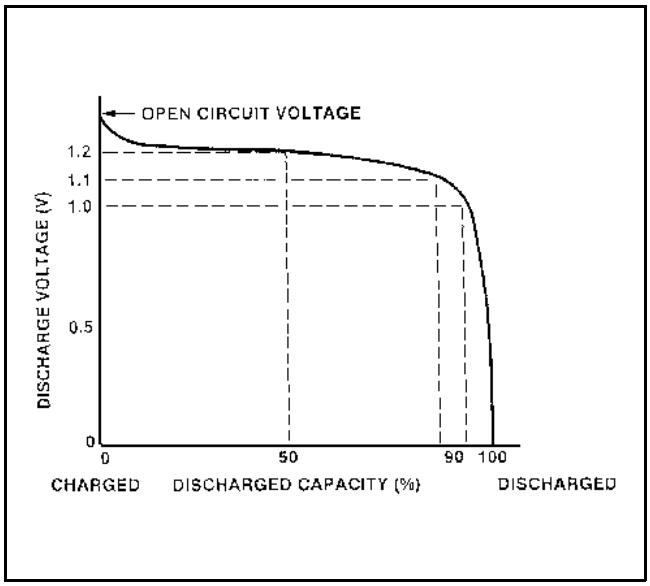


Figure 5 - Typical Ni-Cd Cell Voltage Discharge Curve

Disposal

Ni-Cd

The product that you have purchased contains a rechargeable battery. The battery is recyclable. At the end of its useful life, under various state and local laws, it may be illegal to dispose of this battery into the municipal waste stream. Check with your local solid waste officials for details in your area for recycling options or proper disposal. Call Toll Free 1-800-822-9362 for information and/or procedures for returning rechargeable batteries in your state. (See "Intrinsically Safe Usage" section for additional information concerning Ni-Cd batteries.)

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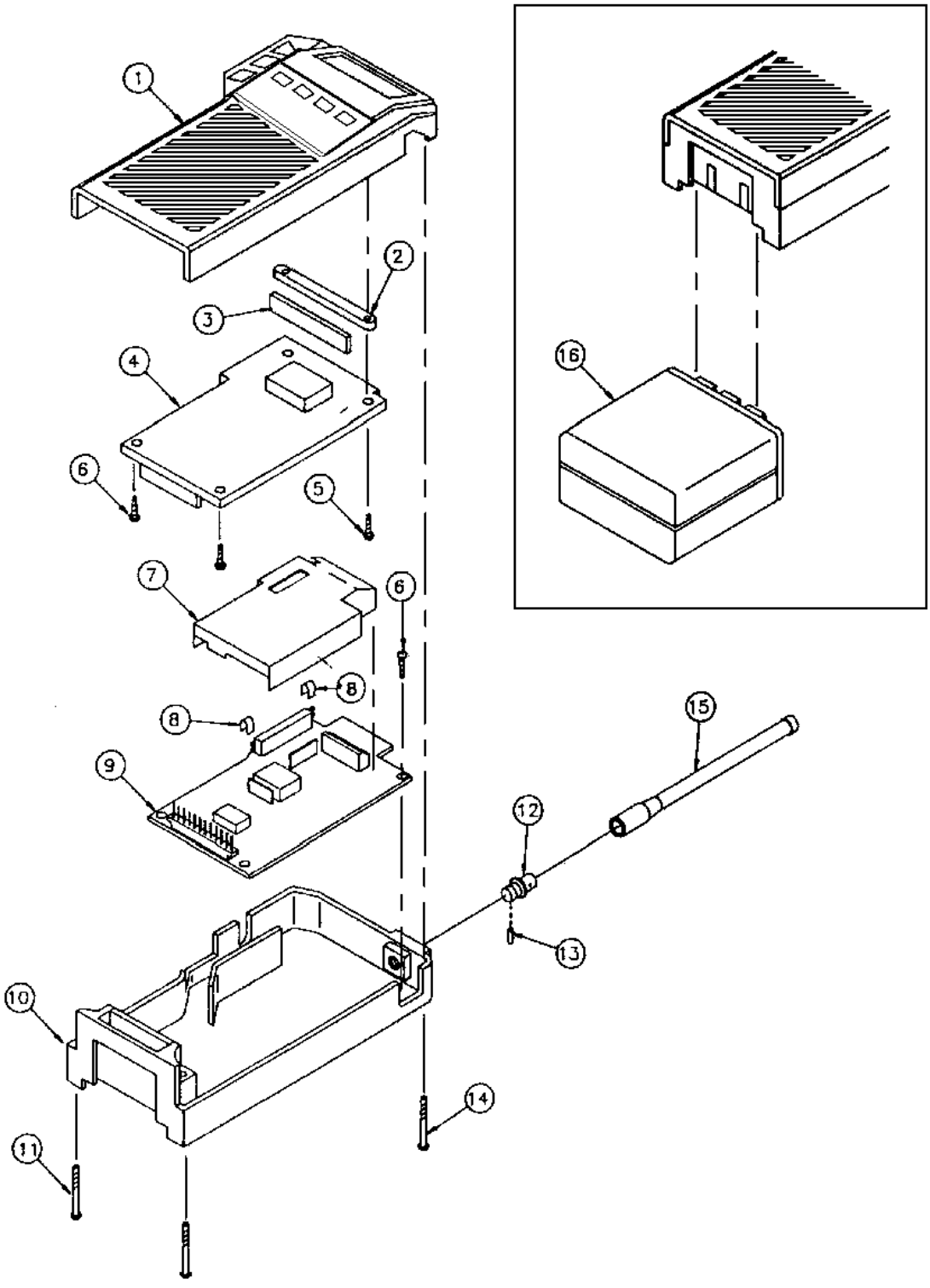
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PCS MECHANICAL PARTS
ISSUE 1

SYMBOL	PART NO.	DESCRIPTION
1	19D902180P10	Front Cap Assembly (Conv.)
	19D902180G11	Front Cap Assembly (Conv./DTMF)
2	19B801570P2	P901 Connector Holder.
3	19A705662P1	P901 Connector "MOE".
4	19D902631G2	Audio/Logic Board (A2).
5	19A702364P310	Machine screw: M3-0.5 x 10. (Quantity 4).
6	19A702364P304	Machine screw: M3-0.5 x 4. (Quantity 5).
7	19B801572G1	RF Shield.
8	19B801492P2	Power Module Mounting Clip. (Quantity 2).
9	19D438222G1	Transmit/Receive Board (A1) 136-153 MHz.
	19D438222G2	Transmit/Receive Board (A1) 150-174 MHz.
	19D438262G1	Transmit/Receive Board (A1) 403-440 MHz.
	19D438262G2	Transmit/Receive Board (A1) 440-470 MHz.
	19D438262G3	Transmit/Receive Board (A1) 470-512 MHz.
10	19D902175G1	Rear Cover Assembly.
11	19A705732P333	Machine screw: M3-0.5 x 33. (Quantity 2).
12	19A702270P2	BNC Antenna Connector.
13	19A143453P1	Setscrew: #3-48 x .125 inch.
14	19A705732P329	Machine screw: M3-0.5 x 29. (Quantity 2).
15	19B801620P10	Antenna (VHF).
	19B801621P1,2	Antenna, Flex (UHF).
	19B801620P1-3	Antenna, Helical (UHF)
16	19A705293P1-3, 5	Battery.