P100 Series

Portable Two-Way Radios
Training Presentation

P100 Series

Portable Two-Way Radios
Training Presentation

Modules

P100 Series

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- 0.1 Product Positioning

1. Product Overview
- 1.1 Product Introduction
- 1.2 Product Attributes
- 1.2 Product Ergonomics
- 1.3 Specifications
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Module 0

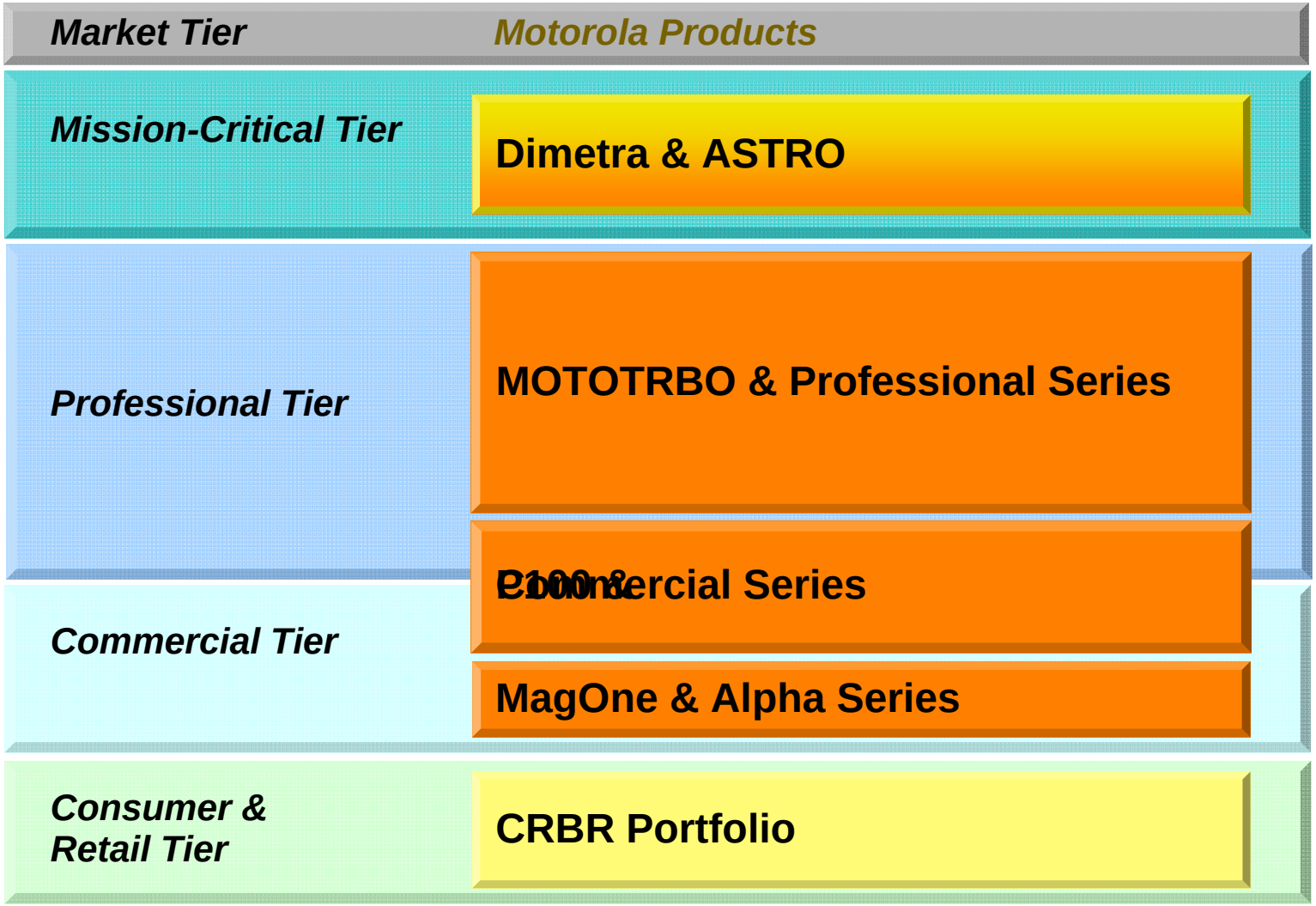
P100 Series Product Positioning & Pricing

Module Content

0.1 Product Positioning

Module 0.1

Motorola EMEA Portfolio



Module 0.1
Product Positioning

* Non EU only # EU Only

Module 1

P100 Series Product Overview

Module Content

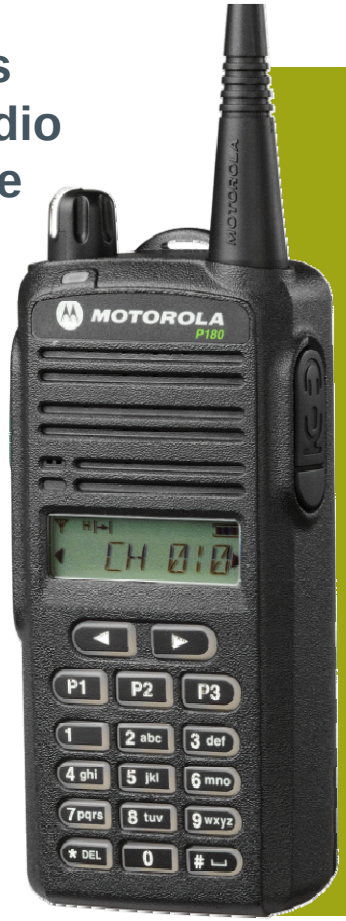
- *1.1 Product Introduction*
- *1.2 Product Attributes*
- *1.2 Product Ergonomics*
- *1.3 Specifications*
- *1.4 Product Package*

Module 1.1

Product Introduction

P100 Series

The Motorola P100 Series offers commercial users a two-way radio solution with a extensive feature set and ergonomic shape in a durable, lightweight, compact design– helping organizations increase efficiency and productivity.



Increased Functionality

- Tighter specifications
- Build-in Simple voice scrambling
- VOX ready
- Build-in DTMF signaling
- Front Panel programming
- Li-Ion battery available

Improved Ergonomics

- Robust design
- Lightweight & compact
- Large, textured PTT
- 8-digit alpha-numeric LCD
- Large on / off / volume control

Quality Features at a Competitive Price

Module 1.2

Product Attributes

P100 Series

Better Audio

- The P100 Series radios are design to perform at 70dB Rx Spurious Rejection, Rx Intermodulation & Rx Adjacent Channel Selectivity at 25kHz, thus providing better rejection towards adjacent channels noise.
- The speaker produces powerful 500mW of audio output to penetrate high noise environment.
- Companding technology provide crisp audio while minimizing distortion at high volume levels, by compressing the voice when transmitting and expanding the voice back on the receiver.

Module 1.2

Product Attributes

P100 Series

Better Flexibility

- P100 Series comes with the Front Panel Programming capability, which enables user to program the radio without the need for CPS.

Module 1.2

Product Attributes

P100 Series

Essential Feature Loaded

- 99 Channels
- Build-in VOX
- Built-in Voice Inversion Scrambling
- Built-in DTMF Signaling
  - PTT-ID (Individual, Group, ALL) encode & decode
  - Selective Call encode & decode
  - Call Alert encode & decode
- Front Panel Programming (FPP) capability
- Li-Ion / NiMH Battery offering

Module 1.2

Product Attributes

P100 Series

Simple Operation & Improved Ergonomics

- Comfortable Channel knob
- Well positioned buttons
- LED to indicate transmission mod
- Large LCD for reading radio channel and status
- Durable, Lightweight, Compact Design

Module 1.2

Product Attributes

P100 Series

Quality—*The Motorola P100 Series radio is designed and tested to meet various levels of both internal and external quality standards.*

ALT–Accelerated Life Test

- Series of stringent Motorola internal test to simulate 5 years of hard use in real life.
- Consisted of drop test, temperature shock test, vibration, dust, ESD and humidity test.

MIL Spec 810C, D, E and F

- Stamp of approval from the U.S. Military for use in rough environment
- Consisted of Salt Fog & dust test, low and high temperature storage and operation test

IP54 rating

- International Protection (IP) against dust (rating 5) and water (rating 4)

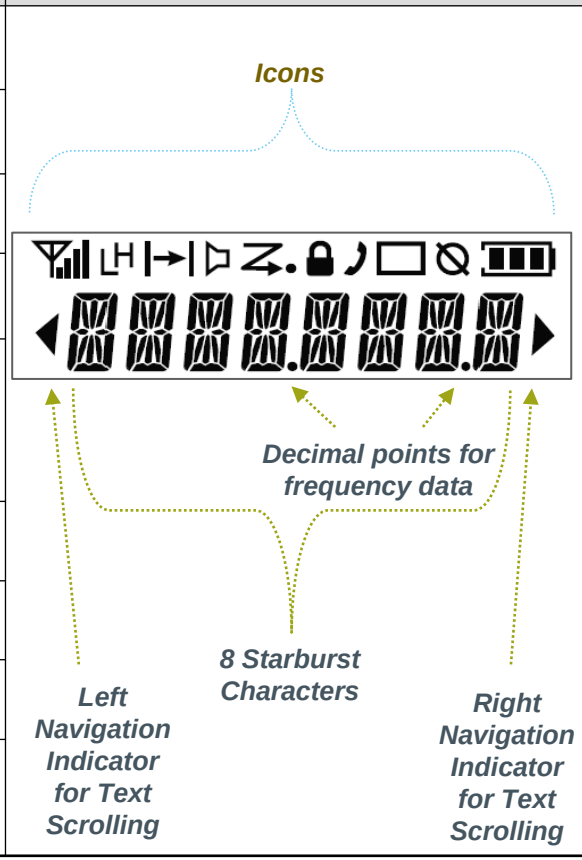
Module 1.3

Physical Attributes

P100 Series

Understanding Status Icons

P100 Series

Icon	Name	Description	Display
	Signal Strength	More bars indicate a stronger signal.	
	Power Level	"L" indicates radio is transmitting in low power. "H" indicates radio is transmitting in high power.	
	Talkaround	Radio is not transmitting through the repeater.	
	Monitor	Indicates the radio is monitoring a selected channel.	
	Scan	Arrow blinks without dot, when scan is activated. Arrow and dot are fixed when there is some activity on a non-priority channel. Dot blinks and arrow is fixed when there is some activity on the priority channel.	
	Scrambling	Scrambling feature is activated.	
	Programming Mode	Radio is in Programming Mode.	
	Keypad Lock	Keypad is locked.	
	Battery Meter	Indicates remaining charge in battery based on number of bars (0 - 3). Blinks when battery is low.	

Programmable Buttons

P100 Series

Well positioned 3 front + 2 side programmable buttons

- Buttons are dual functional: short and long press
- Functions programmable via CPS

LED Color Indicator

P100 Series

LED Color	*State*	*Indication*
Green	**Illuminated**	**Radio is transmitting in normal mode.** **Radio is transmitting in scrambling mode.**
	Normal Blinking	**Radio is receiving in normal mode.** **Channel is Busy.** **Radio passed self test during powering up.**
Amber	**Illuminated**	**Monitor activated.** **Permanent sticky monitor activated.** **Selective call received**
	Normal Blinking	**Radio is in active scan mode.** **Radio is receiving in scrambling mode.**
	Fast Blinking	**Call alert received**
Red	**Normal Blinking**	**Radio is transmitting in normal mode while battery is low.** **Radio is transmitting in scrambling mode while battery is low.**
	Fast Blinking	**Radio failed self test during powering up.**

Module 1.4

Product Specifications

P100 Series

General Specifications	
Frequency Range	136-174MHz, 403-447MHz, 435-480MHz
Memory Channels	99 CH
Channel Spacing	12.5/25 kHz switchable
Operating Temperature Range	-30C to +60C (Radio)
Sealing	Passes rain testing per IP54
DIMENSIONS (H X W X D) WITH	
LiIon battery	120 x 55 x 35.5 mm
NiMH battery	120 x 55 x 36.5 mm
High Capacity LiIon battery	120 x 55 x 40.7 mm
WEIGHT WITH	
LiIon battery	335 g
NiMH battery	395 g
High Capacity LiIon battery	342 g
AVERAGE BATTERY LIFE @5-5-90% DUTY CYCLE (HIGH POWER), WITH	
LiIon battery	11 hrs
NiMH battery	9 hrs
High Capacity LiIon battery	16 hrs

Module 1.4

Product Specifications *(cont.)*

P100 Series

Transmitter	
RF Output High Power	5W (VHF), 4W (UHF)
Low Power	1W
Spurs and Harmonics	9kHz - 1GHz < -36dBm, > 1GHz < -30dBm
Frequency Stability (-30°C to +60°C)	+/- 2.5ppm
FM Hum & Noise	> 40dB
Modulation Limiting	<= 5Khz (25KHz),<= 2.5Khz (12.5kHz)
Audio Response (from 6dB/oct pre-emphasis, 300-3000Hz)	+1/-3dB
Audio Distortion @ 1kHz tone, 60% rated max dev.	<5%
Receiver	
Sensitivity (12dB SINAD)	<-119 dBm (0.25uV)
Adjacent Channel Selectivity	> 70dB (25KHz), >65dB (12.5kHz)
Intermodulation	>70dB
Spurious Rejection	>70dB
Audio Distortion	<5%
Hum and Noise	>40dB
Conducted Emission	< -57dBm for below 1GHz, < -47dBm for above 1GHz
Audio Output @ <5% Distortion	500mW (at 24 ohm)

Module 1.5

Standard Sales Model Content

P100 Series

Standard Package includes:

- Radio
- Antenna
- Battery Li-Ion or NiMH
- Charger
- Belt clip
- User Guide and Safety Manual

Module 2

P100 Series Features and Benefits

Module Content

Module 2.1

Conventional Features & Benefits

P100 Series

Features	Benefits
99 Channels	Provides extensive amount of channels for users to operate on, thus providing greater flexibility in call group management.
Built in VOX	VOX enables hand-free operation as a user's voice activates the PTT activation. Radio no longer requires additional option board for the VOX function as this feature is built in.
Built in voice inversion scrambling	Voice inversion scrambling provides a measure of security over the transmission. Radio without this feature will not provide an intelligent output as the voice signals are scrambled.
Front Panel Programming (FPP) capability	Front Panel Programming (FPP) enables the user to program the radio without using the CPS. This provides a great flexibility as programming no longer relies on availability of CPS.
70dB Rx Spurious Rejection, Rx Intermodulation & Rx Adjacent Channel Selectivity at 25Khz.	Better RF specifications provide the radio with better rejection against noise from the adjacent channels, thus providing clearer transmission.

Module 2.1

Conventional Features & Benefits (Con't)

Features	Benefits
Repeater / Talkaround	At a touch of a button, the radio switches between repeater mode and talkaround mode.
Monitor	Radio monitors the current channel for transmission activity. Once activity is detected on the channel, the radio will un-mute to the voice thus enabling the user to listen to the traffic.
Normal and Priority Scan	Enables users to monitor multiple channels and receive calls when transmitted on the channel. As for priority scan, users can assign a certain channel to be scan on, 50% of the time.
Prime Channel	Prime channel would be the channel that requires the most monitoring. Therefore the radio would go back to this channel if the radio is idle on the other channel for a certain time limit or the Prime channel button is pressed.
Channel Alias	Channels can be program to a name (alias). The LCD will display the alias when the scanning radio detects the transmitting channel.
Power Level Selectable	Allows users to change the transmit power from Low to High and vice versa at a press of a button. This setting is per channel basis. It allows users to save battery life when high power transmission is not required.

Module 2.2

Signaling Features & Benefits–DTMF Signaling

P100 Series

Features	Benefits
PTT-ID (Individual, Group, ALL) encode & decode	This enables the identity of the transmitting radio to be shown on the radio LCD thus eliminating the need for identification via voice.
Selective Call encode & decode	Enables users to select a particular personal or group for call without involving other units. This reduces the channel congestion as it eliminates unnecessary conversation between users.
Call Alert encode & decode	Enables users to alert an individual or group of radio users that an attempt is being made to contact them. This feature enables busy channel users to be contacted easily. Apart from that, it alerts the user of an incoming call if the user momentarily steps away from the radio.

Module 2.3

Physical Features & Benefits

P100 Series

5 Fully Programmable Buttons— Supports up to 10 product features (short/long press) with just one touch.

8 Character Alphanumeric—Display large backlit LCD display with icons, to display channel number, Caller ID, Channel alias and feature enable/disable.

Green band on PTT button—Provides greater visibility of PTT button location.

Larger speaker installed—Louder voice output.

Module 2.4

CPS Features & Benefits

P100 Series

Systematic, easy to navigate menu

Code plug duplicate button

Provides customer summary report

Comprehensive help menu provided

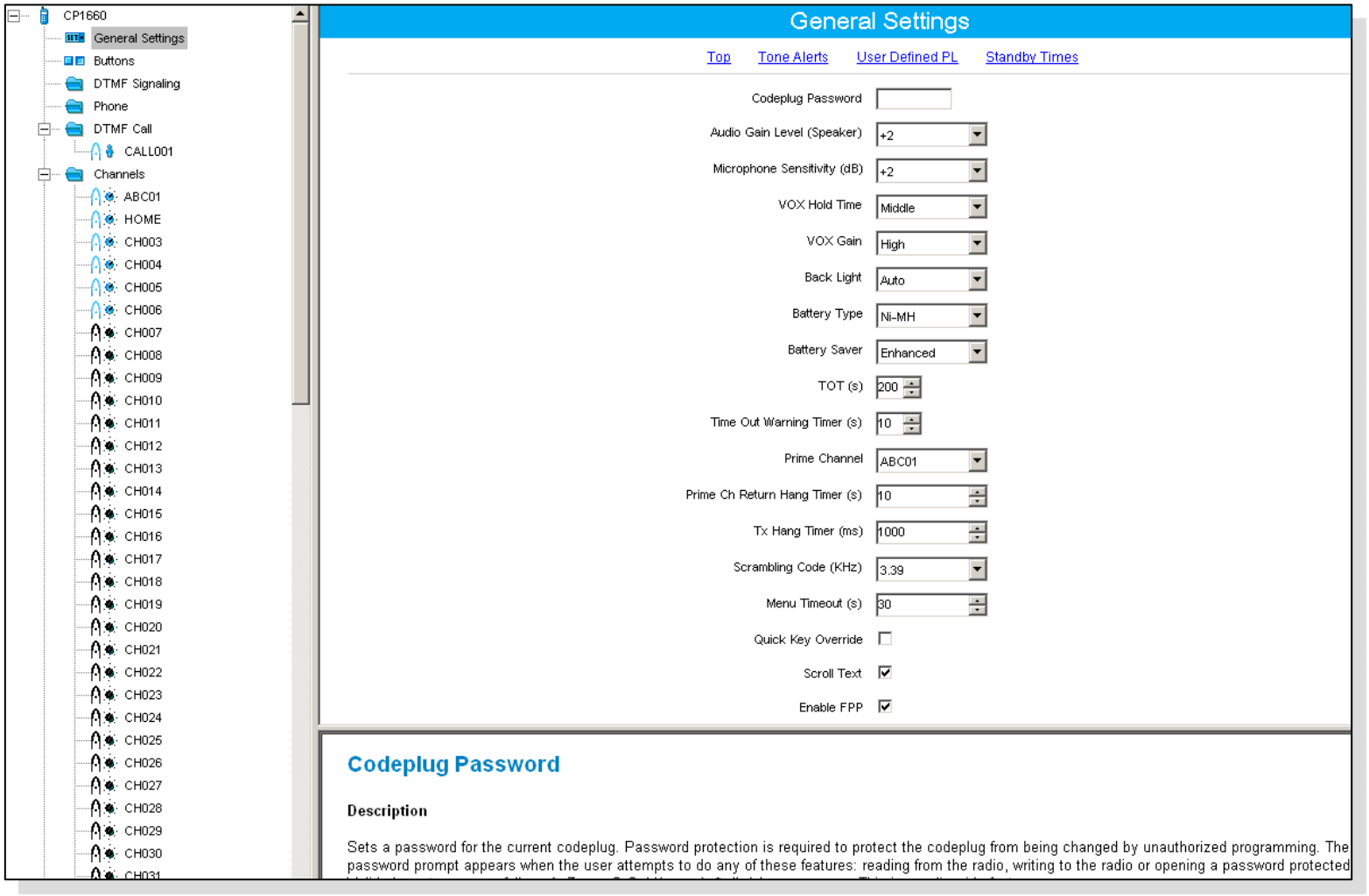
USB programming cable

- Does not require additional equipment such as RIB box, external power supply and serial cables.
- USB interface widely available.

Module 2.4

CPS User Interface

P100 Series



Module 2.4

CPS customer handouts and summary

P100 Series

MOTOROLA

Serial Number 0278JH7862 Model Number AZH03RDK8AA9

1. Power On/Off, Volume
2. Push To Talk
3. Microphone
4. Short Press: Unassigned
   Long Press: Unassigned
5. Short Press: Squelch Type
   Long Press: Unassigned
6. Short Press: Channel Scan
   Long Press: Unassigned
7. Short Press: Power Level
   Long Press: Unassigned
8. Short Press: Squelch Type
   Long Press: Unassigned
9. Display Description

Display	Description
Illuminated Green	Radio is transmitting in normal mode
	Radio is transmitting in scrambling mode
Normal Blinking Green	Radio is receiving in normal mode
	Channel is busy
	Radio passed self test during powering up
Illuminated Amber	Monitor activated
	Permanent Sticky Monitor activated
	Selective Call received
Normal Blinking Amber	Radio is in active scan mode
	Radio is receiving in scrambling mode
Fast Blinking Amber	Call Alert received
Normal Blinking Red	Radio is transmitting in normal mode while battery is low
	Radio is transmitting in scrambling mode while battery is low

Model Number AZH03RDK8AA9
Serial Number 0278JH7862

CPS Channels Summary

	CH001	CH002	CH003	CH004	CH005
Position	1	2	3	4	5
Channel Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Channel Bandwidth (KHz)	25	25	25	12.5	12.5
Scan List	List1	List1	List1	List1	List1
Scan Type	Normal Scan	Normal Scan	Normal Scan	Normal Scan	Normal Scan
Call Type	Sel Call	Sel Call	Sel Call	Sel Call	Sel Call
Squelch Setting	Normal	Tight	Tight	Tight	Tight
PL Required for Call	Disabled	Disabled	Disabled	Disabled	Disabled
Allow Talkaround	Disabled	Disabled	Disabled	Disabled	Disabled
Ack Individual Call	Disabled	Disabled	Disabled	Disabled	Disabled
Scrambling	Disabled	Disabled	Disabled	Disabled	Disabled
RX Only	Disabled	Disabled	Disabled	Disabled	Disabled
Phone Mode	Disabled	Disabled	Disabled	Disabled	Disabled
Companding/Expanding	Enabled	Disabled	Disabled	Disabled	Disabled
RX					
Frequency (MHz)	435.125000	457.525000	479.875000	453.125000	457.525000
Squelch Type	CSQ	CSQ	CSQ	CSQ	CSQ
DPL Code (Octal)	023	023	023	023	023
DPL Invert	Disabled	Disabled	Disabled	Disabled	Disabled
TPL Frequency (Hz)	67.0	67.0	67.0	67.0	67.0
TPL Code	XZ	XZ	XZ	XZ	XZ
Mute/Unmute Rule	Std Unmuting, Std Muting	Std Unmuting, Std Muting	Std Unmuting, Std Muting	Std Unmuting, Std Muting	Std Unmuting, Std Muting
TX					
Frequency (MHz)	435.125000	457.525000	479.875000	453.125000	457.525000
Squelch Type	CSQ	CSQ	CSQ	CSQ	CSQ
DPL Code (Octal)	023	023	023	023	023
DPL Invert	Disabled	Disabled	Disabled	Disabled	Disabled
TPL Frequency (Hz)	67.0	67.0	67.0	67.0	67.0
TPL Code	XZ	XZ	XZ	XZ	XZ
Reverse Burst Phase	Disabled	Disabled	Disabled	Disabled	Disabled
Power Level	Low	High	High	Low	Low
PTT ID	Disabled	Disabled	Disabled	Disabled	Disabled
DPL Turn-Off Code	Disabled	Disabled	Disabled	Disabled	Disabled
VOX	Disabled	Disabled	Disabled	Disabled	Disabled
Busy Channel Lockout	Disabled	Disabled	Disabled	Disabled	Disabled

Module 3

P100 Series Accessories

Module Content

Module 3

Why Learn about Accessories

Accessories complete and personalize a radio solution

- Security officer may use a surveillance earpiece so radio communication is not shared with the public
- Service industry worker may use a lightweight temple transducer headset so he can keep his ears uncovered, allowing him to pay attention to his customers

Module 3.1

Some Uses of Accessories

P100 Series

Carry

- Makes carrying a radio easier
- Protects the radio
- Ease of removal from belt

Audio

- Keep user's hands free
- No need to pull out radio from the belt for communication
- Discreet communications
- Noise reduction
- Other specialty needs

Module 3.1

Some Uses of Accessories

P100 Series

Spare Batteries

- Ensure Radio has energy when it needs
- Avoids unnecessary charge/ discharge cycles

Others

- Additional functions not available on radio

Module 3.2

Remote Speaker Microphone (RSM)

P100 Series

- **Most commonly used audio accessory**
- **Worn on the shoulder, allows talk & listen without removing radio from belt**

Wind porting speaker microphones boast revolutionary features that allow the public safety professional to have clear and confident communication in the presence of high winds and other severe weather conditions.

Provides an affordable option for light radio users.

MDPMMN4029
Remote Speaker Microphone, IP57 Mic Head

MDPMMN4013
Remote Speaker Microphone with 3.5mm audio jack, IP54 Mic Head

MDPMMN4008 (Mag One)
Remote Speaker Microphone

Module 3.2

- **Secondary Audio Accessories for use with PMMN4013 RSM**
- **Allows option for discreet/private communications when using the RSM**

WADN4190
Receive-Only
Flexible Earpiece

MDPMLN4620
Receive-Only
D-Shell Earpiece

MDRLN4885
Receive-Only Earbud

MDRLN4941
Receive-Only
Earpiece with
Translucent Tube

Module 3.3
Headsets

P100 Series

– Provides high-clarity, discreet two-way communication while maintaining comfort necessary for extended wear

Lightweight Temple Transducer Headset
PMLN5003
Uses bone conduction to allow users to receive audio without covering the ear, so as to keep ears alert to ambient sounds

Lightweight Headset
HMN9013
Lightweight, single muff, with swivel boom mic and in-line PTT

Lightweight Headset (Mag One)
MDPMLN4445
Ultra-light, single muff, with boom mic and in-line PTT/VOX switch

Module 3.4
Earpieces/Earsets

P100 Series

- **Discreet/private Communications**
- **Various styles to suit different user preferences**

PMLN5001
D-Style Earpiece with
In-Line Mic & PTT

MDPMLN4443 (Mag One)
Flexible Ear Receiver with
In-Line Microphone and
PTT/VOX switch

MDPMLN4442(Mag One)
Earbud with In-Line
Mic and PTT/VOX
Switch

MDPMLN4444(Mag One)
Earset with Boom Mic
and in-line PTT/VOX
Switch

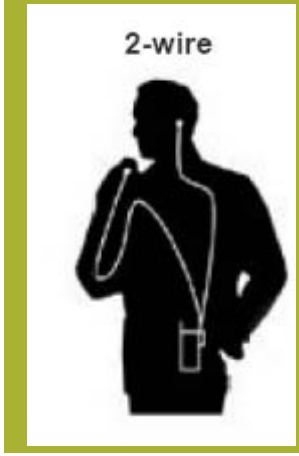
Module 3.5
Surveillance Kit

P100 Series

- Discreet / private communications
- Optional Quick-Disconnect translucent tube allows tube to be easily changed for hygiene purposes
- High noise kits come with foam plugs to shield out noisy environments

  - ***RLN6230:***
    Extreme Noise Kit, Includes Foam Earplugs with Acoustic Tube, Black
  - ***RLN6231**: Extreme Noise Kit, Includes Foam Earplugs with Acoustic Tube, Beige*
  - ***RLN6232**: Low Noise Kit, Includes Rubber Tip with Acoustic Tube, Black*
  - ***RLN6241**: Low Noise Kit, Includes Rubber Tip with Acoustic Tube, Beige*

HMN9754
2-piece Surveillance Kit with microphone & PTT combined, Beige



Module 3.6
Carry Accessories

P100 Series

Belt Clip
HLN9844
Spring Belt Clip
(For 1.5” Belt Width)

Protective Case
PMLN5333 – Full Keypad Model
PMLN5334 – Limited Keypad Model
Requires use of belt clip

Module 3.7

Batteries & Chargers

P100 Series

Batteries:

- PMNN4080 - 2150 mAH min, 2250 mAH typ Li-Ion
- PMNN4081 - 1500 mAh min, 1700 mAH typ Li-Ion
- PMNN4082A/PMNN4092A - 1300 mAH min, 1400 mAH typ NiMH (IP54)
- PMNN4082B- 1300 mAH min, 1400 mAH typ NiMH

Single Unit Rapid Chargers

-PMLN5228 Charger Base

-EPNN9288 Switch Mode Pwr Supply 90-264 V US 2 pin
-EPNN9286 Switch Mode Pwr Supply 90-264 V EU 2 pin
-EPNN9287 Switch Mode Pwr Supply 90-264 V UK 3 pin

Module 3.8
Antennas

Flexible Whip Antennas

- VHF
  - **PMAD4014: VHF Whip, 136-155MHz (14 cm)**
  - **PMAD4015: VHF Whip, 155-174MHZ (14 cm)**
  - **NAD6579: VHF Whip, 148-161MHZ**
- UHF
  - **NAE6483: UHF Whip, 403-520 MHz (16.5 cm)**
  - **PMAE4016: UHF Whip, 403-520 MHz**
  - **PMAE4008: UHF Whip, 470-530 MHz (13 cm)**
  - **PMAE4014: UHF Whip, 403-425MHz (19 cm)**

Heliflex Antennas

- VHF
  - **HAD9338: VHF Heliflex Antenna, 136-162 MHz**
  - **NAD6502: VHF Heliflex, 146-174 MHz**
  - **PMAD4049: VHF Heliflex, 146-174 MHz**

Stubby Antennas

- VHF
  - **PMAD4012: VHF Stubby, 136 - 155 MHz (9 cm)**
  - **PMAD4013: VHF Stubby, 155 - 174 MHz (9 cm)**
  - **HAD9742: VHF Stubby, 146 - 162 MHz (9 cm)**
  - **HAD9743: VHF Stubby, 162 - 174 MHz (9 cm)**
- UHF
  - **PMAE4002: UHF Stubby, 403 - 433 MHz (9 cm)**
  - **PMAE4003: UHF Stubby, 430 - 470 MHz (9 cm)**

Module 4

Radio Operation

P100 Series

Module Content

4.1 Basic Features Operations

4.2 Voice Inversion Scrambling

4.3 VOX Operation

4.4 FPP

Module 4

Basic Features Operations

P100 Series

1. On / Off Radio & PTT

Turn knob clockwise

2. Feature Enable / Disable

Module 4.1

Basic Features Operations

P100 Series

- **Each channel consist of a frequency pair, one for transmit and another for receive.**
- **Press <Right> to increase the channel number and <Left> to decrease. The LCD Screen shows the channel that the radio is operating in.**
- **There are a total of 99 channels (channels that have not been programmed will not be shown).**
- **Each channel may be configured with a PL or DPL code to provide Coded Squelch operation.**

Setting the power level

- Select suitable power output level for optimum power/battery performance.
- Press <Power Select> to select H (High) or L (Low).
  Notice that the power level icon would change accordingly. 

Keypad lock/unlock

- Lock the buttons to prevent radio settings from being changed. 
- Press <Keypad lock> to lock or unlock the buttons (except <PTT> and <MON>).
  LOCK icon appears when the buttons are locked.
- Once buttons are locked, any button press would be ignored and would generate a negative tone.
- The lock/unlock status remains unchanged even when the radio is reset.

Module 4.2

Voice Inversion Scrambling

P100 Series

Voice inversion scrambling provides a measure of security over the transmission. Radio without this feature will not provide an intelligent output as the voice signal are scrambled.

Enable/Disable Voice Inversion Scrambling

- Long press <Scrambling> to enable the voice inversion scrambling. Press the same button again to disable this feature.
- Feature is lock on the selected channel only. Other channels are not affected by the enabling.
- There will be an icon shown on the display when enabled. 
- To change the scrambling code, configure one of the programmable buttons for this function.
- Press this button to toggle between the two codes.

Module 4.3

VOX Operation

VOX enables hand-free operation as user's voice activates the PTT activation. Radio no longer requires additional option board for the VOX function as this feature is built in.

Enable/Disable VOX

- Press <VOX> to enable the VOX. Press the same button again to disable this feature.
- Feature is lock on the selected channel only. Other channels are not affected by the enabling.
- This feature needs to be first enabled via the CPS on the selected channel.

Module 4.4

FPP

Front Panel Programming (FPP) enables the dealer/user to program the radio without using the CPS. This provides a great flexibility as the programming no longer reply on availability of CPS.

Entering Front Panel Programming Mode

- To do so, turn off the radio, hold the S1 button, and turn on the radio.
- Do not let go of the S1 button until the display shows ‘Backlight’. There will be the programming icon on the screen.

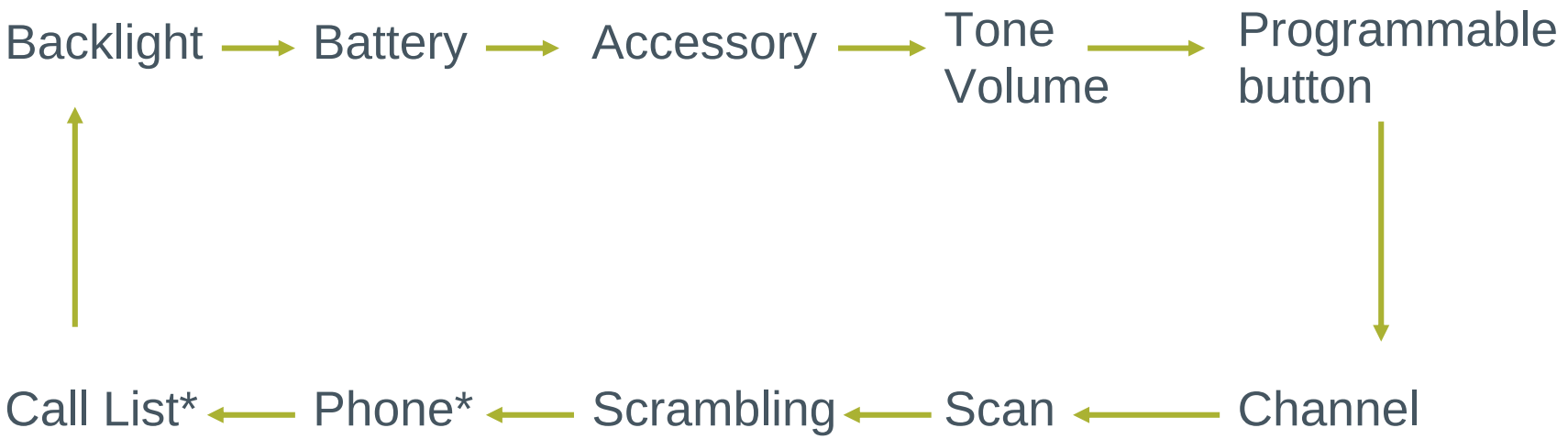
- Use the left/right keys to scroll through the menu, press PTT to enter the submenu, and press S1 to go back to the previous menu.
- To exit this mode, turn off the radio.

Module 4.4

FPP

P100 Series

Menu System



**note: only available on full keypad version (P180, P185)*

Module 5

CPS Programming

P100 Series

Module Content

5.1 CPS Programming

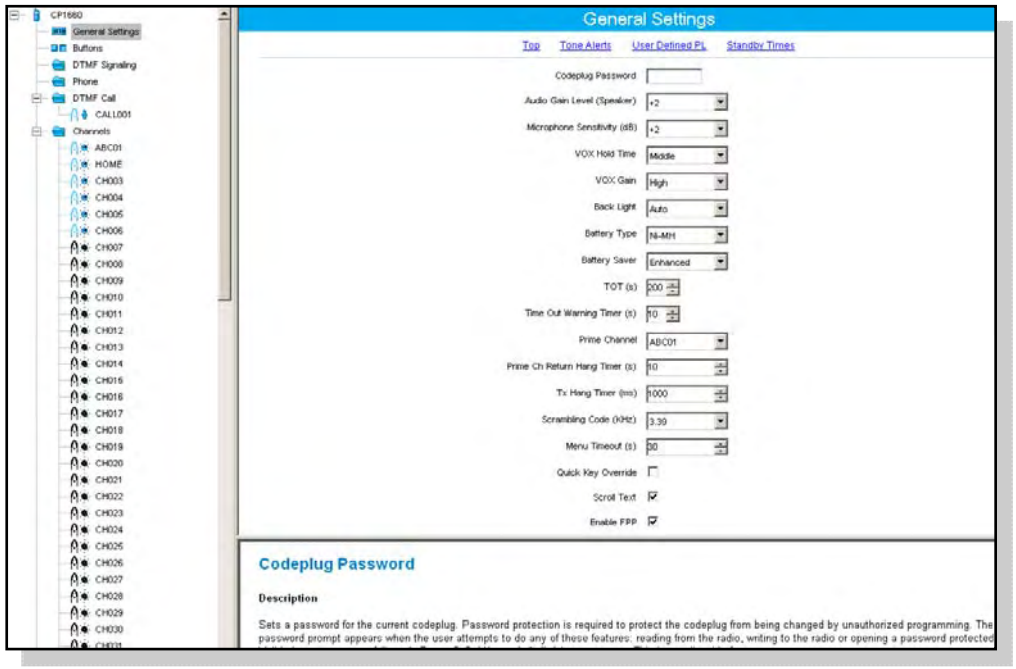
Module 5.1

CPS Operations

P100 Series

Basic setup

- Connect the USB programming cable from the computer to the radio.
- Load the CPS on the computer, and click on the read button on the top toolbar.
- The screen as shown below will appear.



Module 5.1

CPS Operations (cont.)

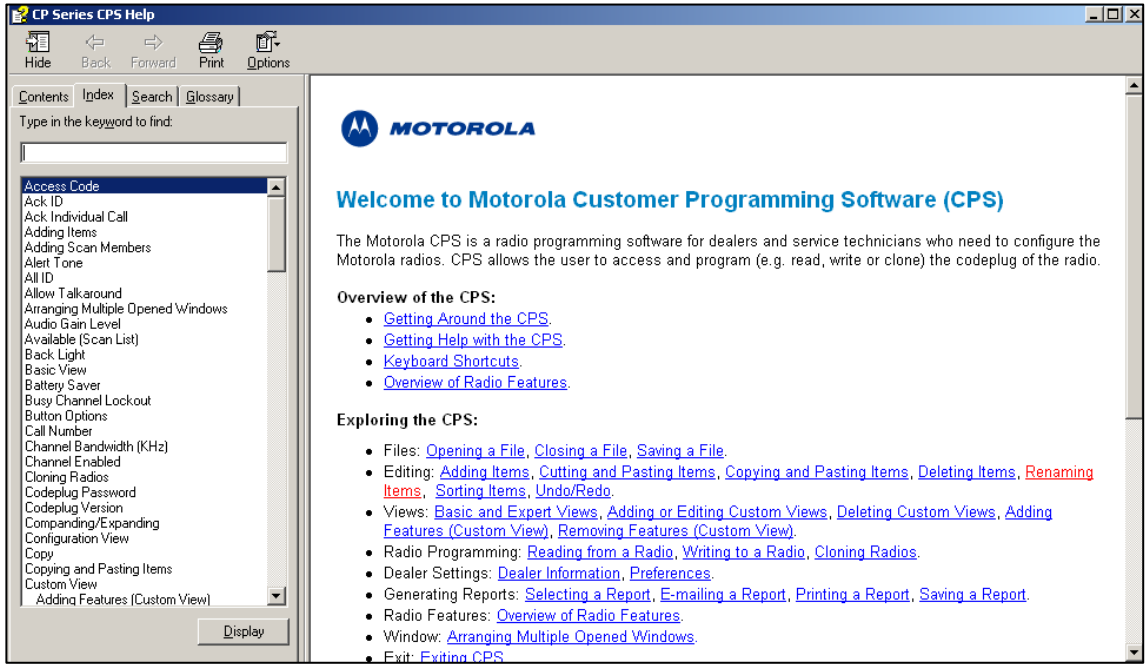
P100 Series

Basic Feature setup

- General Setting
- Button Assignment
- DTMF Signaling setting
- Channels Setting
- Scan List setting

Help Tool

- Go to the Help toolbar

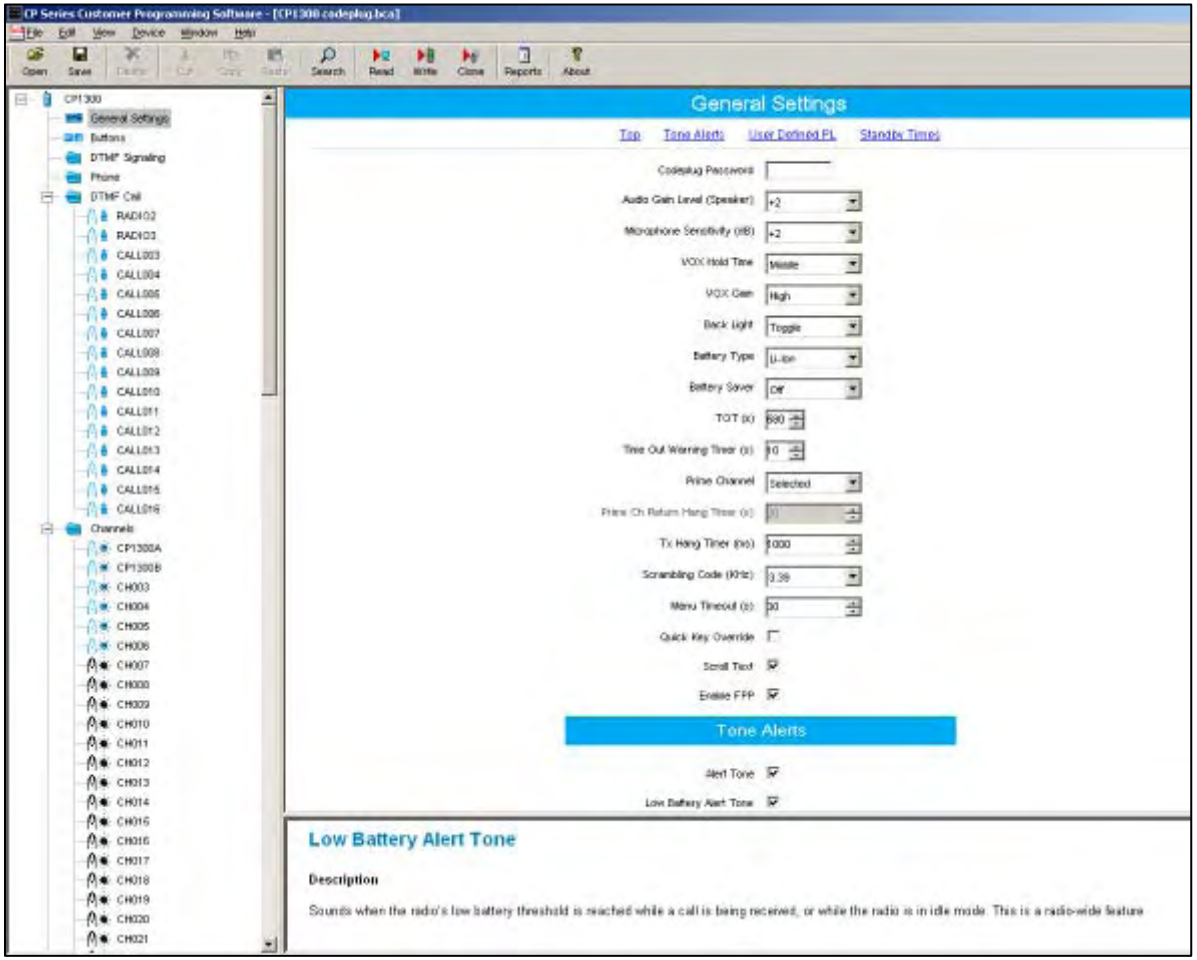


Module 5.1

CPS Operations (cont.)

P100 Series

General Setting




MOTOROLA