MOTOROLA
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Commercial Series

CM300 Radios

Selling Guide

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Chapter 1

PRODUCT OVERVIEW

1.0 Introduction

This Selling Guide is intended to be a reference manual to help you sell and support the CM300 Commercial Series Mobile Radios.

This Selling Guide will allow you to answer the following questions:

- ❏ What product ranges are in the CM Commercial Series Radios ?
- ❏ What products are in the CM300 Series ?
- ❏ Who can benefit from the CM300 Series ?
- ❏ What are the product features ?
- ❏ How do these features benefit my business ?

This Selling Guide complements the CM300 Series sales training and should be used in conjunction with a radio on a live system. This hands on experience will provide you with valuable knowledge which will help you explain the benefits of the CM300 Series to your customers.

1.1 How to use this Selling Guide

The Selling Guide is divided into two chapters -

Chapter 1 - This chapter is a general Product Overview of the CM Commercial Series Radios with a more detailed description of the CM300 Series. The chapter provides model numbers and a list of accessories.

Chapter 2 - This chapter describes the Features and Benefits of the product and develops some ideas on how these features can be of benefit to your customers. The chapter explains the full flexibility of the radio whilst showing you how simple and easy it is to use.

2.0 The CM Commercial Series Radios

Following the completion of extensive research with you our channel partners and your customers, Motorola have developed the CM Commercial Series Mobile Radios.

These radios have been specially developed to meet the communication needs of you and your customers.

The CM Series consists of two different product ranges :

CM100 Series
Two mobiles in a product range which offers PL and limited MDC signalling.

CM300 Series
Two conventional mobiles in a product range which offers PL and 5 Tone Selective signalling.

For further information on CM100 Series radios, please refer to the relevant Selling Guide in this Product Manual.

2.1 A Common Design Approach

All the radios in the CM Series share a common design, and are fully synthesised radios that offer :

- ❑ Great value for money.
- ❑ Small, compact and fully DIN mountable.
- ❑ High quality audio allowing effective and efficient communication.
- ❑ Motorola reknowned build quality.
- ❑ Wide area coverage providing successful communication over a larger range.

All the radios share a common appearance, common accessories and similar user interfaces.

- ❑ Common accessories means all CM Series accessories will work with all CM Series radios, many were used previously on GM300, GM350 and GM950 mobile radios - a considerable benefit for you and your customers.
- ❑ A common user interface means, wherever possible, the radios work in the same way. This should mean that it will be easier for you and your customers to learn how to use the radios.

Common 5 Tone Mobile and Portable radio user interface.

- ❑ The mobile and portable radios share a common CPS and user interface. This will make it easier for you and your customers to move between radio platforms.

2.2 Radio Software Upgrades

Motorola realise that as communication requirements for you and your customers evolve, it is necessary to be able to offer a communication solution to meet these changing requirements which does not force you or your customers to replace existing radios.

Radio software upgrade tools will be available to allow new functionality to be added quickly and easily to most CM Series radios.

Benefits

- ❏ You, our channel partners, can upgrade your stock quickly and efficiently.
- ❏ End users can benefit from new functionality without the cost and inconvenience of buying new radios.
- ❏ This will provide you with the ability to offer a changing range of radio benefits to respond to the evolving needs of your customers.

2.3 Quality Assurance

2.3.1 Accelerated Life Testing

Each model in the CM Series has passed the Motorola Accelerated Life Test (ALT). This testing simulates 5 years hard use in the field and all Motorola radios pass this rigorous test.

2.3.2 Environmental Protection

All CM Series radios have been designed and tested by Motorola to meet the European standard specification IP54 and US Military specifications 810 F.

2.3.3 IP54

This standard demonstrates the radio's ability to withstand driving rain and dust directed at the radio from all directions.

2.3.4 Military Standards 810 F

These Military standards ensure efficient radio operation in rough environments. All radios meet the following specifications :

❏ Low pressure	❏ High temperature	❏ Rain	❏ Humidity
❏ Salt fog	❏ Dust	❏ Vibration	❏ Shock

3.0 The CM300 Commercial Series Mobile Radios

CM360

CM340

Figure 1-1 CM300 Commercial Series Mobile Radios.

The CM300 Series is a range of conventional Commercial Series Mobile Radios providing PL and 5 Tone selective signalling. Research showed that different professions have different communication needs.

To help you provide different communication solutions for your customers, each radio offers a distinct choice of features which you can easily customise using programming software and a suitable personal computer.

The radios in the CM300 Series can be configured to provide on-site or local area coverage.

3.1 CM340 Mobile Radio

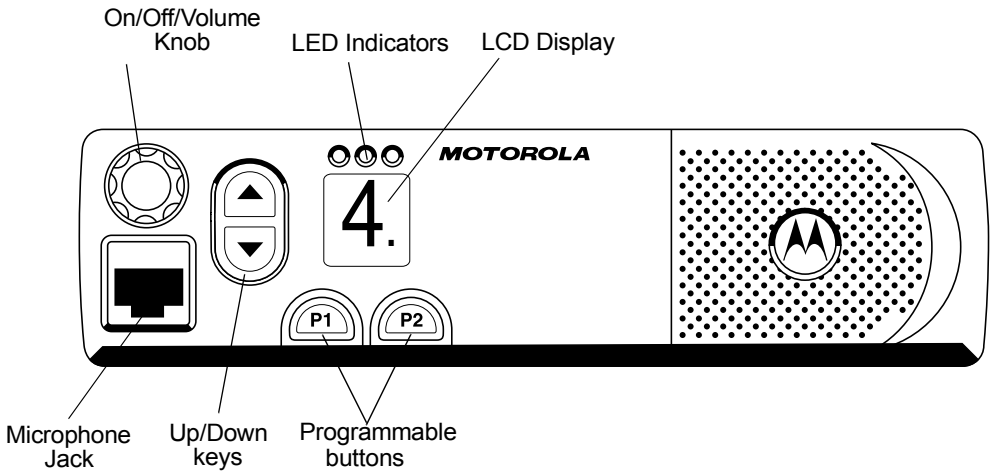

Figure 1-2 CM340 Radio Features.

This entry level, 2 way radio is easy to use, offering simple functionality with uncompromised reliability and ruggedness.

Who is the target audience for this radio ?

The **CM340 is** the affordable communication solution for commercial users who may require a simple, yet flexible, radio and need up to ten different communication channels.

3.2 CM360 Mobile Radio

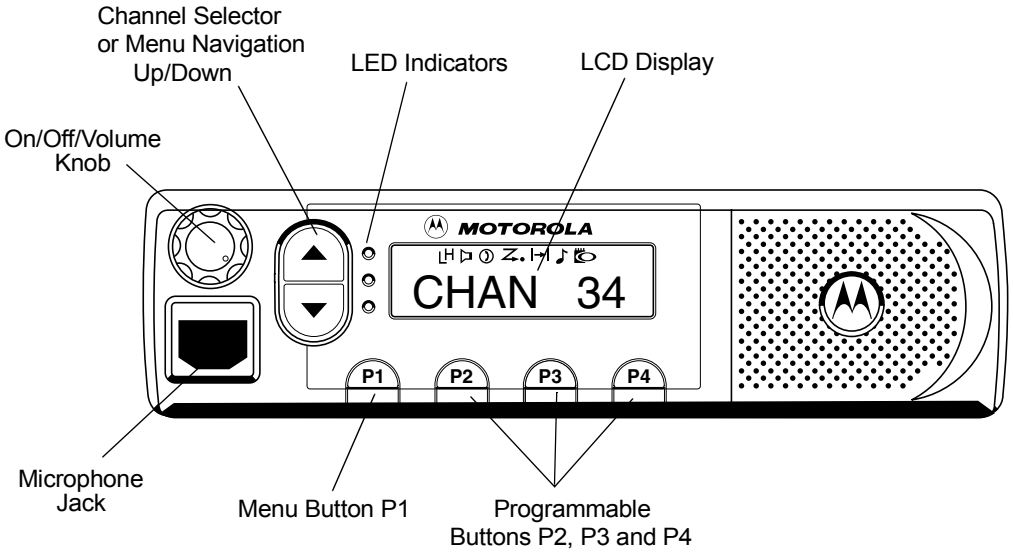

Figure 1-3 CM360 Radio Features

As well as offering all the advantages of the CM340, this radio provides the user with extra visual information which promotes effective and efficient communication.

Who is the target audience for this radio ?

The CM360 is the ideal communication solution for those who require an informative radio, which offers an increased choice of communications methods all of which are easily accessible and simple to use.

Ideal for those who work in large teams and need up to 100 different communication channels.

3.3 Radio Comparison

The CM300 Commercial Series Mobile Radios share a common design, the differences are summarised below :

Table 1-1 CM300 Commercial Series Mobile Radios Comparison.

	CM340	CM360
On-off / volume control	√	√
Channel control	√	√
Red, yellow, green LEDs	√	√
5 Tone signalling	√	√
Option boards	–	√
Radio Upgrades	√	√
1 digit display	√	–
1 line 8 character star burst display	–	1 Line
Menu keys		√
Keypad with 0 - 9, * and #, and dual function programmable keys A, B and C	–	via keypad microphone
Dual function programmable buttons P1, P2,	√	–
Dual function programmable buttons P2, P3, P4	–	√
External Alarm	√	√
Channel Steering	√	√
External Hook	√	√
Display Backlight Control	–	√

3.4 Reasons To Trade Up

CM360

All the advantages of the CM340 plus:

- ❏ Helpful visual operational information - Includes Current Power setting, Contact Names and Status Text messages.
- ❏ Translated Menu Prompts.
- ❏ Option board capability.
- ❏ Additional feature capability accessible via easy to use dealer configurable menus including pre-programmed call lists.
- ❏ Programmable buttons - 6 features on the radio and 6 features on the keypad microphone
- ❏ 100 Communication channels.

CM340

- ❏ Entry level Commercial Radio.
- ❏ Build quality and environmental specifications.
- ❏ Simple talk and listen operation with benefits of 5 Tone Selective signalling.
- ❏ Radio can be upgraded.
- ❏ General Purpose input/output (GPIO).
- ❏ Programmable buttons - 4 features at your fingertips.
- ❏ Up to 10 communication channels.

3.5 Radio Sales Models

The following sales models are available:

Table 1-2 Radio Sales Models.

Model Description	Frequency Band	Frequency Range	Power Level	Model Number
CM340	Midband	66 -88 MHz	1-25W	MDM50FNC9AN2_N
CM340	VHF2	146 -174 MHz	1-25W	MDM50KNC9AN2_N
CM340	UHF1	403 - 440 MHz	1-25W	MDM50QNC9AN2_N
CM340	UHF2	438 - 470 MHz	1-25W	MDM50RNC9AN2_N
CM360	Midband	66 -88 MHz	1-25W	MDM50FNF9AN2_N
CM360	VHF2	146 -174 MHz	1-25W	MDM50KNF9AN2_N
CM360	UHF1	403 - 440 MHz	1-25W	MDM50QNF9AN2_N
CM360	UHF2	438 - 470 MHz	1-25W	MDM50RNF9AN2_N

Note: Not all the product variants are available in every country due to differences in the local market requirements. Please refer to your price pages for a complete list of models.

3.6 Packaged Sales Models

All CM340 and CM360 packaged sales models consist of the following items :

- ❏ Radio
- ❏ Compact Microphone
- ❏ Power Cable
- ❏ Low Profile Trunnion
- ❏ Safety Leaflet

Basic User Guides are available from the European Distribution Centre.

Options are available, please check your Price Pages for details.

3.7 Customer User Guides

In order to help you and your customers use the radios safely and efficiently, two different customer booklets have been written :

- ❑ Basic User Guide
- ❑ Feature User Guide

3.7.1 Basic User Guide

The Basic User Guide provides useful information for your customers on how to start using their CM300 Series radio. A copy of this multi-lingual booklet is in book and CDROM format and is available from the European Distribution Centre.

3.7.2 Feature User Guide

The Product Manual contains a copy of the Feature User Guide. It has been written especially for your customers and provides step by step operational instructions for all the features available for the CM340 and CM360.

IMPORTANT: **For simplicity, please provide just the operational information for the features which you have programmed into your customers radio**.

3.7.3 Languages

The Basic User Guide is in the following languages:

- ❑ English
- ❑ German
- ❑ French
- ❑ Italian
- ❑ Spanish
- ❑ Portuguese
- ❑ Danish
- ❑ Swedish
- ❑ Dutch
- ❑ Russian
- ❑ Czech
- ❑ Hungarian
- ❑ Polish
- ❑ Romanian
- ❑ Turkish
- ❑ Greek
- ❑ Arabic

The Feature User Guide is in the Product Manual Languages:

- ❑ English
- ❑ German
- ❑ French
- ❑ Italian
- ❑ Russian
- ❑ Spanish

3.8 Accessories

3.8.1 Compact Microphone

The mobile packages include a high performance microphone and hang-up clip. These microphones offer a Push To Talk (PTT) key and have a “Hang-up switch” at the rear that will clear a call when the microphone is replaced into the hang-up clip.

3.8.2 External Speakers

External speakers are available to provide either 7.5 W or 13 W of audio, enough for clear communication in even very noisy and harsh environments. The speakers measure approximately 110mm x 65mm x 55mm and 125mm x 125mm x 60mm.

3.8.3 Mounting Bracket and Power Cables

The mobile radio is supplied ready for installation with a rugged swivel mounting cradle and fused 3 metre power cable included as part of the standard packaged model.

3.8.4 Additional Accessories

A wide selection of accessories are available for the mobile radio, which includes a range of microphones, mounting kits and cables:-

- ❏ Mag One Microphone
- ❏ Heavy Duty Microphone
- ❏ Keypad Microphone
- ❏ Visor Mounted Microphone
- ❏ Telephone Style Handset
- ❏ Range of Mounting Options
- ❏ Footswitch With Remote PTT
- ❏ External Alarm Relay
- ❏ Power and Control Cable Options
- ❏ Desk Microphone for use with Base Station
- ❏ Service accessories

Chapter 2

FEATURES AND BENEFITS

1.0 Introduction

This chapter describes those radio features and functionality which offer a significant benefit to your customers. The intention is to provide you with useful information which is relevant to your customers that will help you sell the CM300 Commercial Series Mobile radios.

2.0 Audio Quality Enhancement

2.1 Companding

Companding is a collective term to define **comp**ressing the audio signal on transmission and exp**anding** the audio signal on reception. The overall effect is to reduce noise in the received signal, giving you crisper, clearer audio clarity. Companding should only be used when other radios in your system have the same companding feature available.

It is important to ensure that **all** radios in a team have the feature switched on.

Benefits

- ❑ Crystal clear communication which makes listening easier.
- ❑ Improves efficiency as messages are heard and understood first time.

3.0 Channels

3.1 Number of channels

The CM340 mobile supports up to 10 channels, and the CM360 mobile up to 100 channels.

Each channel can be either a repeater channel, where the transmit and receive frequencies differ (Semi-Duplex operation), or a Talkaround channel, where the transmit and receive frequencies are the same (Simplex Operation).

3.2 Channel Alias

With up to 100 channels it can be difficult to remember who is on which channel number. To make it easier to recognise the channels, each channel can be given a meaningful alphanumeric name (or Alias) up to 8 characters long.

Benefits

- ❑ Meaningful names can be given to each channel, making it easier to find the right channel.

3.3 Channel Selection

On the CM340 and CM360 there are several methods to change channel:

- Use the up / down scroll buttons. If the buttons are held down, the radio will fast scroll through the channels.
- Enter the channel number directly on the keypad of the keypad microphone on the CM360.
- Press a Memory Channel button.

With direct entry from the keypad, you must long press P1, or press the # button before the radio goes to the new channel. If the selected channel is invalid (including wrong number of digits), an error tone is sounded, and the radio returns to the Channel menu option.

Benefits

- ❏ Different methods of channel selection to suit the user.
- ❏ Fast scroll, direct keypad entry and Memory Channel all facilitate fast channel selection.

3.4 Memory Channel

On the CM340 and CM360, up to two of the programmable function buttons can be programmed as Memory Channel. A Memory Channel button has a specific channel assigned to it. A short or long press of the button, depending on programming, will take the radio direct to that channel without having to use the channel scroll buttons or keypad.

Memory Channel buttons avoid the hassle of scrolling through all the channels programmed into the radio; they jump straight to a predefined channel.

Memory Channel buttons can be fixed or user programmable. If the Memory Channel buttons are user programmable, a long press of the button changes the channel assigned to the button to the one that radio is on at the time. This allows the user to redefine the channels if a particular channel is more frequently used.

User programmed Memory Channels are remembered when the radio is turned off.

Benefits

- ❏ Fast Access to Important Channels
- ❏ User Programmable for day to day operations

3.5 Repeater/Talkaround

Repeater channels use fixed base equipment to increase the range of the radio's signal. Sometimes a repeater is used to interface users to telephone interconnect equipment or other system features. Talkaround frequencies are used between radios within close range of each other when there is no repeater, the repeater is not operating or communications off a system repeater is desired.

A programmable button can be programmed as a Repeater/Talkaround select. On a Repeater channel that has “Talkaround” enabled, the programmable button toggles the channel between repeater and talkaround frequencies.

Benefits

- ❏ Provides direct (radio-radio) operation.
- ❏ Allows operation out of repeater range.
- ❏ Continued communication even when parts of the system are taken out of service for maintenance.

3.6 Dual Power Levels

Two transmitter power levels are available (high or low) on a radio wide basis. Once the power levels are set in the CPS, each channel can be configured as a high power or low power channel.

The two levels are easy for the service shop to set up - simply type in the absolute power level required (e.g.: ’5’ for 5 watts, or ’15’ for 15 watts) and the radio automatically provides this power on the relevant channel. These power levels can be copied from one radio (or archive file) to another radio, significantly reducing workshop time when selling a large fleet of radios.

The power level on a channel can be toggled via a programmable button or the menu.

Benefits

- ❏ Power programmable per channel.
- ❏ Low power reduces air way interference and congestion.
- ❏ High power allows the radio to transmit over a greater distance.

4.0 Features

4.1 Programmable Buttons

The CM300 Commercial Series mobiles have dual function CPS programmable buttons. Each button can be programmed with 2 features (one on a long press and one on a short press) from a wide range of features that are available in the radio. The most commonly used features can be programmed to these buttons, thereby customising the radios to the individual customers’ needs.

The CM340 has 2 programmable buttons i.e four programmable features.

The CM360 has 3 programmable buttons i.e six programmable features. If the keypad mic is used, the 3 programmable buttons on that can also be used, giving a total of 6 programmable buttons, or 12 programmable features.

Benefits

- ❏ Most frequency used features are available on a button press.

4.2 Default Settings

The display and keypad can be programmed to start up in different modes. This allows the radio to be configured to provide the most user friendly operation.

4.2.1 Default Display Mode (CM360)

When the display is in the idle state, it displays the default display. This can be programmed to be:

- Text up to 8 characters long;
- Channel on CM360;

4.2.2 Default Keypad Mode (CM360 with Keypad mic)

The default function of the keypad can be programmed to be:

- Channel;
- Address;
- Status.

Benefits

❏ Default settings allow the most frequently used function(s) to be programmed to the keypad, thus customising the radio for optimum performance. This saves the radio user's time.

4.3 Address, Status and Channel Entry (CM360)

The Address, Status and Channel can easily be accessed and entered. The radio can be put into Address, Status or Channel mode by either being selected through the menu navigation buttons or programmable buttons programmed to provide direct entry to the appropriate menu.

Once in the entry menu, the selected feature can be:

- Incremented or decremented by the up / down menu navigation buttons;
- Entered directly on the keypad microphone (CM360).

After a period of inactivity (5 seconds) or an item is selected, the radio returns to its default modes.

Benefits

❏ Keypad direct entry of the Address, Status and Channel digits allows fast selection.

❏ Programmable buttons allow rapid change between entry functions.

❏ Both these make the radio quicker to use and save the radio user's time.

4.4 Power Up Channel

The radio can be programmed to power up on a pre-defined channel or the last used channel.

Benefits

❏ Designated Power Up Channel avoids missing first messages

4.5 Power Up Logic

The radio can be powered up by:

- Turning the on/off/volume knob clockwise until a click is heard;
- Asserting the ignition line (GPIO pin 10).
  - If ignition sense is enabled on the radio and the vehicle's ignition is connected to the accessory connector, providing the on/off/volume knob is turned on, the radio will automatically turn on whenever the vehicle ignition is turned on (i.e BOTH ignition line and on/off/volume knob must be set to ON);
- Asserting the wake up line (GPIO pin 9).
  - If emergency with wake up is enabled on the radio and an emergency switch is connected to the accessory connector, the radio automatically turns on in emergency mode whenever the emergency switch is pressed. Emergency wake up takes priority over the other power up mode.
  - If emergency with wake up is **not** enabled on the radio and a switch is connected to the accessory connector, the radio turns on in standard mode of operation whenever the switch is pressed.

Benefits

❏ Ignition power up caters for users where auto power-up is required, for example, Fire Engines.

4.6 Power Off Logic

The ability to turn the radio off is dependant on:

- Its turn 'on' method
- The state of the ignition line
- Whether it is in emergency mode
- Whether 'ON/OFF in emergency' is enabled

If the radio is turned ON via the on/off/volume knob and the ignition line is also ON, it can be turned OFF by either the on/off/volume knob being turned to OFF, or the ignition line being de-asserted .

If the radio is turned ON via the emergency wake up, and **ON/OFF in emergency** is disabled, the radio cannot be turned OFF until emergency mode has been exited.

If the radio is turned ON via the emergency wake up, and **ON/OFF in emergency** is enabled, the radio can be turned OFF by turning the on/off/volume knob to ON and then to OFF.

If the radio is turned ON via non emergency wake up, it can be turned OFF by turning the on/off/volume knob to ON and then to OFF.

If ignition sense is asserted when the radio enters emergency mode:
- de-asserting ignition sense does NOT turn the radio OFF;
- ignition sense must be asserted (or re-asserted if it has been de-asserted) before the radio can be turned OFF via the on/off/volume knob.

Benefits

❏ The radio can only be turned OFF in specified conditions.

❏ ON/OFF in Emergency prevents the radio from being turned OFF by mistake or by attacker.

4.7 Power Off Memory

Certain features are remembered when the radio is turned off, and reinstated when the radio is turned on.

- Channel - (unless there is a designated power up channel)
- Last selected Address
- Last selected Status
- Last stored Memory Channel
- Backlight ON/OFF
- Voice messages
- Stun state

Benefits

❏ Operational Parameters are not lost when the radio is turned off.

4.8 VOX

Whenever the user speaks into the microphone the radio automatically goes into transmit mode; this is the equivalent of pressing the PTT.

With various audio threshold levels and tolerances programmed into the radio, the VOX feature intelligently senses background noise, resulting in VOX adapting automatically to the noise level in the environment by setting the microphone input to key up the radio.

The microphone sensitivity can be adjusted to take account of the background noise.

VOX operation is only possible when a special VOX accessory is fitted to the accessory connector of the mobile.

Benefits

❏ ’Hands free’ radio operation.

❏ Drivers can talk without having to take their hand off the steering wheel, or look away from the road.

❏ Passengers do not have to stop, put down their work tools and pick up the radio when making and receiving a call - this increases productivity.

❏ VOX operation automatically adapts to any noise level.

5.0 Scan Operation

5.1 Scanning

Scanning allows activity on different communication channels to be monitored. Each radio can be programmed with up to 32 scan lists, and each scan list can contain up to sixteen channels which are listened to sequentially.

Once scan has started, detection of an incoming call causes the radio to automatically switch to the channel so that the call can be received and scan temporarily stops: this is called the 'landed' state.

Benefits

- ❏ Efficient communication - incoming calls are not missed even when they can be received from more than one communication channel.
- ❏ Simplifies the radio operation for users of multiple communication channels.

5.1.1 Single Priority Scan

Each list can specify a 'Priority' channel that is monitored for activity more often, even when the radio is 'landed' and listening to another channel in the scan list. If the correct unmute condition is detected on the priority channel when the radio has 'landed' on another channel, the priority alert will sound and it will switch to the priority channel to take the call.

5.1.2 Scan Activation

Each channel can be programmed to use any of the scan lists. Scan is activated by:

- pressing a programmable button that has been programmed as the Scan button;
- selecting scan via the menu;
- changing to a channel which has been programmed with **'Automatically Start Scan'**: - this starts scan operation as soon as the radio switches to that channel, i.e. Auto Scan.

5.1.3 Scan Transmit Channel and Talkback

When the radio is not in the landed state (i.e. it is actively scanning, looking for valid channel activity), pressing the PTT causes the radio to change to the defined 'Scan Transmit Channel', where it remains for the duration of the two-way conversation, after which active scanning resumes.

The Scan Transmit Channel choices are:

- Scan Start Channel
- Designated Channel
- Last Free Channel
- Last Busy Channel
- Voted Channel

'Talkback' mode allows the user to respond directly to messages received on 'landed' channels, as long as the response begins during the programmable scan hang timer (called the listen 'Scan Reset' Timer). If Talkback is disabled, pressing the PTT when in the landed state causes the radio to change to the defined 'Scan Transmit Channel'. Talkback has no impact when the radio is actively scanning - it only has an impact on the radio's operation in the landed state.

Scan Start Channel (home channel):
Causes the transmission to occur on the original channel that the radio was on, when scan operation was started. Talkback can be enabled or disabled.

Designated Channel:
Causes transmissions to occur on a designated, pre-programmed channel. Again Talkback can be enabled or disabled.

Last Busy Channel:
Causes transmissions to occur on the channel that was the most recently 'landed' on (i.e.: busy). Talkback can be enabled or disabled.

Last Free Channel:
Causes transmissions to occur on the channel that was most recently detected as being free of activity. The last free channel is updated each time the scan list is gone through, to ensure that the last free channel remembered by the radio was very recently free. When the PTT is pressed this avoids, as far as possible, sending the radio to a channel that is now busy. Talkback can be enabled or disabled.

Voted Channel:
Causes transmissions to occur on the last voted channel. See the section on Scan Vote.

Scan TX Mode	Channel to transmit on, or to suspend scan on, if taken off-hook		
	During Active Scan	Landed, Talkback disabled	Landed, Talkback enabled
Scan Start Channel	Home	Home	Landed
Designated	Designated	Designated	Landed
Last Busy	Last Landed	Landed	Landed
Last Free	Last Free or invalid if none	Landed	Landed
Voted	Voted	Voted	Landed

The radio's display indicates the channel on which transmission will occur or is occurring, depending on the operational mode in use.

NOTE **In order to have the radio 'power-up' into scan mode, the power-up channel should be defined, and be set to an 'Auto Scan Start' channel.**

Benefits

- ❏ Calls can be initiated even whilst scanning.
- ❏ Auto Scan simplifies scan operation, and frees up a function button.
- ❏ Highly flexible - tailor to match specific user requirements.
- ❏ The most important channel can be scanned more frequently than other channels and even when landed on another channel.

5.2 Nuisance Channel Delete

Nuisance Channel Delete allows channels which continually generate unwanted calls or noise to be temporarily removed from the scan list. The priority channel, last channel in the scan list and home channel cannot be deleted.

A programmable button must be set up as nuisance channel delete. Deleted channels can be recovered by turning the radio or scan off and back on again.

Benefits

- ❏ Nuisance Channels can be temporarily removed from the scan list by the user.
- ❏ Efficient radio operation as the radio just listens to channels where valid calls will be received.

5.3 Carrier Squelch Scan

Carrier Squelch Scan allows the user to hear all activity on the scan list channels; the radio does not check PL/DPL or tone signalling. Scanning just for carrier is the fastest scan method.

5.4 Scan Vote

Scan Vote mode is used in multi-frequency simulcast systems that provide wide area repeater coverage in applications where frequency spectrum is readily available. The typical system has a set of scattered base sites that are transmitting the same information on different frequencies. The radios scan the frequencies of these base sites and perform a voting algorithm to select the strongest base site. The radio's transmit frequency is typically the same on every channel, but the radio's receive frequencies are different.

The voting algorithm is described in the CPS help text.

6.0 Transmit Features

6.1 Transmit Time-Out Timer (TOT)

The Transmit Time Out Timer limits the duration of calls by cutting off transmission after a pre-programmed time.

TOT can be implemented in order to enforce efficient use of air time. Also in vehicular operations, a microphone can accidentally be lodged between seats or other objects and accidentally become continuously keyed. This would deny other users from using the channel. TOT automatically ends the call and frees up the channel.

The TOT can be

- **non-cumulative**: the TOT returns to zero each time the radio is de-keyed;
- **cumulative**: the TOT adds all transmission times since the call started. The TOT returns to zero when the call ends (auto reset timer expires or is cancelled).

A '**TOT Pre-Alert**' can be programmed to sound five seconds before the transmission is cut off, to warn the user to finish the conversation.

A '**Re-Key inhibit duration**' can be programmed, which prevents users from re-transmitting a period of time after the TOT has expired. This prevents an individual user from 'hogging' the channel.

A '**De-Key Telegram on TOT'** can be programmed to send a telegram when the radio times out.

Benefits

- ❏ Enforces efficient use of airtime.
- ❏ Addresses accidental continuous keying.
- ❏ Re-Key Timer stops users hogging the channel.

6.2 Transmit Admit Criteria

Transmit Admit Criteria automatically check the channel for activity and only allow the radio to transmit if certain criteria are met. This enforces radio operational discipline and simplifies radio operation. The Transmit Admit Criteria available are:

Never Allowed - This option prevents the user transmitting and operationally the channel is receive only.

Always Allowed - This option allows the user to transmit at any time.

Channel Free - This option only allows transmission when carrier is not present.

PL/DPL Lockout - This option only allows transmission when carrier is not present, or when carrier is present and the radio is detecting the PL decode frequency for the channel.

This option is required for the type of repeater that holds up both carrier and PL during repeater hang time. Repeater hang time is the period of time during which the repeater remains keyed after a user's radio has de-keyed. It is used to prevent other users with different PLs gaining access and control of the repeater before a 'called' radio with the same PL has had a chance to reply.

Past PL/DPL Lockout - This option only allows transmission when carrier is not present, or when carrier is present and the radio has detected the PL decode frequency for the channel since carrier was detected.

NOTE **Carrier is assumed to be lost when the radio is keyed, so this criterion must be satisfied again after de-key.**

This option is required for the type of repeater that only holds up carrier (not PL) during hang time, but where the radios on the repeater use PL. It is used to prevent other users with different PLs gaining access and control of the repeater during gaps in the conversation.

In this case the called radio, not receiving PL during the hang time, must remember that it did receive the correct PL prior to hang time and is therefore able to transmit.

Carrier Gone Timer Expired – This option only allows transmission when carrier has not been detected for a programmable period of time.

This option is used to prevent operators currently not involved in calls, transmitting over other users who may be active on the channel, but are de-keyed with their auto-reset timers running.

PL/DPL Not Detected – This option only allows transmissions when carrier is not present, or when carrier is present and the radio is not currently detecting the PL decode frequency for the channel.

This option may be used:

- To prevent PL users in the same group from transmitting over each other;
- If one group is monopolising a repeater, it allows another group to 'break in' during repeater hang time if a PL is also transmitted;
- If used on repeaters that transmit PL during hang times, users from other groups can gain access during the repeater hang time.

Potential problems are:

- Should not be used on repeaters that transmit PL during repeater hang time as users within the same group cannot transmit during this period and this leads to enforced gaps in the conversation.
- A PL user from one group can transmit at the same time as a PL user from another group.

Past PL/DPL Not Detected – This option only allows transmissions when carrier is not present, or when carrier is present and the radio is not and has not detected the PL decode frequency for the channel since carrier was detected.

Channel Free or No PL/DPL but Past PL/DPL – This option only allows transmissions when carrier is not present, or
when carrier is present and the radio is NOT currently detecting the PL decode frequency for the channel but has detected the PL decode frequency since carrier was detected.

Benefits

- ❏ Enforces channel discipline.
- ❏ Prevents improper radio transmissions.
- ❏ Prevents crosstalk on a shared frequency.
- ❏ Equal user access when combined with Time Out Timer.

6.2.1 Transmit Admit Criteria not Applied in Auto Reset

It is possible to disable the Transmit Admit Criteria whilst the radio is in Auto Reset.

Benefits

- ❏ Once a call is set up, the user is always able to transmit during the Auto Reset time, this means they can always finish their call.

6.2.2 Channel Free Beep

If a transmission attempt fails due to Transmit Admit Criteria not being satisfied, a Channel Free Beep is sounded as soon as the criteria are satisfied.

Benefits

- ❏ User is advised as soon as they are permitted to transmit; particularly useful on a busy channel.
- ❏ Message can be sent as soon as possible.
- ❏ Don't have to waste time re-trying to transmit.

7.0 Squelch Features

7.1 Receive Squelch Mode

Squelch settings are used to keep the radio's loudspeaker turned off unless the required type of signal is detected. The default squelch mode of the radio when it is first turned on can be set as any of the following:

- Open Squelch (Hear all background noise)
- Carrier Squelch (Only open squelch if Carrier is detected)
- PL/DPL Squelch (Only open squelch if the correct PL/DPL is received)
- Tone Squelch (Only open if the correct 5 tone signal is received)
- Tone & PL/DPL (Only open if correct 5 tone and PL/DPL are received)

7.2 PL/DPL Squelch Codes

PL/DPL squelch can be explained to customers as a way to stop them hearing communications between other users on the same channel who are not in their group (on the same PL/DPL). It allows several groups within an organisation to share the same channel.

PL codes are often used to access community repeaters.

Each channel can be programmed with separate encode and decode PL/DPL codes.

PL codes can be set between 65 and 255Hz, in 0.1Hz steps.

DPL has 103 codes between 023 and 754.

7.2.1 PL Squelch

PL squelch can be:

Standard: squelch requirements are satisfied when its PL is present

Reverse: squelch requirements are satisfied when its PL is not present

7.2.2 PL Reverse Burst / DPL TOC

A Reverse Burst or Turn Off Code (TOC) can be generated when the PTT is released on a channel transmitting PL/DPL (respectively). It is sent to indicate the end of transmission to the receiving radio and so reduce squelch tail.

These are the equivalent of 5 tone Cleardown / Remote Close calls.

Benefits

- ❏ Different groups in an organization can share a channel
- ❏ Users don't hear the communications of other groups

7.3 Monitor

Monitor allows the normal Receive Squelch Mode to be temporarily disabled. This allows voice activity on a channel to be listened to. It is particularly useful in radio systems when a single communication channel is shared by several different teams of people, as it allows individuals to check that the channel is free prior to making a call.

NOTE **On many community repeaters monitor is not allowed, as users are not allowed to hear other users' communications. If this is the case, Transmit Inhibit Criteria can be used instead.**

7.3.1 Monitor 1 and Monitor 2 Modes

The CM300 Series radios have 2 monitor modes; normally short press for Monitor 1; long press for Monitor 2. Monitor 1 disables one level of receive squelch, monitor 2 disables a second level of receive squelch.

For example,

	Example 1	***Example 2***
Standard Receive Squelch	PL	Tone & PL
Monitor 1 Squelch (Short Press)	CSQ	PL
Monitor 2 Squelch (Long Press)	Open	Open

If the radio is in auto-reset mode, 'tapping' the monitor button causes auto-reset to end and put the radio into receive squelch mode: ie it will end a call. A long press will put the radio into monitor 2 mode.

7.3.2 Forced Monitor on PTT (Smart PTT)

It is good radio practice to monitor the channel before transmitting. Forced monitor on PTT enforces this. The first press of the PTT or a call button puts the radio in monitor mode. The second press of the PTT or call button actually make the radio transmit. This is Forced Monitor ‘Always’.

Forced Monitor ‘Only if Channel Busy’ is a **Smart PTT**. It only enters monitor mode if there is channel activity; if there is no channel activity the radio is allowed to transmit on the first PTT or call button press.

Benefits

- ❏ Allows squelch codes to be temporarily disabled.
- ❏ Forced monitor enforces good radio practice.
- ❏ Forced monitor is an easy way to monitor channel for activity prior to transmitting.
- ❏ Encourages users not to transmit over the top of other users.

7.4 Hook Operation

Going ’Off-Hook’ by taking the microphone out of its hang-up clip makes the radio enter auto-reset mode, which in turn changes the squelch setting to that defined as the autoreset squelch.

The options available for the Hook are all to do with length of time that the hook function is active. It can be:

- Disabled - (Going Off Hook has no effect);
- Permanent - (The function is active for all the time it is Off Hook);
- Timed - (The function is active only for the duration of the AutoResetTimer, even if the microphone is left Off Hook).

The Hook feature is ignored if the radio is in any of the following modes:

- Emergency;
- Stunned;
- Menu.

Benefits

- ❏ Easy way to monitor the channel for activity prior to transmitting
- ❏ Timed Hook automatically squelches the radio, so the user doesn’t have to put the microphone back on the physical hang up switch.

8.0 Accessory Connector

8.1 Dealer Programmable I/O Features

All models of the CM300 Series Commercial mobile radios incorporate a dealer programmable accessory connector as standard.

There are: 2 input lines,
1 output line, and
3 input / output (I/O) lines.

Table 2-1 Accessory Connector I/O Features

Pin number	3	4	8	9	12	14
External Output Functions:						
Carrier Detect		✓	✓		✓	✓
PL/DPL Detect		✓	✓		✓	✓
Radio Busy		✓	✓		✓	✓
External Alarm		✓				
Per Channel Output		✓	✓		✓	✓
Car Radio Mute		✓	✓		✓	✓
PTT Sense		✓	✓		✓	✓
Decoder Output Control		✓	✓		✓	✓
External Input Functions:						
Channel Steering	✓		✓		✓	✓
Hook	✓		✓		✓	✓
Voice PTT	✓		✓		✓	✓
Data PTT	✓					
Voice & Data PTT	✓					
Mute Audio PA	✓		✓		✓	✓
Open RX Audio	✓		✓		✓	✓
Public Address	✓		✓		✓	✓
Call 1/2/3/4	✓		✓		✓	✓
Emergency	✓		✓		✓	✓
Emergency Wakeup				✓		

Table 2-2 Accessory Connector Pin Out

Pin	Function
1	Speaker -
2	External Mic (audio in)
3	Programmable input 1 (Voice PTT use External Mic / Data PTT use Flat Tx Audio)
4	Programmable Output 2 (External Alarm)
5	Flat TX Audio Input. (Sensitivity 150mV rms for 60% deviation)
6	Bus+ (used for CPS and Flash) (In PL /MDC radios, can be configured as an general purpose input by removing R421)
7	Ground
8	Programmable In/Out 3
9	Programmable Input 4 (with Wakeup Emergency)
10	Ignition Sense Input
11	Receive Audio Output - two possible outputs, function of which depends on dealer progrmming: 1. Flat Rx Audio 330mV rms at 60% deviation 2. Filtered Rx Audio 600mV rms at 60% deviation at 1kHz.
12	Programmable In/Out 5
13	Switched Battery Voltage (max 1A, Dropout Voltage max1V)
14	Programmable In/Out 6
15	Int Speaker link
16	Speaker +

Each programmable pin can be disabled or programmed to a feature. The active state of each pin can be set as high or low: except

- emergency is active low;
- ignition is active high.

NOTE **Please refer to the Radio Installation Manual for more information.**

Benefits

- ❏ Enables interface to a wide range of external devices.
- ❏ Customer specific applications can be catered for.
- ❏ Gives excellent opportunities for enhanced dealer added value.
- ❏ Interface to external Mobile Data Modems.

8.2 Output Functions

8.2.1 Carrier Detect

The output is asserted whenever carrier is detected and is de-asserted if no carrier is present.

The output is de-asserted if the radio is in TX mode.

8.2.2 PL/DPL Detect

The output is asserted whenever the correct PL is detected.

If PL override is disabled, the output is de-asserted when the correct PL is lost.

If PL override is enabled, the output remains asserted for the AutoReset time after the correct PL is lost. This is particularly useful when the mobile is used as a base station and needs to remain active during short losses of RF or PL, eg when the signal is lost for a short moment, or a 5 tone sequence is sent (many earlier radios cannot encode PL and 5 tone simultaneously).

The output is de-asserted if the radio is in TX mode.

8.2.3 Radio Busy

This output is asserted whenever carrier is detected, or the radio is in TX mode.

8.2.4 External Alarm

If the radio has external alarm enabled and a telegram is decoded that has external alarm enable, the output is asserted. This output can be used to energise a relay, etc, that will sound the car's horn and, or flash the lights.

The output is de-asserted when any button is pressed, the radio is stunned or the external alarm timer expires. The timer is reset each time the output is asserted. For instance, if the external alarm duration is 5 seconds, and two decodes are received 1 second apart, the alarm starts on receipt of the first decode, and stop 6 seconds later (i.e., 5 seconds after the second decode).

External Alarm cannot be enabled on decoders set for Stun, Ack1 ringing, Ack1 Answer or Silent Interrogate.

NOTE **This feature is not legal in all countries.**

Benefits

- ❑ Enables the radio user to be aware of an incoming call when out of, but near to, the vehicle.

8.2.5 Per Channel Output

The output is asserted when the radio is on a channel that has 'Per Channel Output' enabled, otherwise the output is de-asserted.

This is used to drive any device which is channel usage specific.

8.2.6 Car Radio Mute

This option is used to mute the audio on a car's hi-fi system when the two way radio is in use.

The output is asserted if the radio's loudspeaker is open or the radio is transmitting.

The output is de-asserted if the radio's loudspeaker has been closed and the radio has not transmitted during the preceding 5 seconds.

8.2.7 PTT Sense

PTT sense is an output line that follows the internal PTT input line. It is used to give full control of the transmit function to an external device, eg a computer sending data, so that it can control a user's attempts to transmit voice messages.

If PTT sense is programmed, when the internal PTT is pressed, the PTT sense line is asserted. Note that pressing the mic PTT does not make the radio go into transmit. If the external device is not transmitting, it asserts the Voice PTT line. It is this that causes the radio to transmit and the audio to be transmitted.

If the external device is already transmitting, it does not assert the Voice PTT line and the voice will not be transmitted. When the external device finishes transmitting, it accepts the next internal mic PTT.

In this application, the audio source must be set to the front microphone, with external voice PTT.

The data source is input on the flat Tx audio line (pin 5), with external data PTT.

If Voice and Data PTT is used (instead of separate Voice PTT and Data PTT), the external device will not transmit it's data whilst the audio is transmitting. However, if data is being transmitted, and the internal PTT is pressed, voice and data will be transmitted simultaneously. This set up will reduce but not eliminate the possibility of voice and data being transmitted simultaneously, and hence the data being corrupted.

Benefits

- ❏ Allows an external device to take control of the transmit function of the radio.
- ❏ Allows data and audio to be sent from the same radio without clashing.

8.2.8 Decoder Output Control

The output is asserted by the successful decode of a decoder that has 'Assert Output Control' enabled.

It is de-asserted by the successful decode of a decoder that has 'De-assert Output Control' enabled. This option is enabled/disabled per personality. This function can be useful for simple telemetry applications.

Benefits

- ❏ Allows remote control of external device.
- ❏ When used in conjunction with external call switch, gives simple telemetry.

8.3 Input Functions

8.3.1 Channel Steering

Channel steering allows an external device to select a channel, using a parallel interface.

The CPS can configure up to 4 input pins in channel steering mode. .

The radio software takes the state of these inputs and brings them together to form an N bit value, where N is the number of pins assigned to channel steering by the CPS and the channel selected is a result of the binary count obtained from these pins; the least significant bit is assigned to the lowest pin number that has channel steering assigned to it.
This value is the Channel Steering Index.

If the Channel Steering Index is zero, channel steering has no affect and channels are selected by normal user inputs.

If the Channel Steering Index is not zero, then the channel is set to the channel that corresponds to the Channel Steering Index value. If the selected channel index refers to a channel higher than the number of channels programmed in the radio, the highest available channel is selected.

Any attempts to change channel via user button action are ignored if the Channel Steering Index is not zero, and the Button Error Alert is sounded instead. This includes the following button actions:

- Up/Down.
- Memory Channel.
- Entering channel numbers via the keypad microphone.

If the Channel Steering Index is reset to zero the radio returns to the last ‘user selected’ channel.

If the radio goes into any Emergency Mode for which an Emergency Revert Channel is defined, the Emergency Revert Channel takes precedence over Channel Steering.

8.3.2 Hook

External hook performs the same function as microphone hook. This can be a mechanical hang-up or electrical switch.

8.3.3 Voice PTT

If Voice PTT is asserted, the TX audio is routed from one of the microphone paths. CPS programming defines whether the external voice PTT uses the internal or external (pin 2) microphone audio path.

8.3.4 Data PTT

If data PTT is asserted, it is assumed that the external PTT is an electronic switch (e.g. a modem) and that it requires the fastest possible radio response. When this pin is asserted the microphone path is muted and the TX audio is routed from the Flat TX audio input (pin 5).

8.3.5 Voice & Data PTT

If voice and data PTT is asserted, it is assumed that the external PTT is an electronic switch that requires the fastest possible radio response. The microphone path and the Flat TX audio input are both enabled and the two signals are summed to form the TX signal. CPS programming defines whether the external PTT uses the internal or external (pin 2) microphone audio path.

8.3.6 Mute Audio PA

When this input is asserted the audio PA (and speaker) is muted. When it is de-asserted, the audio PA operates under normal software control and follow programmed squelch requirements.

8.3.7 Open RX Audio

When this input is asserted the received audio, or option board audio (if fitted), is routed through to the audio PA (and speaker) independent of the normal squelch criteria.

8.3.8 Public Address Enable

When enabled, this feature allows the radio to act as a ‘Public Address’ system. An external switch is connected to this pin. When this pin is asserted, the radio routes the internal or external mic audio through to the Rx Audio (pins 7 and 11). A public address kit must be connected to the Rx audio pins; this provides extra audio amplification and connection to an external speaker (eg mounted on the roof of the car).

When the public Address pin is asserted and the mic PTT is pressed, the radio cannot receive calls. When the Public Address pin is asserted but the mic PTT is not pressed, the radio can receive calls. However, the Public Address pin must be de-asserted (ie the external Public Address switch moved to OFF) before the user can reply to the call.

8.3.9 Call 1, Call 2, Call 3, Call 4

If one of call 1, call 2, call 3 or call 4 inputs is asserted, then its associated telegram is transmitted.

It provides the same functionality that is assigned to a call programmed on a button.

8.3.10 Emergency

If an emergency switch is assigned, asserting the input causes the radio to go into emergency mode.

Emergency switch assigned to pin 9 is a special case. In addition to normal emergency mode, asserting the input when the radio is turned off will invoke Emergency with Wake Up. This causes the radio to power up and immediately enter Emergency mode.

8.3.11 Ignition

Ignition sense is programmable per radio. Connecting the vehicle ignition to this line causes the radio to turn on automatically when the ignition is turned on (provided that the on/off/volume knob is also in the ON position), and turn the radio off when the ignition is turned off. This feature is particularly useful where the radio must always be on when the vehicle is in use, for example, a fire engine.

Benefits

- ❏ The radio turns on automatically when the vehicle is started.

8.4 Data Transmissions

Mobile data systems are increasing in popularity. The CM300 Series mobiles have been designed with this is mind. They have:

- flat transmit and receive audio available on the accessory connector;
- special programmable digital lines on the accessory connector;
- the ability to connect an external data modem to the radio.

An external data modem can be connected to the mobile via the rear accessory connector.

8.5 Accessory Packages

Several common accessories are listed in the **Accessory Package**.

Choosing one of these automatically sets up the GPIO interface in the required configuration. Changes of, and additions to, the standard configuration can be made.

Benefits

- ❏ Reduces time to set up the radio.

9.0 5 Tone (Select 5) Signalling

9.1 Introduction

In 5 tone systems, each radio has a unique numeric identity (e.g. 12345). To signal the number 12345, a sequence of 5 tones is sent. Sequences of audible tones of a very short duration are sent between radios. Most 5 tone sequences take less than half a second to send.

When the radio receives the correct 5 tone sequence it sounds alert beeps and flashes LEDs to indicate to the user that they have been called. The squelch opens so that activity on the channel can be heard, as this is a message specifically directed at them.

Benefits

- Easier, faster communications.
- Users only receive calls specifically for them.
- Alert beeps notify users when a call is received for them.
- Radio user does not need to continuously listen to channel - less user fatigue.
- Improved system performance.

9.2 Signalling Standards

There are several “standards” for 5 tone signalling, each of which uses different durations and frequencies to represent the numbers 0 to 9. The CM300 Series supports all major European 5 tone signalling standards:

100ms CCIR	French ZVEI
70ms CCIR	Modified ZVEI
20ms CCIR	ZVEI
EEA	

In addition, up to two dealer defined signalling standards can be programmed (with any frequency and tone duration within the operational range of the radio) to cater for special applications.

Signalling is defined on a per channel basis, for optimum system integration potential. For example, channel 1 may use 100ms CCIR and channel 2 could be ZVEI.

Benefits

- ❏ Exceptional flexibility to integrate the radio into existing 5 tone systems.
- ❏ No need to change hardware modules to cater for a change in signalling standard.

9.3 G/R Tone Redefinition

For each of the signalling standards, the group (G) and repeat tones (R) may be “redefined” if necessary. For example, in some systems the 0 digit frequency has been used as a group call identifier, as this can be selected from the keypad.

9.4 Single Tones

Two single tones can also be dealer defined, and used within sequences or on their own. This allows the CM300 to be sold into a wider range of existing systems.

10.0 5 Tone (Select 5) Encode Sequences

The radio can be programmed with up to 32 encode sequences.

Each encode sequence can be defined as any one of the 5 tone signalling standards or DTMF.

5 tone sequences can:

- be up to 12 digits long
- have digits 0-9, A-F, G, R, 2 single tones, status or address variable digits.

DTMF sequences can:

- be up to 24 digits long;
- have digits 0-9, P (pause), * and #.

Each sequence can be set up with a pre-time. This is a period that the radio transmits before the sequence is sent out. This allows the total communications path from the transmitter, through any repeaters and to the receiving radio, to be set up before tones are sent.

Benefits

❏ Exceptional flexibility to integrate into existing 5 tone and DTMF systems.

10.1 Telegrams

1, 2 or 3 encode sequences are sent in rapid succession (concatenated) to form a telegram.

Each encode sequence can contain only one type of signalling or DTMF, but Telegrams can contain encode sequences with different signalling.

For example,	sequence 1	ZVEI
	sequence 2	DTMF

The 5 tone sequence opens a telephone interconnect, and the DTMF dials the phone number.

Each radio can be programmed with up to 32 telegrams.

Telegrams may be sent in a variety of ways, such as pressing the PTT, or one of the programmable function buttons which has set to be a call button. It is also possible to have an external call button.

Telegrams are also used to define the message sent by the Auto-Acknowledge and Call Forward features.

Benefits

❏ Telegrams enable the radio to be integrated into systems requiring multiple sequences to cater for special 5 tone applications such as Caller Identity or Repeater Access.

10.2 Contact List (CM360)

A contact list, similar to a phonebook, may be used to give access to up to 255 pre-programmed numbers accessed via the menu. Each entry can have an alias of up to 8 characters of alphanumeric text. The alias is a meaningful name for the individual or group.

The Contact List is used to dial the number of outgoing calls, and to identify the caller of incoming calls. Depending on the way the radio is programmed, it displays either the alias or the number of the person being called, or the caller.

The Contact List can be imported to and exported from the CPS in a Microsoft Excel file.

Benefits

- ❏ Fast, easy access to pre-programmed numbers, saving time dialling and ensuring accuracy.
- ❏ Easy caller identification by displaying name.
- ❏ Fast and easy updates to the Contact List.

10.3 Status Lists (CM360)

A status is a code for transmitting prearranged messages, e.g. status ’05’ may indicate “Return to Base”. The prearranged messages (alias) and associated code digits are contained in a Status List which contains up to 255 entries. There are separate encode and decode status lists; or they can be combined in the decode status list.

The Status List(s) can be imported to and exported from the CPS in Microsoft Excel files.

Benefits

- ❏ Pre-arranged messages used to convey status avoids ambiguity.
- ❏ Efficient use of airtime.
- ❏ Sends useful information to team members, discreetly, without the need to talk.
- ❏ Fast and easy updates to the Status List(s)

10.4 Address and Status Multicall (CM360 with keypad mic)

Contact and Status lists limit the user to 255 pre programmed entries for each list. Multicall allows the user to send any address or status.

The radio is put into address or status mode (as appropriate) by pressing a pre programmed button or via the menu. The number is entered on the keypad, then a Fixed Telegram button or Address Send button (for Advanced Multicall users only) must be pressed to insert the digits into the telegram and send it. Alternatively, a long press on P1 can be used to store the digits for future transmission.

- Addresses up to 8 digits can be sent: 100 million addresses!
- Statuses up to 3 digits can be sent: 1000 statuses.

The radio decodes the address and status data as normal. If the codes match any in the contact or status decode lists, the alias is displayed; if the codes do not match the lists the number is displayed.

Addresses and Status can be entered into one encode telegram and sent simultaneously. They can also be simultaneously decoded from one received telegram.

Benefits

- ❏ Up to 3 variable Status digits.
- ❏ Up to 8 variable Address digits.

10.4.1 Basic and Advanced Multicall

Basic Multicall users only enter variable digits and use a Fixed Telegram button to transmit the telegram.

Advanced Multicall users enter a telegram number (1 - 9) followed by variable digits. Address Send and Fixed Telegram buttons can be used to transmit the telegram. If an Address Send button is used, the variable digits are inserted into the entered telegram, then transmitted. If a Fixed Telegram button is used, the entered telegram number is ignored and the variable digits are inserted into the Fixed telegram, then transmitted.

10.5 Dedicated Call Buttons (Call 1,2,3 and 4)

Up to 4 buttons to be programmed with a telegram which is always sent whenever the button is pressed. It is comparable with the memory button facility on some telephones.

Often, one of the buttons is programmed as a fixed call to the central dispatcher (Base Call); another button is used as a multicall button to send address and/or status digits, either selected from the address and status lists or entered on the keypad. The CM340 can only send pre-programmed telegrams.

External call buttons or switches can also be programmed to the accessory connector. (See Accessory Connector section.)

Benefits

- ❏ Fast access to frequently called people.
- ❏ Simple and effective operation.
- ❏ Promotes efficient radio operation.
- ❏ External call switch for simple telemetry.

10.6 Telegram on PTT

All CM300 Series radios can generate an encode telegram, either manually from one of the call buttons, or automatically tied to PTT operation. When the PTT is pressed, PTT Keyup Mode automatically sends the telegram:

Every PTT - The radio sends the telegram on every PTT press. This is often used to generate an identity (PTT-ID) so that each transmission can be monitored by the system.

Once Only - The radio sends the telegram just once at the beginning of the call, eg to call another radio. The sequence is not sent again until the call ends (monitor button pressed) or the Auto Reset time expires.

Periodic - If the system requires periodic awareness of who is transmitting, for example for health & safety reasons, then a telegram is sent when the PTT is first pressed and periodically during the transmission.

De-Key - An encode telegram can also be sent 'On Dekey' when the PTT is released, to act as a Cleardown call.

Benefits

- ❏ Telegrams tied to PTT provide valuable system information.
- ❏ Telegrams sent Once on PTT simplifies radio operation.
- ❏ End of Message Alert speeds up communications.

10.7 Side Tones On/Off

Whenever the radio encodes (sends) a 5 tone telegram, usually these tones are also heard from the radio's loudspeaker to act as a confidence aid for the radio user. In the case of Telegram on PTT, this also indicates when it is OK to start to talk.

These 'side tones' can be set on or off, to cater for the user's preference.

11.0 DTMF

DTMF (Dual Tone Multi Frequency) is used when the radio is required to operate with an interface to a telephone system.

On all radios a DTMF encode sequence can be sent, and
on the CM360 with keypad mic, the keypad can be put into DTMF live dial mode.

Each DTMF encode sequence can:

- be up to 24 digits long;
- have digits 0 - 9, P (pause), * and #.

The radio does not decode DTMF. A DTMF decode option board can be fitted if required.

11.1 DTMF encode sequence

All radios can send pre programmed DTMF sequences. The sequences cannot contain a combination of 5T and DTMF digits; however, 5T and DTMF sequences can be combined in a telegram.

11.2 DTMF Live Dial Mode (CM360 with keypad mic)

There are two ways to access DTMF live dial on the radio:

Send a telephone interconnect call (5T or DTMF sequence) to a station that connects to a telephone line. The radio can then send DTMF live dial calls from the keypad. On completion of the call, the radio (if programmed) sends a cleardown call (5T or DTMF sequence) and the keypad returns to the default keypad mode.

Press a button pre-programmed to enter DTMF mode. The radio then sends DTMF live dial from the keypad. If needed, DTMF interconnect and cleardown calls can be sent from call buttons or live dial entry on the keypad. The radio keypad remains in DTMF live dial mode until the DTMF mode button is pressed again. When the radio exits DTMF mode, the keypad returns to the default keypad mode.

Benefits

- ❏ Link up with a telephone network to extend the communication system.
- ❏ Pre programmed DTMF sequences allow all radio users to call frequently needed telephone numbers (max 32 sequences).
- ❏ Live dial allows the user to dial any DTMF telephone number.

12.0 5 Tone (Select 5) Decoder

12.1 Multiple Parallel Decoders

The radio can be programmed with up to 16 parallel decoder sequences.

Each 5 tone decoder sequences can:

- be up to 12 digits long
- have digits 0 - 9, A - F, G, R or 2 single tones.

The radio does not decode DTMF. A DTMF decode option board can be fitted if required.

Benefits

- ❏ Extremely Flexible decoder functionality to cater for many applications.

12.2 Individual Calls

Individual Calls allows two radio users to talk to each other in a one to one conversation.

Benefits

- ❏ Alerts a user when a call is received specifically for them.
- ❏ Less radio user fatigue - no need to always be listening.
- ❏ Easier, faster communications.
- ❏ Improved system performance.
- ❏ Allows private / sensitive information to be exchanged between two individuals (unless someone presses the monitor button).

12.3 Group Calls

Group Calls allows a single user to call a number of other radio users at the same time for a one to many conversation. Like a conference call, the entire conversation is shared with everybody in the team. Although only one person can speak at a time, all members of the team can listen and take part in the conversation.

Group Call can be achieved simply via PL radios. In this situation, all users will hear the call.

The key benefits of 5 tone radios is the ability to direct calls to a specific radio. It also allows systems with a large number of radios to be configured to contain a number of small groups, perhaps based on a functional or departmental basis. Each radio may be member of a number of groups.

For each decoder, it is possible to specify which digit positions in the received 5 tone sequence can be 'Group' digits. If a Group tone is received in that position rather than the usual number's tone, the radio recognises and decodes the call. The radio then generates a 'Group Call' alert.

For example

Radio ID is:	1 2 3 4 5	
Group digits:	- - - GG	
Radio will respond to:	12345	(Individual Call)
	123GG	(Group of up to 100 radios)
	1234G	(Sub-Group of 10 radios)

Both normal and expanded group call decode is supported.

Benefits

- ❏ One call puts you in contact with a team of people.
- ❏ Allows radio to be part of one or more workgroups.
- ❏ Much more flexibility to define groups than possible with PL/DPL.
- ❏ Teamwork is possible even when team members may be geographically remote from each other.
- ❏ Information is shared quickly and efficiently.

12.4 ID Decode Display - Caller Identity (CM360)

When a user sends out a call, their user ID is usually encoded in the 5 tone sequence that is transmitted. When that call is received, the receiving radio can extract the caller's ID information from the telegram. If the caller's ID matches one in the contact list, the caller's alias is displayed. If there is no match in the contact list then just the ID digits are displayed.

Benefits

- ❏ Enables user to know who is calling before they answer the call.
- ❏ Answer important calls immediately.
- ❏ Answer less important calls at your convenience.
- ❏ If radio user is away from vehicle, they will know who called when they return.

12.5 Status Decode Display (CM360)

When a call is received, the receiving radio can extract the caller's status from the telegram. If the status matches one in the status list, the status alias is displayed. If there is no match in the status list then just the status digits are displayed. The radio can simultaneously decode address and status from one telegram the address and status information alternates on the display.

Benefits

- ❏ Text for standard status messages.
- ❏ Fast and efficient communication.

12.6 Call Reminder

The radio sounds a distinctive alert when an incoming call is not answered. The alert continue to be sounded periodically until the radio user presses any of the buttons. The display flashes the alias or number of the last call received by the radio.

Benefits

- ❏ Users made aware of last unanswered call.

12.7 Call Back

As the CM300 Series radios are able to work out the identity of the calling radio, it is possible to use this number to Call Back to the original caller. The caller's ID is immediately copied into the call back sequence.

This is especially useful if a call is received when the radio user is temporarily out of their vehicle. On return to their vehicle, the user hears the Call Reminder alerts and sees the display flashing the last caller. All the radio user has to do is press the PTT, or whichever button has been programmed with the Call 1 feature, to call back to the original caller.

Benefits

- ❏ Simplifies and speeds-up return of the last call.

12.8 Missed Calls List (CM360)

If an incoming call is unanswered, the caller's ID is placed in the Missed Calls List. The Missed Calls List stores the following information about each call:

- Caller's radio ID, or alias (if defined in the contact list);
- Status digits, or alias (if defined in the status list);
- Telegram number (Advanced Multicall users only).

If the received telegram does not have address digits, the call is not placed in the Missed Calls List. If a second call occurs from a radio ID already stored in the Missed Calls List, only the most recent information is stored.

The Missed Calls List can support up to 10 entries. If the Missed Calls List is already full and another unanswered call occurs, the radio can be programmed to either:

- Discard the oldest call entry, or
- Not enter any new calls.

If the Missed Calls List has entries, the Missed Calls List icon is illuminated. If one or more new calls have been added since the last time the Missed Calls List was displayed, the Missed Calls List icon flashes.

The Missed Calls menu can be accessed via the menu navigation buttons or a programmable button. However, if the Missed Calls List is empty, the Missed Calls menu is not available. Missed Calls are displayed on a last in first out basis. They can be viewed and deleted from the Missed Calls List.

The currently selected Missed Call can be answered by pressing any button programmed as Fixed Telegram. The radio ID stored for that entry is entered in the telegram, then transmitted.

For Advanced Multicall users only, the currently selected Missed Call can be answered by pressing any button programmed as Address Send. The radio ID stored is entered in the telegram number stored, then transmitted.

The hash button serves as a Fixed Telegram or Address Send button, if so programmed.

There must be the correct number of radio ID digits for the selected telegram's Variable Digits. An incorrect number of digits results in an error tone.

When the Missed Call is answered, the Missed Calls menu is exited, and the call is deleted from the Missed Calls List.

NOTE **When a user answers the Missed Call, they may be on a different channel from that on which the call was received.**

The Missed Calls List is remembered over radio power down.

If Call Forward has been enabled, the calls are not stored in the Missed Calls List of the forwarding radio.

Benefits

- ❏ The user knows who has called if they are unable to answer calls for some reason.
- ❏ The caller's ID is stored even if another call is received.
- ❏ The user can answer calls when it is convenient for them.
- ❏ The user does not have to answer the calls in the same order that they were received.

13.0 Additional Decode Functions

In addition to individual and group call alerts, the functions available to be activated on successful decode are:

13.1 Start Auto-Reset and Stop Auto-Reset (Cleardown)

The Auto Reset Timer can be started and stopped by decode of a 5 tone sequence.

Start Auto Reset decode starts the auto reset timer and opens the squelch so that voice messages are heard. Stop Auto Reset decode ('Cleardown' or 'Remote Close') ends the auto reset timer and returns the radio to the 'Receive Squelch' so that the radio is squelched.

Start Auto-Reset and stop Auto-Reset are used to 'authorise' and 'de-authorise' the radio when operating in Authorisation.

Benefits

- ❏ Automatically opens squelch so that radio user can hear incoming voice message.
- ❏ Automatically closes squelch, to prevent user from hearing unwanted messages.

13.2 Authorisation

Authorisation allows the central dispatch to control call set up and monitoring activity. Only authorised radios can make calls or monitor channels. The only call a de-authorised radio can make is the request for authorisation to a pre-determined destination.

In order that the user can be confident that their call has been received by the base, the base sends back an acknowledgement beep for a short period. To allow the mobile user to hear the acknowledgement beep, the 'Monitor Timer' is set to open the radio's squelch automatically for a few seconds.

On receipt of the request for authorisation call from the mobile, the base, when ready, sends back an authorisation call. The mobile becomes 'Authorised' when it receives this call: the squelch opens and the PTT allows the mobile user to talk with the base.

At the end of the conversation, the radio is sent a 'De-Authorisation' 5 tone sequence from the base, to reset it back to the de-authorisation state.

It is possible for the base to authorise a whole group of radios, if 'Conference Calling' is required.

Benefits

- ❏ Complete control of radio usage within a team, especially useful for supervisors.
- ❏ Enables central dispatcher to deal with calls on priority basis.
- ❏ Enforces good system discipline.
- ❏ Prevents users from listening to sensitive conversations.
- ❏ Reduced time wasting leading to increased productivity.
- ❏ Efficient use of air time.

13.3 Stun / Unstun

Stun/Unstun can only be activated by the system manager or administrator.

A 5 tone sequence is sent to a radio which, on decode, causes it to stop working: the buttons do not function and it will not transmit or receive audio.

This feature can be used to stop a radio working in case:

- The radio is stolen;
- Hire radios are not returned or payments not made;
- A user abuses communication protocols.

The radio can only be unstunned, i.e. returned to operational use, by an unstun signal sent from the system administrator or returning the radio for reprogramming.

Benefits

- ❏ Over-the-Air Stun prevents fraudulent or illegal use of the radio.
- ❏ Render stolen radios unusable.
- ❏ Disable unreturned hire radios.
- ❏ Disable lease radios if monthly payment not received.
- ❏ Over-the-Air reset of stunned radios eliminates need to bring radio to base.

13.4 Auto-Acknowledge Features

When the CM300 Series radio decodes one of its 5 tone sequences, it can be programmed to automatically send back a 5 tone telegram. This provides an (audible) 5 tone response to the calling radio, so that they know that their call has been received.

The radio can decode the auto-acknowledge sequence. Most 5 tone systems use this to automate calls from the central dispatcher. If the dispatcher console does not receive the expected acknowledge, the call is resent to the mobile – **Telegram Repeat**.

It is possible to incorporate 'Status' within the auto-acknowledge telegram. It is therefore possible for the central dispatcher to 'interrogate' the mobile radio to find out the current status of the mobile vehicle operator. This of course assumes that the operator remembers to update the Status number as appropriate.

The auto-acknowledge feature is highly flexible, to enable the radio to work in a wide variety of 5 tone systems. Up to 16 different acknowledge replies can be set up, each with different encode telegrams and other features such as making the radio wait until the channel is free before sending back the auto-acknowledge telegram, sending the telegram on a pre-defined channel, and turning off the usual side tones and LEDs associated with Auto-Ack operation.

An auto-acknowledge telegram may be sent prior to the radio invoking a call forward telegram.

Benefits

- ❏ Auto-Acknowledge can be used to automate calls from the dispatcher.
- ❏ Auto-Acknowledge with status allows dispatch to integrate the radio.
- ❏ High degree of system flexibility is possible.
- ❏ 'Silent Interrogate' or 'Radio Check' is possible (turn off side tones/LEDs).

13.5 Call Forward

Feature

Call Forward allows calls to be forwarded to a portable radio, a 5 tone pager or another radio user. This can be used if the user is away from the vehicle, or does not want to be disturbed.

Benefits

- ❏ Enables re-routing of calls when user is away from vehicle.
- ❏ If you really cannot be disturbed, e.g. in a meeting, your calls can be answered by somebody else.

13.6 Emergency Calls

Emergency is useful if a user is in a potentially hazardous situation, such as risk of hijack or hostage situation (taxis and police). A single button press establishes immediate communication with a pre-defined person or group of people. Emergency calls are prioritised by the radio system and by pass all normal system protocols.

Emergency can be activated by pressing a button or switch with the feature programmed to it. The Emergency feature can be programmed to any of the programmable buttons, or inputs on the accessory connector. If an emergency switch is connected to pin 9 of the accessory connector and the radio is turned off, pressing the switch will turn the radio on and immediately put it into emergency mode: see **emergency wake up** in the accessory connector section.

13.6.1 Emergency Cycles

When in emergency mode, the radio cycles through periods of transmission (TX) and reception (RX), to allow the central dispatcher (base) to hear activity in the vicinity of the radio, and to then allow the radio user to hear messages from the base. This is automatic due to the assumption that in the emergency situation, the radio user is probably unable to press and release the PTT button. The duration of the TX and RX periods within the cycle is dealer programmable.

NOTE **The microphone must be a ‘hot’ mic for its audio to be transmitted without the radio user having to press the PTT. In a ‘hot’ mic, the PTT is not in series with the mic, and the radio can put the mic into transmit mode. The compact mic, HMN3413, is a ‘hot’ mic.**

Limited Number of Cycles:

The number of TX/RX cycles can be dealer programmed as a fixed number, or to carry on until the emergency mode is reset (see later).

TX Cycle: Tone / Tone & Voice

Optionally, a special ’alarm’ tone can be transmitted along with any sounds picked up by the microphone. This alarm tone is at a low level, so that voice messages from the mobile radio user can still be heard by the central dispatcher, but is distinctive so that all radio users on the channel are immediately aware that they are listening to an emergency transmission.

TX Cycle: Telegram

A special 5 tone emergency telegram can be transmitted, to activate emergency mode on the central dispatcher's equipment (e.g. Centro Plus desktop controller). This telegram can also contain Status information.

TX Cycle: Voice Message

An emergency message can be pre-recorded which is sent automatically when the emergency call feature is activated. This message can contain, for example, the user's location or status which would be useful to the recipient, especially if the user is unable to talk.
Refer to Voice Storage to use this feature.

13.6.2 On/Off Switch Enable

The On/Off switch can be programmed to be operational or non-operational when in Emergency mode. If the On/Off switch is enabled, then when in standard emergency, it is possible to turn the radio off (and therefore reset the emergency mode). If the On/Off switch is disabled, it is not possible to turn the radio off. See Power Off Logic section.

13.6.3 Secret Emergency

The radio can be set to 'Secret Emergency' . The display and LEDs turn off, the alert tones and side tones are not generated and the audio is muted; the radio appears to be turned off, even though it is in fact transmitting and receiving.

In 'Standard Emergency' the display, LEDs and alert tones function as in normal radio operation and they change if the radio changes channel or transmits as part of the emergency operation.

13.6.4 Emergency Squelch

The Emergency Squelch can be set different from the standard squelch setting.

13.6.5 Emergency Debounce

In order that the emergency mode of operation is not entered into by accident, it is possible to programme the period of time that the emergency button must remain pressed, before the radio enters emergency mode.

13.6.6 Emergency Revert Channel

A default emergency channel can be specified, so that the radio changes to this channel during the emergency transmission and reception.

13.6.7 Emergency Microphone Source

The microphone source during TX periods is dealer programmable. It can be either the standard microphone (which will work even if the PTT is not pressed), or an external microphone wired into the 16 pin accessory connector. This external microphone can be hidden within the vehicle to avoid the possibility of an attacker being able to disconnect the working microphone (even if the standard microphone is ripped out, the radio can still transmit because it is using the hidden microphone).

13.6.8 Emergency Microphone Gain

It is quite likely, especially if a hidden emergency microphone is used, that the speech level will be lower than normal operational situations. Therefore, a special microphone gain can be set for emergency operation, to amplify quiet sounds.

13.6.9 Exiting Emergency Mode

Emergency mode can be exited by:

- Completion of a limited number of transmit receive cycles;
- Turning the radio off;
- Power is removed from the radio;
- Receipt of a 5 tone Emergency Reset sequence – stops the emergency cycles and returns the radio to normal operation.

13.6.10 Incoming emergency

Incoming emergency calls are decoded by the radio. A unique and easily identifiable alert is sounded.

Benefits

- ❏ A single button press initiates automatic radio operation in situations where vehicle driver is unable to operate radio as normal.
- ❏ Immediate and guaranteed communication with your team when you need it most in an emergency situation - no unpredictable infrastructure delays.
- ❏ Emergency TX/RX cycles allow other radio system users to hear what is happening at the emergency site, and to talk to the radio user.
- ❏ Secret Emergency provides 'covert' communications for sensitive situations.
- ❏ Highly flexible configuration to match radio user requirements.
- ❏ Emergency reset enables central dispatcher to reset radio remotely from emergency mode.

13.7 Lone Worker

Lone Worker is a special form of Emergency mode. The feature enables individuals to work alone with added safety. The radio continues to operate as normal providing the radio buttons are pressed regularly. However, if none of the radio buttons are pressed for a pre-determined amount of time, the radio sounds a distinctive reminder to prompt the user to press one of the buttons.

If after a further amount of time, the radio user still has not pressed any of the buttons, the radio concludes the operator is in need of assistance and automatically makes an emergency call to a pre-determined contact number.

The operation is flexible and can be tailored to meet specific customer requirements.

The Lone Worker Response time can be set from 1 to 255 minutes, giving sufficient time for a driver to leave his vehicle, check a premise and return to the vehicle. The driver could leave a voice or status message stating where he is going, so that if he does not return to his vehicle the location is transmitted in the emergency call.

Benefits

- ❏ Added security and safety for individuals who work remotely from their team.
- ❏ Added security and safety for individuals or teams who work in hazardous conditions.
- ❏ Ensures that in the event of an emergency, communication is established quickly and efficiently with all the inherent benefits of emergency operation.

14.0 Option Board Support (CM360)

The functionality of the CM360 radio can be enhanced by installing a third party Option Board.

The Option Board is plugged into a purpose designed connector fitted on the radio motherboard; no soldering of wires is required.

For information regarding the operation of these third party Option Boards, and the considerable benefits they provide, please contact the appropriate supplier. Recommended third-party supplier internet sites are:

- Transcrypt International - http://www.transcrypt.com

Benefits

- ❏ Radio functionality can be enhanced to match the customers' requirements.
- ❏ The Option Boards are plug-in (no soldering is required). Fitting is quick, easy and does not introduce faults.

14.1 Voice Recorder (CM360)

14.1.1 Voice Recorder Feature

Voice Recorder allows the storage, retrieval and deletion of voice messages. The radio can record messages received over the air or detected by the radio microphone. A number of different messages can be recorded with up to 120 seconds of available record time. The messages are remembered by the radio even when the radio is switched off.

Benefits

- ❏ Paperless notepad.
- ❏ Record and retrieve important information when you need it.
  For example delivery addresses sent out by a central dispatcher.

14.1.2 Emergency Message Feature

An emergency message may be pre-recorded using the voice recorder and sent automatically when the emergency call feature is activated. This message may contain, for example, the user's location or status which may prove useful to the recipient, especially if, in the emergency situation, the user is unable to talk. The user can record just one message which can have a maximum length of 120 seconds.

Benefits

- ❏ User location and or status sent discreetly without the need to talk into the radio.
- ❏ Discreet messages sent between organisations to aid security.

15.0 User Indications

15.1 Display (CM360)

The CM360 has a 1 line 8-character display. The display shows channel, address, status, menu and radio status information.

On the CM360, the default display is programmable either as channel, or a text message. Address and Status are displayed when the mode is entered, via the menu or programmable buttons.

A line of 8 icons illuminate to indicate useful features such as scan, DTMF mode and missed calls.

Benefits

- ❏ Helpful user information increases user efficiency.

15.2 Menu and Prompts (CM360)

Many of the radio features are contained in a structured menu which allows fast and easy access to the feature set. Prompts are given to guide the user through the menu and to understand the radio state. The menu and prompts are programmable as:

- English
- French
- German
- Spanish
- Italian
- Polish

Benefits

- ❏ Quick access to the radio features.
- ❏ Permits many features to be CPS programmed then accessed in the radio.
- ❏ Helpful user information increases user efficiency.
- ❏ Choice of 6 languages.

15.3 Keypad (CM360 with keypad microphone)

A touch tone keypad may be used for dialing a phone number (DTMF), for changing channel or entering an address or status number.

Benefits

- ❏ Allows rapid channel, address and status selection; particularly useful on a large or complex system.
- ❏ Extends the DTMF feature.

15.4 Backlight (CM360)

Backlight illuminates the radio display and menu navigation keys.

The radio can be programmed to have the backlight:

- Permanently on;
- Permanently off;
- On for a timed period - on power up, if the display changes and for any button or key press, the backlight turns on for a programmed period of time.

Backlight brightness, of the display and menu buttons, can also be set by the user via the menu.

Benefits

- ❏ Ease of use giving clear indication of the keys and display especially in subdued light.
- ❏ Allows the radio to be used in a wider variety of environments.

15.5 Alerts

15.5.1 Programmable Alerts

There are eighteen different alerts, 2 ring tones and keypad feedback tones. Each can be programmed as:

- Disabled
- Variable volume (relative to volume setting)
- Fixed (programmed)

Benefits

- ❏ Audible indicators enable users to hear the call progress without having to look at the radio.
- ❏ Improves the “user friendliness” of radio operation.
- ❏ Specific user requirements can be met.
- ❏ Volume of alert tones can be linked to received volume level.

15.5.2 Escalert

Escalert allows the volume of incoming call indications to steadily increase.

Benefits

- ❏ Attracts users attention to incoming calls.
- ❏ Helps reduce time to answer calls - improves efficiency.
- ❏ Helps promote efficient radio operation in high noise environments.

16.0 Other Dealer Benefits

16.1 Password Protection of the Codeplug

The codeplug that is programmed into a radio can be password protected. If the codeplug is password protected, the correct password must be entered into the CPS before it will read the radio. However, a new codeplug can be programmed into a radio with a password protected codeplug; thus a radio can be programmed from a CPS codeplug file if the password is forgotten, or a new file can be created and programmed into a radio if a customer changes dealer.

Benefits

The radio codeplug cannot be read and used by another dealer, thereby safeguarding the time and effort invested by yourself.

17.0 Radio Feature Comparisons

17.1 CM300 Commercial Series vs GM300 Professional Series vs GM950

This chart highlights the differences between the CM300 Series of Commercial Radios and GM300 Series of Professional Radios and their predecessors in the Motorola range of mobile radios.

**	Requires Keypad Microphone	✓	Feature available
Opt.	Requires Option Board	-	Feature Not Available

Table 2-3 Comparison of Motorola Radios

	CM300 Commercial Mobile Series		GM300 Professional Mobile Series			GM950 Mobile Series		
Feature description	**CM340**	**CM360**	**GM340**	**GM360**	**GM380**	**GM950 N2**	**GM950 N3**	**GM950 N4**
Audio Features:								
Companding	✓	✓	✓	✓	✓	-	-	-
Low Level Expansion	-	-	✓	✓	✓	-	-	-
Pre-emphasis / De-emphasis	✓	✓	✓	✓	✓	✓	✓	✓
VOX	✓	✓	✓	✓	✓	-	-	-
Alerts	✓	✓	✓	✓	✓	✓	✓	✓
Volume (min & max)	✓	✓	✓	✓	✓	✓	✓	✓
Channel								
Number of channels	10	100	6	255	255	4	128	128
Channel alias	-	✓	-	✓	✓	-	-	-
Dedicated channel select buttons	-	-	6	-	-	4	-	-
Channel select via up/down buttons	✓	✓	-	✓	✓	-	✓	✓
fast scroll channel change	-	✓	-	✓	✓	-	✓	✓
Numeric channel select (keypad select)	-	**	-	**	✓	-	✓	✓
Channel select via menu mode	-	✓	-	✓	✓	-	-	-
Memory channel	✓	✓	-	✓	✓	-	✓	✓
Channel power - high / low	✓	✓	✓	✓	✓	✓	✓	✓
Repeater talkaround	✓	✓	✓	✓	✓	✓	✓	✓
PL Encode: PL & DPL	✓	✓	✓	✓	✓	✓	✓	✓
PL Decode: PL & DPL	✓	✓	✓	✓	✓	✓	✓	✓
PL reverse burst	✓	✓	✓	✓	✓	✓	✓	✓
DPL turn off code (TOC)	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-3 Comparison of Motorola Radios (Continued)

	CM300 Commercial Mobile Series		GM300 Professional Mobile Series			GM950 Mobile Series		
Feature description	**CM340**	**CM360**	**GM340**	**GM360**	**GM380**	**GM950 N2**	**GM950 N3**	**GM950 N4**
Default settings								
Display	-	✓	-	✓	✓	-	✓	✓
CPS specified text	-	✓	-	✓	✓	-	-	-
current channel	✓	✓	-	✓	-	-	✓	-
channel, status & address	-	-	-	-	✓	-	-	✓
Up/down navigation buttons	-	✓	-	✓	✓	-	-	-
channel, address or status	-	✓	-	✓	✓	-	-	-
Keypad	-	**	-	**	✓	-	-	-
channel, address or status	-	**	-	**	✓	-	-	-
Powerup								
Powerup methods	✓	✓	✓	✓	✓	✓	✓	✓
on/off/volume switch	✓	✓	✓	✓	✓	✓	✓	✓
ignition switch	✓	✓	✓	✓	✓	✓	✓	✓
emergency wakeup	✓	✓	✓	✓	✓	✓	✓	✓
Power up channel - last or designated	-	✓	-	✓	✓	✓	✓	✓
Parameters remembered over power down	✓	✓	✓	✓	✓	✓	✓	✓
channel	✓	✓	✓	✓	✓	✓	✓	✓
last selected address	✓	✓	✓	✓	✓	-	✓	✓
last selected status	✓	✓	✓	✓	✓	-	✓	✓
last stored memory channels	-	✓	-	✓	✓	-	✓	✓
Scan	✓	✓	✓	✓	✓	✓	✓	✓
Scan List	32	32	32	32	32	2	2	2
Channels per Scan List	16	16	16	16	16	4	16	16
Autoscan	✓	✓	✓	✓	✓	✓	✓	✓
Priority scan	✓	✓	✓	✓	✓	✓	✓	✓
Nuisance channel delete	✓	✓	✓	✓	✓	✓	✓	✓
Channel change during scan	✓	✓	✓	✓	✓	✓	✓	✓
Scan transmit channel	✓	✓	✓	✓	✓	✓	✓	✓
home (start channel)	✓	✓	✓	✓	✓	✓	✓	✓
designated	✓	✓	✓	✓	✓	✓	✓	✓
last busy	✓	✓	✓	✓	✓	✓	✓	✓
last free	✓	✓	✓	✓	✓	✓	✓	✓
voted	✓	✓	✓	✓	✓	-	-	-
Talkback when landed	✓	✓	✓	✓	✓	✓	✓	✓
Scan Vote	✓	✓	✓	✓	✓	-	-	-

Table 2-3 Comparison of Motorola Radios (Continued)

Feature description	CM300 Commercial Mobile Series		GM300 Professional Mobile Series			GM950 Mobile Series		
	CM340	CM360	GM340	GM360	GM380	GM950 N2	GM950 N3	GM950 N4
Transmit: TOT								
TOT	✓	✓	✓	✓	✓	✓	✓	✓
Cumulative TOT	✓	✓	✓	✓	✓	-	-	-
TOT pre-alert timer	✓	✓	✓	✓	✓	✓	✓	✓
TOT rekey inhibit timer	✓	✓	✓	✓	✓	✓	✓	✓
Dekey telegram on TOT	✓	✓	✓	✓	✓	-	-	-
Transmit: Transmit Admit Criteria								
Always allowed	✓	✓	✓	✓	✓	✓	✓	✓
Never allowed	✓	✓	✓	✓	✓	✓	✓	✓
Channel free	✓	✓	✓	✓	✓	✓	✓	✓
PL/DPL Lockout	✓	✓	✓	✓	✓	✓	✓	✓
Past PL/DPL Lockout	✓	✓	✓	✓	✓	✓	✓	✓
Carrier Gone Timer Expired	✓	✓	✓	✓	✓	-	-	-
PL/DPL Not Detected	✓	✓	✓	✓	✓	-	-	-
No PL/DPL or Past PL/DPL	✓	✓	✓	✓	✓	-	-	-
Channel Free or No PL/DPL but Past PL/DPL	✓	✓	✓	✓	✓	-	-	-
Transmit Admit Criteria NOT applied in autoreset	✓	✓	✓	✓	✓	✓	✓	✓
Channel free beep	✓	✓	✓	✓	✓	-	-	-
Busy Channel Lockout	✓	✓	✓	✓	✓	✓	✓	✓
Squelch:								
Squelch signalling settings	✓	✓	✓	✓	✓	✓	✓	✓
open squelch	✓	✓	✓	✓	✓	✓	✓	✓
carrier squelch	✓	✓	✓	✓	✓	✓	✓	✓
coded squelch - standard	✓	✓	✓	✓	✓	✓	✓	✓
coded squelch - reverse	✓	✓	✓	✓	✓	-	-	-
signalling squelch	✓	✓	✓	✓	✓	✓	✓	✓
coded+signaling squelch	✓	✓	✓	✓	✓	✓	✓	✓
Monitor 1, monitor 2	✓	✓	✓	✓	✓	✓	✓	✓
Forced monitor	✓	✓	✓	✓	✓	✓	✓	✓
AutoReset Squelch	✓	✓	✓	✓	✓	✓	✓	✓
Hook - disabled, permanent, timed, external	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-3 Comparison of Motorola Radios (Continued)

	CM300 Commercial Mobile Series		GM300 Professional Mobile Series			GM950 Mobile Series		
Feature description	**CM340**	**CM360**	**GM340**	**GM360**	**GM380**	**GM950 N2**	**GM950 N3**	**GM950 N4**
External Output line function								
Disabled	✓	✓	✓	✓	✓	✓	✓	✓
Carrier Detect	✓	✓	✓	✓	✓	✓	✓	✓
PL/DPL Detect	✓	✓	✓	✓	✓	✓	✓	✓
PL override	✓	✓	✓	✓	✓	✓	✓	✓
Radio Busy	✓	✓	✓	✓	✓	✓	✓	✓
External Alarm	✓	✓	✓	✓	✓	✓	✓	✓
Per channel output	✓	✓	✓	✓	✓	✓	✓	✓
Car audio mute	✓	✓	✓	✓	✓	✓	✓	✓
PTT sense	✓	✓	✓	✓	✓	✓	✓	✓
Decode Output Control	✓	✓	✓	✓	✓	✓	✓	✓
Rx audio - filtered unsql, filtered sql, flat unsql	✓	✓	✓	✓	✓	✓	✓	✓
Rx audio - flat sql	✓	✓	✓	✓	✓	-	-	-
External Input line functions								
Channel steering	✓	✓	✓	✓	✓	✓	✓	✓
Hook	✓	✓	✓	✓	✓	✓	✓	✓
Voice PTT	✓	✓	✓	✓	✓	✓	✓	✓
Data PTT	✓	✓	✓	✓	✓	✓	✓	✓
Voice & Data PTT	✓	✓	✓	✓	✓	✓	✓	✓
Mute audio PA	✓	✓	✓	✓	✓	✓	✓	✓
Open RX Audio	✓	✓	✓	✓	✓	✓	✓	✓
Public Address	✓	✓	✓	✓	✓	✓	✓	✓
Call 1,2,3,4	✓	✓	✓	✓	✓	✓	✓	✓
Emergency	✓	✓	✓	✓	✓	✓	✓	✓
Emergency Wakeup	✓	✓	✓	✓	✓	✓	✓	✓
Ignition sense	✓	✓	✓	✓	✓	✓	✓	✓
ignition override	-	-	✓	✓	✓	✓	✓	✓
Conventional Signalling: Select 5								
Signalling standard	✓	✓	✓	✓	✓	✓	✓	✓
user defined signalling standard	2	2	2	2	2	2	2	2
ZVEI - standard, modified, French modified	✓	✓	✓	✓	✓	✓	✓	✓
CCIR - 20mS	✓	✓	✓	✓	✓	-	-	-
CCIR - 70mS, 100mS	✓	✓	✓	✓	✓	✓	✓	✓
EEA	✓	✓	✓	✓	✓	✓	✓	✓
GR Redefinition	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-3 Comparison of Motorola Radios (Continued)

	CM300 Commercial Mobile Series		GM300 Professional Mobile Series			GM950 Mobile Series		
Feature description	**CM340**	**CM360**	**GM340**	**GM360**	**GM380**	**GM950 N2**	**GM950 N3**	**GM950 N4**
Single Tones per radio	2	2	2	2	2	4	4	4
Conventional Signalling: Select 5 Encode								
5T sequence digits	12	12	12	12	12	7	7	7
5T sequences	32	32	32	32	32	16	16	16
Telegrams	32	32	32	32	32	16	16	16
Simultaneous PL & 5T encode	✓	✓	✓	✓	✓	✓	✓	✓
Contact list	-	✓	-	✓	✓	-	-	-
address alias	-	✓	-	✓	✓	-	-	-
Status list	-	✓	-	✓	✓	-	-	-
status alias	-	✓	-	✓	✓	-	-	-
Menu/Select telegrams	-	✓	-	✓	✓	-	-	-
Conventional Signalling: Select 5 Multicall	-	**	-	**	✓	-	✓	✓
Number of address variable digits	-	8	-	8	8	-	3	7
Number of status variable digits	-	3	-	3	3	-	3	7
Advanced multicall seqs	-	**	-	**	✓	-	-	-
Variable digit entry	-	✓	-	✓	✓	-	✓	✓
contact & status lists	-	✓	-	✓	✓	-	-	-
keypad entry variable digit	-	**	-	**	✓	-	-	-
scroll digits	-	✓	-	-	-	-	✓	✓
Variable digit lockout	-	**	-	**	✓	-	✓	✓
Conventional Signalling: Select 5 Decoder								
Parallel decoders	16	16	16	16	16	8	8	8
Decode sequence digits	12	12	12	12	12	7	7	7
Individual call	✓	✓	✓	✓	✓	✓	✓	✓
Group call - std & expanded	✓	✓	✓	✓	✓	✓	✓	✓
Call reminder alert	✓	✓	✓	✓	✓	✓	✓	✓
Decode address alias	-	✓	-	✓	✓	-	-	-
Decode status alias	-	✓	-	✓	✓	-	-	-
Simultaneous decode of address and status digits	-	✓	-	✓	✓	-	-	-
Auto Acknowledge	✓	✓	✓	✓	✓	✓	✓	✓
Auto Acknowledge decode	✓	✓	✓	✓	✓	-	-	-
Telegram Repeat	✓	✓	✓	✓	✓	-	-	-
Call cancel	✓	✓	✓	✓	✓	-	-	-

Table 2-3 Comparison of Motorola Radios (Continued)

	CM300 Commercial Mobile Series		GM300 Professional Mobile Series			GM950 Mobile Series		
Feature description	**CM340**	**CM360**	**GM340**	**GM360**	**GM380**	**GM950 N2**	**GM950 N3**	**GM950 N4**
Select 5 Decode Actions								
Call back	✓	✓	✓	✓	✓	✓	✓	✓
Priority decode	✓	✓	✓	✓	✓	-	-	-
Stun/unstun	✓	✓	✓	✓	✓	✓	✓	✓
Missed calls list	-	10	-	10	10	-	-	10
Authorisation	✓	✓	✓	✓	✓	✓	✓	✓
Cleardown / remote close	✓	✓	✓	✓	✓	✓	✓	✓
Emergency								
Emergency initiation	✓	✓	✓	✓	✓	✓	✓	✓
On pressing emergency button	✓	✓	✓	✓	✓	✓	✓	✓
from external I/O	✓	✓	✓	✓	✓	✓	✓	✓
emergency wake-up	✓	✓	✓	✓	✓	✓	✓	✓
Exiting Emergency TX/RX cycles	✓	✓	✓	✓	✓	✓	✓	✓
Limited number of cycles	✓	✓	✓	✓	✓	✓	✓	✓
via 5-tone decode	✓	✓	✓	✓	✓	✓	✓	✓
turn radio off	✓	✓	✓	✓	✓	✓	✓	✓
Emergency TX/RX cycles	✓	✓	✓	✓	✓	✓	✓	✓
TX cycle: Voice	✓	✓	✓	✓	✓	✓	✓	✓
TX cycle: tone with voice	✓	✓	✓	✓	✓	✓	✓	✓
TX cycle: Emergency Telegram	✓	✓	✓	✓	✓	✓	✓	✓
Tx cycle: Voice message (on option board)	-	✓	✓	✓	✓	-	-	-
Permanent Rx	✓	✓	✓	✓	✓	✓	✓	✓
Programmable emergency squelch	✓	✓	✓	✓	✓	✓	✓	✓
Emergency Revert Channel	✓	✓	✓	✓	✓	✓	✓	✓
Emergency Microphone gain	✓	✓	✓	✓	✓	✓	✓	✓
Emergency Microphone Source	✓	✓	✓	✓	✓	✓	✓	✓
On/Off in emergency	✓	✓	✓	✓	✓	✓	✓	✓
secret emergency	✓	✓	✓	✓	✓	✓	✓	✓
Lone Worker	✓	✓	✓	✓	✓	-	-	-
Incoming Emergency	✓	✓	✓	✓	✓	-	-	-
emergency decode	✓	✓	✓	✓	✓	-	-	-
status	✓	✓	✓	✓	✓	-	-	-

Table 2-3 Comparison of Motorola Radios (Continued)

	CM300 Commercial Mobile Series		GM300 Professional Mobile Series			GM950 Mobile Series		
Feature description	**CM340**	**CM360**	**GM340**	**GM360**	**GM380**	**GM950 N2**	**GM950 N3**	**GM950 N4**
Conventional Signalling: DTMF (encode only)								
DTMF sequence digits	24	24	24	24	24	-	-	16
Pre-programmed seq	✓	✓	✓	✓	✓	-	-	-
Telephone interconnect calls	✓	✓	✓	✓	✓	-	-	✓
Live dial (via keypad)	-	**	-	**	✓	-	-	✓
Option Boards capable	✓	✓	✓	✓	✓	-	-	-
Voice Storage	-	opt	opt	opt	✓	-	-	-
record incoming message (manual)	-	opt	opt	opt	✓	-	-	-
voice recorder	-	opt	opt	opt	✓	-	-	-
emergency message	-	opt	-	opt	✓	-	-	-
Others								
Backlight	-	✓	-	✓	✓	-	✓	✓
Backlight variable intensity	-	✓	-	✓	✓	-	-	-
Keypad lock	-	**	-	**	✓	-	-	✓
Multilingual menus and prompts	-	✓	-	✓	✓	-	-	-

** Requires Keypad Microphone
Opt. Option Board required
✓ Feature available
- Feature Not Available