M7X Transceiver and M7R Receiver
User Documentation

Health and Safety

Warnings

A warning is used to indicate possible danger to personnel. Throughout Park Air handbooks, warnings are indicated by the following symbols:

WARNING   **Indicates electrical danger to personnel.**

WARNING   **Indicates a hazardous material.**

WARNING   **Indicates a non-ionizing radiation hazard.**

WARNING   **Indicates a specified danger to personnel.**

Cautions

A caution is used to indicate possible danger to the equipment.

Caution   **Indicates the presence of electrostatic sensitive devices (ESSD).**

Caution   **Indicates a specified danger to the equipment.**

Approvals and Regulations

The following approvals and regulations apply to the M7X Transceiver and M7R Receiver:

Federal Communications Commission (FCC) Regulations

This transceiver complies with Part 15 and Part 87 of the FCC rules. Operation is subject to the condition that the transceiver does not cause harmful interference.

You are required to obtain a station license before transmitting from your transceiver.

This equipment is licensed only for operation in the VHF aeronautical frequency band between 118 and 136.975 MHz using amplitude modulation (AM) and 25 kHz channel spacing.

The transceiver's power output should not exceed the output necessary for satisfactory technical operation, taking account of local conditions and the area to be covered.

The transceiver's frequency and parameters should be checked by authorized service personnel before use and yearly (or more frequently) thereafter.

List of Abbreviations

The following list gives the standard abbreviations used in Park Air user documentation.

A	ampere		LRU	line replaceable unit
ac	alternating current		M	mega
AGC	automatic gain control		m	metre
ALC	automatic level control		mA	milliamp
AM	amplitude modulation		MARC	multi-access remote control
ATC	air traffic control		Mbits/s	megabits per second
BER	bit error rate		MHz	megahertz
BIT	built-in test		mm	millimetre
bps	bits per second		ms	millisecond
C	celsius		MSK	minimum shift keying
CAS	channel associated signalling		mW	milliwatt
CCE	control centre equipment		NB	narrow-band
CD	compact disk		n/c	normally closed
CSMA	carrier sense multiple access		n/o	normally open
dB	decibel		PA	power amplifier
dc	direct current		PC	personal computer
DSB	double sideband		PCB	printed circuit board
D8PSK	differentially encoded 8-phase shift keying		pk-pk	peak-to-peak
E1-RIC	E1-radio interconnect		ppm	parts per million
ESD	electrostatic sensitive device		PSU	power supply unit
E-BIT	external bit signal		PTT	press to transmit
Fig	figure		RCMS	remote control and monitoring system
FM	frequency modulation		RF	radio frequency
FP	frequency preset		RF PA	radio frequency power amplifier
g	gramme		RSSI	radio signal strength indication
HPA	high power amplifier		TDMA	time division multiple access
Hz	hertz		TS	time slot
IF	intermediate frequency		UHF	ultra high frequency
k	kilo		V	volt
kbits/s	kilobits per second		VA	volt-ampere
kg	kilogramme		VCCS	voice control and communication switch
kHz	kilohertz			
LCD	liquid crystal display		VFP	virtual front panel
LED	light emitting diode		VHF	very high frequency

VOGAD	voice-operated gain adjusting device
W	watt
WB	wideband
WP	waveform profile

Contents

Contents (continued)

Contents (continued)

Contents (continued)

Overview

Introduction

The Park Air M7 range of software driven multimode radios provide transmission and reception between 100 MHz and 399.975 MHz in a number of normal and secure modes. Fig 1-1 shows an M7 radio.

Fig 1-1   M7 Radio

M7 radios are designed for civil, maritime and military applications (see Fig 1-2) and are available in co-site or split-site configurations. Functionality is determined by the combination of installed hardware, and software defined waveforms. A variety of analogue and digital interfaces are provided allowing the radio to operate with a wide range of command and control systems.
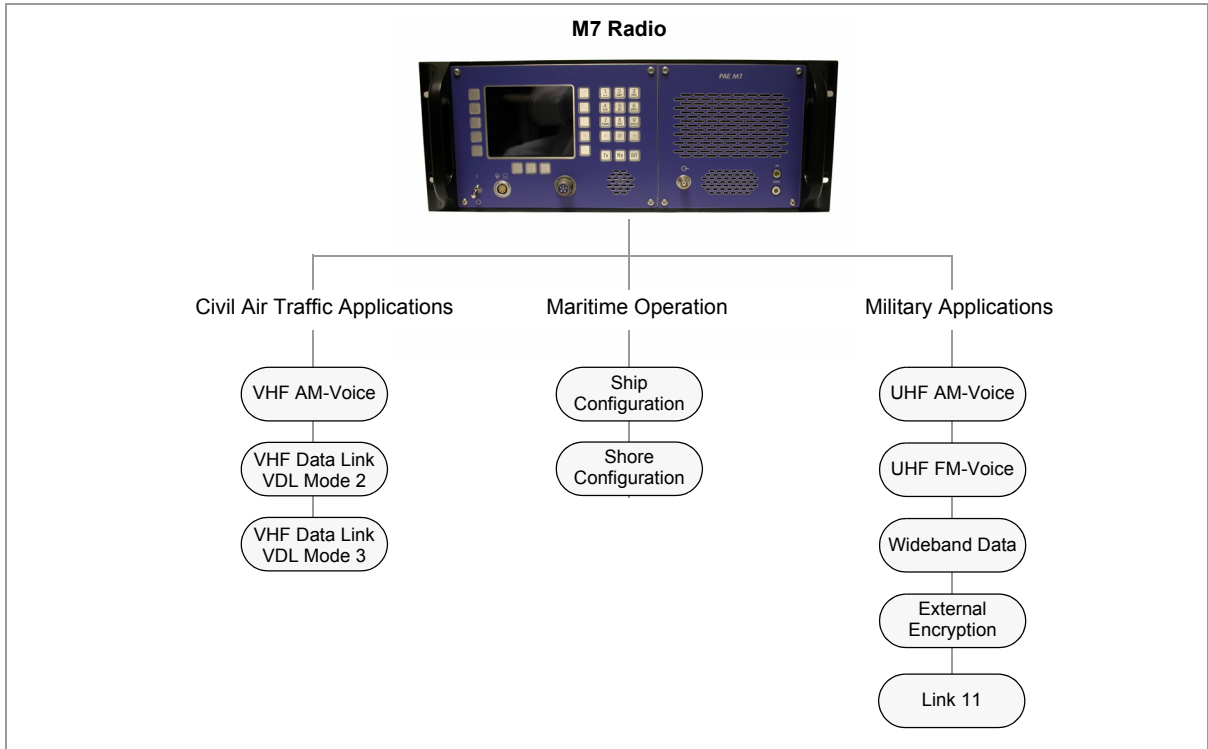
Fig 1-2   Operating Waveforms

Models and Part Numbers

Table 1-1 shows the M7 models covered in this user documentation and lists the order part numbers.

Table 1-1 Models and Part Numbers

Model Number	Description	Order Part Number	Notes
M7X	M7 transceiver	BM7X	The transceiver can be configured as a transceiver, transmitter, or as a receiver.
M7R	M7 receiver	BM7R	

Options

The following options are available:

- ❑ Guard receiver
- ❑ Custom interface module
- ❑ Radio supplied without control head.

What's In the Box

The following items are supplied with each radio:

(1) CD containing the user documentation in interactive Adobe Acrobat format.

(2) CD containing the Park Air radio software as installed during manufacture.

(3) Customer kit, part number 70-M7VUCUST, containing ac and dc power connectors, supply fuses and leads. A full listing of the customer kit is given in the Installation topic.

Accessories

The following accessories are available to purchase:

(1) Support pack, part number 70-M7000SAT. The support pack contains:

- ❑ USB to Lemo lead (for connecting the radio to a PC)
- ❑ CD containing Park Air Data Loader Application (DLA) software.

Radio Operation

The radio can be operated in the following ways:

- ❑ Locally using the front panel controls and indicators
- ❑ Locally using an extended control head
- ❑ Remotely using an M7 series controller
- ❑ Remotely using compatible control equipment.

Local Operation

Local operation of the M7 is effected from a front panel mounted Control Head (Fig 1-3).

The control head contains a high visibility electroluminescent display, tactile soft keys and a numeric keypad. A complete operator audio interface incorporating loudspeaker, headset and microphone facilities is included, along with a USB device interface.
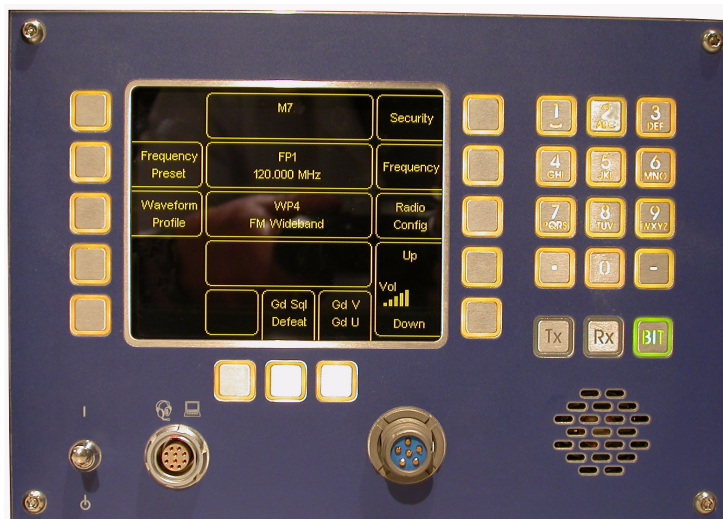
Fig 1-3   M7 Control Head

Local Operation Using an Extended Control Head

The control head is self-contained and connects to the radio via a single E1 link. If required, the control head can be removed from the radio's front panel and located up to 10 metres away (see Fig 1-4).
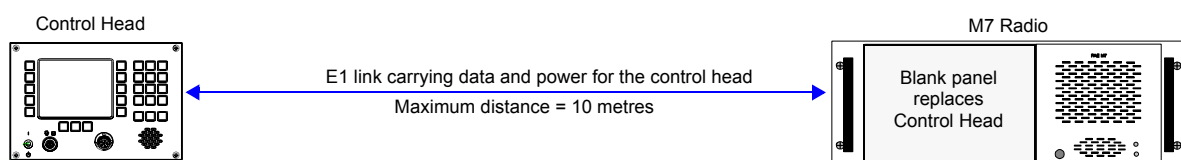
Fig 1-4   Extended Control Head

Remote Operation Using an M7 Controller

Available as a desktop or rack mount unit, the Park Air M7 Controller integrates directly with the M7 radio via an E1 link as shown in Fig 1-5. The controller has the same Control Head as the radio to provide identical operator activity.

For reduced cost or additional security, the radio can operate without a Control Head being fitted. In this configuration the control head is replaced by a blank panel and the radio is operated from a remote location using one or more M7 Controllers.

M7 Controller   E1 link   M7 Radio
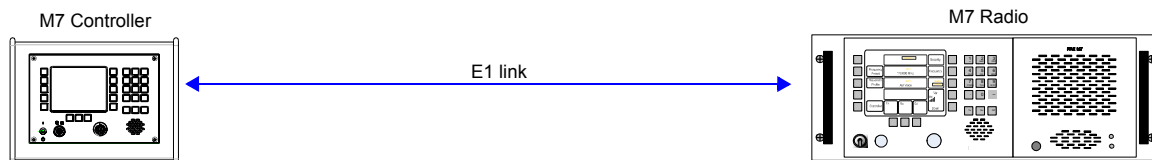
Fig 1-5   Remote Operation Using an M7 Controller

Fig 1-5 shows a simple configuration where one controller is used to remotely operate one radio. More complex configurations where multiple controllers operate multiple radios are described in the M7 Controller documentation.

Remote Operation Using Compatible Control Equipment

The radio is operated remotely by connecting compatible control equipment to the rear panel interfaces. All interfaces are detailed in the Installation topic.

Waveform Profiles and Frequency Presets

M7 radios introduce the concept of *Waveform Profiles* and *Frequency Presets* to provide a simple method of configuring the radio for various operational scenarios.

Waveform Profiles contain all the settings, except operating frequency, for a particular waveform. At least one profile is assigned to each modulation waveform. Multiple profiles, each having different settings can be assigned as required. Up to twenty waveform profiles can be stored in a radio.

Frequency presets consist of a Waveform Profile plus an associated operating frequency. Up to 400 frequency presets can be stored in a radio.

Waveform profiles and frequency presets are fully described in the Operation topic.

Security Profiles

Security profiles control individual operator access to various levels of radio functionality. Each user is allocated one of three security profiles accessed by a 4-digit PIN. Access to specific functions, for example: recalling frequency presets, can be disabled for each profile.

Setting security profiles is detailed in the Operation topic.

Built-In Test

The M7 radio has a comprehensive Built-In Test (BIT) system that continuously monitors key parameters and reports status information. Should a fault be detected, the BIT screen indicates the faulty module or component.

The BIT system also detects external environmental conditions that could lead to degraded performance of the radio, such as high temperature and high VSWR.

The BIT system is described in the Maintenance topic.

Power Supply

All M7 radios operate from a 99 to 264 Vac mains supply, or a low voltage 24/28 Vdc supply. When both ac and dc input supplies are connected, the radio operates from the ac mains. Should the mains supply fail, the radio automatically switches to dc operation and then reverts back to ac operation when the mains supply is restored.

M7 Construction

All M7 radios utilize a common stainless steel chassis assembly that incorporates an ac/dc power supply and an interconnection system. The design incorporates provision for telescopic slide mounting in industrial standard 19 inch (483 mm) cabinets, and for free-standing applications.

Various radio modules are installed into the chassis as required by the chosen configuration. Modules are individually screened to provide maximum EMC immunity. Similar modules are interchangeable and do not require any alignment or manual adjustment on replacement except for an RF power trim or frequency trim.

Modules are individually configuration controlled and have electronic serial numbers for simplified logistics.

Specification

General Specification

Frequency Range	All models operate between 100 and 399.975 MHz (subject to waveform limitations).
Pre-Selectable Frequency Bands	Four pre-selectable frequency bands are available to limit the radio's user selectable frequencies.
Modulation Waveforms	All models are capable of multiple modulation waveforms. Different waveforms are available by including the appropriate software fills. Each radio can hold all the software fills simultaneously. Fig 2-1 details the waveforms available.

Table 2-1 M7X and M7R Waveforms

Waveform	Modulation	Emission Designator	Frequency Range	Channel Spacing
AM Voice	Double Sideband (DSB) Amplitiude Modulation (AM)	6K80A3EJN	100 to 399.975 MHz	25 kHz
		5K00A3EJN		8.33 kHz
		5K00A3EJN		12.5 kHz
FM Voice	Frequency Modulation (FM)	6K80F3EJN	100 to 399.975 MHz	25 kHz
		5K00F3EJN		12.5 kHz
AM Wideband	Double Sideband (DSB) Amplitiude Modulation (AM)	22K0A2DJN	100 to 399.975 MHz	25 kHz
FM Wideband	Frequency Modulation (FM)	22K0F2DJN	100 to 399.975 MHz	25 kHz
Maritime	Phase Modulation (PM)	6K80G3EJN	Channels 1 to 28, and 60 to 88	25 kHz
Link 11	Refer to STANAG 5511 and MIL-STD-188			
VDL Mode 2	Carrier Sense Multiple Access (CSMA)	14K0G1DE	118 to 136.975 MHz	25 kHz
VDL Mode 3	Time Division Multiple Access (TDMA) Differentially encoded 8-Phase Shift Keying (D8PSK)	14K0G7WET	118 to 136.975 MHz	25 kHz

Reference Frequency   Internal or external reference frequency sources can be selected. The factory default is internal.

    Internal   The internal reference frequency is generated by a 10 MHz oscillator having a frequency accuracy better than 0.15 ppm and an adjustment range to allow for 20 years ageing. An output is provided suitable for driving an external frequency counter.

    External   For all waveforms, an external 10 MHz reference frequency can be used instead of the internal reference frequency.

Input Supplies

The M7X and M7R operate from either an ac mains or a dc input supply. When both supplies are connected, operation from the ac supply takes priority; automatic change-over to the dc supply occurs if the mains supply fails. On restoration of the ac supply, the equipment reverts to ac operation.

ac Supply   Any voltage between 99 and 264 Vac, single phase, 48 to 62 Hz. Power consumption figures are shown in Table 2-2.

dc Supply   Any voltage between 21.6 and 32 Vdc, negative earth. Power consumption figures are shown in Table 2-2.

Current Overload   Separate ac and dc fuses mounted on the rear panel provide protection from current overload.

Standby   Standby removes power to all the radio circuits, but does not disconnect the ac or dc input circuits from their relative supplies.

Table 2-2 M7X and M7R Power Consumption Figures

Model	Switched On		Standby		Switched Off		Switch On Inrush	
	ac	dc	ac	dc	ac	dc	ac	dc
M7X	Transmit: typically 550 VA. 825 VA maximum Receive: typically 200 VA.	Transmit: typically 450 W. 700 W maximum Receive: typically 120 W.	30 VA	100 mW	0 VA	<5 mW	60 A maximum	150 A maximum
M7R	Typically 100 VA. 220 VA maximum	Typically 70 W. 120 W maximum	30 VA	100 mW	0 VA	<5 mW	60 A maximum	150 A maximum

Dimensions and Weight

Dimensions
The radio fits into a 19 inch wide equipment cabinet occupying 4U of space. Dimensions are shown in Fig 2-1.

All dimensions in mm
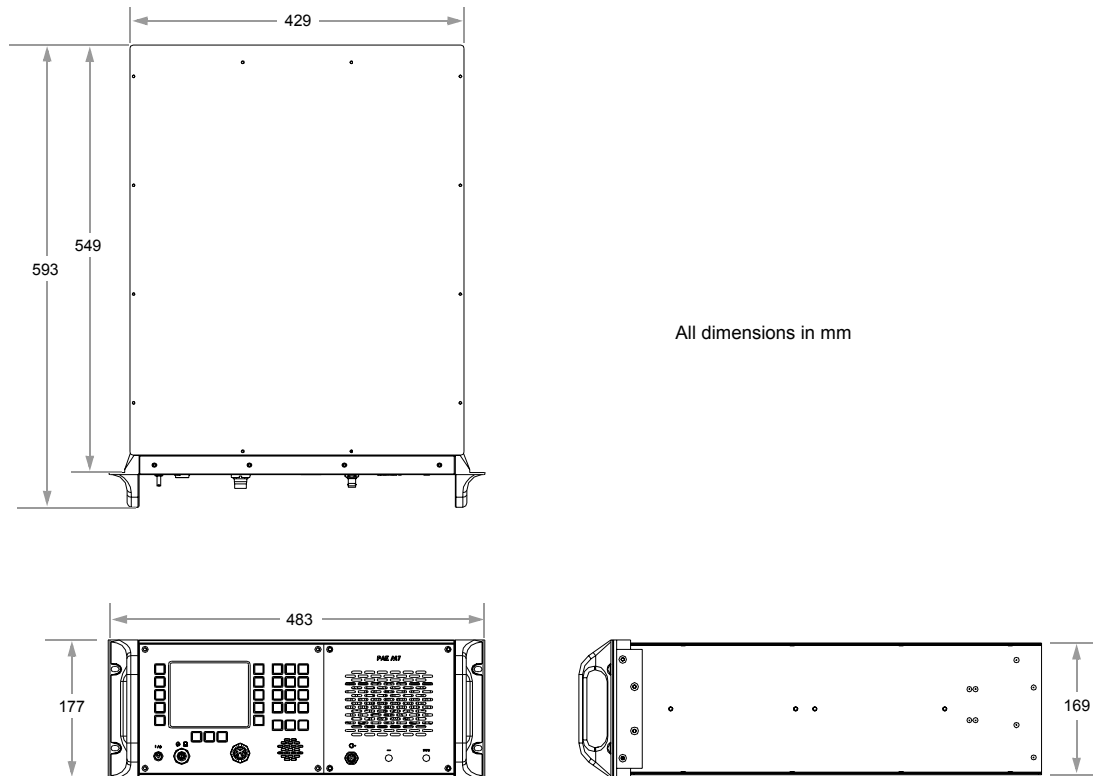
Fig 2-1 M7X and M7R Dimensions

Weight

M7X	25 kg (26 kg with guard receiver fitted).
M7R	23 kg (24 kg with guard receiver fitted).

Environmental

Ambient Temperature Range	All models operate with an ambient temperature between -20°C and +55°C.
Storage Temperature Range	All models can be stored at temperatures between -40°C and +70°C without damage.
Humidity Range	All models operate at relative humidities between 5 and 95% non-condensing.
Altitude	All models operate at altitudes up to 5000 m and can be transported at altitudes of up to 15000 m without damage.
Shock and Vibration	All models operate after a shock of 40 g from 45 Hz to 2 kHz. Compliant with EN 60068-2-27. All models operate during vibrations of 4 to 500 Hz. Compliant with EN 60068-2-6.
Ingress	All models operate in an environment defined in EN 60529 with a freestanding radio to IP20 and the front of the control head to IP34.
Ventilation	All radio models have two independent forced-air ventilation systems. The first consists of twin fans (for redundancy) mounted on the rear panel, drawing air in from behind the radio, blowing it unfiltered through a heat sink assembly isolated from the rest of the radio (cooling the power supply and RF PA) and exhausting it through the front panel. The second consists of a single fan mounted on the rear panel, drawing air in from behind the radio, blowing it unfiltered into the main chassis (cooling the remaining modules) and exhausting it through the front panel. Fans are easily disconnected and removed for replacement. All fans are speed monitored and controlled, dependent on cooling requirements and environmental conditions.
Warm-up Time	All models are fully operational within 20 seconds after switch on, but the radio frequency reference takes up to 10 minutes to meet the frequency accuracy specification.

Transmit Characteristics

RF power output	AM: Adjustable between 1 W and 50 W in 1 W steps
	FM, Link 11 and Maritime: Adjustable between 1 W and 100 W in 1 W steps
Power control	< ±1 dB with frequency < ±1 dB with temperature < ±1 dB with VSWR up to 2:1 < ±3 dB with VSWR up to 3:1. No damage is caused when operating into any load.
Duty cycle	Continuous.
Offset carrier	In AM voice, offset carrier operation with 2, 3, 4 or 5 offsets is available in accordance with ICAO annex 10
	Selectable frequencies are ±2.5 kHz, ±4 kHz, ±5 kHz, ±7.3 kHz, ±7.5 kHz and ±8k Hz.
Spectral mask	Adjacent channel power when not modulated: <-120 dBc/Hz for 25 kHz channels <-110 dBc/Hz for 8.33 and 12.5 kHz channels
	Broadband noise when not modulated: <-145 dBc/Hz at 300 kHz offset <-155 dBc/Hz at 1% frequency offset
Harmonic Outputs	<-36 dBm for carrier powers up to 50 W <-80 dBc for carrier powers greater than 50 W.
Spurious Outputs	<-46 dBm >500 kHz from carrier.

Modulation setting		
	AM waveforms:	85%
	FM voice:	±3.5 kHz
	FM wideband:	±6.25 kHz
	Link 11:	Frequency deviation of ±20 kHz (tolerance ±2 kHz).

Modulation noise		
	AM waveforms:	Residual noise -45 dB
	FM waveforms:	Residual noise -40dB.

Frequency response		
	AM/FM voice, 25 kHz:	+0.5 to -3 dB, 300 to 3400 Hz -20 dB at <100 Hz -30 dB at >5000 Hz
	AM voice, 8.33/12.5 kHz:	+0.5 to -3 dB, 350 to 2500Hz -10 dB at <100 Hz -25 dB at >3200 Hz
	AM/FM wideband (ref 5.5kHz):	+0.5 to -3 dB, 20 Hz to 20 kHz -12 dB at > 25 kHz.

Distortion	<5% thd in normal conditions
	<10% thd in extreme conditions (VSWR >2:1; temperature below 0°C or above 40°C).

ALC	The ALC has an operational range from a threshold level set at 10 dB below the average speech line level setting, to the maximum line input level of +10 dB average speech.
	Within the ALC range, the modulation remains at 85% (±5%)
	The attack time is <20 ms and the decay time is > 2 s (both measured with a 10 dB step to 15 dB into ALC).
Transmit timeout	Adjustable between 5 seconds and 10 minutes or can be set to Off. [Note that Off is when 0 seconds is selected.]

Receive Characteristics

Sensitivity	All figures are (S+N)/N unless otherwise specified and include ITU-T weighting.	
	Noise figure	14 dB
	AM voice (30%)	≥10 dB at -101 dBm
	FM voice	≥10 dB at -104 dBm
	AM/FM Wideband	≥10 dB at -95 dBm
	Link 11	≥10 dB at -95 dBm.
Selectivity	AM/FM voice (25 kHz):	<6 dB at ±12 kHz >80 dB at ±25 kHz
	AM voice (8.33/12.5 kHz):	<6 dB at ±3.5 kHz >70 dB at ±17 kHz
	AM/FM wideband:	>6 dB at ±25 kHz >70 dB at ±75 kHz.
Dynamic range	3rd order intercept point	+19 dBm
	Intermodulation suppression	≥80 dB for interferers 100 kHz and 200 kHz from F_o
	Blocking & cross-modulation	≥80 dB at >200 kHz ≥100 dB at > 4 MHz.
Antenna radiation	<-90 dBm.	
Maximum input	+36 dBm for 20 seconds +27 dBm continuous.	
Frequency response	AM/FM voice, 25 kHz:	+1 to -3 dB, 300 to 3400 Hz -20 dB at <100 Hz -30 dB at >5000 Hz
	AM voice, 8.33/12.5 kHz:	+1 to -3 dB, 350 to 2500Hz -10 dB at <100 Hz -25 dB at >3200 Hz
	AM/FM wideband (ref 5.5kHz):	+1 to -3 dB, 20 Hz to 20 kHz -12 dB at > 25 kHz.
Distortion	AM/FM voice: AM/FM wideband:	<5% thd <10% thd.

RF AGC	<3 dB change in output from reference sensitivity to +10 dBm At least 10 dB SINAD with input up to +17 dBm.
Audio AGC	<1 dB change in output for 30% to 90% change in modulation depth.
Squelch	Carrier operated squelch (with noise compensation and carrier override). Threshold adjustable from -110 dBm to -60 dBm in 1 dB steps. Carrier override 10 dB above threshold setting Attack time <20 ms Carrier override and noise compensation can be turned off.

Optional Guard Receiver

The optional Guard Receiver module simultaneously monitors both the VHF 121.500 MHz and UHF 243.000 MHz emergency frequencies. The module's audio output can be combined with the main receiver output or routed independently.

To determine whether reception is from the main receiver or guard receiver when listening on the narrow-band audio lines, the following audio indication is added:

❑ For VHF guard reception, a single pip is heard every second during reception

❑ For UHF guard reception, a double pip is heard every second during reception.

The audio pip feature is configurable to be on or off.

Antenna	The Guard receiver antenna input can be combined with the main receiver or routed to an independent antenna. When combined with the main receiver, the sensitivity of both main and guard receivers reduces by 3.5 dB.
Sensitivity	≥10 dB at -107 dBm for 30% modulation.

Interfaces

Front Panel

Microphone/Headset/ Loudspeaker Connector	A 10-way Lemo socket that provides the following functions:

- ❑ Active (powered) or passive microphone
- ❑ Headset connection. Receiver and sidetone levels independently adjustable. 0 to 3 V from 33 ohm source
- ❑ Local loudspeaker
- ❑ USB port for software installation and maintenance using the Data Loader Application (DLA).

Ref	BNC socket for monitoring the internal reference frequency accuracy.
AC	LED indicating presence of ac power.
DC	LED indicating presence of dc power.

Rear Panel Facilities

The following facilities are available at the rear panel connectors. Each connector is fully described in the Installation topic.

Antenna	Three configurable N-type antenna ports enable TX, RX or TX/RX combinations. Guard can be independent or combined with main RX
Audio	2 off 4-wire E&M narrow-band 600 ohm balanced interfaces adjustable from -20 to +10 dBm in 1 dB steps
	2 off 4-wire E&M wideband 600 ohm balanced interfaces adjustable from -10 to +10 dBm in 1 dB steps
	1 off 2-wire 600 ohm balanced TX/RX Tape recorder output, fixed level of -13 dBm.
PTT	Multiple PTT inputs accommodating contact closure, phantom connection and keying from both positive and negative voltage are available on the Narrow-band (A) connector.
E1	Balanced 120 ohm, 2.048 Mbps E1 (G703, G704, G711) digital interface. Provides remote availability of all radio functions via M7C controller or suitable VCCS.
Ethernet	Balanced 100 ohm, 10/100Mbps for connection to 10/100Base-T Ethernet network. Provides remote access for RCMS radio control & monitoring.
Serial 1 and 2	Multi-purpose RS422/485 serial ports for connection to peripherals (for example, auto-tune r.f. filters) and general purpose control equipment. Can be configured with HDLC protocol stack for the connection of a VDL-Mode 2 control computer.
T1	Balanced 100 ohm, 1.544Mbps T1 interface for connection of a VDL Mode 3 control computer and split-site VDL Mode 2 interconnection.
Reference	BNC socket used for connecting an external 10 MHz reference frequency (400 mV rms ± 200 mV).

Intentionally Blank

Operation

Introduction

This topic details the operation of the M7 radio. Operation is divided into sub-sections as follows:

❑ Switching on. See page 3-3

❑ Control head key functions. See page 3-4 and Fig 3-2 on page 3-3

❑ Tuning the radio. Procedures start on page 3-7

> Tuning the radio involves an understanding of Waveform Profiles and Frequency Presets. These functions are explained on page 3-8 and page 3-9 respectively

> A Security facility may be applied to the radio. If applied, a user must log in using a 4-digit PIN number supplied by your administrator before the radio can be tuned. Logging in is detailed on page 3-10

❑ Configuring the radio. Procedures start on page 3-22

> Configuration must be completed during initial installation after all required interfaces have been connected. Editing the radio's configuration settings may be required from time to time.

Switching On

⚠️ Do not attempt to operate the radio until the installation and radio configuration has been completed.

(1)   At the rear of the radio, identify the ac and dc supply switches (Fig 3-1).

(2)   If an ac supply is connected to the radio, set the ac supply switch to the On position. Similarly, if a dc supply is connected, set the dc supply switch to the On position.

dc Supply
On/Off Switch

Supply Switch Settings
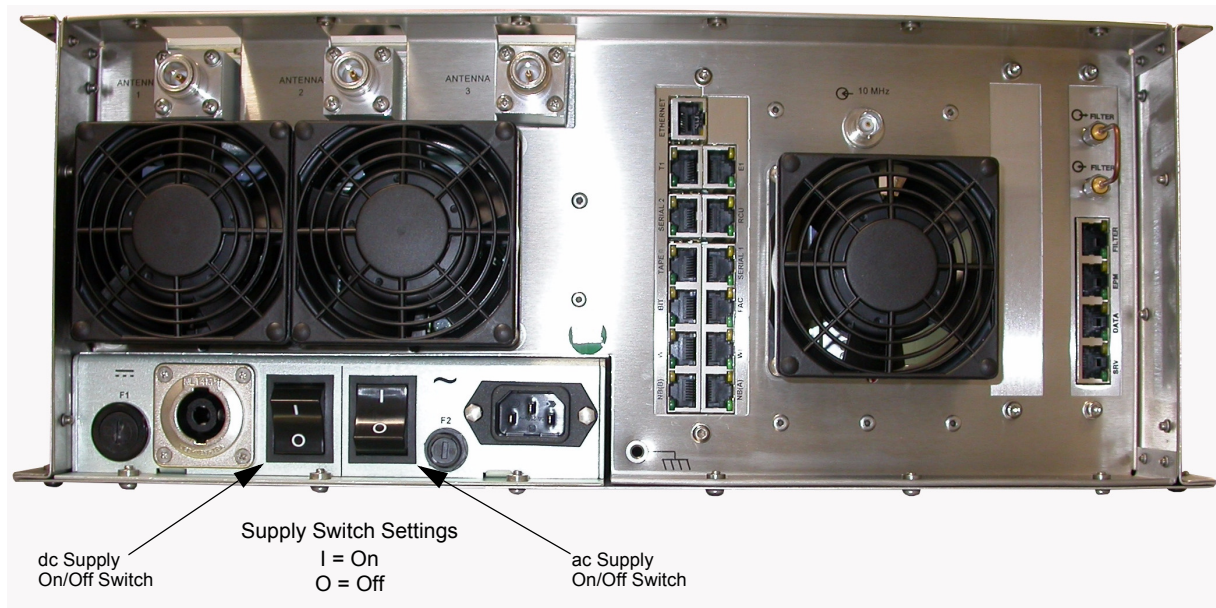I = On
O = Off

ac Supply
On/Off Switch

Fig 3-1 M7 Radio Rear Panel Supply Switch Location

(3)   At the Control Head, Set the On/Off switch to On. Check that the Control Head display lights up.

Control Head
On/Off Switch
(pull out and lever)

Fig 3-2 Control Head

Control Head Key Functions

The control head is normally fitted to the radio's front panel, but can be removed and fitted in any convenient location up to 10 metres from the radio.

Fig 3-2 on page 3-3 shows the control head that is fitted with a high visibility electroluminescent display, tactile soft keys and a numeric keypad. A complete operator audio interface incorporating loudspeaker, headset and microphone facilities is included.

> ⚠️ Hearing loss can result when listening to audio at excessively high levels, or for prolonged periods of time. Always set the volume control to a safe (low) level before using headphones.

Key operation is shown in Fig 3-3, Fig 3-4 and Fig 3-5. Note that Key 1 to Key 13 are soft keys (that is, the function changes depending on the action being performed) that allow selection of the displayed function.

The display turns off if no key has been pressed for 10 minutes. Any key press This facility is enabled or disabled within the Radio Config settings (see page 22).
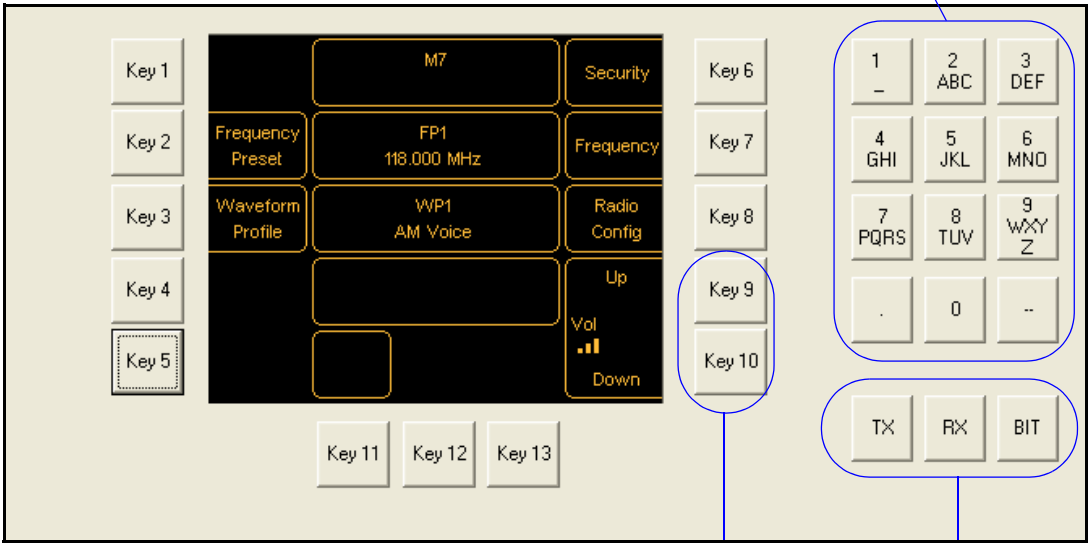
> ⚠️ The legends Key 1 to Key 13 shown on the illustrations throughout this documentation are not engraved on the keys. The legends are used in the documentation in order to make identification easier.

A 12 button keypad used for numeric or alphanumeric entries. Most buttons are multi-function with each press cycling through the characters. For example button 2 cycles through: a b c A B C 2.

When a different button is pressed, the last character selected is accepted and the new button is treated as the next character.

If two sequential characters from the same button are required, the Arrow keys (Key 7 and Key 8) must be used. The Arrow keys are shown in Fig 3-4 on page 3-6.

Key 1 to Key 13
These are soft keys that allow selection of the displayed function.

⚠ The legends Key 1 to Key 13 shown in this illustration, and throughout this documentation, are not engraved on the keys. The legends are used in this documentation in order to simplify identification.

When the display shows the Home screen (as shown in this figure) Key 9 and Key 10 are used as a volume control for the internal loudspeaker and headphones.

TX — Keys the transmitter using modulation from the Microphone connector. Key lights (Blue) when the transmitter is keyed.

RX — Toggles Squelch Defeat between On and Off. Key lights (Blue) when squelch is defeated or a signal is received.

BIT — Provides a visual BIT alarm:

- ❑ Green = no fault
- ❑ Red = internal fault
- ❑ Flashing red = external warning
- ❑ Flashing green = an external warning that has been acknowledged by the operator.

When pressed, displays the BIT screen.

Fig 3-3 Control Head Key Functions

Key 7 and Key 8 move the data entry cursor left and right respectively. The Arrow key function is displayed only when a data entry is required.
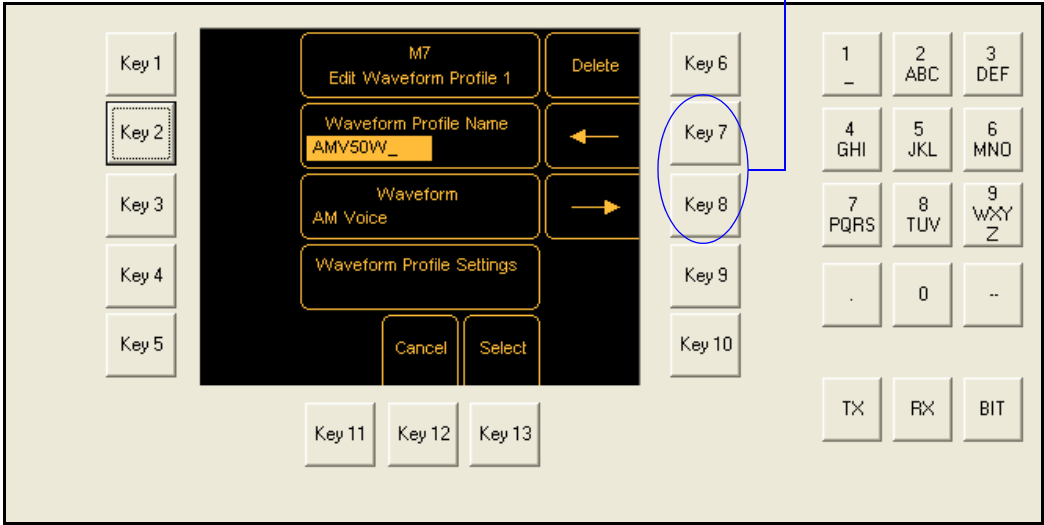
When entering data using the keypad, each button cycles through the associated characters. For example button 2 cycles through: a b c A B C 2. When a different button is pressed, the last character selected is accepted and the new button is treated as the next character.
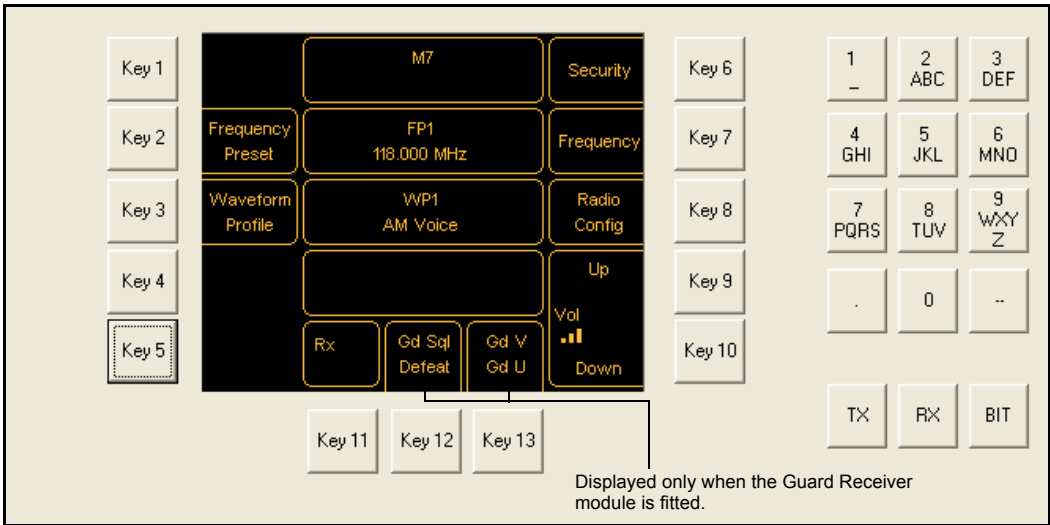
If two sequential characters from the same button are required, the Arrow keys (Key 7 and Key 8) must be used to position the cursor in the required position.

Fig 3-4 Edit Screen

Key 11. Rx is displayed when a signal, strong enough to lift the squelch, is received.

Rx (d) is displayed when the receiver's squelch is defeated (the RX button toggles Squelch Defeat on and off).

Tx is displayed when the transmitter is keyed.

Key 12. Press to defeat guard squelch. Press again to enable squelch operation.

Key 13. Press to cycle through VHF guard frequency, UHF guard frequency, and normal operation. This facility allows the radio to be operated (transmit and receive) on either guard frequency or the currently selected frequency/channel.

Fig 3-5 Indications for Transmit, Receive and Guard Operation

Tuning the Radio

Tuning the radio makes it ready to operate using the required waveform, the required settings for the selected waveform, and at the required frequency. There are three methods of tuning the radio:

(1) **Tuning using the current waveform profile.** This involves selecting a new operating frequency while retaining the current operating waveform and radio settings. See page 3-12.

(2) **Tuning by recalling a stored waveform profile**. This involves recalling one of the 20 available waveform profiles and then entering the required operating frequency. Waveform profiles are detailed on page 3-8. Tuning by recalling a stored waveform profile is described on page 3-14.

(3) **Tuning by recalling a stored frequency preset**. This involves recalling one of the 400 available frequency presets that have been stored in the radio. A stored frequency preset contains a Waveform Profile and an operating frequency (or channel if in Maritime mode). Frequency presets are detailed on page 3-9. Tuning by recalling a stored frequency preset is described on page 3-17.

⚠️

Federal Communications Commission (FCC) Regulations

This transceiver complies with Part 15 and Part 87 of the FCC rules. Operation is subject to the condition that the transceiver does not cause harmful interference.

You are required to obtain a station license before transmitting from your transceiver.

This equipment is licensed only for operation in the VHF aeronautical frequency band between 118 and 136.975 MHz using amplitude modulation (AM) and 25 kHz channel spacing.

The transceiver's power output should not exceed the output necessary for satisfactory technical operation, taking account of local conditions and the area to be covered.

The transceiver's frequency and parameters should be checked by authorized service personnel before use and yearly (or more frequently) thereafter.

Waveform Profiles

A waveform profile is a set of instructions stored in the radio that define a mode of operation and certain parameters associated with the mode. Up to 20 waveform profiles can be created and stored in the radio. When a waveform profile is recalled, the user is prompted to enter an operating frequency (or a channel number if in Maritime mode).

Fig 3-6 and Fig 3-7 show example waveform profiles. The default waveform profile designations are WP1 to WP20. When created and stored in the radio, the designation can be changed to any name containing up to eight characters. The waveform profile WP6 illustrated in Fig 3-6 could be renamed, for example, AMV30W (signifying AM voice with a 30 watt output).
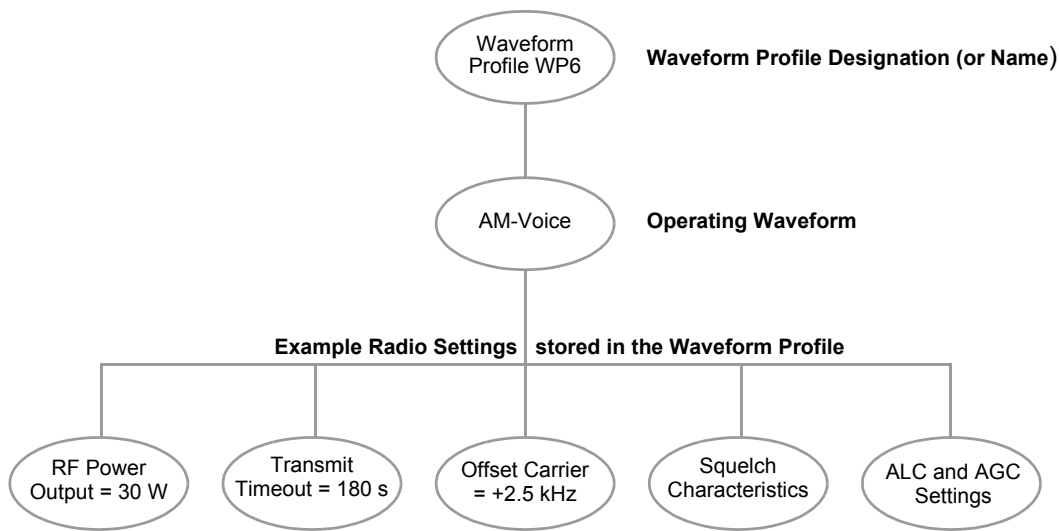
Fig 3-6 Example AM-Voice Waveform Profile

Table 3-5 on page 3-35 shows all radio parameters that are stored with a waveform profile. Creating waveform profiles is detailed in Creating and Storing a Waveform Profile on page 3-32.
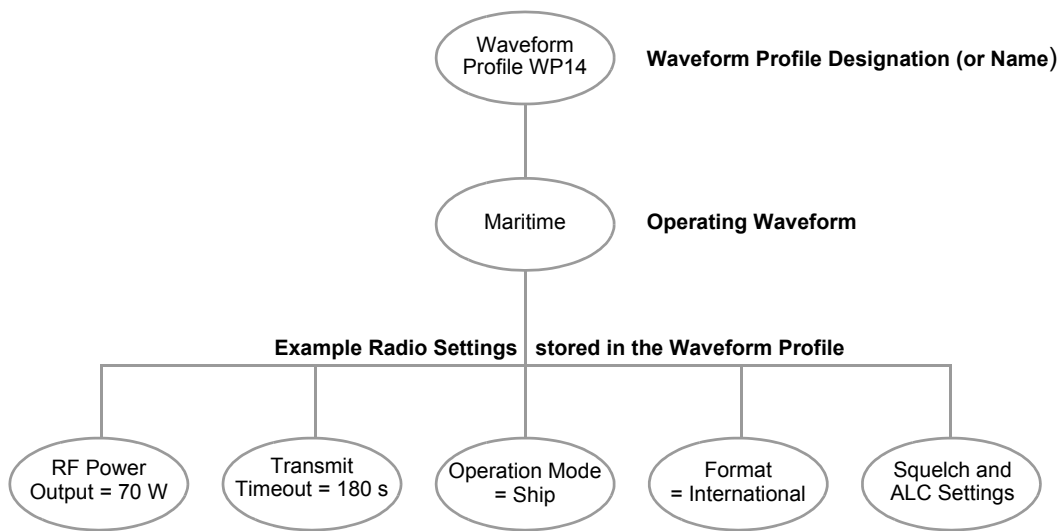
Fig 3-7 Example Maritime Waveform Profile

Frequency Presets

A frequency preset is a set of instructions stored in the radio that define an operating frequency and an associated waveform profile. Up to 400 frequency presets can be created and stored in the radio.

Fig 3-8 shows an example frequency preset.

The default frequency preset designations are FP1 to FP400. When created and stored in the radio, the designation can be changed to any name containing up to eight alphanumeric characters. The frequency preset FP27 illustrated in Fig 3-8 could be renamed, for example, Approach.
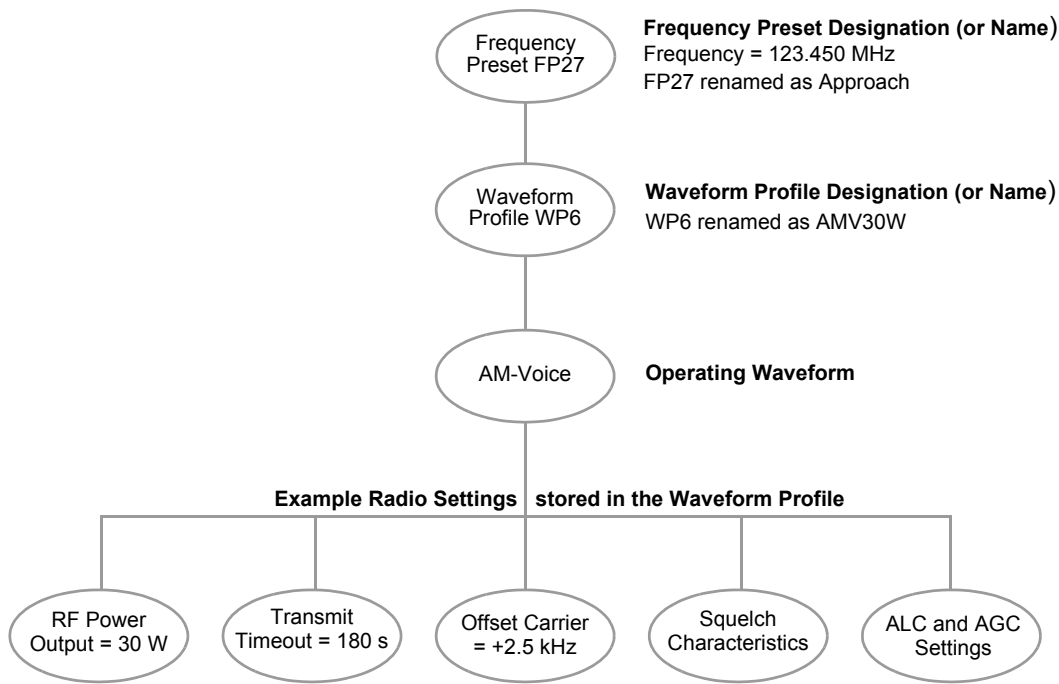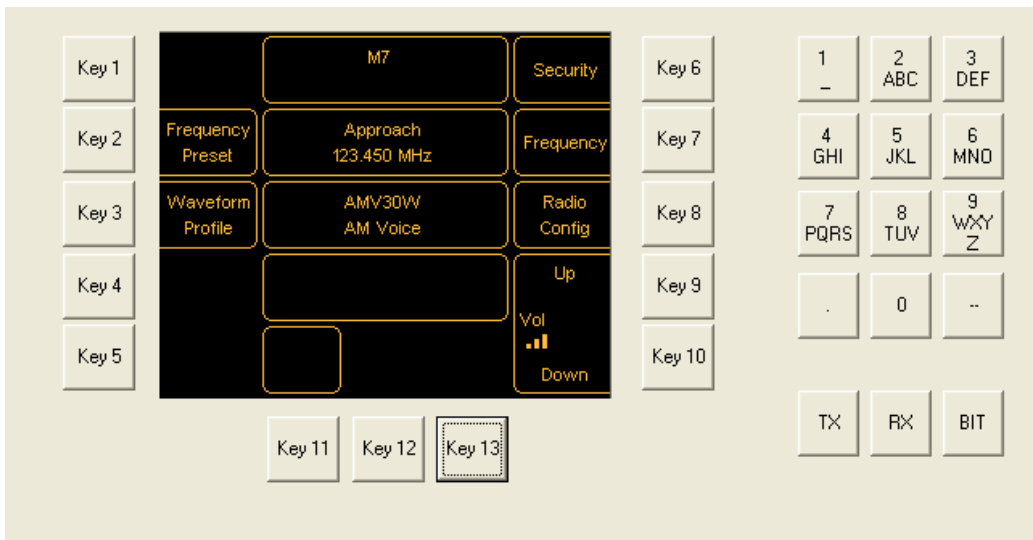

Fig 3-8 Example Frequency Preset

Fig 3-9 Display Showing the Example Frequency Preset and Waveform Profile

---

Log In if Security is Applied

M7 radios have a security feature that restricts non-authorized personnel from retuning and reconfiguring the radio's settings. Security is explained on page 3-40.

Fig 3-10 and Fig 3-11 show the Home screen with and without security applied. Note that in Fig 3-11, the Security label (Key 6) shows Security Log In; additionally the Frequency Preset, Waveform Profile, Frequency and Radio Config labels have dotted surrounds. If security is applied you must have knowledge of a 4-digit PIN before you can proceed to make changes to the radio. Refer to your Administrator.
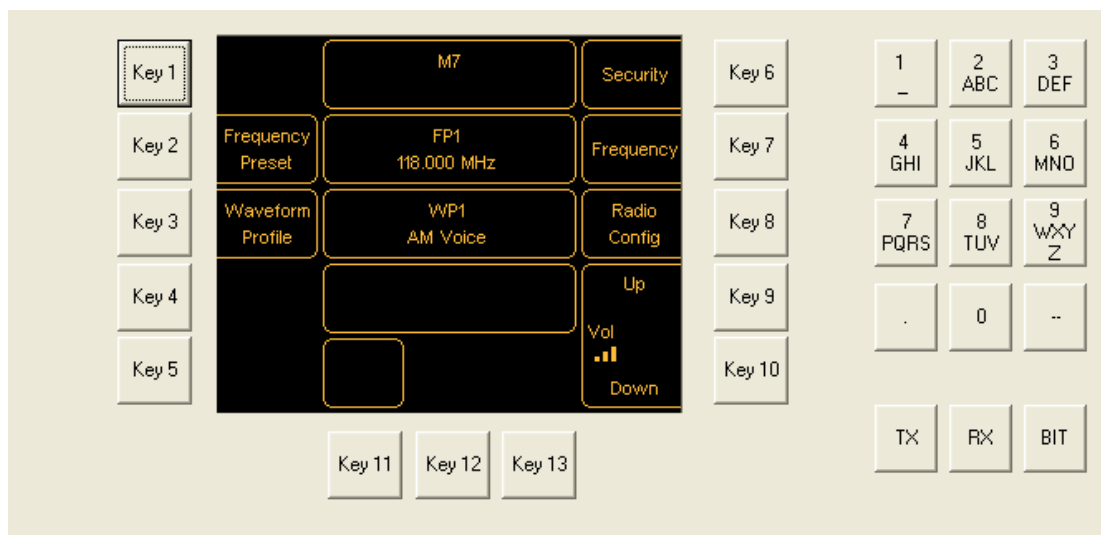
Fig 3-10 Home Screen – No Security Applied
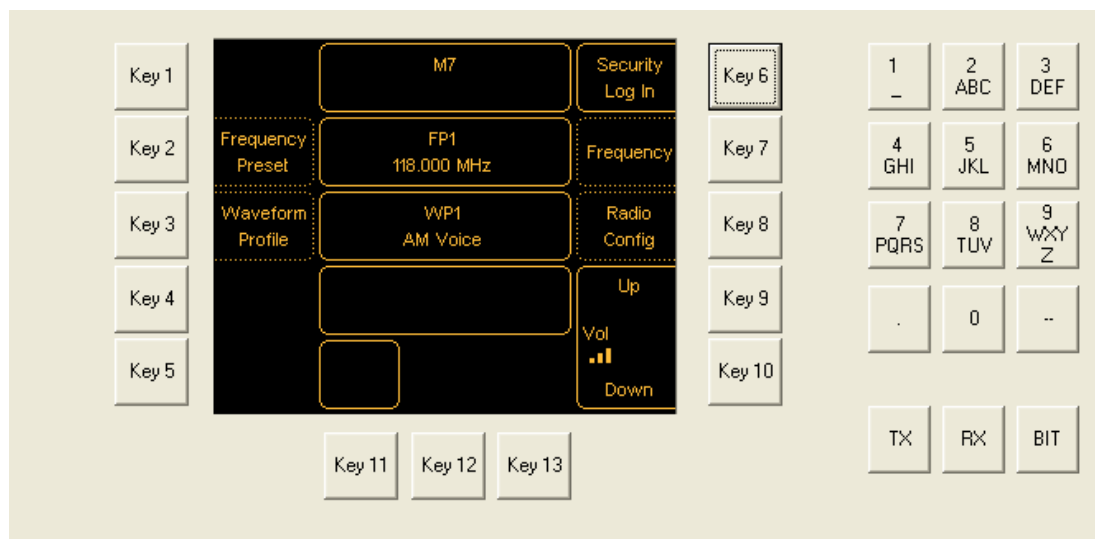
Fig 3-11 Home Screen – With Security Applied

To log in:

(1)   Press *Key 6 – Security Log In*.

(2)   Ensure that the Enter PIN Number Screen (Fig 3-12) is displayed.

(3)   Using the keypad, key in the 4-digit PIN; then press *Key 13 – Enter*. If an incorrect PIN is entered, you are returned to the Home screen as shown in Fig 3-11.
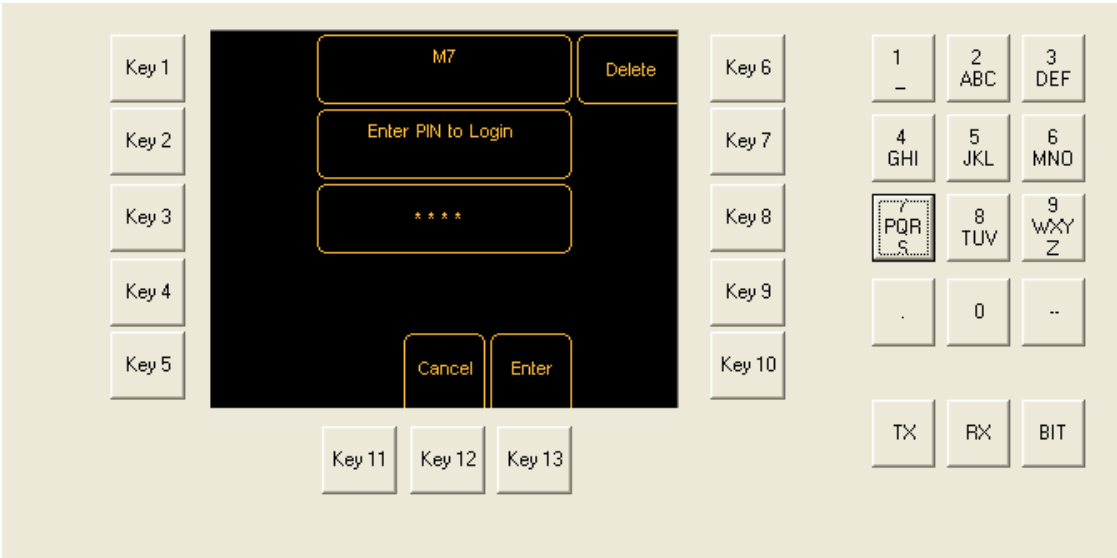
Fig 3-12 Enter PIN Number Screen

(4) When the correct PIN is entered, you are returned to the Home screen. The screen indicates your security profile as shown in Fig 3-13 and the actions you may perform. In the example shown in Fig 3-13, you may recall a frequency preset, but cannot edit the frequency, waveform profile, or radio configuration (they are 'greyed out').
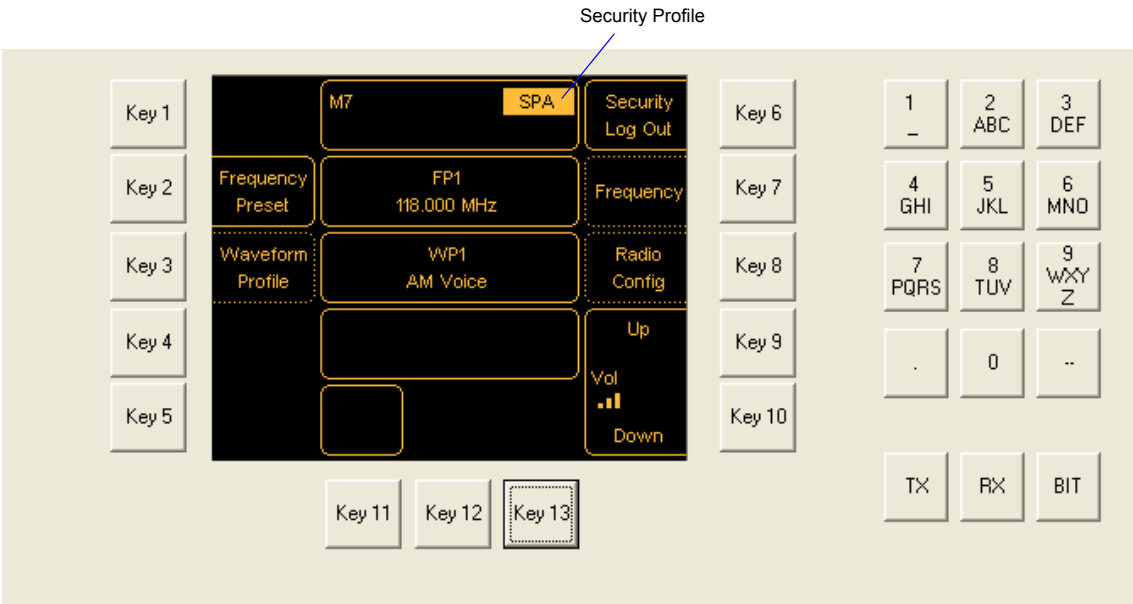
Fig 3-13 Home Screen Showing Permitted Actions

Tuning Using the Current Waveform Profile

⚠ Use this procedure only when sure that the current waveform profile, including the radio parameters associated with the profile, is appropriate for the new operating frequency.

(1) At the Home screen (Fig 3-14) press *Key 7* to display either the Enter Frequency screen (Fig 3-15) or if in Maritime mode, the Enter Channel screen (Fig 3-16).
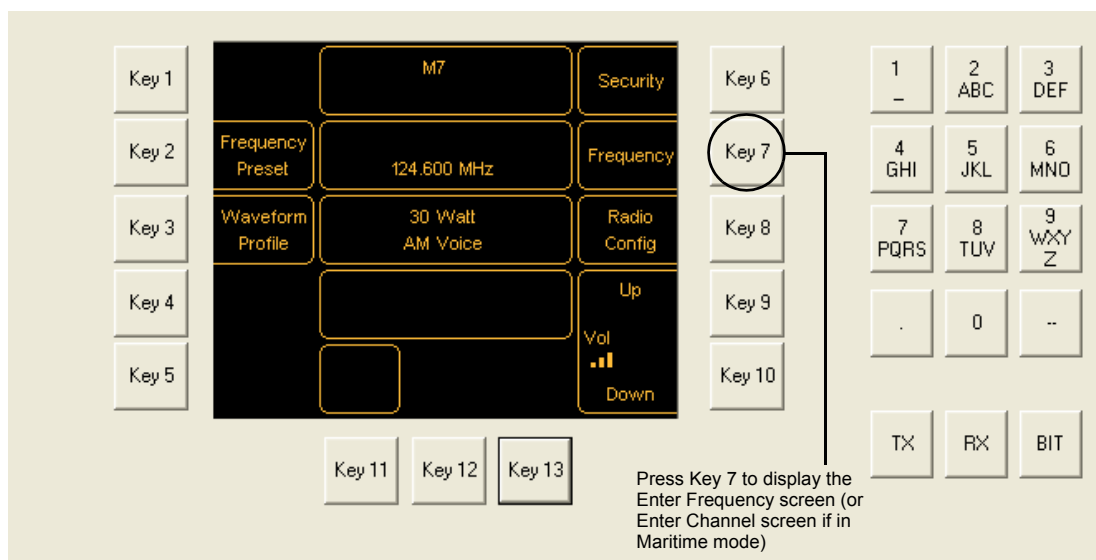
Fig 3-14 Select Frequency from Home Screen

(2) See the Notes on page 3-13. At the Enter Frequency screen (Fig 3-15) enter the required frequency using the alphanumeric keys, or if Maritime mode is selected enter the required channel at the Enter Channel screen (Fig 3-16).

Fig 3-15 Enter Frequency Screen

Fig 3-16 Enter Channel Screen (Maritime Mode Only)

Notes:

❑ If using an offset carrier system, enter the channel frequency, not the actual frequency. The offset information is stored in the Waveform Profile

❑ If using 8.33 kHz channel spacing, see the notes on page 3-19 and enter the appropriate *Displayed Frequency*, not the actual frequency

❑ If using 12.5 kHz channel spacing, see the notes on page 3-20 and enter the appropriate *Displayed Frequency*, not the actual frequency
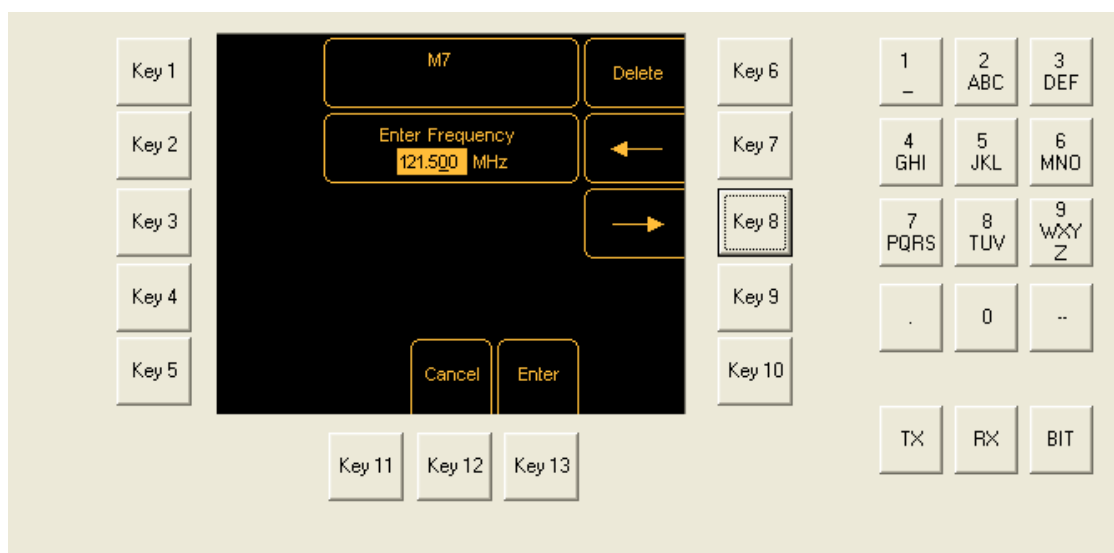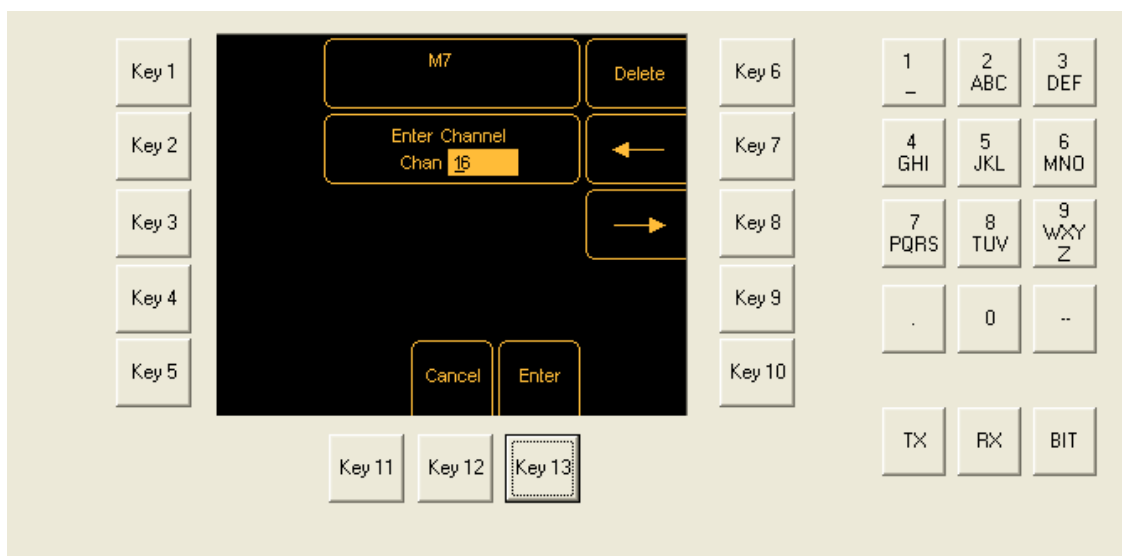
❑ Maritime channels are shown on page 3-21.

(3) When the required frequency or channel number has been keyed in, press *Key 13* to enter the information. If a valid frequency (or channel in Maritime mode) has been entered, the Home screen is displayed showing the new Waveform Profile and/or operating frequency. The radio is now ready for use.

(4) If an invalid frequency (or channel in Maritime mode) was entered during this procedure, the radio remains tuned to the previous settings; neither the Waveform Profile, or frequency are altered. An invalid frequency may be due to:

❑ Entering a frequency outside the range of the radio

❑ Entering a frequency outside of the Selectable Frequency Bands (see page 3-29)

❑ Entering an 8.33 kHz channel frequency outside the permitted frequency band

❑ Entering an 8.33 kHz channel frequency in the wrong format (see page 3-19)

❑ Entering a 12.5 kHz channel frequency outside the permitted frequency band

❑ Entering a 12.5 kHz channel frequency in the wrong format (see page 3-20)

❑ Entering an invalid channel number for Maritime mode

❑ Entering an 8.33 kHz or 12.5 kHz channel frequency in a waveform that does not support these channel spacings.

Tuning by Recalling a Stored Waveform Profile

Waveform profiles are explained on page 3-8. To recall any one of the 20 available profiles:

(1)   From the Home screen (Fig 3-17) press *Key 3* to display the list of Waveform Profiles.

Press Key 3 to display the
Waveform Profile list
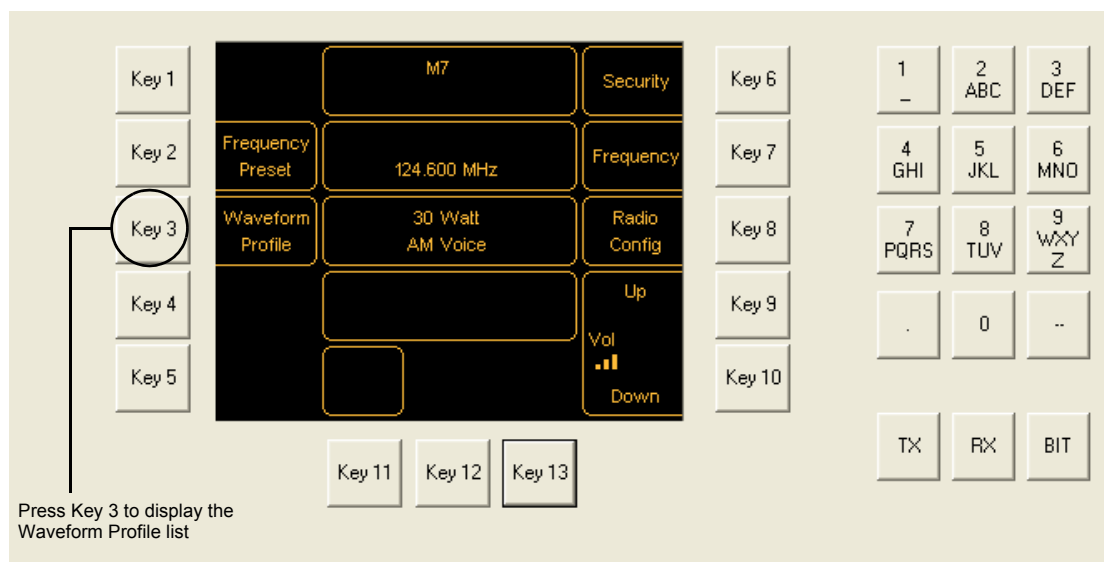
Fig 3-17 Select Waveform Profiles from the Home Screen

(2)   The Waveform Profiles list screen (Fig 3-18) makes the 20 stored profiles available for selection by scrolling through the list using *Key 9* and *Key 10*. An additional feature makes the first six Waveform Profiles (WP1 to WP6) available for immediate recall by pressing *Key 1, 2*, or *3* (for WP1, 2 or 3 respectively) or *Key 6, 7*, or *8* (for WP4, 5 or 6 respectively). If the immediate recall facility is required, press the appropriate key.

(3)   If a Waveform Profile that is not available on the immediate recall keys is required, press *Key 9* or *Key 10* to scroll through the list of 20 profiles. When the required Waveform Profile is highlighted, press *Key 13* to select the profile.

Press Key 9 (Up) or Key 10 (Down)
to scroll through the twenty Waveform Profiles
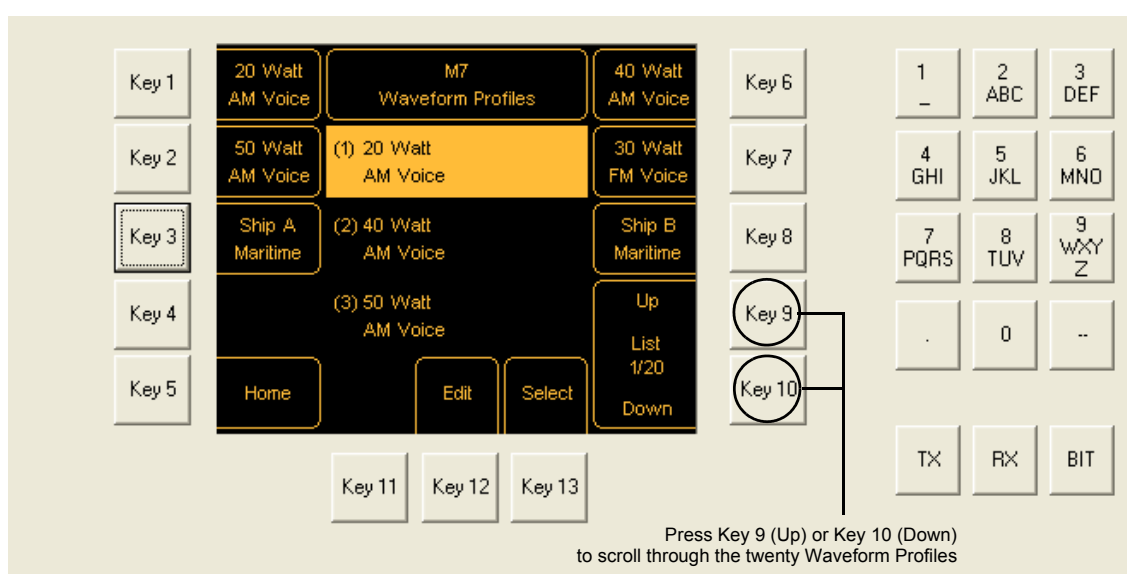
Fig 3-18 Example Waveform Profile List Screen

(4) If a profile applicable to Maritime mode is selected the Enter Channel screen (Fig 3-20) is displayed; for all other modes the Enter Frequency screen (Fig 3-19) is displayed. See the Notes below and then, at the Enter Frequency screen (Fig 3-19) enter the required frequency using the alphanumeric keys, or if Maritime mode is selected enter the required channel at the Enter Channel screen (Fig 3-20).

(5) When the required frequency or channel number has been keyed in, press *Key 13* to enter the information. If a valid frequency (or channel in Maritime mode) has been entered, the Home screen is displayed showing the new Waveform Profile and/or operating frequency. The radio is now ready for use.

Notes:

❑ If using an offset carrier system, enter the channel frequency, not the actual frequency. The offset information is stored in the Waveform Profile

❑ If using 8.33 kHz channel spacing, see the notes on page 3-19 and enter the appropriate *Displayed Frequency*, not the actual frequency

❑ If using 12.5 kHz channel spacing, see the notes on page 3-20 and enter the appropriate *Displayed Frequency*, not the actual frequency

❑ Maritime channels are shown on page 3-21.
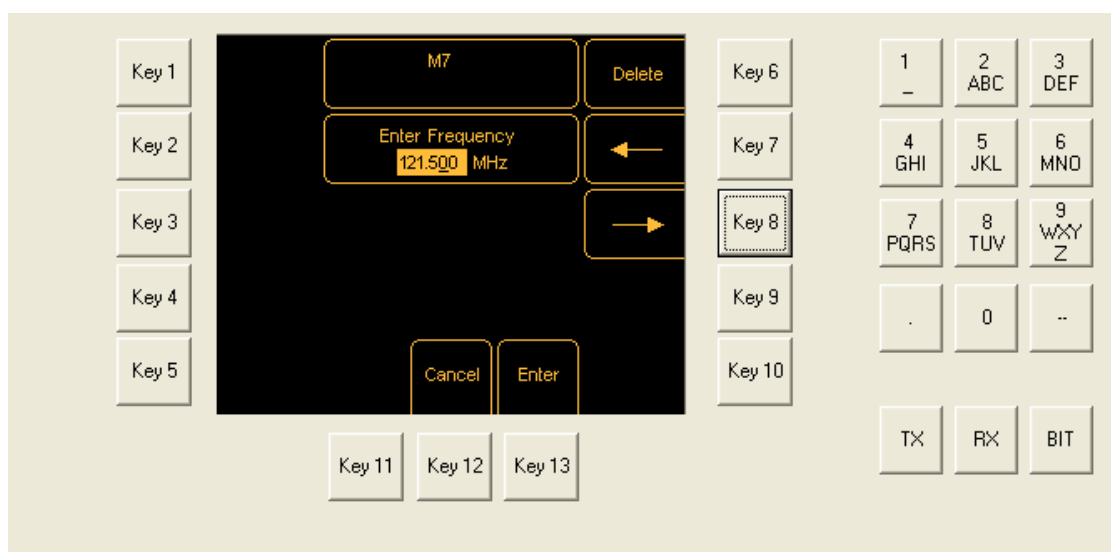
Fig 3-19 Enter Frequency Screen
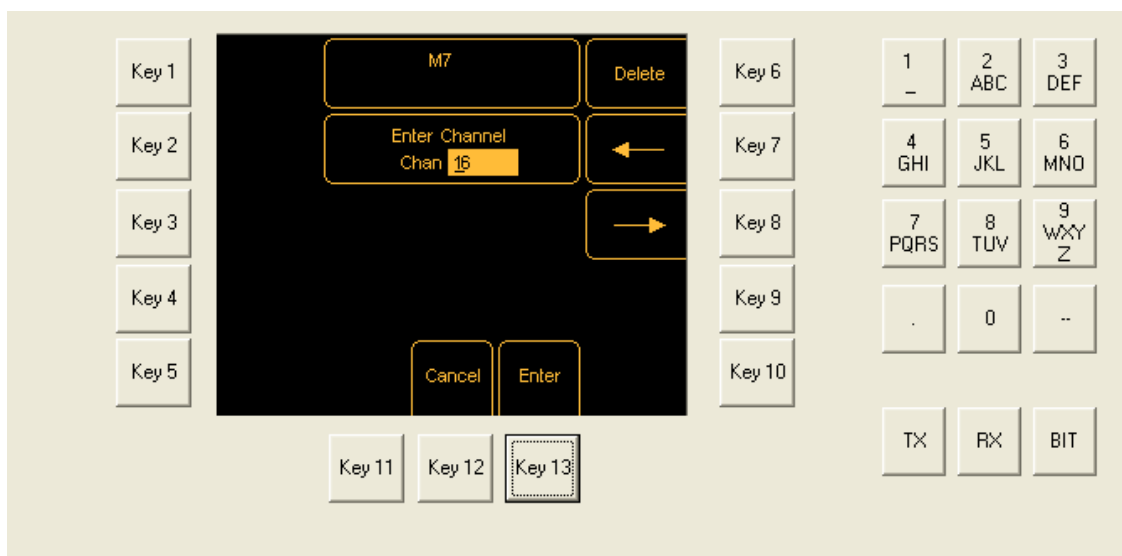
Fig 3-20 Enter Channel Screen (Maritime Mode Only)

(6)   If an invalid frequency (or channel in Maritime mode) was entered during this procedure, the radio remains tuned to the previous settings; neither the Waveform Profile, or frequency are altered. An invalid frequency may be due to:

- ❑ Entering a frequency outside the range of the radio

- ❑ Entering a frequency outside of the Selectable Frequency Bands (see page 3-29)

- ❑ Entering an 8.33 kHz channel frequency outside the permitted frequency band

- ❑ Entering an 8.33 kHz channel frequency in the wrong format (see page 3-19)

- ❑ Entering an 12.5 kHz channel frequency outside the permitted frequency band

- ❑ Entering an 12.5 kHz channel frequency in the wrong format (see page 3-20)

- ❑ Entering an invalid channel number for Maritime mode

- ❑ Entering an 8.33 kHz or 12.5 kHz channel frequency in a waveform that does not support these channel spacings.

Tuning by Recalling a Stored Frequency Preset

Frequency presets are explained on page 3-9. To recall any one of the 400 available presets:

(1)   From the Home screen (Fig 3-21) press *Key 2* to display the list of Frequency Presets.
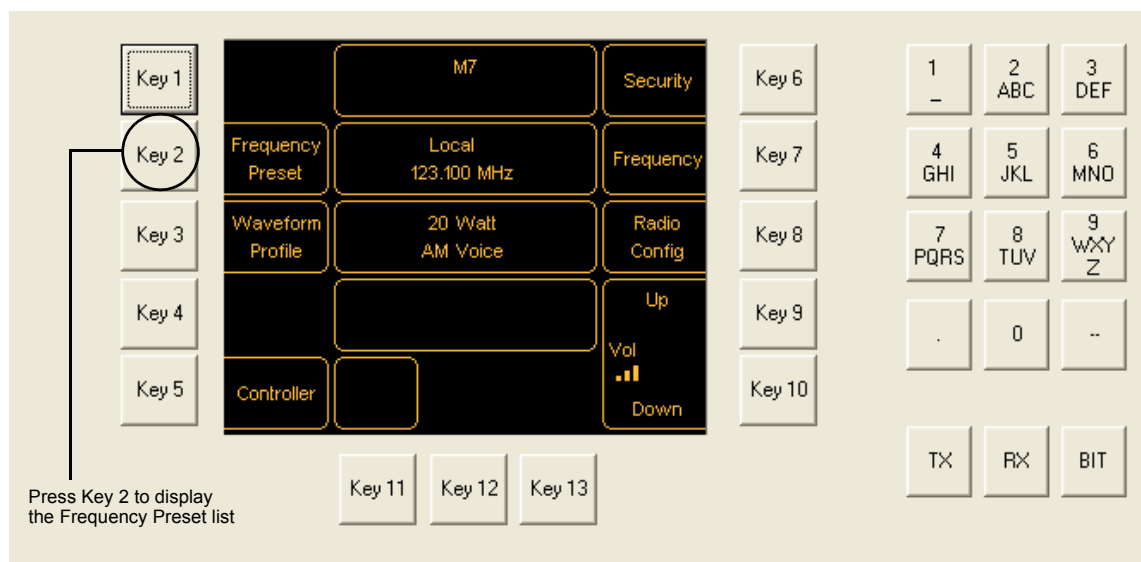
Fig 3-21 Select Frequency Presets from the Home Screen

(2)   The Frequency Presets list screen (Fig 3-22) makes the 400 stored presets available for selection by scrolling through the list using *Key 9* and *Key 10*. An additional feature makes the first six Frequency Presets (FP1 to FP6) available for immediate recall by pressing *Key 1, 2,* or *3* (for FP1, 2 or 3 respectively) or *Key 6, 7,* or *8* (for FP4, 5 or 6 respectively). If the immediate recall facility is required, press the appropriate key.

(3)   If a Frequency Preset that is not available on the immediate recall keys is required, press *Key 9* or *Key 10* to scroll through the list of 400 presets. When the required Frequency Preset is highlighted, press *Key 13* to select the preset. [Note that keeping *Key 9* or *Key 10* pressed results in faster scrolling.]
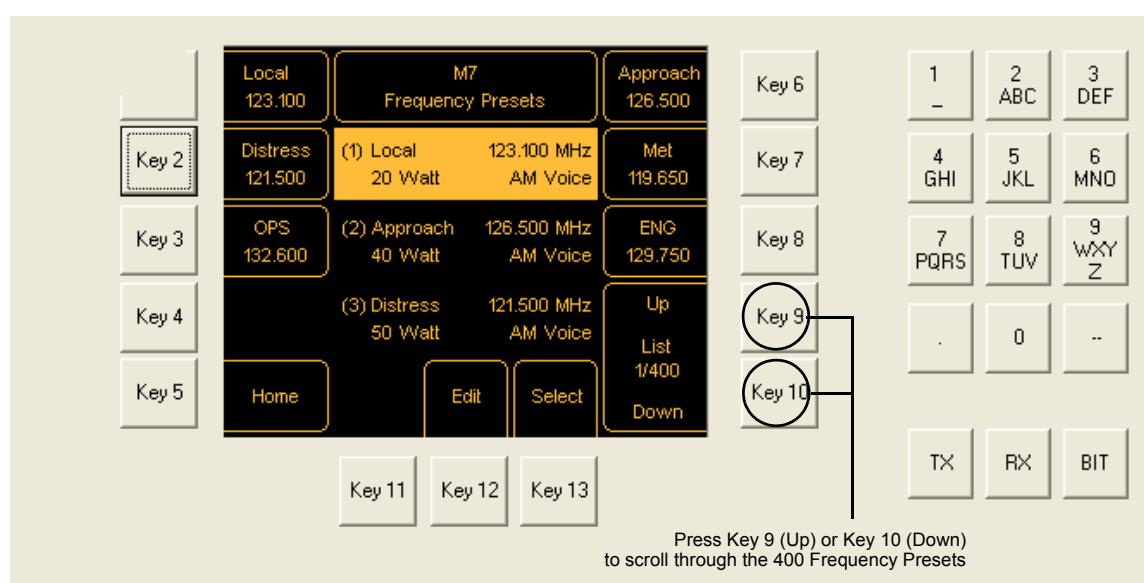
Fig 3-22 Example List of Frequency Presets

(4)   The radio is now ready to operate on the selected frequency and waveform profile as shown on the Home screen (Fig 3-23). In this example, the radio now operates in AM-Voice on the International VHF Distress frequency 121.500 MHz; the power output (M7X only) is 50 watt.

Fig 3-23 Home Screen Showing New Frequency and Waveform Profile

Front Panel Display for 25 kHz and 8.33 kHz Channel Spacing

When setting the operating frequency of the radio and 8.33 kHz channel spacing is required, the frequency that must be entered differs from the actual channel f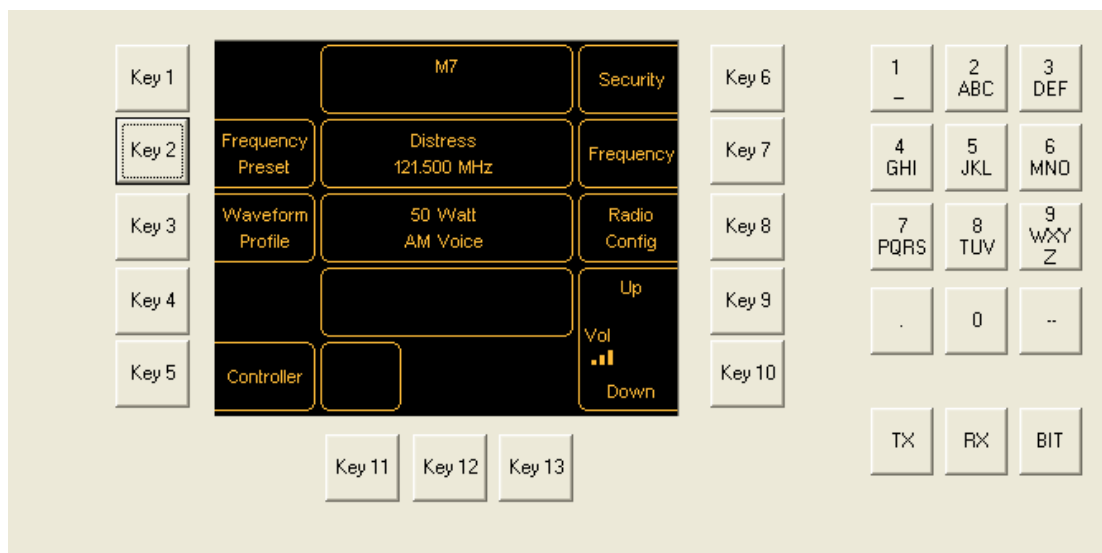requency. Table 3-1 shows the pattern used for 25 kHz and 8.33 kHz spaced channel frequencies from 118.000 MHz to 118.141 MHz. The pattern is the same for any frequency. The display conforms to ICAO convention for 8.33 kHz operation.

Table 3-1 25 kHz and 8.33 kHz Channel Spacing Displays

Actual Frequency (to 4 decimal places)	Channel Spacing	Frequency to be Entered at Radio's Front Panel
118.0000 MHz	**25 kHz**	**118.000 MHz**
118.0000 MHz	8.33 kHz	118.005 MHz
118.0083 MHz	8.33 kHz	118.010 MHz
118.0166 MHz	8.33 kHz	118.015 MHz
118.0250 MHz	**25 kHz**	**118.025 MHz**
118.0250 MHz	8.33 kHz	118.030 MHz
118.0333 MHz	8.33 kHz	118.035 MHz
118.0416 MHz	8.33 kHz	118.040 MHz
118.0500 MHz	**25 kHz**	**118.050 MHz**
118.0500 MHz	8.33 kHz	118.055 MHz
118.0583 MHz	8.33 kHz	118.060 MHz
118.0666 MHz	8.33 kHz	118.065 MHz
118.0750 MHz	**25 kHz**	**118.075 MHz**
118.0750 MHz	8.33 kHz	118.080 MHz
118.0833 MHz	8.33 kHz	118.085 MHz
118.0916 MHz	8.33 kHz	118.090 MHz
118.1000 MHz	**25 kHz**	**118.100 MHz**
118.1000 MHz	8.33 kHz	118.105 MHz
118.1083 MHz	8.33 kHz	118.110 MHz
118.1166 MHz	8.33 kHz	118.115 MHz
118.1250 MHz	**25 kHz**	**118.125 MHz**
118.1250 MHz	8.33 kHz	118.130 MHz
118.1333 MHz	8.33 kHz	118.135 MHz
118.1416 MHz	8.33 kHz	118.140 MHz

Front Panel Display for 25 kHz and 12.5 kHz Channel Spacing

When setting the operating frequency of the radio for 12.5 kHz channel spacing, the frequency that must be entered differs from the actual channel frequency. Table 3-2 shows the pattern used for 25 kHz and 12.5 kHz spaced channel frequencies from 225.0000 MHz to 225.1125 MHz. The pattern is the same for any frequency.

Table 3-2 25 kHz and 12.5 kHz Channel Spacing Displays

Actual Frequency (to 4 Decimal Places)	Channel Spacing	Frequency to be Entered at Radio's Front Pane
225.0000 MHz	**25 kHz**	**225.000 MHz**
225.0000 MHz	12.5 kHz	225.002 MHz
225.0125 MHz	12.5 kHz	225.012 MHz
225.0250 MHz	**25 kHz**	**225.025 MHz**
225.0250 MHz	12.5 kHz	225.027 MHz
225.0375 MHz	12.5 kHz	225.037 MHz
225.0500 MHz	**25 kHz**	**225.050 MHz**
225.0500 MHz	12.5 kHz	225.052 MHz
225.0625 MHz	12.5 kHz	225.062 MHz
225.0750 MHz	**25 kHz**	**225.075 MHz**
225.0750 MHz	12.5 kHz	225.077 MHz
225.0875 MHz	12.5 kHz	225.087 MHz
225.1000 MHz	**25 kHz**	**225.100 MHz**
225.1000 MHz	12.5 kHz	225.102 MHz
225.1125 MHz	12.5 kHz	225.112 MHz

Maritime Channels

The channels listed below show Maritime channels/frequencies. The shaded channels denote that in American format, the Ship Tx Frequency is used for both Ship and Shore working: that is, simplex working.

Channels 75 and 76 are guard channels for channel 16. Channel 70 is used as an emergency channel for semi/automatic operation.

Channel Number	Ship Tx Frequency (MHz)	Shore Tx Frequency (MHz)	Channel Number	Ship Tx Frequency (MHz)	Shore Tx Frequency (MHz)
			60	156.025	160.625
01	156.050	160.650	61	156.075	160.675
02	156.100	160.700	62	156.125	160.725
03	156.150	160.750	63	156.175	160.775
04	156.200	160.800	64	156.225	160.825
05	156.250	160.850	65	156.275	160.875
06	156.300	160.900	66	156.325	160.925
07	156.350	160.950	67	156.375	156.375
08	156.400	156.400	68	156.425	156.425
09	156.450	156.450	69	156.475	156.475
10	156.500	156.500	70	156.525	156.525
11	156.550	156.550	71	156.625	156.575
12	156.600	156.600	72	156.675	156.625
13	156.650	156.650	73	156.725	156.675
14	156.700	156.700	74	156.700	156.725
15	156.750	156.750	75	156.7625	156.7875
16	156.800	156.480	76	156.8125	156.8375
17	156.850	156.850	77	156.875	156.825
18	156.900	161.500	78	156.925	161.525
19	156.950	161.550	79	156.975	161.575
20	157.000	161.600	80	157.025	161.625
21	157.050	161.650	81	157.075	161.675
22	157.100	161.700	82	157.125	161.725
23	157.150	161.750	83	157.175	161.775
24	157.200	161.800	84	157.225	161.825
25	157.250	161.850	85	157.275	161.875
26	157.300	161.900	86	157.325	161.925
27	157.350	161.950	87	157.375	161.975
28	157.400	162.000	88	157.425	162.025

Configuring the Radio

After all procedures given in the Installation topic have been completed, the radio settings should be configured. This involves scrolling through the settings listed in Table 3-3 and setting the required values.

> ⚠️ Some configuration settings **must** be correctly set to match the physical installation; for example, the polarities of the PTT signals and whether a transceiver has been configured as a transceiver, transmitter or receiver. For this reason it is recommended that the security facility be applied before the radio is put into operational use. Restricting an operator from changing configuration settings will avoid inadvertent editing.

After the configuration has been completed, Waveform Profiles and Frequency Presets should be created and stored.

The procedure to create and store a Waveform Profile is given on ; the procedure to create and store a Frequency Preset is given on .

Finally and if required, security should be applied. This is detailed on .

Radio Configuration Procedure

To configure the radio settings:

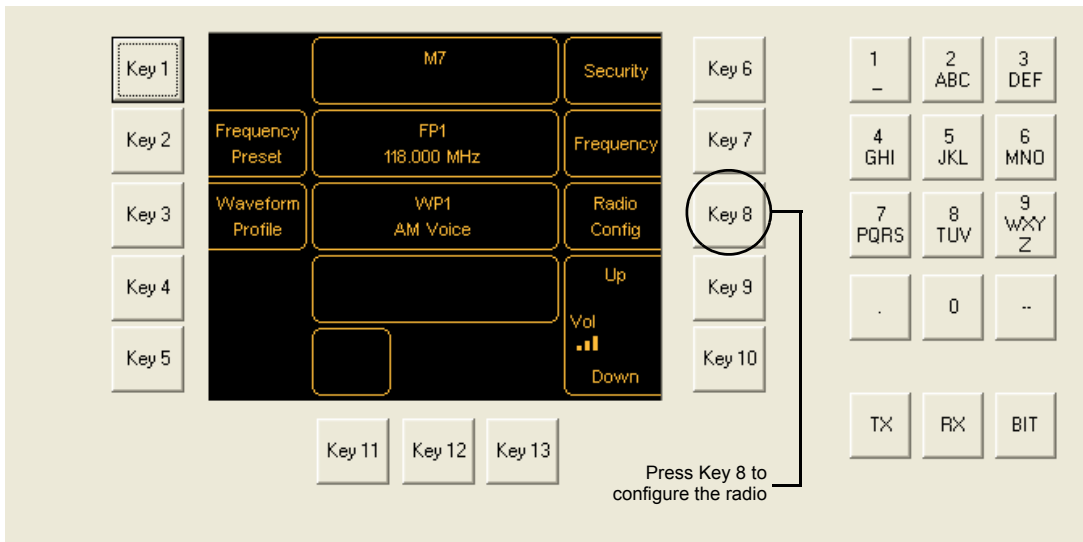(1) From the Home screen (Fig 3-24) press *Key 8 – Radio Config*.

Fig 3-24 Home Screen

(2) Ensure the Edit Radio Config Settings screen (Fig 3-25) is displayed.

In this figure, Selectable Frequency Bands is highlighted; this is Radio Config Setting 1 of 44 in the List. The Up and Down keys allow scrolling through all Radio Config Settings that can be edited.

The number of Radio Config Settings available for editing depends on the radio type, and the options that are fitted. The number 44 shown in this figure, is an example.
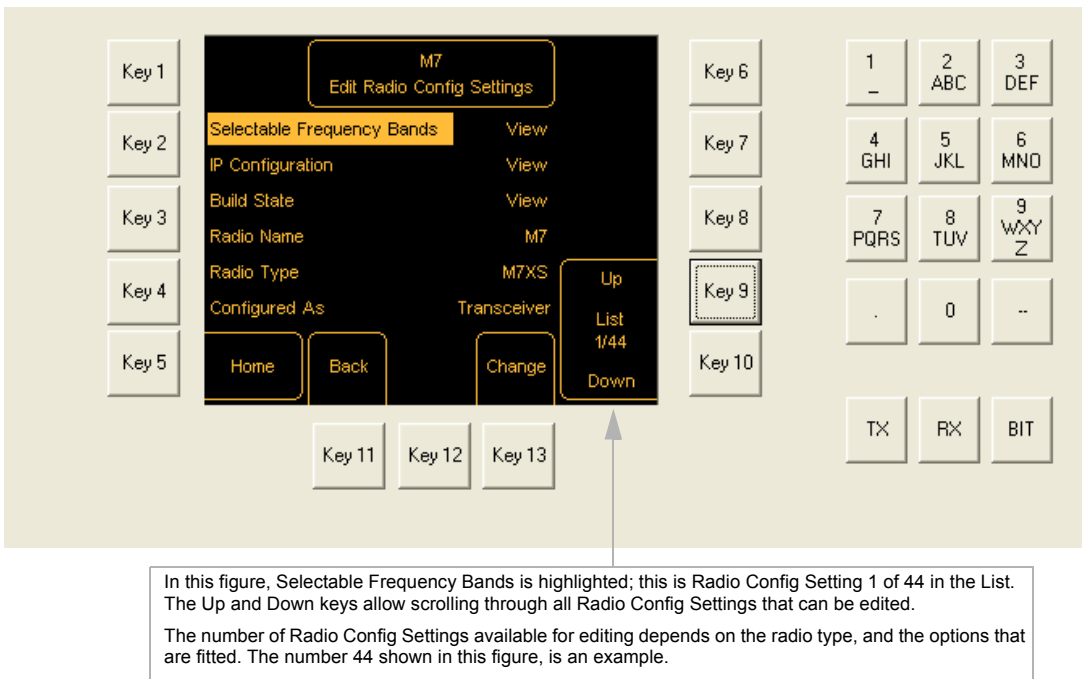
Fig 3-25 Edit Radio Configuration Settings Screen

(3) Use *Key 9* and *Key 10* to scroll up and down the list of settings. Press *Key 13 – Change* to edit the highlighted setting. A list of all settings, the range of values, and detail of additional information is given in Table 3-3.

Table 3-3 List of Edit Radio Config Settings

Setting	Edit Range	Notes
Selectable Frequency Bands	Depends on waveform	See procedure on page 3-29
IP Configuration	DHCP, IP address, Subnet mask, Default gateway, TCP port number	
Build State	Shows hardware and software build state	
Radio Name	Any name containing up to 8 alphanumeric characters	
Radio Type	M7X or M7R	The radio type must be selected
Configured As	Transceiver, Transmitter or Receiver	See procedure on page 3-27.
Guard Module	Fitted or Not fitted	
Custom Interface Module	Fitted or Not fitted	
Front Panel Module	Control Head Fitted or Not fitted	
Brightness	Low, Medium or High	
Automatic Logout	On or Off	
Screen Blanking	On or Off	
Display Timeout	On or Off	
Front Panel Volume Config	Speaker, Headset or Both	
Speaker Volume	0 to 100% (in 10% steps)	
Headset Volume	0 to 100% (in 10% steps)	
Sidetone Volume	Low or High	
Loudspeaker	On or Off	
Facilities Inhibit	On or Off	This will show On when a low input signal is applied to pin 1 of the rear panel Facilities connector
Software Inhibit	On or Off	
Inhibit Configuration	Receiver, Transmitter or Both	
Rx Sensitivity	Standard	Reserved function
Reference Trim	0 to 100% (in 1% steps)	
Reference Select	Internal or External	

Table 3-3 List of Edit Radio Config Settings (Continued)

Setting	Edit Range	Notes
Microphone Type	Passive or Active	Set to Passive for the standard Park Air supplied hand microhone.
Mic Input Sensitivity	Low or High	Set to High for the standard Park Air supplied hand microhone.
USB Interface	On or Off	Set to On when using a maintenance computer connected to the Control Head's Microphone/Headset/Maintenance interface. Set to Off at other times to avoid USB interference on the audio
Guard Squelch Level	-60 dBm to -110 dBm (in 1 dB steps)	
Guard Squelch	On or Off	
Guard Audio AGC	On or Off	
Guard UHF	On or Off	
Guard VHF	On or Off	
NB(B) Audio Config	Main, Guard or Both	
NB(A) Audio Config	Main or Both	
NB(A) PTT Input Ref Voltage	14 V, 0 V or -14 V	
NB(A) PTT Input Polarity	STD (Standard) or INV (Inverted)	
NB(A) PTT Output Polarity	n/o or n/c	Normally open or Normally closed
NB(A) Squelch Output Pol	n/o or n/c	Normally open or Normally closed
NB(A) Line Input Level	+10 dBm to -20 dBm (1 dB steps)	
NB(A) Line Output Level	+10 dBm to -20 dBm (1 dB steps)	
NB(B) Line Input Level	+10 dBm to -20 dBm (1 dB steps)	
NB(B) Line Output Level	+10 dBm to -20 dBm (1 dB steps)	
WB(A) Line Input Level	+10 dBm to -10 dBm (1 dB steps)	
WB(A) Line Output Level	+10 dBm to -10 dBm (1 dB steps)	

Table 3-3 List of Edit Radio Config Settings (Continued)

Setting	Edit Range	Notes
WB(B) Line Input Level	+10 dBm to -10 dBm (1 dB steps)	
WB(B) Line Output Level	+10 dBm to -10 dBm (1 dB steps)	

Select Between Transceiver, Transmitter or Receiver Operation

An M7X radio can be configured to operate as a transceiver, transmitter or a receiver. Configuration should be limited to 'transmitter' or 'receiver' when operating as part of a split-site transmitter/receiver pair connected to a controller.

To select the required configuration:

(1)   From the Home screen (Fig 3-26) press *Key 8 – Radio Config*.
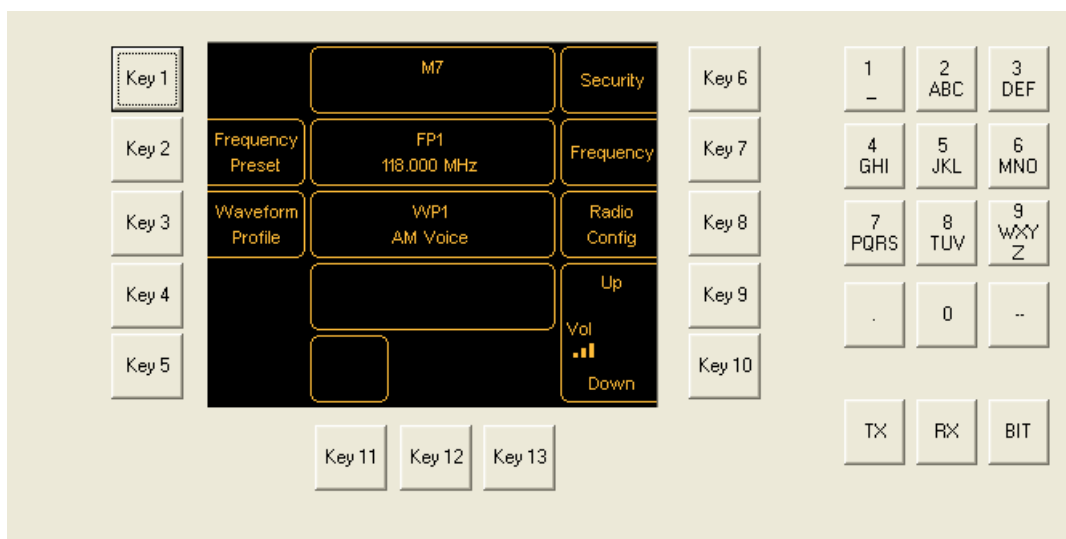
Fig 3-26 Home Screen

(2)   Ensure the Edit Radio Config Settings screen is displayed (Fig 3-27).
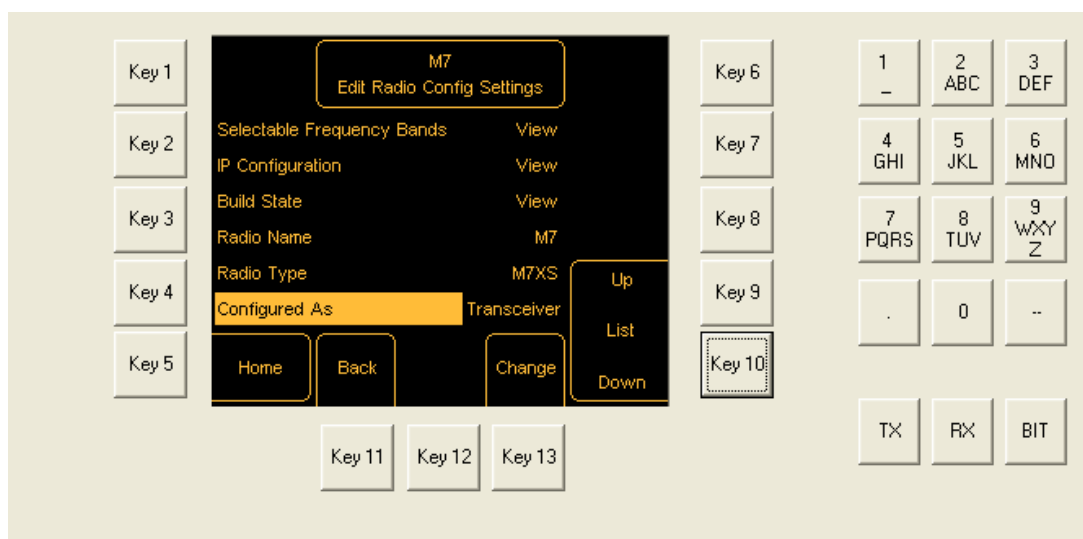
Fig 3-27 Edit Radio Config Settings Screen – Configured as Transceiver

(3)   Press *Key 9* to scroll up or *Key 10* to scroll down, and highlight 'Configured As'. If the configuration needs changing, press *Key 13 – Change*.

---

(4) Press *Key 9* or *Key 10* to scroll through 'Transceiver', 'Transmitter' and 'Receiver'. When the required configuration is shown, press *Key 13 – Store*; see Fig 3-28.

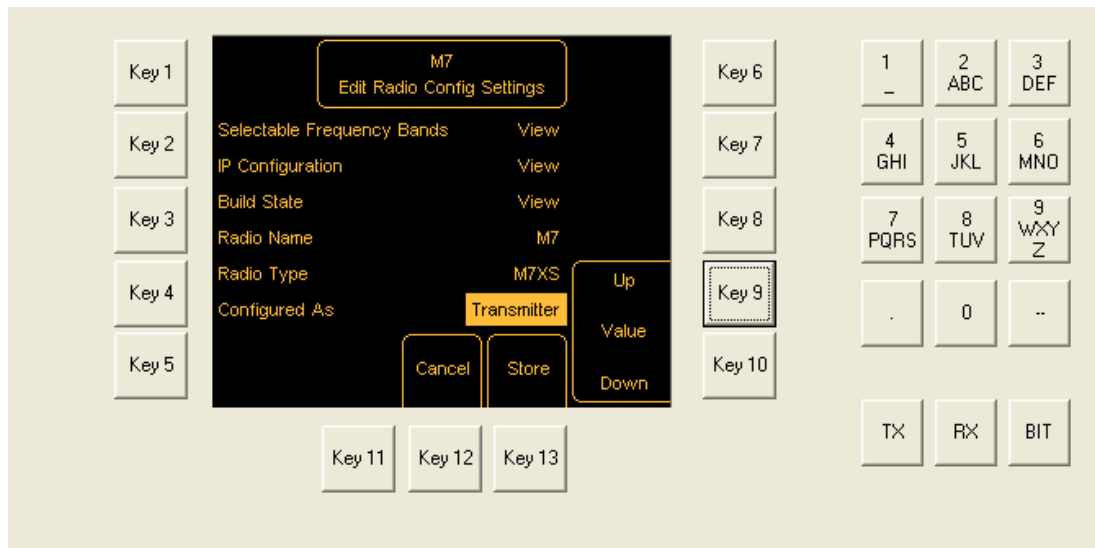**Fig 3-28 Edit Radio Config Settings Screen – Transmitter Selected**

Restricting the Radio's Frequency Range

M7 radios operate between 100 and 399.975 MHz. If required, the frequency range can be restricted by setting up to four pass bands.

Table 3-4 shows example restrictions by using two of the pass bands.

> ⚠ In addition to four user settable pass bands, the radio's frequency range can also be restricted by 'Stop Bands'. For example, to stop transmissions on commercial broadcasting frequencies, a radio may have a stop band between 100 and 110 MHz.
>
> **Stop bands are factory set and cannot be created or changed by a user.** Stop bands, if applicable, are listed below the pass bands (see Fig 3-31).

Table 3-4 Example Pass Bands

Configuration	Pass Band 1		Pass Band 2	
M7 set so that operation is over the full frequency range	100.000 MHz	399.975 MHz		
Example: M7 set to transmit only those frequencies in the range 118 to 136.975 MHz	118.000 MHz	136.975 MHz		
Example: M7 set to transmit only those frequencies in the ranges 120 to 125 MHz and 225 to 245 MHz	120.000 MHz	125.000 MHz	225.000 MHz	245.000 MHz

To set the required configuration:

(1)   From the Home screen (Fig 3-29) press *Key 8 – Radio Config*.
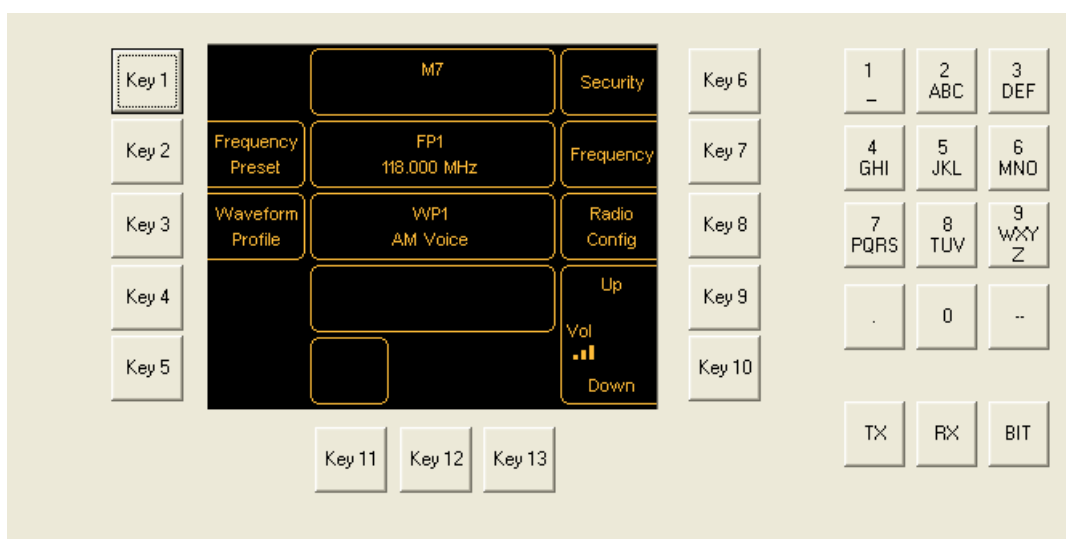

Fig 3-29 Home Screen

(2)   Ensure the Edit Radio Config Settings screen is displayed (Fig 3-30).
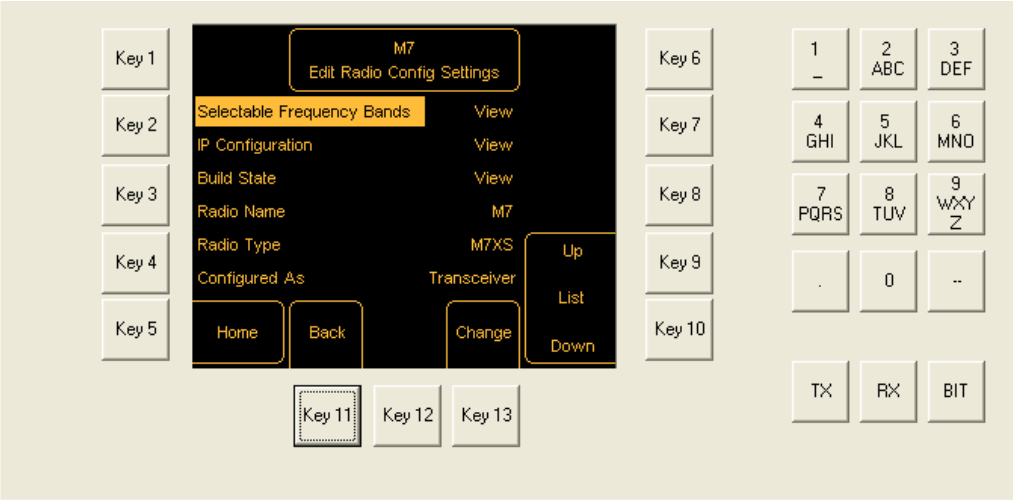
Fig 3-30 Edit Radio Config Settings Screen – Selectable Frequency Bands

(3)   To view the pass bands, press *Key 13 – Change*. The pass bands are listed as shown in Fig 3-31.
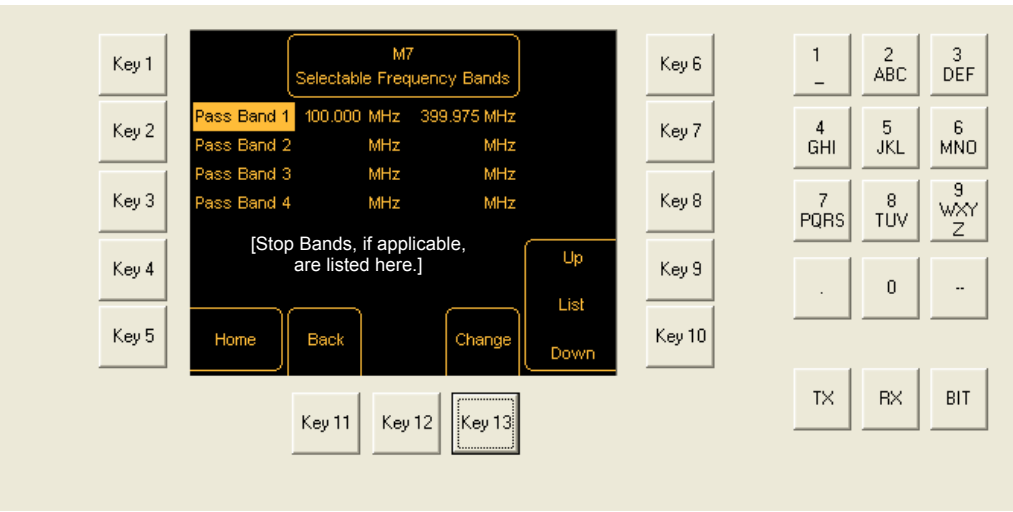
Fig 3-31 List of Pass Bands

(4)   To change the configuration, press *Key 9* or *Key 10* to select a pass band then press *Key 13 – Change*.

(5) Using the numeric keypad, enter the required pass band frequencies. Press *Key 13 – Next* after the low frequency entry to move the cursor to the high frequency.

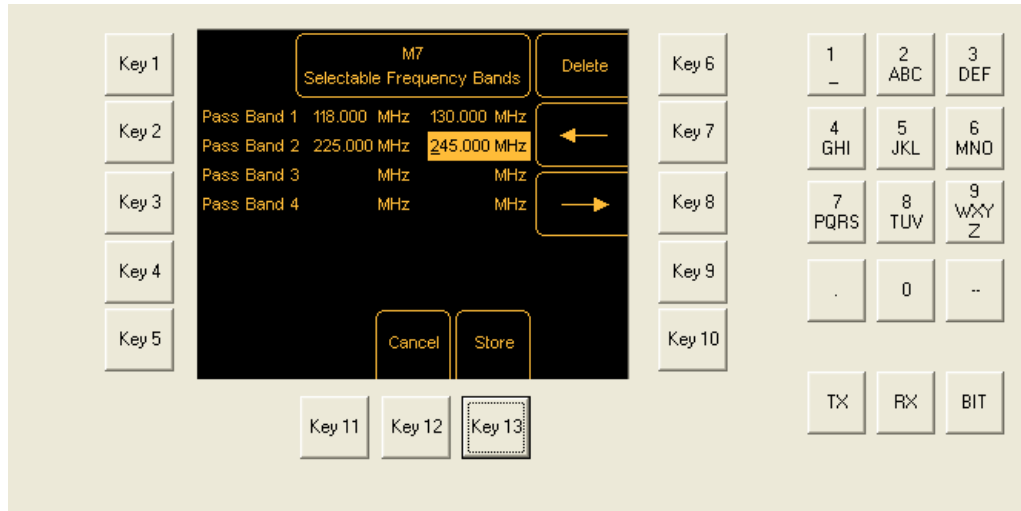[To delete an existing pass band, enter 000.000 as the frequency.]

Fig 3-32 Selectable Frequency Bands

(6) When the required pass bands are displayed, press *Key 13 – Store.*

Creating and Storing a Waveform Profile

A waveform profile is a set of instructions stored in the radio to define a mode of operation and certain parameters associated with the mode as described on page 3-8. Up to 20 different waveform profiles can be stored in the radio. The factory default profiles are designated 'WP1' to 'WP20'.

To create and store a waveform profile:

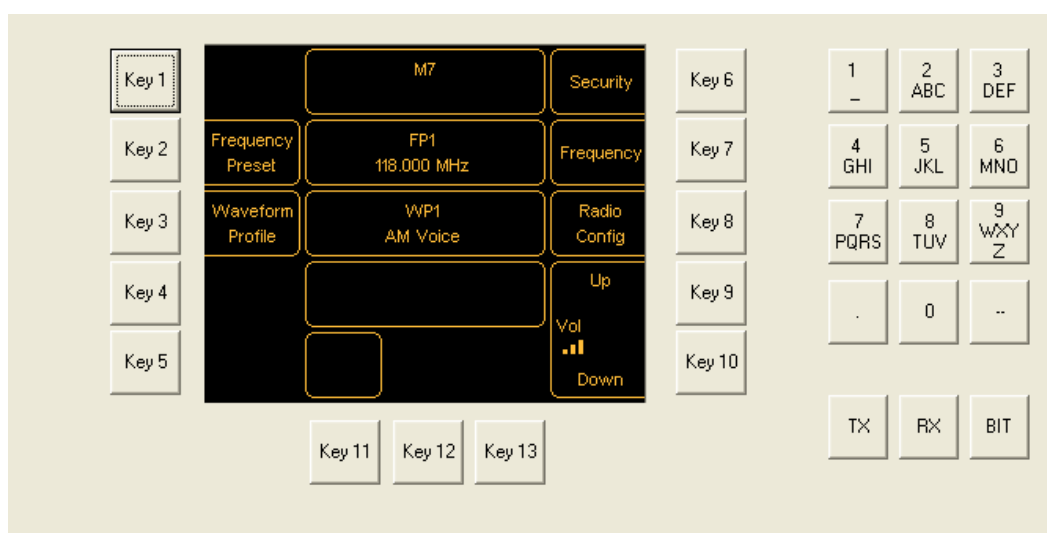(1) From the Home screen (Fig 3-33) press *Key 3* to display the list of waveform profiles (Fig 3-34).

Fig 3-33 Home Screen

(2) Pressing *Key 9* to scroll up, or *Key 10* to scroll down, highlight the waveform profile to be edited then press *Key 12 – Edit* to display the Waveform Profile Edit screen (Fig 3-35).
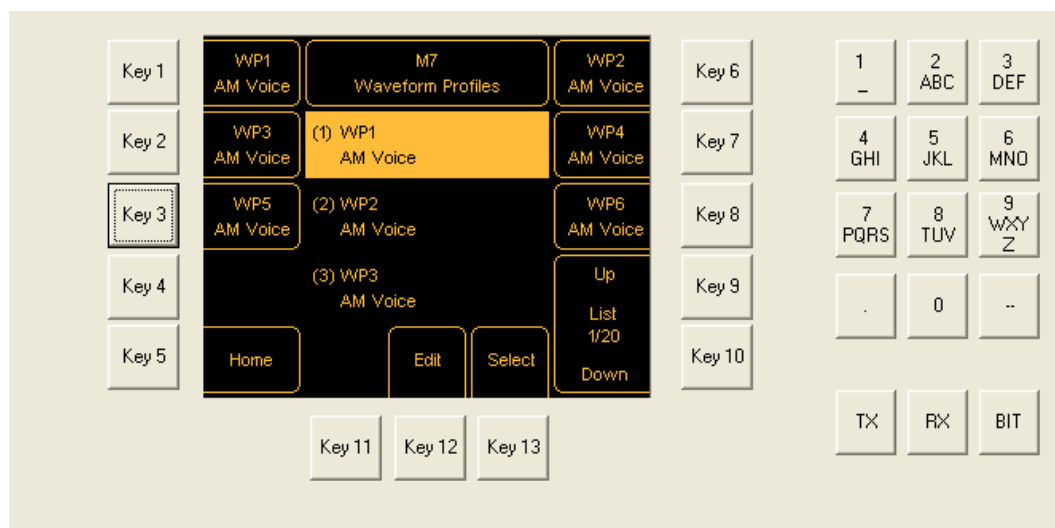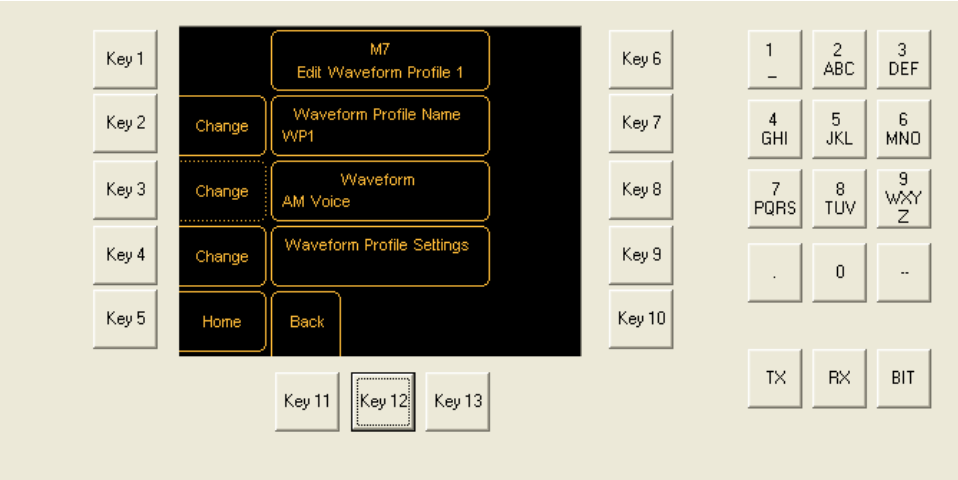

Fig 3-34 List of Waveform Profiles

Note:
The waveform cannot be changed if the waveform profile is currently selected. In this case, the waveform change key is greyed out as shown in this illustration.

Fig 3-35 Waveform Profile Edit Screen

(3)   The first parameter that can be changed is the Name. A waveform profile can have any name up to eight characters long. In this example, the default designation WP1 is being changed to 'AMV50W' as shown in Fig 3-36 (AMV50W meaning AM-Voice with 50 watt output). To change the name, press *Key 2 – Change*. The new name can be entered using the alphanumeric key pad.

(4)   When the new name has been entered, press *Key 13 – Select*. You are returned to the Waveform Profile Edit screen (Fig 3-35).
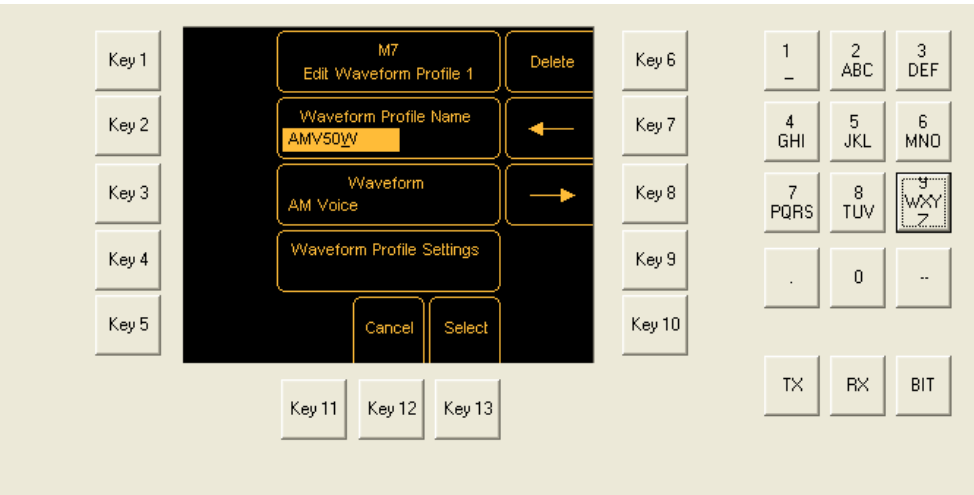

Fig 3-36 Edit Waveform Profile Name

(5)   The required waveform should now be selected by pressing *Key 3 – Change.* This action displays the Select Waveform screen as shown in Fig 3-37*.*
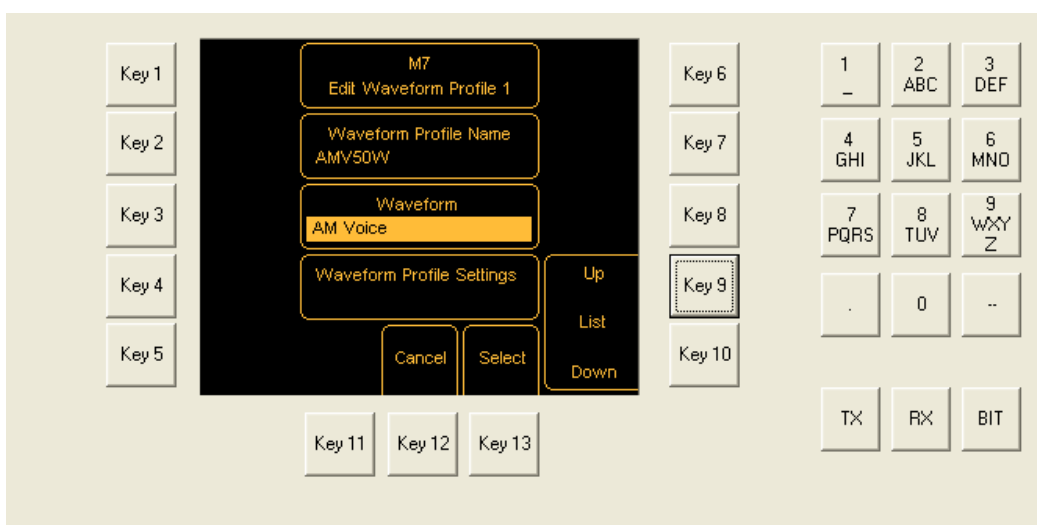
Fig 3-37 Select Waveform

(6) Pressing *Key 9* to scroll up, or *Key 10* to scroll down, highlight the required waveform, then press *Key 13 – Select.* You are returned to the Waveform Profile Edit screen (Fig 3-35).

(7) The radio settings that are stored as part of the waveform profile should now be set. This is achieved by pressing *Key 4 – Change* to display the Waveform Profile Edit Settings screen *(*Fig 3-38*).*

(8) Pressing *Key 9* to scroll up, or *Key 10* to scroll down, highlight any parameter that requires editing and press *Key 13 – Change*. The parameters associated with a waveform profile depends on the selected waveform; Table 3-5 shows the radio's waveform profile parameters that are stored when operating in AM-Voice and Maritime modes.

(9) Press *Key 9* or *Key 10* to edit the parameter's value; then press *Key 13 – Store.*

(10) Repeat steps (8) and (9) to change other parameters.

Fig 3-38 Waveform Profile Edit Settings Screen

(11) When all settings have been made, press *Key 5 – Home.* The waveform profile is now ready for use.