



TACTICAL  
RADIOS

# VHF-90M

Low Band VHF Tactical  
Communications Transceiver



product summary

## SURE & SECURE

The VHF-90M Low Band VHF transceiver is a state of the art communication device, specifically designed for multi-role tactical military and security applications. It is an extremely compact and light weight unit which is simple to operate in demanding, mission critical conditions. The VHF-90M transceiver is from the family of tactical transceivers manufactured by Q-MAC Electronics. Q-MAC's transceivers are field proven in over 105 countries, on every continent and in all conditions, ranging from the climate extremes of Antarctica to the African Sahara.

## COMMUNICATION MODES

- Analogue Voice - Fixed Frequency (AFF)
- Digital Encrypted Voice - Fixed Frequency (DEFF)
- Digital Encrypted Voice - Frequency Hopping (DEFH)
- Digital Encrypted Voice - Free Channel Search (DEFCS)
- Digital Data - Fixed Frequency
- Digital Encrypted Data - Fixed Frequency
- Digital Encrypted Data - Frequency Hopping

## SIMPLE TO USE

The VHF-90M has been designed for tactical military applications. It complies with Mil-Std 810F environmental specifications for immersion, shock, vibration, dust and temperature. Only essential controls are included on the front panel for normal operations. Advanced programming functionality is available in sub-menus. The VHF-90M can be field programmed using the menu prompts and a handset with numeric keypad. A PC based programming software package is used to efficiently fill multiple VHF-90M's to mission-ready status. Selective and group calling is available using the telephone handset with numeric keypad. The VHF-90M is an ideal replacement to the PRC-77 and its variants, which are now obsolete and susceptible to interception and jamming.

## RUGGED DESIGN

Users will appreciate the VHF-90M transceiver's solid construction, simplicity and accessibility. Maintenance is quick and simple - four fasteners provide easy access to three internal modules which can be exchanged without any special tools. All inter-module connectors are gold plated and there are no wiring looms or complex back plane assemblies. In designing the VHF-90M, emphasis has been placed on ensuring low cost of ownership over a long service life. SMD components from generic, multi-sourced families are used and the software defined architecture ensures compatibility with legacy, current and future communication requirements.

## MODULAR CONSTRUCTION

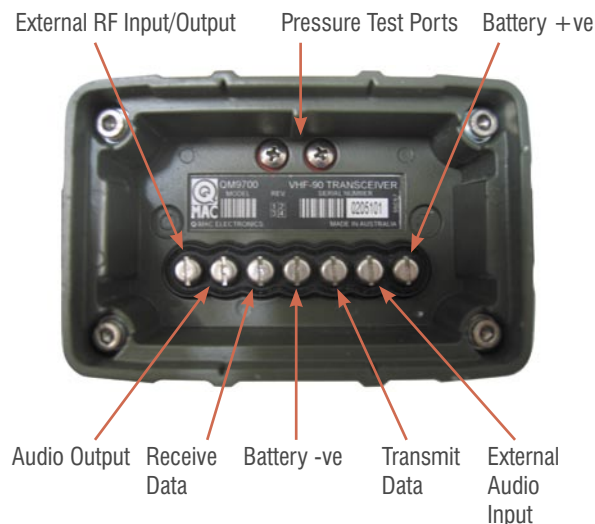
99% of the VHF-90M's circuitry is contained in three main modules - the radio frequency, digital signal processor and power amplifier modules. A very high level of integration is used to minimise component count and to increase reliability. The embedded software is executed by the digital signal processor module, which uses a low current, high speed DSP core engine. Speech coding and all frequency hopping and encryption functions are processed by the DSP under the control of a host microprocessor. The radio frequency module contains a high dynamic range front end with DDS (Direct Digital Synthesiser) system which achieves ultra-fast frequency switching times whilst maintaining low current consumption. The VHF-90M's radio frequency design takes into account the hostile electromagnetic environment of the battle field and achieves excellent ECM resistance and co-siting performance.

Q-MAC's VHF-90M incorporates the very latest in RF, DSP and software design technology, making it the most cost effective, secure, high performance VHF transceiver available in the tactical military market.

secure • simple to use • low cost



VHF-90M Front Panel



VHF-90M Rear Panel

## SQUAD COMMUNICATION

In stand-alone configuration, Q-MAC's VHF-90M is ideal for squad level communication requirements. As an intra-squad radio, the VHF-90M can communicate reliably up to 1km with a short rubber whip antenna, which is typical for close range tactical operations where squad members have to communicate beyond shouting distance.

For inter-squad communications, the primary determinant of the range required is antenna size. Power is only a secondary factor. Whilst doubling power achieves a 12% increase in range, doubling antenna length can achieve a significant 60% increase in range. The VHF-90M supports a full length PRC-77 antenna (3m), extending range up to 10km depending on terrain. It will also accommodate a standard tape whip antenna with gooseneck.

The VHF-90M transceiver is designed for use with either handset or headset. For most tactical military situations, integrated microphones and loudspeakers are ineffective. The high level of ambient noise means that loudspeakers either cannot be heard or can also be heard by the enemy, posing significant risk to the operator. VOX is also impractical as noise will spuriously trigger it.

For example, with the VHF-90M in a holster, a press to talk switch clipped to the rifle or uniform and a single headset, the infantryman has good communication without being impeded by his radio. The VHF-90M and holster combination is designed for both large and small antennas. The holster design mounts the antenna high on the shoulder to ensure maximum elevation to achieve maximum possible range. Customers with existing stocks of handsets, headsets and antennas designed for the PRC-77 can utilise these with Q-MAC's VHF-90M.

## BRIGADE COMMUNICATION

The VHF-90M is available in mobile and base station configurations which include the VDS-90M Docking Station and VHF-50M 50W Booster Amplifier. It is ideal for brigade level systems where medium range communication between vehicles and a command post is required.

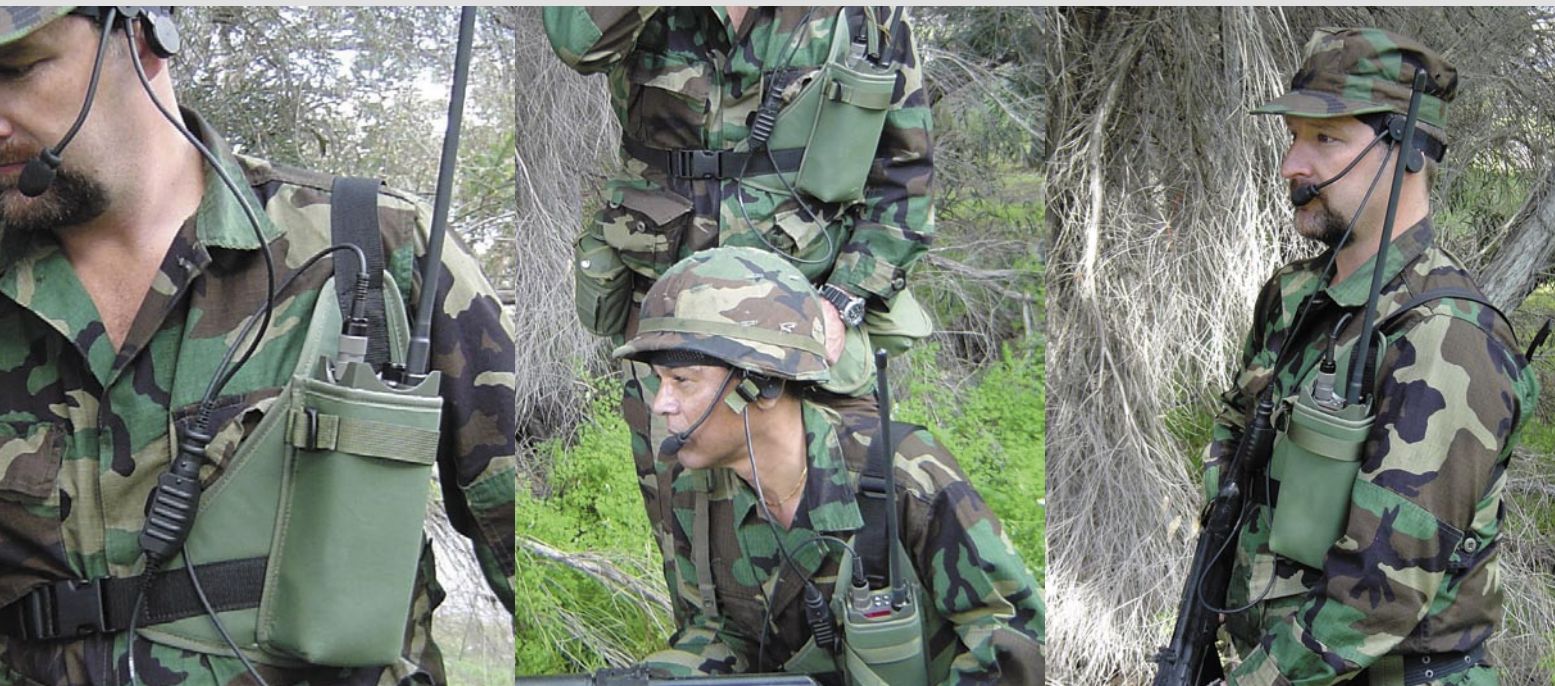
The VDS-90M Docking Station provides convenient docking of the transceiver as well as the flexibility for jerk and run dismounted use of the VHF-90M when not in the vehicle. The docking station can be installed in a range of vehicles including jeeps, patrol boats, troop carriers and tanks. The unit has fixing points for anti-vibration mounting and interconnection to combat net radio systems incorporating intercom harnesses. Auxiliary connectors are provided for connection to data terminals or combat workstations.

The VHF-50M 50W Booster Amplifier provides range extension and increased link reliability in conjunction with the external Q-MAC vehicle whip antenna system. In the event of failure, the VHF-50M has a pass-through mode to ensure continuous communication at lower power levels.

The VHF-90M transceiver, in combination with the VDS-90M Docking Station, VHF-50M Amplifier and an AC mains power supply, can be used in base station configuration with an efficient broadband bicone antenna.







## FEATURES

### VHF-90M Transceiver

- Compatible with PRC-77 & equivalents
- Advanced DSP voice & data signal processing
- Encrypted & frequency hopping security options
- High speed encrypted data
- Selective & group calling
- Messaging & data transfer
- Tactical rebroadcast mode
- 3 power levels up to 5W
- Smart peripheral detection system
- Expansion via VDS-90M Docking Station
- Upgradeable with 50W Booster Amplifier
- Fully digital synthesizer
- Built in test equipment

### Operational

- Intuitive interface
- Single key access to frequently used functions
- Whisper mode
- No false shutdown
- Emergency erase function
- Headset or handset operation
- Channel scan function
- Split Rx/Tx function

### Physical

- Compact & light weight
- Front mounted antenna connector
- Mil-Std 810F immersion & drop proof
- Simple to maintain
- Modular construction
- Compatible with PRC-77 accessories

### Mission Programming

- Field programming via interactive menu
- Default state restore
- Non-volatile data storage
- Terminal mode via RS-232 cable or Bluetooth
- Field cloning
- Fill Gun
- MS Windows™ PC programming

### Battery & Power Supply

- Low current consumption
- Intelligent battery charger
- DC adapter
- AC mains adapter
- Solar panel charger
- Hand crank generator charger



Integrated Vehicle System



VDS-90M Docking Station



VHF-50M 50W Booster Amplifier

## VDS-90M DOCKING STATION

The VDS-90M Docking Station allows a standard VHF-90M transceiver to be installed in a vehicle or base station application. The docking station design enables quick jerk and run operation when the VHF-90M transceiver needs to be used in dismounted configuration.

The primary function of the VDS-90M is to provide power to the VHF-90M transceiver and to provide an interface to accessories typically found in military vehicular platforms, including intercom harness systems, power sources, antennas, data terminals, modems and combat radio selector systems for multi-net and multi-band communications requirements.

Advanced functionality includes the ability to remote control the VHF-90M up to 5km via a two-wire interface using either a second VHF-90M transceiver with docking station or DTMF tones from a tactical telephone exchange.

## VHF-50M 50W BOOSTER AMPLIFIER

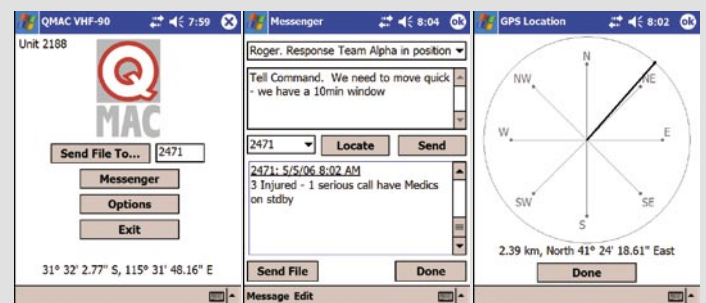
The VHF-50M Amplifier is used as an accessory with the VDS-90M Docking Station to boost the transceiver output power to 50 watts. The VHF-50M significantly increases the communication range and link reliability between radios when terrain disrupts the normal line of sight path. Under direct control of the VHF-90M, the VHF-50M is fully compatible with frequency hopping.

The VHF-50M Amplifier can be switched to bypass mode, enabling the transceiver to transmit directly to an external antenna. The amplifier includes interfaces to attach external accessories such as intercom harness systems, power sources, antennas, data terminals, modems and combat radio selector systems for multi-net and multi-band communications requirements.

## VHF-90M MESSAGING & DATA TRANSFER (MDT)

The MDT is an easy to use software module which provides messaging and file transfer in conjunction with the data mode on the VHF-90M. The MDT application will run on any hardware platform compatible with MS Windows™ Pocket PC™ or MS Windows™ XP™ operating systems. Combined with a GPS receiver, the MDT application can provide GPS coordinates, distance and bearing in a tactical radio network.

When used with a PDA or computer, the operator can use the simple graphical user interface to send and receive files and text messages to designated radios based on their individual ID number. Messages can also be sent to operational groups of radios using the group messaging function. The MDT application allows you to enter the selcall ID, pick a file using a file browser and transmit with confirmation that the file was received. The individual instant messaging function allows a text based conversation to occur over a secure encrypted or frequency hopping link.



**General Specifications**

|                         |  |
|-------------------------|--|
| Frequency Range         | 30-88MHz   |
| Channel Resolution      | 25kHz (2320 channels)  |
| Pre-Programmed Channels | 10   |
| Selective Calling       | Numeric individual & group call  |
| Power Supply            | 12V DC   |
| Batteries               | 10 x 1.2V DC NiMH battery  |
| Battery Endurance       | 12 Hours 9:1 Rx:Tx (typical)   |
| Power Consumption       | <ul style="list-style-type: none"><li>• Transmit @5W 1.5A</li><li>• Receive 150mA</li><li>• Standby 20mA</li></ul>   |
| Whisper                 | -20dB under nominal level  |
| Squelch                 | <ul style="list-style-type: none"><li>• 150Hz tone squelch in legacy mode (AFF)</li><li>• Digital level squelch in secure modes (DEFF, DEFH &amp; DEFCs)</li></ul>   |
| Secure Modes            | <ul style="list-style-type: none"><li>• Transec – Digital Encrypted Fixed Frequency (DEFF)</li><li>• Comsec - Digital Encrypted Frequency Hopping (DEFH) &amp; Digital Encrypted Free Channel Search (DEFCs)</li></ul> |
| Antenna                 | <ul style="list-style-type: none"><li>• Short rubber whip (400mm)</li><li>• Tape whip (1m)</li><li>• 6 section whip (3m)</li><li>• PRC-77 compatible whip antenna</li></ul>  |
| Controls                | Shaft encoder; channel up/down; secure on/off; hop on/off  |
| Display                 | High reliability 5 digit 7 segment LED   |
| Programming             | <ul style="list-style-type: none"><li>• Field programming via DTMF keypad</li><li>• PC programming via RS232 &amp; terminal emulation</li><li>• Windows PC programming software</li><li>• Fill gun</li></ul>           |
| BITE                    | Advanced module diagnostics & error conditions   |
| MTTR                    | 10 minutes   |
| MTBF                    | 8000 hours   |

**Transmitter**

|                          |                                     |
|--------------------------|-------------------------------------|
| Output Power             | 3 levels: 5W; 0.5W; 50mW            |
| Frequency Stability      | ± 2.5ppm                            |
| Deviation                | ± 3kHz to ± 7kHz (factory settable) |
| Modulation               | FM (F3E) in legacy mode             |
| Harmonic Radiation       | -50dB                               |
| Spurious Emission        | -55dB                               |
| Intermediate Frequencies | 130.050 MHz & 455kHz                |

**Receiver**

|                              |  |
|------------------------------|--|
| Receiver Sensitivity         | -116dBm for 12dB SINAD   |
| Blocking                     | >85dB  |
| Adjacent Channel Suppression | +70dB  |
| Image Suppression            | +80dB  |
| Spurious Suppression         | >50dB  |
| AF Output                    | 150mW @ 2% distortion  |
| Squelch                      | 150Hz tone (PRC-77 compatible) & signal threshold in digital modes |

**Mechanical & Environmental**

|              |  |
|--------------|--|
| Weight       | 1kg with battery pack  |
| Dimensions   | 82 x 223 x 54mm  |
| Temperature  | <ul style="list-style-type: none"><li>• Operating -20°C to +60°C</li><li>• Storage -30°C to +80°C</li></ul>            |
| Immersion    | Per Mil-Std 810F   |
| Drop         | Per Mil-Std 810F   |
| Vibration    | Per Mil-Std 810F   |
| Construction | Aluminium extrusion body; injection moulded aluminium front & rear end caps; high impact Lexan® moulded battery casing |

**VHF-50M Amplifier**

|                        |  |
|------------------------|--|
| Output Power           | 50W ± 0.5dB  |
| Harmonic Radiation     | -60dB  |
| Spurious Emission      | -65dB  |
| Frequency Range        | 30-88MHz   |
| Power Supply           | 11-30V DC  |
| Front Panel Connection | RF in; antenna out; VDS control in; aux (audio & PTT in/audio out); DC input |
| Indicators             | RF present; DC supply; fault condition                                       |
| BITE                   | Advanced module diagnostics & error conditions                               |

**VHF-90M Docking Station**

|                        |   |
|------------------------|---|
| Power Supply           | 11-30V DC   |
| Front Panel Connection | Aux handset/headset; RF out; control (audio & PTT in/audio out/DC in); field telephone; rebro control; remote control |
| BITE                   | Advanced module diagnostics & error conditions  |

Q-MAC Electronics Pty Ltd reserves the right to alter any of the specifications contained in this document without notice.



TACTICAL  
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Q-MAC is a wholly owned Australian company.

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