

CONFIDENTIAL



Q-MAC ELECTRONICS

**MILITARY AND PARAMILITARY
PRODUCTS
CATALOG**

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1 IMPORTANT NOTES ABOUT THIS CATALOGUE

End User Declaration:-

- Defence radios designated for defence use are a restricted and controlled export from Australia.
- All products from this catalogue require a signed End User Declaration prior to supply.
- Orders without an accompanying End User Declaration cannot be accepted by Q-MAC Electronics.

List Prices:-

- The prices listed herein (given as "List Prices") are Q-MAC Recommended End User Prices.
- All prices given in this Catalogue are in Australian Dollars (AUD).
- All prices given in this Catalogue are Ex-Works Perth, Western Australia. Quotations for freight, insurance and documentation may be provided upon request. Such quotations will vary from time to time in accordance with current freight /insurance charges.
- Q-MAC reserves the right to alter prices without notice.

Quantity Discount Policy:-

- Q-MAC Electronics does not offer quantity discounts.

Product Descriptions:-

- All product descriptions provided herein are subject to change without notice.

Product Images:-

- All product images are included as a guide only and may not represent actual product described.

Listed Weights:-

- Weights listed herein are approximate and include packaging. They are intended as a guide only, so that Customers may estimate freight costs.
- When calculating the overall weight of a consignment, Customers should also allow for boxes/cartons that will be used to consolidate goods.

Modes of Delivery:-

- Q-MAC utilises INCOTERMS 2000 (as per Section 4) to describe modes of delivery. Where terminology on purchase orders differs from INCOTERMS 2000, Q-MAC reserves the right utilize the nearest matching mode of transport listed in Section 4, INTERNATIONAL FREIGHT INFORMATION.

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2 CONFIGURING Q-MAC PACKAGES

Q-MAC encourages the use of this checklist to ensure end-users consider all aspects of their application. This is especially relevant for field deployment where missing items will cause significant inconvenience



3 PRODUCTS



3.1 HF-90M PACKAGES

Unless indicated otherwise all packages are based on the Standard Model HF-90M

To upgrade to an Advanced Model HF-90M with any of these packages, add the Advanced Option (Part No. QM9056).

To upgrade to a Frequency Hopping Model HF-90M with any Advanced Model, add the Frequency Hopping Option (Part No. QM9061).

The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.

3.1.1 MX9000 HF-90M Ultra-Light Manpack

ULTRA LIGHT PACKAGE FOR COMMUNICATING WHILE ON FOOT

The HF-90M military grade transceiver is a state of the art communications device specifically designed for tactical military applications. The HF-90M will withstand immersion, shock and vibration to military standard.

The HF-90M transceiver is an extremely compact and light weight unit, featuring only essential controls to ensure ease of operation. The HF-90M is available with a secure, jam-resistant ECCM Frequency Hopping option.

Applications:

The MX9000 Ultra-Light Manpack is ideal for military and paramilitary applications where size and weight are important. The Frequency Hopping option provides secure, jam-resistant HF communications.



(5.00kg)

Includes:-

- HF-90M transceiver complete with Mil-Std Telephone Handset
- TA-99 auto tuner complete with coaxial & earth cables
- Collapsible whip antenna (8-section)
- Tape whip antenna
- Long wire antenna kit
- Rechargeable 7.6Ah LiON battery
- Ultra-light backpack

3.1.1.1 Available Advanced Options

QM9056 Advanced Option #6

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M. Replaces standard Mil-Std telephone handset (QM4016) to DTMF Mil-Std telephone handset (QM4014) - suited to HF-90M packages.

Advanced features include:-

All features with Standard Model, PLUS ...

- Front-end Programming via the associated DTMF microphone
- Selcall (Based CCIR 493-4)
- Telcall
- Beacon
- Selcall/Telcall Scan and Mute



(+0.20kg)

QM9061 HF-90M Frequency Hopping Option (factory fitted)

Enables complete protection against intercept and jamming, to a military standard. Frequency Hopping User Guide included.

Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

Only suitable for an HF-90M fitted with an Advanced Option. The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.



(+0.05kg)

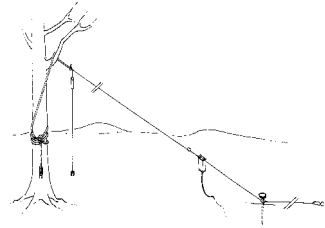
3.1.1.2 Suggested Optional Items:



QM8020M Fold-up Solar Panel Charger

Suits Q-MAC LiON Rechargeable Batteries - 10.8 Watt rated power, complete with cables, connectors and regulator to suit LiON batteries. Comprises five panels, which fold into a compact canvas pouch. Available in black and olive drab.

(1.50kg)



QM7005 Portable broadband antenna, standard version

End-fed broadband antenna, 2-30MHz, 100 Watt rating, made from insulated wire (for easy handling), incorporating counterpoise and earth-clip, complete with 5m RG-58 coaxial cable with connectors, throw cords and earth stake. Antenna is supplied on a shuttle for easy deployment and storage.

(1.25kg)



QM7309 Tape Whip Antenna (spare / replacement)

Flexible tape whip antenna (1m) suited to use in jungle/forestry areas, 4-12.9 MHz operation complete with gooseneck.

(0.20kg)



QM7351 Antenna Extender Coil Section

Extends operation of Collapsible Whip Antenna (QM7301 6-section, and QM7303 8-section) down to 2.7MHz.

Not suitable for use with QM7302, QM7304 or QM7309 whip antennas.

Not suitable for use with HF-90M Frequency Hopping Option/Upgrades – insufficient bandwidth.

(0.20kg)



QM7304 Collapsible Whip Antenna (4-section)

Collapsible four section whip antenna (1m), complete with flexible goose neck.

Refer to Section 3.3.1.8 for details of frequency coverage.

(0.20kg)

3.1.2 MX9011 HF-90M Military Grade Monoblock Manpack

A MILITARY GRADE MONOBLOCK MANPACK FOR COMMUNICATING ON FOOT

The HF-90M Military transceiver is a state of the art communications device specifically designed for tactical military applications. The HF-90M will withstand immersion, shock and vibration to military standards.

The HF-90M transceiver is an extremely compact and light weight unit, featuring only essential controls to ensure ease of operation. The HF-90M is available with a secure, jam-resistant ECCM Frequency Hopping option.

Applications:

The HF-90M Military Grade Monoblock Manpack is ideal for military and paramilitary applications. The Frequency Hopping option provides secure, jam-resistant HF communications.



Includes:-

- HF-90M transceiver
- Mil-Std Telephone Handset
- TA-99 auto tuner complete with coaxial & earth cables
- Collapsible whip antenna (6-section)
- Long wire antenna kit
- Tape whip antenna
- Rechargeable battery (7 Ah) complete with enclosure, charging and accessory power socket and battery condition monitor
- Ruggedised full frame backpack with canvas accessory pockets

(11.00kg)

3.1.3 MX9011b HF-90M Military Grade Monoblock Manpack (minus battery)

Includes:-

- All items mentioned above, except for the battery. Includes battery enclosure suited to 7Ah batteries.



(9.00kg)

3.1.4 MX9011C HF-90M Military Grade Manpack with 7.6AH battery

Includes:-

- All items mentioned above, replacing the standard 7.5AH battery and battery enclosure with a 7.6AH LiION battery and matching enclosure.



(10.00kg)

3.1.4.1 Available Advanced Options



QM9056 Advanced Option #6

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M. Replaces standard Mil-Std telephone handset (QM4016) to DTMF Mil-Std telephone handset (QM4014) - suited to HF-90M packages.

Advanced features include:-

All features with Standard Model, PLUS ...

- Front-end Programming via the associated DTMF microphone
- Selcall (Based CCIR 493-4)
- Telcall
- Beacon
- Selcall/Telcall Scan and Mute

(+0.20kg)



QM9061 HF-90M Frequency Hopping Option (factory fitted)

Enables complete protection against intercept and jamming, to a military standard. Frequency Hopping User Guide included.

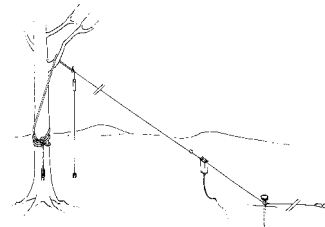
Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

Only suitable for an HF-90M fitted with an Advanced Option. The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.

(+0.05kg)

3.1.4.2 Suggested Optional Items:



QM7005 Portable broadband antenna, standard version

End-fed broadband antenna, 2-30MHz, 100 Watt rating, made from insulated wire (for easy handling), incorporating counterpoise and earth-clip, complete with 5m RG-58 coaxial cable with connectors, throw cords and earth stake. Antenna is supplied on a shuttle for easy deployment and storage.

(1.25kg)



QM7309 Tape Whip Antenna (spare / replacement)

Flexible tape whip antenna (1m) suited to use in jungle/forestry areas, 4-12.9 MHz operation complete with gooseneck.

(0.20kg)



QM7351 Antenna Extender Coil Section

Extends operation of Collapsible Whip Antenna (6-section and 8-section) down to 2.7 MHz.

Not suitable for use with QM7302, QM7304 or QM7309 whip antennas.

Not suitable for use with Frequency Hopping Option/Upgrades – insufficient bandwidth.

(0.20kg)



QM7302 Collapsible Whip Antenna (2-section)

Collapsible two section whip antenna (1m), complete with flexible goose neck.
Refer to Section 3.3.1.4 for details of frequency coverage.

(0.20kg)



QM8024M DC Step-Up Battery Charging Device

Suits Q-MAC SLA Rechargeable Batteries - Steps up vehicle voltage to 14.5 Volt for charging via vehicle cigarette lighter socket, complete with mating connector to suit military grade packages.

(0.30kg)



QM8022M AC Mains Charger (2A)

Compact desk-top unit to suit Q-MAC SLA Rechargeable Batteries – 115/230 Volt AC input, 12 Volt DC nominal, 2 Amp limited current, complete with charging status LED indicators and mating connector to suit military grade packages. Supplied with specified AC mains plug to suit local AC socket.

(1.00kg)



QM8021M Fold-up Solar Panel Charger

Suits Q-MAC SLA Rechargeable Batteries - 10.8 Watt rated power, complete with extension cable and mating connector to suit military grade packages. Comprises five panels, which fold into a compact canvas pouch. Available in black and olive drab.

(1.30kg)



QM8028M Hand Crank Generator (complete with mounts)

Suits Q-MAC SLA Rechargeable Batteries – Output voltage between 13.8 – 16.2V, output current between 1.15 – 1.35A (assumes 60RPM and 12 Ohm resistive load). Lightweight, yet built from high impact material (meets Mil Std 810). Supplied together with monopod (includes carry pack suited to Q-MAC Canvas Backpack on Frame), tree-mount with strap and mating connector to suit military grade packages.

(2.70kg)

3.1.5 MX9027 ML-90 NVIS Roof Rack Antenna Vehicle Package (fixed Transceiver)



IMPROVED PERFORMANCE FROM A VEHICLE INSTALLATION

The Q-MAC ML-90 Roof Rack Antenna Vehicle Package (fixed transceiver) is ideal for NVIS propagation or applications requiring constant coverage for distances of 0 – 1000km. The ML-90 package provides significantly more gain than conventional whip antenna systems.

Applications:

The Q-MAC ML-90 NVIS Roof Rack Antenna Vehicle Package (fixed) is ideal for border patrol, environmental, search and rescue, aid and relief, and mining vehicles.

Includes:-

- HF-90M transceiver complete with microphone and DC power cable
- Transceiver installation kit complete with mounting cradle & external mount speaker with audio mute facility
- ML-90 Auto-tune Antenna system with cables and connectors
- ML-90 installation kit including roof-rack mounting hardware

Specify 12V or 24V version at time of order.

(110.00kg)

3.1.6 MX9027b Short ML-90 NVIS Roof Rack Antenna Vehicle Package (fixed Transceiver)

Includes:-

- All items mentioned above, replacing the standard roof rack with a short roof rack.

Dimensions:-

- 1.5m(L) x 1.25m(W)

Specify 12V or 24V version at time of order.

(100.00kg)

3.1.6.1 Available Advanced Options

QM9056 Advanced Option #6

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M. Replaces standard Mil-Std telephone handset (QM4016) to DTMF Mil-Std telephone handset (QM4014) - suited to HF-90M packages.

Advanced features include: -

All features with Standard Model, PLUS ...

- Front-end Programming via the associated DTMF handset
- Selcall (Based CCIR 493-4)
- Telcall
- Beacon
- Selcall/Telcall Scan and Mute



(+0.20kg)



QM9061 HF-90 Frequency Hopping Option (factory fitted)

Enables complete protection against intercept and jamming, to a military standard. HF-90 Frequency Hopping User Guide included.

Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

ML-90 NOTE: Limited frequency range compatibility with Frequency Hopping Option.

Only suitable for an HF-90M fitted with an Advanced Option.

The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.

(+0.05kg)

3.1.7 MX9015 Vehicle Package

A MILITARY GRADE PACKAGE FOR VEHICLE INSTALLATIONS

The Q-MAC HF-90M Vehicle Package is an HF SSB radio communication system designed for long range mobile applications. The small footprint of the HF-90M transceiver makes it ideal for in dash mounting, simplifying installation by eliminating the requirement to mount a separate control head or run control cabling to a remote control head.

Includes:-

- HF-90M transceiver
- Military grade telephone handset (QM4016)
- Power cable with military connector
- Vehicle installation kit with mounting cradle
- TA-90M automatic tuning whip antenna system covering 2-20MHz

Specify 12V or 24V version at time of order.

Applications:

The Q-MAC HF-90M Vehicle Package with whip antenna is ideal for border patrol, and search and rescue vehicles.

(10.00kg)

3.1.7.1 Available Advanced Options

QM9056 Advanced Option #6

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M.

Replaces standard Mil-Std telephone handset (QM4016) to DTMF Mil-Std telephone handset (QM4014) - suited to HF-90M packages.

Advanced features include: -

All features with Standard Model, PLUS ...

- Front-end Programming via the associated DTMF handset
- Selcall (Based CCIR 493-4)
- Telcall
- Beacon
- Selcall/Telcall Scan and Mute



(+0.20kg)



QM9061 HF-90M Frequency Hopping Option (factory fitted)

Enables complete protection against intercept and jamming, to a military standard. Frequency Hopping User Guide included.

Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

*Only suitable for an HF-90M fitted with an Advanced Option.
The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.*

(+0.05kg)

3.1.8 MX9015i Integrated Vehicle Package

A MILITARY GRADE PACKAGE FOR VEHICLE INSTALLATIONS

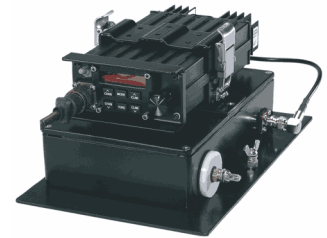
The Q-MAC HF-90M Vehicle Package is an HF SSB radio communication system designed for long range mobile applications. The small footprint of the HF-90M transceiver makes it ideal for in dash mounting, simplifying installation by eliminating the requirement to mount a separate control head or run control cabling to a remote control head.

Includes:-

- HF-90M transceiver
- Military grade telephone handset (QM4016)
- Power cable with military connector
- Vehicle installation kit with mounting cradle
- TA-90M automatic tuning whip antenna system covering 2-20MHz.

Applications:

The Q-MAC HF-90M Vehicle Package with whip antenna is ideal for border patrol, and search and rescue vehicles.



(10.00kg)

3.1.8.1 Available Advanced Options



QM9056 Advanced Option #6

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M.

Replaces standard Mil-Std telephone handset (QM4016) to DTMF Mil-Std telephone handset (QM4014) - suited to HF-90M packages.

Advanced features include: -

All features with Standard Model, PLUS ...

- Front-end Programming via the associated DTMF handset
- Selcall (Based CCIR 493-4)
- Telcall
- Beacon
- Selcall/Telcall Scan and Mute

(+0.20kg)



QM9061 HF-90M Frequency Hopping Option (factory fitted)

Enables complete protection against intercept and jamming, to a military standard. Frequency Hopping User Guide included.

Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

*Only suitable for an HF-90M fitted with an Advanced Option.
The Frequency Hopping Option is subject to Australian Defence
Export Controls. A signed End-User Declaration must be provided
for supply of this option.*

(+0.05kg)

3.1.9 MX9024 HF-90M High Powered 500 Watt Base Station Package (complete)

A FIXED HF-90M TRANSCEIVER WITH THE 500W OUTPUT POWER

The Q-MAC HF-90M 500W Base Station Package is designed for critically important fixed base station use. It includes an HF-90M transceiver coupled with solid state, 500 Watt amplifier and power supply, all contained in a small 19" equipment rack with casters.

Applications:

The Q-MAC HF-90M 500W Base Station Package is ideal for national or regional headquarters, embassies, military and border patrol applications. With the HF-90M Frequency Hopping Option, secure HF networks can be implemented.



Includes:-

- HF-90M transceiver with advanced software
- 19" 10RU Equipment Rack & Hardware
- External panel mounted speaker with audio mute facility
- AC mains power converter unit 90A/ 12V DC.
- 500 watt amplifier with fan kit
- Military telephone handset
- 3 wire centre-fed broadband dipole antenna.
- 50m RG213 coax cable

(65.00kg)

3.1.9.1 Suggested Optional Items (not included with package):



QM9056 Advanced Option #6

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M. Replaces standard Mil-Std telephone handset (QM4016) to DTMF Mil-Std telephone handset (QM4014) - suited to HF-90M packages.

Advanced features include: -

All features with Standard Model, PLUS ...

- Front-end Programming via the associated DTMF handset
- Selcall (Based CCIR 493-4)
- Telcall
- Beacon
- Selcall/Telcall Scan and Mute

(+0.20kg)



QM9061 HF-90M Frequency Hopping Option (factory fitted)

Enables complete protection against intercept and jamming, to a military standard. Frequency Hopping User Guide included.

Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

*Only suitable for an HF-90M fitted with an Advanced Option.
The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.*

(+0.05kg)

3.1.10 MX9019 Integrated HF-90M Base Station

AN INTEGRATED HF-90M TRANSCEIVER BASE STATION

The Q-MAC HF-90M Integrated Base Station is ideal for rapid deployment of a field base station. The main components, including transceiver, battery and power supply, are all contained in one integrated housing.

Applications:

The Q-MAC HF-90M Base Station Package is ideal for regional officers, temporary base stations and tactical applications.



Includes:-

- HF-90M transceiver
- Military telephone handset
- External panel mounted speaker with audio mute facility
- AC mains power supply unit complete with battery backup facility.
- Rechargeable battery (7 Ah)
- Fixed broadband dipole antenna – multi wire

(42.00kg)

3.1.10.1 Suggested Optional Items (not included with package):



QM9056 Advanced Option #6

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M. Replaces standard Mil-Std telephone handset (QM4016) to DTMF Mil-Std telephone handset (QM4014) - suited to HF-90M packages.

Advanced features include: -

All features with Standard Model, PLUS ...

- Front-end Programming via the associated DTMF handset
- Selcall (Based CCIR 493-4)
- Telcall
- Beacon
- Selcall/Telcall Scan and Mute

(+0.20kg)



QM9061 HF-90M Frequency Hopping Option (factory fitted)

Enables complete protection against intercept and jamming, to a military standard. Frequency Hopping User Guide included.

Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

*Only suitable for an HF-90M fitted with an Advanced Option.
The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.*

(+0.05kg)

3.1.11 QM9082M Email and Chat Data Package

A DATA PACKAGE FOR LINKING TO OTHER DATA STATIONS

The combination of a Pactor Protocol modem with Wavemail software and the HF90M package provides long range email and electronic chat capability over HF radio spectrum. The Wavemail software provides multi-user and multi-site routing.

Includes:-

- Swiss PTC Modem
- Wavemail software
- HF-90m interface unit and cables
- Fan

Compatible with:

Base Station
Vehicle Manpack
High Powered Base Station



(4.00kg)

3.2 HF-90M TRANSCEIVER & OPTIONS

3.2.1 QM9101 HF-90M Transceiver – Military Grade



(1.55kg)

Standard features include:-

- 2 - 30 MHz frequency coverage
- 50 Watt PEP power output
- 12V - 24V operating voltage
- 255 programmable channels
- USB/LSB toggle switch
- Tune function
- Clarifier
- Rx signal strength indicator
- Erase facility
- 6 digit LED display

Operation & Installation Guide included.

Standard accessories include: -

- Mil-Std telephone handset microphone (QM4016)
- DC power cable - suited to portables/manpacks.

3.2.2 QM9056 Advanced Option #6

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M. Replaces standard Mil-Std telephone handset (QM4016) with DTMF Mil-Std telephone handset (QM4014) - suited to all MX90xx HF-90M packages.

Advanced features include:-

- Front-end Programming
- Selcall (based on CCIR 493-4)
- Telcall (based on CCIR 493-4)
- Beacon (based on CCIR 493-4)
- Selcall/Telcall Scan and Mute

+(0.20kg)

3.2.3 QM9059 Advanced Option #9

Software and hardware option to convert a Standard Model HF-90M to an Advanced Model HF-90M. Replaces standard microphone with a DTMF Desktop gooseneck microphone with Mil-Std Connector (QM4006M) - suited to all MX90xx HF-90M packages.

Advanced features include:-

- Front-end Programming
- Selcall (based on CCIR 493-4)
- Telcall (based on CCIR 493-4)
- Beacon (based on CCIR 493-4)
- Selcall/Telcall Scan and Mute

+(0.20kg)



3.2.4 HF-90M Package / Options Matrix

USE THIS TABLE TO CLARIFY WHICH ADVANCED OPTIONS CAN BE ADDED TO WHICH HF-90M PACKAGES.

<u>Package Part Number and Description</u>	<u>Advanced Option #</u>
MX9011 HF-90M Monoblock Manpack	6
MX9014 Ruggedised Manpack	6
MX9015 HF-90M Military Grade Vehicle Package	6
MX9018 HF-90M Military Grade Base Station	6, 9
MX9019 HF-90M Integrated Base Station Package	6, 9
MX9024 HF-90M High Powered Base Station Package	6, 9
MX9027 HF-90M NVIS Roof Rack Antenna (fixed transceiver)	6

3.2.5 QM9061 HF-90M Frequency Hopping Option (Factory Fitted)

Enables complete protection against intercept and jamming, to a military standard. Frequency Hopping User Guide included.

Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

Only suitable for an HF-90 fitted with an Advanced Option.

The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.



+(0.05kg)

3.2.6 QM9062 HF-90M Frequency Hopping Option (Field Upgrade)

Enables complete protection against intercept and jamming, to a military standard. Includes firmware and extraction tool required to upgrade an HF-90M. Frequency Hopping User Guide included.

Features include:-

- 5 hops per second
- 256 kHz bandwidth (1 kHz spacing)
- Synchronization time of 25 seconds (average)
- Pseudo-random hopping sequence

Only suitable for an HF-90 fitted with an Advanced Option.

The Frequency Hopping Option is subject to Australian Defence Export Controls. A signed End-User Declaration must be provided for supply of this option.



+(0.15kg)

3.3 ANTENNA SYSTEMS

3.3.1 Portable/Manpack Antenna Systems

3.3.1.1 QM2101 TA-99 Military Grade Automatic Tuner

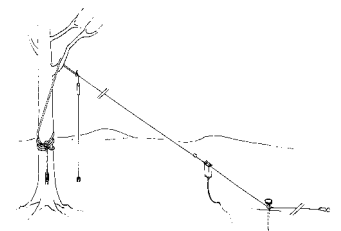
Incorporates LED tuning indicators. Suits collapsible whip, tape & long wire antennas. Supplied with coaxial and earth leads.



+(0.90kg)

3.3.1.2 QM7005 Portable Broadband Antenna (standard version)

End-fed broadband antenna, 2-30 MHz, 100 Watt rating, made from insulated wire (for easy handling), incorporating counterpoise and earth-clip, complete with 5m RG-58 coaxial cable with connectors, throw cords and earth stake. Antenna is supplied on a shuttle for easy deployment and storage. As supplied with the HF-90M Manpack Package.



+(1.25kg)

3.3.1.3 QM7301 Collapsible Whip Antenna (6-section)

High efficiency collapsible six section whip antenna (3m).

As supplied with the HF-90M Manpack.

Frequency coverage: when used with TA-99, Automatic Tuner: 2-26MHz
when used with TA-99 and Frequency Hopping: 4-26MHz

Collapsed length: 500mm



+(0.30kg)

3.3.1.4 QM7302 Collapsible Whip Antenna (2-section)

Collapsible two section whip antenna (1m), complete with flexible gooseneck.

Frequency coverage: when used with TA-99, Automatic Tuner: 3.5-26MHz
when used with TA-99 and Frequency Hopping: 3.5-26MHz

Collapsed length: 495mm



+(0.20kg)

3.3.1.5 QM7309 Tape Whip Antenna

Flexible tape whip antenna (1m) complete with flexible goose neck.
Suited to use in jungle/forestry areas.

Frequency coverage: when used with TA-99, Automatic Tuner: 3.5-26MHz
when used with TA-99 and Frequency Hopping: 3.5-26MHz



+(0.20kg)

3.3.1.6 QM7351 Antenna Extender Coil Section

Extends operation of Collapsible Whip Antenna (6 section) down to 2.7 MHz. This allows operation between 2.7 and 3.6 MHz (i.e. to the lower frequency limit of the collapsible 6 or 8-section whip antennas).

Length: 500mm

Not suitable for use with QM7302, QM7304 or QM7309 whip antennas.

Not suitable for use with HF-90M Frequency Hopping Option/Upgrades – insufficient bandwidth.



+(0.20kg)

3.3.1.7 QM7303 Collapsible Whip Antenna (8-section)

High efficiency collapsible eight section whip antenna (3m).

As supplied with the HF-90M Manpack.

Frequency coverage: when used with TA-99, Automatic Tuner: 2-26MHz
when used with TA-99 and Frequency Hopping: 4-26MHz

Collapsed length: 390mm



+(0.30kg)

3.3.1.8 QM7304 Collapsible Whip Antenna (4-section)

Collapsible four section whip antenna (1m), complete with flexible goose neck.

Frequency coverage: when used with TA-99, Automatic Tuner: 3.5-26MHz
when used with TA-99 and Frequency Hopping: 3.5-26MHz

Collapsed length: 335mm



+(0.20kg)

3.3.1.9 QM7821 Antenna Angle Adaptor

Suited for use with Collapsible Whip Antenna (6 section). Allows adjustment of antenna angle to facilitate NVIS propagation.



+(0.10kg)

3.3.1.10 QM7310 Long Wire Antenna Kit

Suitable for use with TM-90 Manual Tuner and TA-99 Automatic Tuner as a rapid-use antenna system.

Frequency coverage: when used with TA-99, Automatic Tuner: 2-20MHz
 when used with TA-99 and Frequency Hopping: 2-20MHz

Includes:-

- Long wire antenna (7m)
- Counterpoise (5m)
- Long wire antenna adaptor (fits TA-99 tuner)
- Throw rope.

As supplied with the HF-90M Manpack.




+(0.45kg)

Spares for Long Wire Antenna Kit

3.3.1.11 QM7311 Long Wire Antenna Only


Made from easy-to-use plastic coated wire. Incorporates plastic insulator at one end and 'banana' plug at other end (to fit into adaptor). Overall length is 7m. Antenna may be stretched out its full length to cover low freq range or folded in half to cover high freq range.



+(0.15kg)

3.3.1.12 QM7312 Counterpoise


Supplied with 'banana' plug at one end (to fit into connector mounted in carry case). Overall length is 5m.



+(0.10kg)

3.3.1.13 QM7313 Long Wire Antenna Adaptor

Screws into antenna socket on TM-90 Manual Tuner to allow use with long wire antenna. Will also accommodate a regular piece of wire cut to length, which is bare ended.



+(0.05kg)

3.3.2 Vehicle Antenna Systems

3.3.2.1 QM7113 ML-90 Auto-tuning Antenna System (Rack and Tuner)

Roof Rack fully-automatic antenna tuner, complete with rack mounting bracket, cables and ML-90 Tuner. Allows efficient operation between 3.5-15MHz.

*Limited frequency range compatibility with Frequency Hopping Option.
Only compatible with Q-MAC transceivers.*



+(105.00kg)

3.3.2.2 QM7112M TA-90M Auto-tune Antenna System

Compact fully-automatic antenna tuner in robust metal housing, complete with heavy-duty mounting bracket, pair 45 mm & 50 mm C-clamps, cables and continuously loaded fibreglass whip antenna (1/2" BSW base) with fittings. Allows efficient operation between 2-20 MHz. As supplied with the HF-90M Vehicle Package (MX9015).

*Compatible with HF-90M Frequency Hopping Option/Upgrades
in Frequency Range approx. 4 to 20 MHz.*



+(5.50kg)

Spares & Accessories to suit Vehicle Antenna Systems

ML-90:

3.3.2.3 QM5078 ML-90 DC Feed Adaptor Cable

Cable to connect old version HF-90's (without DC feed on antenna socket) to current model ML-90.

+(0.30kg)

TA-90:

3.3.2.4 QM5053 High Voltage Antenna Feed Cable

Translucent high voltage cable complete with lugs and convoluted split tubing. As supplied with the TA-90 Mounting Kit.

+(0.05kg)

3.3.2.5 QM6071 TA-90 Mounting Kit

Kit includes all items as supplied with TA-90 Auto-tune Antenna System minus the TA-90 Tuner and Continuously Loaded Whip Antenna.

+(2.45kg)

3.3.2.6 QM7121M TA-90M Tuner – Military Grade (12 Volt Version)

Supplied complete with mounting bracket assembly. As supplied with the TA-90M Auto-tune Antenna System.

+(2.40kg)

*Compatible with HF-90M Frequency Hopping Option/Upgrades
in Frequency Range approx. 4 to 20 MHz.*

3.3.2.7 QM7601 TA-90 Upgrade 12 Volt to 24 Volt Version

TA-90M Upgrade 12 Volt to 24 Volt Version.

+(0.00kg)

3.3.2.8 QM7131 Continuously Loaded Whip Antenna

Rugged fibreglass construction with 1/2" BSW base. As supplied with the TA-90M Auto-tune Antenna System.

+(0.65kg)

3.3.2.9 QM7136 Antenna Base Assembly

High voltage insulator base (150 mm). As supplied with the TA-90M Mounting Kit.

+(0.65kg)

3.3.2.10 QM7137 Pair 60mm C-Clamps

To fix TA-90M Mounting Bracket to larger bull-bars.

+(0.30kg)

3.3.2.11 QM7801 Heavy Duty Antenna Base and Spring

Suits manual-tap whip antennas - stainless steel construction.

+(1.50kg)

3.3.2.12 QM7810 Antenna Spring

Spring only, as supplied with the TA-90M Mounting Kit.

+(1.35kg)

3.3.3 Base Station Antenna Systems

3.3.3.1 QM7001 Fixed Broadband Dipole Antenna – Single Wire

Single wire centre-fed broadband dipole, 2-30 MHz, 120 Watt PEP rating, stainless steel construction complete with 30 metres RG-58 coaxial cable with connectors. Simple installation.



(3.00kg)

Not supplied with installation accessories.

3.3.3.2 QM7002 Fixed Broadband Dipole Antenna – Multi Wire



3-wire centre-fed broadband dipole, 2-30 MHz, 100 Watt rating, stainless steel construction with fibreglass spreaders complete with 30 metres RG-58 coaxial cable with connectors. Includes parts and instructions to mount in horizontal or inverted V configurations. Improved efficiency. As supplied with the HF-90M Base Station Package.

(9.00kg)

Not supplied with installation accessories.

3.3.3.3 QM7022 Mast Kit for Broadband Dipole Antenna

Mast kit to suit portable use of single wire broadband dipole antenna. Comes with canvas bag.

(13.00kg)

Not supplied with installation accessories.

3.3.3.4 QM7021 Halyard Kit

Includes:-

- 2 x 30m lengths of UV-stable rope (6mm)
- 2 x stainless steel pulleys
- 2 x stainless steel D shackles

Ideal for installing the QM7001 and QM7002 Fixed Broadband Dipole Antennas.

(0.60kg)

3.4 POWER SUPPLIES, CHARGERS & ACCESSORIES

3.4.1 QM8101 Military Grade Battery (7 Ah)

Suits HF-90M Monoblock. Sealed Lead Acid Battery (SLA) in military grade casing with military connector.



(Includes 7Ah SLA Battery)

(3.50kg)

3.4.2 QM8101b Military Grade Battery Enclosure Only (Suit 7 Ah SLA Battery)

Military grade battery enclosure with military connector, for a 7 Ah SLA battery to suit HF-90M Monoblock.



(Enclosure only – no battery included)

(1.00kg)

3.4.3 QM8011 Rechargeable Battery (7 Ah)

12V, 7 Ah, sealed lead acid (SLA) gel battery (non-hazardous for freight purposes). As used with QM8101b battery enclosure (above) and most Manpack/Portable Packages.



(2.55kg)

3.4.4 QM8100 Mil-Std 7.6Ah Lithium Ion Battery Pack

Suits HF-90M Monoblock. 7.6Ah Lithium Ion (Li-Ion) battery in military grade casing with military connector.



(Includes Custom Li-Ion Battery Pack)

(1.50kg)

3.4.5 QM8100b Military Grade Battery Enclosure Only (Suit 7.6Ah Li-Ion Battery)



(Enclosure Only - No Battery Pack)

Military grade battery enclosure with military connector, for a 7.6Ah Li-Ion battery to suit HF-90M Monoblock.

(0.50kg)

3.4.6 QM8110 Mil-Std 15.2Ah Lithium Ion Battery Pack

Suits HF-90M Monoblock. 15.2Ah Lithium Ion (Li-Ion) battery in military grade casing with military connector.

(2.50kg)

3.4.7 QM8110b Military Grade Battery Enclosure Only (Suit 15.2Ah Li-Ion Battery)

Military grade battery enclosure with military connector, for a 15.2Ah Li-Ion battery to suit HF-90M Monoblock.

(Enclosure Only - No Battery Pack)

(1.00kg)

3.4.8 QM8010 Li-Ion Replacement Cell Pack (7.6 Ah)

14.8V, 7.6Ah, Lithium Ion battery pack (non-hazardous for freight purposes). As used with QM8100b and QM8110b battery enclosures (above).

(1.00kg)

3.4.9 QM8005M AC Mains Lithium Ion Charger (1A)

Compact charger to suit Lithium Ion battery packs - 100-250 Volt AC input, 1A limited current. Supplied with specified AC mains plug (2-pin).

(0.25kg)

3.4.10 QM8000M AC Mains Lithium Ion Charger (2A)

Compact charger to suit Lithium Ion battery packs - 100-250 Volt AC input, 2A limited current. Supplied with specified AC mains plug (2-pin).

(1.50kg)

3.4.11 QM8020M Fold-up Solar Panel Charger - Lithium Ion Only

Suits Q-MAC Lithium Ion Batteries - 10.8 Watt rated power, complete with extension cable and mating connector to suit military grade packages. Comprises five panels, which fold into a compact canvas pouch. Standard colour is black.



(1.50kg)

3.4.12 QM8021M Fold-up Solar Panel Charger

Suits Q-MAC Rechargeable SLA Batteries - 10.8 Watt rated power, complete with extension cable and mating connector to suit military grade packages. Comprises five panels, which fold into a compact canvas pouch. Standard colour is black.



(1.30kg)

3.4.13 QM8022M AC Mains Charger (2A)

Compact desk-top unit to suit Q-MAC Rechargeable SLA Batteries – 115/230 Volt AC input, 12 Volt DC nominal, 2 Amp limited current, complete with charging status LED indicators and appropriate connector. Supplied with specified AC mains plug.



(1.00kg)

3.4.14 QM8024M DC Step-Up Battery Charging Device

Suits Q-MAC Rechargeable SLA Batteries - Steps up battery voltage to 14.5 Volt for charging via vehicle cigarette lighter socket, complete with mating connector for HF-90M Manpack.



(0.30kg)

3.4.15 QM8028M Hand Crank Generator (complete with mounts)

Suits Q-MAC Rechargeable SLA Batteries – Output voltage between 13.8 – 16.2V, output current between 1.15 – 1.35A (assumes 60RPM and 12 Ohm resistive load). Lightweight, yet built from high impact material (meets Mil Std 810). Supplied together with monopod (includes carry pack suited to Q-MAC Canvas Backpack on Frame) and tree-mount with strap.



(2.70kg)

3.4.16 QM8051M Battery Condition Monitor

Battery condition monitor to suit military grade radio connector. Monitors battery charge level via a series of LED indicators.



(0.10kg)

3.4.17 QM8022 AC Mains Charger (2A)

Suits MX9014 HF-90M Ruggedised Manpack SLA Batteries – 115/230 Volt AC input, 12 Volt DC nominal, 2 Amp limited current, complete with charging status LED indicators and appropriate connector for MX9014 HF-90M Ruggedised Manpack.. Supplied with specified AC mains plug.



(0.70kg)

3.4.18 QM8024 DC Step-Up Battery Charging Device

Suits MX9014 HF-90M Ruggedised Manpack SLA Batteries - Steps up battery voltage to 14.5 Volt for charging via vehicle cigarette lighter socket, complete with mating connector for MX9014 HF-90M Ruggedised Manpack.



(0.30kg)

3.5 CARRY PACKS & CASES

3.5.1 QM6006 All Welded Backpack Frame – military grade



Ruggedised all steel backpack frame and canvas webbing for Monoblock Manpack

*Standard colour is Black frame with Olive Drab canvas pockets.
Dimensions 490H x 400W x 250D mm (including frame and waist support).*

(9.00kg)

3.5.2 QM6000 UltraLight Backpack for Monoblock

Custom designed single-unit backpack made from water resistant canvas, padded with compartments to house the Monoblock, accessories and antenna. As supplied with the HF-90M MX9000 Package

*Standard colour is Olive Drab.
Dimensions 335H x 192W x 85D mm.(excluding antenna holder)*

(1.00kg)

3.5.3 QM6017 Pelican[®] 1300 Case

Extremely rugged and fully-waterproof (submersible) case. As supplied with the Email/Chat Data Package.

*Standard colours are Black or Yellow.
Inside Dimensions:- 240H x 185W x 155D mm
Outside Dimensions:- 273H x 247W x 177D mm.*

(0.80kg)

3.6 OTHER PARTS & ACCESSORIES

3.6.1 Installation Accessories

3.6.1.1 QM6063 Mounting Cradle for HF-90M on TA-90M

Suited to vehicle and base station applications.

(1.00kg)

3.6.1.2 QM6052M HF-90M Vehicle Installation Kit

Includes:-

- Mounting cradle
- Coaxial cable (RG-58) complete with connectors (4.5m)
- HRC fuse (20 Amp) and holder
- Battery lugs – heavy duty, cable ties, microphone clip, grommets and self-amalgamating tape

As supplied with the HF-90M Vehicle Package.

(1.30kg)

DC power cable (Part No. QM5002M) is not included with the HF-90M Vehicle Installation Kit. It is supplied together with the HF-90M Transceiver (Part No. QM9101) or on its own.

3.6.1.3 QM6061 Mounting Cradle

Suited to vehicle and base station applications. As supplied with the HF-90M Vehicle Installation Kit and HF-90M Base Station Package.

(0.35kg)

3.6.2 Telephone Handsets

3.6.2.1 QM4014 Military Handset DTMF MIL-STD



Industry standard, military grade telephone handset with Mil-spec Connector and DTMF keys for use with Advanced Software features such as Selcall, Beacon Call, Frequency Hopping and Front Panel Programming.

For use with Mil-Spec Model HF-90M

(0.45kg)

3.6.2.2 QM4016 Military Handset No DTMF MIL-STD



Industry standard, military grade telephone handset with Mil-spec Connector.

For use with Mil-Spec Model HF-90M

(0.45kg)

3.6.2.3 QM4006M Commercial DTMF Pedestal Microphone with Military Connector



DTMF Desktop gooseneck microphone with Mil-Std Connector
Suited to all MX90xx HF-90M packages

(1.00kg)

3.6.3 Audio Accessories

3.6.3.1 QM4042M Headphones (military-grade)

Ruggedised headsets incorporating military connector. Suits CW option & telegraph key.

(0.45kg)

3.6.3.2 QM4051M CW Option & Telegraph Key

External CW option housed in a compact die-cast metal box with telegraph key mounted on top. Incorporates a connection for headphones. Supplied with 1.5m lead.

(1.00kg)

3.6.3.3 QM4021M External Mount Speaker (complete with audio mute)

Weatherproof external speaker. Incorporates audio mute facility for fixed channel operation.

(TBA kg)

3.6.4 DC Power Cables

3.6.4.1 QM5001M HF-90M to Misc Power Source (4.5m)

4-pole power connector at one end complete with connector for external speaker on flying lead, bare ended at the other end. As supplied with the HF-90M Vehicle Package and HF-90M Base Station Package.

(2.00kg)

3.6.4.2 QM5002M HF-90M to Portable Battery (0.6m)

4-pole power connector at one end complete with connector for external speaker on flying lead, spade connectors at the other end complete with connector for charging devices on flying lead. Incorporates in-line fuse. As supplied with the HF-90M Manpack and HF-90M Portable Packages.

(0.10kg)

3.6.5 Coaxial Cables (RG-58)

3.6.5.1 QM5021 HF-90M to Vehicle Antenna (4.5m)

BNC connector fitted at one end, nothing fitted at the other end - PL259 plug supplied loose. As supplied with Vehicle Installation Kit.

(0.25kg)

3.6.5.2 QM5022 HF-90M to Base Station Antenna (30m)

BNC connector fitted at one end, PL259 plug fitted to the other end. As supplied with base station antennas (Section 3.3).

(1.50kg)

3.6.5.3 QM5064 TA-99 to HF-90M

Coaxial cable, (115mm), to connect TA-99 to HF-90M Suited to Manpack Package

(0.01kg)

3.6.5.4 QM5068 TA-90M to HF-90M

Coaxial cable, 320mm, to connect TA-90M to HF-90M. Suited to integrated Vehicle Package.

(0.02kg)

3.6.6 Other Cables

3.6.6.1 QM5051M Programming Cable complete with Adaptor

HF-90M → computer serial port (2m). Supplied with DB25 connector and also with adaptor for DB9 connector.

(0.3kg)

For use with HF-90M programming package (Part No. QM1002M).

3.6.7 Miscellaneous Items

3.6.7.1 QM3001 PL259 to BNC Adaptor



(0.05kg)

3.6.7.2 QM4061M Data Interface Unit

Provides an interface between an HF-90M transceiver and an RF modem. Includes a control port for PTT control and auxiliary mic/speaker connector.

(1.00kg)

3.6.7.3 QM9501M Fan Option (modular)

Fits to rear of HF-90M. Suited to continuous-duty base station applications.

(0.07kg)

3.7 DEALER SUPPORT PRODUCTS

3.7.1 Programming Software

3.7.1.1 QM1002M HF-90M Programming Package

IBM compatible software package (Windows Operating System), allows programming of the following functions:-

Standard Model HF-90M:-

- Channel/frequency programming
- USB/LSB mode toggle enable/disable
- Power output setting
- Auto-tune enable/disable

Advanced Model HF-90M:-

- Field programming enable
- Selcall ID number
- Selcall and Scanning on specific channels/frequencies

Includes programming cable (Part No. QM5051M).

Includes Quick Reference Guide - Programming Package.

Package is provided on 3½" floppy disk as standard.



(1.00kg)

NOTE: This programming software is for use on radios with Export Version firmware (HF-90E or HF-90H) and firmware version 301 or greater. It is not compatible with earlier firmware versions. If used on earlier versions of firmware it may render the HF-90M inoperable.

3.7.2 Product Documentation

3.7.2.1 QM1021 HF-90 Technical Manual

Applies equally to HF-90 and HF-90M Transceivers.



Authorised Dealers receive one HF-90 Technical Manual at no charge, with their first purchase of the HF-90M Transceiver. Extra copies must be purchased.

(0.35kg)

3.7.3 Test Devices

3.7.3.1 QM4082 Antenna Current Meter



Meter for measuring antenna current in an antenna system. For use where the antenna coaxial cable carries DC voltage to drive an automatic antenna tuner. Refer to Q-MAC Automatic Antenna Tuners on page 43.

Note: VSWR meters will block the DC voltage to automatic antenna tuners, therefore preventing the tuner from functioning. This device provides an effective method of determining the performance of antenna systems incorporating antenna tuners that require DC on the coaxial cable e.g. TA-99, ML-90.

(2.00kg)

3.7.3.2 QM4081M Voice Enunciator Box



Device to automatically key and modulate an HF-90M transceiver.

(1.00kg)

3.7.3.3 QM4083 Field Service Tool



Convenient pocket tool for suited to field assembly and disassembly of HF-90.

(1.00kg)

3.7.4 Replacement Modules

3.7.4.1 96003 HF-90M RXMP Module



Receiver & Microprocessor Module.

(0.15kg)

3.7.4.2 96005 HF-90M Front Panel Module



HF-90M Front Panel, including front panel PCB.

(0.20kg)

3.7.4.3 96004 HF-90M PASW Module



Power Amplifier & Switch Mode Power Supply Module complete with heatsink assembly.

(0.20kg)

4 INTERNATIONAL FREIGHT INFORMATION

4.1 INTERNATIONAL FREIGHT ABBREVIATIONS

INCOTERMS 2000

Departure:

EXW EX WORKS (... named place)

Main Carriage Unpaid:

FOB FREE ON BOARD (... named port of shipment)

Main Carriage Paid:

CIF COST, INSURANCE AND FREIGHT (... named port of destination)

CIP CARRIAGE AND INSURANCE PAID TO (...named place of destination)

Arrival:

DDU DELIVERED DUTY UNPAID (... named place of destination)

DDP DELIVERED DUTY PAID (... named place of destination)

Methods most commonly used in freight of Q-MAC consignments:

EXW; CIP; DDU

4.2 INTERNATIONAL FREIGHT DEFINITIONS

EXW - EX WORKS (... named place)

"Ex works" means that the seller delivers when he places the goods at the disposal of the buyer at the seller's premises or another named place (i.e. works, factory, warehouse, etc.) not cleared for export and not loaded on any collecting vehicle. This term thus represents the minimum obligation for the seller, and the buyer has to bear all costs and risks involved in taking the goods from the seller's premises. However, if the parties wish the seller to be responsible for the loading of the goods on departure and to bear the risks and all the costs of such loading, this should be made clear by adding explicit wording to this effect in the contract of sale. This term should not be used when the buyer cannot carry out the export formalities directly or indirectly. In such circumstances, the FCA term should be used, provided the seller agrees that he will load at his cost and risk.

FOB - FREE ON BOARD (... named port of shipment)

"Free on Board" means that the seller delivers when the goods pass the ship's rail at the named port of shipment. This means that the buyer has to bear all costs and risks of loss of or damage to the goods from that point. The FOB term requires the seller to clear the goods for export. This term can be used only for sea or inland waterway transport. If the parties do not intend to deliver the goods across the ship's rail, the FCA term should be used.

CIF - COST INSURANCE AND FREIGHT (... named port of destination)

"Cost, Insurance and Freight" means that the seller delivers when the goods pass the ship's rail in the port of shipment. The seller must pay the costs and freight necessary to bring the goods to the named port of destination BUT the risk of loss of or damage to the goods, as well as any additional costs due to events occurring after the time of delivery, are transferred from the seller to the buyer. However, in CIF the seller also has to procure marine insurance against the buyer's risk of loss of or damage to the goods during the carriage. Consequently, the seller contracts for insurance and pays the insurance premium. The buyer should note that under the CIF term the seller is required to obtain insurance only on minimum cover'. Should the buyer wish to have the protection of greater cover, he would either need to agree as much expressly with the seller or to make his own extra insurance arrangements. The CIF term requires the seller to clear the goods for export. This term can be used only for sea and inland waterway transport. If the parties do not intend to deliver the goods across the ship's rail, the CIP term should be used.

CIP - CARRIAGE AND INSURANCE PAID TO (... named place of destination)

"Carriage and Insurance paid to..." means that the seller delivers the goods to the carrier nominated by him, but the seller must in addition pay the cost of carriage necessary to bring the goods to the named destination. This means that the buyer bears all risks and any additional cost occurring after the goods have been so delivered. However, in CIP the seller also has to procure insurance against the buyer's risk of loss of or damage to the goods during the carriage. Consequently, the seller contracts for insurance and pays the insurance premium. The buyer should note that under the CIP term the seller is required to obtain insurance only on minimum cover'. Should the buyer wish to have the protection of greater cover, he would either need to agree as much expressly with the seller or to make his own extra insurance arrangements. "Carrier" means any person who, in a contract of carriage, undertakes to perform or to procure the performance of transport, by rail, road, air, sea, inland waterway or by a combination of

such modes. If subsequent carriers are used for the carriage to the agreed destination, the risk passes when the goods have been delivered to the first carrier. The CIP term requires the seller to clear the goods for export. This term may be used irrespective of the mode of transport, including multimodal transport

DDU - DELIVERED DUTY UNPAID (... named place of destination)

"Delivered duty unpaid" means that the seller delivers the goods to the buyer, not cleared for import, and not unloaded from any arriving means of transport at the named place of destination. The seller has to bear the costs and risks involved in bringing the goods thereto, other than, where applicable, any "duty" (which term includes the responsibility for and the risks of the carrying out of customs formalities, and the payment of formalities, customs duties, taxes and other charges) for import in the country of destination. Such "duty" has to be borne by the buyer as well as any costs and risks caused by his failure to clear the goods for import in time. However, if the parties wish the seller to carry out customs formalities and bear the costs and risks resulting there from as well as some of the costs payable upon import of the goods, this should be made clear by adding explicit wording to this effect in the contract of sale. This term may be used irrespective of the mode of transport but when delivery is to take place in the port of destination on board the vessel or on the quay (wharf), the DES or DEQ terms should be used.

DDP - DELIVERED DUTY PAID (... named place of destination)

"Delivered duty paid" means that the seller delivers the goods to the buyer, cleared for import, and not unloaded from any arriving means of transport at the named place of destination. The seller has to bear all the costs and risks involved in bringing the goods thereto including, where applicable, any "duty" (which term includes the responsibility for and the risk of the carrying out of customs formalities and the payment of formalities, customs duties, taxes and other charges) for import in the country of destination. Whilst the EXW term represents the minimum obligation for the seller, DDP represents the maximum obligation. This term should not be used if the seller is unable directly or indirectly to obtain the import license. However, if the parties wish to exclude from the seller's obligations some of the costs payable upon import of the goods (such as value-added tax: VAT), this should be made clear by adding explicit wording to this effect in the contract of sale. If the parties wish the buyer to bear all risks and costs of the import, the DDU term should be used. This term may be used irrespective of the mode of transport but when delivery is to take place in the port of destination on board the vessel or on the quay (wharf), the DES or DEQ terms should be used.

5 Q-MAC WARRANTY POLICY

Q-MAC Electronics Pty Ltd ('the Company') warrants all products designed/manufactured by the Company to be free of faults arising from defects in workmanship and/or materials.

In the event that the product is proven faulty within the prescribed period, the Company will remedy such fault at no charge to the end user, provided the product is returned to the Company or to one of its Authorised Dealers in accordance with published procedures. The standard prescribed period is 3 (three) years from the date of shipment (to the end user). Where an extended warranty has been pre-paid at the time of initial equipment purchase, the prescribed period will be the standard prescribed period plus the period of the extended warranty.

This Warranty shall not apply where:

- the product has been subject to abuse or accidental damage;
- the product has been installed, adjusted or repaired by anyone other than an Authorised Dealer;
- the product has been installed, operated, adjusted or repaired, other than in accordance with instructions issued by the Company;
- the serial label attached to the product has been defaced or removed.

In addition, this Warranty shall not apply to:

- the distance or terrain over which transceiver products will operate, or ...
- the quality of transmission or reception as a result of unfavourable environmental conditions.

This Warranty shall only apply to:

- products designed, manufactured and supplied by the Company. This presently includes the HF-90 Transceiver, HF-90M Transceiver, TA-99 Tuner, ML-90 Tuner, ML-90 Antenna, TA-90 Tuner, and DTMF keypads which the Company has designed and manufactured.

In all other cases, the Company will make every endeavour to ensure that the end user receives full benefit of any warranty given by the manufacturer. Note that batteries are considered a consumable item and are not covered by this warranty.

WARRANTY OF REPAIRS OR REPLACEMENTS

Repairs conducted on warranty items are warranted for 6 (six) months or the balance of the original warranty – whichever is the longer. Repairs conducted on non-warranty items are warranted for 6 (six) months.

WARRANTY CONDITIONS

Items requiring warranty repair or replacement will be subject to approval by the company. Goods must be suitably packaged for airfreight and be marked "freight pre-paid". The company reserves the right to reject any packages sent for warranty repair where the freight has not been pre-paid or goods have been inadequately packaged resulting in freight damage.

Subject to the terms of this Warranty, no liability (express or implied) is accepted for any consequential loss or damage resulting from a fault in the product. All guarantees (express or implied) concerning quality or fitness for purpose are hereby expressly excluded.

6 PRODUCT INDEX AND SUMMARY

Q-MAC PART NO.	DESCRIPTION	WEIGHT	PAGE
96003	RXMP Module	0.15	33
96004	PASW Module (HF-90M)	0.45	34
96005	Font Panel Module (HF-90M)	0.20	33
MX9000	HF-90M Ultra-Light Manpack	5.00	5
MX9011	HF-90M Monoblock Manpack 7Ah	11.00	7
MX9011b	HF-90M Monoblock Manpack (minus battery)	9.00	7
MX9011c	HF-90M Monoblock Manpack 3.5Ah	10.00	7
MX9015	HF-90M Military Grade Vehicle Package	10.00	11
MX9015i	HF-90M Military Grade Integrated Vehicle Package	10.00	12
MX9019	HF-90M Integrated Base Station Package	42.00	14
MX9024	HF-90M High Powered Base Station	65.00	13
MX9027	HF-90M ML-90 NVIS Roof Rack Antenna (Fixed TXCVR)	110.00	10
MX9027b	HF-90M ML-90 Short NVIS Roof Rack Antenna Package (fixed)	100.00	10
QM1002M	HF-90M Programming Package and Cable	1.00	32
QM1021	HF-90 Technical Manual	0.35	32
QM2101	TA-99 Automatic Tuner	0.90	18
QM3001	BNC/ PL259 Adaptor	0.05	31
QM4006M	Commercial DTMF Pedestal Microphone with military connector	1.00	30
QM4014	Military Handset DTMF Mil-Std	0.45	29
QM4016	Military Handset no DTMF Mil-Std	0.45	29
QM4021M	External Mount Speaker with audio mute	TBA	30
QM4042M	Headphones military grade, military connector	0.45	30
QM4051M	CW Option and Telegraph Key (military grade)	1.00	30
QM4061M	HF-90M Data Interface Unit with military connectors	1.00	31
QM4081M	Voice Enunciator Box	1.00	33
QM4082	Antenna Current Meter	2.00	32
QM4083	Field Service Tool	1.00	33
QM5001M	Power supply lead – HF-90M (4.5m)	2.00	30
QM5002M	DC Power cable (600mm) - HF-90M to portable battery	0.10	30
QM5021	HF-90M vehicle antenna coax cable (4.5m)	0.25	31
QM5022	HF-90M base station antenna coax cable (30m)	1.50	31
QM5043	TA-90 Power Cable (4.5m)	0.25	
QM5051M	Programming cable c/w Adaptor (military grade)	0.30	31
QM5053	TA-90 High Voltage Antenna Feed Cable (500mm)	0.05	21
QM5064	TA-90 to HF-90M Coaxial Cable (120mm)	0.01	31
QM5068	TA-90M to HF-90M Coaxial Cable (320mm)	0.02	31
QM5078	ML-90 DC Feed Adaptor Cable (5.5m)	0.30	21
QM6000	UltraLight Backpack for Monoblock	1.00	28
QM6006	Military Grade, all welded backpack frame	9.00	28
QM6017	Pelican 1300 Case	0.80	28
QM6052M	HF-90M Vehicle Installation Kit	1.30	29
QM6061	Mounting Cradle	0.35	29
QM6063	Mounting Cradle for HF-90M on TA-90M	1.00	29
QM6071	TA-90 Mounting Kit	2.45	21
QM7001	Fixed Broadband Dipole Antenna – Single wire	3.00	22
QM7002	Fixed Broadband Dipole Antenna – Multi Wire	9.00	23
QM7005	End Fed Portable Broadband Antenna – single wire	1.25	18
QM7021	Halyard Kit	0.60	23

Q-MAC PART NO.	DESCRIPTION	WEIGHT	PAGE
QM7022	Fixed Broadband Dipole Antenna – Mast Kit	13.00	23
QM7112M	TA-90M Auto-tune Antenna System	5.50	21
QM7113	ML-90 Auto-tune Antenna System (Rack and Tuner)	105.00	21
QM7121M	TA-90M Tuner (12V Version) (Mil Grade)	2.40	21
QM7131	Continuously Loaded Whip Antenna	0.65	22
QM7136	Antenna Base Assembly	0.65	22
QM7137	Pair 60mm C-Clamps	0.30	22
QM7301	Collapsible Whip Antenna (6 section)	0.30	18
QM7302	Collapsible Whip Antenna (2 section)	0.20	18
QM7303	Collapsible Whip Antenna (8 section)	0.30	19
QM7304	Collapsible Whip Antenna (4 section)	0.20	19
QM7309	Tape Whip Antenna	0.20	19
QM7310	Long Wire Antenna Kit	0.45	20
QM7311	Long Wire Antenna Only	0.15	20
QM7312	Counterpoise	0.10	20
QM7313	Long Wire Antenna Adaptor	0.05	20
QM7351	Antenna Extender Coil Section	0.20	19
QM7601M	TA-90M Upgrade from 12V to 24V Version	0.00	22
QM7801	Heavy Duty Antenna Base & Spring	1.50	22
QM7810	TA-90 Antenna Spring	1.35	22
QM7821	Antenna Angle Adaptor	0.10	19
QM8000M	AC Mains Lithium Battery Charger (2A) to suit Military Batteries	1.50	25
QM8005M	AC Mains Lithium Charger (1A)	0.25	25
QM8010	Lithium Ion Replacement Battery Cell Pack (7.6Ah)	1.00	25
QM8011	Rechargeable Battery (7Ah)	2.55	24
QM8020M	Fold-up Solar Panel Charger – Lithium Only	1.50	26
QM8021M	Fold-up Solar Panel Charger with Military Connector	1.30	26
QM8022	AC Mains Charger (2A)	0.70	27
QM8022M	AC Mains Charger (2A) Fast Charger with Military Connector	1.00	26
QM8024M	Step-Up Battery Charging Device, Military Connector	0.30	26
QM8028M	Hand Crank Generator (with mounts), Military Connector	2.70	27
QM8051M	Battery Condition Monitor, Military Connector	0.10	27
QM8100	MIL-STD 7.6Ah Lithium Ion Battery Pack	1.50	24
QM8100b	MIL-STD 7.6Ah Lithium Ion Enclosure Only	0.50	25
QM8101	Military Grade 7Ah SLA Battery	3.50	24
QM8101b	Military Grade 7Ah SLA Battery Enclosure Only	1.00	24
QM8110	MIL-STD 15.2Ah Lithium Ion Battery Pack	2.50	25
QM8110b	MIL-STD 15.2Ah Lithium Ion Enclosure Only	1.00	25
QM9056	Advanced Option #6	0.20	16
QM9059	Advanced Option #9	0.20	16
QM9061	Frequency Hopping Option (factory fitted)	0.05	17
QM9062	Frequency Hopping Option (suits late model HF-90)	0.15	17
QM9082M	Base Station Data Package – Military Data Interface Unit	4.00	15
QM9101	Transceiver – Military Grade 810F	1.55	16
QM9501M	Fan Option (modular)	0.07	31

7 DATA SECTION

7.1 HF-90M GOLDEN RULES

Use of an adequate power supply and cabling is critical to the correct functioning of the HF-90M family of transceivers. Unless adequate current is supplied to the transceiver, poor performance will result.

Do not attempt to operate the HF-90M directly from a battery charger while the battery is disconnected. Although no damage will occur to the HF-90M, it will not operate correctly.

Using the HF-90M while float charging the battery may reduce the performance of the receiver due to noise generated by the battery charger.

Always ensure that the power cable connecting the transceiver to the power source is at least the same diameter as that originally supplied with the equipment. If the distance between the transceiver and power supply is increased, then the diameter of the power cable will probably need to be increased also. The greater the distance between the transceiver and the power supply, the heavier gauge of cable required.

The HF-90M can operate on voltages down to around 10VDC. Receiver performance will remain fairly constant, however the transmit output power will be reduced at voltages lower than 13.8VDC.

Due to its small size and its high power rating the HF-90M dissipates a significant amount of heat and consequently gets quite hot after extended periods of transmitting. This is normal and not a cause for concern. The radio has been designed to operate with a heatsink temperature (rear of the radio) in excess of 80°C.

7.2 BATTERIES

Correct use and maintenance of rechargeable batteries is essential to providing trouble-free performance of your portable radio system. Q-MAC supplies different batteries for different applications. The charging requirements vary depending on the type of battery being used.

Lead Acid batteries require a constant voltage charge and may be recharged at any time in their discharge cycle. e.g. recharge after use. They should not be left in a discharged state for extended periods. (Nominal cell voltage: 2V.)

Nickel Cadmium (NiCd) batteries require a constant current charge and should preferably be recharged at the end of their discharge cycle. i.e. recharge after being completely discharged. NiCd batteries are susceptible to "memory effect". This occurs when batteries are recharged before they are fully discharged, decreasing the ability of the cells to accept a charge, therefore reducing the capacity of the batteries. (Nominal cell voltage: 1.2V.)

Nickel Metal Hydride (NiMH) is more expensive than NiCd, and can be up to 30% – 40% more capacity than a NiCd battery of the same size and is less susceptible to memory effect. Like NiCad batteries, NiMH batteries prefer a constant current charge. (Nominal cell voltage: 1.2V.)

Lithium Ion (Li-ion) batteries have higher energy density per unit of volume & weight than other battery types (three times as much as NiCd). Li-ion batteries do not suffer from memory effect. Charging a Li-ion battery requires a two-stage process – constant current followed by constant voltage – making Li-ion battery chargers more complex. (Nominal cell voltage: 3.6V.)

NOTE: Battery chargers are not universally interchangeable. Always use an approved charger when charging your batteries.

SAVE MONEY by ordering portable packages with the 'B' suffix and purchasing equivalent batteries locally to reduce freight costs!

7.3 THE EFFECT OF POWER OUTPUT ON RANGE

There is much misunderstanding on the topic of power output and range achieved by HF communication systems. Two different propagation modes exist for HF communication. These are Skywave and Groundwave.

7.3.1 GROUNDWAVE

Field strength on groundwave varies with range and soil type.

At close range over dry ground, a 12dB increase in power is required to double the range. At longer range, a 20dB increase in power is required to double the range.

Limit range on groundwave can be as little as 10km over sand or as much as 100km over seawater. A change of output power from 50watt to 130watt is only 4dB and consequently has only a very small effect on achievable range – typically 2%. There is often more than 4dB difference between the efficiencies of different manufacturer's vehicle antenna tuners so that a 50-Watt radio can outperform a 130-Watt radio if the antenna tuner is more efficient.

7.3.2 SKYWAVE

Many users of HF links use Skywave in the 100-500km range. This is considered as NVIS, Near Vertically Incident Skywave, where the signal bounces directly back from the ionosphere. A horizontally polarized antenna is used which has high angle radiation. The received signal is essentially constant over a radius of 500km. The signal to noise ratio is good if the correct frequency is chosen and a 4dB difference in signal level is not detectable. The correct frequency is one a little beneath the CRITICAL frequency, which can be found by studying ionosondes available at <http://www.ips.oz.au>. The critical frequency rises to about 9MHz at noon during a sunspot maximum and is as low as 5MHz at noon during a sunspot minimum. Vertical whip antennas on vehicles are not well suited for this mode of operation and are often bent back to increase the horizontal radiation.

For longer distance communication of 1000km and beyond power becomes a more significant issue. However, 4dB change will not help significantly. At least 10dB increase in power is necessary to make a worthwhile difference. This would mean increasing from 50watt to 500watt. In fixed station use, the utilization of a beam antenna should be considered for higher frequency long distance working.

7.3.3 Noise

Most HF systems are limited by external noise level if operation is on frequencies below 10MHz. Atmospheric noise due to thunderstorm activity varies by up to 50dB between summer and winter. It is highest in summer and lowest in winter. Man-made power line and other noise can also vary by 50dB, being very severe in urban environments where overhead power lines and computers are present.

Relative to a 50dB variation, 4dB change is vanishingly small and so in circumstances where a 50-Watt signal won't get through, a 130-Watt signal won't get through either.

7.4 ANTENNA BASICS

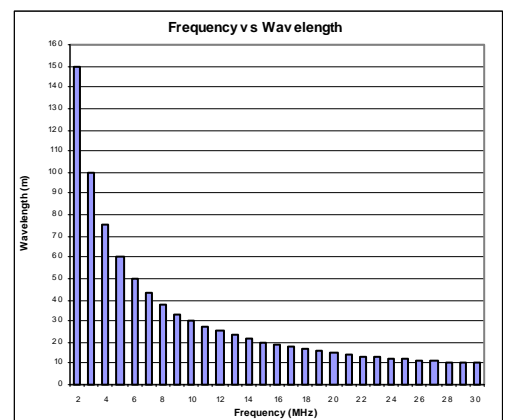
Why Do I Need Such A Long Antenna?

The relationship between frequency and wavelength is inversely proportional. That is, the lower the frequency, the longer the antenna. (Refer to graph) Generally, antennas that are less than ¼ wavelength in length, will not perform as effectively – shorter antennas are a compromise between what is practical and what is still effective.

In addition to the various whip antennas, Q-MAC Electronics supplies three different classes of wire antennas.

Details of these wire antennas are as follows...

Q-MAC Electronics supplies three different classes of wire antennas.



Broadband Dipole

These antennas are balanced antennas and consequently do not depend on a ground connection to form part of the antenna system. They contain elements which terminate the incident wave rendering them essentially broadband. They do not require an antenna tuning unit and work well over short to medium (0-1000km) ranges with moderate elevation (5-10m) and at longer range (>1000km) with higher elevation (20m).

Endfed Broadband

These antennas are unbalanced monopole antennas and a ground connection is a vital part of the antenna system. They contain elements which terminate the incident wave rendering them essentially broadband. They do not require an antenna tuning unit and work well over short to medium (0-1000km) ranges with moderate elevation (5-10m) and at longer range (>1000km) with higher elevation (20m).

Long Wire Antenna

This antenna is frequency conscious and requires both an antenna tuning unit and a good ground connection in order to maximize the radiated power. The length of the wire is typically less than a quarter wavelength and a variable inductor within the antenna tuner is used to add effective length to the wire. If ground conductivity is poor, a wire "counterpoise" can be used as an alternative to a ground connection.

Whip Antenna

This is a special case of the Long Wire Antenna where the wire is replaced by a short rod. For a Manpack Package, the users body, or the ground on which the manpack rests, forms the ground system. As a result of the poorer ground and shorter antenna length, the performance of whip antennas is significantly less than wire antennas.

7.5 PRACTICAL ANTENNA PERFORMANCE

The following distances should be indicative with respect to Q-MAC Manpack antenna systems. In each instance, it is assumed that the Manpack is communicating with a base station utilising a QM7002 Broadband Dipole Antenna or similar wire antenna.

Product Code	Description	Ground wave	Sky wave
	MANPACK ANTENNA TUNERS		
QM7301	6-section collapsible whip antenna	5-10km max	150km- 600km
QM7301 QM7351	6-section collapsible whip antenna used in conjunction with Extender coil.	5-10km max	Not suited to sky wave
QM7302	2-section collapsible whip antenna	2-5km max	150km – 400km
QM7310	Long wire antenna kit	5-30km max	150km – 1000km
	ANTENNA NOT REQUIRING TUNER		
QM7005	Portable Broadband Antenna	5-30km max	150km – 1000km

The above distances are of course subject to correct deployment of the antenna systems in question, frequencies in use, time of day, propagation conditions etc. They are only indicative. Refer to the tables below.

Effective Short Range Communication (Ground Wave) is Dependent On:

Frequency used	Lower frequency provides greater distance
Conductivity of terrain	Less conductivity provides less distance (e.g. <5km over very dry land) High conductivity provides greater distance (e.g. 100km+ over sea)
Noise floor of frequency used	Increased noise reduces usability

N.B. The overriding factor for effective communications via ground wave is the conductivity of the terrain.

Effective Long Range Communication (Skywave) is Dependent On:

Frequency used	Shorter distance covered using lower frequency Longer distance covered using higher frequency
Time of day	A given frequency covers greater distance at night
Season	A given frequency covers greater distance during winter months
Time in sunspot cycle	A given frequency covers less distance during high sunspot activity
Noise floor of frequency used	Increased noise reduces usability

N.B. The overriding factor for effective communications via skywave, is the appropriate selection of frequency.

7.6 Q-MAC AUTOMATIC ANTENNA TUNERS

Installation:

Most Q-MAC automatic antenna tuners rely on being powered by the DC voltage on the RF coaxial cable from the transceiver. This provides a more efficient method of installation by reducing the interconnecting cables in the radio system.

Testing:

If a technician is required to test the operation of the antenna system containing a Q-MAC automatic antenna tuner, then it is recommended that an Antenna Current meter (QM4082, on page 32) is used instead of a VSWR meter. Attempting to use a VSWR meter will block the DC voltage from the HF-90M transceiver therefore preventing the tuner from functioning.

7.7 USEFUL HF PROPAGATION WEBSITES

Australian Government:	
IPS Radio and Space Services	http://www.ips.oz.au/
Solar Terrestrial Dispatch:	
Near Real-Time Maximum Usable Frequency (MUF) Map	http://www.spacew.com/www/realtime.html