

CONFIDENTIAL



Q-MAC ELECTRONICS

**COMMERCIAL PRODUCTS
CATALOGUE**

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1 IMPORTANT NOTES ABOUT THIS CATALOGUE

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-90 PACKAGES

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

To upgrade to an Advanced Model HF-90 with any of these packages, add the Advanced Option (Part No. QM9051/2/3/4/7/8).

To upgrade to a Frequency Hopping Model HF-90 with any Advanced Model, add the Frequency Hopping Option (Part No. QM9061/2/3).

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 QM9013 HF-90 Manpack

COMMUNICATE WHILE ON FOOT

The Q-MAC HF-90 Manpack is a portable, instant-deployment HF SSB Radio Communication System, incorporating the Q-MAC HF-90 Transceiver. This package is designed for applications where the operator requires medium to long range communications whilst on foot. It is ideal where mobility is of paramount importance, given that it is compact, lightweight and comfortable to carry for long periods. It may be used whilst carried on the operator's back, or when placed on the ground.

Applications:

The Q-MAC HF-90 Manpack is ideal for a variety of applications including international aid projects, military/paramilitary applications, search and rescue, mineral exploration, forestry management, conservation and wildlife projects.



(Pictured with Advanced Option and Backpack Upgrade)

Includes:-

- HF-90 transceiver complete with speaker microphone
- TM-90 Manual Tuner complete with coaxial & earth cables
- Collapsible whip antenna (6-section), frequency range of 3.6-10MHz when used with TM-90
- Long wire antenna kit, frequency range of 2.5-10MHz when used with TM-90
- Rechargeable battery (7 Ah) complete with power cable and battery condition monitor
- Canvas backpack complete with support stakes

(7.50kg)

3.1.2 QM9013b HF-90 Manpack (minus battery)

Includes:-

- All items mentioned above, except for the battery.



(4.95kg)

3.1.2.1 Available Advanced Options



QM9052 Advanced Option #2

Software and hardware upgrade to convert Standard HF-90 to an Advanced HF-90. Includes replacing standard speaker microphone with DTMF speaker microphone (QM4003).

Advanced Software Features include:

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

(+0.10kg)



QM9054 Advanced Option #4

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard speaker microphone with a DTMF telephone handset (QM4013) - suited to all packages. Includes Advanced Software Features (as per Option #2)

(+0.20kg)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial grade connector (QM4015) - suited to commercial HF-90 packages where rugged and/or very low temperature operation is required.

(+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.

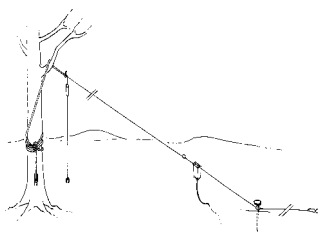
Features include:-

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

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)

3.1.2.2 Suggested Optional Items (not included with package):



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

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

(0.20kg)



QM2102 TM-90 to TA-99 Product Upgrade for new product orders only.

Replaces TM-90 Manual Tuner to a TA-99 Auto Tuner in QM9013 Manpack.

(0.0kg)



QM8024 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.

(0.30kg)



QM8022 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 appropriate connector. Supplied with specified AC mains plug to suit local AC socket.

(0.70kg)



QM8021 Fold-up Solar Panel Charger

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

(1.30kg)



QM8028 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) and tree-mount with strap.

(2.70kg)



QM8011 Rechargeable Battery (7 Ah)

12V, 7 Ah, sealed lead acid gel battery (non-hazardous for freight purposes). As supplied with most HF-90 Manpack/Portable Packages.

(2.55kg)

QM9071 Backpack Upgrade

Replaces standard backpack with military grade framed backpack

(1.30kg)

3.1.3 QM9012 HF-90 Portable Package

AN HF RADIO SYSTEM IN A COMPACT PORTABLE PACKAGE

The Q-MAC HF-90 Portable Package is designed for applications where the operator requires reliable long distance communications in a compact portable format. It is simple to use and fully self contained, incorporating its own rechargeable battery system and a simple roll-out antenna for rapid deployment.

Applications:

The Q-MAC HF-90 Portable Package is ideal for a variety of applications including international aid projects, mineral exploration, search and rescue, conservations and wildlife, forestry management and remote area 4WD use.



(8.10kg)

Includes:-

- HF-90 transceiver complete with microphone.
- Portable broadband antenna (STD version) complete with deployment accessories.
- Rechargeable battery (7 Ah) complete with power cable and battery condition monitor.
- Hard carry case complete with built-in speaker with audio mute facility.

3.1.4 QM9012b HF-90 Portable Package (minus battery)



(5.55kg)

Includes:-

- All items mentioned above, except for the battery.

3.1.4.1 Available Advanced Options



QM9051 Advanced Option #1

Software and hardware upgrade to convert Standard HF-90 to an Advanced HF-90. Includes replacing standard speaker microphone with DTMF microphone (QM4002) (does not include speaker) and allowing front end programming for reprogramming channel information in the field, without the use of a computer.

(+0.10kg)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial grade connector (QM4015) - suited to commercial HF-90 packages where rugged and/or very low temperature operation is required.

(+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

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)

3.1.4.2 Suggested Optional Items (not included with package):



QM8024 DC Step-Up Battery Charging Device

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

(0.30kg)



QM8022 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 appropriate connector. Supplied with specified AC mains plug.

(0.70kg)



QM8021 Fold-up Solar Panel Charger

Suits Q-MAC SLA Rechargeable Batteries - 10.8 Watt rated power, complete with extension cable and appropriate connectors. Comprises five panels, which fold into a compact canvas pouch. Standard colour is black.

(1.30kg)

3.1.5 QM9023 HF-90 MiniPack

AN HF RADIO SYSTEM IN A SMALL PORTABLE PACKAGE

The Q-MAC HF-90 MiniPack is the world's smallest high-power (50W) portable HF SSB radio communications system. The entire package, comprising transceiver, microphone, broadband antenna system and battery system, is contained within a rugged Pelican® Case. When closed, the package is fully waterproof (submersible) and is easily carried by hand, on the back of any motorcycle, on a boat, or even by pack animal.

Applications:

The Q-MAC HF-90 Portable Package is ideal for a variety of applications including international aid projects, mineral exploration, search and rescue, conservations and wildlife, forestry management and remote area 4WD use. Its small size also makes it useful for covert operations.



Includes:-

- HF-90 transceiver complete with speaker microphone.
- MiniPack broadband antenna.
- MiniPack rechargeable battery (4 Ah) complete with power cable.
- Pelican® 1200 case.

(3.65kg)

3.1.5.1 Available Advanced Options



QM9052 Advanced Option #2

Software and hardware upgrade to convert Standard HF-90 to an Advanced HF-90. Includes replacing standard speaker microphone with DTMF speaker microphone (QM4003) and allowing front end programming for reprogramming channel information in the field, without the use of a computer.

(+0.10kg)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial connector (QM4015) - suited to commercial HF-90 packages.

(+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

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)

3.1.5.2 Suggested Optional Items (not included with package):



QM8025 MiniPack AC Mains Charger

Compact charger to suit HF-90 MiniPack - 100-250 Volt AC input, 12 Volt DC nominal, 900mA limited current. Supplied with specified AC mains plug (2-pin).

(0.25kg)



QM8021 Fold-up Solar Panel Charger

Suits Q-MAC SLA Rechargeable Batteries - 10.8 Watt rated power, complete with extension cable and appropriate connectors. Comprises five panels, which fold into a compact canvas pouch. Standard colour is black.

(1.30kg)



QM7020 MiniPack broadband antenna

Includes end-fed broadband antenna, 2-30MHz, 100Watt rating, with miniature counterpoise and earth stake.

(0.20kg)



QM8024 DC Step-Up Battery Charging Device

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

(0.30kg)



QM8051 Battery Condition Monitor

Monitors battery charge level via a series of LED indicators. As supplied with the HF-90 Manpack and HF-90 Portable Packages.

(0.10kg)

3.1.6 QM9025 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-90 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

Dimensions:-

- 1.8m(L) x 1.25m(W)

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

(100.00kg)

3.1.7 QM9025b 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.

(90.00kg)

3.1.7.1 Available Advanced Options



QM9051 Advanced Option #1

Software and hardware upgrade to convert Standard HF-90 to an Advanced HF-90. Includes replacing standard speaker microphone with DTMF microphone (QM4002) (does not include speaker) and allowing front end programming for reprogramming channel information in the field, without the use of a computer.

(+0.10kg)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial grade connector (QM4015) - suited to commercial HF-90 packages where rugged and/or very low temperature operation is required.

(+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-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)

3.1.8 QM9026 ML-90 NVIS Roof Rack Antenna Vehicle Package (with Portable Transceiver Package)

IMPROVED NVIS PERFORMANCE PORTABLE TRANSCEIVER FROM A VEHICLE INSTALLATION

The Q-MAC ML-90 Roof Rack Antenna Vehicle Package (removable 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.

The removable portable transceiver package provides the additional benefit of use away from the vehicle via an end-fed broadband antenna included in a self-contained package with battery.

Applications:

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



Includes:-

- ML-90 Auto-tune Antenna system.
- HF-90 Portable Package
- DC Step-up Battery Charger
- ML-90 cables and connectors
- ML-90 installation kit including roof-rack mounting hardware

Dimensions:-

- 1.8m(L) x 1.25m(W)

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

(107.00kg)

3.1.9 QM9026b 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.

(97.00kg)

3.1.9.1 Available Advanced Options



QM9051 Advanced Option #1

Software and hardware upgrade to convert Standard HF-90 to an Advanced HF-90. Includes replacing standard speaker microphone with DTMF microphone (QM4002) (does not include speaker) and allowing front end programming for reprogramming channel information in the field, without the use of a computer.

(+0.10kg)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial grade connector (QM4015) - suited to commercial HF-90 packages where rugged and/or very low temperature operation is required.

(+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-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)

3.1.9.2 Suggested Optional Items (not included with package):



QM8024 DC Step-Up Battery Charging Device

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

(0.30kg)



QM8022 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 appropriate connector. Supplied with specified AC mains plug.

(0.70kg)



QM8021 Fold-up Solar Panel Charger

Suits Q-MAC Rechargeable SLA Batteries - 10.8 Watt rated power, complete with extension cable and appropriate connectors. Comprises five panels, which fold into a compact canvas pouch. Standard colour is black.

(1.30kg)



QM8011 Rechargeable Battery (7 Ah)

12V, 7 Ah, sealed lead acid gel battery (non-hazardous for freight purposes). As supplied with most HF-90 Manpack/Portable Packages.

(2.55kg)

3.1.10 QM9015 HF-90 Vehicle Package (whip antenna)

CONVENTIONAL HF VEHICLE INSTALLATION

The Q-MAC HF-90 Vehicle Package is an HF SSB radio communication system designed for long-range mobile applications. The small footprint of the HF-90 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.

Applications:

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



Includes:-

- HF-90 transceiver complete with microphone and DC power cable
- Vehicle installation kit complete with mounting cradle & external mount speaker with audio mute facility
- TA-90 auto-tune antenna system
- TA-90 mounting hardware

Compatible with HF-90 Frequency Hopping Option/Upgrades in Frequency Range approx. 4 to 20 MHz. Specify 12V or 24V version at time of order.

(9.55kg)

3.1.10.1 Available Advanced Options



QM9051 Advanced Option #1

Software and hardware upgrade to convert Standard HF-90 to an Advanced HF-90. Includes replacing standard speaker microphone with DTMF microphone (QM4002) (does not include speaker) and allowing front end programming for reprogramming channel information in the field, without the use of a computer.

(+0.10kg)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial grade connector (QM4015) - suited to commercial HF-90 packages where rugged and/or very low temperature operation is required.

(+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

*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)

3.1.11 QM9024 HF-90 High Powered 500 Watt Base Station Package (complete)

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

The Q-MAC HF-90 500W Base Station Package is designed for critically important fixed base station use. It includes an HF-90 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-90 500W Base Station Package is ideal for national or regional headquarters, embassies, military and border patrol applications. With the HF-90 Frequency Hopping Option, secure HF networks can be implemented.



Includes:-

- HF-90 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
- Desktop pedestal DTMF microphone
- 3 wire centre-fed broadband dipole antenna (QM7002)
- 50m RG213 coax cable

(65.00kg)

3.1.11.1 Suggested Optional Items (not included with package):



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

*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)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial grade connector (QM4015) - suited to commercial HF-90 packages where rugged and/or very low temperature operation is required.

(+0.20kg)

3.1.12 QM9020 Integrated HF-90 Base Station

AN INTEGRATED HF-90 TRANSCEIVER BASE STATION

The Q-MAC HF-90 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 an integrated housing.

Applications:

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



(42.00kg)

Includes:-

- HF-90 transceiver
- Fist microphone
- 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 (QM7002)

3.1.12.1 Suggested Optional Items (not included with package):



QM9051 Advanced Option #1

Software and hardware upgrade to convert Standard HF-90 to an Advanced HF-90. Includes replacing standard speaker microphone with DTMF microphone (QM4002) (does not include speaker) and allowing front end programming for reprogramming channel information in the field, without the use of a computer.

(+0.10kg)



QM9058 Advanced Option #8

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Desktop gooseneck microphone (QM4006) with commercial grade connector.

(+0.20kg)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial grade connector (QM4015) - suited to commercial HF-90 packages where rugged and/or very low temperature operation is required.

(+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

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)

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)

3.1.13 QM9018 HF-90 Base Station Kit Package (complete)

A FIXED HF-90 TRANSCEIVER BASE STATION IN KIT FORM

The Q-MAC HF-90 Base Station Kit Package is ideal for rapid deployment of a field base station. The main components, including transceiver, battery and microphone, are all separate, providing flexible mounting arrangements.

Applications:

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

Includes:-

- HF-90 transceiver complete with microphone and DC power cable
- Mounting cradle
- 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 (QM7002)



(37.00kg)

3.1.14 QM9018b HF-90 Base Station Package (minus battery)



Includes:-

- All items mentioned above, except for the battery.

(35.00kg)

3.1.14.1 Suggested Optional Items (not included with package):



QM9051 Advanced Option #1

Software and hardware upgrade to convert Standard HF-90 to an Advanced HF-90. Includes replacing standard speaker microphone with DTMF microphone (QM4002) (does not include speaker) and allowing front end programming for reprogramming channel information in the field, without the use of a computer.

(+0.10kg)



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

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)



QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial grade connector (QM4015) - suited to commercial HF-90 packages where rugged and/or very low temperature operation is required.

(+0.20kg)

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)

3.1.15 QM9082 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 HF90 package provides long range email and electronic chat capability over HF radio spectrum. The Wavemail software provides multi-user and multi-site routing.

Compatible with:
Base Station
Vehicle Manpack
High Powered Base Station



Includes:-

- Swiss PTC Modem
- Wavemail software
- Interface unit and cables
- Fan

(4.00kg)

3.1.16 QM9022 HF-90 Disaster Response Package

A MULTIPLE APPLICATION SOLUTION

The Q-MAC HF-90 Disaster Response Package is a transportable "all in one" package incorporating the Q-MAC HF-90 transceiver. Along with the HF-90, the package contains a variety of antennas, power / charger systems, carry packs / cases, and mounting accessories. The operator can set up either of the following system: Manpack, Portable, Vehicle, and Base Station.

Applications:

The Q-MAC HF-90 Disaster Response Package is ideal for humanitarian, emergency service and peace keeping organisations.



Includes:-

- HF-90 transceiver complete with advanced option (incl. DTMF microphone)
- TM-90 Manual Tuner complete with coaxial & earth cables
- Long wire antenna kit
- Collapsible whip antenna (6-section)
- Extender coil section
- Collapsible whip antenna (2-section)
- Portable broadband antenna
- TA-90 tuner complete with mounting kit
- Vehicle whip antenna (split configuration)
- 2 x Rechargeable battery (7 Ah)
- Battery condition monitor
- 2 x DC power cable (Manpack/portable use)
- 2 x DC power cable (vehicle/base use)
- AC mains power supply unit
- DC step-up battery charging device
- AC mains charger (2A)
- Fold-up solar panel charger
- AC multi-adaptor (Australian, European, UK & US plugs)
- Hard carry case
- Canvas backpack complete with support stakes
- Vehicle installation kit
- DTMF speaker microphone (spare)
- Q-MAC aluminium road case complete with combination lock

(47.00kg)

Additional transceivers and/or accessories may be added as required.

3.1.16.1 Suggested Optional Items (not included with package):



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

*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)



QM9001 HF-90 Transceiver

Spare transceiver to make up additional packages.

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
- Speaker microphone
- DC power cable (Part No. QM5001)

HF-90 Operation & Installation Guide included.

(+2.05kg)



QM9052 Advanced Option #2

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF speaker microphone (QM4003) - suited to QM9023, QM9013 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

(+0.10kg)

3.2 HF-90 TRANSCEIVER & OPTIONS

3.2.1 QM9001 HF-90 Transceiver – Standard Model

Suited to vehicle/base station applications.

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
- Speaker microphone
- DC power cable (Part No. QM5001)

HF-90 Operation & Installation Guide included.



(2.05kg)

3.2.2 QM9001b HF-90 Transceiver – Standard Model

Suited to portable and Manpack applications.

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
- Speaker microphone
- DC power cable (Part No. QM5002)

HF-90 Operation & Installation Guide included.



(1.55kg)

3.2.3 QM9051 Advanced Option #1

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF (QM4002) microphone (does not include speaker*) - suited to QM9012, QM9015, QM9018, QM9020, QM9025, QM9026 and QM9024 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

Advanced Option #1 requires external mount speaker (Part No. QM4021).



+(0.10kg)

3.2.4 QM9052 Advanced Option #2

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF speaker microphone (QM4003) - suited to QM9023, QM9013 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



+(0.10kg)

3.2.5 QM9053 Advanced Option #3

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard speaker microphone with a variable split-band frequency inversion voice scrambler built into the microphone. 16 codes selectable. Suited to all QM90xx 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

Note that the Frequency Hopping Option (Part No. QM9061/2/3) far exceeds the Scrambler with respect to voice security and voice quality.



+(0.10kg)

3.2.6 QM9054 Advanced Option #4

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard speaker microphone with a DTMF telephone handset (QM4013) – suited to all QM90xx 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)

3.2.7 QM9057 Advanced Option #7

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Mil-Std telephone handset with commercial connector (QM4015) - suited to commercial QM90xx HF-90 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)

3.2.8 QM9058 Advanced Option #8

Software and hardware option to convert a Standard Model HF-90 to an Advanced Model HF-90. Replaces standard microphone with a DTMF Desktop gooseneck microphone with commercial connector (QM4006) - suited to commercial QM90xx HF-90 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)

3.2.9 HF-90 Package / Options Matrix

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

<u>Package Part Number and Description</u>	<u>Advanced Option #</u>
QM9012 Portable Package	1, 2, 3, 4, 7
QM9013 Manpack Package	2, 3, 4, 7
QM9015 Vehicle Package (Whip Antenna)	1, 2, 3, 4, 7
QM9018 Base Station Package	1, 2, 3, 4, 7, 8
QM9020 Integrated Base Station	1, 2, 3, 4, 7, 8
QM9022 Disaster Response Package	(dependent on configuration)
QM9023 MiniPack	2, 3, 7
QM9024 High Powered 500 Watt Base Station Package	1, 2, 3, 4, 7, 8
QM9025 ML-90 NVIS Roof Rack Antenna Vehicle Package (fixed)	1, 2, 3, 4, 7
QM9026 ML-90 NVIS Roof Rack Antenna Vehicle Package (removable)	1, 2, 3, 4, 7

Notes:

1. Although Advanced Options 2, 4 and 7 may be used in all packages noted above, these are not normally used with those packages that include external speakers.
2. Although Advanced Option 3, scrambler may be used with any of the packages, the frequency hopping options listed below provide significantly better performance and protection against interception and jamming.

3.2.10 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

+(0.05kg)

*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.*

3.2.11 QM9062 HF-90 Frequency Hopping Option (Suits Late Model HF-90)

Enables complete protection against intercept and jamming, to a military standard. Includes firmware and extraction tool required to upgrade an HF-90 with Serial Number ≥ 3500 . 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

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)

3.2.12 QM9063 HF-90 Frequency Hopping Option (Suits Early Model HF-90)

Enables complete protection against intercept and jamming, to a military standard. Includes hardware and firmware required to upgrade an HF-90 with a Serial No. < 3500 . 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

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.

+(0.35kg)

3.3 ANTENNA SYSTEMS

3.3.1 Portable/Manpack Antenna Systems

3.3.1.1 QM2001 TM-90 Manual Tuner

Single-control tuner, incorporating LED tuning indicators. Suits collapsible whip, tape and long wire antennas. Supplied with coaxial and earth leads. As supplied with the HF-90 Manpack Package.



+(0.90kg)

3.3.1.2 QM2101 TA-99 Automatic Tuner

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



+(0.90kg)

3.3.1.3 QM2102 TM-90 to TA-99 Product Upgrade for new product orders only.

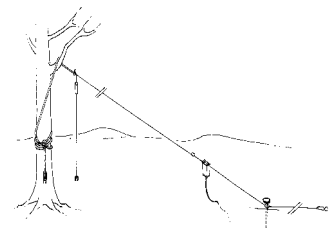
Replaces TM-90 Manual Tuner to a TA-99 Auto Tuner in QM9013 Manpack.



+(0.0kg)

3.3.1.4 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-90 Portable Package.



+(1.25kg)

3.3.1.5 QM7020 MiniPack Broadband Antenna - Spares Kit



Includes:-

- End-fed broadband antenna, 2-30 MHz, 100 Watt rating, made from light-gauge insulated wire, supplied on slim-line reel.
- Miniature counterpoise complete with earth clip.
- Earth stake.

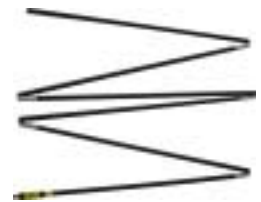
As supplied with the HF-90 MiniPack.

Note that this kit is not a complete independent antenna system. It requires the matching transformer box and coaxial connection, supplied as part of the mounting bracket within the HF-90 MiniPack. It is designed as a spares kit only.



+(0.20kg)

3.3.1.6 QM7301 Collapsible Whip Antenna (6-section)



High efficiency collapsible six section whip antenna (3m).
As supplied with the HF-90 Manpack.

Frequency coverage: when used with TM-90, Manual Tuner: 3.6-10MHz
 when used with TA-99, Automatic Tuner: 2-26MHz
 when used with TA-99 and Frequency Hopping: 4-26MHz

Collapsed length: 500mm



+(0.30kg)

3.3.1.7 QM7302 Collapsible Whip Antenna (2-section)



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

Frequency coverage: when used with TM-90, Manual Tuner: 4-12.9 MHz
 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)

3.3.1.8 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 TM-90, Manual Tuner: 4-12.9 MHz
 when used with TA-99, Automatic Tuner: 3.5-26MHz
 when used with TA-99 and Frequency Hopping: 3.5-26MHz



+(0.20kg)

3.3.1.9 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 whip antenna (6-section)).

Length: 500mm

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

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



+(0.20kg)

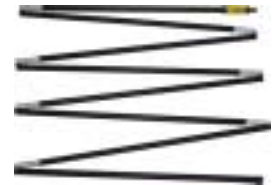
3.3.1.10 QM7303 Collapsible Whip Antenna (8-section)

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

As supplied with the HF-90 Manpack.

Frequency coverage: when used with TM-90, Manual Tuner: 3.6-10MHz
when used with TA-99, Automatic Tuner: 2-26MHz
when used with TA-99 and Frequency Hopping: 4-26MHz

Collapsed length: 390mm



+(0.30kg)

3.3.1.11 QM7304 Collapsible Whip Antenna (4-section)

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

Frequency coverage: when used with TM-90, Manual Tuner: 4-12.9 MHz
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)

3.3.1.12 QM7821 Antenna Angle Adaptor

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



+(0.10kg)

3.3.1.13 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 TM-90, Manual Tuner: 2.5-10 MHz
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 TM-90 and TA-99 tuners)
- Throw rope.

As supplied with the HF-90 Manpack and HF-90 Rapid-Use Portable Package.

+(0.45kg)

Spares for Long Wire Antenna Kit

3.3.1.14 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)

3.3.1.15 QM7312 Counterpoise

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

+(0.10kg)

3.3.1.16 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.
Specify 12V or 24V version at time of order.*

+(105.00kg)

3.3.2.2 QM7112 TA-90 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-90 Vehicle Package.

*Compatible with HF-90 Frequency Hopping Option/Upgrades in Frequency Range approx. 4 to 20 MHz.
Specify 12V or 24V version at time of order.*

+(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 (500mm), complete with lugs and convoluted split tubing. As supplied with the TA-90 Mounting Kit.

+(0.05kg)

3.3.2.5 QM5043 TA-90 Power Cable

Supplied complete with lugs and plastic connectors for fitting to HF-90 Transceiver power cable (Part No. QM5001). As supplied with the TA-90 Mounting Kit.

+(0.25kg)

3.3.2.6 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 (above).

+(2.45kg)

3.3.2.7 QM7121 TA-90 Tuner – (12 Volt Version)

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

+(2.40kg)

Partially compatible with HF-90 Frequency Hopping Option/Upgrades – from approx. 4 to 20 MHz.

3.3.2.8 QM7121a TA-90 Tuner (24 Volt Version)

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

+(2.40kg)

Partially compatible with HF-90 Frequency Hopping Option/Upgrades – from approx. 4 to 20 MHz.

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

TA-90 Upgrade 12 Volt to 24 Volt Version.

+(0.00kg)

3.3.2.10 QM7131 Continuously Loaded Whip Antenna

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

+(0.65kg)

3.3.2.11 QM7133 Continuously Loaded Whip Antenna (Split Configuration)

Rugged fibreglass construction with 1/2" BSW base. Comprises two separate parts that screw together for easy storage. Designed for use with the TA-90 Tuner. As supplied with the HF-90 Disaster Response Package.

+(0.80kg)

3.3.2.12 QM7136 Antenna Base Assembly

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

+(0.65kg)

3.3.2.13 QM7137 Pair 60mm C-Clamps

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

+(0.30kg)

3.3.2.14 QM7801 Heavy Duty Antenna Base and Spring

Suits manual-tap whip antennas - stainless steel construction.

+(1.50kg)

3.3.2.15 QM7810 Antenna Spring

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

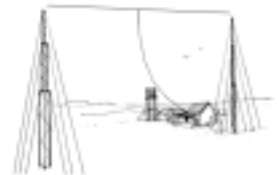
+(1.35kg)

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.

Not supplied with installation accessories.



(3.00kg)

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-90 Base Station Package.

Not supplied with installation accessories.



(9.00kg)

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 QM8011 Rechargeable SLA Battery (7 Ah)



12V (nominal), 7 Ah, sealed lead acid gel battery (non-hazardous for freight purposes). As supplied with most HF-90 Manpack/Portable Packages.

(2.55kg)

3.4.2 QM8004 MiniPack Rechargeable Battery (4 Ah)

12V, 4 Ah (2 x 2 Ah batteries in parallel), sealed lead acid gel battery (non-hazardous for freight purposes). Supplied in custom packaging for ready connection to HF-90 Transceiver complete with DC power cable and connector for charging devices. As supplied with the HF-90 MiniPack.

(1.20kg)

3.4.3 QM8010 Rechargeable Li-Ion Cell Pack (7.6 Ah)

14.8V (nominal), 7.6 Ah, Lithium Ion battery (non-hazardous for freight purposes).

(1.50kg)

3.4.4 QM8021 Fold-up Solar Panel Charger



Suits Q-MAC SLA Rechargeable Batteries - 10.8 Watt rated power, complete with extension cable and appropriate connectors. Comprises five panels, which fold into a compact canvas pouch. Standard colour is black.

(1.30kg)

3.4.5 QM8022 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 appropriate connector. Supplied with specified AC mains plug.

(0.70kg)

3.4.6 QM8024 DC Step-Up Battery Charging Device

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



(0.30kg)

3.4.7 QM8025 MiniPack AC Mains Charger (900mA)

Compact charger to suit HF-90 MiniPack - 100-250 Volt AC input, 12 Volt DC nominal, 900mA limited current. Supplied with specified AC mains plug (2-pin).



(0.25kg)

3.4.8 QM8005 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)

3.4.9 QM8000 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)

3.4.10 QM8028 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) and tree-mount with strap.



(2.70kg)

3.4.11 QM8031 AC Mains Power Supply Unit



115/230 Volt AC, 15 Amp desk-top unit, complete with over voltage/current protection and short circuit protection. Supplied with specified AC mains plug. As supplied with the HF-90 Base Station Package.

(1.50kg)

Requires 4.5m DC Power Cable (Part No. QM5001)

3.4.12 QM8032 Battery Changeover Switch

Monitors the 13.8V DC output from a PSU. Automatically switches to battery in the event of mains power failure, and back again when power is restored. Incorporates battery charging facility. Supplied with appropriate cables and battery lugs. As supplied with the HF-90 Base Station Package.

(0.75kg)

3.4.13 QM8041 AC Mains Multi-Adaptor

Accommodates Australian, European, UK and US style plugs (2-ways). As supplied with the HF-90 Disaster Response Package.

(0.20kg)

3.5 CARRY PACKS & CASES

3.5.1 QM6001 Canvas Backpack – standard

Custom designed single-unit backpack made from water resistant canvas, with fully padded and reinforced compartments to house the HF-90 and its accessories. Incorporates two s/steel support stakes. As supplied with the HF-90 Manpack & HF-90 Portable Package.

*Standard colours are Olive Drab or Blue.
Dimensions 545H x 275W x 160D mm.*

(1.50kg)

3.5.2 QM6003 Canvas Backpack on Frame

Custom designed modular backpack supplied on rugged frame. Made from water resistant canvas, with fully padded and reinforced compartments to house the HF-90 and its accessories. Modular format allows flexibility with respect to the configuration.

*Standard colours are Olive Drab or Blue.
Dimensions 510H x 400W x 300D mm (including frame and waist support).*

(2.80kg)

3.5.3 QM6014 Hard Carry Case

Custom designed weatherproof hard carry case with reinforced interiors. Extremely rugged and floatable. Incorporates speaker with audio mute facility mounted internally (under the lid) and earth lead (to TM-90 Tuner). As supplied with the HF-90 Rapid-Use Portable Package and HF-90 Portable Package.

*Standard colour is Grey.
Dimensions:- 320H x 275W x 205D mm.*

(2.70kg)



3.5.4 QM6015 Pelican[®] 1200 Case

Extremely rugged and fully-waterproof (submersible) case. As supplied with the HF-90 MiniPack.

*Standard colours are Black or Yellow.
Inside Dimensions:- 240H x 185W x 110D mm
Outside Dimensions:-273H x 247W x 127D mm.*

(0.80kg)

3.5.5 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)

3.5.6 QM6020 Aluminium Road Case



Custom designed weatherproof aluminium road case complete with compartments to house the HF-90 Transceiver along with its many accessories. Supplied with combination lock. As supplied with the HF-90 Disaster Response Package.

Dimensions:- 280H x 680W x 780D mm.

(20.00kg)

3.6 OTHER PARTS & ACCESSORIES

3.6.1 Installation Accessories

3.6.1.1 QM6052 HF-90 Vehicle Installation Kit

Includes:-

- Mounting cradle
- External mount speaker with audio mute facility
- 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-90 Vehicle Package.

(1.30kg)

DC power cable (Part No. QM5001) is not included with the HF-90 Vehicle Installation Kit. It is supplied together with the HF-90 Transceiver (Part No. QM9001) or on its own.

3.6.1.2 QM6061 Mounting Cradle

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

(0.35kg)

3.6.2 Fist Microphones

3.6.2.1 QM4001 Speaker microphone



For use with Standard Model HF-90.

(0.20kg)

3.6.2.2 QM4002 DTMF microphone



For use with Advanced Model HF-90. Requires external speaker.

(0.25kg)

3.6.2.3 QM4003 DTMF microphone complete with built-in speaker



For use with Advanced Model HF-90.

(0.25kg)

3.6.2.4 QM4004 DTMF scrambler microphone complete with built-in speaker



Incorporates variable split-band frequency inversion voice scrambler. For use with Advanced Model HF-90. Not recommended for Frequency Hopping models

(0.25kg)

3.6.3 Pedestal Microphones

3.6.3.1 QM4006 DTMF Commercial Pedestal Microphone



DTMF commercial pedestal microphone. For use with Standard Model HF-90.

(1.00kg)

3.6.4 Telephone Handsets

3.6.4.1 QM4011 Telephone handset (commercial-grade)

Handset complete with PTT. For use with Standard Model HF-90.

(0.30kg)

3.6.4.2 QM4013 DTMF Telephone handset (commercial-grade)



Handset complete with DTMF keypad and PTT. For use with Advanced Model HF-90.

(0.40kg)

3.6.4.3 QM4012 Military Handset No DTMF



Industry standard, military grade telephone handset with Commercial Connector.
For use with Standard Model HF-90

(0.45kg)

3.6.4.4 QM4015 Military Handset DTMF



Industry standard, military grade telephone handset with Commercial Connector and DTMF keys for use with Advanced Software features such as Selcall, Beacon Call, Frequency Hopping and Front Panel Programming.
For use with Advanced Model HF-90

(0.45kg)

3.6.5 Audio Accessories

3.6.5.1 QM4041 Headphones (commercial-grade)

Headsets incorporating 6.25 mm jack plug. Suits CW option & telegraph key.

(0.20kg)

3.6.5.2 QM4042 Headphones (military-grade)

Ruggedised headsets incorporating 6.25 mm jack plug. Suits CW option & telegraph key.

(0.45kg)

3.6.5.3 QM4021 External Mount Speaker (complete with audio mute)



Incorporates audio mute facility for fixed channel operation.

(0.45kg)

3.6.5.4 QM4051 CW Option & Telegraph Key



External CW option housed in a compact die-cast metal box with telegraph key mounted on top. Incorporates a 6.25 mm mono jack for connection of suitable headphones. Supplied with 1.5m lead.

(0.45kg)

3.6.6 DC Power Cables

3.6.6.1 QM5001 HF-90 → 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-90 Vehicle Package and HF-90 Base Station Package.

(0.65kg)

3.6.6.2 QM5002 HF-90 → 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-90 Manpack and HF-90 Portable Packages.

(0.10kg)

Refer to page 31 for TA-90 power cable.

3.6.6.3 QM5003 HF-90 → Vehicle Battery (3.0m)

4-pole power connector at one end complete with connector for external speaker on flying lead, crocodile clips at the other end. As supplied with the HF-90 Emergency Package.

(0.50kg)

Refer to page 31 for TA-90 power cable.

3.6.7 Coaxial Cables (RG-58)

3.6.7.1 QM5021 HF-90 → 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)

3.6.7.2 QM5022 HF-90 → 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)

3.6.7.3 QM5041 HF-90 to TM-90 (250mm)

BNC connector fitted at both ends. As supplied with Manpack.

(0.15kg)

3.6.7.4 QM5064 HF-90 to TA-99 (120mm)

BNC connector fitted at both ends. As supplied with Manpack.

(0.01kg)

3.6.8 Other Cables

3.6.8.1 QM5051 Programming Cable complete with Adaptor

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

(0.20kg)

For use with HF-90 programming package (Part No. QM1002).

3.6.9 Miscellaneous Items

3.6.9.1 QM8051 Battery Condition Monitor



Monitors battery charge level via a series of LED indicators. As supplied with the HF-90 Manpack and HF-90 Portable Packages.

(0.10kg)

3.6.9.2 QM3001 PL259 to BNC Adaptor



(0.05kg)

3.6.9.3 QM4061 Data Interface Unit



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

(1.00kg)

3.6.9.4 QM9501 Fan Option (modular)



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

(0.07kg)

3.7 DEALER SUPPORT PRODUCTS

3.7.1 Programming Software

3.7.1.1 QM1002 HF-90 Programming Package

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

Standard Model HF-90:-

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

Advanced Model HF-90:-

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

Includes programming cable (Part No. QM5051).

Includes Quick Reference Guide - HF-90 Programming Package.

Package is provided on 3½" floppy disk as standard.



(0.05kg)

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-90 inoperable.

3.7.2 Product Documentation

3.7.2.1 QM1021 HF-90 Technical Manual



Authorised Dealers receive one HF-90 Technical Manual at no charge, with their first purchase of the HF-90 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 57.

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 QM4081 Voice Enunciator Box

Device to automatically key and modulate an HF-90 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 96000 HF-90 Front Panel Module

Front panel module includes front panel PCB.



(0.15kg)

3.7.4.2 96002 HF-90 PASW Module

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



(0.40kg)

3.7.4.3 96003 HF-90 RXMP Module



Receiver & Microprocessor Module.

(0.15kg)

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.

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7 DATA SECTION

7.1 HF-90 GOLDEN RULES

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

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

Using the HF-90 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-90 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-90 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 will not get through, a 130-Watt signal will not get through either.

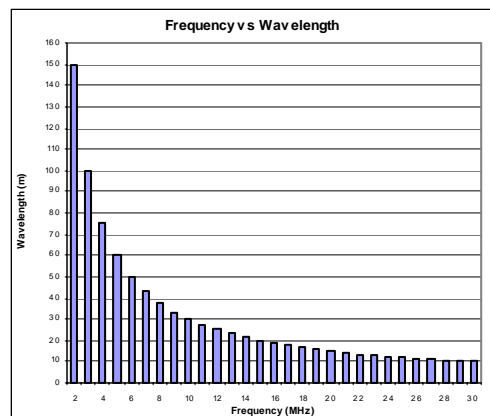
7.4 ANTENNA BASICS

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...



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).

End-fed 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 user's 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 45) is used instead of a VSWR meter. Attempting to use a VSWR meter will block the DC voltage from the HF-90 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>