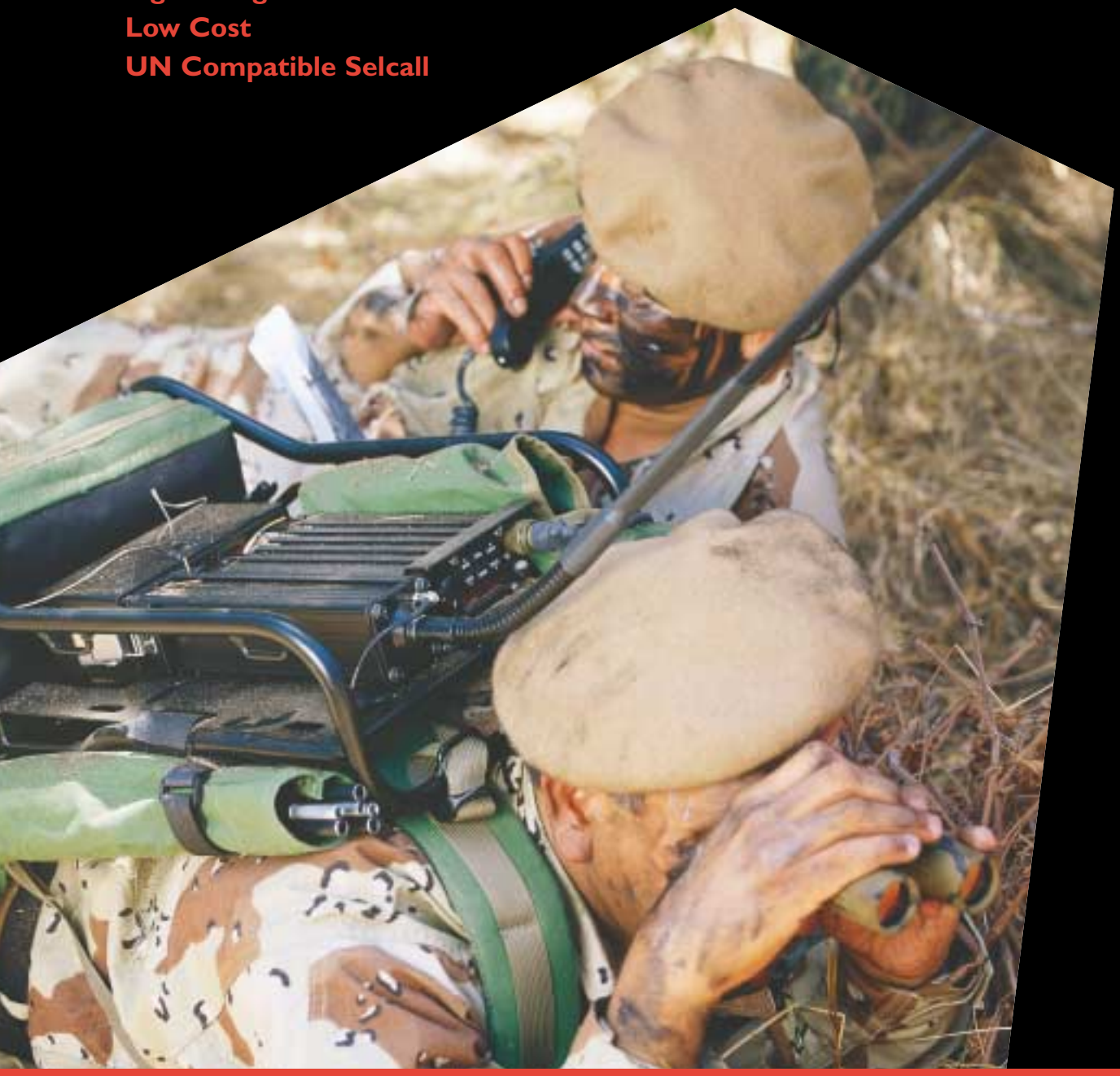
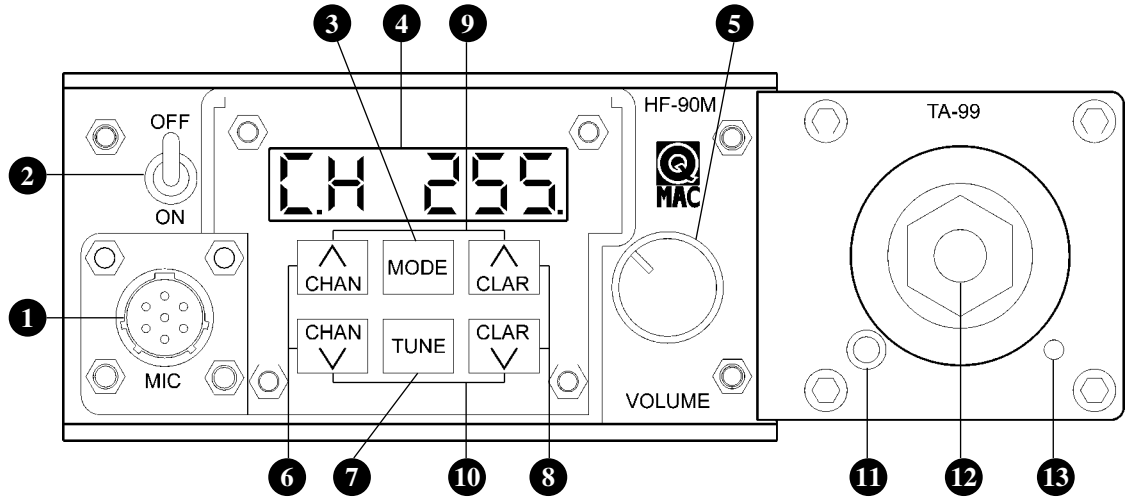
Q-MAC HF-90M FREQUENCY HOPPING HF SSB TRANSCEIVER

Multi Role
50 Watts PEP
ECCM (Frequency Hopping)
Light Weight
Low Cost
UN Compatible Selcall



Military ● Special Forces ● Border Patrol ● Police ● Peace Keeping ● Intelligence



1 Pattern 105 Handset Connector.
2 On/Off switch.
3 Fixed/hopping mode selection key (FH).
USB/LSB mode selection key (NFH).
4 Six digit LED display (7-segment).
5 Volume control knob (encoded shaft).
6 Channel up/down scroll keys. Pressing both keys together enables access to PC Programming.
7 Tune key. Allows continuous signal to be transmitted for tuning long wire and whip antennas.
8 Clarifier up/down scroll keys. Pressing both keys together enables access to field Programming
9 Pressing both keys together enables erase facility.
10 Pressing both keys together enables Rx signal strength meter.
11 Grounding Socket.
12 Antenna Socket threaded.
13 Antenna Current Indicator.

(A) Australian Version Only (I) International Version Only
(FH) Frequency Hopping Version Only (NFH) Non Frequency Hopping Version

The HF-90M Military transceiver is a state of the art communication device specifically designed for tactical military applications. The HF-90M is certified to MIL STD 810-F. It is an extremely compact and light weight unit, featuring only essential controls to ensure ease of operation. The radio is available with a secure, jam-resistant ECCM Frequency Hopping option. It is fully qualified to Mil-Std 810F for immersion, shock, vibration, dust and temperate rating specifications. The HF-90 series of transceivers are field proven in over 75 countries on every continent ranging from climate extremes in Antarctica to African Sahara.

The development of the HF-90M Frequency Hopping Option represents a significant breakthrough in the field of military HF communications. For the first time, military users have access to a product which is affordable, yet offers a very high grade of voice security. This option builds on the HF-90's established reputation as the world's smallest high specification HF SSB transceiver. The addition of the frequency hopping option makes the HF-90M a secure military grade ECCM HF transceiver costing approximately one quarter of competing military transceivers. Deliveries of the HF-90M from Q-MAC are measured in weeks rather than several months typical for military equipment.

Military users will appreciate the solid construction and ease of use of Q-MAC transceivers. Only 4 fasteners providing access to 3 internal PCBs allow any modules to be exchanged in less than 4 minutes. All connectors are gold to gold and wiring looms have been eliminated. Emphasis in the design of the HF-90M has been placed on value engineering to ensure low cost of ownership over a long service life. This is achieved by utilising SMD components from generic multi-sourced families.

The HF-90M has been designed with the tactical military user in mind. Only essential controls are included on the front panel for normal operations. Advanced programming functionality is available in sub-menus. The HF-90M can be either field or PC programmed.

The transceiver has a quality, high specification design. It provides full frequency coverage from 2 - 30 MHz and has capacity for up to 255 programmed channels. In tactical frequencies the unit can operate at selected power levels up to 50 Watt, (which is the highest in the industry for Manpack configurations), whilst achieving the lowest battery consumption compared to other military transceivers due to use of SSB modulation. The HF-90M is extremely reliable due to the advanced SMD manufacturing process used and overall mechanical design efficiency.

The HF-90M utilises a robust radar-style front-end utilising 10GHz GaAsFETs. This results in a very high dynamic range, allowing weak signals to be resolved in the presence of multiple adjacent strong signals. This leads to excellent ECM resistance and cositing performance.

This military radio is unique in its ability to interoperate with UN aid agencies and relief NGOs when deployed in a peace keeping role. The CCIR 493-4 selective calling facility which is standard issue on aid agency radios is used to initiate radio traffic in fixed frequency mode. Where full security is required on a military net the user will revert to using frequency hopping (ECCM).

In short, this revolutionary new transceiver incorporates the very latest in RF design technology, making the HF-90M the most compact, versatile, high performance HF SSB transceiver available in the military market today suitable for Manpack, Vehicle and Base Station applications.

MULTI-ROLE TACTICAL HF COMMUNICATION

HF-90M HF SSB MANPACK

The Q-MAC HF-90M HF Manpack is a portable, instant-deployment HF SSB radio communication system incorporating the Q-MAC HF-90M Transceiver, TA-99 Automatic Tuner and Battery all in an ergonomically designed framed backpack.

This package is designed for applications requiring medium to long range communications, whilst on foot. It is ideal where mobility is of paramount importance, given that it is compact, lightweight (total weight is approximately 8kg) and comfortable to carry for long periods. The HF-90M Manpack is totally independent of terrain and can be used whilst carried on the operators back, or when on the ground. The multi-role design of the HF-90M transceiver in the Manpack allows it to be easily removed for Base Station or Vehicle use with the addition of appropriate accessories.

PACKAGE CONTENTS

- HF-90M Transceiver
- TA-99 Automatic Tuner
- 7AH SLA Removable Battery and Re-usable Enclosure
- Military Grade Telephone Handset
- Backpack (with canvas pockets for antennas, handset and charging accessories)
- 6 Section Whip Antenna
- Flexible Tape Whip Antenna
- Tunable Long-Wire Antenna

OPTIONAL ACCESSORIES

- HF-90M Frequency Hopping Upgrade
- Advanced Software Upgrade with DTMF Telephone Handset
- AC Mains Battery Charger
- DC Vehicle Battery Charger
- Folding Solar Panel Charger
- Hand Crank Generator
- End-Fed Portable Broadband Antenna
- NiCd or NiMH Battery

MULTI-ROLE TACTICAL HF COMMUNICATION

HF-90M HF SSB VEHICLE PACKAGE

The Q-MAC HF-90M Vehicle Package is a HF SSB radio communication system for fixed in-vehicle installation incorporating the Q-MAC HF-90M Transceiver together with the Q-MAC TA-90M Auto-tune Antenna System.

This package is characterised by its extremely compact size, ease of use and its physical robustness. The auto-tune antenna system supplied with the package is designed for maximum tuning efficiency, whilst its rugged two piece configuration offers improved protection to the tuning device. The multi-role design of the Q-MAC HF-90M Transceiver used in the Vehicle Package allows it to be easily converted to a Base Station Package or Manpack with the addition of appropriate accessories.

PACKAGE CONTENTS

HF-90M Transceiver

TA-90M Automatic Tuner

Military Grade Telephone Handset

Mounting Accessories for TA-90M Tuner and HF-90M Transceiver

Fibreglass Whip Antenna

External Speaker with voice squelch

OPTIONAL ACCESSORIES

HF-90M Frequency Hopping Upgrade

Advanced Software Upgrade with DTMF Telephone Handset

End-Fed Portable Broadband Antenna

HF-90M HF SSB BASE STATION PACKAGE

The Q-MAC HF-90M Base Station Package is an HF SSB radio communication system designed for fixed or temporary base station applications. This package incorporates the Q-MAC HF-90M transceiver in a ruggedized enclosure with power supply and backup battery.

A multi-wire dipole antenna included in the package accommodates all frequencies between 2 to 30MHz and offers different mounting configurations. The package as a whole is characterized by its extremely compact size, ease of use and its adaptability. A custom supplied solar charging system can be added for portable field charging. The QMAC HF-90M Base Station Package can be easily converted to a Manpack or Vehicle Package with the addition of appropriate accessories.

PACKAGE CONTENTS

HF-90M Transceiver

Military Grade Telephone Handset

Ruggedized metal enclosure with power supply, back up battery and speaker with voice squelch.

Multi-wire Broadband Dipole Antenna

Halyard Kit

OPTIONAL ACCESSORIES

HF-90M Frequency Hopping Upgrade

Advanced Software Upgrade with DTMF Telephone Handset

End-Fed Portable Broadband Antenna (for portable field deployment)

Q-MAC HF-90M FREQUENCY HOPPING OPTION

The HF-90M Frequency Hopping Option is an integral module within the HF-90M Transceiver. This option enables secure, jam-resistant HF communications to a military standard.

APPLICATIONS

Military and paramilitary users who require HF communications for Long Range Reconnaissance Patrol (LRRP) and Rear Link applications, are frequently faced with enemies which are capable of deploying EW systems.

Aid/relief organizations and peace-enforcement agencies may be seriously compromised in their operations, through interception and jamming of radio traffic from elements within a technically aware population.

A growing problem for military and aid organizations alike is the proliferation of low cost amateur HF radios, which can be easily modified for interception and jamming.

The HF-90M Transceiver, fitted with the frequency hopping option, presents an immediate, cost effective solution to these problems.

FEATURES OF THE HF-90M FREQUENCY HOPPING OPTION

HOPPING RATE AND BANDWIDTH

The HF-90M Frequency Hopping Option has a hop rate of 5 hops per second and operates within a 256kHz bandwidth (hop band). There are 103 contiguous hop bands within the range 2 – 30MHz. The reference frequency which is selected for use by the operator determines which of the hop bands is selected. Several individual hopping networks can operate effectively (and with minimal interference to other networks) within the same hop band.

The hop speed and bandwidth have been rigorously tested and optimized for the following parameters: voice security, voice clarity, antenna bandwidth and propagation.

PSEUDO-RANDOM HOPPING

A pseudo-random (DES) frequency hopping algorithm provides the user with 7.2 x 10^{16} different hopping codes. This results in a sequence repeat time of 457 million years, ensuring a high level of security.

ROBUST ANTI-JAM ALGORITHM

All EW techniques (such as detection, direction finding, unauthorized monitoring and jamming) are effectively countered by the HF-90M frequency hopping algorithm. Even in the presence of badly corrupted synchronization data, the demodulation algorithm, combined with the FEC coding and time frequency diversity, provides a robust anti-jam capability.

RAPID SYNCHRONIZATION

The HF-90M Frequency Hopping Option offers rapid synchronization on late entry – ie. where a network is already communicating in frequency hopping mode and an additional operator wishes to join the network. Synchronization time varies between 6 and 53 seconds (with an average of 26 seconds). Synchronization time on start-up is even more rapid, given that between 3 and 4 synchronization bursts are transmitted within the first 60 seconds of start-up. Synchronization time varies due to the pseudo random time and frequency allocation of synchronization data (bursts) sent from the Master to the Slaves.

SECURE CODE ENTRY

A unique hopping code, comprising 11 digits, must be entered by the operator from the DTMF microphone/handset keypad. The same code must be entered for each HF-90M Transceiver operating within the network. The same reference frequency and sideband (USB/LSB) must also be selected. Once entered, there is no way to retrieve the 11-digit code, thus making the code fully secure. Typically this code would be changed on a regular basis (eg. once every month during peace time and once every week during combat).

SIMPLE OPERATION

Despite its complex design, the hopping function within the HF-90M Transceiver is extremely simple to operate. It is accessed from a single key on the front panel.

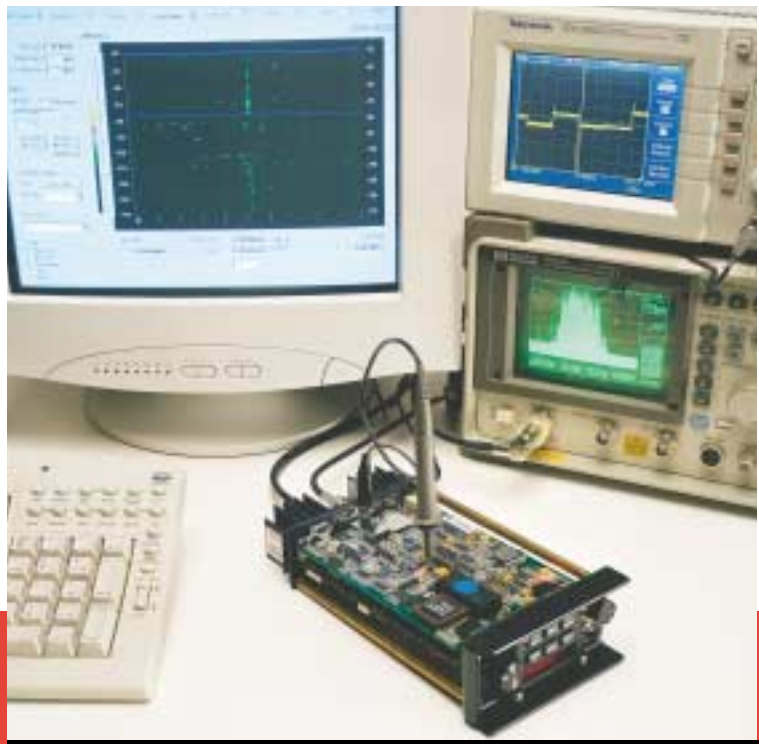
The transceiver display clearly indicates fixed/hopping status at all times. The following modes are differentiated:

- Fixed frequency mode
- Hopping mode – not synchronized
- Hopping mode – synchronized (receiving sync bursts)
- Hopping mode – synchronized (no longer receiving sync bursts)

Setup parameters (including Slave/Base setting, Smart Hopping status and the 11-digit hopping code) are entered via the DTMF microphone/handset keypad.

SELCALL FACILITY IN HOPPING MODE

The HF-90 Transceiver incorporates a Selcall facility which can be used in frequency hopping mode, as well as on a fixed channel. When operating in frequency hopping mode, Selcalls may only be sent/received between transceivers within the hopping network.



SPECIFICATIONS

GENERAL

Frequency range	2 - 30 MHz
Modes of operation	USB, LSB (J3E), CW(Optional), Hopping (Optional), AM (Rx Only), FSK
Number of channels	255
Channel resolution	100Hz
Supply voltage	12 - 24V DC Nominal
Power consumption	
- Transmit	2A - 10A (subject to re-set power output)
- Receive	310mA
Frequency stability	± 2ppm
Antenna impedance	50 Ohm
Antenna connector	BNC
Handsets	Telephone handset with optional DTMF
Selcall system	Based on CCIR 493-4 (UN Standard)
Programming	Via front panel & DTMF telephone handset or IBM PC 4800,8,1,N
BITE	Micro, Rx, Tx Tests
MTTR	4 Minutes
MTBF	6000 Hours

PHYSICAL CHARACTERISTICS

Dimensions (mm)	112(W) X 47(H) X 220(D)
Weight	1kg (HF-90M Only)
Construction	All metal extruded sleeve with front panel and heatsink
Finish	Black anodised Aluminium

TRANSMITTER

Power Output	50 Watt PEP 2-12MHz (derated from 12-30 MHz)
Unwanted sideband	Better than -45dB
Carrier suppression	Better than -45dB
Harmonic suppression	Better than -40dB
Audio Response	270Hz – 2800Hz

RECEIVER

Sensitivity	0.25µV@10dBS+N/N
Selectivity	2.3kHz@-6dB 4.8Hz@-60dB
Image rejection	Better than -50dB
Intermodulation	Better than -70dB
3rd order intercept	+18dBm(GaAsFETMixer)
Intermediate freq's	83.16MHz,455kHz
AGC	Less than 3dB from 3uV-1V
Audio response	270Hz - 2800Hz
Audio output	2 Watt
Audio load impedance	8 Ohms

Represented by:

FREQUENCY HOPPING

Mode	SSB (J3E) speech plus FSK sync
Hop rate	5 hops per sec
Hop channels per band	256
Number of Hop bands	103 contiguous bands (2-30MHz)
Hop sequence	Pseudo-random
Late entry sync time	Average 26 secs
Number of sync channels	8
Hope code entry	11 decimal digits, via DTMF keypad
Hop code binary size	56 bits
Possible codes	7.2×10^{16}
Hop algorithm	Modified DES

TA-90 VEHICLE AUTO TUNER

Frequency range	4-20 MHz
VSWR	Typically less than 2:1
Tuning time	3 Seconds max
Antenna type	Vehicle Whip
Dimensions	221(L) x 146(W) x 56(D)mm
Weight	5Kg
Supply current (idle)	300mA
Voltage	12V or 24V
Input Impedance	50 Ohm

TA-99 MANPACK AUTO TUNER

Frequency range	3-15 MHz
VSWR	Typically less than 2
Tuning time	3 Seconds max
Antenna type	Short Whip, Long Whip, LongWire
Dimensions	205(W) x 50(H) x 50(D)mm
Weight	0.7 Kg
Supply current (idle)	30mA
Voltage	12VDC Feed via Coax
Input Impedance	50 Ohm

ENVIRONMENTAL

Operating temperature	-30°C - 60°C
Storage temperature	-30°C - 80°C
Environmental rating	Per MIL-STD 810F Immersion, Shock, Temperature Vibration and Dust

OPTIONAL ACCESSORIES

Hand Crank Generator, Solar Panel Charger, Morse Key, Antennas, AC/DC Chargers and Programming Software.

Specifications are subject to change without notice.

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