



## MH500 SERIES MILITARY RADIO RELAY

The MH500 series is a new-generation of radio relay terminals designed to support tactical communication systems.

It meets the need for high-capacity, mobile, radio-based networks to meet the increasing demand for traffic capacity and the need to provide reliable data transmission services in support of Command & Control applications facing the continuous narrowing of the available RF spectrum. In addition, it also satisfies the need for backward compatibility with EUROCOM radio relay terminals.

The MH500 series includes equipment working in NATO Bands I, III+ and IV, available in Compact or Split versions to meet different deployment profiles.

Software modem technology, rugged and lightweight design and full control capabilities through comprehensive IP-based network management systems also feature in this family of products generated to support mobile military networks in the challenging 21st century battlefield scenario.

### FREQUENCY BANDS

Three radio relays are available:

- MH502 – operating in the 225-400 MHz NATO Band I
- MH513 – operating in the 1350-2690 MHz NATO Band III+
- MH544 – operating in the 4400-5000 MHz NATO Band IV

Tx/Rx frequencies are independently selectable over the whole frequency band by the operator/Network Management System (NMS). In Band I, III+ and IV, the internal control system provides for automatic continuous tuning of RF pass band cavity filters

### TRAFFIC CAPACITY

Supported traffic capacities are:

- MH502 – up to 4096kb/s
- MH513 – up to 34368kb/s
- MH544 – up to 65536kb/s

An embedded multiplexer supporting up to four independent payloads is available. Eurocom D/1, ITU-T G.703/V.11, Ethernet 10/100 BT and High Speed Serial Interface (HSSI) baseband traffic interfaces are selectable, depending on data rate. Sideband capacity includes digital EOW and auxiliary channel, both with 16/64kb/s configurable rate.

## **SPECTRAL EFFICIENCY**

Optimised trade-off between spectral efficiency and link resilience to offensive jamming is assured through programmable modulation formats. FSK, uncoded/coded QPSK, 8TCM, 16TCM, 32TCM modulations are selectable by the operator/NMS to adapt to different propagation constraints and support operation in crowded electromagnetic scenarios.

## **EPM CAPABILITY**

Inherent robustness – owing to software programmable modulation and high-selectivity filters – is greatly enhanced by a range of electronic protection measures:

- Automatic frequency evasion for interference/jammer avoidance
- Block/convolutional interleaved/concatenated FEC codes for burst/random errors control and pulse jammer effects recovery
- EOW-only mode (last ditch mode) for critical engineering link and operators communication resilience
- Automatic interference and jamming detection
- Bit-Count Integrity (BCI) enhancement for frame misalignment avoidance under severe pulse jammer attacks.

Anti-ESM capability is provided by Automatic Power Control (APC). A robust real-time software procedure, based on received power level and signal quality evaluation, provides continuous real-time control of transmit power to implement Low Probability of Intercept (LPI) communications.

## **CONTROL**

The control system provides intuitive operation, checking all equipment functions with fault identification (BITE) and link quality monitoring in real time. The operator can control the equipment through the AS107 unit, a dedicated military or standard commercial portable terminal. Remote control is available through NMS via a SNMP interface.

## **POWER SUPPLY**

The MH500 series can be supplied either from mains or battery with automatic changeover for no-break operation.

## **MILITARY STANDARDS**

The MH500 series complies with military environmental and EMC/EMP specifications.

## **OPERATIONAL SCENARIO**

Modern operational doctrine envisages an extended and dynamic warfare scenario covering large operational areas with greater dispersion of forces where rapid and reliable communications are essential to fulfil the mission.

A high degree of mobility for the entire suite of communications facilities supporting the battlefield is involved. An army on the move cannot stop to lay fibre optic cables with their huge amount of error-free bandwidth, and has to live with the shortcomings of high-BER radio transmissions.

## **MH 500 SERIES IMPROVES CONVENTIONAL RADIO TECHNOLOGY**

- Supports an Army's growing need for wideband radio communications, providing the high-speed digital backbone for tactical networks
- Assures high-reliability, low-residual bit error rate links compatible with data transmission requirements
- Guarantees narrowband transmission with effective spectrum sharing and excellent co-site performance for dense network operation
- Provides robustness against propagation difficulties and jamming, enhancing network survivability in a hostile battlefield environment

## **FLEXIBLE ARCHITECTURE**

The MH500 series is available in two mechanical configurations, Compact and Split, to allow the maximum flexibility for all operational scenarios.

### **Compact Version**

The Compact Version (available for MH513/MH544) consists of a single-box, rugged, waterproof, 4U, 19" rack mountable equipment. It features reduced dimensions and weight resulting in the smallest tactical radio-relay equipment available in the market. This feature is very useful for field applications, particularly for vehicle installations where equipment size is always a critical point.

### **Split Version**

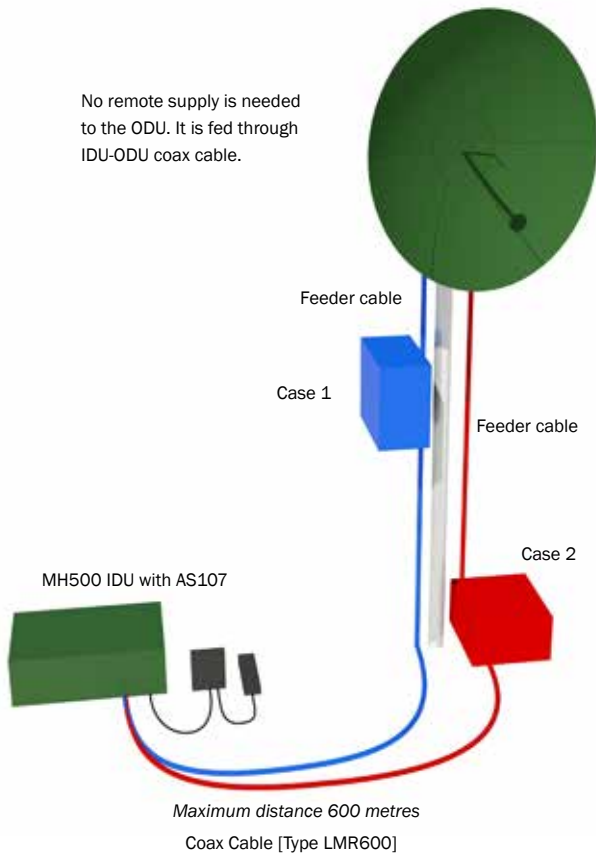
The Split Version consists of a dual-box (IDU/ODU), rugged, waterproof equipment. The IDU uses the same Compact Version 4U case, while the ODU uses a smaller case suitable to be located at the base or at the top of the mast. IDU and ODU are connected by coaxial cable up to 600m.

The ODU is directly supplied by IDU. Split Version provides maximum path loss capability allowing close ODU-antenna location. This feature is very useful in Band IV where feeder losses are relevant, particularly when high masts are required to gain line-of-sight conditions. In Band IV a flat antenna integrated in the ODU is also available on request.

The MH500 series has a fully modular architecture and the same electrical units can be fitted in both mechanical configurations. The RF operating band is easily configured by means of frequency-dependant module substitution. Particularly in the Split Version, the same IDU can be used with Band I, Band III+, Band IV ODU.

**MH500 SPLIT VERSION: THE ODU IS EITHER MOUNTED ON THE MAST (BLUE OPTION) OR AT THE BASE (RED OPTION)**

No remote supply is needed to the ODU. It is fed through IDU-ODU coax cable.



**MH500 COMPACT VERSION**

The MH500 Compact terminal (i.e., full IDU terminal) is connected directly to the antenna via a feeder cable



**MAIN FEATURES**

- Lightweight Compact/Split architecture
- 225-400MHz / 1350-2690MHz / 4400-5000MHz frequency bands
- QPSK, coded-QPSK (1/2,3/4,7/8), 8TCM, 16TCM, 32TCM digital modem
- Up to 65Mb/s full-duplex throughput
- Embedded multiplexer
- EOW and auxiliary channel
- EPM capability
- Low probability of intercept mode
- High-sensitivity EOW-only mode
- SNMP v.3 NMS interface
- Radio remote control
- Mains/battery power supply
- MIL proof design

**RADIO REMOTE CONTROL**

The MH500 series enables full remote control of all radio relay equipment in the network from a single management position.

An operator/NMS is able to monitor and control far-end radio terminals through an IP addressing scheme. Data communication is performed at 64kb/s over the air and routed to any radio relay equipment in the network.

	COMPACT VERSION	SPLIT VERSION
MH502 : 225-400MHz Band I		
MH513 : 1350-2700MHz Band III+		
MH544 : 4400-5000MHz Band IV		

## MH500 TECHNICAL SPECIFICATIONS

### RF data

- Frequency Band
  - 225-400MHz (MH502)
  - 1350-2690MHz (MH513)
  - 4400-5000MHz (MH544)
- Rx/Tx Minimum Duplex Separation
  - 20MHz (MH502)
  - 60MHz (MH513)
  - 100MHz (MH544)
- Channel Spacing
  - 125kHz (MH502/MH513/MH544)
- Modulation Format
  - FSK, QPSK, coded-QPSK (1/2,3/4,7/8), 8TCM, 16TCM, 32TCM

### Baseband data

- Traffic
  - MH502: up to 4x256/512/1024kb/s or up to 2x2048kb/s or 1x4096kb/s
  - MH513: up to 4x256/512/1024/2048/4096/8192/8448kb/s or up to 2x16384kb/s or 1x32768/34368kb/s
  - MH544: up to 4x256/512/1024/2048/4096/8192/8448kb/s or up to 2x16384/32768kb/s or 1x34368/52000/65536kb/s
  - Eurocom: D/1 or ITU-T G.703/V.11, Ethernet 10/100 BT, HSSI interface
  - Auxiliary: Configurable 16kb/s Eurocom D/1 or 64kb/s ITU-T V.11/X.21bis channel
  - Engineering Order Wire: Configurable 16kb/s Eurocom D/1 or 64kb/s ITU-T G.703

### System gain (BER=10<sup>-4</sup>)

- MH502
  - Ranging between 138dB and 118dB depending on bit rate and modulation (8TCM : 130dB@2Mb/s)
- MH513
  - Ranging between 130dB and 101dB depending on bit rate and modulation (8TCM : 122dB@2Mb/s)
- MH544
  - Ranging between 130dB and 98dB depending on bit rate and modulation (8TCM : 122dB@2Mb/s)
- EPM
  - Automatic frequency evasion
  - Block/convolutional FEC codes
  - High-sensitivity EOW-only mode
  - LPI mode by automatic power control
  - Automatic interference/jamming detection
  - Bit-Count Integrity

### Management

- Auto-diagnostics
  - Power-on self-test
  - On-line BITE
  - General Alarm
- Local Control
- V.10/V.24 asynchronous serial line with ASCII protocol or IEEE802.3 10Base-T with WEB oriented interface
- Remote Control
  - IEEE802.3 10Base-T, SNMP v.3 protocol
- Power supply
  - AC/DC with no-break automatic changeover
- Voltage
  - 93-253VAC, 47-63Hz or 19.2-57.6VDC
- Consumption
  - MH502: 220W AC/200W DC
  - MH515/544 Split: 180W AC/160W DC
  - MH513/544 Compact: 150W AC/130W DC

### PHYSICAL

#### Compact Version (available for MH513/MH544)

- Size
  - 177x448x400mm (HxWxD)
- Weight
  - 30kg

#### Split Version (MH502)

- IDU
  - Size: 177x448x400mm (HxWxD)
  - Weight: 18kg
- ODU
  - Size: 177x448x400mm (HxWxD)
  - Weight: 25kg

#### Split Version (MH513/MH544)

- IDU
  - Size: 177x448x400mm (HxWxD)
  - Weight: 18kg
- ODU
  - Size: 177x320x400mm (HxWxD)
  - Weight: 19kg
- Environmental
  - According to MIL-STD-810
- Temperature: -40 °C to +55 °C operating
- Humidity: 95% non condensing
- EMI/EMC
  - According to MIL-STD-461E, Class A3, Part IV (Army Equipment)
- Installation
  - 19" racks
  - Fixed, shelter, platform systems, field use

### AS107 TECHNICAL SPECIFICATIONS

- Display: alphanumeric, 2 rows x 16 columns
- Keyboard: "Thin Switch", 4 rows x 5 columns
- Interface: V.10 protocol
- Power supply: provided by MH500
- Dimensions: 153mm x 116mm x 31mm (HxWxD)
- Weight: 0.7kg