MEROD
Message Entry and Read Out Device

Racal-Comsec

MEROD
A Military Data
Communications System

Racal-Comsec

MEROD – A Military Data Communications System

MA4420 – MEROD Base Station – A Modular Approach
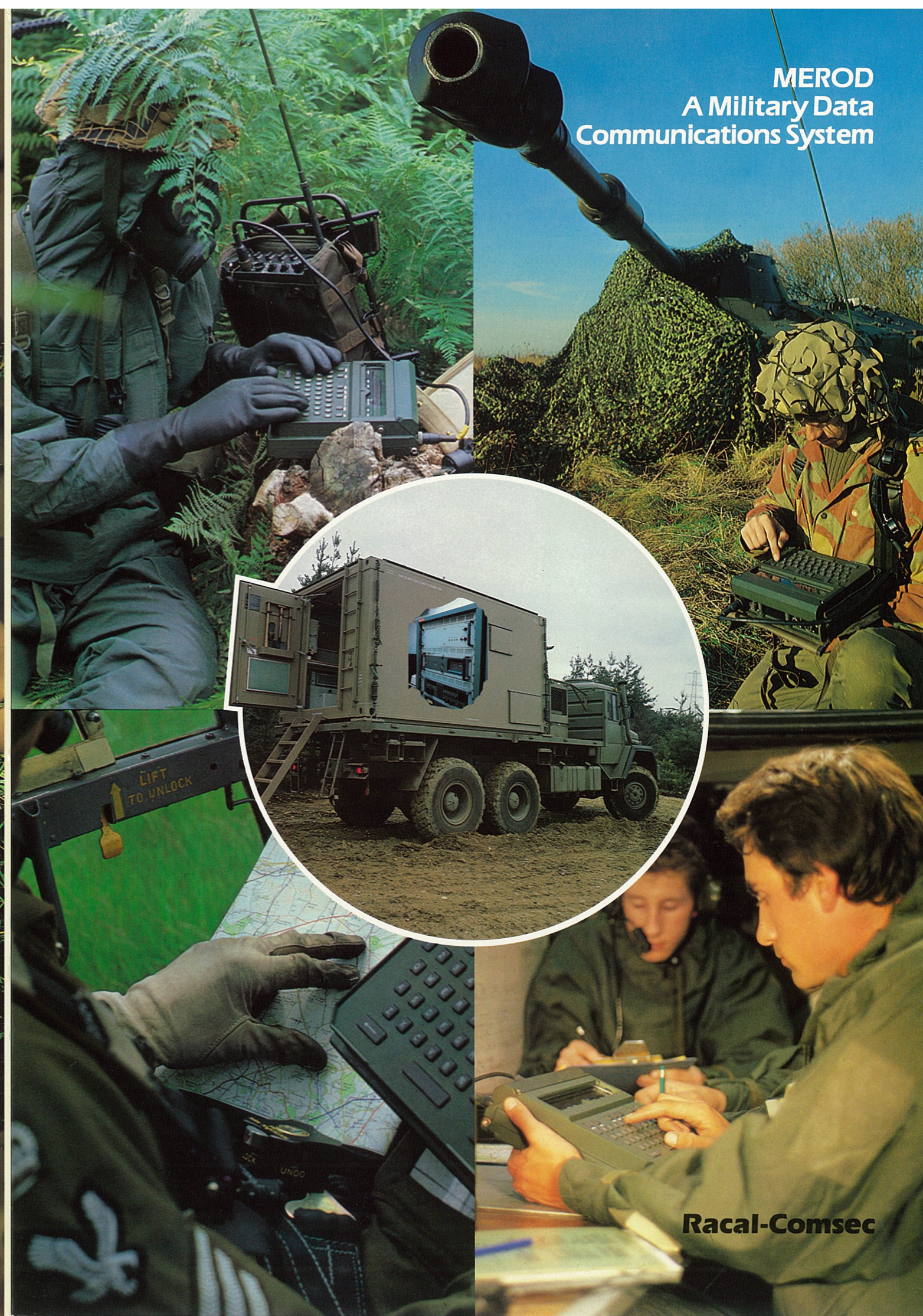
The System

The rapidly expanding pace of electronic warfare technology has rendered all forms of conventional radio communications vulnerable to enemy disruption, while at the same time providing interceptors of radio traffic with the easiest, cheapest and most discreet method of obtaining intelligence.

The MEROD system has been introduced to provide rapid, reliable and highly secure communications, and uses cyphered burst data techniques combined with a powerful forward error correcting capability to provide greatly reduced on-air times and high resistance to transmission errors.
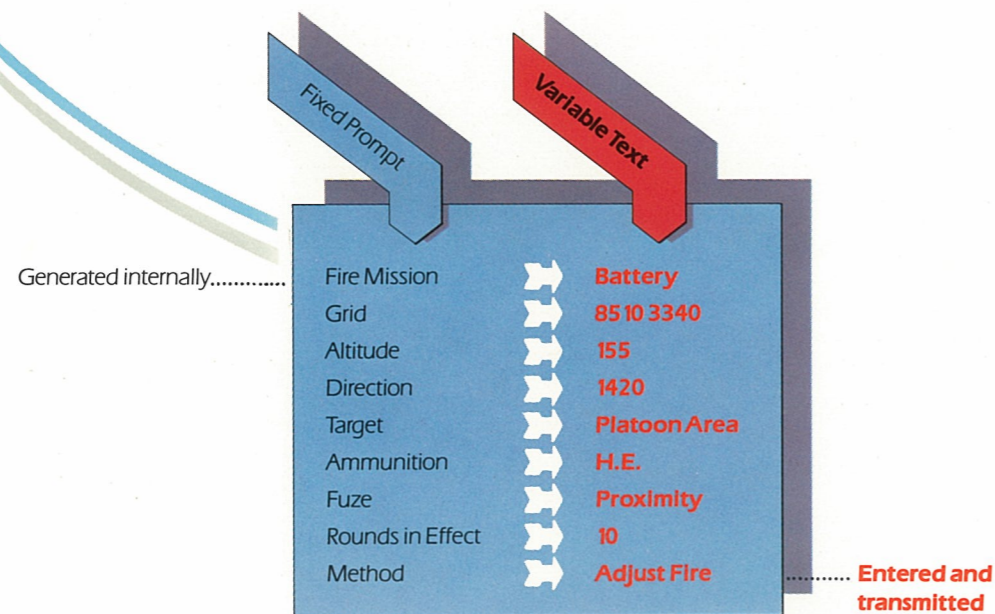
It may be deployed on all forms of tactical and strategic communications networks and its system concept provides the flexibility to meet a wide range of requirements.

Features

- Range of modems to suit any communications media
- Powerful error protection
- In built encryption option
- Individual, group and all station addressing
- Automatic acknowledgement
- User defined special formats
- Wide range of interfaces
- Automatic store and forward capability
- Control by operator VDU or computer
- Hard copy of all traffic via external printer
- Automatic archiving of messages
- Modular construction facilitates systems extension
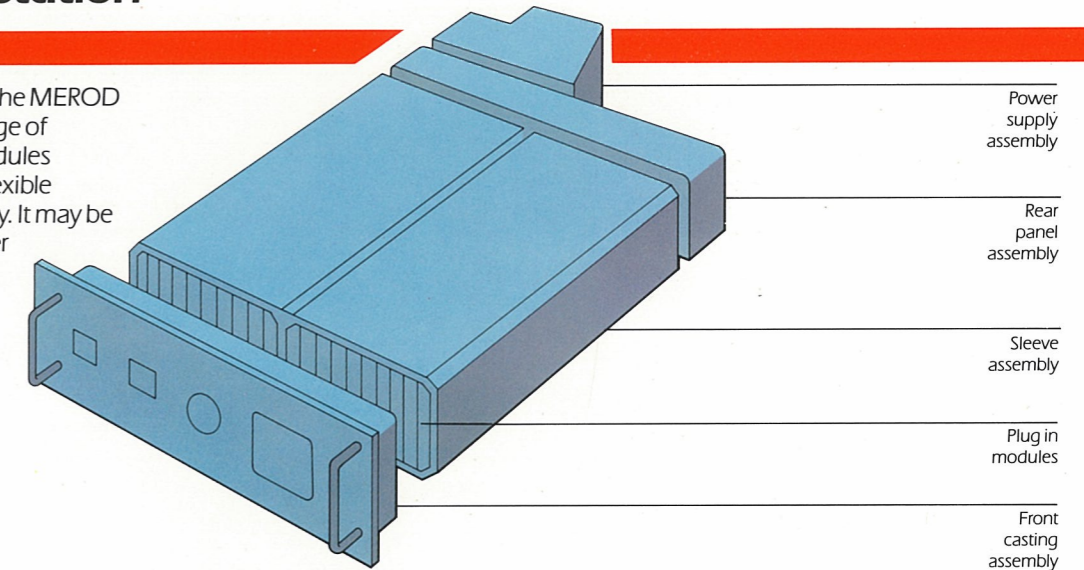
Advantages

- Greatly reduced transmission times reduces exposure to E.W. threats.
- Encryption increases network security
- Formatted message facility reduces preparation and transmission times.
- Error protection improves network reliability and accuracy of communications.
- Data format permits direct access to C^3I computer systems.
- Automatic acknowledgement provides user confidence that traffic has been correctly received.

Generated internally...........

Fixed Prompt	Variable Text
Fire Mission	Battery
Grid	85 10 3340
Altitude	155
Direction	1420
Target	Platoon Area
Ammunition	H.E.
Fuze	Proximity
Rounds in Effect	10
Method	Adjust Fire

.... Entered and transmitted
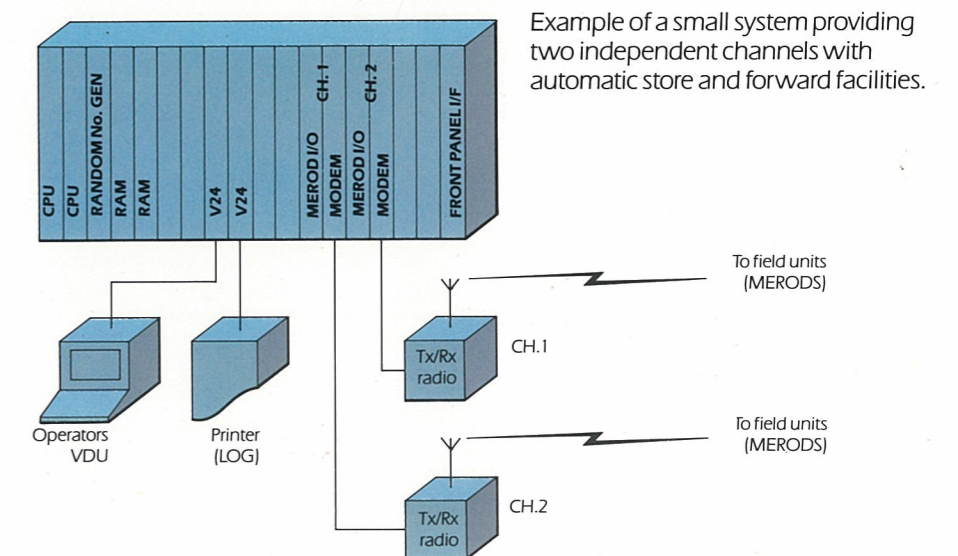
Special Format Example

MEROD Base Station

The MA4420 is the heart of the MEROD system and consists of a range of hardware and software modules providing a powerful and flexible message handling capability. It may be configured to fulfill a number of roles within a communications system. The modules plug into a ruggedised housing suitable for both fixed or mobile applications.

Each MA4420 unit can operate up to four communication channels, with the appropriate modular configuration. Multiple processors may be used to increase the processing power and message handling capability.

Power supply assembly

Rear panel assembly

Sleeve assembly

Plug in modules

Front casting assembly

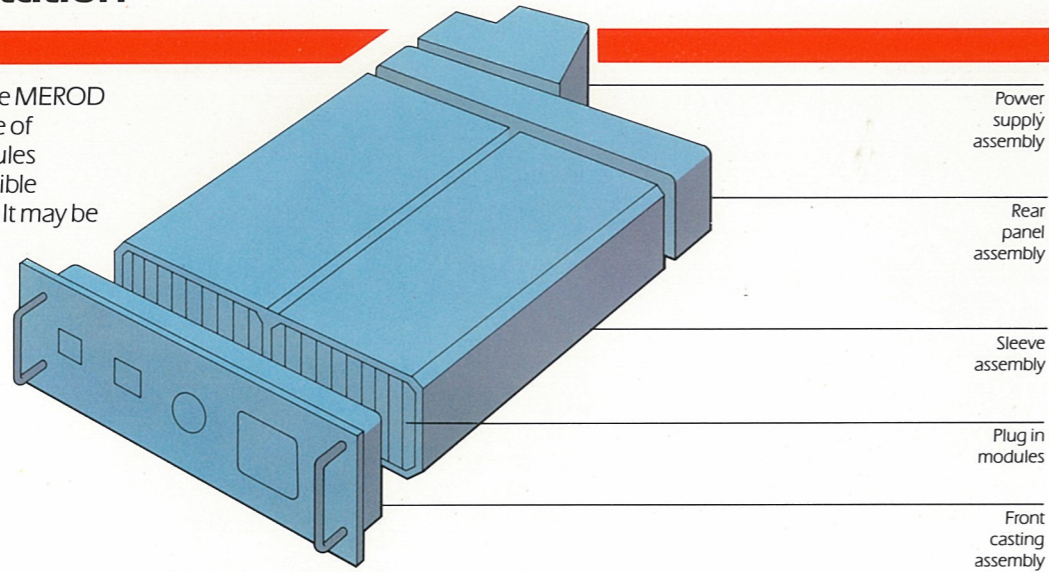| Modules	Functions
CPU.	Central processor and message processing.
16 K or 64 K/Byte memory.	Message storage and general workspace.
V24 interface.	Communication with either VDU or computer system.
Random number board.	Generation of message keys.
HF modem.	Connection to HF radios.
1200 b.p.s. modem.	Connection to VHF/UHF radios.
MEROD I/O board.	Used with each modem on each MEROD channel.
IEEE–488 board.	Control of radio equipment and mass storage devices.
CCITT V21 modem.	Connection to telephone lines.
Front panel interface.	Control of indicators and switches.

Example of a small system providing two independent channels with automatic store and forward facilities.

CPU
CPU
RANDOM No. GEN
RAM
RAM
V24
V24
MEROD I/O   CH.1
MODEM
MEROD I/O   CH.2
MODEM
FRONT PANEL I/F

Operators VDU

Printer (LOG)

Tx/Rx radio   CH.1

Tx/Rx radio   CH.2

To field units (MERODS)

To field units (MERODS)

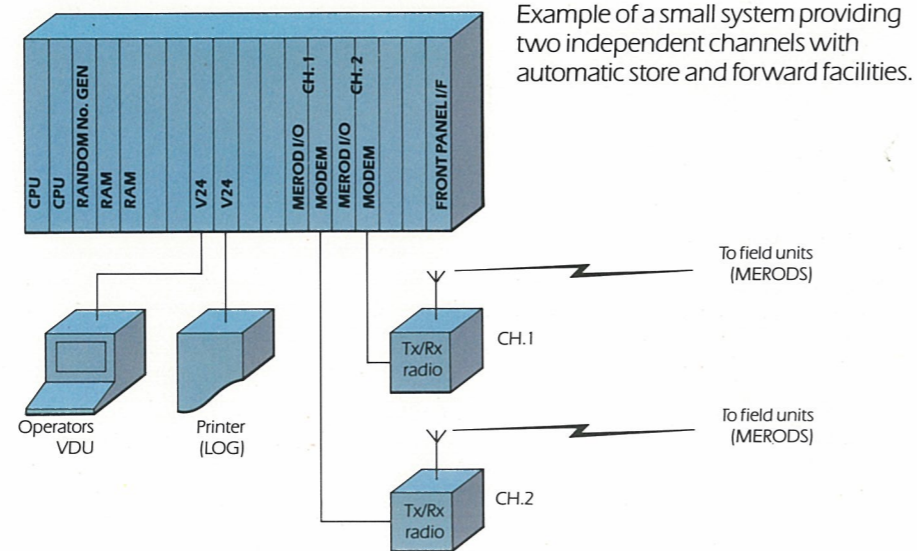# MA4420 – MEROD Base Station – A Modular Approach

MEROD Base Station

The MA4420 is the heart of the MEROD system and consists of a range of hardware and software modules providing a powerful and flexible message handling capability. It may be configured to fulfill a number of roles within a communications system. The modules plug into a ruggedised housing suitable for both fixed or mobile applications.

Power supply assembly

Rear panel assembly

Sleeve assembly

Plug in modules

Front casting assembly

Each MA4420 unit can operate up to four communication channels, with the appropriate modular configuration. Multiple processors may be used to increase the processing power and message handling capability.

Modules	Functions
■ CPU.	■ Central processor and message processing.
■ 16 K or 64 K/Byte memory.	■ Message storage and general workspace.
■ V24 interface.	■ Communication with either VDU or computer system.
■ Random number board.	■ Generation of message keys.
■ HF modem.	■ Connection to HF radios.
■ 1200 b.p.s. modem.	■ Connection to VHF/UHF radios.
■ MEROD I/O board.	■ Used with each modem on each MEROD channel.
■ IEEE–488 board.	■ Control of radio equipment and mass storage devices.
■ CCITT V21 modem.	■ Connection to telephone lines.
■ Front panel interface.	■ Control of indicators and switches.

Example of a small system providing two independent channels with automatic store and forward facilities.

CPU
CPU
RANDOM No. GEN
RAM
RAM
V24
V24
MEROD I/O
MODEM
MEROD I/O
MODEM
FRONT PANEL I/F
CH.1
CH.2

Operators VDU

Printer (LOG)

Tx/Rx radio   CH.1

To field units (MERODS)

Tx/Rx radio   CH.2
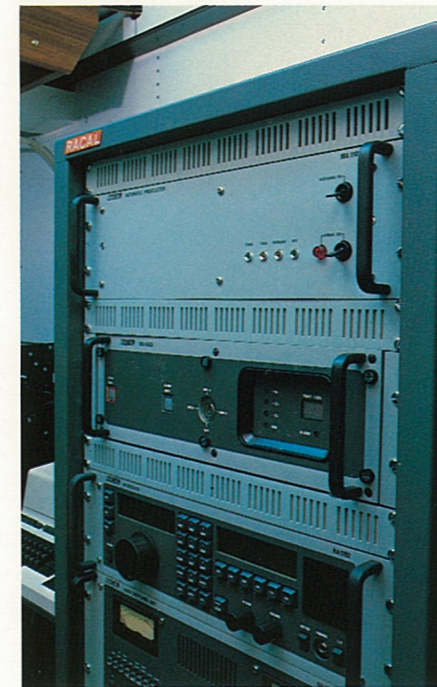
To field units (MERODS)

Installation

The MA4420 can accommodate up to 4 channels and is designed for installation in standard 19" equipment racks.

Multiple channel systems can be easily created by installing further MEROD Base Stations in the same rack.

The MA4420 can if necessary, be configured to meet specific installation requirements.

Reliability/ Maintainability

The MA4420 uses low power CMOS technology, dramatically reducing power consumption. The unit is environmentally sealed.

The unit's operating program is stored in EPROMS which eliminate the need for mechanical discs or tapes. Once powered up, the MA4420 self tests and is then ready for immediate use.
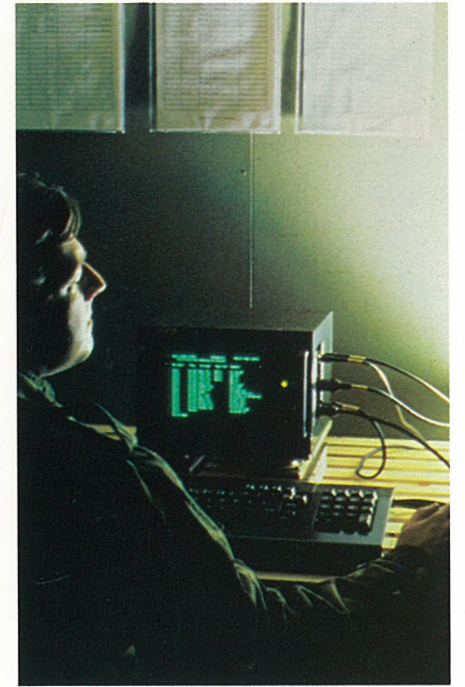
MTTR is kept to a minimum by the use of plug-in modules and powerful Built In Test Equipment (BITE). The front panel fault indicator allows the faulty module to be quickly identified and replaced.

BITE operates at three levels. The first level runs constantly in the 'background' when the processor is quiescent, and does not affect normal operation of the unit. The second level of selftest runs at power up or on demand and is more comprehensive. The third level of selftest is used for maintenance purposes. Using simple loop-back connectors it provides diagnostic fault identification, removing the need for special test equipment.

Peripherals

Operational control can be via a commercial or ruggedised VDU, or external computer system.

The provision of V24/V28 and IEEE 488 interfaces allows remote control of associated communications equipments and the connection of a wide range of peripherals e.g. printers and mass storage devices.
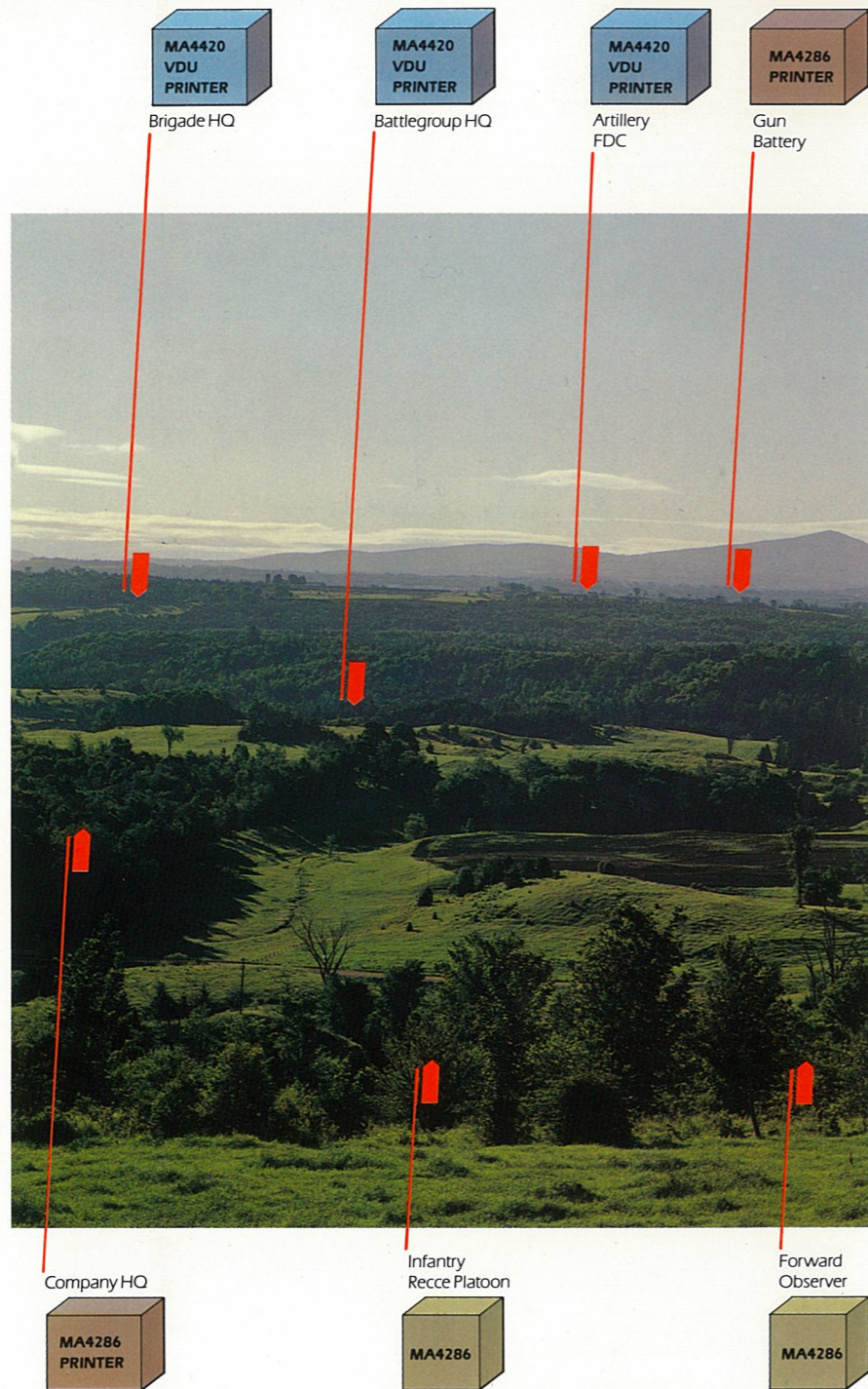
Battlefield System

The MEROD system provides a complete data communications system for the battlefield with the consequent advantage of fast, accurate handling of messages in a noisy environment. The automatic store and forward facility is used to provide communications between users separate networks by automatically selecting the correct routing. The automatic acknowledgement facility confirms the message has been passed and correctly received. Should MEROD units change networks, the MA4420 can be easily and quickly re-programmed to new routing requirements. The user is unaware of routing protocol, and he is left free to concentrate on his primary combative role.

- Automatic store and forward gives communication between users independent of route and bearer.
- Automatic traffic log and message archiving.
- Mobile access to data bases.
- Rapid network reconfiguration possible.

MA4420 VDU PRINTER — Brigade HQ
MA4420 VDU PRINTER — Battlegroup HQ
MA4420 VDU PRINTER — Artillery FDC
MA4286 PRINTER — Gun Battery

Company HQ — MA4286 PRINTER
Infantry Recce Platoon — MA4286
Forward Observer — MA4286

Special Forces

The ECCM capability of the MEROD system makes it particularly relevant to Special Forces applications. The MA4420 can automatically control radio schedules and/or frequencies at the Special Forces H.Q., permitting previously stored traffic to be burst to forward positions at the requisite time. The field terminals in use by the Special Forces could have their automatic acknowledgement facility inhibited to prevent involuntary breaking of radio silence.

The stress of operating in hostile territory is considerably reduced if fast, secure communications, together with high operator confidence can be offered.

Brigade HQ

Special Forces HQ — MA4420 VDU PRINTER

Special Forces — MA4286 / MA4286
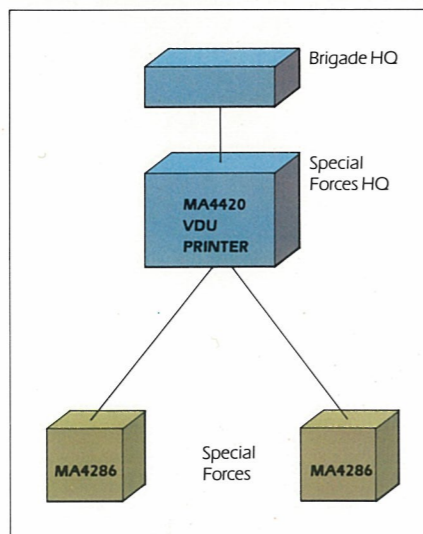
The error protection system used in the MA4420 Base Station and its associated field terminals can often provide reliable reception on radio circuits that will not support voice communications.

In Special Forces situations, the field unit can store traffic for burst transmission as required. Special message formats, such as enemy contact reports, intelligence summaries, casevac requirements, re-supply information etc, enable operators to minimise 'on-air' time, with the associated benefits of conserving radio batteries and minimising risk of detection by enemy D/F activity.

Equipment Specifications

MA4420 MEROD Base Station

Addressing
1,774,224 individually or group-addressed units, with 1 to 4 separate alpha-numeric addresses per message, each consisting of 2 to 4 alpha-numeric characters.

Communications interfaces
Audio connectors of HF radios
Data rate: 150 Baud (optionally 267)
Modulation: wide shift FSK
Demodulation: tones detected independently to achieve in-band diversity
Protocol: CSMA (Carrier Sense Multiple Access)

Audio connectors of VHF/UHF radios
Data rate: 1200bps
Modulation: DQPSK
Protocol: CSMA

Environmental
Operating temperature range:
0°C to +55°C (optionally −40°C to +70°C)
Storage temperature range: −40°C to +70°C

Vibration
MIL-STD 810C. Method 514.2 Proc. VIII

Shock
MIL-STD-810C. Method 516.2 Proc I

Altitude
915m (3000 feet) above sea level.

EMC (radio interference)
MIL-STD-461B. Notice 4 (CEO4, CSO2, REO2, RSO3).

Crypto
Non linear keystream generator. LSI implemented.

Memory
Configured to customer requirements.
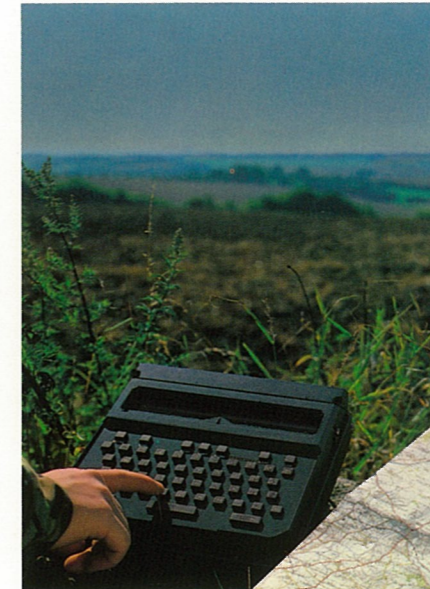
Local interfaces
Control interface
Data rate: 50-19,200 Baud
Character code: ITA5 (ASCII)
Signal levels: CCITT V28
Protocol: CCITT V24

Printer interface
Data rate: 50-19,200 Baud
Character code: ITA2 (Baudot) or ITA5 (ASCII)
Signal levels: CCITT V26
Protocol: CCITT V24

IEEE-488 interface
Functions: Controller, Talker

Mechanical
Enclosure: sealed light alloy case
Installation: 19 inch rack mounting or vehicle fit or table-top.

Dimensions:
Height: 131mm
Width: 427mm
Depth: 495mm
Weight: 16kg

Power
Supply voltage: 110V, 120V, 130V, 220V, 230V, 240V, AC, 47-440Hz (other options available)
Power consumption: 20W-40W at 240V AC depending on configuration.

MA4286 Series of Field Terminals

Addressing and communications
Interfaces
Compatible with MA4420

Control interfaces (remote port)
Data rate: 50–9,600 Baud
Character code: ITA5 (ASCII)
Signal levels: CCITT V28

Mechanical
Enclosure: Fully immersible light-alloy case

Dimensions
Height: 64mm
Width: 230mm
Depth: 230mm
Weight: 2.8kg

Environmental
Operating temperature range: −31°C to +55°C
Storage temperature range (without battery): −40°C to +70°C

Vibration
MIL-STD-810C. Method 514.2 Proc. VIII

Shock
MIL-STD–810C. Method 516.2 Proc. I

Drop (in carrying case)
MIL-STD 810C. Method 516.2 Proc. II

Altitude
15,000 feet (3660m) above sea level.

EMC (radio interference)
MIL-STD-416B. notice 4 (CEO4, CSO2, REO2, RSO3)

Power requirements
External supply: 11-32V DC@ 170 mA typical
Internal supply: Optional rechargeable 1AH battery.

MA4286 MEROD Cyphered, 150 or 267 Baud.
MA4287 MEROD Non-Cyphered, 150 or 267 Baud.
MA4288 MEROD Cyphered, 1200 bps.
MA4289 MEROD Non-Cyphered, 1200 bps.

Racal reserve the right to vary in detail from the description and specification in this publication.

Publication No. 1854-1 E/N385/PP

Printed in England