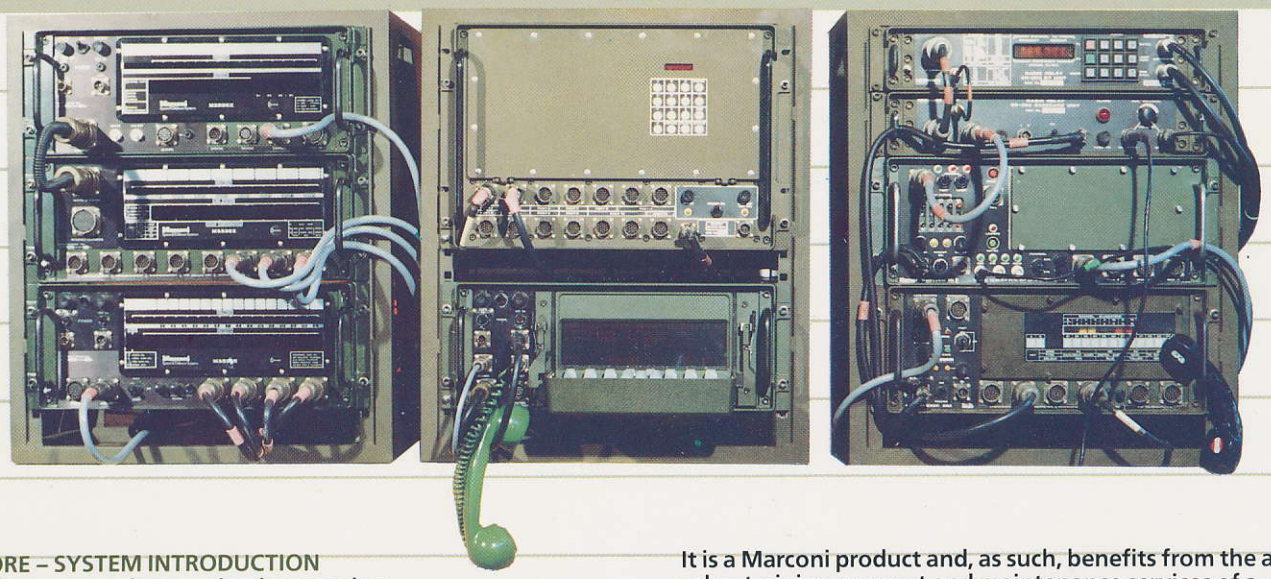
CLAYMORE

Digital Radio Relay System

Marconi
Secure Radio Systems

MARCONI DIGITAL RADIO RE
– THE TOTAL SYSTEM



CLAYMORE – SYSTEM INTRODUCTION

The modern army, whatever its size, requires comprehensive tactical communications networks stretching from General Headquarters down, in some cases, to Battalion level.

With the increasing analogue and digitally secure information carried over such networks in many forms – speech, telegraph, and facsimile data – the demands placed upon the equipment require a high degree of sophistication in order that effective communications be maintained.

Marconi's CLAYMORE digital radio relay system is designed to meet all modern military requirements and is the result of years of Marconi pioneering expertise in digital signal technology. Consequently, CLAYMORE is one of the world's most advanced radio relay systems, offering unrivalled levels of performance, size and reliability, together, with a design flexibility that enables exact configuration to customers' requirements. Whilst CLAYMORE is a totally integrated system, individual units are designed to interface with any existing digital radio relay equipment and can also be adapted to interface with older equipment that may still be in use.

This enables CLAYMORE to be specified as a comprehensive system in its own right or as part of an existing system – either way, you will be employing the finest, most up-to-date, state-of-the-art radio relay technology available anywhere – at any price.

The cost-effectiveness of CLAYMORE arising from its modular design, flexibility and extensive use of large-scale integration and production techniques, cannot be ignored. A product cannot be truly competitive unless it offers all the benefits of sophisticated technology in a cost-effective package. CLAYMORE offers all this and more.

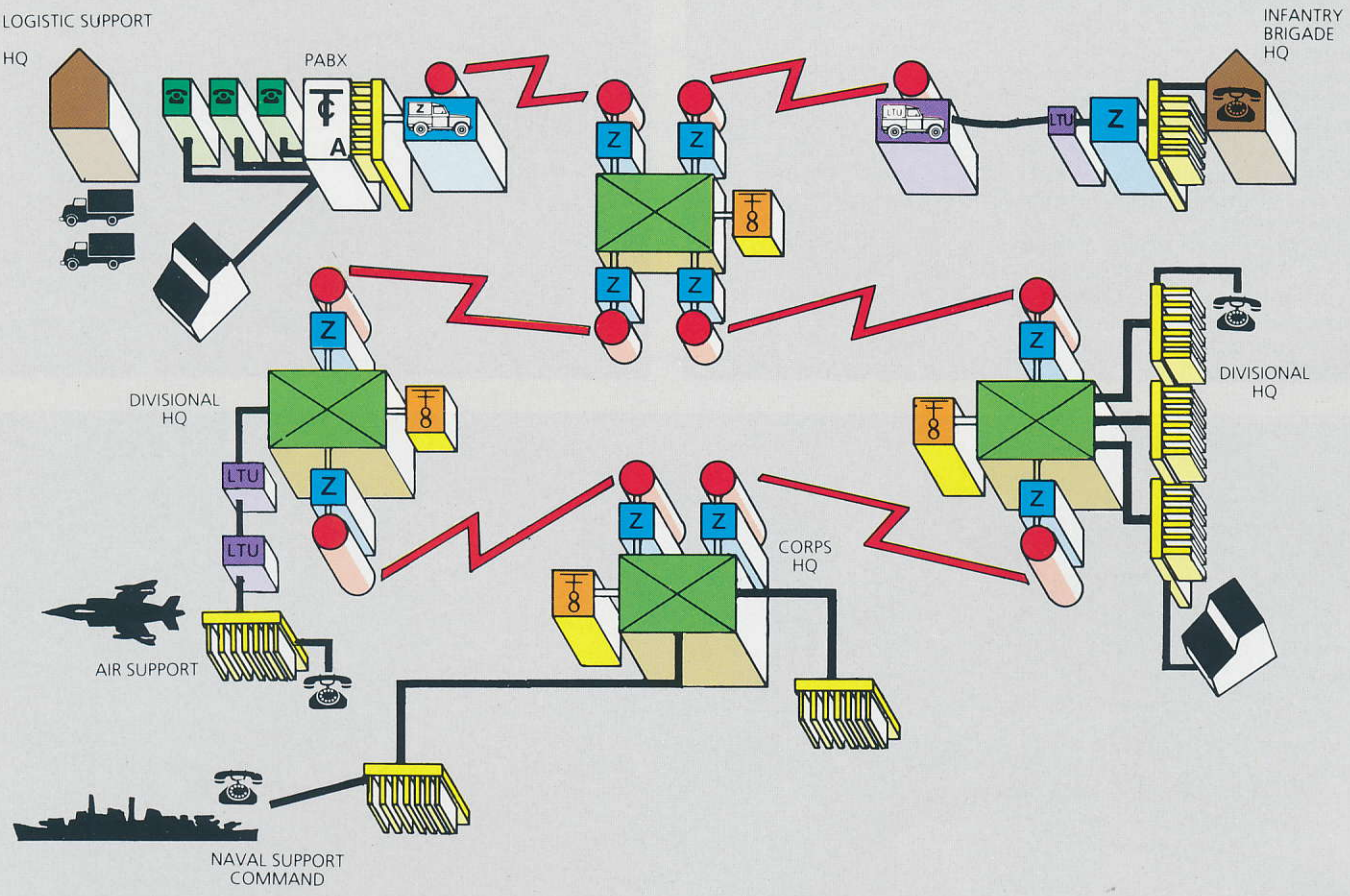
It is a Marconi product and, as such, benefits from the after-sales, training, support and maintenance services of a worldwide organisation that is second-to-none.
CLAYMORE digital radio relay – the total system.

SUMMARY OF SYSTEM COMPONENTS

The following equipments are available in the CLAYMORE system:

- GR083 digital radio relay – the advanced transmitting and receiving equipment that is an essential part of any network.
- MARCRYPMUX – online bulk encryption for long term, high grade security.
- MUX983 signal multiplexer – EUROCOM delta modulation with flexible channel allocation.
- TG274 Telegraph Converter Unit – for connection with teleprinters not having the CCITT V24/V28 digital interface.
- Automatic Signalling Unit – provides conversion between telephone signalling systems and the signals required by digital multiplexers.
- Key Management Unit – to generate the key code variables employed in bulk encryption devices.
- MARDEX digital exchange – microprocessor controlled circuit switching.
- STARS 3MX Solid-state telegraph automatic routing system – microprocessor storage and forwarding of teleprinter and data traffic.
- A range of options and accessories to further enhance the total system capability of CLAYMORE.

CLAYMORE
Switched Network



KEY

- GR 083 RADIO
- MARCRYPMUX (Z)
- LTU LINE TERMINATING UNIT
- SUBSCRIBER ACCESS UNIT
- "STARS" MESSAGE SWITCH
- "MARDEX" DIGITAL EXCHANGE

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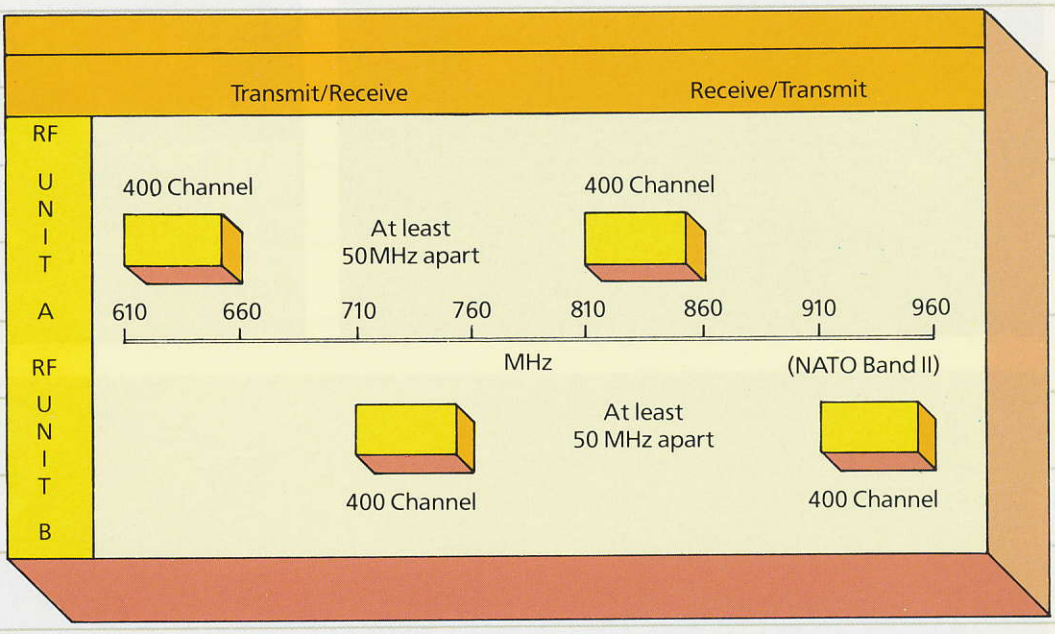
GR083 RADIO RELAY

MICROPROCESSOR CONTROL FOR RELIA

For really effective military communications networks the essential heart of any system must be the transmitting and receiving equipments.
The Marconi GR083 Radio Relay is a fully frequency synthesized, microprocessor controlled, transportable digital radio designed to complement the associated CLAYMORE multiplexing and encryption units to provide a flexible, secure multi-channel system.
GR083 is designed to EUROCOM standards and the use of advanced digital techniques, combined with modular flexibility, provides a product which can be configured for optimum performance in any environment, whilst being easy to install, operate and maintain.
The radio, which will operate at 256, 512, 1024 and 2048 kbit/s, offers 400 duplex channels in only two extremely compact 19-inch, rack mounted units – making GR083 one of the most sophisticated, compact radio terminals available.

GR083 – FEATURES

- Fully frequency synthesized tuning.
- Microprocessor control.
- 400 duplex channels in one unit.
- Rugged, lightweight, compact.
- Simple to operate, easy to maintain.
- Selectable data rate up to 2048 kbit/s.
- AC/DC auto changeover power supplies.
- Low power consumption.
- Comprehensive, built-in self-test facilities.
- RF units can be stacked for increased channel capacity (illustrated is a stack of 3 RF heads, providing no fewer than 1,200 duplex radio channels – sufficient for even the largest military networks).



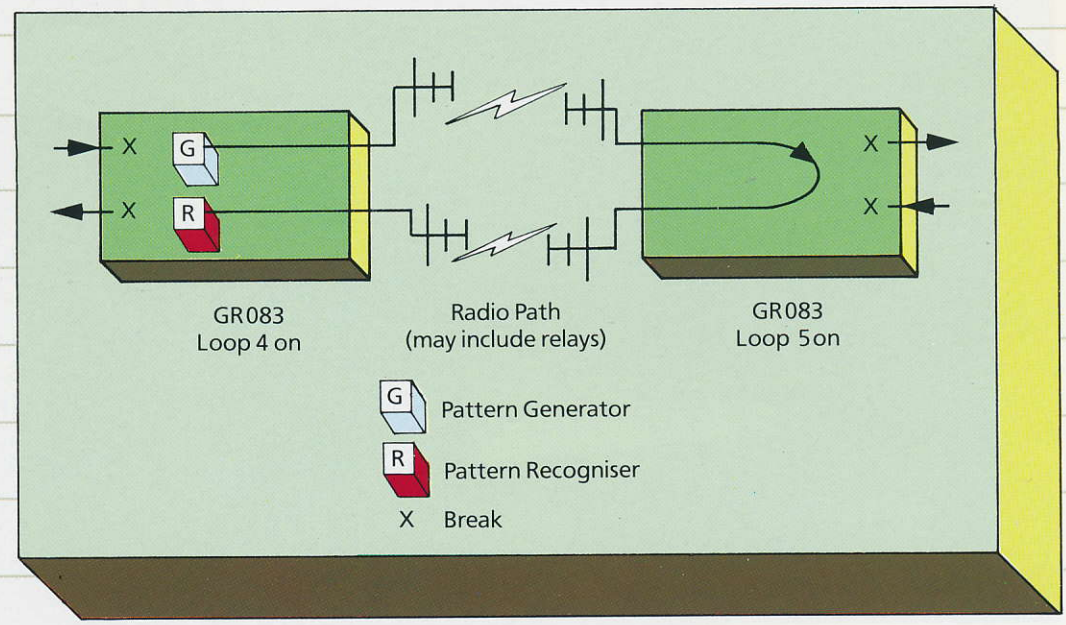
GR083 RF UNIT

The RF unit contains all the microprocessor, control, filter and RF frequency circuitry, most of which are fitted as standard screened modules.

GR083 BASEBAND UNIT

This unit contains the power supplies baseband circuitry and engineering order wire facilities and is common to all GR083 system configurations.

GR083 Testing



ABILITY AND SIMPLICITY OF OPERATION

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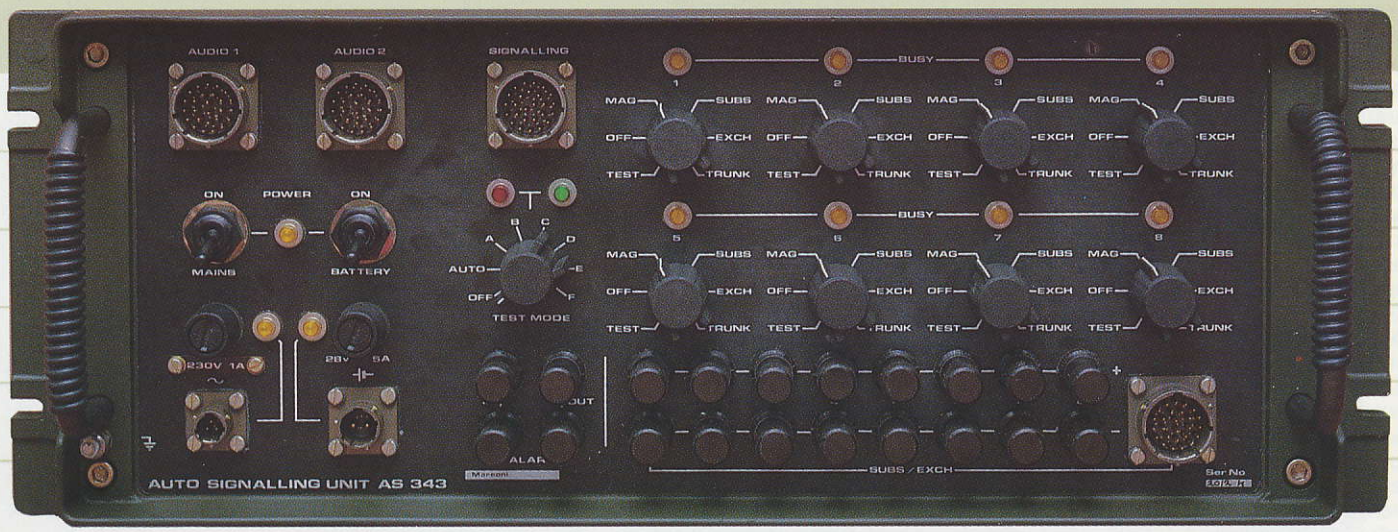
AUTOMATIC SIGNALLING UNIT



Whilst a MUX983 multiplexer can interface with a number of telephone systems such as magneto and 2 and 4 wire E&M systems, the CLAYMORE Automatic Signalling Unit greatly enhances the flexibility of a system.
In tactical situations, where radio relay is employed to improve the flexibility and mobility of a telephone communication system, the multiplexed transmission equipment replaces physical telephone wire links. The ASU interfaces directly with a wide range of telephone exchange equipment and provides the conversion between the telephone signalling systems and the signals required by a digital multiplexer. The ASU also provides the speech path between the telphone equipment and the multiplexer.
The CLAYMORE Automatic Signalling Unit is a rugged, transportable, eight-channel microprocessor controlled device which incorporates a sophisticated, built-in diagnostic test program.

Each of the eight channels may be individually configured by a front panel control to select one of the following modes of operation:
LB telephone to LB telephone · LB telephone to LB exchange · LB exchange to LB exchange · CB telephone to CB telephone (sole user hot-line) · CB telephone to CB exchange · CB exchange to CB exchange · Automatic telephone to Automatic exchange · Automatic exchange to Automatic exchange.

ASU – Features

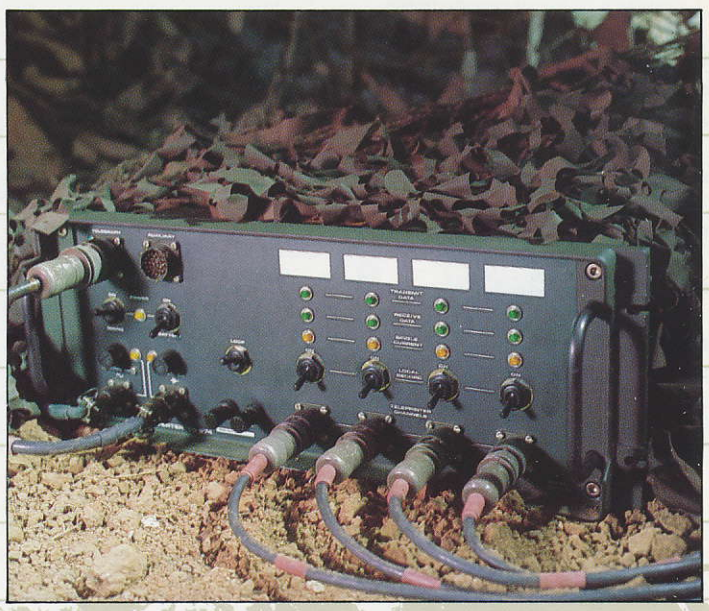
- Microprocessor controlled.
- Sophisticated automatic BITE.
- 8 Interface channels.
- Automatic clear down following loss of transmission path.
- Choice of power supplies.
- Simple to operate.

TELEGRAPH CONVERTER UNIT

The highly advanced digital technology contained within products in the CLAYMORE system is designed to meet the most stringent military demands, but while together they form a totally integrated network, it is realised that certain existing equipments may not readily interface with the new technology. Modern multiplexers (MUX 983) are designed to integrate with peripherals employing CCITT V24/V28 interfaces. The TG274 converter is available where teleprinters already in service do not have the V24/V28 specification.
A single telegraph converter unit provides up to four teleprinter inteface connections to integrate into a digital radio relay network and the system employs advanced CMOS integrated circuits and solid state current switches to ensure high survivability and simplicity of operation. Conversion circuits are contained on plug-in modules for ease of upgrade and maintenance in the field.

TG274 – Features

- Provides an interface for double and single current teleprinters to the modern V24/V28 specification.
- Full or half duplex facilities.
- Simple to operate, easy to maintain.
- Rugged, modular design.
- Mains or battery operation.



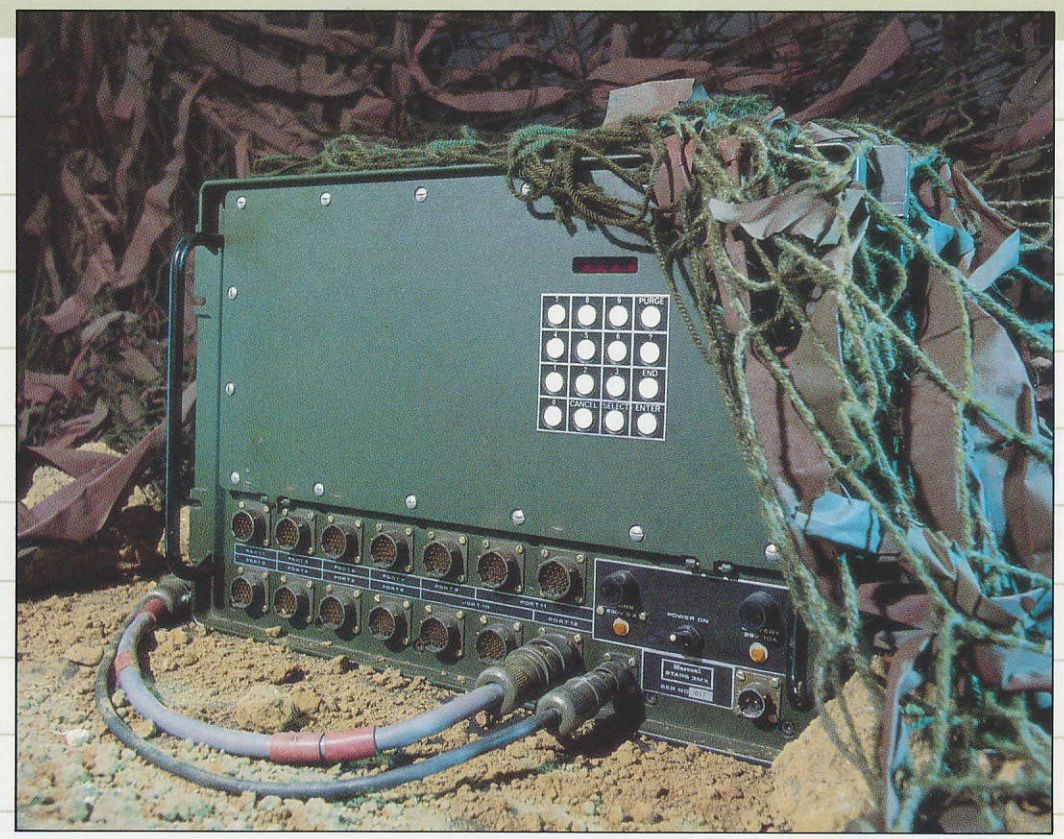
STARS 3MX

SOLID STATE TELEGRAPH AUTOMATIC ROUTING SYSTEM

Due to the ever increasing levels of information carried over a radio relay network, tactical considerations will involve the storing and forwarding of varying amounts of teleprinter and data traffic. An automatic system of storage and forwarding is therefore not only desirable, but essential to maintain effective communication levels.

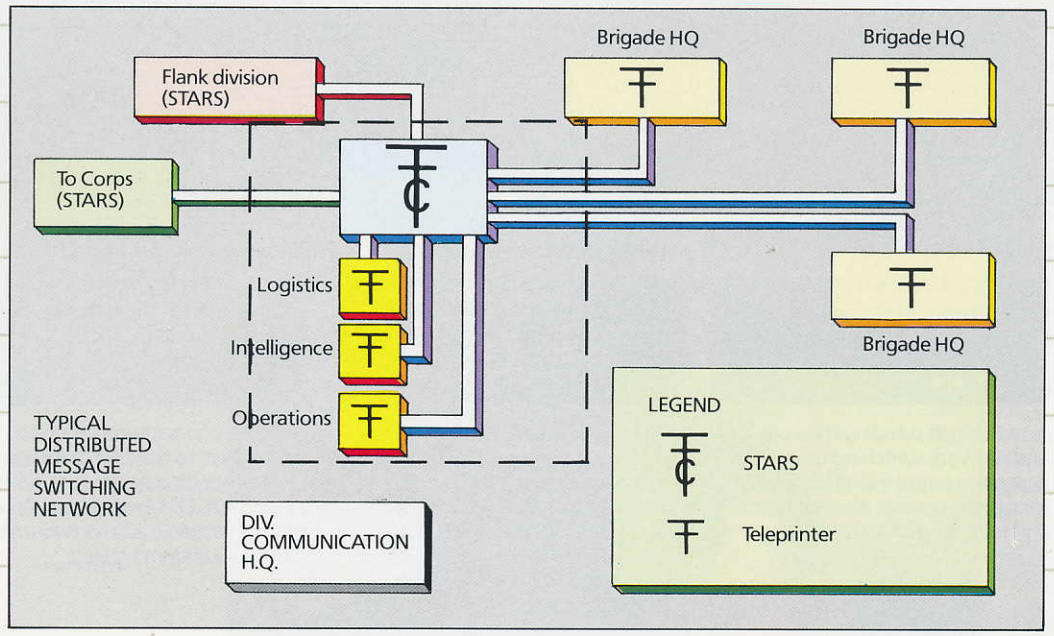
STARS is a compact, microprocessor-controlled automatic routing device designed to EUROCOM standards and to be totally flexible for tailoring to requirements and for ease of future expansion.

STARS may be operated independently or as part of CLAYMORE integrated network. It employs advanced digital technology for high survivability and simplicity of operation. A single STARS unit is capable of handling up to 1,600 input messages per day, and three units can be linked together for greater capacity. Once the unit is configured, either by the use of the front panel keypad/display or from the supervisory terminal, STARS is completely automatic in operation – requiring no operator intervention except for optional archive tape changes.



STARS 3MX – Features

- Designed to EUROCOM standards.
- Operates as stand-alone distributed message switching network or as part of a CLAYMORE digital system.
- 24-hour power failure back-up via internal rechargeable batteries.
- Optional long-term message storage on magnetic tape.
- Modular design for interface and upgrade flexibility.
- Auto Call and Auto Answer facilities.
- Continuously monitored, built-in self-test facilities.
- Choice of power supplies.
- Low power consumption.

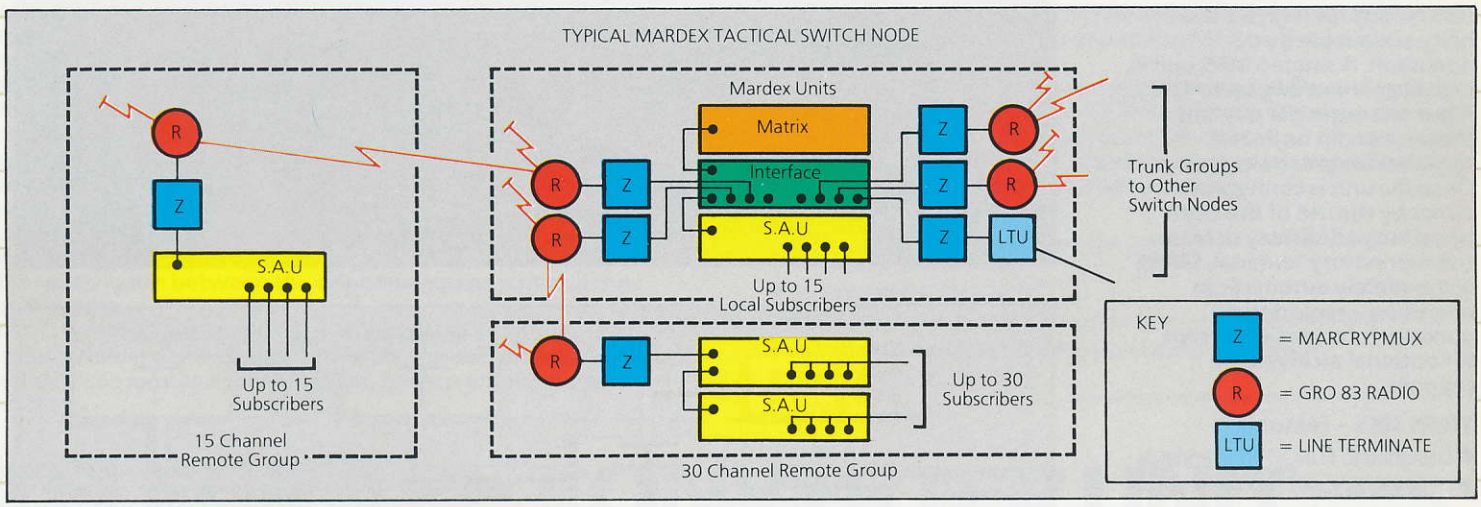


MARDEX DIGITAL EXCHANG
ADVANCED DIGITAL SWITCHING TEC

In a modern digital radio relay system such as CLAYMORE, communications will involve circuit switching by means of exchanges at various locations within a network. It is likely that a single transmission may have to pass through a number of exchanges before reaching its destination. With these high quality digital transmissions it is vital that the switching be carried out in digital form to maintain signal quality. Employing MARDEX within a CLAYMORE network means there is no limit to the number of exchanges through which a signal may pass while still retaining the original speech quality. Also, microprocessor control confers flexibility of routing and maximum reliability upon the system.
MARDEX digital exchange is a family of highly sophisticated equipments employing advanced technology and designed to EUROCOM standards and ruggedised for military operation.
The exclusive use of microprocessor control, combined with modular circuits provides a product which can be configured for optimum performance in varied applications whilst being easy to install, operate and maintain.
The units which make up a MARDEX system are: Switch Matrix Unit; Matrix Interface Unit; Subscriber Access Unit; Operator Console – all described in brief below.

MARDEX – Features

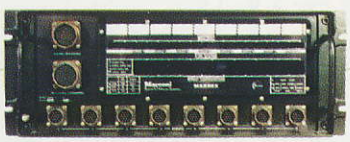
- Interfaces with all types of existing digital and analogue equipment.
- Digital time division multiplex switching.
- Non-blocking, 256 channel capacity.
- Distributed data base.
- Delta modulation at 16 or 32 kbit/s data rate.
- Rugged modularised construction.
- Simple to operate with comprehensive self-testing.
- Automatic initialisation.
- Modular software for configuration flexibility.
- Stored program control.
- Comprehensive, clear status displays.
- User-friendly console.
- Choice of power supplies.
- Low power consumption.



Switch Matrix Unit

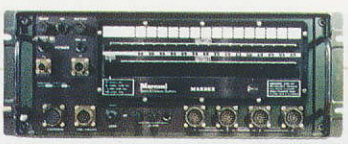
A switch unit which carries out local and network switching under stored program control including facilities for system control, alarm monitoring and recording of statistics.

Matrix Interface Unit



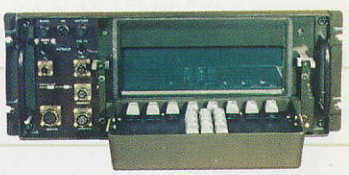
A unit which provides the interface for up to 8 ports each of which may be configured as a 16/32 channel loop or trunk group in any combination or conference facility.

Subscriber Access Unit



Provides connections for up to 15 subscribers to the Matrix Interface Unit, either directly or via radio relay, as a EUROCOM loop group. An expansion module allows two units to form a 30 channel group.

Operator Console Unit



The Operator Console Unit provides a simple to operate, user friendly man-machine interface, providing all necessary engineering and database management facilities. The rugged keyboard is hinged up and stored in transit.

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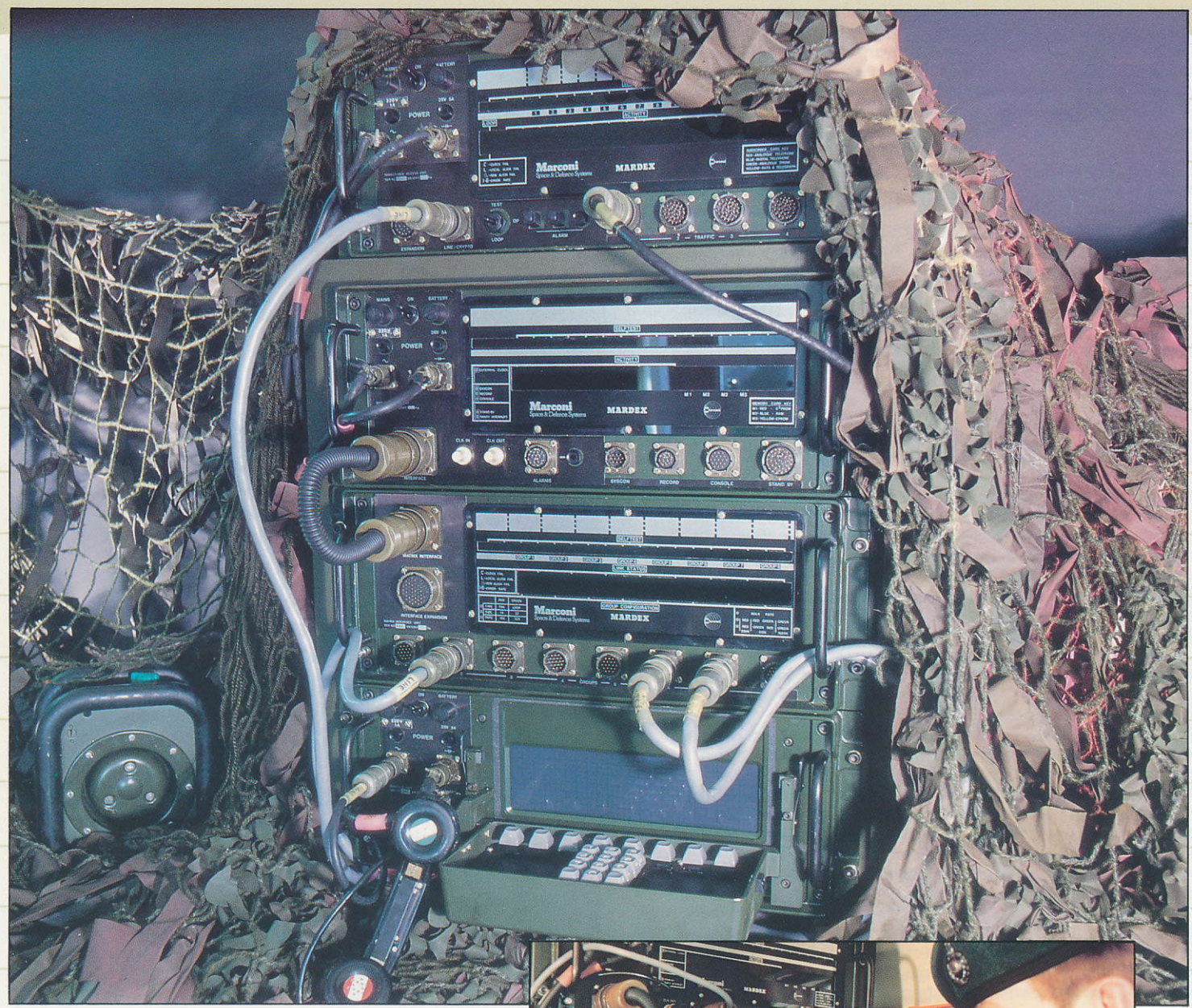


KEY MANAGEMENT SYSTEM

The Key Management System is used to generate key variables for use with MARCRYPMUX. Key variables can either be entered manually or generated randomly by the equipment itself and up to 16 key variables may be stored in the equipment.
Apart from setting up the key variables the equipment carries out a number of sophisticated functions relating to store and recall, editing and correction, addressing and accounting, comparison and verification.
The key variable set up by the Key Management Unit is transferred to a robust pocket sized Fill Gun utilizing an optical transfer mechanism patented by Marconi.
Stores remain active, even when the power is off, until they are erased by the operator.

FILL GUN

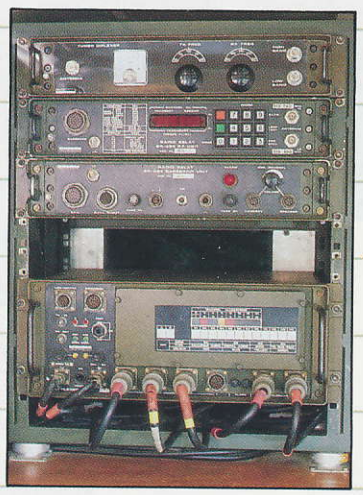
The Marcryp Fill Gun is a robust pocket-size battery operated device with a memory that transfers a key variable, which has been set on the Key Management Unit, to the MARCRYPMUX equipments.
The fill gun battery is capable of powering at least 100 write operations every day for a year.

ANTENNAS

The sophisticated technology of a modern digital radio relay system such as CLAYMORE demands equally high levels of sophistication from the antennas used in conjunction with the transmitting/receiving equipment.
The design of the CLAYMORE Radio Relay Antennas System incorporates effectiveness of operation and simplicity of installation with excellent camouflage characteristics.
The basis of the antenna system is a six or eight element Yagi-Uda array designed to give a directivity gain of approximately 11dB and a 3dB beamwidth of 55°. This is sufficient to satisfy path loss considerations whilst the beamwidth is large enough to ensure easy alignment.
The arrays have been designed to give front to back ratio and side lobe suppresion, thus ensuring minimum interaction between co-sited equipments.
Marconi is also in a position to offer an antenna coupler which has no moving parts and permits duplex operation using a single antenna and feeder. However, whilst we are confident that the system offered is the most suitable for tactical military radio relay, Marconi is quite prepared to discuss alternative antenna configuration.

DIPLEXER

In order that the GR083 will interface with alternative antenna systems, Marconi has developed a diplexer unit, which enables the GR083 to work into a variety of single high gain broadband antennas.
The diplexer is a reliable, rugged, compact unit, which contains no moving parts and utilizes a combination of hybrids and fixed tuned filters. This will provide the necessary isolation between the transmit and receive frequencies, thus keeping the insertion loss to an absolute minimum.



MASTS

A choice of antenna masts at various extended heights is available. They may be fitted to the vehicle or be free standing if preferred.

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SERVICE AND LOGISTICS SUPPORT

Marconi is able to offer maintenance and support facilities to match any customer requirement ranging from factory repair of faulty units to base repair to component level. Full technical and maintenance manuals are available and Marconi will provide training for customer personnel. A range of support test equipment is also available, including special manual or fully automatic test equipment. All CLAYMORE equipment has been designed specifically to permit rapid maintenance of units in the field if necessary.

Marconi
Secure Radio Systems

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