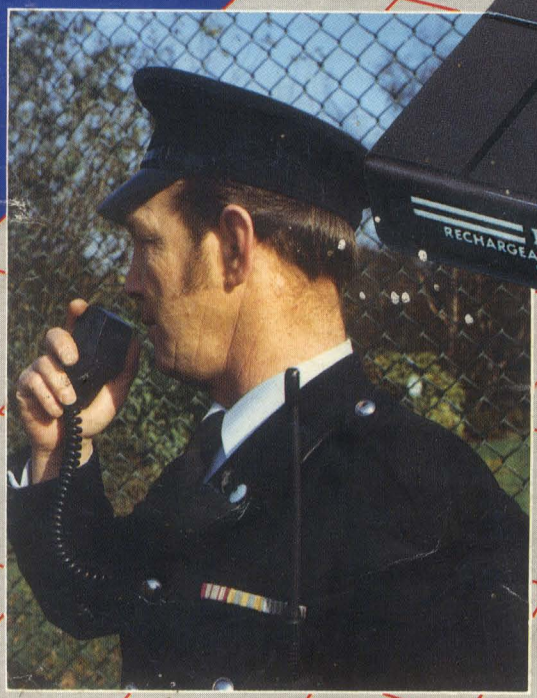
MINSTREL
Radio System

Totally secure voice communications with full digital encryption



Marconi
Space & Defence Systems

MINSTREL - the smallest secure radio system with the greatest capability

- A SYSTEM BASED ON ONE RADIO DESIGN FOR MAXIMUM USER FLEXIBILITY
- HIGHLY SOPHISTICATED L.S.I. CIRCUITRY ACHIEVES FULL DIGITAL ENCRYPTION FACILITIES IN AN EXTREMELY COMPACT PACKAGE
- FULL FREQUENCY SYNTHESIS IN CUSTOMER SPECIFIED WAVEBAND RANGE
- COMPLETELY DEFIES ATTACK BY ANY ANALYSIS TECHNIQUE
- SIMPLICITY OF OPERATION
- LOW POWER CONSUMPTION
- RUGGED CONSTRUCTION GIVES LONG TERM RELIABILITY
- WILL OPERATE WITH EXISTING SYSTEMS IN DIGITAL AND ANALOGUE MODES

Marconi leads the world in the development of secure communications, particularly in the field of digital radio systems.

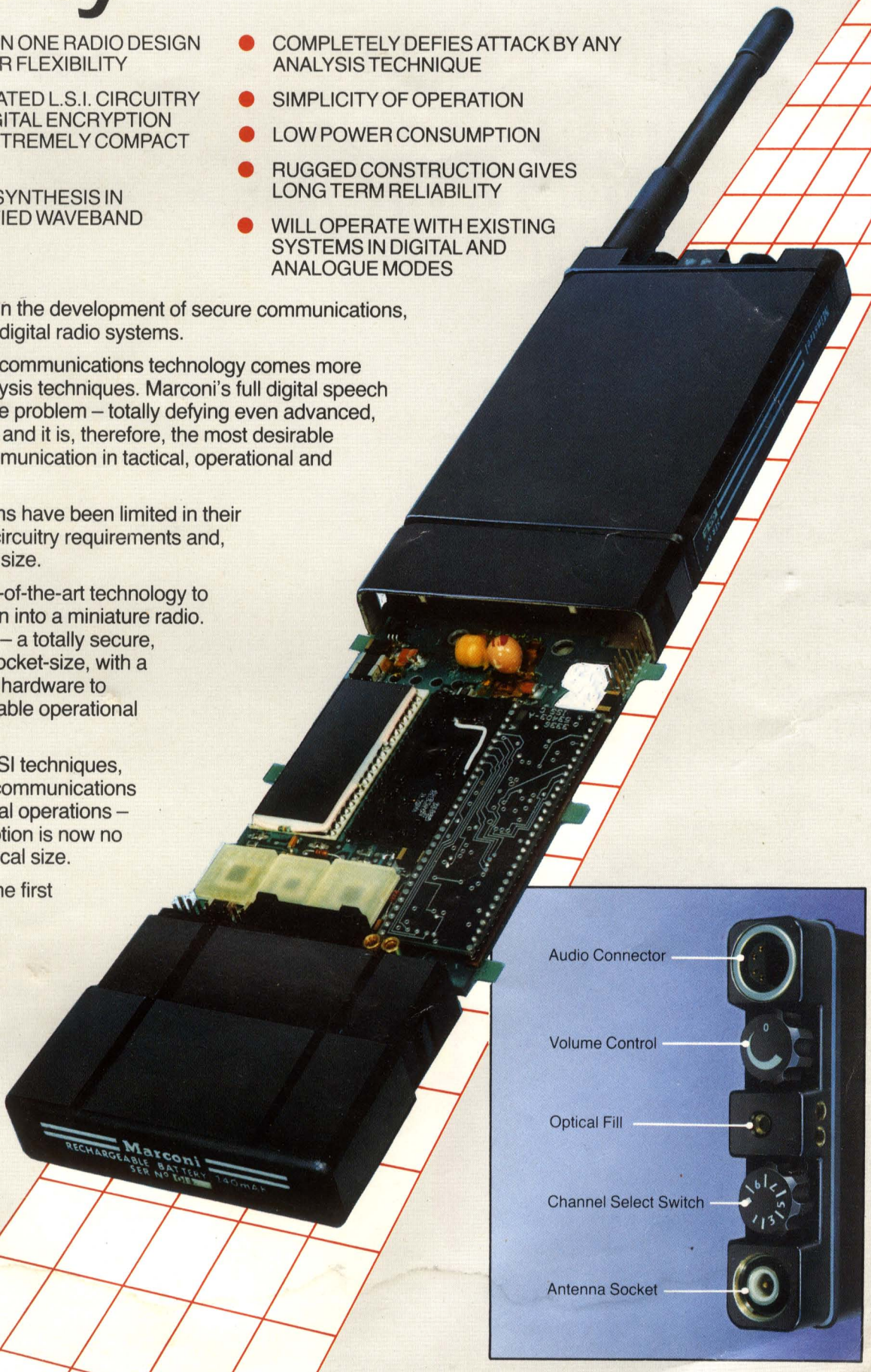
With more sophisticated communications technology comes more sophisticated attack analysis techniques. Marconi's full digital speech encryption overcomes the problem – totally defying even advanced, computer-aided analysis and it is, therefore, the most desirable form of secure radio communication in tactical, operational and covert situations.

Up until now such systems have been limited in their application due to large circuitry requirements and, consequently, their large size.

Marconi have used state-of-the-art technology to bring full digital encryption into a miniature radio. The result is MINSTREL – a totally secure, flexible, radio system – pocket-size, with a range of complementary hardware to extend its already formidable operational capabilities.

Using highly advanced LSI techniques, Marconi has put secure communications into the front line of tactical operations – the use of speech encryption is now no longer restricted by physical size.

MINSTREL is unique – the first pocket-size, digitally secure radio.



CONSTRUCTION OF RADIO EXPOSED BY REMOVING CASE

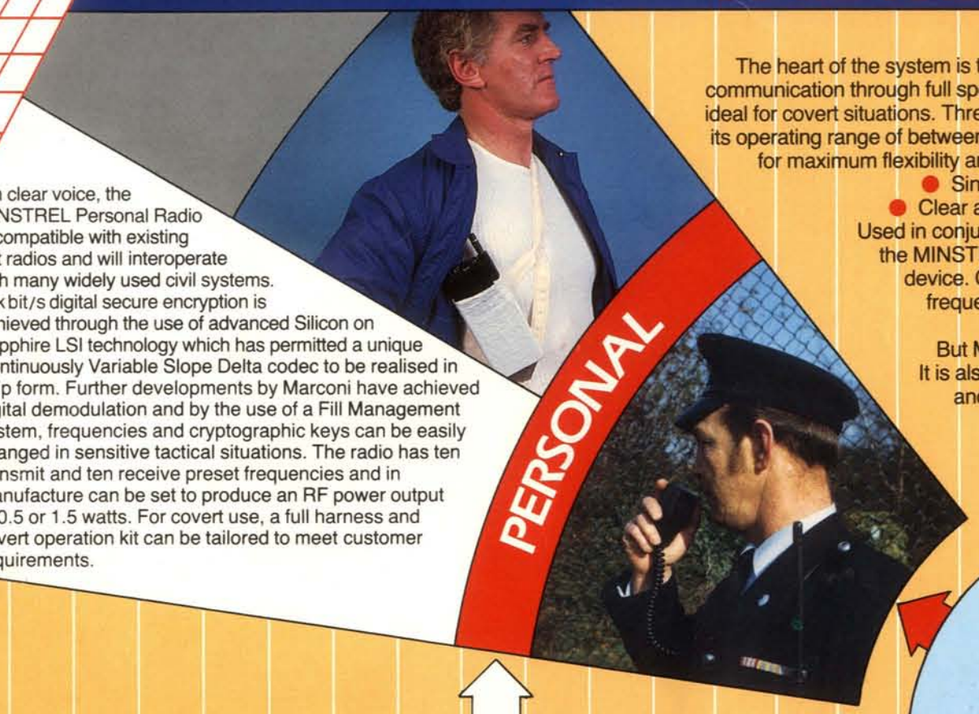
THE MINSTREL SYSTEM

The heart of the system is the Personal Radio. This pocket-size unit provides secure voice communication through full speech encryption. It is extremely compact and is simple to operate – ideal for covert situations. Three frequency bands are available as standard, and any sub-band in its operating range of between 30 and 470 MHz can be provided. Frequency is fully synthesised for maximum flexibility and reliability and the radio will operate in the following modes:

- Single-Frequency or Two-Frequency Simplex.
- Clear analogue, or digitally secure voice at 16kbit/s.

Used in conjunction with the Fill Management Unit and Fill Gun, the MINSTREL Radio becomes a totally secure encryption device. Cryptographic Data is loaded optically, as are frequency presets, and all units carry full testing, failsafe and erasure facilities.
But MINSTREL is more than a personal radio. It is also the basis of an extremely comprehensive and flexible system that can be adapted to suit any requirement.

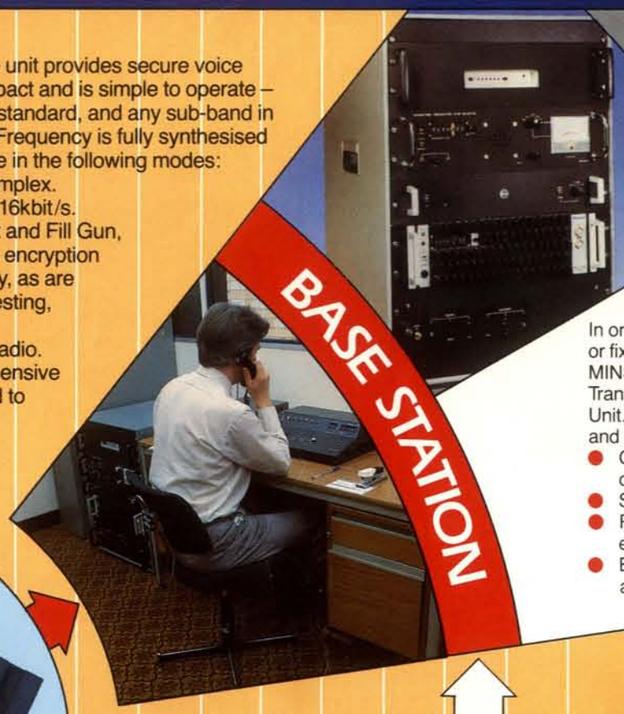
PERSONAL



In clear voice, the MINSTREL Personal Radio is compatible with existing net radios and will interoperate with many widely used civil systems. 16k bit/s digital secure encryption is achieved through the use of advanced Silicon on Sapphire LSI technology which has permitted a unique Continuously Variable Slope Delta codec to be realised in chip form. Further developments by Marconi have achieved digital demodulation and by the use of a Fill Management system, frequencies and cryptographic keys can be easily changed in sensitive tactical situations. The radio has ten transmit and ten receive preset frequencies and in manufacture can be set to produce an RF power output of 0.5 or 1.5 watts. For covert use, a full harness and covert operation kit can be tailored to meet customer requirements.

- Extremely compact and lightweight.
- Re-programmable in the field, using the associated Fill Management Unit.
- Choice of antennas including covert harness.
- Choice of microphone/speaker including induction loop earpiece for covert use.
- Simple to operate, easy to maintain.
- Rugged and robust.

BASE STATION



In order to increase effective range, a headquarters or fixed operational location may employ the MINSTREL Base Station. It comprises a 40 watt Transmitter together with a Receiver and Interface Unit. A Desk Control Unit permits remote operation and contains the Crypto circuitry.

- Gives the MINSTREL System increased area coverage.
- Standard 19" rack mounting.
- Remote control unit operation with full speech encryption facility.
- Efficient static antenna mounted as required.

MOBILE/STATIC

The Applique unit has been developed for use in vehicles. A MINSTREL Personal Radio is simply slipped into the unit where battery charger, antenna and audio connections are quickly effected.

- Converts the personal radio into a 20 watt transceiver.
- Discrete and convenient.
- Radio battery trickle charged from vehicle system.

Even greater flexibility can be achieved by the use of versions of the Applique Unit. With the addition of a battery box, it can be used as a desk-mounted mains powered 20 watt radio, or as a 7 watt manpack version.

ENCRYPTION

Marconi, with their wealth of expertise in this field, have developed the Fill Management Unit (FMU) and Fill Gun which preclude the use of manual methods in loading key information. The FMU is a 'computer' which enables the crypto keys and the ten pre-set frequencies to be entered. They are then transferred optically, direct or via a Fill Gun, into the radios. The optional Fill Gun system is programmed from the FMU and taken to the personal radios and/or base station where loading is performed on site. This simple system combines maximum security with ease of operation and maximum reliability. Furthermore, a 'stay-alive' cell ensures that the 'fill' remains intact even when the radio is switched off.

TALK-THROUGH

Range limitation, geological location and local screening problems can be overcome by employing Two-Frequency Simplex operation using the MINSTREL Talk-Through Station. Large area coverage is achieved, which can be further extended by employing linked Networks. MINSTREL Talk-Through stations operate automatically.

- Designed for permanent installation at an optimum site.
- Fully automatic operation; dual installation.
- Standard 19" rack mounting.
- Equipment identical to Base Station.
- Remote control, using specially equipped radio or line.

SPECIFICATIONS

1. PERSONAL RADIO

Frequency Ranges:	68 to 88MHz 140 to 156MHz 420 to 470MHz } *Or other customer specified bands between 30 - 470MHz.*
Channels:	*Fully synthesised at 25kHz spacing. 10 preset channels, all fully user programmable.*
Channel Allocation Bandwidth:	*Full band for all radios.*
Operating Modes:	*VHF/FM single or two-frequency simplex. Secure Voice 16kbit/s, or Voice.*
Modulation:	*Minimum Shift Keying* *(i) Analogue Voice (Compatible with modern military radios). Pre-emphasis/ De-emphasis at 6dB/octave from 1kHz break-point. Peak deviation ±5·6kHz.* *(ii) Secure digital voice at 16kbit/s. MSK Peak deviation ±4kHz.*
Squelch:	*3 independent squelch modes.* *(1) 16kbit/s digital squelch.* *(2) signal to noise squelch.* *(3) 150Hz tone detected, as part of incoming analogue transmission.*
Frequency and Code-Variable Programming:	*Serial data input via opto-coupled fill gun.*
Transmitter output:	*0·5W or 1·5W into 50Ω load: optional.*
Power Supply:	*12V D.C nominal.*
Battery Life:	*8 - 33 hours depending on battery option. Both primary and rechargeable options available.*
Sizes (incl. battery): (0·5W) (1·5W)	 *205mm x 84mm x 18mm* *205mm x 84mm x 36mm*
Weight (incl. battery) (0·5W):	*500g.*
Operating temperature range:	*–20°C to +70°C*
Receiver Sensitivity:	*–117dBm at Receiver 50Ω input for not greater than 10% bit error rate, in digital mode.* *–117dBm for 10dB SINAD in Analogue mode.*

2. VEHICLE APPLIQUE

Transmitter output:	*20W.*
Size:	*240mm x 50mm x 230mm*
Weight:	*2·5kgs.*

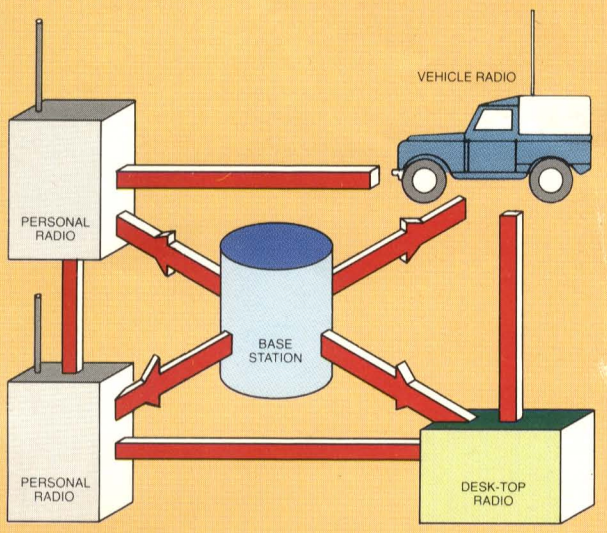
3. TALK-THROUGH

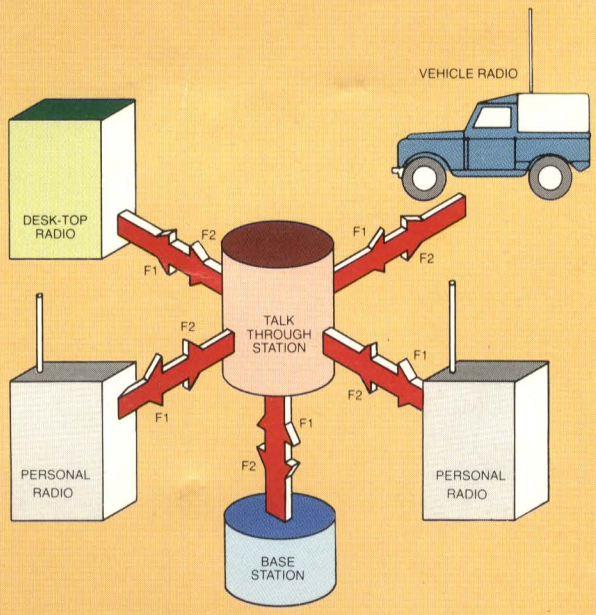
Transmitter output:	*Variable up to 40W.*
Operation in	
Clear analogue	*using 150Hz pilot tone*
Secure digital	*at 16kbit/s.*
19in. rack mounted	

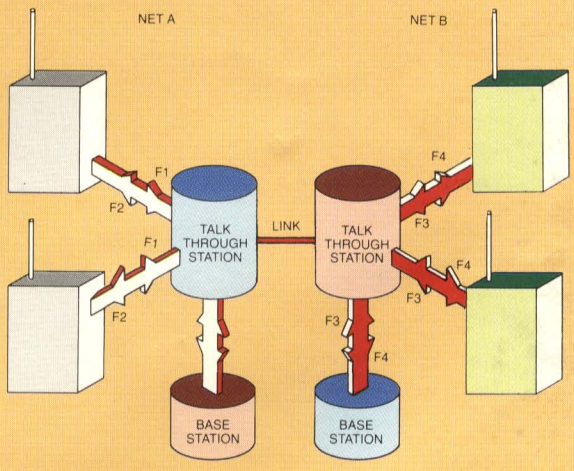
4. BASE STATION

As for Talk-Through:	*Selective call facility. A.C/D.C Power Supply. Control Unit can be remote. Rx and Tx 19in rack mounted.*

POSSIBLE CONFIGURATIONS







Marconi
Space & Defence Systems

Marconi Space & Defence Systems Limited
The Grove, Warren Lane
Stanmore, Middlesex HA7 4LY, England
Telephone: 01-954 2311 Telex: 22616

1000/3/84 MSDS-MC 52
Designed and produced by Blitz Design and Graphics. Printed in England.