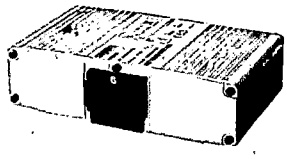
SRG3900
MOBILE RADIO



PRODUCT BULLETIN

MOD-16-2112

Issue: 1

sepura

Going further in critical communications

APPLICATIONS TERMINALS SYSTEMS

Contents

INTRODUCTION

This document describes the functions and features of the SRG3900 TETRA Gateway radio and console range.

Supporting documents

The latest copies of all of these documents are available from the resource centre.

- SRG3900 Datasheet
- SRG3900 Accessories Ordering Guide
- SRG3000 Series Accessories Bulletin: MOD-09-1119
- HBC User Guide : MOD-15-1895
- Motorcycle Kit Bulletin: SB-P-09-4111
- Marine Kit Bulletin: MOD-16-2028
- TETRA Terminals User Guide
- Communications in the Transport sector (English, German & Spanish versions)
- Virtual Console product bulletin: SB-P-08-4096

Glossary

Term	Explanation
CCK	Common Cipher Key
DCK	Derived Cipher Key
DMO	Direct Mode Operation (off network operation)
E2EE	End-to-End Encryption
GCK	Group Cipher Key
GMO	Gateway Mode Operation
HBC	Generic acronym used when referring to the Sepura Handset Based Console range. The HBC combines full console capability with an handset audio accessory. Range includes: • HBC1 = Monochrome handset based console, no context keys, IP54 sealed. No longer in manufacture, now superseded by HBC2 and HBC3 • HBC2 = Colour handset based console, two context keys, IP55 sealed • HBC3 = Colour handset based console, three context keys, IP55 sealed

LIP	Location Information Protocol
MDT	Mobile Data Terminal: computing device attached to SRG3900 via PEI port or console port
OTAR	Over The Air Rekeying: a TETRA facility allowing the change of encryption keys in the radio over the air
PEI	Peripheral Equipment Interface: data connection allowing external equipment to attach and control, or be controlled by, the SRG3900
Radio Manager	Software application used to create customisation scripts for Sepura TETRA radios
SCC	Generic acronym used when referring to DIN sized Sepura Colour Console range which includes: • SCC1 = DIN sized colour console, two context keys, IP54 sealed • SCC2 = DIN sized colour console, two context keys, IP67 sealed • SCC3 = DIN sized colour console, three context keys, IP54 sealed • SCC3(IP67) = DIN sized colour console, three context keys, IP67 sealed
SCK	Static Cipher Key
SDS	Short Data Service: messaging service similar to SMS used in GSM
TMO	Trunked Mode Operation (on-network operation)
UI	User Interface

SRG3900 family

The SRG3900 is at the core of the world's most successful TETRA Gateway solution. Its extensive range of control console solutions, audio accessories and install options means it can be found in the world's police, fire and ambulance vehicles; in motorcycles, trains, mining vehicles, helicopters, patrol boats and exposed rigid inflatable boats (RiBs), as well as in mobile control/incident response vehicles and in emergency control rooms.

SRG3900

- Extensive console options
- Extensive installation options
- Extensive audio accessory options
- **THE MOST WIDELY USED TETRA GATEWAY ON THE MARKET TODAY**

	SRG3900 solution	All other TETRA mobile solutions
Widest choice of control consoles on the market, allowing installations to be tailored to the users' needs	✓	✗
10W RF + dual 8W speakers* + dual 1W speaker mics or handsets** ensure your message is received loud and clear	✓	✗
Marine, aircraft, motorcycle and covert installation options allow all vehicles to utilise the same TETRA radio, lowering your training and support costs	✓	✗
Windows-based Virtual Console and embedded control within specialist BMW and VW public safety vehicles allows seamless integration with onboard computing devices, present in many specialist vehicles, simplifying installation and lowering the overall cost of ownership	✓	✗
Tough technology designed to work in temperatures and environmental extremes*** providing reliable operation where others fail	✓	✗

** Wired in parallel by the installer*
***On a dual SCC console installation*
**** IP67 radio enclosure and control console options available.*

Extending radio coverage beyond your network's current capabilities

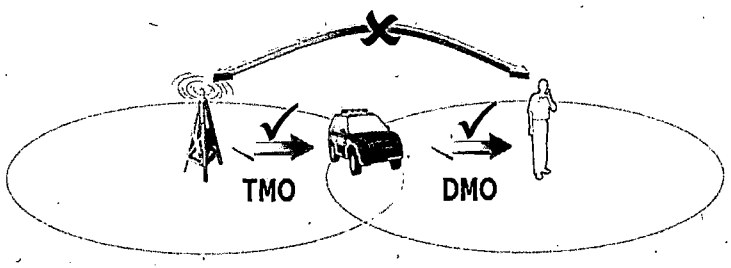
Extended network coverage: powerful 10W Class 2 RF engine
The SRG3900 extends operational range, when compared to other TETRA mobiles, through the delivery of one of the most powerful and sensitive TETRA engines on the market.

- Powerful: TETRA transmission rated at Class 2, transmitting at 10W
- Sensitive: typical TETRA receiver sensitivity rated well beyond ETSI mandatory specifications

Together this increased transmission power, plus increased typical receiver sensitivity, stretches communications – both on- and off-network – into areas where it simply was not possible before.

Extended network coverage: smart gateway operation
The SRG3900 pioneered gateway mode operation (GMO) and is the world's most widely deployed gateway solution.

So what does gateway mode do?
A gateway creates a communications link between on-network users (TMO) and off-network users (DMO). The gateway will re-transmit information received from the network and retransmit to the off-network DMO users, and vice versa

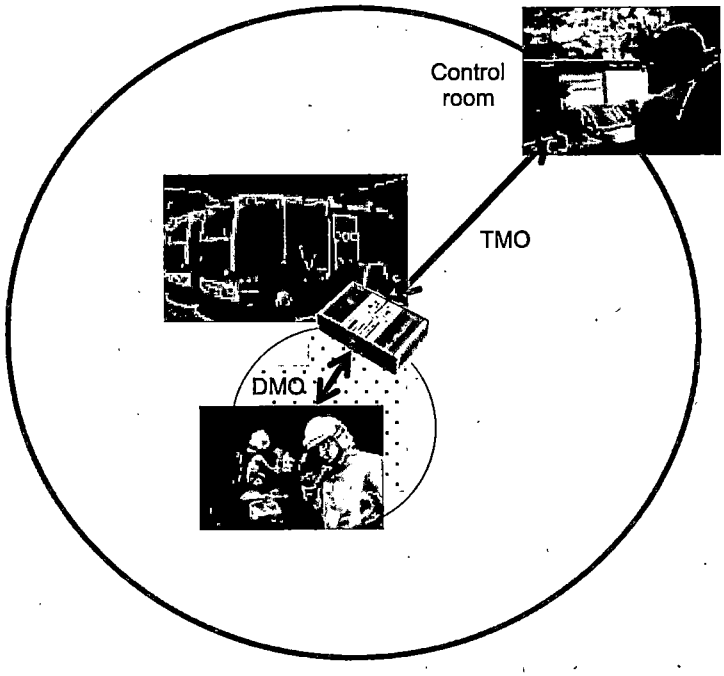


So why is this useful?
This means that users who cannot connect directly to the TETRA network – perhaps because they are working in a network blind spot such as in a tunnel or deep within a building – can continue to work off-network with their local DMO team of users and via the locally positioned SRG3900 gateway, usually fitted in a vehicle with a high gain antenna, parked where it can access the TMO network. It also allows them to stay in communication with TETRA network users and the control room, relaying communications via the SRG3900's powerful TETRA RF engine.

Intelligent call conversion for simplified communications
Many public safety organisations ensure a set procedure is followed when 'at scene': as officers are about to leave their vehicle, the SRG3900 must be switched into gateway mode.

Users proceeding on foot have their hand-portable radios set to DMO, connecting to the vehicle-based SRG3900 and using it as a gateway to the network. Control need only contact the gateway to communicate with the team.

Whilst the team are in the vehicle, the SRG3900 operates as a normal TETRA radio. Gateway mode mutes the vehicles speakers and onboard mics, keeping communications secure. All communication arriving from control is automatically forwarded to the users hand-portables. Control does not need to alter the way they communicate with the team.



Intelligent call conversion = safer operation, tracking DMO users

An in-vehicle SRG3900 used in gateway mode allows control room AVL/APL mapping solutions to track both the vehicle and the DMO users' hand-portables. Should a DMO user need to summon assistance via Man-Down, Lone Worker or by pressing the emergency button, control can direct additional backup or rescue resources exactly where they are required.

For further examples of how the SRG3900's gateway option can extend coverage, simplify operations and enhance user safety, see Appendix A: Typical gateway uses

Extended off-network coverage: powerful DMO repeater

In locations where normal TMO network coverage is not available – or not required – users can revert to off-network Direct Mode (DMO) for communication between local teams. The SRG3900's powerful 10W Class 2 TETRA engine, combined with its repeater capability, allows an SRG3900 sited between DMO users to communicate at ranges that are beyond the normal capability of the users' hand-portable radios alone.

The SRG3900 repeater relays or 'repeats' half-duplex voice calls, status messages, SDS messages, emergency calls, GPS location data and in-band tone signalling when transmitted from a TETRA radio, working in DMO, operating on the same talkgroup as the repeater.

Call participation/monitoring option

While the SRG3900 is in repeater mode, users can also hear/participate in the repeated call. This feature is configurable and can be disabled if required.

E2E encryption

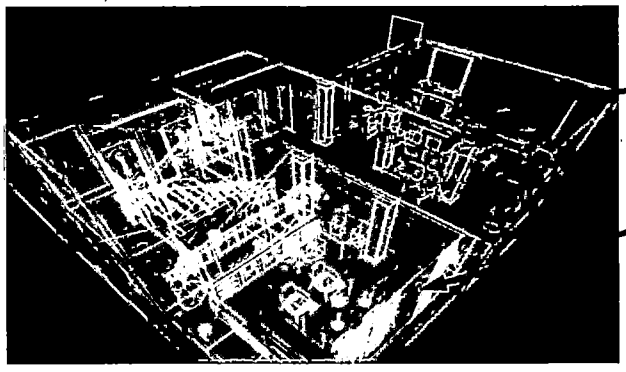
All encrypted traffic will be repeated. If the SRG3900 in repeater mode has the correct encryption keys installed, local monitoring of, and participation in, the repeated voice call is permitted. This feature is configurable and can be disabled if required.

Type 1A frequency-efficient repeater

Repeater operation is governed by ETSI. The SRG3900 repeater uses the 'Type 1A' solution, which allows one call per channel. Type 1A is by far the most spectrum-efficient method of providing a TETRA repeater solution.

In-building coverage extension – using gateway or repeater mode

Even with the best-designed networks, there will always be areas within some buildings where coverage is not possible, due to signal degradation; radio waves attenuate as they pass through buildings, as indicated by the red area in the diagram below.



However, the SRG3900's class-leading 10W RF engine – coupled with its sensitive receiver and gateway operation – results in greatly improved in-building penetration.

Gateway operation effectively creates a local 'bubble' of coverage. Simply park the SRG-equipped vehicle outside the building: users operating within the building only need to be able to communicate with the SRG3900 parked outside (via DMO), utilising the power of the SRG3900's TETRA engine and its high gain antenna to provide TMO network communications.

Users can typically expect communications in challenging environments where hand-portable TMO communications was not possible before.

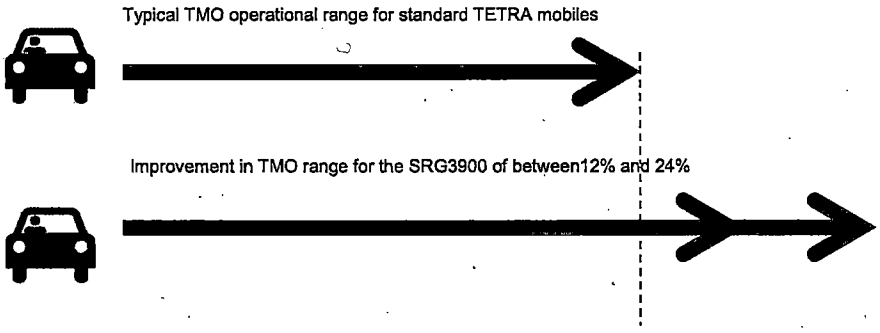
SRG3900 gateway strategically parked outside this building allows hand-portable users within to communicate with control or other TMO network users

In circumstances where TMO network coverage is simply not available – or perhaps where off network communications are preferred – a strategically parked SRG3900, set to repeater mode, can also extend in-building DMO coverage beyond the normal capability of DMO users' hand-portable radios alone.

What range extension can a user expect? Coverage prediction models are used extensively when planning a network over any complex geographic area. Based on such a prediction model, the SRG3900 TMO network range improvement is estimated at between 12% and

24%[1] over other TETRA mobiles. Off-network DMO range improvements is similarly estimated at between 24% and 65%[1] improvement over other TETRA mobiles.

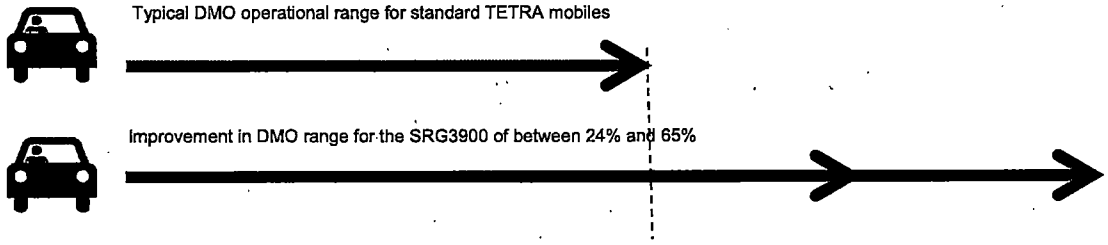
TMO operational range improvement



TMO range extension: the detail [1]

- Compared to a typical TETRA mobile operating at 3W, with standard ETSI defined receiver sensitivity, the SRG3900 achieves a 24% range improvement
- Compared to a typical TETRA mobile radio operating at 10W, with standard ETSI defined receiver sensitivity, the SRG3900 achieves a 12% range improvement

DMO operational range improvement



DMO range extension: the detail [1]

- Compared to a typical TETRA mobile operating at 3W, with standard ETSI defined receiver sensitivity, the SRG3900 achieves a 65% range improvement
- Compared to a typical TETRA mobile operating at 5.6W with standard ETSI defined receive sensitivity, the SRG3900 achieves a 44% range improvement
- Compared to a typical TETRA mobile operating at 10W, the SRG3900 with its improved receive sensitivity achieves a 24% range improvement

Improved user safety

For on-network, off-network and in-building communications, there is less likelihood of a user not being able to place or receive a vital emergency call.

Reduced network costs

The SRG3900's improved RF performance, coupled with its gateway capability, permits the creation of thinner networks without compromising on coverage. Thinner networks – with a reduced number of base stations and associated site link infrastructure – cost less than a network designed to support less powerful and less sensitive TETRA radios without gateway functionality.

Thinner networks = increased savings

Extended coverage: summary of key features

- ✓ Powerful 10W RF Class 2 TETRA engine
- ✓ Typical receive sensitivity far beyond ETSI mandatory specifications
- ✓ RF power configurable in 5dB steps
- ✓ Typically 12%-24%(1) TMO network range improvement over other TETRA radios
- ✓ Typically 24%-65%(1) DMO off-network range improvement over TETRA radios
- ✓ Independent TMO (on network) and DMO (off-network) power level settings
- ✓ Gateway support
  - o Extends the operational reach of a network, allowing hand-held use outside of the designed TETRA infrastructure coverage
  - o Provides predictable operation in areas with poor signal strength
  - o Improves in-building coverage via local gateway 'bubble'
  - o Allows communications even where a network has capacity limitations
  - o Provides a cost-effective coverage in network 'dead spots' or rural areas
  - o Enhance coverage during network roll-out
  - o Provides intelligent call conversion and message routing, simplifying communications
  - o Allows E2EE voice calls to remain encrypted
  - o Routes DMO users emergency calls/Man-Down and Lone Worker alarms to other DMO users and over the network to a defined destination
  - o Allows DMO users GPS location data to be sent via the gateway to be tracked separately from the parked vehicle
- ✓ DMO repeater support:
  - o Extends off-network coverage using efficient 'Type 1A' ESTI standard with presence signal support
  - o For voice, tone signalling, group status & SDS messaging between off-network users
  - o Allows E2EE voice calls to remain encrypted

- Repeats emergency calls
- Call monitoring & participation in calls whilst the SRG3900 is in repeater mode can be optionally enabled via Radio Manager
- Improved in-building coverage

✓ SRG3900 gateway and repeater functionality are licence-enabled via Radio Manager
✓ Permits the deployment of thinner networks with reduced number of base stations
✓ Frequency bands supported:

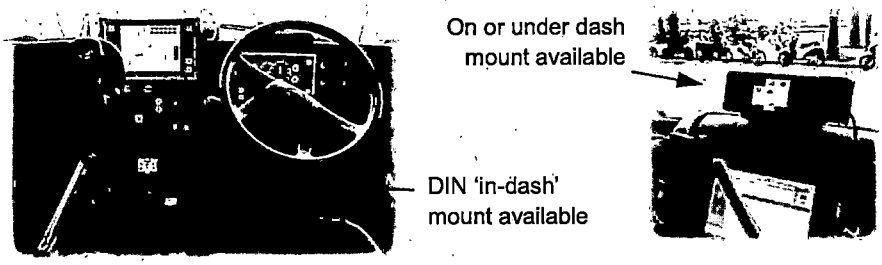
- 344-400MHz
- 380-430MHz
- 407-473MHz
- 806-870MHz

(1) Range extension estimates are predictions. Actual extension may vary due to specific local factors.

Flexible control, tailored to your users' needs

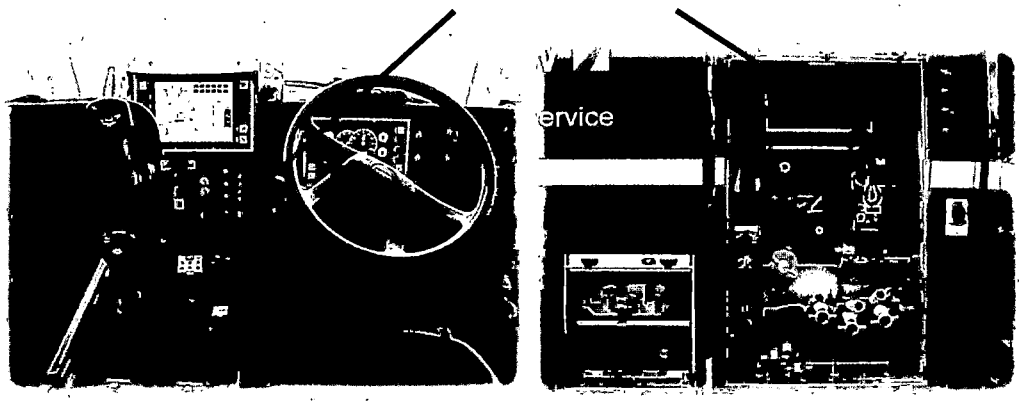
The SRG3900 can be installed with:

- **One control console**: for typical vehicle installations



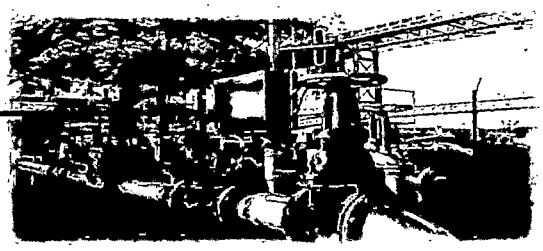
- **Two control consoles**: ideal for demanding twin-use applications, such as installations in ambulances or fire tenders where radio access is required both in the cab and the rear of the vehicle.

Dual SCC console fitted in the driver's cab and rear pump bay of a fire tender



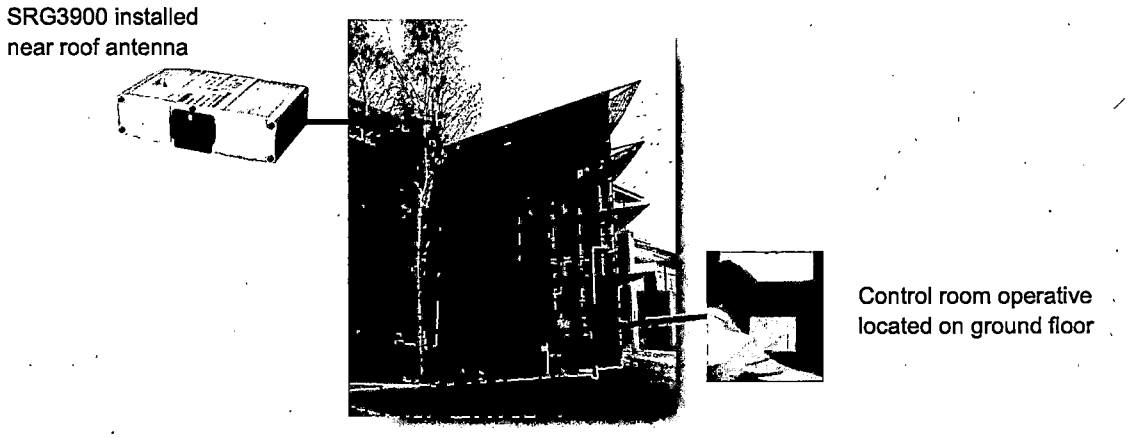
- **No console**: where the SRG3900 acts as a modem, such as in a SCADA/telemetry solution. The telemetry controller is able to control the SRG3900 via a PEI interface.

Modem application: SRG3900 installed inside a purpose-designed enclosure with external antenna



Remote console support: allows maximum installation flexibility

To maximise flexibility and allow each installation to match the needs of the user, consoles can be mounted up to 30m away from a transceiver. In a vehicle, the SRG3900 is typically boot-mounted and the console dash-mounted. The 30m remote console capability is more than enough to cope with dual console installations in the largest of vehicles, plus when installed in an emergency control room situations, the SRG3900 transceiver can be located near the antenna (minimising RF antenna cable loss) and locate the console and user accessories several floors below, beside the user.



For details of available console cables, see the SRG3900 Accessories bulletin

Third-party devices have been created to further extend the distance between the remote console and the SRG3900. For further information, please contact your Sepura Account Manager.

Sepura supports the widest range of consoles on the market, each designed to address specific user, operational and environmental needs.

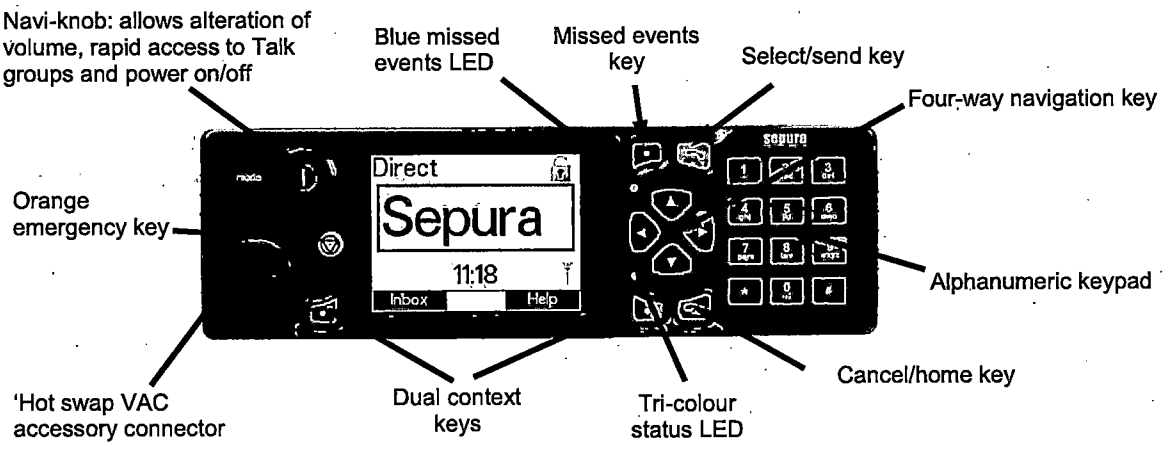
SCC: Standard DIN/dash-mount console

The SCC (Sepura Colour Console) is a small, DIN-sized console, capable of being mounted within a standard single DIN slot in a vehicle's dashboard. Mountings are also available to mount on/under a dash and to make use of third-party AMPS mounting solutions, allowing installation on almost any vehicle.

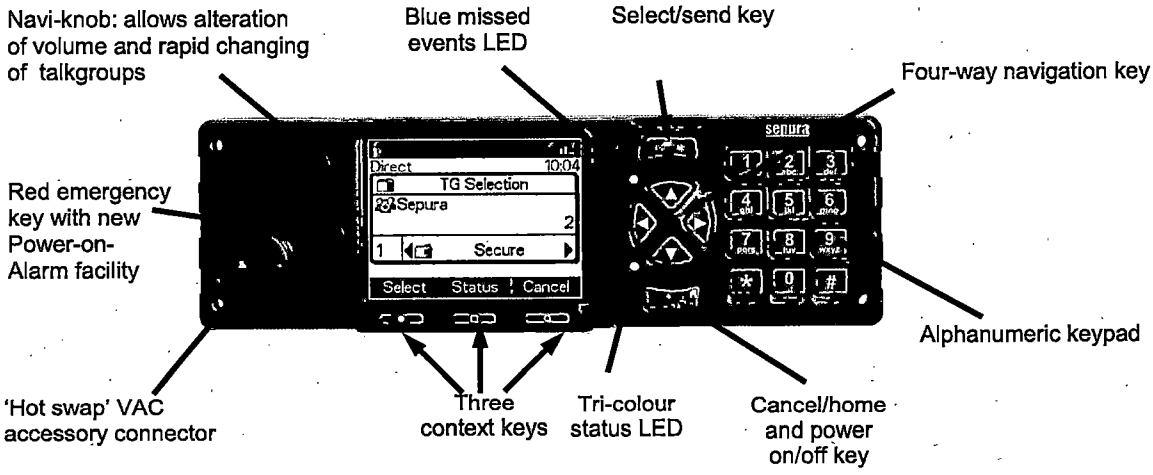
The SCC provides a large colour screen, a large glove friendly keypad, the ability to attach up to three audio accessories (see page 23) and a UI familiar to users of Sepura hand-portable radios, preventing the need for retraining.

Suitable for the majority of in-vehicle or in-building installations, the SCC offers IP54 environmental protection. Coloured bezels can be fitted to indicate that certain capabilities have been programmed. The SCC is suitable for the majority of in-vehicle and in-building installations.

SCC1



SCC3



HBC: Handset-Based Console

With compact, ergonomic design and outstanding audio, the HBC series combines the functionality of a traditional radio console with a telephone handset. Resistant to dust and water ingress, its IP55 rating makes it suitable for use in semi-exposed locations.

Like the SCC, the HBC has a large colour display and a large glove friendly keypad, It also has the ability to attach a hands-free microphone and PTT kit (see page 23). The HBC supports a UI familiar to users of Sepura hand-portable radios, preventing the need for retraining.

The HBC can be installed [3] in one of two operating modes:

- **Handset mode:** the rear microphone and earpiece allow the HBC to be used telephone-style.
- **Fist mic mode** [4]: the user holds the HBC in front of their month and speaks into the front-mounted microphone, located above the display.

The HBC is suitable for the majority of in-vehicle or in-building installations, particularly where space is at a premium.

Typical uses include installation alongside older analogue equipment easing the transition from the old network to the new TETRA network, allowing the driver to access both and negating the need to move the older comms equipment in order to fit the new TETRA equipment.

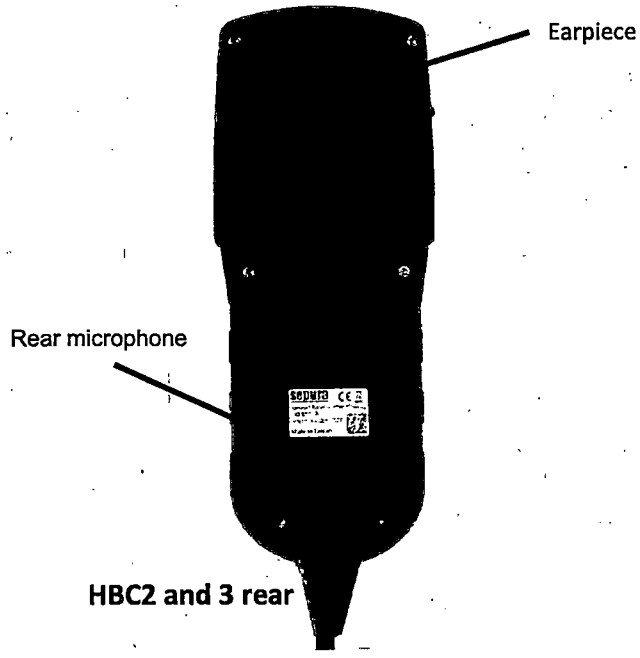
It is also commonly found in the rear of an Ambulance for Paramedic use, and at the rear of a Fire Tender due to its IP55 certification which provides excellent resistance to

Notes:

(3) Mode is set during installation and cannot be changed by the user
(4) In fist mic mode the user makes use of the SRG3900 speaker to hear the caller

HBC2 front

HBC3 front



HBC2 and 3 rear

Please note

When installed in 'Handset mode', the rear earpiece and microphone are in active use.

When installed in fist mic mode, the front facing-microphone is activated.

See the HBC installation guide for more details.

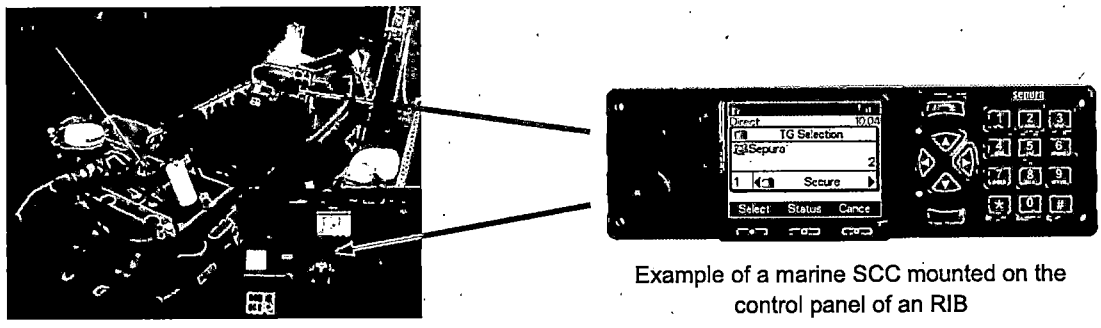
Marine console

An IP67 variant of the SCC is also available, specifically designed to be used in the marine environment on crafts such as rigid inflatable boats (RIBs) and is ideal for use on Motorcycle handlebars.

The marine console supports a standard AMPS mounting system and Sepura-supplied mounts, suitable for fixing to handlebars or boat dash area. It is also 100% compatible with third-party AMPS mounting solutions, allowing installation in almost any vehicle within 30m of the SRG3900. An optional marine housing is also available for the SRG3900. For more details see the SRG3900 Marine Bulletin MOD-16-2028

The marine console provides a large colour screen, a large glove-friendly keypad, the ability to attach up to two IP67 audio accessories (see SRG3900 Marine Bulletin MOD-16-2028). The UI will be 100% familiar to users of Sepura hand-portable radios, preventing the need for retraining.

The marine console is submersible to 1m for 30mins, allows the fitting of coloured bezels to indicate to the user that certain capabilities have been programmed and is suitable for the majority of boat and motorcycle installations – or indeed anywhere where the console will be frequently exposed to harsh elements.



Example of a marine SCC mounted on the control panel of an RIB

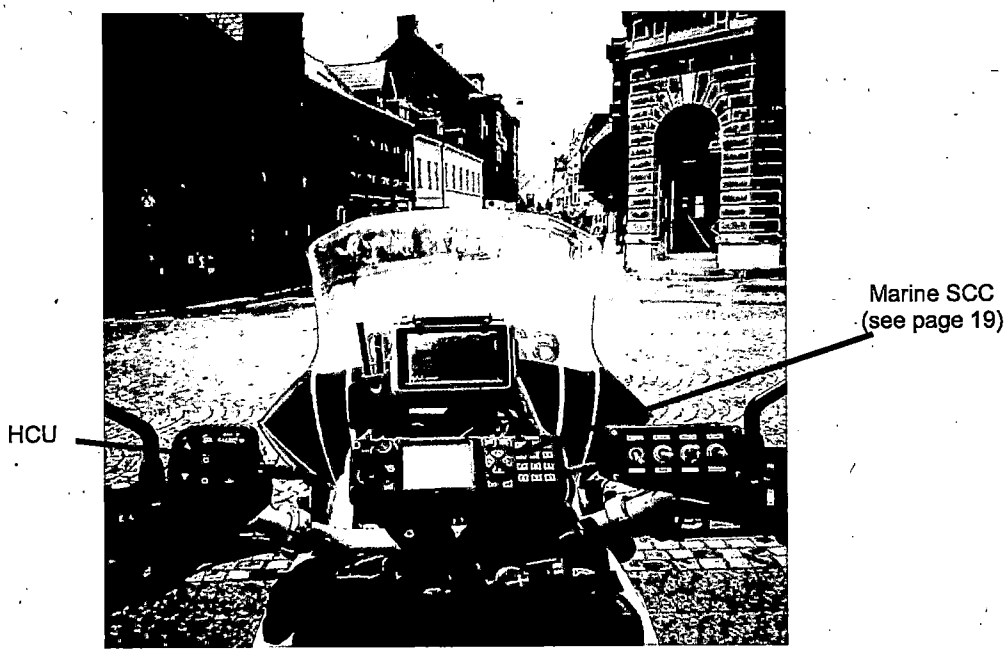
Motorcycle consoles

Whilst a motorcycle is on the move, the Handlebar Control Unit (HCU) allows easy operation of the SRG3900, utilising a simple thumb action to change talkgroup, stack, alter the volume and operate a separate handlebar-mounted PTT.

The HCU has a small display, designed to show essential information. Optionally, a Marine Console (see above), can also be fitted, allowing the rider to interact fully with the SRG3900 once the motorcycle is safely at a standstill.

A full range of motorcycle solutions are available for the SRG, please see Motorcycle kits bulletin SB-P-09-4111for full details. For covert users, a smaller, more inconspicuous HCU is also available. Please contact your Sepura account manager for details

The HCU and its covert variant are IP67 sealed products (submersible to 1m for 30mins). They are designed for use where they will be frequently exposed to the elements.



BMW iDrive console

BMW offer German public safety organisations the ability to use the inbuilt iDrive infotainment system to display what is normally shown on the SRG3900 console. Typically, installations feature the HBC as a second console, used to control the SRG, whilst the large iDrive display allows all occupants of the vehicle to see the status of any communications and messages.

VW console

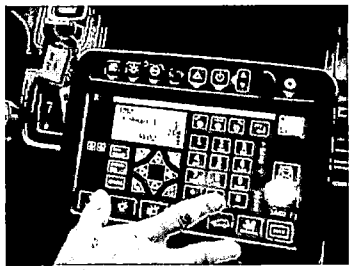
VW, like BMW, offer German public safety organisations the ability to use the inbuilt infotainment system to display what is normally shown on the SRG3900 console. The large infotainment display allows all occupants of the vehicle to see the status of any communications and messages.

Air-approved consoles

Two specialist third-party companies provide air-approved consoles, suitable to be installed in fixed wing or rotary wing (helicopter) aircraft to control one or more SRGs. Please contact your Sepura account manager for more information.

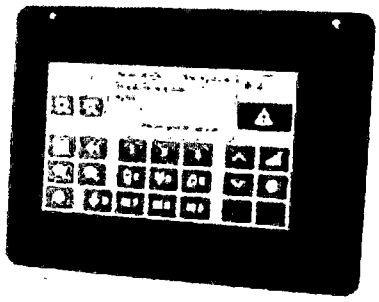
Virtual console

The Sepura Virtual Console provides control of an from a Windows PC, tablet or ruggedised computing device. Please see Virtual Console product bulletin SB-P-08-4096 for more information.



Train console

We offer complete, bespoke solutions for trains, light rail and metros. Please refer to our Transport or speak to your Sepura Account Manager.



Flexible audio

The ability to communicate clearly is a key requirement of all radio users – whatever the weather and however noisy the environment.

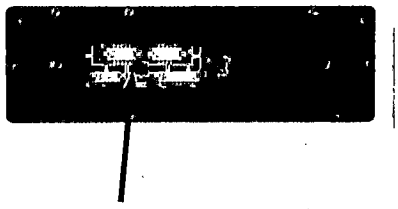
The SRG's powerful TETRA RF engine and gateway capability stretch radio coverage into areas where networks cannot reach and an extensive package of audio capabilities and accessories deliver loud, clear audio across a wide range of vehicle solutions that meet the needs of the most demanding users.

Wide range of accessories

- 8W speaker – small, compact and loud, IP54-certified IP54

SCC standard accessories (rear connection)

- Fist mic
- Handset
- Hands-free kit: external high gain mic and PTT
- Range of bus accessories, e.g. 15W/IP55 loudspeaker, gooseneck mics and foot switch PTT



SCC1 and SCC3 standard rear audio accessory connectors

SCC hot-swappable accessories (front connection to 'VAC' connector)

Hot-swappable accessories can be changed in use

- Speaker mic: small, compact yet tough and loud (1W), IP54-certified
- Speaker handset: compact and loud (1W), IP31-certified

VAC accessories

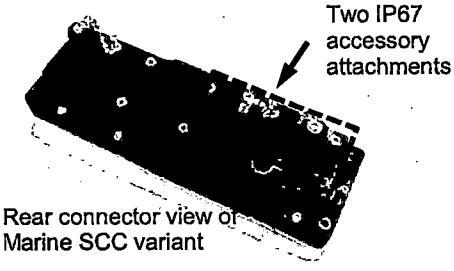
HBC accessories

- Handsfree kit – external high gain mic and PTT connects to HBC interface unit

HBC interface unit

Marine accessories

See SRG3900 Marine bulletin MOD-16-2028 for further details



Two IP67 accessory attachments

Rear connector view of Marine SCC variant

Motorcycle accessories

See SRG3900 Motorcycle bulletin SB-P-09-4111 for further details

Dual speaker support
The SRG3900 supports the attachment of two 8W speakers, wired in parallel, allowing audio to be routed to the two remote console control positions(5)

Support for up to six audio accessories on a dual console solution
Each SCC can support three audio accessories: two permanently installed at the rear, and one hot-swappable accessory mounted on the front of the console. A dual-console installation can support up to six controlling audio accessories plus dual speakers, allowing multiple users to access the SRG3900 via the accessory of their choice. To keep operation simple, the volume altered is defaulted to the accessory in use (5 & 6)

Hear and be heard: noise-suppression technology built in as standard
In a dual-speaker, dual-console solution with a VAC-connected speaker mic or handset on each SCC console, the SRG3900 can deliver >18 W of audio:

- 2x8W into speakers
- 2x1W of audio through the console-connected speaker mics (attached to the front VAC connector of each SCC)
- Total of 9W of audio delivered to each console control point
- Total of 18W across a dual-console solution
- Plus the earpiece audio of any attached console accessories like handsets

In addition, enhanced digital signal processing provides further optimised audio quality at maximum sound pressure. This includes:

- **Transmitter Voice Compression (TVC)** ensures clear transmission at a consistent level to cater for a wide range of differing operational requirements.
- **Noise cancelling technology** decreases unwanted background noise, improving the clarity of received speech
- **Maximum and minimum audio levels for speech and tones** Independently configurable according to the operational environment

(5) Accessories connected at the rear of an SCC console share a single volume control. Parallel wired 8W speakers will also share a volume control
(6) Accessory 'in use' is defined as accessory which last asserted the PTT. Changing the volume of an accessory not in use is also supported on the UI

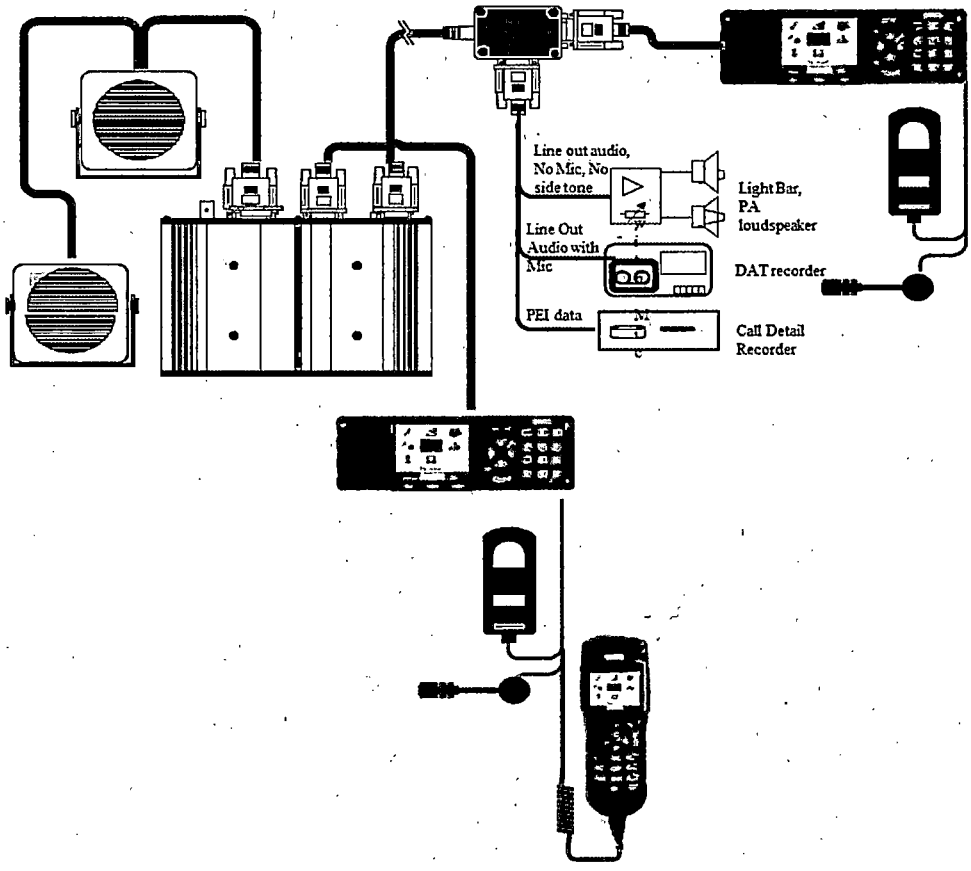
Simplified third-party integration: line-level audio

Line-level audio is a licence-enabled feature allowing the SRG3900 to present and receive audio at a pre-set level, simplifying integration with third-party equipment such as PA systems, recording systems and computer-based console systems.

A detailed guide to line-level audio usage is provided in the Mobile and Gateway Interface Specification 710-00009, available to Mosaic partners. Please see your Sepura Account Manager to join Mosaic and order the document.

Key features include:

- Call broadcast: received audio is broadcast through PA loudspeakers
- Public address: while in a call, the microphone input can be broadcast through the loudspeakers
- Call logging (or recording): either a mix of the TX and RX audio, in the case of a full duplex call, or alternate TX/RX audio according to the PTT switch.
- Audio level is preset and not alterable by the user
- The line-out can be customised as follows:
  - TX audio only
  - RX audio only (including alert tones)
  - TX and RX audio (including alert tones)
- Presentation of audio to line-out can be configured as follows:
  - Continuous
  - Only when in a voice call
  - Only when TX and/or RX audio is present
  - Softkey controlled on/off/toggle
  - Softkey initiated, then enabled for duration of call
- An external digital output line can be configured to indicate when audio is present to simplify integration with third-party equipment (PTT OUT)
- An external digital input can be configured to activate a 'softkey' PTT for line-in audio (PTT IN)
- Use with console splitter box to tap into line-level audio: order part 300-00221



Key audio feature summary

- ✓ 2x 8W speaker support
- ✓ 2x 1W speaker mic/speaker handset support
- ✓ Up to six accessories supported
- ✓ >18W of audio
- ✓ Individual audio volume controls (7)
- ✓ Extensive, flexible accessory support
- ✓ Enhanced digital signal processing
- ✓ Noise-cancelling technology
- ✓ Automatic gain (VOGAD) adjustment and anti-howl processing
- ✓ Independently configurable maximum/minimum audio levels for speech and tones
- ✓ Speaker muting with audible alerts option
- ✓ Compliant with all EU, FCC and IC audio safety legislation (when used with Sepura accessories)
- ✓ Simplified third-party integration through line-level audio

(7) Accessories connected at the rear of an SCC console share a single volume control. Parallel wired 8W speakers will also share a volume control

Designed with your working environment in mind

Ruggedness

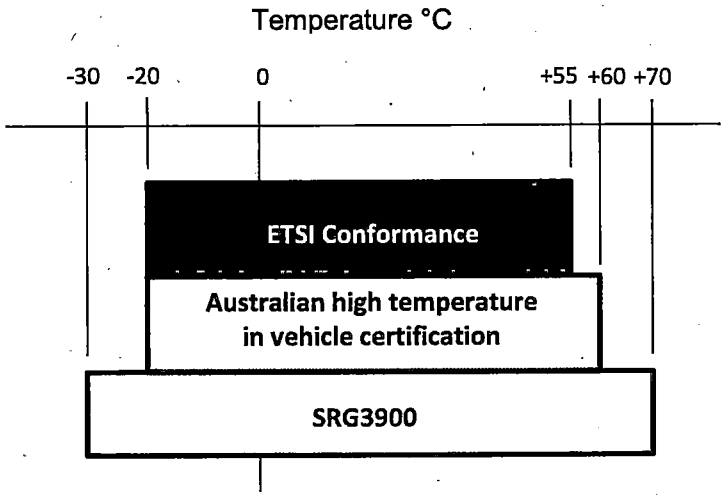
The SRG3900 is designed to be reliable. Its all-metal construction is designed to withstand the constant vibration and electrical interference found in motor vehicles, as well as the repetitive pounding of a boat hitting the waves.

All accessories, including the HBC, are designed to be non-slip and adaptable to a range of environments. Sepura's extensive range of consoles and accessories, including IP67-sealed specialist accessories for motorcycle and marine use, allows you to choose the right console and accessory solution for each vehicle in your fleet, guaranteeing a rugged and reliable vehicle communication solution, capable of providing years of reliable service.

Widest operating temperature range

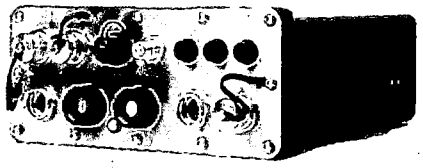
The SRG3900 is designed to operate at temperatures where other radios fail. ETSI TETRA conformance certification is achieved between -20°C and +55°C; the SRG3900 exceeds ETSI and complies with Australian high-temperature certification, achieving conformance testing up to +60°C.

Operationally, the SRG3900 is designed to operate between -30°C and +70°C, operating well beyond ETSI's mandate.



SRG3900 marine enclosure

To complement the IP67 certified SCC marine consoles, the SRG3900 can be housed within an IP67-certified marine enclosure. With a range of IP67-certified marine cables and accessories, Sepura uniquely offers a full solution for use on demanding RiBs or larger patrol craft.



For full details contact your Sepura account manager and see SRG3900 Marine bulletin MOD-16-2028

Summary of the SRG3900's rugged construction features

- ✓ Wide range of accessory/console solutions, inc. waterproof, submersible and dustproof options
- ✓ Flexible installation options
- ✓ Shock, drop & vibration ETS 300 019
- ✓ Widest operating temperature range -30°C to +70°C
- ✓ Full marine solution

An intuitive user experience

The SRG3900 supports several modes of operation to align the user interface to match the Sepura hand-portables that your users are equipped with:

1) **SC20 mode**
   User interface is 100% aligned with the SC20 series of hand-portable radios. Automatically enabled when the SRG3900 is installed with the new SCC3 and/or HBC3 consoles which, like the SC20, provide three context keys

2) **STP mode**
   User interface is 100% aligned with the STP series of hand-portable radios. Automatically enabled when the SRG3900 is installed with the SCC1/2 and/or HBC2 consoles which, like the STP, provide two context keys

3) **SRH mode**
   User interface is 100% aligned with the SRH series of hand-portable radios. Automatically enabled when the SRG3900 is installed with the legacy monochrome console and/or legacy monochrome HBC1 consoles.

Three user interface presentation styles (Grid/List/Legacy)

Whichever consoles are attached, SRG3900 radio users can choose from three user interface presentation styles:

- Grid: resembling smartphone presentation
- List: resembling standard GSM feature phone and most other TETRA radios
- Compatibility mode: resembling Sepura's SRH user interface presentation

Grid and list styles provide an intuitive experience for new users accustomed to smartphones. Compatibility mode is instantly familiar to users trained to use pre-STP9000 Sepura radios, enabling them to be comfortable with the SRG3900 from the moment they switch it on.

Compatibility mode

List Mode

Grid mode

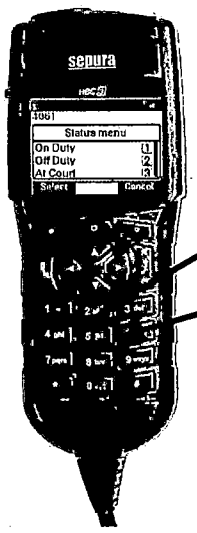
Smart Menus allow simple access to hundreds of softkey functions
Many professional users make use of Sepura's soft-key capability, which allows the user to simply press and hold a key on the keypad to carry out a pre-programmed function.

This might typically be used to send a specific status message, e.g. pressing and holding key '2' could send an 'off duty' status. Other keys could be used to 'request back up', 'request ambulance', etc.

This feature is much appreciated by users, however, the number of available status messages is limited by the physical number of keys on the radio.

Smart Menus have been designed to overcome this limitation.

Instead of one softkey function per physical key, pressing and holding a key can bring up a menu of related functionality, so pressing and holding key '2' will now bring up a menu of status messages.



Press and hold 2 followed by momentarily pressing 6 = softkey number '26'

In the example shown, the user presses and holds key '2' to access the Smart Menu, then momentarily presses '6' to select and send the status 'At Scene'. The user has now activated softkey '26'.

Smart Menus are created on Radio Manager and can, if required, be used to call other nested menus, allowing a complex, bespoke menu structure to be created.

Simplicity is, however, where Smart Menus outperform the competition, allowing hundreds of softkey functions to be simply and intuitively accessed. A user merely has to remember that all status messages are located e.g. on key '2'; once the Smart Menu is open, it guides the user to select the correct status message.

The example also shows the Smart Menu is named 'Status Menu', and each entry in the menu has a user-friendly name all configured in Radio Manager, aiding simple and intuitive use.

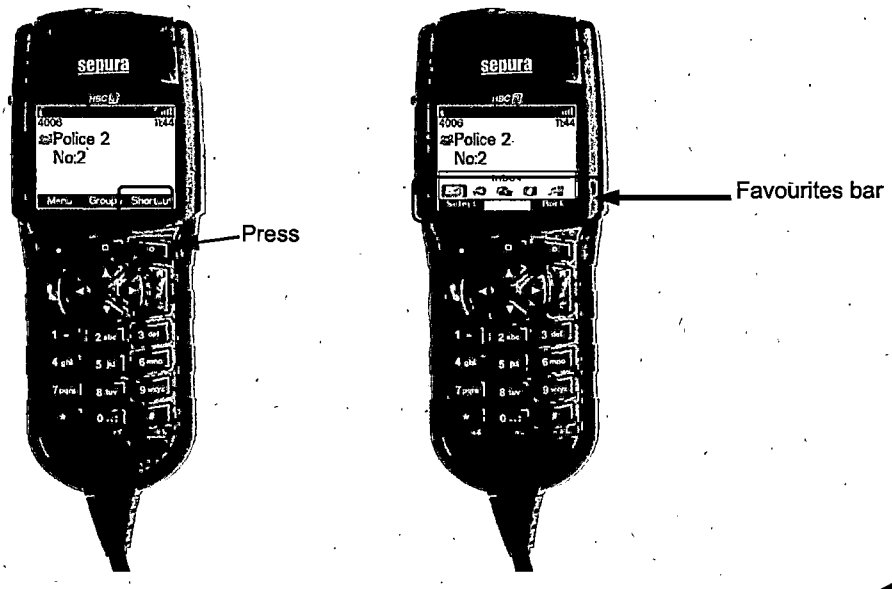
As well as the SRG3900, Smart Menus are also supported on the SC20 series, the STP9000 series and the STP8X series, bringing common intuitive simplicity across the Sepura range.

Shortcut and notification menu bar

When operating in **SC20 mode**, automatically enabled by installing the SRG3900 with SCC3 and/or HBC3 consoles, the new SC20 Shortcut and Notification bar is enabled. This is a smart combination of a 'favourites' feature bar and 'missed events' notifications, which also alerts the user if they have left the radio in a mode that might impede communications.

Favourites

Five commonly used features can be set by Radio Manager allowing the user simple and rapid access from the shortcut menu bar. The user simply presses the 'Shortcut' context key from the top level screen to open the shortcut (favourites) menu bar.

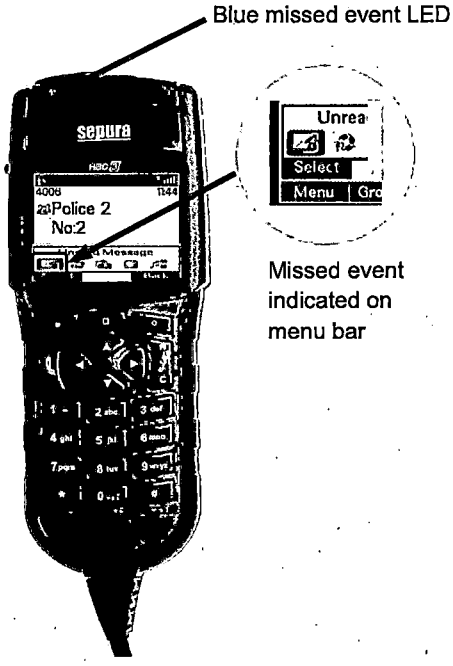


Missed Events

If a user missed a call or has not read a message, the menu bar appears and the blue 'Missed Event' LED will flash.

Just like a smartphone, the missed event is indicated by a red icon next to the appropriate missed message or call icon on the menu bar.

Pressing the 'Shortcut' context key will quickly take the user to the missed event on the menu bar, allowing a swift response.



Status changes

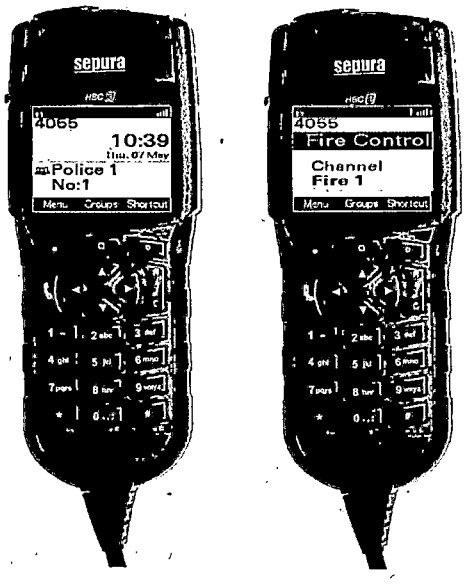
Major state changes that could affect the user's ability to communicate – such as the activation of 'Transmit Inhibit', or 'Speaker Mute' – will cause the menu bar to appear, with the changed state appearing as a new icon on the menu bar, making it very difficult for a user to forget the changed state.

Pressing the 'Shortcut' context key from the top level screen will take the user to the changed state icon on the menu bar, allowing quick access the feature and swift reversal of the state.

Customisable top-level screen/home screen

Like the SC20, the SRG3900 – when installed with SCC3 and/or HBC3 consoles – allows the contents of the top-level screen (the home screen) to be altered.

Its default content – date, time, talk group and folder in use – can be added to, removed from or positioned differently. In addition, text sizing and colour can be customised. This ability is unique in TETRA and allows the Radio Manager user to tailor the information displayed to match the users' needs more closely.



Zoom mode

Like the SC20, the SRG3900 – when installed with SCC3 and/or HBC3 consoles – supports three sizes of text to enhance user readability: standard mode, large mode, very large mode plus the new Zoom mode. The user can select the required text size from the following menu options.

- Very large mode
  Key elements – such as talkgroup on the top-level screen – are presented in very large text, the rest of the menu system is presented with large icons and text. This is ideal when viewing the SRG3900 from a distance, e.g. within a car kit.

- Large mode
  Key elements – such as talkgroup on the top-level screen – are presented in large text, the rest of the menu system is presented with large icons and text.

- Standard mode
  The top-level screen, along with the rest of the menu system, is presented in standard text.

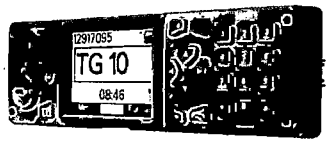
- Unique zoom mode
  As the user moves through the menu system, the text and icon sizes alter to match the configuration of zoom mode determined in Radio Manager, aiding visbility.

  The user could, for example, automatically have the top-level screen in very large mode, the rest of the menu system in standard mode, and any WAP sites accessed in large mode, without having to manually change viewing modes as they move through the menu system.

	HBC3	SCC3
Standard text character size	3.2 mm	4.5 mm
Large text character size	5 mm	7.2 mm
Very large text character size	11 mm	15.7 mm

Colour accent bar/bezel

SCC and HBC consoles allow a coloured bezel to be fitted to assist users in identifying radios that have been programmed e.g. for a particular role, or with particular licence-enabled options installed.



The SCC and HBC are supplied with a black bezel as standard. Optional colours available are grey, fluorescent orange, fluorescent yellow, blue and green. Part numbers for these coloured bezels can be found on the combined SRG/console accessories ordering guide and accessories bulletin (MOD-09-1119).

Multi-language support

Multi language support, via ISO 8859-1 and ISO 8859-5 character sets, offers 22 languages including English, Italian, Swedish, French, German, Spanish, Dutch and Cyrillic-based languages.

Ideographic character set support includes Arabic, simplified Chinese, traditional Chinese and Korean.

User-selected languages.

The SRG3900 can be configured with a selection of two languages from which the user can choose to work with. This is particularly useful for organisations with multiple language requirements, where e.g. the end user requires the UI to display Arabic text, whilst programming technicians require English text.

User profiles make life that little bit easier

User profiles provide the flexibility to alter the way the radio behaves to match the user's needs. Up to 10 profiles can be configured and named via Radio Manager, allowing the user to simply switch to e.g. a 'loud' or 'covert' profile to suit their circumstance.

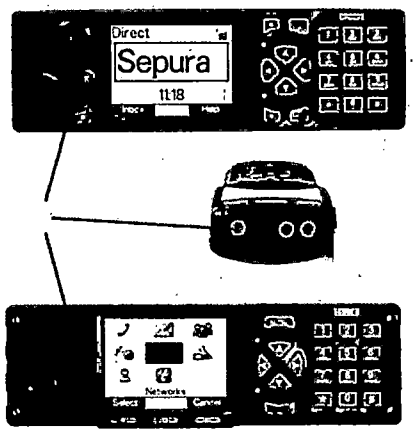
Profiles allow control of back lights, tones and other functions such as 'transmit inhibit' simply by selecting the appropriate user profile from the menu.

Key user experience features

- ✓ Improved intuitivity and simplicity of use
- ✓ Shortcut bar with access to five favourite features
- ✓ Notfication capability of the Shortcut bar provides a simple and obvious reminder of missed event and changed radio states that could impeded communications such as leaving the radios speaker muted
- ✓ Customisable top level screen
- ✓ SmartMenus
- ✓ Multi-language support
- ✓ Customisable zoom mode
- ✓ Coloured accent bars

User safety by design

All Sepura consoles provide a dedicated emergency button, protected from accidental activation, yet easy to locate and operate in a crisis.



The console also provides external interface connections for accessories which could, depending upon installation/application, provide additional emergency keys such as a panic alarm.

Emergency call/Wake-on-alarm features

The HBC3 and SCC3 feature a red emergency button which, in addition to standard emergency use, supports the Wake-On-Alarm feature. While the radio is switched off, pressing and holding the red emergency button for two seconds will cause the radio to power up.

It will go through the normal process of registering on the network, as if the power on key had been activated, before automatically initiating the alarm call[8].

Emergency call behaviour – including live microphone operation, automatic GPS position update and status messaging options – is fully configurable via Radio Manager.

Key features

- ✓ 'Blind find' emergency button
- ✓ Wake-on-alarm feature
- ✓ Customisable emergency behaviour
- ✓ Works in conjunction with Lone Worker

(8) If the radio or network security policy mandates that the user must enter a PIN, the user still must enter a valid PIN before an emergency call is made.

GPS and Glonass satellite tracking – plus Predictive Ephemeris – for increased accuracy

The SRG3900 uses the very latest in GPS technology, making use of the both the GPS and Glonass satellite networks to improve tracking accuracy, even in the most challenging of environments.

Featuring ultra-sensitive technology, the in-built tracking module achieves an impressive -191dBw (-161dBm) tracking sensitivity.

Predictive Ephemeris dramatically shortens the tracking start time in weak signal areas by taking a pre-stored ephemeris (up to 48 hours old) and applying a series of rapid computations to predict the current orbital status of available satellites, and allowing tracking to swiftly commence.

The SRG3900 also supports a GPS-powered 'compass' direction finder facility to enable a user to navigate their way to a particular destination.

Key features

- ✓ -191dBw (-161dBm) tracking sensitivity
- ✓ Enhanced start-up, acquire and tracking through 'predicted ephemeris'
- ✓ Supported message formats:
  - LIP short and long format support
  - NMEA Sepura Compact Format support
  - Simple and full SDS-TL support
- ✓ Comprehensive location updates based on:
  - Trigger events e.g. in an emergency or removal from car kit
  - Time and distance
  - Third-party equipment requests connected to PEI port
  - OTA location update control
- ✓ Tracks both GPS and Glonass,
- ✓ GPS-based compass application
- ✓ Speed and direction indication

Extending operational coverage = improved user safety

For on-network, off-network and in-building communications, the SRG's class-leading TETRA engine, coupled with its gateway and repeater capabilities, extends the reach of communications where it was not possible before, meaning there is less likelihood of a user being unable to place a vital emergency call or missing a warning to vacate the area.

Major state change notification = improved user safety

When installed with the SCC3 and/or HBC3, major state changes that could affect the user's ability to communicate – such as the activation of 'Transmit Inhibit', or 'Speaker Mute' – will cause the shortcut bar (see page 30) to appear with the changed state appearing as a new icon on the menu bar. This makes it very difficult for a user to forget the changed state and avoids safety issues caused by the potential loss of contact.

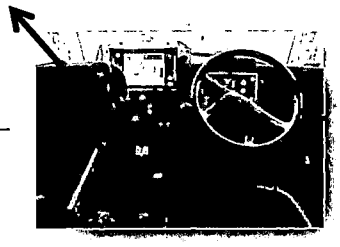
Smart technology

The SRG3900 is an evolving, futureproof platform that brings a package of smart technologies into the hands of the Sepura user.

Picture messaging, URL shortcuts, online look-up via WAP browser
Example – Missing persons

In the initial critical minutes following the report of a lost child:

- Police officers use a smartphone to take a copy of the parents' photograph of the child and email it to back-office staff
- The back office processes the picture(9), stores it on the force's WAP site and creates a picture SDS message together with a description and the child's last reported location
- The message is sent via group SDS to groups of officers in the neighbourhood
- Officers are able to view the picture sent with the SDS picture message and read the associated text on their SRG3900 console



To ensure the message reaches the next officers on shift, it can be resent, or users can choose to access the force's WAP site to view all historic data over-the-air.

In this way the child's image and related information can be rapidly dispersed to relevant officers and the chances of successful outcome are immensely increased

Key features

- ✓ Picture messaging via SDS allows images to be sent over TETRA with no need for packet data
- ✓ URL shortcuts sent via SDS allows back-office systems to direct users to content already stored on their organisations WAP site allowing fast retrieval of maps, building floor plans or even hazardous chemical data

(9) System integration required – contact Sepura account manager for more details of the Sepura Image solution

Security options

The SRG3900 is crypto-protected by Sepura's range of market-leading security options that have enabled it to be used in some of the most security sensitive operations:

Air interface encryption

Full support for TEA1, TEA2, TEA3 Air Interface Encryption (AIE) algorithms[10]

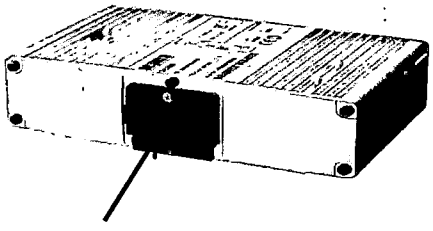
TETRA security classes:

- TMO
  - Class 1: clear
  - Class 2: SCK
  - Class 3 & 3G: DCK, CCK, GCK plus OTAR of CCK and GCK
- DMO: support for Class DM-2C

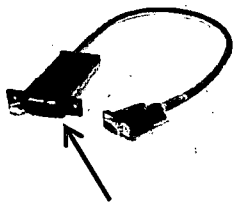
End-to-end encryption (E2EE)

Integrated security options offering:

- embedded E2EE (without tamper protection)
- protected E2EE (with tamper protection)
  - in-country (private, local) E2EE algorithm
  - multiple E2EE algorithms
- Smart card E2EE. Integral SIM connector allows support of third-party smart-card-hosted E2EE solutions
- Remote smart card reader option allowing the most secure users to simply insert and remove their personalised smart card crypto-SIM as needed



Onboard SIM



Remote smart card (SIM) option

Features supported:

- In-field upgrade with software licence
- E2EE for full-duplex and half-duplex voice, SDS, OTAK & CVO
- AES cipher with a 128-bit block size, key size 128 or 256 bits, with full slot synchronisation operation

Key management

- Direct wired connection to Sepura and third-party key-fill tools
- Wireless 'over-the-air keying' (OTAK) messaging
- Wireless 'over-the-air re-keying' (OTAR) messaging

Customisable privacy screen

The SRG, like Sepura hand-portable radios, provides a privacy screen that covers the console's display, obscuring information from casual observers. The privacy screen is typically set to show the emblem or logo of the user's organisation.

Remote stun and kill

The SRG3900 supports over air stun and kill features, providing users and control organisations peace of mind that radios in stolen vehicles can be remotely disabled (stun) and in some cases made unusable (kill) until recovered.

Key features

- ✓ Fully integrated E2E encryption solution
- ✓ Integral SIM reader connector for E2E encrypted SMART card solutions
- ✓ Optional remote SIM smart card reader to allow the most secure users to simply insert and remove their crypto smart card
- ✓ Key management by 'over-the-air keying' (OTAK) messaging and direct connection to Sepura and third-party key-fill tools
- ✓ Lost radio lock down and recovery capabilities (enabled via SDA)
- ✓ Privacy screen

(10) Availability of AIE is subject to export licence

SRG3900 licence-enabled features

Feature licences allow the customer to grow their fleet's capabilities at a pace that suits their budget and operational scenario, safe in the knowledge that their investment is futureproofed.

The SRG3900 has a wealth of specialised features that can be activated by purchasing the relevant feature licence. A comprehensive list of available feature licencesavailable at the time this document was created, is shown below but please always review the Sepura website which will always show the latest feature licenses available.

Repeater licence

Feature description – see page 9 for full details

Repeater capability can be ordered with a radio using the following part numbers

> When ordering with an SRG series radio order 600-00005; or, when ordering as a package with DMO-Gateway, 600-00007

Repeater capability can be ordered for radios already supplied using the following part numbers

> Order 600-00009 or, when ordering as a package with Gateway, 600-00011

Gateway licence

Feature description – see page 7 for full details.

Gateway capability can be ordered with a radio using the following part numbers

> When ordering with an SRG3900 mobile radio order 600-00006
> When ordering as a package with DMO-Repeater 600-00007

Gateway capability can be ordered for radios already supplied using the following part number

> For use with an SRG3900 mobile radio order 600-00010
> When ordering as a package with DMO-Repeater 600-00011

3rd party console support

Feature description – Selected, certified Mosaic development partners are able to offer their own control console solutions, catering for specialist installations such as air-approved consoles. These third party devices allow full control of the SRG3900 and integration to other on board electronics. To enable these third-party devices, a licence is required.

> To attach one 3rd party virtual console to one of the SRG dual console ports order 600-00026
> To attach a second third-party console, order 600-00027 (Must be ordered in conjunction with SRG single Virtual Console [600-00026] see above)

Line level audio

Feature description – see page 24 for full details. Enables audio line in and out functionality on the SRG3900 mobile radio – typically used for connection to audio recording devices, external public address systems, etc. Connection details are available to certified Mosaic development partners.

> Order 600-00033

Softkey functions over PEI

Feature description – Enables a computer attached to the SRG PEI port to trigger softkey functions via the AT command set. Without this licensed feature soft key functions are only available to a radio user pressing and holding a pre-programmed console key.

Please contact Customer Support or your local sales representative for a list of available soft key features.

> Order 600-00037

Callout

Feature description – Is an application that enables the mobilisation of resources in response to an incident. During mobilization Callout presents a screen on the SRG that over rides current activity. The screen provides brief details of the incident and requests a response of whether they can attend the incident or that they cannot attend the incident . The users is forced to make a response, in this way the control room knows which resources are on their way to assist and which are not. For more details on the capabilities of Callout please contact your Sepura Account manager

> Order 600-00073

Picture messaging via SDS

Feature description – See page 37 for full details. Enables the rapid, simultaneous distribution of images, and associated text, to whole groups of users in a matter of seconds via SDS. No packet data is used. The Portalify image server 'slices' the images and sends via SDS. Messages can also be sent securely using E2EE. Please note: requires the installation of Portalify Image solution to send the image. Please contact your Sepura Account manager for more details

> Order 600-00102

Premium application pack

Feature description – Short Data Applications (SDAs) enable radio users to send and receive information in an efficient, user-friendly, form-based format. The premium application pack extends these SDA capabilities:

- Automatically display forms upon start up or successful registration on the network
- SDA can now access softkey functions on the radio
- Select destination address for some call types, position reports and status messages
- Update the radio status line to reflect ongoing activity/status

- New user data entry validation rules to ensure the data the user enters is in the correct format for the backend system to process e.g. date, time, alpha only, alpha numeric, length checking and number range checking.

> Order 600-00103

Embedded End to End Encryption
Feature description

- Embedded E2EE (without tamper protection).
- E2EE for full duplex & half duplex voice, SDS, OTAK & CVO.
- AES cipher with a 128 bit block size, key size 128 with full slot synchronisation operation

> Order 500-71300 – AES128

Tamper protected End to End Encryption
Feature description

- Protected E2EE (with tamper protection).
  - In-Country (Private, Local) E2EE algorithm.
  - Multiple E2EE algorithms.
- E2EE for full duplex & half duplex voice, SDS, OTAK & CVO.
- AES cipher with a 128 bit block size, key size 128 or 256 bits with full slot synchronisation operation

> Order 502-71300 – AES128
> Order 502-71400 – AES256
> Order 502-71464 – Multiple

Smart Card End to End Encryption.
Feature description- Integral SIM connector allows support of 3rd party Smart Card hosted E2EE solutions

> Order 600-00034 – SECTRA
> Order 503-76000 - BDBOS

NEW - Air Interface Migration
Feature description – Allows the SRG to roam to another network and obtain a valid service on that network, typically in another country.

> Order 600-00354 (available now).

NEW – Shortcut and notification bar on SCC1/2 and HBC2
Feature description – The shortcut and notification bar introduced on the SC20 is normally only supported on the SRG when the HBC3 and/or SCC3 consoles are attached. This new

license feature brings this latest user friendly capability to users of the SCC1/2 and/or HBC2 users

It provides quick access commonly used radio features (shortcuts). It also provides an obvious visual indication whenever a major state within the radio has changed, such as when enabling speaker mute. It also brings the missed event solution first introduced on the STP8000 right up to date.

> Order 600-00352 (available March 2017)

NEW – User DMO power setting
Feature description – User are offered an onscreen choice of setting the radios DMO RF transmitter setting:

- 10W (40dBm)
- 3W (35dBm)
- 1.8W (32.5dBM)
- 1W (30dBm)
- 300mW (25dBm)
- 100mW (20dBm)
- 30mW (15dBm)

> Order 600-00353 (available March 2017)

NEW – Profile by Talkgroup
Feature description – Allows status messages and GPS position reports and emergency voice calls to be routed to a destination other than the default. This feature is ideal for users who may have to visit other operational areas. The GPS location information is automatically routed to the local control room just by changing their talkgroup.

Status messages can now be sent directly with fewer key presses than ever before; or to a destination in the phonebook, to the current talkgroup or to a dialled destination.

Feature applies to:

- Quick status destinations, triggered via softkeys
- Default status destination, triggered via menu and/or the mode key
- Primary position destination
- Secondary position destination
- Emergency status destination

> Order 600-00347 (available March 2017)

NEW – Network selection based on Talkgroup selected
Feature description – Enables the radio's automatic selection of TETRA network based on the talkgroup's mobile network identity; the press of a single key changes the network and selects the talkgroup. The whole process becomes simplified and removes operator error

> Order 600-00348 (available March 2017)

NEW – TMO/DMO auto stack selection based on Talkgroup selected
Feature description – Simplifies use by enabling the SRG to automatically select the correct operating mode – trunk or direct – depending upon the Talkgroup the user selects

> Order 600-00349 (available March 2017)

NEW – Reset to default status (ideal for 'pooled' vehicles)
Feature description – Enables the radio to be set back to default customisation values making this feature ideal for use in scenarios where radios are not personal issue, and instead, like the SRG, may be in a 'pooled' vehicle, driven by a number of different users. This feature means users always have a radio operating in a known state, rather than 'as left' by a previous user.

> Order 600-00350 (available March 2017)

NEW – Extended and preferred LA (ideal for when SRG installed in an aircraft)
Feature description – SRG's can be configured with a list of up to 150 preferred location areas (LA's), which are favoured when acquiring a cell at switch-on or during re-selection. If coverage gets weaker, the radio will register on LA's outside this list. The radio can also be configured to only use cells from the preferred LA list, even when coverage drops.

The result is that similar groups of users register on the same LA ensuring efficient use of TETRA resources. A typical usage of this feature would be in an Aircraft based SRG installation where dedicated ground to air TETRA sites are available

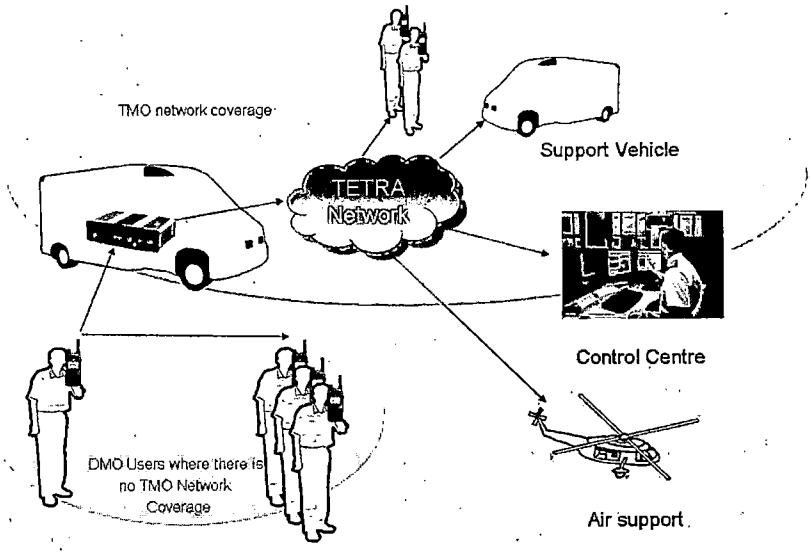
> Order 600-0035I (available March 2017)

Appendix A: typical gateway uses

Extending Network Coverage

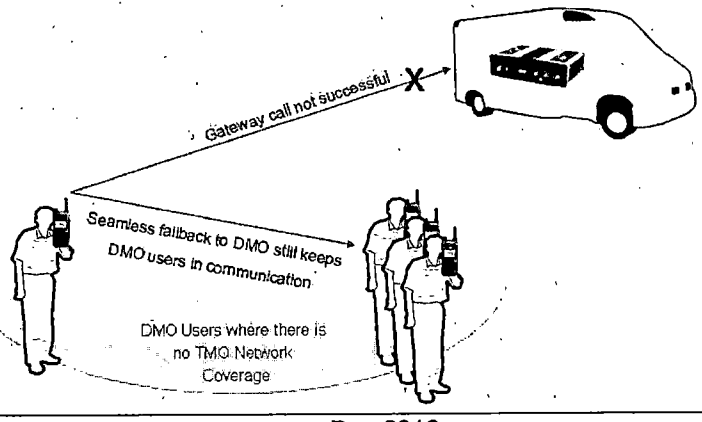
Typically, a gateway is fitted in an ambulance, rapid response vehicle or motorcycle, bringing a local 'bubble' of network coverage to users who have left their vehicle and are now using hand-held radios within buildings or urban areas where network coverage is poor.

These users can choose to communicate via DMO to other users on foot, and via the gateway – with its powerful 10W TETRA engine – with the control room and other users, such as support vehicles, on the network.



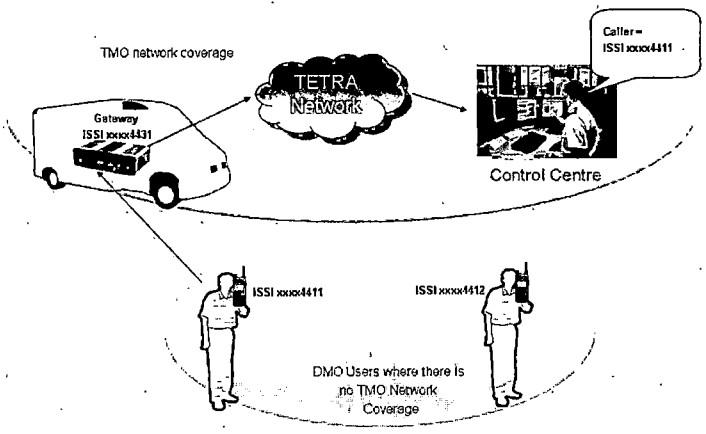
Enhanced fallback operation

Optionally, should a DMO user fail to set up a TMO call via the gateway, the caller will still be able to communicate with other DMO users in his team: the terminal will alert the caller that communication through the gateway was not possible.



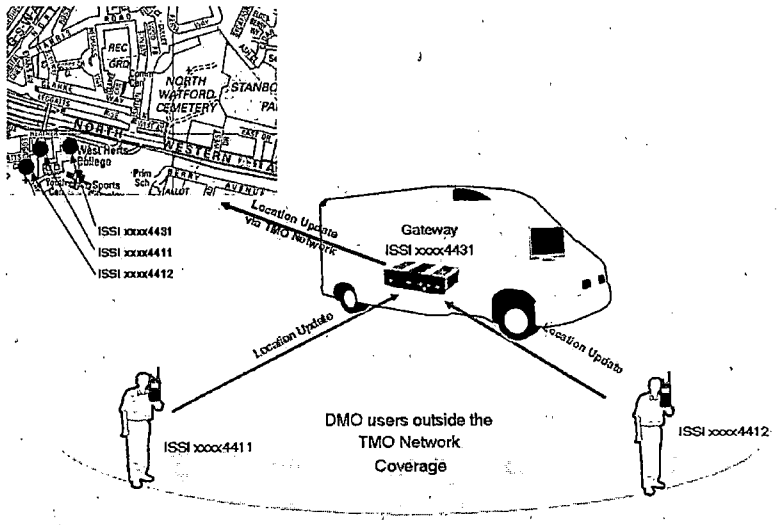
Caller identity

GPS messages and time-stamped status messages sent by a user operating in DMO identify the caller's ISSI and location, rather than the ISSI of the gateway it went through.



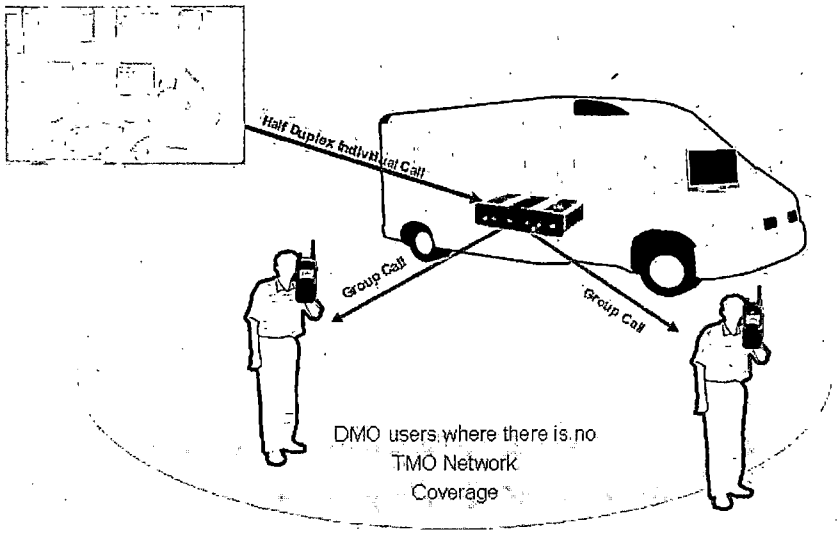
Locating remote users

DMO users operating outside of the coverage area of the TMO network can send SDS-based location updates, incorporating their own ISSI, via the gateway. A control room APL/AVL mapping system will be able to display both the location of GPS-equipped DMO users, and the gateway itself.



Intelligent call conversion 1

Half-duplex calls placed on the TMO network, addressed to the gateway's individual address, will be connected to the DMO group automatically whilst the SRG3900 is in gateway mode simplifying communications.

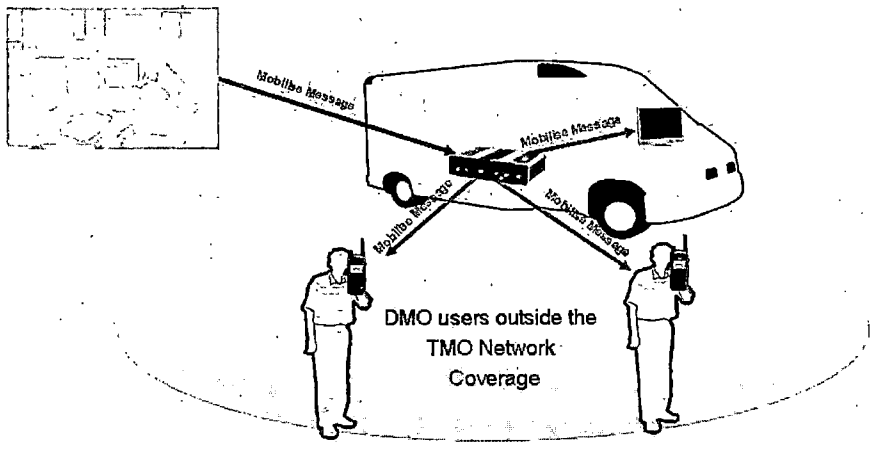


Intelligent call conversion 2

Full-duplex – telephone – calls placed on the TMO network, addressed to the gateway's individual address, can notify the DMO group via SDS to indicate there was a missed call. If an MDT is attached this is also notified via the PEI port.

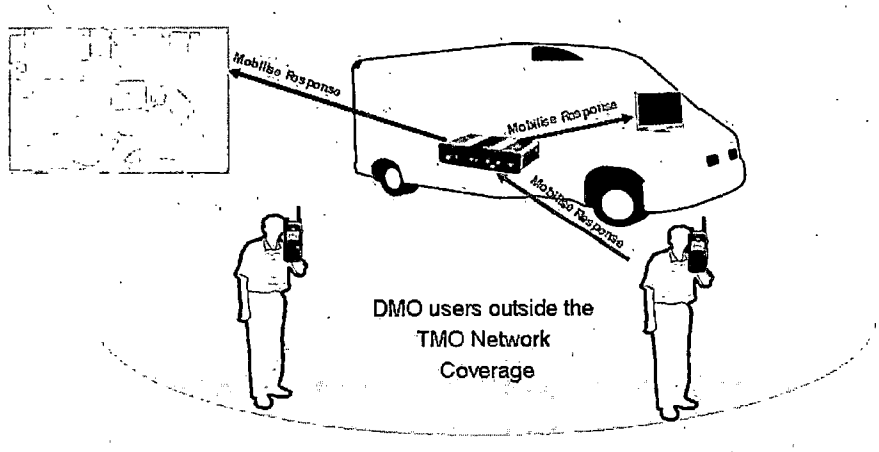
Intelligent message routing 1

SDS and status messages addressed to the gateway, sent by TMO users, can be forwarded to DMO users automatically whilst the SRG3900 is in gateway mode.



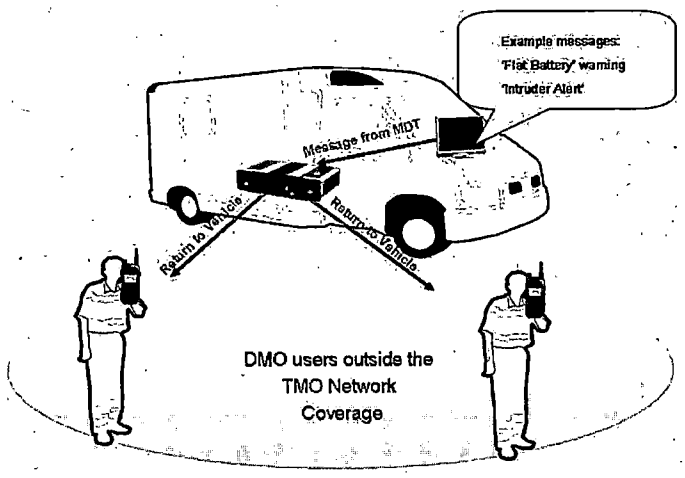
Intelligent message routing 2

SDS and status messages addressed to the gateway, sent by DMO users, can be forwarded to the TMO users automatically whilst the SRG3900 is in gateway mode.



Enhanced MDT support 1: paging

Depending on the circumstance detected by the MDT, it may 'page' DMO users to advise them.



Enhanced MDT support 2: event logging

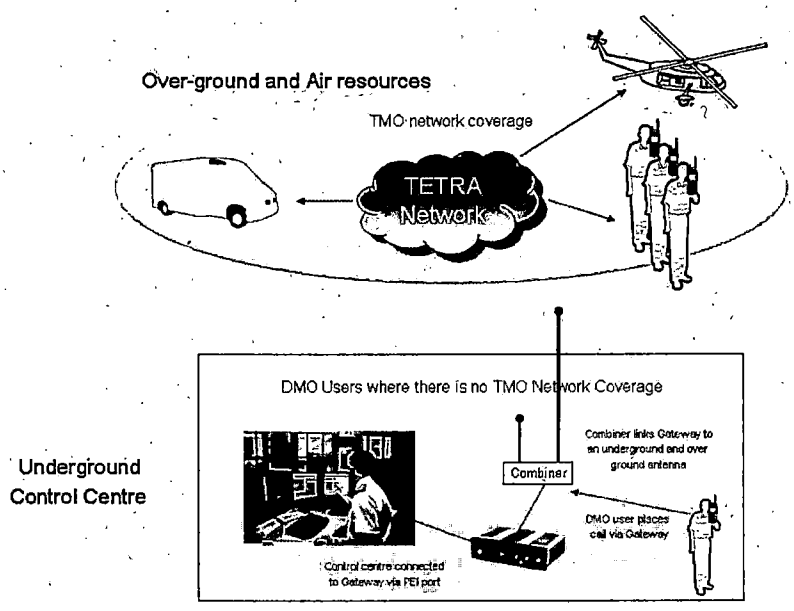
All SDS and status messages passing through the gateway can optionally be recorded on the PEI port, for processing by the MDT.

Enhanced MDT support 3: missed call notification

Duplex call attempts addressed to the gateway create an SDS notification message to the DMO group. The MDT is also notified.

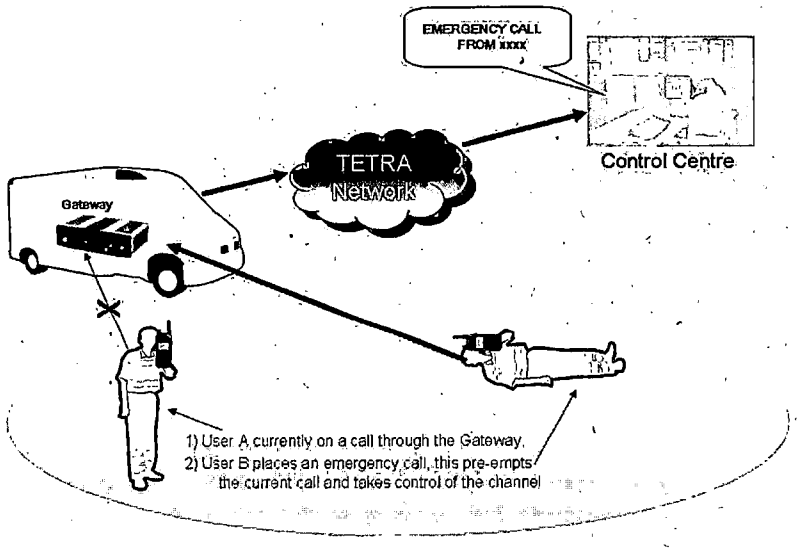
In-building and underground coverage enhancement

Communication with the TMO network can be achieved via a gateway for users operating inside screened buildings, bunkers or in tunnels.



Pre-emption of calls through the gateway

Priority calls pre-empt any on-going call through the gateway.



Gateway-to-mobile switching

The SRG3900 can be simply switched between gateway and mobile modes via:

- the user operating a pre-programmed soft key
- an MDT connected to the PEI port
- the receipt of a programmed status message
- the operation of a programmed digital input line

Operational intelligence: single point of contact

In the high-pressure environment of emergency contact centres, the time taken to contact crews is of paramount importance. The SRG3900's enhanced routing features mean that the control centre only has to contact the vehicle's gateway: if the crew has left the vehicle, the gateway will route the call to their hand-portable radio; if the crew is in the vehicle, the gateway will be switched to back to standard mobile mode and the crew will receive the call.