

# ARCHIVED REPORT

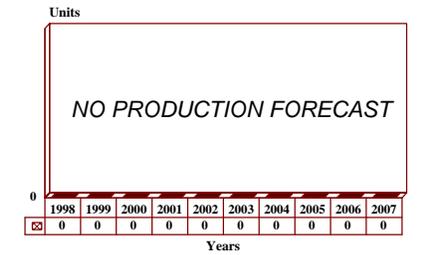
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## Clansman - Archived 11/99

### Outlook

- Production has ended
- Clansman will be replaced by Bowman starting in 1999
- Standard British Army tactical radio through the 1980s and 1990s
- **THIS REPORT WILL BE DROPPED IN 1999**

10 Year Unit Production Forecast  
1998-2007



### Orientation

**Description.** Clansman is an integrated family of man-pack and vehicle-mounted combat net radios.

#### Sponsor

Directorate of Command, Control, Communications and Information Systems

Contracts Branch CB/ML-11C  
 Ministry of Defense  
 Fleetbank House  
 2-6 Salisbury Square  
 London EC4Y 8AT  
 United Kingdom  
 Tel: +44 171 632 3691

#### Contractors

Siemens-Plessey Systems  
 Tactical Communications Systems  
 Grange Road  
 Christchurch  
 Dorset BH23 4JE  
 United Kingdom  
 Tel: +44(0) 1202 486344  
 Fax: +44(0) 1202 404221

Racal Tacticom Ltd  
 472 Basingstoke Road  
 PO Box 112  
 Reading  
 Berkshire RG2 0QF  
 United Kingdom  
 Tel: +44 1734 875181  
 Telex: 848011

Marconi Defense Systems  
 Secure Radio Division  
 Browns Lane  
 The Airport  
 Portsmouth PO3 5PH  
 United Kingdom  
 Tel: +44 1705 664966  
 Telex: 869442

The Clansman family is composed of eight members: Siemens-Plessey Military Communications is responsible for the UK/PRC-320 and UK/PRC-344; Racal Tacticom Ltd built the UK/PRC-349, UK/PRC-350, and the UK/PRC-351; Thorn-EMI-Sensors developed and produced the UK/VRC-321 and UK/VRC-322; and Marconi Defense Systems Secure Radio Division produced the UK/VRC-353.

**Licensee.** In 1978 the Spanish Ministry of Defence established licensed production of the UK/PRC349

personal radio. A contract was awarded to Racal-Tacticom, but was to be produced by EESA.

**Status.** In service, but due to be phased out by the Bowman tactical radio series.

**Total Produced.** It is believed that up to 130,000 Clansman series radios have been delivered over the life of the production line.

**Application.** Clansman was designed to provide an integrated family of radio equipment to replace the Larkspur system previously used by the British Army.

Clansman provides communications facilities over long and short ranges in combat zones anywhere in the world. It is a complete family of integrated systems that include handheld, manpack, vehicular, node points, and some ground-to-air link capabilities. Facilities for access to high-level area communications systems are provided.

**Price Range.** Analysis of order values and quantities indicates the unit price of Clansman radios varies between US\$10,000 for the PRC-344 and US\$20,000-US\$33,750 for the VRC-353 (1994 dollars).

## Technical Data

<b>Characteristics</b>	<b><u>PRC-320</u></b>	<b><u>PRC-344</u></b>	<b><u>PRC-349</u></b>	<b><u>PRC-350</u></b>	<b><u>PRC-351</u></b>
Frequency range	2-30 MHz	225-400 MHz	30-76 MHz	36-57 MHz	36-80 MHz
Channel spacing	100 Hz	50 kHz	25 kHz	25 kHz	25 kHz
Power output	30 W	2 W	1 W	2 W	4-20 W
Height	106 mm	77 mm	244 mm	267 mm	395 mm
Width	248 mm	223 mm	90 mm	142 mm	240 mm
Depth	344 mm	363 mm	41 mm	70 mm	120 mm
Weight	5.6 kg	4 kg	1.5 kg	3.1 kg	7.5-9 kg
	<b><u>VRC-321</u></b>	<b><u>VRC-322</u></b>	<b><u>VRC-353</u></b>		
Frequency range	1.5-30 MHz	1.5-30 MHz	30-76 MHz		
Channel spacing	100 Hz	100 Hz	25 kHz		
Power output	40 W	300 W	50		
Height	220 mm	220 mm	220 mm		
Width	230 mm	240 mm	430 mm		
Depth	360 mm	360 mm	360 mm		
Weight	18 kg	29 kg	22.2 kg		

**Design Features.** The Clansman family of radios consists of eight sets; three HF, four VHF, and one UHF unit, which replace the system of 24 highly diverse sets previously in service. Both the HF and VHF groups include a member for which an RF amplifier is provided, thus ensuring maximum commonality with the higher power sets. A telegraph low power/high power adapter feature is also included in the Clansman range of equipment enabling signals from telegraph or computer peripheral apparatus to be transmitted by the Clansman radio sets.

A broad spectrum of Clansman test gear including a test-sequential automatic tester has been developed in order to minimize required maintenance actions in the field. A field test/repair kit is available from the appropriate radio set manufacturer to diagnose the testing and perform alignment of sub-units and plug-in modules of the radios, and to assist in fault isolation down to the sub-unit level. Special tools and fixtures to facilitate RF circuit alignment and mechanical assembly are included.

**UK/PRC-320 Clansman HF/SSB Manpack Transceiver.** This is a lightweight HF/SSB manpack radio particularly suitable for long range patrols or special forces due to its sky-wave range performance and supporting hand generator system. The radio is solid state with a choice of 280,000 operating frequencies. Frequency selection is achieved by means of decade knobs locked to a temperature compensated reference oscillator. The PRC-320 provides SSB (USB) am and cw (wide and narrow) facilities. Speech processing and automatic level control are employed to provide a whisper speech capability and a high mean power output. A transmitter output of 30 W pep using a 2.4 m whip antenna gives the PRC-320 a ground-wave communications range of up to 40 km. Working into a dipole or end-fed antenna, sky-wave communications at ranges of between 50-2,000 km can be achieved. More than 10,000 PRC-320 sets have been delivered since production began in 1976.

**UK/PRC-344 UHF/AM Manpack Transceiver.** This is a lightweight UHF/AM manpack radio station opti-

mized for providing ground-to-air links between combat troops and their supporting ground-attack aircraft. It is also used for control communications with emergency airfields and helicopter landing pads, and in small naval landing craft for the control of amphibious assault troops and naval landing parties. The PRC-344 is a solid state transceiver which incorporates remote control facilities which are operable up to 3 km. The 2.5 W transmitter output when combined with a battle or elevated omni-directional antenna provides an operational range of 160 km in the ground-to-air mode and 16 km in the ground-to-ground mode. Operation involves channel selection by three decade rotary switches with two further controls provided for mode selection and volume level.

UK/PRC-349 VHF/FM Squad Radio. This is a VHF/FM radio intended for personal communications in combat conditions. The complete radio system is comprised of a basic RT-349 radio with audio equipment, battery, antenna, carrying holster and operator's handbook. RT-349 has synthesizer control and provides 400 speech channels at 25 kHz spacing. Frequency deviation, channel spacing, and the squelch system are fully compatible with the rest of the Clansman family. The RT-349 can be used to trigger PRC-351 and VRC-353 rebroadcast stations.

UK/PRC-350 VHF/FM Transceiver. The PRC-350 manpack transceiver can operate on any one of 841 channels spaced at 25KHz intervals in the 36 to 57 MHz band. Transmission frequency is set by means of four knobs on the side of the unit which can be manipulated while wearing arctic or NBC protective gear. Operating modes include whisper and loud/noise. In the former, used in close combat conditions, the audio output and microphone sensitivity are decreased/increased by a factor of 10, respectively. The loud/noise mode is used in high ambient noise environments and can be used to verify receiver operation as the squelch control is deactivated in this mode. Ancillaries include a terylene carrying harness and manganese-alkaline batteries capable of operating up to 12 hours or rechargeable Ni/Cd batteries with a life of 9 hours.

UK/PRC-351 VHF/FM Transceiver. The PRC-351 manpack station consists of a transceiver, a rechargeable battery, audio components and a 1.2 m whip

antenna. Operation at the rated 4 W output power level provides a station-to-station range of 8 km. An amplifier can be connected to the transceiver, boosting power output to 20 W and increasing range to 16 km. In this configuration, the set is known as the UK/PRC-352. The PRC-351/352 has remote control and rebroadcast facilities. An intercom mode facility is also provided which enables a local operator to talk to a remote operator via telephone cable without the information being radiated.

UK/VRC-321 HF Transceiver System. The VRC-321 HF system has been designed and developed for mobile military use in all types of armored and logistics vehicles. It is primarily designed for ground-wave operation by vehicle stations, but can also be used as a ground station or for sky-wave operation over long distances. All frequencies are synthesized from one reference oscillator with a warm-up time of less than 90 seconds and are selected by decade switches. Two stations can be operated in a single vehicle when a 10 percent frequency separation and 1.8 m antenna separation are provided. This requires 150 dB suppression of unwanted emissions and receiver responses.

UK/VRC-322 HF Transceiver System. The VRC-322 is a medium power (300 W) HF station for mobile ground-wave operation, but can also be used as a ground station and for sky-wave operation over long distances. It can operate in simplex or duplex modes and is also suitable for teletype communications. It employs the same RT-321 drive unit as the VRC-321.

UK/VRC-353 VHF/FM Vehicle Transceiver. This radio, introduced in 1976, is the only VHF/FM system in use on the fighting vehicles of all three UK armed services. It provides 1,840 channels at 25 kHz spacing, with selection accomplished by means of a digital synthesizer. Using an elevated broad-band end-fed antenna, ranges in excess of 80 km can be achieved, while the 50 W output is an important safeguard against jamming. Two or more VRC-353 radios can be operated at maximum power without mutual interference, provided the antennas are at least 2 meters apart. An automatic rebroadcast facility permits the equipment to be used as an automatic repeater station. Remote operation over 3 km of D-10 assault cable or 5 km of CT-10 cable is possible.

## Variants/Upgrades

The Clansman Integrated Communications System consists of the eight variants described above.

UK/PRC-320 Clansman HF/SSB Manpack Transceiver

UK/PRC-344 Clansman UHF/AM Manpack Transceiver

UK/PRC-349 Clansman VHF/FM Squad Radio

UK/PRC-350 Clansman VHF/FM Manpack Transceiver  
 UK/PRC-351 Clansman VHF/FM Manpack Transceiver  
 UK/VRC-321 Clansman HF Transceiver system  
 UK/VRC-322 Clansman HF Transceiver system  
 UK/VRC-353 Clansman VHF/FM Vehicle Transceiver

## Program Review

**Background.** Initial design studies leading to the development of the Clansman system began in the mid-1960s. The objective was to produce a range of interoperable radios to replace the chaotic collection of equipment existing at that time. User trials of prototype systems started in 1970 and continued until 1972. Following evaluation of the trial results, the individual units which make up the Clansman system began to enter production in 1976-79. The equipment was seen entering extensive service by 1980. Clansman was used by both combatants during the Falklands conflict and was also used by both sides during the Iran/Iraq war.

Interest in the use of packet radio technology has been marked. A five-station packet radio demonstrator system was built by the Royal Signals and Radar Establishment in 1987. This was followed by a contract for a 25-station system awarded to Racal-BCC in 1988. This contract was valued at US\$2 million. Key elements of the system include appliqué units attached to a standard Clansman VRC-353 vehicle radio plus a data entry and display unit based on a GRiDCase 1520. SD-Scicon was the sub-contractor for the station processing and man-machine interface. Trials of the system were completed in August 1992.

Clansman is a fully mature system which is now fielded by the British Army and a large complement of export customers. It remains standard fit on all British combat vehicles and with British infantry units, although other radios are now being acquired for special purposes. As

a result of defense reviews, the British Army has been reduced in size and a number of Regiments disbanded. This means that the equipment previously used by these units provides a stored reserve which can be used to replace operational attrition and obviates the need for residual production.

An improved and upgraded Clansman system was one option being examined for the Bowman program. The proposed mid-life Clansman upgrade (Target), however, was abandoned at an early stage due to financial constraints and the proximity of the scheduled Phase 1 Bowman service introduction and Clansman upgrade completion dates. In this regard, it should be noted that during mid-1994 the British Government released an account of communications and control activities undertaken as part of the British contribution to the Gulf War. This disclosure revealed that, despite its previous termination, many of the upgrades intended as part of the Target program were actually carried out as part of the preparations for that conflict.

Exactly what constituted these upgrades is classified information but a calculated guess would be the addition of additional channels and communications security equipment. If correct, this means that the British Army Clansman inventory is currently at an acceptable technical level. As a result, although maintenance of existing stocks will continue, any further substantial upgrade to Clansman will not be approved.

## Funding

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Development and production funding amounted to £500 million by the end of 1985. At this point procurement funding was split equally between domestic and export orders. The UK MoD frequently awards a major research, development and initial production contract in a single year, which then acts as a form of drawing account covering expenditures over a number of years. Clansman is no longer listed in UK Defense Estimates as a major procurement item, a strong indicator of the maturity of the program.

## Recent Contracts

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No known contracts have been awarded since 1989/90.

## Timetable

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<u>Year</u>	<u>Major Development</u>
Mid 1960s	Initial design studies
1970-71	User field trials
1974	Malawi ordered VRC-351
<u>Year</u>	<u>Major Development</u>
1976	VRC-320 entered production Iran ordered Clansman system Nigeria ordered PRC-351/VRC-322
1977	VRC-321 entered production
1978	Kuwait ordered VRC-353 Bahrain adopted Clansman system Spain ordered PRC-349 Argentina ordered VRC-321
1979	PRC-349 entered production Royal Netherlands Navy ordered Clansman systems
1980	Iraq ordered Clansman system UAE ordered PRC-344/VRC-353
1981	Qatar ordered Clansman system
1983	UK MoD ordered VRC-321
1986	Far Eastern order for VRC-353
1989	Egypt ordered PRC-349
1992	Packet switching trials completed
1999	Clansman replace, Bowman, to begin initial production
2002±	Initial Bowman systems gain operational status; Clansman begins to be rapidly phased out

## Worldwide Distribution

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Clansman has been widely exported, with particular sales success being achieved in the Middle East. Iran was an early purchaser of the complete Clansman system and presumably has been operating the system throughout the Iran/Iraq war. Sales successes have also been recorded in South America and South East Asia. The identity of the latter user is unconfirmed, but is probably **Malaysia**. Known users of Clansman or members of the Clansman family include **Argentina, Bahrain, Egypt, Iran, Iraq, Kuwait, Malawi, The Netherlands, Nigeria, Spain, the UK** and the **United Arab Emirates**. Known breakdowns include:

**Argentina.** 199 VRC-321 and 173 VRC-322 radios

**Bahrain.** 82 assorted Clansman sets

**Kuwait.** 690 assorted Clansman units

**Malawi.** 55 VRC-351

**Netherlands.** PRC-320 and PRC-344 (for Royal Netherlands Navy and Marines)

**Nigeria.** 800 PRC-351 and 200 VRC-322

**United Arab Emirates.** 40 PRC-344 and 400 VRC-353

**United Kingdom.** 80,000± systems of all varieties (estimated)

Political events have served to isolate some of these users from supply and product support, but the widespread customer base provides a highly certain thriving spares/support business with the remaining export customers. Technically, Clansman remains available for export subject to normal UK requirements, but the widespread introduction of frequency-agile radios will inhibit a new adoption of the system.

## Forecast Rationale

Since its inception in the late 1970's, the Clansman has proven to be an efficient, effective military communications system which has seen repeated combat use throughout the 1980s and early 1990s. It has been used by the UK in such conflicts as Persian Gulf War and the Falkland Islands war. The system has also been used extensively by other nations in wartime such as the Iran/Iraq war, etc.

While Clansman had been both a commercial and militarily important success, this view has changed since the mid-1990s. By 1995, the Clansman technology was over 20 years old and does not have the ability to be upgraded to take part in the tremendous amount of digital data transmissions, frequency hopping, or any other features that have been identified as being critical for a modern communications system.

It is believed that the last known deliveries of Clansman occurred in 1994/95. Contracts that might have gone to Clansman most probably were applied to the integrated US manufactured SINCGARS family of digital tactical radios, or might have been withheld pending the beginning of production for the Clansman replacement, Bowman.

The ten-year forecast indicates no significant production will occur within the forecast time frame. The age and technical obsolescence of the Clansman system is the major determining factor that will preclude any new acquisitions of the system. The other major element is that the Clansman replacement, Bowman, is scheduled to start initial production in 1999. As the Bowman system becomes available the Clansman system will be phased out.

The only contracts likely to be awarded for Clansman will be restricted to the support of existing inventories, primarily those of non-UK purchasers. Support funding is likely to take the form of a steady stream of small contracts, individually too small to be placed to competitive tender for Clansman auxiliary systems and can be expected to slowly decline from this level until the beginning of next decade when the Bowman system enters service.

(NOTE: For more information see Bowman located in the C3I and Land & Sea-Based Electronics binders).

## Ten-Year Outlook

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No significant production forecast. **THIS REPORT WILL BE DROPPED IN 1999.**

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