

# ARCHIVED REPORT

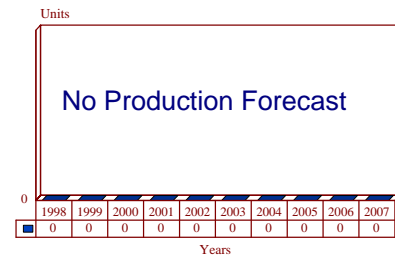
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## GRC-103(V) - ARCHIVED 7/99

### Outlook

- Production believed complete
- Replaced with second-generation GRC-226(V) as part of US Army's MSE
- Third-generation follow-on in the market since 1992
- This report will be dropped next year, 1999

10 Year Unit Production Forecast  
1998-2007



### Orientation

**Description.** Tactical line-of-sight (LOS) radio relay system.

**Sponsor**

US Army  
Communications - Electronics Command  
(CECOM)  
Ft. Monmouth, New Jersey (NJ)  
USA

**Contractors**

Canadian Marconi Co  
600 Dr. Frederick Philips Boulevard  
Ville Saint-Laurent  
Montreal, Quebec H4M 2S9  
Canada  
Tel: +1 514 748 3148  
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(Prime: development/production)

Canadian Commercial Corp  
50 O'Connor Suite 1100  
Ottawa, Ontario K1A 0S6  
Canada

Tel: +1 613 996 0034; 800 748 8191

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[Responsible for the export and distribution of the GRC-103(V)]

**Status.** Production believed complete.

**Total Produced.** Through 1994, an estimated 18,550 units were produced.

**Application.** The GRC-103(V) is a lightweight, mobile, tactical radio relay system designed to effect radio relay circuits rapidly in military forward-area communications systems.

**Price Range.** Approximately US\$35,000, based upon estimated procurement quantities within the last known production contract (1986 dollars).

## Technical Data

	<u>Metric</u>	<u>US</u>
<b>Characteristics</b>		
Weight:	212.5 kg	468 lb
Temperature:		
(non-operating)	-54°C to +69°C	-65°F to +155°F
(operating)	-37°C to + 52°C	-35°F to +125°F
Planning Range:	80 km	50 mi
Frequency Range:	220 MHz to 1850 MHz in five bands	
	Band 1 - 220 MHz to 405 MHz	
	Band 2 - 395 MHz to 705 MHz	
	Band M - 610 MHz to 960 MHz	
	Band 3 - 695 MHz to 1000 MHz	
	Band 4 - 1350 MHz to 1850 MHz	
Number of Channels:	Band 1 - 369	
	Band 2 - 621	
	Band 3 - 621	
	Band 4 - 1,000	
Channel Spacing:	Bands 1, 2, M, 3 - 16 MHz minimum	
	Band 4 - 20 MHz Minimum	
Modulation:	FM nominal deviation +/- 300 kHz for 1	
	V input peak to peak	
Transmitter Power Output:	Band 1 - 30 W	
	Band 2 - 25 W	
	Band M - 20 W	
	Band 3 - 20 W	
	Band 4 - 15 W	
Receiver Noise Figure:	Bands 1, 2, M, 3, 4 - 8.0 dB nominal	
Data Bit rates:	288, 576, 1152 kb/s or	
	256, 512, 1024 kb/s or	
	2048 kb/s	
Power Requirements:	115 or 230 V AC, 47 Hz to 420 Hz,	
	24 Vdc, 140 W	

**Design Specifications.** The GRC-103(V) operates in the 220 MHz to 1.85 GHz frequency range, supplying more than 4,500 radio frequency channels in five separate frequency bands. Any of the channels can be swiftly selected using simple front-panel controls. Five-band frequency coverage is accomplished by the use of five separate, interchangeable, plug-in radio frequency heads for both transmitter and receiver to allow greater flexibility in frequency planning. The system can be secured by using electronic key generator TSEC/KG-27.

The GRC-103(V) is designed to allow selection of a variety of traffic capacities, system responses and radio frequency bandwidths. Basically, the radio set carries 15 to 63 channels delta modulation, six to 24 channels pulse code modulation, or four to 60 channels frequency division multiplex.

**Multiplexer.** Combination with the TD-5064(V)/U multiplexer adds further capabilities. The multiplexer processes 15 two-wire/four-wire VF delta-modulated channels for radio or cable transmission, and can be expanded up to a 63-channel capacity by using up to four multiplex units in master/slave configuration without any ancillary gear requirements. The basic unit interfaces channels directly for telephone use, or – by optional change of codes – selected channels may be converted for teletype, data, through-dialing, or other special needs as required.

**System Configurations.** The GRC-103(V) radio set in combination with the TD-5064(V)/U multiplexer can be used in variations ranging from: a simple terminal-to-terminal standalone link, providing 15 voice channels or equivalent teletype or data channels over a distance of up to 80 kilometers (depending on path characteristics);

a higher-capacity master/slave system using additional multiplex units to provide up to 63 voice channels; to an extended system, using back-to-back radio repeaters with a range of many hundreds of kilometers, yet supplying equivalent channel performance to a conventional permanent system. Radio and multiplex gear can be duplicated over the same path to supply hot or cold standby facilities, or to expand the number of available channels beyond the maximum of one radio system.

The GRC-103(V) forms part of numerous different vehicle-mounted systems. These include the MRC-115, MRC-126, MRC-127, MRC-129, TCC-65, TRC-113, TRC-145, TRC-180, and VRC-59. The GRC-103(V)4 is mentioned specifically as the model used in conjunction with the TRC-173 and TRC-174: the TRC-173 is composed of two GRC-103(V)4 radios, one VRC-46 or VRC-90 radio, and portions of the Digital Group Multiplexer (DGM) family of equipment; the

TRC-174's configuration is similar, save for its use of three GRC-103(V)4s.

**Operational Characteristics.** The complete radio system can be set up and operational in less than 30 minutes. Up to 63 voice frequency channels can be provided with associated multiplex gear. The system works with delta modulation, Pulse Code Modulation (PCM) or Frequency Division Multiplex (FDM) multiplex gear to deal with telephone, telegraph, teletype, facsimile, or data transmission.

All equipment is designed to be rugged and mobile for use in military-forward areas without shock-mounting. The system has high-output power for long range, coupled with low receiver noise factor for top performance. Also included are directional, high-gain antenna systems with vertical or horizontal polarization and low-loss transmission cable. The radio, antenna, and mast equipment consist of compact man-transportable units.

## Variants/Upgrades

There are four known variants of the GRC-103(V) series: The (V)1, (V)2, (V)3, and (V)4. The difference between the models is the frequency range of the bands in which the system operates.

## Program Review

**Background.** In 1962, Canadian Marconi Company agreed to design, develop, and produce Band 1 of the GRC-103 for the US Army. The development program was completed in 1966 at a cost of US\$10 million, and the system ultimately entered production in 1970. It entered Australian Army service in 1977. Although only the use of Band 1 was originally specified, the manufacturer – using both its own funds and those supplied by the Canadian and US governments – added a Band 0 (or M), 2, 3, and 4 capability. Other significant activity included a US Army production contract worth US\$50 million in 1980.

A significant blow to the system occurred in the mid-1980s: though at first chosen for use in the MSE (Mobile Subscriber Equipment) program in 1985, the follow-on GRC-226(V) line-of-sight radio was ultimately selected for the contract in 1986. Also produced by Canadian Marconi, the GRC-226(V) has been delivered to the US Army in quantities numbering over 7,000 units. Nevertheless, the GRC-103(V) did continue to find success, as illustrated by the award of a five-year, US\$46 million contract in 1986 for the supply of additional units to the US Army.

Its production cycle lasting almost 25 years, with applications including the TRI-TAC program, the equipment has been extensively updated on a regular basis in order to incorporate the latest technology. In FY85, the US Army sought a new lighter and more portable antenna for the radio as part of an NDI (non-developmental item) effort. In the late 1980s, CECOM performed a market investigation to determine the availability of contractors for performing the tasks required to modify the Burst Error Correcting Coder (BECC) to accommodate the GRC-103(V). As a replacement for the TD-1065 data buffer, the BECC would provide error correction to the data transmission and protection of voice communication against vulnerable interference over the communication channel.

In 1990, Canada outlined plans for its Tactical Command, Control, and Communications System (TCCCS) modernization program to update its tactical communications, which would include the GRC-103(V). In November 1990, Control Data Corp's Computing Devices Co (now known as Computing Devices Canada) was awarded a 10-year, US\$860 million contract to develop and supply the Integrated Radio and Intercommunication System (IRIS). A major subcontractor to Computing Devices is Racal-Tacticom of the

United Kingdom. The IRIS design, which includes the GRC-103 replacement, is based on an improved version of Racal's Jaguar frequency-hopping tactical radios.

## Funding

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None included in current US budget documents.

## Recent Contracts

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No contracts of any kind for the GRC-103(V) have been identified since 1991. The 1989 contract listed here is the last with a significant dollar value.

<u>Contractors</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Canadian Comm Corp	37.3	Nov 1989 – Connector-filter assembly PO/AM-4316R, applied to GRC-103 (DAAB07-90-C-U250)
Canadian Comm Corp	0.1	Dec 1991 – Tuned cavity subassembly applied to GRC-103(V) (DAAB07-92-C-H619)

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1962	Canadian Marconi agreed to design, develop, and produce Band 1 of the GRC-103(V) for the US Army
	1966	US\$10 million development program completed
	1970	Entered production
	1977	Entered Australian Army service
Nov	1980	US Army placed production contract worth US\$50 million
	FY85	Investigation and evaluation of a new, nondevelopmental antenna for GRC-103 by US Army initiated
	1985	GRC-103(V) at first chosen for use in MSE (Mobile Subscriber Equipment) program
	1986	GRC-226(V) chosen for MSE in place of GRC-103(V)
	1986	Canadian Marconi won competition to supply additional GRC-103(V)s to the US Army as part of a five-year requirement worth US\$46 million
Nov	1990	Award of 10-year IRIS program (Canada), which included replacement of GRC-103(V)
	1992	Third-generation GRC-512(V) introduced
	1994	Production of GRC-103(V) phased out

## Worldwide Distribution

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The **US** is the largest user, with at least 12,000 procured. Other customers have included **Australia, Canada**, and 25 other nations, including various **NATO** members.

## Forecast Rationale

The US Army had once planned to use the GRC-103(V) (MSE) tactical radio telephone system. However, the radio relay as part of its Mobile Subscriber Equipment replacement of the GRC-103 with the newer digital

UHF radio relay GRC-226(V) began to spell the end for the older system. In addition, Canadian Marconi introduced a third-generation line-of-sight radio, the GRC-512(V), in 1992; customers of this equipment have included Canada and Taiwan.

Still, the company was able to achieve a notable sales success for the GRC-103(V) through its adaptation of

the radio to fit in with numerous systems (and its offering of various radio configurations that use the GRC-103(V) as their basis). Significant production of the GRC-103(V) apparently ended by the mid-1990s. Since that time, activity has likely been limited to spares support and, perhaps, low-rate production for smaller users looking for a high-quality system that need not be state-of-the-art.

## Ten-Year Outlook

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With major production complete, the forecast chart has been omitted. This report has been reissued to include final corrections and updates, and will be dropped next year.

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