

# H.F., S.S.B. MANPACK RADIO SYSTEMS

## UK/PRC 320 CLANSMAN & PRC 320/1

**Designed to full military user  
requirement and specification**

**Extensively evaluated and  
proved by British Army**

**In full production to U.K.  
Government standards**

**Outstanding ground and  
skywave performance**

**Full range of ancillaries  
including hand generator  
system**



The UK/PRC 320 in operation

## Application

UK/PRC 320 is a lightweight h.f. s.s.b. radio station designed as part of the British Army's 'Clansman' range of radio equipments for combat use throughout the world. It represents an advanced concept in military h.f. station radios with a comprehensive range of ancillaries for manpack, ground station and vehicle use.

The PRC 320 is particularly suitable for use by long range patrols or special forces because of its superior skywave range performance and hand generator system.

## Description

The equipment is all solid-state and operates in the band 2 to 29.9999MHz with 100Hz channel spacing. This gives a choice of 280 000 frequencies. Communications at night are much improved by using frequencies above 20MHz. Selection is obtained by decade knobs which control a micro-miniature synthesiser locked to a temperature compensated reference oscillator, giving a high order of stability under all environmental conditions. PRC 320 is simple to operate and provides s.s.b. (u.s.b.), a.m., c.w. (wide) and c.w. (narrow) facilities. Speech processing and automatic level control are employed to provide whisper speech facilities and a high mean output power.

An alternative version (PRC 320/1) can be supplied having both upper and lower sideband in the s.s.b. mode, compatible a.m., c.w. (wide) and with 1kHz channel spacing giving 28 000 channels.

A transmitter output power of 30W p.e.p. working into a 2.4m (8ft) whip antenna gives PRC 320 a reliable ground wave communications range in excess of 40km (25 miles) by day under normal conditions.

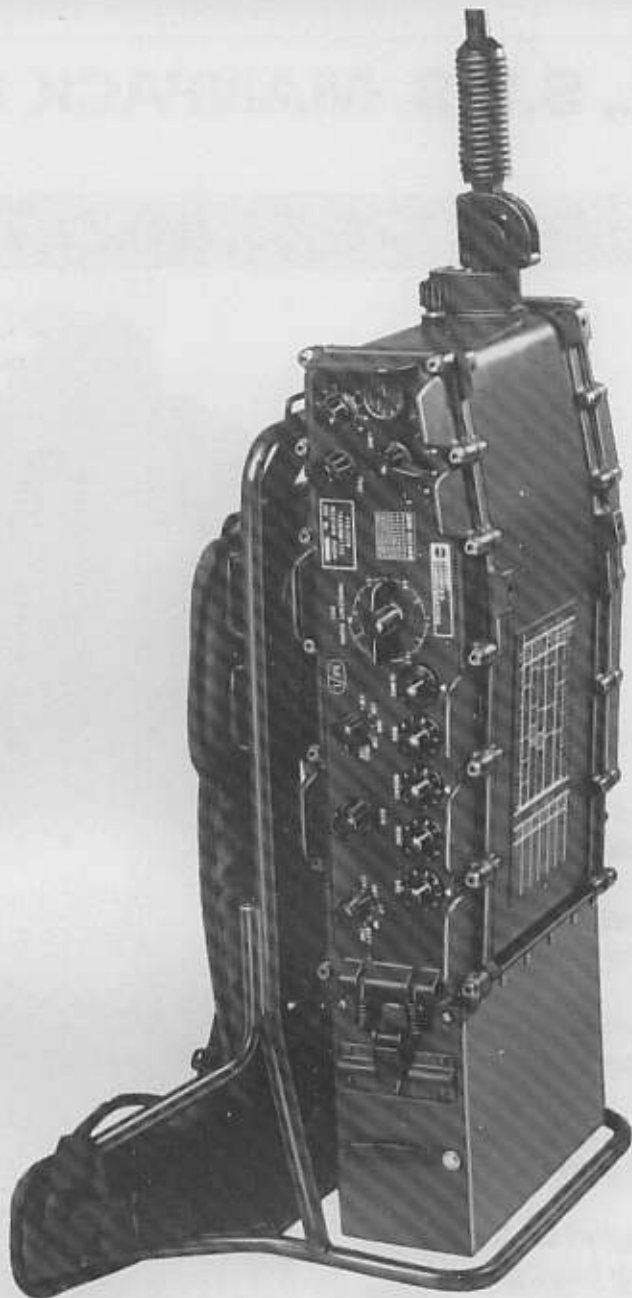
PRC 320 is suitable for use as a ground station, working into static ground or skywave antennas which greatly increase the distance range.

Working into a dipole or end-fed antenna, skywave communications at ranges from 50km (31 miles) to 2000km (1240 miles) or greater can readily be achieved. This superior range performance is due in part to the high grade receiver and high efficiency manual antenna tuning unit which is integral with the transmitter-receiver unit.

The radio is carried on the operator's back and allows him full use of his weapons. It is powered by rechargeable 24V nickel-cadmium batteries of 1.0 or 3.3Ah capacity. These batteries are charged using any of the charging units described below. Alternatively, the radio can be powered by a hand-generator system with 1.0Ah battery.

The radio can be operated remotely if required at distances up to 3km (2 miles)

With its manpack carrier and battery, the PRC 320 can be used as a 'clip-in'



The PRC 320/1

vehicle installation. A vehicle-mounted antenna is used and the battery is float-charged by a d.c. charging unit from the vehicle supply. The advantage of the system is that the transmitter-receiver can be quickly removed from the vehicle and used in its manpack role.

## Variants

PRC 320/1 is similar in appearance and build standard to PRC 320 but provides l.s.b. and u.s.b., c.a.m., and c.w. (wide) facilities. Channel spacing is 1kHz. PRC 320-100 or PRC 320/1-100 100W h.f. s.s.b. Vehicle Station uses the manpack station in its 'clip-in' role to drive a 100W amplifier with automatic antenna tuning unit.

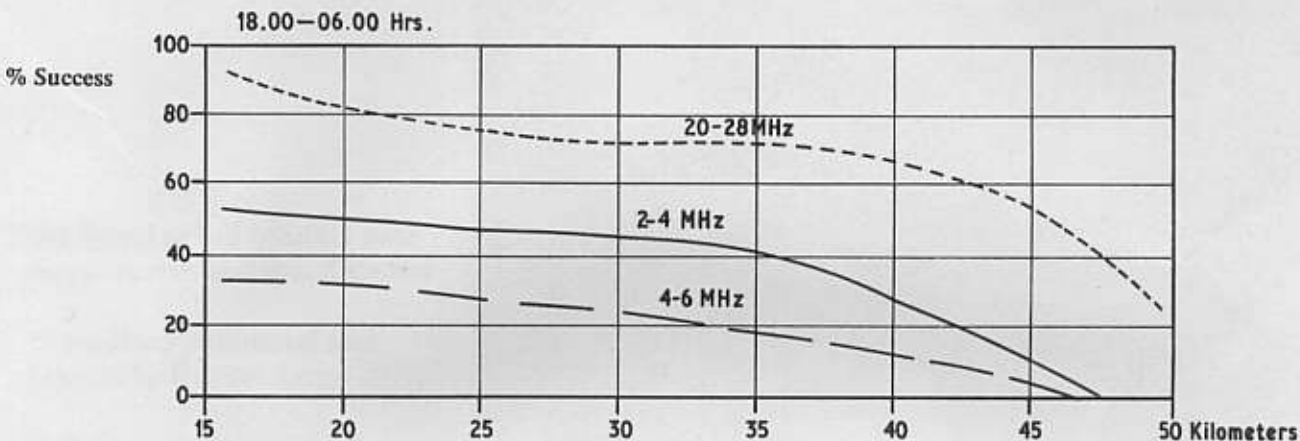
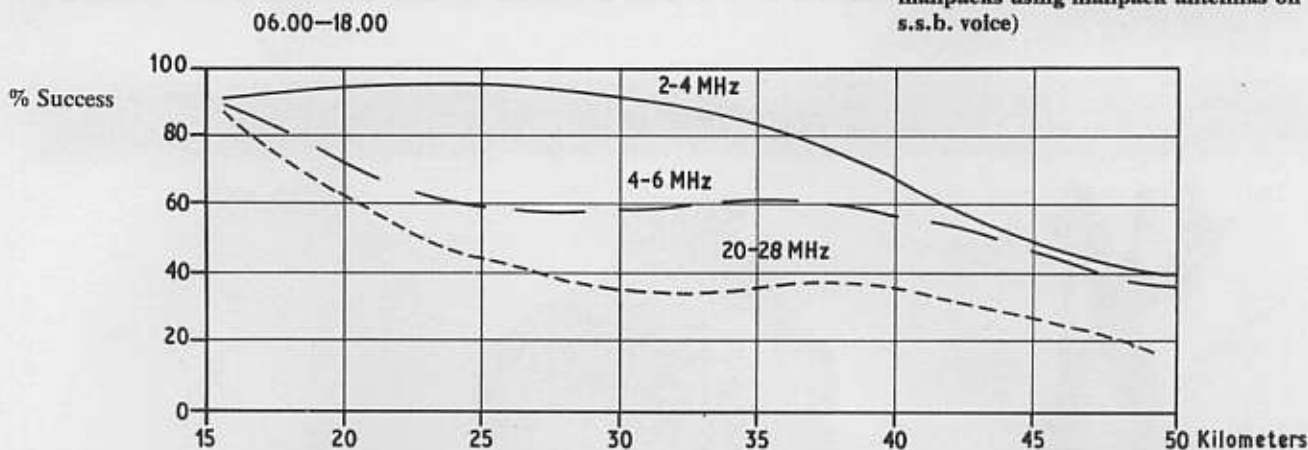
VRC 320/2 30W h.f. s.s.b. Vehicle Station is a vehicle variant in repackaged form which provides the same facilities as the PRC 320/1 and has an

automatic a.t.u. VRC 320/2-100 100W h.f. s.s.b. Vehicle Station utilises RT 320/2 plus 100W amplifier with automatic antenna tuning unit.

# UK/PRC 320 GROUND WAVE RANGE PERFORMANCE

## BRITISH ARMY USER TRIALS GROUND WAVE RESULTS

(Based on over 7,000 contacts between manpacks using manpack antennas on s.s.b. voice)



Success is defined as a strength 3 readability signal, or better in both directions between random sites in north west Europe.

## ANCILLARIES

### Audio Equipment

- (a) Clansman or modified Larkspur handsets and headsets with boom microphone
- (b) Knee-strap morse key
- (c) An interface can also be provided with the Clansman or Larkspur vehicle control harness system

### Batteries

Clansman sealed rechargeable nickel-cadmium batteries 24V, 3.3Ah and 1.0Ah

### Battery charging

**Hand-generator system:** Comprises a hand-generator and 1.0Ah nickel-cadmium battery. This system can be fitted to the radio in place of the normal 3.3Ah battery. The radio can be operated indefinitely provided the hand-generator is turned while the set is switched on. Ideal for long-distance patrol use and for isolated posts.

**A.C. charging unit:** Capable of charging up to sixteen Clansman batteries from a.c. mains supply.

**D.C. charging unit (28V):** Capable of charging a

Clansman battery, or float-charging the battery and radio when powered from a nominal 28V d.c. source such as a vehicle battery supply or petrol charging engine.

**D.C. charging unit (14V):** As above, but powered from a nominal 14V d.c. source.

For details of the hand-generator a.c. and d.c. battery charging systems, see Publication No. 9313.

### Remote control system

For remote operation of voice and pressel over field cable at distances up to 3km. Comprises a local unit and a remote control handset.

### Antenna gear

- Lightweight mast 5.4m
- Long-wire, end-fed antenna
- Dipole antenna
- Whip antenna 2.4m and antenna angle adaptor
- Vehicle whip antenna system 3, 4 or 5m (PV 1316)

## Data Summary

### General

	UK/PRC 320	PRC 320/1
<b>Frequency range:</b>	2 to 29.9999	2 to 29.999
<b>Channel spacing:</b>	100Hz intervals	1kHz intervals
<b>Mode of operation:</b>	s.s.b. (A3J) u.s.b. a.m. (A3) c.w. (wide) A1 c.w. (narrow) A1	s.s.b. (A3J) u.s.b. s.s.b. (A3J) l.s.b. c.a.m. (A3H) c.w. (A1)

**Frequency stability:** 1 part in  $10^6$  over 6 months  
**Power supply:** 24V, 3.3Ah rechargeable battery or power supply unit  
**Battery operating life:** 12h at 1:9 transmit/receive ratio  
**Weight:** Transmitter-receiver: 5.3kg (11lb 10oz)  
**Dimensions:** Manpack: 344mm x 248mm x 106mm  
(13.6in x 9.7in x 4.2in)  
Rechargeable Battery:  
184mm x 127mm x 72mm  
(7.25in x 5.0in x 2.84in)

### Transmitter

**Power output:** 30W p.e.p.  
**Spurious output:** Harmonics 40dB below wanted output  
**Modulation sensitivity (whisper speech):** 0.4 to 40mV for full modulation

### Receiver

	UK/PRC 320	PRC 320/1
<b>Sensitivity (o/c levels)</b>	0.8 $\mu$ V s.s.b. for 10dB signal-to-noise 3.3 $\mu$ V 30% modulated for 10dB signal-to-noise 0.8 $\mu$ V c.w. (narrow) for 17dB signal-to-noise	0.8 $\mu$ V s.s.b. and c.w. for 10dB signal-to-noise 3.3 $\mu$ V 30% modulated a.m. for 10dB signal-to-noise
<b>Selectivity (nominal 6dB bandwidth)</b>	2.9kHz s.s.b. or c.w. (wide) 6kHz a.m. 300Hz, c.w. (narrow)	2.9kHz s.s.b. and c.w. 2.4kHz c.a.m.
<b>Image rejection:</b>	Greater than 50dB	
<b>I.F. rejection:</b>	Greater than 60dB	

### Environmental conditions

**Working temperature:** -37°C to +55°C plus solar radiation  
**Storage temperature:** -40°C to +65°C  
**Immersion depth in water:** 1m (3ft) for 2 hours  
**Altitude operation:** 2500m (8000ft)  
**Altitude transport:** 7500m (25000ft)

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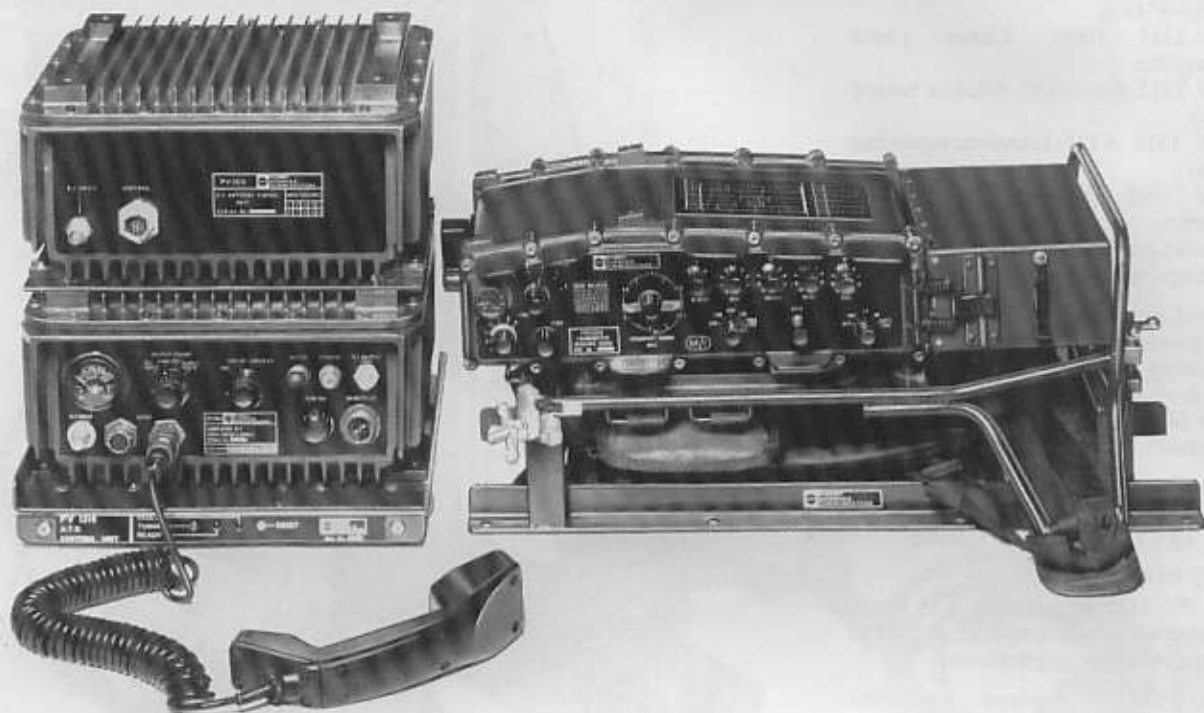
**PLESSEY**  
electronic systems

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# HF VEHICLE RADIO STATIONS

## PRC 320-100W & PRC 320/1-100W



PRC 320/1-100W

**Frequency range**  
2—29.9999MHz  
(or 2—29.999MHz)

**280 000 synthesised channels**  
(or 28 000)

**100W p.e.p. output**

**Suitable for installation in soft-skinned or armoured vehicles**

**Low power consumption**

**Incorporates British Army CLANSMAN equipment**

**Transmitter-receiver immediately available for manpack use**

**Fully automatic antenna tuning**

### Application

The PRC 320-100W HF SSB Vehicle Station uses the CLANSMAN RT 320 30W manpack in its vehicle 'clip-in' configuration to drive the PV 1311 100W Linear Power Amplifier followed by the PV 1313 automatic antenna tuning unit. The CLANSMAN RT 320 is currently in full scale production for British Army service in the manpack role.

A salient feature of this 100W vehicle station is that the transceiver may be readily removed and used as a manpack.

In all cases the transceiver is installed in the vehicle in its 'clip-in' manpack form complete with manpack carrier. It is removed by means of a 'quick release' mounting and it is then ready for instant use as a manpack with a transmitter power of 30W. This feature is of special value where the vehicle becomes a casualty or when it is desired to establish radio communication in a location inaccessible to the vehicle. Complete logistic commonality between the manpack and vehicle station is also ensured.

### Description

The equipment is all-solid state and operates in the band 2—30MHz.

Frequency control is achieved by a microminiature synthesiser locked to a temperature-compensated reference oscillator giving a high order of stability. Speech processing and automatic level control are employed to provide whisper speech facilities and to maintain optimum mean output power.

When operating into a vehicle whip antenna, the system will provide reliable ground-wave communication up to 100km (62 miles) over average rolling terrain. Considerably greater ranges can be obtained using sky-wave propagation.

The system is normally powered from a 24V (nominal) negative-earth vehicle supply. Protection is incorporated against supply spikes and surges and reversed polarity connection. The transceiver can obtain its supply from the PV 1311 Amplifier or from a Clansman 3.3Ah rechargeable nickel-cadmium battery float-charged from the vehicle supply via a Clansman d.c. charging unit.

This latter configuration has the advantage that when the transceiver is removed from the vehicle for use as a manpack, it has a fully-charged battery in position and the manpack radio is available for immediate use.

A typical installation in a vehicle would comprise:

- RT 320 30W manpack transmitter-receiver with carrying frame and 'clip-in' rack
- PV 1311 100W Linear power amplifier
- PV 1313 Automatic antenna tuning unit
- PV 1318 ATU Interface/mounting tray
- PV 1316 Vehicle whip antenna system
- Audio gear and cables
- Manpack ancillaries as required

A fixed mounting frame is provided for the power amplifier and a 'clip-in' mounting frame for the transceiver. A 3.3Ah nickel-cadmium battery and a 12 or 24V d.c. charging unit can also be supplied.

### Unit descriptions

#### PV 1311 HF 100W Linear Amplifier

The PV 1311 is a 100W h.f. linear transmitter power amplifier for fixed station or mobile applications.

The PV 1311 operates over the frequency range 2 to 30MHz and uses solid-state circuitry throughout in a broadband design which obviates the necessity for tuning. Operation is from a 24V (nominal) d.c. vehicle supply. Built-in protection circuits ensure that the amplifier is not damaged by conditions of high load v.s.w.r. (including open circuit or short circuit at the antenna), incorrect supply voltage or polarity, excessive drive or restricted cooling. Built-in test equipment enables the operator to rapidly check the major functions.

The PV 1311 provides a regulated d.c. output of 4A at 26V for supplying a RT 320 transmitter-receiver.

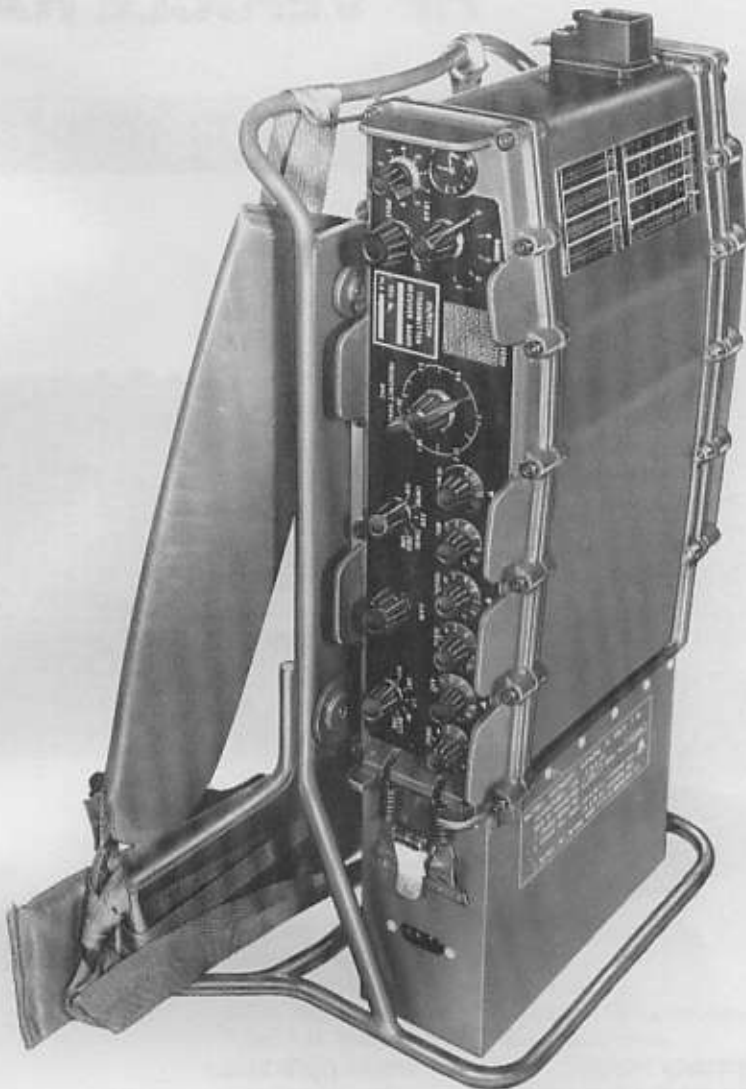
#### PV 1313 Automatic Antenna Tuning Unit (ATU)

The PV 1313 Antenna tuning unit operates over the frequency range 2 to 30MHz and is capable of tuning a wide range of whip and wire antennas as follows:—

4m vehicle whip	2 to 30MHz
5m vehicle whip	2 to 30MHz
10m whip	2 to 12MHz

Long wire antennas — various lengths 2 to 30MHz.

All tuning adjustments are carried out automatically by means of servo-mechanisms within the unit. When the frequency is to be changed, the antenna tuning unit is reset to minimum inductance by means of a press-button on the interface unit. The antenna tuning unit is then tuned by switching



The RT320 Transceiver with 3.3Ah battery fitted to manpack carrier

the transceiver to 'c.w.' and operating the pressel switch.

Indications of 'tuning in progress', 'tuning complete' or 'antenna fault' are given on the automatic unit interface. A suitable control cable up to 100m in length can be supplied to permit control of the antenna tuning unit.

#### PV 1318 ATU Interface/mounting tray

The normal method of installation for the PV 1311 and PV 1313 is to mount one on top of the other by means of four fixing screws and to mount the whole on a PV 1318 vehicle shock mounting tray. The PV 1318 also incorporates the ATU interface mentioned above.

Should it be required to mount the PV 1313 separately then a PVS 1317 mounting tray (without ATU interface) is used.

#### PV 1316 Vehicle Whip Antenna System

This incorporates a rugged mounting base derived from the Clansman system, with an angle adaptor and four

'MS' section elements to make up a vehicle whip antenna of 3, 4 or 5m in length.

#### Variants

A variant, the PRC 320/1—100W station is available in which the RT320 transmitter-receiver is replaced by the RT 320/1 which has switched upper and lower sideband s.s.b., compatible a.m. and c.w. (wide) facilities at 1kHz channel spacing.

## Ancillaries

### Audio Equipment

- (a) Clansman or modified Larkspur handsets and headsets with boom microphone
- (b) Knee-strap morse key
- (c) An interface can also be provided with the Clansman or Larkspur vehicle control harness system

### Remote control system

For remote operation of voice and pressel over field cable at distances up to 3km. Comprises local unit and remote control handset.

### Antenna gear

- Lightweight mast 5.4m
- Long-wire, end-fed antenna
- Dipole antenna
- Whip antenna 2.4m and antenna angle adaptor
- Vehicle whip antenna system 3, 4 and 5m (PV 1316)



## Data Summary

### General

#### Frequency range

<b>PRC 320—100W</b> 2—29.9999	<b>PRC 320/1—100W</b> 2—29.999
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#### Channel spacing

100Hz	1kHz
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#### Mode of operation

s.s.b. (A3J) u.s.b.	s.s.b. (A3J) u.s.b.
a.m. (A3)	s.s.b. (A3J) l.s.b.
c.w. (wide) A1	c.a.m. (A3H)
c.w. (narrow) A1	c.w. (A1)

#### Frequency stability

1 part in  $10^5$  over 6 months

#### Power supplies

20—32V d.c. (negative-earth)

#### Current consumption

Average 6A  
Peak 15A

#### Supply protection

Transients up to  $\pm 600V$  at 15mJ  
Surges up to 80V either polarity

#### Interface levels

Phone: 10mW into 150 ohms  
Mic: 100mV r.m.s. (maximum)

#### Size(mm):

<b>RT 320 or RT 320/1</b>	<b>PV 1311</b>	<b>PV 1313</b>
280 x 255 x 102	275 x 245 x 140	275 x 245 x 140

#### Weight(kg):

5.6	4.6	6
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#### Tuning time for auto a.t.u.

Typical 5s  
Maximum 10s

### Transmitter

**Power output (selectable):** 100/30/3W p.e.p.

**Spurious outputs:** At least 40dB below wanted signal

### Receiver

#### PRC 320—100W

Sensitivity (o/c levels)

0.8 $\mu$ V s.s.b. for 10dB signal-to-noise

3.3 $\mu$ V 30% modulated a.m. for 10dB signal-to-noise

0.8 $\mu$ V c.w. (narrow) for 17dB signal-to-noise

#### PRC 320/1—100W

0.8 $\mu$ V s.s.b. and c.w. for 10dB signal-to-noise

3.3 $\mu$ V 30% modulated for 10dB signal-to-noise

### Selectivity (nominal 6dB bandwidth)

#### PRC 320—100W

2.9kHz s.s.b. or c.w. (wide)

6kHz a.m.

300Hz c.w. (narrow)

#### PRC 320/1—100W

2.9kHz s.s.b. and c.w.

2.4kHz c.a.m.

### Image rejection

Greater than 50dB

### IF rejection

Greater than 60dB

### Environmental

#### DEF 133 Class L3

#### Working temperature

-37°C to +55°C plus solar radiation

#### Storage temperature

-37°C to +85°C

#### Immersion

1m for 2h

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