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*Colin Hinson*

*In the village of Blunham, Bedfordshire, UK.*



AP 116A - 0115 - 1

# CONCISE DETAILS OF GROUND RADIO AND ANCILLARY EQUIPMENT

RADIO RECEIVING EQUIPMENT

BY COMMAND OF THE DEFENCE COUNCIL

A handwritten signature in black ink, appearing to be 'W. G. ...'.

Ministry of Defence

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Prepared by : Hunting Communication Technology Limited  
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Publications authority : ATP/MOD (PE)

Service users should send their comments  
through the channel prescribed for the purpose in  
AP 100B-01 Order No 0504

## PREFACE

This Air Publication is one of a series, given in the List of Associated Publications, providing concise details of ground radio equipment and ancillaries.

When this publication is amended, changes in technical information within individual pages will be marked by two marginal arrows thus:

▶-----◀ indicating the start and finish of the changed text. Grammatical changes or corrections will not be so marked.

LIST OF ASSOCIATED PUBLICATIONS IN THE SERIES

<u>AP</u>	<u>Title</u>
116A-0110-1	Introduction and index (to complete series)
116A-0111-1	Fixed ground radio installations
116A-0112-1	Transportable ground radio installations
116A-0113-1	Mobile ground radio installations
116A-0114-1	Radio transmitting equipment (including transmitter-receivers)
116A-0115-1	Radio receiving equipment
116A-0116-1	Frequency generation equipment
116A-0117-1	Control, monitoring and simulating equipment (including closed circuit television, sound recording and sound reproducing equipment)
116A-0118-1	Antennas, masts and antenna tuning, coupling and matching equipment
116A-0119-1	Radio and telegraph power supply equipment
116A-0120-1	Telegraph and terminal equipment

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2	Receiver type R7109 (5820-99-932-5695)
3	Receiver type R7351 (5820-99-932-5694)
4	Receiver type R8998 (5820-99-955-0769)
5	Receiver type R10149 (5820-99-933-2369)
6	Receiver type R10168 (5820-99-955-0771)
7	Receiver type R10170 (5820-99-955-0770)
8	Receiver type R15095 (10D/20489)
9	Receiver type R15172 (10D/22019)
10	Receiver (5820-99-933-0813)
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23	Tracking receiver DEI model MTR 4B
24	VLF tracking receiver Tracor Inc. model T599H
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26	Receiver UK/FRR 628
27	To be allocated
28	Receiver UK/FRR 626
29	Receiver UK/FRR 627
30	Receiver UK/FRR 638

RECEIVER, RADIO

Type R1392D (10D/17745)  
 R1392E (10D/17768)  
 R1392J (5820-99-  
 953-7424)  
 62H (Naval)(10D/  
 23989)

Relevant publication:-

AP116E-0702-1

**Function**

V.H.F. communication and D/F receivers primarily intended for use in conjunction with the transmitters Type T.1131 series and T.1540, receiver (Naval) 62H being specifically used with transmitter Type 75C. The receivers are designed for the reception of c.w. and R/T signals. Receivers R.1392D and E are similar R.1392D being tropicalized whilst R.1392E is non-tropicalized. R.1392G is similar to R.1392D but covers a lower frequency range. R.1392J is similar to R.1392D but is more selective. Receiver 62H is designed for a ship-borne or ground station role and tropicalized.

**Frequency range**

100 MHz to 156 MHz (3 to 1.9 metres).  
 65 MHz to 85.375 MHz (R.1392G only) (4.6 to 3.5 metres).

**Frequency control**

Crystal controlled heterodyne oscillator with a multiplication factor of 18.

**Frequency accuracy and stability**

To crystal accuracy.

**Channel spacing**

Suitable for reception of transmissions spaced by 90 kHz.

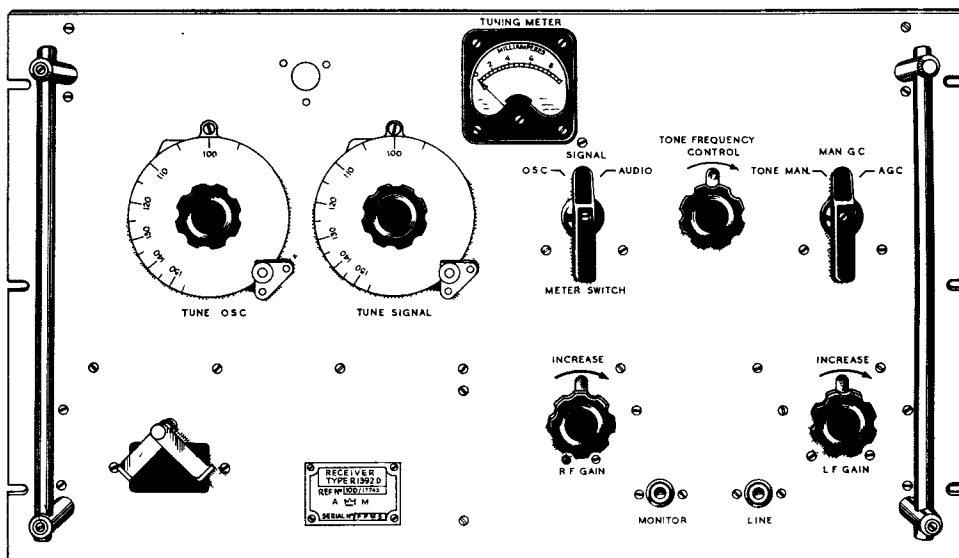
Suitable for reception of transmissions spaced by 50 kHz (R1392J)

**Intermediate frequency**

4.86 MHz.  
 9.72 MHz (62H only).

**I.F. Bandwidth**

For 6dB down: plus or minus 25 kHz  
 12 kHz (R1392J)



Receiver, Type 1392D

**Modulation**

**Input impedance**

**Sensitivity**

**Muting level**

**Automatic gain control**

**Output impedance**

**Output power**

**Antennae**

**Power supplies**

**Power consumption**

**Overall dimensions**

**Weight**

**Ancillary equipment**

Amplitude modulated reception.

100 ohms (coaxial feeder line).

For output of not less than 100mW into 600 ohms, in each case:—

R.1392D & E require 10 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

R.1392J requires 8 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

62H (Naval) requires 5 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

R.1392D & E 7 $\mu$ V; R.1392J 6 $\mu$ V; 62H 4 $\mu$ V.

Fully operative at 8 $\mu$ V.

600 ohms (surge impedance).

5mW at plug PL1, 100mW at line jack JI 100mW (62H Naval).

Standard v.h.f. antenna.

62H (Naval): suitable for C.A.W. system.

6.3V at 4A, 240V at 80mA.

50 watts: 62H (Naval) 60W (approx.).

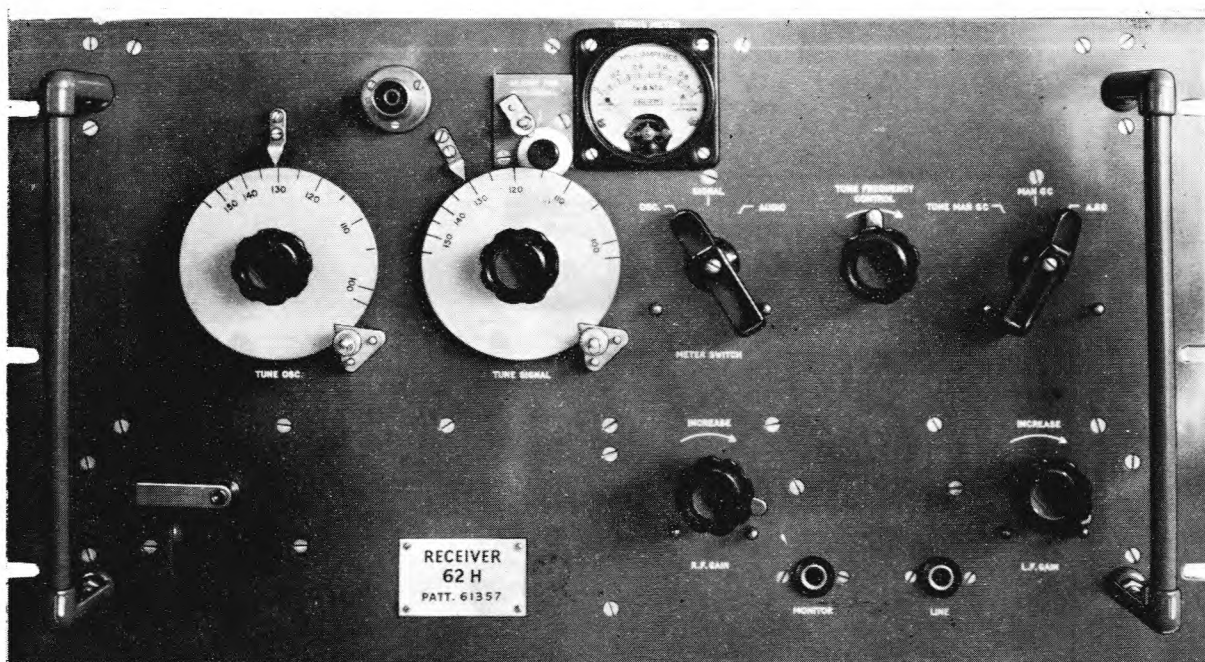
Height	Width	Depth
10½ in (26.7 cm)	1ft 7in (48.3 cm)	1ft 0½ in (31.7 cm)

47 lb (21.3 kg).

Power unit, Type 234A (a.c. mains) (10D/17395).

Power unit, Type 138 (6V d.c. supply) (10D/17390).

Power unit, A.P.W836A (a.c. mains).



**Receiver, Type 62H**

## RECEIVER, RADIO

Type R7109  
(5820-99-932-5695)

Relevant publication:-

AP116E-0731-1

**Function**

U.H.F. multi-channel receiver for fixed or mobile ground installations. The receiver is a double super-heterodyne with the first local oscillator controlled by a channel selection and frequency control system. Receiver R.7109 comprises receiver sub-assembly (formerly receiver unit Type 9095), cover electrical fitted (formerly cover assembly), cable assembly (formerly cable assembly Type 7804) and cover, access, electrical equipment, fitted chassis (formerly cover front, Type 1068).

**Origin**

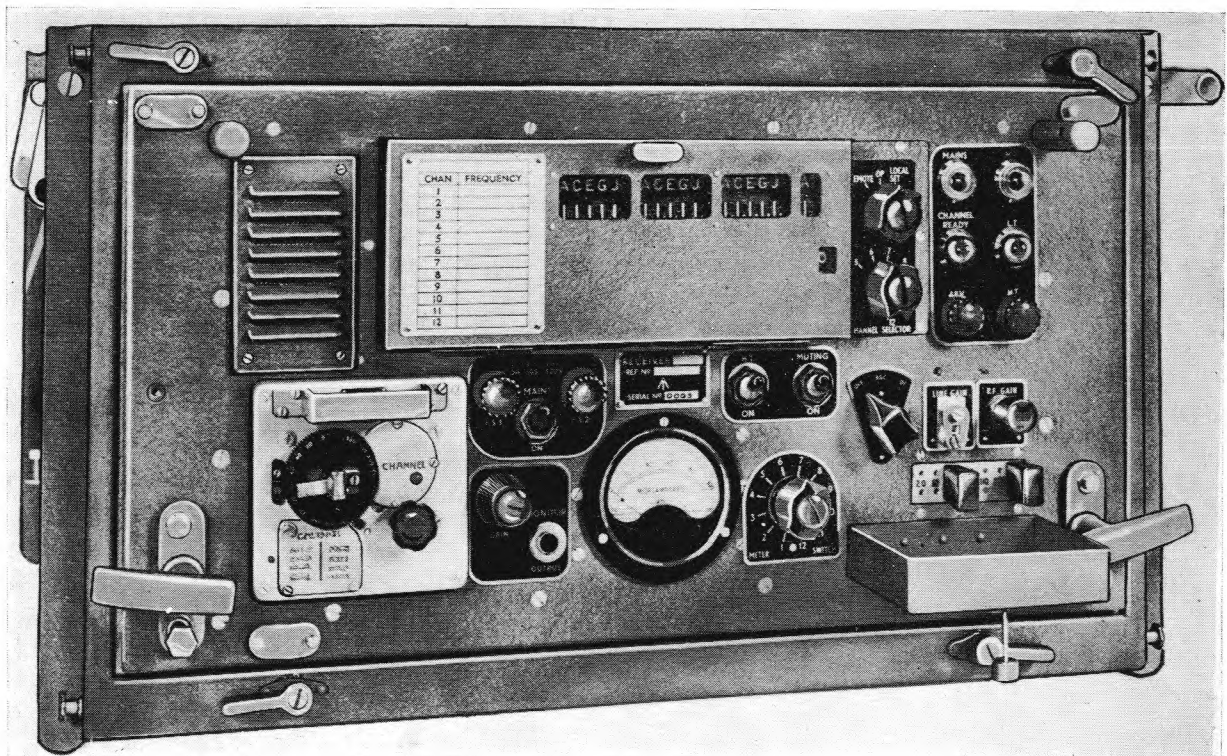
The Plessey Co. Ltd., Type XCA.200.

**Frequency range**

225 MHz to 399.9 MHz.

**Frequency control and channel system**

Frequency of the first oscillator is controlled by a channel selection and frequency control system. Frequency of the second oscillator is crystal controlled at 22.025 MHz. The receiver can be set up at any twelve channels out of the total of 1750. Any one of the twelve can subsequently be selected either locally or remotely via a remote control system.



Receiver, Type R.7109

**Frequency accuracy and stability**

The operating frequency of the receiver is automatically kept within 10 MHz of correct frequency after selection is made.

**Channel spacing**

100 kHz.

**Intermediate frequencies**

24 MHz and 1.975 MHz.

**I.F. Bandwidth**

*For 6dB down:* not less than 60 kHz.  
*For 60dB down:* not greater than 140 kHz.

**Modulation**

Amplitude modulated reception.

**Sensitivity**

With an r.f. signal across the antenna terminals of  $1\mu\text{V}$  modulated 30 per cent at 1000 Hz, the signal/noise ratio at the output is greater than 10dB.

**Output**

With an r.f. signal across the antenna terminals of  $5\mu\text{V}$  modulated 100 per cent at 1000 Hz:—  
Monitor output 200mW.

Line output 2.0V and 3.5V for any load between 100 ohms and 1800 ohms.

Attenuated line output 1mW max. into 600 ohm G.P.O. line.

**Antennae**

Antenna unit, design 41, Type AJE.

**Power supplies**

115 or 230 volts, 45 to 65 Hz, single-phase a.c.

**Power consumption**

250 watts.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft 1 $\frac{1}{4}$ in (33.6 cm)	1ft 11 $\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

**Weight**

110 lb (50 kg) (*excluding cabinet*)  
Cover assembly 51 lb (23 kg) (*excluding connectors*).

**Ancillary equipment**

Cooler, dry air, electrical equipment (5820-99-932-3995) (formerly air blower, Type 7344, 10K/19476).

## RECEIVER, RADIO

Type R7351  
(5820-99-932-5694)

Relevant publication:-

AP116E-0730-1

**Function**

U.H.F. single channel receiver for fixed or mobile ground installations. The receiver is a double super-heterodyne with both oscillators crystal controlled, and comprises receiver sub-assembly (formerly receiver unit, Type 9096), cover electrical fitted (formerly cover assembly), cable assembly (formerly cable assembly, Type 9097) cover, access, electrical equipment, fitted chassis (formerly cover front, Type 1068) and two external connectors.

**Origin**

The Plessey Co. Ltd.

**Frequency range**

225 MHz to 399.9 MHz.

**Frequency control**

Crystal controlled local oscillators.

**Frequency accuracy and stability**

To crystal accuracy.

**Channel spacing**

100 kHz.

**Intermediate frequencies**

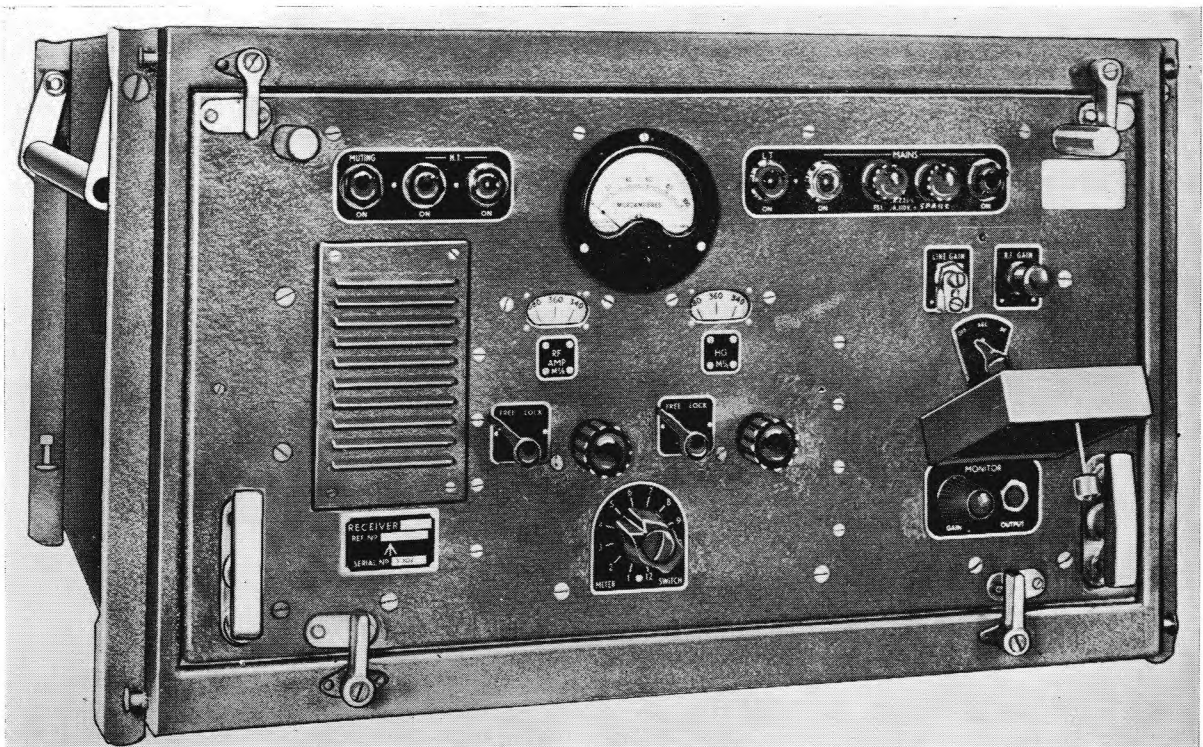
24 MHz and 1.975 MHz.

**Modulation**

Amplitude modulated reception.

**Sensitivity**

With an r.f. signal across the antenna terminals of  $1\mu\text{V}$  modulated 30 per cent at 1000 Hz, the signal plus noise/noise ratio at the output is greater than 10dB.



Receiver, Type R.7351

**Output**

With an r.f. signal across the antenna terminals of  $5\mu\text{V}$  modulated 100 per cent at 1000 Hz:—  
Monitor output 200mW.

Line output 2.0V and 3.5V for any load between 100 ohms and 1800 ohms. Attenuated line output: 5mW max., into 600 ohms G.P.O. line.

**Antennae**

Antenna unit, design 41, Type AJE.

**Power supplies**

115 or 230 volts, 45 Hz to 65 Hz single phase a.c.

**Power consumption**

160 watts.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft 1 $\frac{1}{4}$ in (33.6 cm)	1ft 11 $\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

**Weight**

80 lb (36.3 kg) (*excluding cabinet*)

*Cover assembly 51 lb (23 kg) (excluding connectors).*

**Ancillary equipment**

Cooler, dry air, electrical equipment (5820-99-932-399) (formerly air blower, Type 7344, 10K/19476).

## RECEIVER, RADIO

Type R8998  
(5820-99-955-0769)

## Relevant publication:-

AP116E-0734

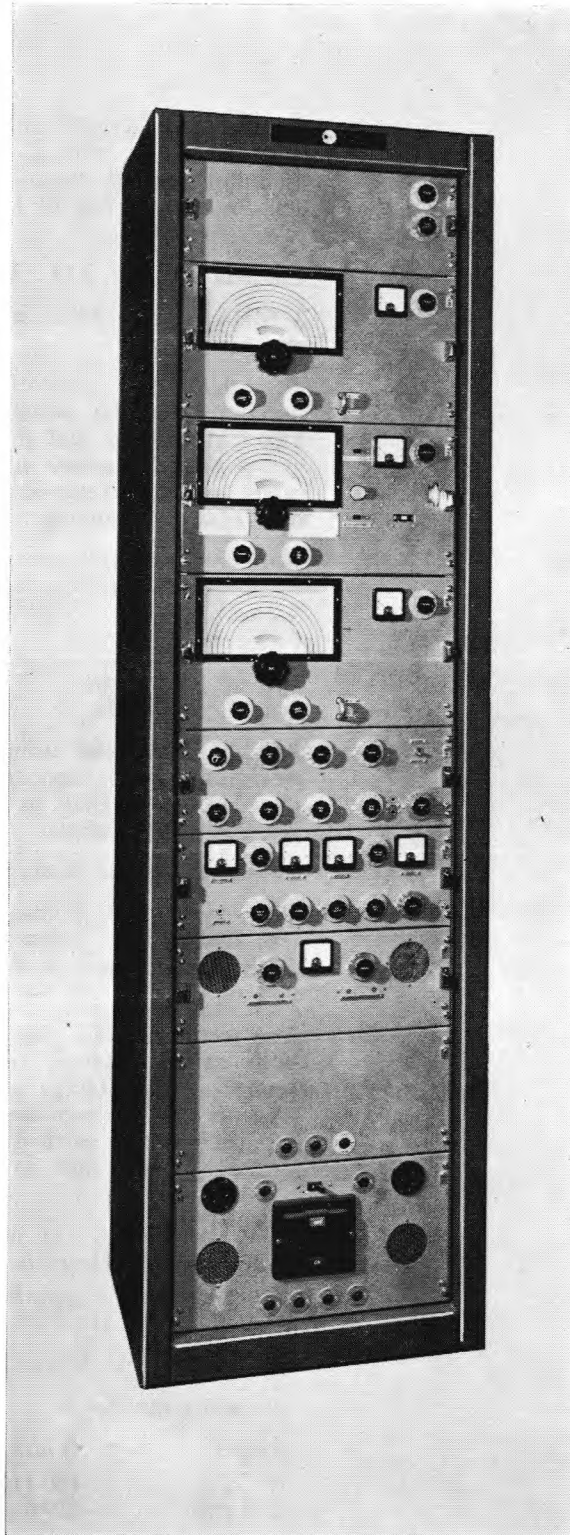
<b>Function</b>	Double diversity h.f. receiver comprising a triple superheterodyne with a high stability variable local oscillator and six crystal controlled spot frequencies (c.w., m.c.w., on/off or f.s.k. working).		
<b>Origin</b>	The Marconi Co. Ltd., Type H.R.11.		
<b>Frequency range</b>	3 MHz to 27.5 MHz in four ranges. (100 to 10.9 metres).		
<b>Frequency control</b>	A variable L.C. controlled first frequency changer oscillator may be switched in place of the crystal first oscillator so that the receiver may be tuned to any desired frequency in the band. Frequency multipliers are used to provide the final frequency required for frequency changing.		
<b>Frequency accuracy and stability</b>	<i>Variable first oscillator:</i> 15 parts in $10^6$ per degree C. <i>Crystal first oscillator:</i> 1 part in $10^6$ per degree C. <i>Second oscillator:</i> 15 parts in $10^6$ per degree C.		
<b>Intermediate frequencies</b>	1st i.f. 2600 kHz. 2nd i.f. 100 kHz. 3rd i.f. 10 kHz.		
<b>Sensitivity</b>	At 27.5 MHz and using the 1 kHz passband, the minimum signal input required for recording f.s.k. (560 Hz shift) signals at a keying speed of 100 bauds is $0.25\mu\text{V}$ in 75 ohms.		
<b>Input impedance</b>	75 ohms (coaxial feeder).		
<b>A.F.C.</b>	The receiver will follow, with a residual mistune of less than 4 Hz, frequency drifts up to $\pm 3$ kHz arising as the sum of drifts of the carrier frequency and of the receiver oscillator.		
<b>D.C. output</b>	The recording unit provides a d.c. output of 30.0-30 volts at 10 kilohms impedance for keying a tone sender or any voltage operated telegraph equipment. The output unit provides two d.c. outputs of 30.0-30 mA each into an earthed load not exceeding 2 kilohms or 20.0-20 mA into an earthed load not exceeding 4 kilohms.		
<b>Max. receiving speed</b>	300 bauds (375 w.p.m. morse code) with 3 kHz bandwidth and 850 Hz shift. 200 bauds (250 w.p.m. morse code) with 1 kHz bandwidth and 560 Hz shift.		
<b>Power supplies</b>	200 to 250 volts, 50 Hz single phase a.c.		
<b>Power consumption</b>	500 watts (approx.).		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7ft 2 $\frac{1}{4}$ in (219 cm)	1ft 11 $\frac{1}{2}$ in (59.6 cm)	1ft 9in (53.3 cm)

**Weight**

743 lb (349.3 kg).

**Ancillary equipment**

Receiver, radio, 5820-99-955-0771 (formerly receiver, Type R.10168 10D/20459).



**Receiver, Type R.8998**

## RECEIVER, RADIO

Type R10149  
(5820-99-933-2369)

Relevant publication:-

AP116E-0716-1

**Function**

Triple diversity, independent sideband h.f. receiver. The receiver is a double superheterodyne and may be crystal controlled on six spot frequencies or may be tuned to any required frequency by a variable oscillator incorporated in the equipment. It will receive independent sideband, single-sideband or double-sideband transmissions. The equipment comprises fifteen removable units mounted in two steel cabinets.

**Origin**

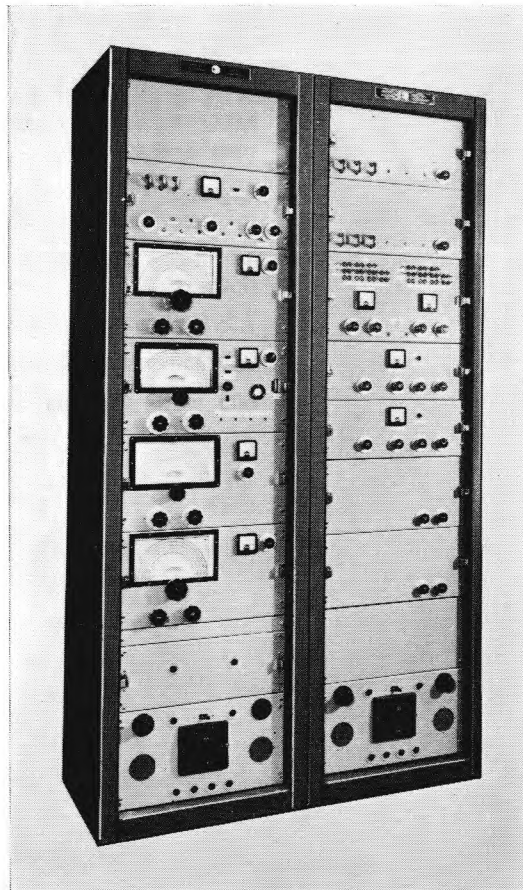
The Marconi Co. Ltd., Type HR.23.

**Frequency range**

3 MHz to 27.5 MHz in four ranges (100 to 10.9 metres).

**Frequency control**

Frequency of the first oscillator is controlled by a variable oscillator or crystal controlled oscillator for any one of six spot frequencies. An a.f.c. system is incorporated in which the frequency of i.f.2 (100



Receiver, Type R.10149

kHz) resulting from the receiver carrier is compared with a crystal controlled 100k Hz reference frequency. Any frequency difference between the carrier and the reference frequency causes a connecting motor in the a.f.c. system to vary the second oscillator frequency so as to reduce the error to zero.

The combined variations in frequency of the receiver oscillator does not exceed the following:—

	Crystal oscillator	L.C. oscillator
At 3 MHz	50 Hz per degree C	130 Hz per degree C
10 MHz	60 Hz per degree C	230 Hz per degree C
20 MHz	70 Hz per degree C	400 Hz per degree C
27.5 MHz	80 Hz per degree C	500 Hz per degree C

**Frequency accuracy and stability**

**Selectivity**

1st i.f.: plus or minus 9 kHz at 2dB attenuation.  
 1st i.f.: plus or minus 38 kHz at 30dB attenuation.  
 2nd i.f.: Discrimination against unwanted frequencies more than 520 Hz outside the passband is greater than 75dB from 4 to 10 MHz and greater than 60dB for frequencies above 10 MHz.

**Frequency response**

3.5 kHz passband: less than 3dB total variation from 100 Hz to 2.5 kHz.

6 kHz passband: less than 3dB total variation from 100 Hz to 6 kHz.

**Intermediate frequencies**

1st i.f. 2600 kHz and 2nd i.f. 100 kHz.

**Cross talk**

Less than -60dB between sideband paths.

**Input impedance**

75 ohms (coaxial feeder).

**Sensitivity**

With a signal of 1.4µV at 3 MHz or 2µV at 27.5 MHz the output signal/noise ratio is 20dB with 6 kHz passband.

**A.F.C.**

Capable of following with less than 1 Hz residual mistune, frequency drifts up to plus or minus 3 kHz.

**Output power**

40 milliwatts (max) in 600 ohms for separate path outputs.

2.5 milliwatts for combined path outputs.

**Power supplies**

200-250 volts, 50 Hz single phase a.c.

**Power consumption**

600 watts (approx.).

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
7ft 2½in	3ft 11in	1ft 9in
(219 cm)	(119.3 cm)	(53.3 cm)

**Weight**

1350 lb approx. (612.4 kg).

RECEIVER, RADIO

Type R10168  
(5820-99-955-0771)

Relevant publication:-

AP116E-0718-1

**Function**

Frequency shift duplex receiver which is used in conjunction with receiver Type R.8998 for double diversity reception of two channel frequency shift duplex signals. The equipment converts the 10 kHz i.f. signal from the receiver into d.c. voltages suitable for operating two-tone senders or a current output which may operate two teleprinters.

**Origin**

The Marconi Co. Ltd., Type HU.14A.

**Reception facilities**

Two channel frequency shift keying (synchronized or unsynchronized): single channel working.

**Input impedance**

600 ohms.

**Output impedance**

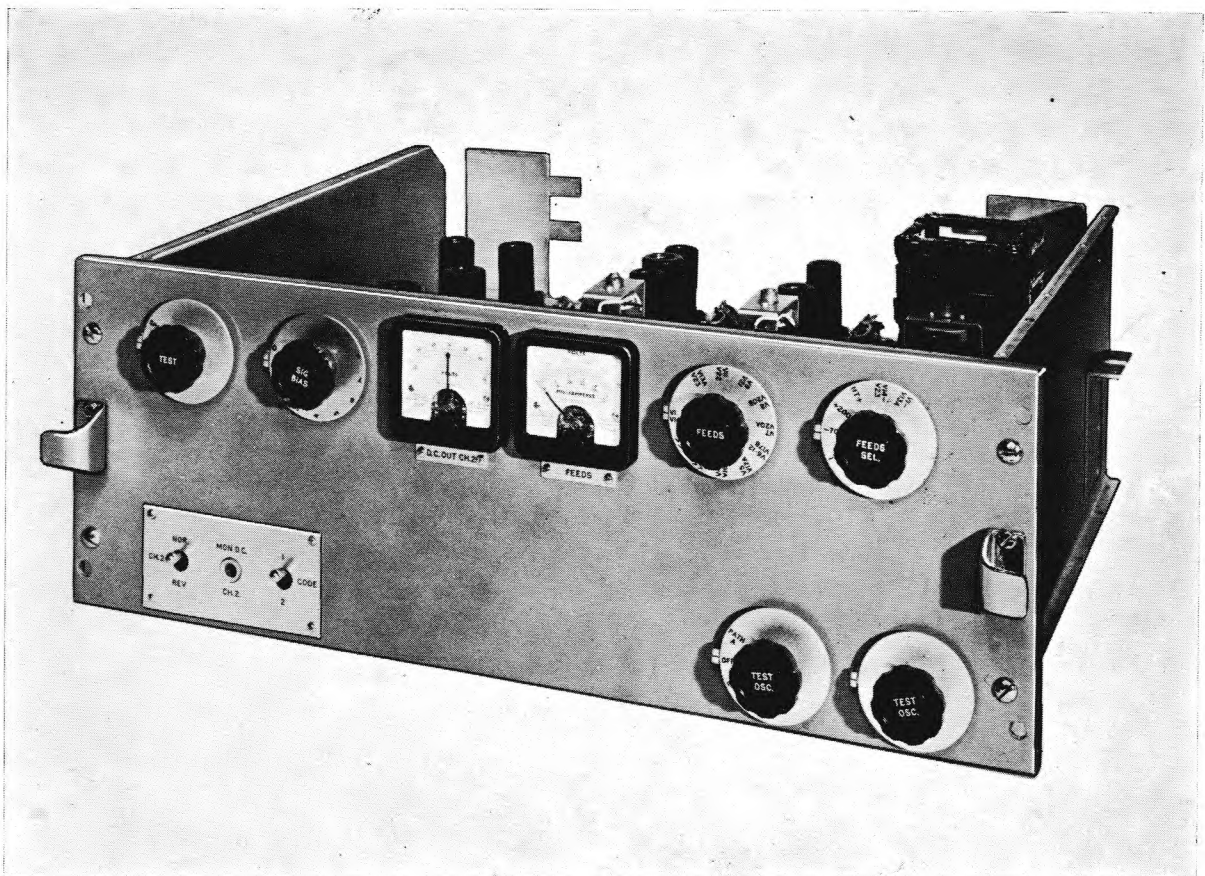
10 000 ohms (approximately).

**Input**

10 kHz centre frequency at levels of 10 mV to 1V.

**Output**

30-0-30V d.c. on both channels.

**Keying speed**Up to 100 bauds on Channel 1.  
Up to 50 bauds on Channel 2.

Receiver Type R.10168 or R.10170

<b>Power supplies</b>	110-120 volts or 200-250 volts, 50 Hz, single phase a.c.		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	6 $\frac{3}{4}$ in (17 cm)	1ft 7in (48 cm)	1ft 5 $\frac{3}{4}$ in (45 cm)
<b>Weight</b>	24 lb (10.9 kg).		
<b>Associated equipment</b>	Receiver, radio, 5820-99-955-0769 (formerly receiver Type R.8998, 10D/20755).		

## RECEIVER, RADIO

Type R10170  
(5820-99-955-0770)

Relevant publication:-

AP116E-0717-1

(For illustration of Receiver, Type R10170  
see Item No. 6).**Function**

Frequency shift duplex receiver which receives the two-channel f.s.k. modulated i.f. output from rack assembly, Type 9352 and converts the signals into d.c. voltages suitable for operating two-tone senders or a current output unit. The unit is designed to work from the 50 kHz output of the receiving equipment in rack assembly, Type 9352. Provision is made for reversing the phase of the d.c. output of either channel if necessary. A calibrated oscillator is incorporated to enable the unit to be tested and the discrimination to be set up. Switched metering enables all valve feeds and h.t. voltages to be monitored. The d.c. outputs are continuously monitored by centre-zero meters.

**Origin**

The Marconi Co. Ltd., Type HU.14B.

**Reception facilities**

Two channel frequency shift keying (synchronized or unsynchronized). Single channel working.

**Input impedance**

75 ohms (coaxial feeder).

**Output impedance**

10 000 ohms (approximately).

**Input**

50 kHz centre frequency at levels of 10mV to 1V.

**Output**

30-0-30V d.c. on both channels.

**Adjacent frequency shift**

400 Hz with four shift frequencies the total shift is 1200 Hz.

**Keying speed**

Up to 100 bauds on Channel 1.

Up to 50 bauds on Channel 2.

**Power requirements**

230V, 50 Hz, single phase a.c. at 50W,

+140V d.c. at 35 mA.

+210V d.c. at 50 mA.

-140V d.c. at 5 mA.

-70V d.c. at 15 mA.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
6 $\frac{3}{4}$ in (17 cm)	1ft 7in (48 cm)	1ft 5 $\frac{3}{4}$ in (45 cm)

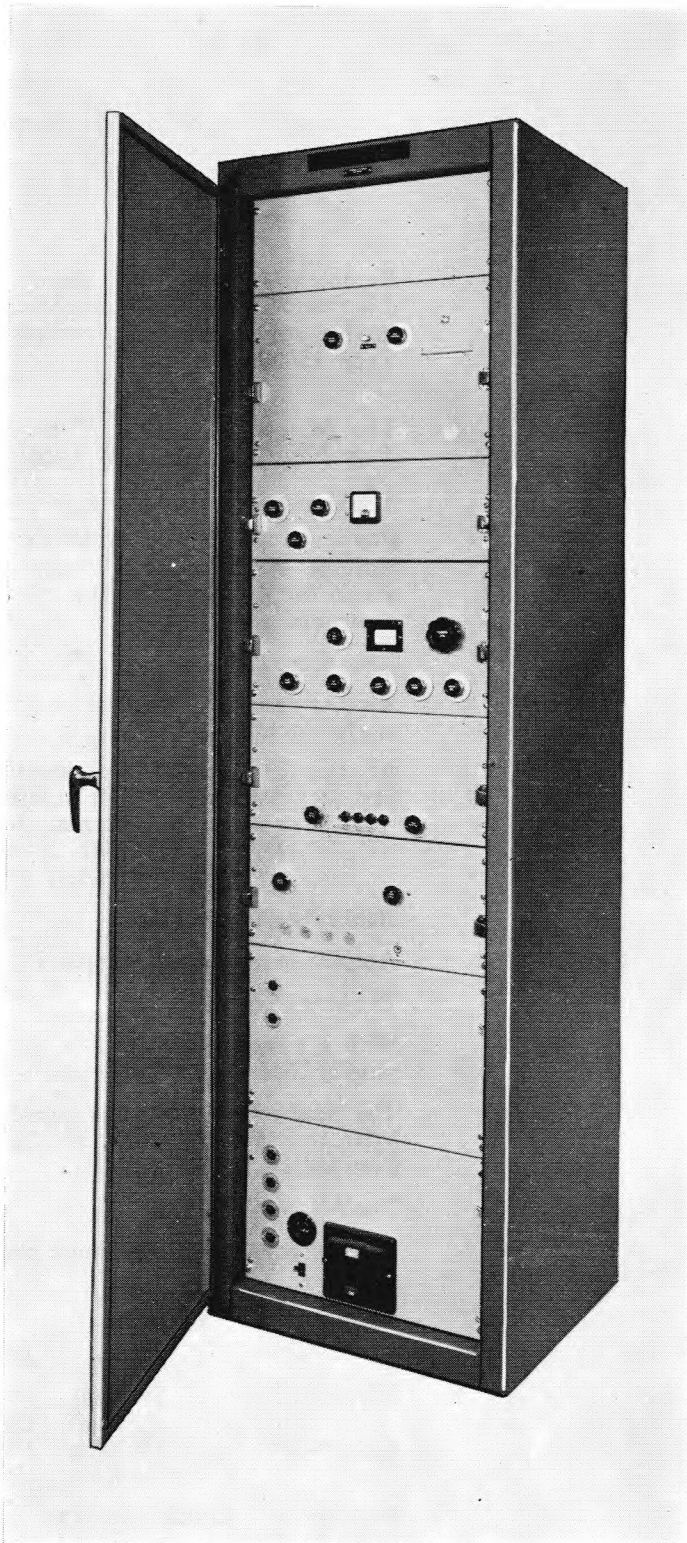
**Weight**

24 lb (10.9 kg).

**Associated equipment**

Rack assembly, Type 9352 (10D/19932).





**Receiver Type R.15095**



Control unit Type 15056

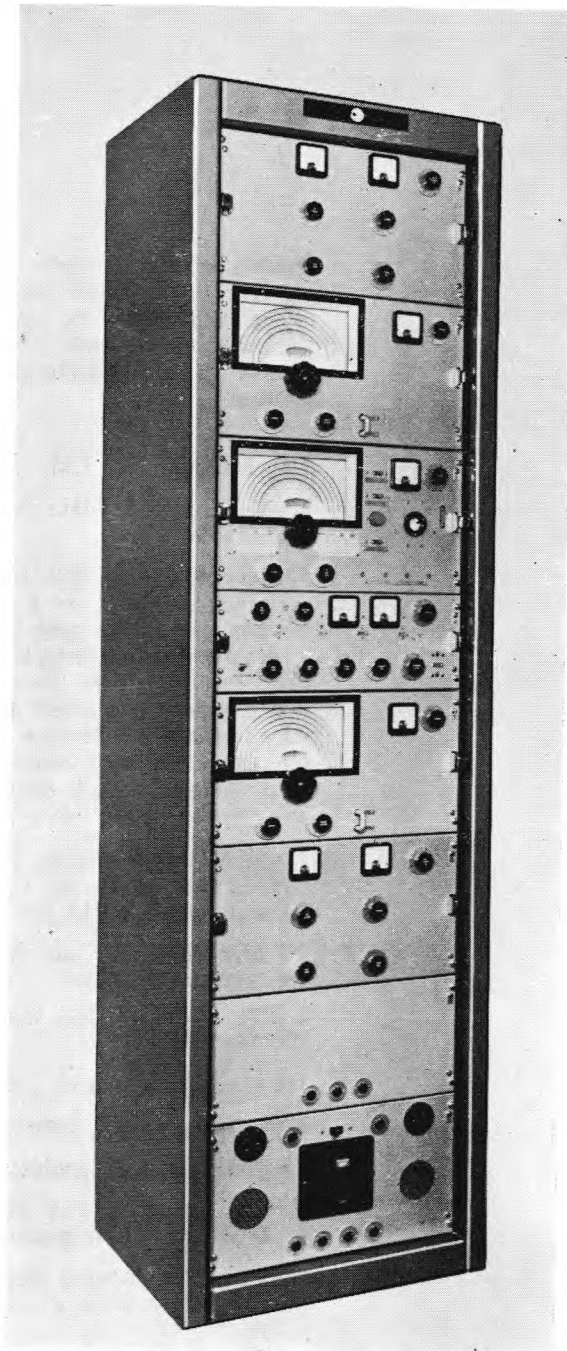
RECEIVER, RADIO

Type R15172 (10D/22019)

Relevant publication:-

AP116E-0722-1

<b>Function</b>	Double diversity single sideband h.f. receiver. The receiver is a double superheterodyne and may be crystal controlled on six spot frequencies or continuously tuned over the frequency range. It will receive either sideband of a double sideband transmission.		
<b>Origin</b>	The Marconi Co. Ltd., Type HR.24.		
<b>Frequency range</b>	3 MHz to 27.5 MHz in four ranges (100 to 10.9 metres).		
<b>Frequency control</b>	Frequency of the first oscillator is controlled by a variable oscillator, or a crystal controlled oscillator for any one of six spot frequencies. An a.f.c. system is incorporated in which the frequency of i.f.2 (100 kHz) resulting from the received carrier is compared with a crystal controlled 100 kHz reference frequency. Any frequency difference between the carrier and the reference frequency causes a correcting motor in the a.f.c. system to vary the second oscillator frequency so as to reduce the error to zero.		
<b>Frequency accuracy and stability</b>	<i>Variable first oscillator:</i> 15 parts in $10^6$ per degree C. <i>Crystal first oscillator:</i> 1 part in $10^6$ per degree C. <i>Second oscillator:</i> 15 parts in $10^6$ per degree C.		
<b>Frequency response</b>	3.5 kHz passband: less than 3dB total variation from 100 kHz to 2.5 kHz. 6 kHz passband: less than 3dB total variation from 100 Hz to 6 kHz.		
<b>Intermediate frequencies</b>	1st i.f. 2600 kHz and 2nd i.f. 100 kHz.		
<b>Cross talk</b>	Less than -50dB between diversity paths.		
<b>Input impedance</b>	75 ohms (coaxial feeder).		
<b>Sensitivity</b>	With a signal of $2\mu\text{V}$ the output signal/noise ratio is 20dB with 6 kHz passband.		
<b>A.F.C.</b>	Capable of following frequency drifts up to plus or minus 3 kHz with a residual mistune of less than 1 Hz.		
<b>Output power</b>	40 milliwatts (max.) in 600 ohms from each diversity path.		
<b>Power supplies</b>	200-250 volts, 50 Hz, single phase a.c.		
<b>Power consumption</b>	400 watts (approx.).		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7ft 0 $\frac{1}{4}$ in (214 cm)	2ft 0in (61 cm)	1ft 8in (56 cm)
<b>Weight</b>	500 lb (approx.) (227 kg).		



**Receiver, Type R.15172**

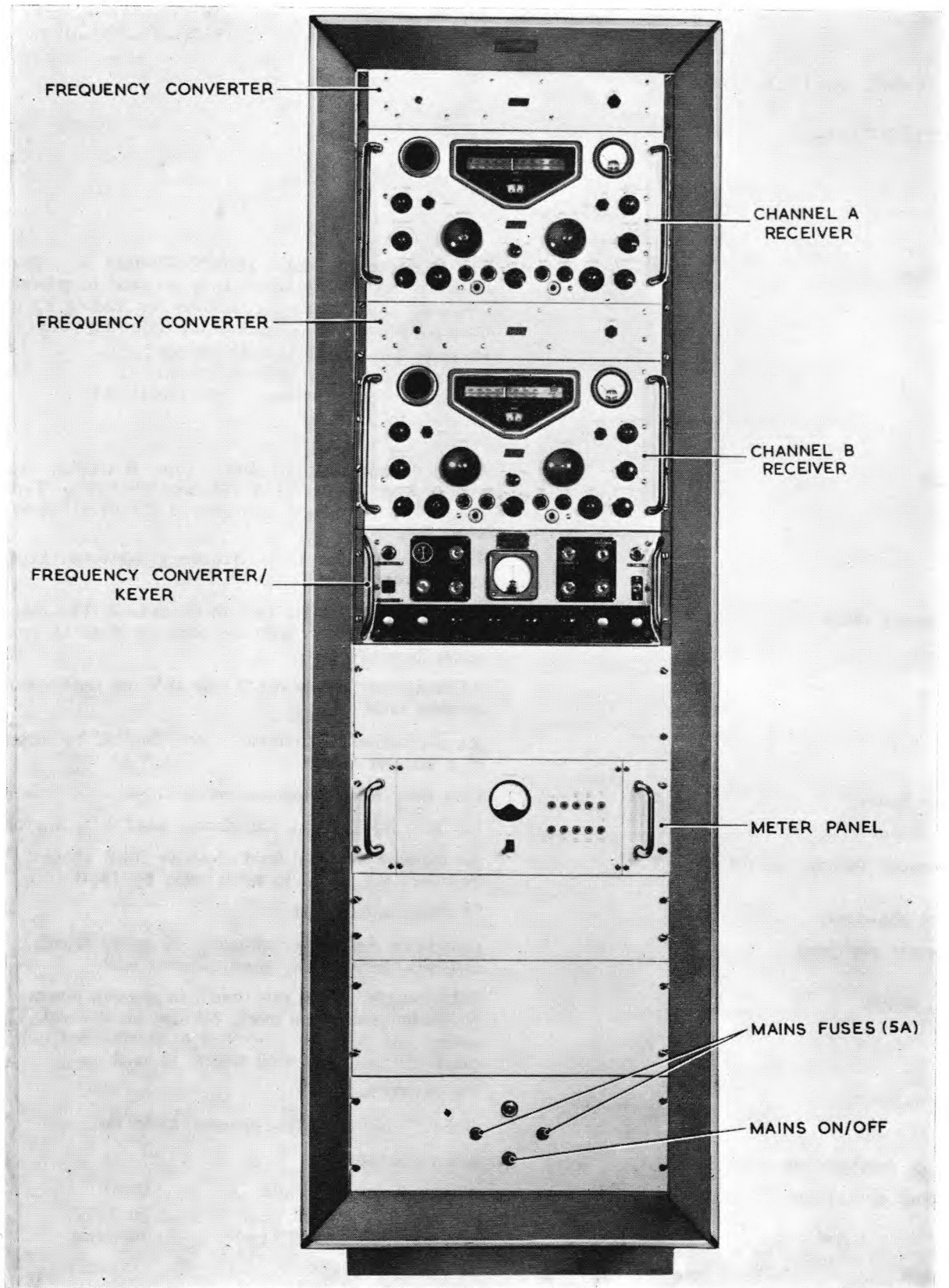
RECEIVER, RADIO  
(A.M. Type S5/1)

5820-99-933-0813

Relevant publication:-

AP116E-0712-1

<b>Function</b>	The receiving set, radio 5820-99-933-0813 is a dual diversity receiving terminal. It is designed to provide frequency shift telegraphy facilities for feeding up to three teleprinters. It consists of the following units:— Receiver Type S1/3 5820-99-999-9292 (2). Frequency converter 5820-99-933-0846 (2). Frequency converter/keyer 5805-99-933-0847.						
<b>Origin</b>	Racal Communications Ltd., Type RA.103/1; receiver A.M. Type S1/3 (5820-99-999-9292), Type RA. 17L; frequency converter (5820-99-933-0846), Type RA. 70D. The Plessey Co. Ltd., frequency converter/keyer (5805-99-933-0847), Type PV.78B.						
<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of an i.f. converter (Sheet No. 11).						
<b>Sensitivity</b>	All reception: bandwidth 3 kHz 1 $\mu$ V for 18dB signal to noise ratio.						
<b>Selectivity</b>	Six alternative i.f. bandwidths are obtained by means of a selector switch.						
<b>Noise factor</b>	Less than 7dB throughout entire range.						
<b>I.F. output</b>	100 kHz at 75 ohms impedance; level 0.2V approx.						
<b>Automatic volume control</b>	An increase in signal level of above 20dB above 1 $\mu$ V improves the signal to noise ratio by 18dB.						
<b>Input impedance</b>	75 ohms unbalanced.						
<b>Diversity switching</b>	<i>Operating time:</i> approximately 20 microseconds. <i>Switching differential:</i> approximately 6dB.						
<b>D.C. output</b>	Polar output: 20-60 mA (one side at earth potential). Normally positive on mark, but can be reversed. The output can also be switched to single-sided output positive or negative with respect to earth.						
<b>Keying speed</b>	Up to 300 bauds.						
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.						
<b>Power consumption</b>	320 watts (approx.).						
<b>Overall dimensions</b>	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;"><i>Height</i></th> <th style="text-align: left;"><i>Width</i></th> <th style="text-align: left;"><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>6ft 6<math>\frac{3}{8}</math>in (199.1 cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3 cm)</td> <td>2ft 3<math>\frac{1}{2}</math>in (69.8 cm)</td> </tr> </tbody> </table>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	6ft 6 $\frac{3}{8}$ in (199.1 cm)	2ft 0 $\frac{1}{2}$ in (62.3 cm)	2ft 3 $\frac{1}{2}$ in (69.8 cm)
<i>Height</i>	<i>Width</i>	<i>Depth</i>					
6ft 6 $\frac{3}{8}$ in (199.1 cm)	2ft 0 $\frac{1}{2}$ in (62.3 cm)	2ft 3 $\frac{1}{2}$ in (69.8 cm)					
<b>Weight</b>	440 lb (201.8 kg).						



Receiving set, radio 5820-99-933-0813

**FREQUENCY CONVERTER 5820-99-933-0846**

<b>Input frequency</b>	100 kHz $\pm$ 1 kHz.
<b>Input impedance</b>	75 ohms.
<b>Input level</b>	0.1 volt nominal, 0.3 volt maximum.
<b>Attenuator level</b>	0dB to -20dB approx.
<b>Output frequency</b>	14 kHz.
<b>Output impedance</b>	600 ohms.
<b>Output level</b>	5mW $\pm$ 3dB for an input of 0.1 volt.
<b>Spurious output</b>	-40dB relative to 5mW.
<b>Frequency stability</b>	1 part in $10^5$ .
<b>Ambient temperature range</b>	-26°C to +55°C.
<b>Power supply</b>	100-125V and 200-250V, 45-60 Hz.

**FREQUENCY CONVERTER/KEYER 5805-99-933-0847**

<b>Function</b>	To convert frequency shift keying signals to polar or single sided d.c. and act as a diversity switch to select the strongest signal from two diversity receivers.		
<b>Inputs</b>	Two inputs of 600 ohms balanced: centre frequency of input filters 14 kHz. Nominal input level 5mW. Signalling speed up to 300 bauds.		
<b>Outputs</b>	Polar d.c. output: approximately 20-60 mA (one side at earth potential). Normally positive on mark but can be reversed. The output can also be switched to single-sided output positive or negative with respect to earth.		
<b>Telegraph distortion</b>	Not greater than 5% up to 100 bauds.		
<b>Input filters</b>	Separate filters for each channel, centred on 14 Hz. Total bandwidth at -3dB approximately 1000 Hz. Bandwidth at -40dB approximately 5.5 kHz.		
<b>Limiting</b>	The equipment is designed to operate satisfactorily on input signals varying by $\pm$ 20dB on nominal.		
<b>Diversity switching</b>	The stronger input signal is selected. Switching delay, less than 3 milliseconds. Operating time, approximately 20 microseconds. Switching differential approximately 6dB at all input levels.		
<b>Discriminator</b>	A linear discriminator is built into the equipment which will accept shifts between 150 Hz and 1000 Hz without adjustment.		
<b>Power supplies</b>	105V-115V 200V-250V a.c., 40-64 Hz.		
<b>Power consumption</b>	126VA at full output.		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7in (17.8 cm)	1ft 7in (48.3 cm)	1ft 0 $\frac{3}{4}$ in (32.4 cm)
<b>Weight</b>	31 lb (14.1 kg).		

## RECEIVER, RADIO

5820-99-943-2775

## Relevant publication:-

AP116E-0704-1

**Function**

General purpose ground station h.f. communication receiver. The lower frequency limit can be extended to 12.5 kHz by the addition of an i.f. converter which is designated mixer stage, frequency 5820-99-943-3464. The receiver and i.f. converter can be used in rack assemblies or for bench mounting. The following variant assemblies are available:—

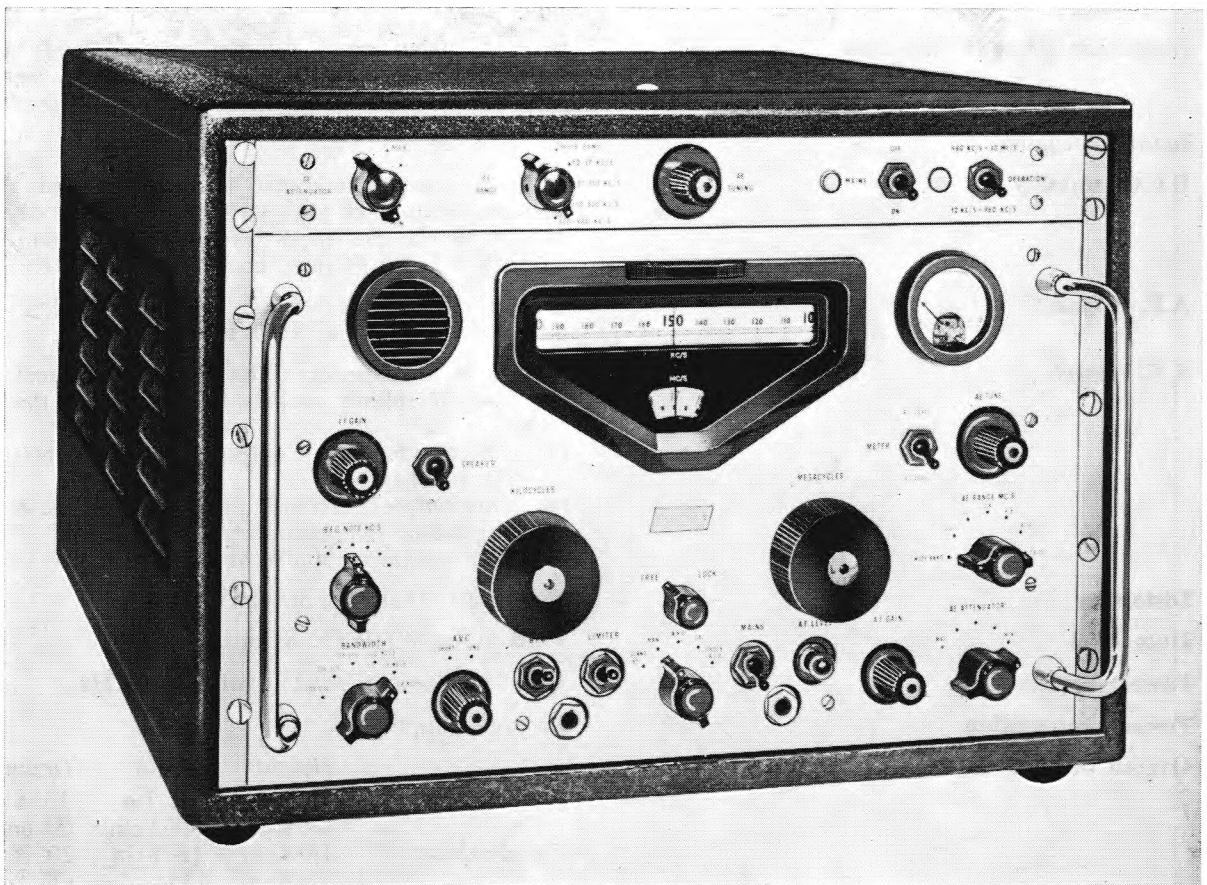
Rack mounted receiver—Receiver Type S1/1.

Bench mounted receiver—Receiver Type S1/2 (mounted in cabinet 5820-99-972-8566).

Bench mounted receiver and i.f. converter combined—Receiver Type S2/1 (mounted in cabinet 5820-99-972-8567).

**Origin**

Racal Communications Ltd., Type RA.17, Mk. 2: mixer stage, frequency (5820-99-943-3464) RA.37A.



Receiver, radio 5820-99-943-2775

<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of the i.f. converter.																					
<b>Calibration</b>	A 100 kHz signal derived from a 1 MHz crystal oscillator with a stability of 5 parts in $10^6$ provides check points at 100 kHz intervals.																					
<b>Stability</b>	During a warm-up time of three hours, overall drift is less than 1500 Hz under conditions of constant supply voltage and ambient temperature; beyond this period drift will be less than 150 Hz at all frequencies under normal operating conditions.																					
<b>Sensitivity</b>	<i>C.W. reception:</i> bandwidth 3 kHz $1\mu\text{V}$ for 20dB signal-to-noise ratio. <i>R/T and m.c.w. reception:</i> 30% modulated: bandwidth 3 kHz $3.5\mu\text{V}$ for 20dB signal-to-noise ratio.																					
<b>I.F. output</b>	100 kHz at 75 ohms impedance. Two outlets in parallel are provided.																					
<b>Selectivity</b>	Six alternative i.f. bandwidths are obtained by a selector switch. Filter details are:—																					
	<table border="0"> <thead> <tr> <th><i>Switch position</i></th> <th><i>−6dB</i></th> <th><i>−66dB</i></th> </tr> </thead> <tbody> <tr> <td>100 Hz</td> <td>80-120 Hz</td> <td>less than 1.6 kHz</td> </tr> <tr> <td>300 Hz</td> <td>270-330 Hz</td> <td>less than 1.8 kHz</td> </tr> <tr> <td>750 Hz</td> <td>700-800 Hz</td> <td>less than 2.5 kHz</td> </tr> <tr> <td>1.2 kHz</td> <td>950-1200 Hz</td> <td>less than 8 kHz</td> </tr> <tr> <td>3 kHz</td> <td>2.85-3.3 kHz</td> <td>less than 12 kHz</td> </tr> <tr> <td>8 kHz</td> <td>7.6-8.4 kHz</td> <td>less than 20 kHz</td> </tr> </tbody> </table>	<i>Switch position</i>	<i>−6dB</i>	<i>−66dB</i>	100 Hz	80-120 Hz	less than 1.6 kHz	300 Hz	270-330 Hz	less than 1.8 kHz	750 Hz	700-800 Hz	less than 2.5 kHz	1.2 kHz	950-1200 Hz	less than 8 kHz	3 kHz	2.85-3.3 kHz	less than 12 kHz	8 kHz	7.6-8.4 kHz	less than 20 kHz
<i>Switch position</i>	<i>−6dB</i>	<i>−66dB</i>																				
100 Hz	80-120 Hz	less than 1.6 kHz																				
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1.2 kHz	950-1200 Hz	less than 8 kHz																				
3 kHz	2.85-3.3 kHz	less than 12 kHz																				
8 kHz	7.6-8.4 kHz	less than 20 kHz																				
<b>Noise factor</b>	1.5 MHz: less than 8dB. 3, 6, 12 and 24 MHz: less than 6dB.																					
<b>Image and spurious responses</b>	With a tuned input, external image signals are at least 58dB down. Internally generated spurious responses are 2dB above noise level in all cases.																					
<b>Input impedance</b>	75 ohms unbalanced.																					
<b>B.F.O. stability</b>	With a constant ambient temperature and supply voltage, 30 minutes after switching on, drift does not exceed 50 Hz. For input level variations from $10\mu\text{V}$ to 1mV b.f.o. drift does not exceed 100 Hz.																					
<b>A.F. response</b>	With 8 kHz i.f. bandwidth: response remains within 6dB from 250 Hz to 3500 Hz.																					
<b>A.F. output</b>	(1) $2\frac{1}{2}$ in. loudspeaker (50mW) on front panel. (2) Two telephone sockets in parallel on the front panel. (3) Three independent outputs of 3mW at 600 ohms on rear of chassis. (4) One output of 10mW at 600 ohms. Preset level is independent of gain control setting. (5) One output of 50mW at 3 ohms.																					
<b>Distortion</b>	Not greater than 5% at 50mW output.																					
<b>Hum level</b>	46dB at 1mW (10mW output setting).																					
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.																					
<b>Power consumption</b>	85 watts (approx.).																					
<b>Overall dimensions</b>	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>For rack mounting</i></td> <td><math>10\frac{1}{2}</math>in (26.6 cm)</td> <td>1ft 7in (48.3 cm)</td> <td>1ft <math>8\frac{1}{8}</math>in (51 cm)</td> </tr> <tr> <td><i>Fitted cabinet</i></td> <td>1ft <math>2\frac{1}{2}</math>in (36.8 cm)</td> <td>1ft <math>8\frac{1}{2}</math>in (53 cm)</td> <td>2ft <math>3\frac{7}{8}</math>in (70.8 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>For rack mounting</i>	$10\frac{1}{2}$ in (26.6 cm)	1ft 7in (48.3 cm)	1ft $8\frac{1}{8}$ in (51 cm)	<i>Fitted cabinet</i>	1ft $2\frac{1}{2}$ in (36.8 cm)	1ft $8\frac{1}{2}$ in (53 cm)	2ft $3\frac{7}{8}$ in (70.8 cm)									
	<i>Height</i>	<i>Width</i>	<i>Depth</i>																			
<i>For rack mounting</i>	$10\frac{1}{2}$ in (26.6 cm)	1ft 7in (48.3 cm)	1ft $8\frac{1}{8}$ in (51 cm)																			
<i>Fitted cabinet</i>	1ft $2\frac{1}{2}$ in (36.8 cm)	1ft $8\frac{1}{2}$ in (53 cm)	2ft $3\frac{7}{8}$ in (70.8 cm)																			

**Weight** *For rack mounting* 67 lb (30.4 kg).  
*Fitted cabinet* 97 lb (44 kg).

**MIXER STAGE, FREQUENCY 5820-99-943-3464**

**Function** To extend the lower frequency limits of the receiver.

**Frequency range** 12.5 kHz to 980 kHz (24000 to 306 metres).

**Stability** After warm up time of  $1\frac{1}{2}$  hours, overall drift less than 150 Hz under conditions of constant supply voltage and ambient temperature.

**Input impedance** 75 ohms unbalanced.

**Sensitivity** C.W. reception (bandwidth 3 kHz):  $1\mu\text{V}$  for 15dB signal-to-noise ratio. R/T and m.c.w. reception (30% modulated) (bandwidth 3 kHz):  $3\mu\text{V}$  for 20dB signal-to-noise ratio.

**Image response** With tuned input, external image signals are reduced by at least 50dB.

**Overall dimensions**

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>For rack mounting</i>	$1\frac{3}{4}$ in (4.4 cm)	1ft 7in (48.3 cm)	1ft 1in (33 cm)
<i>Cabinet containing receiver and l.f. converter</i>	1ft $2\frac{1}{2}$ in (36.8 cm)	1ft $8\frac{1}{2}$ in (52 cm)	1ft $9\frac{7}{8}$ in (55.6 cm)

**Weight** *For rack mounting* 11 lb ( 5 kg).  
*Cabinet containing receiver and l.f. converter* 110 lb (50 kg).

## RECEIVER, RADIO

5820-99-999-9292

Relevant publication:-

AP116E-0704-1

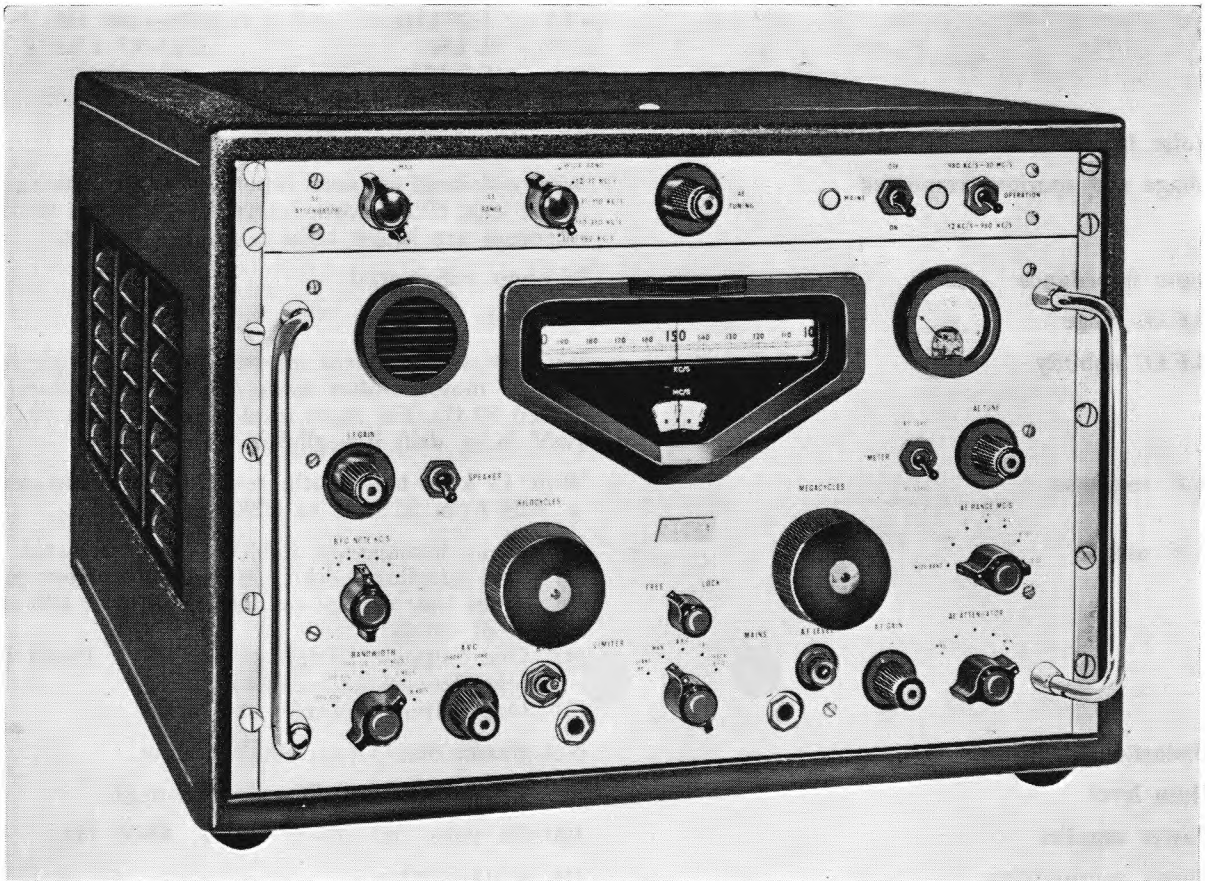
**Function**

General purpose ground station h.f. communications receiver. This receiver is a later version of receiver, radio 5820-99-943-2775. The lower frequency limit can be extended to 12.5 kHz by the addition of an l.f. converter which is designated mixer stage, frequency 5820-99-943-3464. The receiver and l.f. converter can be used in rack assemblies or for bench mounting. The following variant assemblies are available:—

Rack mounted receiver—Receiver, Type S1/3.

Bench mounted receiver—Receiver, Type S1/4 (mounted in cabinet).

Bench mounted receiver and l.f. converter combined—Receiver, Type S2/2 (mounted in cabinet).



**Receiver, radio, 5820-99-999-9292**

<b>Origin</b>	Racal Communications Ltd., Type RA.17L; mixer stage, frequency (5820-99-943-3464) RA.37A.														
<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of the i.f. converter.														
<b>Calibration</b>	A 100 kHz signal derived from a 1 MHz crystal oscillator with a stability of 5 parts in $10^6$ provides check points at 100 kHz intervals.														
<b>Stability</b>	During a warm-up time of $1\frac{1}{2}$ hours, overall drift is less than 50 Hz under conditions of constant supply voltage and ambient temperature.														
<b>Sensitivity</b>	C.W. reception: bandwidth 3 kHz $1\mu\text{V}$ for 18dB signal-to-noise ratio. R/T and m.c.w. reception: 30% modulated bandwidth 3 kHz: $3\mu\text{V}$ for 18dB signal-to-noise ratio.														
<b>I.F. output</b>	100 kHz at 75 ohms impedance. Level 0.2V approximately with a.g.c. in operation. Two outlets in parallel are provided.														
<b>Selectivity</b>	Six alternative i.f. bandwidth are obtained by a selector switch. Filter details are:— <table border="0" style="margin-left: 40px;"> <tr> <td style="text-align: center;"><i>Switch position</i></td> <td style="text-align: center;"><i>—6dB</i></td> </tr> <tr> <td style="text-align: center;">100 Hz</td> <td style="text-align: center;">80-120 Hz</td> </tr> <tr> <td style="text-align: center;">300 Hz</td> <td style="text-align: center;">270-330 Hz</td> </tr> <tr> <td style="text-align: center;">1.2 kHz</td> <td style="text-align: center;">950-1200 Hz</td> </tr> <tr> <td style="text-align: center;">3 kHz</td> <td style="text-align: center;">2.85-3.3 kHz</td> </tr> <tr> <td style="text-align: center;">6.5 kHz</td> <td style="text-align: center;">6.5-7.8 kHz</td> </tr> <tr> <td style="text-align: center;">13 kHz</td> <td style="text-align: center;">13.0-14.3 kHz</td> </tr> </table>	<i>Switch position</i>	<i>—6dB</i>	100 Hz	80-120 Hz	300 Hz	270-330 Hz	1.2 kHz	950-1200 Hz	3 kHz	2.85-3.3 kHz	6.5 kHz	6.5-7.8 kHz	13 kHz	13.0-14.3 kHz
<i>Switch position</i>	<i>—6dB</i>														
100 Hz	80-120 Hz														
300 Hz	270-330 Hz														
1.2 kHz	950-1200 Hz														
3 kHz	2.85-3.3 kHz														
6.5 kHz	6.5-7.8 kHz														
13 kHz	13.0-14.3 kHz														
<b>Noise factor</b>	Less than 7dB throughout the entire range.														
<b>Image and spurious responses</b>	With wideband or tuned input, external image signals are at least 60dB down. Internally generated spurious responses are below noise level in all cases.														
<b>Input impedance</b>	75 ohms unbalanced.														
<b>B.F.O. range</b>	$\pm 8$ kHz.														
<b>B.F.O. stability</b>	With constant ambient temperature and supply voltage 30 minutes after switching on, drift does not exceed 50 Hz. For input level variation from $10\mu\text{V}$ to $1\text{mV}$ , b.f.o. drift is negligible.														
<b>A.F. response</b>	With 13 kHz bandwidth, response remained within $\pm 4\text{dB}$ from 250 Hz to 6000 Hz.														
<b>A.F. output</b>	(1) $2\frac{1}{2}$ in. loudspeaker (50mW) on front panel. (2) Two telephone sockets in parallel on front panel. (3) Three independent outputs of 3mW at 600 ohms at rear of chassis. (4) One output of 10mW at 600 ohms. Preset level is independent of gain control. (5) One output of 50mW at 3 ohms.														
<b>Distortion</b>	Not greater than 5% at 50mW output.														
<b>Hum level</b>	—50dB at 1mW (10mW output setting).														
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.														
<b>Power consumption</b>	100 watts (approx.).														

**Sheet No. 12 (cont'd)****Overall dimensions**

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>For rack mounting</i>	10½in (26.6 cm)	1ft 7in (48.3 cm)	1ft 8½in (51 cm)
<i>Fitted cabinet</i>	1ft 2½in (36.8 cm)	1ft 8½in (52 cm)	2ft 3⅞in (70.8 cm)

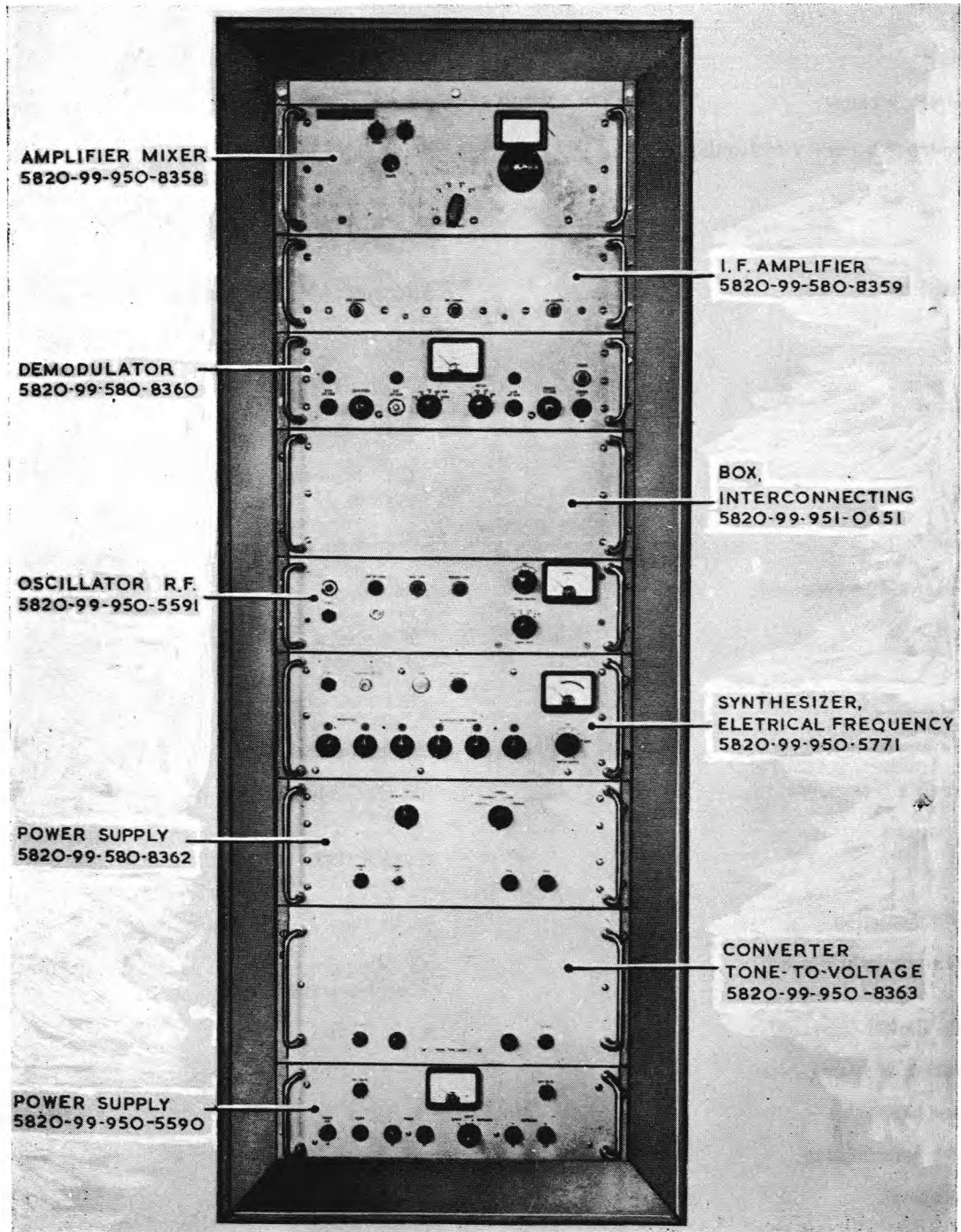
**Weight**

<i>For rack mounting</i>	67 lb (30.4 kg).
<i>Fitted cabinet</i>	97 lb (44 kg).

RECEIVER, RADIO

Relevant publication:-

AP116E-0127-1B, 1J



Receiving set, radio, 5820-99-950-5773

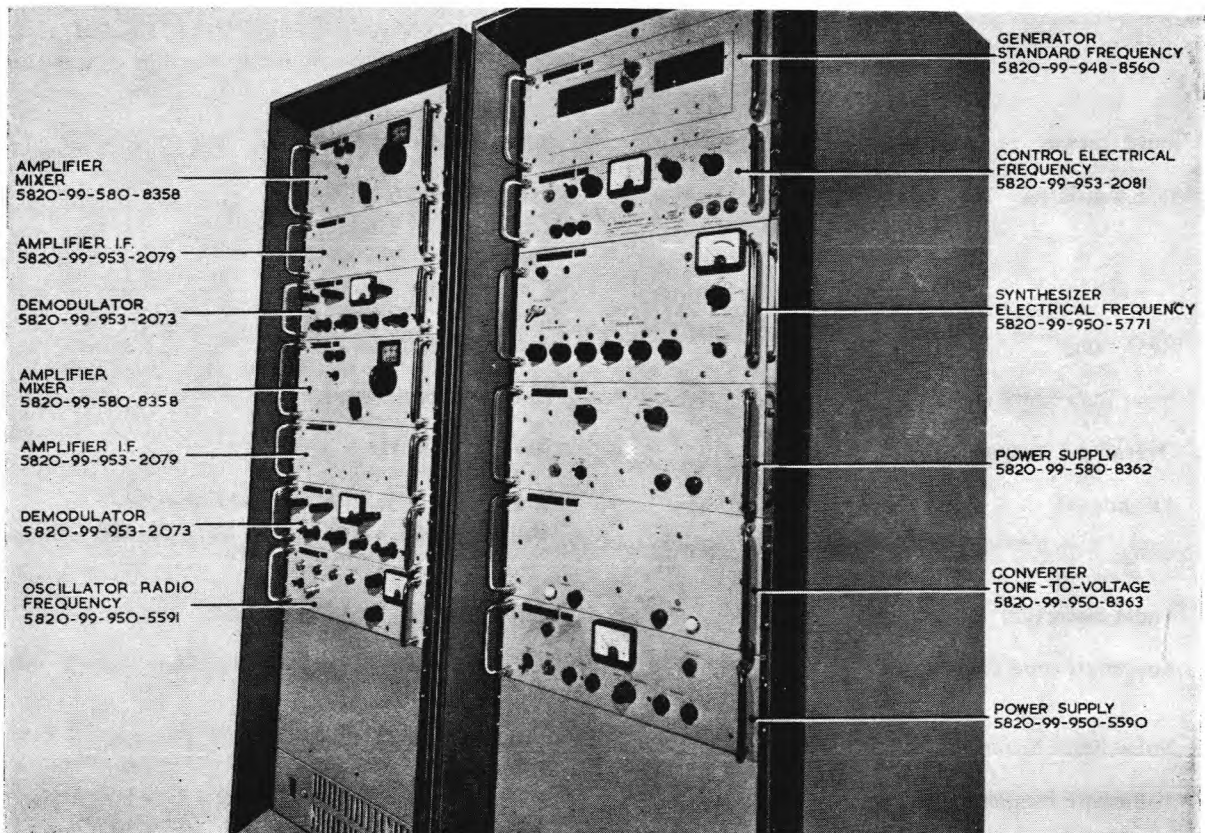
<b>Function</b>	A remotely controlled, h.f., superheterodyne receiver used with FGRI.23144 voice and telegraph transmitter and receiver station. The local oscillator uses a system of frequency synthesis, the standard frequency for which may be either an external source of 100 kHz, 200 kHz, 1 MHz or 5 MHz selected by a switch, or an internal standard 1 MHz selected by the same switch for use as a standby in case of failure of the external source. The receiving set is housed in a single floor-standing cabinet in which the sub-unit chassis are attached to standard 19 inch front panels.									
<b>Origin</b>	Racal Communications Ltd., Type RTA.191A.									
<b>Frequency range</b>	2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.									
<b>Frequency accuracy and stability</b>	Dependent upon reference standard. The synthesizer, electrical frequency, 5820-99-950-5771, incorporates a standby internal reference frequency source, a statement of the frequency stability and accuracy of which is included.									
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).									
<b>Tuning</b>	(1) <i>Remote or local</i> – automatic control from synthesizer, electrical frequency. (2) <i>Manual</i> – mechanical override of the automatic system.									
<b>Noise factor</b>	Better than 10 dB.									
<b>IF bandwidths (nominal)</b>	<i>SSB</i> : 3.5 kHz. <i>AM</i> : 7 kHz. <i>CW (wide)</i> : 3.5 kHz. <i>CW (narrow)</i> : 350 Hz.									
<b>BFO range</b>	$\pm 2.5$ kHz nominal.									
<b>Input impedance (r.f.)</b>	75 ohms unbalanced.									
<b>Overall a.f. response</b>	300 Hz – 3400 Hz $\pm 2$ dB.									
<b>AF outputs</b>	<i>Line</i> : 1 mW into 600 ohms (max.). <i>Monitor jack</i> : nominally 1 mW into 600 ohms (max.) adjustable.									
<b>Audio distortion</b>	Better than 2% total harmonic.									
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.									
<b>Noise limiter (a.m. only)</b>	Series limiter provided.									
<b>Duration of tuning cycle</b>	Average 12 seconds, maximum 20 seconds.									
<b>Power supply</b>	100-125V, 200-250V ( $\pm 6\%$ ), 45-65 Hz, single phase.									
<b>Power consumption</b>	600 watts (approx.).									
<b>Dimensions</b>	<table border="0"> <tr> <td><i>Height</i></td> <td><i>Width</i></td> <td><i>Depth</i></td> </tr> <tr> <td>5ft 10<math>\frac{1}{2}</math>in</td> <td>2ft 0<math>\frac{1}{2}</math>in</td> <td>2ft 3in</td> </tr> <tr> <td>(178.4cm)</td> <td>(62.3cm)</td> <td>(68.6cm)</td> </tr> </table>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	5ft 10 $\frac{1}{2}$ in	2ft 0 $\frac{1}{2}$ in	2ft 3in	(178.4cm)	(62.3cm)	(68.6cm)
<i>Height</i>	<i>Width</i>	<i>Depth</i>								
5ft 10 $\frac{1}{2}$ in	2ft 0 $\frac{1}{2}$ in	2ft 3in								
(178.4cm)	(62.3cm)	(68.6cm)								
<b>Weight</b>	600 lb (272 kg) approx.									

## RECEIVER, RADIO

5820-99-953-2075

Relevant publication:-

AP116E-0127-1D, 1W



Receiving set, radio, 5820-99-953-2075

**Function**

A remotely controlled, h.f. superheterodyne receiving set comprising two receivers with a common local oscillator, enabling the set to be used for space diversity reception. The local oscillator uses a system of frequency synthesis, the standard frequency for which can be either an external source of 100 kHz, 200 kHz, 1 MHz or 5 MHz selected by a switch, or an internal standard 1 MHz source selected by the same switch for use as a standby in case of failure of the external source. The receiving set is used with TGRI.(AT)26023/1 air transportable voice and telegraph transmitter/receiver station and is housed in two racks in which the sub-unit chassis are attached to standard 19 inch front panels.

**Origin**

Racal Communications Ltd., Type RTA.241A.

**Frequency range**

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz

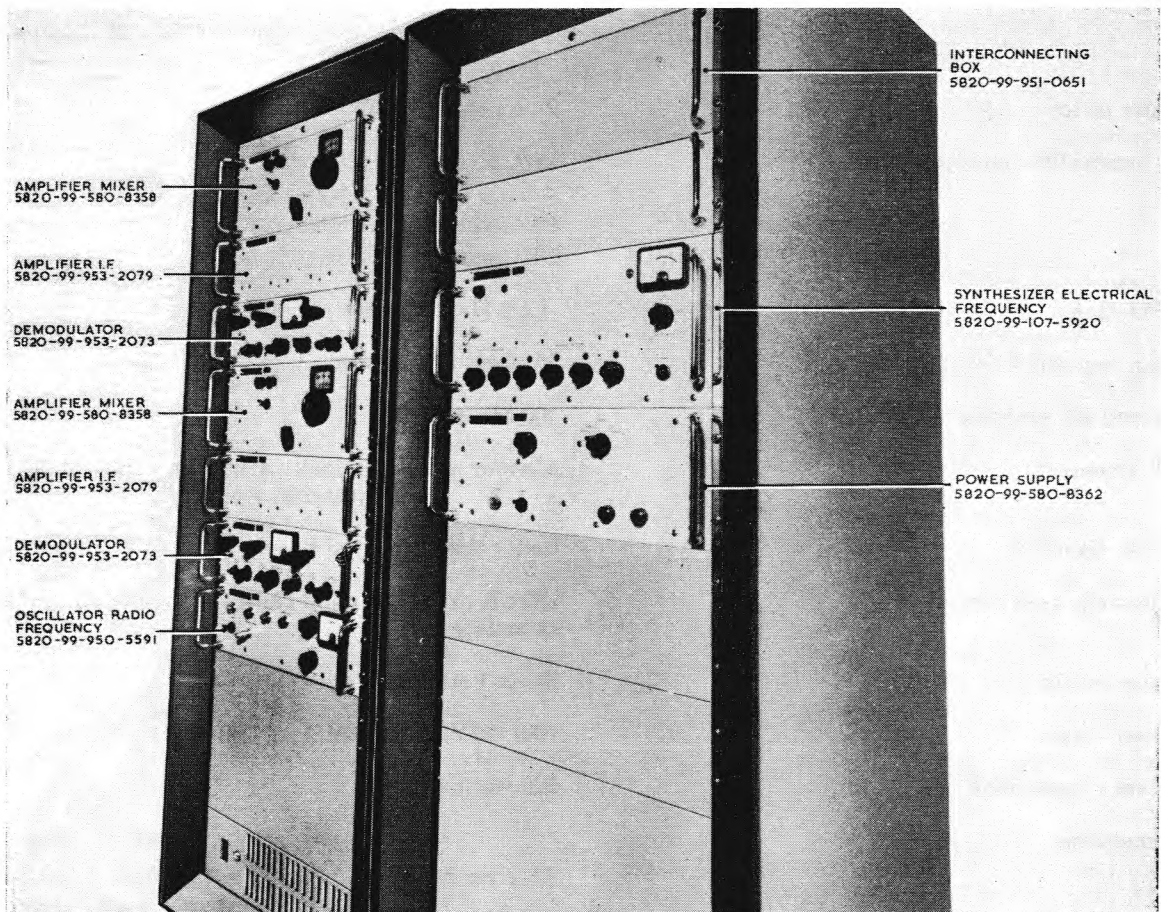
<b>Frequency accuracy and stability</b> ( <i>controlled by external frequency standard source</i> ).	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.			
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).			
<b>Tuning</b>	(1) <i>Remote or local</i> – automatic control, from synthesizer, electrical frequency. (2) <i>Manual</i> – mechanical override of the automatic system.			
<b>Noise factor</b>	Better than 10 dB.			
<b>IF bandwidths</b>	<i>ISB, SSB</i> : 6 KHz. <i>AM</i> : 7 KHz. <i>CW (wide)</i> : 3.5 KHz. <i>CW (narrow)</i> : 350 Hz.			
<b>BFO range</b>	±2.5 Hz nominal.			
<b>Input impedance</b> ( <i>r.f.</i> )	75 ohms unbalanced.			
<b>Overall a.f. response</b>	300 Hz–6000 Hz.			
<b>AF outputs</b>	<i>Line</i> : 1 mW into 600 ohms. <i>Monitor jack</i> : nominally 1 W into 600 ohms (max.) adjustable.			
<b>Audio distortion</b>	Better than 2% total harmonic.			
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.			
<b>Noise limiter</b> ( <i>a.m. only</i> )	Series limiter provided.			
<b>Automatic frequency control</b>	Manual capture, after capture 1.6 MHz carrier held to ±50 Hz.			
<b>Power supply</b>	100–125V, 200–250V, 45–65 Hz, single phase.			
<b>Power consumption</b>	600 watts (approx.).			
<b>Dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
	Receiver rack	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
	Control rack	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
<b>Weights</b>	600 lb (272 kg) approx., each rack.			

## RECEIVER, RADIO

5820-99-107-5921

Relevant publication:-

AP116E-0127-1C, 1Y



Receiving set, radio, 5820-99-107-5921

**Function**

A locally controlled, h.f. superheterodyne receiving set comprising two receivers in which the common local oscillator uses a system of frequency synthesis, the standard frequency for which is the internal 1 MHz standard source from the synthesizer, electrical frequency.

The receiving set is used with FGRI.23186, voice and telegraph transmitter and receiver link station and is housed in two racks in which the sub-unit chassis are attached to standard 19-inch front panels.

**Origin**

Racal Communications Ltd., Type RTA.241C.

**Frequency range**

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.

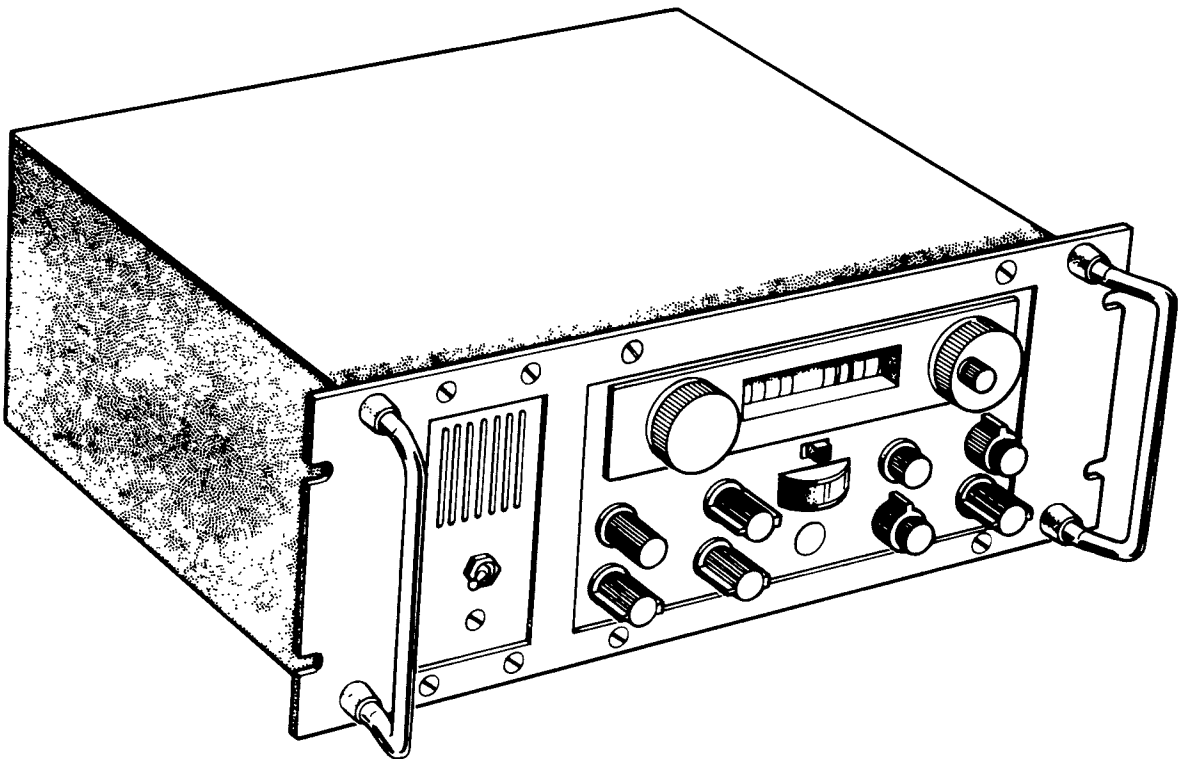
<b>Frequency accuracy and stability</b> ( <i>controlled by synthesizer internal frequency standard source</i> )	Stability, including ageing over 24 hours, after 30 days operation less than $\pm 2$ parts in $10^{-9}$ . Stability with change in ambient temperature $\pm 25^{\circ}\text{C}$ from $25^{\circ}\text{C}$ , less than $\pm 2$ parts in $10^{-8}$ .												
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).												
<b>Tuning</b>	(1) <i>Local</i> – automatic from synthesizer. (2) <i>Manual</i> – mechanical override of the automatic system.												
<b>Noise factor</b>	Better than 10 dB.												
<b>IF bandwidths</b> ( <i>nominal</i> )	<i>ISB, SSB</i> : 6 KHz. <i>AM</i> : 7 KHz. <i>CW (wide)</i> : 3.5 KHz. <i>CW (narrow)</i> : 350 Hz.												
<b>BFO range</b>	$\pm 2.5$ Hz nominal												
<b>Input impedance</b> ( <i>r.f.</i> )	75 ohms unbalanced.												
<b>Overall a.f. response</b>	300 Hz–6000 Hz												
<b>AF outputs</b>	<i>Monitor jack</i> : nominally 1 mW into 600 ohms (max.) adjustable.												
<b>Audio distortion</b>	Better than 2% total harmonic.												
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.												
<b>Noise limiter</b> ( <i>a.m. only</i> )	Series limiter is provided.												
<b>Power supply</b>	100–125V, 200–250V, ( $\pm 6\%$ ), 45–65 Hz single phase.												
<b>Power consumption</b>	600 watts (approx.).												
<b>Dimensions</b>	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>Receiver rack</td> <td>5ft 10<math>\frac{1}{4}</math>in (178.4cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3cm)</td> <td>2ft 3in (68.6cm)</td> </tr> <tr> <td>Control rack</td> <td>5ft 10<math>\frac{1}{4}</math>in (178.4cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3cm)</td> <td>2ft 3in (68.6cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	Receiver rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)	Control rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>										
Receiver rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)										
Control rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)										
<b>Weights</b>	600 lb (272 kg) approx., each rack.												

## RECEIVER, RADIO

5820-99-107-4926

Relevant publication:-

AP116E-0732-1A and 1B



Receiver, radio 5820-99-107-4926

## FUNCTION

A general purpose ground station h.f. communications receiver. The receiver, radio consists of receiver, radio 5820-99-107-1509 (less monitor loudspeaker facility) and amplifier, audio frequency 5820-99-195-0459 (fitted monitor loudspeaker); both equipments are fitted for rack mounting into frame, electrical equipment 5820-99-195-0460.

## ORIGIN

Racal Communications Ltd., Type RA.317.  
Receiver, radio 5820-99-107-1509, Type RA.217R;  
amplifier, audio frequency 5820-99-195-0459, Type MA.389.

## FREQUENCY RANGE

1 to 30 MHz (300 to 10 metres).

## CALIBRATION

A 100kHz signal derived from a 1MHz crystal oscillator, with a stability of 5 parts in  $10^6$ , provides check points at 100kHz intervals.

## STABILITY

After 2 hours from switching on,  $\pm 50$ Hz over an 8-hour period with constant ambient temperatures and humidity.

## SENSITIVITY

CW, SSB reception:  $1\mu\text{V}$  for 15dB signal-to-noise ratio and 3kHz bandwidth.  
MCW, DSB reception:  $3\mu\text{V}$  for 15dB signal-to-noise ratio (30% modulated at 400Hz).

## I.F. OUTPUT

With a.g.c. in operation:

- (1) at 1.6MHz: 0.1V at high impedance (nominal).
- (2) at 100kHz: 0.27V (1mW) nominal into 75 ohms.
- (3) at 455kHz: 0.22V (1mW) nominal into 50 ohms.

## SELECTIVITY

Four alternative i.f. bandwidths are obtained by a selector switch; the nominal filter details are as follows:

<u>At -3dB points</u>	<u>At -60dB points</u>
13kHz	30kHz
3kHz	9kHz
1kHz	4kHz
0.2kHz	2kHz

## NOISE FACTOR

Not greater than 10dB throughout entire range.

## IMAGE AND SPURIOUS RESPONSE TO EXTERNAL SIGNALS

- (1) External signals less than 10% off-tune shall be greater than +60dB relative to  $1\mu\text{V}$  in order to produce a spurious signal equivalent to  $1\mu\text{V}$ .
- (2) With a tuned aerial, external signals more than 10% off-tune shall be greater than +80dB relative to  $1\mu\text{V}$  to produce a spurious signal equivalent to  $1\mu\text{V}$ .

## INTERNALLY GENERATED SPURIOUS RESPONSES

Not greater than 2dB above noise level in a 3kHz bandwidth.

## INPUT IMPEDANCE

75 ohms (nominal) unbalanced.

## B.F.O. RANGE

- (1)  $\pm 8\text{kHz}$  variable
- (2)  $\pm 1.5\text{kHz}$  crystal controlled.

## B.F.O. STABILITY

- (1)  $\pm 15\text{Hz}$  for less than 5 minutes.
- (2)  $\pm 25\text{Hz}$  for less than 30 minutes.

## A.F. RESPONSE

100 to 6000Hz, flat within 3dB.

## A.F. OUTPUTS

- (1) 50mW (nominal), at less than 1% distortion, into 3-ohm loudspeaker.
- (2) 1mW into 600 ohms line output.

## HUM LEVEL

40dB below rated 600-ohm line output.

## POWER SUPPLIES

One of two alternative power units is fitted.

- (1) PU.408A:

Input: 100-125V or 200-250V, 40-400Hz.  
Output: -16V d.c. at 180mA.  
Consumption: 7VA approx.

(2) PU.409:

Input: 100-125V or 200-250V, 40-400Hz.

Outputs: -16V d.c. at 400mA and -24V d.c. at 40mA.

DIMENSIONS (excluding handles)

Height	Width	Depth
7 in (17.75cm)	19 in (48 cm)	13 1/8 in (33.3 cm)

WEIGHT

41 lb (18.75kg)

AMPLIFIER, AUDIO FREQUENCY  
(5820-99-195-0459)

FUNCTION

To provide a monitor loudspeaker output for receiver, radio 5820-99-107-1509.

ORIGIN

Racal Communications Ltd., Type MA.389.

INPUT LEVEL

10mW across 600 ohms.

OUTPUT POWER

50mW across 3 ohms.

DISTORTION

Less than 1%.

A.F.RESPONSE

100 to 6000Hz.

POWER SUPPLY

-16V d.c.

DIMENSIONS

Height	Width	Depth
6 1/4 in (17.5 cm)	3 1/4 in (8.25 cm)	7 in (17.75cm)

WEIGHT 1 lb (0.45 kg)

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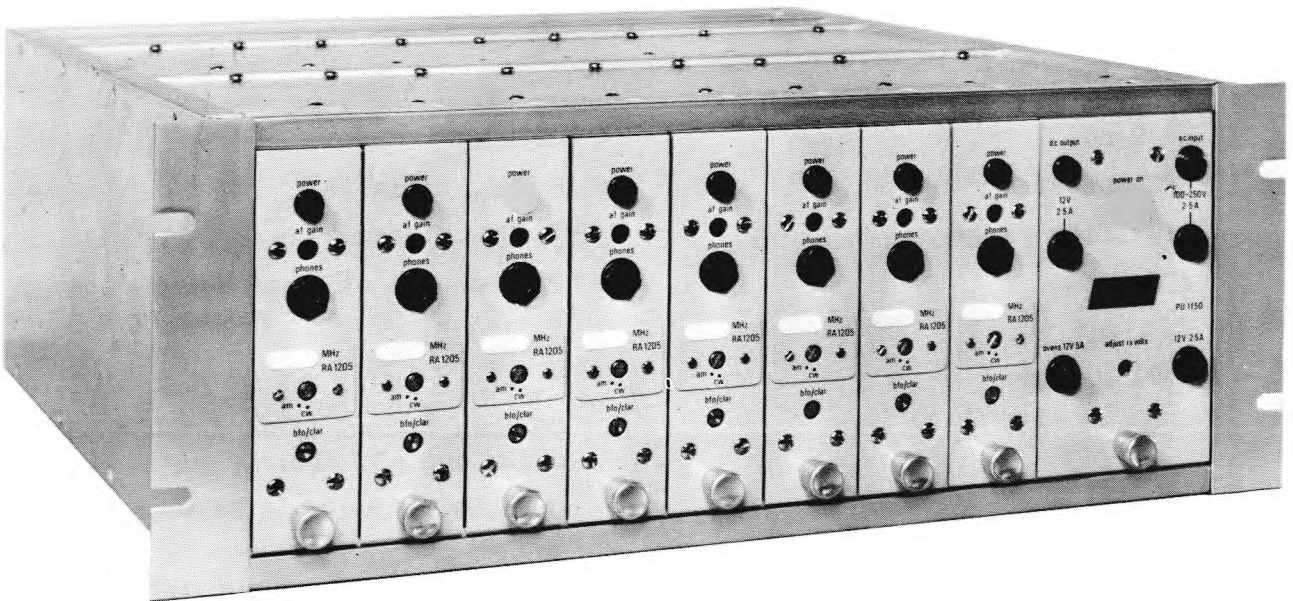
Item No. 17

RECEIVER, RADIO

(10D/5820-99-618-1034)  
(Racal type RA 1205/8)

Relevant publication:-

AP116E-Q751



Receiver, radio 5820-99-618-1034 (Racal RA 1205/8)

FUNCTION

An assembly of eight double superheterodyne single channel usb/cw receivers, each one operating at a preset frequency in the range 1.5 MHz to 24 MHz.

ORIGIN

Racal Communications Ltd., Type RA.1205/8.

## TECHNICAL DATA

Frequency range	1.6 MHz. to 24 MHz (down to 1.5 MHz with slight performance degradation).
Frequency accuracy and stability	2 parts in $10^7$ /day, and $\pm 30$ Hz for a temperature change of 10 C within the range of $-10^{\circ}\text{C}$ to $+55^{\circ}\text{C}$ .
Sensitivity	1 microvolt for 10 dB signal-to-noise ratio.
Tuning	Local preset.
I.F. bandwidth	2.6 kHz.
I.F. frequency	
1 st.	1.4 kHz
2 nd.	100 kHz.
BFO range	$\pm 8$ kHz, variable
Clarifier range	$\pm 75$ Hz, minimum.
AGC range	80 dB change of input causes change in a.f. output not exceeding 6 dB.
A.F. outputs	
Line	600 ohms balanced, adjustable between +6 dBm and -30 dBm.
Monitor jack	600 ohms, adjustable between 0 dBm and -40 dBm.
Power consumption	7.5 VA per receiver module.

## POWER SUPPLY REQUIRED

100-124V, 200-250V, 45-400 Hz single phase  
or  
12V  $\pm$  10% d.c. (negative earth)

## DIMENSIONS

Height	Width	Depth
178 mm (7 in.)	483 mm (19 in.)	483 mm (19 in.)

WEIGHT                      24 kg (53 lb)

AP116A-0115-1

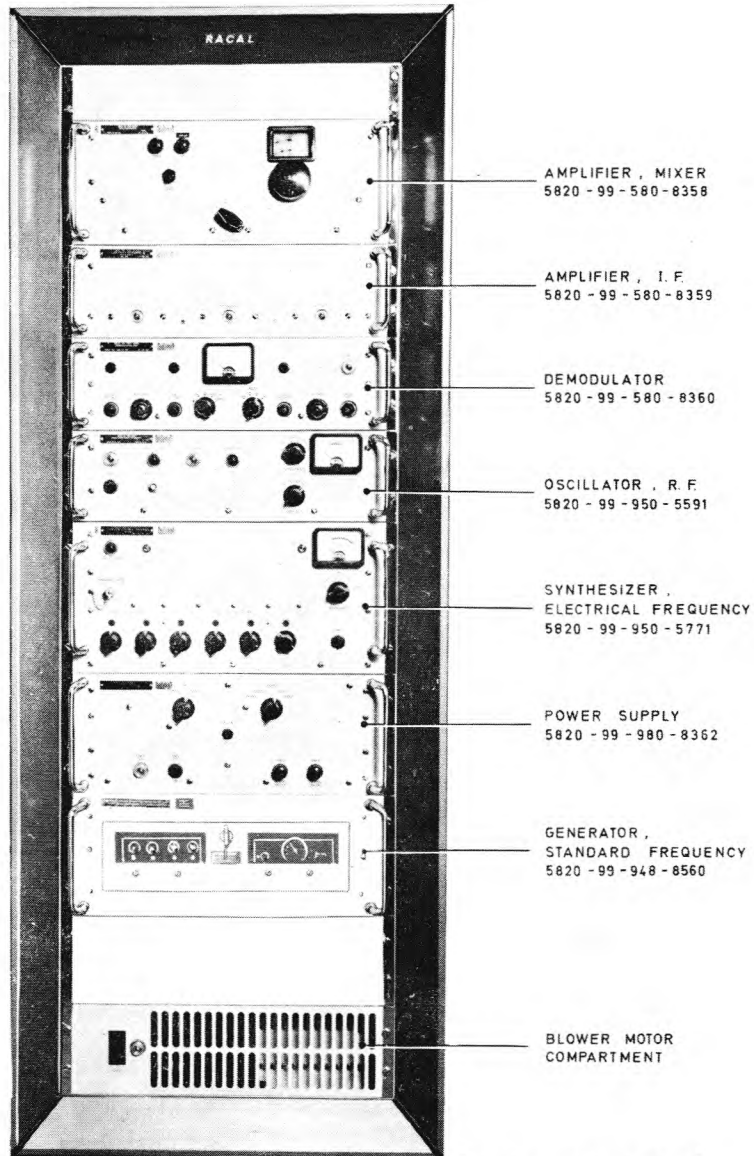
Item No. 18

RECEIVER, RADIO

5820-99-119-3981  
(Racal type RTA.191P)

Relevant publication:-

AP116E-0127-1D



Receiving set, radio, 5820-99-119-3981 (Racal RTA.191P)

#### FUNCTION

A locally controlled, h.f. superheterodyne receiving set with a frequency range of 2 to 30 MHz selected in 100 Hz increments. The possible modes of operation are single sideband, independent sideband, compatible amplitude modulation and c.w. telegraphy (keyed tone or frequency shift). The receiving set is used with TGRI (AT)26063/1 air transportable voice and telegraph transmitter/receiver station.

ORIGIN

Racal Communications Ltd., Type RTA.191P

## TECHNICAL DATA

FREQUENCY RANGE	2.0 to 29.9999 MHz.
FREQUENCY ACCURACY AND STABILITY (controlled by external frequency standard source)	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
SENSITIVITY	SSB and CW 1 microvolt for 13 dB signal-to-noise ratio.
	AM 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING	
Local	Automatic control from synthesizer, electrical frequency.
Manual	Mechanical override of the automatic system.
NOISE FACTOR	Better than 10 dB.
IF BANDWIDTHS	
SSB	3.5 kHz.
AM	7 kHz.
CW (wide)	3.5 kHz.
CW (narrow)	350 Hz.
BFO RANGE	$\pm 2.5$ kHz nominal.
INPUT IMPEDANCE ( $R_i'$ )	75 ohms unbalanced.
OVERALL AF RESPONSE	300 Hz-3400 Hz.
AF OUTPUTS	
line	1 mW into 600 ohms.
monitor jack	Nominally 1 mW into 600 ohms (max.) adjustable.
AUDIO DISTORTION	Better than 2% total harmonic.
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.
NOISE LIMITER (a.n. only)	Series limiter provided.
POWER SUPPLY	100-125V, 200-250V, 45-65 Hz, single phase.
POWER CONSUMPTION	600 watts (approx.)

## DIMENSIONS

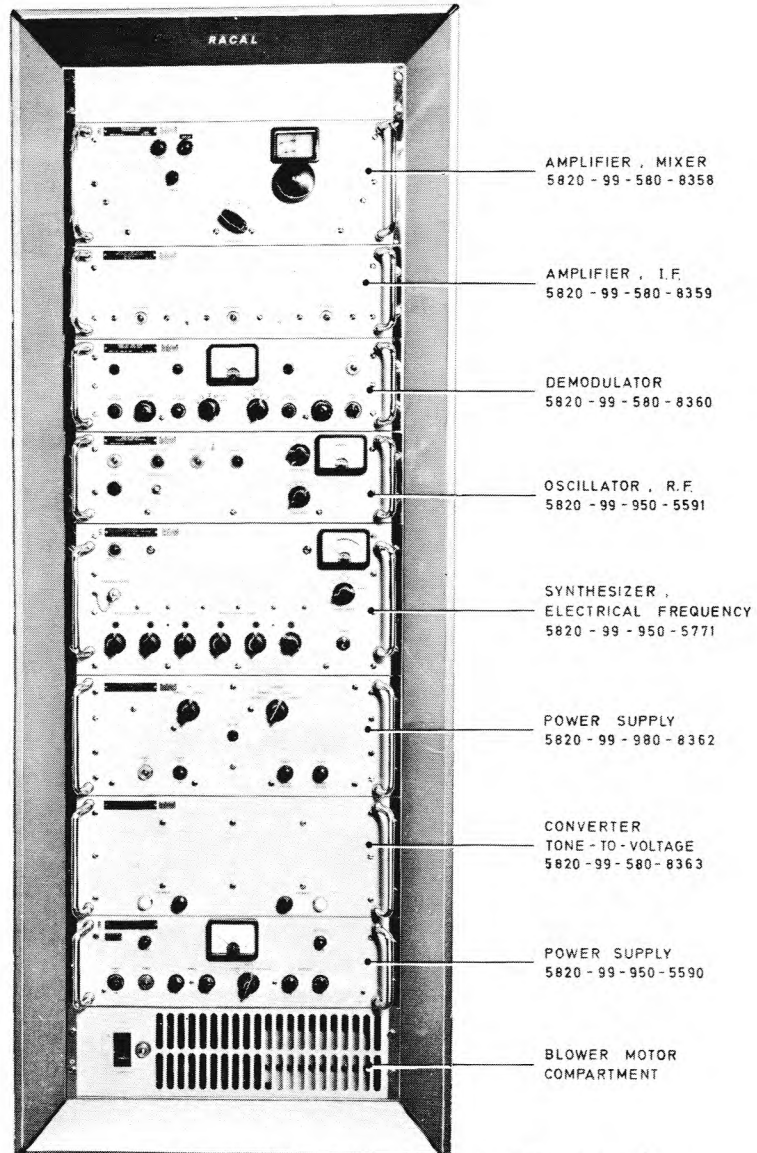
	Height	Width	Depth
Receiver rack	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)
WEIGHT	273 kg (600 lb)		

## RECEIVER, RADIO

5820-99-119-3979  
(Racal type RTA.191Q)

Relevant publication:-

AP116E-0127-1D



Receiving set, radio, 5820-99-119-3979 (Racal RTA.191Q)

## FUNCTION

A remote or locally controlled, h.f. superheterodyne receiving set with a frequency range of 2 to 30 MHz selected in 100 Hz increments. The possible modes of operation are single sideband, independent sideband, compatible amplitude modulation and c.w. telegraph (keyed tone or frequency shift). The receiving set is used with TGRI(AT)26063 air transportable voice and telegraph transmitter/receiver station.

## ORIGIN

Racal Communications Ltd., Type RTA.191Q.

## TECHNICAL DATA

FREQUENCY RANGE	2.0 to 29.9999 MHz	
FREQUENCY ACCURACY AND STABILITY (controlled by internal frequency standard source).	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.	
SENSITIVITY	SSB and CW	1 microvolt for 13 dB signal-to-noise ratio.
	AM	5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING		
Local	Automatic control from synthesizer, electrical frequency.	
Manual	Mechanical override of the automatic system.	
NOISE FACTOR	Better than 10 dB.	
IF BANDWIDTHS		
SSB	3.5 kHz	
AM	7 kHz.	
CW (wide)	3.5 kHz.	
CW (narrow)	350 Hz.	
BFO RANGE	$\pm 2.5$ kHz nominal.	
INPUT IMPEDANCE (RF)	75 ohms unbalanced.	
OVERALL AF RESPONSE	300 Hz-3400 Hz.	
AF OUTPUTS		
LINE	1 mW into 600 ohms	
MONITOR JACK	Nominally 1 mW into 600 ohms (max.) adjustable.	
AUDIO DISTORTION	Better than 2% total harmonic.	
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.	
NOISE LIMITER (a.m. only)	Series limiter provided.	
POWER SUPPLY		
100-125V, 200-250V, 45-65 Hz, single phase.		
POWER CONSUMPTION	600 watts (approx.)	

## DIMENSIONS

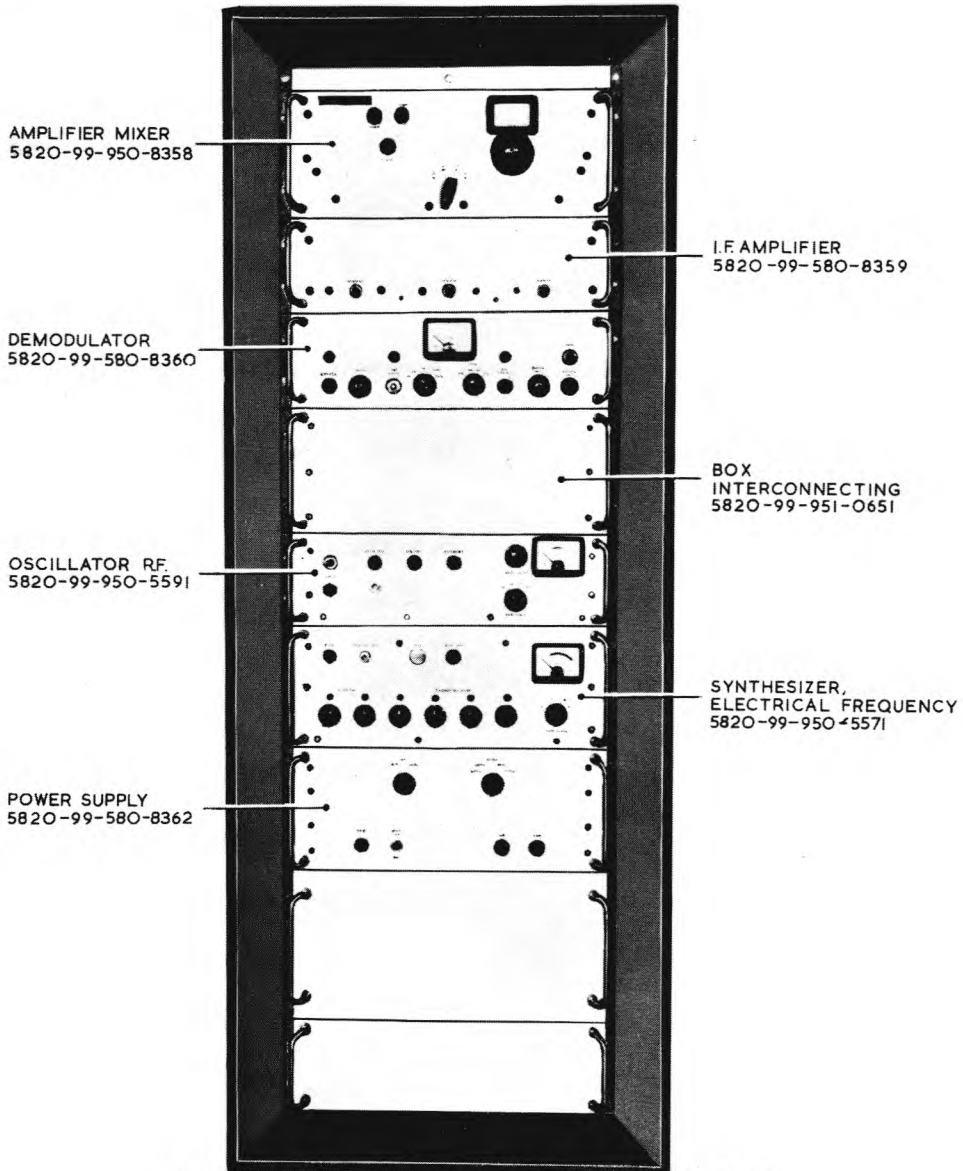
Receiver rack	Height	Width	Depth
	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)
WEIGHT	273 kg (600 lb).		

RECEIVER, RADIO

5820-99-951-0461  
(Racal type RTA.191K)

Relevant publication:-

AP116E-0127-1E



Receiving set, radio, 5820-99-951-0461

FUNCTION

An h.f. superheterodyne receiving station with a frequency range of 2 to 30 MHz, capable of voice and telegraph communication. The possible modes of operation are single sideband (upper or lower sideband, suppressed or pilot carrier), compatible amplitude modulation, or c.w. telegraphy.

ORIGIN

Racal Communications Ltd., Type RTA.191K.

FREQUENCY RANGE	2.0 to 29.9999 MHz.
FREQUENCY ACCURACY AND STABILITY (controlled by external frequency standard source)	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
SENSITIVITY	
SSB and CW	1 microvolt for 13 dB signal-to-noise ratio.
AM	5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING:	
Local	Automatic control from synthesizer electrical frequency.
Manual	Mechanical override of the automatic system.
NOISE FACTOR	Better than 10 dB.
IF BANDWIDTHS	
SSB	3.5 kHz.
AM	7 kHz.
CW (wide)	3.5 kHz.
CW (narrow)	350 Hz.
BFO RANGE	$\pm 2.5$ kHz nominal.
INPUT IMPEDANCE (RF)	75 ohms unbalanced.
OVERALL AF RESPONSE	300 Hz-3400 Hz.
AF OUTPUTS	
Line	1 mW into 600 ohms.
Monitor jack	Nominally 1 mW into 600 ohms (max.) adjustable.
AUDIO DISTORTION	Better than 2% total harmonic.
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.
NOISE LIMITER (a.m. only)	Series limiter provided.
POWER SUPPLY	
	100-125V, 200-250V, 45-65 Hz, single phase.
POWER CONSUMPTION	600 watts (approx.)

DIMENSIONS

	Height	Width	Depth
Receiver rack	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)

WEIGHT                    273 kg (600 lb)

AP116A-0115-1

Item No. 21

RECEIVER, RADIO

5820-99-630-9620  
(Racal type RA.1772)

Relevant publication:-

AP116E-0748-16



HF Receiver (Racal type RA.1772) 5820-99-630-9620

#### FUNCTION

General purpose ground station fully synthesized h.f. communications receiver.

The receiver may be rack or bench mounted.

#### ORIGIN

Racal Communications Ltd., Type RA.1772 (H/S2/R/B3/0/0)

TECHNICAL DATA

FREQUENCY RANGE 15 kHz to 30 MHz.

MODES OF RECEPTION A1  
A2, A2H, A2J  
A3, A3A, A3B, A3H

TUNING

Switched selection of 1 MHz steps and a continuously tunable synthesizer in 10 Hz or 100 Hz steps over each 1 MHz band.

Electronic digital readout to 10 Hz.

OVERSPILL

20 kHz at either end of each 1 MHz band. Overrun indication is provided.

TUNING ACCURACY

Plus or minus 5 Hz relative to frequency of the wanted signal.

FREQUENCY STABILITY

Temperature  $\pm 1:10^8/^{\circ}\text{C}$   
Longterm  $\pm 1.5:10^7$  over a 30 day period or  $\pm 5:10^9$  per day

ANTENNA INPUT

50 ohms to 75 ohms nominal.  
co-axial b.n.c. connector.

SENSITIVITY

c.w. and s.s.b. (A1, A2H, A3A, A3H, A3J)

In a 3 kHz bandwidth the signal-to-noise ratio is better than:

15 kHz-50 kHz, 15 dB with 10 $\mu$ V (emf) input

50 kHz-500 kHz, 15 dB with 3 $\mu$ V (emf) input

500 kHz-30 MHz, 15 dB with 1 $\mu$ V (emf) input

## d.s.b. (A2, A3)

In a 3 kHz bandwidth the signal-to-noise ratio is better than:

- 15 kHz-50 kHz, 15 dB with 30 $\mu$ V(emf) input,  
30% modulated
- 50 kHz-500 kHz, 15 dB with 10 $\mu$ V(emf) input,  
30% modulated.
- 500 kHz-30 MHz, 15 dB with 3 $\mu$ V(emf) input,  
30% modulated.

## IF FREQUENCY

1 st	34 MHz
2 nd	1.4 MHz.

## IF SELECTIVITY

## SSB (A3A, A3J)

Pass band at -6 dB	250 Hz to 3000 Hz
Pass band at -60 dB	-650 and +4100 Hz.

## ISB (A3B)

Pass band at -6 dB	250 Hz to 3000 Hz
Pass band at -60 dB	-400 and +4100 Hz

## CW/MCW/AM (A1, A2, A3, A2H, A3H)

In addition to the mode-selected s.s.b or i.s.b filters, i.f. filters of the following nominal passbands are fitted:-

1 kHz, 3 kHz, 8 kHz.

## CROSS MODULATION

With a wanted signal greater than 300 $\mu$ V emf, in a 3 kHz bandwidth, an unwanted signal, 30% modulated, removed not less than 20 kHz, greater than 300 mV emf, will produce an output 20 dB below the output produced by the wanted signal.

## RECIPROCAL MIXING

With a wanted signal of less than 100 $\mu$ V emf, in a 3 kHz bandwidth an unwanted signal, 30% modulated, removed not less than 20 kHz, greater than 70 dB above the wanted signal level will give a noise level 20 dB below the output produced by the wanted signal.

## BLOCKING

With a wanted signal of 1 mV emf.  
an unwanted signal more than 20 kHz removed.  
greater than 500 mV will reduce the output by 3 dB.

## INTERMODULATION PRODUCTS

### Out of band

With two 30 mV emf signals separated and removed from the wanted signal  
by not less than 20 kHz.  
The third order intermodulation products are not less than -85 dB  
below either of the interfering signals and typically better than -90 dB.

### In band

Two in band signals of 30 mV emf will produce third-order intermodulation  
products of not greater than -40 dB.

## SPURIOUS RESPONSE

### External

External signals, 20 kHz removed from the wanted signal must be at  
least 80 dB above the level of the wanted signal to produce an  
equivalent output.

### Internal

Not greater than 3 dB above noise level measured in a 3 kHz bandwidth.

## AGC

### Range

An increase in input of 100 dB above 2 micro-  
volts emf will produce an output change of  
less than 6 dB.

Switched selection of AGC 'off' 'short' and  
long time constants.

## BFO RANGE

± 3 kHz, variable by a slow-motion.

## AUDIO CHARACTERISTICS

### Output levels

#### Line outputs

1 mW nominal into 600 ohms balanced, adjustable  
by preset level control on front panel to  
+6 dBm.

#### Phone outputs

Balance, 10 mW nominal into 600 ohms.

Power output 50 mW into internal loudspeaker which is capable of being switched in or out of operations.

External speaker Connection for external speaker 1 watt into 8 ohms.

#### AF response

Line outputs Within 1 dB from 100 Hz to 6000 Hz relative to the level of a standard 1000 Hz tone.  
(The overall a.f. response will be dependent upon the i.f. bandwidth selected).

#### AF distortion

Line outputs Not greater than 2% at specified output of 1 mW nominal.

Loudspeaker outputs Not greater than 5% at 50 mW output to internal loudspeaker and 1W output to external speaker.

Phone output Not greater than 5% at specified output of 10 mW nominal.

#### CROSS TALK (A3B)

With a wanted signal at a level of 1 mV and the AF output adjusted to 1 mW, the crosstalk from an equal signal in the opposite sideband, at greater than 400 Hz from the carrier, is not greater than -50 dB relative to 1 mW.

#### METERING

A meter is provided on the front panel to indicate r.f. level, a.f. level to line, f.s.k. tune, and suitable performance or supply test levels.

#### POWER SUPPLY

100V-125V or 200V-250V,  $\pm 10\%$ , 45-65 Hz

Power consumption: 60 VA (Approx.)

#### DIMENSIONS

Height	Width	Depth
176 mm (7 in.)	483 mm (19 in.)	410 mm (16.14 in.)

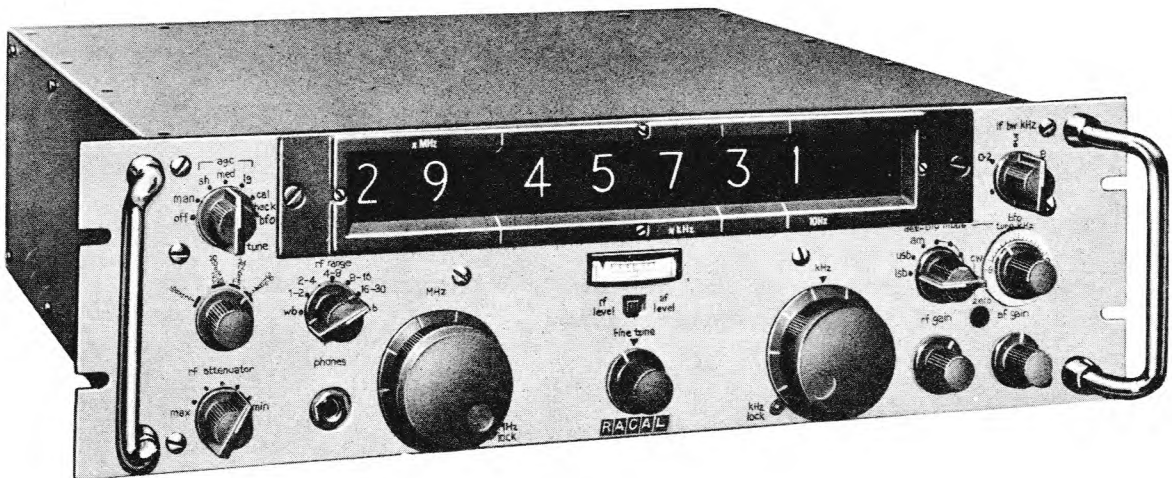
WEIGHT 20.4 kg (45 lb) (Approx.)

RECEIVER RADIO

(5820-99-624-0202)  
(Racal RA 1218A)

Relevant publications:-

AP116E-0745-1A, B



H.F. Communications Receiver Type RA 1218A

FUNCTION

A general purpose all solid-state h.f. communications receiver of high stability with an electronic frequency display.

MODES OF RECEPTION

- (1) MCW, CW, DSB, SSB (USB or LSB)
- (2) ISB and FSK with suitable adaptor /converter

ORIGIN

RACAL Communications Ltd., Type RA 1218A

FREQUENCY RANGE

1 to 30 MHz which can be extended down to 3 KHz by the connection of a RACAL LF Converter Unit.

### RESETTING ACCURACY

± 50 Hz using the Main Tuning controls

± 10 Hz using the Fine Tuning control

### FREQUENCY STABILITY

± 10 Hz plus accuracy of frequency standard.

An external standard of 1 MHz may be used.

### SENSITIVITY (Tuned Mode)

With tuned antenna input, and measured in a 3 KHz bandwidth, sensitivity figures are typically:

CW/SSB - 1 microvolt (emf) for 15 dB signal-to-noise ratio

MCW/DSB (30% modulated at 400 Hz) - 3 microvolts (emf) for 15 dB signal-to-noise ratio.

### SELECTIVITY

Three IF filters are fitted as standard but two additional filters may be fitted as optional extras. Nominal bandwidths are:

#### 3dB Bandwidths

##### Standard Filters

8 KHz

3 KHz

200 Hz

##### Additional Filters available

13 kHz

6 kHz

1.2 kHz

.500 kHz

### CROSS-MODULATION

For a wanted signal level up to 1 mV, and with appropriate use of the antenna attenuator, an interfering signal, 20 kHz removed and modulated 30%, at a level 45 dB above that of the wanted signal, will in general produce cross-modulation of less than 3%.

### INTERMODULATION

To produce an equivalent 1 microvolt input, the level of two equal unwanted signals greater than 10% removed from the wanted frequency, must

be at least 80 dB above 1 microvolt in the tuned input mode.

#### BLOCKING

For levels of wanted signal up to 1mV and with appropriate use of the antenna attenuator, an interfering signal 20 KHz removed will be 56 dB above the level of the wanted signal to reduce its output by 3 dB. The ratio of wanted to unwanted signal level is improved at the rate of approximately 2 dB/1% up to 10% off-tune in the tuned input mode.

#### SPURIOUS RESPONSE TO EXTERNAL SIGNALS (IMAGE etc): IN TUNED MODE

To produce a response equivalent to a 1 microvolt signal, an external signal less than 10% off-tune must, in general, be greater than 70 dB above 1 microvolt.

#### INTERNALLY GENERATED SPURIOUS RESPONSES

Not greater than 3 dB above noise level in a 3 kHz bandwidth.

#### NOISE FACTOR (Tuned Mode)

Typically 10 dB

#### ANTENNA INPUT

- (1) Nominal impedance 75 ohm unbalanced
- (2) Wideband, or tuned in five selected bands:
  - a. 1 to 2 MHz
  - b. 2 to 4 MHz
  - c. 4 to 8 MHz
  - d. 8 to 16 MHz
  - e. 16 to 30 MHz

#### IF OUTPUT (AGC ON)

- (1) At 1.6 MHz: 0.1V (nominal) at high impedance
- (2) At 100 KHz: 0.27V (1 mW) nominal at 75 ohms

### AUTOMATIC GAIN CONTROL

(1) Time Constants (nominal)

	Charge	Discharge
a. Short	17 mS	60 mS
b. Medium	40 mS	400 mS
c. Long	40 mS	6 S

(2) Output Change - An increase in input of 85 dB above 2 microvolts will produce a change in output level of less than 4 dB.

### BFO

(1) Variable  $\pm$  8 kHz with respect to i.f. centre frequency.

(2) Fixed  $\pm$  1.5 kHz (USB/LSB) crystal controlled.

### AF OUTPUT

(1) Headphone jack on front panel: 10 mW nominal in 600 ohms.

(2) 10 mW in 600 ohms at rear terminals. An alternative version providing one watt into 15 ohms for an external loudspeaker is available.

(3) 1 mW in 600 ohms 'line' outlet. The preset level is independent of the AF Gain control setting.

### AF DISTORTION

Not greater than 5%

### AF RESPONSE

100 to 6000 Hz flat within 4 dB relative to the peak in the widest bandwidth fitted.

### METERING

'S' scale metering in dBs relative to 1 microvolt.

(1) R.F. Signal level

(2) AF level to line

### POWER SUPPLIES

100-125V or 200-250V, 45-400 Hz, a.c. single phase

POWER CONSUMPTION

60 VA approximately (with one-watt amplifier)

DIMENSIONS

5.25 inches (13.5 cm) High

19 inches (48.3 cm) Wide

19 inches (48.3 cm) Deep

WEIGHT

50 lb (22.9 kg) approximately

ENVIRONMENTAL CONDITIONS

The equipment is designed to meet certain of the requirements of specification DEF 133 L2, operating within the ambient temperature range of  $-5^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ .

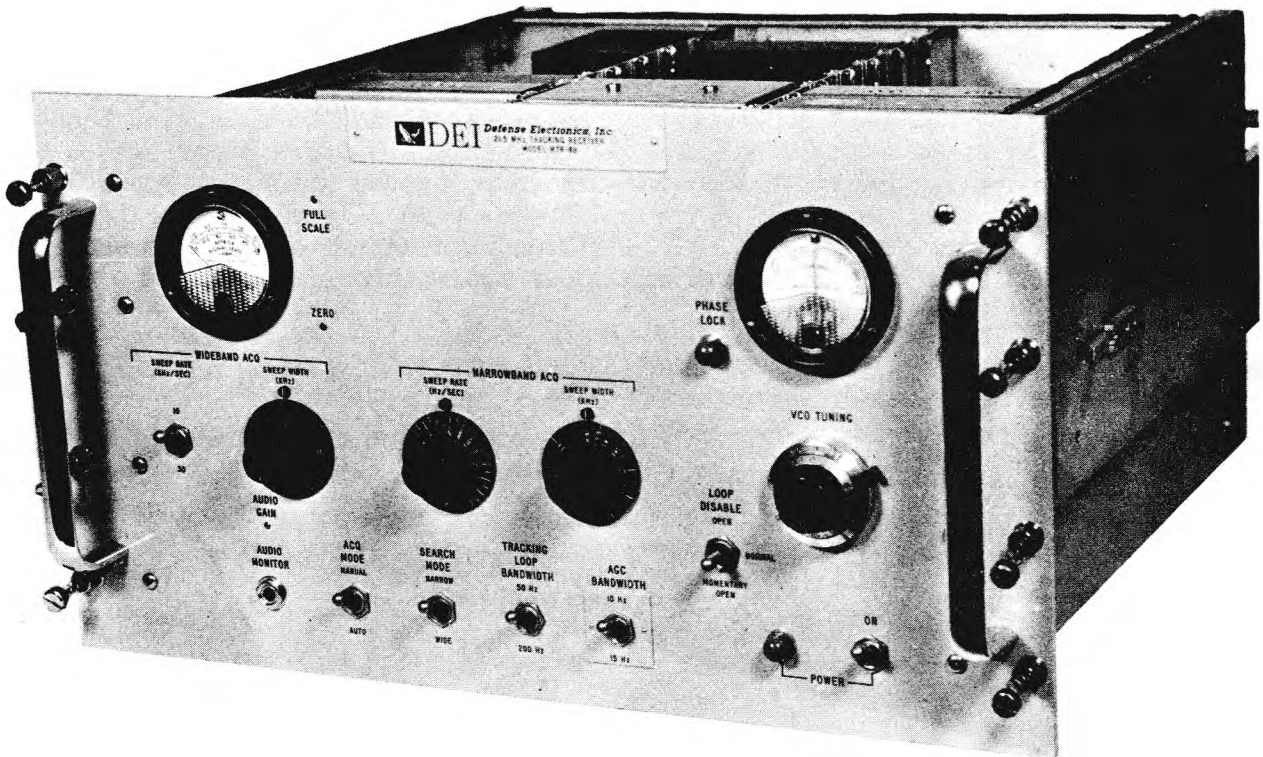
CONSTRUCTION

The unit is of modular construction.

TRACKING RECEIVER  
DEFENSE ELECTRONIC INC. MODEL MTR-4B  
(PART OF SKYNET TELEMETRY AND COMMAND STATION UHF SYSTEM)

Relevant publication:-

AP116E-0738-1



21.5 MHz tracking receiver D.E.I. Inc., Model MTR-4B

FUNCTION

A tracking receiver designed to process phase modulated 21.5 MHz r.f. input signals into video and conical scan tracking error information.

ORIGIN

Defense Electronics Inc., Rockville, Maryland USA 20854  
Model MTR-4B



Sweep rate	10( $\pm 1$ ) kHz/sec or 30( $\pm 3$ ) kHz/sec, switch selectable.
Acquisition bandwidth	800 Hz
Narrowband characteristics	
Sweep width	500 Hz to 10 kHz, continuously adjustable.
Sweep rate	50 Hz/sec to 1500 Hz/sec, continuously adjustable
Acquisition loop bandwidth	50 Hz or 200 Hz, switch selectable
Frequency tracking rate	90 Hz/sec at 50 Hz loop b.w. (0.32 radians phase error) 900 Hz/sec at 200 Hz loop b.w. (0.32 radians phase error).
AGC bandwidth	10( $\pm 2$ ) Hz or 15( $\pm 3$ ) Hz, switch selectable
Power supply required	240V a.c. $\pm 10\%$ , 50 Hz $\pm 5\%$ , single phase.

#### ENVIRONMENTAL

##### Temperature range:

Operating	0°C to +32°C
Storage	-40°C to +52°C
Relative humidity	30 to 70%
Barometric pressure	610 to 775 mmHg.

#### MECHANICAL

##### Dimensions

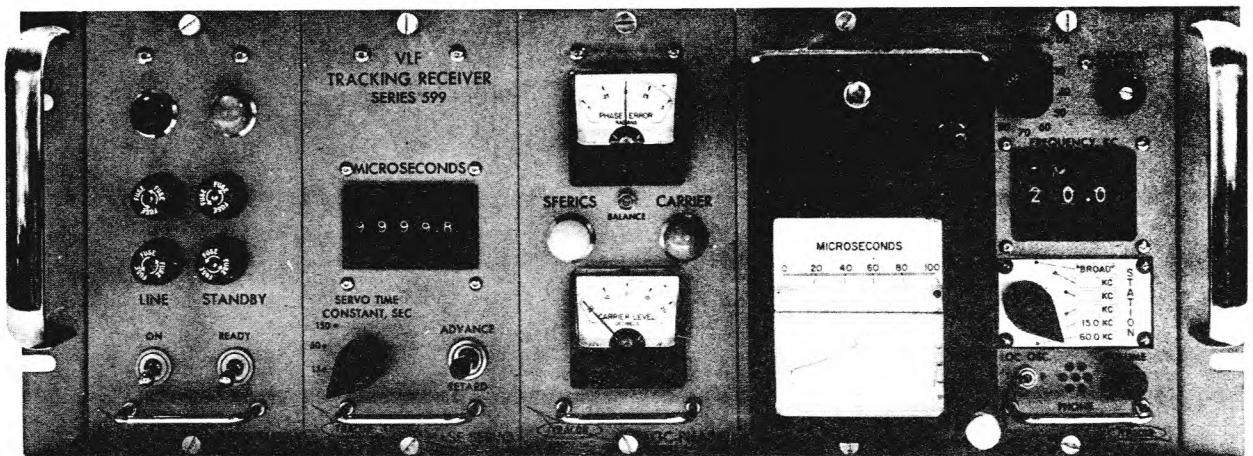
Height	Width	Depth
266 mm (10 $\frac{1}{2}$ in)	483 mm (19 in)	495 mm (19 $\frac{1}{2}$ in)

Weight 40 lb (approximately)

VLF TRACKING RECEIVER  
TRACOR INC., MODEL T599H

Relevant publication:-

AP116E-0735



VLF receiver model 559H

FUNCTION

Reception of very low highly stabilized reference carrier frequency transmissions from special global VLF stations for time and frequency calibration measurement and standardization purposes.

ORIGIN

Tracor Inc., USA Model T599H

## GENERAL DESCRIPTION

The unit is completely solidstate, and it is designed for phase locked reception of v.l.f. Signals which gives long-term and short term accuracy several orders of magnitude better than that obtained by reception of WWV or WWVH.

Frequency measurements to an accuracy of 1 part in  $10^9$  can be achieved in intervals as short as 30 minutes; observation over 24-hour intervals gives a measurement accuracy of several parts in  $10^{11}$ .

The receiver provides a reliable tracking of any one of the stations listed below from nearly anywhere in the world.

Transmitting station	Frequency kHz	Location	Sponsor, August 1964
WWVL	20.0	Ft. Collins, Colorado	Natl. Bureau of Standards
NBA	24.0	Balboa, Canal Zone	US Navy
NPM	19.8	Lualualei, Hawaii	US Navy
NAA	17.8	Cutler, Maine	US Navy
NPG	18.6	Jim Creek, Washington	US Navy
NSS	21.4	Annapolis, Maryland	US Navy
GBR	16.0	Rugby, England	British
OMEGA	10.2	Global net (various)	US Navy
OMEGA	13.6	Global net (various)	US Navy

Note:- All frequency standard transmissions are based on the UT2 time scale.

For reception of the Omega transmission, an auxiliary switch programmer is required for selection of a particular Omega station from the network of stations.

A total of 240 discrete channels in 100 Hz. steps is available between the lower limit of tracking operation at 8.0 kHz and the upper limit of 31.9 kHz.

Optional models of v.l.f. receiver track the 60 kHz transmission of WWVB operated by National Bureau of Standards.

The unit is a fully integrated receiving system and incorporates various major functional elements into single instrumentation packages v.h.f. receiver, phase comparator, servo phase shifter, frequency synthesizer and power supply. Only an external frequency standard and an antenna is connected to the unit.

Phase differences as small as 0.1 microsecond between the phase of incoming v.l.f. carrier frequency and phase derived from the local frequency source are detected by the front panel digital counter and a permanent record of the accumulated phase difference is made on a built-in stripchart recorder.

## TECHNICAL DATA

### ELECTRICAL

#### Frequency coverage

Standard receiver provides 240 channel tracking in 100 Hz increments for all carrier-stabilized VLF stations in the region 8.0 kHz-31.9 kHz (Additional 60 kHz coverage available).

#### RF filter capability

Front panel five-position switch permits selection of either a broadband filter or narrow band filter in r.f. selection. Broadband filter position normally used in all-channel tracking capability; plug in narrow band filters provide image rejection and additional frequency selectivity at specified frequencies.

#### Frequency synthesizer

Frequency synthesizer generates coherent local oscillator signal, in 100 Hz increments, between 9.0 and 30.9 kHz. Digital thumb-wheel switch gives direct indication of desired v.l.f. station frequency; toggle switch permits selection of local oscillator frequency either 1 kHz above or below station frequency.

#### Time difference register

Front panel digital counter, pulsed by electronic phase servo, displays relative time difference between local standard and v.l.f. carrier; counter dial cumulative to 9999.9  $\mu$ S. Counter dial may be manually set to zero or other desired initial reading (independently of phase position of tracking servo).

#### Recording outputs

Built-in inkless chart recorder records relative phase difference between local standard and v.l.f. carrier. Chart speed: 1 inch per hour (other speeds available on request). Manual selection of either 100  $\mu$ S. or 10  $\mu$ S. phase sensitivity (fullscale deflection) of internal chart recorder. Phase and coherent carrier amplitude information is also available, for use with external chart recorder.

#### VLF Phase

Two independent analog outputs, having deflection sensitivities of 100  $\mu$ S. and 10  $\mu$ S. full scale, provided for use with external chart recorder; with independent controls to adjust span calibration for any nominal 1 mA recorder.

### Coherent signal amplitude

Relative v.l.f. signal strength, equivalent to the receivers a.g.c. bias voltage, can be recorded on any nominal 1mA recorder; nominal logarithmic characteristic over a 40 dB range (chart records linear on a dB scale).

### Meter display

Individual meters indicate

- a) Relative carrier level: 40 dB full-scale range
- b) Phase detector error voltage (on zero-centre meter)

### Auxiliary outputs

- a) Amplified v.l.f. station signal, at 1 kHz intermediate frequency and phase coherent with r.f. carrier.
- b) Phase shifted 100 kHz square wave, 0.5 V peak to peak nominal
- c) Phase shifted 1kHz square wave, 0.5 V peak to peak nominal
- d) Phase shifted 100 Hz square wave, 0.5 V peak to peak nominal
- e) Reference frequency (L.O.) offset 1 kHz from v.l.f. carrier, square wave, 0.5 V peak to peak nominal

### Audio output

Built-in speaker and volume control for aural monitoring of v.l.f. station at approximately 1 kHz.

### Frequency standard input

Requires stable 1 MHz or 100 kHz from external frequency standard. Input level 0.5-5 volt r.m.s. into 1000 ohms.

### Antenna requirements

Designed for use with loop, whip or simple wire antenna; shielded loop antenna (Model 599-600 or equal) recommended for high noise locations. Antenna may be located any distance from receiver. (100 ft. of 50 ohm coaxial cable supplied with receiver).

### Bandwidth

- a) RF bandwidth (narrow band filters) 500 Hz, nominal
- b) IF bandwidth 50 Hz, nominal
- c) Servo bandwidth (equivalent noise bandwidth): selectable from 0.002 Hz to 0.06 Hz (phase tracking servo)

### Noise suppression

Blanking circuit rejects impulse noise either man-made or atmospheric ('sferics') Front panel lamp indicates presence of blanked noise impulse and facilitates adjustment of blanking circuit control.

### Servo disable circuit

Electronic switch disables phase servo whenever v.l.f. carrier drops below minimal level; front panel warning lamp lights at same time. Tracking resumes automatically when carrier returns.

## PERFORMANCE

### Receiver sensitivity

0.01 microvolt signal (corresponding to 0.3 microvolt/meter field strength at 20.0 kHz with model 599-600 loop antenna) into receiver energizes carrier level switch and enables normal phase tracking; tracking maintained at an input signal-to-noise ratio of -50 dB (Gaussian noise measured in a 1 kHz bandwidth; servo time constant switch in 50 sec position).

### Phase tracking servo

Front panel selector switch provides following servo response characteristics:

Nominal time Constant (sec)	Equivalent noise bandwidth (Hz),	Maximum tracking rate (nominal)
5	0.06	$\pm 1 \times 10^{-6}$
15	0.02	$\pm 3.3 \times 10^{-7}$
50	0.006	$\pm 1 \times 10^{-7}$
150	0.002	$\pm 3.3 \times 10^{-8}$

### Nominal servo deadband:

Less than  $\pm 0.1$  sec. in all switch positions

### Manual servo slewing

Momentary contact, centre-off toggle switch provided to advance or retard phase servo at a nominal  $1\mu\text{S. /sec.}$  rate.

### Calibration accuracy

Short-term and long-term stability better than  $\pm 0.5 \mu\text{S.}$  under normal laboratory conditions; intrinsic calibration accuracy (relative to received v.l.f. carrier) nominally better than  $\pm 1 \times 10^{-11}$  on a 24-hour basis.

## Synthesizer stability

Phase of the coherent local oscillator signal is absolutely fixed by the synthesizer setting; the synthesizer, after being switched to other frequencies, shows less than  $\pm 0.05 \mu\text{s}$ . shift when returned to its original setting.

## AGC

Stable a.g.c. circuit assures full-reliability phase locked servo operation over a 40 dB range of carrier level with total variation of phase shift less than  $0.5 \mu\text{s}$ . (equivalent, at 20 kHz).

## Dynamic range

Total signal level operating range in excess of 120 dB (including 80 dB manual gain control and 40dB a.g.c. range)

## POWER SUPPLY REQUIRED

95-125 volt a.c., 48-62 Hz, 40 watts nominal, or d.c. source (e.g. +12 volt and -12 volt d.c. standby batteries)

External standby batteries, when used, automatically assume full operating load in the event of primary a.c. power failure. All receiver functions, including servo tracking, are sustained without interruption; however, chart drive motor in recorder stops during a.c. power off time. Standby current drain approximately 600 mA at +12 volt d.c. and 600 mA at -12 volt d.c.

## MECHANICAL

### DIMENSIONS

	Height	Width	Depth
(rack panel)	178 mm (7 in.)	483 mm (19 in.)	419 mm (16 1/2 in.)

WEIGHT 20.5 kg (45 lb)

### Ambient temperature limits

0°C to +50°C while operating (+05°C maximum storage temperature)

### Packaging

Circuits are packed in the following modules:

Receiver/synthesizer/recorder	unit 202
AGC/phase error	unit 302
Phase servo	unit 402
Power supply	unit 502

## LORAN-C

UK/FRR 652  
HF RECEIVER  
TYPE PRS 2282A

Relevant publications:

AP 116E-0768-16

FUNCTION

The UK/FRR652 is a general purpose HF communications receiver that provides continuous coverage of the frequency range 10 kHz to 30 MHz, and allows for reception of AM, CW, SSB, LSB, FSK and FM signals.

ORIGIN

Plessey Military Communications.

DESCRIPTION

The UK/FRR652 is a double superheterodyne HF communications receiver with a tunable frequency range of 10 kHz to 30 MHz in 10 Hz steps. A conventional tuning control mounted on the receiver front panel provides continuous fast or slow frequency control without any need for band changing. A ten digit keypad provides for instant frequency access as required. Instant recall of up to 100 frequencies, together with their respective mode, bandwidth, a.g.c. and BFO settings is also provided.

The UK/FRR652 HF communications receiver front panel controls and indicators are illustrated in Fig 1.

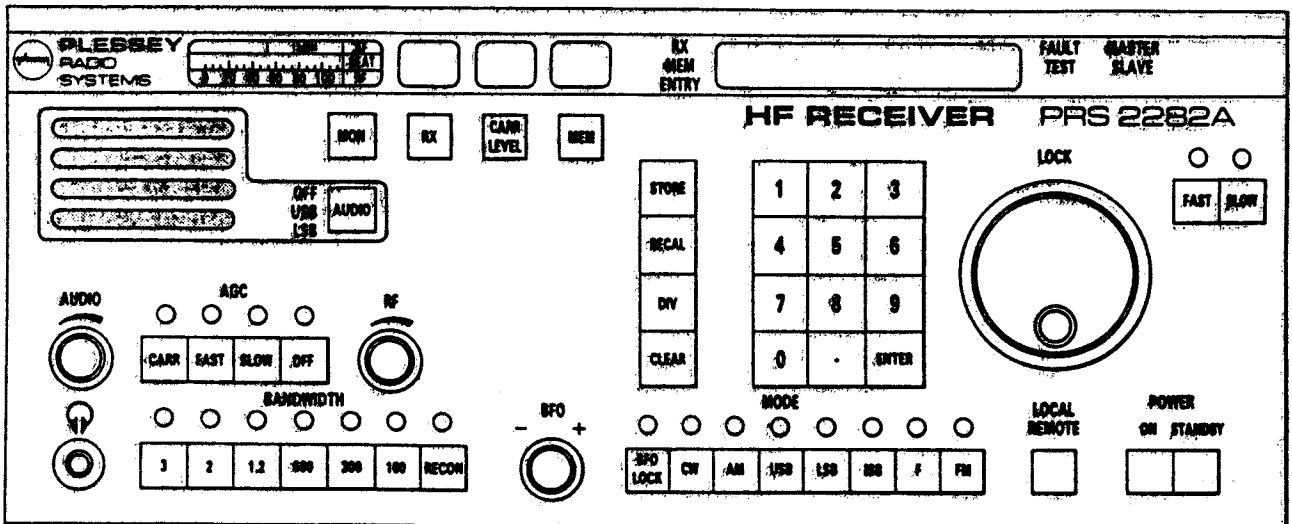


Fig 1 UK/FRR652 HF Communications Receiver Front panel

PHYSICAL CHARACTERISTICS

Weight

Complete Unit: 16 kg.

Dimensions

Height: 177 mm.  
Width: 483 mm.  
Depth: 380 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 10 kHz to 30 MHz in 10 Hz steps.

Modes of reception: CW, AM, USB, LSB, ISB, F, FM.

Bandwidths:	<u>Centre frequency</u>
8 kHz	F.C.
2 kHz	F.C. +2 kHz.
1.2 kHz	F.C. +2 kHz.
600 kHz	F.C. +1 kHz.
300 kHz	F.C. +1 kHz.
100 kHz	F.C. +1 kHz.
3 kHz	F.C. +1.75 kHz.
3 kHz	F.C. -1.75 kHz.

Memory capacity: 100 channels.

Data stored: Frequency, mode bandwidth, a.g.c. time-constant, reinserted carrier, BFO offset.

Data retention: Memory retention is better than 10 days at 25°C using storage capacitor.

Power requirements: 100 V, 120 V, 220 V or 240 V, 50 to 400 Hz.

Power consumption: Approximately 90 watts.

Operating conditions: -10°C to +55°C, 95% RH at 40°C.

UK/FRR 628  
HF RECEIVER  
TYPE RA1772

Relevant publications:

AP 116E-0753-16

FUNCTION

The radio receiver Type RA1772 is a fully synthesised, solid state, communications receiver providing reception facilities for LSB/USB (A3A,A3H,A3J), ISB(A3B), AM(A3) and telegraphy (A1,A2H,A2J) with two IF filters offset by 1 kHz.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

The frequency range of the receiver is 15 kHz to 30 MHz and the built-in synthesiser is phase-locked to the output of a 5MHz frequency standard. The MHz selection is in 1 MHz increments; a single knob tuning control tunes the synthesiser continuously over each 1 MHz band, with switched selection of FAST and SLOW tuning rates, or LOCK. In the LOCK position, the synthesiser does not respond to movement of the kHz tuning control. At the ends of each 1 MHz band, the tuning provides a 20 kHz overspill to eliminate the need for reverse tuning of the kHz control. Overspill is indicated by an illuminated lamp behind the appropriate MHz dial setting, above or below the setting initially selected. An electronic digital display indicates the kHz setting to 10 Hz. Some receivers will be fitted with a battery module MS540 which ensures that the tuning state is maintained following a momentary mains failure.

A built-in meter may be switched to indicate RF and AF signal levels as well as supply voltage levels. A slow-motion BFO control is provided for CW operation.

A switched monitor loudspeaker is provided and two front panel mounted jack sockets permit headphone monitoring of the output selected by the MODE switch. When the right-hand phone jack is in use the internal loudspeaker is muted. A general view of the RA1772 receiver is illustrated in Fig 1.

PHYSICAL CHARACTERISTICS

Weight

Complete unit: Approx. 22 kg.

Dimensions

Height: 178 mm.  
Width: 483 mm.  
Depth: 410 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.  
Modes of reception: A1, A2, A2H, A2J,  
A3, A3A, A3B, A3H, A3J.  
Tuning: 1 MHz increments (0 to 29)  
continuously tunable in  
10 Hz or 100 Hz increments  
over each 1 MHz band.  
Electronic frequency display  
to 10 Hz.  
Overspill: 20 kHz at either end of each  
1 MHz band. Indication provided.  
Antenna input: 50 ohms to 75 ohms (nominal).  
Power supply: 100 to 125 V or 200 to 250 V at  
45 to 65 Hz.  
Power consumption: Approximately 60 VA.

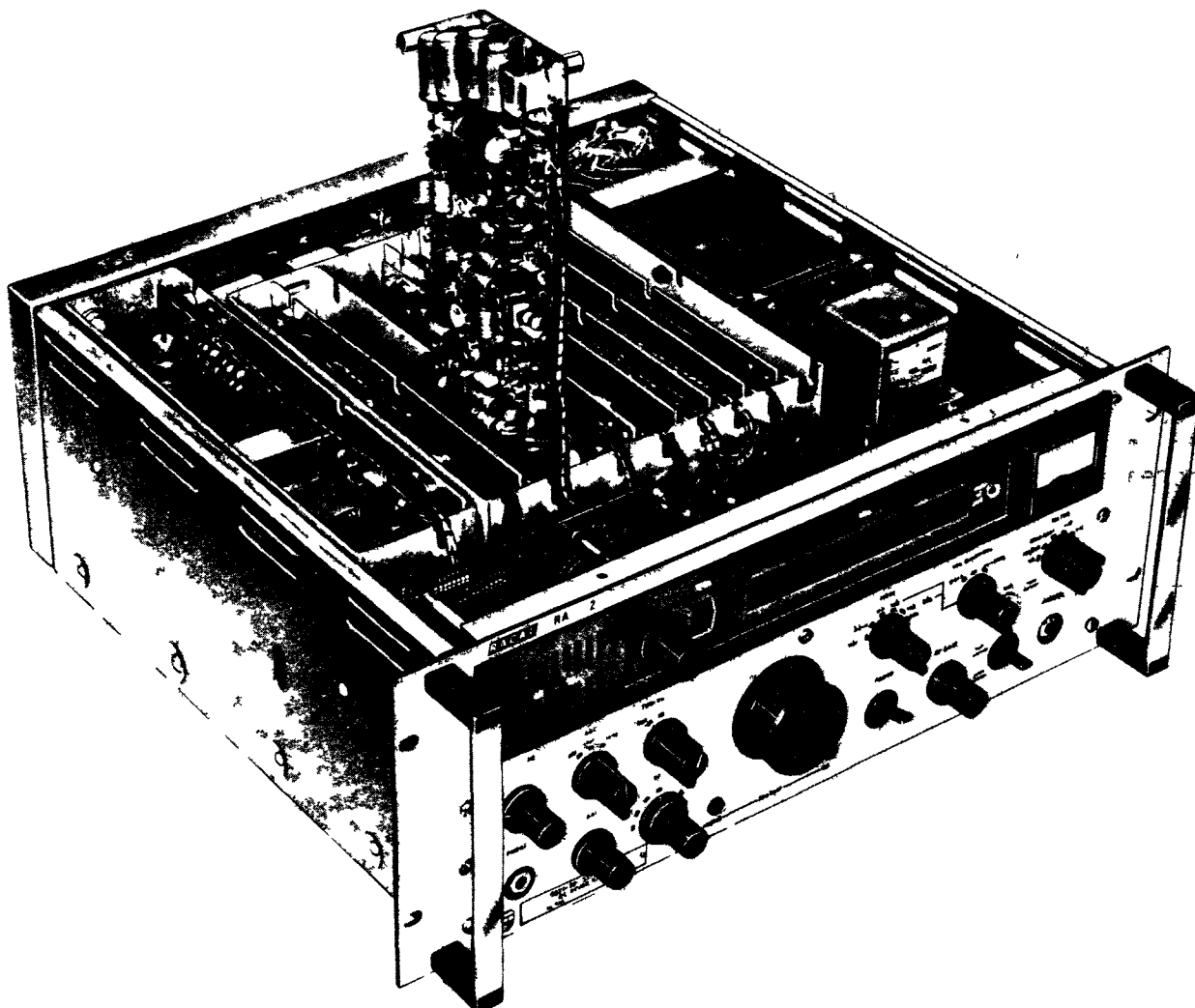


Fig 1 Receiver General View

UK/FRR 626  
HF RECEIVER  
TYPE RA1778/DA78120/B

Relevant publications:

AP 116E-0754-1

FUNCTION

The RA1778 is a fully synthesised solid state communications receiver providing reception facilities for LSB/USB (A3A, A3H, A3J), AM(A3) and CW(A1). Facilities for ISB(A3B), FSK(F1) and AFC are provided by optional, internally fitted, modules.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

The receiver is fully synthesised and tunable over the range 15 kHz to 30 MHz, with a built-in memory facility which can be programmed up to 12 frequencies for rapid channel changes.

A rigid die-cast chassis provides the basis for the main frame of the receiver. Mounted within compartments on the underside of the chassis are the mixer boards and part of the frequency generating system. Mounted on the top of the chassis is an aluminium box structure, which houses up to nine (dependent on the options fitted) printed circuit boards, each individually screened. Also mounted on the top of the chassis is the frequency standard module and the power supply transformer. The power supply printed circuit board is mounted on the inside of the rear panel and adjacent to this board are mounted the power supply smoothing capacitors. Further printed circuit boards containing memory and decoder logic circuits are mounted on the inside of the front panel. Fig 1 illustrates the controls and indicators on the receiver front panel.

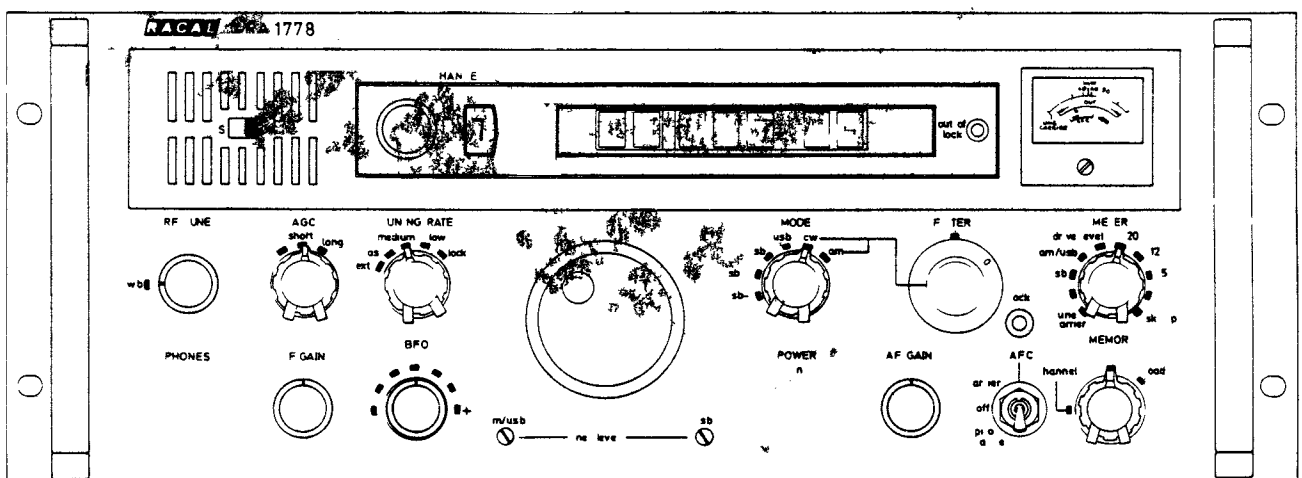


Fig 1 RA1778 HF Receiver Front Panel

PHYSICAL CHARACTERISTICS

Weight

Complete unit. 48½ lb (22 kg).

Dimensions

Height: 7 inches (178 mm).  
Width: 19 inches (483 mm).  
Depth: 16 inches (407 mm).

FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.

Modes of reception: A1, A2, A2H, A2J, A3, A3A, A3J, A3H  
with the following options:

- (1) Choice of USB or LSB.
- (2) Provision for reception of A3B or F1.
- (3) Provision of AFC.

Tuning: 12 Programmable channels.  
Continuously tunable synthesiser in  
10 Hz, 20 Hz or 1 kHz increments.  
7 Digit electronic readout.

Tuning accuracy: ±5 Hz relative to the frequency of the  
required signal.

Power supply: 100 V to 125 V or 200 V to 250 V, 45 to 65 Hz.

Power consumption: Approximately 60 VA (basic receiver).  
Approximately 90 VA (fully equipped).

Operation: -10°C to +55°C.

UK/FRR-627  
REMOTELY CONTROLLED HF RECEIVER  
TYPE MA1072/RA1784

Relevant publications:

AP 116E-0755-1A

FUNCTION

The RA1784 is a fully synthesised, triple-conversion, HF communications receiver operating over the frequency range 15 kHz to 29.99999 MHz.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

A rigid die-cast chassis provides the basis for the main frame of the receiver, illustrated in Fig 1. Frequency selection and control of all available functions is achieved by serial data from the MA1072 control panel. This data is applied to a serial data interface module at the RA1784 receiver, where it is converted into parallel internal control data. This technique allows extended or full remote control using two cables, with revertive check data returned via a third cable. For extended control the MA1072 control panel may be linked directly to the RA1784 receiver by hard wired cables. For remote control, standard telephone circuits may be used via data modems.

The MA1072 control panel is illustrated in Fig 2. The receiver frequency is set by a single tuning knob and is indicated on a 7-digit display. The selected function, tuning rate and other facilities are indicated by the appropriate illuminated push-button. If a fault occurs on the receiver, or the interconnections have not been made, a fault indicator is illuminated. A battery operated memory circuit will retain the currently tuned frequency and maintain other settings during a temporary supply failure.

A number of MA1072 control panels and/or RA1784 receivers may be connected with ancillary equipment into systems to provide for a variety of applications. The EXTERNAL socket on the MA1072 control panel provides for the connection of a frequency entry pad. This may take the form of a numeric key pad (0 to 9 and decimal point) to enable the receiver to be set rapidly to a particular operating frequency. Alternatively, a multi-frequency memory together with a channel switch would enable the receiver to be set rapidly to any one of a number of pre-programmed channel frequencies.

Power supply

The RA1784 receiver requires an a.c. input of 100 V to 125 V or 200 V to 250 V at 45 to 65 Hz.

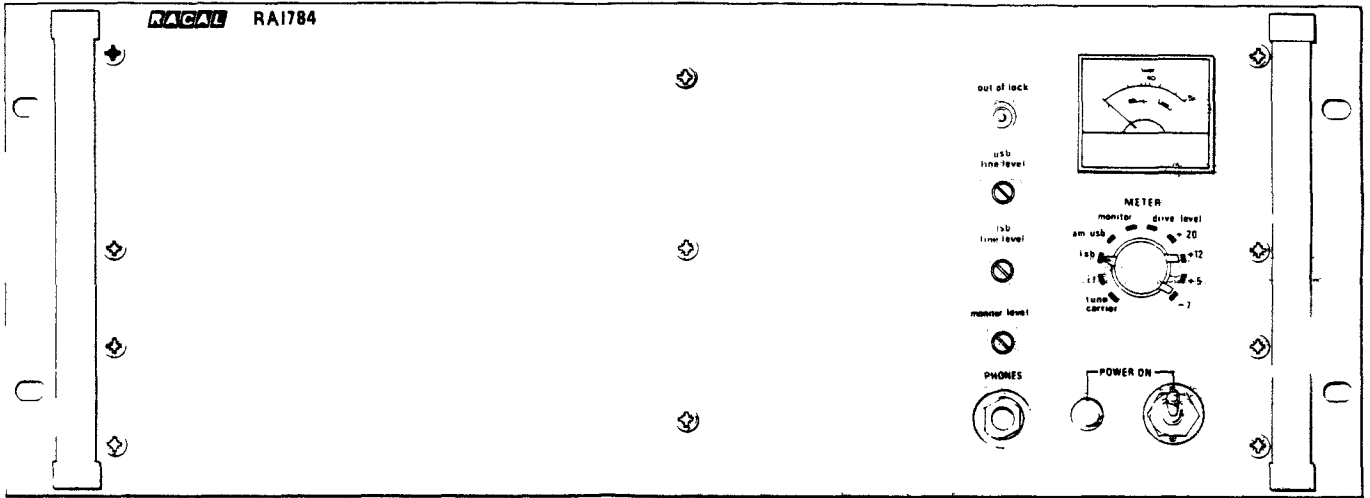


Fig 1 RA1784 Receiver Front View

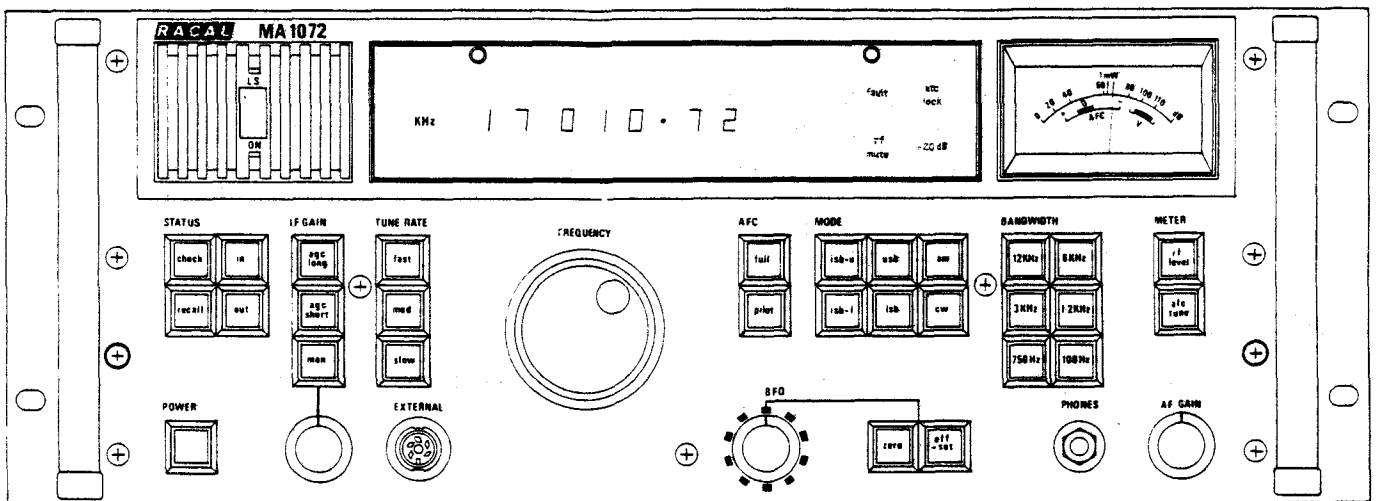


Fig 2 MA1072 Control Panel Front View

PHYSICAL CHARACTERISTICS

	<u>MA1072 Control Panel</u>	<u>RA1784 Receiver</u>
Weight:	Approximately 16 kg.	Approximately 31 kg.
Height:	178 mm.	178 mm.
Width:	483 mm.	483 mm.
Depth:	300 mm.	464 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.

Modes of reception: A1, A2, A2H, A2J, A3, A3A, A3B, A3J, A3H  
with the following options:

- (1) USB and/or LSB.
- (2) ISB.
- (3) AFC.
- (4) Half octave filters.

Tuning: Continuously tunable synthesiser in 10 Hz,  
20 Hz or 1 kHz increments.  
Electronic frequency display in 10 Hz steps.

Power supply: 100 V to 125 V or 200 V to 250 V, 45 to 65 Hz.

Power consumption: Approximately 60 VA (basic receiver).  
Approximately 90 VA (fully equipped).

Operation: -10°C to +55°C.

UK/FRR 638 RECEIVER  
UHF/VHF MULTI-CHANNEL  
GROUND-TO-AIR COMMUNICATIONS EQUIPMENT

Relevant publications:

AP 116E-0756-16 - Receiver UK/FRR 638.

DESCRIPTION

Receiver Assembly

The UK/FRR 638 receiver operates in the UHF frequency range 225 to 399.975 MHz and the VHF frequency range 117 to 136.975 MHz. The receiver comprises a power supply and an IF/AM detector module with UHF or VHF front end, synthesiser and preset memory module. The memory can hold up to 29 separate channels. The frequency selection controls are on the preset memory module, which may be a UHF or VHF unit. This module is fastened into but removable from the equipment case front. The receiver assembly is illustrated in Fig 1.

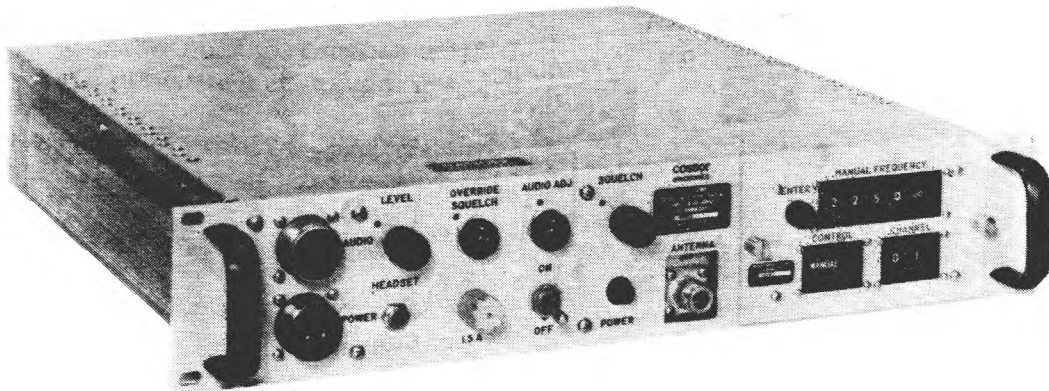


Fig 1 Receiver Assembly

LEADING PARTICULARS

Receiver assembly

Frequency range: VHF: 117.000 to 136.975 MHz.  
UHF: 225.000 to 399.975 MHz.

Modulation: Amplitude modulation.

Power supplies: 207 to 255 V ac at 47 to 63 Hz.

Temperature: Operating: -10°C to +55°C.  
Storage: -40°C to +85°C.

Dimensions:  
Width: 483 mm.  
Height: 89 mm.  
Depth: 483 mm.

Weight: Case: 12.3 Kg.  
Modules: 6.4 Kg.

DESCRIPTION

Remote Control Unit

The Remote Control Unit (RCU) is a self-contained unit providing frequency or channel selection of the transmitters from a remote location, when REMOTE is selected on the main equipment. The RCU is connected to the main equipment by 40 metres of multicore cable thus enabling the operation of the equipment to be carried out by the operator in a control tower situation, with the main equipment located in a ground area.

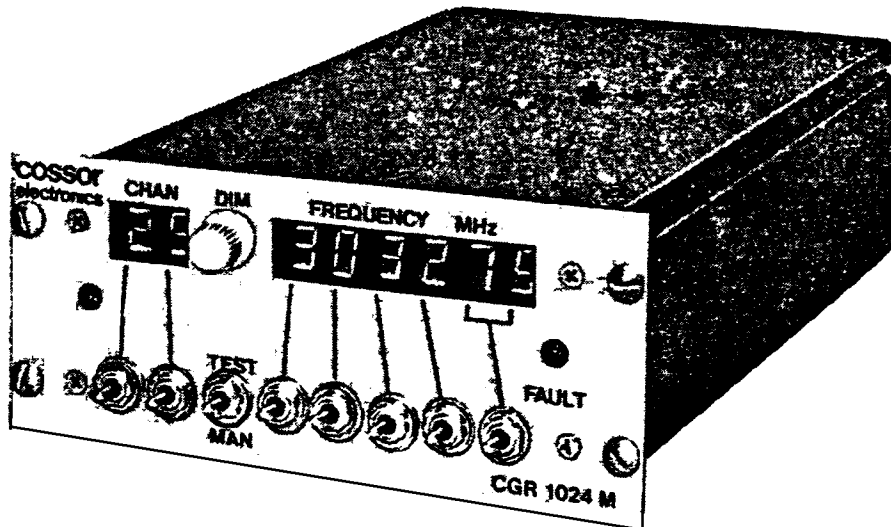


Fig 2 Remote Control Unit

LEADING PARTICULARS

Remote control unit

Dimensions.

Width: 146 mm.  
Height: 64 mm.  
Depth: 281 mm.

Weight: 0.80 Kg.

Temperature: Operating: -10°C to +55°C.  
Storage: -40°C to +85°C.

Power requirements: +28 V at 0.75 A max to transmitter  
and 0.375 A for receiver.

## PREFACE

This Air Publication is one of a series, given in the List of Associated Publications, providing concise details of ground radio equipment and ancillaries.

When this publication is amended, changes in technical information within individual pages will be marked by two marginal arrows thus:

▶-----◀ indicating the start and finish of the changed text. Grammatical changes or corrections will not be so marked.

LIST OF ASSOCIATED PUBLICATIONS IN THE SERIES

<u>AP</u>	<u>Title</u>
116A-0110-1	Introduction and index (to complete series)
116A-0111-1	Fixed ground radio installations
116A-0112-1	Transportable ground radio installations
116A-0113-1	Mobile ground radio installations
116A-0114-1	Radio transmitting equipment (including transmitter-receivers)
116A-0115-1	Radio receiving equipment
116A-0116-1	Frequency generation equipment
116A-0117-1	Control, monitoring and simulating equipment (including closed circuit television, sound recording and sound reproducing equipment)
116A-0118-1	Antennas, masts and antenna tuning, coupling and matching equipment
116A-0119-1	Radio and telegraph power supply equipment
116A-0120-1	Telegraph and terminal equipment

## CONTENTS

Preliminary pages

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Concise details

Item No.	Equipment
1	Receivers type R1392D (10D/17745), R1392E (10D/17768), R1392J (5820-99-953-7424) and 62H (Naval) (10D/23989)
2	Receiver type R7109 (5820-99-932-5695)
3	Receiver type R7351 (5820-99-932-5694)
4	Receiver type R8998 (5820-99-955-0769)
5	Receiver type R10149 (5820-99-933-2369)
6	Receiver type R10168 (5820-99-955-0771)
7	Receiver type R10170 (5820-99-955-0770)
8	Receiver type R15095 (10D/20489)
9	Receiver type R15172 (10D/22019)
10	Receiver (5820-99-933-0813)
11	Receiver (5820-99-943-2775)
12	Receiver (5820-99-999-9292)
13	Receiver (5820-99-950-5773)
14	Receiver (5820-99-953-2075)
15	Receiver (5820-99-107-5921)
16	Receiver (5820-99-107-4926)
17	Receiver (5820-99-618-1034)
18	Receiver (5820-99-119-3981)
19	Receiver (5820-99-119-3979)
20	Receiver (5820-99-951-0461)
21	Receiver (5820-99-630-9620)
22	Receiver (5820-99-624-0202) Raca1 RA1218A
23	Tracking receiver DEI model MTR 4B
24	VLF tracking receiver Tracor Inc. model T599H
▶ 25	Receiver UK/FRR 652
26	Receiver UK/FRR 628
27	To be allocated
28	Receiver UK/FRR 626
29	Receiver UK/FRR 627
30	Receiver UK/FRR 638

RECEIVER, RADIO

Type R1392D (10D/17745)  
 R1392E (10D/17768)  
 R1392J (5820-99-  
 953-7424)  
 62H (Naval)(10D/  
 23989)

Relevant publication:-

AP116E-0702-1

**Function**

V.H.F. communication and D/F receivers primarily intended for use in conjunction with the transmitters Type T.1131 series and T.1540, receiver (Naval) 62H being specifically used with transmitter Type 75C. The receivers are designed for the reception of c.w. and R/T signals. Receivers R.1392D and E are similar R.1392D being tropicalized whilst R.1392E is non-tropicalized. R.1392G is similar to R.1392D but covers a lower frequency range. R.1392J is similar to R.1392D but is more selective. Receiver 62H is designed for a ship-borne or ground station role and tropicalized.

**Frequency range**

100 MHz to 156 MHz (3 to 1.9 metres).  
 65 MHz to 85.375 MHz (R.1392G only) (4.6 to 3.5 metres).

**Frequency control**

Crystal controlled heterodyne oscillator with a multiplication factor of 18.

**Frequency accuracy and stability**

To crystal accuracy.

**Channel spacing**

Suitable for reception of transmissions spaced by 90 kHz.

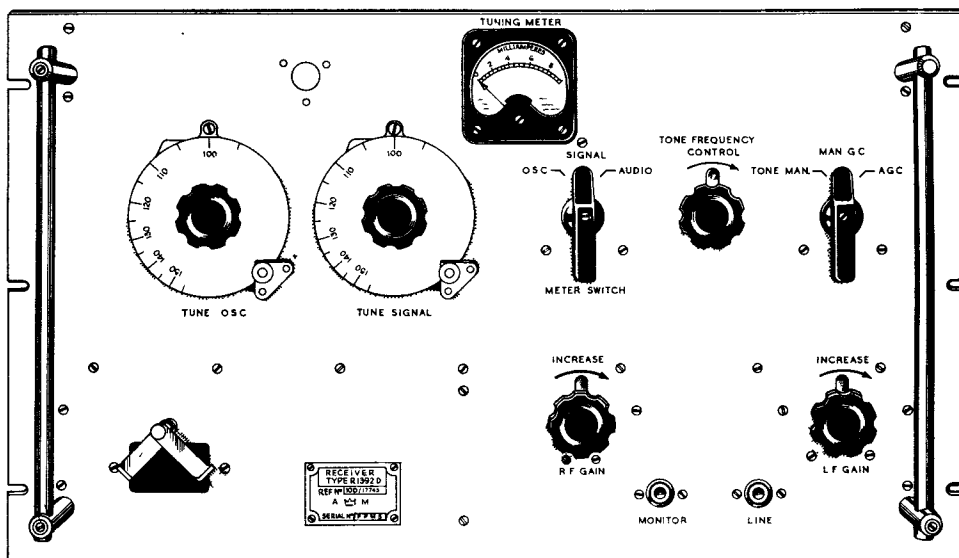
Suitable for reception of transmissions spaced by 50 kHz (R1392J)

**Intermediate frequency**

4.86 MHz.  
 9.72 MHz (62H only).

**I.F. Bandwidth**

For 6dB down: plus or minus 25 kHz  
 12 kHz (R1392J)



Receiver, Type 1392D

**Modulation**

**Input impedance**

**Sensitivity**

**Muting level**

**Automatic gain control**

**Output impedance**

**Output power**

**Antennae**

**Power supplies**

**Power consumption**

**Overall dimensions**

**Weight**

**Ancillary equipment**

Amplitude modulated reception.

100 ohms (coaxial feeder line).

For output of not less than 100mW into 600 ohms, in each case:—

R.1392D & E require 10 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

R.1392J requires 8 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

62H (Naval) requires 5 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

R.1392D & E 7 $\mu$ V; R.1392J 6 $\mu$ V; 62H 4 $\mu$ V.

Fully operative at 8 $\mu$ V.

600 ohms (surge impedance).

5mW at plug PL1, 100mW at line jack J1 100mW (62H Naval).

Standard v.h.f. antenna.

62H (Naval): suitable for C.A.W. system.

6.3V at 4A, 240V at 80mA.

50 watts: 62H (Naval) 60W (approx.).

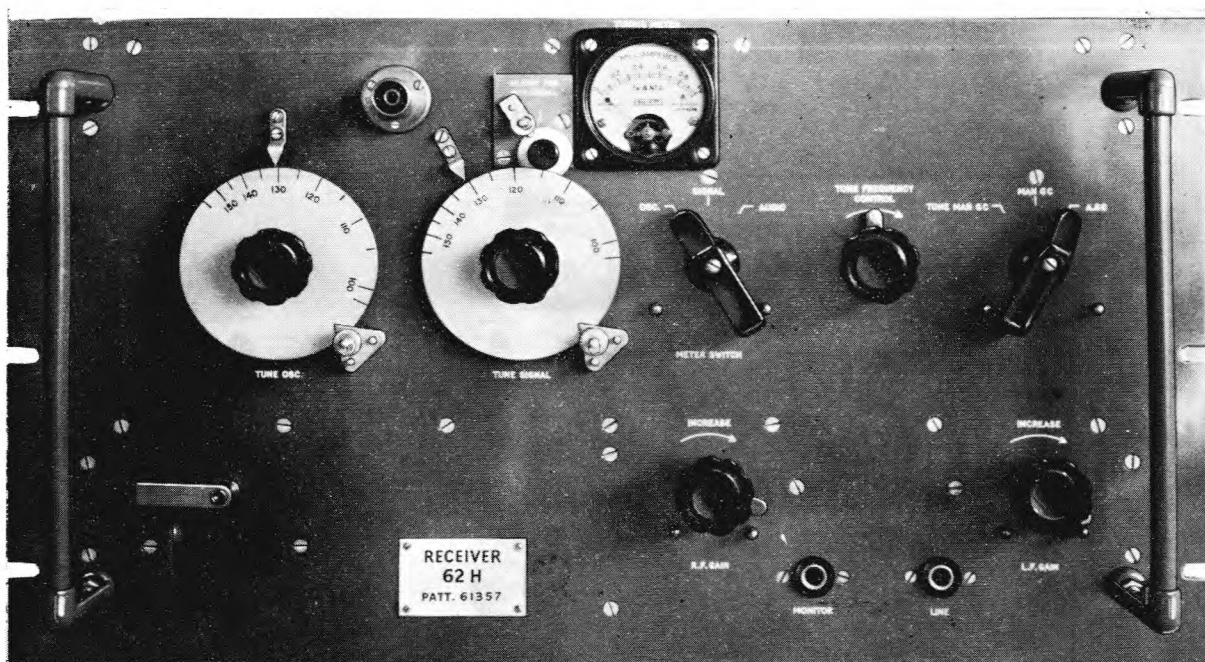
Height	Width	Depth
10½ in (26.7 cm)	1ft 7in (48.3 cm)	1ft 0½ in (31.7 cm)

47 lb (21.3 kg).

Power unit, Type 234A (a.c. mains) (10D/17395).

Power unit, Type 138 (6V d.c. supply) (10D/17390).

Power unit, A.P.W836A (a.c. mains).



**Receiver, Type 62H**

## RECEIVER, RADIO

Type R7109  
(5820-99-932-5695)

Relevant publication:-

AP116E-0731-1

**Function**

U.H.F. multi-channel receiver for fixed or mobile ground installations. The receiver is a double super-heterodyne with the first local oscillator controlled by a channel selection and frequency control system. Receiver R.7109 comprises receiver sub-assembly (formerly receiver unit Type 9095), cover electrical fitted (formerly cover assembly), cable assembly (formerly cable assembly Type 7804) and cover, access, electrical equipment, fitted chassis (formerly cover front, Type 1068).

**Origin**

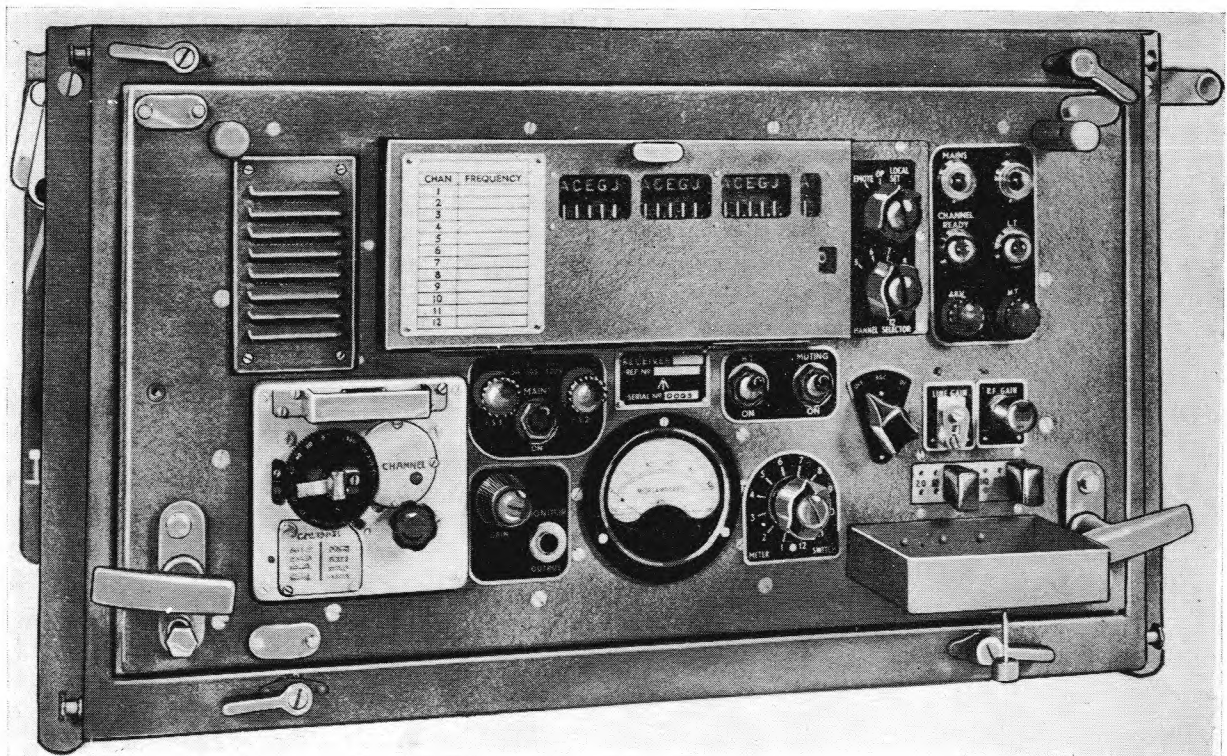
The Plessey Co. Ltd., Type XCA.200.

**Frequency range**

225 MHz to 399.9 MHz.

**Frequency control and channel system**

Frequency of the first oscillator is controlled by a channel selection and frequency control system. Frequency of the second oscillator is crystal controlled at 22.025 MHz. The receiver can be set up at any twelve channels out of the total of 1750. Any one of the twelve can subsequently be selected either locally or remotely via a remote control system.



Receiver, Type R.7109

**Frequency accuracy and stability**

The operating frequency of the receiver is automatically kept within 10 MHz of correct frequency after selection is made.

**Channel spacing**

100 kHz.

**Intermediate frequencies**

24 MHz and 1.975 MHz.

**I.F. Bandwidth**

*For 6dB down:* not less than 60 kHz.  
*For 60dB down:* not greater than 140 kHz.

**Modulation**

Amplitude modulated reception.

**Sensitivity**

With an r.f. signal across the antenna terminals of  $1\mu\text{V}$  modulated 30 per cent at 1000 Hz, the signal/noise ratio at the output is greater than 10dB.

**Output**

With an r.f. signal across the antenna terminals of  $5\mu\text{V}$  modulated 100 per cent at 1000 Hz:—  
Monitor output 200mW.

Line output 2.0V and 3.5V for any load between 100 ohms and 1800 ohms.

Attenuated line output 1mW max. into 600 ohm G.P.O. line.

**Antennae**

Antenna unit, design 41, Type AJE.

**Power supplies**

115 or 230 volts, 45 to 65 Hz, single-phase a.c.

**Power consumption**

250 watts.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft 1 $\frac{1}{4}$ in (33.6 cm)	1ft 11 $\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

**Weight**

110 lb (50 kg) (*excluding cabinet*)  
Cover assembly 51 lb (23 kg) (*excluding connectors*).

**Ancillary equipment**

Cooler, dry air, electrical equipment (5820-99-932-3995) (formerly air blower, Type 7344, 10K/19476).

## RECEIVER, RADIO

Type R7351  
(5820-99-932-5694)

Relevant publication:-

AP116E-0730-1

**Function**

U.H.F. single channel receiver for fixed or mobile ground installations. The receiver is a double super-heterodyne with both oscillators crystal controlled, and comprises receiver sub-assembly (formerly receiver unit, Type 9096), cover electrical fitted (formerly cover assembly), cable assembly (formerly cable assembly, Type 9097) cover, access, electrical equipment, fitted chassis (formerly cover front, Type 1068) and two external connectors.

**Origin**

The Plessey Co. Ltd.

**Frequency range**

225 MHz to 399.9 MHz.

**Frequency control**

Crystal controlled local oscillators.

**Frequency accuracy and stability**

To crystal accuracy.

**Channel spacing**

100 kHz.

**Intermediate frequencies**

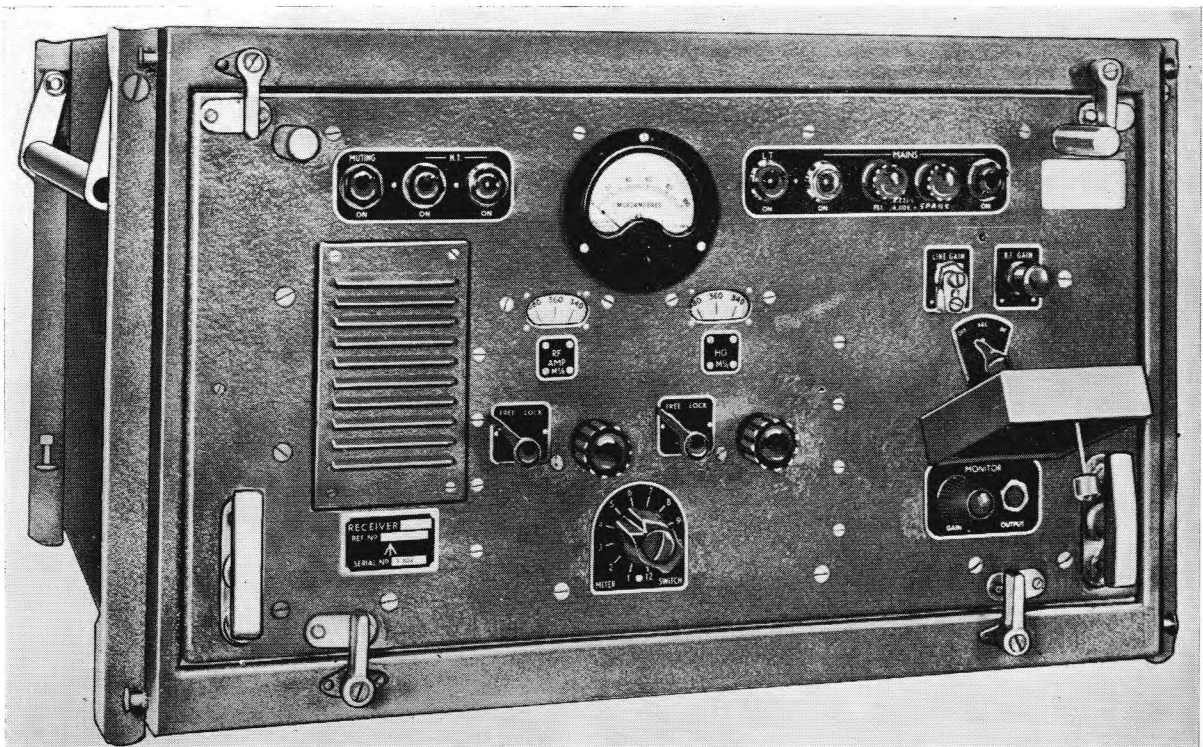
24 MHz and 1.975 MHz.

**Modulation**

Amplitude modulated reception.

**Sensitivity**

With an r.f. signal across the antenna terminals of  $1\mu\text{V}$  modulated 30 per cent at 1000 Hz, the signal plus noise/noise ratio at the output is greater than 10dB.



Receiver, Type R.7351

**Output**

With an r.f. signal across the antenna terminals of  $5\mu\text{V}$  modulated 100 per cent at 1000 Hz:—  
Monitor output 200mW.

Line output 2.0V and 3.5V for any load between 100 ohms and 1800 ohms. Attenuated line output: 5mW max., into 600 ohms G.P.O. line.

**Antennae**

Antenna unit, design 41, Type AJE.

**Power supplies**

115 or 230 volts, 45 Hz to 65 Hz single phase a.c.

**Power consumption**

160 watts.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft 1 $\frac{1}{4}$ in (33.6 cm)	1ft 11 $\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

**Weight**

80 lb (36.3 kg) (*excluding cabinet*)

*Cover assembly 51 lb (23 kg) (excluding connectors).*

**Ancillary equipment**

Cooler, dry air, electrical equipment (5820-99-932-399) (formerly air blower, Type 7344, 10K/19476).

## RECEIVER, RADIO

Type R8998  
(5820-99-955-0769)

## Relevant publication:-

AP116E-0734

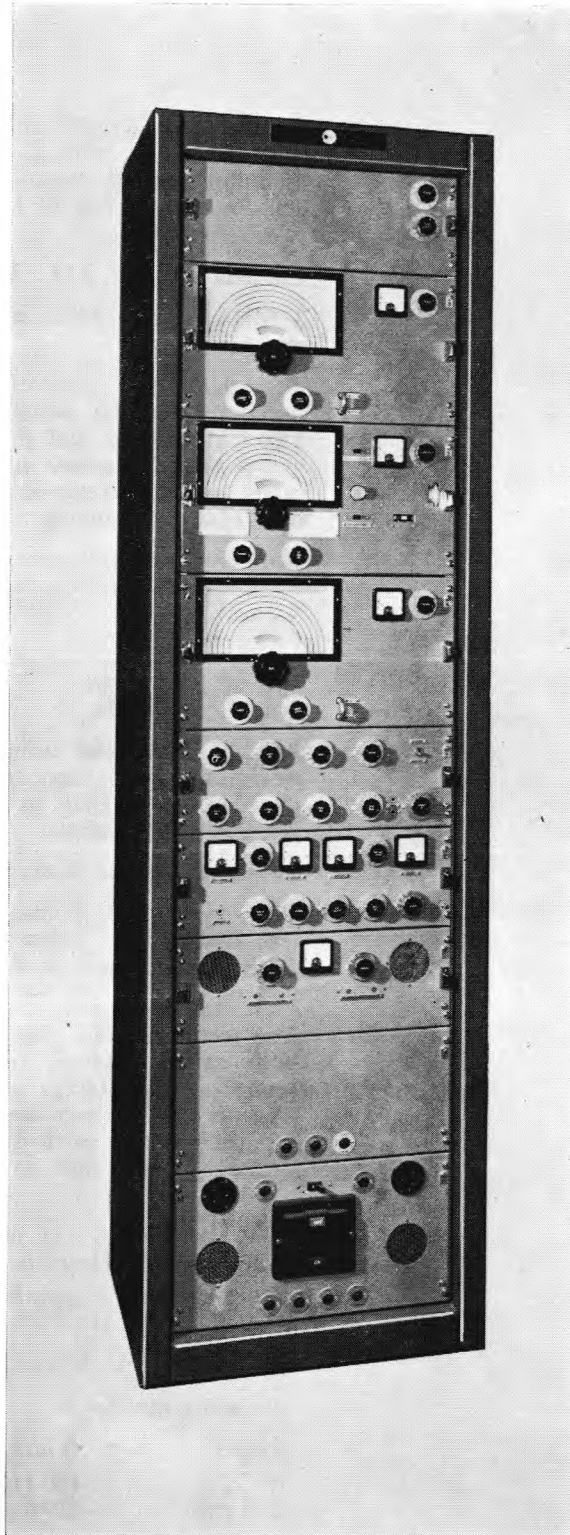
<b>Function</b>	Double diversity h.f. receiver comprising a triple superheterodyne with a high stability variable local oscillator and six crystal controlled spot frequencies (c.w., m.c.w., on/off or f.s.k. working).		
<b>Origin</b>	The Marconi Co. Ltd., Type H.R.11.		
<b>Frequency range</b>	3 MHz to 27.5 MHz in four ranges. (100 to 10.9 metres).		
<b>Frequency control</b>	A variable L.C. controlled first frequency changer oscillator may be switched in place of the crystal first oscillator so that the receiver may be tuned to any desired frequency in the band. Frequency multipliers are used to provide the final frequency required for frequency changing.		
<b>Frequency accuracy and stability</b>	<i>Variable first oscillator:</i> 15 parts in $10^6$ per degree C. <i>Crystal first oscillator:</i> 1 part in $10^6$ per degree C. <i>Second oscillator:</i> 15 parts in $10^6$ per degree C.		
<b>Intermediate frequencies</b>	1st i.f. 2600 kHz. 2nd i.f. 100 kHz. 3rd i.f. 10 kHz.		
<b>Sensitivity</b>	At 27.5 MHz and using the 1 kHz passband, the minimum signal input required for recording f.s.k. (560 Hz shift) signals at a keying speed of 100 bauds is $0.25\mu\text{V}$ in 75 ohms.		
<b>Input impedance</b>	75 ohms (coaxial feeder).		
<b>A.F.C.</b>	The receiver will follow, with a residual mistune of less than 4 Hz, frequency drifts up to $\pm 3$ kHz arising as the sum of drifts of the carrier frequency and of the receiver oscillator.		
<b>D.C. output</b>	The recording unit provides a d.c. output of 30.0-30 volts at 10 kilohms impedance for keying a tone sender or any voltage operated telegraph equipment. The output unit provides two d.c. outputs of 30.0-30 mA each into an earthed load not exceeding 2 kilohms or 20.0-20 mA into an earthed load not exceeding 4 kilohms.		
<b>Max. receiving speed</b>	300 bauds (375 w.p.m. morse code) with 3 kHz bandwidth and 850 Hz shift. 200 bauds (250 w.p.m. morse code) with 1 kHz bandwidth and 560 Hz shift.		
<b>Power supplies</b>	200 to 250 volts, 50 Hz single phase a.c.		
<b>Power consumption</b>	500 watts (approx.).		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7ft 2 $\frac{1}{4}$ in (219 cm)	1ft 11 $\frac{1}{2}$ in (59.6 cm)	1ft 9in (53.3 cm)

**Weight**

743 lb (349.3 kg).

**Ancillary equipment**

Receiver, radio, 5820-99-955-0771 (formerly receiver, Type R.10168 10D/20459).



**Receiver, Type R.8998**

## RECEIVER, RADIO

Type R10149  
(5820-99-933-2369)

Relevant publication:-

AP116E-0716-1

**Function**

Triple diversity, independent sideband h.f. receiver. The receiver is a double superheterodyne and may be crystal controlled on six spot frequencies or may be tuned to any required frequency by a variable oscillator incorporated in the equipment. It will receive independent sideband, single-sideband or double-sideband transmissions. The equipment comprises fifteen removable units mounted in two steel cabinets.

**Origin**

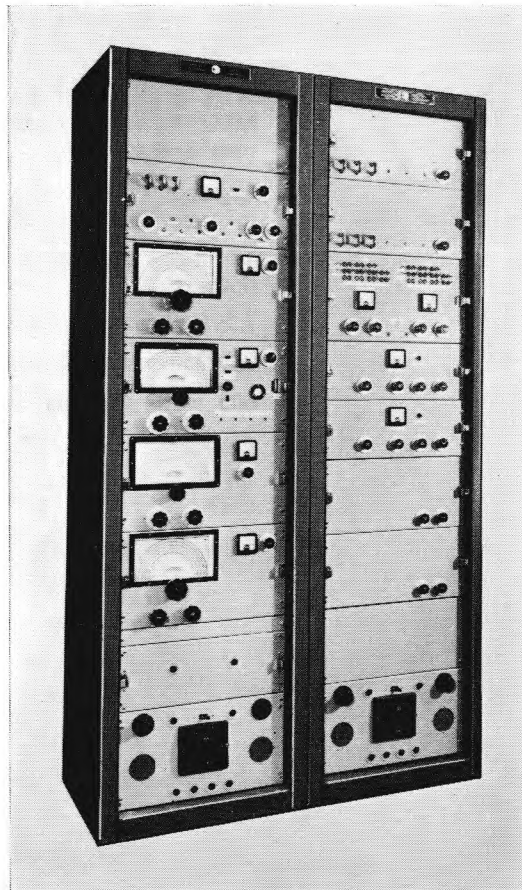
The Marconi Co. Ltd., Type HR.23.

**Frequency range**

3 MHz to 27.5 MHz in four ranges (100 to 10.9 metres).

**Frequency control**

Frequency of the first oscillator is controlled by a variable oscillator or crystal controlled oscillator for any one of six spot frequencies. An a.f.c. system is incorporated in which the frequency of i.f.2 (100



Receiver, Type R.10149

kHz) resulting from the receiver carrier is compared with a crystal controlled 100k Hz reference frequency. Any frequency difference between the carrier and the reference frequency causes a connecting motor in the a.f.c. system to vary the second oscillator frequency so as to reduce the error to zero.

The combined variations in frequency of the receiver oscillator does not exceed the following:—

	Crystal oscillator	L.C. oscillator
At 3 MHz	50 Hz per degree C	130 Hz per degree C
10 MHz	60 Hz per degree C	230 Hz per degree C
20 MHz	70 Hz per degree C	400 Hz per degree C
27.5 MHz	80 Hz per degree C	500 Hz per degree C

**Frequency accuracy and stability**

**Selectivity**

1st i.f.: plus or minus 9 kHz at 2dB attenuation.  
 1st i.f.: plus or minus 38 kHz at 30dB attenuation.  
 2nd i.f.: Discrimination against unwanted frequencies more than 520 Hz outside the passband is greater than 75dB from 4 to 10 MHz and greater than 60dB for frequencies above 10 MHz.

**Frequency response**

3.5 kHz passband: less than 3dB total variation from 100 Hz to 2.5 kHz.

6 kHz passband: less than 3dB total variation from 100 Hz to 6 kHz.

**Intermediate frequencies**

1st i.f. 2600 kHz and 2nd i.f. 100 kHz.

**Cross talk**

Less than -60dB between sideband paths.

**Input impedance**

75 ohms (coaxial feeder).

**Sensitivity**

With a signal of 1.4µV at 3 MHz or 2µV at 27.5 MHz the output signal/noise ratio is 20dB with 6 kHz passband.

**A.F.C.**

Capable of following with less than 1 Hz residual mistune, frequency drifts up to plus or minus 3 kHz.

**Output power**

40 milliwatts (max) in 600 ohms for separate path outputs.

2.5 milliwatts for combined path outputs.

**Power supplies**

200-250 volts, 50 Hz single phase a.c.

**Power consumption**

600 watts (approx.).

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
7ft 2½in	3ft 11in	1ft 9in
(219 cm)	(119.3 cm)	(53.3 cm)

**Weight**

1350 lb approx. (612.4 kg).

RECEIVER, RADIO

Type R10168  
(5820-99-955-0771)

Relevant publication:-

AP116E-0718-1

**Function**

Frequency shift duplex receiver which is used in conjunction with receiver Type R.8998 for double diversity reception of two channel frequency shift duplex signals. The equipment converts the 10 kHz i.f. signal from the receiver into d.c. voltages suitable for operating two-tone senders or a current output which may operate two teleprinters.

**Origin**

The Marconi Co. Ltd., Type HU.14A.

**Reception facilities**

Two channel frequency shift keying (synchronized or unsynchronized): single channel working.

**Input impedance**

600 ohms.

**Output impedance**

10 000 ohms (approximately).

**Input**

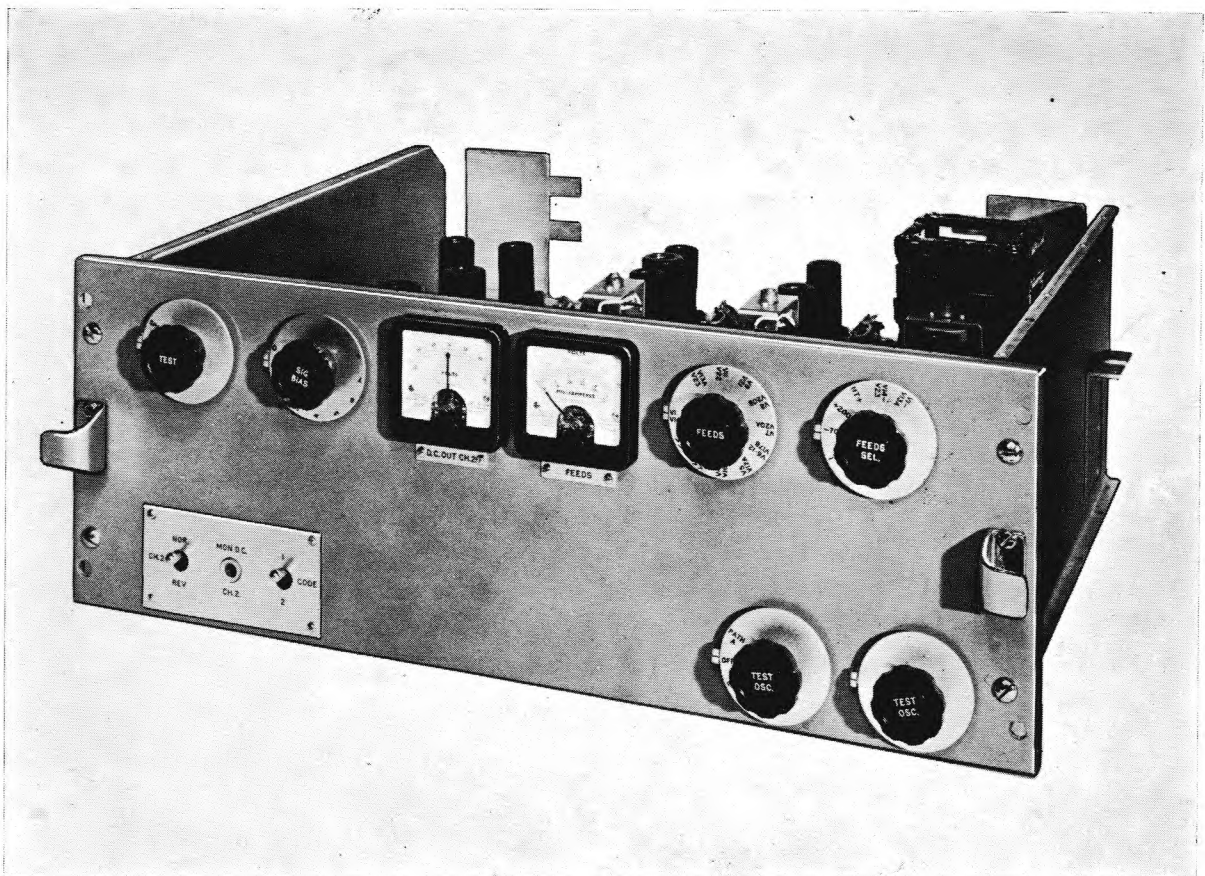
10 kHz centre frequency at levels of 10 mV to 1V.

**Output**

30-0-30V d.c. on both channels.

**Keying speed**

Up to 100 bauds on Channel 1.  
Up to 50 bauds on Channel 2.



Receiver Type R.10168 or R.10170

<b>Power supplies</b>	110-120 volts or 200-250 volts, 50 Hz, single phase a.c.		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	6 $\frac{3}{4}$ in (17 cm)	1ft 7in (48 cm)	1ft 5 $\frac{3}{4}$ in (45 cm)
<b>Weight</b>	24 lb (10.9 kg).		
<b>Associated equipment</b>	Receiver, radio, 5820-99-955-0769 (formerly receiver Type R.8998, 10D/20755).		

## RECEIVER, RADIO

Type R10170  
(5820-99-955-0770)

Relevant publication:-

AP116E-0717-1

(For illustration of Receiver, Type R10170  
see Item No. 6).**Function**

Frequency shift duplex receiver which receives the two-channel f.s.k. modulated i.f. output from rack assembly, Type 9352 and converts the signals into d.c. voltages suitable for operating two-tone senders or a current output unit. The unit is designed to work from the 50 kHz output of the receiving equipment in rack assembly, Type 9352. Provision is made for reversing the phase of the d.c. output of either channel if necessary. A calibrated oscillator is incorporated to enable the unit to be tested and the discrimination to be set up. Switched metering enables all valve feeds and h.t. voltages to be monitored. The d.c. outputs are continuously monitored by centre-zero meters.

**Origin**

The Marconi Co. Ltd., Type HU.14B.

**Reception facilities**

Two channel frequency shift keying (synchronized or unsynchronized). Single channel working.

**Input impedance**

75 ohms (coaxial feeder).

**Output impedance**

10 000 ohms (approximately).

**Input**

50 kHz centre frequency at levels of 10mV to 1V.

**Output**

30-0-30V d.c. on both channels.

**Adjacent frequency shift**

400 Hz with four shift frequencies the total shift is 1200 Hz.

**Keying speed**

Up to 100 bauds on Channel 1.

Up to 50 bauds on Channel 2.

**Power requirements**

230V, 50 Hz, single phase a.c. at 50W,

+140V d.c. at 35 mA.

+210V d.c. at 50 mA.

-140V d.c. at 5 mA.

-70V d.c. at 15 mA.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
6 $\frac{3}{4}$ in (17 cm)	1ft 7in (48 cm)	1ft 5 $\frac{3}{4}$ in (45 cm)

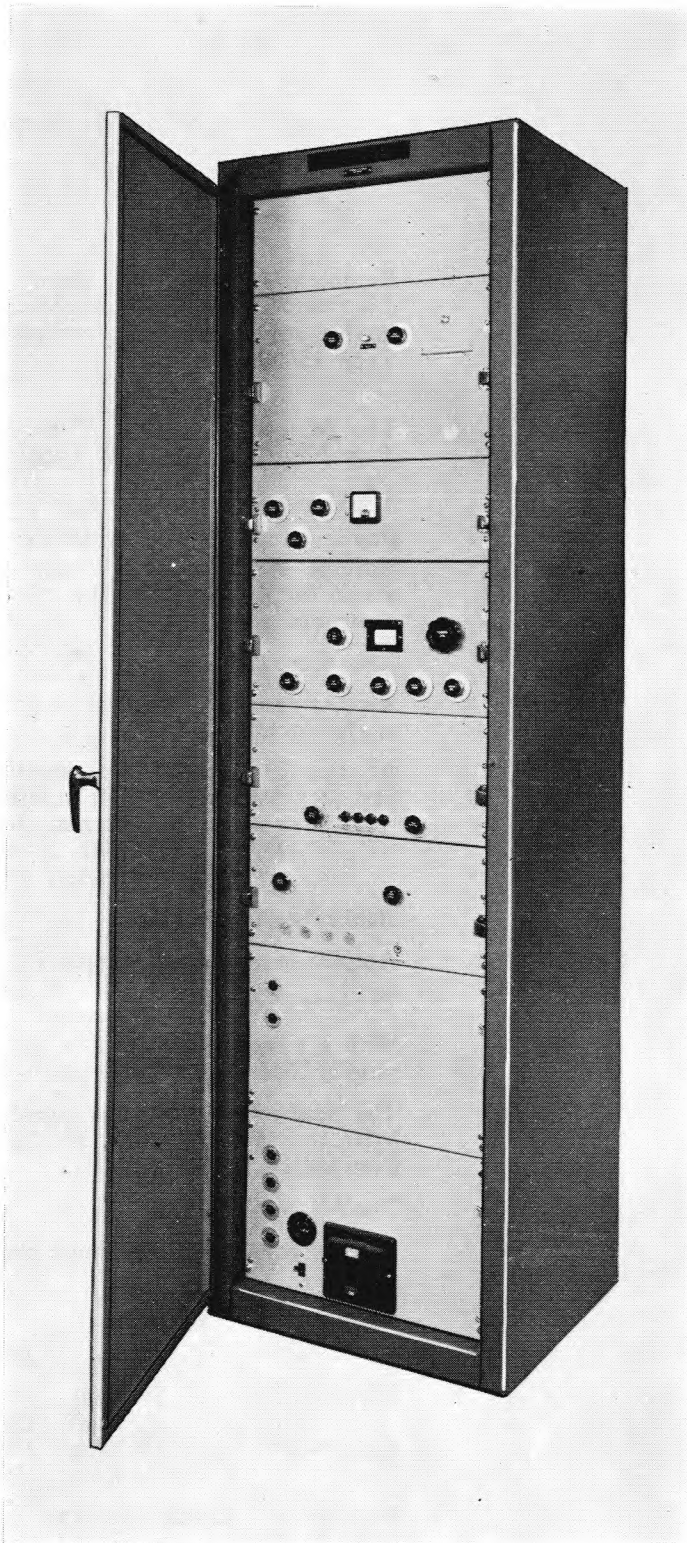
**Weight**

24 lb (10.9 kg).

**Associated equipment**

Rack assembly, Type 9352 (10D/19932).





**Receiver Type R.15095**



Control unit Type 15056

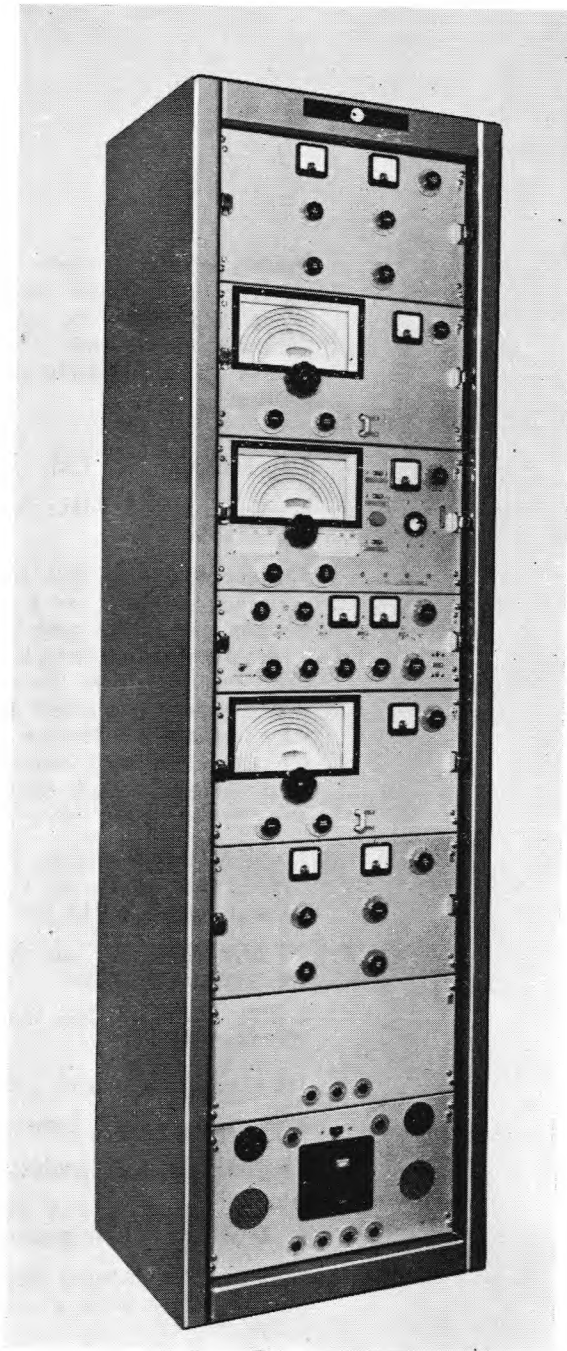
RECEIVER, RADIO

Type R15172 (10D/22019)

Relevant publication:-

AP116E-0722-1

<b>Function</b>	Double diversity single sideband h.f. receiver. The receiver is a double superheterodyne and may be crystal controlled on six spot frequencies or continuously tuned over the frequency range. It will receive either sideband of a double sideband transmission.		
<b>Origin</b>	The Marconi Co. Ltd., Type HR.24.		
<b>Frequency range</b>	3 MHz to 27.5 MHz in four ranges (100 to 10.9 metres).		
<b>Frequency control</b>	Frequency of the first oscillator is controlled by a variable oscillator, or a crystal controlled oscillator for any one of six spot frequencies. An a.f.c. system is incorporated in which the frequency of i.f.2 (100 kHz) resulting from the received carrier is compared with a crystal controlled 100 kHz reference frequency. Any frequency difference between the carrier and the reference frequency causes a correcting motor in the a.f.c. system to vary the second oscillator frequency so as to reduce the error to zero.		
<b>Frequency accuracy and stability</b>	<i>Variable first oscillator:</i> 15 parts in $10^6$ per degree C. <i>Crystal first oscillator:</i> 1 part in $10^6$ per degree C. <i>Second oscillator:</i> 15 parts in $10^6$ per degree C.		
<b>Frequency response</b>	3.5 kHz passband: less than 3dB total variation from 100 kHz to 2.5 kHz. 6 kHz passband: less than 3dB total variation from 100 Hz to 6 kHz.		
<b>Intermediate frequencies</b>	1st i.f. 2600 kHz and 2nd i.f. 100 kHz.		
<b>Cross talk</b>	Less than -50dB between diversity paths.		
<b>Input impedance</b>	75 ohms (coaxial feeder).		
<b>Sensitivity</b>	With a signal of $2\mu\text{V}$ the output signal/noise ratio is 20dB with 6 kHz passband.		
<b>A.F.C.</b>	Capable of following frequency drifts up to plus or minus 3 kHz with a residual mistune of less than 1 Hz.		
<b>Output power</b>	40 milliwatts (max.) in 600 ohms from each diversity path.		
<b>Power supplies</b>	200-250 volts, 50 Hz, single phase a.c.		
<b>Power consumption</b>	400 watts (approx.).		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7ft 0 $\frac{1}{4}$ in (214 cm)	2ft 0in (61 cm)	1ft 8in (56 cm)
<b>Weight</b>	500 lb (approx.) (227 kg).		



**Receiver, Type R.15172**

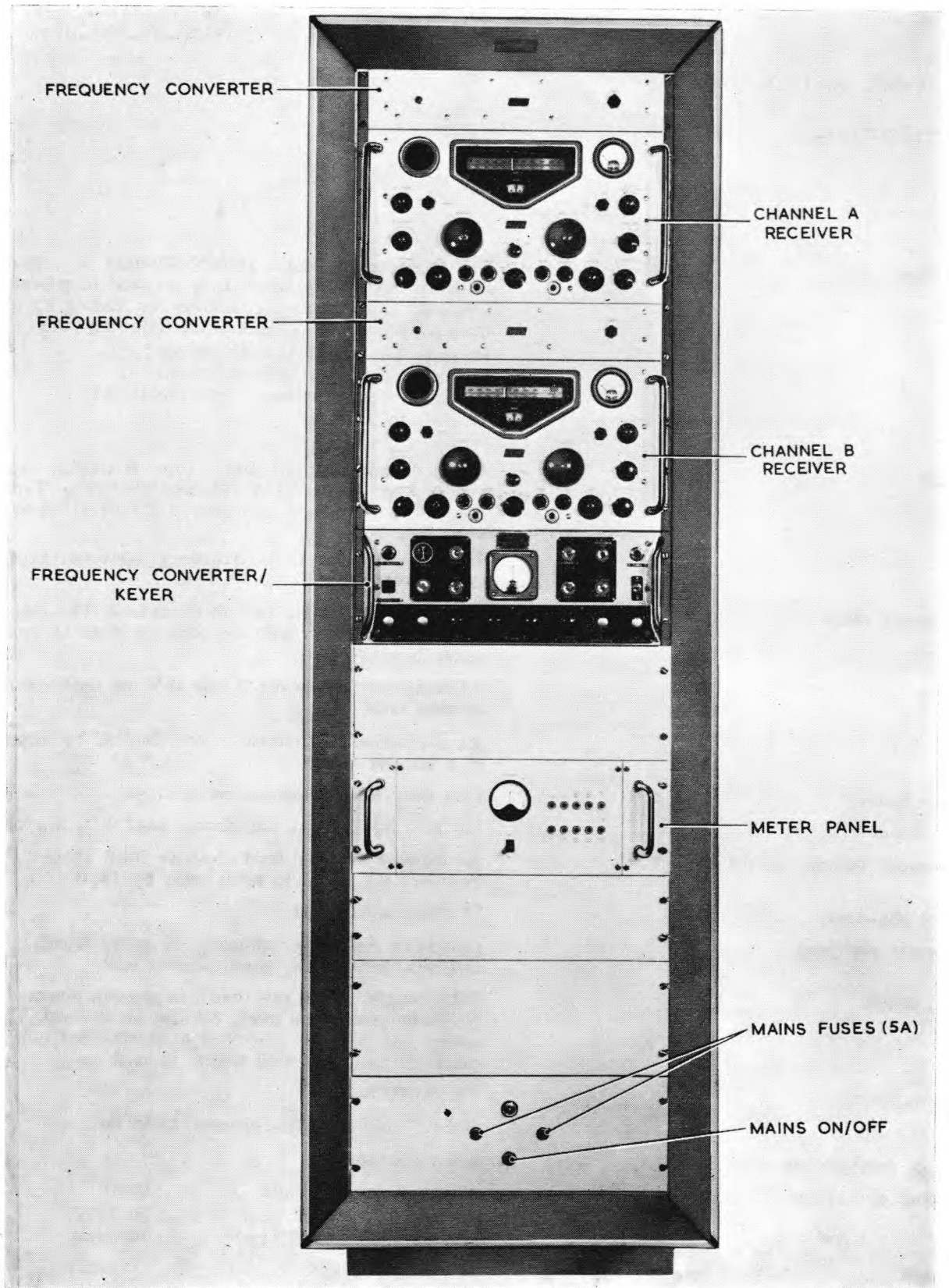
RECEIVER, RADIO  
(A.M. Type S5/1)

5820-99-933-0813

Relevant publication:-

AP116E-0712-1

<b>Function</b>	The receiving set, radio 5820-99-933-0813 is a dual diversity receiving terminal. It is designed to provide frequency shift telegraphy facilities for feeding up to three teleprinters. It consists of the following units:— Receiver Type S1/3 5820-99-999-9292 (2). Frequency converter 5820-99-933-0846 (2). Frequency converter/keyer 5805-99-933-0847.						
<b>Origin</b>	Racal Communications Ltd., Type RA.103/1; receiver A.M. Type S1/3 (5820-99-999-9292), Type RA. 17L; frequency converter (5820-99-933-0846), Type RA. 70D. The Plessey Co. Ltd., frequency converter/keyer (5805-99-933-0847), Type PV.78B.						
<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of an i.f. converter (Sheet No. 11).						
<b>Sensitivity</b>	All reception: bandwidth 3 kHz 1 $\mu$ V for 18dB signal to noise ratio.						
<b>Selectivity</b>	Six alternative i.f. bandwidths are obtained by means of a selector switch.						
<b>Noise factor</b>	Less than 7dB throughout entire range.						
<b>I.F. output</b>	100 kHz at 75 ohms impedance; level 0.2V approx.						
<b>Automatic volume control</b>	An increase in signal level of above 20dB above 1 $\mu$ V improves the signal to noise ratio by 18dB.						
<b>Input impedance</b>	75 ohms unbalanced.						
<b>Diversity switching</b>	<i>Operating time:</i> approximately 20 microseconds. <i>Switching differential:</i> approximately 6dB.						
<b>D.C. output</b>	Polar output: 20-60 mA (one side at earth potential). Normally positive on mark, but can be reversed. The output can also be switched to single-sided output positive or negative with respect to earth.						
<b>Keying speed</b>	Up to 300 bauds.						
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.						
<b>Power consumption</b>	320 watts (approx.).						
<b>Overall dimensions</b>	<table> <thead> <tr> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>6ft 6<math>\frac{3}{8}</math>in (199.1 cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3 cm)</td> <td>2ft 3<math>\frac{1}{2}</math>in (69.8 cm)</td> </tr> </tbody> </table>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	6ft 6 $\frac{3}{8}$ in (199.1 cm)	2ft 0 $\frac{1}{2}$ in (62.3 cm)	2ft 3 $\frac{1}{2}$ in (69.8 cm)
<i>Height</i>	<i>Width</i>	<i>Depth</i>					
6ft 6 $\frac{3}{8}$ in (199.1 cm)	2ft 0 $\frac{1}{2}$ in (62.3 cm)	2ft 3 $\frac{1}{2}$ in (69.8 cm)					
<b>Weight</b>	440 lb (201.8 kg).						



Receiving set, radio 5820-99-933-0813

**FREQUENCY CONVERTER 5820-99-933-0846**

<b>Input frequency</b>	100 kHz $\pm$ 1 kHz.
<b>Input impedance</b>	75 ohms.
<b>Input level</b>	0.1 volt nominal, 0.3 volt maximum.
<b>Attenuator level</b>	0dB to -20dB approx.
<b>Output frequency</b>	14 kHz.
<b>Output impedance</b>	600 ohms.
<b>Output level</b>	5mW $\pm$ 3dB for an input of 0.1 volt.
<b>Spurious output</b>	-40dB relative to 5mW.
<b>Frequency stability</b>	1 part in $10^5$ .
<b>Ambient temperature range</b>	-26°C to +55°C.
<b>Power supply</b>	100-125V and 200-250V, 45-60 Hz.

**FREQUENCY CONVERTER/KEYER 5805-99-933-0847**

<b>Function</b>	To convert frequency shift keying signals to polar or single sided d.c. and act as a diversity switch to select the strongest signal from two diversity receivers.		
<b>Inputs</b>	Two inputs of 600 ohms balanced: centre frequency of input filters 14 kHz. Nominal input level 5mW. Signalling speed up to 300 bauds.		
<b>Outputs</b>	Polar d.c. output: approximately 20-60 mA (one side at earth potential). Normally positive on mark but can be reversed. The output can also be switched to single-sided output positive or negative with respect to earth.		
<b>Telegraph distortion</b>	Not greater than 5% up to 100 bauds.		
<b>Input filters</b>	Separate filters for each channel, centred on 14 Hz. Total bandwidth at -3dB approximately 1000 Hz. Bandwidth at -40dB approximately 5.5 kHz.		
<b>Limiting</b>	The equipment is designed to operate satisfactorily on input signals varying by $\pm$ 20dB on nominal.		
<b>Diversity switching</b>	The stronger input signal is selected. Switching delay, less than 3 milliseconds. Operating time, approximately 20 microseconds. Switching differential approximately 6dB at all input levels.		
<b>Discriminator</b>	A linear discriminator is built into the equipment which will accept shifts between 150 Hz and 1000 Hz without adjustment.		
<b>Power supplies</b>	105V-115V 200V-250V a.c., 40-64 Hz.		
<b>Power consumption</b>	126VA at full output.		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7in (17.8 cm)	1ft 7in (48.3 cm)	1ft 0 $\frac{3}{4}$ in (32.4 cm)
<b>Weight</b>	31 lb (14.1 kg).		

## RECEIVER, RADIO

5820-99-943-2775

## Relevant publication:-

AP116E-0704-1

**Function**

General purpose ground station h.f. communication receiver. The lower frequency limit can be extended to 12.5 kHz by the addition of an i.f. converter which is designated mixer stage, frequency 5820-99-943-3464. The receiver and i.f. converter can be used in rack assemblies or for bench mounting. The following variant assemblies are available:—

Rack mounted receiver—Receiver Type S1/1.

Bench mounted receiver—Receiver Type S1/2 (mounted in cabinet 5820-99-972-8566).

Bench mounted receiver and i.f. converter combined—Receiver Type S2/1 (mounted in cabinet 5820-99-972-8567).

**Origin**

Racal Communications Ltd., Type RA.17, Mk. 2: mixer stage, frequency (5820-99-943-3464) RA.37A.



Receiver, radio 5820-99-943-2775

<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of the i.f. converter.																					
<b>Calibration</b>	A 100 kHz signal derived from a 1 MHz crystal oscillator with a stability of 5 parts in $10^6$ provides check points at 100 kHz intervals.																					
<b>Stability</b>	During a warm-up time of three hours, overall drift is less than 1500 Hz under conditions of constant supply voltage and ambient temperature; beyond this period drift will be less than 150 Hz at all frequencies under normal operating conditions.																					
<b>Sensitivity</b>	<i>C.W. reception:</i> bandwidth 3 kHz $1\mu\text{V}$ for 20dB signal-to-noise ratio. <i>R/T and m.c.w. reception:</i> 30% modulated: bandwidth 3 kHz $3.5\mu\text{V}$ for 20dB signal-to-noise ratio.																					
<b>I.F. output</b>	100 kHz at 75 ohms impedance. Two outlets in parallel are provided.																					
<b>Selectivity</b>	Six alternative i.f. bandwidths are obtained by a selector switch. Filter details are:—																					
	<table border="0"> <thead> <tr> <th><i>Switch position</i></th> <th><i>—6dB</i></th> <th><i>—66dB</i></th> </tr> </thead> <tbody> <tr> <td>100 Hz</td> <td>80-120 Hz</td> <td>less than 1.6 kHz</td> </tr> <tr> <td>300 Hz</td> <td>270-330 Hz</td> <td>less than 1.8 kHz</td> </tr> <tr> <td>750 Hz</td> <td>700-800 Hz</td> <td>less than 2.5 kHz</td> </tr> <tr> <td>1.2 kHz</td> <td>950-1200 Hz</td> <td>less than 8 kHz</td> </tr> <tr> <td>3 kHz</td> <td>2.85-3.3 kHz</td> <td>less than 12 kHz</td> </tr> <tr> <td>8 kHz</td> <td>7.6-8.4 kHz</td> <td>less than 20 kHz</td> </tr> </tbody> </table>	<i>Switch position</i>	<i>—6dB</i>	<i>—66dB</i>	100 Hz	80-120 Hz	less than 1.6 kHz	300 Hz	270-330 Hz	less than 1.8 kHz	750 Hz	700-800 Hz	less than 2.5 kHz	1.2 kHz	950-1200 Hz	less than 8 kHz	3 kHz	2.85-3.3 kHz	less than 12 kHz	8 kHz	7.6-8.4 kHz	less than 20 kHz
<i>Switch position</i>	<i>—6dB</i>	<i>—66dB</i>																				
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750 Hz	700-800 Hz	less than 2.5 kHz																				
1.2 kHz	950-1200 Hz	less than 8 kHz																				
3 kHz	2.85-3.3 kHz	less than 12 kHz																				
8 kHz	7.6-8.4 kHz	less than 20 kHz																				
<b>Noise factor</b>	1.5 MHz: less than 8dB. 3, 6, 12 and 24 MHz: less than 6dB.																					
<b>Image and spurious responses</b>	With a tuned input, external image signals are at least 58dB down. Internally generated spurious responses are 2dB above noise level in all cases.																					
<b>Input impedance</b>	75 ohms unbalanced.																					
<b>B.F.O. stability</b>	With a constant ambient temperature and supply voltage, 30 minutes after switching on, drift does not exceed 50 Hz. For input level variations from $10\mu\text{V}$ to 1mV b.f.o. drift does not exceed 100 Hz.																					
<b>A.F. response</b>	With 8 kHz i.f. bandwidth: response remains within 6dB from 250 Hz to 3500 Hz.																					
<b>A.F. output</b>	(1) $2\frac{1}{2}$ in. loudspeaker (50mW) on front panel. (2) Two telephone sockets in parallel on the front panel. (3) Three independent outputs of 3mW at 600 ohms on rear of chassis. (4) One output of 10mW at 600 ohms. Preset level is independent of gain control setting. (5) One output of 50mW at 3 ohms.																					
<b>Distortion</b>	Not greater than 5% at 50mW output.																					
<b>Hum level</b>	46dB at 1mW (10mW output setting).																					
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.																					
<b>Power consumption</b>	85 watts (approx.).																					
<b>Overall dimensions</b>	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>For rack mounting</i></td> <td>10<math>\frac{1}{2}</math>in (26.6 cm)</td> <td>1ft 7in (48.3 cm)</td> <td>1ft 8<math>\frac{1}{8}</math>in (51 cm)</td> </tr> <tr> <td><i>Fitted cabinet</i></td> <td>1ft 2<math>\frac{1}{2}</math>in (36.8 cm)</td> <td>1ft 8<math>\frac{1}{2}</math>in (53 cm)</td> <td>2ft 3<math>\frac{7}{8}</math>in (70.8 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>For rack mounting</i>	10 $\frac{1}{2}$ in (26.6 cm)	1ft 7in (48.3 cm)	1ft 8 $\frac{1}{8}$ in (51 cm)	<i>Fitted cabinet</i>	1ft 2 $\frac{1}{2}$ in (36.8 cm)	1ft 8 $\frac{1}{2}$ in (53 cm)	2ft 3 $\frac{7}{8}$ in (70.8 cm)									
	<i>Height</i>	<i>Width</i>	<i>Depth</i>																			
<i>For rack mounting</i>	10 $\frac{1}{2}$ in (26.6 cm)	1ft 7in (48.3 cm)	1ft 8 $\frac{1}{8}$ in (51 cm)																			
<i>Fitted cabinet</i>	1ft 2 $\frac{1}{2}$ in (36.8 cm)	1ft 8 $\frac{1}{2}$ in (53 cm)	2ft 3 $\frac{7}{8}$ in (70.8 cm)																			

**Weight** *For rack mounting* 67 lb (30.4 kg).  
*Fitted cabinet* 97 lb (44 kg).

**MIXER STAGE, FREQUENCY 5820-99-943-3464**

**Function** To extend the lower frequency limits of the receiver.

**Frequency range** 12.5 kHz to 980 kHz (24000 to 306 metres).

**Stability** After warm up time of  $1\frac{1}{2}$  hours, overall drift less than 150 Hz under conditions of constant supply voltage and ambient temperature.

**Input impedance** 75 ohms unbalanced.

**Sensitivity** C.W. reception (bandwidth 3 kHz):  $1\mu\text{V}$  for 15dB signal-to-noise ratio. R/T and m.c.w. reception (30% modulated) (bandwidth 3 kHz):  $3\mu\text{V}$  for 20dB signal-to-noise ratio.

**Image response** With tuned input, external image signals are reduced by at least 50dB.

**Overall dimensions**

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>For rack mounting</i>	$1\frac{3}{4}$ in (4.4 cm)	1ft 7in (48.3 cm)	1ft 1in (33 cm)
<i>Cabinet containing receiver and l.f. converter</i>	1ft $2\frac{1}{2}$ in (36.8 cm)	1ft $8\frac{1}{2}$ in (52 cm)	1ft $9\frac{7}{8}$ in (55.6 cm)

**Weight** *For rack mounting* 11 lb ( 5 kg).  
*Cabinet containing receiver and l.f. converter* 110 lb (50 kg).

## RECEIVER, RADIO

5820-99-999-9292

Relevant publication:-

AP116E-0704-1

**Function**

General purpose ground station h.f. communications receiver. This receiver is a later version of receiver, radio 5820-99-943-2775. The lower frequency limit can be extended to 12.5 kHz by the addition of an l.f. converter which is designated mixer stage, frequency 5820-99-943-3464. The receiver and l.f. converter can be used in rack assemblies or for bench mounting. The following variant assemblies are available:—

Rack mounted receiver—Receiver, Type S1/3.

Bench mounted receiver—Receiver, Type S1/4 (mounted in cabinet).

Bench mounted receiver and l.f. converter combined—Receiver, Type S2/2 (mounted in cabinet).



**Receiver, radio, 5820-99-999-9292**

<b>Origin</b>	Racal Communications Ltd., Type RA.17L; mixer stage, frequency (5820-99-943-3464) RA.37A.														
<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of the i.f. converter.														
<b>Calibration</b>	A 100 kHz signal derived from a 1 MHz crystal oscillator with a stability of 5 parts in $10^6$ provides check points at 100 kHz intervals.														
<b>Stability</b>	During a warm-up time of $1\frac{1}{2}$ hours, overall drift is less than 50 Hz under conditions of constant supply voltage and ambient temperature.														
<b>Sensitivity</b>	C.W. reception: bandwidth 3 kHz $1\mu\text{V}$ for 18dB signal-to-noise ratio. R/T and m.c.w. reception: 30% modulated bandwidth 3 kHz: $3\mu\text{V}$ for 18dB signal-to-noise ratio.														
<b>I.F. output</b>	100 kHz at 75 ohms impedance. Level 0.2V approximately with a.g.c. in operation. Two outlets in parallel are provided.														
<b>Selectivity</b>	Six alternative i.f. bandwidth are obtained by a selector switch. Filter details are:— <table border="0" style="margin-left: 40px;"> <tr> <td style="text-align: center;"><i>Switch position</i></td> <td style="text-align: center;"><i>—6dB</i></td> </tr> <tr> <td style="text-align: center;">100 Hz</td> <td style="text-align: center;">80-120 Hz</td> </tr> <tr> <td style="text-align: center;">300 Hz</td> <td style="text-align: center;">270-330 Hz</td> </tr> <tr> <td style="text-align: center;">1.2 kHz</td> <td style="text-align: center;">950-1200 Hz</td> </tr> <tr> <td style="text-align: center;">3 kHz</td> <td style="text-align: center;">2.85-3.3 kHz</td> </tr> <tr> <td style="text-align: center;">6.5 kHz</td> <td style="text-align: center;">6.5-7.8 kHz</td> </tr> <tr> <td style="text-align: center;">13 kHz</td> <td style="text-align: center;">13.0-14.3 kHz</td> </tr> </table>	<i>Switch position</i>	<i>—6dB</i>	100 Hz	80-120 Hz	300 Hz	270-330 Hz	1.2 kHz	950-1200 Hz	3 kHz	2.85-3.3 kHz	6.5 kHz	6.5-7.8 kHz	13 kHz	13.0-14.3 kHz
<i>Switch position</i>	<i>—6dB</i>														
100 Hz	80-120 Hz														
300 Hz	270-330 Hz														
1.2 kHz	950-1200 Hz														
3 kHz	2.85-3.3 kHz														
6.5 kHz	6.5-7.8 kHz														
13 kHz	13.0-14.3 kHz														
<b>Noise factor</b>	Less than 7dB throughout the entire range.														
<b>Image and spurious responses</b>	With wideband or tuned input, external image signals are at least 60dB down. Internally generated spurious responses are below noise level in all cases.														
<b>Input impedance</b>	75 ohms unbalanced.														
<b>B.F.O. range</b>	$\pm 8$ kHz.														
<b>B.F.O. stability</b>	With constant ambient temperature and supply voltage 30 minutes after switching on, drift does not exceed 50 Hz. For input level variation from $10\mu\text{V}$ to $1\text{mV}$ , b.f.o. drift is negligible.														
<b>A.F. response</b>	With 13 kHz bandwidth, response remained within $\pm 4\text{dB}$ from 250 Hz to 6000 Hz.														
<b>A.F. output</b>	(1) $2\frac{1}{2}$ in. loudspeaker (50mW) on front panel. (2) Two telephone sockets in parallel on front panel. (3) Three independent outputs of 3mW at 600 ohms at rear of chassis. (4) One output of 10mW at 600 ohms. Preset level is independent of gain control. (5) One output of 50mW at 3 ohms.														
<b>Distortion</b>	Not greater than 5% at 50mW output.														
<b>Hum level</b>	—50dB at 1mW (10mW output setting).														
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.														
<b>Power consumption</b>	100 watts (approx.).														

**Sheet No. 12 (cont'd)****Overall dimensions**

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>For rack mounting</i>	10½in (26.6 cm)	1ft 7in (48.3 cm)	1ft 8½in (51 cm)
<i>Fitted cabinet</i>	1ft 2½in (36.8 cm)	1ft 8½in (52 cm)	2ft 3⅞in (70.8 cm)

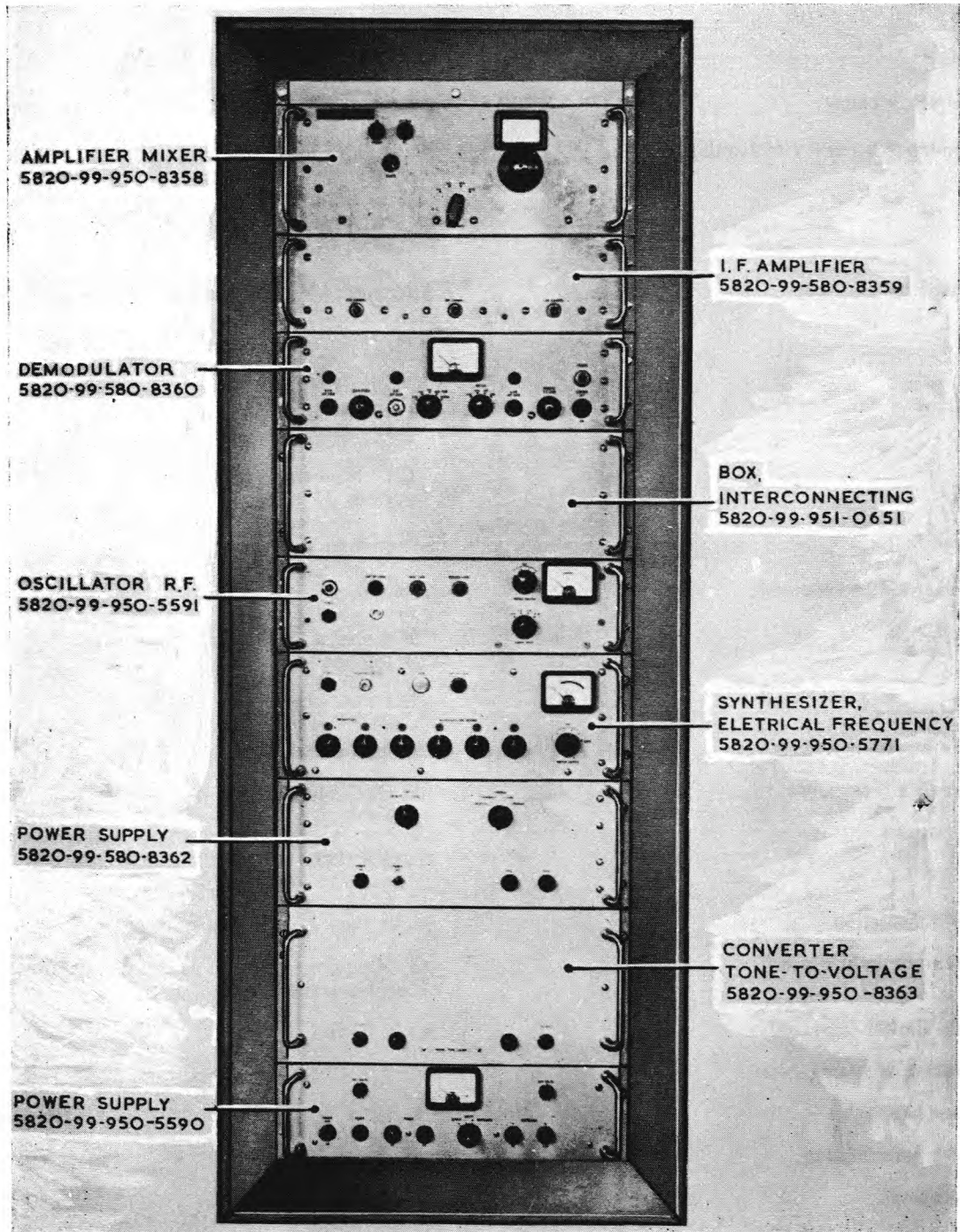
**Weight**

<i>For rack mounting</i>	67 lb (30.4 kg).
<i>Fitted cabinet</i>	97 lb (44 kg).

RECEIVER, RADIO

Relevant publication:-

AP116E-0127-1B, 1J



Receiving set, radio, 5820-99-950-5773

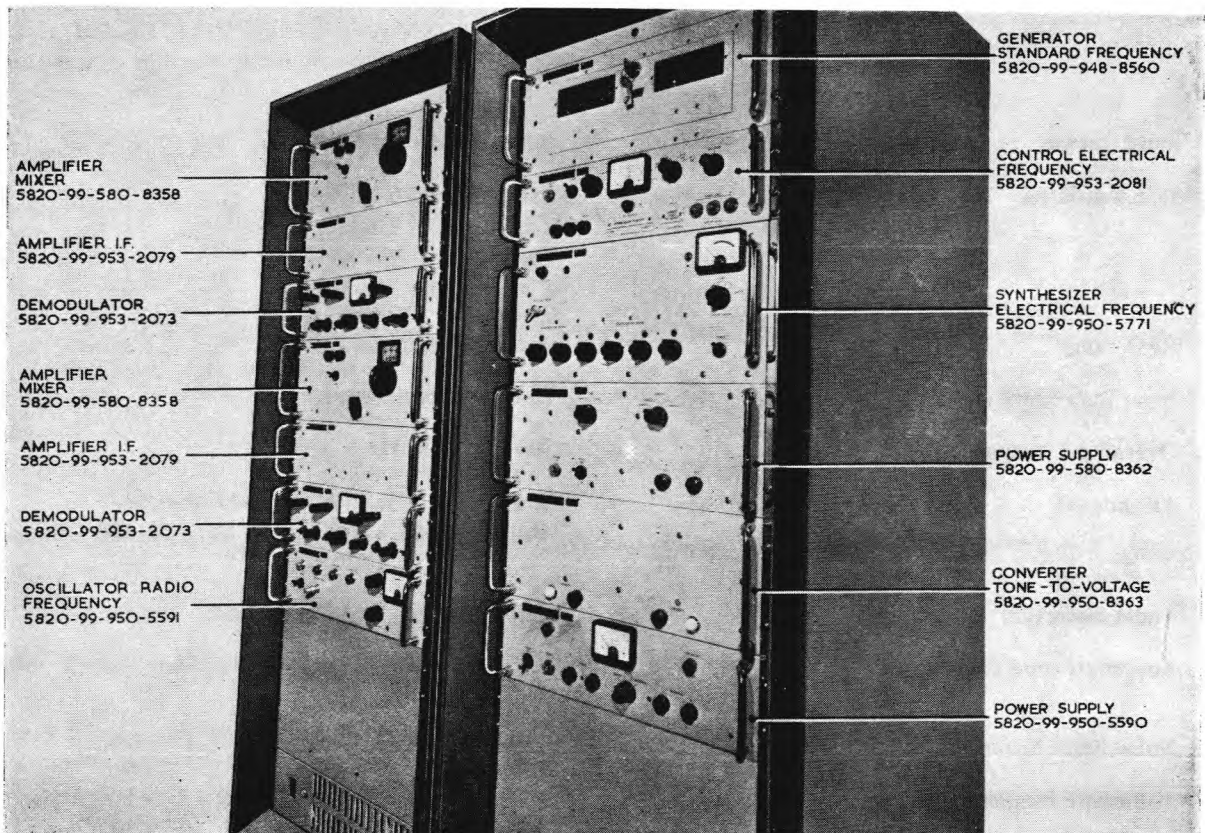
<b>Function</b>	A remotely controlled, h.f., superheterodyne receiver used with FGRI.23144 voice and telegraph transmitter and receiver station. The local oscillator uses a system of frequency synthesis, the standard frequency for which may be either an external source of 100 kHz, 200 kHz, 1 MHz or 5 MHz selected by a switch, or an internal standard 1 MHz selected by the same switch for use as a standby in case of failure of the external source. The receiving set is housed in a single floor-standing cabinet in which the sub-unit chassis are attached to standard 19 inch front panels.		
<b>Origin</b>	Racal Communications Ltd., Type RTA.191A.		
<b>Frequency range</b>	2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.		
<b>Frequency accuracy and stability</b>	Dependent upon reference standard. The synthesizer, electrical frequency, 5820-99-950-5771, incorporates a standby internal reference frequency source, a statement of the frequency stability and accuracy of which is included.		
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).		
<b>Tuning</b>	(1) <i>Remote or local</i> – automatic control from synthesizer, electrical frequency. (2) <i>Manual</i> – mechanical override of the automatic system.		
<b>Noise factor</b>	Better than 10 dB.		
<b>IF bandwidths (nominal)</b>	<i>SSB</i> : 3.5 kHz. <i>AM</i> : 7 kHz. <i>CW (wide)</i> : 3.5 kHz. <i>CW (narrow)</i> : 350 Hz.		
<b>BFO range</b>	$\pm 2.5$ kHz nominal.		
<b>Input impedance (r.f.)</b>	75 ohms unbalanced.		
<b>Overall a.f. response</b>	300 Hz – 3400 Hz $\pm 2$ dB.		
<b>AF outputs</b>	<i>Line</i> : 1 mW into 600 ohms (max.). <i>Monitor jack</i> : nominally 1 mW into 600 ohms (max.) adjustable.		
<b>Audio distortion</b>	Better than 2% total harmonic.		
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.		
<b>Noise limiter (a.m. only)</b>	Series limiter provided.		
<b>Duration of tuning cycle</b>	Average 12 seconds, maximum 20 seconds.		
<b>Power supply</b>	100-125V, 200-250V ( $\pm 6\%$ ), 45-65 Hz, single phase.		
<b>Power consumption</b>	600 watts (approx.).		
<b>Dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	5ft 10 $\frac{1}{2}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
<b>Weight</b>	600 lb (272 kg) approx.		

## RECEIVER, RADIO

5820-99-953-2075

Relevant publication:-

AP116E-0127-1D, 1W



Receiving set, radio, 5820-99-953-2075

**Function**

A remotely controlled, h.f. superheterodyne receiving set comprising two receivers with a common local oscillator, enabling the set to be used for space diversity reception. The local oscillator uses a system of frequency synthesis, the standard frequency for which can be either an external source of 100 kHz, 200 kHz, 1 MHz or 5 MHz selected by a switch, or an internal standard 1 MHz source selected by the same switch for use as a standby in case of failure of the external source. The receiving set is used with TGRI.(AT)26023/1 air transportable voice and telegraph transmitter/receiver station and is housed in two racks in which the sub-unit chassis are attached to standard 19 inch front panels.

**Origin**

Racal Communications Ltd., Type RTA.241A.

**Frequency range**

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz

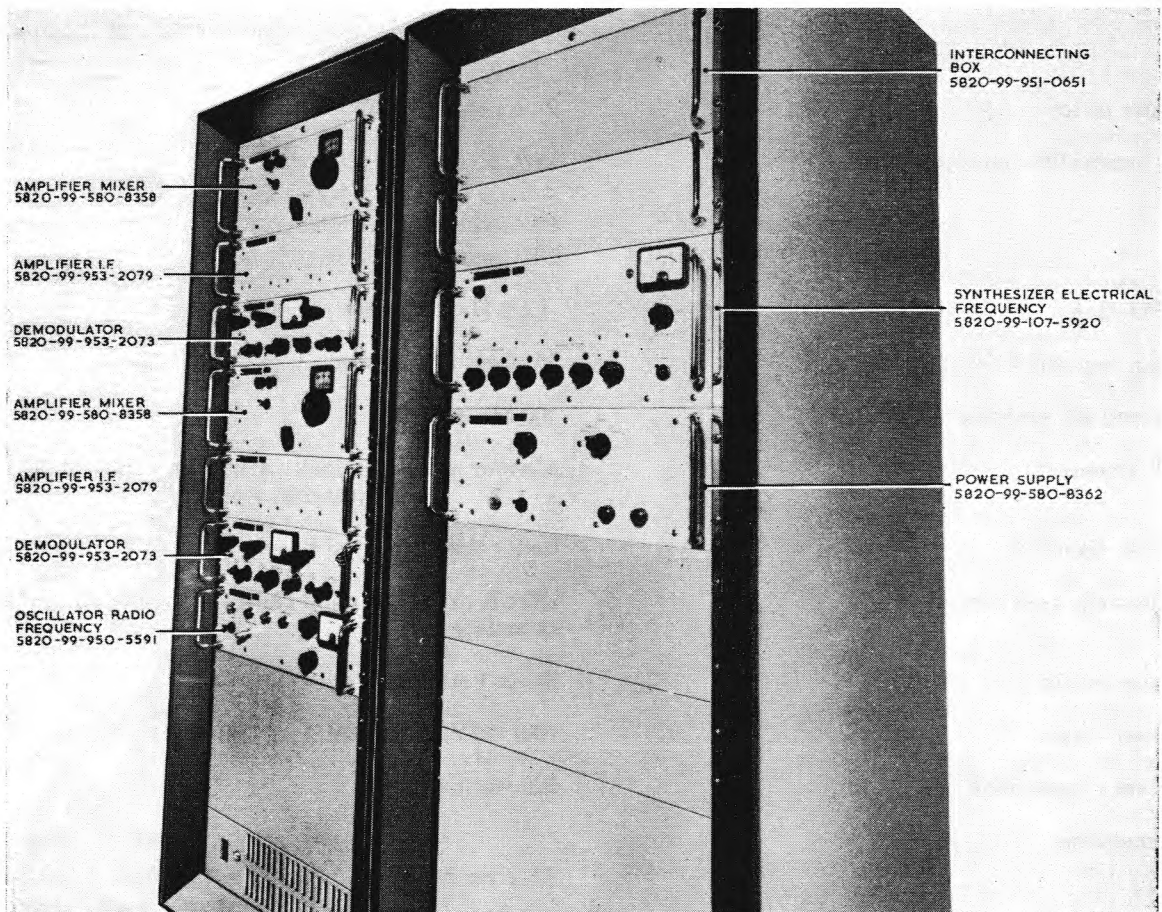
<b>Frequency accuracy and stability</b> ( <i>controlled by external frequency standard source</i> ).	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.			
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).			
<b>Tuning</b>	(1) <i>Remote or local</i> – automatic control, from synthesizer, electrical frequency. (2) <i>Manual</i> – mechanical override of the automatic system.			
<b>Noise factor</b>	Better than 10 dB.			
<b>IF bandwidths</b>	<i>ISB, SSB</i> : 6 KHz. <i>AM</i> : 7 KHz. <i>CW (wide)</i> : 3.5 KHz. <i>CW (narrow)</i> : 350 Hz.			
<b>BFO range</b>	±2.5 Hz nominal.			
<b>Input impedance</b> ( <i>r.f.</i> )	75 ohms unbalanced.			
<b>Overall a.f. response</b>	300 Hz–6000 Hz.			
<b>AF outputs</b>	<i>Line</i> : 1 mW into 600 ohms. <i>Monitor jack</i> : nominally 1 W into 600 ohms (max.) adjustable.			
<b>Audio distortion</b>	Better than 2% total harmonic.			
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.			
<b>Noise limiter</b> ( <i>a.m. only</i> )	Series limiter provided.			
<b>Automatic frequency control</b>	Manual capture, after capture 1.6 MHz carrier held to ±50 Hz.			
<b>Power supply</b>	100–125V, 200–250V, 45–65 Hz, single phase.			
<b>Power consumption</b>	600 watts (approx.).			
<b>Dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
	Receiver rack	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
	Control rack	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
<b>Weights</b>	600 lb (272 kg) approx., each rack.			

## RECEIVER, RADIO

5820-99-107-5921

Relevant publication:-

AP116E-0127-1C, 1Y



Receiving set, radio, 5820-99-107-5921

**Function**

A locally controlled, h.f. superheterodyne receiving set comprising two receivers in which the common local oscillator uses a system of frequency synthesis, the standard frequency for which is the internal 1 MHz standard source from the synthesizer, electrical frequency.

The receiving set is used with FGRI.23186, voice and telegraph transmitter and receiver link station and is housed in two racks in which the sub-unit chassis are attached to standard 19-inch front panels.

**Origin**

Racal Communications Ltd., Type RTA.241C.

**Frequency range**

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.

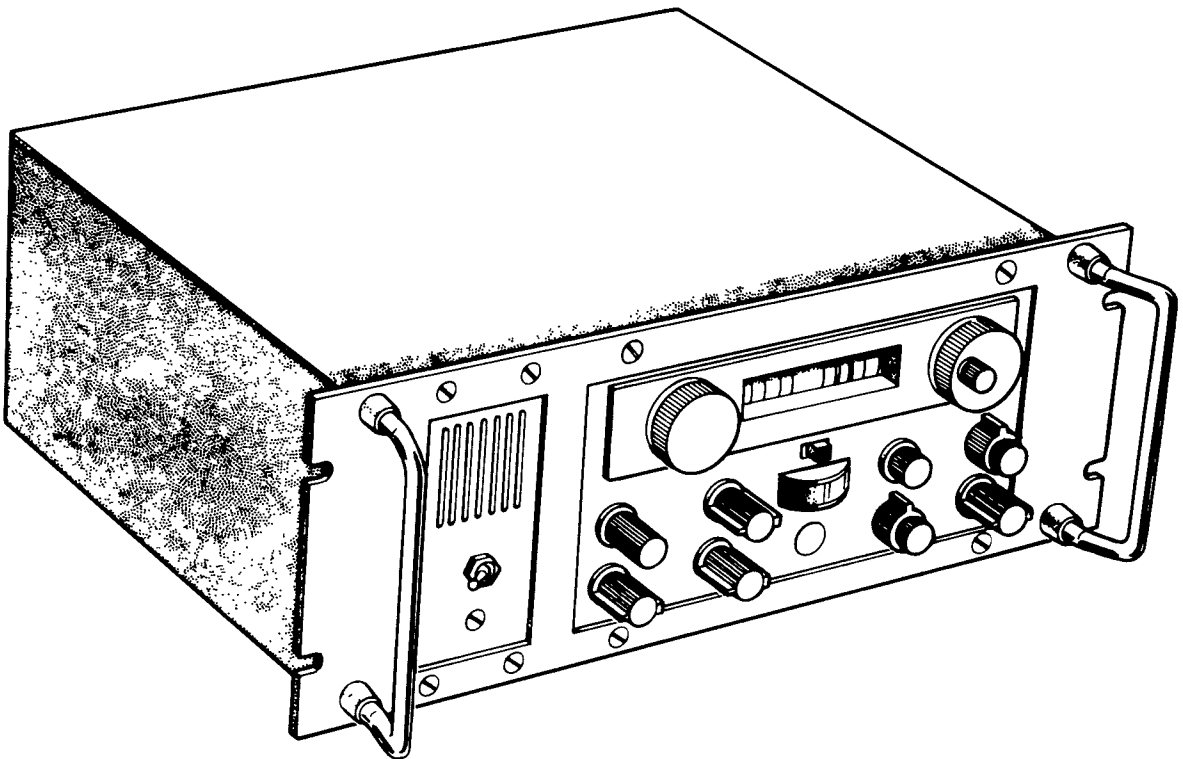
<b>Frequency accuracy and stability</b> ( <i>controlled by synthesizer internal frequency standard source</i> )	Stability, including ageing over 24 hours, after 30 days operation less than $\pm 2$ parts in $10^{-9}$ . Stability with change in ambient temperature $\pm 25^{\circ}\text{C}$ from $25^{\circ}\text{C}$ , less than $\pm 2$ parts in $10^{-8}$ .												
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).												
<b>Tuning</b>	(1) <i>Local</i> – automatic from synthesizer. (2) <i>Manual</i> – mechanical override of the automatic system.												
<b>Noise factor</b>	Better than 10 dB.												
<b>IF bandwidths</b> ( <i>nominal</i> )	<i>ISB, SSB</i> : 6 KHz. <i>AM</i> : 7 KHz. <i>CW (wide)</i> : 3.5 KHz. <i>CW (narrow)</i> : 350 Hz.												
<b>BFO range</b>	$\pm 2.5$ Hz nominal												
<b>Input impedance</b> ( <i>r.f.</i> )	75 ohms unbalanced.												
<b>Overall a.f. response</b>	300 Hz–6000 Hz												
<b>AF outputs</b>	<i>Monitor jack</i> : nominally 1 mW into 600 ohms (max.) adjustable.												
<b>Audio distortion</b>	Better than 2% total harmonic.												
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.												
<b>Noise limiter</b> ( <i>a.m. only</i> )	Series limiter is provided.												
<b>Power supply</b>	100–125V, 200–250V, ( $\pm 6\%$ ), 45–65 Hz single phase.												
<b>Power consumption</b>	600 watts (approx.).												
<b>Dimensions</b>	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>Receiver rack</td> <td>5ft 10<math>\frac{1}{4}</math>in (178.4cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3cm)</td> <td>2ft 3in (68.6cm)</td> </tr> <tr> <td>Control rack</td> <td>5ft 10<math>\frac{1}{4}</math>in (178.4cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3cm)</td> <td>2ft 3in (68.6cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	Receiver rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)	Control rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>										
Receiver rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)										
Control rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)										
<b>Weights</b>	600 lb (272 kg) approx., each rack.												

## RECEIVER, RADIO

5820-99-107-4926

Relevant publication:-

AP116E-0732-1A and 1B



Receiver, radio 5820-99-107-4926

**FUNCTION**

A general purpose ground station h.f. communications receiver. The receiver, radio consists of receiver, radio 5820-99-107-1509 (less monitor loudspeaker facility) and amplifier, audio frequency 5820-99-195-0459 (fitted monitor loudspeaker); both equipments are fitted for rack mounting into frame, electrical equipment 5820-99-195-0460.

## ORIGIN

Racal Communications Ltd., Type RA.317.  
Receiver, radio 5820-99-107-1509, Type RA.217R;  
amplifier, audio frequency 5820-99-195-0459, Type MA.389.

## FREQUENCY RANGE

1 to 30 MHz (300 to 10 metres).

## CALIBRATION

A 100kHz signal derived from a 1MHz crystal oscillator, with a stability of 5 parts in  $10^6$ , provides check points at 100kHz intervals.

## STABILITY

After 2 hours from switching on,  $\pm 50$ Hz over an 8-hour period with constant ambient temperatures and humidity.

## SENSITIVITY

CW, SSB reception:  $1\mu\text{V}$  for 15dB signal-to-noise ratio and 3kHz bandwidth.  
MCW, DSB reception:  $3\mu\text{V}$  for 15dB signal-to-noise ratio (30% modulated at 400Hz).

## I.F. OUTPUT

With a.g.c. in operation:

- (1) at 1.6MHz: 0.1V at high impedance (nominal).
- (2) at 100kHz: 0.27V (1mW) nominal into 75 ohms.
- (3) at 455kHz: 0.22V (1mW) nominal into 50 ohms.

## SELECTIVITY

Four alternative i.f. bandwidths are obtained by a selector switch; the nominal filter details are as follows:

<u>At -3dB points</u>	<u>At -60dB points</u>
13kHz	30kHz
3kHz	9kHz
1kHz	4kHz
0.2kHz	2kHz

## NOISE FACTOR

Not greater than 10dB throughout entire range.

## IMAGE AND SPURIOUS RESPONSE TO EXTERNAL SIGNALS

- (1) External signals less than 10% off-tune shall be greater than +60dB relative to  $1\mu\text{V}$  in order to produce a spurious signal equivalent to  $1\mu\text{V}$ .
- (2) With a tuned aerial, external signals more than 10% off-tune shall be greater than +80dB relative to  $1\mu\text{V}$  to produce a spurious signal equivalent to  $1\mu\text{V}$ .

## INTERNALLY GENERATED SPURIOUS RESPONSES

Not greater than 2dB above noise level in a 3kHz bandwidth.

## INPUT IMPEDANCE

75 ohms (nominal) unbalanced.

## B.F.O. RANGE

- (1)  $\pm 8\text{kHz}$  variable
- (2)  $\pm 1.5\text{kHz}$  crystal controlled.

## B.F.O. STABILITY

- (1)  $\pm 15\text{Hz}$  for less than 5 minutes.
- (2)  $\pm 25\text{Hz}$  for less than 30 minutes.

## A.F. RESPONSE

100 to 6000Hz, flat within 3dB.

## A.F. OUTPUTS

- (1) 50mW (nominal), at less than 1% distortion, into 3-ohm loudspeaker.
- (2) 1mW into 600 ohms line output.

## HUM LEVEL

40dB below rated 600-ohm line output.

## POWER SUPPLIES

One of two alternative power units is fitted.

- (1) PU.408A:

Input: 100-125V or 200-250V, 40-400Hz.

Output: -16V d.c. at 180mA.

Consumption: 7VA approx.

(2) PU.409:

Input: 100-125V or 200-250V, 40-400Hz.

Outputs: -16V d.c. at 400mA and -24V d.c. at 40mA.

DIMENSIONS (excluding handles)

Height	Width	Depth
7 in (17.75cm)	19 in (48 cm)	13 1/8 in (33.3 cm)

WEIGHT

41 lb (18.75kg)

AMPLIFIER, AUDIO FREQUENCY  
(5820-99-195-0459)

FUNCTION

To provide a monitor loudspeaker output for receiver, radio 5820-99-107-1509.

ORIGIN

Racal Communications Ltd., Type MA.389.

INPUT LEVEL

10mW across 600 ohms.

OUTPUT POWER

50mW across 3 ohms.

DISTORTION

Less than 1%.

A.F.RESPONSE

100 to 6000Hz.

POWER SUPPLY

-16V d.c.

DIMENSIONS

Height	Width	Depth
6 1/4 in (17.5 cm)	3 1/4 in (8.25 cm)	7 in (17.75cm)

WEIGHT 1 lb (0.45 kg)

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Item No. 17

RECEIVER, RADIO

(10D/5820-99-618-1034)  
(Racal type RA 1205/8)

Relevant publication:-

AP116E-Q751



Receiver, radio 5820-99-618-1034 (Racal RA 1205/8)

**FUNCTION**

An assembly of eight double superheterodyne single channel usb/cw receivers, each one operating at a preset frequency in the range 1.5 MHz to 24 MHz.

**ORIGIN**

Racal Communications Ltd., Type RA.1205/8.

## TECHNICAL DATA

Frequency range	1.6 MHz. to 24 MHz (down to 1.5 MHz with slight performance degradation).
Frequency accuracy and stability	2 parts in $10^7$ /day, and $\pm 30$ Hz for a temperature change of 10 C within the range of $-10^{\circ}\text{C}$ to $+55^{\circ}\text{C}$ .
Sensitivity	1 microvolt for 10 dB signal-to-noise ratio.
Tuning	Local preset.
I.F. bandwidth	2.6 kHz.
I.F. frequency	
1 st.	1.4 kHz
2 nd.	100 kHz.
BFO range	$\pm 8$ kHz, variable
Clarifier range	$\pm 75$ Hz, minimum.
AGC range	80 dB change of input causes change in a.f. output not exceeding 6 dB.
A.F. outputs	
Line	600 ohms balanced, adjustable between +6 dBm and -30 dBm.
Monitor jack	600 ohms, adjustable between 0 dBm and -40 dBm.
Power consumption	7.5 VA per receiver module.

## POWER SUPPLY REQUIRED

100-124V, 200-250V, 45-400 Hz single phase  
or  
12V  $\pm$  10% d.c. (negative earth)

## DIMENSIONS

Height	Width	Depth
178 mm (7 in.)	483 mm (19 in.)	483 mm (19 in.)

WEIGHT                      24 kg (53 lb)

AP116A-0115-1

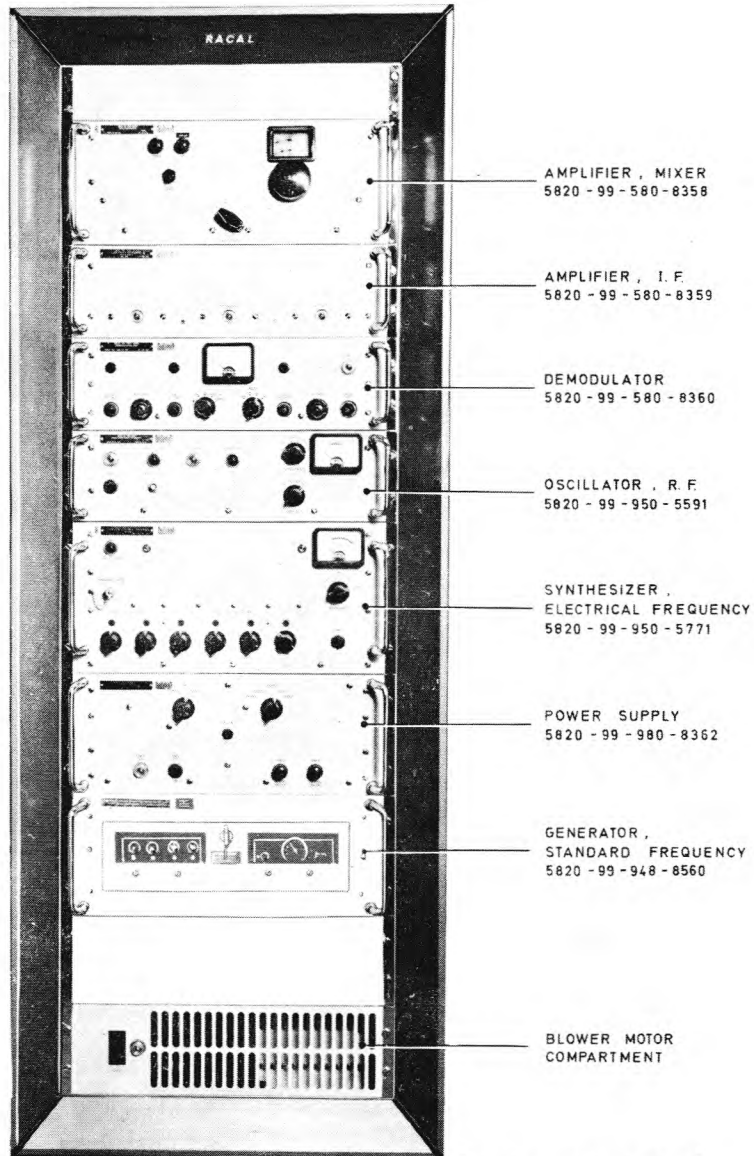
Item No. 18

RECEIVER, RADIO

5820-99-119-3981  
(Racal type RTA.191P)

Relevant publication:-

AP116E-0127-1D



Receiving set, radio, 5820-99-119-3981 (Racal RTA.191P)

#### FUNCTION

A locally controlled, h.f. superheterodyne receiving set with a frequency range of 2 to 30 MHz selected in 100 Hz increments. The possible modes of operation are single sideband, independent sideband, compatible amplitude modulation and c.w. telegraphy (keyed tone or frequency shift). The receiving set is used with TGRI (AT)26063/1 air transportable voice and telegraph transmitter/receiver station.

ORIGIN

Racal Communications Ltd., Type RTA.191P

## TECHNICAL DATA

FREQUENCY RANGE	2.0 to 29.9999 MHz.
FREQUENCY ACCURACY AND STABILITY (controlled by external frequency standard source)	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
SENSITIVITY	SSB and CW 1 microvolt for 13 dB signal-to-noise ratio.
	AM 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING	
Local	Automatic control from synthesizer, electrical frequency.
Manual	Mechanical override of the automatic system.
NOISE FACTOR	Better than 10 dB.
IF BANDWIDTHS	
SSB	3.5 kHz.
AM	7 kHz.
CW (wide)	3.5 kHz.
CW (narrow)	350 Hz.
BFO RANGE	$\pm 2.5$ kHz nominal.
INPUT IMPEDANCE (R <sub>i</sub> )	75 ohms unbalanced.
OVERALL AF RESPONSE	300 Hz-3400 Hz.
AF OUTPUTS	
line	1 mW into 600 ohms.
monitor jack	Nominally 1 mW into 600 ohms (max.) adjustable.
AUDIO DISTORTION	Better than 2% total harmonic.
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.
NOISE LIMITER (a.n. only)	Series limiter provided.
POWER SUPPLY	100-125V, 200-250V, 45-65 Hz, single phase.
POWER CONSUMPTION	600 watts (approx.)

## DIMENSIONS

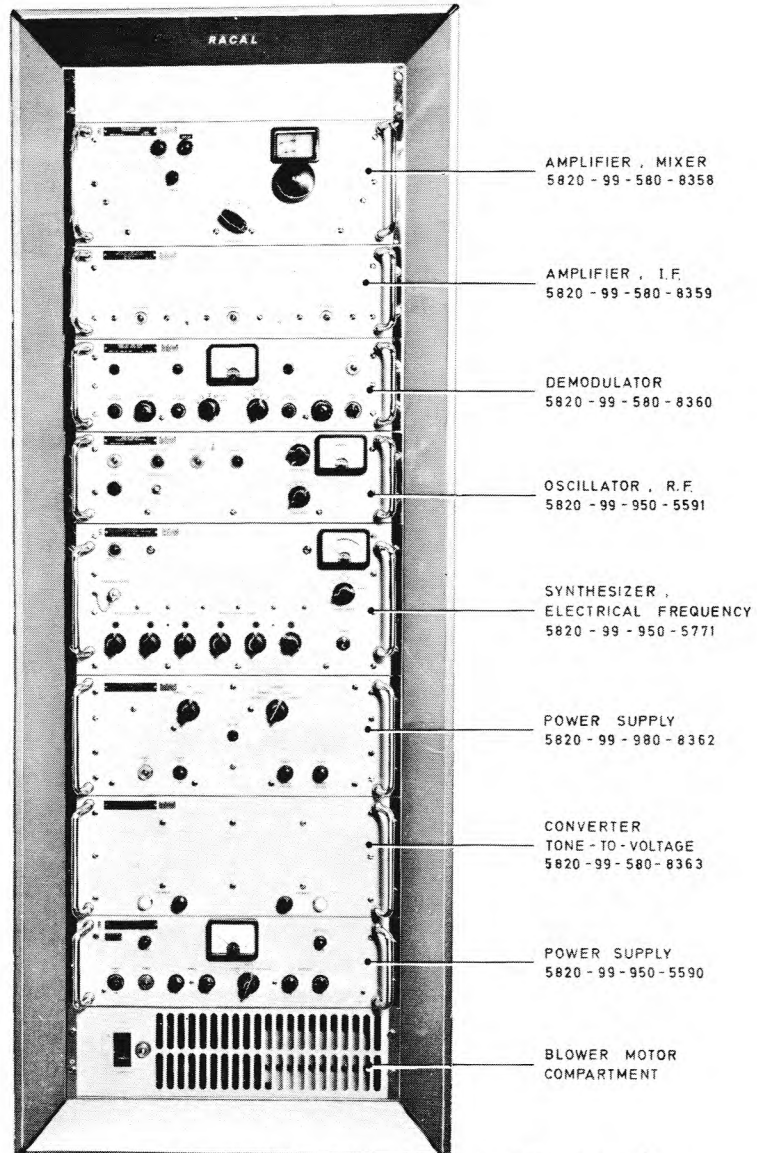
	Height	Width	Depth
Receiver rack	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)
WEIGHT	273 kg (600 lb)		

## RECEIVER, RADIO

5820-99-119-3979  
(Racal type RTA.191Q)

Relevant publication:-

AP116E-0127-1D



Receiving set, radio, 5820-99-119-3979 (Racal RTA.191Q)

## FUNCTION

A remote or locally controlled, h.f. superheterodyne receiving set with a frequency range of 2 to 30 MHz selected in 100 Hz increments. The possible modes of operation are single sideband, independent sideband, compatible amplitude modulation and c.w. telegraph (keyed tone or frequency shift). The receiving set is used with TGRI(AT)26063 air transportable voice and telegraph transmitter/receiver station.

## ORIGIN

Racal Communications Ltd., Type RTA.191Q.

## TECHNICAL DATA

FREQUENCY RANGE	2.0 to 29.9999 MHz	
FREQUENCY ACCURACY AND STABILITY (controlled by internal frequency standard source).	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.	
SENSITIVITY	SSB and CW	1 microvolt for 13 dB signal-to-noise ratio.
	AM	5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING		
Local	Automatic control from synthesizer, electrical frequency.	
Manual	Mechanical override of the automatic system.	
NOISE FACTOR	Better than 10 dB.	
IF BANDWIDTHS		
SSB	3.5 kHz	
AM	7 kHz.	
CW (wide)	3.5 kHz.	
CW (narrow)	350 Hz.	
BFO RANGE	$\pm 2.5$ kHz nominal.	
INPUT IMPEDANCE (RF)	75 ohms unbalanced.	
OVERALL AF RESPONSE	300 Hz-3400 Hz.	
AF OUTPUTS		
LINE	1 mW into 600 ohms	
MONITOR JACK	Nominally 1 mW into 600 ohms (max.) adjustable.	
AUDIO DISTORTION	Better than 2% total harmonic.	
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.	
NOISE LIMITER (a.m. only)	Series limiter provided.	
POWER SUPPLY		
100-125V, 200-250V, 45-65 Hz, single phase.		
POWER CONSUMPTION	600 watts (approx.)	

## DIMENSIONS

Receiver rack

Height

Width

Depth

178 cm  
(70 in.)61 cm  
(24 in.)69 cm  
(27 in.)

## WEIGHT

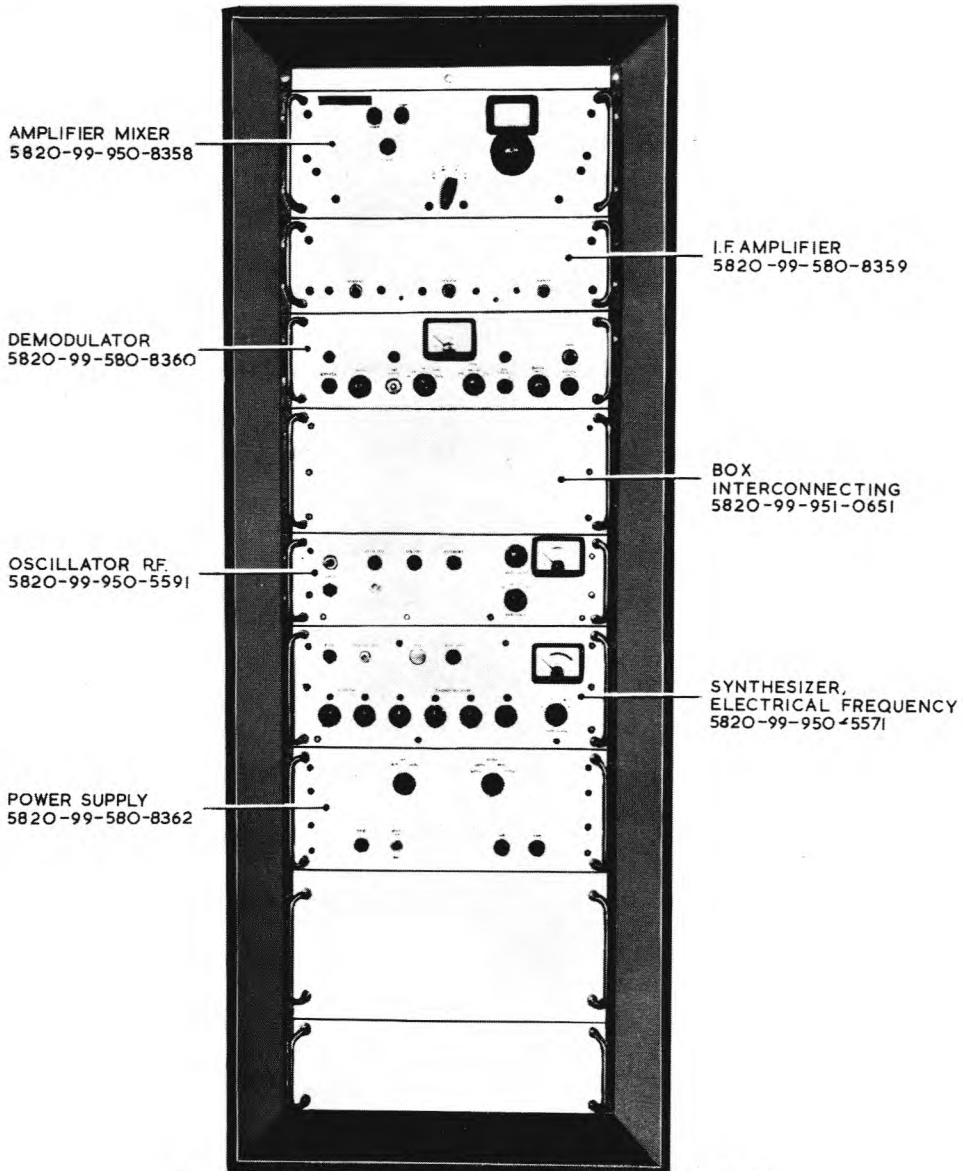
273 kg (600 lb).

RECEIVER, RADIO

5820-99-951-0461  
(Racal type RTA.191K)

Relevant publication:-

AP116E-0127-1E



Receiving set, radio, 5820-99-951-0461

FUNCTION

An h.f. superheterodyne receiving station with a frequency range of 2 to 30 MHz, capable of voice and telegraph communication. The possible modes of operation are single sideband (upper or lower sideband, suppressed or pilot carrier), compatible amplitude modulation, or c.w. telegraphy.

ORIGIN

Racal Communications Ltd., Type RTA.191K.

FREQUENCY RANGE	2.0 to 29.9999 MHz.
FREQUENCY ACCURACY AND STABILITY (controlled by external frequency standard source)	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
SENSITIVITY	
SSB and CW	1 microvolt for 13 dB signal-to-noise ratio.
AM	5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING:	
Local	Automatic control from synthesizer electrical frequency.
Manual	Mechanical override of the automatic system.
NOISE FACTOR	Better than 10 dB.
IF BANDWIDTHS	
SSB	3.5 kHz.
AM	7 kHz.
CW (wide)	3.5 kHz.
CW (narrow)	350 Hz.
BFO RANGE	$\pm 2.5$ kHz nominal.
INPUT IMPEDANCE (RF)	75 ohms unbalanced.
OVERALL AF RESPONSE	300 Hz-3400 Hz.
AF OUTPUTS	
Line	1 mW into 600 ohms.
Monitor jack	Nominally 1 mW into 600 ohms (max.) adjustable.
AUDIO DISTORTION	Better than 2% total harmonic.
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.
NOISE LIMITER (a.m. only)	Series limiter provided.
POWER SUPPLY	
	100-125V, 200-250V, 45-65 Hz, single phase.
POWER CONSUMPTION	600 watts (approx.)

DIMENSIONS

	Height	Width	Depth
Receiver rack	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)

WEIGHT                    273 kg (600 lb)

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Item No. 21

RECEIVER, RADIO

5820-99-630-9620  
(Racal type RA.1772)

Relevant publication:-

AP116E-0748-16



HF Receiver (Racal type RA.1772) 5820-99-630-9620

#### FUNCTION

General purpose ground station fully synthesized h.f. communications receiver.

The receiver may be rack or bench mounted.

#### ORIGIN

Racal Communications Ltd., Type RA.1772 (H/S2/R/B3/0/0)

TECHNICAL DATA

FREQUENCY RANGE 15 kHz to 30 MHz.

MODES OF RECEPTION A1  
A2, A2H, A2J  
A3, A3A, A3B, A3H

TUNING

Switched selection of 1 MHz steps and a continuously tunable synthesizer in 10 Hz or 100 Hz steps over each 1 MHz band.

Electronic digital readout to 10 Hz.

OVERSPILL

20 kHz at either end of each 1 MHz band. Overrun indication is provided.

TUNING ACCURACY

Plus or minus 5 Hz relative to frequency of the wanted signal.

FREQUENCY STABILITY

Temperature  $\pm 1:10^8/^{\circ}\text{C}$   
Longterm  $\pm 1.5:10^7$  over a 30 day period or  $\pm 5:10^9$  per day

ANTENNA INPUT

50 ohms to 75 ohms nominal.  
co-axial b.n.c. connector.

SENSITIVITY

c.w. and s.s.b. (A1, A2H, A3A, A3H, A3J)

In a 3 kHz bandwidth the signal-to-noise ratio is better than:

15 kHz-50 kHz, 15 dB with 10 $\mu$ V (emf) input

50 kHz-500 kHz, 15 dB with 3 $\mu$ V (emf) input

500 kHz-30 MHz, 15 dB with 1 $\mu$ V (emf) input

## d.s.b. (A2, A3)

In a 3 kHz bandwidth the signal-to-noise ratio is better than:

- 15 kHz-50 kHz, 15 dB with 30 $\mu$ V(emf) input,  
30% modulated
- 50 kHz-500 kHz, 15 dB with 10 $\mu$ V(emf) input,  
30% modulated.
- 500 kHz-30 MHz, 15 dB with 3 $\mu$ V(emf) input,  
30% modulated.

## IF FREQUENCY

1 st	34 MHz
2 nd	1.4 MHz.

## IF SELECTIVITY

## SSB (A3A, A3J)

Pass band at -6 dB	250 Hz to 3000 Hz
Pass band at -60 dB	-650 and +4100 Hz.

## ISB (A3B)

Pass band at -6 dB	250 Hz to 3000 Hz
Pass band at -60 dB	-400 and +4100 Hz

## CW/MCW/AM (A1, A2, A3, A2H, A3H)

In addition to the mode-selected s.s.b or i.s.b filters, i.f. filters of the following nominal passbands are fitted:-

1 kHz, 3 kHz, 8 kHz.

## CROSS MODULATION

With a wanted signal greater than 300 $\mu$ V emf, in a 3 kHz bandwidth, an unwanted signal, 30% modulated, removed not less than 20 kHz, greater than 300 mV emf, will produce an output 20 dB below the output produced by the wanted signal.

## RECIPROCAL MIXING

With a wanted signal of less than 100 $\mu$ V emf, in a 3 kHz bandwidth an unwanted signal, 30% modulated, removed not less than 20 kHz, greater than 70 dB above the wanted signal level will give a noise level 20 dB below the output produced by the wanted signal.

## BLOCKING

With a wanted signal of 1 mV emf.  
an unwanted signal more than 20 kHz removed.  
greater than 500 mV will reduce the output by 3 dB.

## INTERMODULATION PRODUCTS

### Out of band

With two 30 mV emf signals separated and removed from the wanted signal  
by not less than 20 kHz.  
The third order intermodulation products are not less than -85 dB  
below either of the interfering signals and typically better than -90 dB.

### In band

Two in band signals of 30 mV emf will produce third-order intermodulation products of not greater than -40 dB.

## SPURIOUS RESPONSE

### External

External signals, 20 kHz removed from the wanted signal must be at least 80 dB above the level of the wanted signal to produce an equivalent output.

### Internal

Not greater than 3 dB above noise level measured in a 3 kHz bandwidth.

## AGC

### Range

An increase in input of 100 dB above 2 microvolts emf will produce an output change of less than 6 dB.

Switched selection of AGC 'off' 'short' and long time constants.

## BFO RANGE

± 3 kHz, variable by a slow-motion.

## AUDIO CHARACTERISTICS

### Output levels

#### Line outputs

1 mW nominal into 600 ohms balanced, adjustable by preset level control on front panel to +6 dBm.

#### Phone outputs

Balance, 10 mW nominal into 600 ohms.

Power output 50 mW into internal loudspeaker which is capable of being switched in or out of operations.

External speaker Connection for external speaker 1 watt into 8 ohms.

#### AF response

Line outputs Within 1 dB from 100 Hz to 6000 Hz relative to the level of a standard 1000 Hz tone.  
(The overall a.f. response will be dependent upon the i.f. bandwidth selected).

#### AF distortion

Line outputs Not greater than 2% at specified output of 1 mW nominal.

Loudspeaker outputs Not greater than 5% at 50 mW output to internal loudspeaker and 1W output to external speaker.

Phone output Not greater than 5% at specified output of 10 mW nominal.

#### CROSS TALK (A3B)

With a wanted signal at a level of 1 mV and the AF output adjusted to 1 mW, the crosstalk from an equal signal in the opposite sideband, at greater than 400 Hz from the carrier, is not greater than -50 dB relative to 1 mW.

#### METERING

A meter is provided on the front panel to indicate r.f. level, a.f. level to line, f.s.k. tune, and suitable performance or supply test levels.

#### POWER SUPPLY

100V-125V or 200V-250V,  $\pm 10\%$ , 45-65 Hz

Power consumption: 60 VA (Approx.)

#### DIMENSIONS

Height	Width	Depth
176 mm (7 in.)	483 mm (19 in.)	410 mm (16.14 in.)

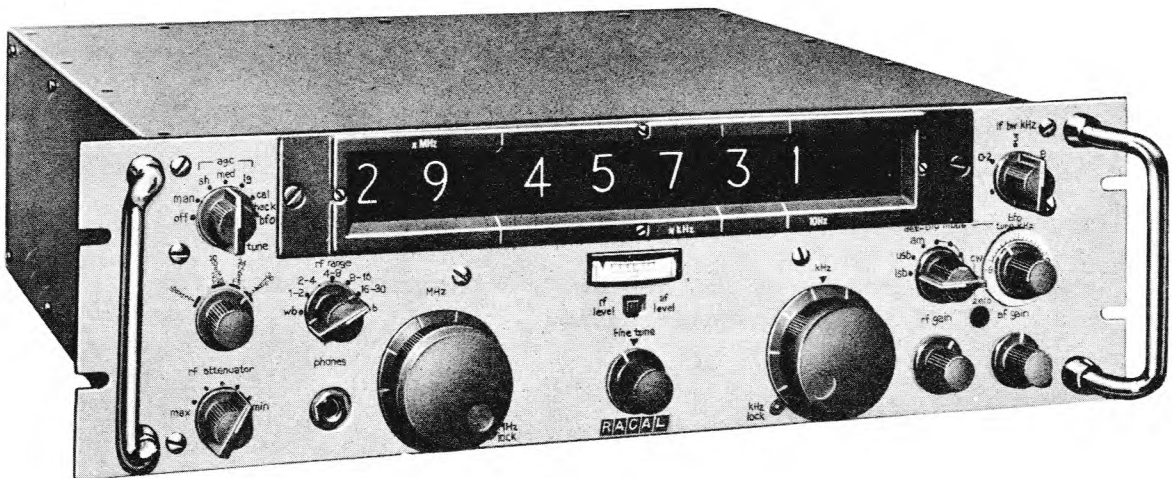
WEIGHT 20.4 kg (45 lb) (Approx.)

RECEIVER RADIO

(5820-99-624-0202)  
(Racal RA 1218A)

Relevant publications:-

AP116E-0745-1A, B



H.F. Communications Receiver Type RA 1218A

FUNCTION

A general purpose all solid-state h.f. communications receiver of high stability with an electronic frequency display.

MODES OF RECEPTION

- (1) MCW, CW, DSB, SSB (USB or LSB)
- (2) ISB and FSK with suitable adaptor /converter

ORIGIN

RACAL Communications Ltd., Type RA 1218A

FREQUENCY RANGE

1 to 30 MHz which can be extended down to 3 KHz by the connection of a RACAL LF Converter Unit.

### RESETTING ACCURACY

± 50 Hz using the Main Tuning controls

± 10 Hz using the Fine Tuning control

### FREQUENCY STABILITY

± 10 Hz plus accuracy of frequency standard.

An external standard of 1 MHz may be used.

### SENSITIVITY (Tuned Mode)

With tuned antenna input, and measured in a 3 KHz bandwidth, sensitivity figures are typically:

CW/SSB - 1 microvolt (emf) for 15 dB signal-to-noise ratio

MCW/DSB (30% modulated at 400 Hz) - 3 microvolts (emf) for 15 dB signal-to-noise ratio.

### SELECTIVITY

Three IF filters are fitted as standard but two additional filters may be fitted as optional extras. Nominal bandwidths are:

#### 3dB Bandwidths

##### Standard Filters

8 KHz

3 KHz

200 Hz

##### Additional Filters available

13 kHz

6 kHz

1.2 kHz

.500 kHz

### CROSS-MODULATION

For a wanted signal level up to 1 mV, and with appropriate use of the antenna attenuator, an interfering signal, 20 kHz removed and modulated 30%, at a level 45 dB above that of the wanted signal, will in general produce cross-modulation of less than 3%.

### INTERMODULATION

To produce an equivalent 1 microvolt input, the level of two equal unwanted signals greater than 10% removed from the wanted frequency, must

be at least 80 dB above 1 microvolt in the tuned input mode.

#### BLOCKING

For levels of wanted signal up to 1mV and with appropriate use of the antenna attenuator, an interfering signal 20 KHz removed will be 56 dB above the level of the wanted signal to reduce its output by 3 dB. The ratio of wanted to unwanted signal level is improved at the rate of approximately 2 dB/1% up to 10% off-tune in the tuned input mode.

#### SPURIOUS RESPONSE TO EXTERNAL SIGNALS (IMAGE etc): IN TUNED MODE

To produce a response equivalent to a 1 microvolt signal, an external signal less than 10% off-tune must, in general, be greater than 70 dB above 1 microvolt.

#### INTERNALLY GENERATED SPURIOUS RESPONSES

Not greater than 3 dB above noise level in a 3 kHz bandwidth.

#### NOISE FACTOR (Tuned Mode)

Typically 10 dB

#### ANTENNA INPUT

- (1) Nominal impedance 75 ohm unbalanced
- (2) Wideband, or tuned in five selected bands:
  - a. 1 to 2 MHz
  - b. 2 to 4 MHz
  - c. 4 to 8 MHz
  - d. 8 to 16 MHz
  - e. 16 to 30 MHz

#### IF OUTPUT (AGC ON)

- (1) At 1.6 MHz: 0.1V (nominal) at high impedance
- (2) At 100 KHz: 0.27V (1 mW) nominal at 75 ohms

### AUTOMATIC GAIN CONTROL

(1) Time Constants (nominal)

	Charge	Discharge
a. Short	17 mS	60 mS
b. Medium	40 mS	400 mS
c. Long	40 mS	6 S

(2) Output Change - An increase in input of 85 dB above 2 microvolts will produce a change in output level of less than 4 dB.

### BFO

(1) Variable  $\pm$  8 kHz with respect to i.f. centre frequency.

(2) Fixed  $\pm$  1.5 kHz (USB/LSB) crystal controlled.

### AF OUTPUT

(1) Headphone jack on front panel: 10 mW nominal in 600 ohms.

(2) 10 mW in 600 ohms at rear terminals. An alternative version providing one watt into 15 ohms for an external loudspeaker is available.

(3) 1 mW in 600 ohms 'line' outlet. The preset level is independent of the AF Gain control setting.

### AF DISTORTION

Not greater than 5%

### AF RESPONSE

100 to 6000 Hz flat within 4 dB relative to the peak in the widest bandwidth fitted.

### METERING

'S' scale metering in dBs relative to 1 microvolt.

(1) R.F. Signal level

(2) AF level to line

### POWER SUPPLIES

100-125V or 200-250V, 45-400 Hz, a.c. single phase

POWER CONSUMPTION

60 VA approximately (with one-watt amplifier)

DIMENSIONS

5.25 inches (13.5 cm) High

19 inches (48.3 cm) Wide

19 inches (48.3 cm) Deep

WEIGHT

50 lb (22.9 kg) approximately

ENVIRONMENTAL CONDITIONS

The equipment is designed to meet certain of the requirements of specification DEF 133 L2, operating within the ambient temperature range of  $-5^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ .

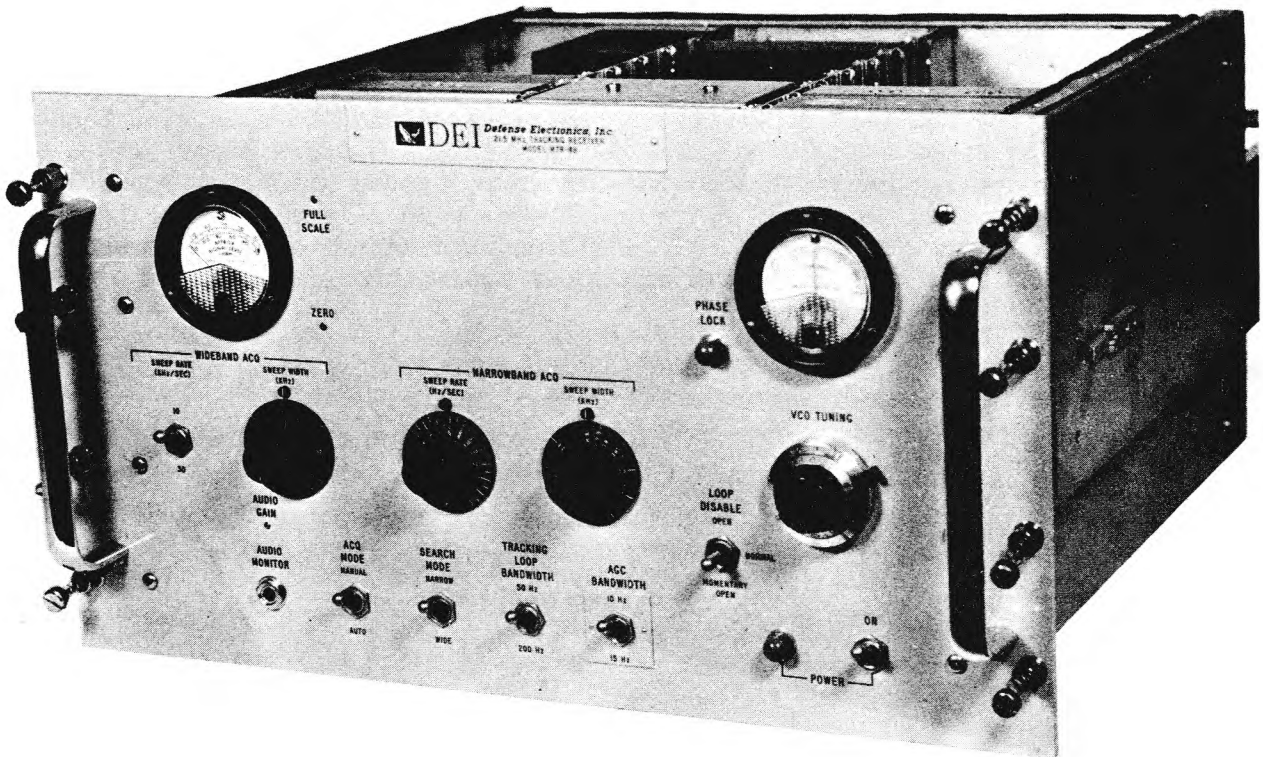
CONSTRUCTION

The unit is of modular construction.

TRACKING RECEIVER  
DEFENSE ELECTRONIC INC. MODEL MTR-4B  
(PART OF SKYNET TELEMETRY AND COMMAND STATION UHF SYSTEM)

Relevant publication:-

AP116E-0738-1



21.5 MHz tracking receiver D.E.I. Inc., Model MTR-4B

FUNCTION

A tracking receiver designed to process phase modulated 21.5 MHz r.f. input signals into video and conical scan tracking error information.

ORIGIN

Defense Electronics Inc., Rockville, Maryland USA 20854  
Model MTR-4B



Sweep rate	10( $\pm$ 1) kHz/sec or 30( $\pm$ 3) kHz/sec, switch selectable.
Acquisition bandwidth	800 Hz
Narrowband characteristics	
Sweep width	500 Hz to 10 kHz, continuously adjustable.
Sweep rate	50 Hz/sec to 1500 Hz/sec, continuously adjustable
Acquisition loop bandwidth	50 Hz or 200 Hz, switch selectable
Frequency tracking rate	90 Hz/sec at 50 Hz loop b.w. (0.32 radians phase error) 900 Hz/sec at 200 Hz loop b.w. (0.32 radians phase error).
AGC bandwidth	10( $\pm$ 2) Hz or 15( $\pm$ 3) Hz, switch selectable
Power supply required	240V a.c. $\pm$ 10%, 50 Hz $\pm$ 5%, single phase.

#### ENVIRONMENTAL

##### Temperature range:

Operating	0°C to +32°C
Storage	-40°C to +52°C
Relative humidity	30 to 70%
Barometric pressure	610 to 775 mmHg.

#### MECHANICAL

##### Dimensions

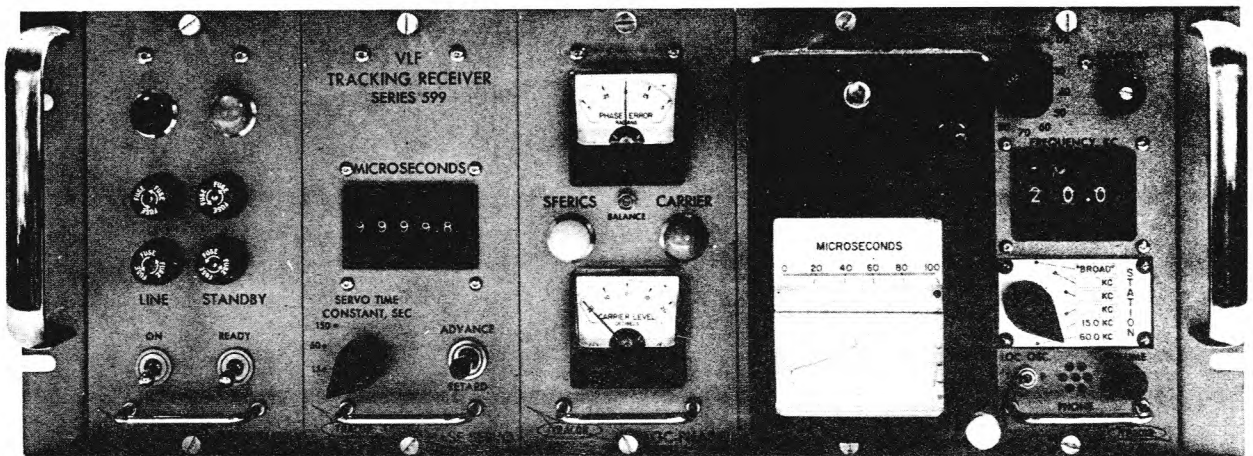
Height	Width	Depth
266 mm (10 $\frac{1}{2}$ in)	483 mm (19 in)	495 mm (19 $\frac{1}{2}$ in)

Weight 40 lb (approximately)

VLF TRACKING RECEIVER  
TRACOR INC., MODEL T599H

Relevant publication:-

AP116E-0735



VLF receiver model 559H

FUNCTION

Reception of very low highly stabilized reference carrier frequency transmissions from special global VLF stations for time and frequency calibration measurement and standardization purposes.

ORIGIN

Tracor Inc., USA Model T599H

## GENERAL DESCRIPTION

The unit is completely solidstate, and it is designed for phase locked reception of v.l.f. Signals which gives long-term and short term accuracy several orders of magnitude better than that obtained by reception of WWV or WWVH.

Frequency measurements to an accuracy of 1 part in  $10^9$  can be achieved in intervals as short as 30 minutes; observation over 24-hour intervals gives a measurement accuracy of several parts in  $10^{11}$ .

The receiver provides a reliable tracking of any one of the stations listed below from nearly anywhere in the world.

Transmitting station	Frequency kHz	Location	Sponsor, August 1964
WWVL	20.0	Ft. Collins, Colorado	Natl. Bureau of Standards
NBA	24.0	Balboa, Canal Zone	US Navy
NPM	19.8	Lualualei, Hawaii	US Navy
NAA	17.8	Cutler, Maine	US Navy
NPG	18.6	Jim Creek, Washington	US Navy
NSS	21.4	Annapolis, Maryland	US Navy
GBR	16.0	Rugby, England	British
OMEGA	10.2	Global net (various)	US Navy
OMEGA	13.6	Global net (various)	US Navy

Note:- All frequency standard transmissions are based on the UT2 time scale.

For reception of the Omega transmission, an auxiliary switch programmer is required for selection of a particular Omega station from the network of stations.

A total of 240 discrete channels in 100 Hz. steps is available between the lower limit of tracking operation at 8.0 kHz and the upper limit of 31.9 kHz.

Optional models of v.l.f. receiver track the 60 kHz transmission of WWVB operated by National Bureau of Standards.

The unit is a fully integrated receiving system and incorporates various major functional elements into single instrumentation packages v.h.f. receiver, phase comparator, servo phase shifter, frequency synthesizer and power supply. Only an external frequency standard and an antenna is connected to the unit.

Phase differences as small as 0.1 microsecond between the phase of incoming v.l.f. carrier frequency and phase derived from the local frequency source are detected by the front panel digital counter and a permanent record of the accumulated phase difference is made on a built-in stripchart recorder.

## TECHNICAL DATA

### ELECTRICAL

#### Frequency coverage

Standard receiver provides 240 channel tracking in 100 Hz increments for all carrier-stabilized VLF stations in the region 8.0 kHz-31.9 kHz (Additional 60 kHz coverage available).

#### RF filter capability

Front panel five-position switch permits selection of either a broadband filter or narrow band filter in r.f. selection. Broadband filter position normally used in all-channel tracking capability; plug in narrow band filters provide image rejection and additional frequency selectivity at specified frequencies.

#### Frequency synthesizer

Frequency synthesizer generates coherent local oscillator signal, in 100 Hz increments, between 9.0 and 30.9 kHz. Digital thumb-wheel switch gives direct indication of desired v.l.f. station frequency; toggle switch permits selection of local oscillator frequency either 1 kHz above or below station frequency.

#### Time difference register

Front panel digital counter, pulsed by electronic phase servo, displays relative time difference between local standard and v.l.f. carrier; counter dial cumulative to 9999.9  $\mu$ S. Counter dial may be manually set to zero or other desired initial reading (independently of phase position of tracking servo).

#### Recording outputs

Built-in inkless chart recorder records relative phase difference between local standard and v.l.f. carrier. Chart speed: 1 inch per hour (other speeds available on request). Manual selection of either 100  $\mu$ S. or 10  $\mu$ S. phase sensitivity (fullscale deflection) of internal chart recorder. Phase and coherent carrier amplitude information is also available, for use with external chart recorder.

#### VLF Phase

Two independent analog outputs, having deflection sensitivities of 100  $\mu$ S. and 10  $\mu$ S. full scale, provided for use with external chart recorder; with independent controls to adjust span calibration for any nominal 1 mA recorder.

### Coherent signal amplitude

Relative v.l.f. signal strength, equivalent to the receivers a.g.c. bias voltage, can be recorded on any nominal 1mA recorder; nominal logarithmic characteristic over a 40 dB range (chart records linear on a dB scale).

### Meter display

Individual meters indicate

- a) Relative carrier level: 40 dB full-scale range
- b) Phase detector error voltage (on zero-centre meter)

### Auxiliary outputs

- a) Amplified v.l.f. station signal, at 1 kHz intermediate frequency and phase coherent with r.f. carrier.
- b) Phase shifted 100 kHz square wave, 0.5 V peak to peak nominal
- c) Phase shifted 1kHz square wave, 0.5 V peak to peak nominal
- d) Phase shifted 100 Hz square wave, 0.5 V peak to peak nominal
- e) Reference frequency (L.O.) offset 1 kHz from v.l.f. carrier, square wave, 0.5 V peak to peak nominal

### Audio output

Built-in speaker and volume control for aural monitoring of v.l.f. station at approximately 1 kHz.

### Frequency standard input

Requires stable 1 MHz or 100 kHz from external frequency standard. Input level 0.5-5 volt r.m.s. into 1000 ohms.

### Antenna requirements

Designed for use with loop, whip or simple wire antenna; shielded loop antenna (Model 599-600 or equal) recommended for high noise locations. Antenna may be located any distance from receiver. (100 ft. of 50 ohm coaxial cable supplied with receiver).

### Bandwidth

- a) RF bandwidth (narrow band filters) 500 Hz, nominal
- b) IF bandwidth 50 Hz, nominal
- c) Servo bandwidth (equivalent noise bandwidth): selectable from 0.002 Hz to 0.06 Hz (phase tracking servo)

### Noise suppression

Blanking circuit rejects impulse noise either man-made or atmospheric ('sferics') Front panel lamp indicates presence of blanked noise impulse and facilitates adjustment of blanking circuit control.

### Servo disable circuit

Electronic switch disables phase servo whenever v.l.f. carrier drops below minimal level; front panel warning lamp lights at same time. Tracking resumes automatically when carrier returns.

## PERFORMANCE

### Receiver sensitivity

0.01 microvolt signal (corresponding to 0.3 microvolt/meter field strength at 20.0 kHz with model 599-600 loop antenna) into receiver energizes carrier level switch and enables normal phase tracking; tracking maintained at an input signal-to-noise ratio of -50 dB (Gaussian noise measured in a 1 kHz bandwidth; servo time constant switch in 50 sec position).

### Phase tracking servo

Front panel selector switch provides following servo response characteristics:

Nominal time Constant (sec)	Equivalent noise bandwidth (Hz),	Maximum tracking rate (nominal)
5	0.06	$\pm 1 \times 10^{-6}$
15	0.02	$\pm 3.3 \times 10^{-7}$
50	0.006	$\pm 1 \times 10^{-7}$
150	0.002	$\pm 3.3 \times 10^{-8}$

### Nominal servo deadband:

Less than  $\pm 0.1$  sec. in all switch positions

### Manual servo slewing

Momentary contact, centre-off toggle switch provided to advance or retard phase servo at a nominal  $1\mu\text{S. /sec.}$  rate.

### Calibration accuracy

Short-term and long-term stability better than  $\pm 0.5 \mu\text{S.}$  under normal laboratory conditions; intrinsic calibration accuracy (relative to received v.l.f. carrier) nominally better than  $\pm 1 \times 10^{-11}$  on a 24-hour basis.

## Synthesizer stability

Phase of the coherent local oscillator signal is absolutely fixed by the synthesizer setting; the synthesizer, after being switched to other frequencies, shows less than  $\pm 0.05 \mu\text{s}$ . shift when returned to its original setting.

## AGC

Stable a.g.c. circuit assures full-reliability phase locked servo operation over a 40 dB range of carrier level with total variation of phase shift less than  $0.5 \mu\text{s}$ . (equivalent, at 20 kHz).

## Dynamic range

Total signal level operating range in excess of 120 dB (including 80 dB manual gain control and 40dB a.g.c. range)

## POWER SUPPLY REQUIRED

95-125 volt a.c., 48-62 Hz, 40 watts nominal, or d.c. source (e.g. +12 volt and -12 volt d.c. standby batteries)

External standby batteries, when used, automatically assume full operating load in the event of primary a.c. power failure. All receiver functions, including servo tracking, are sustained without interruption; however, chart drive motor in recorder stops during a.c. power off time. Standby current drain approximately 600 mA at +12 volt d.c. and 600 mA at -12 volt d.c.

## MECHANICAL

### DIMENSIONS

	Height	Width	Depth
(rack panel)	178 mm (7 in.)	483 mm (19 in.)	419 mm (16 1/2 in.)

WEIGHT 20.5 kg (45 lb)

### Ambient temperature limits

$0^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  while operating ( $+05^{\circ}\text{C}$  maximum storage temperature)

### Packaging

Circuits are packed in the following modules:

Receiver/synthesizer/recorder	unit 202
AGC/phase error	unit 302
Phase servo	unit 402
Power supply	unit 502

## LORAN-C

UK/FRR 652  
HF RECEIVER  
TYPE PRS 2282A

Relevant publications:

AP 116E-0768-16

FUNCTION

The UK/FRR652 is a general purpose HF communications receiver that provides continuous coverage of the frequency range 10 kHz to 30 MHz, and allows for reception of AM, CW, SSB, LSB, FSK and FM signals.

ORIGIN

Plessey Military Communications.

DESCRIPTION

The UK/FRR652 is a double superheterodyne HF communications receiver with a tunable frequency range of 10 kHz to 30 MHz in 10 Hz steps. A conventional tuning control mounted on the receiver front panel provides continuous fast or slow frequency control without any need for band changing. A ten digit keypad provides for instant frequency access as required. Instant recall of up to 100 frequencies, together with their respective mode, bandwidth, a.g.c. and BFO settings is also provided.

The UK/FRR652 HF communications receiver front panel controls and indicators are illustrated in Fig 1.

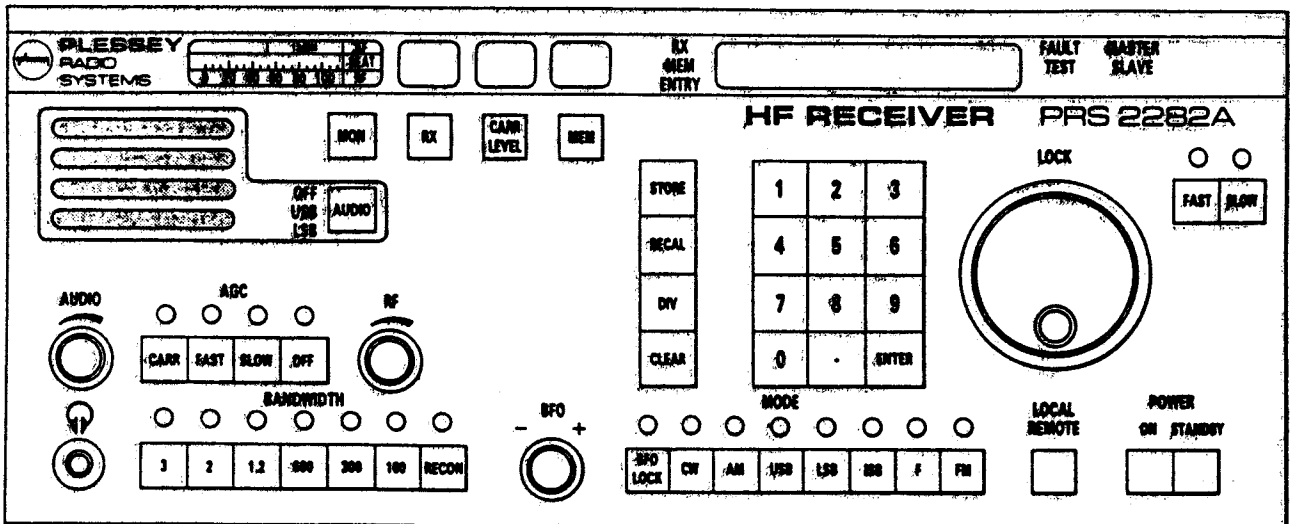


Fig 1 UK/FRR652 HF Communications Receiver Front panel

PHYSICAL CHARACTERISTICS

Weight

Complete Unit: 16 kg.

Dimensions

Height: 177 mm.  
Width: 483 mm.  
Depth: 380 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 10 kHz to 30 MHz in 10 Hz steps.

Modes of reception: CW, AM, USB, LSB, ISB, F, FM.

Bandwidths:	<u>Centre frequency</u>
8 kHz	F.C.
2 kHz	F.C. +2 kHz.
1.2 kHz	F.C. +2 kHz.
600 kHz	F.C. +1 kHz.
300 kHz	F.C. +1 kHz.
100 kHz	F.C. +1 kHz.
3 kHz	F.C. +1.75 kHz.
3 kHz	F.C. -1.75 kHz.

Memory capacity: 100 channels.

Data stored: Frequency, mode bandwidth, a.g.c. time-constant, reinserted carrier, BFO offset.

Data retention: Memory retention is better than 10 days at 25°C using storage capacitor.

Power requirements: 100 V, 120 V, 220 V or 240 V, 50 to 400 Hz.

Power consumption Approximately 90 watts.

Operating conditions: -10°C to +55°C, 95% RH at 40°C.

UK/FRR 628  
HF RECEIVER  
TYPE RA1772

Relevant publications:

AP 116E-0753-16

FUNCTION

The radio receiver Type RA1772 is a fully synthesised, solid state, communications receiver providing reception facilities for LSB/USB (A3A,A3H,A3J), ISB(A3B), AM(A3) and telegraphy (A1,A2H,A2J) with two IF filters offset by 1 kHz.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

The frequency range of the receiver is 15 kHz to 30 MHz and the built-in synthesiser is phase-locked to the output of a 5MHz frequency standard. The MHz selection is in 1 MHz increments; a single knob tuning control tunes the synthesiser continuously over each 1 MHz band, with switched selection of FAST and SLOW tuning rates, or LOCK. In the LOCK position, the synthesiser does not respond to movement of the kHz tuning control. At the ends of each 1 MHz band, the tuning provides a 20 kHz overspill to eliminate the need for reverse tuning of the kHz control. Overspill is indicated by an illuminated lamp behind the appropriate MHz dial setting, above or below the setting initially selected. An electronic digital display indicates the kHz setting to 10 Hz. Some receivers will be fitted with a battery module MS540 which ensures that the tuning state is maintained following a momentary mains failure.

A built-in meter may be switched to indicate RF and AF signal levels as well as supply voltage levels. A slow-motion BFO control is provided for CW operation.

A switched monitor loudspeaker is provided and two front panel mounted jack sockets permit headphone monitoring of the output selected by the MODE switch. When the right-hand phone jack is in use the internal loudspeaker is muted. A general view of the RA1772 receiver is illustrated in Fig 1.

PHYSICAL CHARACTERISTICS

Weight

Complete unit: Approx. 22 kg.

Dimensions

Height: 178 mm.  
Width: 483 mm.  
Depth: 410 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.  
Modes of reception: A1, A2, A2H, A2J,  
A3, A3A, A3B, A3H, A3J.  
Tuning: 1 MHz increments (0 to 29)  
continuously tunable in  
10 Hz or 100 Hz increments  
over each 1 MHz band.  
Electronic frequency display  
to 10 Hz.  
Overspill: 20 kHz at either end of each  
1 MHz band. Indication provided.  
Antenna input: 50 ohms to 75 ohms (nominal).  
Power supply: 100 to 125 V or 200 to 250 V at  
45 to 65 Hz.  
Power consumption: Approximately 60 VA.

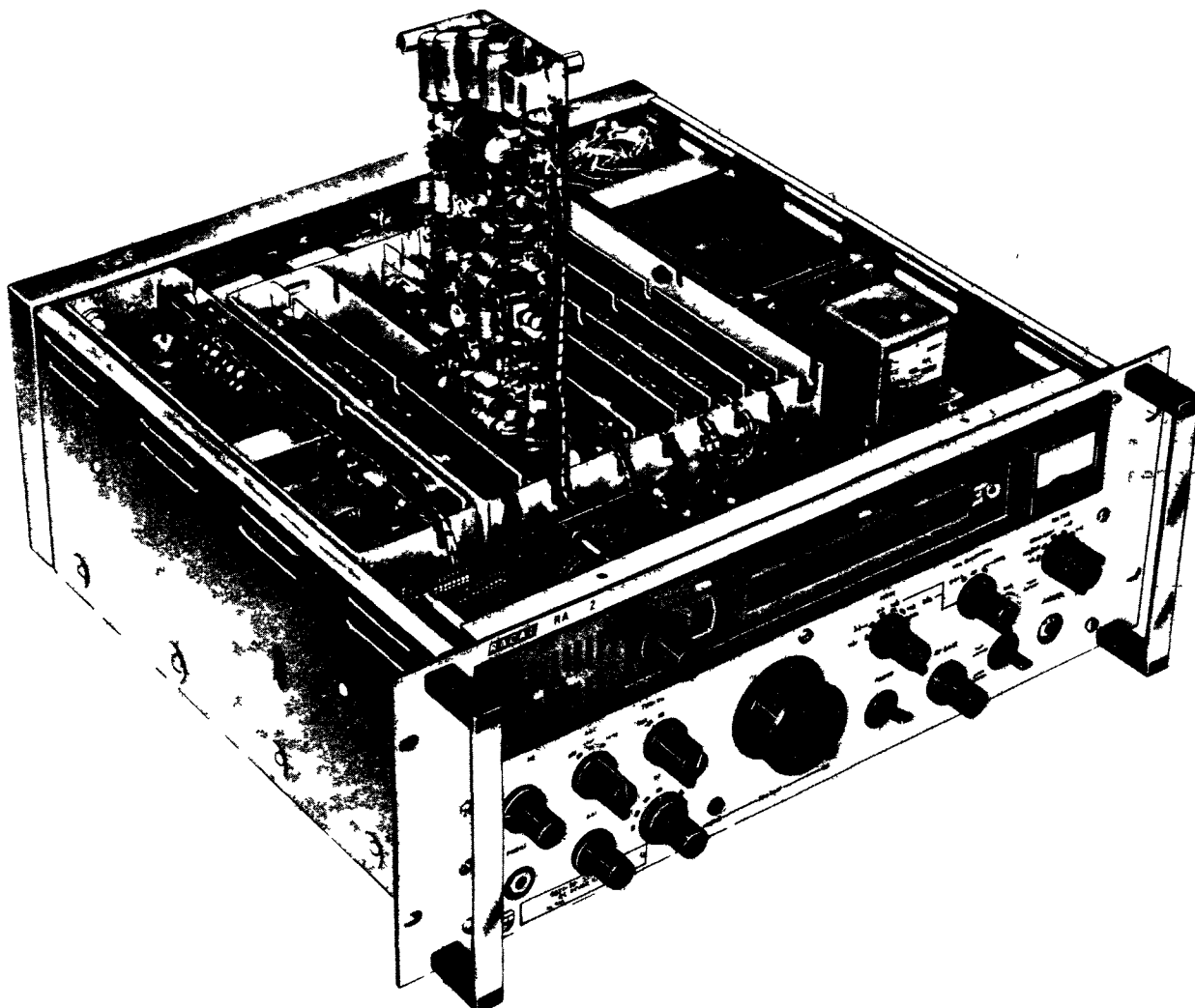


Fig 1 Receiver General View

UK/FRR 626  
HF RECEIVER  
TYPE RA1778/DA78120/B

Relevant publications:

AP 116E-0754-1

FUNCTION

The RA1778 is a fully synthesised solid state communications receiver providing reception facilities for LSB/USB (A3A, A3H, A3J), AM(A3) and CW(A1). Facilities for ISB(A3B), FSK(F1) and AFC are provided by optional, internally fitted, modules.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

The receiver is fully synthesised and tunable over the range 15 kHz to 30 MHz, with a built-in memory facility which can be programmed up to 12 frequencies for rapid channel changes.

A rigid die-cast chassis provides the basis for the main frame of the receiver. Mounted within compartments on the underside of the chassis are the mixer boards and part of the frequency generating system. Mounted on the top of the chassis is an aluminium box structure, which houses up to nine (dependent on the options fitted) printed circuit boards, each individually screened. Also mounted on the top of the chassis is the frequency standard module and the power supply transformer. The power supply printed circuit board is mounted on the inside of the rear panel and adjacent to this board are mounted the power supply smoothing capacitors. Further printed circuit boards containing memory and decoder logic circuits are mounted on the inside of the front panel. Fig 1 illustrates the controls and indicators on the receiver front panel.

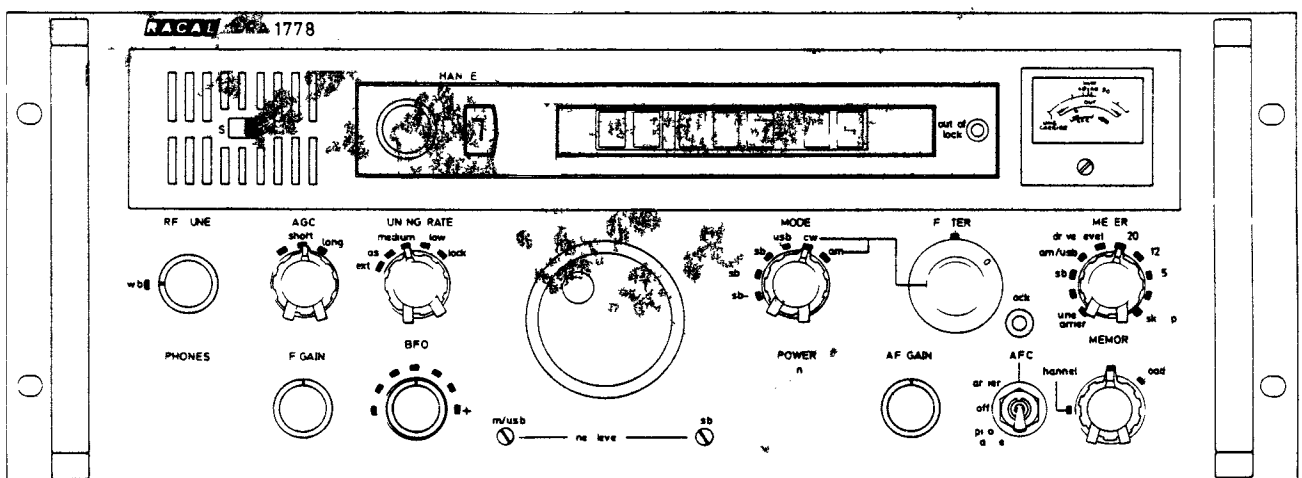


Fig 1 RA1778 HF Receiver Front Panel

## PHYSICAL CHARACTERISTICS

### Weight

Complete unit. 48½ lb (22 kg).

### Dimensions

Height: 7 inches (178 mm).  
Width: 19 inches (483 mm).  
Depth: 16 inches (407 mm).

## FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.

Modes of reception: A1, A2, A2H, A2J, A3, A3A, A3J, A3H  
with the following options:

- (1) Choice of USB or LSB.
- (2) Provision for reception of A3B or F1.
- (3) Provision of AFC.

Tuning: 12 Programmable channels.  
Continuously tunable synthesiser in  
10 Hz, 20 Hz or 1 kHz increments.  
7 Digit electronic readout.

Tuning accuracy: ±5 Hz relative to the frequency of the  
required signal.

Power supply: 100 V to 125 V or 200 V to 250 V, 45 to 65 Hz.

Power consumption: Approximately 60 VA (basic receiver).  
Approximately 90 VA (fully equipped).

Operation: -10°C to +55°C.

UK/FRR-627  
REMOTELY CONTROLLED HF RECEIVER  
TYPE MA1072/RA1784

Relevant publications:

AP 116E-0755-1A

FUNCTION

The RA1784 is a fully synthesised, triple-conversion, HF communications receiver operating over the frequency range 15 kHz to 29.99999 MHz.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

A rigid die-cast chassis provides the basis for the main frame of the receiver, illustrated in Fig 1. Frequency selection and control of all available functions is achieved by serial data from the MA1072 control panel. This data is applied to a serial data interface module at the RA1784 receiver, where it is converted into parallel internal control data. This technique allows extended or full remote control using two cables, with revertive check data returned via a third cable. For extended control the MA1072 control panel may be linked directly to the RA1784 receiver by hard wired cables. For remote control, standard telephone circuits may be used via data modems.

The MA1072 control panel is illustrated in Fig 2. The receiver frequency is set by a single tuning knob and is indicated on a 7-digit display. The selected function, tuning rate and other facilities are indicated by the appropriate illuminated push-button. If a fault occurs on the receiver, or the interconnections have not been made, a fault indicator is illuminated. A battery operated memory circuit will retain the currently tuned frequency and maintain other settings during a temporary supply failure.

A number of MA1072 control panels and/or RA1784 receivers may be connected with ancillary equipment into systems to provide for a variety of applications. The EXTERNAL socket on the MA1072 control panel provides for the connection of a frequency entry pad. This may take the form of a numeric key pad (0 to 9 and decimal point) to enable the receiver to be set rapidly to a particular operating frequency. Alternatively, a multi-frequency memory together with a channel switch would enable the receiver to be set rapidly to any one of a number of pre-programmed channel frequencies.

Power supply

The RA1784 receiver requires an a.c. input of 100 V to 125 V or 200 V to 250 V at 45 to 65 Hz.

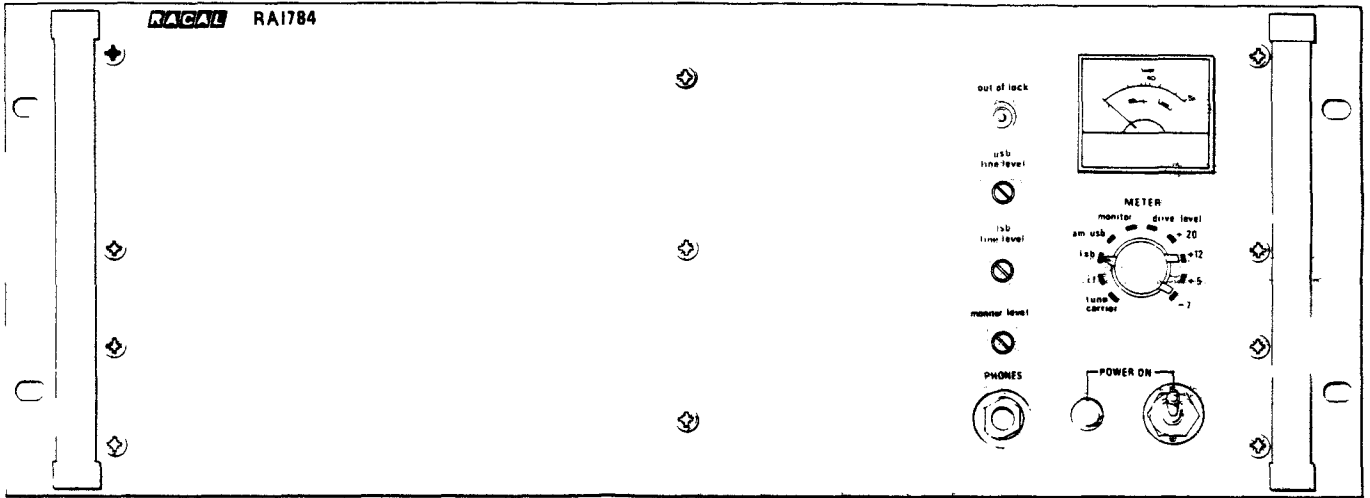


Fig 1 RA1784 Receiver Front View

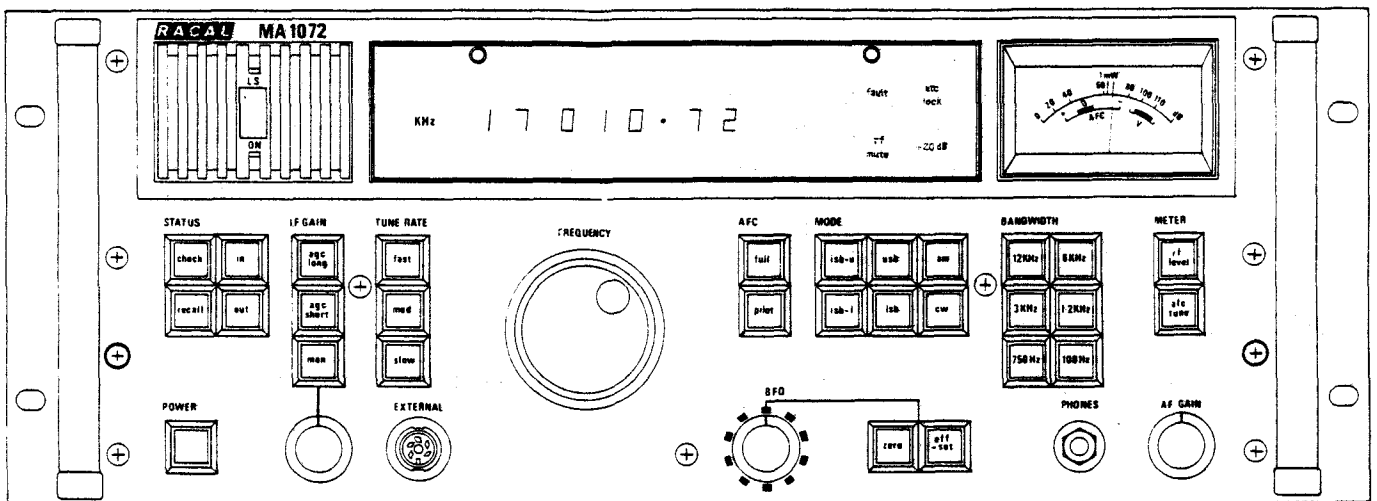


Fig 2 MA1072 Control Panel Front View

PHYSICAL CHARACTERISTICS

	<u>MA1072 Control Panel</u>	<u>RA1784 Receiver</u>
Weight:	Approximately 16 kg.	Approximately 31 kg.
Height:	178 mm.	178 mm.
Width:	483 mm.	483 mm.
Depth:	300 mm.	464 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.

Modes of reception: A1, A2, A2H, A2J, A3, A3A, A3B, A3J, A3H  
with the following options:

- (1) USB and/or LSB.
- (2) ISB.
- (3) AFC.
- (4) Half octave filters.

Tuning: Continuously tunable synthesiser in 10 Hz,  
20 Hz or 1 kHz increments.  
Electronic frequency display in 10 Hz steps.

Power supply: 100 V to 125 V or 200 V to 250 V, 45 to 65 Hz.

Power consumption: Approximately 60 VA (basic receiver).  
Approximately 90 VA (fully equipped).

Operation: -10°C to +55°C.

UK/FRR 638 RECEIVER  
UHF/VHF MULTI-CHANNEL  
GROUND-TO-AIR COMMUNICATIONS EQUIPMENT

Relevant publications:

AP 116E-0756-16 - Receiver UK/FRR 638.

DESCRIPTION

Receiver Assembly

The UK/FRR 638 receiver operates in the UHF frequency range 225 to 399.975 MHz and the VHF frequency range 117 to 136.975 MHz. The receiver comprises a power supply and an IF/AM detector module with UHF or VHF front end, synthesiser and preset memory module. The memory can hold up to 29 separate channels. The frequency selection controls are on the preset memory module, which may be a UHF or VHF unit. This module is fastened into but removable from the equipment case front. The receiver assembly is illustrated in Fig 1.

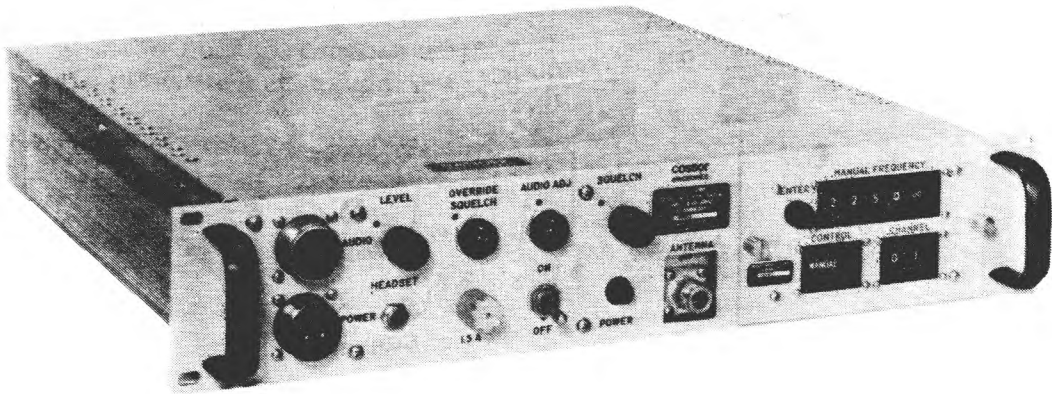


Fig 1 Receiver Assembly

LEADING PARTICULARS

Receiver assembly

Frequency range: VHF: 117.000 to 136.975 MHz.  
UHF: 225.000 to 399.975 MHz.

Modulation: Amplitude modulation.

Power supplies: 207 to 255 V ac at 47 to 63 Hz.

Temperature: Operating: -10°C to +55°C.  
Storage: -40°C to +85°C.

Dimensions:  
Width: 483 mm.  
Height: 89 mm.  
Depth: 483 mm.

Weight: Case: 12.3 Kg.  
Modules: 6.4 Kg.

DESCRIPTION

Remote Control Unit

The Remote Control Unit (RCU) is a self-contained unit providing frequency or channel selection of the transmitters from a remote location, when REMOTE is selected on the main equipment. The RCU is connected to the main equipment by 40 metres of multicore cable thus enabling the operation of the equipment to be carried out by the operator in a control tower situation, with the main equipment located in a ground area.

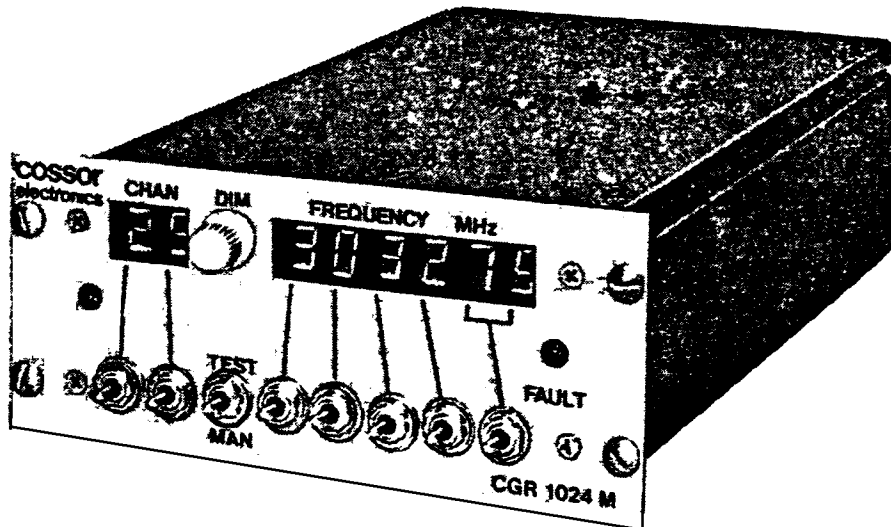


Fig 2 Remote Control Unit

LEADING PARTICULARS

Remote control unit

Dimensions.

Width: 146 mm.  
Height: 64 mm.  
Depth: 281 mm.

Weight: 0.80 Kg.

Temperature: Operating: -10°C to +55°C.  
Storage: -40°C to +85°C.

Power requirements: +28 V at 0.75 A max to transmitter  
and 0.375 A for receiver.

## PREFACE

This Air Publication is one of a series, given in the List of Associated Publications, providing concise details of ground radio equipment and ancillaries.

When this publication is amended, changes in technical information within individual pages will be marked by two marginal arrows thus:

▶-----◀ indicating the start and finish of the changed text. Grammatical changes or corrections will not be so marked.

LIST OF ASSOCIATED PUBLICATIONS IN THE SERIES

<u>AP</u>	<u>Title</u>
116A-0110-1	Introduction and index (to complete series)
116A-0111-1	Fixed ground radio installations
116A-0112-1	Transportable ground radio installations
116A-0113-1	Mobile ground radio installations
116A-0114-1	Radio transmitting equipment (including transmitter-receivers)
116A-0115-1	Radio receiving equipment
116A-0116-1	Frequency generation equipment
116A-0117-1	Control, monitoring and simulating equipment (including closed circuit television, sound recording and sound reproducing equipment)
116A-0118-1	Antennas, masts and antenna tuning, coupling and matching equipment
116A-0119-1	Radio and telegraph power supply equipment
116A-0120-1	Telegraph and terminal equipment

## CONTENTS

Preliminary pages

Prelim (title) page	Page 1/2
Amendment record sheet	3/4
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Concise details

Item No.	Equipment
1	Receivers type R1392D (10D/17745), R1392E (10D/17768), R1392J (5820-99-953-7424) and 62H (Naval) (10D/23989)
2	Receiver type R7109 (5820-99-932-5695)
3	Receiver type R7351 (5820-99-932-5694)
4	Receiver type R8998 (5820-99-955-0769)
5	Receiver type R10149 (5820-99-933-2369)
6	Receiver type R10168 (5820-99-955-0771)
7	Receiver type R10170 (5820-99-955-0770)
8	Receiver type R15095 (10D/20489)
9	Receiver type R15172 (10D/22019)
10	Receiver (5820-99-933-0813)
11	Receiver (5820-99-943-2775)
12	Receiver (5820-99-999-9292)
13	Receiver (5820-99-950-5773)
14	Receiver (5820-99-953-2075)
15	Receiver (5820-99-107-5921)
16	Receiver (5820-99-107-4926)
17	Receiver (5820-99-618-1034)
18	Receiver (5820-99-119-3981)
19	Receiver (5820-99-119-3979)
20	Receiver (5820-99-951-0461)
21	Receiver (5820-99-630-9620)
22	Receiver (5820-99-624-0202) Raca1 RA1218A
23	Tracking receiver DEI model MTR 4B
24	VLF tracking receiver Tracor Inc. model T599H
▶ 25	Receiver UK/FRR 652
26	Receiver UK/FRR 628
27	To be allocated
28	Receiver UK/FRR 626
29	Receiver UK/FRR 627
30	Receiver UK/FRR 638

RECEIVER, RADIO

Type R1392D (10D/17745)  
 R1392E (10D/17768)  
 R1392J (5820-99-  
 953-7424)  
 62H (Naval)(10D/  
 23989)

Relevant publication:-

AP116E-0702-1

**Function**

V.H.F. communication and D/F receivers primarily intended for use in conjunction with the transmitters Type T.1131 series and T.1540, receiver (Naval) 62H being specifically used with transmitter Type 75C. The receivers are designed for the reception of c.w. and R/T signals. Receivers R.1392D and E are similar R.1392D being tropicalized whilst R.1392E is non-tropicalized. R.1392G is similar to R.1392D but covers a lower frequency range. R.1392J is similar to R.1392D but is more selective. Receiver 62H is designed for a ship-borne or ground station role and tropicalized.

**Frequency range**

100 MHz to 156 MHz (3 to 1.9 metres).  
 65 MHz to 85.375 MHz (R.1392G only) (4.6 to 3.5 metres).

**Frequency control**

Crystal controlled heterodyne oscillator with a multiplication factor of 18.

**Frequency accuracy and stability**

To crystal accuracy.

**Channel spacing**

Suitable for reception of transmissions spaced by 90 kHz.

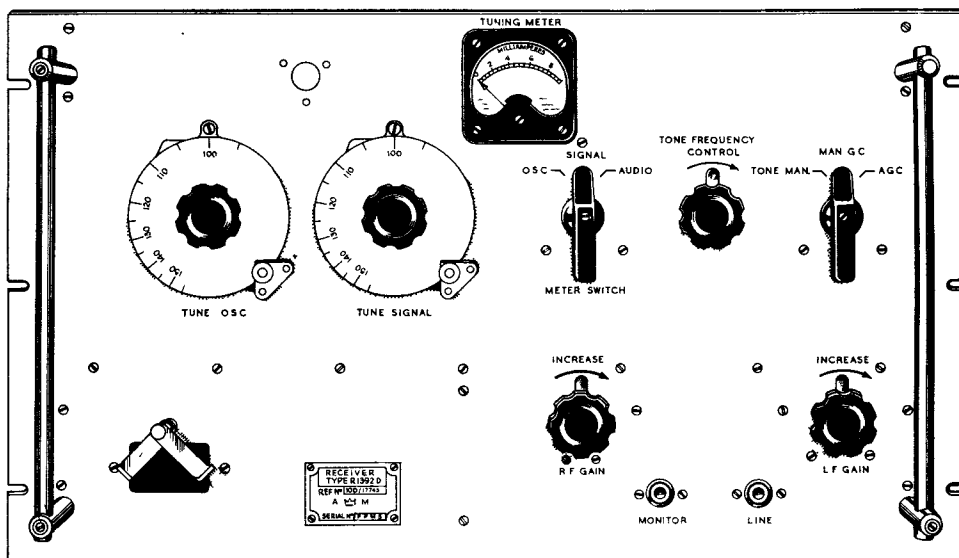
Suitable for reception of transmissions spaced by 50 kHz (R1392J)

**Intermediate frequency**

4.86 MHz.  
 9.72 MHz (62H only).

**I.F. Bandwidth**

For 6dB down: plus or minus 25 kHz  
 12 kHz (R1392J)



Receiver, Type 1392D

**Modulation**

**Input impedance**

**Sensitivity**

**Muting level**

**Automatic gain control**

**Output impedance**

**Output power**

**Antennae**

**Power supplies**

**Power consumption**

**Overall dimensions**

**Weight**

**Ancillary equipment**

Amplitude modulated reception.

100 ohms (coaxial feeder line).

For output of not less than 100mW into 600 ohms, in each case:—

R.1392D & E require 10 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

R.1392J requires 8 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

62H (Naval) requires 5 $\mu$ V signal modulated to 30% depth at 1000 Hz across 100 ohms input.

R.1392D & E 7 $\mu$ V; R.1392J 6 $\mu$ V; 62H 4 $\mu$ V.

Fully operative at 8 $\mu$ V.

600 ohms (surge impedance).

5mW at plug PL1, 100mW at line jack JI 100mW (62H Naval).

Standard v.h.f. antenna.

62H (Naval): suitable for C.A.W. system.

6.3V at 4A, 240V at 80mA.

50 watts: 62H (Naval) 60W (approx.).

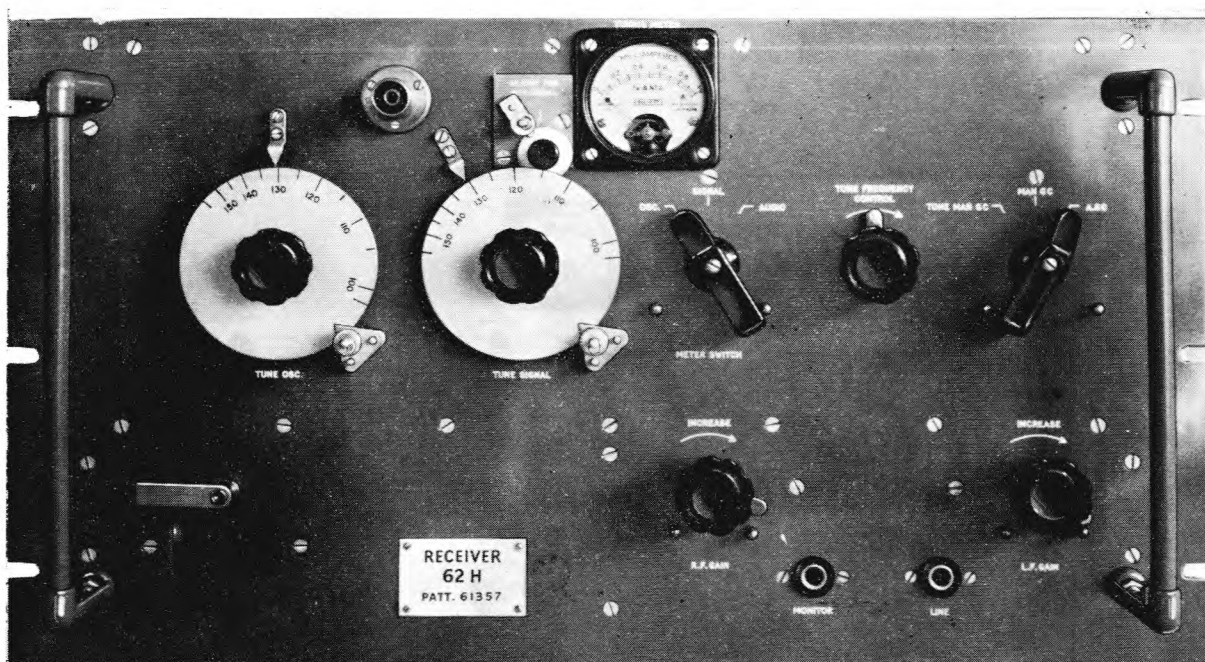
Height	Width	Depth
10½ in (26.7 cm)	1ft 7in (48.3 cm)	1ft 0½ in (31.7 cm)

47 lb (21.3 kg).

Power unit, Type 234A (a.c. mains) (10D/17395).

Power unit, Type 138 (6V d.c. supply) (10D/17390).

Power unit, A.P.W836A (a.c. mains).



**Receiver, Type 62H**

## RECEIVER, RADIO

Type R7109  
(5820-99-932-5695)

Relevant publication:-

AP116E-0731-1

**Function**

U.H.F. multi-channel receiver for fixed or mobile ground installations. The receiver is a double super-heterodyne with the first local oscillator controlled by a channel selection and frequency control system. Receiver R.7109 comprises receiver sub-assembly (formerly receiver unit Type 9095), cover electrical fitted (formerly cover assembly), cable assembly (formerly cable assembly Type 7804) and cover, access, electrical equipment, fitted chassis (formerly cover front, Type 1068).

**Origin**

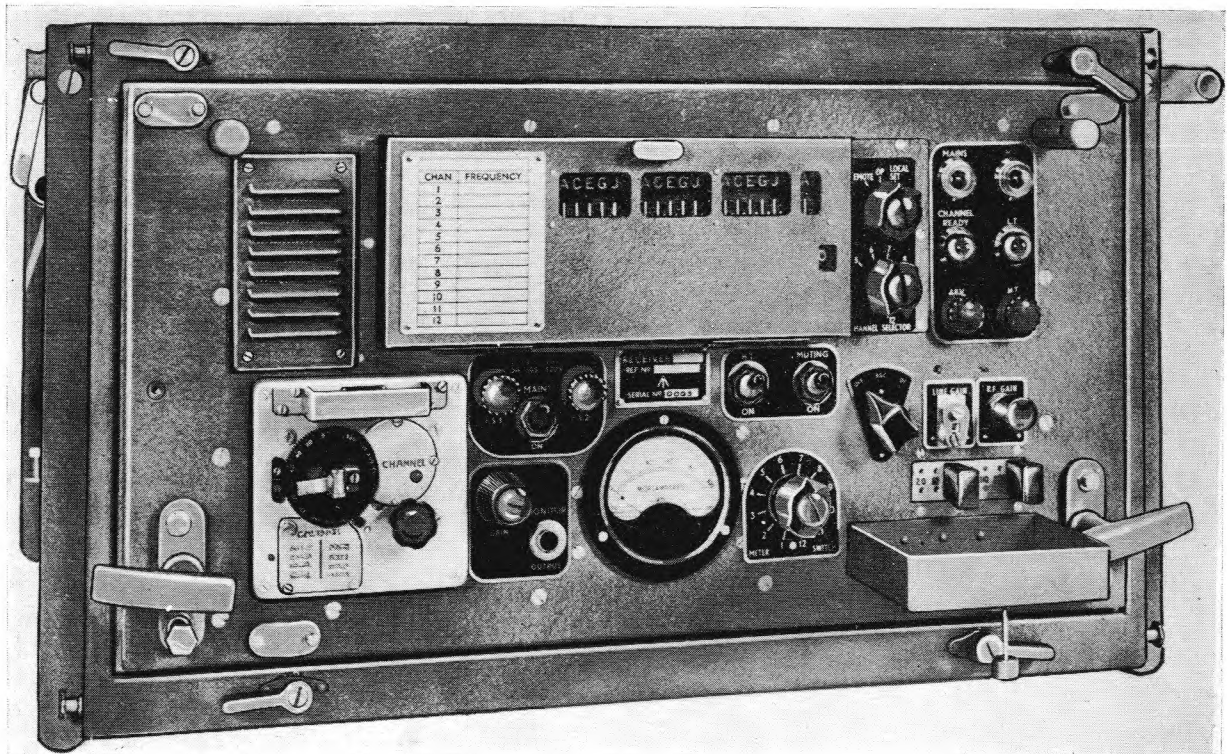
The Plessey Co. Ltd., Type XCA.200.

**Frequency range**

225 MHz to 399.9 MHz.

**Frequency control and channel system**

Frequency of the first oscillator is controlled by a channel selection and frequency control system. Frequency of the second oscillator is crystal controlled at 22.025 MHz. The receiver can be set up at any twelve channels out of the total of 1750. Any one of the twelve can subsequently be selected either locally or remotely via a remote control system.



Receiver, Type R.7109

**Frequency accuracy and stability**

The operating frequency of the receiver is automatically kept within 10 MHz of correct frequency after selection is made.

**Channel spacing**

100 kHz.

**Intermediate frequencies**

24 MHz and 1.975 MHz.

**I.F. Bandwidth**

*For 6dB down:* not less than 60 kHz.  
*For 60dB down:* not greater than 140 kHz.

**Modulation**

Amplitude modulated reception.

**Sensitivity**

With an r.f. signal across the antenna terminals of  $1\mu\text{V}$  modulated 30 per cent at 1000 Hz, the signal/noise ratio at the output is greater than 10dB.

**Output**

With an r.f. signal across the antenna terminals of  $5\mu\text{V}$  modulated 100 per cent at 1000 Hz:—  
Monitor output 200mW.

Line output 2.0V and 3.5V for any load between 100 ohms and 1800 ohms.

Attenuated line output 1mW max. into 600 ohm G.P.O. line.

**Antennae**

Antenna unit, design 41, Type AJE.

**Power supplies**

115 or 230 volts, 45 to 65 Hz, single-phase a.c.

**Power consumption**

250 watts.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft 1 $\frac{1}{4}$ in (33.6 cm)	1ft 11 $\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

**Weight**

110 lb (50 kg) (*excluding cabinet*)  
Cover assembly 51 lb (23 kg) (*excluding connectors*).

**Ancillary equipment**

Cooler, dry air, electrical equipment (5820-99-932-3995) (formerly air blower, Type 7344, 10K/19476).

## RECEIVER, RADIO

Type R7351  
(5820-99-932-5694)

Relevant publication:-

AP116E-0730-1

**Function**

U.H.F. single channel receiver for fixed or mobile ground installations. The receiver is a double super-heterodyne with both oscillators crystal controlled, and comprises receiver sub-assembly (formerly receiver unit, Type 9096), cover electrical fitted (formerly cover assembly), cable assembly (formerly cable assembly, Type 9097) cover, access, electrical equipment, fitted chassis (formerly cover front, Type 1068) and two external connectors.

**Origin**

The Plessey Co. Ltd.

**Frequency range**

225 MHz to 399.9 MHz.

**Frequency control**

Crystal controlled local oscillators.

**Frequency accuracy and stability**

To crystal accuracy.

**Channel spacing**

100 kHz.

**Intermediate frequencies**

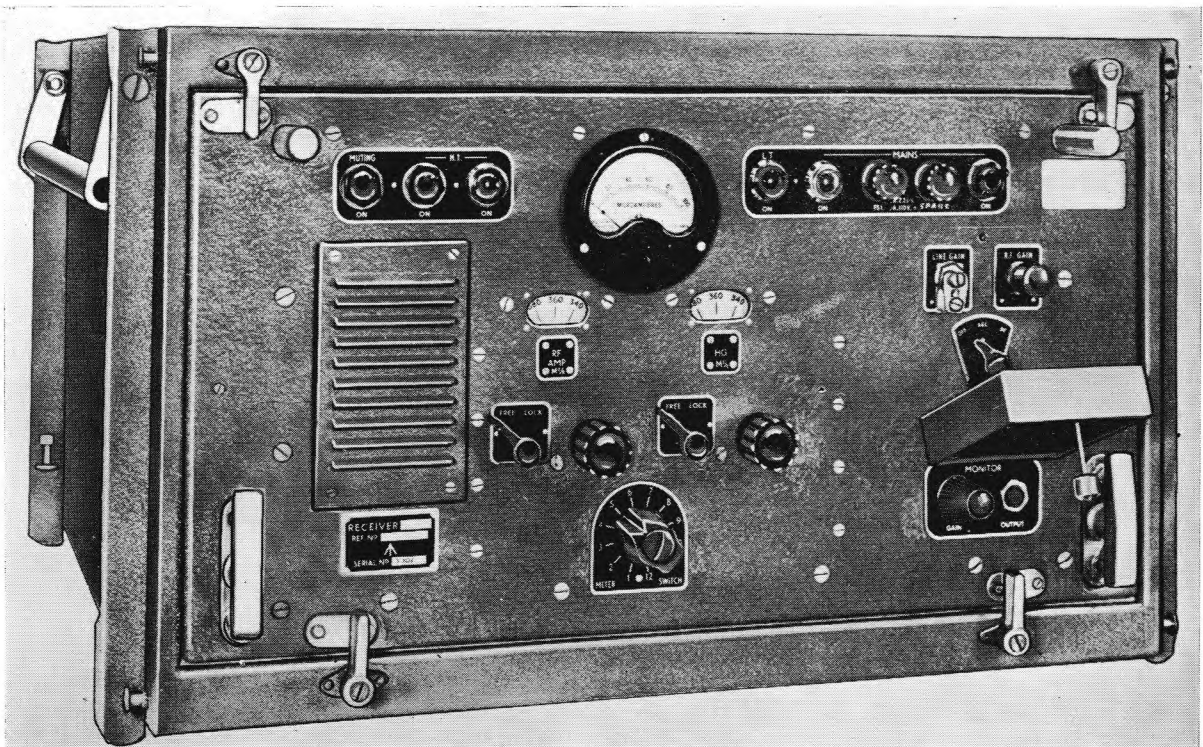
24 MHz and 1.975 MHz.

**Modulation**

Amplitude modulated reception.

**Sensitivity**

With an r.f. signal across the antenna terminals of  $1\mu\text{V}$  modulated 30 per cent at 1000 Hz, the signal plus noise/noise ratio at the output is greater than 10dB.



Receiver, Type R.7351

**Output**

With an r.f. signal across the antenna terminals of  $5\mu\text{V}$  modulated 100 per cent at 1000 Hz:—  
Monitor output 200mW.

Line output 2.0V and 3.5V for any load between 100 ohms and 1800 ohms. Attenuated line output: 5mW max., into 600 ohms G.P.O. line.

**Antennae**

Antenna unit, design 41, Type AJE.

**Power supplies**

115 or 230 volts, 45 Hz to 65 Hz single phase a.c.

**Power consumption**

160 watts.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
1ft 1 $\frac{1}{4}$ in (33.6 cm)	1ft 11 $\frac{1}{4}$ in (59 cm)	2ft 0in (61 cm)

**Weight**

80 lb (36.3 kg) (*excluding cabinet*)

*Cover assembly* 51 lb (23 kg) (*excluding connectors*).

**Ancillary equipment**

Cooler, dry air, electrical equipment (5820-99-932-399) (formerly air blower, Type 7344, 10K/19476).

## RECEIVER, RADIO

Type R8998  
(5820-99-955-0769)

## Relevant publication:-

AP116E-0734

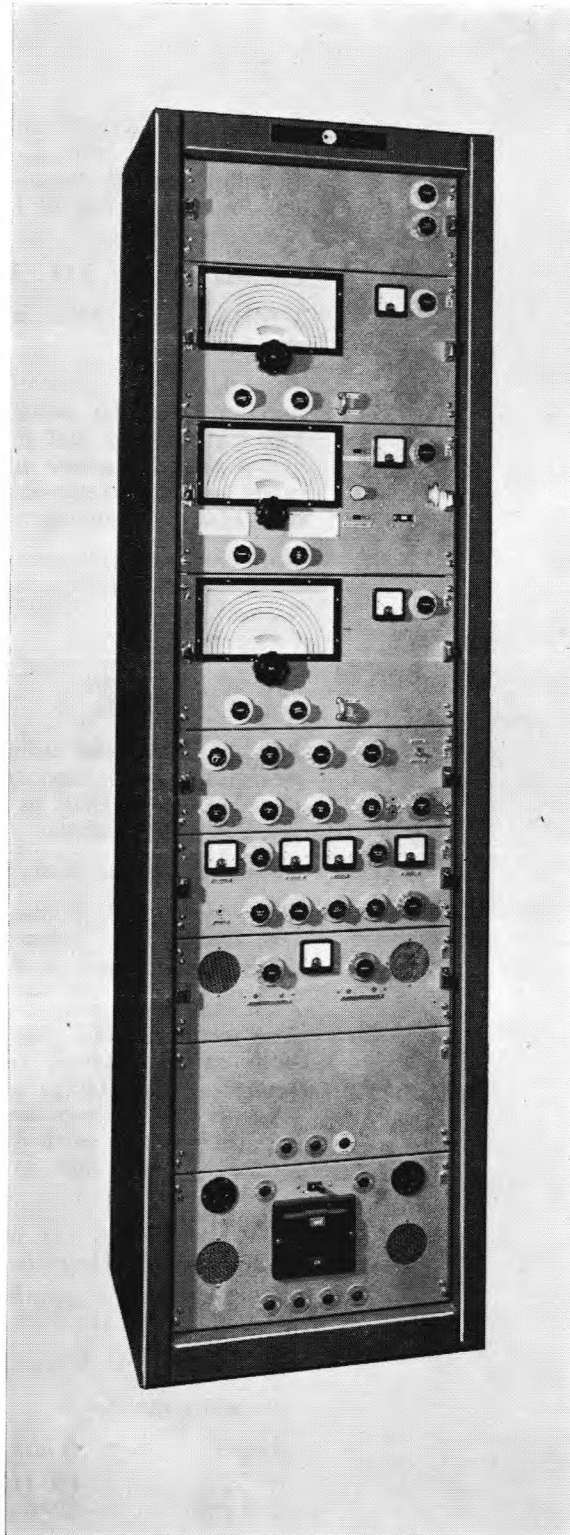
<b>Function</b>	Double diversity h.f. receiver comprising a triple superheterodyne with a high stability variable local oscillator and six crystal controlled spot frequencies (c.w., m.c.w., on/off or f.s.k. working).		
<b>Origin</b>	The Marconi Co. Ltd., Type H.R.11.		
<b>Frequency range</b>	3 MHz to 27.5 MHz in four ranges. (100 to 10.9 metres).		
<b>Frequency control</b>	A variable L.C. controlled first frequency changer oscillator may be switched in place of the crystal first oscillator so that the receiver may be tuned to any desired frequency in the band. Frequency multipliers are used to provide the final frequency required for frequency changing.		
<b>Frequency accuracy and stability</b>	<i>Variable first oscillator:</i> 15 parts in $10^6$ per degree C. <i>Crystal first oscillator:</i> 1 part in $10^6$ per degree C. <i>Second oscillator:</i> 15 parts in $10^6$ per degree C.		
<b>Intermediate frequencies</b>	1st i.f. 2600 kHz. 2nd i.f. 100 kHz. 3rd i.f. 10 kHz.		
<b>Sensitivity</b>	At 27.5 MHz and using the 1 kHz passband, the minimum signal input required for recording f.s.k. (560 Hz shift) signals at a keying speed of 100 bauds is $0.25\mu\text{V}$ in 75 ohms.		
<b>Input impedance</b>	75 ohms (coaxial feeder).		
<b>A.F.C.</b>	The receiver will follow, with a residual mistune of less than 4 Hz, frequency drifts up to $\pm 3$ kHz arising as the sum of drifts of the carrier frequency and of the receiver oscillator.		
<b>D.C. output</b>	The recording unit provides a d.c. output of 30.0-30 volts at 10 kilohms impedance for keying a tone sender or any voltage operated telegraph equipment. The output unit provides two d.c. outputs of 30.0-30 mA each into an earthed load not exceeding 2 kilohms or 20.0-20 mA into an earthed load not exceeding 4 kilohms.		
<b>Max. receiving speed</b>	300 bauds (375 w.p.m. morse code) with 3 kHz bandwidth and 850 Hz shift. 200 bauds (250 w.p.m. morse code) with 1 kHz bandwidth and 560 Hz shift.		
<b>Power supplies</b>	200 to 250 volts, 50 Hz single phase a.c.		
<b>Power consumption</b>	500 watts (approx.).		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7ft 2 $\frac{1}{4}$ in (219 cm)	1ft 11 $\frac{1}{2}$ in (59.6 cm)	1ft 9in (53.3 cm)

**Weight**

743 lb (349.3 kg).

**Ancillary equipment**

Receiver, radio, 5820-99-955-0771 (formerly receiver, Type R.10168 10D/20459).



**Receiver, Type R.8998**

## RECEIVER, RADIO

Type R10149  
(5820-99-933-2369)

Relevant publication:-

AP116E-0716-1

**Function**

Triple diversity, independent sideband h.f. receiver. The receiver is a double superheterodyne and may be crystal controlled on six spot frequencies or may be tuned to any required frequency by a variable oscillator incorporated in the equipment. It will receive independent sideband, single-sideband or double-sideband transmissions. The equipment comprises fifteen removable units mounted in two steel cabinets.

**Origin**

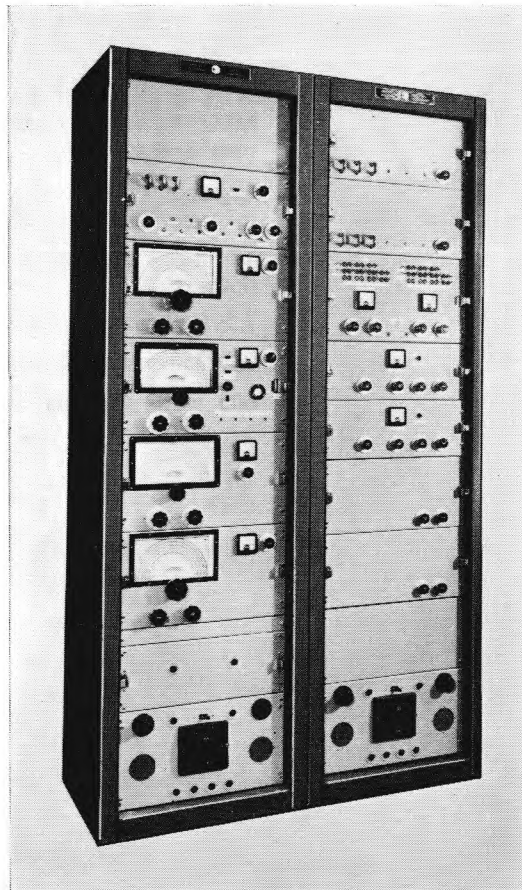
The Marconi Co. Ltd., Type HR.23.

**Frequency range**

3 MHz to 27.5 MHz in four ranges (100 to 10.9 metres).

**Frequency control**

Frequency of the first oscillator is controlled by a variable oscillator or crystal controlled oscillator for any one of six spot frequencies. An a.f.c. system is incorporated in which the frequency of i.f.2 (100



Receiver, Type R.10149

kHz) resulting from the receiver carrier is compared with a crystal controlled 100k Hz reference frequency. Any frequency difference between the carrier and the reference frequency causes a connecting motor in the a.f.c. system to vary the second oscillator frequency so as to reduce the error to zero.

The combined variations in frequency of the receiver oscillator does not exceed the following:—

	Crystal oscillator	L.C. oscillator
At 3 MHz	50 Hz per degree C	130 Hz per degree C
10 MHz	60 Hz per degree C	230 Hz per degree C
20 MHz	70 Hz per degree C	400 Hz per degree C
27.5 MHz	80 Hz per degree C	500 Hz per degree C

**Frequency accuracy and stability**

**Selectivity**

1st i.f.: plus or minus 9 kHz at 2dB attenuation.  
 1st i.f.: plus or minus 38 kHz at 30dB attenuation.  
 2nd i.f.: Discrimination against unwanted frequencies more than 520 Hz outside the passband is greater than 75dB from 4 to 10 MHz and greater than 60dB for frequencies above 10 MHz.

**Frequency response**

3.5 kHz passband: less than 3dB total variation from 100 Hz to 2.5 kHz.

6 kHz passband: less than 3dB total variation from 100 Hz to 6 kHz.

**Intermediate frequencies**

1st i.f. 2600 kHz and 2nd i.f. 100 kHz.

**Cross talk**

Less than -60dB between sideband paths.

**Input impedance**

75 ohms (coaxial feeder).

**Sensitivity**

With a signal of 1.4μV at 3 MHz or 2μV at 27.5 MHz the output signal/noise ratio is 20dB with 6 kHz passband.

**A.F.C.**

Capable of following with less than 1 Hz residual mistune, frequency drifts up to plus or minus 3 kHz.

**Output power**

40 milliwatts (max) in 600 ohms for separate path outputs.

2.5 milliwatts for combined path outputs.

**Power supplies**

200-250 volts, 50 Hz single phase a.c.

**Power consumption**

600 watts (approx.).

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
7ft 2½in	3ft 11in	1ft 9in
(219 cm)	(119.3 cm)	(53.3 cm)

**Weight**

1350 lb approx. (612.4 kg).

RECEIVER, RADIO

Type R10168  
(5820-99-955-0771)

Relevant publication:-

AP116E-0718-1

**Function**

Frequency shift duplex receiver which is used in conjunction with receiver Type R.8998 for double diversity reception of two channel frequency shift duplex signals. The equipment converts the 10 kHz i.f. signal from the receiver into d.c. voltages suitable for operating two-tone senders or a current output which may operate two teleprinters.

**Origin**

The Marconi Co. Ltd., Type HU.14A.

**Reception facilities**

Two channel frequency shift keying (synchronized or unsynchronized): single channel working.

**Input impedance**

600 ohms.

**Output impedance**

10 000 ohms (approximately).

**Input**

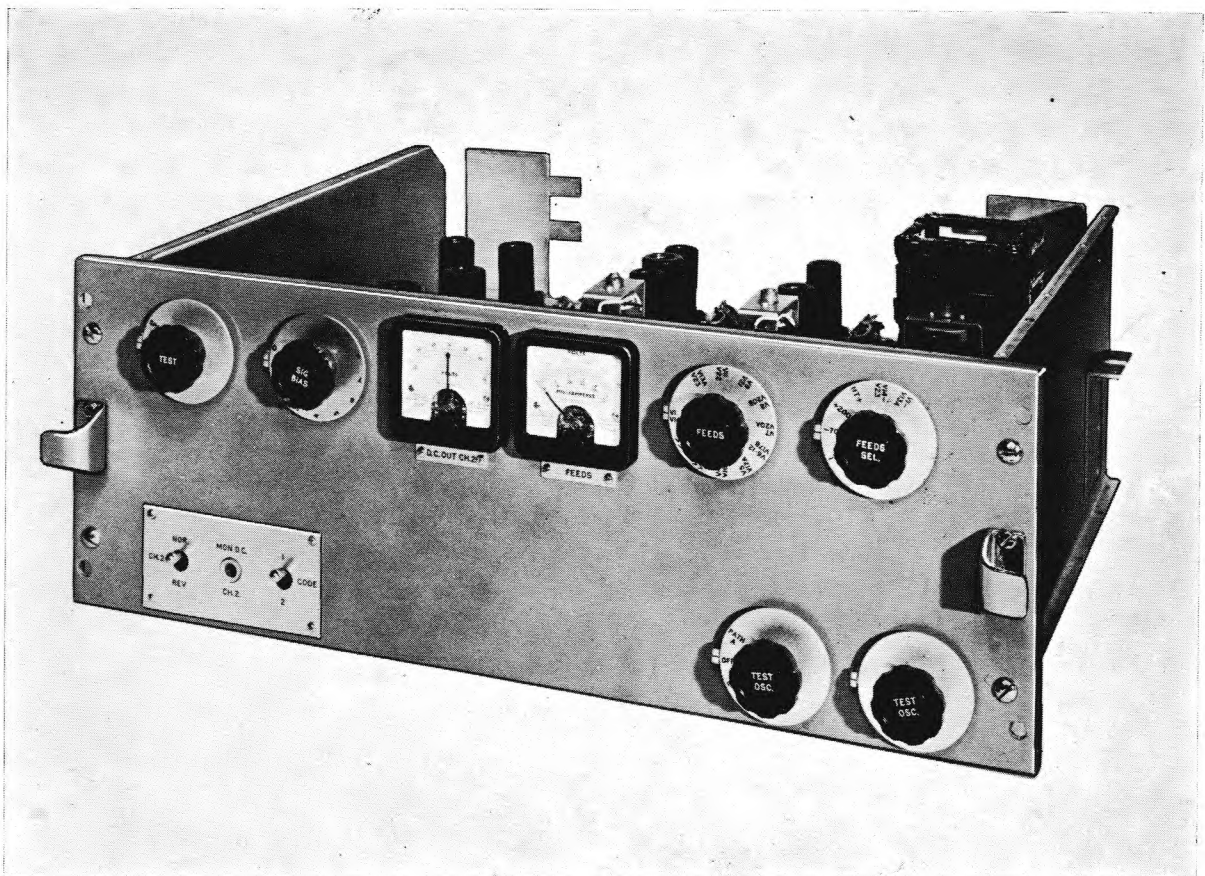
10 kHz centre frequency at levels of 10 mV to 1V.

**Output**

30-0-30V d.c. on both channels.

**Keying speed**

Up to 100 bauds on Channel 1.  
Up to 50 bauds on Channel 2.



Receiver Type R.10168 or R.10170

<b>Power supplies</b>	110-120 volts or 200-250 volts, 50 Hz, single phase a.c.		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	6 $\frac{3}{4}$ in (17 cm)	1ft 7in (48 cm)	1ft 5 $\frac{3}{4}$ in (45 cm)
<b>Weight</b>	24 lb (10.9 kg).		
<b>Associated equipment</b>	Receiver, radio, 5820-99-955-0769 (formerly receiver Type R.8998, 10D/20755).		

## RECEIVER, RADIO

Type R10170  
(5820-99-955-0770)

Relevant publication:-

AP116E-0717-1

(For illustration of Receiver, Type R10170  
see Item No. 6).**Function**

Frequency shift duplex receiver which receives the two-channel f.s.k. modulated i.f. output from rack assembly, Type 9352 and converts the signals into d.c. voltages suitable for operating two-tone senders or a current output unit. The unit is designed to work from the 50 kHz output of the receiving equipment in rack assembly, Type 9352. Provision is made for reversing the phase of the d.c. output of either channel if necessary. A calibrated oscillator is incorporated to enable the unit to be tested and the discrimination to be set up. Switched metering enables all valve feeds and h.t. voltages to be monitored. The d.c. outputs are continuously monitored by centre-zero meters.

**Origin**

The Marconi Co. Ltd., Type HU.14B.

**Reception facilities**

Two channel frequency shift keying (synchronized or unsynchronized). Single channel working.

**Input impedance**

75 ohms (coaxial feeder).

**Output impedance**

10 000 ohms (approximately).

**Input**

50 kHz centre frequency at levels of 10mV to 1V.

**Output**

30-0-30V d.c. on both channels.

**Adjacent frequency shift**

400 Hz with four shift frequencies the total shift is 1200 Hz.

**Keying speed**

Up to 100 bauds on Channel 1.

Up to 50 bauds on Channel 2.

**Power requirements**

230V, 50 Hz, single phase a.c. at 50W,

+140V d.c. at 35 mA.

+210V d.c. at 50 mA.

-140V d.c. at 5 mA.

-70V d.c. at 15 mA.

**Overall dimensions**

<i>Height</i>	<i>Width</i>	<i>Depth</i>
6 $\frac{3}{4}$ in (17 cm)	1ft 7in (48 cm)	1ft 5 $\frac{3}{4}$ in (45 cm)

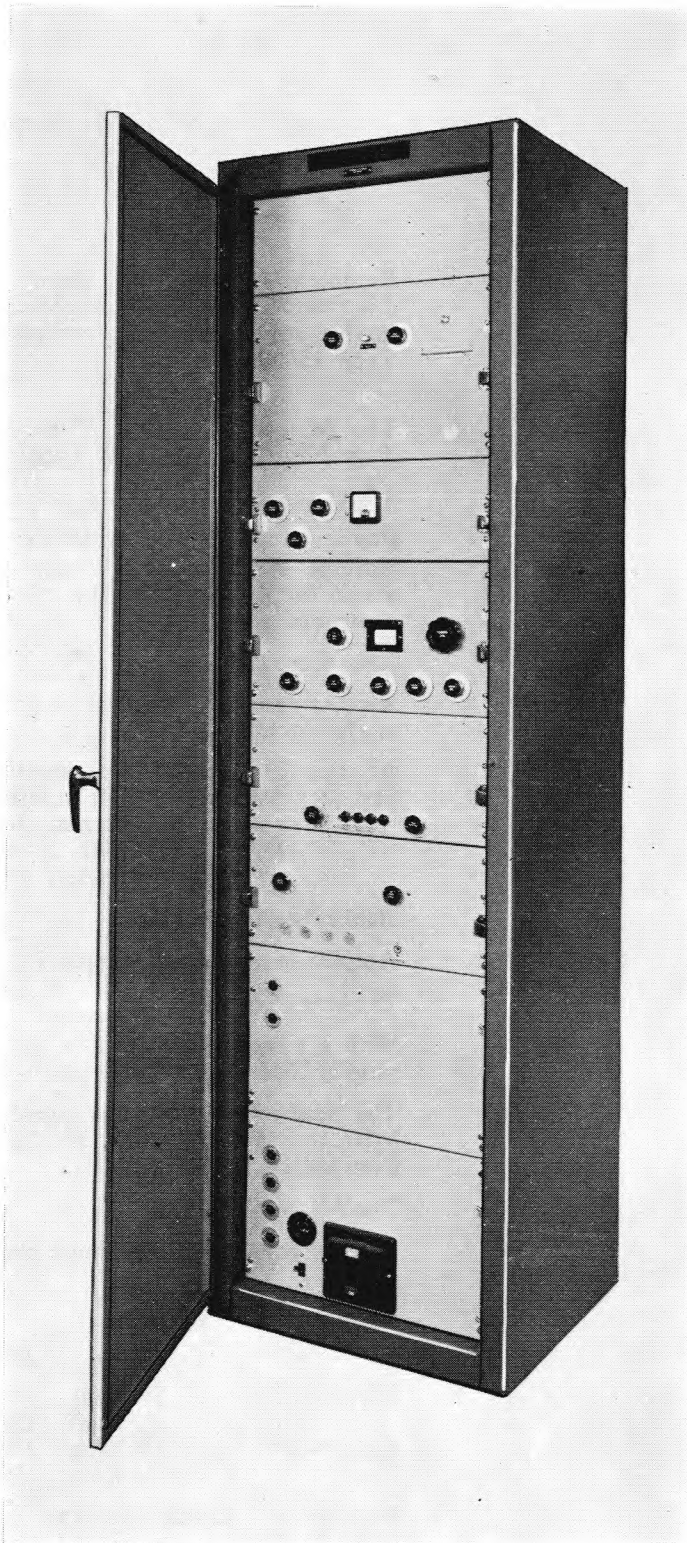
**Weight**

24 lb (10.9 kg).

**Associated equipment**

Rack assembly, Type 9352 (10D/19932).





**Receiver Type R.15095**



Control unit Type 15056

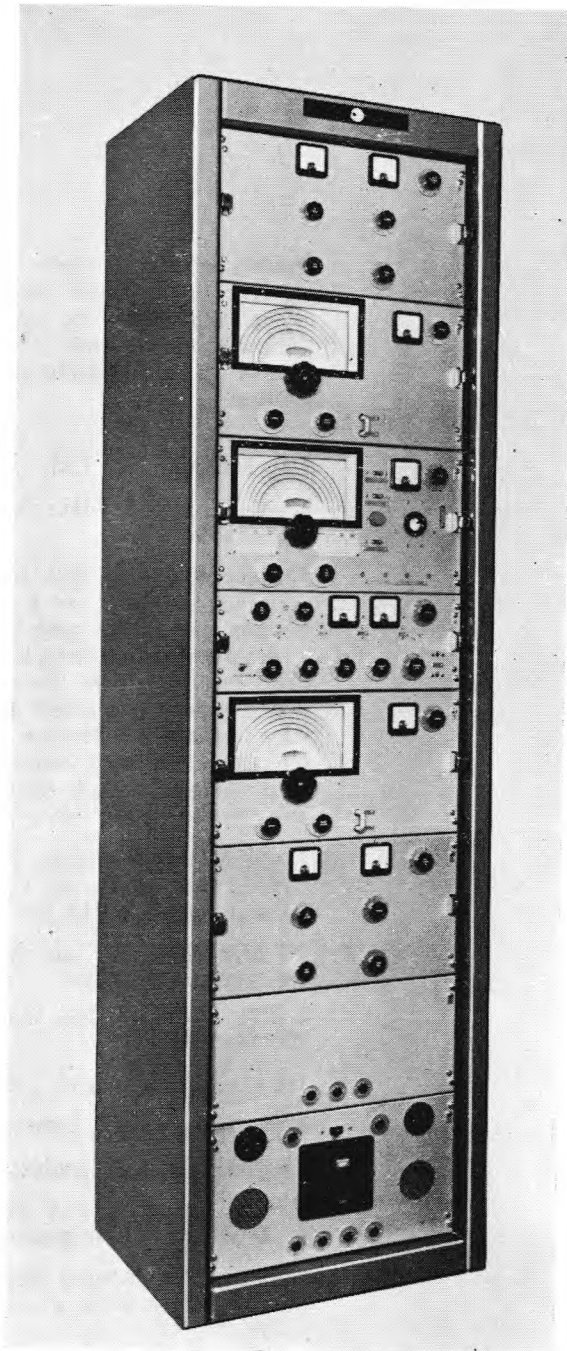
RECEIVER, RADIO

Type R15172 (10D/22019)

Relevant publication:-

AP116E-0722-1

<b>Function</b>	Double diversity single sideband h.f. receiver. The receiver is a double superheterodyne and may be crystal controlled on six spot frequencies or continuously tuned over the frequency range. It will receive either sideband of a double sideband transmission.									
<b>Origin</b>	The Marconi Co. Ltd., Type HR.24.									
<b>Frequency range</b>	3 MHz to 27.5 MHz in four ranges (100 to 10.9 metres).									
<b>Frequency control</b>	Frequency of the first oscillator is controlled by a variable oscillator, or a crystal controlled oscillator for any one of six spot frequencies. An a.f.c. system is incorporated in which the frequency of i.f.2 (100 kHz) resulting from the received carrier is compared with a crystal controlled 100 kHz reference frequency. Any frequency difference between the carrier and the reference frequency causes a correcting motor in the a.f.c. system to vary the second oscillator frequency so as to reduce the error to zero.									
<b>Frequency accuracy and stability</b>	<i>Variable first oscillator:</i> 15 parts in $10^6$ per degree C. <i>Crystal first oscillator:</i> 1 part in $10^6$ per degree C. <i>Second oscillator:</i> 15 parts in $10^6$ per degree C.									
<b>Frequency response</b>	<i>3.5 kHz passband:</i> less than 3dB total variation from 100 kHz to 2.5 kHz. <i>6 kHz passband:</i> less than 3dB total variation from 100 Hz to 6 kHz.									
<b>Intermediate frequencies</b>	1st i.f. 2600 kHz and 2nd i.f. 100 kHz.									
<b>Cross talk</b>	Less than -50dB between diversity paths.									
<b>Input impedance</b>	75 ohms (coaxial feeder).									
<b>Sensitivity</b>	With a signal of $2\mu\text{V}$ the output signal/noise ratio is 20dB with 6 kHz passband.									
<b>A.F.C.</b>	Capable of following frequency drifts up to plus or minus 3 kHz with a residual mistune of less than 1 Hz.									
<b>Output power</b>	40 milliwatts (max.) in 600 ohms from each diversity path.									
<b>Power supplies</b>	200-250 volts, 50 Hz, single phase a.c.									
<b>Power consumption</b>	400 watts (approx.).									
<b>Overall dimensions</b>	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;"><i>Height</i></th> <th style="text-align: left;"><i>Width</i></th> <th style="text-align: left;"><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>7ft 0<math>\frac{1}{4}</math>in</td> <td>2ft 0in</td> <td>1ft 8in</td> </tr> <tr> <td>(214 cm)</td> <td>(61 cm)</td> <td>(56 cm)</td> </tr> </tbody> </table>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	7ft 0 $\frac{1}{4}$ in	2ft 0in	1ft 8in	(214 cm)	(61 cm)	(56 cm)
<i>Height</i>	<i>Width</i>	<i>Depth</i>								
7ft 0 $\frac{1}{4}$ in	2ft 0in	1ft 8in								
(214 cm)	(61 cm)	(56 cm)								
<b>Weight</b>	500 lb (approx.) (227 kg).									



**Receiver, Type R.15172**

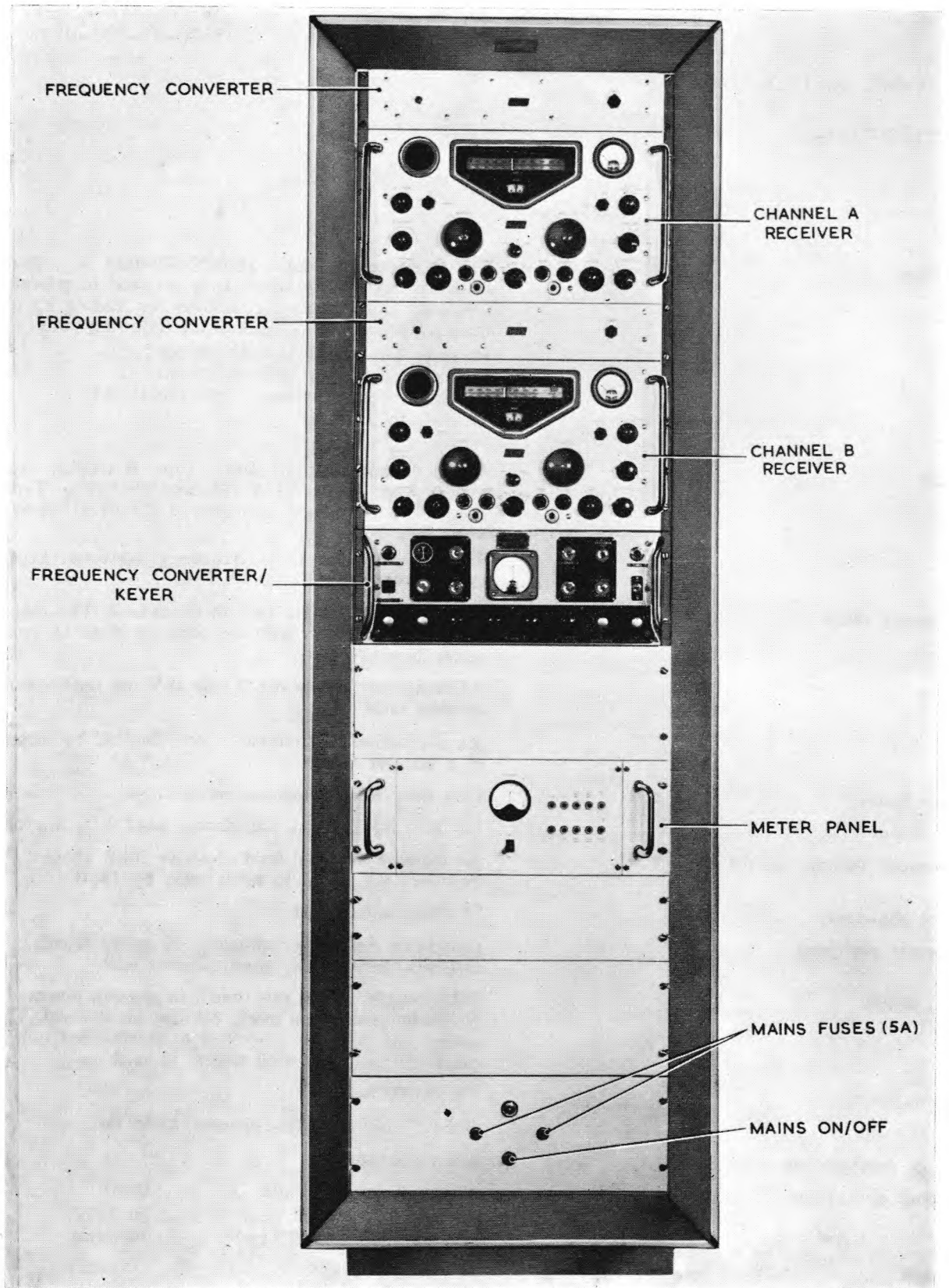
RECEIVER, RADIO  
(A.M. Type S5/1)

5820-99-933-0813

Relevant publication:-

AP116E-0712-1

<b>Function</b>	The receiving set, radio 5820-99-933-0813 is a dual diversity receiving terminal. It is designed to provide frequency shift telegraphy facilities for feeding up to three teleprinters. It consists of the following units:— Receiver Type S1/3 5820-99-999-9292 (2). Frequency converter 5820-99-933-0846 (2). Frequency converter/keyer 5805-99-933-0847.						
<b>Origin</b>	Racal Communications Ltd., Type RA.103/1; receiver A.M. Type S1/3 (5820-99-999-9292), Type RA. 17L; frequency converter (5820-99-933-0846), Type RA. 70D. The Plessey Co. Ltd., frequency converter/keyer (5805-99-933-0847), Type PV.78B.						
<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of an i.f. converter (Sheet No. 11).						
<b>Sensitivity</b>	All reception: bandwidth 3 kHz 1 $\mu$ V for 18dB signal to noise ratio.						
<b>Selectivity</b>	Six alternative i.f. bandwidths are obtained by means of a selector switch.						
<b>Noise factor</b>	Less than 7dB throughout entire range.						
<b>I.F. output</b>	100 kHz at 75 ohms impedance; level 0.2V approx.						
<b>Automatic volume control</b>	An increase in signal level of above 20dB above 1 $\mu$ V improves the signal to noise ratio by 18dB.						
<b>Input impedance</b>	75 ohms unbalanced.						
<b>Diversity switching</b>	<i>Operating time:</i> approximately 20 microseconds. <i>Switching differential:</i> approximately 6dB.						
<b>D.C. output</b>	Polar output: 20-60 mA (one side at earth potential). Normally positive on mark, but can be reversed. The output can also be switched to single-sided output positive or negative with respect to earth.						
<b>Keying speed</b>	Up to 300 bauds.						
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.						
<b>Power consumption</b>	320 watts (approx.).						
<b>Overall dimensions</b>	<table> <thead> <tr> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>6ft 6<math>\frac{3}{8}</math>in (199.1 cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3 cm)</td> <td>2ft 3<math>\frac{1}{2}</math>in (69.8 cm)</td> </tr> </tbody> </table>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	6ft 6 $\frac{3}{8}$ in (199.1 cm)	2ft 0 $\frac{1}{2}$ in (62.3 cm)	2ft 3 $\frac{1}{2}$ in (69.8 cm)
<i>Height</i>	<i>Width</i>	<i>Depth</i>					
6ft 6 $\frac{3}{8}$ in (199.1 cm)	2ft 0 $\frac{1}{2}$ in (62.3 cm)	2ft 3 $\frac{1}{2}$ in (69.8 cm)					
<b>Weight</b>	440 lb (201.8 kg).						



Receiving set, radio 5820-99-933-0813

**FREQUENCY CONVERTER 5820-99-933-0846**

<b>Input frequency</b>	100 kHz $\pm$ 1 kHz.
<b>Input impedance</b>	75 ohms.
<b>Input level</b>	0.1 volt nominal, 0.3 volt maximum.
<b>Attenuator level</b>	0dB to -20dB approx.
<b>Output frequency</b>	14 kHz.
<b>Output impedance</b>	600 ohms.
<b>Output level</b>	5mW $\pm$ 3dB for an input of 0.1 volt.
<b>Spurious output</b>	-40dB relative to 5mW.
<b>Frequency stability</b>	1 part in $10^5$ .
<b>Ambient temperature range</b>	-26°C to +55°C.
<b>Power supply</b>	100-125V and 200-250V, 45-60 Hz.

**FREQUENCY CONVERTER/KEYER 5805-99-933-0847**

<b>Function</b>	To convert frequency shift keying signals to polar or single sided d.c. and act as a diversity switch to select the strongest signal from two diversity receivers.		
<b>Inputs</b>	Two inputs of 600 ohms balanced: centre frequency of input filters 14 kHz. Nominal input level 5mW. Signalling speed up to 300 bauds.		
<b>Outputs</b>	Polar d.c. output: approximately 20-60 mA (one side at earth potential). Normally positive on mark but can be reversed. The output can also be switched to single-sided output positive or negative with respect to earth.		
<b>Telegraph distortion</b>	Not greater than 5% up to 100 bauds.		
<b>Input filters</b>	Separate filters for each channel, centred on 14 Hz. Total bandwidth at -3dB approximately 1000 Hz. Bandwidth at -40dB approximately 5.5 kHz.		
<b>Limiting</b>	The equipment is designed to operate satisfactorily on input signals varying by $\pm$ 20dB on nominal.		
<b>Diversity switching</b>	The stronger input signal is selected. Switching delay, less than 3 milliseconds. Operating time, approximately 20 microseconds. Switching differential approximately 6dB at all input levels.		
<b>Discriminator</b>	A linear discriminator is built into the equipment which will accept shifts between 150 Hz and 1000 Hz without adjustment.		
<b>Power supplies</b>	105V-115V 200V-250V a.c., 40-64 Hz.		
<b>Power consumption</b>	126VA at full output.		
<b>Overall dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	7in (17.8 cm)	1ft 7in (48.3 cm)	1ft 0 $\frac{3}{4}$ in (32.4 cm)
<b>Weight</b>	31 lb (14.1 kg).		

## RECEIVER, RADIO

5820-99-943-2775

## Relevant publication:-

AP116E-0704-1

**Function**

General purpose ground station h.f. communication receiver. The lower frequency limit can be extended to 12.5 kHz by the addition of an i.f. converter which is designated mixer stage, frequency 5820-99-943-3464. The receiver and i.f. converter can be used in rack assemblies or for bench mounting. The following variant assemblies are available:—

Rack mounted receiver—Receiver Type S1/1.

Bench mounted receiver—Receiver Type S1/2 (mounted in cabinet 5820-99-972-8566).

Bench mounted receiver and i.f. converter combined—Receiver Type S2/1 (mounted in cabinet 5820-99-972-8567).

**Origin**

Racal Communications Ltd., Type RA.17, Mk. 2: mixer stage, frequency (5820-99-943-3464) RA.37A.



Receiver, radio 5820-99-943-2775

<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of the i.f. converter.																					
<b>Calibration</b>	A 100 kHz signal derived from a 1 MHz crystal oscillator with a stability of 5 parts in $10^6$ provides check points at 100 kHz intervals.																					
<b>Stability</b>	During a warm-up time of three hours, overall drift is less than 1500 Hz under conditions of constant supply voltage and ambient temperature; beyond this period drift will be less than 150 Hz at all frequencies under normal operating conditions.																					
<b>Sensitivity</b>	<i>C.W. reception:</i> bandwidth 3 kHz $1\mu\text{V}$ for 20dB signal-to-noise ratio. <i>R/T and m.c.w. reception:</i> 30% modulated: bandwidth 3 kHz $3.5\mu\text{V}$ for 20dB signal-to-noise ratio.																					
<b>I.F. output</b>	100 kHz at 75 ohms impedance. Two outlets in parallel are provided.																					
<b>Selectivity</b>	Six alternative i.f. bandwidths are obtained by a selector switch. Filter details are:—																					
	<table border="0"> <thead> <tr> <th><i>Switch position</i></th> <th><i>−6dB</i></th> <th><i>−66dB</i></th> </tr> </thead> <tbody> <tr> <td>100 Hz</td> <td>80-120 Hz</td> <td>less than 1.6 kHz</td> </tr> <tr> <td>300 Hz</td> <td>270-330 Hz</td> <td>less than 1.8 kHz</td> </tr> <tr> <td>750 Hz</td> <td>700-800 Hz</td> <td>less than 2.5 kHz</td> </tr> <tr> <td>1.2 kHz</td> <td>950-1200 Hz</td> <td>less than 8 kHz</td> </tr> <tr> <td>3 kHz</td> <td>2.85-3.3 kHz</td> <td>less than 12 kHz</td> </tr> <tr> <td>8 kHz</td> <td>7.6-8.4 kHz</td> <td>less than 20 kHz</td> </tr> </tbody> </table>	<i>Switch position</i>	<i>−6dB</i>	<i>−66dB</i>	100 Hz	80-120 Hz	less than 1.6 kHz	300 Hz	270-330 Hz	less than 1.8 kHz	750 Hz	700-800 Hz	less than 2.5 kHz	1.2 kHz	950-1200 Hz	less than 8 kHz	3 kHz	2.85-3.3 kHz	less than 12 kHz	8 kHz	7.6-8.4 kHz	less than 20 kHz
<i>Switch position</i>	<i>−6dB</i>	<i>−66dB</i>																				
100 Hz	80-120 Hz	less than 1.6 kHz																				
300 Hz	270-330 Hz	less than 1.8 kHz																				
750 Hz	700-800 Hz	less than 2.5 kHz																				
1.2 kHz	950-1200 Hz	less than 8 kHz																				
3 kHz	2.85-3.3 kHz	less than 12 kHz																				
8 kHz	7.6-8.4 kHz	less than 20 kHz																				
<b>Noise factor</b>	1.5 MHz: less than 8dB. 3, 6, 12 and 24 MHz: less than 6dB.																					
<b>Image and spurious responses</b>	With a tuned input, external image signals are at least 58dB down. Internally generated spurious responses are 2dB above noise level in all cases.																					
<b>Input impedance</b>	75 ohms unbalanced.																					
<b>B.F.O. stability</b>	With a constant ambient temperature and supply voltage, 30 minutes after switching on, drift does not exceed 50 Hz. For input level variations from $10\mu\text{V}$ to 1mV b.f.o. drift does not exceed 100 Hz.																					
<b>A.F. response</b>	With 8 kHz i.f. bandwidth: response remains within 6dB from 250 Hz to 3500 Hz.																					
<b>A.F. output</b>	(1) $2\frac{1}{2}$ in. loudspeaker (50mW) on front panel. (2) Two telephone sockets in parallel on the front panel. (3) Three independent outputs of 3mW at 600 ohms on rear of chassis. (4) One output of 10mW at 600 ohms. Preset level is independent of gain control setting. (5) One output of 50mW at 3 ohms.																					
<b>Distortion</b>	Not greater than 5% at 50mW output.																					
<b>Hum level</b>	46dB at 1mW (10mW output setting).																					
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.																					
<b>Power consumption</b>	85 watts (approx.).																					
<b>Overall dimensions</b>	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td><i>For rack mounting</i></td> <td>10<math>\frac{1}{2}</math>in (26.6 cm)</td> <td>1ft 7in (48.3 cm)</td> <td>1ft 8<math>\frac{1}{8}</math>in (51 cm)</td> </tr> <tr> <td><i>Fitted cabinet</i></td> <td>1ft 2<math>\frac{1}{2}</math>in (36.8 cm)</td> <td>1ft 8<math>\frac{1}{2}</math>in (53 cm)</td> <td>2ft 3<math>\frac{7}{8}</math>in (70.8 cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>For rack mounting</i>	10 $\frac{1}{2}$ in (26.6 cm)	1ft 7in (48.3 cm)	1ft 8 $\frac{1}{8}$ in (51 cm)	<i>Fitted cabinet</i>	1ft 2 $\frac{1}{2}$ in (36.8 cm)	1ft 8 $\frac{1}{2}$ in (53 cm)	2ft 3 $\frac{7}{8}$ in (70.8 cm)									
	<i>Height</i>	<i>Width</i>	<i>Depth</i>																			
<i>For rack mounting</i>	10 $\frac{1}{2}$ in (26.6 cm)	1ft 7in (48.3 cm)	1ft 8 $\frac{1}{8}$ in (51 cm)																			
<i>Fitted cabinet</i>	1ft 2 $\frac{1}{2}$ in (36.8 cm)	1ft 8 $\frac{1}{2}$ in (53 cm)	2ft 3 $\frac{7}{8}$ in (70.8 cm)																			

**Weight** *For rack mounting* 67 lb (30.4 kg).  
*Fitted cabinet* 97 lb (44 kg).

**MIXER STAGE, FREQUENCY 5820-99-943-3464**

**Function** To extend the lower frequency limits of the receiver.

**Frequency range** 12.5 kHz to 980 kHz (24000 to 306 metres).

**Stability** After warm up time of  $1\frac{1}{2}$  hours, overall drift less than 150 Hz under conditions of constant supply voltage and ambient temperature.

**Input impedance** 75 ohms unbalanced.

**Sensitivity** C.W. reception (bandwidth 3 kHz):  $1\mu\text{V}$  for 15dB signal-to-noise ratio. R/T and m.c.w. reception (30% modulated) (bandwidth 3 kHz):  $3\mu\text{V}$  for 20dB signal-to-noise ratio.

**Image response** With tuned input, external image signals are reduced by at least 50dB.

**Overall dimensions**

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>For rack mounting</i>	$1\frac{3}{4}$ in (4.4 cm)	1ft 7in (48.3 cm)	1ft 1in (33 cm)
<i>Cabinet containing receiver and l.f. converter</i>	1ft $2\frac{1}{2}$ in (36.8 cm)	1ft $8\frac{1}{2}$ in (52 cm)	1ft $9\frac{7}{8}$ in (55.6 cm)

**Weight** *For rack mounting* 11 lb ( 5 kg).  
*Cabinet containing receiver and l.f. converter* 110 lb (50 kg).



<b>Origin</b>	Racal Communications Ltd., Type RA.17L; mixer stage, frequency (5820-99-943-3464) RA.37A.														
<b>Frequency range</b>	0.98 MHz to 30 MHz (306 to 10 metres). The range extends to 12.5 kHz with the addition of the i.f. converter.														
<b>Calibration</b>	A 100 kHz signal derived from a 1 MHz crystal oscillator with a stability of 5 parts in $10^6$ provides check points at 100 kHz intervals.														
<b>Stability</b>	During a warm-up time of $1\frac{1}{2}$ hours, overall drift is less than 50 Hz under conditions of constant supply voltage and ambient temperature.														
<b>Sensitivity</b>	C.W. reception: bandwidth 3 kHz $1\mu\text{V}$ for 18dB signal-to-noise ratio. R/T and m.c.w. reception: 30% modulated bandwidth 3 kHz: $3\mu\text{V}$ for 18dB signal-to-noise ratio.														
<b>I.F. output</b>	100 kHz at 75 ohms impedance. Level 0.2V approximately with a.g.c. in operation. Two outlets in parallel are provided.														
<b>Selectivity</b>	Six alternative i.f. bandwidth are obtained by a selector switch. Filter details are:— <table border="0" style="margin-left: 40px;"> <tr> <td style="text-align: center;"><i>Switch position</i></td> <td style="text-align: center;"><i>—6dB</i></td> </tr> <tr> <td style="text-align: center;">100 Hz</td> <td style="text-align: center;">80-120 Hz</td> </tr> <tr> <td style="text-align: center;">300 Hz</td> <td style="text-align: center;">270-330 Hz</td> </tr> <tr> <td style="text-align: center;">1.2 kHz</td> <td style="text-align: center;">950-1200 Hz</td> </tr> <tr> <td style="text-align: center;">3 kHz</td> <td style="text-align: center;">2.85-3.3 kHz</td> </tr> <tr> <td style="text-align: center;">6.5 kHz</td> <td style="text-align: center;">6.5-7.8 kHz</td> </tr> <tr> <td style="text-align: center;">13 kHz</td> <td style="text-align: center;">13.0-14.3 kHz</td> </tr> </table>	<i>Switch position</i>	<i>—6dB</i>	100 Hz	80-120 Hz	300 Hz	270-330 Hz	1.2 kHz	950-1200 Hz	3 kHz	2.85-3.3 kHz	6.5 kHz	6.5-7.8 kHz	13 kHz	13.0-14.3 kHz
<i>Switch position</i>	<i>—6dB</i>														
100 Hz	80-120 Hz														
300 Hz	270-330 Hz														
1.2 kHz	950-1200 Hz														
3 kHz	2.85-3.3 kHz														
6.5 kHz	6.5-7.8 kHz														
13 kHz	13.0-14.3 kHz														
<b>Noise factor</b>	Less than 7dB throughout the entire range.														
<b>Image and spurious responses</b>	With wideband or tuned input, external image signals are at least 60dB down. Internally generated spurious responses are below noise level in all cases.														
<b>Input impedance</b>	75 ohms unbalanced.														
<b>B.F.O. range</b>	$\pm 8$ kHz.														
<b>B.F.O. stability</b>	With constant ambient temperature and supply voltage 30 minutes after switching on, drift does not exceed 50 Hz. For input level variation from $10\mu\text{V}$ to $1\text{mV}$ , b.f.o. drift is negligible.														
<b>A.F. response</b>	With 13 kHz bandwidth, response remained within $\pm 4\text{dB}$ from 250 Hz to 6000 Hz.														
<b>A.F. output</b>	(1) $2\frac{1}{2}$ in. loudspeaker (50mW) on front panel. (2) Two telephone sockets in parallel on front panel. (3) Three independent outputs of 3mW at 600 ohms at rear of chassis. (4) One output of 10mW at 600 ohms. Preset level is independent of gain control. (5) One output of 50mW at 3 ohms.														
<b>Distortion</b>	Not greater than 5% at 50mW output.														
<b>Hum level</b>	—50dB at 1mW (10mW output setting).														
<b>Power supplies</b>	100-125 volts and 200-250 volts, 45-65 Hz.														
<b>Power consumption</b>	100 watts (approx.).														

**Sheet No. 12 (cont'd)****Overall dimensions**

	<i>Height</i>	<i>Width</i>	<i>Depth</i>
<i>For rack mounting</i>	10½in (26.6 cm)	1ft 7in (48.3 cm)	1ft 8½in (51 cm)
<i>Fitted cabinet</i>	1ft 2½in (36.8 cm)	1ft 8½in (52 cm)	2ft 3⅞in (70.8 cm)

**Weight**

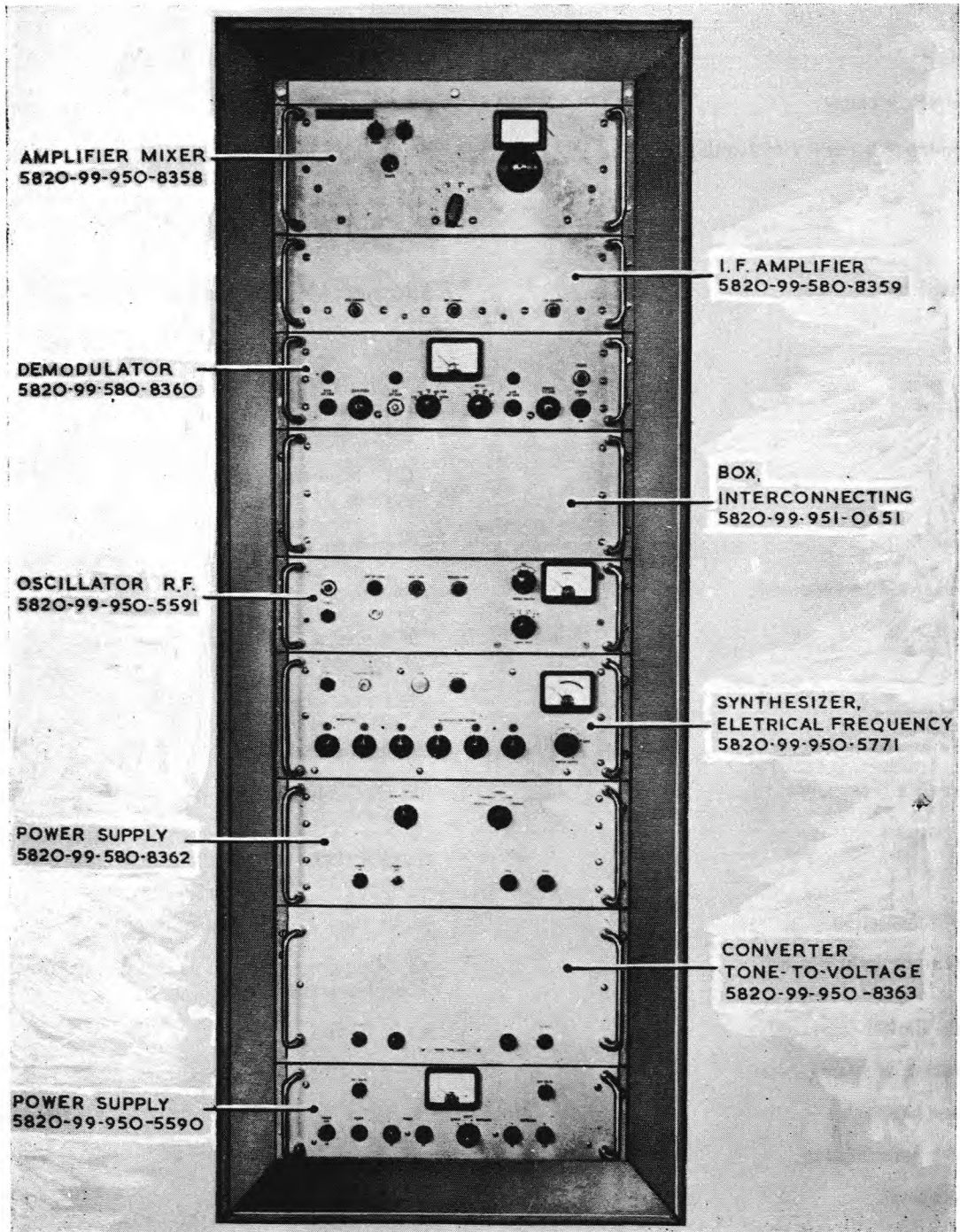
<i>For rack mounting</i>	67 lb (30.4 kg).
<i>Fitted cabinet</i>	97 lb (44 kg).

RECEIVER, RADIO

5820-99-950-5773

Relevant publication:-

AP116E-0127-1B, 1J



Receiving set, radio, 5820-99-950-5773

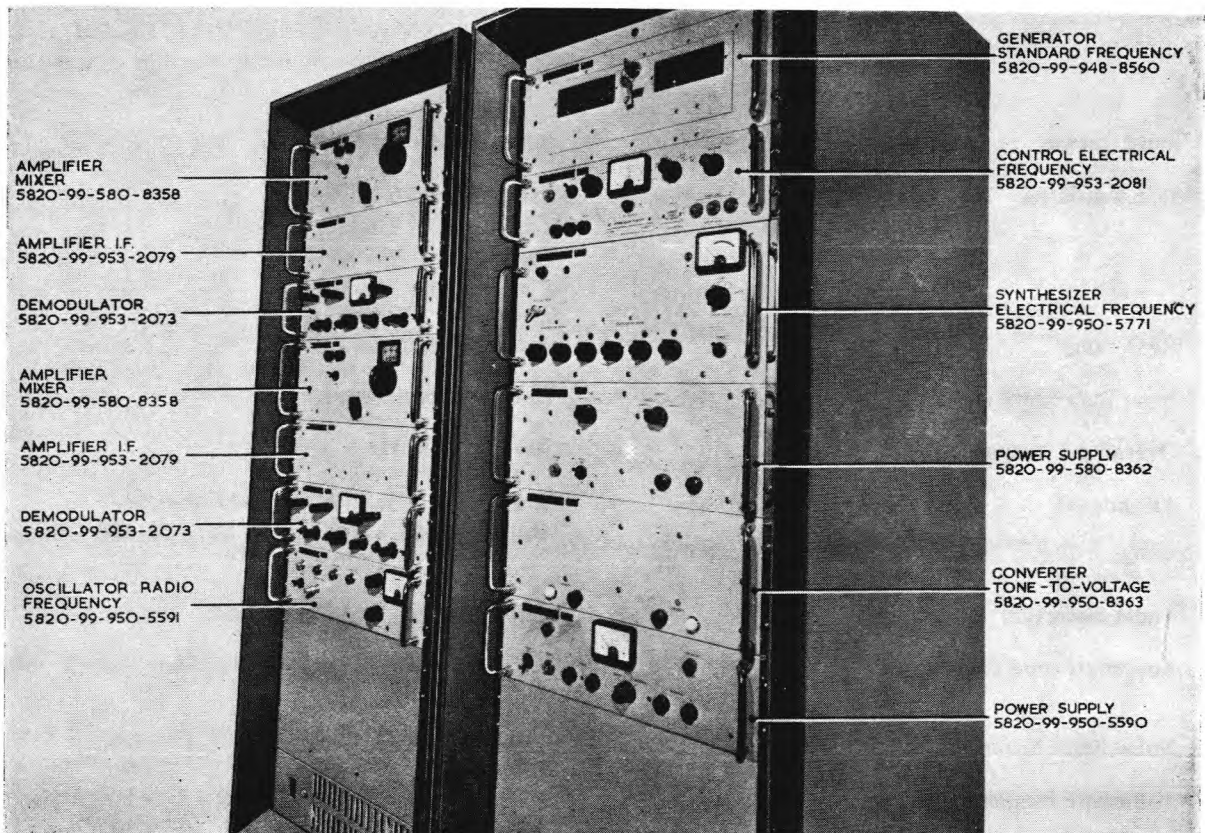
<b>Function</b>	A remotely controlled, h.f., superheterodyne receiver used with FGRI.23144 voice and telegraph transmitter and receiver station. The local oscillator uses a system of frequency synthesis, the standard frequency for which may be either an external source of 100 kHz, 200 kHz, 1 MHz or 5 MHz selected by a switch, or an internal standard 1 MHz selected by the same switch for use as a standby in case of failure of the external source. The receiving set is housed in a single floor-standing cabinet in which the sub-unit chassis are attached to standard 19 inch front panels.		
<b>Origin</b>	Racal Communications Ltd., Type RTA.191A.		
<b>Frequency range</b>	2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.		
<b>Frequency accuracy and stability</b>	Dependent upon reference standard. The synthesizer, electrical frequency, 5820-99-950-5771, incorporates a standby internal reference frequency source, a statement of the frequency stability and accuracy of which is included.		
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).		
<b>Tuning</b>	(1) <i>Remote or local</i> – automatic control from synthesizer, electrical frequency. (2) <i>Manual</i> – mechanical override of the automatic system.		
<b>Noise factor</b>	Better than 10 dB.		
<b>IF bandwidths (nominal)</b>	<i>SSB</i> : 3.5 kHz. <i>AM</i> : 7 kHz. <i>CW (wide)</i> : 3.5 kHz. <i>CW (narrow)</i> : 350 Hz.		
<b>BFO range</b>	$\pm 2.5$ kHz nominal.		
<b>Input impedance (r.f.)</b>	75 ohms unbalanced.		
<b>Overall a.f. response</b>	300 Hz – 3400 Hz $\pm 2$ dB.		
<b>AF outputs</b>	<i>Line</i> : 1 mW into 600 ohms (max.). <i>Monitor jack</i> : nominally 1 mW into 600 ohms (max.) adjustable.		
<b>Audio distortion</b>	Better than 2% total harmonic.		
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.		
<b>Noise limiter (a.m. only)</b>	Series limiter provided.		
<b>Duration of tuning cycle</b>	Average 12 seconds, maximum 20 seconds.		
<b>Power supply</b>	100-125V, 200-250V ( $\pm 6\%$ ), 45-65 Hz, single phase.		
<b>Power consumption</b>	600 watts (approx.).		
<b>Dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>
	5ft 10 $\frac{1}{2}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
<b>Weight</b>	600 lb (272 kg) approx.		

## RECEIVER, RADIO

5820-99-953-2075

Relevant publication:-

AP116E-0127-1D, 1W



Receiving set, radio, 5820-99-953-2075

**Function**

A remotely controlled, h.f. superheterodyne receiving set comprising two receivers with a common local oscillator, enabling the set to be used for space diversity reception. The local oscillator uses a system of frequency synthesis, the standard frequency for which can be either an external source of 100 kHz, 200 kHz, 1 MHz or 5 MHz selected by a switch, or an internal standard 1 MHz source selected by the same switch for use as a standby in case of failure of the external source. The receiving set is used with TGRI.(AT)26023/1 air transportable voice and telegraph transmitter/receiver station and is housed in two racks in which the sub-unit chassis are attached to standard 19 inch front panels.

**Origin**

Racal Communications Ltd., Type RTA.241A.

**Frequency range**

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz

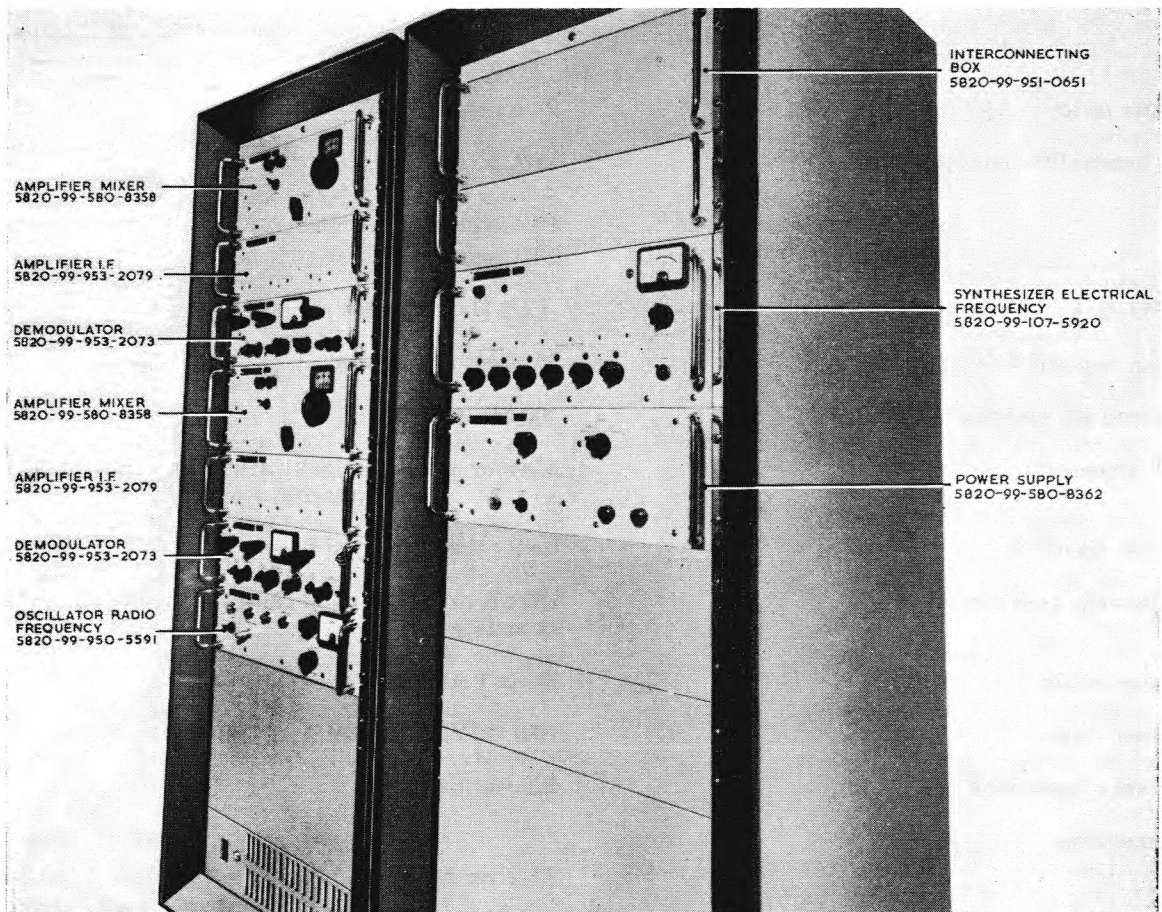
<b>Frequency accuracy and stability</b> ( <i>controlled by external frequency standard source</i> ).	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.			
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).			
<b>Tuning</b>	(1) <i>Remote or local</i> – automatic control, from synthesizer, electrical frequency. (2) <i>Manual</i> – mechanical override of the automatic system.			
<b>Noise factor</b>	Better than 10 dB.			
<b>IF bandwidths</b>	<i>ISB, SSB</i> : 6 KHz. <i>AM</i> : 7 KHz. <i>CW (wide)</i> : 3.5 KHz. <i>CW (narrow)</i> : 350 Hz.			
<b>BFO range</b>	±2.5 Hz nominal.			
<b>Input impedance</b> ( <i>r.f.</i> )	75 ohms unbalanced.			
<b>Overall a.f. response</b>	300 Hz–6000 Hz.			
<b>AF outputs</b>	<i>Line</i> : 1 mW into 600 ohms. <i>Monitor jack</i> : nominally 1 W into 600 ohms (max.) adjustable.			
<b>Audio distortion</b>	Better than 2% total harmonic.			
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.			
<b>Noise limiter</b> ( <i>a.m. only</i> )	Series limiter provided.			
<b>Automatic frequency control</b>	Manual capture, after capture 1.6 MHz carrier held to ±50 Hz.			
<b>Power supply</b>	100–125V, 200–250V, 45–65 Hz, single phase.			
<b>Power consumption</b>	600 watts (approx.).			
<b>Dimensions</b>	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
	Receiver rack	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
	Control rack	5ft 10¼in (178.4cm)	2ft 0½in (62.3cm)	2ft 3in (68.6cm)
<b>Weights</b>	600 lb (272 kg) approx., each rack.			

## RECEIVER, RADIO

5820-99-107-5921

Relevant publication:-

AP116E-0127-1C, 1Y



Receiving set, radio, 5820-99-107-5921

**Function**

A locally controlled, h.f. superheterodyne receiving set comprising two receivers in which the common local oscillator uses a system of frequency synthesis, the standard frequency for which is the internal 1 MHz standard source from the synthesizer, electrical frequency.

The receiving set is used with FGRI.23186, voice and telegraph transmitter and receiver link station and is housed in two racks in which the sub-unit chassis are attached to standard 19-inch front panels.

**Origin**

Racal Communications Ltd., Type RTA.241C.

**Frequency range**

2.0 to 29.9999 MHz (150 to 10 metres) in steps of 100 Hz.

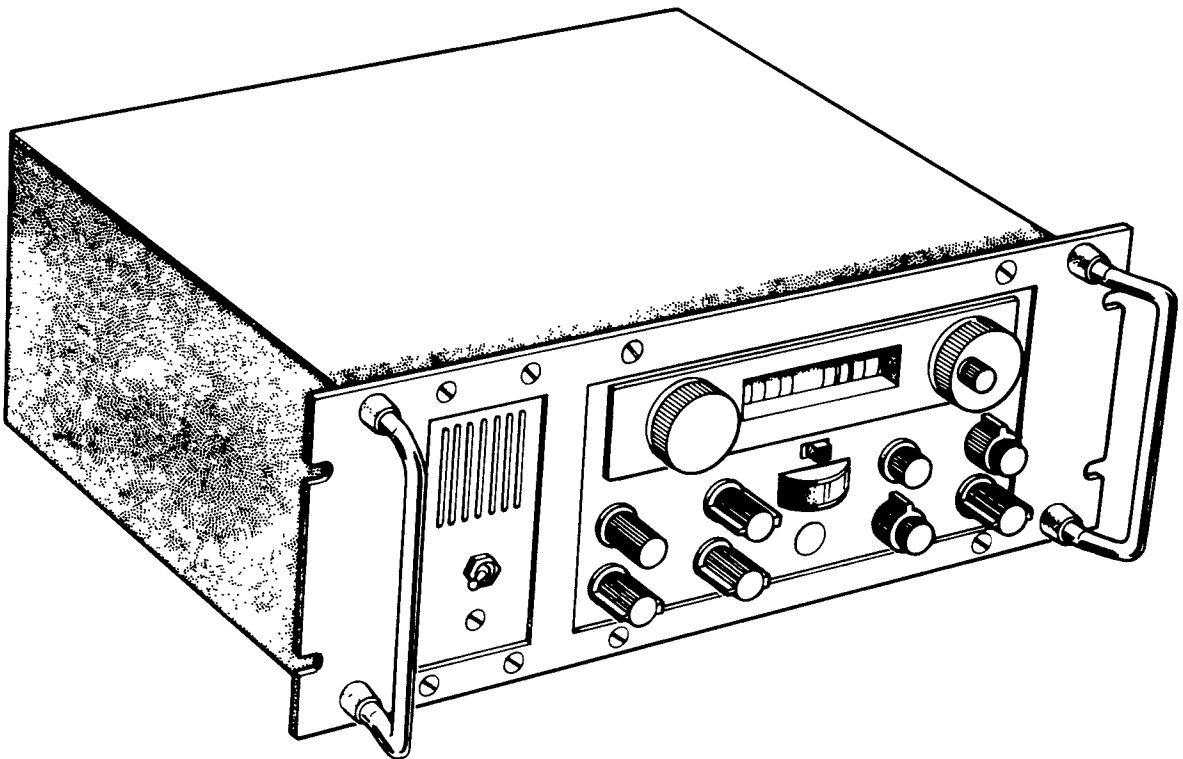
<b>Frequency accuracy and stability</b> ( <i>controlled by synthesizer internal frequency standard source</i> )	Stability, including ageing over 24 hours, after 30 days operation less than $\pm 2$ parts in $10^{-9}$ . Stability with change in ambient temperature $\pm 25^{\circ}\text{C}$ from $25^{\circ}\text{C}$ , less than $\pm 2$ parts in $10^{-8}$ .												
<b>Sensitivity</b>	<i>SSB and CW</i> : 1 microvolt for 13 dB signal-to-noise ratio. <i>AM</i> : 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).												
<b>Tuning</b>	(1) <i>Local</i> – automatic from synthesizer. (2) <i>Manual</i> – mechanical override of the automatic system.												
<b>Noise factor</b>	Better than 10 dB.												
<b>IF bandwidths</b> ( <i>nominal</i> )	<i>ISB, SSB</i> : 6 KHz. <i>AM</i> : 7 KHz. <i>CW (wide)</i> : 3.5 KHz. <i>CW (narrow)</i> : 350 Hz.												
<b>BFO range</b>	$\pm 2.5$ Hz nominal												
<b>Input impedance</b> ( <i>r.f.</i> )	75 ohms unbalanced.												
<b>Overall a.f. response</b>	300 Hz–6000 Hz												
<b>AF outputs</b>	<i>Monitor jack</i> : nominally 1 mW into 600 ohms (max.) adjustable.												
<b>Audio distortion</b>	Better than 2% total harmonic.												
<b>Automatic gain control</b>	100 dB change of input causes change in a.f. output not exceeding 6 dB.												
<b>Noise limiter</b> ( <i>a.m. only</i> )	Series limiter is provided.												
<b>Power supply</b>	100–125V, 200–250V, ( $\pm 6\%$ ), 45–65 Hz single phase.												
<b>Power consumption</b>	600 watts (approx.).												
<b>Dimensions</b>	<table border="0"> <thead> <tr> <th></th> <th><i>Height</i></th> <th><i>Width</i></th> <th><i>Depth</i></th> </tr> </thead> <tbody> <tr> <td>Receiver rack</td> <td>5ft 10<math>\frac{1}{4}</math>in (178.4cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3cm)</td> <td>2ft 3in (68.6cm)</td> </tr> <tr> <td>Control rack</td> <td>5ft 10<math>\frac{1}{4}</math>in (178.4cm)</td> <td>2ft 0<math>\frac{1}{2}</math>in (62.3cm)</td> <td>2ft 3in (68.6cm)</td> </tr> </tbody> </table>		<i>Height</i>	<i>Width</i>	<i>Depth</i>	Receiver rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)	Control rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)
	<i>Height</i>	<i>Width</i>	<i>Depth</i>										
Receiver rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)										
Control rack	5ft 10 $\frac{1}{4}$ in (178.4cm)	2ft 0 $\frac{1}{2}$ in (62.3cm)	2ft 3in (68.6cm)										
<b>Weights</b>	600 lb (272 kg) approx., each rack.												

## RECEIVER, RADIO

5820-99-107-4926

Relevant publication:-

AP116E-0732-1A and 1B



Receiver, radio 5820-99-107-4926

## FUNCTION

A general purpose ground station h.f. communications receiver. The receiver, radio consists of receiver, radio 5820-99-107-1509 (less monitor loudspeaker facility) and amplifier, audio frequency 5820-99-195-0459 (fitted monitor loudspeaker); both equipments are fitted for rack mounting into frame, electrical equipment 5820-99-195-0460.

## ORIGIN

Racal Communications Ltd., Type RA.317.  
Receiver, radio 5820-99-107-1509, Type RA.217R;  
amplifier, audio frequency 5820-99-195-0459, Type MA.389.

## FREQUENCY RANGE

1 to 30 MHz (300 to 10 metres).

## CALIBRATION

A 100kHz signal derived from a 1MHz crystal oscillator, with a stability of 5 parts in  $10^6$ , provides check points at 100kHz intervals.

## STABILITY

After 2 hours from switching on,  $\pm 50$ Hz over an 8-hour period with constant ambient temperatures and humidity.

## SENSITIVITY

CW, SSB reception:  $1\mu\text{V}$  for 15dB signal-to-noise ratio and 3kHz bandwidth.  
MCW, DSB reception:  $3\mu\text{V}$  for 15dB signal-to-noise ratio (30% modulated at 400Hz).

## I.F. OUTPUT

With a.g.c. in operation:

- (1) at 1.6MHz: 0.1V at high impedance (nominal).
- (2) at 100kHz: 0.27V (1mW) nominal into 75 ohms.
- (3) at 455kHz: 0.22V (1mW) nominal into 50 ohms.

## SELECTIVITY

Four alternative i.f. bandwidths are obtained by a selector switch; the nominal filter details are as follows:

<u>At -3dB points</u>	<u>At -60dB points</u>
13kHz	30kHz
3kHz	9kHz
1kHz	4kHz
0.2kHz	2kHz

## NOISE FACTOR

Not greater than 10dB throughout entire range.

## IMAGE AND SPURIOUS RESPONSE TO EXTERNAL SIGNALS

- (1) External signals less than 10% off-tune shall be greater than +60dB relative to  $1\mu\text{V}$  in order to produce a spurious signal equivalent to  $1\mu\text{V}$ .
- (2) With a tuned aerial, external signals more than 10% off-tune shall be greater than +80dB relative to  $1\mu\text{V}$  to produce a spurious signal equivalent to  $1\mu\text{V}$ .

## INTERNALLY GENERATED SPURIOUS RESPONSES

Not greater than 2dB above noise level in a 3kHz bandwidth.

## INPUT IMPEDANCE

75 ohms (nominal) unbalanced.

## B.F.O. RANGE

- (1)  $\pm 8\text{kHz}$  variable
- (2)  $\pm 1.5\text{kHz}$  crystal controlled.

## B.F.O. STABILITY

- (1)  $\pm 15\text{Hz}$  for less than 5 minutes.
- (2)  $\pm 25\text{Hz}$  for less than 30 minutes.

## A.F. RESPONSE

100 to 6000Hz, flat within 3dB.

## A.F. OUTPUTS

- (1) 50mW (nominal), at less than 1% distortion, into 3-ohm loudspeaker.
- (2) 1mW into 600 ohms line output.

## HUM LEVEL

40dB below rated 600-ohm line output.

## POWER SUPPLIES

One of two alternative power units is fitted.

- (1) PU.408A:

Input: 100-125V or 200-250V, 40-400Hz.  
Output: -16V d.c. at 180mA.  
Consumption: 7VA approx.

(2) PU.409:

Input: 100-125V or 200-250V, 40-400Hz.

Outputs: -16V d.c. at 400mA and -24V d.c. at 40mA.

DIMENSIONS (excluding handles)

Height	Width	Depth
7 in (17.75cm)	19 in (48 cm)	13 1/8 in (33.3 cm)

WEIGHT

41 lb (18.75kg)

AMPLIFIER, AUDIO FREQUENCY  
(5820-99-195-0459)

FUNCTION

To provide a monitor loudspeaker output for receiver, radio 5820-99-107-1509.

ORIGIN

Racal Communications Ltd., Type MA.389.

INPUT LEVEL

10mW across 600 ohms.

OUTPUT POWER

50mW across 3 ohms.

DISTORTION

Less than 1%.

A.F.RESPONSE

100 to 6000Hz.

POWER SUPPLY

-16V d.c.

DIMENSIONS

Height	Width	Depth
6 1/4 in (17.5 cm)	3 1/4 in (8.25 cm)	7 in (17.75cm)

WEIGHT 1 lb (0.45 kg)

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Item No. 17

RECEIVER, RADIO

(10D/5820-99-618-1034)  
(Racal type RA 1205/8)

Relevant publication:-

AP116E-Q751



Receiver, radio 5820-99-618-1034 (Racal RA 1205/8)

**FUNCTION**

An assembly of eight double superheterodyne single channel usb/cw receivers, each one operating at a preset frequency in the range 1.5 MHz to 24 MHz.

**ORIGIN**

Racal Communications Ltd., Type RA.1205/8.

## TECHNICAL DATA

Frequency range	1.6 MHz. to 24 MHz (down to 1.5 MHz with slight performance degradation).
Frequency accuracy and stability	2 parts in $10^7$ /day, and $\pm 30$ Hz for a temperature change of 10 C within the range of $-10^{\circ}\text{C}$ to $+55^{\circ}\text{C}$ .
Sensitivity	1 microvolt for 10 dB signal-to-noise ratio.
Tuning	Local preset.
I.F. bandwidth	2.6 kHz.
I.F. frequency	
1 st.	1.4 kHz
2 nd.	100 kHz.
BFO range	$\pm 8$ kHz, variable
Clarifier range	$\pm 75$ Hz, minimum.
AGC range	80 dB change of input causes change in a.f. output not exceeding 6 dB.
A.F. outputs	
Line	600 ohms balanced, adjustable between +6 dBm and -30 dBm.
Monitor jack	600 ohms, adjustable between 0 dBm and -40 dBm.
Power consumption	7.5 VA per receiver module.

## POWER SUPPLY REQUIRED

100-124V, 200-250V, 45-400 Hz single phase  
or  
12V  $\pm$  10% d.c. (negative earth)

## DIMENSIONS

Height	Width	Depth
178 mm (7 in.)	483 mm (19 in.)	483 mm (19 in.)

WEIGHT                      24 kg (53 lb)

AP116A-0115-1

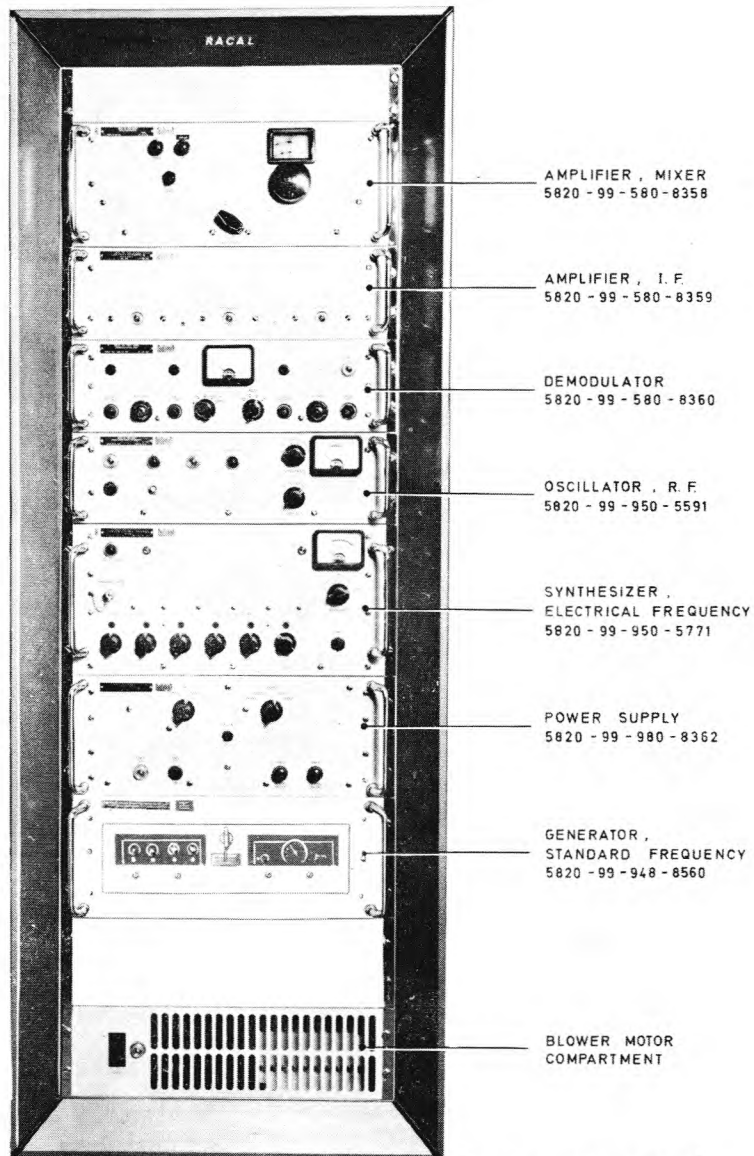
Item No. 18

RECEIVER, RADIO

5820-99-119-3981  
(Racal type RTA.191P)

Relevant publication:-

AP116E-0127-1D



Receiving set, radio, 5820-99-119-3981 (Racal RTA.191P)

#### FUNCTION

A locally controlled, h.f. superheterodyne receiving set with a frequency range of 2 to 30 MHz selected in 100 Hz increments. The possible modes of operation are single sideband, independent sideband, compatible amplitude modulation and c.w. telegraphy (keyed tone or frequency shift). The receiving set is used with TGRI (AT)26063/1 air transportable voice and telegraph transmitter/receiver station.

ORIGIN

Racal Communications Ltd., Type RTA.191P

## TECHNICAL DATA

FREQUENCY RANGE	2.0 to 29.9999 MHz.
FREQUENCY ACCURACY AND STABILITY (controlled by external frequency standard source)	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
SENSITIVITY	SSB and CW 1 microvolt for 13 dB signal-to-noise ratio.
	AM 5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING	
Local	Automatic control from synthesizer, electrical frequency.
Manual	Mechanical override of the automatic system.
NOISE FACTOR	Better than 10 dB.
IF BANDWIDTHS	
SSB	3.5 kHz.
AM	7 kHz.
CW (wide)	3.5 kHz.
CW (narrow)	350 Hz.
BFO RANGE	$\pm 2.5$ kHz nominal.
INPUT IMPEDANCE (R <sub>i</sub> )	75 ohms unbalanced.
OVERALL AF RESPONSE	300 Hz-3400 Hz.
AF OUTPUTS	
line	1 mW into 600 ohms.
monitor jack	Nominally 1 mW into 600 ohms (max.) adjustable.
AUDIO DISTORTION	Better than 2% total harmonic.
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.
NOISE LIMITER (a.n. only)	Series limiter provided.
POWER SUPPLY	100-125V, 200-250V, 45-65 Hz, single phase.
POWER CONSUMPTION	600 watts (approx.)

## DIMENSIONS

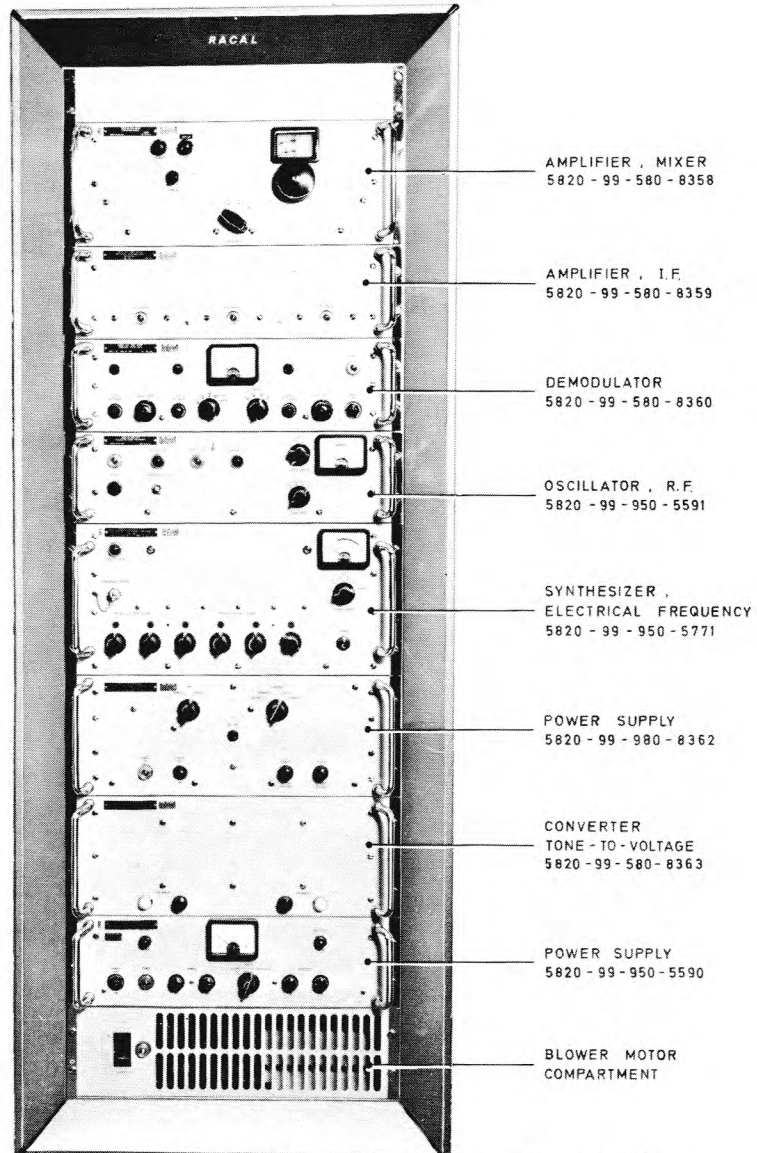
	Height	Width	Depth
Receiver rack	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)
WEIGHT	273 kg (600 lb)		

## RECEIVER, RADIO

5820-99-119-3979  
(Racal type RTA.191Q)

Relevant publication:-

AP116E-0127-1D



Receiving set, radio, 5820-99-119-3979 (Racal RTA.191Q)

## FUNCTION

A remote or locally controlled, h.f. superheterodyne receiving set with a frequency range of 2 to 30 MHz selected in 100 Hz increments. The possible modes of operation are single sideband, independent sideband, compatible amplitude modulation and c.w. telegraph (keyed tone or frequency shift). The receiving set is used with TGRI(AT)26063 air transportable voice and telegraph transmitter/receiver station.

## ORIGIN

Racal Communications Ltd., Type RTA.191Q.

## TECHNICAL DATA

FREQUENCY RANGE	2.0 to 29.9999 MHz	
FREQUENCY ACCURACY AND STABILITY (controlled by internal frequency standard source).	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.	
SENSITIVITY	SSB and CW	1 microvolt for 13 dB signal-to-noise ratio.
	AM	5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING		
Local	Automatic control from synthesizer, electrical frequency.	
Manual	Mechanical override of the automatic system.	
NOISE FACTOR	Better than 10 dB.	
IF BANDWIDTHS		
SSB	3.5 kHz	
AM	7 kHz.	
CW (wide)	3.5 kHz.	
CW (narrow)	350 Hz.	
BFO RANGE	$\pm 2.5$ kHz nominal.	
INPUT IMPEDANCE (RF)	75 ohms unbalanced.	
OVERALL AF RESPONSE	300 Hz-3400 Hz.	
AF OUTPUTS		
LINE	1 mW into 600 ohms	
MONITOR JACK	Nominally 1 mW into 600 ohms (max.) adjustable.	
AUDIO DISTORTION	Better than 2% total harmonic.	
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.	
NOISE LIMITER (a.m. only)	Series limiter provided.	
POWER SUPPLY		
100-125V, 200-250V, 45-65 Hz, single phase.		
POWER CONSUMPTION	600 watts (approx.)	

## DIMENSIONS

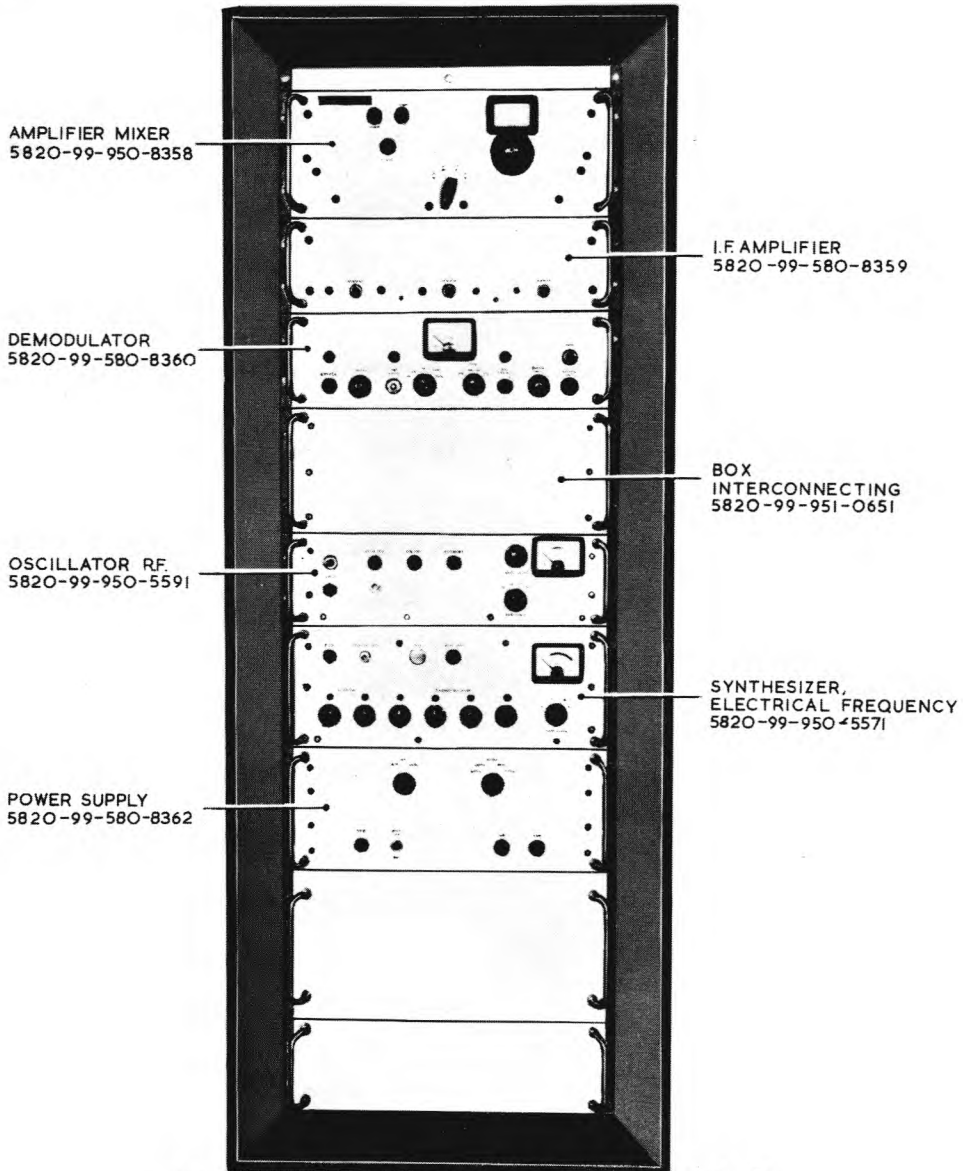
Receiver rack	Height	Width	Depth
	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)
WEIGHT	273 kg (600 lb).		

RECEIVER, RADIO

5820-99-951-0461  
(Racal type RTA.191K)

Relevant publication:-

AP116E-0127-1E



Receiving set, radio, 5820-99-951-0461

FUNCTION

An h.f. superheterodyne receiving station with a frequency range of 2 to 30 MHz, capable of voice and telegraph communication. The possible modes of operation are single sideband (upper or lower sideband, suppressed or pilot carrier), compatible amplitude modulation, or c.w. telegraphy.

ORIGIN

Racal Communications Ltd., Type RTA.191K.

FREQUENCY RANGE	2.0 to 29.9999 MHz.
FREQUENCY ACCURACY AND STABILITY (controlled by external frequency standard source)	Dependent upon reference standard. The synthesizer, electrical frequency, incorporates a standby internal reference frequency source.
SENSITIVITY	
SSB and CW	1 microvolt for 13 dB signal-to-noise ratio.
AM	5 microvolts for 13 dB signal-to-noise ratio (30% modulation).
TUNING:	
Local	Automatic control from synthesizer electrical frequency.
Manual	Mechanical override of the automatic system.
NOISE FACTOR	Better than 10 dB.
IF BANDWIDTHS	
SSB	3.5 kHz.
AM	7 kHz.
CW (wide)	3.5 kHz.
CW (narrow)	350 Hz.
BFO RANGE	$\pm 2.5$ kHz nominal.
INPUT IMPEDANCE (RF)	75 ohms unbalanced.
OVERALL AF RESPONSE	300 Hz-3400 Hz.
AF OUTPUTS	
Line	1 mW into 600 ohms.
Monitor jack	Nominally 1 mW into 600 ohms (max.) adjustable.
AUDIO DISTORTION	Better than 2% total harmonic.
AUTOMATIC GAIN CONTROL	100 dB change of input causes change in a.f. output not exceeding 6 dB.
NOISE LIMITER (a.m. only)	Series limiter provided.
POWER SUPPLY	
	100-125V, 200-250V, 45-65 Hz, single phase.
POWER CONSUMPTION	600 watts (approx.)

DIMENSIONS

	Height	Width	Depth
Receiver rack	178 cm (70 in.)	61 cm (24 in.)	69 cm (27 in.)

WEIGHT                    273 kg (600 lb)

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Item No. 21

RECEIVER, RADIO

5820-99-630-9620  
(Racal type RA.1772)

Relevant publication:-

AP116E-0748-16



HF Receiver (Racal type RA.1772) 5820-99-630-9620

#### FUNCTION

General purpose ground station fully synthesized h.f. communications receiver.

The receiver may be rack or bench mounted.

#### ORIGIN

Racal Communications Ltd., Type RA.1772 (H/S2/R/B3/0/0)

TECHNICAL DATA

FREQUENCY RANGE 15 kHz to 30 MHz.

MODES OF RECEPTION A1  
A2, A2H, A2J  
A3, A3A, A3B, A3H

TUNING

Switched selection of 1 MHz steps and a continuously tunable synthesizer in 10 Hz or 100 Hz steps over each 1 MHz band.

Electronic digital readout to 10 Hz.

OVERSPILL

20 kHz at either end of each 1 MHz band. Overrun indication is provided.

TUNING ACCURACY

Plus or minus 5 Hz relative to frequency of the wanted signal.

FREQUENCY STABILITY

Temperature  $\pm 1:10^8/^{\circ}\text{C}$   
Longterm  $\pm 1.5:10^7$  over a 30 day period or  $\pm 5:10^9$  per day

ANTENNA INPUT

50 ohms to 75 ohms nominal.  
co-axial b.n.c. connector.

SENSITIVITY

c.w. and s.s.b. (A1, A2H, A3A, A3H, A3J)

In a 3 kHz bandwidth the signal-to-noise ratio is better than:

15 kHz-50 kHz, 15 dB with 10 $\mu$ V (emf) input

50 kHz-500 kHz, 15 dB with 3 $\mu$ V (emf) input

500 kHz-30 MHz, 15 dB with 1 $\mu$ V (emf) input

## d.s.b. (A2, A3)

In a 3 kHz bandwidth the signal-to-noise ratio is better than:

- 15 kHz-50 kHz, 15 dB with 30 $\mu$ V(emf) input,  
30% modulated
- 50 kHz-500 kHz, 15 dB with 10 $\mu$ V(emf) input,  
30% modulated.
- 500 kHz-30 MHz, 15 dB with 3 $\mu$ V(emf) input,  
30% modulated.

## IF FREQUENCY

1 st	34 MHz
2 nd	1.4 MHz.

## IF SELECTIVITY

## SSB (A3A, A3J)

Pass band at -6 dB	250 Hz to 3000 Hz
Pass band at -60 dB	-650 and +4100 Hz.

## ISB (A3B)

Pass band at -6 dB	250 Hz to 3000 Hz
Pass band at -60 dB	-400 and +4100 Hz

## CW/MCW/AM (A1, A2, A3, A2H, A3H)

In addition to the mode-selected s.s.b or i.s.b filters, i.f. filters of the following nominal passbands are fitted:-

1 kHz, 3 kHz, 8 kHz.

## CROSS MODULATION

With a wanted signal greater than 300 $\mu$ V emf, in a 3 kHz bandwidth, an unwanted signal, 30% modulated, removed not less than 20 kHz, greater than 300 mV emf, will produce an output 20 dB below the output produced by the wanted signal.

## RECIPROCAL MIXING

With a wanted signal of less than 100 $\mu$ V emf, in a 3 kHz bandwidth an unwanted signal, 30% modulated, removed not less than 20 kHz, greater than 70 dB above the wanted signal level will give a noise level 20 dB below the output produced by the wanted signal.

## BLOCKING

With a wanted signal of 1 mV emf.  
an unwanted signal more than 20 kHz removed.  
greater than 500 mV will reduce the output by 3 dB.

## INTERMODULATION PRODUCTS

### Out of band

With two 30 mV emf signals separated and removed from the wanted signal  
by not less than 20 kHz.  
The third order intermodulation products are not less than -85 dB  
below either of the interfering signals and typically better than -90 dB.

### In band

Two in band signals of 30 mV emf will produce third-order intermodulation products of not greater than -40 dB.

## SPURIOUS RESPONSE

### External

External signals, 20 kHz removed from the wanted signal must be at least 80 dB above the level of the wanted signal to produce an equivalent output.

### Internal

Not greater than 3 dB above noise level measured in a 3 kHz bandwidth.

## AGC

### Range

An increase in input of 100 dB above 2 microvolts emf will produce an output change of less than 6 dB.

Switched selection of AGC 'off' 'short' and long time constants.

## BFO RANGE

± 3 kHz, variable by a slow-motion.

## AUDIO CHARACTERISTICS

### Output levels

#### Line outputs

1 mW nominal into 600 ohms balanced, adjustable by preset level control on front panel to +6 dBm.

#### Phone outputs

Balance, 10 mW nominal into 600 ohms.

Power output 50 mW into internal loudspeaker which is capable of being switched in or out of operations.

External speaker Connection for external speaker 1 watt into 8 ohms.

#### AF response

Line outputs Within 1 dB from 100 Hz to 6000 Hz relative to the level of a standard 1000 Hz tone.  
(The overall a.f. response will be dependent upon the i.f. bandwidth selected).

#### AF distortion

Line outputs Not greater than 2% at specified output of 1 mW nominal.

Loudspeaker outputs Not greater than 5% at 50 mW output to internal loudspeaker and 1W output to external speaker.

Phone output Not greater than 5% at specified output of 10 mW nominal.

#### CROSS TALK (A3B)

With a wanted signal at a level of 1 mV and the AF output adjusted to 1 mW, the crosstalk from an equal signal in the opposite sideband, at greater than 400 Hz from the carrier, is not greater than -50 dB relative to 1 mW.

#### METERING

A meter is provided on the front panel to indicate r.f. level, a.f. level to line, f.s.k. tune, and suitable performance or supply test levels.

#### POWER SUPPLY

100V-125V or 200V-250V,  $\pm 10\%$ , 45-65 Hz

Power consumption: 60 VA (Approx.)

#### DIMENSIONS

Height	Width	Depth
176 mm (7 in.)	483 mm (19 in.)	410 mm (16.14 in.)

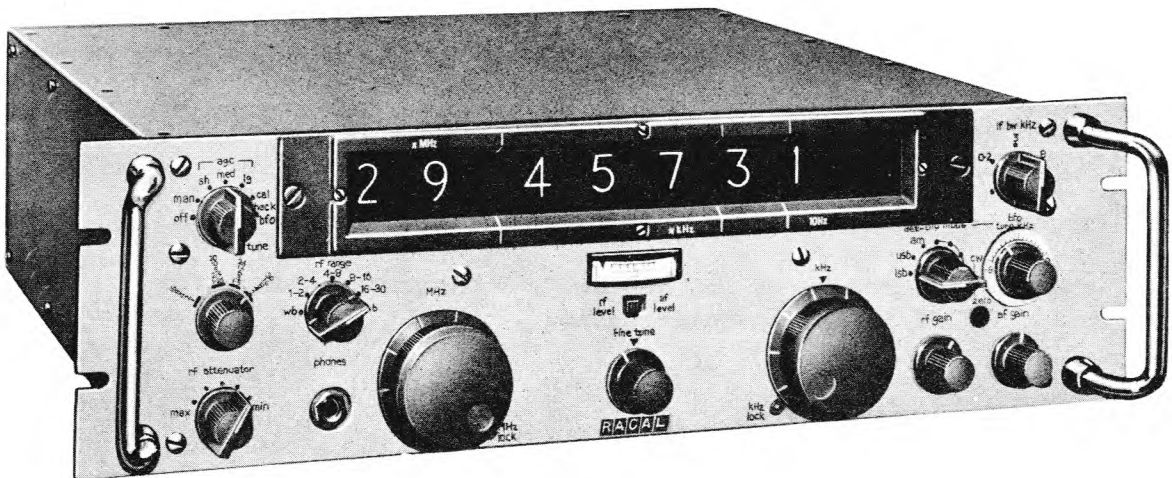
WEIGHT 20.4 kg (45 lb) (Approx.)

RECEIVER RADIO

(5820-99-624-0202)  
(Racal RA 1218A)

Relevant publications:-

AP116E-0745-1A, B



H.F. Communications Receiver Type RA 1218A

FUNCTION

A general purpose all solid-state h.f. communications receiver of high stability with an electronic frequency display.

MODES OF RECEPTION

- (1) MCW, CW, DSB, SSB (USB or LSB)
- (2) ISB and FSK with suitable adaptor /converter

ORIGIN

RACAL Communications Ltd., Type RA 1218A

FREQUENCY RANGE

1 to 30 MHz which can be extended down to 3 KHz by the connection of a RACAL LF Converter Unit.

### RESETTING ACCURACY

± 50 Hz using the Main Tuning controls

± 10 Hz using the Fine Tuning control

### FREQUENCY STABILITY

± 10 Hz plus accuracy of frequency standard.

An external standard of 1 MHz may be used.

### SENSITIVITY (Tuned Mode)

With tuned antenna input, and measured in a 3 KHz bandwidth, sensitivity figures are typically:

CW/SSB - 1 microvolt (emf) for 15 dB signal-to-noise ratio

MCW/DSB (30% modulated at 400 Hz) - 3 microvolts (emf) for 15 dB signal-to-noise ratio.

### SELECTIVITY

Three IF filters are fitted as standard but two additional filters may be fitted as optional extras. Nominal bandwidths are:

#### 3dB Bandwidths

##### Standard Filters

8 KHz

3 KHz

200 Hz

##### Additional Filters available

13 kHz

6 kHz

1.2 kHz

.500 kHz

### CROSS-MODULATION

For a wanted signal level up to 1 mV, and with appropriate use of the antenna attenuator, an interfering signal, 20 kHz removed and modulated 30%, at a level 45 dB above that of the wanted signal, will in general produce cross-modulation of less than 3%.

### INTERMODULATION

To produce an equivalent 1 microvolt input, the level of two equal unwanted signals greater than 10% removed from the wanted frequency, must

be at least 80 dB above 1 microvolt in the tuned input mode.

#### BLOCKING

For levels of wanted signal up to 1mV and with appropriate use of the antenna attenuator, an interfering signal 20 KHz removed will be 56 dB above the level of the wanted signal to reduce its output by 3 dB. The ratio of wanted to unwanted signal level is improved at the rate of approximately 2 dB/1% up to 10% off-tune in the tuned input mode.

#### SPURIOUS RESPONSE TO EXTERNAL SIGNALS (IMAGE etc): IN TUNED MODE

To produce a response equivalent to a 1 microvolt signal, an external signal less than 10% off-tune must, in general, be greater than 70 dB above 1 microvolt.

#### INTERNALLY GENERATED SPURIOUS RESPONSES

Not greater than 3 dB above noise level in a 3 kHz bandwidth.

#### NOISE FACTOR (Tuned Mode)

Typically 10 dB

#### ANTENNA INPUT

- (1) Nominal impedance 75 ohm unbalanced
- (2) Wideband, or tuned in five selected bands:
  - a. 1 to 2 MHz
  - b. 2 to 4 MHz
  - c. 4 to 8 MHz
  - d. 8 to 16 MHz
  - e. 16 to 30 MHz

#### IF OUTPUT (AGC ON)

- (1) At 1.6 MHz: 0.1V (nominal) at high impedance
- (2) At 100 KHz: 0.27V (1 mW) nominal at 75 ohms

### AUTOMATIC GAIN CONTROL

(1) Time Constants (nominal)

	Charge	Discharge
a. Short	17 mS	60 mS
b. Medium	40 mS	400 mS
c. Long	40 mS	6 S

(2) Output Change - An increase in input of 85 dB above 2 microvolts will produce a change in output level of less than 4 dB.

### BFO

(1) Variable  $\pm$  8 kHz with respect to i.f. centre frequency.

(2) Fixed  $\pm$  1.5 kHz (USB/LSB) crystal controlled.

### AF OUTPUT

(1) Headphone jack on front panel: 10 mW nominal in 600 ohms.

(2) 10 mW in 600 ohms at rear terminals. An alternative version providing one watt into 15 ohms for an external loudspeaker is available.

(3) 1 mW in 600 ohms 'line' outlet. The preset level is independent of the AF Gain control setting.

### AF DISTORTION

Not greater than 5%

### AF RESPONSE

100 to 6000 Hz flat within 4 dB relative to the peak in the widest bandwidth fitted.

### METERING

'S' scale metering in dBs relative to 1 microvolt.

(1) R.F. Signal level

(2) AF level to line

### POWER SUPPLIES

100-125V or 200-250V, 45-400 Hz, a.c. single phase

POWER CONSUMPTION

60 VA approximately (with one-watt amplifier)

DIMENSIONS

5.25 inches (13.5 cm) High

19 inches (48.3 cm) Wide

19 inches (48.3 cm) Deep

WEIGHT

50 lb (22.9 kg) approximately

ENVIRONMENTAL CONDITIONS

The equipment is designed to meet certain of the requirements of specification DEF 133 L2, operating within the ambient temperature range of  $-5^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ .

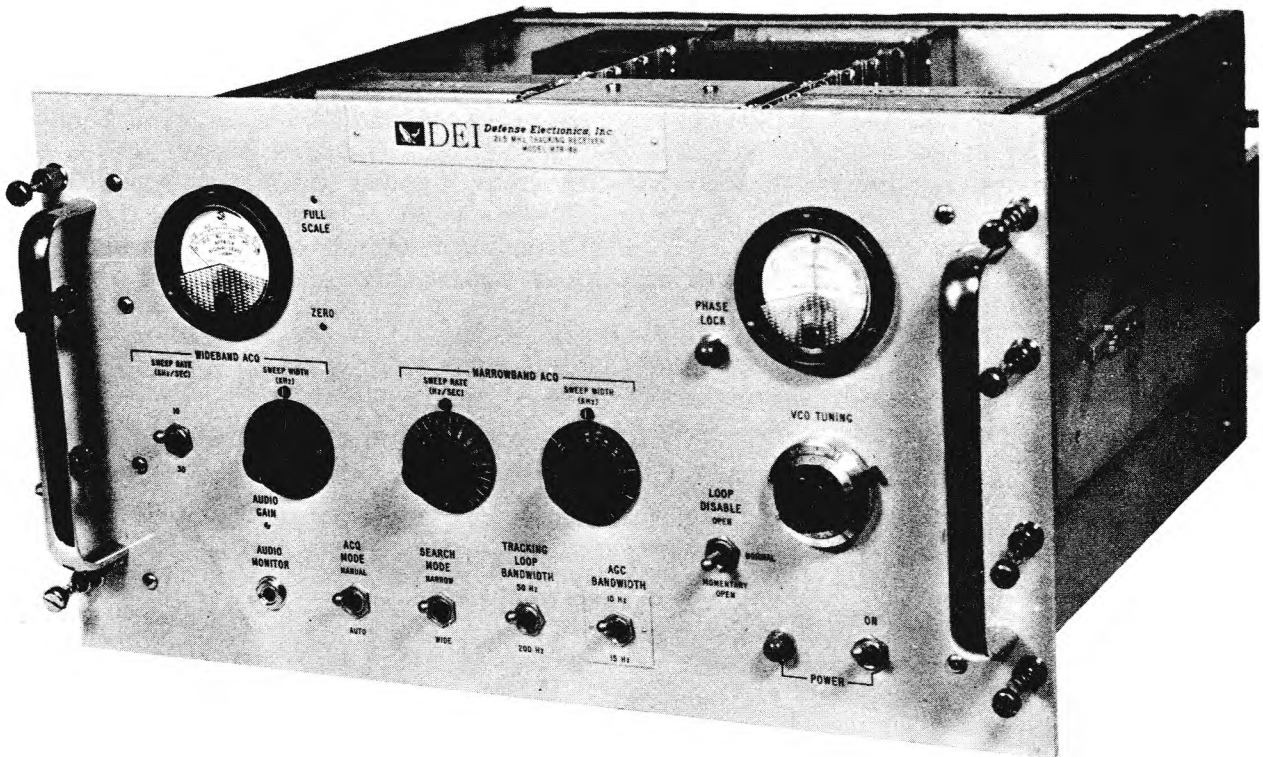
CONSTRUCTION

The unit is of modular construction.

TRACKING RECEIVER  
DEFENSE ELECTRONIC INC. MODEL MTR-4B  
(PART OF SKYNET TELEMETRY AND COMMAND STATION UHF SYSTEM)

Relevant publication:-

AP116E-0738-1



21.5 MHz tracking receiver D.E.I. Inc., Model MTR-4B

FUNCTION

A tracking receiver designed to process phase modulated 21.5 MHz r.f. input signals into video and conical scan tracking error information.

ORIGIN

Defense Electronics Inc., Rockville, Maryland USA 20854  
Model MTR-4B



Sweep rate	10( $\pm 1$ ) kHz/sec or 30( $\pm 3$ ) kHz/sec, switch selectable.
Acquisition bandwidth	800 Hz
Narrowband characteristics	
Sweep width	500 Hz to 10 kHz, continuously adjustable.
Sweep rate	50 Hz/sec to 1500 Hz/sec, continuously adjustable
Acquisition loop bandwidth	50 Hz or 200 Hz, switch selectable
Frequency tracking rate	90 Hz/sec at 50 Hz loop b.w. (0.32 radians phase error) 900 Hz/sec at 200 Hz loop b.w. (0.32 radians phase error).
AGC bandwidth	10( $\pm 2$ ) Hz or 15( $\pm 3$ ) Hz, switch selectable
Power supply required	240V a.c. $\pm 10\%$ , 50 Hz $\pm 5\%$ , single phase.

#### ENVIRONMENTAL

##### Temperature range:

Operating	0°C to +32°C
Storage	-40°C to +52°C
Relative humidity	30 to 70%
Barometric pressure	610 to 775 mmHg.

#### MECHANICAL

##### Dimensions

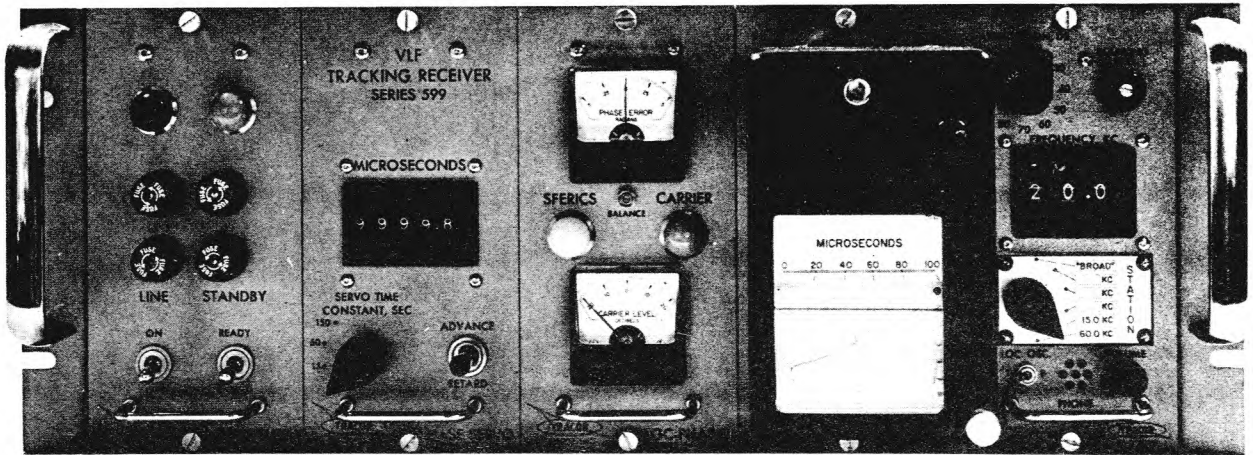
Height	Width	Depth
266 mm (10 $\frac{1}{2}$ in)	483 mm (19 in)	495 mm (19 $\frac{1}{2}$ in)

Weight 40 lb (approximately)

VLF TRACKING RECEIVER  
TRACOR INC., MODEL T599H

Relevant publication:-

AP116E-0735



VLF receiver model 559H

FUNCTION

Reception of very low highly stabilized reference carrier frequency transmissions from special global VLF stations for time and frequency calibration measurement and standardization purposes.

ORIGIN

Tracor Inc., USA Model T599H

## GENERAL DESCRIPTION

The unit is completely solidstate, and it is designed for phase locked reception of v.l.f. Signals which gives long-term and short term accuracy several orders of magnitude better than that obtained by reception of WWV or WWVH.

Frequency measurements to an accuracy of 1 part in  $10^9$  can be achieved in intervals as short as 30 minutes; observation over 24-hour intervals gives a measurement accuracy of several parts in  $10^{11}$ .

The receiver provides a reliable tracking of any one of the stations listed below from nearly anywhere in the world.

Transmitting station	Frequency kHz	Location	Sponsor, August 1964
WWVL	20.0	Ft. Collins, Colorado	Natl. Bureau of Standards
NBA	24.0	Balboa, Canal Zone	US Navy
NPM	19.8	Lualualei, Hawaii	US Navy
NAA	17.8	Cutler, Maine	US Navy
NPG	18.6	Jim Creek, Washington	US Navy
NSS	21.4	Annapolis, Maryland	US Navy
GBR	16.0	Rugby, England	British
OMEGA	10.2	Global net (various)	US Navy
OMEGA	13.6	Global net (various)	US Navy

Note:- All frequency standard transmissions are based on the UT2 time scale.

For reception of the Omega transmission, an auxiliary switch programmer is required for selection of a particular Omega station from the network of stations.

A total of 240 discrete channels in 100 Hz. steps is available between the lower limit of tracking operation at 8.0 kHz and the upper limit of 31.9 kHz.

Optional models of v.l.f. receiver track the 60 kHz transmission of WWVB operated by National Bureau of Standards.

The unit is a fully integrated receiving system and incorporates various major functional elements into single instrumentation packages v.h.f. receiver, phase comparator, servo phase shifter, frequency synthesizer and power supply. Only an external frequency standard and an antenna is connected to the unit.

Phase differences as small as 0.1 microsecond between the phase of incoming v.l.f. carrier frequency and phase derived from the local frequency source are detected by the front panel digital counter and a permanent record of the accumulated phase difference is made on a built-in stripchart recorder.

## TECHNICAL DATA

### ELECTRICAL

#### Frequency coverage

Standard receiver provides 240 channel tracking in 100 Hz increments for all carrier-stabilized VLF stations in the region 8.0 kHz-31.9 kHz (Additional 60 kHz coverage available).

#### RF filter capability

Front panel five-position switch permits selection of either a broadband filter or narrow band filter in r.f. selection. Broadband filter position normally used in all-channel tracking capability; plug in narrow band filters provide image rejection and additional frequency selectivity at specified frequencies.

#### Frequency synthesizer

Frequency synthesizer generates coherent local oscillator signal, in 100 Hz increments, between 9.0 and 30.9 kHz. Digital thumb-wheel switch gives direct indication of desired v.l.f. station frequency; toggle switch permits selection of local oscillator frequency either 1 kHz above or below station frequency.

#### Time difference register

Front panel digital counter, pulsed by electronic phase servo, displays relative time difference between local standard and v.l.f. carrier; counter dial cumulative to 9999.9  $\mu$ S. Counter dial may be manually set to zero or other desired initial reading (independently of phase position of tracking servo).

#### Recording outputs

Built-in inkless chart recorder records relative phase difference between local standard and v.l.f. carrier. Chart speed: 1 inch per hour (other speeds available on request). Manual selection of either 100  $\mu$ S. or 10  $\mu$ S. phase sensitivity (fullscale deflection) of internal chart recorder. Phase and coherent carrier amplitude information is also available, for use with external chart recorder.

#### VLF Phase

Two independent analog outputs, having deflection sensitivities of 100  $\mu$ S. and 10  $\mu$ S. full scale, provided for use with external chart recorder; with independent controls to adjust span calibration for any nominal 1 mA recorder.

### Coherent signal amplitude

Relative v.l.f. signal strength, equivalent to the receivers a.g.c. bias voltage, can be recorded on any nominal 1mA recorder; nominal logarithmic characteristic over a 40 dB range (chart records linear on a dB scale).

### Meter display

Individual meters indicate

- a) Relative carrier level: 40 dB full-scale range
- b) Phase detector error voltage (on zero-centre meter)

### Auxiliary outputs

- a) Amplified v.l.f. station signal, at 1 kHz intermediate frequency and phase coherent with r.f. carrier.
- b) Phase shifted 100 kHz square wave, 0.5 V peak to peak nominal
- c) Phase shifted 1kHz square wave, 0.5 V peak to peak nominal
- d) Phase shifted 100 Hz square wave, 0.5 V peak to peak nominal
- e) Reference frequency (L.O.) offset 1 kHz from v.l.f. carrier, square wave, 0.5 V peak to peak nominal

### Audio output

Built-in speaker and volume control for aural monitoring of v.l.f. station at approximately 1 kHz.

### Frequency standard input

Requires stable 1 MHz or 100 kHz from external frequency standard. Input level 0.5-5 volt r.m.s. into 1000 ohms.

### Antenna requirements

Designed for use with loop, whip or simple wire antenna; shielded loop antenna (Model 599-600 or equal) recommended for high noise locations. Antenna may be located any distance from receiver. (100 ft. of 50 ohm coaxial cable supplied with receiver).

### Bandwidth

- a) RF bandwidth (narrow band filters) 500 Hz, nominal
- b) IF bandwidth 50 Hz, nominal
- c) Servo bandwidth (equivalent noise bandwidth): selectable from 0.002 Hz to 0.06 Hz (phase tracking servo)

### Noise suppression

Blanking circuit rejects impulse noise either man-made or atmospheric ('sferics') Front panel lamp indicates presence of blanked noise impulse and facilitates adjustment of blanking circuit control.

### Servo disable circuit

Electronic switch disables phase servo whenever v.l.f. carrier drops below minimal level; front panel warning lamp lights at same time. Tracking resumes automatically when carrier returns.

## PERFORMANCE

### Receiver sensitivity

0.01 microvolt signal (corresponding to 0.3 microvolt/meter field strength at 20.0 kHz with model 599-600 loop antenna) into receiver energizes carrier level switch and enables normal phase tracking; tracking maintained at an input signal-to-noise ratio of -50 dB (Gaussian noise measured in a 1 kHz bandwidth; servo time constant switch in 50 sec position).

### Phase tracking servo

Front panel selector switch provides following servo response characteristics:

Nominal time Constant (sec)	Equivalent noise bandwidth (Hz),	Maximum tracking rate (nominal)
5	0.06	$\pm 1 \times 10^{-6}$
15	0.02	$\pm 3.3 \times 10^{-7}$
50	0.006	$\pm 1 \times 10^{-7}$
150	0.002	$\pm 3.3 \times 10^{-8}$

### Nominal servo deadband:

Less than  $\pm 0.1$  sec. in all switch positions

### Manual servo slewing

Momentary contact, centre-off toggle switch provided to advance or retard phase servo at a nominal  $1\mu\text{S. /sec.}$  rate.

### Calibration accuracy

Short-term and long-term stability better than  $\pm 0.5 \mu\text{S.}$  under normal laboratory conditions; intrinsic calibration accuracy (relative to received v.l.f. carrier) nominally better than  $\pm 1 \times 10^{-11}$  on a 24-hour basis.

## Synthesizer stability

Phase of the coherent local oscillator signal is absolutely fixed by the synthesizer setting; the synthesizer, after being switched to other frequencies, shows less than  $\pm 0.05 \mu\text{s}$ . shift when returned to its original setting.

## AGC

Stable a.g.c. circuit assures full-reliability phase locked servo operation over a 40 dB range of carrier level with total variation of phase shift less than  $0.5 \mu\text{s}$ . (equivalent, at 20 kHz).

## Dynamic range

Total signal level operating range in excess of 120 dB (including 80 dB manual gain control and 40dB a.g.c. range)

## POWER SUPPLY REQUIRED

95-125 volt a.c., 48-62 Hz, 40 watts nominal, or d.c. source (e.g.  $\pm 12$  volt and -12 volt d.c. standby batteries)

External standby batteries, when used, automatically assume full operating load in the event of primary a.c. power failure. All receiver functions, including servo tracking, are sustained without interruption; however, chart drive motor in recorder stops during a.c. power off time. Standby current drain approximately 600 mA at +12 volt d.c. and 600 mA at -12 volt d.c.

## MECHANICAL

### DIMENSIONS

	Height	Width	Depth
(rack panel)	178 mm (7 in.)	483 mm (19 in.)	419 mm (16 1/2 in.)

WEIGHT 20.5 kg (45 lb)

### Ambient temperature limits

$0^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  while operating ( $+05^{\circ}\text{C}$  maximum storage temperature)

### Packaging

Circuits are packed in the following modules:

Receiver/synthesizer/recorder	unit 202
AGC/phase error	unit 302
Phase servo	unit 402
Power supply	unit 502

## LORAN-C

UK/FRR 652  
HF RECEIVER  
TYPE PRS 2282A

Relevant publications:

AP 116E-0768-16

FUNCTION

The UK/FRR652 is a general purpose HF communications receiver that provides continuous coverage of the frequency range 10 kHz to 30 MHz, and allows for reception of AM, CW, SSB, LSB, FSK and FM signals.

ORIGIN

Plessey Military Communications.

DESCRIPTION

The UK/FRR652 is a double superheterodyne HF communications receiver with a tunable frequency range of 10 kHz to 30 MHz in 10 Hz steps. A conventional tuning control mounted on the receiver front panel provides continuous fast or slow frequency control without any need for band changing. A ten digit keypad provides for instant frequency access as required. Instant recall of up to 100 frequencies, together with their respective mode, bandwidth, a.g.c. and BFO settings is also provided.

The UK/FRR652 HF communications receiver front panel controls and indicators are illustrated in Fig 1.

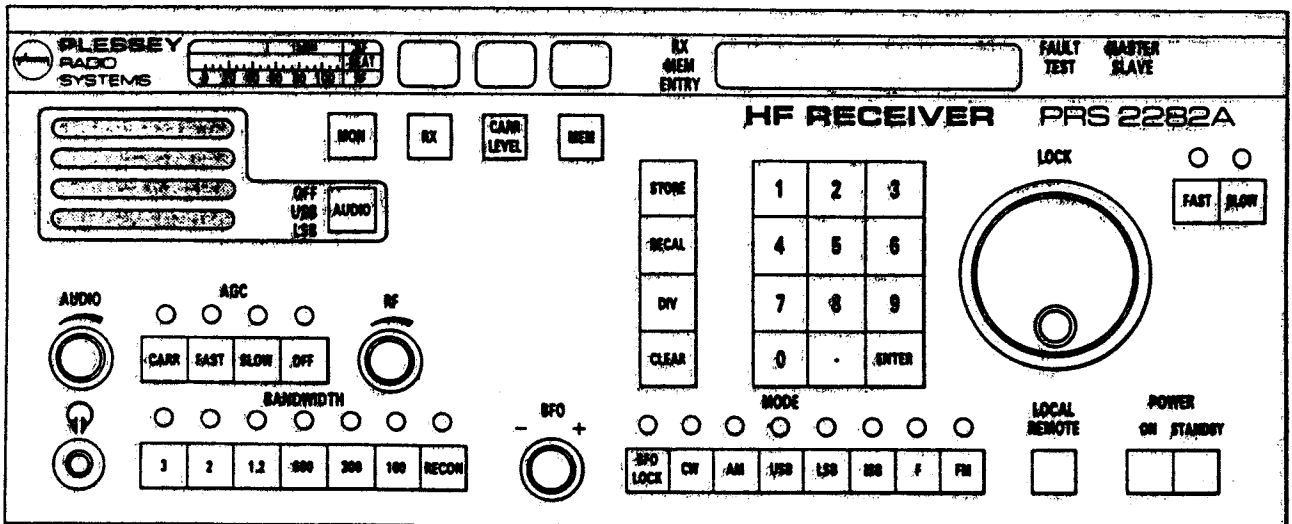


Fig 1 UK/FRR652 HF Communications Receiver Front panel

PHYSICAL CHARACTERISTICS

Weight

Complete Unit: 16 kg.

Dimensions

Height: 177 mm.  
Width: 483 mm.  
Depth: 380 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 10 kHz to 30 MHz in 10 Hz steps.

Modes of reception: CW, AM, USB, LSB, ISB, F, FM.

Bandwidths:	<u>Centre frequency</u>
8 kHz	F.C.
2 kHz	F.C. +2 kHz.
1.2 kHz	F.C. +2 kHz.
600 kHz	F.C. +1 kHz.
300 kHz	F.C. +1 kHz.
100 kHz	F.C. +1 kHz.
3 kHz	F.C. +1.75 kHz.
3 kHz	F.C. -1.75 kHz.

Memory capacity: 100 channels.

Data stored: Frequency, mode bandwidth, a.g.c. time-constant, reinserted carrier, BFO offset.

Data retention: Memory retention is better than 10 days at 25°C using storage capacitor.

Power requirements: 100 V, 120 V, 220 V or 240 V, 50 to 400 Hz.

Power consumption Approximately 90 watts.

Operating conditions: -10°C to +55°C, 95% RH at 40°C.

UK/FRR 628  
HF RECEIVER  
TYPE RA1772

Relevant publications:

AP 116E-0753-16

FUNCTION

The radio receiver Type RA1772 is a fully synthesised, solid state, communications receiver providing reception facilities for LSB/USB (A3A,A3H,A3J), ISB(A3B), AM(A3) and telegraphy (A1,A2H,A2J) with two IF filters offset by 1 kHz.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

The frequency range of the receiver is 15 kHz to 30 MHz and the built-in synthesiser is phase-locked to the output of a 5MHz frequency standard. The MHz selection is in 1 MHz increments; a single knob tuning control tunes the synthesiser continuously over each 1 MHz band, with switched selection of FAST and SLOW tuning rates, or LOCK. In the LOCK position, the synthesiser does not respond to movement of the kHz tuning control. At the ends of each 1 MHz band, the tuning provides a 20 kHz overspill to eliminate the need for reverse tuning of the kHz control. Overspill is indicated by an illuminated lamp behind the appropriate MHz dial setting, above or below the setting initially selected. An electronic digital display indicates the kHz setting to 10 Hz. Some receivers will be fitted with a battery module MS540 which ensures that the tuning state is maintained following a momentary mains failure.

A built-in meter may be switched to indicate RF and AF signal levels as well as supply voltage levels. A slow-motion BFO control is provided for CW operation.

A switched monitor loudspeaker is provided and two front panel mounted jack sockets permit headphone monitoring of the output selected by the MODE switch. When the right-hand phone jack is in use the internal loudspeaker is muted. A general view of the RA1772 receiver is illustrated in Fig 1.

PHYSICAL CHARACTERISTICS

Weight

Complete unit: Approx. 22 kg.

Dimensions

Height: 178 mm.  
Width: 483 mm.  
Depth: 410 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.  
Modes of reception: A1, A2, A2H, A2J,  
A3, A3A, A3B, A3H, A3J.  
Tuning: 1 MHz increments (0 to 29)  
continuously tunable in  
10 Hz or 100 Hz increments  
over each 1 MHz band.  
Electronic frequency display  
to 10 Hz.  
Overspill: 20 kHz at either end of each  
1 MHz band. Indication provided.  
Antenna input: 50 ohms to 75 ohms (nominal).  
Power supply: 100 to 125 V or 200 to 250 V at  
45 to 65 Hz.  
Power consumption: Approximately 60 VA.

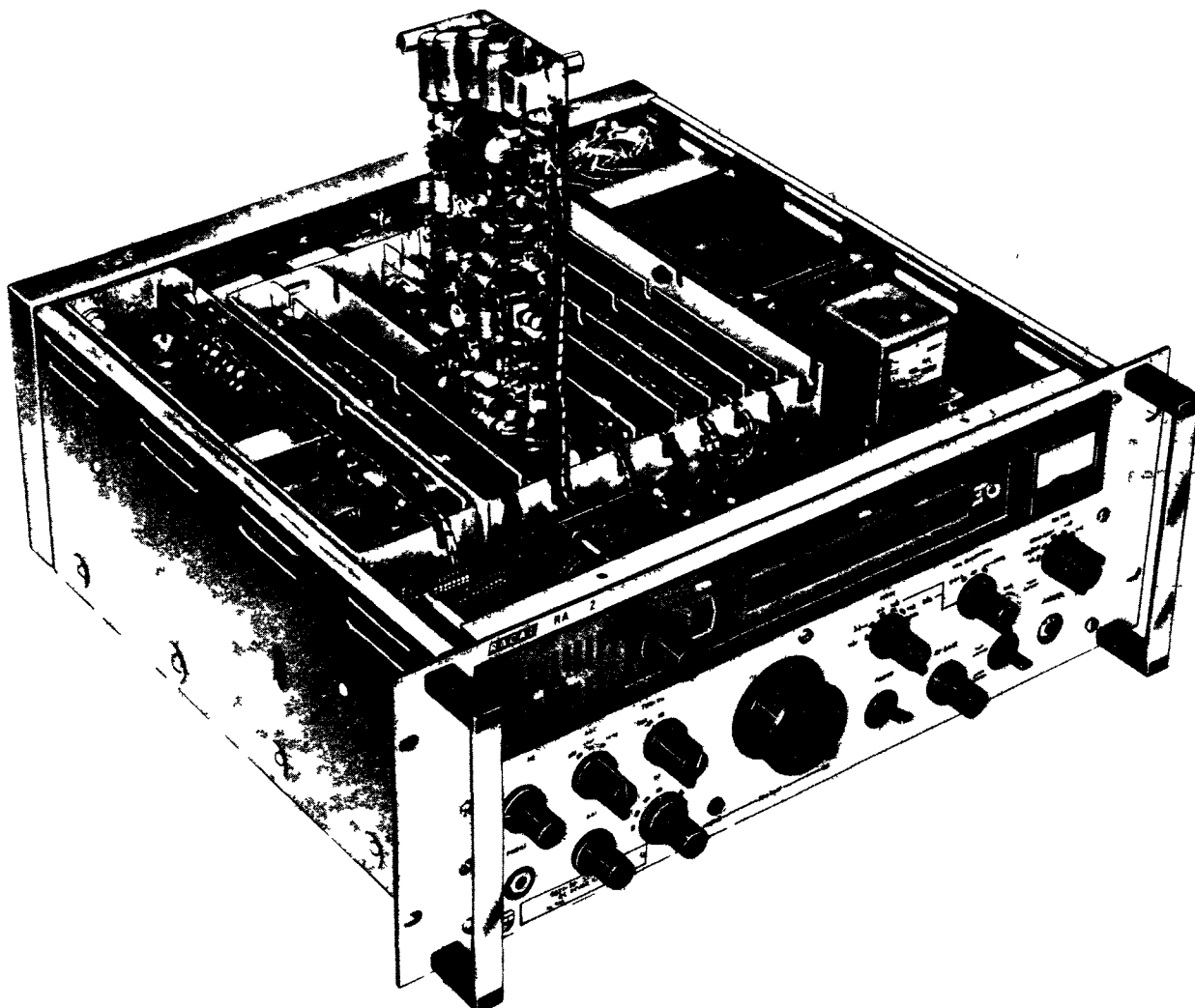


Fig 1 Receiver General View

UK/FRR 626  
HF RECEIVER  
TYPE RA1778/DA78120/B

Relevant publications:

AP 116E-0754-1

FUNCTION

The RA1778 is a fully synthesised solid state communications receiver providing reception facilities for LSB/USB (A3A, A3H, A3J), AM(A3) and CW(A1). Facilities for ISB(A3B), FSK(F1) and AFC are provided by optional, internally fitted, modules.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

The receiver is fully synthesised and tunable over the range 15 kHz to 30 MHz, with a built-in memory facility which can be programmed up to 12 frequencies for rapid channel changes.

A rigid die-cast chassis provides the basis for the main frame of the receiver. Mounted within compartments on the underside of the chassis are the mixer boards and part of the frequency generating system. Mounted on the top of the chassis is an aluminium box structure, which houses up to nine (dependent on the options fitted) printed circuit boards, each individually screened. Also mounted on the top of the chassis is the frequency standard module and the power supply transformer. The power supply printed circuit board is mounted on the inside of the rear panel and adjacent to this board are mounted the power supply smoothing capacitors. Further printed circuit boards containing memory and decoder logic circuits are mounted on the inside of the front panel. Fig 1 illustrates the controls and indicators on the receiver front panel.

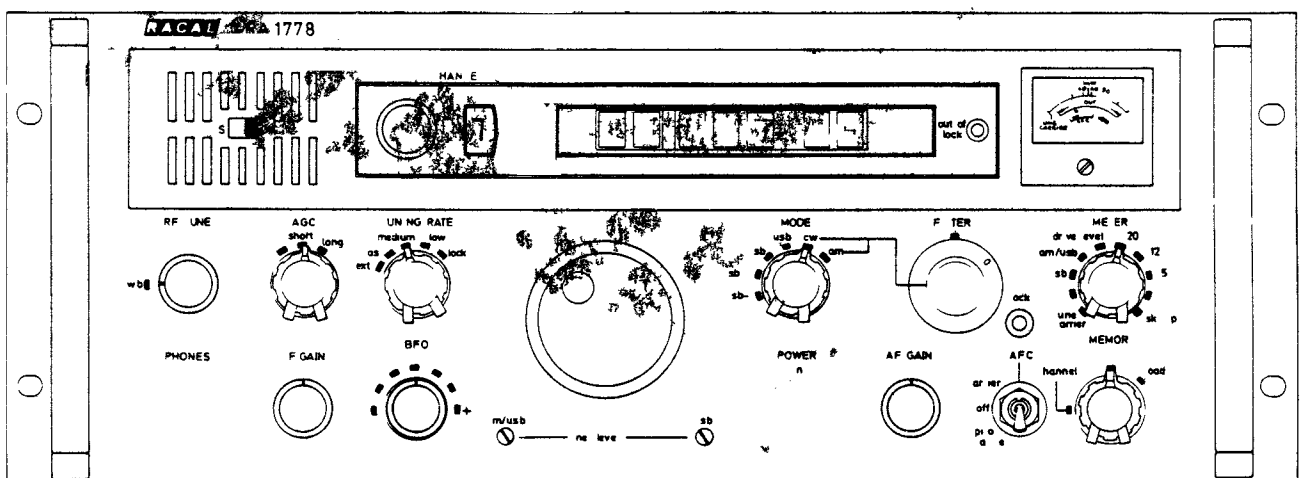


Fig 1 RA1778 HF Receiver Front Panel

PHYSICAL CHARACTERISTICS

Weight

Complete unit. 48½ lb (22 kg).

Dimensions

Height: 7 inches (178 mm).  
Width: 19 inches (483 mm).  
Depth: 16 inches (407 mm).

FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.

Modes of reception: A1, A2, A2H, A2J, A3, A3A, A3J, A3H  
with the following options:

- (1) Choice of USB or LSB.
- (2) Provision for reception of A3B or F1.
- (3) Provision of AFC.

Tuning: 12 Programmable channels.  
Continuously tunable synthesiser in  
10 Hz, 20 Hz or 1 kHz increments.  
7 Digit electronic readout.

Tuning accuracy: ±5 Hz relative to the frequency of the  
required signal.

Power supply: 100 V to 125 V or 200 V to 250 V, 45 to 65 Hz.

Power consumption: Approximately 60 VA (basic receiver).  
Approximately 90 VA (fully equipped).

Operation: -10°C to +55°C.

UK/FRR-627  
REMOTELY CONTROLLED HF RECEIVER  
TYPE MA1072/RA1784

Relevant publications:

AP 116E-0755-1A

FUNCTION

The RA1784 is a fully synthesised, triple-conversion, HF communications receiver operating over the frequency range 15 kHz to 29.99999 MHz.

ORIGIN

Racal Communications Systems Ltd.

DESCRIPTION

A rigid die-cast chassis provides the basis for the main frame of the receiver, illustrated in Fig 1. Frequency selection and control of all available functions is achieved by serial data from the MA1072 control panel. This data is applied to a serial data interface module at the RA1784 receiver, where it is converted into parallel internal control data. This technique allows extended or full remote control using two cables, with revertive check data returned via a third cable. For extended control the MA1072 control panel may be linked directly to the RA1784 receiver by hard wired cables. For remote control, standard telephone circuits may be used via data modems.

The MA1072 control panel is illustrated in Fig 2. The receiver frequency is set by a single tuning knob and is indicated on a 7-digit display. The selected function, tuning rate and other facilities are indicated by the appropriate illuminated push-button. If a fault occurs on the receiver, or the interconnections have not been made, a fault indicator is illuminated. A battery operated memory circuit will retain the currently tuned frequency and maintain other settings during a temporary supply failure.

A number of MA1072 control panels and/or RA1784 receivers may be connected with ancillary equipment into systems to provide for a variety of applications. The EXTERNAL socket on the MA1072 control panel provides for the connection of a frequency entry pad. This may take the form of a numeric key pad (0 to 9 and decimal point) to enable the receiver to be set rapidly to a particular operating frequency. Alternatively, a multi-frequency memory together with a channel switch would enable the receiver to be set rapidly to any one of a number of pre-programmed channel frequencies.

Power supply

The RA1784 receiver requires an a.c. input of 100 V to 125 V or 200 V to 250 V at 45 to 65 Hz.

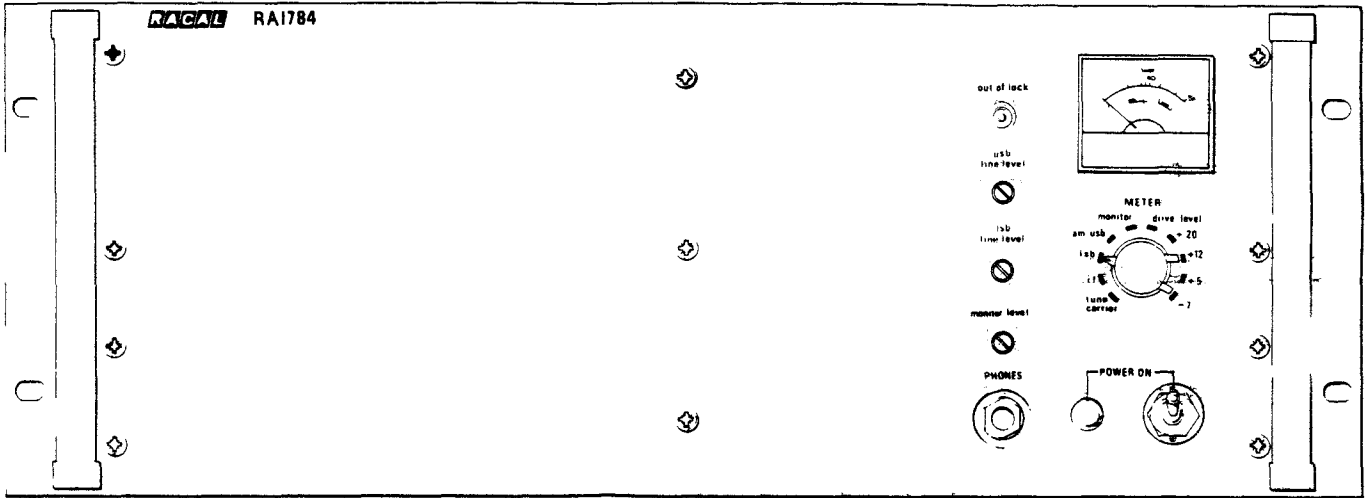


Fig 1 RA1784 Receiver Front View

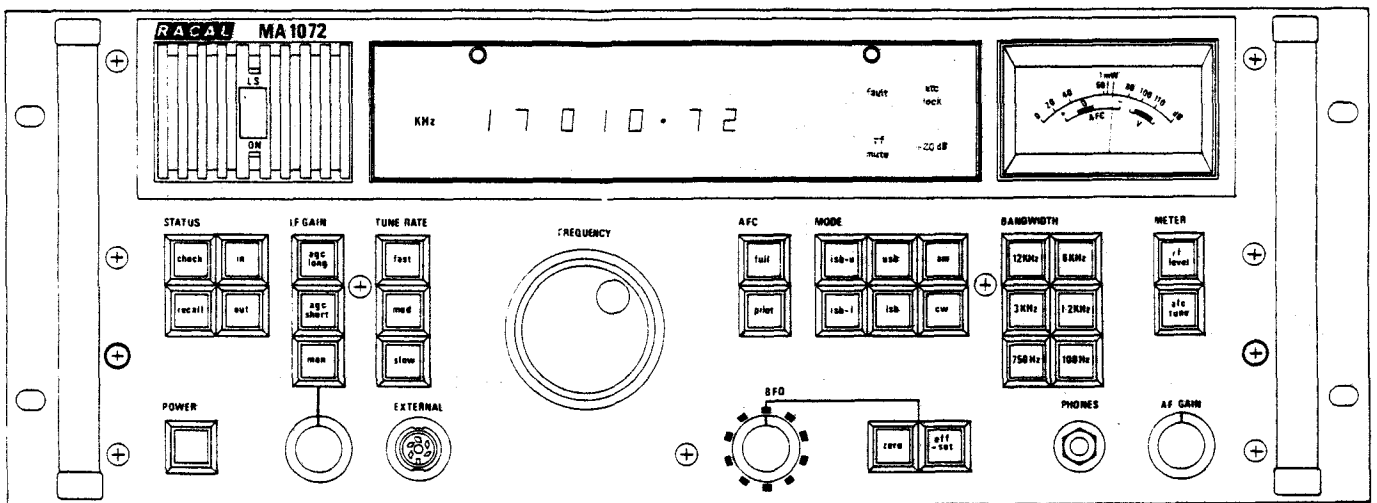


Fig 2 MA1072 Control Panel Front View

PHYSICAL CHARACTERISTICS

	<u>MA1072 Control Panel</u>	<u>RA1784 Receiver</u>
Weight:	Approximately 16 kg.	Approximately 31 kg.
Height:	178 mm.	178 mm.
Width:	483 mm.	483 mm.
Depth:	300 mm.	464 mm.

FUNCTIONAL CHARACTERISTICS

Frequency range: 15 kHz to 30 MHz.

Modes of reception: A1, A2, A2H, A2J, A3, A3A, A3B, A3J, A3H  
with the following options:

- (1) USB and/or LSB.
- (2) ISB.
- (3) AFC.
- (4) Half octave filters.

Tuning: Continuously tunable synthesiser in 10 Hz, 20 Hz or 1 kHz increments.  
Electronic frequency display in 10 Hz steps.

Power supply: 100 V to 125 V or 200 V to 250 V, 45 to 65 Hz.

Power consumption: Approximately 60 VA (basic receiver).  
Approximately 90 VA (fully equipped).

Operation: -10°C to +55°C.

UK/FRR 638 RECEIVER  
UHF/VHF MULTI-CHANNEL  
GROUND-TO-AIR COMMUNICATIONS EQUIPMENT

Relevant publications:

AP 116E-0756-16 - Receiver UK/FRR 638.

DESCRIPTION

Receiver Assembly

The UK/FRR 638 receiver operates in the UHF frequency range 225 to 399.975 MHz and the VHF frequency range 117 to 136.975 MHz. The receiver comprises a power supply and an IF/AM detector module with UHF or VHF front end, synthesiser and preset memory module. The memory can hold up to 29 separate channels. The frequency selection controls are on the preset memory module, which may be a UHF or VHF unit. This module is fastened into but removable from the equipment case front. The receiver assembly is illustrated in Fig 1.

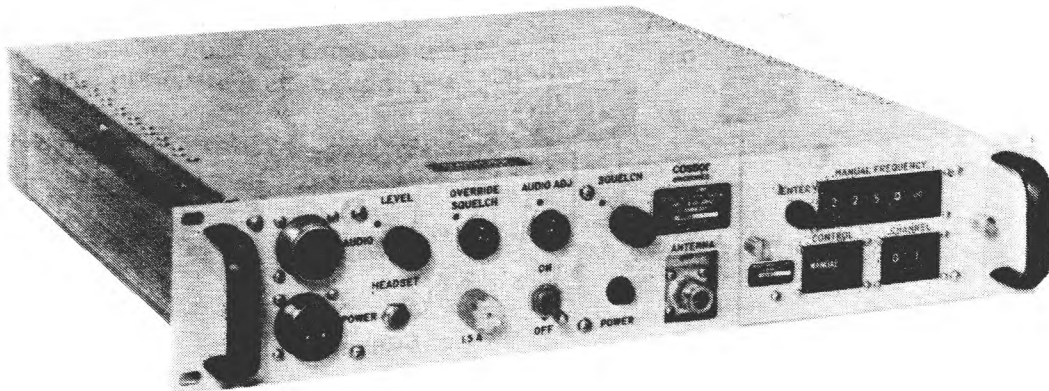


Fig 1 Receiver Assembly

LEADING PARTICULARS

Receiver assembly

Frequency range: VHF: 117.000 to 136.975 MHz.  
UHF: 225.000 to 399.975 MHz.

Modulation: Amplitude modulation.

Power supplies: 207 to 255 V ac at 47 to 63 Hz.

Temperature: Operating: -10°C to +55°C.  
Storage: -40°C to +85°C.

Dimensions:  
Width: 483 mm.  
Height: 89 mm.  
Depth: 483 mm.

Weight: Case: 12.3 Kg.  
Modules: 6.4 Kg.

DESCRIPTION

Remote Control Unit

The Remote Control Unit (RCU) is a self-contained unit providing frequency or channel selection of the transmitters from a remote location, when REMOTE is selected on the main equipment. The RCU is connected to the main equipment by 40 metres of multicore cable thus enabling the operation of the equipment to be carried out by the operator in a control tower situation, with the main equipment located in a ground area.

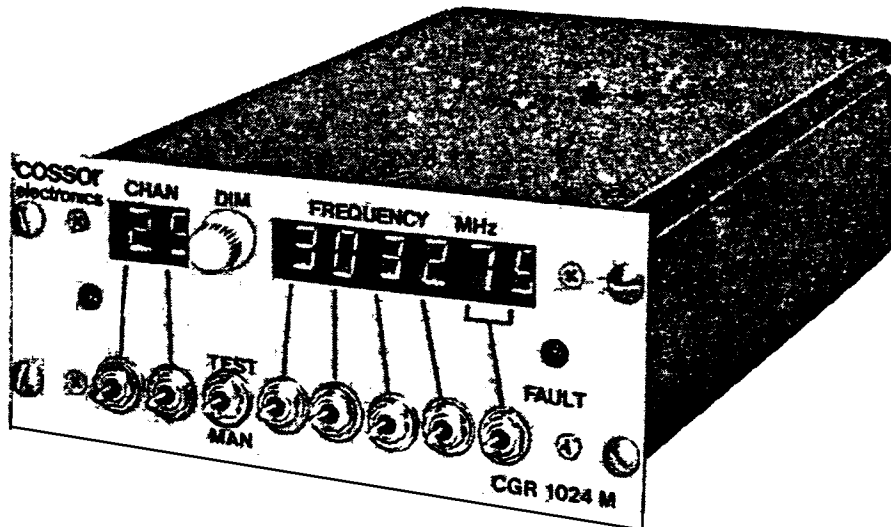


Fig 2 Remote Control Unit

LEADING PARTICULARS

Remote control unit

Dimensions.

Width: 146 mm.  
Height: 64 mm.  
Depth: 281 mm.

Weight: 0.80 Kg.

Temperature: Operating: -10°C to +55°C.  
Storage: -40°C to +85°C.

Power requirements: +28 V at 0.75 A max to transmitter  
and 0.375 A for receiver.