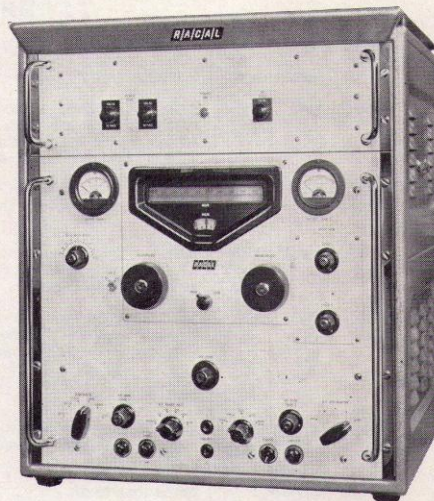


Dual Channel Receiver

RA.253

www.radiopharos.it

- FREQUENCY RANGE 1 TO 30 MHz
- COMMON TUNING CONTROLS
- INDEPENDENT CHANNEL LEVEL ADJUSTMENT
- SIMPLE AND RAPID TO OPERATE



The RACAL RA.253 Dual Channel Receiver is intended for use in dual diversity and h.f., d/f roles. The equipment, which has a high sensitivity in each of its two signal paths, covers frequencies from 1 to 30 MHz. Electronic bandswitching, similar to that used in the RACAL RA.17 and RA.117 Receivers, is incorporated. Tuning involves one set of controls only, using common high-stability oscillators to ensure accurate and identical frequency setting. Due to the use of a minimum of variable tuned circuits in the two signal channels, far greater accuracy in matching the channels is obtained than in the conventional dual receiver. Independent level controls and metering circuits are provided for each channel to facilitate the accurate setting-up required.

The equipment comprises separate receiver and power unit and is rigidly constructed in modular form on cast aluminium chassis. This design provides great mechanical strength, resulting in very high receiver stability.

For high precision frequency setting the Racal MA.350B Decade Frequency Generator can be employed with the receiver. For space diversity reception, the Racal Diversity Switching Unit Type MA.168B is available and the usefulness of the receiver can be further extended by Racal adaptors available for s.s.b., i.s.b. and f.s.k. reception.

RACAL

Publication No.
330-1

TECHNICAL DESCRIPTION

In each channel, the relevant aerial input signal is amplified by an r.f. amplifier and passed through a 30 MHz low-pass filter to the Wadley frequency changing system. Here it is mixed with the output from a variable frequency oscillator (VFO1) common to both channels to give the first i.f. (40 MHz), which covers a spectrum 1 MHz wide.

The output of VFO1 is also mixed with selected harmonics of a 1 MHz crystal oscillator to produce a "harmonic channel" centred on 37.5 MHz. This 37.5 MHz signal is, in turn, mixed with the 40 MHz wideband first i.f. in the second mixer, resulting in a wideband second i.f. covering a spectrum from 2 to 3 MHz. This automatic drift-cancelling system ensures that, if a change occurs in the output frequency of VFO1, the resultant change in the first i.f. is cancelled in the second mixer by a similar change in the harmonic channel.

The interpolation receiver which follows is preceded by a filter which rejects signals outside this wideband spectrum. A common second v.f.o. (VFO2) feeds the mixers in both channels to convert the 2 to 3 MHz signal to an i.f. of 1.6 MHz. This i.f. is combined with 1.7 MHz (from a crystal-controlled oscillator) in a further mixer to give the final i.f. of 100 kHz. The 100 kHz i.f. chain in each channel incorporates filters with common switching to provide six alternative bandwidths. A b.f.o. is included for c.w. reception and a series noise-limiter to reduce the effects of impulse noise. Three audio outputs are available from each channel two at 600 ohms and one for a loud-speaker (3 ohms). A crystal calibrator enables the scale of VFO2 to be checked at 100 kHz intervals.

TECHNICAL SPECIFICATION

Frequency Range:	1 to 30 MHz.	Calibration:	Scale divisions at 1 kHz intervals; crystal check points (5 parts in 10 ⁶) at every 100 kHz.																												
Input Impedance:	75Ω unbalanced for each channel.	R.F./I.F. Gain:	65 dB of attenuation available in each channel.																												
Sensitivity:	A1 reception; bandwidth 3 kHz; 1 μV for 17 dB signal-to-noise ratio. A2 reception; 30% modulated, 3 kHz bandwidth; 3 μV for 17 dB signal-to-noise ratio.	I.F. Output:	100 kHz, 500 mV (approximately) in 75Ω from each channel.																												
Noise Factor:	Less than 8 dB over the frequency range.	Noise Limiter:	Series noise limiter available for operation at modulation levels exceeding 30% in each channel.																												
Frequency Stability:	After warm-up period, the drift is less than 50 Hz with constant supply voltage and ambient temperature.	Meter Indication:	100 kHz i.f. output level from either channel is monitored by separate meters. 50 μA is equivalent to approximately 500 mV into 75Ω.																												
Selectivity:	Six alternative i.f. bandwidths are obtained by means of a selector switch. The nominal bandwidths (in kHz) are:- <table border="0" style="margin-left: 20px;"> <tr> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>—6 dB</td> <td>8.0</td> <td>3.0</td> <td>1.2</td> <td>0.75</td> <td>0.3</td> <td>0.10</td> </tr> <tr> <td>—60 dB</td> <td>26</td> <td>18.5</td> <td>14</td> <td>2.1</td> <td>2.0</td> <td>1.5</td> </tr> </table>		1	2	3	4	5	6	—6 dB	8.0	3.0	1.2	0.75	0.3	0.10	—60 dB	26	18.5	14	2.1	2.0	1.5	B.F.O. Range:	±8 kHz.							
	1	2	3	4	5	6																									
—6 dB	8.0	3.0	1.2	0.75	0.3	0.10																									
—60 dB	26	18.5	14	2.1	2.0	1.5																									
Intermodulation:	Better than 85 dB down for interfering signals at least 10% removed from the wanted signal.	A.F. Output:	RA.253A: Single a.f. stage switched to either channel. RA.253B: One a.f. stage for each channel. Each a.f. stage provides the following outputs: (a) Two of 3 mW into 600Ω, terminated on a rear panel tag board. (b) One of 50 mW into 3Ω, terminated on the rear panel tag board. (c) One of 3 mW in 600Ω, terminated on a phone jack in front panel.																												
Cross Coupling:	Better than 60 dB.	Power Supply:	100-125V or 200-250V 45-65 Hz, single phase a.c. Consumption 160 VA approximately.																												
Image and Spurious Responses:	With wideband or tuned input external image signals at least 60 dB down. Internally generated spurious responses less than 3 dB above noise level.	Environmental Conditions:	Operating temperature range: 0°C. to +55°C. Storage temperature range: —26°C to +70°C.																												
A.G.C.:	An increase in signal level of 100 dB above 1 μV increases the output by less than 7 dB.	Dimensions:	<table border="0" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>Height</th> <th>Width</th> <th>Depth</th> </tr> <tr> <th></th> <th>in.</th> <th>cm.</th> <th>in.</th> </tr> </thead> <tbody> <tr> <td>(a) For Rack mounting</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Receiver</td> <td>15.75</td> <td>40</td> <td>19 48</td> </tr> <tr> <td>Power supply unit</td> <td>5.25</td> <td>13</td> <td>19 48</td> </tr> <tr> <td>(b) Fitted in cabinet</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Receiver & P.S.U.</td> <td>24</td> <td>61</td> <td>20.5 52 22.5 57</td> </tr> </tbody> </table>		Height	Width	Depth		in.	cm.	in.	(a) For Rack mounting				Receiver	15.75	40	19 48	Power supply unit	5.25	13	19 48	(b) Fitted in cabinet				Receiver & P.S.U.	24	61	20.5 52 22.5 57
	Height	Width	Depth																												
	in.	cm.	in.																												
(a) For Rack mounting																															
Receiver	15.75	40	19 48																												
Power supply unit	5.25	13	19 48																												
(b) Fitted in cabinet																															
Receiver & P.S.U.	24	61	20.5 52 22.5 57																												
A.G.C. Time Constant:	Short: Charge 25 mS, discharge 200 mS. Long: Charge 200 mS, discharge 1S.	Weight:	For Rack mounting: 130 lb. (59 kg.) approximately. Fitted cabinet: 180 lb. (82 kg.) approximately.																												
Cross Modulation:	For wanted signal levels between 3 μV and 1 mV, and with appropriate use of the aerial attenuator, an interfering signal 10 kHz removed and modulated 30% must have a level greater than 46 dB above that of the wanted signal to produce a cross modulation of 3%. The ratio of wanted to unwanted signal is improved at the rate of approximately 2 dB/1% up to 10% off tune in the tuned input mode.																														
Blocking:	With similar conditions to those for cross modulation, an unwanted signal must be 60 dB greater before the audio output of the wanted signal is reduced by 3 dB due to blocking.																														

The RACAL policy is one of continuous improvement, and consequently the equipment may vary in detail from the description and specification in this publication.

RACAL

www.radiopharos.it

RACAL COMMUNICATIONS LTD.

BRACKNELL · BERKSHIRE ENGLAND

Telephone:
BRACKNELL 3244
JC/N1067/CP

Cables/Grams:
RACAL BRACKNELL

TELEX 84166

Printed in England