KEY FEATURES

- Frequency range 15kHz to 30MHz.
- High RF performance.
- Modular construction.
- Wide range of optional modules.
- Automatic scanning of channels and frequency.
- Serial ASCII or IEEE 488 control.
- Controller of slave receivers.
- Simple to operate.
- Comprehensive BITE.

DESCRIPTION

This family of high performance HF receivers covers the frequency range 15kHz to 30MHz.

Using a highly modular design, the same frame and modules can be configured to assemble receivers to meet a variety of different applications.

The family includes single and dual receivers and a range of optional modules may be fitted to enhance the receiver facilities. The following receivers are available:

- RA3701 Single HF Receiver with front panel controls.
- RA3702 Dual HF Receiver with front panel controls.

Each of the receivers includes, as standard, a serial ASCII remote control interface with a built-in multi-addressing capability of up to 100 receivers. Alternatively, an IEEE 488 interface may be fitted. Slave receivers may be controlled in a number of ways: by computer; by using the MA3700 receiver control unit; or by the RA3701 and RA3702 receivers, which have built-in controller facilities. All front panel operating functions except power on/off switching can be controlled remotely.

Single function buttons control the most commonly used operations and four keys control the receivers' many special facilities by means of a menu system.

Comprehensive built-in test equipment (BITE), locates faults to module level and may be controlled remotely as well as locally from the front panel.

The RA3701 is a registered design in the UK (1033864) and the Federal Republic of Germany (URA1416/86).

The frequency synthesizer is patented in the UK (2026268) and the US (4204174).
Frequency range
15kHz to 30MHz in 1Hz or 10Hz steps.

Tuning
By numeric keypad or single spinwheel turning knob with selectable turn rate.

Modes of operation
CW
MCW
AM
FM
USB/LSB
R2A, R2A, R2A, R3E, H3E, R3E
Options:
ISB
BS, R8E, B8E (RA3701)
FSK
F16
BFO
Tunable +/- 9.99kHz in 10Hz steps using the main tuning knob or by keypad entry.

Channel Store
100 frequencies in non-volatile EEROM memory with associated mode, bandwidth, AGC and BFO settings. Bulk erasure of the memory is possible from the front panel or remotely.

Scan modes
(a) Channel scan between designated channels with selected dwell time on each channel (0.1s to 99.9s).
(b) Frequency sweep between any two frequencies with selected step size (from 0.1Hz to 999.9kHz) and sweep rate (from 1Hz/s to 999.9kHz/s).

In either mode scanning may be halted on detection of a signal above a threshold set at the front panel with the IF gain control.

Frequency stability
One of the following optional frequency standards may be fitted :

(a) TCXO
Accuracy ±1.5 in 10^-7
(b) 9442 ovened oscillator
Temperature stability ±3 in 10^-9 per °C
Ageing ±3 in 10^-8 per day after 3 months continuous operation.
(c) 9442 ovened oscillator
Temperature stability ±6 in 10^-10 per °C
Ageing ±5 in 10^-10 per day after 3 months continuous operation.

*Full details in Racal Duna Publications 829.2 and 829.7.

Sensitivity
For the frequency range 0.5 - 30MHz:
SSB/CW: A signal of -113dBm (1μV emf) in a 2.7kHz bandwidth with an S+N/N of 16dB [19dB] with the RF amplifier on and 10dB [13dB] with the RF amplifier off.
AM: A signal of -103dBm (1μV emf) 70% modulated at 1kHz in a 6kHz bandwidth, gives an S+N/N of 16dB [19dB] with the RF amplifier on and 10dB [13dB] with the RF amplifier off.

Selectivity
The following bandwidths are standard:
USB
2.7kHz
LSB
2.7kHz
Symmetrical
300Hz
1kHz
2.7kHz
6kHz

Other filters are available as options. A total of 5 filters (giving 7 bandwidths) are fitted in the basic receiver. The optional IF Filter Module allows a further 7 filters to be added.

Reciprocal mixing
With a wanted signal of -113dBm (1μV emf) in a 2.7kHz bandwidth, an unwanted signal 20kHz removed must be greater than 95dB (102dB) above the wanted signal to give a noise level equal to the output produced by the wanted signal.
At 80kHz removed the difference in level must be greater than 100dB (115dB).

Out of band intermodulation products
RF amplifier on:
With two -133dBm (100mV emf) signals separated and removed from the wanted signal by 25kHz, the third order intermodulation products will be not less than 70dB [75dB] below either of the interfering signals. Third order intercept point not less than +32dB (+25dB).
RF amplifier off:
Third order intercept point typically not less than +33dB.

In band intermodulation products
Two in band signals of -13dBm (100mV emf) with 600Hz spacing produce third order intermodulation products not greater than -50dB [-55dB] at the IF output and line output.

Blocking
With a wanted signal of -53dBm (1mV emf), an unwanted signal more than 20kHz removed must be greater than +76dB (+130dB) to reduce the output by 3dB.

Cross modulation
With a wanted signal of -53dBm (1mV emf) in a 2.7kHz bandwidth, an unwanted signal 30% modulated, more than 20kHz removed must be greater than +76dB (+79dB) to produce an output 20dB below the output produced by the wanted signal.

External spurious responses
Spurious response rejection not less than 90dB (90dB).

Image and IF rejection
Image and IF rejection not less than 90dB (90dB).

Internal spurious responses
Typically fewer than 5 internal spurious responses give an output more than 3dB above the receiver noise level in a 2.7kHz bandwidth. None give an output more than 6dB above the receiver noise level in a 2.7kHz bandwidth.

Antenna input
(a) Input impedance 50ohms nominal.
(b) The receiver will withstand, without damage, input signals of up to 50V emf continuously.
(c) Re-radiation from antenna input 0-30cm. Not greater than -87dBm 10μV pd.
30-100MHz: Not greater than -67dBm (50μV pd).

AGC
An increase in input of 120dB above -107dBm (2μV emf) produces an output change of less than 2dB.
Short, medium and long decay times may be selected from the front panel. When the mode is changed the receiver automatically selects the last time constant used in that mode.

IF gain control
The IF gain control may be used to set:
(a) Receiver gain
(b) AGC threshold
(c) Squelch threshold
The control range is 120dB.

Note
Figures in [] are typical values.

AF outputs
(a) 200mW into the internal loudspeaker. Adjustable using the front panel volume control. May be switched off from the front panel.
(b) Rear panel connection for external loudspeaker. Level adjustable using the front panel volume control. Maximum output 1W into 8 ohms or 200mW into 15 ohms.
(c) Front panel headphone output. Adjustable using the front panel volume control. Maximum output 200mW into 15 ohms or 1mW into 600ohms. Plugging in headphones disables the internal loudspeaker.
(d) Rear panel line output -20dBm to +10dBm into 600ohms balanced. Level adjustable by means of a preset control mounted on top of the receiver.

IF outputs
(a) Narrow
Centre frequency 1.4kHz. Bandwidth determined by IF filter selected. Level -7dBm into 50 ohms. (Optional module provides 100kHz IF output).
(b) Wide
Centre frequency 1.4kHz. -3dB bandwidth not less than 12kHz.

Metering
The front panel bar-graph meter may be switched to meter either RF signal level or AF line level.

Remote Control
One of the following interfaces is fitted:
(a) Serial ASCII complying with CCITT rec. V.11 and V.28 standard RS232-A. Compatible with V28/RS232-C.
(b) IEEE 488 complying with ANSI/EIA Std 488-1978.

Power supply
103, 105, 220, 240V, 45-65Hz.

Operates to full specification over the range 15% to +10% relative to taps. With mains surge of ±5% for up to 1 second without damage.

Power consumption approximately 50W for the basic RA3701 receiver.

Environmental
The full Environmental specification is given in Racal Document E520 (Issue 5) available on request. The equipment is suitable for operation in fixed or transportable installations.

Operating temperature -10°C to +55°C.
Storage temperature -40°C to +10°C.
Relative humidity 95% at 40°C.

Dimensions
Height 133mm (5.25 in)
Width 483mm (19 in)
Depth 456mm (17.7 in) behind front panel.

Weight
Approximately 14kg (31 lb) for the basic RA3701 receiver.
Approximately 20kg (44 lb) for the RA3702 receiver.

Optional modules
The RA3701 may be fitted with up to 5 plug-in additional modules. One plug-in optional module may be fitted to the RA3702.

Please consult Racal for details of optional modules.