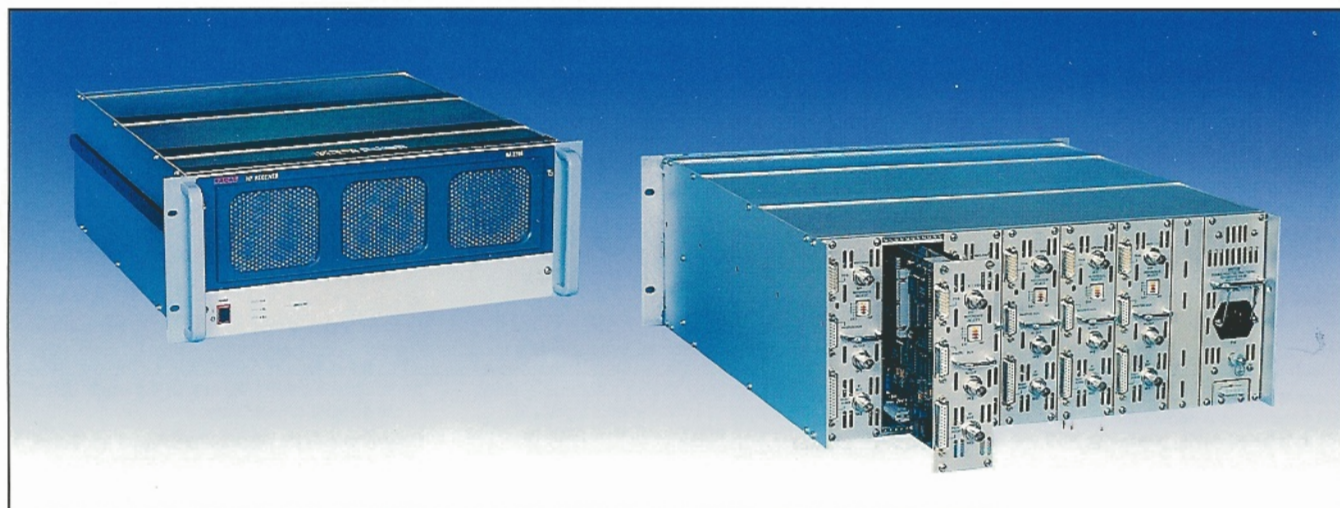


RA3796

MULTIPLE DIGITAL HF RECEIVER UNIT



KEY FEATURES

- Six full performance receivers in single 4U 19" rack unit
- Frequency range 10kHz to 30MHz
- High performance RF circuits
- Digital Signal Processing
- Full remote control of all RA3790 series features
- Automatic scanning of channels and multiple frequency ranges
- User programmable digital IF filters providing up to 100 bandwidths
- Tunable IF notch filter plus passband tuning
- Serial RS423 or Ethernet Remote Control
- Wide range of options
- Modular construction
- Comprehensive Built In Test Equipment (BITE)

DESCRIPTION

The RA3796 is a member of the RA3790 series of digital HF receivers. The RA3796 provides six independent, high performance HF receivers in a single 4U 19" rack unit with integral power supply and cooling facilities. In 19" rack installations, the RA3796 provides three times the receiver density of the RA3792/4 dual receivers. The RA3796 is the ideal choice for multiple receiver installations for either remote operator or computer control.

Each receiver covers the frequency range 10kHz to 30MHz with functions such as IF filtering, AGC and demodulation being implemented using digital signal processing techniques. The receivers provide the high level of RF performance required when operating in the crowded HF spectrum, and particular attention has been given to sensitivity, intermodulation, reciprocal mixing and spurious responses.

A serial ASCII remote control interface is provided as standard to allow a multi-addressing capacity of up to 100 receivers by any one receiver. Control of the receivers may be carried out using either the MA3790 control unit, or any RA3791 or RA3792 receiver, all of which have identical front panels and controller facilities.

Alternatively they may be controlled from a suitable computer or workstation. All the standard RA3790 series receiver functions may be remotely controlled. The remote control protocol is compatible with that used in the well established RA3700 series, thereby allowing RA3790 and RA3700 series receivers to be used together in a system.

As an option the RA3796 may be fitted with an Ethernet Local Area Network interface complying with IEEE 802.3 and operating the TCP/IP network protocol. This interface is specified and is readily available for most computers. It permits cheap, simple cabling and has a high bandwidth (10Mbps) with a multiple access topology.

In addition to the remote control interfaces, the RA3796, in common with all the RA3790 series receivers, has an independent local control bus. This serial interface allows any RA3790 series unit with an operator's front panel to monitor or control each receiver in the RA3796 attached to the local bus.

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MULTIPLE DIGITAL HF RECEIVER UNIT

TECHNICAL SPECIFICATION

Frequency range

10kHz to 30MHz in 1Hz steps

Modes of operation

CW	A1A, A1B
MCW	A2A, A2B
AM	A3E
FM	F3E
FSK	F1B
USB/LSB	H2A, H2B, H3E J2A, J2B, J3E R2A, R2B, R3E

Option:

ISB B7B, B8E, B9W

BFO

Tunable ± 8 kHz in 10Hz steps

Channel store

100 frequencies in non-volatile EEPROM memory with associated mode, bandwidth, AGC and BFO settings. Bulk erasure of memory is possible by remote command

Scan modes

- Channel scan between designated channels with selected dwell time on each channel (0.1s to 9.99s)
- Frequency sweep over a number of ranges defined by the user. Skip ranges or frequencies may be programmed. Step size 100Hz to 999.9kHz. Sweep rate 10Hz/s to 999.99kHz/s

In either mode scanning may be halted on detection of a signal above a programmable threshold

Frequency stability

One of the following optional frequency standards may be fitted:-

- TCXO**
 ± 7 parts in 10^7 over the range -10°C to $+55^\circ\text{C}$
- Ovened oscillator**
 ± 1 part in 10^7 over the range -10°C to $+55^\circ\text{C}$. Ageing ± 2 in 10^8 per day after 24 hours continuous operation
- High stability ovened oscillator**
 ± 1.5 parts in 10^8 over the range -10°C to $+55^\circ\text{C}$. Ageing ± 5 in 10^{10} per day after 30 days continuous operation

Sensitivity

For the frequency range 0.5 – 30MHz

SSB/CW: A signal of -113dBm ($1\mu\text{V}$ emf) in a 2.7kHz bandwidth gives an S+N/N of: 16dB [19dB], RF amplifier on, 10dB [13dB], RF amplifier off

AM: A signal of -103dBm ($3\mu\text{V}$ emf) 70% modulated at 1kHz, in a 6kHz bandwidth, gives an S+N/N of: 16dB [19dB], RF amplifier on, 10dB [13dB], RF amplifier off

Selectivity

The receiver has digital filters with the following bandwidths:

USB	2.7kHz (300Hz to 3kHz)
LSB	2.7kHz (300Hz to 3kHz)
Symmetrical	300Hz 1kHz 3kHz 6kHz 12kHz

The user may programme the receiver via the remote interface to configure additional filters by entering the bandwidths required. Up to 100 different filters may be configured. Once configured, the filters are selected, by filter number, via the remote interface. All filters have very low ripple and differential group delay and a stopband exceeding 100dB

The software allows the bandwidth and position of a configured filter to be finely adjusted. It also provides a variable width, tunable IF notch filter

Reciprocal mixing

With a wanted signal of -113dBm ($1\mu\text{V}$ emf) in a 2.7kHz bandwidth, an unwanted signal 20kHz removed must be greater than 96dB [102dB] above the wanted signal in order 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 106dB [115dB]

Out of band intermodulation products

With two -13dBm (100mV emf) signals separated and removed from the wanted signal by 20kHz, the third order intermodulation products, relative to either of the interfering signals, will be not less than: 86dB [90dB], RF amplifier off, 70dB [76dB], RF amplifier on

Third order intercept point is not less than: $+30\text{dBm}$ [$+32\text{dBm}$], RF amplifier off, $+22\text{dBm}$ [$+25\text{dBm}$], RF amplifier on

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 and line outputs

Blocking

With a wanted signal of -53dBm (1mV emf), an unwanted signal more than 20kHz removed must be greater than $+7\text{dBm}$ [$+13\text{dBm}$] 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 $+1\text{dBm}$ [$+7\text{dBm}$] to produce an output 20dBm below the output produced by the wanted signal

External spurious responses

Spurious response rejection not less than 80dB [90dB] at frequency offsets greater than 20kHz

Image and IF rejection

Image and IF rejection not less than 90dB [100dB]

Antenna input

- Input impedance 50 ohms nominal
- The receiver will withstand, without damage, input signals of up to 50V emf continuously
- Re-radiation from antenna input:
0-30MHz: Not greater than -87dBm ($10\mu\text{V}$ pd)
30-100MHz: Not greater than -67dBm [-87dBm]

AGC

An increase in input of 120dB above -107dBm ($2\mu\text{V}$ 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. Decay time constants are programmable by the user

IF gain control

The following levels may be set via the remote interface:

- Receiver gain
 - AGC threshold
 - Squelch threshold
- The control range is 120dB

AF outputs

Two rear panel line outputs providing -20dB to $+10\text{dBm}$ into 600 ohms balanced. Levels adjustable via remote control

IF output

Centre frequency may be selected by the user as follows:

- 1.4MHz
- Programmable by the user in the range 10kHz to 455kHz in 5kHz steps

Bandwidth may be selected by the user as follows:

- Narrowband: Bandwidth equal to selected IF bandwidth. Level nominally -7dBm
- Wideband: Bandwidth 12kHz. Level nominally 50dB above antenna input or -7dBm , whichever is the smaller

Digital signal output (option)

The serial digital interface can be programmed to provide:

- Digital IF output: Bandwidth either equal to selected IF bandwidth or fixed at 12kHz
- Digital audio output

Metering

The following levels are available over the remote interface:

- RF signal level
- AF line level
- Tune indication for FSK

Remote control

- Six independent Serial ASCII interfaces complying with CCITT recommendation V10 and EIA standard RS423-A. Compatible with V28/RS232-C. Maximum data rate 9600 baud
- (Option) Single Ethernet interface complying with IEEE 802.3 and operating TCP/IP protocol, controlling all six receivers

Power supply

100V to 120V and 200V to 240V AC, 47 to 63 Hz. Power consumption 225W

Environmental

Operating temperature -10°C to $+55^\circ\text{C}$
Storage temperature -40°C to $+70^\circ\text{C}$
Relative humidity 95% at 40°C

Dimensions

Height: 177mm (7 inches)
Width: 483mm (19 inches)
Depth: 500mm (19.7 inches)
behind the front panel

Weight: 18kg

Note: Figures in [] are typical values.

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Communicating through technology

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