

Five new VLF-HF receivers with advanced modular technology.



R-3000

SERIES HF RECEIVERS



R-2307/U is the nomenclature version of the R-3030. The R-2307/U is supplied in one configuration only as defined on the specification pages of this brochure.

14,995



R-3020 allows the user to control all functions exclusively through the use of a computer interface bus rather than front panel control. This receiver has many applications in surveillance installations where one operator must control multiple receivers simultaneously. There are two complete receivers in each R-3020 chassis.

13,000



R-3030 offers two separate receivers in one chassis. Each receiver can be independently controlled by either the front panel keypad or a user selected computer interface bus. User defined options include various IF bandwidths, IF outputs and computer interfaces (IEEE-488, RS-232, RS-422 and MIL-STD-188).

17,995



R-3050 was developed for the user who wants the operating features of an R-3030 or R-2307/U but needs the capability of ISB reception from a single receiver. As with the R-3030, many options can be user defined. Standard configuration includes a rear panel antenna select connector controlled through the front panel keypad. The R-3050 has a built-in front panel speaker.

8,250



R-3080 is a half rack version of the R-3030 developed for installations where space is a critical factor. The operation and specifications are similar to that of an R-3030 with many options that are user defined. As this receiver takes less than half the area of a full 19-inch wide panel, space is available for other analysis equipment.

7,950

Full-Featured Receivers

With the R-3000 series, many advanced features are standard; there is no need to add costly options. This unique package of standard features includes:

- 100 channel memory
- Microprocessor controlled front panel with keypad and knob control for all models except R-3020.
- Versatile sweep and scan modes
- Independently selectable modes and bandwidths
- Multi-mode metering of signal strength, audio level or frequency shift
- Individually shielded plug-in modules with ¼ turn fasteners
- Minimal power input (approximately 35 watts per receiver)
- Low weight

100-Channel Memory

The R-3000 series' 100 memory channels are easily programmed from the keypad. In addition to frequency data, each channel can be programmed to store such selected functions as Mode, Bandwidth, BFO, AGC and Threshold Level.

Frequencies not stored in memory can be entered by selecting the desired frequency and mode using the keypad. This data can then be stored in any selected memory channel by pressing the Store ("STO") function.

Frequency Range

The R-3000 series receives signals in a frequency range from 5 kHz to 30 MHz. The synthesizer is a three loop design. Typical lock time is 10 ms or less.

Modes and Outputs

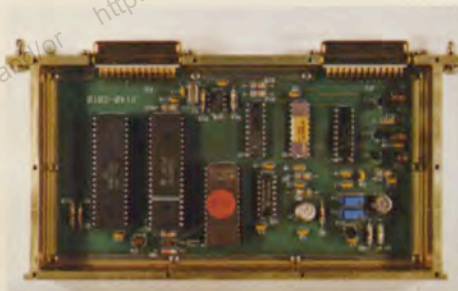
Selectable modes provided are LSB, USB, AM, CW and FM. The audio output is available from a standard phone jack and/or a 600 ohm balanced line. In addition, the FM detected signal is always present on a 93 ohm unbalanced line for input to ancillary analysis equipment.

Bandwidths

Each receiver has standard bandwidths as defined in the specifications. Other bandwidths are available on special order for all models except the R-2307/U.

Automatic Gain Control (AGC)

AGC is RF derived with average detection in AM mode and peak detection in all other modes. The design features fast attack, selectable hold and fast release.



Internal view of CPU module.

Easy-To-Read Front Panel Displays

Bright, clear LED displays help simplify the R-3000 series' operation. The use of multifunctional displays wherever possible creates an uncluttered, easy-to-read front panel. Thus, even inexperienced operators are quick to take advantage of the R-3000 series' advanced features.

- 1 Channel Display:** Two alphanumeric characters - 00 to 99 for store or recall of specific channel data, "Fr" for frequency entry, "bF" for BFO offset entry, "IF" for IF shift entry, "GA" for gain entry, "L" for threshold level entry, "d" for dwell time entry
- 2 Main Display:** 7 digits plus decimal and minus sign (-) for the following functions:
 - **Frequency:** 7 digits plus decimal in MHz; normal display
 - **BFO Offset:** 9.99 to -9.99 in kHz; displayed during BFO adjustment only
 - **IF Shift:** 9.99 to -9.99 in kHz; displayed during IF shift adjustment only
 - **RF Gain:** 0 to -127 dB; displayed

during manual RF gain adjustment only

- **Threshold:** -127 dBm to 0 dBm; displayed during threshold level adjustment only
 - **Dwell Time:** 0 to 9 seconds; displayed during dwell time adjustment only
 - **Step:** 0.1 to 9.9 kHz; displayed during step adjustment only
- 3 Mode Display:** Single character: L (LSB), U (USB), A (AM), C (CW) or F (FM)
 - 4 Bandwidth:** 2 digits plus decimal indicating bandwidth in kHz
 - 5 AGC Display:** 2 digits plus decimal indicating hold time in seconds
 - 6 Meter:** 20 segment light bar meter showing:
 - **Signal Strength:** -120 to 0 dBm
 - **Audio Level:** -30 to +4 dBm (reference 600 ohm)
 - **Frequency Shift:** -50% to +50% of bandwidth
 - 7 Annunciators:**
 - **AUDIO** - meter reads audio level
 - **FREQ** - meter reads relative frequency shift
 - **REM** - control of unit is via remote control bus
 - **FAULT** - internal fault detected
 - **KPAD** - keypad entry is active
 - **SKIP** - channel is skipped during scan
- Front Panel Controls:**
- 8 Power On/Off Switch:** Toggle type circuit breaker
 - 9 Local/Remote Switch:** Toggle switch for local or remote control functions
 - 10 Main Adjustment Knob:** Optical shaft encoder for:
 - **Frequency:** 10 Hz, 100 Hz or 1 kHz per step

- **BFO Offset/IF Shift:** 10 Hz per step from +9.99 to -9.99 kHz
- **RF Gain/Threshold Level:** 1 dB per step with 127 dB range
- **Scan/Sweep Rate:** Variable 20 to 1000 ms per step in 20 ms increments

11 Phones Jack: Independently driven tip and ring contacts

12 Volume: Adjusts audio level to phones jack tip and ring contacts

Front Panel Keypad

Human engineered, splashproof snap action keypad reduces errors by providing operator tactile feedback on each entry.

13 Multiple Function Control Keys (12):

These keys combine with numeric keys or operate in sequence to perform a variety of functions.

Keys that open the numeric function and allow adjustment via control knob:

- **FREQ:** display indicates frequency of tuned RF input (7 digits plus decimal in MHz)
- **BFO:** display indicates offset frequency of BFO (3 digits, sign and decimal in kHz)
- **IF:** display indicates shift frequency of IF (3 digits, sign and decimal in kHz)
- **GAIN:** display indicates RF gain in dB (3 digits)



BFO offset display. Example shows BFO offset of -1.4 kHz.



IF shift frequency display. Example shows -2.25 kHz IF shift.



RF gain display. Example shows 127 dB gain reduction.



Dwell time display. Example shows dwell time of 9 seconds.



Function Control Keys (12):

Combine with numeric keys in sequence to perform various functions.

Use the numeric function selector via control knob.

Display indicates frequency input (7 digits plus Hz)

Display indicates offset frequency (3 digits, sign and Hz)

Display indicates shift frequency, sign and decimal in Hz

Display indicates RF gain in dB



BFO offset display. Example shows BFO offset of -1.4 kHz.



IF shift frequency display. Example shows -2.25 kHz IF shift.



RF gain display. Example shows 127 dB gain reduction.



Dwell time display. Example shows dwell time of 9 seconds.

- **LEVEL:** display indicates threshold level in dBm (3 digits)

- **DWEL:** display indicates dwell time in seconds (1 digit)

Sequential Function Keys

- **MODE:** sequences mode selection between LSB, USB, AM, FM and CW. Display uses single letter (L, U, A, F or C) to indicate mode

- **BW:** sequences IF bandwidth between 0.5, 1.0, 2.0, 4.0 and 8.0 kHz

- **AGC:** selects AGC hold time in seconds. Display indicates hold time

- **STEP:** selects step size for sweep operation

- **RATE:** sequence between 10 Hz, 100 Hz step on main tuning indicated by intensified digit in main display

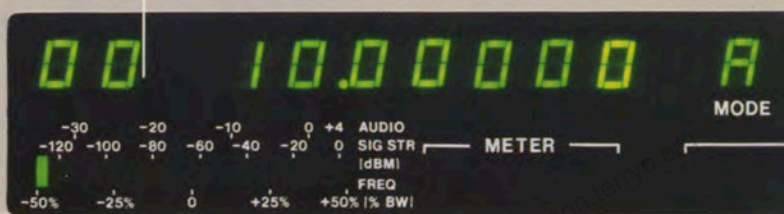
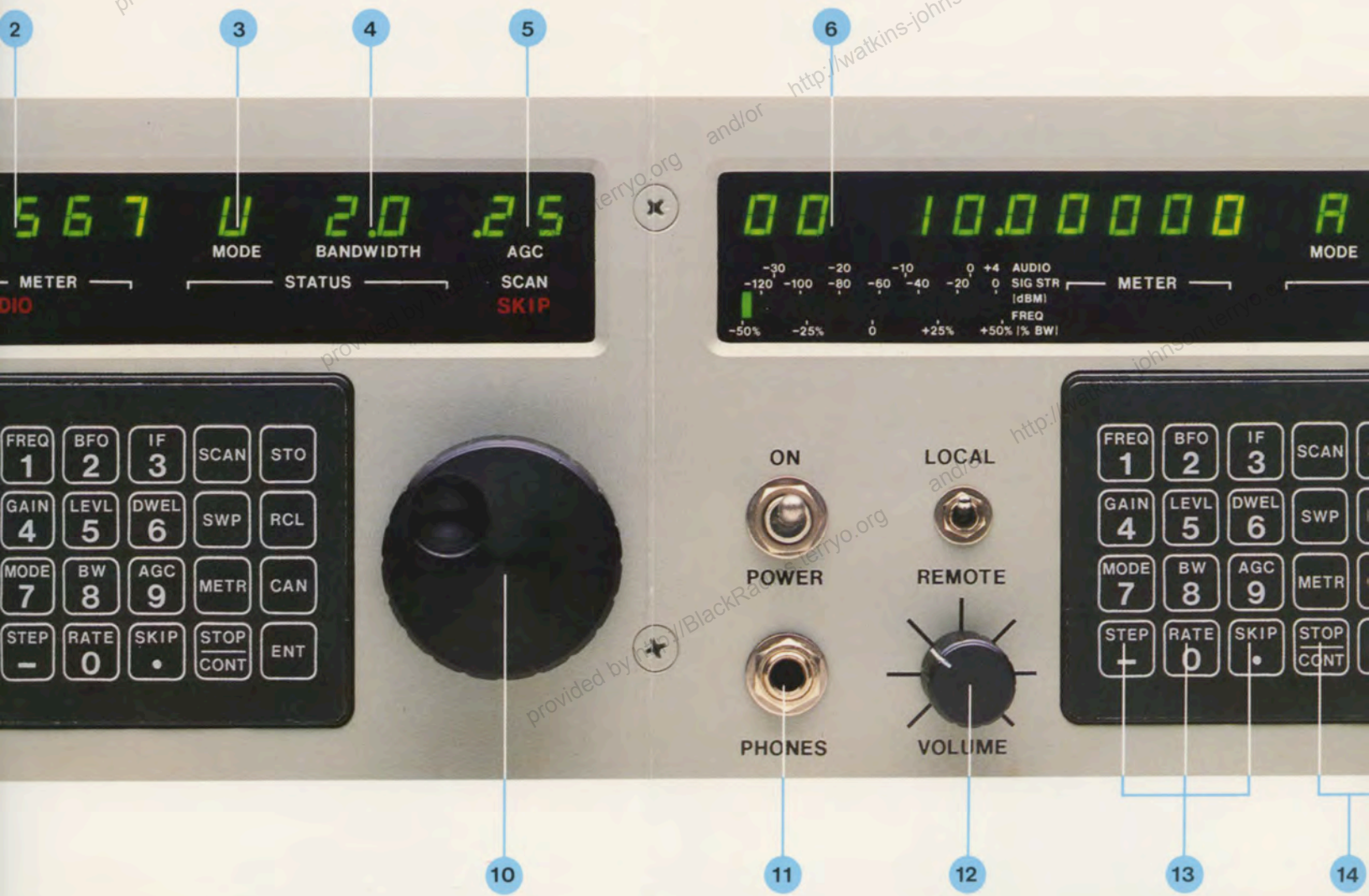
- **SKIP:** used to omit frequencies during scan operations

14 Single Function Keys

- **SCAN:** starts scan of channels as programmed

- **STO:** saves current all status in designated memory

- **SWP:** starts sweep of bands determined by memory channels



- **LEVEL:** display indicates threshold level in dBm (3 digits)
- **DWEL:** display indicates dwell time in seconds (1 digit)

Sequential Function Keys

- **MODE:** sequences mode selection between LSB, USB, AM, FM and CW. Display uses single letter (L, U, A, F or C) to indicate mode
- **BW:** sequences IF bandwidth between 0.5, 1.0, 2.0, 4.0 and 8.0 kHz
- **AGC:** selects AGC hold time in seconds. Display indicates hold time
- **STEP:** selects step size for sweep operation

- **RATE:** sequence tuning rate between 10 Hz, 100 Hz and 1 kHz per step on main tuning knob. Rate is indicated by intensifying significant digit in main display

- **SKIP:** used to omit undesired frequencies during scan or sweep operations

14 Single Function Keys (8):

- **SCAN:** starts scan of memory channels as programmed
- **STO:** saves current frequency and all status in designated channel memory
- **SWP:** starts sweep of frequency bands determined by parameters in memory channels

- **RCL:** displays designated memory channel data

- **METR:** sequences the readout between signal strength, audio level and frequency shift indication

- **CAN:** cancels current keypad operations and returns unit to previous state

- **STOP/CONT:** halts or resumes SCAN or SWEEP on current channel or frequency

- **ENT:** causes currently displayed frequency and other displayed status to be programmed into receiver.



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Modular Construction for Reliability and Ease of Maintenance

The independently shielded modules protect circuits from electromagnetic interference and help ensure the highest possible signal quality. This rugged, modular construction also makes the R-3000 series extremely reliable – in excess of 6,000 hours mean time between failure.

When a problem does occur, built-in fault detection circuitry helps to pinpoint the problem and facilitate

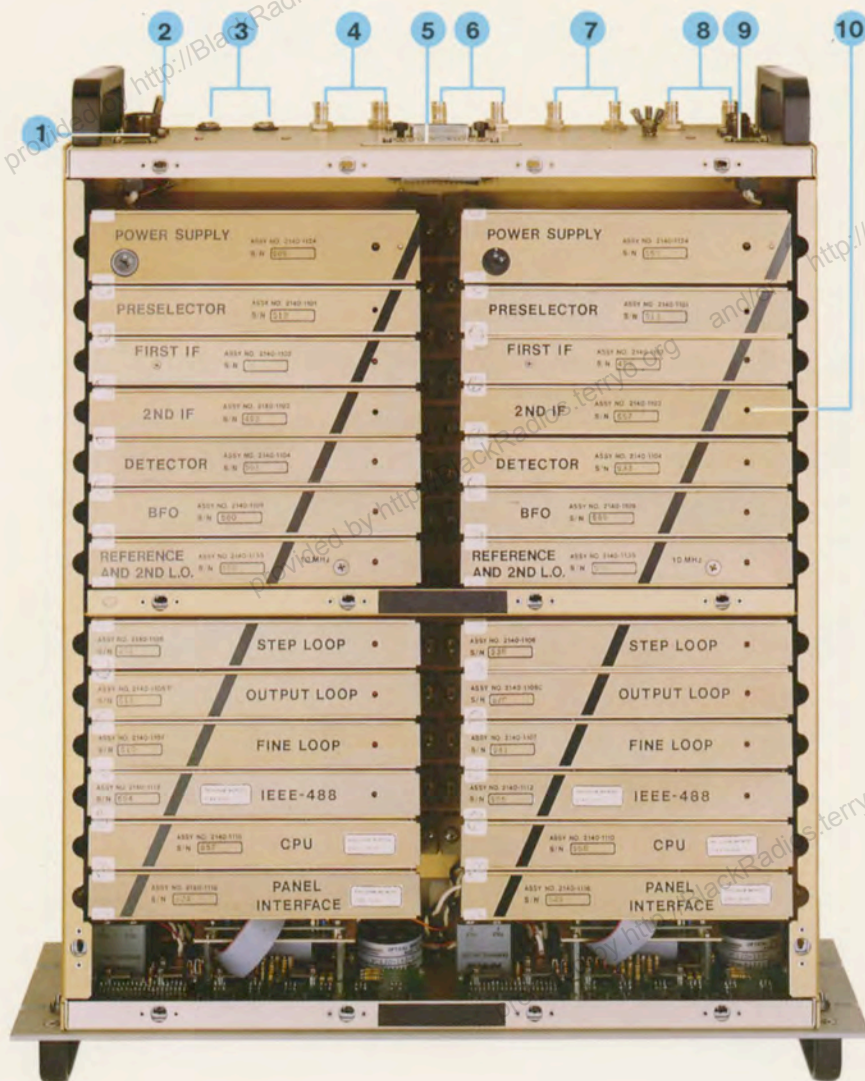
repair. The "FAULT" display on the front panel advises the operator of a malfunction. LED fault indicators on modules isolate major failures, enabling maintenance personnel to quickly locate the failed module.

Each module is labeled and marked with a diagonal coding stripe to prevent improper installation. No special tools are required to remove and replace the plug-in modules, which are secured with 1/4 turn fasteners. Repairs are completed in a matter of minutes without alignment or adjustment.

While the overall mean time to repair for R-3000 series receivers is less than 30 minutes, most faults can be diagnosed and corrected in less than half that time.



The R-3030 is quicker and easier to maintain than any receiver in its class.



Cubic's R-3000 Series – The Perfect Choice

Simplicity of operation and maintenance make the R-3000 series immediately field ready.

Compact size, light weight, low power consumption, rugged construction and a full range of standard features make it the obvious operational choice.

Commonality of modules between receivers in the R-3000 series helps to reduce inventory requirements, training time and maintenance costs.

In short, the R-3000 series HF receivers by Cubic Communications offers affordable state-of-the-art capabilities – today.

- 1 Audio and FM Video Outputs
- 2 Reference Internal and External Switch
- 3 Phone Outputs
- 4 Reference In and Out
- 5 Remote Control Bus Connection and Address Switches
- 6 2nd IF Monitor Outputs
- 7 1st IF Monitor Outputs
- 8 Antenna Inputs
- 9 Power Connector
- 10 LED Fault Indicators

Standard Features

	R-2307	R-3020	R-3030	R-3050	R-3080
Frequency Range: 5 kHz - 30 MHz	X	X	X	X	X
7 Digit LED Display, Resolution 10 Hz	X		X	X	X
Tuning (Keypad or Tuning Knob)	X		X	X	X
Tuning (Remote)	X	X	X	X	X
Tuning Step Rates of 10, 100, 1000 Hz	X		X	X	X
BFO and IF Shift Tuning: +/- 9.99 kHz	X	X	X	X	X
Sweep and Scan Capability	X	X	X	X	X
Memory: 100 Channels Non-Volatile RAM	X		X	X	X
0.5, 1, 2, 4, 8 kHz Bandwidths	X	X	X		X
0.3, 1.0, 2.0, 2.7, 6.0 kHz Bandwidths				X	
LSB, USB, AM, CW, FM Modes	X	X	X	X	X
ISB Mode				X	
10 MHz Reference Module	X	X	X		X
1 MHz Reference Module				X	
Automatic Preselector (10 Frequency Bands)	X	X	X	X	X
Bargraph (Audio, Signal Strength, Frequency)	X		X	X	X
Bus Module: IEEE-488	X	X	X	X	X
Antenna Connection	TNC	BNC	BNC	N	BNC
Weight (Pounds)	47	40	47	34	25
Power Requirements per Receiver (Watts)	35	35	35	35	35
Input Voltage: 95-135/190-270 VAC, 47-420 Hz	X	X	X	X	X
Environmental Design (MIL-STD-810D, MIL-STD-810C, MIL-STD-167-1, MIL-S-901C)	X	X	X	X	X

Optional Features

	R-2307	R-3020	R-3030	R-3050	R-3080
Bus Module Selectable by Customer at Time of Order (no cost option): RS-232, RS-422, RS-485, MIL-STD-188-114 or Special Parallel Bus	SEE NOTE	X	X	X	X
1 MHz Reference Module		X	X		X
10 MHz Reference Module				X	
Rear Panel Connectors: N, TNC, BNC		X	X	X	X
Filter Bandwidths (up to 6) Selectable		X	X	X	X
Output IF (other than 455 kHz)		X	X	X	X

NOTE: The R-2307/U can be configured with IEEE-488 or the Special Parallel bus modules. Due to configuration control, no other options are available on this receiver.

R-3000 Series Technical Specifications

FREQUENCY:

Range: 5 kHz - 30 MHz

Resolution: 10 Hz

Stability (internal standard): 1 ppm over temperature range; .01 ppm per week aging

MODES:

LSB, USB, AM, CW, FM

RF SECTION:

Input: 50 ohms

VSWR: less than 3:1

Sensitivity: for 10 dB SINAD (above 1.6 MHz)

AM (8 kHz BW): -110 dBm

90% modulation

CW (500 Hz BW): -124 dBm

SSB (2 kHz BW): -118 dBm

Noise Figure: 13 dB (maximum above 1.6 MHz)

Protection: up to 100 volts RMS from 50 ohm source without damage; automatic reset

Preselection: automatically selected filter, 10 frequency bands, 8 one-half octave bands between 1.6-30 MHz, 2 bands from 5 kHz to 1.6 MHz

Gain Control:

Type: automatic and manual

AGC Range: 120 dB minimum

AGC Threshold: 0.5 μ V

Audio reference level at 50 μ V

Fast attack, selectable hold, fast release

Hold time (locally or remote selectable):

For all models except R-3050

Zero: 15 ms nominal

Short: 50 ms nominal

Medium: 250 ms nominal

Long: 3 seconds nominal

For R-3050

Zero: 20 ms nominal

Short: 250 ms nominal

Medium: 1 second nominal

Long: 3 seconds nominal

Off: manual gain control only

Release Time: 50 ms

Manual Gain Control: 0 to -127 dB gain reduction

IF SECTION:

First IF: 40.455 MHz

Second IF: 455 kHz

First IF Bandwidth:*

10 kHz at -6 dB

20 kHz at -60 dB

*Other first IF bandwidth filters are available upon request.

INTERFERENCE IMMUNITY:

IF Rejection: 100 dB minimum

Image Rejection: 90 dB minimum

Cross Modulation: unmodulated wanted signal of 100 μ V together with a modulated (30% at 1 kHz) unwanted signal of 250mV spaced 100 kHz apart will produce less than 10% cross modulation of wanted signal

Blocking: attenuation of wanted RF signal at 50 μ V and caused by an unmodulated signal of 0.5V spaced 100 kHz away will be less than 3 dB

Oscillator Re-Radiation: 1 μ V maximum from antenna connector into 50 ohms

Spurious Responses: -123 dBm equivalent or less for -50 dBm input signals

Generated Spurious: -123 dBm input equivalent or less, 2 to 30 MHz

Intermodulation Distortion: third order intermodulation products resulting from two input signals at -20 dBm each are less than -100 dBm typical

INPUT/OUTPUT:

Outputs:

First IF (Wideband): 40.455 MHz with 1 MHz minimum bandwidth, 50 ohms at approximately 0 dB gain from input

Second IF: 455 kHz at selected bandwidth and nominal 0 dBm level, 0 \pm 3 dB over range

Synthesizer Reference: 0 dBm, 50 ohm output for receiver daisy chain operation (see standard and optional features on previous page)

Audio:

LSB, USB, AM, CW: 0 \pm 3 dBm over dynamic range

Frequency: 0.5 V/kHz AC coupled (4 V p-p maximum) 600 ohms balanced pair contacts on AUDIO connector

Headphones or Speaker: 0 to 12 V p-p 15 ohm source impedance

FM Video (always present): 1 V per kHz (positive sense, DC coupled) 93 ohm single ended coax contacts on AUDIO connector

Signal Strength: digital format on bus (8 bit) on bus connector, analog format on AUDIO connector

Inputs:

Synthesizer Reference: 0 dBm, 50 ohms (see standard and optional features on previous page)

GENERAL DATA:

Power Requirements: 35 watts maximum per receiver, 95-135 VAC or 190-270 VAC (internally selectable), 47-420 Hz

PHYSICAL:

Size:

R-2307/R-3030/R-3020

19"W \times 5.22"H \times 21.2"D

48.26 cm \times 13.26 cm \times 53.85 cm

R-3050

19"W \times 5.22"H \times 19.16"D

48.26 cm \times 13.26 cm \times 48.67 cm

R-3080

8.5"W \times 5.22"H \times 21.2"D

21.59 cm \times 13.26 cm \times 53.85 cm

ENVIRONMENTAL DATA:

Temperature Range: -20 to +60°C

Relative Humidity: per MIL-STD-810D (method 507.2)

Vibration: Sinusoidal: per MIL-STD-167-1
Random: per MIL-STD-810D (method 514.3)

Shock: per MIL-STD-810C for all units except R-2307/U where the rating is per MIL-S-901C

EMI/EMC: per MIL-STD-461B, class A1A.

Specifications subject to change without notice



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