

R-3030

DUAL HF RECEIVER

Cubic Communications' R-3030 dual HF receiver offers a unique combination of compact size, light weight and a wide range of advanced features – all at a price unmatched by any comparable receiver. Front panel micro-processor control and complete

remote control capability combine to achieve state-of-the-art performance. In addition, the R-3030 incorporates built-in fault detection and modular construction for the fastest and easiest field level maintenance of any receiver in its class.

The R-3030 chassis contains two completely independent receivers. With two receivers in the same rack mount normally required for a single receiver, the R-3030 is the space-saving, cost-effective answer to virtually any general purpose or surveillance requirement.

Now designated
R-2307/U
 by the U.S. Navy



R-3030

DUAL HF RECEIVER

Full-Featured Receiver

With the R-3030, 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
- Versatile sweep and scan modes
- Independently selectable modes and bandwidths
- Multi-mode metering of: received signal strength, audio level or frequency shift indicator
- Compact 5¼" X 19" rack chassis
- Individually shielded plug-in modules with ¼ turn fasteners
- Minimal power input (approximately 35 watts per receiver)
- Low weight (both receivers, approximately 40 pounds total)

100-Channel Memory

The R-3030's 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 and bandwidth.

Frequencies not stored in memory can be entered by selecting the desired frequency and mode with the keypad. This data can then be stored in any selected memory channel by pressing a key.

Frequency Range

The R-3030 receives signals in a frequency range from 5 kHz to 30 MHz in 10 Hz steps. The synthesizer is a three loop design for fast lockup. Typical lock time is 5 ms or less.

Modes and Outputs

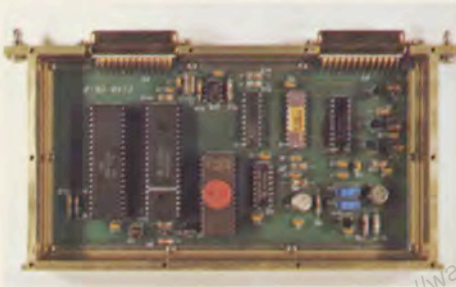
Selectable modes provided are LSB, USB, AM, CW and FM. The selected output is available from a standard phone jack and/or a 600 ohm balanced line output. In addition, the FM detected signal is always present on a 93 ohm unbalanced line for input to ancillary analysis equipment.

Bandwidths

Standard IF bandwidths are: 0.5, 1, 2, 4 and 8 kHz. Other bandwidths are available on special order.

Automatic Gain Control (AGC)

AGC is derived from an RF detector and is average (AM mode) or peak detected (all other modes). The design features fast attack, selectable hold and fast release. Attack time is less than 10 ms. Hold times are: zero, short (50 ms), medium (250 ms) and long (3 seconds). Release time is 50 ms nominal. Other time constants are available on special order.



Shielding enhances EMI/EMC performance, as in module shown above.

Easy-To-Read Front Panel Displays

Bright, clear LED displays help simplify the R-3030's 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-3030's 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:** Seven numeric digits plus decimal points and minus sign (-) for the following functions:
 - **Frequency:** 7 digits plus decimal in MHz; normal display
 - **BFO Offset:** Blanked or minus sign (-) plus 3 digits and decimal in kHz; displayed during BFO offset adjustment only

- **IF Shift:** Blanked or minus sign (-) plus 3 digits and decimal in kHz; displayed during IF shift adjustment only

- **RF Gain:** 3 digits; displayed during manual RF gain adjustment only

- **Threshold:** Minus sign (-) plus digits; displayed during threshold adjustment only

- **Dwell Time:** 1 digit; displayed during dwell time 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: 0.5, 1.0, 2.0, 4.0 or 8.0

5 AGC Display: 2 digits plus decimal indicating hold time in seconds: 0.0, .05, .25, 3.0 or blanked for manual gain control

6 Meter: 20 segment light bar meter showing:

- **Signal strength:** -20 to 0 dBm

- **Audio level:** -30 to +4 dB (standard 600 ohm)

- **Frequency Shift:** -50% to +50% of IF 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: 1.75 inch diameter knob on optical shaft encoder for:

- **Frequency** - 10 Hz, 100 Hz or 1 kHz per step

- **BFO Offset/IF Shift:** 10 Hz or 100 Hz per step from +9.99 to -9.99 kHz
- **RF Gain/Threshold:** 1 dB per step from 0 to -127 dB
- **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 at MHz)
- **BFO:** display indicates offset frequency of BFO (3 digits plus sign plus decimal at kHz)
- **IF:** display indicates shift frequency of IF (3 digits plus sign plus decimal at kHz)
- **GAIN:** display indicates RF gain in dB (3 digits)



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



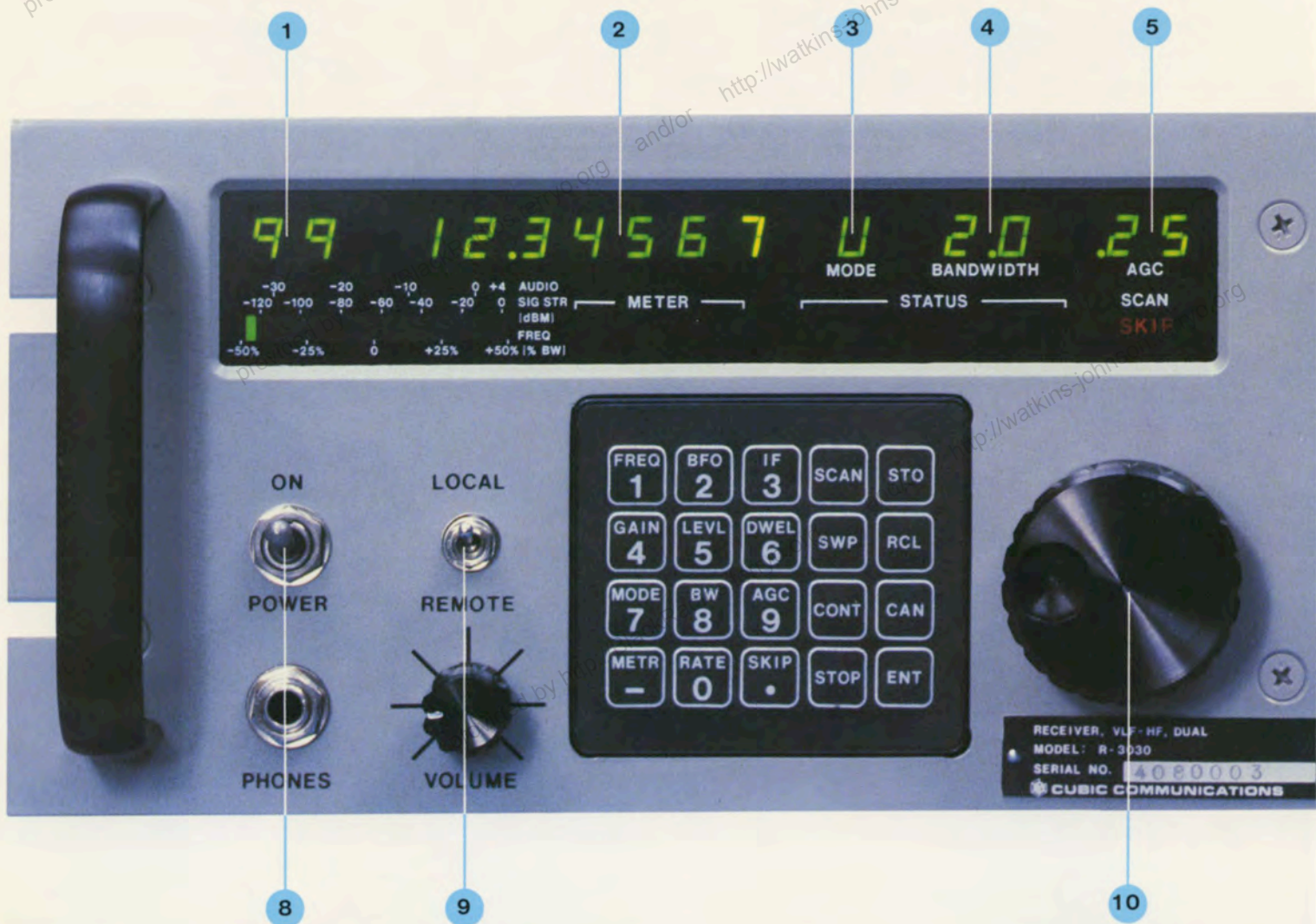
IF shift frequency display. Example shows 2.25 kHz IF shift.



RF gain display. Example shows 127 dB gain reduction.



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



Control Keys

...with numeric
...sequence to
...functions.
...numeric
...adjustment via
...indicates fre-
...RF input (7
...al at MHz)
...icates offset
... (3 digits plus
...at kHz)
...es shift fre-
...gits plus sign
...Hz)
...icates RF gain



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. Display indicates hold time

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

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

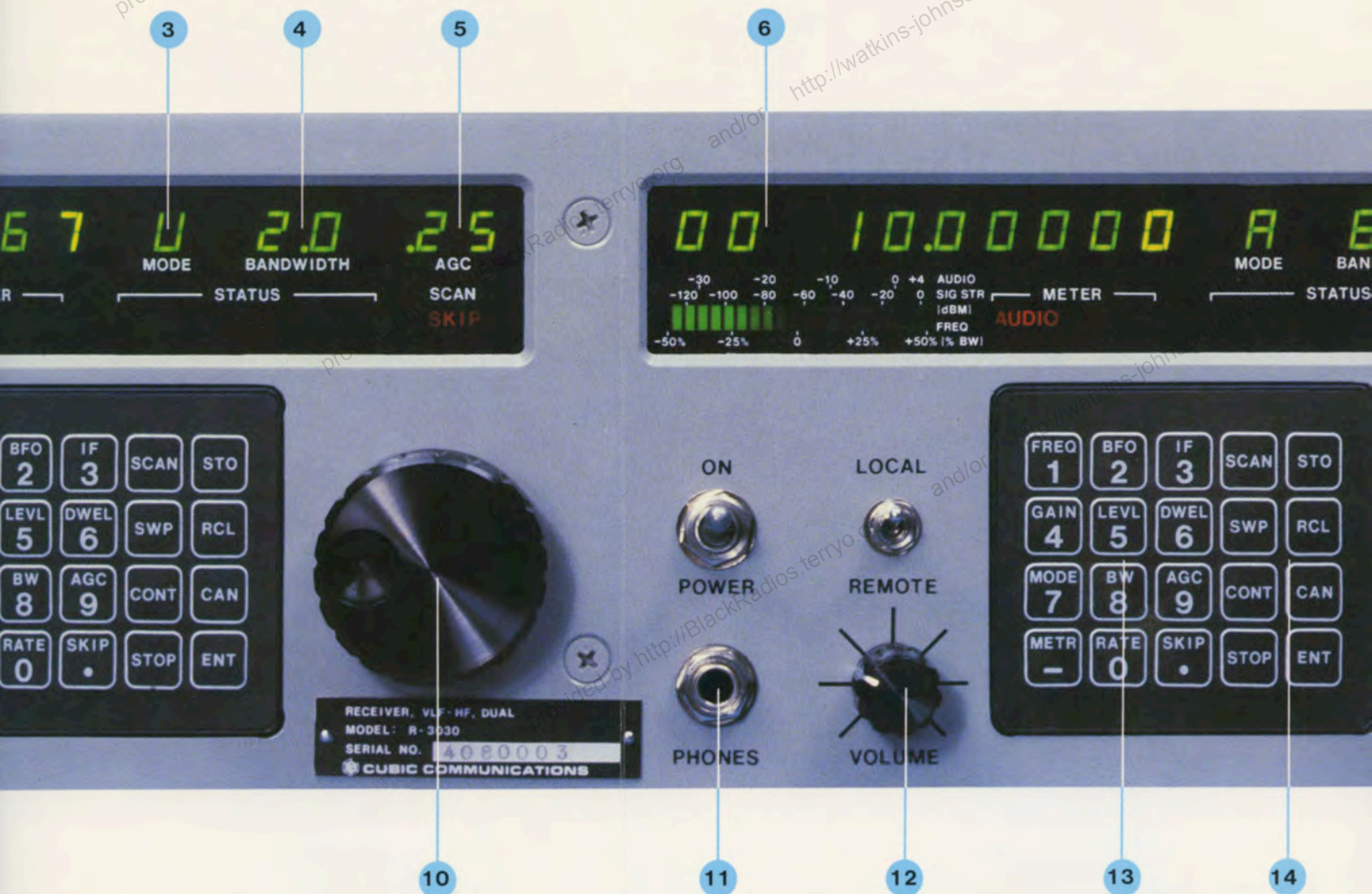
- **SKIP:** used to omit undesired frequencies during scan sweep operations

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



- **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. Display indicates hold time
- **METR:** sequences the readout between signal strength, audio level and frequency shift indication

- **RATE:** sequences tuning rate between 10 Hz, 100 Hz and 1 kHz per step on main tuning knob. Rate is indicated by intensifying significant digits 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
- **CONT:** resumes SCAN or SWEEP from current settings
- **CAN:** cancels current keypad operations and returns unit to previous state
- **STOP:** halts SCAN or SWEEP on current channel or frequency
- **ENT:** causes current displayed frequency and other displayed status to be programmed into receiver. Enables knob control of numerical functions



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-3030 extremely reliable – in excess of 5,000 hours mean time between failure.

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

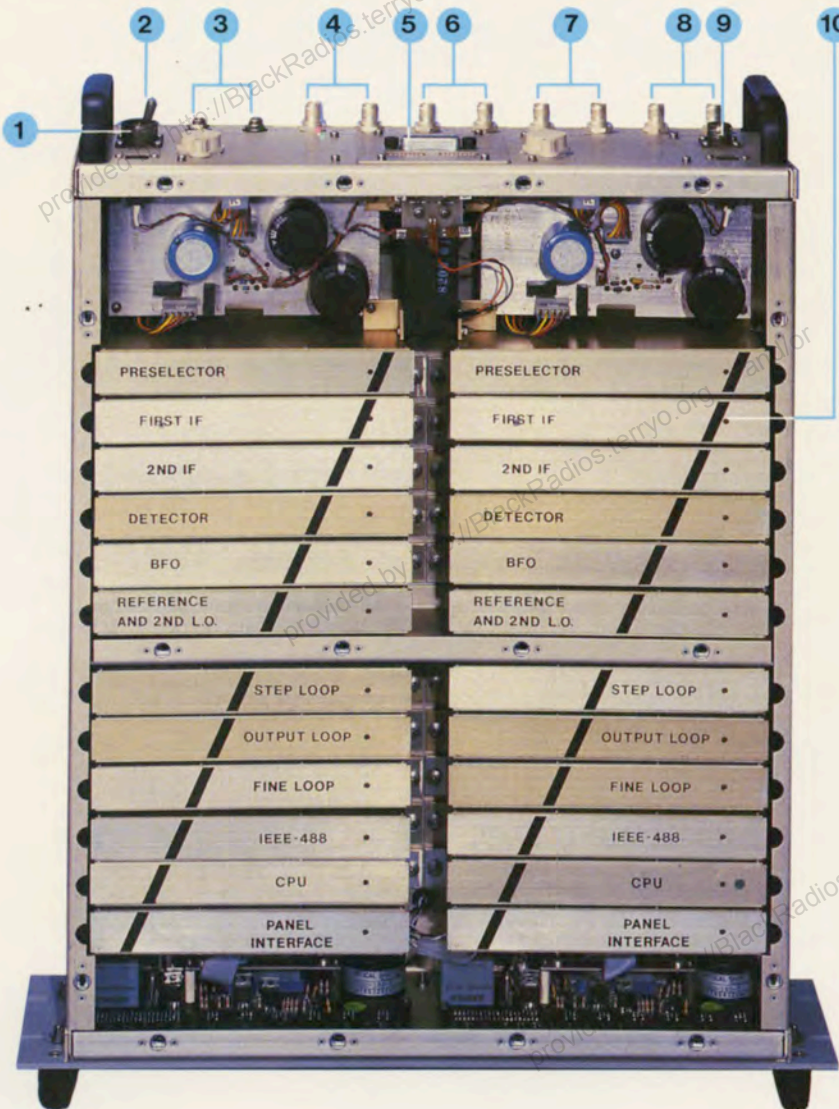
facilitate repair. The “FAULT” display on the R-3030’s front panel advises the operator of a malfunction. LED fault indicators on modules isolate major failures, enabling maintenance personnel to quickly locate the failed module.

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 the R-3030 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-3030 - The Perfect Choice

Simplicity of operation and maintenance make the R-3030 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.

Competitive cost resolves budgetary problems, which are further eased by the high reliability and quick turnaround time when repairs are required.

In short, the R-3030 dual HF surveillance general purpose receiver 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

R-3030 Technical Specifications

FREQUENCY:

Range: 5 kHz - 30 MHz

Resolution: 10 Hz

Stability (internal standard):

- 1 ppm over temperature range:
- .01 ppm per week aging

Tuning Modes:

1. manual, optical shaft encoder
2. keypad
3. remote control

Display: 7 digit LED

Power Interrupt: stores memory channel data for up to 5 years. Upon power restoration, receiver returns to previously tuned channel or frequency

MODES:

LSB, USB, AM, CW, FM

RF SECTION:

Input: 50 ohms, TNC

VSWR: less than 3:1

Sensitivity: for 10 dB SINAD

- (above 50 kHz)
- AM (8 kHz BW): -110 dBm
- 90% modulation
- CW (500 Hz BW): -127 dBm
- SSB (2 kHz BW): -121 dBm

Noise Figure: 13 dB (maximum above 50 kHz)

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 remotely selectable):
Zero: 15 ms nominal
Short: 50 ms nominal
Medium: 250 ms nominal
Long: 3 seconds nominal
Off: manual gain control only
Release Time: 50 ms nominal
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

Second IF bandwidths (selectable):

- a. 500 \pm 50 Hz at -6 dB
4 kHz max. at -60 dB
- b. 1000 \pm 50 Hz at -6 dB
5 kHz max. at -60 dB
- c. 2000 \pm 100 Hz at -6 dB
5 kHz max. at -60 dB
- d. 4000 \pm 200 Hz at -6 dB
10 kHz max. at -60 dB
- e. 8000 \pm 400 Hz at -6 dB
20 kHz max. at -60 dB

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 1 V 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 -120 dBm

INPUT/OUTPUT:

Outputs:

First IF (Wideband): 40.455 MHz with 1 MHz minimum bandwidth, 50 ohms at approximately 0 dB gain from input (2 TNC females)

Second IF: 455 kHz at selected bandwidth and nominal 0 dBm level, 0 \pm 3 dB over range (2 TNC females per assembly)

Synthesizer Reference: 0 dBm, 50 ohm output for receiver daisy chain operation, 10 MHz (1 TNC female per assembly)

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: dual 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: 10 MHz, 0 dBm, 50 ohms (1 TNC female per assembly)

Antenna: 2 TNC females per assembly

GENERAL DATA:

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

Dimensions (2-receiver chassis): 19"W x 5.25"H x 23"D (including rear protective handles)

Weight (2 receivers per chassis): 40 lbs.

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

FEATURES:

Standard:

- 100 memory channels
- Preselector
- BFO \pm 9.99 kHz (10 or 100 Hz steps)
- Built-in fault detection
- Multi-function keypad
- LSB, USB, AM, CW and FM modes
- 0.5, 1, 2, 4, 8 kHz bandwidths
- Dual independent receivers in single chassis
- Multi-function LED meter
Signal strength
Audio level
Frequency shift display
- FM video output
- 10, 100 or 1000 Hz tuning steps
- IF shift tuning \pm 9.99 kHz (10 or 100 Hz steps)
- RF input over voltage protection up to 100 V RMS from 50 ohm source

Optional:

- IEEE-488 data bus
- RS-232 data bus
- MIL-STD-188 data bus
- Special data bus
- Customer-specified bandwidths (up to 6 bandwidths available)

Specifications subject to change without notice



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