

**FIXED BASE, MOBILE  
OR SHIPBOARD**

# RT-1393/USQ HF/SSB Transceiver

From **CUBIC** – A World Leader in Defense Electronics

- 1.6-30 MHz in 100 Hz increments. Rx and Tx (Rx only from 100 kHz to 1.6 MHz)
- Frequency selection by keyboard and variable rate scanning
- 100 Channel memory simplex or 1/2 duplex frequencies plus mode and functions selected. No memory loss with power failure
- ISB (Independent Sideband) Option
- USB, LSB, CW and AM Modes
- Bandwidth selection independently on USB and LSB, Wide, Medium, and Narrow Bandwidths available
- High stability, low phase noise synthesizer
- Noise Blanker, Squelch and Tunable Notch Filter
- Pilot Carrier Insertion for Marine Compatibility
- Full or semi break-in in CW mode
- LCD metering of forward power and VSWR, plus independent receive level of each sideband
- All modes and functions entered by keyboard and displayed on illuminated LCD annunciator panel
- Full remote or computer interface
- 24 hour clock, internally powered
- Full 100 watt PEP or continuous CW output, all modes
- Tune mode and fault indicator for use with companion CU-2285/USQ automatic antenna tuner
- Plug-in modular construction
- Dust, rain, blast and splash proof
- Designed for Fixed, Vehicular, or Shipboard operation



**CUBIC COMMUNICATIONS**

A member of the Cubic Corporation family of companies



# RT-1393/USQ HF/SSB Transceiver

The Model RT-1393/USQ represents the most advanced and modern HF Transceiver available.

An all solid state, 100 watt, HF-SSB/AM Transceiver, the RT-1393/USQ provides highly reliable voice, data, or CW communications with continuous coverage from 1.6 to 30 MHz in 100 Hz synthesized steps. While transmit functions are limited to 1.6 MHz at the low end, the receiver is fully functional to 100 kHz, but with some loss of sensitivity below 500 kHz.

Rugged cast aluminum and modular plug-in construction assures continuous operation in the severest of environmental conditions.

The RT-1393/USQ offers simplex or semi-duplex modes and is capable of USB, LSB, CW and AM. Independent sideband (ISB) operation is optional. Two sets of IF filters are installed to provide simultaneous selection of wide, medium, or narrow for optimum performance on each sideband. Filter bandwidths are 2.4, 1.8 and 0.5 kHz respectively. For AM, a 6 kHz wide filter and envelope detector are provided. (Other filter bandwidths available on special order.)

100 channels of memory can be simply programmed from the keyboard and stored. Each channel may be simplex or semi-duplex. In addition to the frequency data, each channel may be programmed to store other selected functions such as mode, filter bandwidth, RF attenuation, pilot carrier, full or semi-CW break-in, etc.

Memory channels may be programmed while the radio is in normal operation without disturbing any active frequency setting!



Any channel may be recalled from memory for review in the secondary LCD register by pressing "RECALL" and the memory channel number (the secondary register changes from normal function as a 24 hour clock to frequency mode for this purpose). Desired memory channel displayed in the secondary review register will become active and displayed in the active register if the "ENTER" key is pressed. The secondary display will then revert to clock function.

Memory and clock functions are "kept alive" for up to 10 years by an internal battery independent of external power!

To enter a frequency not already in memory, it is only necessary to key in the desired frequency on the keyboard and select the desired mode, bandwidth, etc. After selection and review on the secondary display, this data may be entered into the active register or into a selected memory channel by the press of a key.

For surveillance of a frequency area, the variable rate scan feature may be used to automatically and continuously scan up or down at a rate from zero to 25 kHz per second.

Frequency stability is maintained at  $\pm 1 \times 10^6$  (.0001%) with an internal temperature compensated crystal oscillator. An external standard may be used if greater stability is desired.

An accessory Automatic Antenna Tuner, the CU-2285/USQ, designed to match a variety of whips or long wire antennas, may be located up to 100 meters from the transceiver. Automatic tuning and an indication of proper tuning or a fault is obtained by the press of a key. Tuning time is typically 5 seconds.

The RT-1393/USQ is capable of full or remote control or computer interface to distances of up to 250 meters, with accessory remote control heads and computer modems.

Attention has been paid to providing an extremely low phase noise frequency synthesizer with a fast settling rate for use with sophisticated encoding devices.

Illumination for the LCD displays is provided by soft green colored electroluminescent backup plates. Keyboard keys are LED back lighted. The lighting level is front panel adjustable. The LCD displays are automatically heated for extreme cold weather operation.

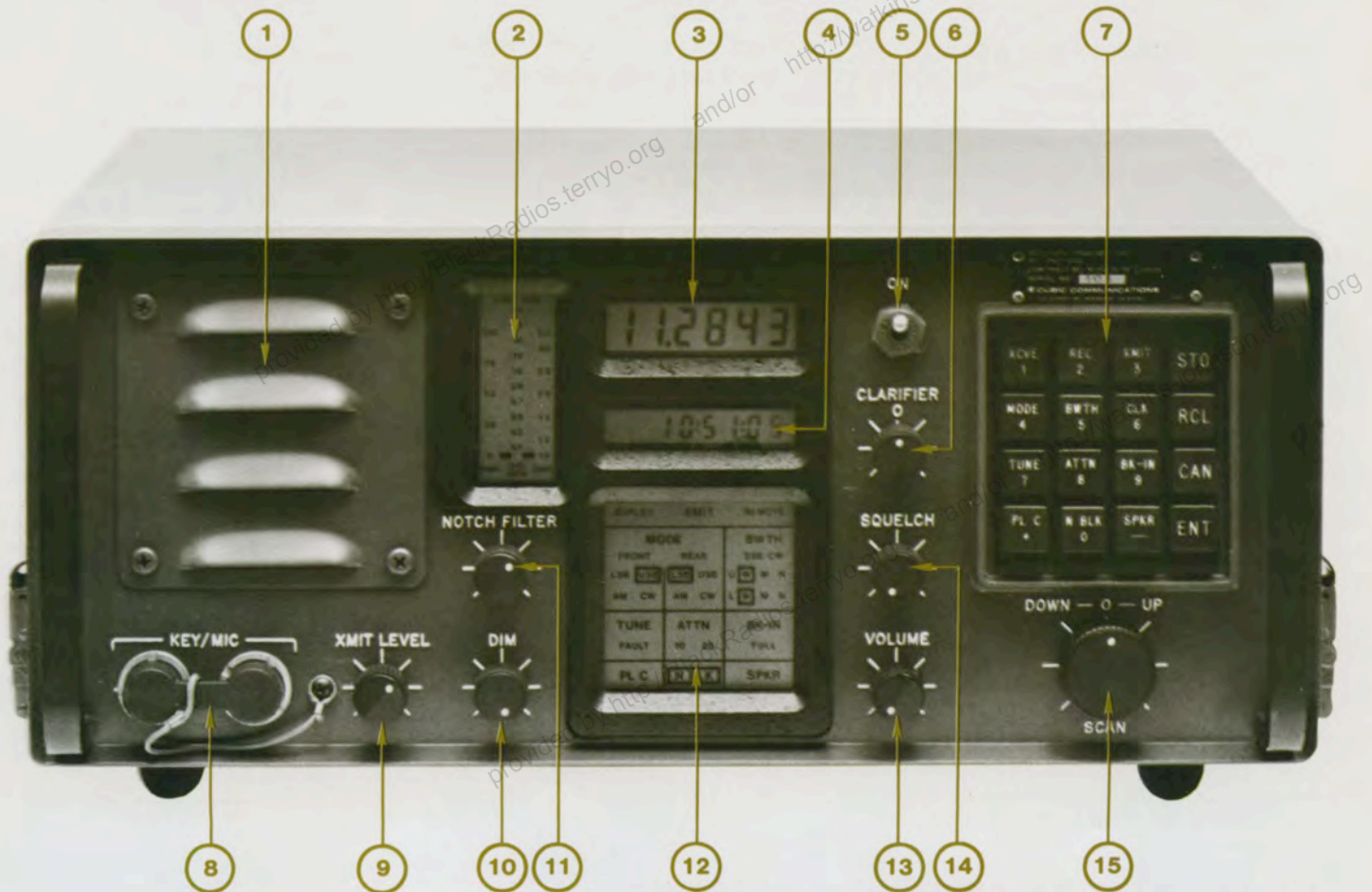
For the CW (code) operator, the availability of "full" as well as semi break-in, a narrow CW crystal filter, and a tunable notch filter to "notch out" interfering signals, ensures reliable communications under adverse conditions.



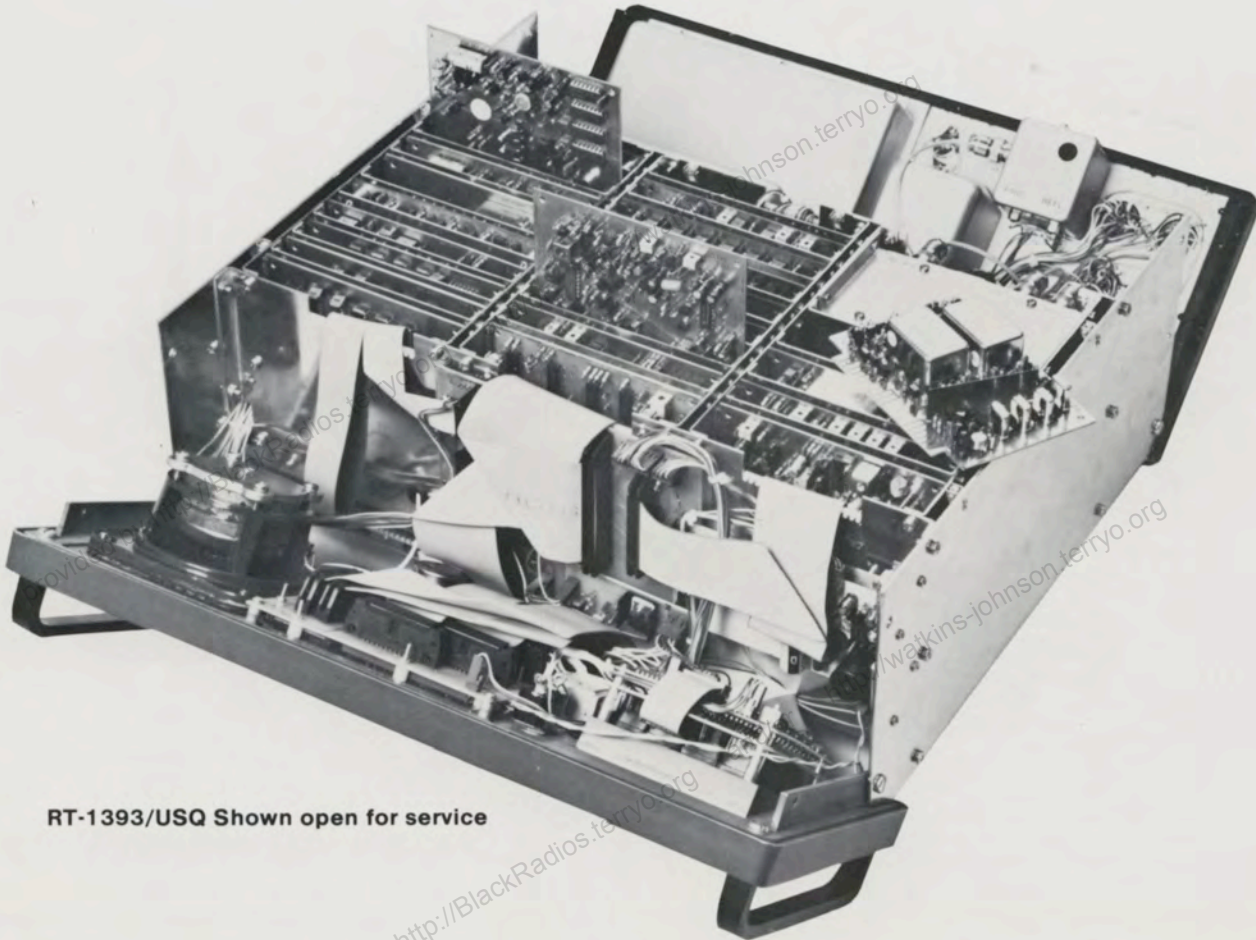
1. **Blast and Waterproof Speaker.** Turned "ON" or "OFF" by keyboard selection.
2. **LCD Bar Metering.** In Transmit, meter indicates forward power on left and VSWR on right. In Receive, bars indicate signal levels present on lower and upper sidebands.
3. **LCD display of active transceive frequency.** If in 1/2 duplex mode, the transmit frequency is displayed when the microphone is keyed.
4. **Secondary Display.** In normal mode, displays 24 hour clock. In frequency mode, acts as intermediate register to display selected frequencies before entering into active (RxFx) registers. In memory mode, displays frequencies in memory channel selected by keyboard. Separate receive and transmit frequencies may be displayed without

5. **Power "ON-STANDBY" Waterproof Switch.** Remote control unit can turn unit "ON" when transceiver is in Standby condition.
6. **Clarifier.** Used to shift receive frequency  $\pm 150$  Hz in 10 Hz steps.
7. **Keyboard.** Lighted waterproof keyboard to control all frequency, mode and memory functions. Up to 100 simplex or semi-duplex frequencies may be entered into memory from keyboard.
8. **Dual key/microphone connectors.**
9. **Transmit level.** Adjusts output power up to safe level set by ALC. Not a microphone gain control. Microphone gain is automatically set to maintain RF output with voice input from a whisper to a shout.

10. **Dimmer control** for intensity of electroluminescent back lighting of panels and keyboard LED's.
11. **Notch filter** tunable from 300 to 3000 Hz providing typically 30dB attenuation of unwanted signal.
12. **Back lighted annunciator panel.** Indicates status of selected mode, antenna tuning, speaker on-off, selected USB or LSB bandwidths, noise blanker, pilot carrier presence, full or semi CW break-in, RF attenuation, 1/2 duplex, simplex or remote operation.
13. **Volume control** for speaker or handset. Speaker may be turned off from keyboard.
14. **Squelch.** Adjustable to quiet receiver when no signal present.
15. **Scan Rate Control** with center off detent. Allows frequency scanning up or down at rate selected from 0 to 25 kHz per second.







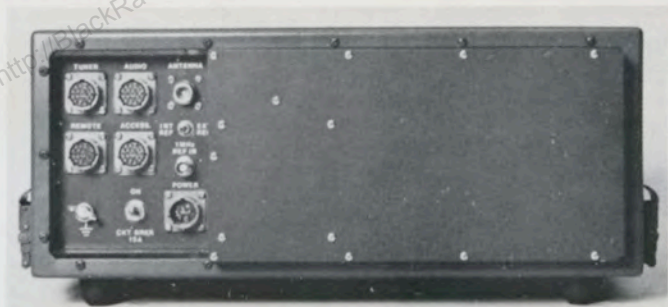
RT-1393/USQ Shown open for service

## Service

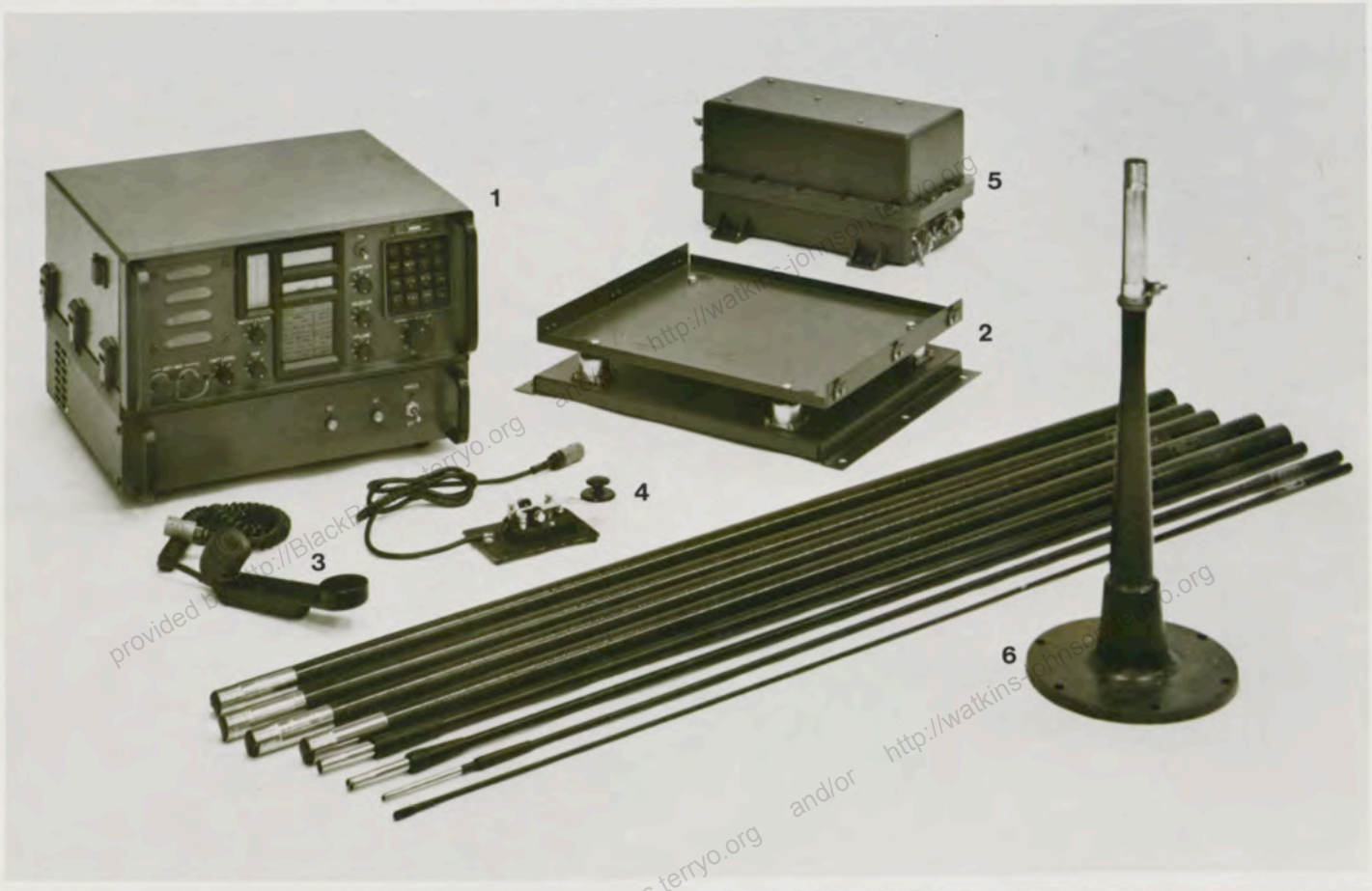
As shown in the photograph, both the front and rear panels fold down for service access. All PC boards are of uniform size and plug into a fixed "mother board." All modules are readily accessible and are interconnected by plug-in coax or "ribbon" cables. PC boards are of medium component density, double sided, glass epoxy material with plated through holes. No expensive exotic, non-repairable throw-away modules are used.

## Rear Panel

Every conceivable function necessary to provide the utmost in flexibility for the RT-1393/USQ has been made available on rear panel connectors. The heatsink is recessed and covered to prevent accidental damage to cooling fins, and to provide highly efficient directed forced air cooling.







## Accessories

Available accessories as shown include (1) Model CPS heavy duty switching power supply for operating the transceiver from 115/230 VAC 50/60 Hz mains (2) MTC vehicular mounting bracket (3) H-189/GR handset (4) CWK hand key (5) CU-2285/USQ Automatic Antenna Tuner (6) AT-1011/U 32' vertical antenna.

Available but not illustrated are: 6504, 16' mobile whip antenna; SCKC, straight connector kit for mobile use; RCKC, right angle connector kit for mobile use; and the VCU-1, 12 VDC to 24 VDC converter for operation from a 12 V source.

Also available are brackets to convert the RT to rack mounting.

Various remote control heads can be supplied. Since each user may need different functions remotely available, the proper unit may be designed to customer requirements. Modems for computer interface can also be supplied in various encoding formats.

### CU-2285/USQ Automatic Antenna Tuner

While designed for use with the RT-1393/USQ Transceiver, the tuner will enhance the reliability of automatic operation of any 150 watt HF transceiver.

The tuner incorporates a microprocessor to analyze digitized outputs from phase, magnitude and VSWR detectors. The microprocessor program incorporates routines for all combinations of these outputs. Stepping motors for variable capacitors and vacuum relays for the variable inductor are directed in a successive approximation routine to match the antenna to the optimum VSWR.

Antennas from 3 to 75 meters in length may be tuned, with the only limitations due to voltage buildup for short antennas operating at low frequencies. Typical tuning time is 5 seconds.

When an acceptable VSWR is achieved, the tune line which is activated at the start of the tune cycle is deactivated, allowing the receiver to go to normal operation.

Construction is of heavy cast aluminum and is fully waterproof for vehicular, shipboard or antenna base mount.

GE  
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Mo  
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Ti  
En  
Si  
Du  
Im  
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VS  
M  
Sp





# Specifications

## GENERAL:

### Frequency Range:

1.6-30.0 MHz, 100 Hz Steps (Transmit and Receive) 100 KHz - 1.6 MHz Receive only (below 500 KHz with reduced sensitivity)  
Clarifier  $\pm$  150 Hz, 10 Hz Steps (Receive only)

### Frequency Stability:

$\pm 1 \times 10^6$  with internal standard. Input provided for external 1 MHz standard for increased stability.

### Modes of Operation:

USB, LSB, AM, CW, USB or LSB with Pilot Carrier, USB and LSB simultaneously with Independent Sideband (ISB) option, FSK, FAX, etc. with external modems.

### Power Input:

20-30 VDC or 115/230 VAC with optional AC Power Supply (Model CPS) (at 28 VDC input RX-60 watts; TX-300 watts)

### Environmental:

Temperature Range Operating:

-30° to +65°C

Storage: -40° to +85°C

Humidity: 95% at 50°C

Shock/Vibration: MIL-STD-810C

Weather: MIL-STD-108E, Splashproof

### Size:

RT-1393/USQ Transceiver: 7H x 17W x 17D inches  
(17.8H x 43.2W x 43.2D cm)  
Optional Power Supply: 3.5H x 5W x 17D Inches  
(8.9H x 12.7W x 43.2D cm)  
CU-2285/USQ Coupler: 7.5H x 9.75W x 16D Inches (19.0H x 24.8W x 40.6D cm)

### Weight:

RT-1393/USQ Transceiver:

42.8 lbs. (19.5 kg)

Optional Power Supply:

22.5 lbs. (10.2 kg)

CU-2285/USQ Coupler: 29 lbs. (13.2 kg)

### Tune Time:

Instant Frequency and Mode Selection; 5 seconds typical with CU-2285/USQ Automatic Coupler

### Frequency Readout:

6 Digit LCD, 0.5" High

### Time Readout:

6 Digit LCD, 0.3" High

### Entry Mode Readout:

8 Digit LCD, 0.3" High (Shared with Time Readout)

### Simplex/Semi-Duplex:

Keyboard Selectable

### Duty Cycle:

Semi-Continuous. Full Continuous optional

### Impedance:

50 ohms nominal

### ALC:

Factory set to limit PEP or CW power to 100 watts on high power and 20 watts in tune mode. Provisions for external ALC from associated linear amplifier.

### VSWR Protection:

Gradual Power Reduction for VSWR of 2:1 or greater.

### Memory:

100 Front Panel Programmable Channels (Simplex or Semi-Duplex) Memory maintained during power outage or OFF (or in transit) by battery with 10 year life.

## RECEIVER:

### Sensitivity:

SSB -0.5 uv for 10dB S + N/N

AM -3.0 uv for 10dB S + N/N

### Selectivity:

SSB -400 to 2800 Hz at 6dB (Wide)

SSB -400 to 2200 Hz at 6dB (Medium)

SSB/CW -600 to 1000 Hz at 6dB (Narrow)

AM -6kHz at 6dB

### Audio Output:

5 watts to internal speaker

30 MW to handset

0dBm to Rear Panel Connection

(600 ohm balanced)

### External Spurious:

-75dB

### IF & Image Rejection:

80dB Minimum

### Squelch:

Mutes Receiver Audio in Absence of Signal

### AGC:

Independently derived on each Mode, Audio flat within 6dB, 1uV of 100,000 uV

## TRANSMITTER:

### Power Output:

SSB-100 Watts PEP

CW-100 Watts

AM-25 Watts (Carrier)

### Carrier Suppression:

40dB Minimum

### Undesired Sideband Suppression:

60dB Minimum

### Harmonic Suppression:

50dB Below PEP

### Intermodulation Distortion:

33dB Below PEP

### Hum and Noise Level:

50dB Below PEP

## CONTROLS AND FRONT PANEL READOUT

### Power:

On/Off Switch (Remote can turn Power On with Panel OFF)

### Keyboard:

16 Key: numeric, mode, memory, bandwidth and other functions

### Variable Rate Scan:

Knob

### Clarifier:

Knob

### Audio Gain:

Knob

### Transmit Level:

Knob

### Light Dim:

Knob

### Audio Notch Filter Tune:

Knob

### Squelch:

Knob

### Noise Blanker:

Keyboard on/off

### Antenna Tune:

Keyboard Command

### Internal Speaker Mute:

Keyboard on/off

### CW Full/CW Semi-Break-In:

Keyboard Selected

### Mode:

Keyboard Selected

### IF Filter Bandwidth:

Keyboard Selected

### RF Attenuator:

Keyboard Selected

### Frequency/Time:

Keyboard Entered

### Pilot Carrier:

Keyboard on/off

### Frequency Readout:

6 Digit LCD

### Clock Readout:

6 Digit LCD

### Memory Store:

Keyboard Selected

### Memory Recall:

Keyboard Selected

### Annunciator Panel:

LCD Display

### Signal Strength, Transmit Power:

Dual LCD Bargraph

### Key/Mic Connector:

MS Type (dual)

## REAR PANEL AUDIO CONNECTIONS

### (For NON-ISB)

Ground  
+16V  
+28V (through CB)  
Key  
Power On (Ground)  
+28V (through diode)  
External Speaker  
Ext Speaker Return  
Rx Audio Return  
Rx Audio 600 ohms  
Rx Audio 150 ohms  
Shield Ground (3)  
Tx Audio Return  
Tx Audio 600 ohms

### (For ISB)

Ground  
+16V  
+28V  
Key  
Power On  
LSB Enable  
USB Enable  
Ext Speaker  
Ext Speaker Return  
AM Out  
Am Out Return  
LBS Out  
LBS Out Return  
USB Out  
USB Out Return  
LSB/AM In  
LSB AM In Return  
USB In  
USB In Return

## REAR PANEL ACCESSORY CONNECTIONS

Remote	Tuner	Accessory
Ground	Ground	Ground
+16V	+16V	+16V
+28V	+28V	+28V
Key	Key	Key
Power On	/ACK	ALC
	+28V	
Mic Audio	STATUS	
Mod Audio	CMD	Ext Speaker
Rx Audio	Shield Ground	Ext. Speaker Return
		Linear Key
Vol Cont AF	Key	Linear Key
Audio Comn	Ground	Return
		Band 1-8
LSB/AM		
LSB/AM Return		
USB		
USB Return		
Data Out A		
Data Out B		
Data In A		
Data In B		

Specifications subject to change without prior notice.



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