

TRANSWORLD TW100

SYNTHESIZED MICROPROCESSOR 1.6 -30MHz
SSB - FSK TRANSCEIVER

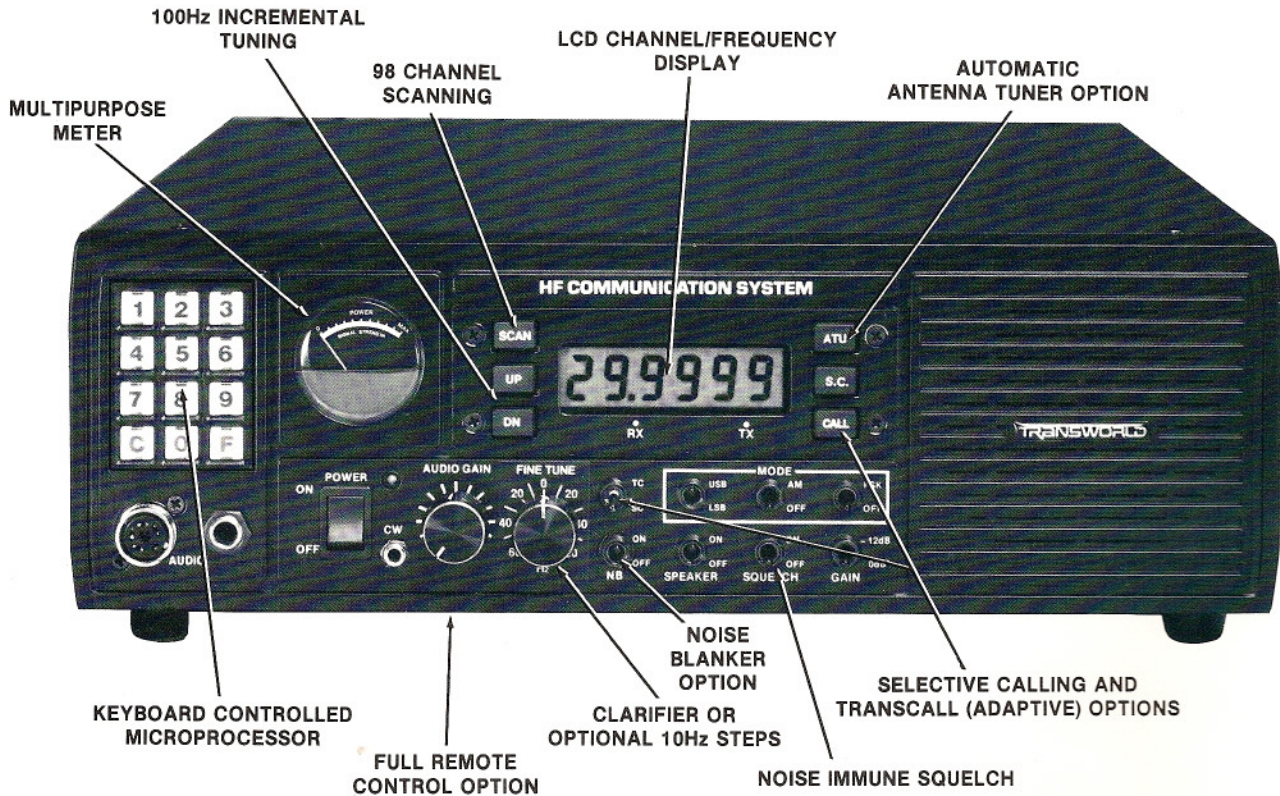
Now Available With Built-in TRANSCALL
Adaptive Option



- 1.6 — 30MHz
- Microprocessor Controlled
- All Solid State
- 100 Memory Channels
- Continuous Tune
- Synthesized 100Hz (10Hz*) Steps
- Simplex/Half-Duplex Operation
- Liquid Crystal Display
- Keypad Entry
- Scanning Mode
- U.S. Design & Manufacture
- F.C.C. Type Accepted**
- 125 Watts PEP/100 Watts Average
- High Dynamic Range Receiver
- Noise Immune Squelch
- Modular Construction
- Internal Power Supply*
- 2 or 4 Wire Remote Control*
- Internal Selective Calling*
- Computer Control — RS232*
- TRANSCALL Adaptive Operation*
- Noise Blanker*

*Optional

**Parts 81, 83, 90, 97 — 120 Watts



The TRANSWORLD TW100 is an advanced synthesized HF transceiver covering the entire HF frequency range from 1.6 to 30MHz. The TW100 provides voice operation in the single sideband mode, radioteletype with the optional modem, and telegraphy. The transceiver is controlled by a microprocessor which provides the ultimate in operating flexibility with features such as 100 memory channels, continuous tuning, separate transmit and receive frequencies for half-duplex operation and channel scanning. The transceiver is controlled by a keypad and the channel number and frequency are shown on a large liquid crystal display. A special version, model TW100SX, is available which only displays channel numbers and requires an external channel programming/reprogramming unit.

The TW100 Series offers a wide range of options and accessories to provide advanced systems capabilities. Built-in options include full Remote Control Capability, Selective Calling and the TRANCALL Adaptive System. The TRANCALL system makes HF operation as simple as using a telephone. The operator simply "dials" the number (actually a three digit entry on the keypad) and presses the CALL button. The transceiver then automatically links up with the station being called and they together select the best available channel. When the connection is made, a telephone-type ringing signal alerts both stations. Additional accessory items include Antenna Tuners, Broadband Antennas, RTTY/FSK Modems and Linear Amplifiers.

MICROPROCESSOR CONTROL

A high performance microprocessor is used to control the synthesizer in the TW100. The inputs from the front panel keypad control the selection of the channel frequencies stored in the memory and permit the entry of new frequencies on the free tuning channel. The microprocessor also controls the large easily read Liquid Crystal Display which can be used to show both channel and frequency

information. The use of the microprocessor provides great flexibility of control combined with simple operation and programming.

CIRCUITRY

The TW100 uses all solid state, broadband circuitry which eliminates all field adjustments and tuning. An upconversion design to the first IF at 75MHz, places images and spurious responses in the VHF range, where

they are removed by simple low pass filters. The transmitter spectral purity is ensured by six 10-pole elliptical function filters selected by the channel switch. The second IF is at 1650kHz where the main selectivity is provided by high performance 6-pole crystal filters. The receiver uses a high quality packaged diode balanced mixer with an intercept point of +11dBm. This gives the receiver exceptional dynamic range and freedom from

intermodulation and overload. The frequency control system is derived from one stable 5120kHz reference oscillator. A 10kHz phase locked loop covers 76.6 to 105MHz for the first conversion oscillator. The second 100Hz phase locked loop controls a TCXO operating at 73.35MHz to provide downconversion to 1650kHz. Direct loops are used giving great spectral purity and a simple easily serviced design.

OPERATING MODES

The standard transceiver is supplied for A3J, and A3H operation. USB, AME and CW operation is standard and LSB may be provided as an option. A separate power supply and modem are available for FSK (teletype operation). This power supply provides additional cooling for continuous operation at 100W (average) power output. The high performance FSK modem provides direct connection to any standard RTTY machine. As an option, high speed TX/RX switching is provided for simplex ARQ operation.

CONSTRUCTION

The case of the transceiver is a rugged frame formed by the diecast front panel and massive rear heatsink joined by side extrusions. The modules are mounted on a plate held between the two side extrusions, and the final amplifier mounts on the rear heatsink. The main circuitry is contained in 6 diecast boxes providing complete RF shielding and environmental protection. The six modules, the PA assembly, the RF filter module and the frequency selection module are all easily changed for field service. The entire transceiver is constructed from aluminum alloys and all external hardware is stainless steel for operation under the most severe environmental conditions.

FULLY AUTOMATIC TUNING

When used in conjunction with the companion digital AT100 Automatic Antenna Tuner, efficient transceiver coupling to a wide variety of whip and wire antennas is fully automatic. Tuning time for the radio with coupler is typically 1 second.

AUDIO SYSTEM

The TW100 has two features that add

greatly to operating convenience. The receiver audio squelch system is designed to respond only to voice signals and eliminates much of the background noise, characteristic of HF operation. The transmitter is equipped with a VOGAD which automatically adjusts the gain of microphone amplifier and provides maximum output power regardless of voice level. The TW100 has demonstrated compatibility with various COMSEC security devices. Please contact the factory for details.

FREQUENCY CALIBRATION

All channel frequencies are derived from a single high stability crystal oscillator. If it is ever necessary to adjust the frequency calibration, a single adjustment will set all channel frequencies. When greater stability is required, the HS10 High Stability Option incorporates a 1 part in 10⁷

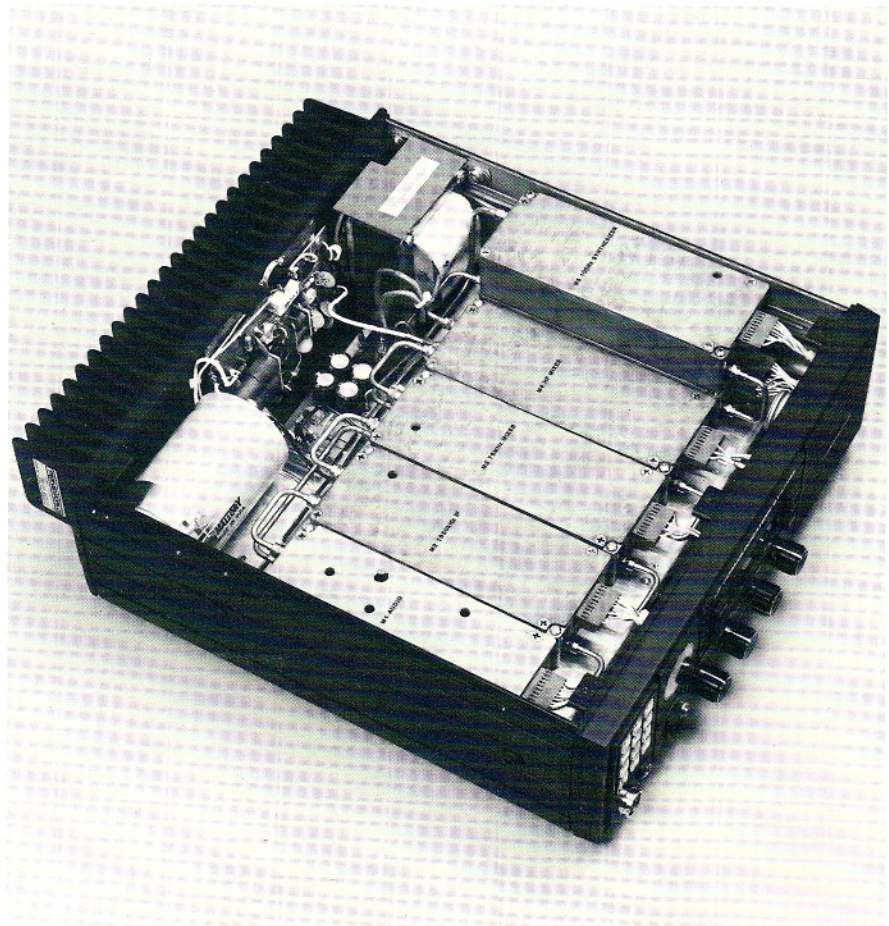
TCXO and also provides 10Hz digital incremental tuning in place of the receiver clarifier.

POWER SUPPLY

The TW100 operates directly from any 13.6V DC power source permitting direct operation from a vehicle or shipboard supply system. Provision is made for the internal installation of optional 28V DC or 115/230V 50/60Hz AC power supplies which are rated for SSB service. A base station power supply is also available for teletype service. This supply is rated for continuous service and provides forced air cooling for the transceiver power amplifier.

COMPANION LINEAR AMPLIFIERS

Companion all solid state linear amplifiers are available to boost the output power to either 500 to 1000 Watts output.

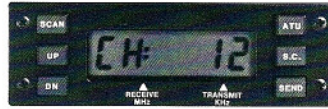


The modular design of the TW100 enhances serviceability.

CHANNELIZED OPERATION (CHANNELS 01-99)

PRESS **[C]** and CHANNEL NUMBER

example **[C][1][2]**



TO DISPLAY CHANNEL FREQUENCY PRESS **[F]** Receive or simplex frequency is then displayed.



PRESS **[F]** Again or press microphone switch and the transmit frequency is displayed.
(The frequency stays the same on simplex channels)



OPERATIONAL MODES

The transceiver uses internal switches to select the three operational modes. In addition, the coding circuits may be removed so that the transceiver remains permanently in Mode 2 or Mode 3.

- MODE 1 The memory channels and the continuous tune channel may be reprogrammed from the keyboard.
- MODE 2 The memory channels cannot be changed. The continuous tune channel operates only in the receive mode.
- MODE 3 Only the memory channels operate and the frequency cannot be changed or displayed.

CONTINUOUS TUNE — CHANNEL 00

Channel 00 is the continuous tune channel.

ENTER **[C][0][0]**

The transceiver is ready for the entry of a new frequency.

To enter 8034KHz ENTER **[8][0][3][4][0][F]**



The frequency may be changed again. To change to 11563.8KHz

ENTER **[1][1][5][6][3][8][F]**



To enter a separate transmit frequency enter **[F]** again.

The complete keystroke sequence to enter 12.5654MHz receive and 13862.8kHz transmit is:

[1][2][5][6][5][4][F][F][1][3][8][6][2][8][F]



The transmit frequency is displayed at the end of the sequence.

If no separate transmit frequency is entered, the microprocessor automatically enters the receiver frequency in the transmit memory.

The last frequency stored in Channel 00 is held in memory until changed by the operator.

MEMORY CHANNELS

A lithium battery with a life of 10 years is used to store all channels in permanent memory when the transceiver is switched off. In Mode 1, the memory channels may be changed from the front panel using a special double keystroke entry designed to prevent accidental erasure of the stored information.

UP DOWN TUNING

The **[UP]** and **[DN]** tuning buttons are used for continuous tuning. A single press of the switch moves the frequency in 100Hz steps. Holding down a switch rapidly changes the frequency. The tuning buttons do not move the transmitting frequency.



SCANNING

Up to 98 channels may be scanned automatically by pressing the **[SCAN]** switch. This switch is a toggle, press once to start the scan and again to stop the scan.

Channel scanning starts at Channel 01 and stops at the channel number designated by special keystroke entry. The channel numbers are displayed as scanned.



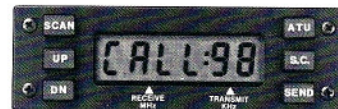
INTERNAL OPTIONS

SELCALL SELECTIVE CALLING OPTION

This option permits selective calling of up to 256 stations per system as well as an "all call" feature. This digital system, which is specifically designed for high reliability in HF-SSB systems, includes a transpond feature to automatically acknowledge receipt of a call. At the station called the receipt of the selective call sounds an alarm and activates the CALL indication on the LCD display.

The code of the station being called is entered on the keyboard and it is shown on the display before transmission.

When the selective calling system is used in conjunction with the scan mode, the call is repeated until the called station scans to the calling frequency and receives the correct call code. The called station stops scanning, sounds the alarm and sends back an automatic reply, which, in turn, stops the call sequence. If the call is not answered within 60 seconds, the scan mode is resumed but a "CALL" indication remains on the display of the called station.



TRANSCALL ADAPTIVE SYSTEM

The TRANSCALL option is an adaptive HF communications system for fixed and mobile stations incorporating the SELCALL option and, in addition, providing automatic evaluation of the communications path on up to ten different channels. The path selection is based on lowest error rate detected on digital burst transmissions as well as on signal strength. After the best available path is chosen, audible and visual alarms alert the operators. This results in a fully-automated system which adapts to rapidly changing HF propagation conditions while reducing the need for specialized operator training.

Operation of the TRANSCALL system is as simple as using a telephone. The three digit station code is entered on the keypad and the TRANSCALL button is pressed. The operator then waits for the radio to select the best channel and the call to be answered. The selective calling system may be used in both TRANSCALL and normal operating modes and is fully compatible with the standard SELCALL selective calling system. To avoid interruption to existing communications, TRANSCALL monitors each channel for traffic before attempting to establish the link.

The TRANSCALL system is an internal microprocessor controlled module fitted to the standard Transworld TW100 and TW100SX transceivers. No separate control units or special connections are required. The selection of TRANSCALL or Selcall modes is from the radio's front panel and code entry is through the transceiver keypad.

TRANSCALL equipped radios can be used with either broadband antennas (e.g. ABB Series) or with whip or longwire antennas in conjunction with the AT100/M Memory Antenna Tuner. TRANSCALL can also be used with the 500 and 1000 Watt Linear Amplifiers and in many remote control configurations.

- UL** The standard TW100 is configured for Upper Sideband only. This option adds Lower Sideband capability.
- WB** Replaces the standard sideband filters with special wideband (300-3100Hz) filters which may be required in some high speed data and burst applications.
- RC** Adds the capability for Remote Control operation using the TW5201/RT5201 Remote Control Units or RS232 Computer Control.
- HS10** Increases frequency stability to 1 part in 10⁷. Also replaces analogue receiver clarifier with digital 10Hz steps.
- ARQ** Permits high speed (20mS) Rx/Tx switching for simplex SITOR/ARQ operation.
- NB** Reduces interference from impulse type noise (e.g., automotive ignitions, etc.).

ACCESSORIES AND ANCILLARIES

REMOTE CONTROLS

When equipped with the RC option, the TW100 can be connected to a remote control unit to give complete control of the transceiver over any voice grade two or four wire line or radio link. The TW5201 remote head duplicates the control functions available from the radio's front panel including frequency changing, mode selection, etc. The remote control is used to operate the transceiver from a remote site, from an alternate operating position, or as the control head in a vehicle mounted mobile installation (model RT5201). As an option, TRANSCALL capability can be added to a remote control if a metallic (DC continuity) wire line is available to the radio.



PF100 HEAVY DUTY POWER SUPPLY

Addition of this unit permits use of the TW100 in radioteletype, facsimile and other applications requiring 100W Average continuous output. The PF100 is designed so that the TW100 fits on top of it to provide additional radio cooling. Operating power is 115/230V, 50/60Hz.



PF5100 HEAVY DUTY POWER SUPPLY AND MODEM

This unit consists of a PF100 Power Supply and a high performance FSK Modem, permitting direct connection to a wide variety of TTY machines with neutral, polar or low level RS232/MIL188C interfaces.



AT100 AUTOMATIC ANTENNA TUNER

The AT100 is designed to quickly and efficiently match the 50 ohm output of the TW100 to a wide variety of whip and longwire antennas. Tuner operation is fully automatic and typically requires about one second. The AT100 is mounted in a heavy duty fiberglass case which permits all weather operation in both mobile and fixed station operation. A special version of the tuner, model AT100/M, is available with 10 memory channels (in addition to the automatic tuning mode) for use in channel scanning and adaptive systems.

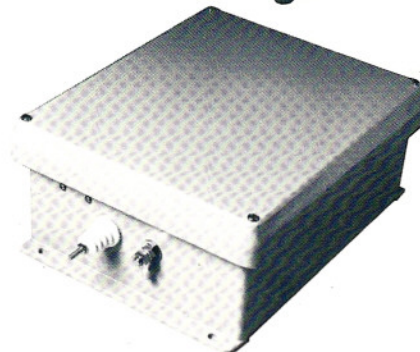
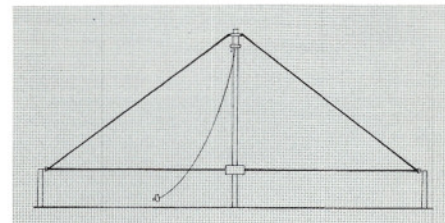


ABB SERIES BROADBAND ANTENNAS

The ABB Series of antennas is specially designed to offer broadband coverage over the entire 2 to 30 MHz HF spectrum and is optimized for short and medium range up to 2500 Km. Several models are available to meet various power level and space requirements.

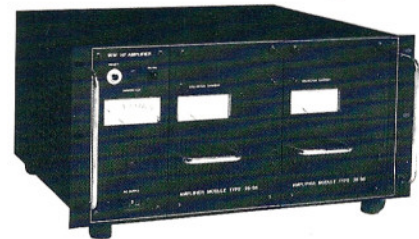


TW500A 500W PEP LINEAR AMPLIFIER

This all solid state Linear Amplifier is designed for voice operation to increase the output power of the TW100 to 500W PEP output. It is also available as part of the TW1100 rack mounted system package complete with TW100 Transceiver and optional accessories.

TW1000A 1000W PEP/AVERAGE LINEAR AMPLIFIER

The TW1000A is an all solid state Linear Amplifier designed for continuous duty voice, FSK or FAX operation to increase the output power of the TW100 to 1000W PEP and Average output. The TW1000A operates direct from a high current 28VDC source such as the PS1000 115/230VAC Power Supply. It is also available as part of the TW1500 rack mounted system package complete with TW100 Transceiver, Power Supply and optional accessories.



TW5500 RTTY/ARQ MESSAGE TERMINAL

This Message Terminal is an integrated unit which combines the functions of an electronic teleprinter with advanced message handling capabilities, and a high performance FSK modem. As an option it can also be fitted for SITOR (ARQ/FEC) operation. The TW5500 connects directly to the TW100 with PF100 Power Supply to provide complete facilities for the transmission, reception and storage of messages, including automatic operation and selective calling.



MD DESK MICROPHONE

This is a high quality dynamic Desk Microphone with push-to-talk bar.



MR HAND MICROPHONE

This is a rugged high quality hand microphone.



RM RACK MOUNT KIT

Permits installation of TW100 in standard 19 inch rack cabinets. Requires 5.25 in (13.3m) panel space.

PSA POWER SUPPLY ADAPTER

The PSA unit provides charging of a customer-supplied 12 (or 28) VDC battery with automatic reversion to battery power in case of mains failure.

TW5800 TELEPHONE INTERFACE

This unit permits interconnection of the TW100 with standard telephone lines. Both manual and VOX operation is provided. A rack mounted version is also available.



TECHNICAL SPECIFICATIONS

GENERAL FREQUENCY RANGE: 1.6 - 30MHz in 100Hz (optionally 10Hz) synthesized steps
FREQUENCY ENTRY: Keypad controlled microprocessor
CHANNELS: 100 Simplex and Half-Duplex
CHANNEL PROGRAMMING: Mode 1 Front Panel, Modes 2/3 Internal
SX Models require external programmer
CONTINUOUS ENTRY: Channel 00 by keypad entry. Mode 1: Transmit & Receive
Mode 2: Receive Only Mode 3/SX Models: Disabled
FREQUENCY DISPLAY: 6 Digit by keystroke (locked out in Mode 3 and SX Models)
PROTECTION AGAINST UNAUTHORIZED FREQUENCY CHANGE: Coding device may be removed
from TW100 to lock transceiver in Mode 2 or Mode 3. TW100SX requires use of special external
programming unit.
TUNING: Up & Down Pushbutton Switches (receive only), 100Hz steps
SCANNING: Automatic 2-98 channels
ANTENNA IMPEDANCE: 50 Ohms, SO-239 connector
TEMPERATURE RANGE: - 30° to + 60°C
SHOCK/VIBRATION: Testing methods in accordance with MIL-STD-810D
FREQUENCY CONTROL: ± 0.0001%, ± 20Hz maximum (1 part in 10⁷ with HS10 option)
MODES: Simplex and Half-duplex
OPERATION MODES: A3J (USB/LSB*), A3A* (SSB reduced carrier), A3H (compatible AM),
A1 (CW), F1 (teletype)* *Optional
COMSEC: Demonstrated compatibility with various COMSEC units
TX/RX SWITCHING: 20mS maximum
SIZE: 4.25H x 13.5W x 17.5D in. (10.8 x 34.3 x 44.5cm)
WEIGHT: AC-13kg (28.6 lb), DC-11.6kg (25.5 lb)

POWER SUPPLY 13.6V DC ± 20%: Receive 620mA, Transmit 12A Average SSB
28V DC NOMINAL (20-32V): Receive 350mA, Transmit 7A Average SSB
Internal AC power supply 110/230V ± 10%, 50/60Hz for SSB operation
External power supply 110/230V ± 10%, 50/60Hz for FSK operation, optional built-in FSK modem

TRANSMITTER POWER OUTPUT: 125W PEP, 100W Average (FCC Type Accepted Parts 81, 83, 90, 97 at
120 Watts)
OVERLOAD PROTECTION: Protected against mismatch including open and shorted antennas
and thermal overload
CARRIER SUPPRESSION: Greater than - 50dB
UNWANTED SIDEBAND: - 60dB at 1kHz typical
SPURIOUS SUPPRESSION: Greater than - 63dB
HARMONIC SUPPRESSION: - 63dB (except below 2MHz)
AUDIO INPUT: 150 Ohms, VOGAD for constant audio level, 600 ohms 0dBm (rear connector)
AUDIO BANDWIDTH: 300Hz to 2700Hz (300Hz to 3100Hz optional)
INTERMODULATION DISTORTION: - 32dB typical
ALC: Less than 1dB increase for 20dB increase in audio input
AUDIO COMPRESSION: No significant distortion + 30dB above normal
METERING: Relative RF output (calibrated 100W full scale)

RECEIVER SENSITIVITY: 0.35µV for 10dB SINAD (front panel selection of 12dB attenuator)
SELECTIVITY: 300 to 2700Hz at - 6dB. - 60dB at 5kHz (optional 300Hz to 3100Hz at - 4dB)
IMAGE REJECTION: Greater than 80dB
IF REJECTION: Greater than 80dB
INTERNAL SPURIOUS: Less than 6 audible, all below 0.3µV
CONDUCTED RADIATION: - 85dBm
AGC CHARACTERISTICS: Less than 6dB audio increase from 3µV to 300,000µV, dual time
constant for voice or FSK/CW
INTERCEPT POINT: + 11dBm, + 23dBm with attenuator activated
INTERMODULATION: - 85dB
CLARIFIER: ± 125Hz minimum (± 70Hz in calibrated digital 10Hz steps with HS10 option)
SQUELCH: Audio derived syllabic-type, noise immune
NOISE BLANKER: Optional, pulse type
AUDIO OUTPUT: 4W into 3 ohms, internal loudspeaker, separate 600 ohms 0dBm squelched
and unsquelched outputs (rear panel)
METERING: Relative signal strength

Specifications subject to change without notice.