3.0 INTRODUCTION

This section contains detailed electrical and mechanical specifications for the Model 8164 WWVB Receiver Disciplined Oscillator.

3.1 RECEIVER/COMPARATOR

RECEIVED STANDARD FREQUENCY: 60 kHz, NBS Station WWVB

SENSITIVITY: 0.4 μV rms into 50 ohms. Minimum field strength at antenna, 30 μV per meter when used with Model 8206 antenna.

SIGNAL-TO-NOISE RATIO: -35 dB worst case to remain phase locked to the carrier.

NBS OUTPUT: Phase locked to WWVB carrier, 0.1, 1.0, 5.0 or 10 MHz output. Frequency selected by front panel pushbutton. The output impedance is 100 ohms. The open circuit output low level voltage is less than 0.5 volts and the high level voltage is typically 3.4 volts. The signal is TTL compatible into loads greater than 120 ohms. Noise jitter is typically 1.0 E-7 in a 1 second gate period.

PHASE LOCK INDICATION: Green panel lamp indicates phase lock to WWVB. Red lamp indicates phase unlock.

LOCAL COMPARATOR INPUT: 0.1, 1.0, 5.0, or 10.0 MHz, front panel selectable, 100 mV rms minimum into 50 ohms.

TIME CODE: BCD yielding date, time of day, and a correction factor for converting from atomic time to celestial time.

3.2 FREQUENCY STANDARD OUTPUTS

FRONT PANEL: 0.1, 1.0, 5.0, or 10 MHz, front panel selectable. The output impedance is 100 ohms. The open circuit output low level voltage is less than 0.5 volts and the high level voltage is typically 3.4 volts. The signal is TTL compatible into loads greater than 120 ohms.

REAR PANEL: Separate outputs at 0.1, 1.0, 5.0, and 10 MHz, 600 mV rms sine wave into 50 ohms, 30 dB harmonic suppression. Without termination output is TTL-compatible.

If Option 03 is added, these four outputs are converted to drive Frequency Distribution Line Taps only. In this version, all four rear panel outputs provide 10 MHz sine waves and 12 VDC to 50-ohm cable that drives the Line Taps. In both versions, OUTPUT FAULT lamp shows absence of signal at any output connector.

3.2.1 FREQUENCY STANDARD STABILITY

LONG TERM: Accuracy is typically held to within ±1.0 E-9.

SHORT TERM STABILITY: 2.0 E-10 rms over 10 successive 10-second counts.

TEMPERATURE: ±5.0 E-10 per °C maximum, 0-50°C.

LOAD: ±1.0 E-11 for any load change.

SUPPLY VOLTAGE: ±2.5 E-10 maximum for +10% voltage change.

WARM-UP AT 25°C: Within ±2.0 E-9 of NBS reference 4 hours after receiver phase locks to WWVB.

3.2.2 FREQUENCY ADJUSTMENTS

FINE: Microprocessor controlled with an adjustment resolution of 2.44 E-10

COARSE: Internal adjustment with ±2.5 E-6 minimum range.

3.3 STANDBY SUPPLY

EXTERNAL: Rear panel AUX IN/OUT connector Pin 3 accepts 22-30 VDC for oscillator standby power during AC line interruptions. Suitable for used with lead-acid batteries. Current drain during power interruption is 40 ma typical, 200 ma maximum. The external battery is float-charge at a 200 ma rate, voltage limited and temperature compensated.

OPTION 34 BATTERY PACK: Mounted internally weight 6 lbs. Allows 50 hours typical operation at +25°C, 36 hours minimum standby operation during AC line interruption. Recharge rates, 33% in 6 hours, 66% in 12 hours, 100% in 36 hours.

3.4 STRIP CHART RECORDER

READOUT: Displays comparison of local input signal or internal frequency standard with WWVB. May be switched to monitor receiver phase lock voltage. Readings are permanently recorded on chart paper. Real-time readout on edgewise meter with 2.4 inch scale at the top of the panel display.

CHART SPEEDS: Chart recorder speed as shipped from the factory is 20 mm per hour. The speed may be changed to 10 or 60 mm per hour by substituting the cams supplied with the Simpson manual. Refer to the Simpson Operators Manual for instructions on chart speed changing and paper replacement.

PHASE COMPARISON SCALE: Selectable 0-50 or 0-10 microsecond full scale relative time.

PAPER: 52 ft. reel, 2.75 inches wide, pressure sensitive, rectilinear scales. One roll lasts for 1 month of continuous use. The time scale and hour markers are printed on the chart paper. Replacement paper may be ordered through Spectracom Corporation. Order part number MP00025 for a box of 10 rolls.

3.5 ALARM LAMPS

OUTPUT FAULTS: Indicates the disappearance of standard output signal from any of the four rear-panel outputs.

FREQ: Standard oscillator is off frequency by more than 1.0 E-8.

SIGNAL: Lamp is on if receiver phase lock is lost for more than 10 hours.

CPU: Indicates microprocessor failure.

ADJUST OSC: Standard oscillator has aged so that the microprocessor must pull it to within 1.0 E-7 of the end of its fine adjustment range to hold it on frequency. Warns that internal coarse oscillator adjustment should be made within three months. Occurs every few years.

TIME: With Timelock™ activated, indicates time error accumulation of more than four milliseconds.

3.6 ALARM OUTPUTS

SIGNAL: RS-422

ALARM: An alarm is triggered whenever any of STATUS ALERT or OUTPUT FAULT lamps light. The alarm is reset when the fault has been cleared. The alarm outputs are found on the rear panel AUX IN/OUT connector.

3.7 DATA STRUCTURE

SIGNAL: RS-232C

CHARACTER STRUCTURE: 1 start bit, 7 data bits, 1 mark bit, and 1 stop bit.

BAUD RATE: Dip switch programmable from 300 to 9600 baud.

3.8 MECHANICAL & INSTALLATION

LINE POWER: 115/230 VAC ±10%, 60 Hz. Consumes 60 VA.

OPERATING TEMPERATURE: 0 to 50°C.

SIZE:

Panel Height	5.25 in.	(133 mm)
Panel Width	17 in.	(432 mm)
Depth	13.5 in.	(343 mm)
Weight	21 lbs.	(9.5 Kg)
Ship Wt.	25 lbs.	(11.3 Kg)

Handles extend 1.75 in. from front panel.
Allow 2-3 inches cable clearance at rear.