EXHIBIT 11: Test Box User's Manual

Test Box User's Manual

Scope

Test Box is a windows based application that allows us to control the TX and RX setting of the WBSU. The program is provided to assist FCC approval testing of the WBSU.

Connecting your PC to the WBSU

Connecting the WBSU to a PC running Test Box involves 1) connecting a -48 Vdc power supply to the PC, 2) connecting the WBSU interface cable, and 3) connecting the WBSU debug cable. The block diagram below show the connections.

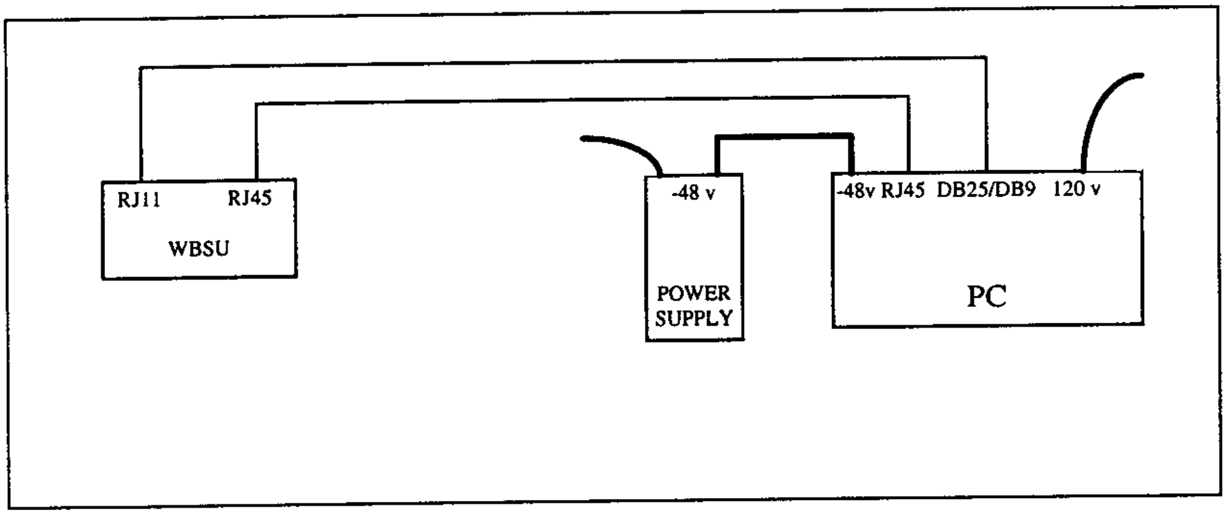

Figure 1-1 WBSU Test Box Block Diagram

One end of the WBSU Interface Cable plugs in to the RJ-45 port on the WBSU. The other end plugs in to one of the four ports on the PC Interface card.

To monitor the WBSU activity (debug port) use COM port 2 on your PC to connect to the WBSU. The debug communication port on the WBSU is a female RJ-11. You can use a cable with DB9 or DB25 on one end for your PC COM port and connect the PC to the WBSU with a straight through RJ-11 cable. Set your terminal program with COM port 2, 9600 baud rate and N81 settings.

Running the Test Box Application

1. To run the Test Box application, double click on the Test Box icon.
2. At the initial screen, select the COM Setting button to setup **COM port 2** and select **9600** for the baud rate.
3. Click on the Test Box option to start.

4. The screen splits into two sections: Carrier 1 and Carrier 2.
5. For **Carrier 1 TRX Setting**,
   ** Enter the desire **Channel** and **Frequency Band**.
   ** Enter a **Tx Power Level** (0 - 10) for all the time slots 1 to 6.
   Note: 0 is at maximum power level. It is recommended that all the time slots have the same Tx power level.
   ** The **ALL** button allows quick assignment of a particular power level to all 6 time slots.
   ** Set **Modulation** to **Off**.
   ** Set **Tx Data Pattern** to **PN9**.
6. For **Carrier 1 Rx Setting**,
   ** Set **Rx** to **Diversity**.
   ** Click on **Next Page** for other Rx Setting.
   ** Set **Sync Pattern** to **Sync1**.
   ** Set **Sync+ Pattern** to **Sync + 1**.
   ** Enter a value for the **DVCC** (1 - 255).
   ** For **DCCH/DTC** setting, **leave all time slots uncheck**.
   ** Make sure **DVCC is selected.**
   ** Set **First Regular AGC** ("Auto Gain Control") to **First**.
   ** Click on **Prev Page** to return.
7. Repeat the same procedure for Carrier 2.
8. Click **OK** to setup and to activate the WBSU with the above parameters.
9. Click **DSP On** to set the WBSU in-service and to begin transmitting on the assigned channel.

Important Note: If you decide to change the Tx or Rx setting while the WBSU is in-service, you must click the "**Reset**" option to reset the WBSU prior making any change to any setting. While resetting your WBSU, your terminal program should display:

Boot 1> DSP Download Carrier 1 OK
Boot 1> DSP Download Carrier 2 OK
Boot 2>

EXHIBIT 12: Measurement Procedure and Test Equipment

This Exhibit provides a brief summary of the methods used for the indicated measurements. A full list of all test equipment is provided.

Table 12.1: Measurement Equipment - ITS

Description	Manufacturer	Model Number
Spectrum Analyzer	Hewlett Packard	8566B
Preselector	Hewlett Packard	85685A
Dipole Antenna Set	Compliance Design	A100
Bilog Antenna Set	Chase	CBL6112A
Preamplifier	Compliance Design	P950
Preamplifier	Compliance Design	P1000+
Preamplifier	Hewlett Packard	HP8449B
Horn Antenna	EMCO	3115
Horn Antenna	EMCO	3116
Temperature Chamber	Thermotron	
DC Voltmeter	Fluke	87
Signal Generator	Fluke	6082A
Attenuator	Pasternack	
Attenuator	Hewlett Packard	8491B
Cables	Pasternack	RG-142LL
Oscilloscope	Tektronix	TDS640
Power meter	Hewlett Packard	436A
Power Sensor	Hewlett Packard	8481A

RF Output Power - CFR 47 Part 2.985 (a)

The RF power output was measured with the peak power meter. The output for carrier one was directly connected to peak power meter through a short, low loss cable.

Occupied Bandwidth - CFR 47 Part 2.989

Occupied bandwidth measurements were made with the HP8566B using a resolution bandwidth of 3 kHz, which is approximately 1% of the emission bandwidth.

Radiated Spurious - CFR 47 Part 2.993

Radiated spurious measurements were made at Intertek Testing Services Open Area Test Site in Norcross, GA. The characteristics of this site are filed with the FCC. Please reference FCC Site File: 31040/SIT 1300F2. This site is NVLAP accredited for FCC test methods, NVLAP Code: 100409-0.

The EUT was placed on a wooden table on a flush mounted metal turntable. The transmitter was set to radiate at its maximum power levels and measurements were performed. The maximum signal was detected by varying the receive antenna in height and rotating the transmitter on a turntable. Measurements were made in worst case orthogonal axis.

Cabinet radiation must be at least 43 + 10 Log (P) dB below the fundamental per CFR 47 §24.238(a). For a worst case calculation, the radiated field strength at the fundamental frequency can be calculated assuming the power is radiated from a theoretical dipole antenna with a gain of 1.64. Assuming an output power of 0.1 watt and a test distance of 3 meters, the field strength can be calculated using the following equation.

$$E_r = \frac{\sqrt{30 \times P_t \times G_t}}{d}$$

$$E_r = \frac{\sqrt{30 \times 0.1 \times 1.64}}{3}$$

$$E_r = 0.7494$$

Where E_r is the is the field strength in V/m;
P_t is the power output in Watts from the power amplifier;
G_t is the numerical gain of a theoretical dipole antenna; and
d is the distance in meters between the product and the measurement antenna.

Conducted Spurious Emissions - CFR 47 Part 2.991

The transceiver was terminated into a 50-ohm input of a spectrum analyzer with appropriate attenuation. All spurious emissions greater than 20 dB below the specified value shall be recorded.

The conducted spurious emissions shall be attenuated below the maximum level of the carrier in accordance with the following formula: 43 + log (P), where P is the output power in Watts.

Frequency Stability - CFR 47 Part 2.995

Frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Frequency Stability versus Temperature

The transmitter was placed in an environmental chamber and tested in the range of -30 to +50 degrees Celsius. The transmitter temperature was stabilized at each temperature setting. The power was applied to the transmitter and allowed to stabilize for 15 minutes. The frequency of the transmitter was measured. This procedure was repeated for each 10 degree step up to +50 degrees Celsius.

Frequency Stability versus Power Supply Voltage

The supply voltage was varied from -24.0 to -55.5 Vdc. The normal supply voltage is -48 Vdc. Frequency deviation was measured at the every 6 Volt step from –24 to –54 Vdc, and –55.5 Vdc was chosen because it is 115% of nominal. The voltage was measured at the dc input to the device.

EXHIBIT 13: ANSI C95.1 Compliance

Table 13.1: ERP Calculations

Transmit Maximum ERP Calculation	Output
Total Power for all Channels (Watts)	0.1
Maximum Antenna Gain (dBd)	1.5
Minimum TX Foam Cable Loss, 1-5/8" (dB)	1.0
Minimum TX Jumpers and Adapter Loss (dB)	1.0
Wireless Base Station EIRP (dBm)	19.5
Wireless Base Station EIRP (Watts)	0.089
Wireless Base Station ERP (dBm)	21.6
Wireless Base Station ERP (Watts)	0.144

The Wireless Base Station Unit uses 5 channels at a maximum of 0.1 Watts.

EXAMPLE CALCULATION FOR THE OMNI ANTENNA
P = 0.1, the maximum total power in Watts transmitted by the antenna.
CL = 1.0, the Cable loss in dB.
JAL = 1.0, the loss in dB due to jumpers and adapters.
AG = 1.5, the maximum antenna gain in dBd.

$$ERP(dBm) = 10 \cdot Log(\mathrm{P} \cdot 1000) - CL - JAL + AG$$

$$ERP(dBm) = 10 \cdot Log(0.1 \cdot 1000) - 1.0 - 1.0 + 1.5$$
$$ERP(dBm) = 19.5$$
$$ERP(Watts) = 10^{[\{ERP(dBm) - 30\}/10]}$$
$$ERP(Watts) = 10^{[\{19.5 - 30\}/10]}$$
$$ERP(Watts) = 0.089$$

$$EIRP(dBm) = ERP(dBm) + 2.1$$

$$EIRP(dBm) = 19.5 + 2.1$$
$$EIRP(dBm) = 21.6$$
$$EIRP(Watts) = 10^{[\{EIRP(dBm) - 30\}/10]}$$
$$EIRP(Watts) = 10^{[\{21.6 - 30\}/10]}$$
$$EIRP(Watts) = 0.144$$

MPE at 1.9 GHz

In typical installations, the antenna will be mounted to a tower or above a rooftop by a minimum of 10 meters. Since the total power of all channels is less than 1000W ERP (1640W EIRP), compliance testing with the MPE limits of FCC 96-326 is not required.

The limit for Maximum Permissible Exposure (MPE) at the frequency of 1.96 GHz is 6.53 mW/cm^2. For Occupational/Controlled Exposure using the equation Limit = f/300 per FCC 96-326 and 1.31 mW/cm^2 for General Population/Uncontrolled Exposure using the equation Limit = f/300 per FCC 96-326. The EIRP at 1.96 GHz for the AirSite Remote Radio's directional antenna is 1037 Watts; the transmitted power is 2 Watts.

The conversion from power to power density uses the following equation: $PD = P_r G/4\pi r^2$

Where: PD is Power Density (in W/m^2);
P_r is radiated power (in watts);
G is the numeric gain of the antenna; and
r is the distance (in meters) from the antenna.

The conversion from W/m^2 to mW/cm^2 is: $mW/cm^2 = W/m^2/10$

Calculations:
The distance, r, is dependant on Occupational/Controlled Exposure or Population/Uncontrolled Exposure. The following table illustrates the power density for the antennas used on the ARR. These antennas are located at the top of the cell site tower.

At a distance of r = 1 m from the antenna, the power density is (note that this power density will only be induced on an individual if that individual was physically 1 meters in line-of-site of the antenna):

Table 13.2: Power density calculations for MPE

	Transmit Antenna
Antenna Gain (dBi)	3.6
Numeric gain	2.31
Rated Power (Watts)	0.1
Power Density (W/m^2)	0.002
Power Density (mW/cm^2)	0.0002
Minimum distance, in m, for MPE	0.136

At this power level, an individual would need to be within 0.14 meters of the device in order to be at the limit for controlled exposure.

This EUT, at 1 meter away from the transmit antennas, is well within the limits for maximum permissible exposure.