

## APPENDIX B: Emissions Equipment List

| DESCRIPTION                | MANUFACTURER     | MODEL NUMBER | SERIAL NUMBER | CAL LAB      |
|----------------------------|------------------|--------------|---------------|--------------|
| AMPLIFIER                  | HEWLETT PACKARD  | 11975A       | 2304A00348    | TEST EQUITY  |
| AMPLIFIER (S/A 1)          | RHEIN TECH       | PR-1040      | N/A           | RTL          |
| AMPLIFIER (S/A 2)          | RHEIN TECH       | RTL2         | N/A           | RTL          |
| AMPLIFIER (S/A 3)          | RHEIN TECH       | 8447F        | 2944A03783    | RTL          |
| AMPLIFIER (S/A 4)          | RHEIN TECH       | 8447D        | 2727A05397    | RTL          |
| BICONICAL/LOG ANTENNA 1    | ANTENNA RESEARCH | LPB-2520     | 1037          | LIBERTY LABS |
| BICONICAL/LOG ANTENNA 2    | ANTENNA RESEARCH | LPB-2520     | 1036          | LIBERTY LABS |
| FIELD SITE SOURCE          | EMCO             | 4610         | 9604-1313     | RTL          |
| FILTER (ROOM 1)            | SOLAR            | 8130         | 947305        | RTL          |
| FILTER (ROOM 2)            | SOLAR            | 8130         | 947306        | RTL          |
| HARMONIC MIXER 1           | HEWLETT PACKARD  | 11970K       | 2332A00563    | TELOGY       |
| HARMONIC MIXER 2           | HEWLETT PACKARD  | 11970A       | 2332A01199    | TELOGY       |
| HORN ANTENNA 1             | EMCO             | 3160-10      | 9606-1033     | EMCO         |
| HORN ANTENNA 2             | EMCO             | 3160-9       | 9605-1051     | EMCO         |
| HORN ANTENNA 3             | EMCO             | 3160-7       | 9605-1054     | EMCO         |
| HORN ANTENNA 4             | EMCO             | 3160-8       | 9605-1044     | EMCO         |
| HORN ANTENNA 5             | EMCO             | 3160-03      | 9508-1024     | EMCO         |
| LISN (ROOM 1/L1)           | SOLAR            | 7225-1       |               | ACUCAL       |
| LISN (ROOM 1/L2)           | SOLAR            | 7225-1       |               | ACUCAL       |
| LISN (ROOM 2/L1)           | SOLAR            | 7225-1       | 900078        | ACUCAL       |
| LISN (ROOM 2/L2)           | SOLAR            | 7225-1       | 900077        | ACUCAL       |
| PRE-AMPLIFIER              | HEWLETT PACKARD  | 8449B OPT    | 3008A00505    | TELOGY       |
| QUASI-PEAK ADAPTER (S/A 1) | HEWLETT PACKARD  | 85650A       | 3145A01599    | ACUCAL       |
| QUASI-PEAK ADAPTER (S/A 2) | HEWLETT PACKARD  | 85650A       | 2811A01276    | ACUCAL       |
| QUASI-PEAK ADAPTER (S/A 3) | HEWLETT PACKARD  | 85650A       | 2521A00473    | ACUCAL       |
| QUASI-PEAK ADAPTER (S/A 4) | HEWLETT PACKARD  | 85650A       | 2521A01032    | ACUCAL       |
| RF PRESECTOR (S/A 1)       | HEWLETT PACKARD  | 85685A       | 3146A01309    | ACUCAL       |
| SIGNAL GENERATOR (HP)      | HEWLETT PACKARD  | 8660C        | 1947A02956    | ACUCAL       |
| SIGNAL GENERATOR (WAVETEK) | WAVETEK          | 3510B        | 4952044       | ACUCAL       |
| SPECTRUM ANALYZER 1        | HEWLETT PACKARD  | 8566B        | 3138A07771    | ACUCAL       |
| SPECTRUM ANALYZER 2        | HEWLETT PACKARD  | 8567A        | 2841A00614    | ACUCAL       |
| SPECTRUM ANALYZER 4        | HEWLETT PACKARD  | 8567A        | 2727A00535    | ACUCAL       |
| TUNABLE DIPOLE             | EMCO             | 3121         | 274           | LIBERTY LABS |

## APPENDIX C: Conducted and Radiated Test Methodology

### CONDUCTED EMISSIONS MEASUREMENTS

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

### RADIATED EMISSIONS MEASUREMENTS

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances, in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the ten-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz using a Hewlett Packard 8566B spectrum analyzer, a Hewlett Packard 85650A quasi-peak adapter, and Antenna Research Bilog antenna. In order to gain sensitivity, a RTL PR-1040 preamplifier was connected in series between the antenna and the input of the spectrum analyzer.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. When any clock exceeds 108 MHz, the EUT was tested between 1 to 2 Gigahertz in peak mode with the resolution bandwidth set at 1 MHz as stated in ANSI C63.4. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

*Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.*