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APPLICANT: KA WAH MANUFACTORY LIMITED

FCC ID: F5J604208

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#### TEST EQUIPMENT LIST

1. Spectrum Analyzer: Hewlett Packard 8566B, with preselector HP 85685A, & Quasi-Peak Adapter HP 85650A, & HP 8449B OPT H02 Cal. 9/30/97
2. Eaton Biconnical Antenna Model 94455-1 20-200 MHz Serial No. 0997 Cal. 9/17/97
3. Electro-Metric Dipole Kit, 20-1000 MHz, Model TDA 25 cal. 5/15/97
4. Electro-Metric Horn 1-18 GHz, Model RGA-180, Cal. 9/24/97
5. Electro-Metric Antennas Model TDS-25-1, TDS-25-2, 9/3/97
6. Electro-Metric Line Impedance Stabilization Network Model No. EM-7821, Serial No. 101; 100KHz-30MHz 50uH. 9/30/97
7. Electro-Metric Line Impedance Stabilization Network Model No. EM-7820, Serial No. 2682; 10KHz-30MHz 50uH. 9/30/97

#### TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a preselector. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz. The ambient temperature of the UUT was 74.5oF with a humidity of 74%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

|            |                                        |
|------------|----------------------------------------|
| Freq (MHz) | METER READING + ACF = FS               |
| 33         | 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m |

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 74.5oF with a humidity of 74%.

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TEST PROCEDURES CONTINUED

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ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES: The unit under test was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSIC63.4-1992 with the EUT 40 cm from the vertical ground wall.

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CIRCUIT DESCRIPTION:

In the transmit mode the momentary switches SW-L, SW-R, SW-B, & SW-F provide input to the encoder intergrated circuit U1. The output of U1 modulates the RF output stage Q2 via Q3 by varing the emitter current. The crystal oscillator Q1 is coupled to the modulated stage Q2 via C3. From Q2 the signal is fed through a doubled tuned circuit T11,C12 and then to the filter made up of C9, C7, L2, C8, & L3. The output ofthe filter is connected to the antenna.

ANTENNA AND GROUND CIRCUITRY

This unit makes use of a extended length 9 inch antenna. The antenna is inductively coupled. This unit is powered from a 9.0V battery.

No ground connection is provided. The unit relies on the ground tract of the printed circuit board.

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NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.227

REQUIREMENTS: CARRIER FREQUENCY WILL NOT EXCEED 80 dBuV/m AT 3M.  
OUT-OF-BAND EMISSIONS SHALL NOT EXCEED:

|               |                                  |
|---------------|----------------------------------|
| 30 - 88 MHz   | 40.0 dBuV/M MEASURED AT 3 METERS |
| 88 - 216 MHz  | 43.5 dBuV/M                      |
| 216 - 960 MHz | 46.0 dBuV/M                      |
| ABOVE 960 MHz | 54.0 dBuV/M                      |

TEST DATA:

| EMISSION<br>FREQUENCY<br>MHz | METER READING<br>AT 3 METERS<br>dBuV | COAX<br>LOSS<br>dB | ANTENNA<br>CORRECTION<br>FACTOR dB | FIELD<br>STRENGTH<br>dBuV/m@3m | MARGIN<br>dB | ANT.<br>POL. |
|------------------------------|--------------------------------------|--------------------|------------------------------------|--------------------------------|--------------|--------------|
| 27.15                        | 48.50                                | 0.20               | 11.75                              | 60.45                          | 19.55        | V            |
| 54.29                        | 24.80                                | 0.80               | 9.61                               | 35.21                          | 4.79         | V            |
| 81.44                        | 24.30                                | 0.80               | 12.13                              | 37.23                          | 2.77         | V            |
| 108.58                       | 23.40                                | 0.80               | 8.38                               | 32.58                          | 10.92        | V            |
| 135.73                       | 9.10                                 | 0.80               | 15.32                              | 25.22                          | 18.28        | V            |
| 162.87                       | 7.30                                 | 0.90               | 17.17                              | 25.37                          | 18.13        | V            |
| 190.02                       | 8.30                                 | 0.90               | 13.67                              | 22.87                          | 20.63        | H            |
| 217.16                       | 10.30                                | 1.20               | 12.42                              | 23.92                          | 22.08        | H            |
| 244.31                       | 16.30                                | 1.20               | 13.21                              | 30.71                          | 15.29        | H            |
| 271.45                       | 20.10                                | 1.40               | 14.00                              | 35.50                          | 10.50        | H            |
| 298.60                       | 19.20                                | 1.40               | 15.61                              | 36.21                          | 9.79         | H            |
| 325.74                       | 18.50                                | 1.40               | 14.85                              | 34.75                          | 11.25        | H            |
| 352.89                       | 28.40                                | 1.40               | 15.63                              | 45.43                          | 0.57         | H            |
| 380.03                       | 17.90                                | 1.40               | 16.42                              | 35.72                          | 10.28        | H            |
| 407.18                       | 9.00                                 | 1.60               | 17.17                              | 27.77                          | 18.23        | H            |
| 434.33                       | 5.20                                 | 1.60               | 17.79                              | 24.59                          | 21.41        | H            |

SAMPLE CALCULATION:

FSdBuV/m = MR(dBuV) + ACFdB.

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NAME OF TEST: RADIATION INTERFERENCE CONTINUED

TEST PROCEDURE: The procedure used was ANSI STANDARD C63.4-1992. The spectrum was scanned from 30 MHz to 1000 MHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The UUT was tested in 3 orthogonal planes.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

PERFORMED BY: S. S. SANDERS

DATE: MAY 15, 1998

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NAME OF TEST: Occupied Bandwidth  
RULES PART NO.: 15.227  
REQUIREMENTS: The field strength of any emissions appearing outside the 26.96-27.28 MHz band shall not exceed 100 uV/m (15.209).

THE GRAPH ON THE FOLLOWING PAGE REPRESENTS THE WORSE CASE OCCUPIED BANDWIDTH EMISSIONS FOR THIS DEVICE.

METHOD OF MEASUREMENT: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was taken. The vertical scale is set to -10 dBm per division. The horizontal scale is set to 5 kHz per division.

TEST RESULTS: The unit DOES meet the FCC requirements.

PERFORMED BY: S. S. SANDERS

MAY 15, 1998

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