CERTIFICATION

OF A

SCANNING RECEIVER

UNDER CFR TITLE 47, PART 15.109, PART 15.121

GRANTEE: **TAIYO MUSEN CO., LTD.**

FCC ID: BAA9JKTD-L1630

October 2, 2006

Prepared By:

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APPLICATION FOR CERTIFICATION

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TEST: FIELD STRENGTH OF RADIATED EMISSIONS

Grantee: TAIYO MUSEN CO., LTD.

FCC ID: BAA9JKTD-L1630

Setup:

The equipment under test (EUT) was configured and operated in accordance with the applicable provisions of ANSI C63.4-2003, Section 6, 12. Measurements were made in accordance with applicable paragraphs of Section 8.2.2 and 8.2.3, Section 12.1.1.1 Appendix D, Section 12.1.4 and Appendix H3 and H4 where applicable.

The EUT was placed on a 1 by 1.5 meter table located 40 cm above a 2-meter diameter non-metallic turntable that sits 40 cm above the 15 X 30 meter ground plane at Spectrum's Open Area Test Site. The bi-conilog antenna was mounted on a tower spaced at a three meters distance, and arranged for adjustment in height (1-4 meters) and vertical/horizontal polarization to maximize the emissions levels when combined with turntable rotation of the EUT. An Agilent E7405AHP spectrum analyzer with its internal amplifier was used for the peak measuring instrumentation.

Discussion:

No modifications were required prior to the final radiated emissions measurements made February 1, 2006 and reported herein.

The EUT is a computer controlled synthesized triple super-heterodyne receiver used for automatic digital direction finding. The receiver operates in the 110 – 169.995 MHz spectrum. The receiver is designed for installation in a marine vessel and used to receive incoming signals and display direction or relative bearing to the source, with respect to the bow of the ship.

The receiver has four modes of operation. Measurements were made in all four modes. In Manual Mode and Spot Mode the receiver was set to operate at 112.00, 140.00, and 168.00 MHz for a low mid and high channel covering the 60 MHz wide band of the receiver. In Manual Mode, the frequency desired is entered on the front panel, in Spot Mode, the frequency is retrieved from 1 of 30 programmable memory selections but both remain on a single frequency. In Search Mode, the receiver scans a range limited to +/-500 kHz of the center frequency. The above three frequencies were also used while testing Search Mode of operation. In the Scanning Mode of operation, the receiver can be programmed to scan 3 groups of up to 10 channels per group. During testing channels were programmed spaced across the 60 MHz band of operation.

Preliminary measurements were made as described in Section 8.3.11 and 13.1.4.1 with the receiver operating as described. During preliminary measurements only low levels of emissions were detected.

The EUT configuration is detailed in the photographs included with this report.

The final set of measurements was made on February 1, 2006. The measurements specified in ANSI C63.4-2003, Section 8.3.1.2 and 13.1.4.2 were made as specified in Section 13.1.1. The receiver position is detailed in the photographs of the EUT setup submitted herein.

The EUT was 14 VDC powered with an Astron VS-35-M power supply during all of the measurements. RBW and VBW of 100 kHz were used for measurements below 1 GHz. RBW and VBW of 1 and 3 MHz were used above 1 GHz. We endeavored to maximize levels of the emissions with EUT rotation and adjustment of antenna height and polarization.

Measurements were made over the frequency range of 30 - 2000 MHz. The only emissions observed at three meters were in the frequency range of 390 MHz to 425.9 MHz. The worst case levels observed from either fixed frequency selection or while in scanning mode are reported on the following page.

The Model: EA-35-351A H type Adcock antenna tested with the unit is the only antenna intended for use with the TD-L1630. The receiver easily complied with the radiated requirements with a 12 dB margin with the H type Adcock antenna connected. Accordingly, antenna conducted emissions measurements were not made nor are they required.

Conclusion:

The TAIYO MUSEN CO., LTD. FCC ID: BAA9JKTD-L1630, Automatic Direction Finder Receiver when operated and measured as discussed above, meets the receiver radiated spurious emissions requirements under Title 47, CFR Part 15.109(a). This receiver is not subject to the transition provisions of Part 15.37.

TEST: FIELD STRENGTH OF SPURIOUS RADIATED EMISSIONS

Grantee: **TAIYO MUSEN CO., LTD.**

FCC ID: **BAA9JKTD-L1630**

Model: **TD-L1630**

Minimum Standard Specified: Part 15.109 (a)
Authorization Procedure: Part 2.1053
Frequency Range Observed: 30 to 2000 MHz Date: 2/01/06
Test Equipment Setup: Please refer to the block diagram and test setup photos in Appendix 1.

RADIATED HARMONIC AND SPURIOUS EMISSIONS									
Frequency MHz	**Max. Spectrum Analyzer Reading dBu/V**	**Ant. Vert. or Horz.**	**Peak or Quasi-peak Detector**	**Antenna Factor dB**	**Cable loss dB**	**Amp Gain dB**	**Corrected Reading dBuV/m**	**Limit Quasi-Pk dBu/V**	**Margin in dB below LIMIT**
390.0	12.87	V	Peak	16.1	3.15	-Inc.-	32.12	46	13.88
397.9	17.23	V	Peak	16.1	3.15	-Inc.-	36.48	46	9.52
401.6	18.44	V	Peak	16.1	3.20	-Inc.-	37.74	46	8.26
403.0	17.07	V	Peak	16.1	3.20	-Inc.-	36.37	46	9.63
405.0	19.40	V	Peak	16.1	3.20	-Inc.-	38.70	46	7.30
407.0	19.65	V	Peak	16.1	3.20	-Inc.-	38.95	46	7.05
411.6	18.02	V	Peak	16.2	3.25	-Inc.-	37.47	46	8.53
413.1	19.43	V	Peak	16.2	3.25	-Inc.-	38.88	46	7.12
417.0	17.22	V	Peak	16.3	3.30	-Inc.-	36.82	46	9.18
422.4	21.58	V	Peak	16.4	3.35	-Inc.-	41.33	46	4.67
423.6	19.23	V	Peak	16.4	3.35	-Inc.-	38.98	46	7.02
425.9	13.72	V	Peak	16.4	3.35	-Inc.-	33.47	46	12.53

TEST: CELLULAR IMAGE REJECTION

As required by Part 15.121(b).

Measurements were made to measure the spurious image rejection for cellular frequencies of the TDL1630 scanning receiver.
A signal generator was set up with 1 kHz modulation and +/- 3 kHz deviation and set to one of the six test frequencies. The signal generator output was fed to the receiver input at one of the test frequencies while the complete receiver frequency range was scanned. The receiver "Squelch Threshold" was measured at 5 dBuV. The signal generator output was set to 60 dBuV based on (38 dB (FCC limit) + 27(added margin) = 65 dB
The TD-L1630 can only continuously scan increments of +/- 500kHz of the Fo entered stepping every 5 kHz over this range. The manual refers to this function as Search. The term Scan in the product manual refers to Scanning preprogrammed channels in memory. The receiver was manually programmed One channel at a time every 1 MHz from 110.00 to 170.00 MHz covering the band. At each entered frequency the receiver would scan +/- 500 kHz of the programmed center frequency in 5 kHz steps and then the next channel would be entered and the step repeated. The Hold button was depressed to lock the receiver on any spurious signal it might receive while scanning. This procedure was followed for each of the test frequencies while the receiver scanned over its band of operation 1 MHz at a time.

A) Initial Screening
A-1) Power EUT adjusted speaker volume adjusted squelch A-2) Set the signal generator for an in band channel mid band receiving range at 140.00 MHz A-3 Programmed Frequency of 140.00 MHz into EUT A-4) Measured the receiver "Squelch Threshold" at –5 dBuV A-5) Set the signal generator for one of the six test frequencies. Set the RF output level of the signal generator to 60 dBuV. The 60 dBuV level corresponds approximately to 65 dB above the "Squelch Threshold" sensitivity measured at –5 dBuV. This would be approximately 27 dB above the FCC Limit (6538 = 27dB). A-6) Enable EUT and program frequencies as described above 1 MHz at a time. A-7) List detected frequencies. ***None were detected.*** A-7) Repeat for remaining test frequencies.
Note: No Image/Spurious was detected during this test. However, had frequencies been detected we would have proceeded as follows:
b) Measuring the Image Rejection Ratio
B-1) Based on the results of the Initial screening, both the EUT and signal generator shall be set to each frequency the receiver detected (A7 above). Connect a resistive termination to the receiver audio output and set the squelch control for open squelch.
B-2) Adjust and record the RF output level of the signal generator to obtain a 12 dB SINAD on the EUT. The signal generator output level at which the 12 dB SINAD is achieved is the receiving sensitivity of the EUT and not tight squelch sensitivity. B-3) Adjust the frequency of the signal generator to the cellular test channel associated with signals detected in A-7. Adjust and record the RF output of the signal generator to obtain a 12 dB SINAD on the EUT. B-4) The image Rejection Ration is obtained as the difference between steps B-2) and B-3)

Test Data

Limit: All Image/Spurious must be 38 dB below the limit

Cellular Channel Test Frequencies In MHz	Frequency in MHz Image/Spurious detected while scanning	Image Rejection Ratio in dB
824.010	None	
836.520	None	
849.000	None	
869.010	None	
881.520	None	
894.000	None	

Block Diagram