SE 125 SYSTEM TEST REPORT

Below is the data required by 47CFR2.1046 through 47CFR2.1057

List of Measurement Equipment Used

Equipment	Serial Number	Calibration Date
HP8591E Spectrum Analyzer	3543A04924	21OCT11
Tektronix 475	B020865	17FEB11
HP 3585B	3008A01748	18NOV03*
BK Precision 1803D Freq Counter	362 1000 0174	05DEC11
HP5314A Freq Counter	2036A09572	05DEC11
Yokogawa WT200 Power Meter	12W506562	28JUN11

*Usage of this equipment was completed while still in calibration. Data from previous tests were used.

47CFR2.1046 Measurements required: RF output power.

A Tektronix TAS 475 oscilloscope was used to verify the proper RF Power at the transmitter's output terminals terminated into a 50 Ohm Non Inductive dummy load. Power was calculated using the formula Watts = $(Vpp/(2\cdot\sqrt{2}))^2/50$. The system operating frequency was 320 KHz

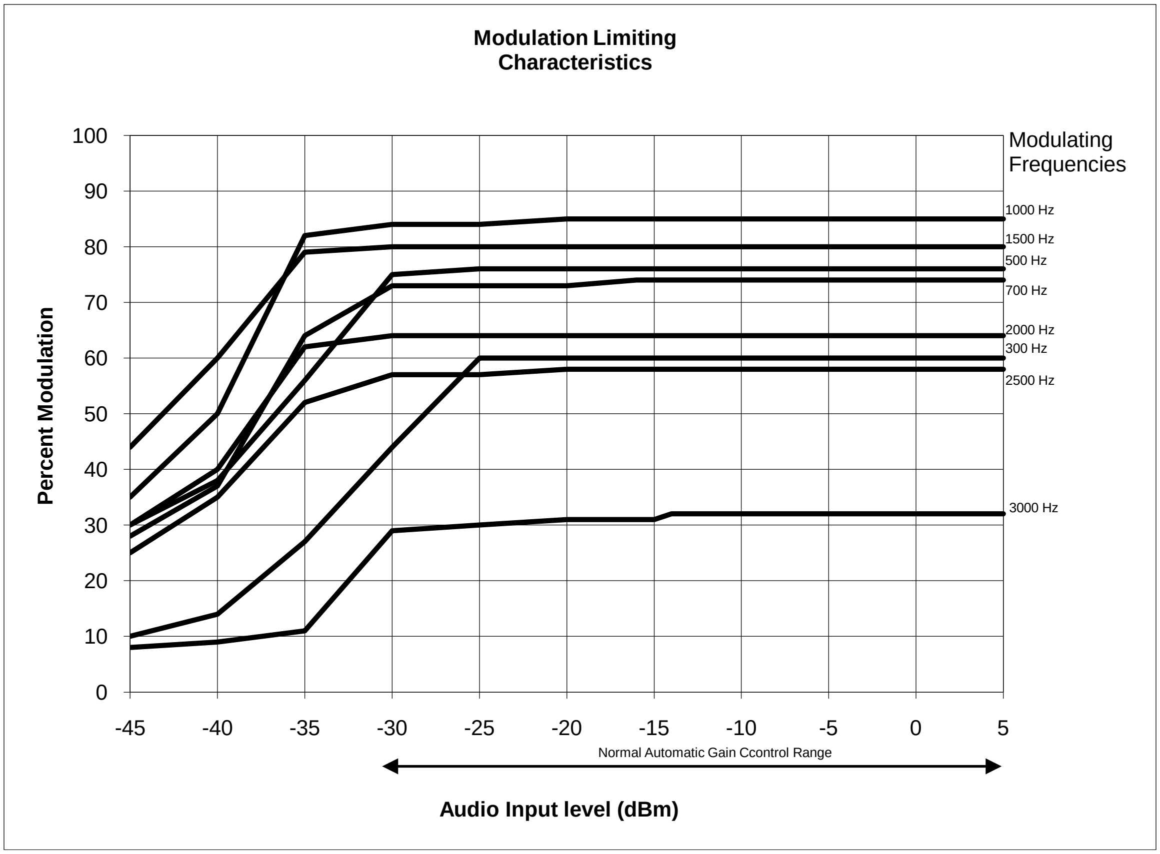
Description of below chart column headers:
Watts = Calculated output power at 50 Ohm non inductive load
Vpp = Peak to Peak Voltage read across an external 50 Ohm non inductive load

Transmitter Power Meter Reading	Voltage Across 50 Ohm Load (Vpp)	Calculated Power (Watts)
10	63	9.92
15	77	14.82
20	89	19.80
25	100	25.00
50	142	50.41
75	173	74.82
100	200	100.00
125	224	125.44

47CFR2.1047 Measurements required: Modulation characteristics.

(a) The Hewlett Packard 3585B Spectrum analyzer was connected to the input of the pulse width modulator on the TX1 board. The tracking generator output was connected to the audio input terminals. The system was setup per the manual and the frequency was swept from 0 to 6000 Hz. Figure 1 in Appendix A shows this curve. Figure 2 in Appendix A shows the audio band-pass filter.

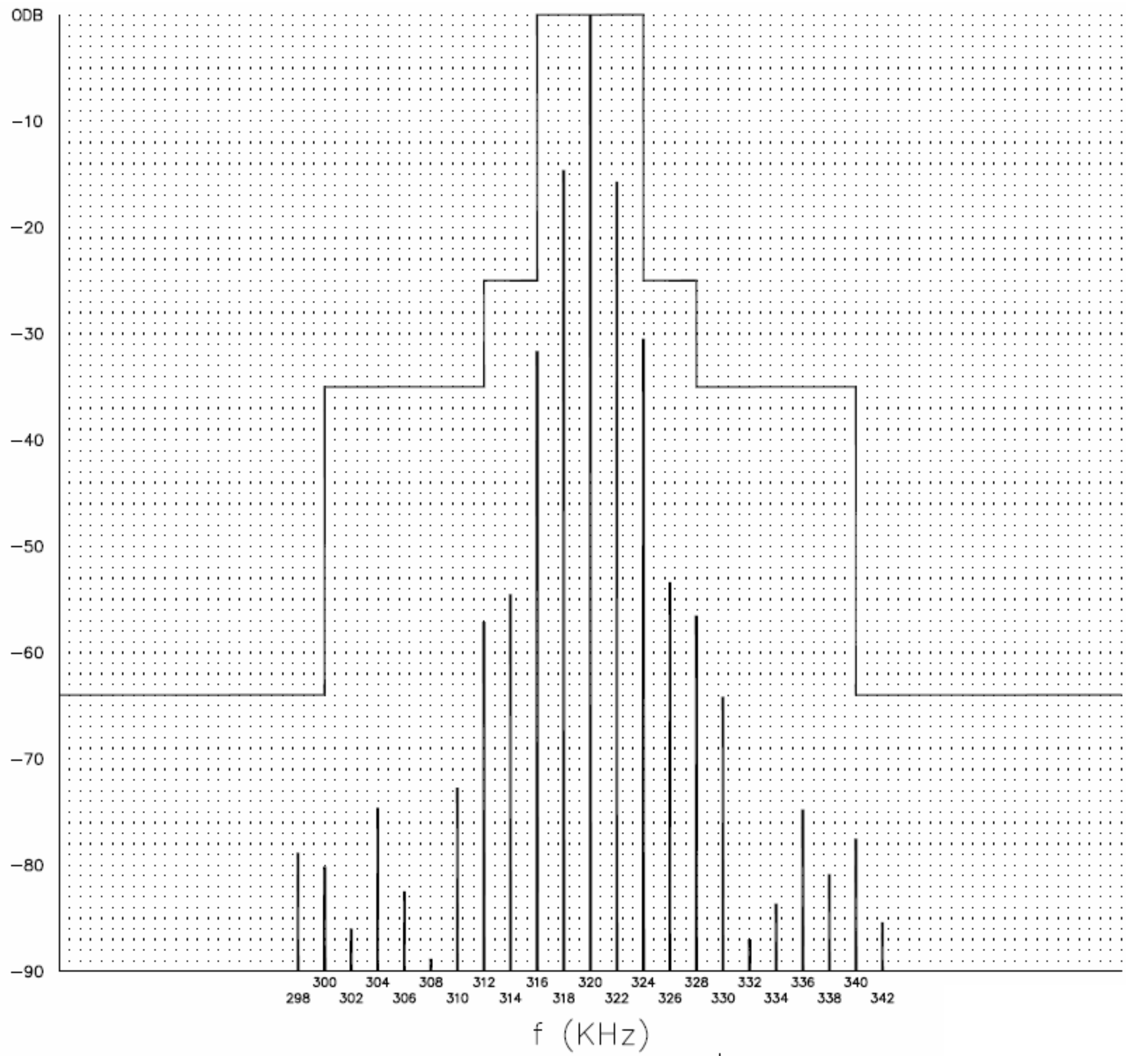
(b) A typical transmitter was set up for 100 Watts into a 50 Ohm dummy load. The voice circuitry was adjusted for an 85% modulated signal at 1000 Hz with an input of –17dBm. The frequency was adjusted from 300 Hz to 3000 Hz while adjusting the audio input level from –45dBm to +5dBm. The "Modulation Limiting Characteristics" graph below shows the modulating limiting capability of the Automatic Gain Control circuit. The roll off in percent modulation at the different frequencies is due to the in line band-pass filter.



These measurements were made on 01APR04. The circuitry and performance remains unchanged.

47CFR2.1049 Measurements required: Occupied bandwidth.

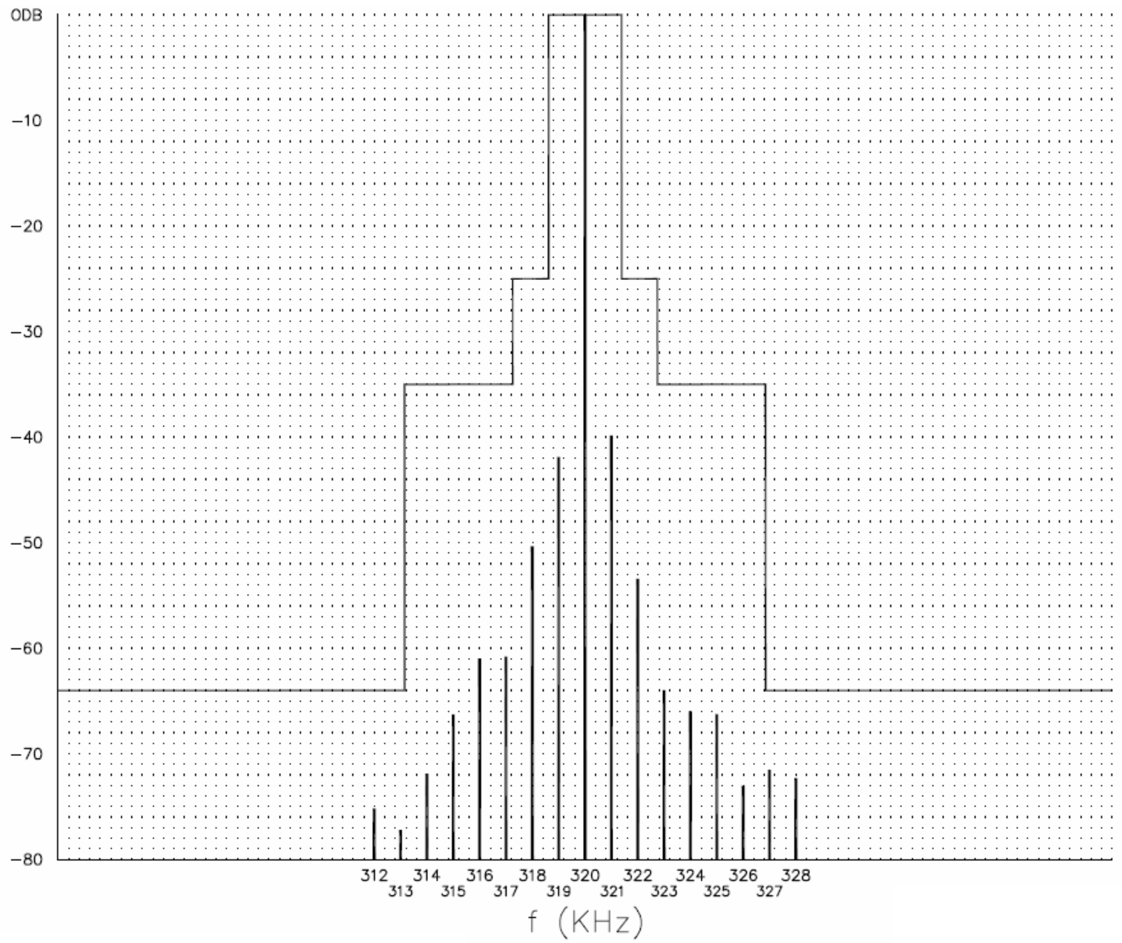
A3E emission - The transmitter was set to 125 Watts into a 50 Ohm non inductive dummy load. The system was adjusted for 50% modulation with an input of (-17dBm) 2500Hz using a Wavetek 136 Signal Generator, verifying the frequency with a BK Precision 1803D Frequency Counter. The input was increased by 16 dBm with the Automatic Gain Control (AGC) circuit adjusted to limit at 95% modulation. The measurements for the spectrum shown below were made using a Hewlett Packard 5891E Spectrum Analyzer.



NOTES: 1. THIS DWG NO. SD733000 REV. 1.
2. TITLE: TYPE CERTIFICATION SE125 OCCUPIED BANDWIDTH (125 WATTS) A3E DIAGRAM.

47CFR2.1049 Measurements required: Occupied bandwidth.

A2A emission - The transmitter was set to 125 Watts into a 50 Ohm dummy load. The system was adjusted for 95% modulation with an internally produced identifier tone of 1020 Hz. The measurements for the spectrum shown below were made using a Hewlett Packard 8591E Spectrum Analyzer.

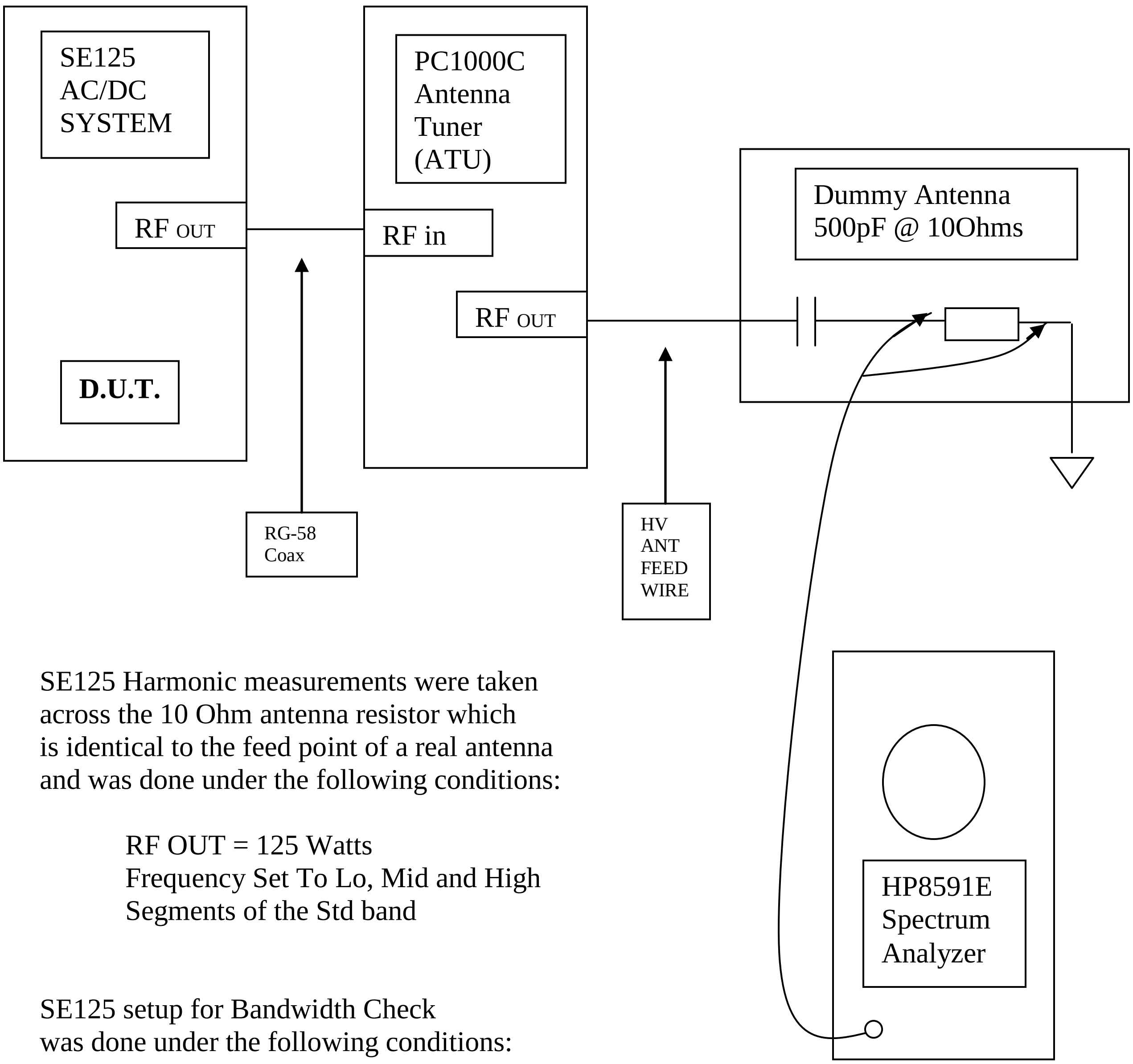


NOTES: 1. THIS DWG NO. SD733001 REV. 1.
2. TITLE: TYPE CERTIFICATION SE125 OCCUPIED BANDWIDTH (125 WATTS) A2A DIAGRAM.

TEST RATIONALE

Occupied bandwidth was tested and documented in the Standard Band. This is because internal transmitter operation (specifically the modulator section) is virtually identical across all its bands. The only difference between the Standard, M and H bands is the final RF filter section. However, this section has no effect on occupied bandwidth, since they are virtually flat with no more than 1dB loss from 100 kHz to the top end of the band it is strapped for. For this reason testing at different RF frequencies was deemed redundant and unnecessary. A cursory test bore this assumption out.

Spurious Harmonics and Occupied Bandwidth Test Set-Up



SE125 Harmonic measurements were taken across the 10 Ohm antenna resistor which is identical to the feed point of a real antenna and was done under the following conditions:

RF OUT = 125 Watts
Frequency Set To Lo, Mid and High
Segments of the Std band

SE125 setup for Bandwidth Check was done under the following conditions:

RF OUT = 125 Watts
Frequency Set To 320kHz

Image of equipment under test

Front view showing the Transmitter, ATU, Spectrum analyzer, and Dummy antenna on top of ATU. Spectrum Analyzer is attached across dummy antenna 10 Ohm resistor. White Insulator is the antenna feed-point which is connected to the Dummy Antenna. Spectrum Analyzer is 8591E.

47CFR2.1051 Measurements required: Spurious emissions at antenna terminals.

The transmitter was connected to a dummy antenna through the PC-1000C3 antenna tuning unit. The dummy antenna was 10 Ohms in series with 500 pF. The equipment was operated at 125 Watts in each of the STD band filter segments. The spectrum was observed for each case with a HP8591E Spectrum Analyzer. Results are tabulated below. All spurious emissions are dB relative to carrier.
Measurements made 17JUL2012.

Frequency (KHz)	2 x Freq	3 x Freq	4 x Freq	5 x Freq	All Other Frequencies
190	63.14	67.33	69.59	<70	<70
200	63.92	68.17	<70	<70	<70
210	63.36	68.81	<70	<70	<70
220	64.47	69.59	<70	<70	<70
230	63.15	68.31	<70	<70	<70
240	65.71	69.95	<70	<70	<70
250	64.31	69.34	<70	<70	<70
260	64.24	68.33	<70	<70	<70
270	64.50	68.72	<70	<70	<70
280	65.55	68.37	<70	<70	<70
290	65.80	68.54	<70	<70	<70
300	64.66	68.61	<70	<70	<70
310	64.22	69.09	<70	<70	<70
320	64.47	69.13	<70	<70	<70
330	64.21	69.56	<70	<70	<70
340	65.81	68.84	<70	<70	<70
350	63.97	69.93	<70	<70	<70
360	65.44	69.05	<70	<70	<70
370	66.19	68.93	<70	<70	<70
380	63.68	<70	<70	<70	<70
390	65.32	69.41	<70	<70	<70
400	65.44	69.55	<70	<70	<70
410	66.35	69.68	<70	<70	<70
420	63.12	<70	<70	<70	<70
430	63.79	69.53	<70	<70	<70
440	64.26	<70	<70	<70	<70
450	63.87	<70	<70	<70	<70
460	63.82	<70	<70	<70	<70
470	63.38	<70	<70	<70	<70
480	63.17	<70	<70	<70	<70
490	63.20	<70	<70	<70	<70
500	63.55	<70	<70	<70	<70
510	64.07	<70	<70	<70	<70
520	63.52	<70	<70	<70	<70
530	63.37	<70	<70	<70	<70
535	63.45	<70	<70	<70	<70

TEST RATIONALE

Harmonic testing was performed at the antenna input terminal for the full range of each band segment requiring a different passive filter module. These filter modules almost exclusively determine the final harmonic and spurious signal content and therefore the system needed to be tested in each major band segment involving a different filter.

The test was done at maximum normal transmitter output of 125 Watts. The SE Series is designed to operate smoothly and continuously from 10 to 125 Watts. Therefore harmonic testing was accomplished at maximum power output where worst case stress on the final Power Amplifier FETs and subsequent filter components occurs and maximum harmonic and spurious energy content exists.

47CFR2.1053 Measurements required: Field strength of spurious radiation

Testing was done for compliance of Article 3.1(b) of European Community Council Directive. Testing showed conformance to emission requirements of EN 61000-6-4, with radiated emissions test CISPR 16-2-3 Edition 3.0:2010

Testing was done by RETLIF Laboratories, Test Report R-1513P-2.

Relevant information regarding these emissions tests, including a certificate of compliance, is shown in an excerpt from the test document below. The full report is available upon request.

CERTIFICATE OF CONFORMANCE
ARTICLE 3.1(b) OF EUROPEAN COMMUNITY COUNCIL DIRECTIVE 1995/5/EC, R&TTE DIRECTIVE

Date of Issue:	May, 2010
Issued By:	Retlif Testing Laboratories 3131 Detwiler Road Harleysville, PA 19438
Issued To:	Southern Avionics Company 5000 Belmont Street Beaumont, TX 77706
Reference:	Retlif Report Number R-1513P-2

Retlif Testing Laboratories hereby acknowledges that compliance testing in accordance with the below listed standards was performed on a representative sample of the equipment listed below. Retlif Testing Laboratories further acknowledges that the test sample listed below was found to be in compliance with these standards.
This certificate is hereby issued to the above named grantee and is valid only for the equipment identified below.

Manufacturer:	Southern Avionics Company 5000 Belmont Street Beaumont, TX 77706
Equipment Tested:	Non-Directional Beacon
Model Number:	SE250 / SE125
Serial Number:	33022XX010001
Brand Name:	SE Series Transmitter
Product Type:	Generic Heavy Industrial

Note(s):1) See attached report R-1513P-2 for details and/or conditions pertaining to this certificate.
2) Conforms to the emissions requirements of EN 61000-6-4:2007:

CISPR 16-2-1 Edition 2.0:2008	Conducted Emissions
CISPR 16-2-3 Edition 3.0:2010	Radiated Emissions
IEC 61000-3-2 Edition 3.2:2009	Harmonic Current Emissions
IEC 61000-3-3 Edition 2.0:2008	Voltage Fluctuations and Flicker

3) Conforms to the immunity requirements of EN 61000-6-2:2005:

IEC 61000-4-2 Edition 2.0:2008-12	Electrostatic Discharge
IEC 61000-4-3 Edition 3.1:2008-04	Radiated Immunity
IEC 61000-4-4 Edition 2.0:2004-07	EFT/Burst, Power and I/O Leads
IEC 61000-4-5 Edition 2.0, 2005-11	Surge Immunity, Power Leads
IEC 61000-4-6 Edition 3.0:2008-10	Conducted Immunity, Power and I/O Leads
IEC 61000-4-8 Edition 2.0:2009-09	Power Frequency Magnetic Fields
IEC 61000-4-11 Edition 2.0:2004-03	Voltage Dips and Interrupts

4.0 General Requirements

4.1 Test Environment

All testing was performed at the Retlif Testing Laboratories Harleysville, Pennsylvania facility. Each test method was performed in the environment specified within the test standard. Where the test environment deviated from that specified, it is noted in the applicable test method.

4.1.1 Shielded Enclosures

All testing which required the use of a shielded enclosure was performed in a solid steel, double wall, modular type. The attenuation characteristics of the enclosure were in accordance with IEEE-Std-299. All input power lines to the enclosure were filtered utilizing filters manufactured in accordance with MIL-PRF-15733H and tested in accordance with MIL-STD-220B. The walls of the enclosure were treated with a combination of carbon impregnated foam and ferrite tile. For IEC 61000-4-3, the floor between the EUT and test antenna was treated with ferrite tile. The enclosure met the field uniformity requirements contained therein.

4.1.2 Conducted Emissions

All conducted emissions testing described herein was performed on a conducting ground plane. The conducting ground plane for measuring AC power line conducted emissions consisted of a floor-earth grounded conducting surface. The conducting surface was a minimum of 2.0 meters x 2.0 meters in size and extended at least 0.5 meters beyond the vertical projection (footprint) of the EUT. The ground plane was covered by insulating material 10 millimeters thick.

4.1.3 Radiated Emissions

4.1.3.1 Preliminary

Preliminary radiated emissions measurements were performed in a shielded enclosure.

4.1.3.2 Formal

Formal radiated emissions testing was performed on an open area test site (OATS). The test site measurements were in accordance with CISPR 16. The conducting ground plane was constructed of one quarter inch ground cloth. The equipment under test was placed in an RF transparent enclosure on top of a flush mounted, metallic turntable. The test site met the test site attenuation requirements specified in CISPR 16 throughout the range of measurement frequencies.

4.2 Test Instrumentation

A listing of all test instrumentation utilized is contained within each applicable test method. These listings indicate the model, manufacturer, frequency range, last calibration date and calibration due date of all instrumentation utilized. All instrumentation utilized was calibrated prior to use in accordance with the procedures set forth in Retlif Testing Laboratories standard manuals RCM-001 and RQM-001 which are in accordance with the requirements of ANSI/NCSL Z-540.1.

4.2.1 Measurement Uncertainty

In accordance with ISO/IEC 17025, Retlif Testing Laboratories has produced an estimate of the uncertainty of its measurements using accepted methods of analysis, through the production and application of suitable uncertainty of measurement procedures. For emissions testing, measurement uncertainty has been calculated in order to provide a confidence level of 95% (K=2.0). For immunity/susceptibility testing, measurement uncertainty has been calculated to provide a minimum confidence level of 90% (K=1.64). The results of these calculations are shown in the table below:

Table 2 - Measurement Uncertainty

Test Method	**Confidence Level**	**Probability Distribution**	**K**	**Expanded Uncertainty**
Conducted Emissions	95 %	Normal	2.00	3.72 dB
Radiated Emissions	95 %	Normal	2.00	6.10 dB
Harmonics	95 %	Normal	2.00	3.19 %
Flicker	95 %	Normal	2.00	5.10 %
Radiated Immunity	90 %	Normal	1.64	1.80 dB
Conducted Immunity	95 %	Normal	2.00	2.21 dB
Magnetic Immunity	95 %	Normal	2.00	1.44 dB

For Electrostatic Discharge (ESD), Electrical Fast Transient/Burst (EFT/B) and Surge immunity testing, the test methods specify the limits to the values of the major sources of uncertainty of measurement. The test equipment utilized to perform these tests has been determined to meet the requirements of the relevant standards and the results have been reported in accordance with the relevant standards. Therefore, the requirements for measurement uncertainty are deemed to have been satisfied.

4.3 Detector Function

For the conducted emissions testing described herein Peak, Quasi-Peak and Average detector functions in accordance with CISPR 16 were utilized.

For the radiated emissions testing described herein a Quasi-Peak detector function in accordance with CISPR 16 was utilized.

5.0 Description of Equipment Under Test

5.1 EUT Description

The EUT is an SE Series dual transmitter module, Non-Directional Beacon that can be configured as either a 250 watt (SE250) or as a 125 watt (SE125). It consists of four major assemblies housed in a standard 19”, IP66 enclosure. The assemblies which are common between the SE125 and the SE250 include the master control panel, two (2) transmitters, and al power control panel. The transmitter operates in three standard frequency ranges: 190 kHz to 650 kHz, 500 kHz to 1250 kHz and 1500 kHz to 1800 kHz. All digital control and RF assemblies are identical between frequency ranges with the exception of the RF filter module. The only difference between an SE125 and an SE250 is the size of the power supply in the transmitter module. The SE125 has a 350 watt unit and the SE250 uses a 750 watt model. All other major components are the same between models.

5.1.1 Designations

Table 3 details the equipment nomenclature, Model Number and Serial Number, where applicable, of all EUT system components, if applicable.

Table 3 - EUT Designations

Description	Manufacturer	Model Number	Serial Number
Non-Directional Beacon System	Southern Avionics	SE250 (250 watts) SE125 (125 watts)	33022XX010001
Master Control Panel		SLM33000	N/A
(2) Transmitter Drawer		SLE33100	
Power Control Panel		SLM33003	

5.1.2 Physical Characteristics

Table 4 details the physical characteristics of all EUT components, if applicable.

Table 4 - Physical Characteristics

Description	Depth (cm)	Width (cm)	Height (cm)	Weight (kg)
Non-Directional Beacon System	48.0	54.0	81.0	40.6
Master Control Panel	38.0	48.0	22.2	1.5
(2) Transmitter Drawer	38.0	48.0	22.2	14.0
Power Control Panel	38.0	48.0	8.9	0.5

5.2 Electrical Characteristics

5.2.1 Power Input

Table 5 details the electrical power requirements of all EUT components:

Table 5 - Power Input

Description	Input Voltage	Frequency	Current	Phase(s)
Non-Directional Beacon	230 V	50 Hz	2.3 Amps	Single
*External Battery	48 V	DC	4.6 Amps	N/A

* External battery is for backup power in case of AC input failure and is provided for a detached battery pack, therefore, conducted emissions on this port is not required.

5.2.2 Highest Clock Frequency

The highest clock frequency generated or used by the EUT was 32 MHz.

5.3 EUT Configuration

For all test methods, the EUT was configured as shown in the General Test Setup drawing, Figure 1.

5.3.1 Power Leads and Interconnecting Cables

All power and interconnecting cables, including cable length, routing and type were as specified in Table 6:

Table 6 - EUT Interconnecting Cable Configurations

Description	EUT Port	Cable Length (Meters)	Signal Description	Cable Description	Routed To
EUT	Ground Lug	1.54	Ground	Unshielded/ 10 AWG, Standard	Ground Plane
EUT	J50	2.24	RF Output	Shielded/ RG-58 Lu Coax	Attenuator
EUT	J1	6.15	Ethernet	Shielded/ CAT5 24 AWG, 6 Conductor	Laptop
Attenuator	Output	7.70	RF Output	Shielded/ RG-58U/Coax	Oscilloscope
EUT	TB6	1.86	Mains Cord	Unshielded/ 14 AWG, 3 Wire	AC Input
EUT	TB5	3.00	DC In + 48 V	Unshielded/ 10 AWG, Standard	Batteries
EUT	TB3	3.00	Serial Interface	Shielded/ 24 AWG, 6 Conductor	Unterminated
EUT	TB4	3.00	Coupler Control	Shielded/ 22 AWG, 4 Conductor	Unterminated

6.0 Test Methods Performed and Test Results

The following test methods were performed on the Non-Directional Beacon. All testing documented herein was performed in the sequence shown in Table 9:

Table 9 - Test Sequence and Results

Testing Date(s)	Para.	Test Method	Results
April 28, 2010	6.3	IEC 61000-3-2, Harmonic Current Emissions	Complied
April 28, 2010	6.4	IEC 61000-3-3, Voltage Fluctuations and Flicker	Complied
April 29, 2010	6.10	IEC 61000-4-6, Conducted RF Immunity, Power Leads 150 kHz to 80 MHz	Complied
April 29-30, 2010	6.11	IEC 61000-4-6, Conducted RF Immunity, I/O 150 kHz to 80 MHz	Complied
April 30, 2010	6.13	IEC 61000-4-11, Voltage Dips and Interrupts	Complied
April 30, 2010	6.7	IEC 61000-4-4, Electrical Fast Transients, Power Leads	Did Not Comply
April 30, 2010	6.8	IEC 61000-4-4, Electrical Fast Transients, I/O Leads	Did Not Comply
May 3 and 14, 2010	6.6	IEC 61000-4-3, Radiated Immunity 27 MHz to 2.7 GHz	Complied
May 4-5, 2010	6.2	CISPR 16-2-3, Radiated Emissions 30 MHz to 1 GHz	Complied
May 5, 2010	6.5	IEC 61000-4-2, Electrostatic Discharge	Complied
May 5, 2010	6.1	CISPR 16-2-1, Conducted Emissions 150 kHz to 30 MHz	Complied
May 6, 2010	6.9	IEC 61000-4-5, Surge Immunity, Power Leads	Did Not Comply
May 12, 2010	See Paragraphs 5.4.1, 5.4.2 and 5.4.3 for a detailed description of the modifications performed		
May 14, 2010	6.9	Re-Test - IEC 61000-4-5, Surge Immunity, Power Leads	Complied
May 14, 2010	6.7	Re-Test - IEC 61000-4-4, Electrical Fast Transients, Power Leads	Complied
May 14, 2010	6.8	Re-Test - IEC 61000-4-4, Electrical Fast Transients, I/O Leads	Complied
May 14, 2010	6.12	IEC 61000-4-8, Power Frequency Magnetic Field Immunity	Complied

See individual test methods contained in paragraphs 6.1 through 6.13 of this test report for a full description of the test procedures utilized and the results obtained.

6.2 CISPR 16-2-3, Radiated Emissions, 150 kHz to 2 GHz

6.2.1 Normative References

CISPR 16-2-3 Edition 3.0: 2010

6.2.2 Purpose

The purpose of this test was to measure and signals radiated by the EUT other than through an antenna which can potentially disturb other equipment on the ship, such as radio receivers.

6.2.3 Test Limits

The limits shown in Table 11 were used to determine compliance of the EUT to the Radiated Emission requirements specified by EN 61000-6-4 utilizing the test methods of CISPR 16-2-3.

Table 11 - Radiated Emissions, Test Limits

Frequency Range	EN 61000-6-4 Quasi-Peak Limit [dBμV/M], at 10.0 Meters
30.0 MHz to 230.0 MHz	40.0
230.0 MHz to 1.0 GHz	47.0

6.2.4 Test Setup

The EUT and associated cabling, configured as detailed in paragraph 5.0 herein, was placed on a 0.8 m non-conductive test stand on the flush mounted turntable, in its normal plane of operation. The turntable positions were relative to the EUT as follows:

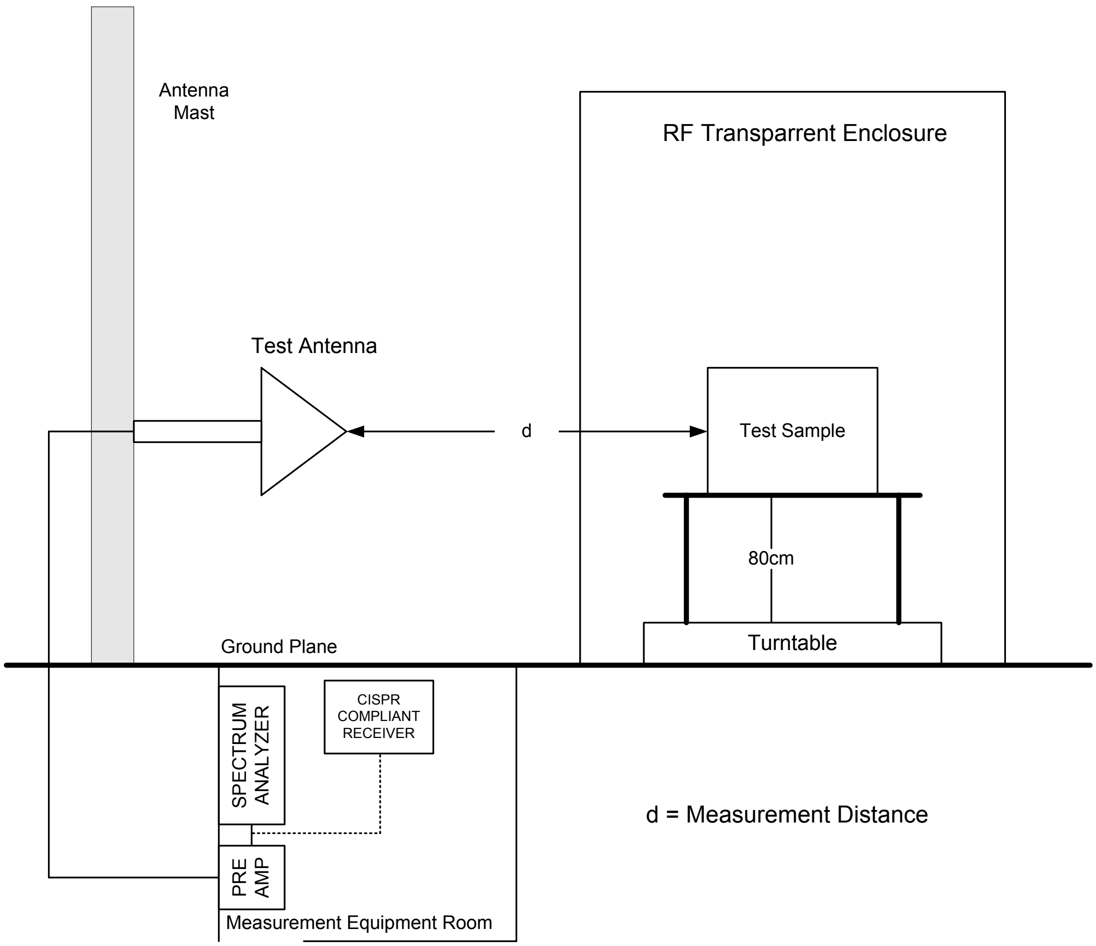
When facing the EUT the front is at 0^{o}, the rear is at 180^{o} and the left side is at 270^{o}. The test stand was situated such that the nearest part of the boundary of the EUT was located 3.0 m from the measuring antenna.

The power cables were routed to the power mains outlet located on top of the turntable. Excess power cable length was left on the surface of the turntable. Earth connections, where required for safety purposes, were connected to a ground reference point on the turntable. Where not otherwise provided or specified by the manufacturer, they were 1.0 m long and run parallel to the mains connection at a distance of not more than 0.1 m.

The power and signal cables were oriented in relation to the ground plane in a manner equivalent to actual use. Excess length of interconnecting cables was bundled at the approximate center of the cable with bundles 30 to 40 cm in length, running in the horizontal plane from the port to which they were connected. Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the EUT.

Test Setup (con't.)
The antenna was connected via coaxial cable to a CISPR compliant receiver for final readings and to a broadband pre-amplifier, which in turn was connected to a spectrum analyzer in order to maximize emissions.

Figure 3 - Radiated Emissions, Test Setup



6.2.5 Test Equipment
The details of the test equipment utilized during the performance of this test method are shown below:

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
012	Loop Antenna, Active	EMCO	9 kHz - 30 MHz	6502	7/21/2009	7/21/2010
713A	25 Foot Rigid Cable	Retlif	10 kHz - 18 GHz	R&S Receiver	10/8/2009	10/8/2010
8071	Spectrum Analyzer	Hewlett Packard	100Hz-2.5 GHz/2-22GH	8566B	8/17/2009	8/17/2010
8072	Spectrum Analyzer Display	Hewlett Packard		85662A	8/17/2009	8/17/2010
8079	EMI Test Receiver	Rohde & Schwarz	0.9-30 MHz	ESH3	6/2/2009	6/2/2010
8080	Receiver	Rohde & Schwarz	20-1300 MHz	ESVP	5/20/2009	5/20/2010
8300	OATS Site NSA	RSI	3/10 Meter Site		9/1/2009	9/1/2010
8411	Preamplifier	Sonoma Instrument Co.	9 kHz - 1 GHz	310N	9/30/2009	9/30/2010
8433	Biconilog	ETS Lindgren	20 - 6000 MHz	3142D	9/21/2009	9/21/2011

6.2.6 Test Procedure

With the test instrumentation and the EUT configured as stated above, the following steps were performed:

1. The EUT was operated as detailed in paragraph 5.5 herein.
2. The spectrum analyzer was configured to display the frequency range of test.
3. With the test antenna both horizontally and vertically polarized, the EUT cabling was relocated in order to maximize the radiated emissions.
4. The operating mode of the EUT was varied in order to determine the operating mode which produced maximum radiated emissions with respect to the limit.
5. The EUT configuration which produced maximum radiated emissions with respect to the limit was maintained for the duration of testing.
6. The frequency of test was scanned to determine the frequency of all emissions from the EUT.
7. At each frequency upon which an emission was determined to be from the EUT the following steps were performed in order to further maximize the observed emissions:
   a. The test antenna height was
      i.) At a fixed height of 1.5 m for frequencies between 150 kHz and 30 MHz.
      ii.) Varied from 1.5 to 4.0 m for frequencies above 30 MHz.
   b. The test antenna polarization was varied from vertical to horizontal for frequencies above 30 MHz.
   c. The EUT was rotated 360° about its vertical axis.
8. The RF cable from the test antenna was connected to the CISPR compliant receiver.
9. For all emissions found to be within 20 dB of the specified limit, the following was recorded:
   a. Frequency of emission.
   b. Quasi-Peak detector receiver meter reading.
   c. Correction factor consisting of antenna factor and cable loss.
   d. Test antenna height and polarization where applicable.
   e. Turntable position.

6.2.7 Sample Calculations

Shown below is a sample showing calculations used, either manually or under software control, to derive the final corrected reading.

$R_C = M_R + C_{IL} + A_F$

Where:
R_C = Corrected Reading in dBµV/M
M_R = Meter Reading in dBµV
C_{IL} = Insertion Loss of Cable in dB
A_F = Antenna Factor in dB

Example:
M_R = 25.3 dBµV
C_{IL} = 3.6 dB
A_F = 12.4dB

R_C = 25.3 + 3.6 + 12.4
= 41.3 dBµV/M

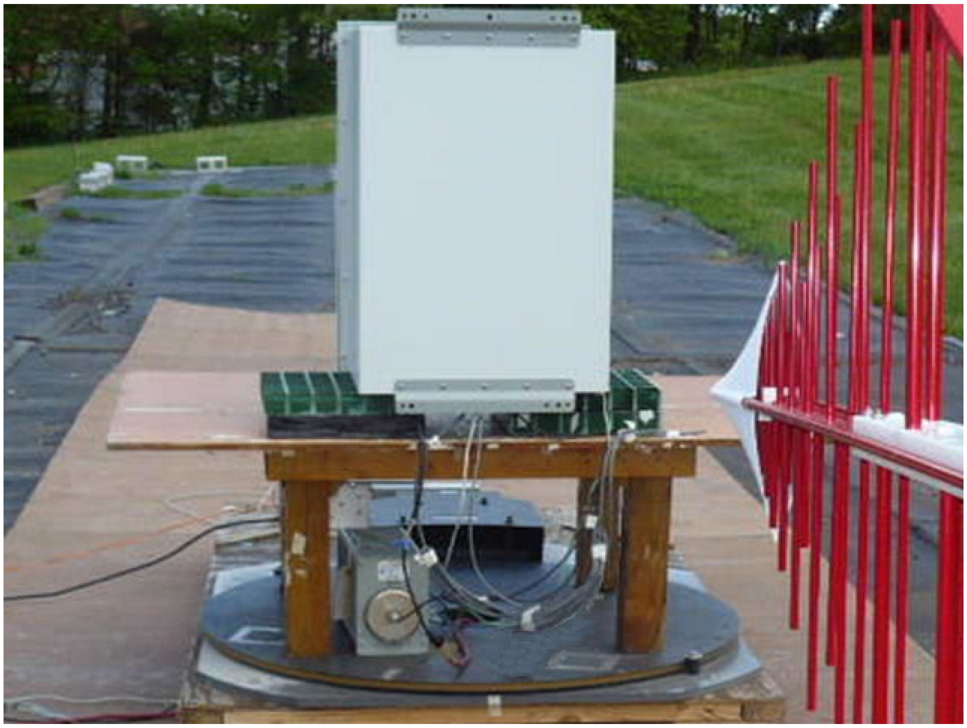
6.2.8 Test Results

The EUT complied with the requirements specified for this method. No emissions were observed which exceeded the CISPR 16-2-3 limits specified by EN 61000-6-4.

See the following photograph(s) and test data for a full presentation of the test setup and results obtained.

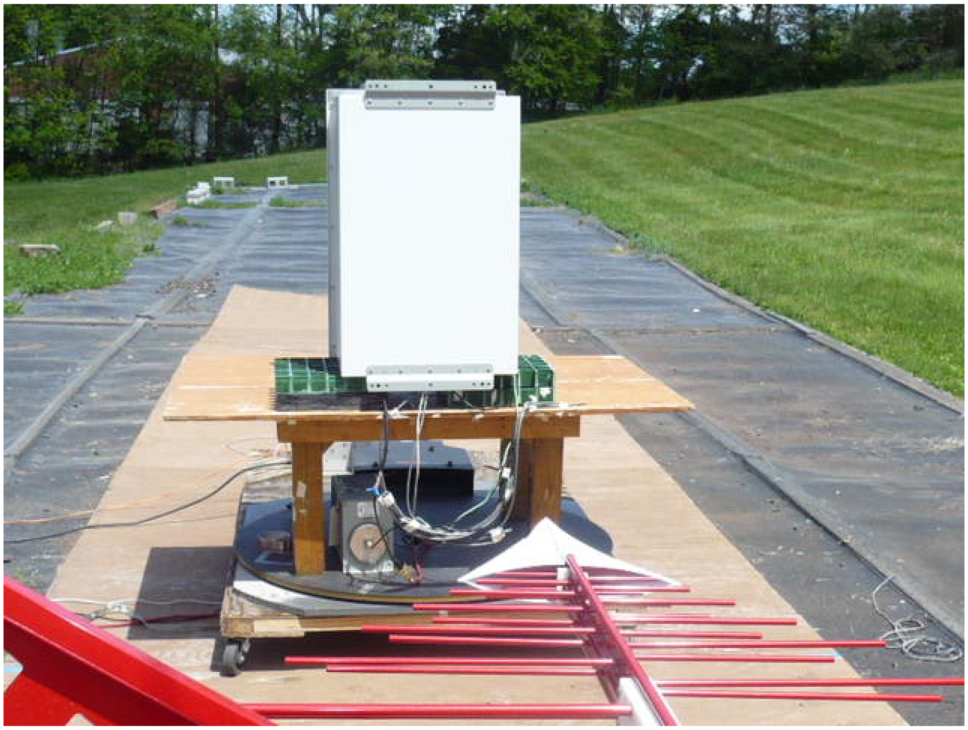
Test Photograph(s)
Radiated Emissions

Test Photograph(s)
Radiated Emissions

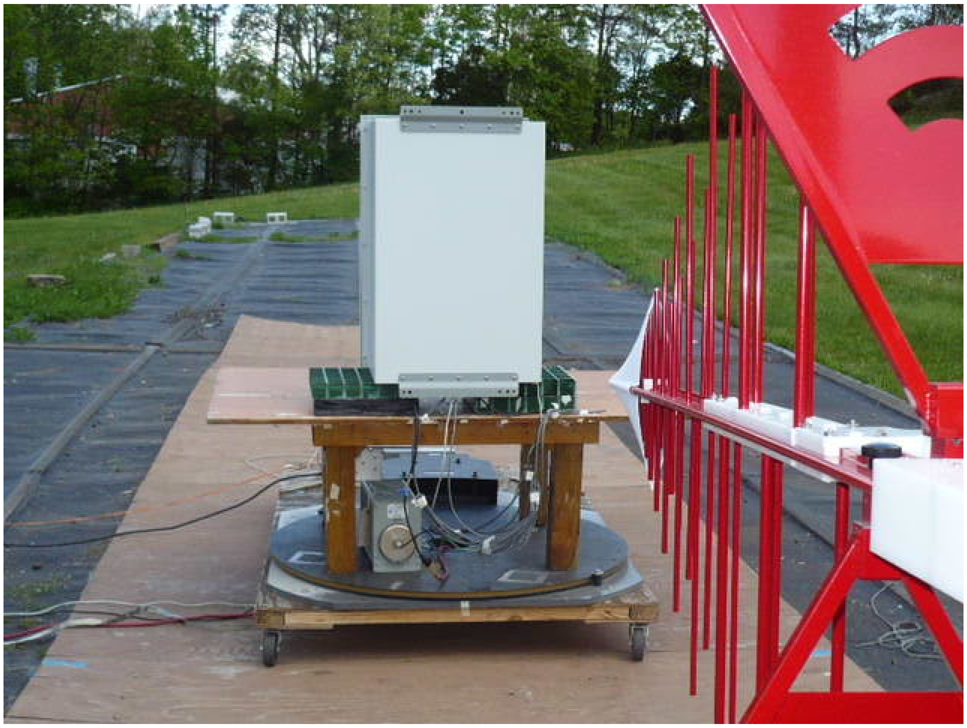


Test Setup

Test Photograph(s)
Radiated Emissions



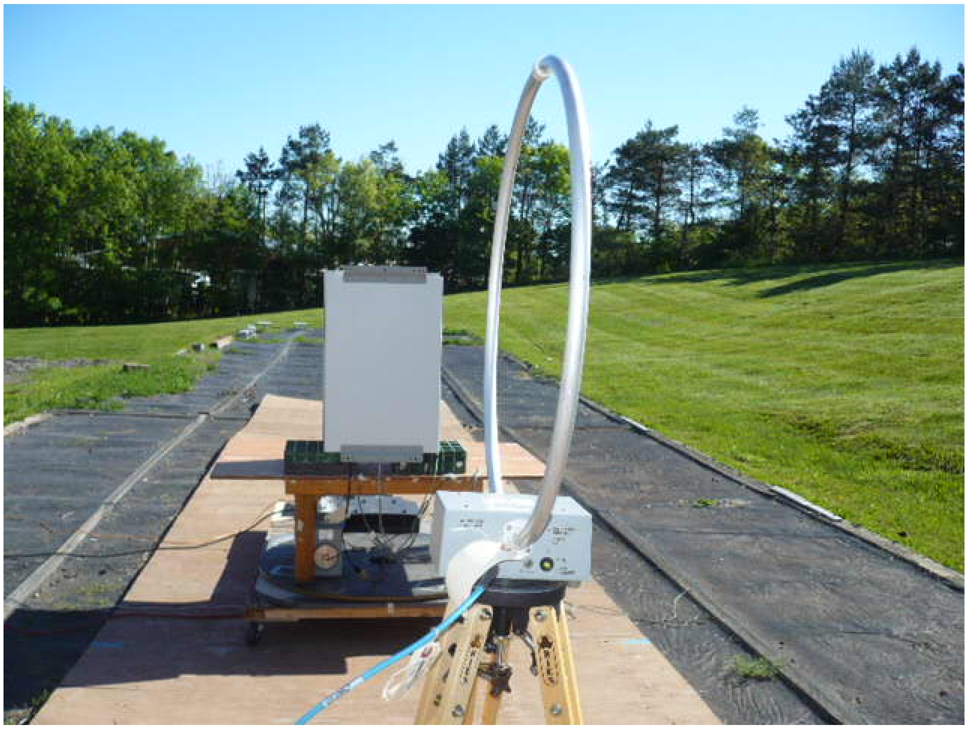
Horizontal Antenna Polarization, 30 MHz to 1 GHz



Vertical Antenna Polarization, 30 MHz to 1 GHz

Test Photograph(s)
Radiated Emissions

Parallel Antenna Polarization, 150 kHz to 30 MHz



Perpendicular Antenna Polarization, 150 kHz to 30 MHz

CISPR 16-2-3, Radiated Emissions
30 MHz to 1 GHz
Test Data

Test Method:	**CISPR 16-2-3, Radiated Emissions, 30 MHz to 1 GHz**		
Customer:	Southern Avionics Company	**Job No.**	R-1513P-2
Test Sample:	Non directional Beacon		
Part Number.:	N/A	**Serial No.**	33022xx010001
Model Number	SE250		
Operating Mode	Full RF power output at 320 KHz		
Test Specification	EN61000-6-4; Electromagnetic Compatibility (EMC) – Part 6-4: Generic Standards – Immunity for Industrial Environments		
Technician:	B. Mortimer	**Date:**	5/6/10
Notes:	Test Distance: 3 Meters Converted to 10 meters Detector: Quasi-Peak Temp: 24 ºC RH: 31 %		

Test Freq.	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Distance Correction	Corrected Reading	Limit
MHz	(V/H) / Meters	Degrees	dBuV	dB		dBuV/M	dBuV/M
30.00							40
I							I
*110.00	H / 1.0	180	7.7	9.8		17.5	I
I							I
I							I
I							I
I							I
I							I
I							I
I							I
*195.00	H / 1.0	180	0.7	11.3		12.0	I
I							I
I							I
230.00							40
230.00							47
I							I
388.64	V / 1.00	25	16.7	24.0	-10.45	30.3	I
388.64	H / 1.00	237	16.8	24.0	-10.45	30.4	I
I							I
688.00	V / 1.40	232	13.4	17.7	-10.45	20.7	I
688.00	H / 1.60	130	19.6	17.7	-10.45	26.9	I
I							I
*995.00	H / 1.0	180	3.9	27.8		31.7	I
I							I
I							I
1000.00							47

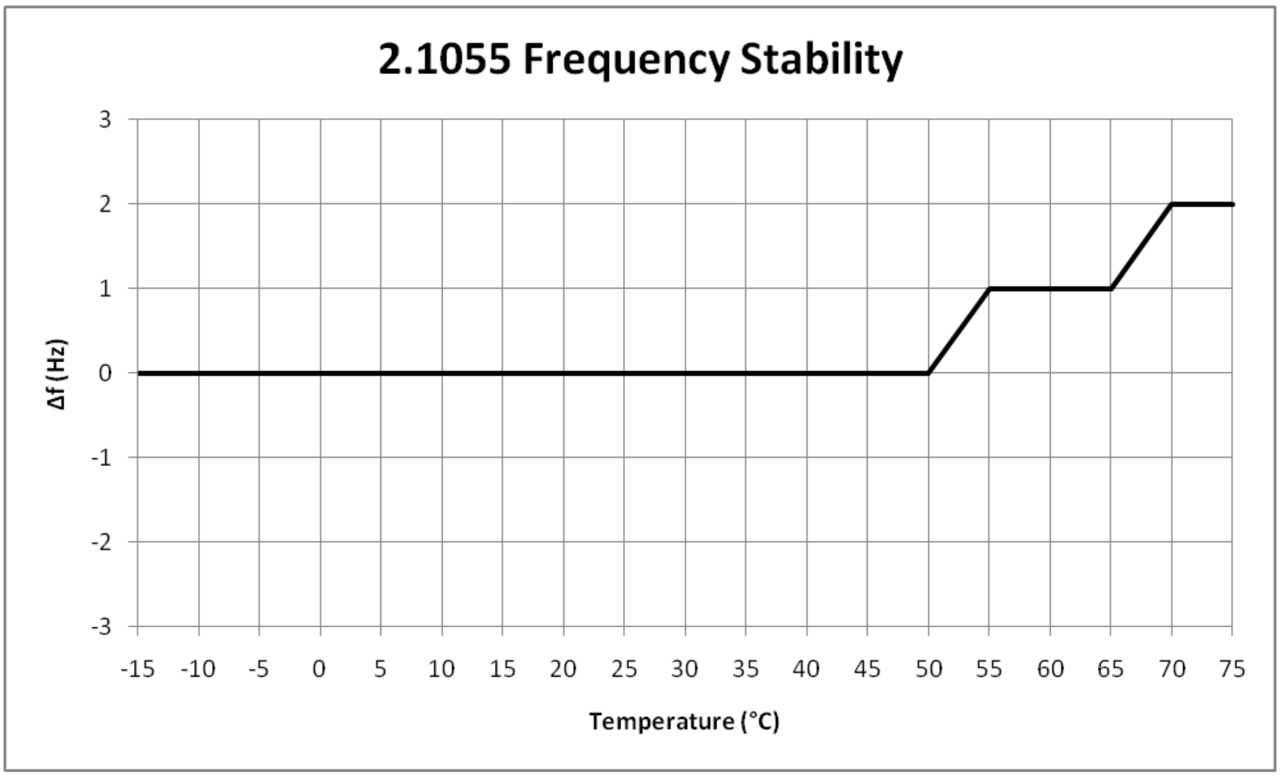
NOTES: The frequency range was scanned from 30.0 MHz to 1 GHz. All emissions not recorded were more than 20dB below the specified limit.
*These frequencies represent the minimum sensitivity of the receiver system.

47CFR2.1055 Measurement required: Frequency stability.

a.) Frequency stability based on temperature fluctuations

Oscillator chip used is Suntsu STGF527-32.000MHZ, SAC Part Number 1YD32000. The Manufacturers Specifications is listed in the datasheet on the next page.

All components related to frequency generation and control, including all transmitter drawer modules, and master control board, were placed inside a temperature chamber. Frequency was measured using an HP5314A frequency counter. Carrier frequency of the transmitter was set for 500 kHz. Tests began at an ambient room temperature of 23°C. Frequency readings are in respect to the starting frequency, initially measured at room temperature.



STG SERIES

14 PIN DIP TCXO

STG SERIES FEATURES

- AVAILABLE TO ±1.0ppm
- STANDARD FULL-SIZE PACKAGE
- HCMOS/TTL COMPATIBLE
- RoHS COMPLIANT
- 3.3±0.3V OR 5.0±0.5V

PART NUMBERING GUIDE

STG F 3 27 - 15.000MHz

FREQUENCY STABILITY
F: ±5.0ppm
G: ±2.5ppm
H: ±2.0ppm
I: ±1.5ppm
J: ±1.0ppm

SUPPLY VOLTAGE
3: 3.3±0.3 V
5: 5.0±0.5 V

OPERATING TEMPERATURE RANGE
BLANK: 0°C to + 70°C
16: -10°C to + 60°C
27: -20°C to + 70°C
37: -30°C to + 75°C
48: -40°C to + 85°C

FREQUENCY

*FOR CUSTOM PARAMETERS CONTACT YOUR SUNTSU REPRESENTATIVE.
CAGE CODE: 4GUT4

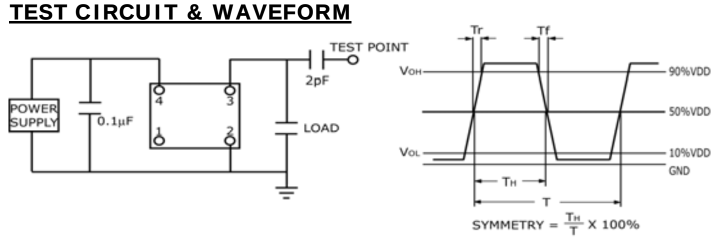
ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE:	2.000MHz-150.000MHz
STABILITY (VS. AGING):	±1.0ppm/FIRST YEAR MAX
STABILITY (VS. VOLTAGE):	±0.5ppm MAX
FREQUENCY ADJUSTMENT (INTERNAL TRIMMER):	±3.0ppm MIN
STORAGE TEMPERATURE:	-55°C TO 125°C
HCMOS - 50% OF WAVEFORM	40%/60%
CURRENT CONSUMPTION:	
5.0V:	40mA MAX
3.3V:	30mA MAX
LOAD:	
CMOS:	15pF MAX
TTL:	2 TTL GATES
RISE/FALL TIME:	10nS MAX
PHASE NOISE (TYPICAL):	
10Hz OFFSET:	-70dBc/Hz
100Hz OFFSET:	-95dBc/Hz
1kHz OFFSET:	-110dBc/Hz
10kHz OFFSET:	-120dBc/Hz

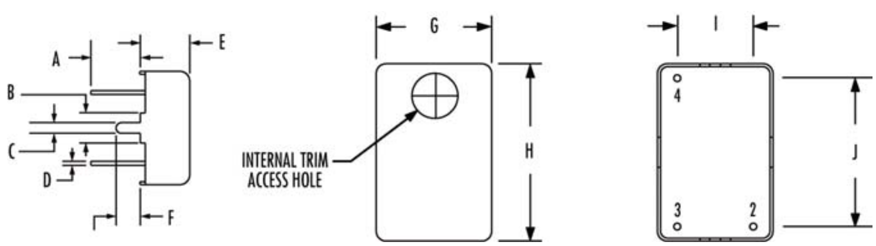
ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

DROP TEST:	30cm ONTO 2mm STEEL PLATE (3 TIMES)
MECHANICAL SHOCK:	MIL-STD-883, METHOD 2002, CONDITION B
VIBRATION:	MIL-STD-883, METHOD 2007, CONDITION A

TEST CIRCUIT & WAVEFORM



PRODUCT SCHEMATIC



PIN	FUNCTION
1	NO PIN
2	CASE GROUND
3	OUTPUT
4	SUPPLY VOLTAGE
	DIMENSIONS
A	9.00 MAX
B	4.00±0.1
C	1.00±0.1
D	0.50
E	9.20 MAX
F	2.50±0.1
G	11.85
H	18.45
I	7.62
J	15.24

NOTE: DIMENSIONS IN MILLIMETERS (mm); DRAWING NOT TO SCALE

47CFR2.1055 Measurement required: Frequency stability.

c.) The transmitter was connected to a variable transformer (PowerStat 226U), to vary the input AC power from 85% to 115% while monitoring frequency stability. Supply voltage was measured at the input terminals using a Yokogawa WT200 Digital Power Meter. Frequency was measured over a 50 Ohm dummy load, using a BK Precision 1803D Frequency Counter.

The transmitter was set for 320 kHz. Frequency measurements are shown as read from the external meter, not the internal displayed frequency.

220V AC, 320 kHz		
Input Voltage	% of nominal voltage	Output frequency
187	85%	319,999 Hz
198	90%	319,999 Hz
209	95%	319,999 Hz
220	100%	319,999 Hz
231	105%	319,999 Hz
241	110%	319,999 Hz
253	115%	319,999 Hz

115V AC, 320 kHz		
Input Voltage	% of nominal voltage	Output frequency
97.75	85%	319,999 Hz
103.5	90%	319,999 Hz
109.25	95%	319,999 Hz
115.0	100%	319,999 Hz
120.75	105%	319,999 Hz
126.5	110%	319,999 Hz
132.25	115%	319,999 Hz

It can be noted that as power was slowly reduced to zero volts, frequency did not change until after the transmitter received an “AC power failure” fault.