Exhibit F

Test Report

HST-2110 and HST-2120 FCC Type Certification Report

815-4601-002 Rev -

Rockwell Collins, Inc.
400 Collins Rd NE
Cedar Rapids, Iowa 52498

CAGEC 4V792

Notices and Signatures

This document is a paper representation of the master copy which is maintained in the Product Development Manager (PDM) database.

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Approval Signatures

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Revision History

Ver/Rev	Doc Chg #	Release Date	Originator	Reasons for Change
001/-			R. L. Breitwisch	Original Release
002/-			A.P. Mikola	Updated per HST-2110/2120 Type Approval

Forward

The following information is being submitted in compliance with Part 2 and Part 87 of Title 47, Code of Federal Regulations – Telecommunications, for certification of the Rockwell Collins High Speed Data Transceiver.

Type Number: HST-2110
Collins Part Number: 822-2231-xxx
FCC ID: AJK8222231

And

Type Number: HST-2120
Collins Part Number: 822-2233-xxx
FCC ID: AJK8222233

The units tested for the purposes of this report were engineering units representative of production configurations.

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1. Test Procedures and Results

1.1. Test Procedure and Compliance Matrix

The table below identifies the applicable sections of this document and its relationship between the Parts 2 and 87 requirements. The test diagrams, procedures and results are included listed sections of the report.

1.2. Test Requirements Matrix

Part 2	Part 87	Test Description Summary	Report
2.1046	87.131	RF Power Output	3.4
2.1047	87.141	Modulation Characteristics	3.5
2.1049	87.135	Occupied Bandwidth	3.6
2.1051	87.139	Spurious Emissions at Antenna Terminals	3.7
2.1053	87.139	Field Strength of Spurious Radiation	3.8
2.1055	87.133	Frequency Stability	3.9
N/A	87.187 (q)	Priority and Preemption	3.10

Table 1 - Test Requirements Matrix

1.3. Test Equipment

The test equipment used for each test is listed in the relevant test sections.

1.4. RF Power Output

1.4.1. FCC Requirements

The relevant FCC requirements being addressed by this test are:

Section 2.1046 (a)

For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the value of current and voltage on circuit elements specified in 2.1033 (c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

Section 87.131 Notes (1), (ii), (8)

Class of Station	Frequency Band	Authorized Emissions[9]	Maximum Power[1]
Aircraft Earth	UHF	G1D, G1E, G1W	60 Watts[8]

(1) The power is measured at the transmitter output terminals and the type of power is determined according to the emission designator as follows:

> (ii) Peak envelope power (pX) for all emission designators other than those referred to in paragraph (l) of this note.

(8) Power may not exceed 60 watts per carrier. The maximum EIRP may not exceed 2000 watts per carrier.

1.4.2. Test Equipment List

Quantity	Item
1	MCDU with Cockpit telephone interface
1	SRT-2100 Over the air test station with HST-2110
1	SRT-2100, PN 822-2023-001
1	HST-2110, PN 822-2231-030
1	Ground telephone

1.4.3. Test Setup, Equipment and Results for RF Power Output

This test demonstrates the ability of the SRT-2100 system to control the RF output power of the HST-2110 to achieve the desired HPA output power and EIRP in the presence of Aero SATCOM carriers (generated by the SRT) under conditions of varying antenna gains.

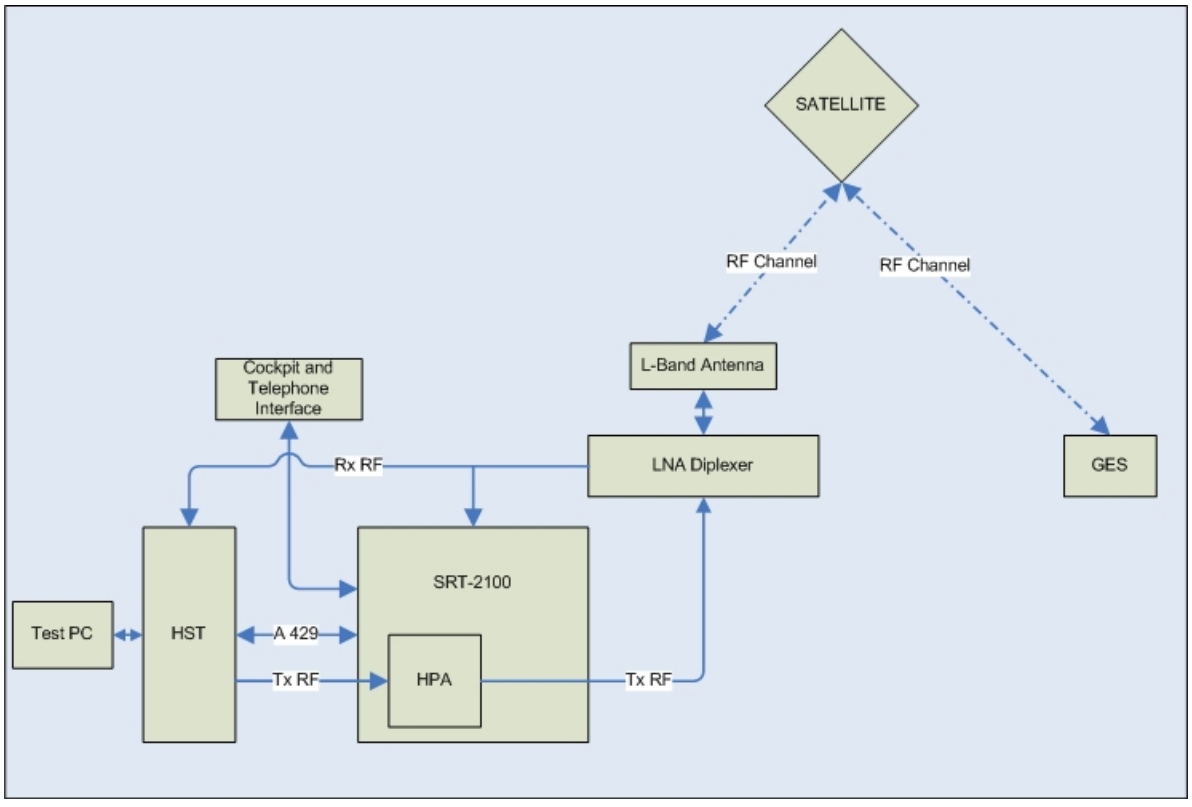

Figure 1 - RF Power Output Test Setup

Test Procedure

1. Measure the HST to HPA loss of the test station. Enter into data sheet.
2. On the SimPC, confirm that the antenna gain is 12 dB.
3. Apply power to all the LRUs.
4. Enter TEST on the HST trace PC, then =, then 29, then ESC. This step may be avoided if the HST trace is showing the available, requested, allocated and back off commands from the SRT.
5. Wait for HST to log onto the M4 network.
6. Enter test command 159 into the SRT to show the HPA reported output power.
7. Through the maintenance menu, set channel preferences 1 & 2 to 4800Bps Voice Codec's.
8. Set up an M4 circuit and allow the HST output power to settle as per the GES power control commands. Note the following on the data sheet as the power settles:
    a. Antenna Gain
    b. Aero Call 1 EIRP
    c. Aero Call 2 EIRP
    d. HST Reported EIRP
    e. HPA Reported Output Power Level
9. Bring up a 4800 bps Aero call on the SRT-2100 via the MCDU. Allow the power to settle as per the Aero GES power control commands. Note the following on the data sheet :
    a. Antenna Gain
    b. Aero Call 1 EIRP
    c. Aero Call 2 EIRP
    d. HST Reported EIRP
    e. HPA Reported Output Power Level
10. Bring up a 4800 bps Aero call on the SRT-2100 via the MCDU. Allow the power to settle as per the Aero GES power control commands. Note the following on the data sheet :
    a. Antenna Gain
    b. Aero Call 1 EIRP
    c. Aero Call 2 EIRP
    d. HST Reported EIRP
    e. HPA Reported Output Power Level
11. Vary the antenna gain between a maximum of 16dB and a minimum of 7 dB. Note the following on the data sheet for each antenna gain :
    a. Antenna Gain
    b. Aero Call 1 EIRP
    c. Aero Call 2 EIRP
    d. HST Reported EIRP
    e. HPA Reported Output Power Level

	A	B	C	D	E	F	G	X	Y	Z	AA	AB
1	HPA ref (Watts)	45										
2	Max HPA out (dB) :	2										
3	Max Out dBW	18.53										
4	Max Out dBm :	48.53										
5	Ant to HPA Loss :	2										
6	HST max Out (dBm) :	31.5										
7	HST1 Offset (loss) :	-1.3										
8	HST2 Offset (loss) :	-1.3										
9	RFU to HPA Attn =	5										
10	HST1 to HPA Attn =	3.7										
11	HST2 to HPA Attn =	3.7										
12										Dual HST Cont Wave		
13	Ant Gain	Total EIRP	Data	EIRP	EIRP	Avail EIRP	HST1 EIRP	Calculated HPA Out	Measured HPA Out	Computed HPA at output Trace	error	Pass/Fail
14	dB	dBW	dBW	Call 1	Call 2	dBW	dBW	dBm	dBm	dBm	dB	(+2.5/- 1.0 dB)
15	12	28.53	10.50	-100	-100	28.46	-100	846.28				n/a
16	12	28.53	10.50	-100	-100	28.46	14	35.76	37.70	36.28	0.52	PASS
17	12	28.53	10.50	-100	-100	28.46	22.5	44.26	45.20	44.02	-0.24	PASS
18	12	28.53	10.50	-100	-100	28.46	20.5	42.26	43.30	42.05	-0.21	PASS
19	12	28.53	10.50	-100	-100	28.46	18.5	40.26	41.40	40.07	-0.19	PASS
20	12	28.53	10.50	12.5	-100	28.35	18.5	40.94	42.30	41.06	0.12	PASS
21	12	28.53	10.50	11.5	-100	28.37	18.5	40.81	41.92	40.56	-0.25	PASS
22	12	28.53	10.50	10.5	-100	28.39	18.5	40.70	41.94	40.56	-0.14	PASS
23	12	28.53	10.50	10.5	12.5	28.28	18.5	41.31	42.70	41.22	-0.09	PASS
24	12	28.53	10.50	10.5	11.5	28.30	18.5	41.19	42.50	41.22	0.03	PASS
25	12	28.53	10.50	10.5	10.5	28.32	18.5	41.10	42.40	41.06	-0.04	PASS
26	13	29.53	10.50	10.5	10.5	29.37	18.5	40.10	41.50	40.24	0.14	PASS
27	14	30.53	10.50	10.5	10.5	30.40	18.5	39.10	40.40	38.92	-0.18	PASS
28	15	31.53	10.50	10.5	10.5	31.43	18.5	38.10	39.40	37.93	-0.17	PASS
29	16	32.53	10.50	10.5	10.5	32.45	18.5	37.10	38.40	36.94	-0.16	PASS
30	11	27.53	10.50	10.5	10.5	27.27	18.5	42.10	43.30	42.05	-0.05	PASS
31	10	26.53	10.50	10.5	10.5	26.19	18.5	43.10	44.30	43.04	-0.06	PASS
32	9	25.53	10.50	10.5	10.5	25.10	18.5	44.10	45.20	44.02	-0.08	PASS
33	8	24.53	10.50	10.5	10.5	23.98	18.5	45.10	46.00	45.01	-0.09	PASS
34	7	Preempted HSD										

1.4.4. Test Results Discussion

Since the HST drives a common High Power Amplifier, the actual output power is determined by the SRT-2100 which controls system gains and ensures the desired output power at the antenna. The SRT-2100 power control software is responsible for ensuring that the maximum HPA output power is limited to 45 Watts, and that the maximum EIRP cannot exceed 2000 Watts EIRP. The test results above verify that the HST generates the correct power output, and allows the SRT-2100 to control system gains and maintain the desired HPA power output. The power control software that prevents overdriving the 45 Watt HPA is contained within the SRT-2100.

The 3000 bps BPSK modulation is classified as G1D and, as such, is an authorized emission under 87.131. The 134400 16-QAM waveform is classified as G1D, G1E, or G1W, depending on use. These three emission types are not presently listed as an authorized emission in the table of 87.131. A waiver to utilize these new emission types is being requested.

This test data demonstrates the system will comply with the maximum output power requirements of 87.131 for Aircraft Earth Stations.

1.5. Modulation Characteristics [2.1047(d)]

1.5.1. FCC Requirements

The relevant FCC requirements being addressed by this test are:

Section 2.1047 (d)

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

Section 87.141 (j)

Transmitters used at Aircraft earth stations must employ BPSK for transmission rates up to and including 2400 bits per second, and QPSK for higher rates.

1.5.2. Test Setup, Equipment and Results for Modulation Characteristics

The HST-2120 was tested with a Collins SRT-2100 and measurements were made at the output of the SRT-2100.

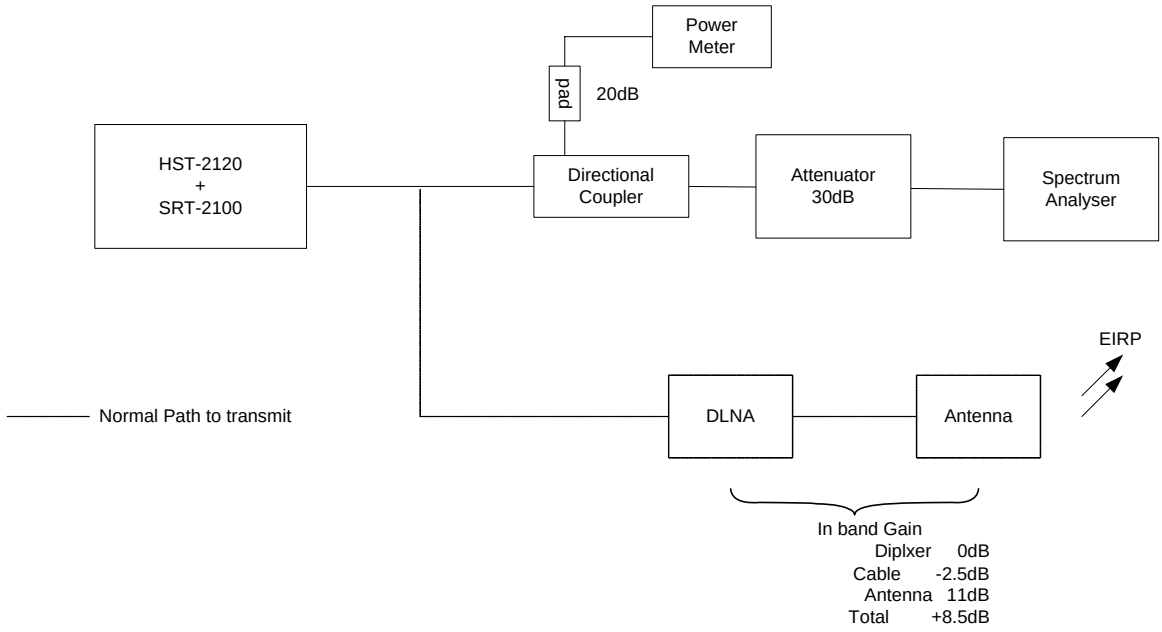

Figure 2 - Modulation Characteristics Test Setup

Test Equipment for Modulation Characteristic

Equipment Name	Recommended Equipment Model Number	Required For
Power Meter	HP437B (or equivalent)	Measuring RF Power
Spectrum Analyzer	R&S FSEB 20 (or equivalent)	Measuring Output Spectrum
30dB High Power Attenuator	Narda 769-30 (or equivalent)	Reducing RF Output Power to safe levels
20dB fixed attenuator	Narda 765-20 (or equivalent)	Reducing RF Output Power to safe levels
20dB Directional Coupler	HP778D (or equivalent)	Reducing RF Output Power to safe levels

Modulation Characteristics Test Results

Date: 16-QAM 16-Nov-2005; BPSK 21-Nov-2005
Location: EMS Technologies, Ottawa, Canada
Model: HST-2120 Serial number: 017
Model: SRT-2100 Serial number: 137938
Test procedure: Configure the HST-2120 and SRT-2120 to transmit a 3000 bps BPSK signal at nominal EIRP 14dBW and measure the constellation diagram. Repeat this test while transmitting a 134400 bps 16-QAM signal at nominal EIRP 22.5dBW.

3000 BPS BPSK

Figure 3 shows the measured I/Q Constellation points for the transmitted 3000 BPS BPSK signal. The symbol rate is 3000 Hz.

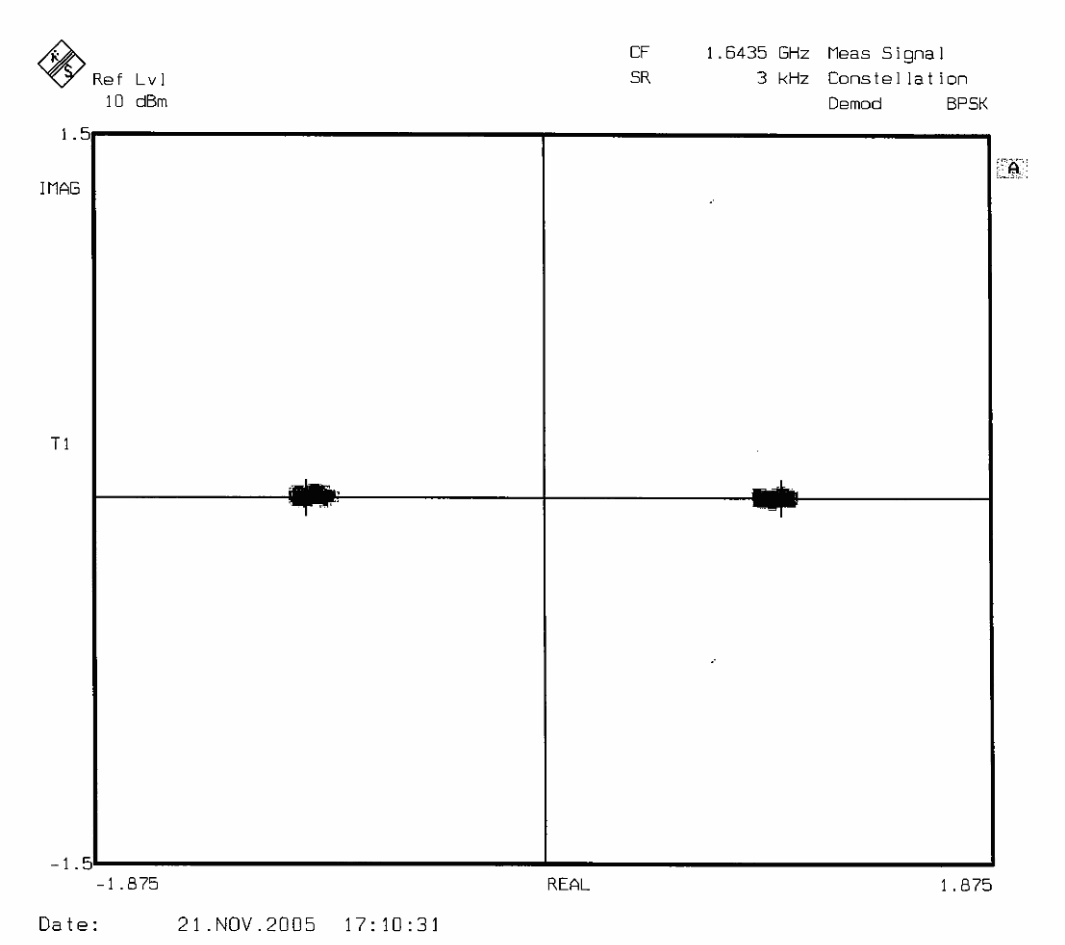

Figure 3 - 3000 bps BPSK I/Q Diagram

134400 BPS 16-QAM

Figure 4 below shows the measured I/Q Constellation points for the transmitted 134400 BPS 16-QAM signal. The symbol rate is 33600 Hz.

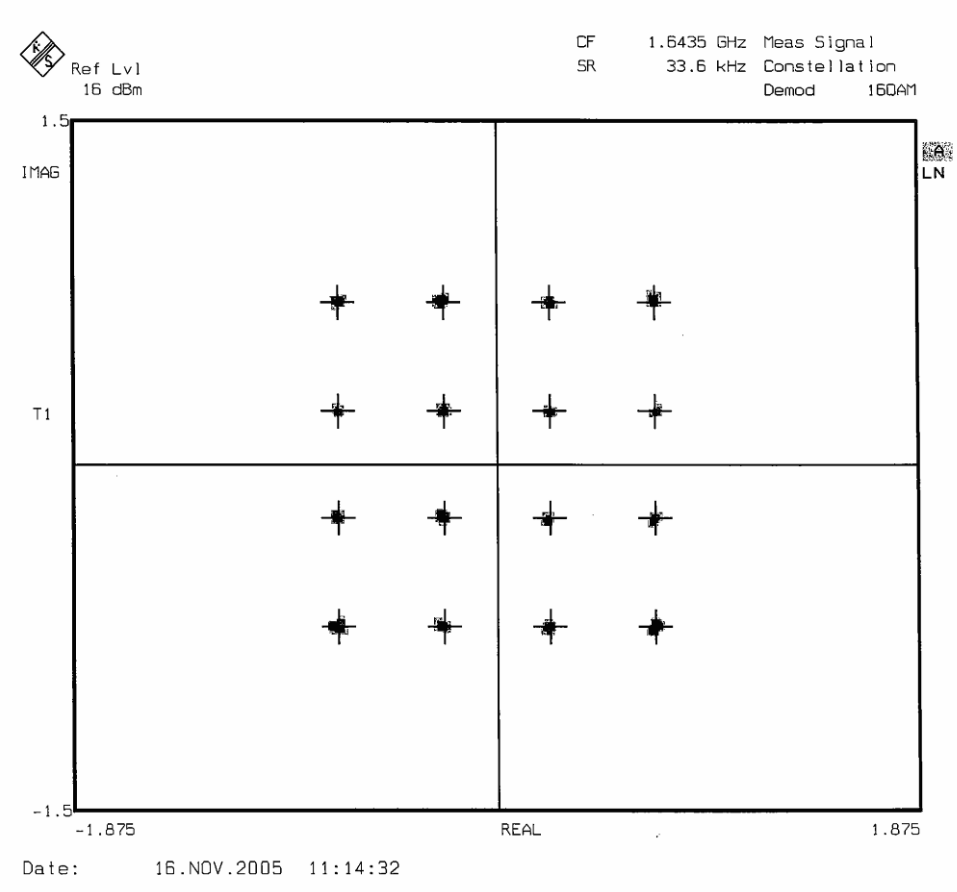

Figure 4 – 134400 bps 16-QAM I/Q Diagram

1.5.3. Test Results Discussion

The data rates and modulation characteristics of the new INMARSAT Swift64 service are not accommodated by the current Part 87 regulations, and conflict with the requirements of 87.141(j). These test results are provided to document the characteristics of the Swift64 modulation waveforms should a Waiver be granted to permit their use.

1.6. Occupied Bandwidth

1.6.1. FCC Requirements

Section 2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable.

Section 2.1049 (h)

Transmitters employing digital modulation techniques – when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are operational at the discretion of the user.

Section 87.135 (a), (b), (c)

(a) Occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are equal to 0.5 percent of the total mean power of a given emission.

(b) The authorized bandwidth is the maximum occupied bandwidth authorized to be used by a station.

(c) The necessary bandwidth for a given class of emission is the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

Section 87.137 (a), (b)

(a) The assignable emissions, corresponding emission designators and authorized bandwidths are as follows:

Class of emission	Emission Designator	Authorized Bandwidth (kilohertz)		
		Below 50 MHz	Above 50 MHz	Frequency Deviation
G1D[16]	21K0G1D		25	

[16] Authorized for use by Aircraft Earth Stations. Lower values of necessary and authorized bandwidth are permitted.

(b) For other emissions, an applicant must determine the emission designator by using Part 2 of this chapter.

1.6.2. Test Setup, Equipment and Results for Occupied Bandwidth

The HST-2120 was tested with a Collins SRT-2100 and measurements were made at the output of the SRT-2100.

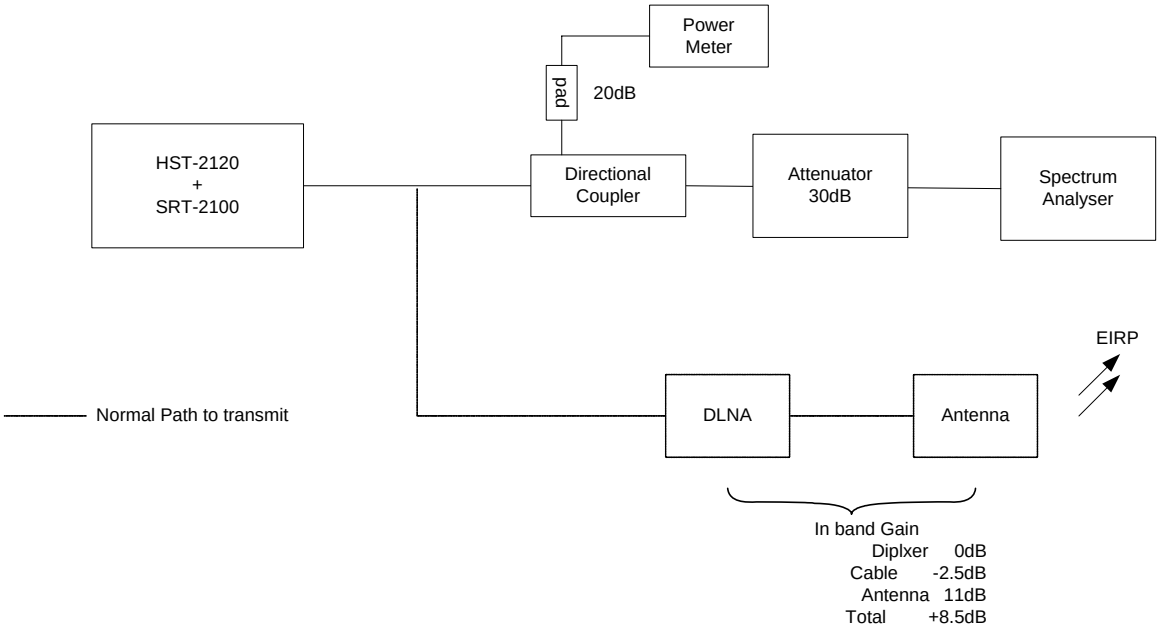

Figure 5 - Occupied Bandwidth Test Setup

Test Equipment for Occupied Bandwidth

Equipment Name	Recommended Equipment Model Number	Required For
Power Meter	HP437B (or equivalent)	Measuring RF Power
Spectrum Analyzer	R&S FSEB 20 (or equivalent)	Measuring Output Spectrum
30dB High Power Attenuator	Narda 769-30 (or equivalent)	Reducing RF Output Power to safe levels
20dB fixed attenuator	Narda 765-20 (or equivalent)	Reducing RF Output Power to safe levels
20dB Directional Coupler	HP778D (or equivalent)	Reducing RF Output Power to safe levels

Occupied Bandwidth Test Results

Date: 16-QAM 16-Nov-2005; BPSK 21-Nov-2005
Location: EMS Technologies, Ottawa, Canada
Model: HST-2120 Serial number: 017
Model: SRT-2100 Serial number: 137938

Test procedure: Configure the HST-2120 and SRT-2100 to transmit a 3000 bps BPSK signal at nominal EIRP 14dBW and measure the 99% occupied bandwidth. Repeat this test while transmitting a 134400 bps 16-QAM signal at nominal EIRP 22.5dBW.

3000 BPS

The occupied bandwidth is 15.83 kHz, as shown in Figure 6 below.

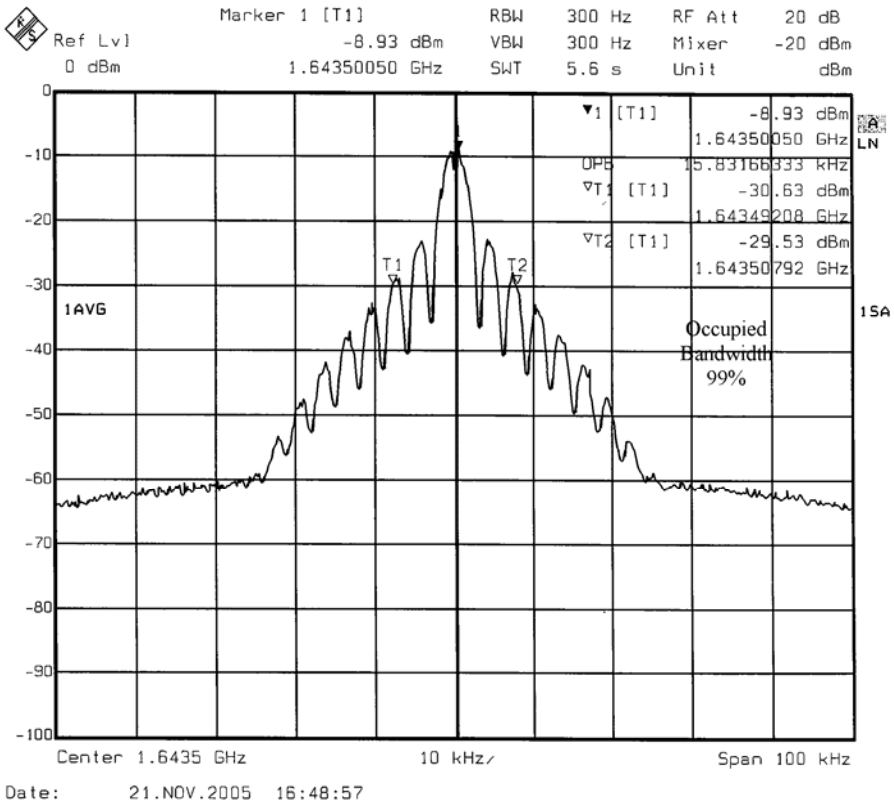

Figure 6 – Occupied Bandwidth 3000 bps

134400 BPS

The occupied bandwidth is 37.03 kHz, as shown in the following plot:

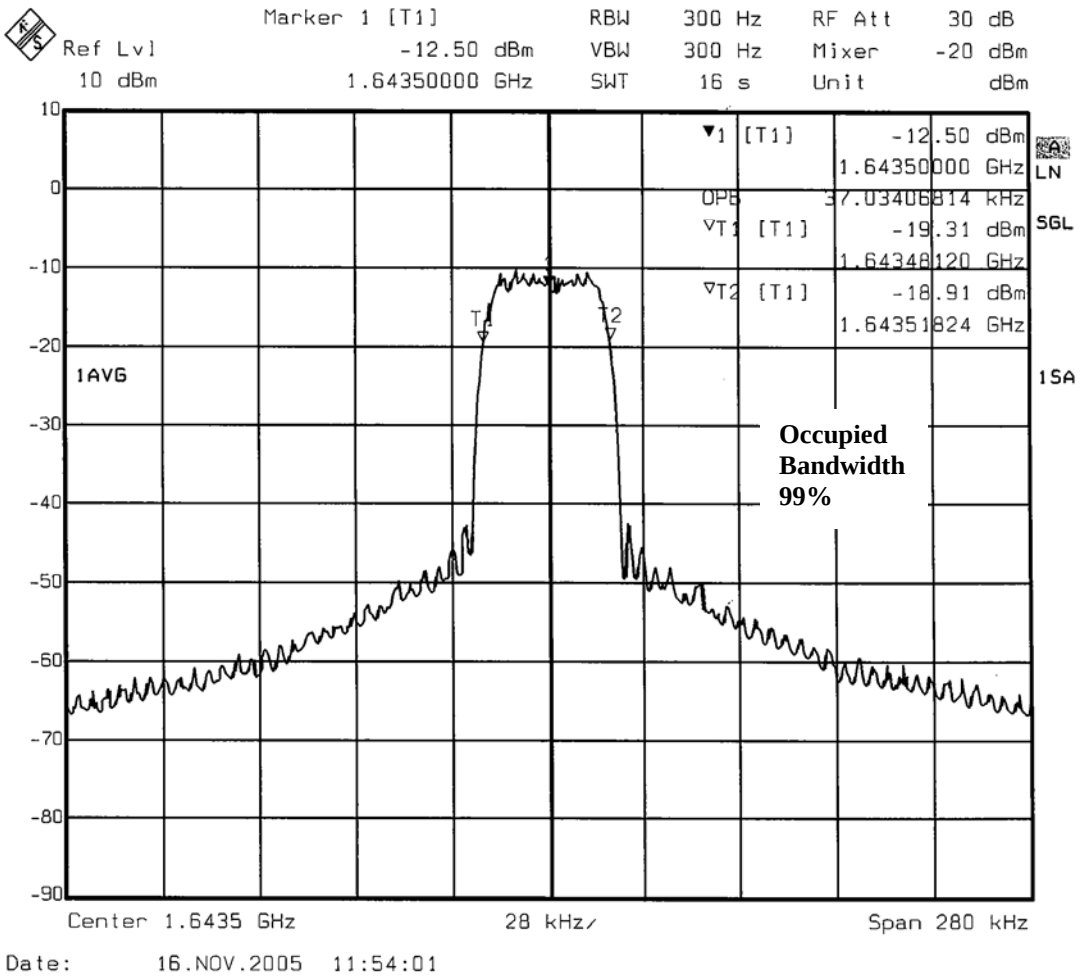

Figure 7 – Occupied Bandwidth 134400 bps

1.6.3. Test Results Discussion

The one of the two emissions types used by the INMARSAT for the Swift64 service are not currently accommodated in the tables of 87.137(a). Specifically:

(a) The 3000 bps signaling channel, which uses an unfiltered BPSK modulation, has an occupied bandwidth measured at 15.83 kHz, within the 25 kHz authorized bandwidths for G1D emissions.

(b) The 64000 bps 16-QAM user data channel has an occupied bandwidth measured at 37.03 kHz. This higher data rate emission type (D1D) is not accommodated by the table of 87.137.

Rockwell Collins intends to submit a Request for Waiver to accommodate the higher data rate emission type utilized by the INMARSAT Swift64 service and the associated occupied bandwidth.

1.7. Spurious Emissions at Antenna Terminals

1.7.1. FCC Requirements

Section 2.1051

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in Section 2.1049 as appropriate. The magnitude of spurious emissions attenuated more than 20 dB below the permissible values need not be specified.

Section 87.139 (i) (1), (2), (3)

(i) In case of conflict with other provisions of Section 87.139, the provisions of this paragraph shall govern for aircraft earth stations. When using G1D, G1E, or G1W emissions in the 1646.5 – 1660.5 MHz frequency band, the emissions must be attenuated as shown below.

(1) At rated output power, while transmitting a modulated single carrier, the composite spurious and noise output shall be attenuated by at least:

Frequency (MHz)	Attenuation (dB) [1]
0.01 – 1559	-135 dB/4 KHz
1525 – 1559	-203 dB/4 KHz
1559 – 1585	-155 dB/MHz
1585 – 1605	-143 dB/MHz
1605 – 1610	-117 dB/MHz
1610 – 1610.6	-95 dB/MHz
1610.6 – 1613.8	-80 dBW/MHz[3]
1613.8 – 1614	-95 dB/MHz
1614 – 1626.5	-70 dB/4 KHz
1626.5 – 1660	-70 dB/4 KHz[2,3,4]
1660 – 1670	-49.5dBW/20 KHz[2,3,4]
1670 – 1735	-60 dB/4 KHz
1735 – 12000	-105 dB/4 KHz
12000 – 18000	-70 dB/4 KHz

[1] These values are expressed in dB referenced to the carrier for the bandwidth indicated, and relative to the maximum emission envelope level, except where the attenuation is shown in dBW the attenuation is expressed in terms of absolute power referenced to the bandwidth indicated.
[2] Attenuation measured within the transmit band excludes the band +/- 35 kHz of the carrier frequency.
[3] This level is not applicable for intermodulation products.

[4] The upper limit for the excess power for any narrow-band spurious emission (excluding intermodulation products within a 30 KHz measurement bandwidth) shall be 10 dB above the power limit in this table.

(2) The transmitter emission limit is a function of the modulation type and the Symbol Rate (SR). Symbol Rate is expressed in symbols per second.

(3) While transmitting a single modulated signal at the rated output power of the transmitter, the emissions must be attenuated below the maximum emission level by at least:

Frequency Offset (normalized SR)	Attenuation (dB)
+/- 0.75 x SR	0
+/- 1.40 x SR	20
+/- 2.95 x SR	40

Where:
SR = Symbol Rate
SR = 1 x channel rate for BPSK
SR = 0.5 x channel rate for QPSK

The mask shall be defined by drawing straight lines through the above points.

1.7.2. Test Setup, Equipment and Results for Spurious Emissions [Section 87.139 (i) (1)]

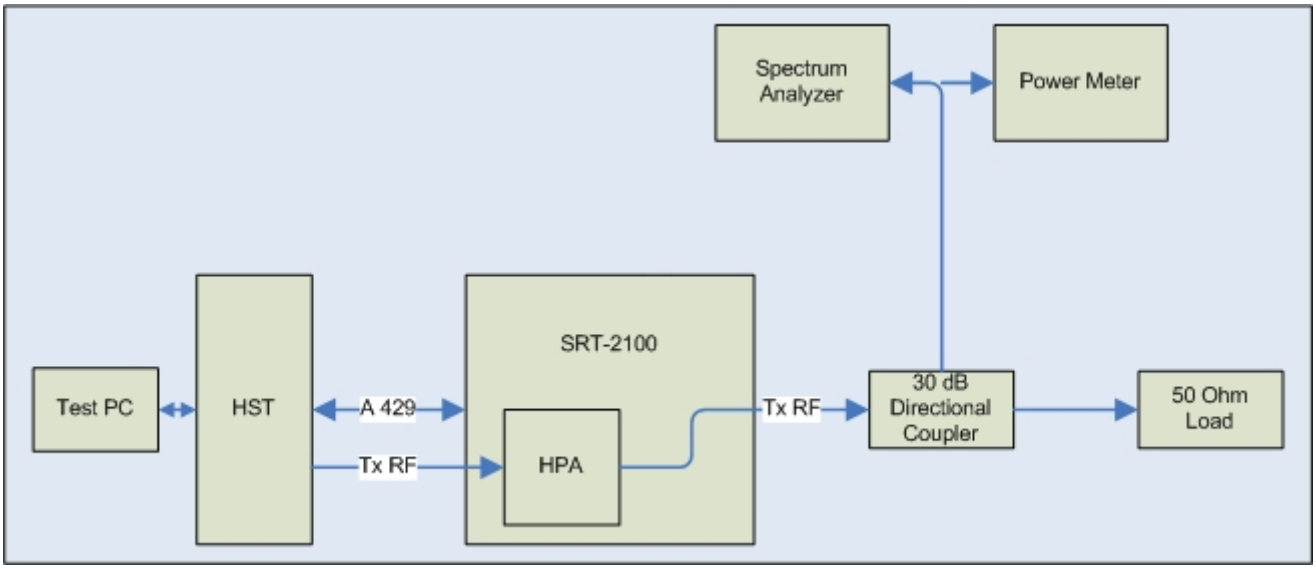

Figure 8 - Spurious Emissions Test Setup

Note on LNA/Diplexer

The Modified Type A LNA/Diplexer contributes a significant amount to the spurious signal rejection of the SAT-2100 system with a HST-2110 or HST-2120. However, in order to accurately measure the performance of the HST, the D/LNA had to be removed for the tests performed in this section and the FCC emission limits adjusted to reflect required performance in the absence of a LNA/Diplexer. The LNA/Diplexer is normally purchased as part of the antenna subsystem, and is not manufactured by Rockwell Collins. The LNA/Diplexer rejection assumed is per the standards for a "Modified Type A" diplexer as published in ARINC Characteristic 741.

To simplify testing, the measurement bandwidth was normalized to a 4 kHz measurement bandwidth.

Refer to the following table for the Pass/Fail criteria used during testing:

Frequency (MHz)	FCC Limit Per 87.139(i)(1)	LNA/ Diplexer Rejection (dB)	Pass/Fail Criteria spurious plus noise dBc (45 W output)	Pass/Fail Criteria Noise @ 4 kHz bandwidth
0.01 – 1525	-135 dB/4 KHz	80	-55 dBc/4 kHz	-55 dBc
1525 – 1559	-203 dB/4 KHz	120	-83 dBc/4 kHz	-83 dBc
1559 – 1585	-155 dB/MHz	100	-55 dBc/MHz	-79 dBc
1585 – 1605	-143 dB/MHz	88	-55 dBc/MHz	-79 dBc
1605 – 1610	-117 dB/MHz	62	-55 dBc/MHz	-79 dBc
1610 – 1610.6	-95 dB/MHz	40	-55 dBc/MHz	-79 dBc
1610.6 – 1613.8	-80 dBW/MHz	40	-56.5 dBc/MHz	-80.5 dBc
1613.8 – 1614	-95 dB/MHz	40	-55 dBc/MHz	-79 dBc
1614 – 1626.5	-70 dB/4 KHz	0	-70 dBc/4 KHz	-70 dBc
1626.5 – 1660	-70 dB/4 KHz	0	-70 dBc/4 KHz	-70 dBc
1660 – 1670	-49.5dBW/20 KHz	0	-66 dBc/20 KHz	-72 dBc
1670 – 1735	-60 dB/4 KHz	0	-60 dBc/4 KHz	-60 dBc
1735 – 12000	-105 dB/4 KHz	50	-55 dBc/4 KHz	-55 dBc
12000 – 18000	-70 dB/4 KHz	15	-55 dBc/4 KHz	-55 dBc

Conversion from dBW to dBc assumes maximum HPA output of 45 Watts = 16.5 dBW

Test Equipment for Spurious Emissions

Equipment Name	*Recommended Equipment Model Number*	*Required For*
HST-2110 AC HST-2120 DC	Collins PN 822-2231-020 Collins PN 822-2233-010	SAT-2100 System Component
SRT-2100	Collins PN 822-2023-001	SAT-2100 System Component
Directional Coupler	Narda 3042-20(or equivalent)	Coupler RF path to test equipment
Power Meter	HP437B (or equivalent)	Measuring RF Power
Spectrum Analyzer (up to 3 GHz)	Agilent E4402B (or equivalent)	Measuring Output Spectrum and Unwanted Emissions
Spectrum Analyzer (up to 22 GHz, low noise)	HP437B (or equivalent)	Measuring Output Spectrum and Unwanted Emissions
Test Interface PC	IBM Compatible PC with custom interface SW to control HST-2100 test modes	Set up HST-2110/2120 test mode

The HST-2110/2120 was tested as a system with the SRT-2100. Measurements were made at the output of the HPA. The HST-2110/2120 was set up to transmit at full power using the 16-QAM modulation. Since the modulation waveform is generated digitally using the same transmit path and components, the spurious performance is independent of the waveform being transmitted. The following procedure was run on both a HST-2110 AC and a HST-2120 DC in order to capture the differences between the AC and DC power supply.

Test Results for Spurious Emissions

Date: April 01, 2006
Location: Rockwell Collins, Cedar Rapids, Iowa
Model: HST-2110 AC, HST-2120 DC

Test Procedure for Spurious Emissions

1. Setup the equipment as shown in Figure 8 - Spurious Emissions Test Setup
2. Configure the SRT-2100 to start up into maintenance mode and use the SRT Interface Program (IP) to enable the internal HPA.
3. Disconnect the SRT->HST crosstalk bus to prevent the SRT from commanding the HST to decrease its output power.
4. Apply power to the HST unit under test and use the interface PC to initialize the channel card.
5. Use test interface PC to configure HST unit under test for the maximum EIRP (22.5 dBm) using a CW signal to establish mean power reference level. [On RS232 interface, enter “TST”, at Menu 5 enter “U”-Initialize HST ODU registers, “F”-Set TX Frequency(1643.5 MHz), “G”-Request EIRP from SRT(22.5 dBW), “M”-Set Modulation Type(CW, “C”-continuous)]
6. Measure mean power with power meter and set spectrum analyzer to set base line reference level.
7. Use test interface PC to configure HST unit under test for 16-QAM modulation at the maximum EIRP (22.5 dBm). [“E”-Request EIRP from SRT(22.5 dBW), “M”-Set Modulation Type(16-QAM, “C”-continuous)]

8. Measure mean power with power meter then connect spectrum analyzer and make measurements according to spectrum analyzer settings in table below.

Test Results for Spurious Emissions

Spectrum analyzer measurements were made according to the spectrum analyzer configurations in the following table for both the HST-2110 AC and the HST-2120 DC. These measurements are included in:

"Exhibit F1 – Spurious Emissions – HST-2110AC.pdf" and

"Exhibit F2 – Spurious Emissions – HST-2120DC.pdf".

Note on Measurement Bandwidths

The spectrum analyzer measures signal power in a particular "resolution bandwidth" as it sweeps across the selected frequency band and plots the data. If a wider bandwidth is used, more power is in that band and the point plotted is higher in amplitude. Section 87.139 (i) (1) footnote 1 states that "these values are expressed in dB below the carrier referenced to a 4 kHz bandwidth and relative to the maximum emission envelope level."

For all figures except figure 20, trace data from the Agilent E4402B spectrum analyzer was imported into version 7.1 SP3, of MATLAB and then normalized to the specified 4 KHz resolution bandwidth and the maximum emission level.

Figures 20 for both the HST-2110 and HST-2120 were generated through the use of an X-Y plotter connected to the HP437B spectrum analyzer. The display line of -43.2 dBm, when referenced to the maximum measured emission envelope of the HST-2110/2120 (11.09 and 12.28 dBm respectively) is the approximate limit line for discrete spurious at -55 dBc.

+11.06 dBm – (-43.2 dBm) = **-55 dBc**

Since the measurements were taken at a bandwidth of 30 kHz, the pass/fail limits for broadband noise normalized to a 4 KHz resolution bandwidth would be $10*\log_{10}$ (4 KHz/ 30 KHz) = 8.75 dB lower than the limit line shown on the plots, or approximately **–52 dBm.**

The data demonstrates that the HST-2110 and HST-2120 **meets all spurious emissions requirements** when used with the specified Modified Type A LNA/Diplexer.

1.7.3. Test Setup, Equipment and Results for Frequency Spectrum [Section 87.139 (i) (3)]

The HST-2120 was tested with a Collins SRT-2100 and measurements were made at the output of the SRT-2100.

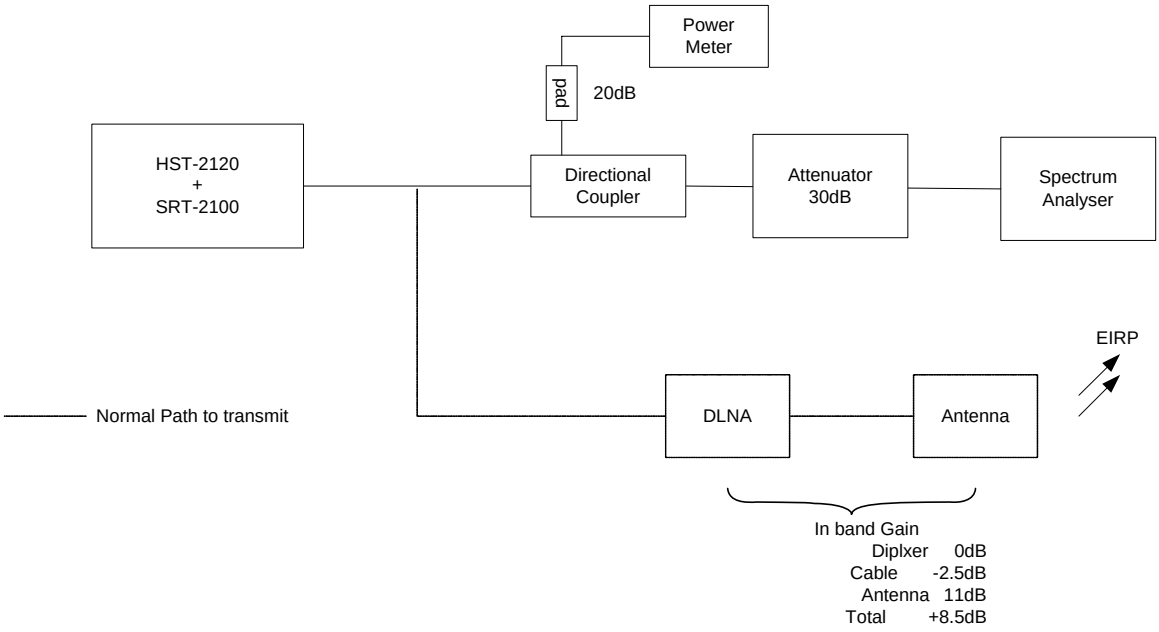

Figure 9 - Frequency Spectrum Test Setup

Test Equipment for Frequency Spectrum

Equipment Name	Recommended Equipment Model Number	Required For
Power Meter	HP437B (or equivalent)	Measuring RF Power
Spectrum Analyzer	R&S FSEB 20 (or equivalent)	Measuring Output Spectrum
30dB High Power Attenuator	Narda 769-30 (or equivalent)	Reducing RF Output Power to safe levels
20dB fixed attenuator	Narda 765-20 (or equivalent)	Reducing RF Output Power to safe levels
20dB Directional Coupler	HP778D (or equivalent)	Reducing RF Output Power to safe levels

Test Results for Frequency Spectrum

Date: 16-QAM 16-Nov-2005; BPSK 21-Nov-2005
Location: EMS Technologies, Ottawa, Canada
Model: HST-2120 Serial number: 017
Model: SRT-2100 Serial number: 137938
Test procedure: Configure the HST-21X0 and SRT-2120 to transmit a 3000 bps BPSK signal at nominal EIRP 14dBW and measure the frequency spectrum. Repeat this test while transmitting a 134400 bps 16-QAM signal at nominal EIRP 22.5dBW.

3000 bps BPSK

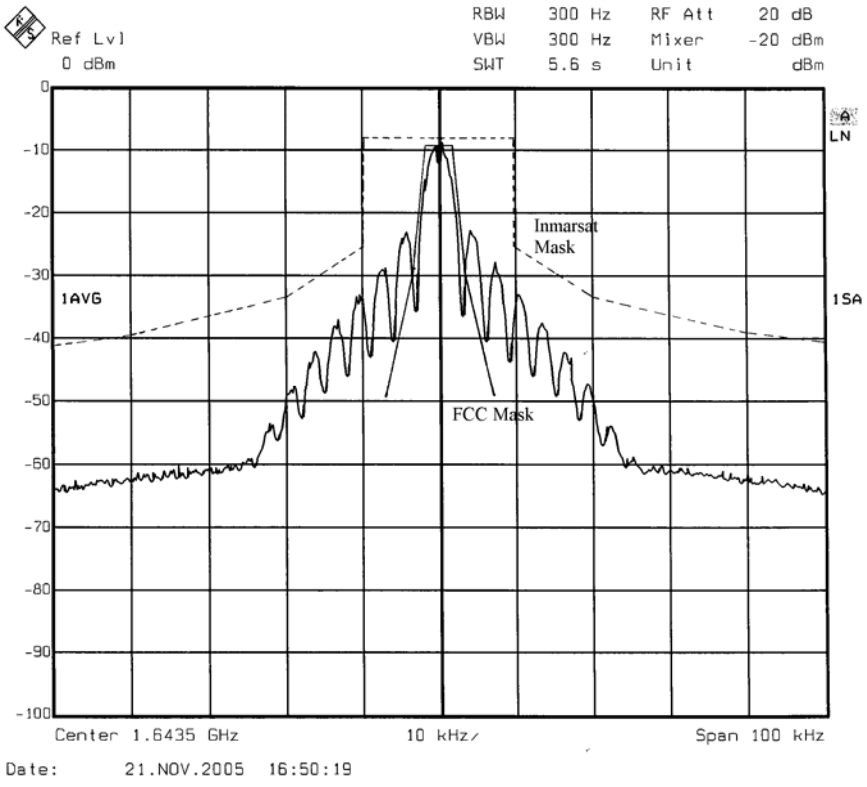

Figure 10 – 3000bps BPSK Transmitter Spectrum

Note: Both the mask specified by 87.139 (i) (3) and the applicable INMARSAT requirements are shown above. Refer to the Section 3.7.4 for a discussion of the test results.

134400 bps 16-QAM

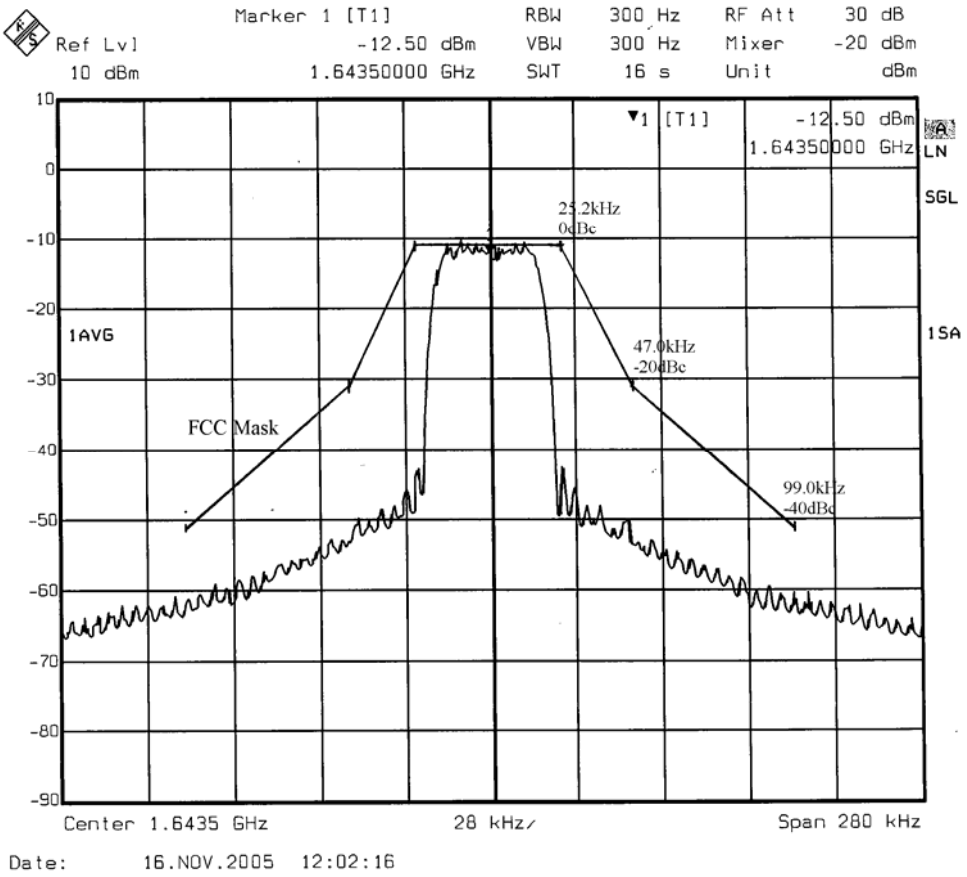

Figure 11 – 134400 bps 16-QAM Transmitter Spectrum

1.7.4. Test Results Discussion

Transmitter Spurious – 87.139 (i) (1)

The test results demonstrate that the transmitter is complaint with the provisions of this section. It is assumed that the requirements of this section should also apply to emission types D1D, D1E, and D1W, although these emission types are not specifically referenced in 87.139 (i).

Transmitter Spectrum Mask – 87,139 (i) (3)
The 3000 bps modulation specified by INMARSAT is pure BPSK, and does not incorporate any raised cosine filtering. As a result, the spectrum shape is not compliant with 87.138 (i) (3). A waiver request is anticipated to allow the use of this waveform as defined by INMARSAT.
The 134400 bps (64000bps user data rate) 16-QAM modulation is complaint with the mask, given the definition that the symbol rate is 33600 symbols per second. In this case, SR = 0.25 x channel rate for 16-QAM (4 information bits per symbol).

1.8. Field Strength of Spurious Radiation

1.8.1. FCC Requirements

Section 2.1053 (a), (b) (2)

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(2) All equipment operating on frequencies higher than 25 MHz.

Section 87.139 (i), (1)

(i) In case of conflict with other provisions of Section 87.139, the provisions of this paragraph shall govern for aircraft earth stations. When using G1D, G1E, or G1W emissions in the 1646.5 – 1660.5 MHz frequency band, the emissions must be attenuated as shown below.

(1) At rated output power, while transmitting a modulated single carrier, the composite spurious and noise output shall be attenuated by at least:

Frequency (MHz)	Attenuation (dB) [1]
0.01 – 1559	-135 dB/4 KHz
1525 – 1559	-203 dB/4 KHz
1559 – 1585	-155 dB/MHz
1585 – 1605	-143 dB/MHz
1605 – 1610	-117 dB/MHz
1610 – 1610.6	-95 dB/MHz
1610.6 – 1613.8	-80 dBW/MHz[3]
1613.8 – 1614	-95 dB/MHz
1614 – 1626.5	-70 dB/4 KHz
1626.5 – 1660	-70 dB/4 KHz[2,3,4]
1660 – 1670	-49.5dBW/20 KHz[2,3,4]
1670 – 1735	-60 dB/4 KHz

1735 – 12000	-105 dB/4 KHz
12000 – 18000	-70 dB/4 KHz

[1] These values are expressed in dB referenced to the carrier for the bandwidth indicated, and relative to the maximum emission envelope level, except where the attenuation is shown in dBW the attenuation is expressed in terms of absolute power referenced to the bandwidth indicated.
[2] Attenuation measured within the transmit band excludes the band +/- 35 kHz of the carrier frequency.
[3] This level is not applicable for Intermodulation products.
[4] The upper limit for the excess power for any narrow band spurious emission (excluding Intermodulation products within a 30 kHz measurement bandwidth) shall be 10 dB above the power limit in this table.

1.8.2. Test Setup, Equipment and Results for Field Strength of Spurious Radiation [Section 87.139 (i) (1)]

The following procedure is derived from DO-160D, Section 21 and adapted for testing the requirements of section 87.139(i) of FCC Part 87. While RTCA DO-160D does not require testing above 6 GHz, the same setup and methodology was used to measure radiated emissions up to 18 GHz.

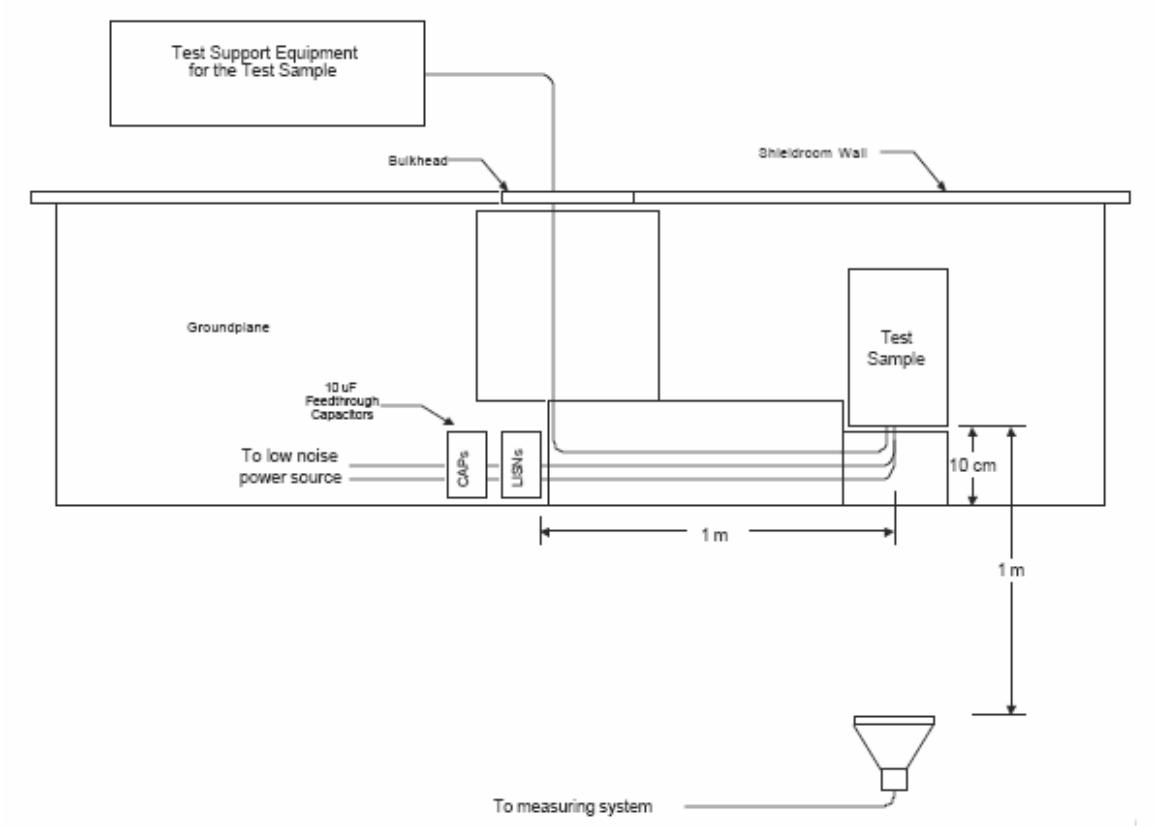

Figure 12 Field Strength Test Setup

Notes:

1. Terminate all LISN monitor output terminals with 50 ohms.
2. DC Bond resistance between the ground plane and enclosure shall not exceed 2.5 milliohms.

3. The lengths of the power leads from the test sample to the LISNs shall not exceed 1 meter.
4. At least 1 meter of EUT cable is to be 10 cm from the front of the test bench and parallel to its front edge. Excess interconnect cable bundle length will be zigzagged at the back of the test bench, approximately 5 cm above the ground plane.

Test Conditions for Field Strength of Spurious Radiation

1. Set up the radiated emissions test equipment as shown in Figure 14.
2. HST-2110/2120 operation during radiated emissions measurements monitors digital I/O discretes and exercises the ARINC 429 buses, Ethernet and RS232 ports via loopbacks. An ISDN/L-band loopback is also activated.

Test Measurements for Field Strength of Spurious Radiation

1. Measure and record emissions over the range from 150 kHz to 18,000 MHz using the automated DO-160D emissions measurement system.
2. Change antennas as required.

Test Equipment for Field Strength of Spurious Radiation

Equipment	Manufacturer and Model Number	Frequency Range (Bandwidth)
Active whip	RVA-30	10 kHz to 30 MHz
Biconical	EMCO 3104C	25 MHz to 200 MHz
Conical Log Spiral	Stoddart 93490-1	200 MHz to 1 GHz
Double Ridged Guide	EMCO 3115	1 GHz to 18 GHz
Calibrated Cable	RG-400, Adams Russell	NA
LISN	Fischer, FCC-LISN-DO-160	100 kHz - 400 MHz
10 μf Capacitor	Solar 6512-106R	N/A
Spectrum Analyzer	Hewlett Packard, 8566B w/OPT 462	100 Hz - 22 GHz
Preselector	HP 85685A	20 Hz - 2 GHz
Printer	HP Laser Jet	NA
Computer	Gateway 2000	NA
Bus Extender	HP 37204	NA

Test Results for Field Strength of Spurious Radiation

Date:
Location: MPB, Ottawa, Canada
Model: HST-2120
Serial number:
Test procedure: EMS-TS-1110-10022, Sect 2.8.2 and RTCA DO-160D, Sect 21.4.

Reference Field Level Calculations

According to Section 87.139 (i), the radiated spurious emissions are to be attenuated to the same degree as the spurious emissions at the antenna terminals. A reference field level was calculated for comparison with the measured narrow-band data and based on these requirements. The following assumptions were made for these calculations:

- The intended transmitted signal is radiated through a dipole antenna at 1-meter distance from the point at which the measurements are made.
- This distance is sufficiently greater than the distance at which the radial component of the E-field is negligible.
- The peak power available at the dipole antenna is calculated with maximum cable loss at the rated output power. This power would be 17.8 dBW (45 watts) – 2.5 dB (cable loss) = 15.3 dBW (33.7 watts).
- The duty cycle of the operation is 100%.

The calculation proceeded as follows:
For a half-wave dipole antenna in free space, in the direction of maximum radiation, the field strength is

E = (49.2 * Pt) 0.5 /R

Where

R = distance in meters

Pt = transmitted power in watts

For a distance of R = 1 meter and the transmitted power of 33.7 watts, the reference field strength of the desired signal is calculated to be:

E = (49.2 * 33.7) 0.5 / 1 = 40.7 Volts/meter = 40.7 * 10 6 Micro-Volts/meter = **148.40 dBuV/meter.**

"***Exhibit F3 – Spurious Radiation.pdf"*** contains the test results as well as photographs documenting the test set-up. Note that the limit lines on all plots are those required for RTCA DO-160D, Section 21.4, Category M.

1.8.3. Test Results Discussion

The FCC test procedures for emissions radiated from the equipment case and interconnecting cables is specified in 2.1053 "Measurements Required: Field Strength of Spurious Radiation." These procedures require demonstration of compliance with the same emissions limits specified in 87.139(i)(1). However, the limits of 87.139(i)(1) were recently updated to align with the requirements of RTCA DO-210D "Minimum Operational Performance Standards for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) Avionics" (MOPS). This resulted in a change from the previous FCC attenuation limits of 83 dB (below 1559 MHz) and 55 dB (above 1559 MHz) to attenuations now as high as 203 dBc in the receive band (1525-1559 MHz). These new requirements are appropriate at the Satcom antenna terminals, since Satcom is a full duplex system and shares a single antenna. Most of the receiver/transmitter isolation to achieve this attenuation is provided by the LNA/Diplexer . Other attenuation requirements in the MOPS were established to protect any GPS receiver antenna mounted nearby on the aircraft and to protect radio astronomy. These limits assumed the Satcom antenna could exhibit in excess of 12 dB gain at these frequencies.

However, there is no practical reason to require these same attenuations from the equipment case and interconnecting cables. The equipment and cables are located internal to the aircraft fuselage, and the field strength of any spurious emission is not amplified by the gain of the antenna. None of the other electronic equipment that may be installed in the aircraft are tested to the levels of 87.139(i)(1).

Rockwell Collins is requesting a waiver of 87.139(i)(1) as applied to the field strength measurements of equipment and interconnecting cables specified in 2.1053. Rockwell Collins is requesting that the FCC accept compliance with the standard radiated field strength procedures and limits for equipment and interconnecting cables for equipment installed internal to aircraft fuselage as specified in RTCA DO-160D, Section 21, Category M.

The plots in **"*Exhibit F3 – Spurious Radiation.pdf*"** indicate that the HST-2120 meets or exceeds the radiated emissions requirements of DO-160D, Section 21, Category M for electronic equipment installed internal to the fuselage.

1.9. Frequency Stability

1.9.1. FCC Requirements

Section 2.1055 (a) (2), (b), (c) (1) (2), (d) (1) (3)

(a) (2) The frequency stability shall be measured with variation of ambient temperature from –20° to +50° centigrade for equipment licensed for use aboard aircraft in the Aviation Services under part 87 of FCC Code of Federal Regulations Title 47.

(b) The frequency measurements shall be made at the extremes and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying shall be shown.

(c) (1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0° centigrade and +30° centigrade with no primary power applied.

(c)(2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater.

(d) (1) (3) The frequency stability shall be measured with variation of primary supply voltage of 85 to 115 percent of the nominal value. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

Section 87.133
The carrier frequency of each station must be maintained within these tolerances:

Frequency band (lower limit exclusive, upper limit inclusive), and categories of stations	Tolerance
Band – 470 to 2450 MHz Aircraft Earth Station	320 Hz [1]

[1] For purposes of certification, a tolerance of 160 Hz applies to the reference oscillator of the AES transmitter. This is a bench test.

1.9.2. Test Setup, Equipment and Results for Frequency Stability [Section 87.133]

3.9.2.1 Test Setup, Equipment and Results for Frequency Stability of the HST-2120 (DC)

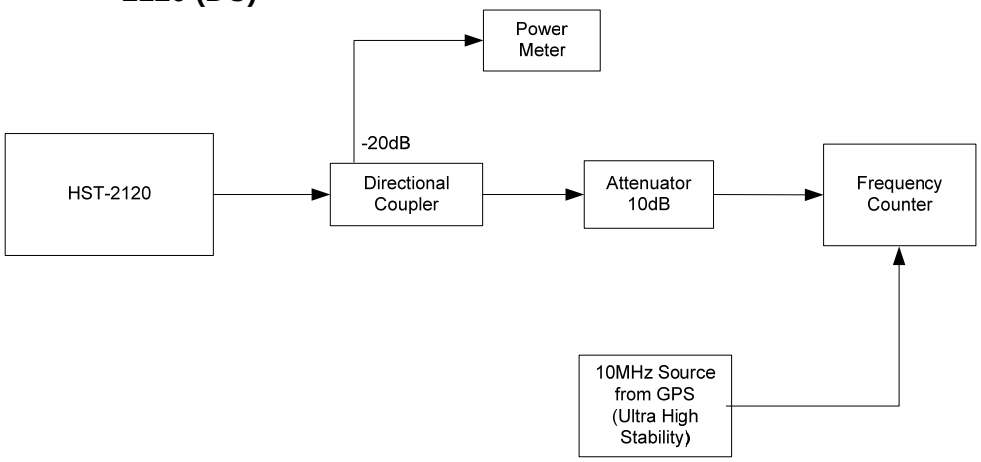

Figure 13 Frequency Stability Test Setup

Test Equipment for Frequency Stability

Equipment Name	Recommended Equipment Model Number	Required For
Spectrum Analyzer	HP8560E (or equivalent)	Monitoring signal
Frequency Counter	EIP Model 545 (or equivalent)	Measuring Frequency
20dB Directional Coupler	HP7780 (or equivalent)	Reducing RF Output Power to safe levels
10dB Attenuator	Narda 768-10 (or equivalent)	Reducing RF Output Power to safe levels

Test Results for Frequency Stability

Date: 16-Dec-2005
Location: EMS Technologies, Ottawa, Canada
Model: HST-2120
Serial number: 017
Test procedure: 47 CFR 2.1055 (b) (c) (d).

Temperature	Supply voltage	Tolerance (Hz)
-20 to +50 C	85% - 115%	320

Test Results - Stability

Temperature (° C)	Voltage (VDc)	Frequency (Hz)	Error (Hz)	Pass/Fail
-20	23.8	1,643,500,093	93	Pass
-20	28	1,643,500,095	95	Pass
-20	32.2	1,643,500,097	97	Pass
-10	23.8	1,643,500,095	95	Pass
-10	28	1,643,500,093	93	Pass
-10	32.2	1,643,500,096	96	Pass
0	23.8	1,643,500,092	92	Pass
0	28	1,643,500,094	94	Pass
0	32.2	1,643,500,091	91	Pass
+10	23.8	1,643,500,094	94	Pass
+10	28	1,643,500,093	93	Pass
+10	32.2	1,643,500,092	92	Pass
+20	23.8	1,643,500,092	92	Pass
+20	28	1,643,500,091	91	Pass
+20	32.2	1,643,500,091	91	Pass
+30	23.8	1,643,500,089	89	Pass
+30	28	1,643,500,089	89	Pass
+30	32.2	1,643,500,090	90	Pass
+40	23.8	1,643,500,088	88	Pass
+40	28	1,643,500,087	87	Pass
+40	32.2	1,643,500,086	86	Pass
+50	23.8	1,643,500,084	84	Pass
+50	28	1,643,500,085	85	Pass
+50	32.2	1,643,500,085	85	Pass

Test Results – Warm-up Time

As the HST-2110 and HST-2120 have an ovenized frequency reference, compliance with Section 2.1055 (c) is required. The High Stability Reference oscillator and other frequency determining elements (including synthesizers) are identical for all versions of the HST.

Upon power up the HST-2120 is set to generate a carrier of 1643.500.000 MHz and the frequency recorded every minute. Warm up time, defined as the longest time required for the frequency to be within tolerance, is 3 minutes.

Temperature (° C)	Time (min)	Frequency (Hz)	Within tolerance
0	1	1,643,497,028	N/A
0	2	1,643,500,136	N/A
0	3	1,643,500,093	Y
0	4	1,643,500,095	Y
0	5	1,643,500,094	Y
0	6	1,643,500,095	Y
0	7	1,643,500,092	Y
0	8	1,643,500,095	Y
0	9	1,643,500,096	Y
0	10	1,643,500,092	Y
+30	1	1,643,498,707	N/A
+30	2	1,643,500,102	N/A
+30	3	1,643,500,091	Y
+30	4	1,643,500,088	Y
+30	5	1,643,500,088	Y
+30	6	1,643,500,089	Y
+30	7	1,643,500,089	Y
+30	8	1,643,500,089	Y
+30	9	1,643,500,089	Y
+30	10	1,643,500,089	Y

3.9.2.2 Test Setup, Equipment and Results for Frequency Stability of the HST-2110 (AC)

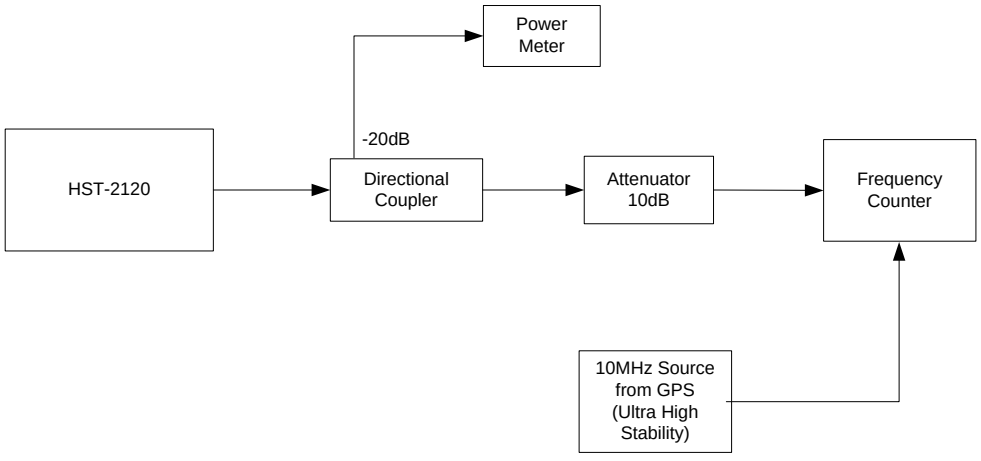

Figure 14 Frequency Stability Test Setup

Test Equipment for Frequency Stability

Equipment Name	Recommended Equipment Model Number	Required For
Power Meter	HP E4419B (or equivalent)	Monitoring signal level
Frequency Counter	EIP Model 545A (or equivalent)	Measuring Frequency
20dB Directional Coupler	HP778D (or equivalent)	Reducing RF Output Power to safe levels
10dB Attenuator	Narda 768-10 (or equivalent)	Reducing RF Output Power to safe levels
10 MHz Source from GPS (Ultra High Stability)	EndRun Technologies Model: Praecis Gfr P/N 3010-0010-000	10 MHz Reference for Frequency Counter

Test Results for Frequency Stability

Date: 10May-2006 & 11May-2006
Location: EMS Technologies, Ottawa, Canada
Model: HST-2110 (AC)
Serial number: 300
Test procedure: 47 CFR 2.1055 (b) (c) (d).

Temperature	Supply voltage	Tolerance (Hz)
-20 to +50 C	85% - 115%	320

Test Equipment:

Equipment Name	Recommended Equipment Model Number	Serial Number CAL Due Date
Power Meter	HP E4419B	GB43311611 14Mar2007
Frequency Counter	EIP Model 545A	00210 19Nov2006
20dB Directional Coupler	HP778D	13409 16Mar2007
10dB Attenuator	Narda 768-10 (or equivalent)	-
10 MHz Reference from GPS	EndRun Technologies Model: Praecis Gfr P/N: 3010-0010-000	04040017 Calibration Not required

Test Results - Stability

Temperature (° C)	Voltage (Vac)	Frequency (Hz)	Error (Hz)	Pass/Fail
-20	97.7	1,643,499,987	-13	Pass
-20	115	1,643,499,986	-14	Pass
-20	132.3	1,643,499,987	-13	Pass
-10	97.7	1,643, 499,985	-15	Pass
-10	115	1,643, 499,986	-14	Pass
-10	132.3	1,643, 499,986	-14	Pass
0	97.7	1,643, 499,984	-16	Pass
0	115	1,643, 499,985	-15	Pass
0	132.3	1,643, 499,985	-15	Pass
+10	97.7	1,643, 499,983	-17	Pass
+10	115	1,643, 499,983	-17	Pass
+10	132.3	1,643, 499,983	-17	Pass
+20	97.7	1,643,499,979	-21	Pass
+20	115	1,643, 499,978	-22	Pass
+20	132.3	1,643, 499,979	-21	Pass
+30	97.7	1,643, 499,977	-23	Pass
+30	115	1,643, 499,978	-22	Pass
+30	132.3	1,643, 499,977	-23	Pass
+40	97.7	1,643, 499,975	-25	Pass
+40	115	1,643, 499,976	-24	Pass
+40	132.3	1,643, 499,976	-24	Pass
+50	97.7	1,643, 499,974	-26	Pass
+50	115	1,643, 499,973	-27	Pass
+50	132.3	1,643, 499,973	-27	Pass

Test Results – Warm-up Time

As the HST-2110 (AC) has an ovenized frequency reference, compliance with Section 2.1055 (c) is required.

Upon power up, the HST-2110 (AC) was set to generate a carrier of 1643.500.000 MHz and the frequency recorded every minute. Warm up time, defined as the longest time required for the frequency to be within tolerance, is 3 minutes.

Temperature (° C)	Time (min)	Frequency (Hz)	Pass/Fail
0	1	1,643,497,817	N/A
0	2	1,643,499,319	N/A
0	3	1,643,499,984	Y
0	4	1,643,499,985	Y
0	5	1,643,499,984	Y
0	6	1,643,499,984	Y
0	7	1,643,499,985	Y

0	8	1,643,499,984	Y
0	9	1,643,499,984	Y
0	10	1,643,499,985	Y
+30	1	1,643,499,898	N/A
+30	2	1,643,499,976	N/A
+30	3	1,643,499,978	Y
+30	4	1,643,499,978	Y
+30	5	1,643,499,977	Y
+30	6	1,643,499,977	Y
+30	7	1,643,499,977	Y
+30	8	1,643,499,977	Y
+30	9	1,643,499,977	Y
+30	10	1,643,499,978	Y

1.9.3. Test Results Discussion

The HST-2110 and HST-2120 meet the FCC requirements for frequency accuracy. However, when operated as a system with an SRT-2100, the actual transmit frequency is the sum of the SRT frequency reference error (+/- 160 Hz), and the HST frequency reference error. As a result, the actual transmit frequency error of the system may exceed the +/- 160 Hz reference oscillator requirement stated in 87.133. The INMARSAT standards allow for a relaxation of accuracy, due to the higher data rates used. The INMARSAT requirement is +/- 1250 Hz, which is easily met by the SRT and HST as a system. A Waiver request is anticipated to permit the operation of equipment designed to meet +/- 1250 Hz frequency established by INMARSAT for this service.

1.10. Priority and Preemption

An aircraft earth station, AES, equipped with both a SRT-2100 and HST-2110 or HST-2120 share a common antenna and high power amplifier. The SRT internally reserves amplifier power so that higher priority data traffic such as ACARS has immediate availability to the AES channel and HPA power resources. In addition, both the AES and ground earth station manage voice calls based on the priority of the calls.

The priority, which is assigned to each call, as it originates, provides the basis for handling of the call within the AES and GES. These priorities are established and the requirements for their use are defined in Inmarsat System Definition Manual. Inmarsat also specifies a number of protocol tests, which must be completed to verify that the AES complies with the priority and preemption requirements.

For AES to GES calls, the pilot specifies the nature (priority) of the call as a part of the call set up procedure. If the AES resources are exhausted, the pilot is prompted to select whether to preempt a lower priority call, or have his call queued until resources are available. This operation is in “real time” in the sense that the pilot makes the decision at the time that the call is placed. If he elects to queue the call, he can later use the preempt feature if the situation warrants. Selection of the preemption feature will

terminate lower priority calls which are in progress and to make resources available for the pilot's higher priority call.

For GES to AES calls, the pilot involvement is not practical. As an upcoming call request is made to the AES, the SRT-2100 examines the status of the current resources to determine if resources are available for an assignment. The processor also examines the status of the cockpit lines to determine their availability. If the incoming call priority is "Cockpit Safety" or greater and all resources are in use, lower priority calls will be terminated until resources are available to complete the call. If the cockpit line(s) are busy and the incoming call is of greater priority than one of calls currently placed, that call will be terminated and the resources will be used for the incoming call. In the event that call has the same or lower priority than the cockpit calls already placed, it will be rejected by the AES.

1.10.1. FCC Requirements

The discussion and test results shown in this section address and meet the requirements of the following FCC requirements:

Section 87.187 (q)

In the frequency bands 1549.500-1558.500 MHz and 1651.000-1660.000 MHz, the Aeronautical Mobile-Satellite requirements that cannot be accommodated in the distress and safety frequency bands 91554.0-1545.0 MHz) and 1645-1646.5 MHz) shall have priority access with real-time preemptive capability for communications in the Mobile-Satellite Service.

Section 87.189 (e)

Transmission of public correspondence must be suspended when such operation will delay or interfere with message pertaining to safety of life and property or regularity of flight, or when ordered by the captain of the aircraft.

1.10.2. Test Equipment List

Quantity	Item
1	MCDU with Cockpit telephone interface
1	SAT-2100 Over the air test station with HST-2110
1	SRT-2100, PN 822-2023-001
1	HST-2110 AC, PN 1110-A-0601-01
1	HST-2110 DC, PN 1110-A-0601-02
1	HST-2120 DC, PN 1110-A-0601-03
1	Ground telephone

1.10.3. Test Procedures Air-to-Ground

The purposes of these tests are:

(A) To verify the ability of the AES to preempt a HST-21X0 call with a higher priority cockpit call when sufficient resources are not available.

(B) To verify the ability of the GES to preempt a HST-21X0 call with a higher priority cockpit call when sufficient resources are not available.

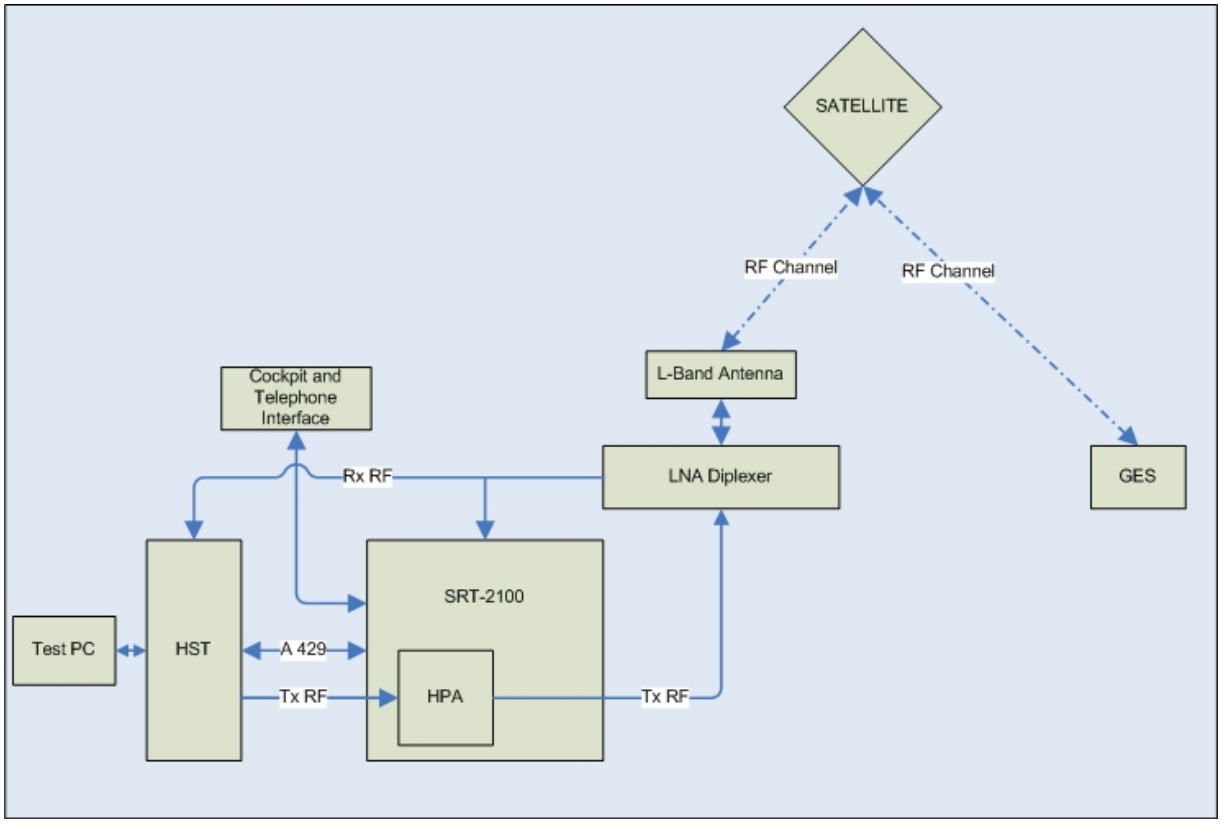

Figure 15 - Priority/Preemption Test Setup

PREEMPT TEST Air-To-Ground

1. Setup the equipment as shown in Figure 15.
2. Make a HST-2110 ATG call to a lab phone by dialing 001319295XXXX#
3. When lab phone rings pick up. Verify voice quality to ground and from ground
4. Adjust antenna gain so that no resources are available to make an additional call.
5. Setup the MCDU to initiate a Q10 priority ATG cockpit voice call to a lab telephone.
6. Press *PREEMPT on the MCDU to initiate the cockpit voice call.
7. Verify the HST-2110 call is disconnected and the cockpit call is initiated.
8. When the lab phone rings pick up. Verify voice quality to ground and through headset from ground
9. Verify sidetone is heard with the headset when talking into the mouthpiece
10. End the call from the air by pressing END CALL*
11. Verify call cleared, and that the cause code on the trace is LOC=0, CLASS=1, VALUE=0, S=CCITT_Q931
12. Hang up phones

PREEMPT TEST Ground-To-Air

1. Setup the equipment as shown in Figure 15
2. Make a HST-2110 ATG call to a lab phone by dialing 001319295XXXX#
3. When lab phone rings pick up. Verify voice quality to ground and from ground

4. Adjust antenna gain so that no resources are available to make an additional call.
5. Make a cockpit voice Q10 priority GTA call using “Satellite Aircom Cockpit” service and Sprint card
6. Dial 9 1 800 877 8000 0 514 841 2102 [pin number]
7. Press ANSWER* on the MCDU for voice 1
8. Verify the HST-2110 call is disconnected
9. Verify voice quality to ground and through headset from ground
10. Verify sidetone is heard with the headset when talking into the mouthpiece
11. End call from the air by pressing END CALL*
12. Verify call cleared, and that the cause code on the trace is LOC=0, CLASS=1, VALUE=0, S=CCITT_Q931
13. Hang up phones

1.10.4. Test Results Discussion

Air-to-Ground Preemption Demonstrated for All Units (Pass/Fail) _Pass__

Ground-to-Air Preemption Demonstrated for All Units (Pass/Fail) _Pass__