Aviation Communication and Surveillance Systems	NXT-800 TRANSPONDER END ITEM TEST (EIT) TEST REQUIREMENTS DOCUMENT (TRD)			
CAGE Code **1WYD3**	Initial Release Date **15-APR-2014**	Revision Date **1-JUL-2014**	Document Number **8010008-001**	Revision **D**

Record of Revisions

Rev	Date	Authorization	Description of Change
-	15-APR-2014	ECR015042	CR DB03_00003249: Initial Release CR DB03_00003255: CR DB03_00003327: CR DB03_00003375:
A	28-APR-2014	ECR015095	CR DB03_00003481: Changes to resolve issues and BL release of NXT-800
B	19-JUN-2014	ECR015208	Modify Standby Power Tests, Mutual Suppression Tests, ARINC Tests, Appendix B Report Format, Appendix D GUI, and Appendix E Calibration
C	26-JUN-2014	ECR015240	Change how we measure power consumption to use power supply rather than DMM.
D	1JUN-2014	ECR015257	Changed Limits on Hot Calibration in App. E, and decreased the minimum transmit power consumption from 40W to 30W.

Table of Contents

Table of Figures

Table of Tables

1 INTRODUCTION

This document is the Test Requirements Document (TRD) for the NXT-800 Mode S Transponder.

1.1 Purpose

The purpose of this document is to define the specifications and test methods required for testing a NXT-800 Mode S Transponder.

1.2 Scope

This Test Requirements Document establishes the requirements for performing an End Item Acceptance Test on a NXT-800 Mode S Transponder Line Replaceable Unit (LRU).

1.3 References

Table 1-1: Referenced ACSS Documents

Document No.	Description
8010002-001	NXT-800 Transponder Hardware Requirements Document (HRD)
8010040-001	NXT Transponder Hardware Test Software (HTS) Test Requirements Document (TRD)
8010114-001	NXT Transponder Acceptance Test Procedure (ATP)
9001080-001	Test Station, Transponder Parametric, ESS
9008000-55	Assembly, Hardware NXT-800
9008000-55000	Assembly, EITM-NXT-800 Hardware End Item
9008049-001	NXT Transponder Environmental Stress Screening (ESS) Software
9008047-001	NXT-800 Transponder Software Configuration File
9001936-001	NXT Transponder Calibration Defaults
9001937-001	NXT Transponder Temp/Vibe Profiles
PL9008000-55	Assembly, Hardware NXT-800 Parts List
PL9008000-55000	Assembly, EITM-NXT-800 Hardware End Item Parts List

1.4 Definitions

1.4.1 Acronyms and Abbreviations

Table 1-2: Acronyms and Abbreviations

Acronym	Definition
ACSS	Aviation Communication and Surveillance Systems
ADSB	Aircraft Specific Data Base
AIU	Aircraft Interface Unit
ARINC	Aeronautical Radio, Inc.
ATCRBS	Air Traffic Control Radar Beacon System

Table 1-2: Acronyms and Abbreviations

Acronym	Definition
ATDL	Air Transport Data Link
ATP	Acceptance Test Procedure
ATS	Altitude Type Subfield
ATSU	Air Traffic Services Unit
BITE	Built-In Test Equipment
CCA	Circuit Card Assembly
CCP	Common Computing Platform
CMU	Communications Management Unit
CPA	Common Processor Assembly
CPLD	Complex Programmable Logic Device
CPS	Common Power Supply
CRC	Cyclic Redundancy Check
DAC	Digital to Analog Converter
DCV	Direct Current Voltage
DMTL	Dynamic Minimum Threshold Level
ECC	Error Checking and Correction
EIT	End Item Test
EPROM	Erasable Programmable Read-Only Memory
EEPROM	Electrically Erasable Programmable Read-Only Memory
FCC	Flight Control Computer, Federal Communications Commission
ESS	Environment Stress Screening
FMC	Flight Management Computer
FMS	Flight Management System
FPGA	Field Programmable Gate Array
GND	Ground
GNSS	Global Navigation Satellite System
GPIO	General Input/Output
GPS	Global Positioning System
GUI	Graphical User Interface
HBM	Heartbeat Monitor
HRD	Hardware Requirements Document
HTML	Hyper Text Markup Language
HTS	Hardware Test Software
I^2C	Inter-Integrated Circuit
IC	Integrated Circuit
I/O	Input/Output
IRS	Inertial Reference System, Interface Requirements Specification
JTAG	Joint Test Action Group
KHz	Kilohertz
LBP	Left Bottom Plug
LRU	Line Replaceable Unit
LSB	Least Significant Bit
MCP	Mode Control Panel
MFG	Manufacturer
MHz	Megahertz
MSB	Most Significant Bit
MSP	Mode Select Panel, Maintenance Station Processor, Most Significant Bit, Mode-S Protocol
MTL	Minimum Trigger Level

Table 1-2: Acronyms and Abbreviations

Acronym	Definition
NAC_V	Navigation Accuracy Category for Velocity
P1	Processor 1
P2	Processor 2
P3	Processor 3
PC	Personal Computer
PCI	Peripheral Components Interconnect
PDL	Portable Data Loader
QA	Quality Assurance
RCVR	Receiver
RF	Radio Frequency
RFIU	Radio Frequency (RF) Interface Unit
SDA	System Design Assurance
SDI	Serial Data Input/
SDRAM	Synchronous Dynamic Random Access Memory
SEM	Soft Error Mitigation
SLS	Side Lobe Suppression
SPI	Special Pulse for Identification, Special Position Identifier
SPR	Sync Phase Reversal
STIV	Switching Threshold Input Voltage
SW	Software
TCAS	Traffic Collision Avoidance System ≈ Airborne Collision Avoidance System
TM	Time Mark
TRD	Test Requirements Document
UART	Universal Asynchronous Receiver/Transmitter
UUT	Unit Under Test
VALFAC	Validation Facility
VFOM	Vertical Figure of Merit
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio
WVT	Working Voltage Threshold
XIC	Transponder Interface Controller
XPDR	Transponder

2 GENERAL INFORMATION

2.1 General Requirements

The following conditions are recommended for performing tests on a Transponder LRU:

Power to the UUT should be removed before attaching or removing any interconnecting systems.

2.2 General RF Test Requirements

Step 1. All antenna ports must be terminated in 50 ohms while power is applied to the UUT.

- Test equipment connected to the antenna ports must have a voltage standing wave ratio (VSWR) of less than 1.5:1.
- Test equipment connected to the antenna ports shall withstand peak power levels of at least 1000 W and average power levels of at least 2 W.
- RF power values are specified as measured at the rear connector of the UUT. If cabling or test equipment introduces losses into the measurement, these losses shall be allowed for in the values reported by the test equipment.
- Figure 2-1 shows the basic characteristics which define a pulse.

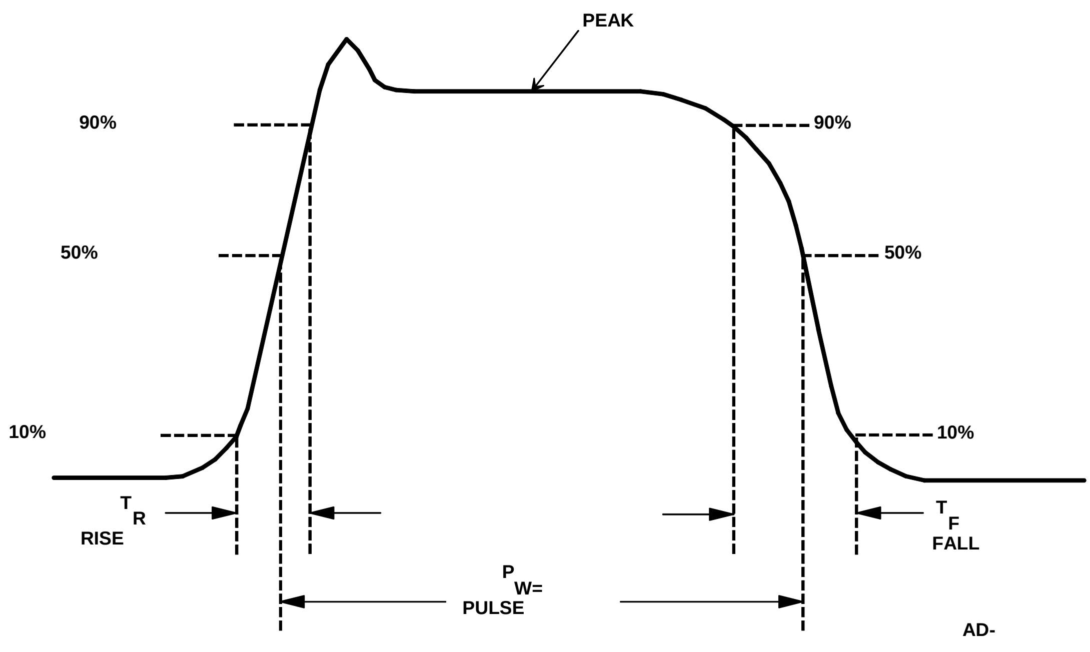

Figure 2-1: Basic Pulse Measurements

2.3 Power Requirements

The following are power requirements for operating the test equipment:

- 115 Vac, 60 Hz, 20 A, standard service power for test equipment operation.

3 TEST EQUIPMENT REQUIREMENTS

3.1 Test Equipment Hardware

The Transponder ESS Test Station, part number 9001080-001, is the test equipment hardware required to perform the tests.

The Transponder ESS Test Station shall be calibrated under the following conditions:

- Initial deployment of an Transponder ESS Test Station.
- A disconnection of an RF path within the Transponder ESS Test Station.
- Repair or replacement of an RF component within the Transponder ESS Test Station.
- If calibration of the Transponder ESS Test Station has not been performed within thirty days.

Note: Calibration of the Transponder ESS Test Station is not required when the disconnected RF path or repaired/replaced RF component is not being utilized within the station.

As part of the initialization process, the Transponder ESS Test Station shall be capable of determining whether the Transponder ESS Test Station and station instruments are in or out of calibration, based on the last and next calibration date.

If the Transponder ESS Test Station instruments will be out of calibration within 2 weeks (14 calendar days), the operator shall be notified.

If the Transponder ESS Test Station instruments are out of calibration, the operator shall be locked out and unable to use the Transponder ESS Test Station.

Note: After the Transponder ESS Test Station instruments have been calibrated, the ResourceRoster.ini file must be updated in order to utilize the Transponder ESS Test Station again.

3.2 Manual Station Calibration

The RF paths in the station that need calibration in order to ensure accurate UUT measurements are the Top and Bottom Antenna paths to the SDX2000 RF I/O port and Mode S Bottom port. These signal paths need to be calibrated on all three UUT slots in the ESS station. The procedure is as follows and should be performed every 30 days:

Note: The spreadsheet, *C:\9008049\StationClaibration.xlsx*, provides a method of entering, calculating, and storing the calibration data collected during this process.

Step 1. Power up the Transponder ESS Test Station and external Spectrum Analyzer and Signal Generator. Allow them to warm up for at least 30 minutes. Verify that the test equipment used is calibrated and functioning properly.

Step 2. Connect the Signal Generator to the Top Antenna port of the test fixture.

Step 3. Setup the Signal Generator as follows:

Frequency: **1090MHz**

RF Amplitude: **0dBm**

Step 4. Connect a Spectrum Analyzer (a Peak Power Meter can also be used) to the RF I/O input cable.

Step 5. Setup the Spectrum Analyzer as follows:

Center Frequency: **1090MHz**

Span: **10MHz**

Step 6. Connect the Top Antenna port to the RF I/O Input of the SDX using the stations RF relay.

Step 7. Turn the Signal Generator RF Output **ON** and using peak search record the amplitude of the signal on the Spectrum Analyzer (**Top to Top Path Loss**).

Step 8. Turn the Signal Generator RF Output **OFF**.

Step 9. Connect the Signal Generator to the Bottom Antenna port of the test fixture.

Step 10. Connect the Spectrum Analyzer (a Peak Power Meter can also be used) to the Mode S Bottom input cable.

Step 11. Turn the Signal Generator RF Output **ON** and using peak search record the amplitude of the signal on the Spectrum Analyzer (**Bottom to Bottom Path Loss**).

Step 12. Turn the Signal Generator RF Output **OFF**.

Step 13. Connect the Bottom Antenna port to the RF I/O Input of the SDX using the stations RF relay.

Step 14. Connect the Spectrum Analyzer (a Peak Power Meter can also be used) to the RF I/O input cable.

Step 15. Turn the Signal Generator RF Output **ON** and using peak search record the amplitude of the signal on the Spectrum Analyzer (**Bottom to Top Path Loss**).

Step 16. Turn the Signal Generator RF Output **OFF**.

Step 17. Connect the Signal Generator to the Top Antenna port of the test fixture.

Step 18. Connect the Spectrum Analyzer (a Peak Power Meter can also be used) to the Mode S Bottom input cable.

Step 19. Turn the Signal Generator RF Output **ON** and using peak search record the amplitude of the signal on the Spectrum Analyzer (**Top to Bottom Path Loss**).

Step 20. Turn the Signal Generator RF Output **OFF**.

Step 21. Connect the Cable from the Signal Generator to the Spectrum Analyzer.

Step 22. Turn the Signal Generator RF Output **ON** and using peak search record the amplitude of the signal on the Spectrum Analyzer (**Cable Loss**).

Step 23. Turn the Signal Generator RF Output **OFF**.

Step 24. Subtract the absolute value of the Cable loss from absolute value of both the path loss to get the actual path loss.

Step 25. Update the calibration variables in TestStand.

StationGlobals.StationCalibration.CalibratedBy

StationGlobals.StationCalibration.DateTime

StationGlobals.StationCalibration.nCableLoss[*a*][*b*][*c*][*d*]

Where: a = UUT Type (0 – NXT600, 1 – NXT800)
b = Slot (0 – 3)
c = Antenna input (0 – Top, 1 – Bottom)
d = SDX2000 input (0 – RF I/O, 1 – Mode S Bottom)

3.3 Test Equipment Software

If the Transponder ESS Test Station, 9001080-001, is used for performing the tests described in this document, the testing process is automated using National Instruments LabWindows CVI and National Instruments TestStand.

If the Transponder ESS Test Station is used to perform the tests described in this document, the test software shall generate a test report as described in Appendix B, NXT Test Report Requirements.

Hardware Test Software (HTS) must be loaded into the UUT prior to executing the tests described in this document.

The test software protocol operates on command/response architecture. Commands are sent to the HTS from a test PC via RS232. Responses or results are returned to the test PC where they are post-processed by automation software.

3.4 Test Equipment / UUT Setup

Power up Transponder ESS Test Station and allow it to warm up for at least 30 minutes. Verify that the test equipment used is calibrated and functioning properly.

4 TEST REQUIREMENTS

4.1 Software Version Tests [Group 1]

The following steps will verify that the UUT serial number, part number, and mod level are correct and that the UUT programmable devices have the correct software versions installed.

Step 1. Locate and open the file “C:\9008049\common\configfiles\9008000_config.ini” (referred to henceforth as the “configuration file”).

Step 2. Send the HTS command “**DUMPPN**” to the UUT. Wait for the command to execute.

Step 3. For each part or entity in Table 4-1, verify that number and CRC (if applicable) in the configuration file matches the actual value in the UUT returned by the HTS command.

Step 4. If any of the software versions are incorrect, prompt operator regarding whether to continue testing or abort. If the operator chooses to continue the test results are marked as “Failed”. If the software versions are correct, proceed with testing.

Table 4-1: Software Version, Mod Level, and Identification Tests

Part or Entity Number	Check Number	Check CRC
LRU Serial Number	Yes	N/A
LRU Part Number	Yes	N/A
Boot	Yes	Yes
XIC FPGA Image 1	Yes	Yes
Data Loader 1	Yes	Yes
Data Loader 2	Yes	Yes
HTS Software	Yes	Yes

4.2 Initial Fault Log Tests [Group 2]

The UUT performs Built in Test Equipment (BITE) tests following power being applied to the unit. Results of BITE tests are stored in Maintenance Memory fault logs, which can be read and verified to determine successful UUT operation. The following test does not verify the BITE log it just stores it off for future use.

Step 1. Execute the HTS command "**mld 3**".

Step 2. Using XMODEM 1K Binary protocol to transfer the file from the UUT and save it to a .txt file. The file naming convention is as follows:

C:\9008049\Downloads\MaintenanceLog_*serialNumber*_INITIAL[*Date*][*Time*].txt

4.3 Standby Input Power Tests [Group 3]

Note: Part number 9008000-55 only accepts DC input power. Part number 9008000-10 accepts AC or DC input power.

4.3.1 Standby DC Input Power

4.3.1.1 Standby Input Power at Low Vdc (20.5Vdc) Test

The following steps will verify that the DC input power is within specifications when +20.Vdc is applied to the UUT DC input power pins. The internal +70Vdc will also be verified to be within specifications.

Step 1. Connect the DC power supply positive output (+) to UUT ARINC 600 connector, pin BP-10. Connect the DC power supply negative output (-) to UUT ARINC 600 connector, pin BP-3

Step 2. Set the DC power supply to +20.5Vdc (±0.25Vdc) and apply power to the UUT.

Step 3. Read the power from the power supply and verify it is between 20W - 50W.

Step 4. Execute the "**INTVOLT**" HTS command to read the internal +70Vdc monitor.

Step 5. Verify that the returned value is +70.0Vdc ± 10.5Vdc

4.3.1.2 Standby Input Power at High Vdc (32.2Vdc) Test

The following steps will verify that the DC input power is within specifications when +32.2Vdc is applied to the UUT DC input power pins. The internal +70Vdc will also be verified to be within specification.

Step 1. Set the DC power supply to +32.2Vdc (±0.25Vdc).

Step 2. Read the power from the power supply and verify it is between 20W - 50W.

Step 3. Execute the "**INTVOLT**" HTS commands to read the internal +70.0Vdc monitor.

Step 4. Verify that the returned value is +70.0Vdc ± 10.5Vdc

4.3.2 Standby AC Input Power

4.3.2.1 Standby Input Power at Low Vac (+97Vac, 320Hz) Test

The following steps will verify that the AC input power is within specifications when 95 Vac is applied to the UUT AC input power pins. The internal +70 Vdc will also be verified to be within specifications.

Step 1. Connect the AC Power Lines to the UUT ARINC 600 connector as follows: AC-High to Pin BP-1; AC Common to Pin BP-7; AC GND to Pin BP-11.

Step 2. Set the AC power supply to 97Vac (±2.0Vac), 320Hz and apply power to the UUT.

Step 3. Read the power from the power supply and verify it is between 20W - 50W.

Step 4. Execute the "**INTVOLT**" HTS command to read the internal +70Vdc monitor.

Step 5. Verify that the returned value is +70.0Vdc ± 10.5Vdc

4.3.2.2 Standby Input Power at High Vac (+134Vac, 320Hz) Test

The following steps will verify that the AC input power is within specifications when 134Vac is applied to the UUT AC input power pins. The internal +70Vdc will also be verified to be within specification.

Step 1. Set the AC power supply to 134Vac (±2Vac).

Step 2. Read the power from the power supply and verify it is between 20W - 50W.

Step 3. Execute the "**INTVOLT**" HTS commands to read the internal +70.0Vdc monitor.

Step 4. Verify that the returned value is +70.0Vdc ± 10.5Vdc

4.3.2.3 Standby Input Power at Low Vac (+97Vac, 480Hz) Test

The following steps will verify that the AC input power is within specifications when 95 Vac is applied to the UUT AC input power pins. The internal +70 Vdc will also be verified to be within specifications.

Step 1. Connect the AC Power Lines to the UUT ARINC 600 connector as follows: AC-High to Pin BP-1; AC Common to Pin BP-7; AC GND to Pin BP-11.

Step 2. Set the AC power supply to 97Vac (±2.0Vac), 480Hz and apply power to the UUT.

Step 3. Read the power from the power supply and verify it is between 20W - 50W.

Step 4. Execute the "**INTVOLT**" HTS command to read the internal +70Vdc monitor.

Step 5. Verify that the returned value is +70.0Vdc ± 10.5Vdc

4.3.2.4 Standby Input Power at High Vac (+134Vac, 480Hz) Test

The following steps will verify that the AC input power is within specifications when 134Vac is applied to the UUT AC input power pins. The internal +70Vdc will also be verified to be within specification.

Step 1. Set the AC power supply to 134Vac (±2 Vac), 480Hz.

Step 2. Read the power from the power supply and verify it is between 20W - 50W.Execute the "**INTVOLT**" HTS commands to read the internal +70.0Vdc monitor.

Step 3. Verify that the returned value is +70.0Vdc ± 10.5Vdc

Step 4. Set the AC power supply to 115Vaz, 400Hz.

4.4 Voltage Monitor Tests [Group 4]

The following tests will verify that the internal voltage monitor circuitry is functioning correctly and that the internal fixed voltages are within specifications.

Step 1. Execute the “**INTVOLT**” HTS command to read the internal voltage monitors.

Step 2. Verify the voltage monitors and tolerances listed in Table 4.4-1.

Table 4.4-1: Voltage Monitor Tests

Voltage Monitor Name	Result	Tolerance
+1.0V Regulated	+1.0 Vdc	±0.05 Vdc
+1.2V Regulated	+1.2 Vdc	±0.06 Vdc
+1.8V Regulated	+1.8 Vdc	±0.10 Vdc
+3.3V Regulated	+3.3 Vdc	±0.10 Vdc
+5V Filtered	+5.0 Vdc	±0.25 Vdc
+15V Filtered	+15.0 Vdc	±1.50 Vdc
-15V Filtered	-15.0 Vdc	±1.50 Vdc
28V Filtered	+28.0 Vdc	±1.50 Vdc
+50V Power Supply	+50.0 Vdc	±1.00 Vdc
+70V Power Supply	+70.0 Vdc	±7.00 Vdc
-70V Power Supply	-70.0 Vdc	+10.00/-15.00 Vdc
CPS Temperature Sensor (Voltage)	Min: Chamber Temp + 2.78Vdc Max: Chamber Temp + 3.13Vdc	
CPS Temperature Sensor (Temp)	Min: Chamber Temp +5°C Max: Chamber Temp + 40°C	
GND Reference	0.0 Vdc	±0.05

4.5 Operator Interactive Tests [Group 5 to 7]

4.5.1 Test Switch Tests [Group 5]

The following steps will verify that the Test Switch circuitry is functioning correctly.

Step 1. Press and hold the front panel Test Switch.

Step 2. Execute the following HTS command to read the Test Switch discrete: "**rdin 6**".

Step 3. Release the front panel Test Switch.

Step 4. Verify that the returned result is "**11x0xxxxxxxxxx11xxxxxxxxxxxxxxxx**".

Note: "x" signifies bits that aren't verified.

4.5.2 Front Panel LED Tests [Group 6]

The following tests will verify that the front panel LEDs are functioning correctly.

4.5.2.1 All LEDs on After Reset

The following steps will verify that all front panel LEDs are illuminated after a reset.

Step 1. Perform a hardware reset.

Step 2. Verify the "XPDR P/F" LED is initially illuminated green and all other LEDs are initially illuminated red.

Note: After completion of the hardware reset, all of the LEDs are illuminated red.

4.5.2.2 NXT XPDR Status LED (Green)

The following steps will verify that the NXT XPDR Status LED (Green) circuitry is functioning correctly.

Step 1. Execute the "**sled 0 1**" HTS command to drive the NXT XPDR Status LED green.

Step 2. Verify the NXT XPDR Status LED is illuminated green.

Step 3. Execute the "**sled 0 0**" HTS command to drive the NXT XPDR Status LED off.

4.5.2.3 NXT XPDR Status LED (Red)

The following steps will verify that the NXT XPDR Status LED (Red) circuitry is functioning correctly.

Step 1. Execute the "**sled 1 1**" HTS command to drive the NXT XPDR Status LED red.

Step 2. Verify the NXT XPDR Status LED is illuminated red.

Step 3. Execute the "**sled 1 0**" HTS command to drive the NXT XPDR Status LED off.

4.5.2.4 ADSB Status LED (Red)

The following steps will verify that the ADSB Status LED (Red) circuitry is functioning correctly.

Step 1. Execute the "**sled 2 1**" HTS command to drive the ADSB Status LED red.

Step 2. Verify the ADSB Status LED is illuminated red.

Step 3. Execute the "**sled 2 0**" HTS command to drive the ADSB Status LED off.

4.5.2.5 Control Panel Status LED (Red)

The following steps will verify that the CNTL PNL Status LED (Red) circuitry is functioning correctly.

Step 1. Execute the "**sled 4 1**" HTS command to drive the Control Panel Status LED red.

Step 2. Verify the Control Panel Status LED is illuminated red.

Step 3. Execute the "**sled 4 0**" HTS command to drive the Control Panel Status LED off.

4.5.2.6 Top Antenna Status LED (Red)

The following steps will verify that the TOP ANT Status LED (Red) circuitry is functioning correctly.

Step 1. Execute the "**sled 5 1**" HTS command to drive the TOP ANTENNA Status LED red.

Step 2. Verify the Top Antenna Status LED is illuminated red.

Step 3. Execute the "**sled 5 0**" HTS command to drive the TOP ANTENNA Status LED off.

4.5.2.7 Bottom Antenna Status LED (Red)

The following steps will verify that the BOT ANT Status LED (Red) circuitry is functioning correctly.

Step 1. Execute the "**sled 3 1**" HTS command to drive the Bottom Antenna Status LED red.

Step 2. Verify the Bottom Antenna Status LED is illuminated red.

Step 3. Execute the "**sled 3 0**" HTS command to drive the Bottom Antenna Status LED off.

4.5.2.8 ALT SIG Status LED (Red)

The following steps will verify that the ALT SIG Status LED (Red) circuitry is functioning correctly.

Step 1. Execute the "**sled 6 1**" HTS command to drive the Alt Sig Status LED red.

Step 2. Verify the Alt Sig Status LED is illuminated red.

Step 3. Execute the "**sled 6 0**" HTS command to drive the Alt Sig Status LED off.

4.5.3 RS-232 Test [Group 7]

Note: Refer to development engineering for an alternative means to test the RS-232 circuitry through the Ethernet (RJ-45) debug port.

The following steps will verify that the RS-232 circuitry is functioning correctly through the Ethernet (RJ-45) debug port.

Step 1. Disable the RS-232 port connected to the UUT’s ARINC 600 connector @ TP-4A and TP-4B.

Step 2. Enable the RS-232 port connected to the Ethernet (RJ-45) connector.

Step 3. Execute the “**INTVOLT**” HTS command to read the internal +70 Vdc monitor.

Step 4. Verify that the returned value is +70.0 Vdc ±10.5 Vdc.

Step 5. Disable the RS-232 port connected to the Ethernet (RJ-45) connector.

Step 6. Enable the RS-232 port connected to the ARINC 600 connector.

Note: The RS-232 through the ARINC 404 connector is tested by implication.

4.6 Discrete Input Tests [Groups 8]

4.6.1 Transponder Off Gnd/Open Discrete Input Test

The following steps will verify that the Transponder Off Gnd/Open discrete input circuitry is functioning correctly.

Step 1. Apply a ground to the ARINC 600 pin BP-4.

Step 2. Apply an open to the ARINC 600 pin BP-4.

Step 3. Verify the UUT resets.

4.6.2 GPIO Gnd/Open Discrete Input Tests

The following steps will verify that the GPIO Gnd/Open discrete input circuitry is functioning correctly.

Step 1. Refer to Table 4.6-1 and repeat the following steps for each pin listed in the table.

Step 2. Apply a ground to the ARINC 600 pin.

Step 3. Read Discrete-In Word #4 by executing the HTS command: "**rdin 6**".

Step 4. Verify the corresponding result listed in Table 4.6-1.

Note: "x" signifies bits that aren't verified.

Step 5. Remove the ground from the ARINC 600 pin.

Table 4.6-1: GPIO Gnd/Open Discrete Input Tests

ARINC 600 Pin	Hardware Signal Name	Results
TP-5K	Air/Ground Discrete Input #1	01x1xxxxxxxxxx01xxxxxxxxxxxxxxxx
TP-5J	Air/Ground Discrete Input #2	10x1xxxxxxxxxx10xxxxxxxxxxxxxxxx

4.6.3 Gnd/Open Discrete Input Tests

The following steps will verify that the Gnd/Open discrete input circuitry is functioning correctly.

Step 1. Refer to Table 4.6-2 and repeat the following steps for each pin listed in the table.

Step 2. Apply a ground to the ARINC 600 pin.

Step 3. Read Discrete-In Words #0, #1, #2, #3 and #5 by executing the HTS commands: "**rdin 0**", "**rdin 1**", "**rdin 2**", "**rdin 3**" and "**rdin 5**".

Step 4. Verify the corresponding result listed in Table 4.6-2.

Step 5. Remove the ground from the ARINC 600 pin.

Table 4.6-2: Gnd/Open Discrete Input Tests

ARINC 600 Pin	Hardware Signal Name	Results
TP-1A	A/V Length/Width A (MSB)	x011111111111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-1B	A/V Length/Width B	x101111111111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-1C	A/V Length/Width C (LSB)	x110111111111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-1D	GPS Antenna Longitudinal Offset A (MSB)	x111011111111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-1E	GPS Antenna Longitudinal Offset B	x111101111111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-1F	GPS Antenna Longitudinal Offset C (LSB)	x111110111111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-1G	Navigation Accuracy Category for Velocity (NACV)	x111111011111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-1H	System Design Assurance (SDA)	x111111101111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-3C	Cable Delay Program Top/Bot	x111111110111111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-3D	Cable Delay Program B	x111111111011111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx

Table 4.6-2: Gnd/Open Discrete Input Tests

ARINC 600 Pin	Hardware Signal Name	Results
TP-3E	Cable Delay Program A	x111111111101111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-3G	SDI Program B	x111111111110111 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-3H	SDI Program A	x111111111111011 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-2J	Reserved Discrete #1	x111111111111101 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-4K	Reserved Discrete #2	x111111111111110 1111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-5A	Max True Airspeed Program A	x111111111111111 0111111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-5B	Max True Airspeed Program B	x111111111111111 1011111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-5C	Max True Airspeed Program C	x111111111111111 1101111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
TP-6K	Antenna Single/Dual Program	x111111111111111 1110111111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-4E	Aircraft Category A (MSB)	x111111111111111 1111011111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx

Table 4.6-2: Gnd/Open Discrete Input Tests

ARINC 600 Pin	Hardware Signal Name	Results
MP-4F	Aircraft Category B (LSB)	x111111111111111 1111101111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-4G	ADS-B Configuration Parity	x111111111111111 1111110111111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-4H	ADS-B Receive Capability	x111111111111111 1111111011111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-5H	Mode S Data Link Program Input	x111111111111111 1111111101111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-5J	Antenna BITE Program Input	x111111111111111 1111111110111110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-5K	VFOM Adjust	x111111111111111 1111111111011110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-6F	Alt Type Select Program B	x111111111111111 1111111111101110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-6G	Alt Type Select Program A	x111111111111111 1111111111110110 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-6E	Alt Data Source Select Discrete Input	x111111111111111 1111111111111010 x111111111111111 111111111111110x x00000xxxxxxxxxx
BP-2	Backward Incompatibility Discrete	x111111111111111 1111111111111100 x111111111111111 111111111111110x x00000xxxxxxxxxx

Table 4.6-2: Gnd/Open Discrete Input Tests

ARINC 600 Pin	Hardware Signal Name	Results
TP-6C	Reserved Discrete Input #3	x111111111111111 1111111111111111 x111111111111111 111111111111110x x00000xxxxxxxxxx
MP-1A	Mode S Address Bit A1	x111111111111111 1111111111111110 x011111111111111 111111111111110x x00000xxxxxxxxxx
MP-1B	Mode S Address Bit A2	x111111111111111 1111111111111110 x101111111111111 111111111111110x x00000xxxxxxxxxx
MP-1C	Mode S Address Bit A3	x111111111111111 1111111111111110 x110111111111111 111111111111110x x00000xxxxxxxxxx
MP-1D	Mode S Address Bit A4	x111111111111111 1111111111111110 x111011111111111 111111111111110x x00000xxxxxxxxxx
MP-1E	Mode S Address Bit A5	x111111111111111 1111111111111110 x111101111111111 111111111111110x x00000xxxxxxxxxx
MP-1F	Mode S Address Bit A6	x111111111111111 1111111111111110 x111110111111111 111111111111110x x00000xxxxxxxxxx
MP-1G	Mode S Address Bit A7	x111111111111111 1111111111111110 x111111011111111 111111111111110x x00000xxxxxxxxxx
MP-1H	Mode S Address Bit A8	x111111111111111 1111111111111110 x111111101111111 111111111111110x x00000xxxxxxxxxx
MP-1J	Mode S Address Bit A9	x111111111111111 1111111111111110 x111111110111111 111111111111110x x00000xxxxxxxxxx

Table 4.6-2: Gnd/Open Discrete Input Tests

ARINC 600 Pin	Hardware Signal Name	Results
MP-1K	Mode S Address Bit A10	x111111111111111 1111111111111110 x111111111011111 111111111111110x x00000xxxxxxxxxx
MP-2A	Mode S Address Bit A11	x111111111111111 1111111111111110 x111111111101111 111111111111110x x00000xxxxxxxxxx
MP-2B	Mode S Address Bit A12	x111111111111111 1111111111111110 x111111111110111 111111111111110x x00000xxxxxxxxxx
MP-2C	Mode S Address Bit A13	x111111111111111 1111111111111110 x111111111111011 111111111111110x x00000xxxxxxxxxx
MP-2D	Mode S Address Bit A14	x111111111111111 1111111111111110 x111111111111101 111111111111110x x00000xxxxxxxxxx
MP-2E	Mode S Address Bit A15	x111111111111111 1111111111111110 x111111111111110 111111111111110x x00000xxxxxxxxxx
MP-2F	Mode S Address Bit A16	x111111111111111 1111111111111110 x111111111111111 011111111111110x x00000xxxxxxxxxx
MP-2G	Mode S Address Bit A17	x111111111111111 1111111111111110 x111111111111111 101111111111110x x00000xxxxxxxxxx
MP-2H	Mode S Address Bit A18	x111111111111111 1111111111111110 x111111111111111 110111111111110x x00000xxxxxxxxxx
MP-2J	Mode S Address Bit A19	x111111111111111 1111111111111110 x111111111111111 111011111111110x x00000xxxxxxxxxx

Table 4.6-2: Gnd/Open Discrete Input Tests

ARINC 600 Pin	Hardware Signal Name	Results
MP-2K	Mode S Address Bit A20	x111111111111111 1111111111111110 x111111111111111 1111011111111110x x00000xxxxxxxxxx
MP-3A	Mode S Address Bit A21	x111111111111111 1111111111111110 x111111111111111 111110111111110x x00000xxxxxxxxxx
MP-3B	Mode S Address Bit A22	x111111111111111 1111111111111110 x111111111111111 111111011111110x x00000xxxxxxxxxx
MP-3C	Mode S Address Bit A23	x111111111111111 1111111111111110 x111111111111111 111111101111110x x00000xxxxxxxxxx
MP-3D	Mode S Address Bit A24	x111111111111111 1111111111111110 x111111111111111 111111110111110x x00000xxxxxxxxxx
TP-2K	ADS-B FAIL Disable	x111111111111111 1111111111111110 x111111111111111 111111111011110x x00000xxxxxxxxxx
TP-7D	Control Data Port Select Discrete Input	x111111111111111 1111111111111110 x111111111111111 111111111101110x x00000xxxxxxxxxx
TP-7G	Standby/On Discrete Input	x111111111111111 1111111111111110 x111111111111111 111111111110110x x00000xxxxxxxxxx
MP-3H	Functional Test Discrete Input	x111111111111111 1111111111111110 x111111111111111 111111111111010x x00000xxxxxxxxxx
MP-5G	Extended Squitter Disable Input	x111111111111111 1111111111111110 x111111111111111 111111111111100x x00000xxxxxxxxxx

Table 4.6-2: Gnd/Open Discrete Input Tests

ARINC 600 Pin	Hardware Signal Name	Results
MP-7K	Reserved Discrete Input #9	x111111111111111 1111111111111110 x111111111111111 111111111111111x x00000xxxxxxxxxx
TP-6F	Reserved Discrete Input #4	x111111111111111 1111111111111110 x111111111111111 111111111011110x x00000xxxxxxxxxx
TP-6G	Reserved Discrete Input #5	x111111111111111 1111111111111110 x111111111111111 111111111101110x x00000xxxxxxxxxx
TP-7C	Reserved Discrete Input #6	x111111111111111 1111111111111110 x111111111111111 111111111110110x x00000xxxxxxxxxx
TP-7K	Reserved Discrete Input #7	x111111111111111 1111111111111110 x111111111111111 111111111111010x x00000xxxxxxxxxx
MP-3J	Reserved Discrete Input #8	x111111111111111 1111111111111110 x111111111111111 111111111111100x x00000xxxxxxxxxx

4.7 Discrete Output Tests [Group 9 to 10]

Note: Refer to the NXT-800 Transponder Hardware Requirements Document (HRD), document number 8010002-001, for voltage output levels.

4.7.1 200mA Gnd/Open Discrete Output Tests [Group 9]

The following steps will verify that the 200mA Gnd/Open discrete output circuitry is functioning correctly by asserting/de-asserting each discrete output and then measuring the discrete output voltage level on a DMM.

Refer to Table 4.7-1 and repeat the following steps for each ARINC 600 pin listed in the table.

Step 1. Connect a load resistor and the DMM to the specified ARINC 600 pin.

Step 2. Read the DMM and determine the current state of the specified discrete output.

Step 3. Execute the "**SDOUT** *word state*" HTS command to the discrete output to the opposite state.

Step 4. Read the voltage on the DMM and verify the output changed state.

Step 5. Execute the "**SDOUT** *word state*" HTS command to switch the discrete output to its' original state.

Step 6. Read the voltage on the DMM and verify the output changed to its' original state.

Table 4.7-1: Discrete Output Tests

ARINC 404 Pin	Hardware Signal Name	Word
TP-3A	ADS-B Function Fail Output	0
TP-3B	XPDR Fail Discrete Output #2	1
BP-9	Fan Return	3

4.7.2 5V/Open Discrete Output [Group 10]

The following steps will verify that the 5V/Open discrete output circuitry is functioning correctly by asserting/de-asserting the discrete output and then measuring the discrete output voltage level on a DMM.

Refer to Table 4.7-2 and repeat the following step for the ARINC 600 pin listed in the table.

Step 1. Connect a load resistor and the DMM to the specified ARINC 600 pin.

Step 2. Read the DMM and determine the current state of the specified discrete output.

Step 3. Execute the "**SDOUT** *word state*" HTS command to the discrete output to the opposite state.

Step 4. Read the voltage on the DMM and verify the output changed state.

Step 5. Execute the "**SDOUT** *word state*" HTS command to switch the discrete output to its' original state.

Step 6. Read the voltage on the DMM and verify the output changed to its' original state.

Table 4.7-2: XPDR Fail Discrete Output Tests

ARINC 404 Pin	Hardware Signal Name	Word
MP-3K	XPDR Fail Discrete Output #1	7

4.8 ARINC 429 Tx/Rx Tests [Group 11]

These tests will verify that the A429 TX/RX circuitry is functioning correctly.

Note: Refer to the Test Station, ATDL Parametric, ESS drawings, document number 9001080-001.

Note: The transmission data does not match the receive data due to Big Endian and Little Endian system representations.

4.8.1 ARINC 429: Rx Low Speed Self Test

This test exercises the ARINC429 receivers using the built-in test transmitter at low speed (12.5kbps). The command transmits data on the IO FPGA ARINC test transmitter port and verifies that the ARINC receivers correctly receive the data. This test is an internal test only. No data is transmitted externally.

Step 1. Execute the “**ARST**” HTS command.

Step 2. Verify that the returned result is “**PASS**”.

4.8.2 ARINC 429: Tx Low Speed Self Test

This test exercises the ARINC transmitters using the built-in test receiver at low speed (12.5kbps). The command transmits data on each of the IO FPGA ARINC test transmitter port and verifies that the ARINC receivers correctly receive the data. This test is an internal test only. No data is transmitted externally.

Step 1. Execute the “**ARTST**” HTS command.

Step 2. Verify that the returned result is “**PASS**”.

4.8.3 ARINC 429: Rx High Speed Self Test

This test exercises the ARINC429 receivers using the built-in test transmitter at low speed (100kbps). The command transmits data on the IO FPGA ARINC test transmitter port and verifies that the ARINC receivers correctly receive the data. This test is an internal test only. No data is transmitted externally.

Step 1. Execute the “**ARST**” HTS command.

Step 2. Verify that the returned result is “**PASS**”.

4.8.4 ARINC 429: Tx High Speed Self Test

This test exercises the ARINC transmitters using the built-in test receiver at low speed (100kbps). The command transmits data on the IO FPGA ARINC test transmitter port and verifies that the ARINC receivers correctly receive the data. This test is an internal test only. No data is transmitted externally.

Step 1. Execute the “**ATST**” HTS command.

Step 2. Verify that the returned result is “**PASS**”.

4.8.5 ARINC 429: Tx0 Low Speed Test

This test exercises the 'MSP/ATSU/CMU Out #1 or Comm A_B' transmitter (ARINC 600 Pins MP-5E and MP-5F). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Connect the UUT ARINC 429 transmitter to the Ballard ARINC 429 test resource as shown in Table 4.8-1.

Table 4.8-1: ARINC 429 Tx0

ARINC 429 Transmitter	
ARINC 600 Pin	**Hardware Signal Name**
MP-5E	MSP/ATSU/CMU Out #1 or Comm A_B Out A
MP-5F	MSP/ATSU/CMU Out #1 or Comm A_B Out B

Step 2. Configure Ballard ARINC 429 Card to receive at low (12.5kbps) speed and odd parity.

Step 3. Configure and enable the transmitter for low speed, parity check, and interrupt disabled by executing the "**ATS 0 L E P N**" HTS command.

Step 4. Transmit data by executing the HTS commands:

"**ATT 0 ABCD122C 1234ABB3 2AAAAA55**"

Step 5. Read the data received by Ballard A429 Card.

Step 6. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.6 ARINC 429: Tx0 High Speed Test

This test exercises the 'MSP/ATSU/CMU Out #1 or Comm A_B' transmitter. Data is transmitted at high (100 KHz) speed and verified that it was received correctly.

Step 1. Configure and enable the transmitter for high speed, parity check, and interrupt disabled executing the "**ATS 0 H E P N**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to receive at high (100kbps) speed and odd parity.

Step 3. Transmit data by executing the HTS commands:

"**ATT 0 1234ABB3 2AAAAA55 ABCD122C**"

Step 4. Read the data received by Ballard A429 Card.

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.7 ARINC 429: Tx1 Low Speed Test

This test exercises the 'General Output #1 or Comm C_D' transmitter (ARINC 600 Pins TP-2E and TP-2F). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Connect the UUT ARINC 429 transmitter to the Ballard ARINC 429 test resource as shown in Table 4.8-2.

Table 4.8-2: ARINC 429 Tx1

ARINC 429 Transmitter	
ARINC 600 Pin	**Hardware Signal Name**
TP-2E	General Output #1 or Comm C/D Out A
TP-2F	General Output #1 or Comm C/D Out B

Step 2. Configure Ballard ARINC 429 Card to receive at low (12.5kbps) speed and odd parity.

Step 3. Configure and enable the transmitter for low speed, parity check, and interrupt disabled by executing the "**ATS 1 L E P N**" HTS command.

Step 4. Transmit data by executing the HTS commands:

"**ATT 1 ABCD122C 1234ABB3 2AAAAA55**"

Step 5. Read the data received by Ballard A429 Card.

Step 6. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.8 ARINC 429: Tx1 High Speed Test

This test exercises the 'General Output #1 or Comm C_D' transmitter. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure Ballard ARINC 429 Card to receive at high (100kbps) speed and odd parity.

Step 2. Configure and enable the transmitter for high speed, parity check, and interrupt disabled by executing the "**ATS 1 H E P N**" HTS command.

Step 3. Transmit data by executing the HTS commands:

"**ATT 1 1234ABB3 2AAAAA55 ABCD122C**"

Step 4. Read the data received by Ballard A429 Card.

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.9 ARINC 429: Tx2 Low Speed Test

This test exercises the ‘XT Coordination’ transmitter (ARINC 600 Pins TP-5G and TP-5H). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Connect the ARINC 429 Transmitter to the Ballard ARINC 429 Receiver as shown in Table 4.8-3.

Table 4.8-3: ARINC 429 Tx2

ARINC 429 Transmitter	
ARINC 600 Pin	**Hardware Signal Name**
TP-5G	XT Coordination A
TP-5H	XT Coordination B

Step 2. Configure Ballard ARINC 429 Card to receive at low (12.5kbps) speed and odd parity.

Step 3. Configure and enable the transmitter for low speed, parity generation and 4 bit time delay between words by executing the “**ATS 2 L E P N**” HTS command.

Step 4. Transmit data by executing the HTS commands:

“**ATT 2 ABCD122C 1234ABB3 2AAAAA55**”

Step 5. Read the data received by Ballard A429 Card.

Step 6. Verify that the result is equal to “**ABCD1234 1234ABCD 2AAAAAAA**”.

4.8.10 ARINC 429: Tx2 High Speed Test

This test exercises the ‘XT Coordination transmitter. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure Ballard ARINC 429 Card to receive at high (100kbps) speed and odd parity.

Step 2. Configure and enable the transmitter for high speed, parity check, and interrupt disabled by executing the “**ATS 2 H E P N**” HTS command.

Step 3. Transmit data by executing the HTS commands:

“**ATT 2 1234ABB3 2AAAAA55 ABCD122C**”

Step 4. Read the data received by Ballard A429 Card.

Step 5. Verify that the result is equal to “**1234ABCD 2AAAAAAA ABCD1234**”.

4.8.11 ARINC 429: Tx3 Low Speed Test

This test exercises the 'Maintenance Data Output' transmitter (ARINC 600 Pins MP-6C and MP-6D). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Connect the ARINC 429 Transmitter to the Ballard ARINC 429 Receiver as shown in Table 4.8-4.

Table 4.8-4: ARINC 429 Tx3

ARINC 429 Transmitter	
ARINC 600 Pin	**Hardware Signal Name**
MP-6C	Maintenance Data Output A
MP-6D	Maintenance Data Output B

Step 2. Configure Ballard ARINC 429 Card to receive at low (12.5kbps) speed and odd parity.

Step 3. Configure and enable the transmitter for low speed, parity check, and interrupt disabled by executing the "**ATS 3 L E P N**" HTS command.

Step 4. Transmit data by executing the HTS commands:

"**ATT 3 ABCD122C 1234ABB3 2AAAAA55**"

Step 5. Read the data received by Ballard A429 Card.

Step 6. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.12 ARINC 429: Tx3 High Speed Test

This test exercises the '*Maintenance Data Output*' transmitter. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure Ballard ARINC 429 Card to receive at high (100kbps) speed and odd parity.

Step 2. Configure and enable the transmitter for high speed, parity check, and interrupt disabled by executing the "**ATS 3 H E P N**" HTS command.

Step 3. Transmit data by executing the HTS commands:

"**ATT 3 1234ABB3 2AAAAA55 ABCD122C**"

Step 4. Read the data received by Ballard A429 Card.

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.13 ARINC 429: Rx0 Low Speed Test

This test exercises the 'FMC/GNSS #1 In #1 or Comm A/B In' receiver (ARINC 600 Pins TP-2A and TP-2B). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 0 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 0 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.14 ARINC 429: Rx0 High Speed Test

This test exercises the 'FMC/GNSS #1 In #1 or Comm A/B In' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 0 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 0 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.15 ARINC 429: Rx1 Low Speed Test

This test exercises the 'FMC/GNSS #2 In #1' receiver (ARINC 600 Pins MP-4C and MP-4D). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 1 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 1 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.16 ARINC 429: Rx1 High Speed Test

This test exercises the 'FMC/GNSS #2 In #1' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 1 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 1 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.17 ARINC 429: Rx2 Low Speed Test

This test exercises the 'IRS/FMS/Data Concentrator In #1 or Comm C/D In' receiver (ARINC 600 Pins TP-2C and TP-2D). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 2 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 2 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.18 ARINC 429: Rx2 High Speed Test

This test exercises the 'IRS/FMS/Data Concentrator In #1 or Comm C/D In' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 2 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 2 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.19 ARINC 429: Rx3 Low Speed Test

This test exercises the 'TX Coordination' receiver (ARINC 600 Pins TP-5E and TP-5F). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 3 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 3 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.20 ARINC 429: Rx3 High Speed Test

This test exercises the 'TX Coordination' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 3 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 3 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.21 ARINC 429: Rx4 Low Speed Test

This test exercises the 'FMC #1, General Input #2' receiver (ARINC 600 Pins TP-6A and TP-6B). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 4 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 4 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.22 ARINC 429: Rx4 High Speed Test

This test exercises the 'FMC #1, General Input #2' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 4 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 4 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.23 ARINC 429: Rx5 Low Speed Test

This test exercises the 'Reserved A429 Input #3' receiver (ARINC 600 Pins MP-4A and MP-4B). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 6 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 6 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.24 ARINC 429: Rx5 High Speed Test

This test exercises the 'Reserved A429 Input #3' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 6 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 6 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.25 ARINC 429: Rx6 Low Speed Test

This test exercises the 'FCC/MCP #1 In / VHF #3' receiver (ARINC 600 Pins MP-3F and MP-3G). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 6 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 6 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.26 ARINC 429: Rx6 High Speed Test

This test exercises the 'FCC/MCP #1 In / VHF #3' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 6 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 6 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.27 ARINC 429: Rx7 (429 pins) Low Speed Test

This test exercises the 'Air Data Input #1' receiver (ARINC 600 Pins TP-7H AND TP-7J). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Disconnect the ARINC 575 Common Pins (ARINC 600 Pins TP-6H AND TP-6J).

Step 2. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 7 L E P I**" HTS command.

Step 3. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 4. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 5. Read the received data by executing the HTS commands:

"**ARR 7 O**"

Step 6. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

Step 7. Reconnect the ARINC 575 Common Pins (ARINC 600 Pins TP-6H AND TP-6J).

4.8.28 ARINC 429: Rx7 (429 pins) High Speed Test

This test exercises the 'Air Data Input #1' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Disconnect the ARINC 575 Common Pins (ARINC 600 Pins TP-6H AND TP-6J).

Step 2. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 7 H E P I**" HTS command.

Step 3. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 4. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 5. Read the received data by executing the HTS commands:

"**ARR 7 O**"

Step 6. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

Step 7. Reconnect the ARINC 575 Common Pins (ARINC 600 Pins TP-6H AND TP-6J).

4.8.29 ARINC 429: Rx8 (429 pins) Low Speed Test

This test exercises the 'Air Data Input #2' receiver (ARINC 600 Pins MP-5A and MP-5B). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Disconnect the ARINC 575 Common Pins (ARINC 600 Pins MP-5C and MP-5D).

Step 2. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 8 L E P I**" HTS command.

Step 3. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 4. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 5. Read the received data by executing the HTS commands:

"**ARR 8 O**"

Step 6. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

Step 7. Reconnect the ARINC 575 Common Pins (ARINC 600 Pins MP-5C and MP-5D).

4.8.30 ARINC 429: Rx8 (429 pins) High Speed Test

This test exercises the 'Air Data Input #2' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Disconnect the ARINC 575 Common Pins (ARINC 600 Pins MP-5C and MP-5D).

Step 2. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 8 H E P I**" HTS command.

Step 3. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 4. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 5. Read the received data by executing the HTS commands:

"**ARR 8 O**"

Step 6. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

Step 7. Reconnect the ARINC 575 Common Pins (ARINC 600 Pins MP-5C and MP-5D).

4.8.31 ARINC 429: Rx9 Low Speed Test

This test exercises the 'Control Data Port or FCC #1/MCP #1/VHF #3 In' receiver (ARINC 600 Pins TP-7A and TP-7B). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 9 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 9 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.32 ARINC 429: Rx9 High Speed Test

This test exercises the 'Control Data Port or FCC #1/MCP #1/VHF #3 In' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 9 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 9 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.33 ARINC 429: Rx10 Low Speed Test

This test exercises the 'Control Data Port B In' receiver (ARINC 600 Pins TP-7E and TP-7F). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 10 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 10 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.34 ARINC 429: Rx10 High Speed Test

This test exercises the 'Control Data Port B In' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 10 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 10 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.35 ARINC 429: Rx11 Low Speed Test

This test exercises the 'Maintenance Data Input' receiver (ARINC 600 Pins MP-6A and MP-6B). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 8 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 8 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.36 ARINC 429: Rx11 High Speed Test

This test exercises the 'Maintenance Data Input' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 8 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 8 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.37 ARINC 429: Rx12 Low Speed Test

This test exercises the 'Reserved A429 Input #1' receiver (ARINC 600 Pins TP-2G and TP-2H). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 9 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 9 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.38 ARINC 429: Rx12 High Speed Test

This test exercises the 'Reserved A429 Input #1' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 9 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 9 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.39 ARINC 429: Rx13 Low Speed Test

This test exercises the 'Reserved A429 Input #2' receiver (ARINC 600 Pins MP-4J and MP-4K). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 10 L E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 4. Read the received data by executing the HTS commands:

"**ARR 10 O**"

Step 5. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

4.8.40 ARINC 429: Rx13 High Speed Test

This test exercises the 'Reserved A429 Input #2' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 10 H E P I**" HTS command.

Step 2. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 3. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 4. Read the received data by executing the HTS commands:

"**ARR 10 O**"

Step 5. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

4.8.41 ARINC 429: Rx7 (575 pins) Low Speed Test

This test exercises the 'Air Data Input #1 ARINC 575' receiver (ARINC 600 Pins TP-6H AND TP-6J). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Disconnect the ARINC 429 Common Pins (ARINC 600 Pins TP-7H AND TP-7J).

Step 2. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 7 L E P I**" HTS command.

Step 3. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 4. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 5. Read the received data by executing the HTS commands:

"**ARR 7 O**"

Step 6. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

Step 7. Reconnect the ARINC 429 Common Pins (ARINC 600 Pins TP-7H AND TP-7J).

4.8.42 ARINC 429: Rx7 (575 pins) High Speed Test

This test exercises the 'Air Data Input #1 ARINC 575' receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Disconnect the ARINC 429 Common Pins (ARINC 600 Pins TP-7H AND TP-7J).

Step 2. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 7 H E P I**" HTS command.

Step 3. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 4. Transmit the following data via the Ballard ARINC 429 Card:

"1234ABB3 2AAAAA55 ABCD122C"

Step 5. Read the received data by executing the HTS commands:

"**ARR 7 O**"

Step 6. Verify that the result is equal to "**1234ABCD 2AAAAAAA ABCD1234**".

Step 7. Reconnect the ARINC 429 Common Pins (ARINC 600 Pins TP-7H AND TP-7J).

4.8.43 ARINC 429: Rx8 (575 pins) Low Speed Test

This test exercises the 'Air Data Input #2 ARINC 575' receiver (ARINC 600 Pins MP-5C and MP-5D). Data is transmitted at low (12.5kbps) speed and verified that it was received correctly.

Step 1. Disconnect the ARINC 429 Common Pins (ARINC 600 Pins MP-5A and MP-5B).

Step 2. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the "**ARS 8 L E P I**" HTS command.

Step 3. Configure Ballard ARINC 429 Card to transmit at low (12.5kbps) speed.

Step 4. Transmit the following data via the Ballard ARINC 429 Card:

"ABCD122C 1234ABB3 2AAAAA55"

Step 5. Read the received data by executing the HTS commands:

"**ARR 8 O**"

Step 6. Verify that the result is equal to "**ABCD1234 1234ABCD 2AAAAAAA**".

Step 7. Reconnect the ARINC 429 Common Pins (ARINC 600 Pins MP-5A and MP-5B).

4.8.44 ARINC 429: Rx8 (575 pins) High Speed Test

This test exercises the ‘Air Data Input #2 ARINC 575’ receiver. Data is transmitted at high (100kbps) speed and verified that it was received correctly.

Step 1. Disconnect the ARINC 575 Common Pins (ARINC 600 Pins MP-5A and MP-5B).

Step 2. Configure and enable the receiver for low speed, parity check, and interrupt enabled by executing the “**ARS 8 H E P I**” HTS command.

Step 3. Configure Ballard ARINC 429 Card to transmit at low (100kbps) speed.

Step 4. Transmit the following data via the Ballard ARINC 429 Card:

“1234ABB3 2AAAAA55 ABCD122C”

Step 5. Read the received data by executing the HTS commands:

“**ARR 8 O**“

Step 6. Verify that the result is equal to “**1234ABCD 2AAAAAAA ABCD1234**”.

Step 7. Reconnect the ARINC 429 Common Pins (ARINC 600 Pins MP-5A and MP-5B).

4.9 GPS Time Mark Tests [Group 12]

Note: Refer to development engineering for an alternative means to test the GPS Time Mark circuitry.

The following tests will verify the GPS Time Mark Epoch counter.

Note: At power-up the Time Mark Register's EPOCH field contains a 1. The Time Mark Register EPOCH field will increment to 0xFF before rolling over.

4.9.1 GPS Time Mark #1 Increment Test

Step 1. Connect the Station's VP Chassis Time Mark Circuit (TM Circuit) output to the ARINC 600 Connector pins TP-6D and TP-6E.

Step 2. Read the initial value of the Epoch counter by executing the HTS command:

"**RBW F0400000 F0400000**"

The first byte will be the initial value of the TM1 EPOCH counter in hex.

Step 3. Connect a 5v signal to the 1mS input of the TM Circuit.

Step 4. Connect a 0v signal to the 1Ms input of the TM Circuit.

Step 5. Repeat steps 3 and 4 above ten times.

Step 6. Read the final value of the Epoch counter by executing the HTS command:

"**RBW F0400000 F0400000**"

The first byte will be the final value of the TM1 EPOCH counter in hex.

Step 7. Verify the finalValue – initalValue = 10.

Step 8. Disconnect the TM Circuit from the UUT.

4.9.2 GPS Time Mark #2 Increment Test

Step 1. Connect the Station's VP Chassis Time Mark Circuit (TM Circuit) output to the ARINC 600 Connector pins TP-1J and TP-1K.

Step 2. Read the initial value of the Epoch counter by executing the HTS command:

"**RBW F0400004 F0400004**"

The first byte will be the initial value of the TM2 EPOCH counter in hex.

Step 3. Connect a 5v signal to the 1mS input of the TM Circuit.

Step 4. Connect a 0v signal to the 1Ms input of the TM Circuit.

Step 5. Repeat steps 3 and 4 above ten times.

Step 6. Read the final value of the Epoch counter by executing the HTS command:

"**RBW F0400004 F0400004**"

The first byte will be the final value of the TM2 EPOCH counter in hex.

Step 7. Verify the finalValue – initalValue = 10.

Step 8. Disconnect the TM Circuit from the UUT.

4.9.3 GPS Time Mark #1 Rollover Test

Step 1. Connect the Station's VP Chassis Time Mark Circuit (TM Circuit) output to the ARINC 600 Connector pins TP-6D and TP-6E.

Step 2. Read the initial value of the Epoch counter by executing the HTS command:

"**RBW F0400000 F0400000**"

The first byte will be the initial value of the TM1 EPOCH counter in hex.

Step 3. Connect a 5v signal to the 1mS input of the TM Circuit.

Step 4. Connect a 0v signal to the 1Ms input of the TM Circuit.

Step 5. Repeat steps 3 and 4 above 256 times.

Step 6. Read the final value of the Epoch counter by executing the HTS command:

"**RBW F0400000 F0400000**"

The first byte will be the final value of the TM1 EPOCH counter in hex.

Step 7. Verify the finalValue – initalValue = 0.

Step 8. Disconnect the TM Circuit from the UUT.

4.9.4 GPS Time Mark #2 Rollover Test

Step 1. Connect the Station's VP Chassis Time Mark Circuit (TM Circuit) output to the ARINC 600 Connector pins TP-1J and TP-1K.

Step 2. Read the initial value of the Epoch counter by executing the HTS command:

"**RBW F0400004 F0400004**"

The first byte will be the initial value of the TM2 EPOCH counter in hex.

Step 3. Connect a 5v signal to the 1mS input of the TM Circuit.

Step 4. Connect a 0v signal to the 1Ms input of the TM Circuit.

Step 5. Repeat steps 3 and 4 above 256 times.

Step 6. Read the final value of the Epoch counter by executing the HTS command:

"**RBW F0400004 F0400004**"

The first byte will be the final value of the TM2 EPOCH counter in hex.

Step 7. Verify the finalValue – initalValue = 0.

Step 8. Disconnect the TM Circuit from the UUT.

4.10 Processor Tests [Group 13]

The following tests will verify processor circuitry.

4.10.1 Power-Off Timer Test

This test verifies the Power-Off Timer register changes state using a BITE test in the UUT firmware.

Step 1. Execute the HTS command “**POTT**”.

Step 2. Verify that the returned value is “Passed”.

4.10.2 Soft Error Mitigation (SEM) Test

The SEM Test is tested during boot as part of the BITE tests. This test captures the result of that test.

Step 1. Assert the Air/Ground discretes 1 and 2 (ARINC 600 pins MP-5J and MP-5K).

Step 2. Reboot the UUT.

Step 3. Parse the boot information via the RS-232 port.

Step 4. Verify that the status of the “XIC SEM Test” is “Passed”.

4.11 Mutual Suppression Pulse Amplitude and Pulse Width Test [Group 14]

Note: Refer to development engineering for an alternative means to test the Mutual Suppression circuitry.

The following steps will verify the pulse amplitude and width of the Mutual Suppression Pulse.

Step 1. Connect the oscilloscope to ARINC 600 Pin BP-12.

Step 2. Setup the oscilloscope for DC coupling, 1MegaOhm, and for viewing a pulse that will have an amplitude between 20VDC – 30VDC and a pulse width between 120us-135us.

Step 3. Send HTS command “**EITST 3 0 100 F F F F F F F 0 0 1 2 0**”.

Step 4. Verify that the suppression pulse amplitude is 28 ± 4.5 Vdc and the pulse width is 130 ± 5us.

Step 5. Connect the oscilloscope to ARINC 600 Pin BP-13.

Step 6. Setup the oscilloscope for DC coupling, 1MegaOhm, and for viewing a pulse that will have an amplitude between 20VDC – 30VDC and a pulse width between 120us-135us.

Step 7. Send HTS command “**EITST 3 0 100 F F F F F F F 0 0 1 2 0**”.

Step 8. Verify that the suppression pulse amplitude is 28 ± 4.5 Vdc and the pulse width is 130 ± 5us.

4.12 Antenna BITE Tests [Group 15]

The following steps will verify the Antenna BITE circuitry.

Step 1. With the NXT connected to the Test Station, Execute the "**EITST 6 20 0**" HTS command.

Step 2. Verify the "Average Top" results from the HTS command is less than 1.5.

Step 3. Verify the "Average Bottom" results from the HTS command is less than 1.5.

4.13 RF Wrap Self Tests [Group 16]

4.13.1 ATCRBS Mode A Top RF Wrap Test

The ATCRBS Mode A RF Wrap Test verifies the bottom transmitters and top receivers of a single LRU via a BITE Test and internal RF wraps.

Step 1. Execute the HTS command "**rfwrap 2 0 0 100 0**".

Step 2. Verify that the returned value is greater than 90% at least 3 out of 5 measurements.

4.13.2 ATCRBS Mode C Top RF Wrap Test

The ATCRBS Mode C RF Wrap Test verifies the bottom transmitters and top receivers of a single LRU via a BITE Test and internal RF wraps.

Step 1. Execute the HTS command "**rfwrap 2 0 1 100 0**".

Step 2. Verify that the returned value is greater than 90% at least 3 out of 5 measurements.

4.13.3 ATCRBS Mode A Bottom RF Wrap Test

The ATCRBS Mode A RF Wrap Test verifies the top transmitters and bottom receivers of a single LRU via a BITE Test and internal RF wraps.

Step 1. Execute the HTS command "**rfwrap 2 1 0 100 0**".

Step 2. Verify that the returned value is greater than 90% at least 3 out of 5 measurements.

4.13.4 ATCRBS Mode C Bottom RF Wrap Test

The ATCRBS Mode C RF Wrap Test verifies the top transmitters and bottom receivers of a single LRU via a BITE Test and internal RF wraps.

Step 1. Execute the HTS command "**rfwrap 2 1 1 100 0**".

Step 2. Verify that the returned value is greater than 90% at least 3 out of 5 measurements.

4.13.5 Mode S Top RF Wrap Test

The Mode S RF Wrap Test verifies the bottom transmitters and top receivers of a single LRU via a BITE Test and internal RF wraps.

Step 1. Execute the HTS command "**rfwrap 1 0 100 0**".

Step 2. Verify that the non-isolated returned value is greater than 90% at least 3 out of 5 measurements.

Step 3. Verify that the isolated returned value is less than 10% at least 3 out of 5 measurements.

4.13.6 Mode S Bottom RF Wrap Test

The Mode S RF Wrap Test verifies the bottom transmitters and top receivers of a single LRU via a BITE Test and internal RF wraps.

Step 1. Execute the HTS command “**rfwrap 1 1 100 0**”.

Step 2. Verify that the non-isolated returned value is greater than 90% at least 3 out of 5 measurements.

Step 3. Verify that the isolated returned value is less than 10% at least 3 out of 5 measurements.

4.14 Transmitter Tests [Group 17 to 20]

4.14.1 Transmitter Input Power & Voltage Monitor Tests [Group 17]

4.14.1.1 Top Transmitter Input Power & Voltage Monitor Test

The following steps verify that the UUT input power and the internal +70 Vdc are within specifications while transmitting Long Mode S Squitters at a rate of 161 transmissions per second with all data bits set to 1 out of the Top antenna port.

Step 1. Connect the SDX2000 to the Top antenna port.

Step 2. Setup the UUT to transmit out the Top antenna port, 161 long Mode S squitters with all data bits set to one and chase the forward power, by executing the HTS command: "**EITST 3 0 161 F F F F F F F 0 1 2 0**".

Step 3. Read the power from the power supply and verify the UUT input power is as follows: 30 W ≤ reading ≤ 60 W.

Step 4. Execute the "**INTVOLT**" HTS command to read the internal +70.0 Vdc monitor.

Step 5. Verify that the returned value is +70.0 Vdc (±10.5 Vdc).

4.14.1.2 Bottom Transmitter Input Power & Voltage Monitor Test

The following steps verify that the UUT input power and the internal +70 Vdc are within specifications while transmitting Long Mode S Squitters at a rate of 161 transmissions per second with all data bits set to 1 out of the Bottom antenna port.

Step 1. Connect the SDX2000 to the Bottom antenna port.

Step 2. Setup the UUT to transmit out the Bottom antenna port, 161 long Mode S squitters with all data bits set to one and chase the forward power, by executing the HTS command: "**EITST 3 1 161 F F F F F F F 0 1 2 0**".

Step 3. Read the power from the power supply and verify the UUT input power is as follows: 30 W ≤ reading ≤ 60 W.

Step 4. Execute the "**INTVOLT**" HTS command to read the internal +70.0 Vdc monitor.

Step 5. Verify that the returned value is +70.0 Vdc (±10.5 Vdc).

4.14.2 Transmitter Frequency Test [Group 18]

The Transmitter Frequency test verifies that the transmitter frequency is within the specified limits.

Step 1. Connect the SDX2000 to the Top antenna port.

Step 2. Setup the SDX2000 to make a frequency measurement.

Step 3. Setup the UUT to transmit out the Top antenna port, 100 long Mode S squitters per second with all data bits set to zero and chase the forward power, by executing the HTS command:
"**EITST 3 0 100 0 0 0 0 0 0 0 0 1 2 1**".

Step 4. Verify the frequency is:

	MFG LIM	OPR LIM
Frequency	1090 ± 1 MHz	1090 ± 1 MHz

4.14.3 Transmitter Top Pulse Parametric Tests [Group 19]

4.14.3.1 Long Mode S First/Last Pulse Peak Power & Droop Test

The following steps verify the averaged peak power of the first and last pulses of Long Mode S replies transmitted at a rate of 100 transmissions per second, with all data bits set to one, are within specifications. The droop from the first pulse to the last pulse is also measured and verified to be within specification.

Step 1. Connect the SDX2000 to the Top antenna port.

Step 2. Setup the UUT for Long Mode S replies using the Top antenna port and chase the forward power, by executing the HTS commands: "**EITST 4 0 1**" to enable Mode S replies and "**EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF 0 1 2 0**".

Step 3. Setup the SDX2000 for 100 Long Mode S interrogations with all data bits set to one.

Step 4. Using the SDX2000, measure and verify the peak power of the first pulse, '**P1**'.

Step 5. Using the SDX2000, measure and verify the peak power of the last pulse, '**S111**'.

Step 6. Calculate and verify the droop between the first and last pulses.

Step 7. Verify the following pulse measurements and droop:

Pulse	MFG Reading (dBm)	OPR Reading (dBm)
First	54 ≤ reading ≤ 60	54 ≤ reading ≤ 60
Last	54 ≤ reading ≤ 60	54 ≤ reading ≤ 60
Droop	reading ≤ 1.500 (dB)	reading ≤ 2.000 (dB)

4.14.3.2 Long Mode S Second Pulse Rise/Fall Time & Pulse Width Test

The following steps verify the averaged Pulse Width and rise/fall times of the second pulse of Long Mode S replies transmitted at a rate of 100 transmissions per second, with all data bits set to one, are within specifications.

Step 1. Connect an oscilloscope to the Top antenna port.

Step 2. Setup the UUT for Mode S squitters using the Top antenna port, 100 long Mode S replies with all data bits set to one and chase the forward power, by executing the HTS command: "**EITST 3 0 100 FFFF FFFF FFFF FFFF FFFF FFFF 0 1 2 0**".

Step 3. Using an oscilloscope measure and record the pulse width of the second pulse. Pulse width measurements should be taken at the half voltage or 6 dB power points of the pulse.

Step 4. Using an oscilloscope measure and record the rise/fall time of the second pulse. Rise time measurements should be made between the 10% to 90% voltage pulse waveform points. Fall time measurements should be made between the 90% to 10% voltage pulse waveform points.

Step 5. Stop squitters by executing the HTS command:

"**EITST 3 0 0 FFFF FFFF FFFF FFFF FFFF FFFF 0 0 0 0**".

Step 6. Verify the following pulse measurements:

Pulse Parameter	Reading
Pulse Width	+500.00 ± 50 ns
Rise Time	+75.00 ± 25 ns
Fall Time	+125.00 ± 75 ns

4.14.3.3 Long Mode S Last Pulse Rise/Fall Time & Pulse Width Test

The following steps verify the averaged Pulse Width and rise/fall times of the last pulse of Long Mode S replies transmitted at a rate of 100 transmissions per second, with all data bits set to one, are within specifications.

Step 1. Connect an oscilloscope to the Top antenna port.

Step 2. Setup the UUT for Mode S squitters using the Top antenna port, 100 long Mode S replies with all data bits set to one and chase the forward power, by executing the HTS command: "**EITST 3 0 100 FFFF FFFF FFFF FFFF FFFF FFFF 0 1 2 0**".

Step 3. Using an oscilloscope measure and record the pulse width of the last pulse. Pulse width measurements should be taken at the half voltage or 6 dB power points of the pulse.

Step 4. Using an oscilloscope measure and record the rise/fall time of the last pulse. Rise time measurements should be made between the 10% to 90% voltage pulse waveform points. Fall time measurements should be made between the 90% to 10% voltage pulse waveform points.

Step 5. Stop squitters by executing the HTS command:

"**EITST 3 0 0 FFFF FFFF FFFF FFFF FFFF FFFF 0 0 0 0**".

Step 6. Verify the following pulse measurements:

Pulse Parameter	Reading
Pulse Width	+500.00 ± 50 ns
Rise Time	+75.00 ± 25 ns
Fall Time	+125.00 ± 75 ns

4.14.4 Transmitter Bottom Pulse Parametric Tests [Group 20]

4.14.4.1 Long Mode S First/Last Pulse Peak Power & Droop Test

The following steps verify the averaged peak power of the first and last pulses of Long Mode S replies transmitted at a rate of 100 transmissions per second, with all data bits set to one, are within specifications. The droop from the first pulse to the last pulse is also measured and verified to be within specification.

Step 1. Connect the SDX2000 to the Bottom antenna port.

Step 2. Setup the UUT for Long Mode S replies using the Bottom antenna port and chase the forward power, by executing the HTS commands: "**EITST 4 0 1**" to enable Mode S replies and "**EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF 0 1 2 0**".

Step 3. Setup the SDX2000 for 100 Long Mode S interrogations with all data bits set to one.

Step 4. Using the SDX2000, measure and verify the peak power of the first pulse, '**P1**'.

Step 5. Using the SDX2000, measure and verify the peak power of the last pulse, '**S111**'.

Step 6. Calculate and verify the droop between the first and last pulses.

Step 7. Verify the following pulse measurements and droop:

Pulse	MFG Reading (dBm)	OPR Reading (dBm)
First	54 ≤ reading ≤ 60	54 ≤ reading ≤ 60
Last	54 ≤ reading ≤ 60	54 ≤ reading ≤ 60
Droop	reading ≤ 1.500 (dB)	reading ≤ 2.000 (dB)

4.14.4.2 Long Mode S Second Pulse Rise/Fall Time & Pulse Width Test

The following steps verify the averaged Pulse Width and rise/fall times of the second pulse of Long Mode S replies transmitted at a rate of 100 transmissions per second, with all data bits set to one, are within specifications.

Step 1. Connect an oscilloscope to the Bottom antenna port.

Step 2. Setup the UUT for Mode S squitters using the Bottom antenna port, 100 long Mode S replies with all data bits set to one and chase the forward power, by executing the HTS command: "**EITST 3 1 100 FFFF FFFF FFFF FFFF FFFF FFFF 0 1 2 0**".

Step 3. Using an oscilloscope measure and record the pulse width of the second pulse. Pulse width measurements should be taken at the half voltage or 6 dB power points of the pulse.

Step 4. Using an oscilloscope measure and record the rise/fall time of the second pulse. Rise time measurements should be made between the 10% to 90% voltage pulse waveform points. Fall time measurements should be made between the 90% to 10% voltage pulse waveform points.

Step 5. Stop squitters by executing the HTS command:

"**EITST 3 0 0 FFFF FFFF FFFF FFFF FFFF FFFF 0 0 0 0**".

Step 6. Verify the following pulse measurements:

Pulse Parameter	Reading
Pulse Width	+500.00 ± 50 ns
Rise Time	+75.00 ± 25 ns
Fall Time	+125.00 ± 75 ns

4.14.4.3 Long Mode S Last Pulse Rise/Fall Time & Pulse Width Test

The following steps verify the averaged Pulse Width and rise/fall times of the last pulse of Long Mode S replies transmitted at a rate of 100 transmissions per second, with data bits set to one, are within specifications.

Step 1. Connect an oscilloscope to the Bottom antenna port.

Step 2. Setup the UUT for Mode S squitters using the Bottom antenna port, 100 long Mode S replies with all data bits set to one and chase the forward power, by executing the HTS command: "**EITST 3 1 100 FFFF FFFF FFFF FFFF FFFF FFFF 0 1 2 0**".

Step 3. Using an oscilloscope measure and record the pulse width of the last pulse. Pulse width measurements should be taken at the half voltage or 6 dB power points of the pulse.

Step 4. Using an oscilloscope measure and record the rise/fall time of the last pulse. Rise time measurements should be made between the 10% to 90% voltage pulse waveform points. Fall time measurements should be made between the 90% to 10% voltage pulse waveform points.

Step 5. Stop squitters by executing the HTS command:

"**EITST 3 0 0 FFFF FFFF FFFF FFFF FFFF FFFF 0 0 0 0**".

Step 6. Verify the following pulse measurements:

Pulse Parameter	Reading
Pulse Width	+500.00 ± 50 ns
Rise Time	+75.00 ± 25 ns
Fall Time	+125.00 ± 75 ns

4.15 Receiver Tests [Group 21 to 31]

4.15.1 Receiver Minimum Trigger Level (MTL) and Low-Level Tests [Group 21]

Note: Since the transponder receiver hardware is the same for Mode S and ATCRBS, the Minimum Triggering Level set point is the same for both Mode S and ATCRBS. Because the specified MTL for Mode S is more strict than ATCRBS, the MTL for both Mode S and ATCRBS shall be -74 dBm + 3 dB, at the back of the UUT.

4.15.1.1 Top Minimum Trigger Level (MTL) Tests

4.15.1.1.1 Top ATCRBS Mode A MTL Test

This test verifies that at least 90% replies shall be decoded for a minimum trigger level of -74 dBm (+3 per DO181E for antenna cable loss) injected into the Top Antenna port for Mode A interrogations.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-71 dBm**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 1 0 FFFE 0 2 0**”.

This configures the UUT to send replies to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid Top ATCRBS replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≥90
OPR LIM	≥90

4.15.1.1.2 Top ATCRBS Mode C MTL Test

This test verifies that at least 90% replies shall be decoded for a minimum trigger level of -74 dBm (+3 per DO181E for antenna cable loss) injected into the Top Antenna port for Mode C interrogations.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-71 dBm**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 1 0 FFFE 1 2 0**”.

This configures the UUT to send replies to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid top ATCRBS replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≥90
OPR LIM	≥90

4.15.1.1.3 Top Mode S MTL Test

This test verifies that at least 99% replies shall be decoded for a minimum trigger level of -74 dBm (+3 per DO181E for antenna cable loss) injected into the Top Antenna port for Mode S interrogations.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-71 dBm**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to send 100 Mode S UF-11 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”.

This configures the UUT to reply to valid Mode S interrogations.

Step 5. On the SDX2000, read the Mode S %Replies to determine the number of valid top Mode S replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≥99
OPR LIM	≥99

4.15.1.1.4 Top ATCRBS Mode A Low-Level Test

This test verifies that no more than 10% replies shall be decoded for a minimum trigger level of -84 dBm injected into the Top 0 Antenna port for Mode A interrogations.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-84 dBm**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 1 0 FFFE 0 2 0**”.

This configures the UUT to send replies to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid top ATCRBS replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≤5
OPR LIM	≤10

4.15.1.1.5 Top ATCRBS Mode C Low-Level Test

This test verifies that no more than 10% replies shall be decoded for a minimum trigger level of -84 dBm injected into the Top Antenna port for Mode C interrogations.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-84 dBm**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 1 0 FFFE 1 2 0**”.

This configures the UUT to send replies to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid top ATCRBS replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≤5
OPR LIM	≤10

4.15.1.1.6 Top Mode S Low-Level Test

This test verifies that no more than 1% replies shall be decoded for a minimum trigger level of -84 dBm injected into the Top Antenna port for Mode S interrogations.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-84 dBm**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to send 100 Mode S UF-11 interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 0 1**" to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**".

This configures the UUT to reply to valid Mode S interrogations.

Step 5. On the SDX2000, read the Mode S %Replies to determine the number of valid top Mode S replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≤5
OPR LIM	≤10

4.15.1.2 Bottom Minimum Trigger Level Tests

4.15.1.2.1 Bottom ATCRBS Mode A MTL Test

This test verifies that at least 90% replies shall be decoded for a minimum trigger level of -74 dBm (+3 per DO181E for antenna cable loss) injected into the Bottom Antenna port for Mode A interrogations.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-71 dBm**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 FFFE 0 2 0**".

This configures the UUT to send replies to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid bottom ATCRBS replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≥90
OPR LIM	≥90

4.15.1.2.2 Bottom ATCRBS Mode C MTL Test

This test verifies that at least 90% replies shall be decoded for a minimum trigger level of -74 dBm (+3 per DO181E for antenna cable loss) injected into the Bottom Antenna port for Mode C interrogations.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-71 dBm**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 1 1 FFFE 1 2 0**”.

This configures the UUT to send replies to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid bottom ATCRBS replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≥90
OPR LIM	≥90

4.15.1.2.3 Bottom Mode S MTL Test

This test verifies that at least 99% replies shall be decoded for a minimum trigger level of -74 dBm (+3 per DO181E for antenna cable loss) injected into the Bottom Antenna port for Mode S interrogations.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-71 dBm**

Step 2. Configure the SDX2000 to send 100 Mode S UF-11 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 1 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”.

This configures the UUT to reply to valid Mode S interrogations.

Step 5. On the SDX2000, read the Mode S %Replies to determine the number of valid bottom Mode S replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≥99
OPR LIM	≥99

4.15.1.2.4 Bottom ATCRBS Mode A Low-Level Test

This test verifies that no more than 10% replies shall be decoded for a minimum trigger level of -84 dBm injected into the Bottom Antenna port for Mode A interrogations.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-84 dBm**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 FFFE 0 2 0**".

This configures the UUT to send replies to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid bottom ATCRBS replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≤5
OPR LIM	≤10

4.15.1.2.5 Bottom ATCRBS Mode C Low-Level Test

This test verifies that no more than 10% replies shall be decoded for a minimum trigger level of -84 dBm injected into the Bottom Antenna port for Mode C interrogations.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-84 dBm**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 FFFE 1 2 0**".

This configures the UUT to send replies to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid bottom ATCRBS replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≤5
OPR LIM	≤10

4.15.1.2.6 Bottom Mode S Low-Level Test

This test verifies that no more than 10% replies shall be decoded for a minimum trigger level of -84 dBm injected into the Bottom Antenna port for Mode S interrogations.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-84 dBm**

Step 2. Configure the SDX2000 to send 100 Mode S UF-11 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 1 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”.

This configures the UUT to reply to valid Mode S interrogations.

Step 5. On the SDX2000, read the Mode S %Replies to determine the number of valid bottom Mode S replies from the UUT that was decoded.

Step 6. Verify the number of replies received is as follows:

	Replies
MFG LIM	≤5
OPR LIM	≤10

4.15.2 Receiver Dynamic Range Tests [Group 22]

4.15.2.1 ATCRBS Dynamic Range Tests

4.15.2.1.1 Top ATCRBS Dynamic Range Tests

This test verifies that the UUT Top port generates at least 90% replies in the input range between -71 dBm and -24 dBm at the UUT antenna port.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**See Verification Table in Step 6**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 FFFE 1 2 0**".

This configures the UUT to reply to valid ATCRBS interrogations.

Step 5. Set the SDX2000 to inject the specified RF level to the Top antenna port for each level listed in the table below. On the SDX2000, read the ATCRBS %Replies to determine the number of valid top ATCRBS replies from the UUT that was decoded.

Step 6. Verify the following:

	-71 dBm	-50 dBm	-24 dBm
Replies	**≥90**	**≥90**	**≥90**

4.15.2.1.2 Bottom ATCRBS Dynamic Range Tests

This test verifies that the UUT Bottom port generates at least 90% replies in the input range between -71 dBm and -24 dBm at the UUT antenna port.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**See Verification Table in Step 6**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 FFFE 1 2 0**".

This configures the UUT to reply to valid ATCRBS interrogations.

Step 5. Set the SDX2000 to inject the specified RF level to the Bottom antenna port for each level listed in the table below. On the SDX2000, read the ATCRBS %Replies to determine the number of valid bottom ATCRBS replies from the UUT that was decoded.

Step 6. Verify the following:

	-71 dBm	-50 dBm	-24 dBm
Replies	≥90	≥90	≥90

4.15.2.2 Mode S Dynamic Range Tests

4.15.2.2.1 Top Mode S Dynamic Range Tests

This test verifies that the UUT Top port generates at least 99% Mode S replies in the input range between -71 dBm and -24 dBm at the UUT antenna port.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	1030.0 ± 0.1 MHz	See Verification Table in Step 6
Bottom	-	-

Step 2. Configure the EIT station to send 100 Mode S UF-11 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”.

This configures the UUT to process Mode S interrogations and reply upon receipt of a valid Mode S interrogation.

Step 5. For each RF level listed in the table below, inject an RF signal at the specified input level at the Top antenna port. On the SDX2000, read the Mode S %Replies to determine the number of valid Top Mode S replies from the UUT that was decoded.

Step 6. Verify the following:

	-71 dBm	-50 dBm	-24 dBm
Replies	≥99	≥99	≥99

4.15.2.2.2 Bottom Mode S Dynamic Range Tests

This test verifies that the UUT Bottom port generates at least 99% Mode S replies in the input range between -71 dBm and -24 dBm at the UUT antenna port

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	-	-
Bottom	1030.0 ± 0.1 MHz	See Verification Table in Step 6

Step 2. Configure the EIT station to interrogate 100 Mode S UF-11 per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 2 1 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**".

This configures the UUT to process Mode S interrogations and reply upon receipt of a valid Mode S interrogation.

Step 5. For each RF level listed in the table below, inject an RF signal at the specified input level at the Bottom antenna port. On the SDX2000, read the Mode S %Replies to determine the number of valid Bottom Mode S replies from the UUT that was decoded.

Step 6. Verify the following:

	-71 dBm	-50 dBm	-24 dBm
Replies	≥99	≥99	≥99

4.15.3 Receiver Out-of-Band Rejection Tests [Group 23]

4.15.3.1 Top Receiver Out-of-Band Rejection Tests

This test verifies the bandwidth of the transponder Top receiver.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	See Verification Table in Step 6	-74.0 dBm
Bottom	-	-

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 1 0 FFFE 0 2 0**”.

This configures the UUT to reply to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid top ATCRBS replies from the UUT that were decoded.

Step 6. Verify the proper number of replies at each frequency specified in the table below:

Replies	1005 MHz	1055 MHz	1029.8 MHz	1030.2 MHz
MFG LIM	≤5	≤5	≥90	≥90
OPR LIM	≤10	≤10	≥90	≥90

4.15.3.2 Bottom Receiver Out-of-Band Rejection Tests

This test verifies the bandwidth of the transponder Bottom 0 receiver.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	-	-
Bottom	See Verification Table in Step 6	-74.0 dBm

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 1 1 0 FFFE 0 2 0**”.

This configures the UUT to reply to valid ATCRBS interrogations.

Step 5. On the SDX2000, read the ATCRBS %Replies to determine the number of valid bottom ATCRBS replies from the UUT that were decoded.

Step 6. Verify the proper number of replies at each frequency specified in the table below:

Replies	1005 MHz	1055 MHz	1029.8 MHz	1030.2 MHz
MFG LIM	≤5	≤5	≥90	≥90
OPR LIM	≤10	≤10	≥90	≥90

4.15.4 Receiver ATCRBS Side Lobe Suppression (SLS) Tests [Group 24]

4.15.4.1 Top Receiver Mode A SLS Tests

4.15.4.1.1 Top Receiver Mode A SLS P2 ON 0 dB Test

This test verifies that the UUT Top port does not reply to Mode A interrogations with the P2 pulse turned on and set to a level where P2 = P1.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**See Verification Table in Step 6**
Bottom	**-**	**-**

Step 2. Configure the EIT station to transmit 100 Mode A interrogations per second in a continuous loop. Turn the P2 pulse on and adjust the SDX2000 such that the P2 level equals P1.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 FFFE 0 2 0**"

This will configure the UUT to process ATCRBS interrogations and reply upon receipt of a valid interrogation.

Step 5. For each input level specified in the table below, inject the specified RF level into the top antenna port. Read the SDX2000 to determine the number of valid top ATCRBS replies from the UUT that the SDX2000 decoded in the last frame. Repeat for each input power level.

Step 6. Verify the following:

	-72 dBm	-50 dBm	-24 dBm
Replies	**≤1**	**≤1**	**≤1**

4.15.4.1.2 Top Receiver Mode A SLS P2 ON -9 dB Test

This test verifies that the UUT Top port replies to Mode A interrogations with the P2 pulse turned on and set to a level where P2 = P1 - 9 dB

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**See Verification Table in Step 6**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode A interrogations per second in a continuous loop. Turn the P2 pulse on and adjust the SDX2000 such that the P2 level equals P1 - 9 dB.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 FFFE 0 2 0**"

This will configure the UUT to process ATCRBS interrogations and reply upon receipt of a valid interrogation.

Step 5. For each input level specified in the table below, inject the specified RF level into the top antenna port. Read the SDX2000 to determine the number of valid top ATCRBS replies from the UUT that the SDX2000 decoded in the last frame. Repeat for each input power level.

Step 6. Verify the following:

	-72 dBm	-50 dBm	-24 dBm
Replies	**≥90**	**≥90**	**≥90**

4.15.4.2 Bottom Mode A SLS Tests

4.15.4.2.1 Bottom Mode A SLS P2 ON 0 dB Test

This test verifies that the UUT Bottom port does not reply to Mode A interrogations with the P2 pulse turned on and set to a level where P2 = P1

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**See Verification Table in Step 6**

Step 2. Configure the SDX2000 to transmit 100 Mode A interrogations per second in a continuous loop. Turn the P2 pulse on and adjust the SDX2000 such that the P2 level equals P1.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 FFFE 0 2 0**"

This will configure the UUT to process ATCRBS interrogations and reply upon receipt of a valid interrogation.

Step 5. For each input level specified in the table below, inject the specified RF level into the bottom 0 antenna port. Read the SDX2000 to determine the number of valid top ATCRBS replies from the UUT that the SDX2000 decoded in the last frame. Repeat for each input power level.

Step 6. Verify the following:

	-72 dBm	-50 dBm	-24 dBm
Replies	**≤1**	**≤1**	**≤1**

4.15.4.2.2 Bottom Mode A SLS P2 ON -9 dB Test

This test verifies that the UUT Bottom port replies to Mode A interrogations with the P2 pulse turned on and set to a level where P2 = P1 - 9 dB

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**See Verification Table in Step 6**

Step 2. Configure the SDX2000 to transmit 100 Mode A interrogations per second in a continuous loop. Turn the P2 pulse on and adjust the SDX2000 such that the P2 level equals P1 - 9 dB.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 FFFE 0 2 0**"

This will configure the UUT to process ATCRBS interrogations and reply upon receipt of a valid interrogation.

Step 5. For each input level specified in the table below, inject the specified RF level into the bottom antenna port. Read the SDX2000 to determine the number of valid top ATCRBS replies from the UUT that the SDX2000 decoded in the last frame. Repeat for each input power level.

Step 6. Verify the following:

	-72 dBm	-50 dBm	-24 dBm
Replies	**≥90**	**≥90**	**≥90**

4.15.5 Xpdr Receiver Mode S Formats Side Lobe Suppression (SLS) Tests [Group 25]

4.15.5.1 Top Side Lobe Suppression, Mode S Formats (P5 = P6 + 3dB) Test

This test verifies that the UUT Top port does not generate Mode S replies to Mode S interrogations when P5 exceeds the received amplitude of P6 by 3 dB.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-55.0 dBm**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode S interrogations per second in a continuous loop.

Step 3. Setup the SDX2000 to set the SLS offset of P5 to 3dB more than P6.

Step 4. Send the HTS command “**EITST 4 0 1**” to enable Top Antenna Mode S replies.

Step 5. Setup the UUT for transponder reply processing by sending the HTS command: **“EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”

Step 6. On the SDX2000, read the Mode S %Replies to determine the number of valid Mode S replies from the UUT that was decoded.

Step 7. Verify the Mode S replies are ≤10%.

4.15.5.2 Top Side Lobe Suppression, Mode S Formats (P5 = P6 – 12dB) Test

This test verifies that the UUT Top port generates Mode S replies to Mode S interrogations when P6 exceeds the received amplitude of P5 by 12 dB.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-55.0 dBm**
Bottom	**-**	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode S interrogations per second in a continuous loop.

Step 3. Setup the SDX2000 to set the SLS offset of P5 to 12dB less than P6.

Step 4. Send the HTS command “**EITST 4 0 1**” to enable Top Antenna Mode S replies.

Step 5. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”

Step 6. On the SDX2000, read the Mode S %Replies to determine the number of valid Mode S replies from the UUT that was decoded.

Step 7. Verify the Mode S replies are ≥99 percent.

4.15.5.3 Bottom Side Lobe Suppression, Mode S Formats (P5 = P6 + 3dB) Test

This test verifies that the UUT Bottom port does not generate Mode S replies to Mode S interrogations when P5 exceeds the received amplitude of P6 by 3 dB.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-55.0 dBm**

Step 2. Configure the SDX2000 to transmit 100 Mode S interrogations per second in a continuous loop.

Step 3. Setup the SDX2000 to set the SLS offset of P5 to 3dB more than P6.

Step 4. Send the HTS command “**EITST 4 0 1**” to enable Bottom Antenna Mode S replies.

Step 5. Setup the UUT for transponder reply processing by sending the HTS command: **“EITST 2 1 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”

Step 6. On the SDX2000, read the Mode S %Replies to determine the number of valid Mode S replies from the UUT that was decoded.

Step 7. Verify the Mode S replies are ≤10%.

4.15.5.4 Bottom Side Lobe Suppression, Mode S Formats (P5 = P6 – 12dB) Test

This test verifies that the UUT Bottom port generates Mode S replies to Mode S interrogations when P6 exceeds the received amplitude of P5 by 12 dB.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-55.0 dBm**

Step 2. Configure the SDX2000 to transmit 100 Mode S interrogations per second in a continuous loop.

Step 3. Setup the SDX2000 to set the SLS offset of P5 to 12dB less than P6.

Step 4. Send the HTS command “**EITST 4 0 1**” to enable Bottom Antenna Mode S replies.

Step 5. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 1 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”

Step 6. On the SDX2000, read the Mode S %Replies to determine the number of valid Mode S replies from the UUT that was decoded.

Step 7. Verify the Mode S replies are ≥99 percent.

4.15.6 Receiver ATCRBS Code Tests [Group 26]

4.15.6.1 Receiver Mode A Code Tests

4.15.6.1.1 Top Receiver Mode A Code Test – Code 2525

This test verifies that the transponder properly sets the code bits in Mode A ATCRBS replies on the top antenna port using the code 2525.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 1 0 99CE 0 2 0**”.

This sets the Mode A code to 2525 and the Mode A SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
Mode A Code	**2525**

4.15.6.1.2 Top Receiver Mode A Code Test – Code 5252

This test verifies that the transponder properly sets the code bits in Mode A ATCRBS replies on the top antenna port using the code 5252.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 E632 0 2 0**".

This sets the Mode A code to 5252 and the Mode A SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	-74 dBm
Mode A Code	5252

4.15.6.1.3 Top Receiver Mode A Code Test – SPI Off

This test verifies that the transponder does not set the SPI bit in Mode A ATCRBS replies on the top antenna port when the SPI indication is not on.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	1030.0 ± 0.1 MHz
Bottom	-

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 E632 0 2 0**".

This sets the Mode A code to 5252 and the Mode A SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	-74 dBm
SPI Bit	0

4.15.6.1.4 Top Receiver Mode A Code Test – SPI On

This test verifies that the transponder properly sets the SPI bit in Mode A ATCRBS replies on the top antenna port when the SPI indication is on.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	1030.0 ± 0.1 MHz
Bottom	-

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 E633 0 2 0**".

This sets the Mode A code to 5252 and the Mode A SPI bit to 1.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	-74 dBm
SPI Bit	1

4.15.6.1.5 Bottom Mode A Code Test – Code 2525

This test verifies that the transponder properly sets the code bits in Mode A ATCRBS replies on the bottom antenna port using the code 2525.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	-
Bottom	1030.0 ± 0.1 MHz

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 99CE 0 2 0**".

This sets the Mode A code to 2525 and the Mode A SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	-74 dBm
Mode A Code	2525

4.15.6.1.6 Bottom Mode A Code Test – Code 5252

This test verifies that the transponder properly sets the code bits in Mode A ATCRBS replies on the bottom antenna port using the code 5252.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	-
Bottom	1030.0 ± 0.1 MHz

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 E632 0 2 0**".

This sets the Mode A code to 5252 and the Mode A SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
Mode A Code	**5252**

4.15.6.1.7 Bottom Mode A Code Test – SPI Off

This test verifies that the transponder does not set the SPI bit in Mode A ATCRBS replies on the bottom antenna port when the SPI indication is not on.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	**Frequency**
Top	**-**
Bottom	**1030.0 ± 0.1 MHz**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 E632 0 2 0**".

This sets the Mode A code to 5252 and the Mode A SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
SPI Bit	**0**

4.15.6.1.8 Bottom Mode A Code Test – SPI On

This test verifies that the transponder properly sets the SPI bit in Mode A ATCRBS replies on the bottom antenna port when the SPI indication is on.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	**Frequency**
Top	**-**
Bottom	**1030.0 ± 0.1 MHz**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 E633 0 2 0**".

This sets the Mode A code to 5252 and the Mode A SPI bit to 1.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
SPI Bit	**1**

4.15.6.2 Receiver Mode C Code Tests

4.15.6.2.1 Top Receiver Mode C Code Test – Code 2525

This test verifies that the transponder properly sets the code bits in Mode C ATCRBS replies on the top antenna port using the code 2525.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 99CE 0 2 0**".

This sets the Mode C code to 2525 and the Mode C SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
Mode C Code	**2525**

4.15.6.2.2 Top Receiver Mode C Code Test – Code 5252

This test verifies that the transponder properly sets the code bits in Mode C ATCRBS replies on the top antenna port using the code 5252.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 E632 0 2 0**".

This sets the Mode C code to 5252 and the Mode C SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
Mode C Code	**5252**

4.15.6.2.3 Top Receiver Mode C Code Test – SPI Off

This test verifies that the transponder does not set the SPI bit in Mode C ATCRBS replies on the top antenna port when the SPI indication is not on.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 E632 0 2**".

This sets the Mode C code to 5252 and the Mode C SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
SPI Bit	**0**

4.15.6.2.4 Top Receiver Mode C Code Test – SPI On

This test verifies that the transponder properly sets the SPI bit in Mode C ATCRBS replies on the top antenna port when the SPI indication is on.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 0 E633 0 2 0**".

This sets the Mode C code to 5252 and the Mode C SPI bit to 1.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
SPI Bit	**1**

4.15.6.2.5 Bottom Receiver Mode C Code Test – Code 2525

This test verifies that the transponder properly sets the code bits in Mode C ATCRBS replies on the bottom antenna port using the code 2525.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**-**
Bottom	**1030.0 ± 0.1 MHz**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 99CE 0 2 0**".

This sets the Mode C code to 2525 and the Mode C SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
Mode C Code	**2525**

4.15.6.2.6 Bottom Receiver Mode C Code Test – Code 5252

This test verifies that the transponder properly sets the code bits in Mode C ATCRBS replies on the bottom antenna port using the code 5252.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**-**
Bottom	**1030.0 ± 0.1 MHz**

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 E632 0 2 0**".

This sets the Mode C code to 5252 and the Mode C SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	-74 dBm
Mode C Code	5252

4.15.6.2.7 Bottom Receiver Mode C Code Test – SPI Off

This test verifies that the transponder does not set the SPI bit in Mode C ATCRBS replies on the bottom antenna port when the SPI indication is not on.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	-
Bottom	1030.0 ± 0.1 MHz

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 E632 0 2 0**".

This sets the Mode C code to 5252 and the Mode C SPI bit to 0.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	-74 dBm
SPI Bit	0

4.15.6.2.8 Bottom Receiver Mode C Code Test – SPI On

This test verifies that the transponder properly sets the SPI bit in Mode C ATCRBS replies on the bottom antenna port when the SPI indication is on.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	-
Bottom	1030.0 ± 0.1 MHz

Step 2. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 1 0**" to enable ATCRBS replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 1 1 E633 0 2 0**".

This sets the Mode C code to 5252 and the Mode C SPI bit to 1.

Step 5. Inject the specified RF level into the UUT. Using the SDX2000, decode the reply data and determine that the data is as specified below:

RF Level	**-74 dBm**
SPI Bit	**1**

4.15.7 Receiver Mode S Code Tests [Group 27]

Note: The transmission data does not match the receive data due to Big Endian and Little Endian system representations.

4.15.7.1 Top Receiver Mode S Code Tests (UF-0)

This test verifies that the transponder recognizes Uplink Format 0 interrogations and replies on the top antenna port with the proper downlink format.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-0 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 0 *data* 0 0 2 0**” using the data from the table below for each power level.

RF Level	HTS Data
-74dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**
-50dBm	**5555 5555 5555 5555 5555 5555 5555**
-24dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**

This configures the UUT to reply to valid Mode S interrogations.

Step 5. Inject an RF signal at each of the listed input levels. Using the SDX2000, verify the Mode S data is as specified below for each power level:

RF Level	-74 dBm	-50 dBm	-24 dBm
Mode S Data	**2AAAAAA**	**5555555**	**2AAAAAA**

4.15.7.2 Top Receiver Mode S Code Tests (UF-4)

This test verifies that the transponder recognizes Uplink Format 4 interrogations and replies on the top antenna port with the proper downlink format.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-4 interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 0 1**" to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 2 0 *data* 0 0 2 0**" using the data from the table below for each power level.

RF Level	HTS Data
-74dBm	AAAA AAAA AAAA AAAA AAAA AAAA AAAA
-50dBm	5555 5555 5555 5555 5555 5555 5555
-24dBm	AAAA AAAA AAAA AAAA AAAA AAAA AAAA

This configures the UUT to reply to valid Mode S interrogations.

Step 5. Inject an RF signal at each of the listed input levels. Using the SDX2000, verify the Mode S data is as specified below for each power level:

RF Level	-74 dBm	-50 dBm	-24 dBm
Mode S Data	2AAAAAA	5555555	2AAAAAA

4.15.7.3 Top Receiver Mode S Code Tests (UF-5)

This test verifies that the transponder recognizes Uplink Format 5 interrogations and replies on the top antenna port with the proper downlink format.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	1030.0 ± 0.1 MHz
Bottom	-

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-5 interrogations per second in a continuous loop.

Step 3. Send the HTS command "**EITST 4 0 1**" to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 2 0 *data* 0 0 2 0**" using the data from the table below for each power level.

RF Level	HTS Data
-74dBm	AAAA AAAA AAAA AAAA AAAA AAAA AAAA
-50dBm	5555 5555 5555 5555 5555 5555 5555
-24dBm	AAAA AAAA AAAA AAAA AAAA AAAA AAAA

This configures the UUT to reply to valid Mode S interrogations.

Step 5. Inject an RF signal at each of the listed input levels. Using the SDX2000, verify the Mode S data is as specified below for each power level:

RF Level	-74 dBm	-50 dBm	-24 dBm
Mode S Data	2AAAAAA	5555555	2AAAAAA

4.15.7.4 Top Receiver Mode S Code Tests (UF-16)

This test verifies that the transponder recognizes Uplink Format 16 interrogations and replies on the top antenna port with the proper downlink format.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-16 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 0 *data* 0 1 2 0**” using the data from the table below for each power level.

RF Level	HTS Data
-74dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**
-50dBm	**5555 5555 5555 5555 5555 5555 5555**
-24dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**

This configures the UUT to reply to valid Mode S interrogations.

Step 5. Inject an RF signal at each of the listed input levels. Using the SDX2000, verify the Mode S data is as specified below for each power level:

RF Level	Mode S Code
-74dBm	**2AAAAAAAAAAAAAAAAAAAA**
-50dBm	**555555555555555555555**
-24dBm	**2AAAAAAAAAAAAAAAAAAAA**

4.15.7.5 Bottom Receiver Mode S Code Tests (UF-0)

This test verifies that the transponder recognizes Uplink Format 0 interrogations and replies on the bottom antenna port with the proper downlink format.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-0 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 1 *data* 0 0 2 0**” using the data from the table below for each power level.

RF Level	HTS Data
-74dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**
-50dBm	**5555 5555 5555 5555 5555 5555 5555**
-24dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**

This configures the UUT to reply to valid Mode S interrogations.

Step 5. Inject an RF signal at each of the listed input levels. Using the SDX2000, verify the Mode S data is as specified below for each power level:

RF Level	-74 dBm	-50 dBm	-24 dBm
Mode S Data	**2AAAAAA**	**5555555**	**2AAAAAA**

4.15.7.6 Bottom Receiver Mode S Code Tests (UF-4)

This test verifies that the transponder recognizes Uplink Format 4 interrogations and replies on the bottom antenna port with the proper downlink format.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-4 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 1 *data* 0 0 2 0**” using the data from the table below for each power level.

RF Level	HTS Data
-74dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**
-50dBm	**5555 5555 5555 5555 5555 5555 5555**
-24dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**

This configures the UUT to reply to valid Mode S interrogations.

Step 5. Inject an RF signal at each of the listed input levels. Using the SDX2000, verify the Mode S data is as specified below for each power level:

RF Level	-74 dBm	-50 dBm	-24 dBm
Mode S Data	**2AAAAAA**	**5555555**	**2AAAAAA**

4.15.7.7 Bottom Receiver Mode S Code Tests (UF-5)

This test verifies that the transponder recognizes Uplink Format 5 interrogations and replies on the bottom antenna port with the proper downlink format.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	1030.0 ± 0.1 MHz
Bottom	-

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-5 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: “**EITST 2 1 *data* 0 0 2 0**” using the data from the table below for each power level.

RF Level	HTS Data
-74dBm	AAAA AAAA AAAA AAAA AAAA AAAA AAAA
-50dBm	5555 5555 5555 5555 5555 5555 5555
-24dBm	AAAA AAAA AAAA AAAA AAAA AAAA AAAA

This configures the UUT to reply to valid Mode S interrogations.

Step 5. Inject an RF signal at each of the listed input levels. Using the SDX2000, verify the Mode S data is as specified below for each power level:

RF Level	-74 dBm	-50 dBm	-24 dBm
Mode S Data	2AAAAAA	5555555	2AAAAAA

4.15.7.8 Bottom Receiver Mode S Code Tests (UF-16)

This test verifies that the transponder recognizes Uplink Format 16 interrogations and replies on the bottom antenna port with the proper downlink format.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	1030.0 ± 0.1 MHz
Bottom	-

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-16 interrogations per second in a continuous loop.

Step 3. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command: "**EITST 2 1 *data* 0 1 2 0**" using the data from the table below for each power level.

RF Level	HTS Data
-74dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**
-50dBm	**5555 5555 5555 5555 5555 5555 5555**
-24dBm	**AAAA AAAA AAAA AAAA AAAA AAAA AAAA**

This configures the UUT to reply to valid Mode S interrogations.

Step 5. Inject an RF signal at each of the listed input levels. Using the SDX2000, verify the Mode S data is as specified below for each power level:

RF Level	Mode S Code
-74dBm	**2AAAAAAAAAAAAAAAAAAAA**
-50dBm	**5555555555555555555555**
-24dBm	**2AAAAAAAAAAAAAAAAAAAA**

4.15.8 Receiver All-Call Pulse Position Tests [Group 28]

4.15.8.1 Top Mode C/Mode S Receiver All-Call Pulse Position Test (-0.05 µsec)

This test verifies that the transponder generates Mode S replies to Mode C/Mode S All-Call interrogations as the delay of the P4 pulse is varied.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-60 dBm**
Bottom	**-**	**-**

Step 2. Configure the EIT station to interrogate 100 Mode C/Mode S All-Call per second in a continuous loop, with the following pulse specifications:

P1 Pulse: ON, pulsewidth = 0.8 microseconds
P2 Pulse: OFF
P3 Pulse: ON, pulsewidth = 0.8 microseconds
P4 Pulse: ON, pulsewidth = 1.6 microseconds, position delta -0.05 microseconds

Configure the EIT station such that the amplitude of the P4 pulse is equal to the P3 pulse.

Step 3. Send the HTS command "**EITST 4 1 1**" to enable ATCRBS and Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command:

"**EITST 1 0 FFFFF 0 2 0**"

Step 5. Verify the SDX-2000 receives ≤10% ATCRBS replies and ≥90% Mode S replies.

4.15.8.2 Top Mode C/Mode S Receiver All-Call Pulse Position Test (+0.05 µsec)

This test verifies that the transponder generates Mode S replies to Mode C/Mode S All-Call interrogations as the delay of the P4 pulse is varied.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-60 dBm**
Bottom	**-**	**-**

Step 2. Configure the EIT station to interrogate 100 Mode C/Mode S All-Call per second in a continuous loop, with the following pulse specifications:

P1 Pulse: ON, pulsewidth = 0.8 microseconds
P2 Pulse: OFF
P3 Pulse: ON, pulsewidth = 0.8 microseconds
P4 Pulse: ON, pulsewidth = 1.6 microseconds, position delta +0.05 microseconds

Configure the EIT station such that the amplitude of the P4 pulse is equal to the P3 pulse.

Step 3. Send the HTS command "**EITST 4 1 1**" to enable ATCRBS and Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command:

"**EITST 1 0 FFFFF 0 2 0**"

Step 5. Verify the SDX-2000 receives ≤10% ATCRBS replies and ≥90% Mode S replies.

4.15.8.3 Top Mode C/Mode S All-Call Pulse Position Test (-0.3 µsec)

This test verifies that the transponder generates Mode S replies to Mode C/Mode S All-Call interrogations as the delay of the P4 pulse is varied.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-60 dBm**
Bottom	**-**	**-**

Step 2. Configure the EIT station to interrogate 100 Mode C/Mode S All-Call per second in a continuous loop, with the following pulse specifications:

P1 Pulse: ON, pulsewidth = 0.8 microseconds
P2 Pulse: OFF
P3 Pulse: ON, pulsewidth = 0.8 microseconds
P4 Pulse: ON, pulsewidth = 1.6 microseconds, position delta -0.3 microseconds

Configure the EIT station such that the amplitude of the P4 pulse is equal to the P3 pulse.

Step 3. Send the HTS command "**EITST 4 1 1**" to enable ATCRBS and Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command:

"**EITST 1 0 FFFFF 0 2 0**"

Step 5. Verify the SDX-2000 receives ≥90% ATCRBS replies and ≤10% Mode S replies.

4.15.8.4 Top Mode C/Mode S All-Call Pulse Position Test (+0.3 µsec)

This test verifies that the transponder generates Mode S replies to Mode C/Mode S All-Call interrogations as the delay of the P4 pulse is varied.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**1030.0 ± 0.1 MHz**	**-60 dBm**
Bottom	**-**	**-**

Step 2. Configure the EIT station to interrogate 100 Mode C/Mode S All-Call per second in a continuous loop, with the following pulse specifications:

P1 Pulse: ON, pulsewidth = 0.8 microseconds
P2 Pulse: OFF
P3 Pulse: ON, pulsewidth = 0.8 microseconds
P4 Pulse: ON, pulsewidth = 1.6 microseconds, position delta +0.3 microseconds

Configure the EIT station such that the amplitude of the P4 pulse is equal to the P3 pulse.

Step 3. Send the HTS command "**EITST 4 1 1**" to enable ATCRBS and Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command:

"**EITST 1 0 FFFFF 0 2 0**"

Step 5. Verify the SDX-2000 receives ≥90% ATCRBS replies and ≤10% Mode S replies.

4.15.8.5 Bottom Mode C/Mode S All-Call Pulse Position Test (-0.05 μsec)

This test verifies that the transponder generates Mode S replies to Mode C/Mode S All-Call interrogations as the delay of the P4 pulse is varied.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-60 dBm**

Step 2. Configure the EIT station to interrogate 100 Mode C/Mode S All-Call per second in a continuous loop, with the following pulse specifications:

P1 Pulse: ON, pulsewidth = 0.8 microseconds
P2 Pulse: OFF
P3 Pulse: ON, pulsewidth = 0.8 microseconds
P4 Pulse: ON, pulsewidth = 1.6 microseconds, position delta -0.05 microseconds

Configure the EIT station such that the amplitude of the P4 pulse is equal to the P3 pulse.

Step 3. Send the HTS command "**EITST 4 1 1**" to enable ATCRBS and Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command:

"**EITST 1 1 FFFFF 0 2 0**"

Step 5. Verify the SDX-2000 receives ≤10% ATCRBS replies and ≥90% Mode S replies.

4.15.8.6 Bottom Mode C/Mode S All-Call Pulse Position Test (+0.05 μsec)

This test verifies that the transponder generates Mode S replies to Mode C/Mode S All-Call interrogations as the delay of the P4 pulse is varied.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-60 dBm**

Step 2. Configure the EIT station to interrogate 100 Mode C/Mode S All-Call per second in a continuous loop, with the following pulse specifications:

P1 Pulse: ON, pulsewidth = 0.8 microseconds
P2 Pulse: OFF

P3 Pulse: ON, pulsewidth = 0.8 microseconds
P4 Pulse: ON, pulsewidth = 1.6 microseconds, position delta +0.05 microseconds

Configure the EIT station such that the amplitude of the P4 pulse is equal to the P3 pulse.

Step 3. Send the HTS command "**EITST 4 1 1**" to enable ATCRBS and Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command:

"**EITST 1 1 FFFFF 0 2 0**"

Step 5. Verify the SDX-2000 receives ≤10% ATCRBS replies and ≥90% Mode S replies.

4.15.8.7 Bottom Mode C/Mode S All-Call Pulse Position Test (-0.3 µsec)

This test verifies that the transponder generates Mode S replies to Mode C/Mode S All-Call interrogations as the delay of the P4 pulse is varied.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-60 dBm**

Step 2. Configure the EIT station to interrogate 100 Mode C/Mode S All-Call per second in a continuous loop, with the following pulse specifications:

P1 Pulse: ON, pulsewidth = 0.8 microseconds
P2 Pulse: OFF
P3 Pulse: ON, pulsewidth = 0.8 microseconds
P4 Pulse: ON, pulsewidth = 1.6 microseconds, position delta -0.3 microseconds

Configure the EIT station such that the amplitude of the P4 pulse is equal to the P3 pulse.

Step 3. Send the HTS command "**EITST 4 1 1**" to enable ATCRBS and Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command:

"**EITST 1 1 FFFFF 0 2 0**"

Step 5. Verify the SDX-2000 receives ≥90% ATCRBS replies and ≤10% Mode S replies.

4.15.8.8 Bottom Mode C/Mode S All-Call Pulse Position Test (+0.3 µsec)

This test verifies that the transponder generates Mode S replies to Mode C/Mode S All-Call interrogations as the delay of the P4 pulse is varied.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	**-**	**-**
Bottom	**1030.0 ± 0.1 MHz**	**-60 dBm**

Step 2. Configure the EIT station to interrogate 100 Mode C/Mode S All-Call per second in a continuous loop, with the following pulse specifications:

P1 Pulse: ON, pulsewidth = 0.8 microseconds
P2 Pulse: OFF
P3 Pulse: ON, pulsewidth = 0.8 microseconds
P4 Pulse: ON, pulsewidth = 1.6 microseconds, position delta +0.3 microseconds

Configure the EIT station such that the amplitude of the P4 pulse is equal to the P3 pulse.

Step 3. Send the HTS command “**EITST 4 1 1**” to enable ATCRBS and Mode S replies.

Step 4. Setup the UUT for transponder reply processing by sending the HTS command:

“**EITST 1 1 FFFFF 0 2 0**”

Step 5. Verify the SDX-2000 receives ≥90% ATCRBS replies and ≤10% Mode S replies.

4.15.9 Reply Delay and Jitter Tests [Group 29]

4.15.9.1 ATCRBS Top Reply Delay and Jitter Tests

This test verifies that the transponder interrogation reply delay and jitter performance is within specification for ATCRBS interrogation replies on the Top antenna port.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 3. Setup the UUT for interrogation reply processing for ATCRBS Mode C with temperature compensation enabled by sending the “**EITST 1 0 FFFE 0 2 0**” HTS command.

Step 4. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 5. Using the SDX2000, measure and verify the reply delay and jitter measurements.

Step 6. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 7. Using the SDX2000, measure and verify the reply delay and jitter measurements.

Step 8. Verify the results at each power level listed below:

RF Level	-72 dBm	-50 dBm	-24 dBm
Mode A Reply Delay	3.0 ± 0.5 µs	3.0 ± 0.5 µs	3.0 ± 0.5 µs
Mode A Jitter	0.1 ± 0.1 µs	0.1 ± 0.1 µs	0.1 ± 0.1 µs
Mode C Reply Delay	3.0 ± 0.5 µs	3.0 ± 0.5 µs	3.0 ± 0.5 µs
Mode C Jitter	0.1 ± 0.1 µs	0.1 ± 0.1 µs	0.1 ± 0.1 µs
Mode A/C Variation	<0.2 µs	<0.2 µs	<0.2 µs

4.15.9.2 ATCRBS Bottom Reply Delay and Jitter Tests

This test verifies that the transponder interrogation reply delay and jitter performance is within specification for ATCRBS interrogation replies on the Bottom antenna port.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**-**
Bottom	**1030.0 ± 0.1 MHz**

Step 2. Send the HTS command “**EITST 4 1 0**” to enable ATCRBS replies.

Step 3. Setup the UUT for interrogation reply processing for ATCRBS Mode C with temperature compensation enabled by sending the “**EITST 1 1 FFFE 0 2 0**” HTS command.

Step 4. Configure the SDX2000 to send 100 ATCRBS Mode A interrogations per second in a continuous loop.

Step 5. Using the SDX2000, measure and verify the reply delay and jitter measurements.

Step 6. Configure the SDX2000 to send 100 ATCRBS Mode C interrogations per second in a continuous loop.

Step 7. Using the SDX2000, measure and verify the reply delay and jitter measurements.

Step 8. Verify the results at each power level listed below:

RF Level	-72 dBm	-50 dBm	-24 dBm
Mode A Reply Delay	3.0 ± 0.5 µs	3.0 ± 0.5 µs	3.0 ± 0.5 µs
Mode A Jitter	0.1 ± 0.1 µs	0.1 ± 0.1 µs	0.1 ± 0.1 µs
Mode C Reply Delay	3.0 ± 0.5 µs	3.0 ± 0.5 µs	3.0 ± 0.5 µs
Mode C Jitter	0.1 ± 0.1 µs	0.1 ± 0.1 µs	0.1 ± 0.1 µs
Mode A/C Variation	<0.2 µs	<0.2 µs	<0.2 µs

4.15.9.3 Mode S Top Reply Delay and Jitter Tests

This test verifies that the transponder interrogation reply delay and jitter performance is within specification for Mode S interrogation replies on the Top antenna port.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bottom	**-**

Step 2. Send the HTS command "**EITST 4 0 1**" to enable Mode S replies.

Step 3. Setup the UUT for interrogation reply processing for Mode S with temperature compensation enabled by sending the following HTS command:

"**EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**"

Step 4. Configure the SDX2000 to transmit 100 Mode S interrogations per second in a continuous loop.

Step 5. Using the SDX2000, measure and verify the reply delay and jitter measurements.

Step 6. Verify the results at each power level listed below:

RF Level	-72 dBm	-50 dBm	-24 dBm
Mode S Reply Delay	128.0 ± 0.25 µs	128.0 ± 0.25 µs	128.0 ± 0.25 µs
Mode S Jitter	0.08 ± 0.08 µs	0.08 ± 0.08 µs	0.08 ± 0.08 µs

4.15.9.4 Mode S Bottom Reply Delay and Jitter Tests

This test verifies that the transponder interrogation reply delay and jitter performance is within specification for Mode S interrogation replies on the Bottom antenna port.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**-**
Bottom	**1030.0 ± 0.1 MHz**

Step 2. Send the HTS command "**EITST 4 0 1**" to enable Mode S replies.

Step 3. Setup the UUT for interrogation reply processing for Mode S with temperature compensation enabled by sending the following HTS command:

"**EITST 2 1 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**"

Step 4. Configure the SDX2000 to transmit 100 Mode S interrogations per second in a continuous loop.

Step 5. Using the SDX2000, measure and verify the reply delay and jitter measurements.

Step 6. Verify the results at each power level listed below:

RF Level	-72 dBm	-50 dBm	-24 dBm
Mode S Reply Delay	128.0 ± 0.25 µs	128.0 ± 0.25 µs	128.0 ± 0.25 µs
Mode S Jitter	0.08 ± 0.08 µs	0.08 ± 0.08 µs	0.08 ± 0.08 µs

4.15.10 Mode S Sync Phase Reversal (SPR) Position Tests [Group 30]

4.15.10.1 Top Mode S SPR Position Tests

This test verifies that the transponder responds to interrogations on the Top port when the SPR delay is within 0.05 microseconds of the nominal value and that responses are not generated when the SPR delay is greater than 0.2 microseconds of the nominal value.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**1030.0 ± 0.1 MHz**
Bot	**-**

Step 2. Configure the SDX2000 to transmit 100 Mode S interrogations per second.

Step 3. Configure the interrogation as follows:

Value Description
Mode S, Top Antenna
UF=11
Mode S Address = FFFFFF
SPR Timing Deviation values (refer to step 5 below)

Step 4. Send the HTS command “**EITST 4 0 1**” to enable Mode S replies.

Step 5. Setup the UUT for transponder reply processing by sending the HTS command:

“**EITST 2 0 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**”.

This configures the UUT to reply to valid Mode S interrogations.

Step 6. Inject an RF signal at each of the listed input levels and each of the SPR timing deviations. Verify the reply efficiency is as specified in the following:

Deviation (µs)	-71 dBm	-50 dBm	-24 dBm
-0.25	≤1	≤1	≤1
-0.05	≥99	≥99	≥99
0.05	≥99	≥99	≥99
0.25	≤1	≤1	≤1

4.15.10.2 Bottom Mode S SPR Position Tests

This test verifies that the transponder responds to interrogations on the Bot port when the SPR delay is within 0.05 microseconds of the nominal value and that responses are not generated when the SPR delay is greater than 0.2 microseconds of the nominal value.

Step 1. Initially configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency
Top	**-**
Bot	**1030.0 ± 0.1 MHz**

Step 2. Configure the SDX2000 to transmit 100 Mode S interrogations per second.

Step 3. Configure the interrogation as follows:

Value Description
Mode S, Bottom Antenna
UF=11
Mode S Address = FFFFFF
SPR Timing Deviation values (refer to step 5 below)

Step 4. Send the HTS command "**EITST 4 0 1**" to enable Bottom Antenna Mode S replies.

Step 5. Setup the UUT for transponder reply processing by sending the HTS command:

"**EITST 2 1 FFFF FFFF FFFF FFFF FFFF FFFF FFFF 0 0 2 0**".

This configures the UUT to reply to valid Mode S interrogations.

Step 6. Inject an RF signal at each of the listed input levels and each of the SPR timing deviations. Verify the reply efficiency is as specified in the following:

Deviation (µs)	-71 dBm	-50 dBm	-24 dBm
-0.25	≤1	≤1	≤1
-0.05	≥99	≥99	≥99
0.05	≥99	≥99	≥99
0.25	≤1	≤1	≤1

4.15.11 Diversity Tests [Group 31]

This test verifies that the UUT replies on the appropriate port with the correct number of replies based on the characteristics of the received Mode S interrogation signals.

Step 1. Configure the EIT station UUT Rx paths as follows:

Antenna Port	Frequency	RF Level
Top	1030.0 ± 0.1 MHz	See Verification Table in Step 5
Bottom	1030.0 ± 0.1 MHz	See Verification Table in Step 5

Step 2. Configure the SDX2000 to transmit 100 Mode S UF-11 interrogations per second in a continuous loop. For each test number configure the Top and Bottom interrogations as follows:

Test No.	1	2	3	4	5	6	Comments
Delay	100 nsec	100 nsec	100 nsec	100 nsec	400 nsec	400 nsec	Uplink Format 11
	T before B	T before B	B before T	B before T	B before T	T before B	Mode S address FFFFFF SPR delay to mid-range

Step 3. Send the HTS command "**EITST 4 0 1**" to enable Mode S replies.

Step 4. Setup the UUT for transponder reply processing on both antennas by sending the HTS command:

"**EITST 7 F F F F F F F 0 1 2**".

This will configure the UUT to process ATCRBS and Mode S interrogations and reply upon receipt of a valid interrogation.

Step 5. For each RF level listed in the table below, inject an RF signal at the specified input level at the Top and Bottom 0 antenna ports. Inject the RF signals according to the specified delay between the top and bottom ports.

Test No.	1	2	3	4	5	6
Top	-50 dBm	-50 dBm	-50 dBm	-50 dBm	-50 dBm	-69 dBm
Bottom	-46 dBm	-54 dBm	-46 dBm	-54 dBm	-69 dBm	-50 dBm

Step 6. On the SDX2000, read and verify the Mode S %Replies to determine the number of valid Top and Bottom Mode S replies from the UUT that was decoded as follows:

Test No.	1		2		3		4		5		6	
Port	**Bot**	**Top**	**Top**	**Bot**	**Bot**	**Top**	**Top**	**Bot**	**Bot**	**Top**	**Top**	**Bot**
Mfg Limits	≥99	≤1	≥99	≤1	≥99	≤1	≥99	≤1	≥99	≤1	≥99	≤1
Opr Limits	≥90	≤1	≥90	≤1	≥90	≤1	≥90	≤1	≥90	≤1	≥90	≤1

4.16 Data Log Retrieval Tests [Group 32]

Note: Refer to Development Engineering for an alternative verification method.

Nothing is currently implemented in regards to this test because nothing exists in HTS that logs operations or faults.

4.17 Operational Software Version Tests [Group 33]

Note: The Operational Software Version Tests are only completed during Final Test.

Note: Refer to Development Engineering for an alternative verification method.

The following steps will load and verify that the UUT serial number, part number, and mod level are correct and that the UUT programmable devices have the correct operational software versions installed.

Step 1. Obtain the Master Media(s) according to the NXT-800 end item part number and mod level.

Step 2. Load the Master Media(s) on the UUT via the ARINC 600 RS-232 (MP-6J and MP-6K) pins.

Step 3. Read the NXT-800 UUT installed part number, serial number, software numbers, firmware numbers and CRC values (if applicable).

Step 4. For each part or entity in Table 4.17-1, verify that the number and CRC (if applicable) in the configuration file (c:\9008048\common\configfiles\9008000_config.ini) matches the actual values in the UUT.

Step 5. If any of the operational software versions are incorrect, retry loading operational software. If the operational software versions are incorrect two times in a row, discontinue testing. If the software versions are correct, proceed with testing.

Table 4.17-1: Operational Software Version, Mod Level, and Identification Tests

Part or Entity Number	Check Number	Check CRC
LRU Serial Number	Yes	N/A
LRU Part Number	Yes	N/A
Boot	Yes	Yes
XIC FPGA	Yes	Yes
Data Loader Image 1	Yes	Yes
Data Loader Image 2	Yes	Yes
Operational Software	Yes	Yes

4.18 Final Fault Log Tests [Group 34] (Not Implemented)

Notes: 1 - The Final Fault Log Tests are only completed during FinalConfig.
2 - Refer to Development Engineering for an alternative verification method.
3 - Currently the Fault Log file is captured to the C:\9008049\Downloads directory for analysis as needed.

The UUT performs Built in Test Equipment (BITE) tests following power being applied to the unit. Results of BITE tests are stored in Maintenance Memory fault logs, which can be read and verified to determine successful UUT operation. The following steps will verify no unexpected faults were logged in Maintenance Memory and BITE memory will be cleared.

Step 1. If the UUT has input power applied, remove the input power before continuing.

Step 2. Set the following initial aircraft conditions:

a. Air/Ground discretes #1 and #2 (TP-5K and TP-5J) to Ground.

b. Standby/On Discrete (TP-7G) to Ground.

Step 3. Connect the DC power supply positive output (+) to UUT pin BP-10. Connect the DC power supply negative output (-) to UUT pin BP-3.

Step 4. Set the DC power supply to +28.0 Vdc (±0.25 Vdc) and apply power to the UUT.

Step 5. Capture the BOOT messages from the ARINC 600 RS-232 (MP-7A and MP-7B) pins.

Step 6. Query the Maintenance Memory fault for BITE data with WebEddit.

Step 7. Verify no unexpected faults were logged.

Step 8. Command the NXT-800 UUT to clear Maintenance Memory of all BITE data with WebEddit.

Note: After clearing Maintenance Memory, an expected UUT power reset will occur.

Step 9. Verify BITE memory has been cleared.

Step 10. Remove input power to the UUT.

A NXT-800 SOFTWARE/FIRMWARE LOADING PROCEDURE

A.1 Introduction

The NXT-800 XIC FPGA and Processor FLASH memory must be Configured/Programmed with several baseline operational images before application software can be installed and executed on the NXT-800 UUT.

Refer to the current revision of TI8009112-001, Instructions for Loading Engineering Flash/FPGA files on NXT TPA CCAs, for procedures to configure the XIC FPGA operational firmware and program the processor FLASH memory images via the NXT CPA CCA Multi-Core, Single Scan Chain using a NXT CPA CCA Test fixture, and Corelis JTAG hardware and software. The images can also be loaded using an In-circuit Emulator.

Refer to the configuration file, 9008000_Config.ini, current revision of part number 9008047-001, to obtain the NXT-800 Initial Configuration Test Software and HTS Image(s) that are to be loaded onto the NXT-800 TPA CCA prior to operation on the Environmental Stress Screening Test Station.

B NXT TEST REPORT REQUIREMENTS

B.1 Introduction

This appendix defines the minimum requirements for the functional report produced by the 9008049-001 test software.

B.2 File Format

The test report shall consist of an HTML file which relies on the following formatting files in order to parse and display the data:

- TR5_Horizontal.xsl (*ATML Stylesheet)*
- minus.png (*Minus sign image for reducing display level)*
- plus.png (*Plus sign image for increasing display level)*

Note: These files must reside in the report file directory to view the report files correctly.

B.3 File Name

The filename shall uniquely identify the report file. Newer test reports shall not overwrite older test reports. The filename shall be constructed using the following format:

9008000-10_*UUTSerialNumber_TestType_Profile_CalInfo*_Slot_[*Date*][*Time*]_*Status*.xml

where:	*TestType* is	**PreTest**	*(Preliminary End Item Test, including Room Temp Calibration)*
		ESS	*(Environmental Stress Screening Test, including Hot and Cold Calibration)*
		FinalTest	*(Final End Item Test, No Calibration Performed)*
		FULL	*(Full ESS Test, including Room Temp Calibration and test)*
		FinalConfig	*(Change SN, Load Ops SW, and Verify)*
	Profile is	**NONE, LONG, SHORT**	
	CalInfo is	**Cal, CalOnly, NoCal**	
	Slot is	**Slot1, Slot2, Slot3**	
	Status is	**Passed, Failed, or Terminated**	

For example:

9008000-10_NXH00059_ESS_LONG_Cal_Slot3[6 18 2014][7 00 39 AM]_Error.xml
9008000-10_NXH00060_PreTest_NONE_Cal_Slot1[6 17 2014][2 37 52 PM]_Passed.xml

Report files shall be saved locally in the following folder:

C:\\9008049\Data

Report files shall be moved and stored to a periodically backed up network drive when testing and evaluation is complete.

B.4 File Contents

Each report file shall consist of 2 main portions: a summary report and a detailed report of each test executed.

B.4.1 Test Report

The test report shall include all data necessary to document the test execution and results.

The test report shall include a report header, a list of the calibrated test equipment with calibration dates, verification of UUT part number and serial number, a verification of the software part numbers installed on the UUT, a complete dump of the UUTs current calibration data, and a list of the tests executed with detailed result of the pass/fail status.

B.4.1.1 Report Header

The 9008049 test software shall generate a header for the report file containing the following information:

UUT Part Number	9008000-10
UUT Serial Number	NXH00060
TestType_Profile_CalType	PreTest_NONE_Cal
UUT Result	Passed
Date	Tuesday, June 17, 2014
Time	2:37:52 PM
Test SW	9008049-001 Rev D
ATP Revision	8010114-001 Rev B
Station ID	626N5F1
ESS Slot Number	1
Operator	1
Execution Time	00:03:28
Number of Results	56

B.4.1.2 Failure Chain

The 9008049 test software shall generate a failure chain for the report file containing the following information:

- Test name for first point of failure
- Test Sequence where failure occurred

The following is presented as an example, not a strict model for compliance:

Failure Chain		
Step	**Sequence**	**Sequence File**
Verify Boot Version	MainSequence	G1__SoftwareVersionTests.seq
Group 1 : Software Version Tests	MainSequence	9008049.seq

B.4.1.3 Calibrated Equipment List *(Not Implemented)*

The 9008049 test software shall generate a list of the calibrated equipment on the test station. The equipment list shall include the equipment serial number along with the most recent calibration date and next required calibration date.

Model No.	Serial No	Manufacturer	Last Cal	Next Cal
SDX2000	L1993	Aeroflex	11/15/2013	12/15/2014
PXI-5600	123456123	NI	03/01/2014	03/01/2015
PXI-5142	66771	NI	01/01/2014	01/01/2015
N1911A	SER223	Agilent	07/07/2013	07/07/2014
34970A	A117733	Agilent	05/04/2013	05/04/2014
PXI-5650	N119957	NI	02/01/2014	02/01/2015
PXI-5650	N123321	NI	08/07/2013	08/07/2014
PXI-4110	P772234	NI	01/01/2014	01/01/2015

B.4.1.4 UUT Identification Verification

The 9008049 test software shall verify the programmed UUT information (part number and serial number) against the operator entered data.

The following is presented as an example, not a strict model for compliance:

Step	Status	Measurement	Units	Limits		
				Low Limit	High Limit	Comparison Type
Verify Part Number	Passed	F9006000-55		F9006000-55		IgnoreCase
Verify Serial Number	Passed	NXE00009		NXE00009		IgnoreCase

B.4.1.5 UUT Calibration Data

The 9008049 test software shall output the current calibration data from the UUT for inclusion in the test report.

The following is presented as an example, not a strict model for compliance:

Step	Status	Measurement	Units	Limits		
				Low Limit	High Limit	Comparison Type
Get Cal Data	Passed					
TestResults/Data						
sResp:	\r XPDR Type: 66\r RF fwd power strike counter: 19\r RF fwd power pass counter: 01\r RF power isolation strike counter: 19\r RF data validity strike counter: 19\r RF data validity pass counter: 05\r RCVR Mode S loopback strike counter: 19\r RCVR Mode S loopback pass counter: 01\r RCVR ATCRBS loopback strike counter: 19\r RCVR ATCRBS loopback pass counter: 01\r RF fwd power isolation pass counter: 01\r Synthesizer Lock strike counter: 03\r Synthesizer Lock pass counter: 01\r Transmitter isolation tolerance: 0000\r RF fwd power delta tolerance: 00FF\r Transmitter Cal Temperature: 44.\r Receiver Cal Temperature: 44.\r Top Bot\r Forward Power Target: 3339 3325\r Attenuator Setting: 404 408\r MAX Attenuator Setting Hot: 0 0\r MAX Attenuator Setting Cold: 0 0\r Fwd Power Sensor Temp Adj HOT: 0 0\r Fwd Power Sensor Temp Adj COLD: 0 0\r PLL Calibration - R: 00100095\r PLL Calibration - N: 0020AF02\r PLL Calibration - C: 00025920\r XPDR-In MTL Offset Register: 908B\r XPDR-In MTL Temperature Slope HOT: 0 0\r XPDR-In MTL Temperature Slope COLD: 0 0\r XPDR-In DMTL Compression Offset: 0F00\r XPDR-In SPR Window Delay: 0024\r XPDR-In Pulse Width/SPR Window Width: 0006\r XPDR-In Min/Max Slope: 0707\r XPDR-In DMTL Decay / DMTL Offset: 0911\r XPDR-In MTL / DMTL Hold: 3651\r XPDR-In ATCRBS Reply Rate Limit: 4137\r XPDR-In DMTL Threshold: E0E0\r XPDR-In Spurious ATCRBS: 0D0A\r ATCRBS reply delay: 000D\r All Call reply delay: 0099\r Mode S reply delay: 00BC\r P3-P4 Compression offset: 0000\r XPDR-In Test Top 1030 Rx Cal: 008A\r XPDR-In Test Bot 1030 Rx Cal: 008A\r XPDR-In Test 1030 Rx Tolerance: 0023\r XPDR-In Test 1030 Tr Attenuator: 0000\r XPDR-In Test 1030 Pin Attenuator: 0034\r XPDR-In Test 1030 Tx Dac Attenuator: 0000\r Antenna Voltage Threshold: 0900\r Jitter Adjust Offset: 0000\r XPDR-Out Test 1090 Fp Tolerance: 0000\r XPDR-Out VCTCXO Bias: 0\r XPDR-Out 4 Watt Bias: 2712\r XPDR-Out 25 Watt Bias: 1502\r XPDR-Out Final A Bias: 1237\r XPDR-Out Final B Bias: 1488\r Hot Cold\r XPDR-Out VCTCXO Bias Slope: 0 0\r XPDR-Out 4 Watt Bias Slope: 0 0\r XPDR-Out 25 Watt Bias Slope: 0 0\r XPDR-Out Final A Bias Slope: 0 0\r XPDR-Out Final B Bias Slope: 0 0\r XPDR-Out VCTCXO Feedback 0\r XPDR-Out 4 Watt Feedback: 587\r XPDR-Out 25 Watt Feedback: 592\r XPDR-Out Final A Feedback: 1718\r XPDR-Out Final B Feedback: 1753\r \r CRC = F789A382\r size = 00000100\r \r \r HTS					

B.4.1.6 Software Part Number/CRC Verification

The 9008049 test software shall output the current software part number and associated CRC and verify the results against the current released configuration and include the pass/fail status in the test report.

The following is presented as an example, not a strict model for compliance:

Step	Status	Measurement	Units	Limits		
				Low Limit	High Limit	Comparison Type
Verify Boot Version	Passed	RL96001-008		RL96001-008		IgnoreCase
Verify Boot CRC	Passed	AB560D49		AB560D49		IgnoreCase
Verify XIC FPGA Image 1 Part Number	Passed	RL9008060-004		RL9008060-004		IgnoreCase
Verify XIC FPGA Image 1 CRC	Passed	0ADCC177		0ADCC177		IgnoreCase
Verify Data Loader 1 Part Number	Passed	RL96003-007		RL96003-007		IgnoreCase
Verify Data Loader 1 CRC	Passed	81FB7229		81FB7229		IgnoreCase
Verify Data Loader 2 Version	Passed	RL96003-007		RL96003-007		IgnoreCase
Verify Data Loader 2 CRC	Passed	81FB7229		81FB7229		IgnoreCase
Verify HTS Part Number	Passed	RL96004-001		RL96004-001		IgnoreCase
Verify HTS CRC	Passed	43D44EBE		43D44EBE		IgnoreCase

B.4.2 Detailed Test Results

The Detailed Test Results included in the report shall consist of a sequential listing of all tests performed. The format of each test will depend on the nature of the test and the specific format of the individual test result is not specified here. The following information shall be present in the individual test result for all rests, irrespective of its actual format.

Test Number
Descriptive test name
Overall test result
Upper test limit, if one exists
Lower test limit, if one exists
Equality or string comparison limit, if one exists
Test comparison type
Actual measurement or test result

The following is presented as an example, not a strict model for compliance:

Step	Status	Measurement	Units	Limits		
				Low Limit	High Limit	Comparison Type
Verify UUT Input Power (LOW DCV)	Passed	31.27	W	25.00	35.00	GELE(>= <=)
Verify +70V Power Supply	Passed	71.114	Vdc	59.500	80.500	GELE(>= <=)
Verify UUT Input Power (HI DCV)	Passed	34.23	W	25.00	35.00	GELE(>= <=)
Verify +70V Power Supply	Passed	71.022	Vdc	59.500	80.500	GELE(>= <=)

C NXT OPERATIONAL SOFTWARE AND FIRMWARE REQUIREMENTS

The NXT EIT **shall** be capable of loading and verifying Operational Software and Firmware.

The results of loading and verifying Operational Software and Firmware **shall** be recorded in a separate test report.

Note: Table C-1 shows an example of hardware, Operational Software and Firmware to be loaded and the corresponding numbers and CRCs to be verified.

Table C-1: Operational Software and Firmware Verification Example

Description	Number	CRC
LRU Part Number	Yes	N/A
LRU Serial Number	Yes	N/A
Application Software	Yes	Yes
Operational Software	Yes	Yes
Boot Software	Yes	Yes
Dataloader Software (Copy 1)	Yes	Yes
Dataloader Software (Copy 2)	Yes	Yes
XIC FPGA	Yes	Yes

D NXT TEST GRAPHICAL USER INTERFACE (GUI)

D.1 Introduction

The Graphical User Interface (GUI) interface used for the NXT EIT and ESS test station serves the purpose of loading and running a test sequence file with operator selected options.

Note: The operator interface is a derivative of the standard, Full-Featured CVI TestExec user interface supplied by National Instruments.

D.2 Requirements

The GUI **shall** invoke National Instruments TestStand.

Note: National Instruments TestStand will be referred to as TestStand from herein.

The GUI **shall** allow the operator to select one of the following options:

- Calibrate the UUT (Calibrate UUT)
- Test the UUT (Test UUT)

Note: The UUT test sequence file name is 9008049.seq. The UUT calibration sequence file name is NXTCal_Room.seq.

The EIT station calibration is performed manually.

The GUI **shall** run the selected sequence file using a selected entry point.

Note: A "Single Pass" or "Test UUTs" are examples of a selected entry point.

If the operator selects Test UUT, the GUI **shall** provide a means for the operator to select the limits (Manufacturing or Field, see the figure for the dialog box).

If the operator selects Test UUT, the test software **shall** provide a means for the operator to select the test type (PreEIT, FinalEIT, ESS, Full Test, or FinalConfig, see the figure for the dialog box).

Prior to main sequence test execution, the test software **shall** obtain the following UUT data and test information through a barcode reader or manual entry by the operator:

- UUT Serial Number
- UUT Base Part Number and Dash Number
- Employee ID (technician name or number)

A display **shall** show the UUT Serial Number and UUT Base Part Number.

If the UUT data and test information has not been entered, the test software **shall** prohibit any test execution.

The GUI **shall** show the current sequence execution.

The GUI **shall** provide the current UUT pass/fail status.

The GUI **shall** provide a help menu.

The following screen shots will demonstrate how the above requirements are captured.

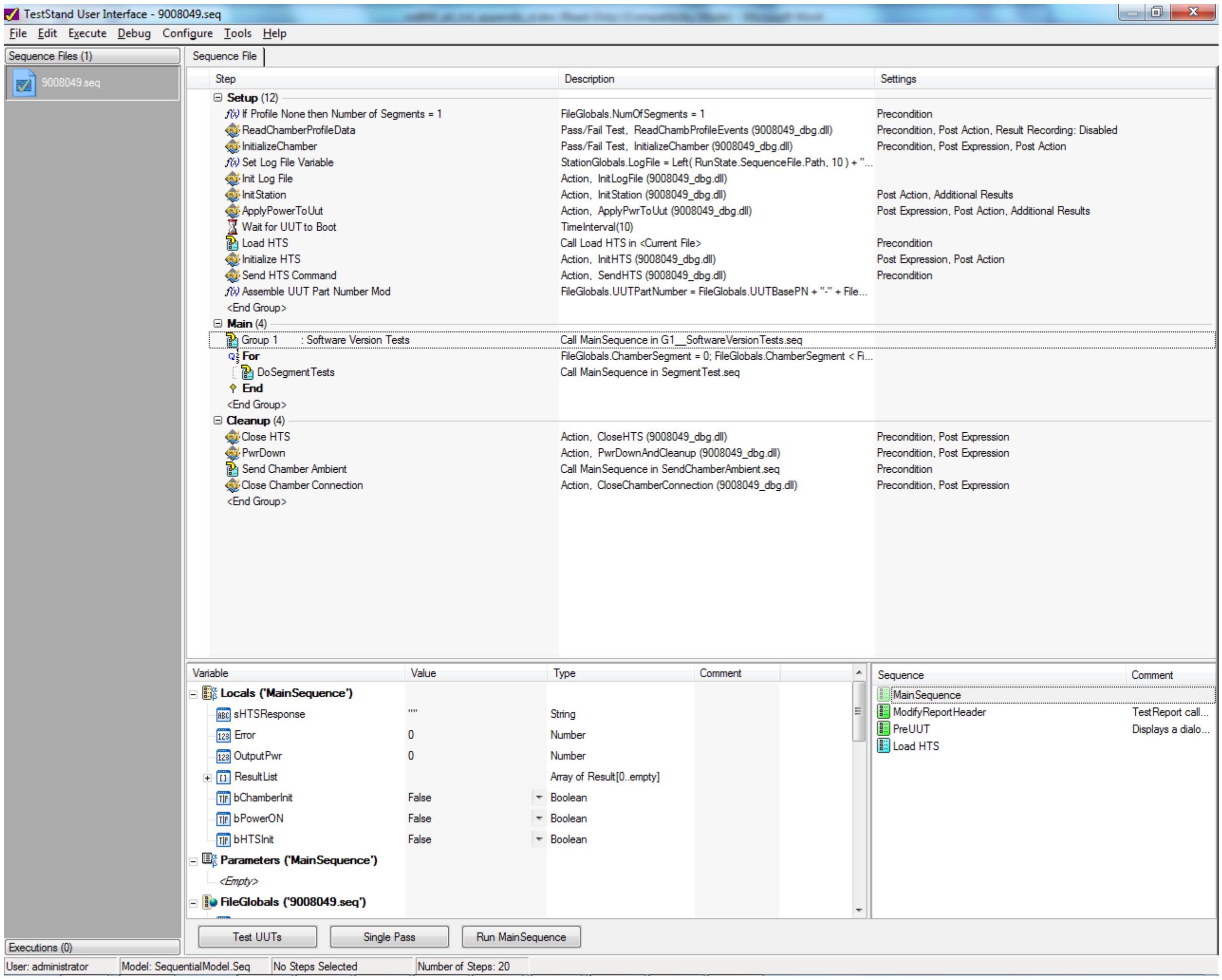

Figure D-1: ESS\EIT Test Executive GUI

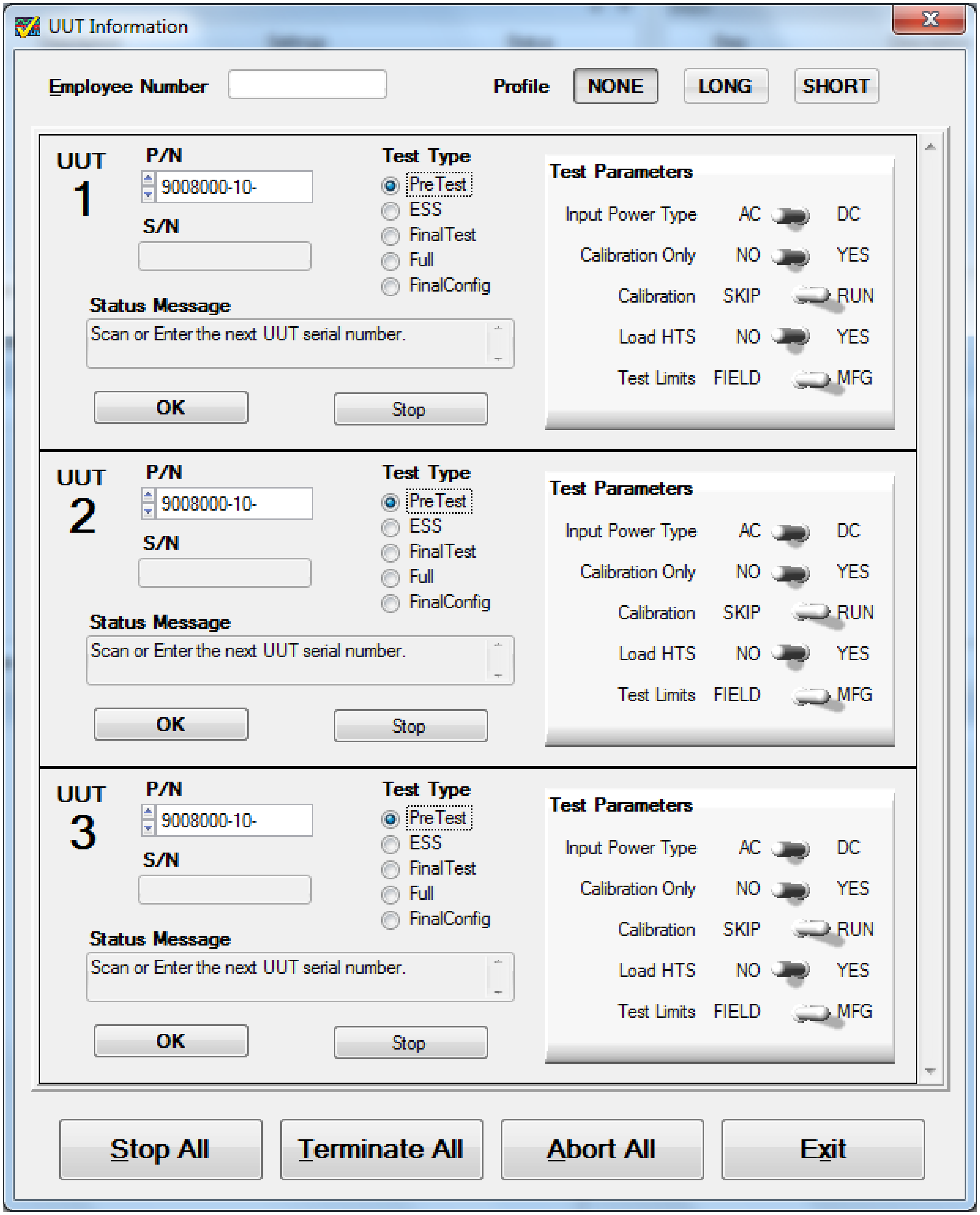

Figure D-2: ESS\EIT UUT Information GUI (Initialized)

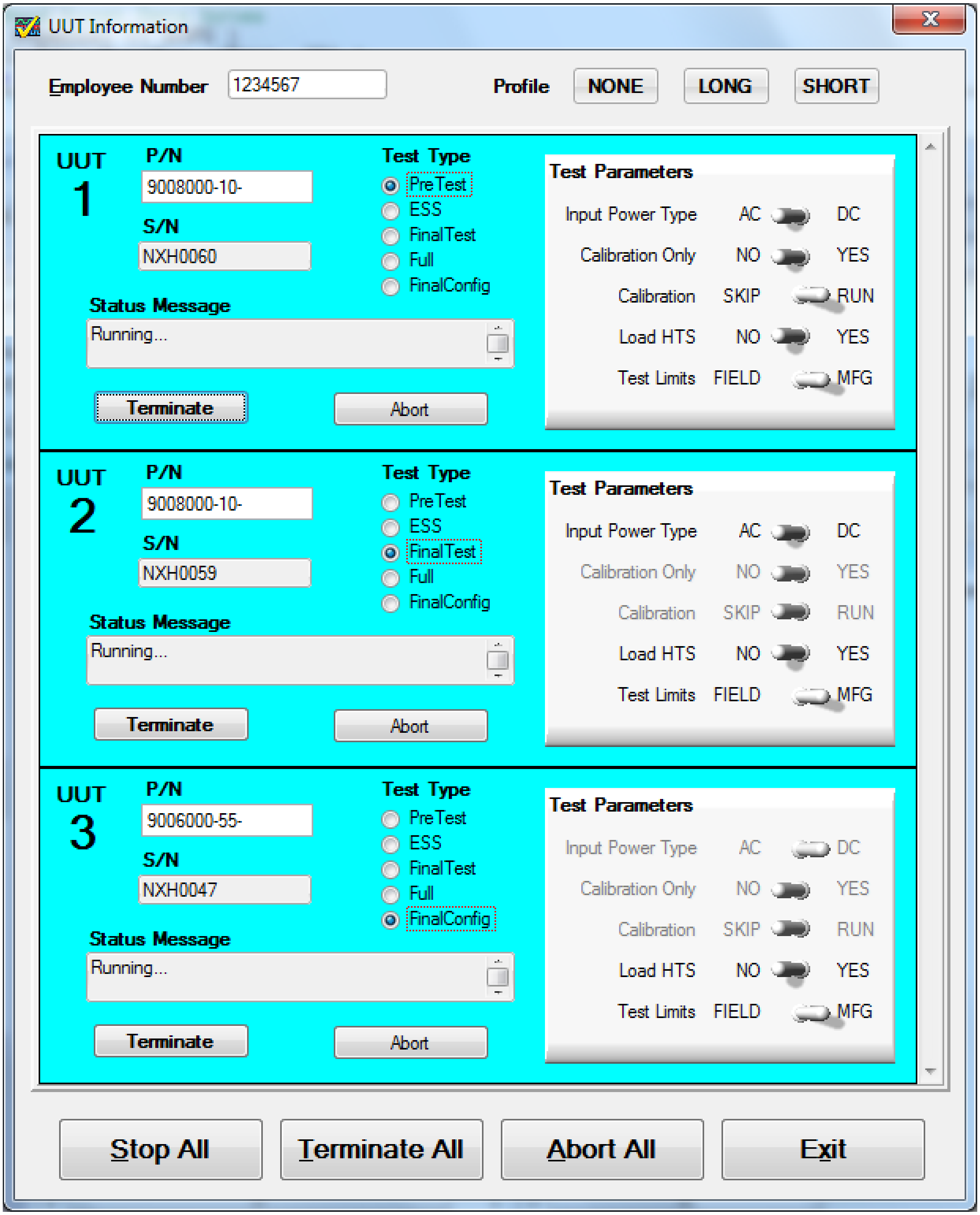

Figure D-3: ESS\EIT UUT Information GUI (Running Tests)

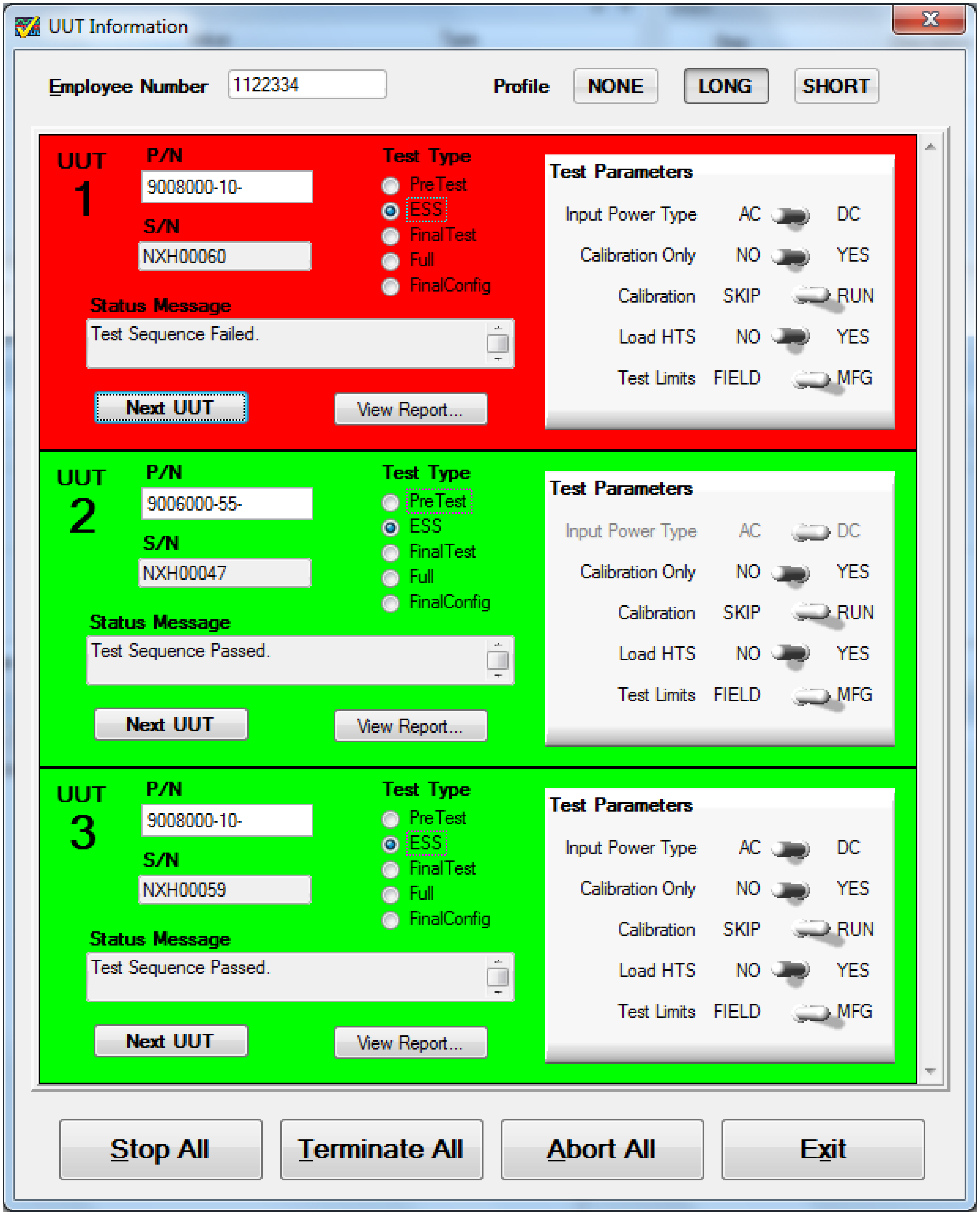

Figure D-4: ESS\EIT UUT Information GUI (Tests Complete)

E NXT TRANSPONDER CALIBRATION

E.1 Introduction

The NXT-600 and NXT-800 must be calibrated at Room temperature to ensure the Current Bias Levels, Output RF Levels, and Minimum Trigger Levels (MTLs) for both Top and Bottom antenna transmit and receive characteristics are within specification limits. These Line Replaceable Units (LRUs) also must be calibrated at Hot and Cold temperatures to evaluate and store the Current Bias, Forward Power Target, and MTL Temperature slopes. The temperature slope calibration is used to adjust the characteristics of the LRU as operating/environmental temperatures change and ensures the unit maintains the specified performance over temperature.

This document details the steps involved in calibrating the Unit Under Test (UUT). The Room Temperature Calibration is generally performed as part of the Pre End Item Test (EIT), since the UUT cannot be expected to pass the Acceptance Test Procedure (ATP) without it. The Cold and Hot calibration is performed during the first two cycles of the Long or Short Environmental Stress Screening (ESS) test of the UUT. The calibration steps are fully automated and integrated with the ESS Test SW, however the calibration steps can also be run stand-alone using the following test sequences after "soaking" the unit at the specified temperature long enough to establish a stable operating temperature, or manually using the steps detailed in this document.

- *C:\9008049\Test\Sequences\NXTCal_Room.seq* *(Room Temp)*
- *C:\9008049\Test\Sequences\NXTCal_Cold.seq* *(Cold Temp)*
- *C:\9008049\Test\Sequences\NXTCal_Hot.seq* *(Hot Temp)*

The following procedure references an Excel Spreadsheet which can be found at:

C:\9008049\ NXT_Temperature_Slope_Calculator.xlsx

This spreadsheet contains the data collection and algorithms necessary to manually determine the calibration settings and actual HTS commands to send to the UUT to store and save the calibration on the unit.

E.2 Setting the Default Calibration Data

Ensure that HTS is loaded and that an RS232 connection is available. Open up TeraTerm or similar terminal emulation application. These descriptions are written for TeraTerm.

1) Select the **Setup->Terminal...** menu item and ensure the "**Local Echo**" checkbox is selected.
2) Press **OK**.
3) Select the **Setup->Serial port..** menu and set the parameters as follows:

```
Connection       : Set to the appropriate Comm port
                   (COM3 for EIT Station, COM3, COM4, or COM5 on ESS
                   Station based on UUT1, UUT2, or UUT3)
Bits per second : 115200
Data bits       : 8
Parity          : None
Stop bits       : 1
Flow Control    : None
```

4) Press **OK** to save all of your settings

   To ensure your setup is working correctly you can hit the "**Enter**" key and verify you see the following.

   HTS>

5) Load the default calibration data:

   NOTE: Default Calibration Data is loaded to the appropriate directories by the NXT Transponder Calibration Defaults CD, Part Number 9001936-001.

   a) Select the **Control->Macro** menu item.
   b) Navigate to the correct Macro Directory for the unit under test and select the default calibration macro:

      NXT-600
      C:\9008049\Macros\NXT600_CAL_Default.ttl *(Room Temp)*

      NXT-800
      C:\9008049\Macros\NXT800_CAL_Default.ttl *(Room Temp)*

      NXT-600 or NXT-800 Temperature Calibration
      C:\9008049\Macros\NXT_Hot_CAL_Default.ttl *(Hot Temp)*
      C:\9008049\Macros\NXT_Cold_CAL_Default.ttl *(Cold Temp)*

   c) Press **OK** to load the calibration defaults. TeraTerm will close when the load is finished. Restart TeraTerm to finish the calibration.

E.3 Room Temperature Calibration

Prior to calibrating at room temperature ensure that the transponders internal temperature has stabilized (less than 0.5°C change over a 1 minute interval). You can verify this by running the HTS command **INTVOLT** and examining the output. Once the temperature has stabilized, begin calibration.

Note: The temperature will stabilize at ~40° C in a chamber set for 22° C.

E.3.1 Biasing the Power Amplifiers (ROOM)

From HTS do the following:

1) Run the HTS Command **SETBIAS**.
2) Following the HTS instructions bias the amplifiers as specified in the following table.

Power Amplifier Stage	Bias Current	NOTES
4 W Stage	50 ± 2.5 mA	Starts drawing current around ~2400
25 W Stage	50 ± 2.5 mA	Starts drawing current around ~1200
500 W Stage A	150 ± 5 mA	Starts drawing current around ~1200
500 W Stage B	150 ± 5 mA	Starts drawing current around ~1200

3) Hit the space bar to save your adjustments and enter them into the *NXT_Temperature_Slope_Calculator.xlsx* spreadsheet
4) Run the HTS Command **SAVECAL** to save the calibration values

E.3.2 Calibrating the Transmitter (ROOM)

Once the default calibration data is populated and the power amplifiers are biased you can calibrate the transmitter using the following procedure starting with the Top antenna.

SDX2000 TXCAL Setup:

Setup the SDX2000 as follows:

Measured Pulse	: P1
PRF	: 00
Gen Frequency	: 1030 MHz
Gen Power	: -110.0 dBm
Power Measurement	: dBm

Top Antenna:

1) Setup the SDX as described in "*SDX2000 TXCAL Setup*".
2) Connect the Top and Bottom antennas to the SDX2000 inputs for RF I/O and Mode S Bottom respectively.
3) Run the HTS Command: **TXCAL 1 0**.
4) Following the HTS prompts adjust the DAC attenuation so that the P1 pulse meets the characteristics in the Pulse Characteristics Table.

   Note: Be sure to add the cable loss to the Pulse Power Measurement.

Pulse Characteristics	Range
Pulse Power	57.0 – 58.0 dBm (Hot: 56.2 – 57.2 dBm)
Width	500 ± 35ns
Rise Time	55 – 90 ns
Top Ripple	< .5 dB
Fall Time	55 – 185 ns

5) Hit the space bar to save your adjustments and enter the Top Forward Power Target into the *NXT_Temperature_Slope_Calculator.xlsx* spreadsheet.
6) Run the HTS Command: **SAVECAL**.

Bottom Antenna:

1) Setup the SDX as described in "*SDX2000 TXCAL Setup*".
2) Connect the Top and Bottom antennas to the SDX2000 inputs for Mode S Bottom an RF I/O respectively.
3) Run the HTS Command: **TXCAL 1 1**.
4) Following the HTS prompts adjust the DAC attenuation so that the P1 pulse meets the characteristics in the Pulse Characteristics Table.
5) Hit the space bar to save your adjustments and enter the Bottom Forward Power Target into the *NXT_Temperature_Slope_Calculator.xlsx* spreadsheet.
6) Run the HTS Command: **SAVECAL**.

E.3.3 Calibrating the Receiver (ROOM)

Once the default calibration data is populated, the power amplifiers are biased, and the transmitter is calibrated you can calibrate the receivers using the following procedure.

Note: The Receiver should be calibrated using Mode S Interrogations because the ATCRBS MTL is lower than that of Mode S Interrogations as controlled by default calibration data.

SDX2000 RXCAL Setup:

1) The MTL should be -76 dBm at the back of the box. Determine the cable loss from the unit to the SDX and add it to -76 dBm to come up with the power level for the appropriate interrogation.
2) Set the PRF/Interrogations per second to 100.
3) Once the interrogators power level is set, set it up for Mode S interrogations with the following properties:
    a. UF=11, DATA=0’s, ADDRESS=0xFFFFFF
4) Ensure the top antenna is connected to the RF I/O input of the SDX and that the bottom antenna is connected to the Bottom Mode S input port.

Top Antenna:

1) Setup the SDX as described in “*SDX RXCAL Setup”.*
2) Run the HTS command: **RXCAL 1 0**.
3) Monitoring the SDX follow the prompts on HTS to adjust the MTL Offset so that the average reply percentage, for 10 successive measurements, is greater than 91% and less than 94% with no single measurement less than 86%.
4) On the SDX decrease the interrogation power level by 3dB and verify that the average reply percentage is less than 10% for 10 successive measurements.
5) Hit the space bar to save your adjustments and enter them into the *NXT_Temperature_Slope_Calculator_rev_xxx.xlsx spreadsheet*.

    Note: Only the last two characters are used. If HTS shows FF94 use 94 in the spreadsheet

6) Run the HTS Command: **SAVECAL**.

Bottom Antenna:

1) Setup the SDX as described in “*SDX RXCAL Setup”, except* switch the Top and Bottom antenna connections on the SDX2000.
2) Run the HTS command: **RXCAL 1 1**.
3) Monitoring the SDX follow the prompts on HTS to adjust the MTL Offset so that the average reply percentage, for 10 successive measurements, is greater than 91% and less than 94% with no single measurement less than 86%.
4) On the SDX decrease the interrogation power level by 3dB and verify that the average reply percentage is less than 10% for 10 successive measurements.
5) Hit the space bar to save your adjustments and enter them into the *NXT_Temperature_Slope_Calculator_rev_xxx.xlsx* spreadsheet.

    Note: Only the last two characters are used. If HTS shows FF94 use 94 in the spreadsheet

6) Run the HTS Command: **SAVECAL**.

E.3.4 Set Calibration Temperature (ROOM)

1) Run the HTS command **INTVOLT**.
2) Enter the value into the *NXT_Temperature_Slope_Calculator_rev_xxx.xlsx* spreadsheet

3) Store the result in the Calibration Temperature Register using the HTS command **WRITECAL 4E xxxx xxxx** where xxxx represents the hexadecimal conversion of the temperature result in decimal. The converted value is located in "Setting" section of the *NXT_Temperature_Slope_Calculator_rev_xxx.xlsx* spreadsheet.
4) Run the HTS command: **SAVECAL**.

E.3.5 Saving Calibration Data (ROOM)

1) Save the *NXT_Temperature_Slope_Calculator_rev_xxx.xlsx* spreadsheet to the ESS data directory using the following naming convention:

   C:\9008049\Data/NXT_Temp_Slope_Calculator_*serialNum_[mmddyyy][hhmm].*xlsx

2) In TeraTerm, select the **File->Log…** menu item.
3) Assign a file name based on unit serial number, date, time, and initial state in the ESS data directory using the following naming convention:

   C:\9008049\Data*serialNum*_Cal_Room_[*mmddyyy][hhmm].*txt

4) Run HTS command **PRNCAL**.
5) Exit TeraTerm.

E.4 Getting the Cold Temperature Slopes

Prior to calibrating at cold (-40°C) ensure that the transponders internal temperature has stabilized. You can verify this by running the HTS command **INTVOLT** multiple times and examining the output. Once the temperature has stabilized enter it into the same *NXT_Temp_Slope_Calculator.xlsx* spreadsheet used for the Room temperature calibration.

Note: The temperature will stabilize at ~ -30° C in a chamber set for -40° C.

E.4.1 Biasing the Power Amplifiers (COLD)

From HTS do the following:

1) Run the HTS Command **SETBIAS**.
2) Following the HTS instructions bias the amplifiers as specified in the following table.

Power Amplifier Stage	Bias Current	NOTES
4 W Stage	50 ± 2.5 mA	Starts drawing current around ~2400
25 W Stage	50 ± 2.5 mA	Starts drawing current around ~1200
500 W Stage A	150 ± 5 mA	Starts drawing current around ~1200
500 W Stage B	150 ± 5 mA	Starts drawing current around ~1200

3) Hit the space bar to save your adjustments and enter them into the *NXT_Temp_Slope_Calculator.xlsx* spreadsheet.
4) Do **NOT** save the calibration, i.e., do **NOT** run **SAVECAL**.

E.4.2 Calibrating the Transmitter (COLD)

Follow the steps in **Calibrating the Transmitter (ROOM)**, but do **NOT** save the calibration data, i.e. run the **SAVECAL** command. This would overwrite room calibration data and calibration would have to be restarted.

E.4.3 Calibrating the Receiver (COLD)

Follow the steps in **Calibrating the Receiver (ROOM)**, but do **NOT** save the calibration data, i.e. run the **SAVECAL** command. This would overwrite room calibration data and calibration would have to be restarted.

E.4.4 Saving Calibration Data (COLD)

1) Save the changes to the *NXT_Temp_Slope_Calculator.xlsx* spreadsheet.
2) In TeraTerm, select the **File->Log…** menu item.
3) Assign a file name based on unit serial number, date, time, and initial state in the ESS data directory using the following naming convention:

   C:\9008049\Data*serialNum*_Cal_Cold_[*mmddyyy][hhmm]*.txt

4) Run HTS command **PRNCAL**.
5) Exit TeraTerm.

E.4.5 Writing the Temperature Slopes (COLD)

1) Power cycle the UUT.
2) Run the HTS Command: **PRNCAL**.
3) Verify that the calibration data shown matches that stored off in the step **Saving Calibration Data (ROOM)** above. If it does not correct it by sending the appropriate HTS commands.
4) Copy the values from the “Setting HTS Command” portion of the *NXT_Temp_Slope_Calculator.xlsx* spreadsheet and paste them into TeraTerm.
5) Run the HTS Command: **SAVECAL**.

E.5 Getting the Hot Temperature Slopes

Prior to calibrating at hot (+70°C) ensure that the transponders internal temperature has stabilized. You can verify this by running the HTS command **INTVOLT** multiple times and examining the output. Once the temperature has stabilized enter it into the saved *NXT_Temp_Slope_Calculator.xlsx* spreadsheet use for room and cold temperature calibration.

Note: The temperature will stabilize at ~80° C in a chamber set for 70° C*.*

E.5.1 Biasing the Power Amplifiers (HOT)

Do **NOT** modify the bias voltage at hot.

E.5.2 Calibrating the Transmitter (HOT)

Follow the steps in **Calibrating the Transmitter (ROOM)**, but do **NOT** save the calibration data, i.e. run the **SAVECAL** command. This would overwrite room calibration data and calibration would have to be restarted. The minimum Output Power Limit is reduced from 57.0dBm to 56.2dBm for Hot Calibration.

E.5.3 Calibrating the Receiver (HOT)

Follow the steps in **Calibrating the Receiver (ROOM)**, but do **NOT** save the calibration data, i.e. run the **SAVECAL** command. This would overwrite room calibration data and calibration would have to be restarted.

E.5.4 Saving Calibration Data (HOT)

1) Save the changes to the *NXT_Temp_Slope_Calculator.xlsx* spreadsheet.
2) In TeraTerm, select the **File->Log…** menu item.
3) Assign a file name based on unit serial number, date, time, and initial state in the ESS data directory using the following naming convention:

   C:\9008049\Data*serialNum*_Cal_Hot_[*mmddyyy][hhmm]*.txt

4) Run HTS command **PRNCAL**.
5) Exit TeraTerm.

E.5.5 Writing the Temperature Slopes (HOT)

1) Power cycle the UUT.
2) Run the HTS Command: **PRNCAL**.
3) Verify that the calibration data shown matches that stored off in the step **Saving Calibration Data (Cold)** above. If it does not correct it by sending the appropriate HTS commands.
4) Copy the values from the “Setting HTS Command” section of the *NXT_Temp_Slope_Calculator.xlsx* spreadsheet and paste them into TeraTerm.
5) Run the HTS Command: **SAVECAL**.

END OF DOCUMENT