

**Report 11137
4 May 1998**

**Integrated
Advanced Microwave Sounding Unit-A (AMSU-A)
METSAT A1 Signal Processor Engineering Test Report
(P/N: 1331670-2, S/N: F01)**

**Contract No. NAS 5-32314
CDRL 207**

Submitted to:

**National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771**

Submitted by:

**Aerojet
1100 West Hollyvale Street
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1.0 Introduction

This report presents a description of the tests performed, and the test data, for the A1 METSAT Signal Processor Assembly PN: 1331670-2, S/N F01. The assembly was tested in accordance with AE-26754, "METSAT Signal Processor Scan Drive Test and Integration Procedure".

The tests were conducted at room temperature in the AMSU-A test area of building 57. The tests fall into six categories: 1) Continuity, 2) Power Distribution, 3) Digital Processor, 4) Analog Processor, 5) Scan Drive, and 6) Supply Current.

2.0 Objective

The objective is to demonstrate functionality of the signal processor prior to instrument integration.

3.0 Test Data

All test data is presented on the enclosed copies of the test data sheets (TDSs) numbered A-2 through A-14. Redlines to the data sheets were necessary and were accomplished in accordance with program directive No. 91. Each change was approved by Quality and the test engineer. Changes were made for the following reasons: 1) Notes were added to verify the test equipment and/or test setup was correct, 2) Command instructions were clarified to remove any ambiguity in the instructions, and 3) Added and/or removed steps to improve the test flow.

4.0 TESTS

4.1 Continuity

A complete continuity test of the backplane wiring is performed at the facility where the wirewrapping of the backplane is done. The continuity tests performed here involve 1) the I/O interface card slots, J301 and J326, 2) the Aerojet added Pre-amp/detector signal cable and connector, 3) the Aerojet added Pre-amp/detector power cable and connector, and 4) chassis return connections. The tests are manual resistance measurements tests. Test data is presented on TDS 1.

4.2 Power Distribution

In these tests supply voltages are input to the signal processor from the Test Relay Unit (TRU) as in normal testing. No CCAs are installed in the signal processor for the tests. The test verifies that the four supply voltages are present on the proper pins of all backplane connectors. The test setup block diagram is shown in Figure 1, and test data is presented on TDS 2.

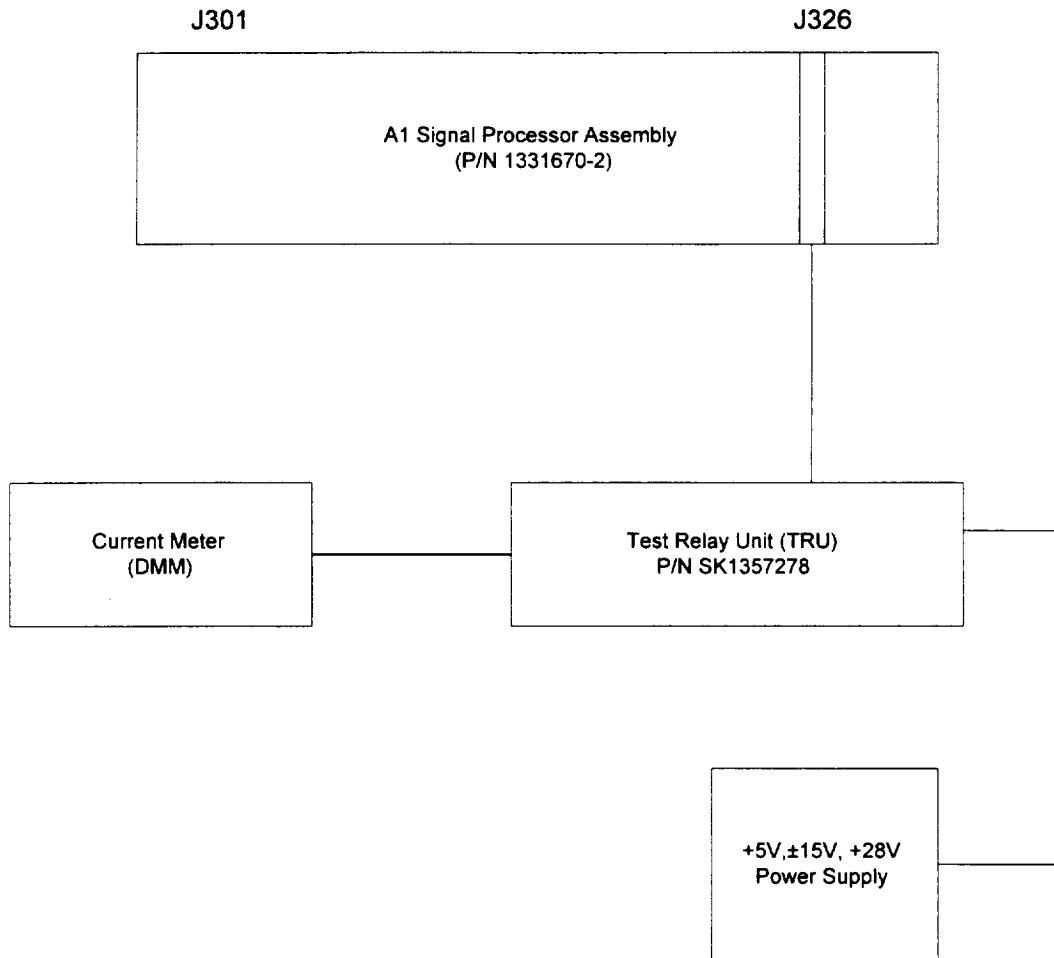


Figure 1. A1 Signal Processor Test Setup

4.3 Digital Processor

Beginning with this test, CCAs are installed into the card cage as required to perform the test, and then remain installed. At the conclusion of all tests, a complete set of CCAs has been installed. The complete test setup block diagram which is required for performing any of the tests is shown in Figure 2.

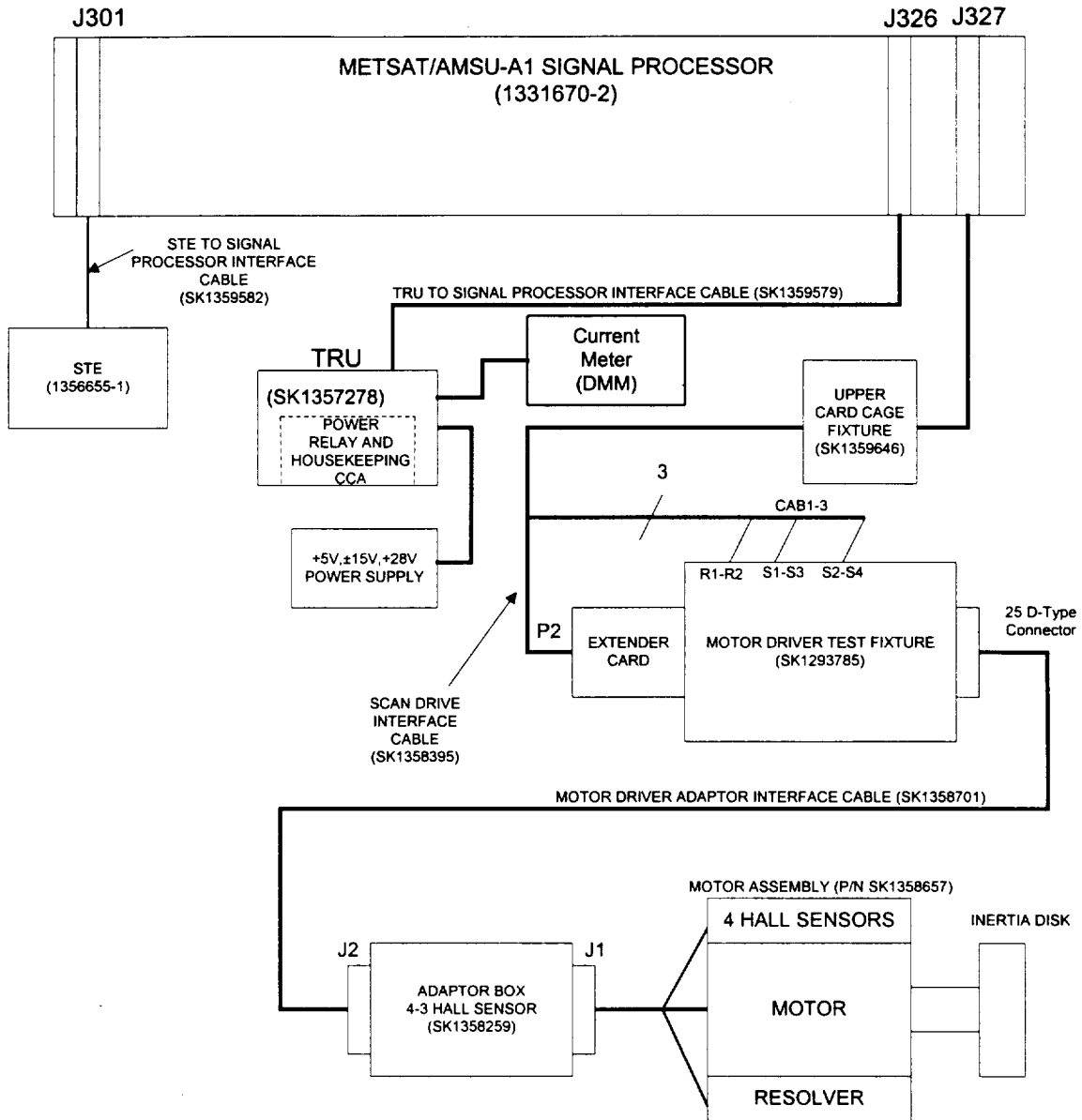


Figure 2 Scan Drive Test Set-Up

4.3.1 Memory

In this test, the digital test set is used in place of the CPU CCA to read and verify data of the test PROMs on the "GOLD" Memory CCA. Test data is presented on TDS 3.

4.3.2 CPU

The CPU test requires that the CPU Auxiliary test CCA be installed in place of the Memory CCA. In this test, the RAM and various instructions performed by the CPU are tested. In addition, the waveform of the clock signal to the DC-DC converter is measured at the CLOCK jack on the TRU. Test data is presented on TDS 3.

4.3.3 Scan Control Interface

In this test, input and output ports 0 through 3 are tested. In addition, the disable feature of the input ports is checked out. Test data is presented on TDS 3.

4.3.4 Timing and Control

In this test, the proper time intervals of I/H, DUMP, INTCMPL, TSCMPL, STOP, and ANTENNA STROBE are verified. In addition to the above tests, the test set also checks the input ports 16 and 17, output port #13 (4 MSBs), output port 14, input port #15 (DAC BSY signal), and output port #13 (4 LSBs). Test data is presented on TDS 3.

4.3.5 Spacecraft Interface

In this test, the STE is turned on and initialized. The STE is tested with a series of self-tests to verify the readiness of the STE to test flight hardware. After successfully passing the self-tests, the STE is used to simulate the spacecraft command signals and retrieve limited test data for the remaining signal processor tests. STE test data is presented on TDS 4.

4.3.6 Relay Control

This test verifies the operation of the module power command and the survival heater command. The presence of the +10 volt Interface power is verified. The PLO lock alarm signals, Scan 1 and 2 relay drive and position indicators, and PLO relay drive and relay position indicators are also verified. Test data is presented on TDS 4.

4.4 Analog Processor

4.4.1 Independence of Measurements

This test is performed using the Analog CCA Test Fixture, the Integrate and Dump Filter and the Analog Mux and A/D Converter CCAs. The test gives a measurement of the sample-to-sample crosstalk within a channel, which is dependent on the completeness of the dump of the integration capacitor. Test data is presented on TDS 5.

4.4.2 Integrate/dump filter, radiometric data multiplexing, and digitization tests

In this test, a 2 volt dc signal is input to each integrate and dump filter, and the channel output code from the A/D converter is measured. The integrator output waveform is also displayed on an oscilloscope for verification of timing. Test data is presented on TDS 6.

4.4.3 Temperature monitoring circuits

In this test a resistor of value approximating the room temperature resistance of the PRTs is connected at the input of each PRT readout circuit, and the output code from the A/D converter is measured. The reference voltage used in the PRT readout circuits is also measured. Test data is presented on TDS 7.

4.4.4 Analog telemetry

In this test each of the analog telemetry signals is measured at the ANALOG HSKP jack on the TRU. Test data is presented on TDS 8.

4.5 Scan Drive

This test includes all CCAs involved in the scan drive function. The circuitry is programmed to provide one complete revolution of the drive motor as it steps through each of the thirty scene positions and the two calibration positions. The circuitry is programmed to park at the Warm Cal, Cold Cal, and the Nadir positions during the test sequence. The GSE test modes are also verified. To verify proper performance, the inertia disk on the motor shaft is visually observed through the one revolution and the various calibration positions. Test data is presented on TDS 9.

4.6 Supply Current

In this test, the total current drawn by the signal processor from each of the four supply voltages is measured with the signal processor fully populated with CCA's. Test data is presented on TDS 10.

5.0 TEST ANOMALIES

Two test anomalies occurred. The first anomaly occurred when the clock signal was to be measured at the clock jacks on the TRU. No clock signal was present. The test was stopped and a Test Anomaly Report (attached) was opened (TAR 003142). Troubleshooting and visual inspection revealed that a twisted pair clock line was missing from the backplane. The test was continued and the twisted pair clock line was added by the wirewrap supplier after test completion.

The second anomaly occurred during the signal processor power distribution test. Minus 15 volts was measured on the +10 volt output. The test was stopped and a Test Anomaly Report (attached) was opened (TAR 002330). Troubleshooting and visual inspection revealed a piece of bare wire wedged between two sockets on connector J326. This wire shorted the -15V output to the +10V output (not powered at the time). The wire short was removed and the test was continued and successfully passed.

6.0 TEST RESULTS

The METSAT/AMSU A1 SIGNAL PROCESSOR TEST was successfully completed and all test data is within specified limits.

TEST DATA SHEET 1
A1 Continuity Tests (4.2.1)

| From | To | Signal Name | Pass/Fail |
|---------|---------|--------------------|-----------|
| J301-1 | P511-3 | CH 3 - IN | Pass |
| J301-10 | P511-13 | CH 8 - IN | Pass |
| J301-13 | P511-15 | CH 9 - IN | Pass |
| J301-15 | P511-17 | CH 10 - IN | Pass |
| J301-16 | P511-19 | CH 11 - IN | Pass |
| J301-19 | P511-21 | CH 12 - IN | Pass |
| J301-21 | P511-23 | CH 13 - IN | Pass |
| J301-22 | P511-25 | CH 14 - IN | Pass |
| J301-25 | P511-1 | CH 15 - IN | Pass |
| J301-3 | P511-5 | CH 4 - IN | Pass |
| J301-4 | P511-7 | CH 5 - IN | Pass |
| J301-60 | E1 | CHASSIS GND | Pass |
| J301-7 | P511-9 | CH 6 - IN | Pass |
| J301-9 | P511-11 | CH 7 - IN | Pass |
| J301-90 | E2 | CHASSIS GND | Pass |
| J304-43 | P512-5 | +15V(2) | Pass |
| J304-45 | P512-24 | +15V(2) | Pass |
| J304-46 | P512-9 | 15VRTN(2/3) | Pass |
| J304-48 | P512-29 | 15VRTN(2/3) | Pass |
| J304-49 | P512-14 | -15V(3) | Pass |
| J304-51 | P512-15 | -15V(3) | Pass |
| J305-68 | P512-12 | PRT35_HI (PRE AMP) | Pass |
| J305-72 | P512-11 | PRT35_LO (PRE AMP) | Pass |
| J326-76 | E3 | CHASSIS GND | Pass |

Assembly No. 1331670-2 Shop Order No. 292504

Serial No. F01 Pass Fail

Test Engineer D. Lund 3/4/98 Quality Control [Signature] 3-5-98
(Signature) (Date) (Signature) (Date)

Customer Representative (Flight hardware only) R. Brown 3-31-98
(Signature) (Date)

TEST DATA SHEET 2
A1 Power Distribution (Paragraphs 4.2.2 & 4.2.3)

Power Supply Voltages:

+5.7 ± 0.1V: +5.70V
-15.7 ± 0.1V: -15.72V

+15.7 ± 0.1V: +15.75V
+28.7 ± 0.1V: +28.70V

Test Set-up Verified: YES NO

| Para. 4.2.3 Step No. | Connector No. | +5 ±0.5 V | P/F | +15 ±0.3V | P/F | -15 ±0.3V | P/F | +28 ±0.56V | P/F | +9 ±1V * | P/F |
|----------------------|---------------|-----------|-----|-----------|-----|-----------|-----|------------|-----|----------|-----|
| 7 | J301 | | | | | | | | | +8.69 | P |
| 21 | J303 | | | +15.05 | P | -15.03 | P | | | | |
| 22 | J304 | | | +15.05 | P | -15.03 | P | | | | |
| 43 | J305 | | | +15.05 | P | -15.03 | P | | | | |
| 54 | J306 | | | +15.05 | P | -15.03 | P | | | | |
| 85 | J307 | +4.96 | P | +15.05 | P | -15.03 | P | | | | |
| 85 | J308 | | | +15.05 | P | -15.03 | P | | | | |
| 85 | J309 | | | +15.05 | P | -15.03 | P | | | | |
| 85 | J310 | | | +15.05 | P | -15.03 | P | | | | |
| 85 | J311 | | | +15.05 | P | -15.03 | P | | | | |
| 85 | J312 | +4.96 | P | | | | | | | +8.68 | P |
| 85 | J313 | +4.97 | P | | | | | | | +8.68 | P |
| 85 | J314 | +4.96 | P | | | | | | | | |
| 85 | J315 | +4.96 | P | | | | | | | | |
| 85 | J316 | +4.96 | P | | | | | | | | |
| 85 | J317 | +4.96 | P | | | | | | | | |
| 85 | J318 | +4.96 | P | | | | | | | | |
| 85 | J319 | +4.96 | P | +15.05 | P | -15.03 | P | +27.97 | P | | |
| 85 | J320 | +4.97 | P | +15.05 | P | -15.03 | P | | | | |
| 85 | J321 | +4.97 | P | | | | | | | | |
| 85 | J322 | +4.97 | P | +15.05 | P | -15.03 | P | | | | |
| 85 | J323 | +4.97 | P | +15.05 | P | -15.03 | P | | | | |
| 85 | J324 | +4.97 | P | | | | | | | | |
| 85 | J325 | +4.97 | P | +15.05 | P | -15.03 | P | | | | |
| 76 | J327 | +4.98 | P | +15.05 | P | -15.03 | P | +27.96 | P | | |

* Measured at Paragraph 4.2.5.2 Test
 Assembly No. 1331670-2 Shop Order No. 292504

Serial No. F01 Pass Fail

Test Engineer D. Lund 3/4/98 (Signature) (Date)
 Quality Control [Signature] 3-8-98 (Signature) (Date)

Customer Representative (Flight hardware only) R. Brown 3-31-98 (Signature) (Date)

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 3/4/98
 D Lund

TEST DATA SHEET 3 (Sheet 1 of 2)
A1 Digital Processor (Paragraph 4.2.4)

CPU CCA Serial No. (J316) F08
Scan Control Interface CCA Serial No. (J318) F23
Timing and Control CCA Serial No. (J315) F09

4.2.4.1 Memory tests:

4.2.4.1/10 Circle Pass or Fail to indicate the result of the tests :

Pass Fail

If "Fail", record the error code and error description.

Error Code: None
Error Description: None

4.2.4.2 CPU tests:

4.2.4.2/10

| | <u>Measurements</u> | <u>Limits</u> | <u>Pass/Fail</u> |
|------|---------------------|---------------|------------------|
| Vp-p | <u>4.00V</u> | 3.30 - 4.94 V | <u>Pass</u> |
| T | <u>801 nS</u> | 761 - 841 ns | <u>Pass</u> |

4.2.4.2/19 Circle Pass or Fail to indicate the result of the CPU tests
(with 8 Sec Sync Pulse coming from the J314 - pin 49):

Pass ↑ Fail ↑

~~If "Fail", record the error code and error description.~~

~~Error Code: _____~~
~~Error Description: _____~~

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3/4/98

D. L. ... 3/4/98

4.2.4.3 Scan Control Interface Tests:

4.2.4.3/16 The input ports 0 and 1 tests

Pass Fail

4.2.4.3/23 Inhibit input port 0 and 1 tests

Pass Fail

4.2.4.3/35 The input ports 2 and 3 tests

Pass Fail

4.2.4.3/43 Inhibit input port 2 and 3 tests

Pass Fail

4.2.4.3/55 The output ports 0 and 1 tests

Pass Fail

TEST DATA SHEET 3 (Sheet 2 of 2)
A1 Digital Processor (Paragraph 4.2.4)

4.2.4.3 Scan Control Interface Tests (Cont):

4.2.4.3/63 The output ports 2 and 3 tests

Pass Fail

If "Fail", record the error code and error description.

Error Code: None

Error Description: None

4.2.4.4 Timing and Control Tests:

4.2.4.4/13 The Integrate and Hold pulse and the Dump pulse at the card rack slot J308. Pass Fail

4.2.4.4/23 The Integrate and Hold pulse and the Dump pulse at the card rack slot J309. Pass Fail

4.2.4.4/33 The Integrate and Hold pulse and the Dump pulse at the card rack slot J310. Pass Fail

4.2.4.4/43 The Integrate and Hold pulse and the Dump pulse at the card rack slot J311. Pass Fail

4.2.4.4/54 The Integrate and Hold pulse and the Dump pulse at the card rack slot J301. Pass Fail

4.2.4.4/64 The Antenna Strobe pulse test at J320. Pass Fail

4.2.4.4/68 The Antenna Strobe pulse test at J323. Pass Fail

4.2.4.4/78 The test of the interface to the Temp. Sensor Analog Mux card rack slot J306. Pass Fail

4.2.4.4/89 The test of the interface to the Analog Mux and Converter card rack slot J307. Pass Fail

If "Fail", record error code and error description:

Error Code: None

Error Description: None

Assembly No. 1331670-2

Shop Order No. 292504

Serial No. F01

Pass Fail

Test Engineer D. Lind 3/4/98
(Signature) (Date)

Quality Control [Signature] 3-31-98
(Signature) (Date)

Customer Representative (Flight hardware only)

R. Brown 3-31-98
(Signature) (Date)

TEST DATA SHEET 4
A1 Relay Driver Tests (Paragraph 4.2.5.2)

Spacecraft Interface #2 CCA (J312) Ser. No. F22
 Spacecraft Interface #1 CCA (J313) Ser. No. F14
 Parallel to Serial Converter CCA (J314) Ser. No. F24
 Relay Driver And Current Monitor CCA (J319) Ser. No. F03

Test Set-up Verified: Yes No STE Self Test: Pass Fail

| Step No. | Test Description | Pass/Fail |
|----------|---------------------------------|-----------|
| 23 | Module power connects | Pass |
| 26 | Survival heater power turns on | Pass |
| 27 | Survival heater power turns off | Pass |
| 28 | Module power disconnects | Pass |
| 30 | Scanner 1 power turns on | Pass |
| 31 | Scanner 2 power turns on | Pass |
| 32 | Scanner 1 power turns off | Pass |
| 32 | Scanner 2 power turns off | Pass |
| 34 | PLLO toggle | Pass |
| 35 | Module power disconnect | Pass |

Assembly No. 1331670-2 Shop Order No. 292504
 Serial No. F01 Pass Fail
 Test Engineer [Signature] 3/4/98 Quality Control [Signature] 3-5-98
(Signature) (Date) (Signature) (Date)
 Customer Representative (Flight hardware only) [Signature] 3-31-98
(Signature) (Date)

TEST DATA SHEET 5
A1 Independence Of Measurements (Paragraph 4.2.6.1)

Analog Mux and A/D Converter CCA Serial No. F03

Test Set-up verified: YES NO

| Supply | Measured Value (V) | Limits (V) |
|--------|--------------------|------------|
| +5 | <u>+4.80</u> | +5 ± 0.25 |
| +15 | <u>+15.88</u> | +15 ± 1.0 |
| -15 | <u>-15.44</u> | -15 ± 1.0 |

| Integrate and Dump/Filter CCA Serial No. | Channel No. | Average for SIGNAL switch in HI position | Average for SIGNAL switch in LO position | Measurement Dependence ≤0.01% | Pass/Fail |
|--|-------------|--|--|-------------------------------|-----------|
| F29 | 0 | 14100.6 | 14099.2 | 0.0021% | Pass |
| | 1 | 14102.2 | 14100.5 | 0.0026% | Pass |
| | 2 | 14103 | 14101.2 | 0.0028% | Pass |
| | 3 | 14105.3 | 14103.4 | 0.0029% | Pass |
| F30 | 0 | 14033 | 14030.8 | 0.0034% | Pass |
| | 1 | 14052.4 | 14049.9 | 0.0038% | Pass |
| | 2 | 14042.8 | 14040.7 | 0.0032% | Pass |
| | 3 | 14048.5 | 14046.1 | 0.0037% | Pass |
| F32 | 0 | 14047.9 | 14046 | 0.0029% | Pass |
| | 1 | 14030.7 | 14029 | 0.0026% | Pass |
| | 2 | 14050.8 | 14048.7 | 0.0032% | Pass |
| | 3 | 14050.5 | 14048.3 | 0.0034% | Pass |
| F33 | 0 | 14040.5 | 14038.5 | 0.0031% | Pass |
| | 1 | 14048 | 14045.8 | 0.0034% | Pass |
| | 2 | 14034.1 | 14031.9 | 0.0034% | Pass |
| | 3 | 14040.9 | 14038.8 | 0.0032% | Pass |

Assembly No. 1331670-2

Shop Order No. 292504

Serial No. F01

Pass Fail

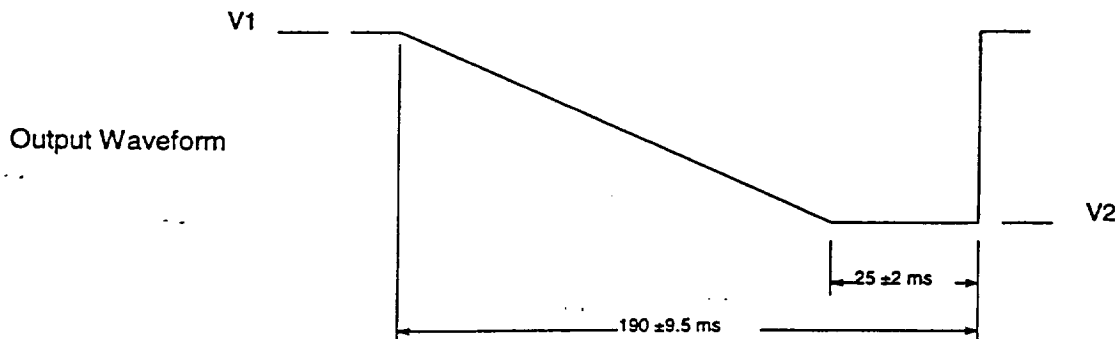
Test Engineer D. Lund 3/4/98
(Signature) (Date)

Quality Control [Signature] 3-5-98
(Signature) (Date)

Customer Representative (Flight hardware only) R. Proulx 3-31-98
(Signature) (Date)

TEST DATA SHEET 6 (Sheet 1 Of 2)
A1 Integrator Signal Multiplexing, And Digitization (Paragraph 4.2.6.2)

Analog Mux and A/D Converter CCA: Ser. No. F03
 Integrate and Dump/Filter CCA:
 Rack Slot J308: Ser. No. F29
 Rack Slot J309: Ser. No. F30
 Rack Slot J310: Ser. No. F32
 Rack Slot J311: Ser. No. F33



| Channel | Data | Data Limits | Data Pass/Fail | Integrator Waveform Pass/Fail |
|---------|-------|----------------|----------------|-------------------------------|
| 3 | 29143 | 27282 to 31076 | Pass | Pass |
| 4 | 29022 | 27282 to 31076 | Pass | Pass |
| 5 | 28890 | 27282 to 31076 | Pass | Pass |
| 6 | 28972 | 27282 to 31076 | Pass | Pass |
| 7 | 29136 | 27282 to 31076 | Pass | Pass |
| 8 | 29056 | 27282 to 31076 | Pass | Pass |
| 9 | 29061 | 27282 to 31076 | Pass | Pass |
| 10 | 29043 | 27282 to 31076 | Pass | Pass |
| 11 | 29130 | 27282 to 31076 | Pass | Pass |
| 12 | 28972 | 27282 to 31076 | Pass | Pass |
| 13 | 29039 | 27282 to 31076 | Pass | Pass |
| 14 | 29018 | 27282 to 31076 | Pass | Pass |
| 15 | 29048 | 27282 to 31076 | Pass | Pass |

TEST DATA SHEET 6 (Sheet 2 Of 2)
A1 Integrator Signal Multiplexing, And Digitization (Paragraph 4.2.6.2)

| Signal Name | Output | Output Return | Signal Levels | Pass/Fail |
|------------------------|---------|---------------|---------------|-----------|
| I/H | J301-42 | J301-41 | Pulses (TTL) | Pass |
| Dump | J301-45 | J301-41 | Pulses (TTL) | Pass |
| +5 Vdc GSE Interlock A | J301-61 | J301-70 | +5 V | Pass |
| +5 Vdc GSE Interlock B | J301-62 | J301-70 | +5 V | Pass |

Assembly No. 1331670-2

Shop Order No. 292504

Serial No. F01

Pass Fail

Test Engineer [Signature] 3/4/98
(Signature) (Date)

Quality Control [Signature] [Signature]
(Signature) (Date)

Customer Representative (Flight hardware only) R. P. [Signature] 3.31.98
(Signature) (Date)

TEST DATA SHEET 7 (Sheet 1 of 2)
A1 Temperature Monitoring Circuits (Paragraph 4.2.6.3)

Temperature Sensor A CCA (J303) Serial No. F08
 Temperature Sensor B CCA (J304) Serial No. F25
 Temperature Sensor B CCA (J305) Serial No. F26
 Temperature Sensor Analog Mux CCA (J306) Serial No. F15

| Dig. A Temp No. | Description | Data | Data Limits | Pass/Fail |
|-----------------|------------------|-------|-------------------------------|-----------|
| 1 | Scan Motor A1-1 | 30893 | 28259 to 32513 | Pass |
| 2 | Scan Motor A1-2 | 31232 | 28259 to 32513 | Pass |
| 3 | Feedhorn A1-1 | 31065 | 28259 to 32513 | Pass |
| 4 | Feedhorn A1-2 | 31437 | 28259 to 32513 | Pass |
| 5 | RF MUX A1-1 | 30904 | 28259 to 32513 | Pass |
| 6 | RF MUX A1-2 | 30752 | 28259 to 32513 | Pass |
| 7 | LO CH 3 | 30764 | 28259 to 32513 | Pass |
| 8 | LO CH 4 | 30832 | 28259 to 32513 | Pass |
| 9 | LO CH 5 | 31199 | 28259 to 32513 | Pass |
| 10 | LO CH 6 | 30894 | 28259 to 32513 | Pass |
| 11 | LO CH 7 | 31031 | 28259 to 32513 | Pass |
| 12 | LO CH 8 | 30562 | 28259 to 32513 | Pass |
| 13 | LO CH 15 | 30731 | 28259 to 32513 | Pass |
| 14 | PLO #2 | 30830 | 28259 to 32513 | Pass |
| 15 | PLO #1 | 30899 | 28259 to 32513 | Pass |
| 16 | N/A | N/A | 28259 to 32513 N/A | N/A |
| 17 | Mixer IF CH 3 | 30944 | 28259 to 32513 | Pass |
| 18 | Mixer IF CH 4 | 30924 | 28259 to 32513 | Pass |
| 19 | Mixer IF CH 5 | 30815 | 28259 to 32513 | Pass |
| 20 | Mixer IF CH 6 | 31050 | 28259 to 32513 | Pass |
| 21 | Mixer IF CH 7 | 30743 | 28259 to 32513 | Pass |
| 22 | Mixer IF CH 8 | 30630 | 28259 to 32513 | Pass |
| 23 | Mixer IF CH 9/14 | 30833 | 28259 to 32513 | Pass |
| 24 | Mixer IF CH 15 | 30854 | 28259 to 32513 | Pass |
| 25 | IF Amp CH 11/14 | 30807 | 28259 to 32513 | Pass |
| 26 | IF Amp CH 9 | 31039 | 28259 to 32513 | Pass |
| 27 | IF Amp CH 10 | 30881 | 28259 to 32513 | Pass |
| 28 | IF Amp CH 11 | 30936 | 28259 to 32513 | Pass |
| 29 | DC/DC Conv | 30815 | 28259 to 32513 | Pass |
| 30 | IF Amp CH 13 | 30944 | 28259 to 32513 | Pass |
| 31 | IF Amp CH 14 | 30720 | 28259 to 32513 | Pass |
| 32 | IF Amp CH 12 | 30653 | 28259 to 32513 | Pass |
| 33 | RF Shelf A1-1 | 31071 | 28259 to 32513 | Pass |
| 34 | RF Shelf A1-2 | 30672 | 28259 to 32513 | Pass |
| 35 | Detector/Preamp | 31084 | 28259 to 32513 | Pass |

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TEST DATA SHEET 7 (Sheet 2 of 2)
A1 Temperature Monitoring Circuits (Paragraph 4.2.6.3)

| Dig. A Temp No. | Description | Data | Data Limits | Pass/Fail |
|-----------------|-------------------|-------|----------------|-----------|
| 36 | A1-1 Warm Load 1 | 22290 | 20339 to 23401 | Pass |
| 37 | A1-1 Warm Load 2 | 22263 | 20339 to 23401 | Pass |
| 38 | A1-1 Warm Load 3 | 22463 | 20339 to 23401 | Pass |
| 39 | A1-1 Warm Load 4 | 22176 | 20339 to 23401 | Pass |
| 40 | A1-1 Warm Load C | 22316 | 20339 to 23401 | Pass |
| 41 | A1-2 Warm Load 1 | 22594 | 20339 to 23401 | Pass |
| 42 | A1-2 Warm Load 2 | 22283 | 20339 to 23401 | Pass |
| 43 | A1-2 Warm Load 3 | 22381 | 20339 to 23401 | Pass |
| 44 | A1-2 Warm Load 4 | 22303 | 20339 to 23401 | Pass |
| 45 | A1-2 Warm Load C | 22173 | 20339 to 23401 | Pass |
| 46 | Thermal Reference | 25007 | 23340 to 26320 | Pass |

Assembly No. 1331670-2 Shop Order No. 292504
 Serial No. F01 Pass Fail
 Test Engineer D. Lind 3/4/98 Quality Control [Signature] 3-5-98
 (Signature) (Date) (Signature) (Date)
 Customer Representative (Flight hardware only) R. D. [Signature] 3-31-98
 (Signature) (Date)

TEST DATA SHEET 8
A1 Analog Telemetry (Paragraph 4.2.6.4)

| ANALOG HSKP Switch Position | DVM Reading (V) | Limits (V) | Pass/Fail |
|--------------------------------|--------------------|---------------|-----------|
| 1 | 3.01 | 2.85 to 3.15 | Pass |
| 2 | 3.47 | 3.30 to 3.66 | Pass |
| 3 | 3.00 | 2.87 to 3.17 | Pass |
| 4 | 3.03 | 2.85 to 3.15 | Pass |
| 5 | 3.47 | 3.30 to 3.66 | Pass |
| 6 | 3.02 | 2.87 to 3.17 | Pass |
| 7 | 3.47 | 3.30 to 3.66 | Pass |
| 8 | 3.01 | 2.87 to 3.17 | Pass |
| 9 | 3.00 | 2.85 to 3.15 | Pass |
| 10 | 3.59 | 3.42 to 3.78 | Pass |
| 11 | 3.28 | 3.13 to 3.45 | Pass |
| 12 | 2.98 | 2.84 to 3.14 | Pass |
| 13 | 2.97 | 2.84 to 3.14 | Pass |
| 14 | 2.98 | 2.84 to 3.14 | Pass |
| 15 | 2.98 | 2.84 to 3.14 | Pass |
| 16 | 2.99 | 2.84 to 3.14 | Pass |
| 17 | 2.98 | 2.84 to 3.14 | Pass |
| 18 | 3.47 | 3.30 to 3.66 | Pass |
| 19 | 4.47 | 4.30 to 4.66 | Pass |
| 19 | 0.46 | 0.4 to 0.48 | Pass |
| 20 | 4.47 | 4.30 to 4.66 | Pass |
| 20 | 0.46 | 0.4 to 0.48 | Pass |
| 21 | +0.002 | -0.05 to 0.05 | Pass |
| 21 | 2.97 | 2.8 to 3.4 | Pass |
| 22 | +0.007 | -0.05 to 0.05 | Pass |
| 22 | 2.95 | 2.8 to 3.4 | Pass |

Assembly No. 1331670-2

Shop Order No. 292504

Serial No. F01

Pass Fail

Test Engineer D. Lind 3/4/98
(Signature) (Date)

Quality Control [Signature] 3/4/98
(Signature) (Date)

Customer Representative (Flight hardware only) R. Druen 3-31-98
(Signature) (Date)

TEST DATA SHEET 9
A1 Scan Drive/ Signal Processor Tests (Paragraph 4.3.1 And 4.3.2)

A1-1 Drive Subsystem CCAs:

Interface Converter CCA (J320) Ser. No. F28
 Resolver Data Isolator CCA (J321) Ser. No. F20
 R/D Converter/Oscillator CCA (J322) Ser. No. F18
~~Motor Driver 3 Hall Sensor (J401) Ser. No.~~

QC
229
3/4/98

Test Set-up Verified: Yes No

| Para/Step No. | Mode | Pass/Fail |
|---------------------------|------------------------------|-----------|
| 4.3.1.2.1/12 H | Motor in warm cal position | Pass |
| 4.3.1.2.2/3 | Motor in nadir position | Pass |
| 4.3.1.2.3/2 | Motor in cold cal position 1 | Pass |
| 4.3.1.2.3/3 | Motor in cold cal position 2 | Pass |
| 4.3.1.2.3/4 | Motor in cold cal position 3 | Pass |
| 4.3.1.2.3/5 | Motor in cold cal position 4 | Pass |
| 4.3.1.2.4/5 | Motor in full scan mode | Pass |
| 4.3.1.2.5/9 | GSE mode 2 | Pass |
| 4.3.1.2.6/4 | GSE mode 4 | Pass |
| 4.3.1.2.7/4 | GSE mode 5 | Pass |
| 4.3.1.2.8/4 | GSE mode 1 | Pass |
| 4.3.1.2.9/4 | GSE mode 3 | Pass |
| 4.3.1.2.9/7 | GSE mode 7 | Pass |
| 4.3.1.2.10/2 | Scan power off | Pass |

A1-2 Drive Subsystem CCAs:

Interface Converter CCA (J323) Ser. No. F29
 Resolver Data Isolator CCA (J324) Ser. No. F36
 R/D Converter/Oscillator CCA (J325) Ser. No. F19
~~Motor Driver 3 Hall Sensor (J404) Ser. No.~~

QC
229
3/4/98

Test Set-up Verified: Yes No

Para. No./Step No.

4.3.2.2 A1-2 scan drive operates in full scan mode. Pass Fail

Assembly No. 1331670-2 Shop Order No. 292504

Serial No. F01 Pass Fail

Test Engineer D. Lund 3/4/98 Quality Control [Signature] 3/4/98
 (Signature) (Date) (Signature) (Date)

Customer Representative (Flight hardware only) R. [Signature] 3-5-98
 (Signature) (Date)

TEST DATA SHEET 10
A1 Supply Currents (Paragraph 4.4)

| Voltages | Measured Current | Limits (in mA) | Pass/Fail |
|----------|------------------|----------------|-----------|
| +28.7V | 7.7 | 6 to 12 | Pass |
| +5.7V | 808 | 700 to 1642 | Pass |
| +15.7V | 195 | 152 to 364 | Pass |
| -15.7V | 190 | 162 to 381 | Pass |

Assembly No. 1331670-2

Shop Order No. 292504

Serial No. F01

Pass Fail

Test Engineer [Signature] 3/4/98
(Signature) (Date)

Quality Control [Signature] 3-5-98
(Signature) (Date)

Customer Representative (Flight hardware only) [Signature] 3-31-98
(Signature) (Date)

TAR NO. 003142

SYSTEM NO. _____

ASSY NAME METSAT A1 SIGNAL PROCESSOR

TEST ANOMALY RECORD

DATE 12/8/97 Page 1 of 1

ASSY P/N 1331670-2 REV 1

SPEC (MPI, AE, ...) 26754 REV ~

ASSY S/N F01

CUMULATIVE TIME _____ hrs _____ min

S/O NO. 292504

ELAPSED TIME _____ hrs _____ min

TEST OPER NO. 8040 STEP A

(REF. MPI 00-005)

AMEND. 1

First time for failure at this point? YES NO Test Proc Para No. where failure occurred 4.2.4.2

Type of test (EXP: T/C 1 FFT HOT) TEST PROCEDURE PROOFING Para Step No. 10

DESCRIPTION OF ANOMALY (LIST EXPECTED AND RECORDED VALUES): NO CLOCK SIGNAL AT CLOCK jack on TRU. SHOULD BE 3.3 to 4.94 V. MEASURED ZERO.

TECH/TE NOTIFIED TEAM LEADER NAME A. NIETO DEFECT CODE MW TECH [Signature] DATE 12-8-97

INSTRUCTIONS:
 OPER. STATION TEST
3040 AMSU Test to notify inspection of failure/anomaly. (Except engineering, MPI or Pretest.)
3045 INSP Inspection to notify DCMC of failure / anomaly. (GFE)

PROD [Signature] INSP [Signature]
12/8/97 12/8/97

TROUBLESHOOT/REWORK/RETEST ACTION PLAN:
TROUBLESHOOT TO DETERMINE CAUSE OF PROBLEM

TE [Signature] DATE 12/8/97
 TEAM LEADER [Signature] DATE 12/8/97

NOTE: Remove pink copy here. Deliver to QA drop box.

| OPER. | STATION | | PROD | INSP | RMKS |
|-------------|-------------|--|--------------------|------|------|
| <u>8008</u> | <u>TEST</u> | <u>PERFORM CONTINUITY CHECK ON TRU AND OUT TO DETERMINE POINT AT WHICH CLOCK SIGNAL IS LOST AND REASON FOR LOSS.</u> | <u>[Signature]</u> | | |
| | | <u>CONTINUE TEST PER AE-26754, CORRECTIVE ACTION TO BE DONE AFTER TEST COMPLETION.</u> | | | |

NOTE: For parts replacement continuation page is MANDATORY

PASSED Retest/Start DATE _____
 FAILED Retest/Start DATE _____
 GO TO S/O CONT., OR OPERATION 8040 PAGE 2
AMEND. 1

WHAT WAS THE CAUSE OF THE ANOMALY? MISTED PAIR CLOCK LINES MISSING FROM BACKPLANE

CORRECTIVE ACTION: SEND BACKPLANE TO WIREWRAP SUPPLIER FOR INSTALLATION OF WIRES (SHIPPER 9641)

DATE _____ TEAM LEADER [Signature]

TAR NO. 002330 **SYSTEM NO.** _____

TEST ANOMALY RECORD DATE 2/3/98 Page 1 of 1

ASSY NAME METSAT AI SIGNAL PROCESSOR ASSY.

ASSY P/N 1331670-2 REV F

ASSY S/N F01

S/O NO. 292504

TEST OPER NO. 120 STEP A

REF. MPI 00-005) SPEC (MPI, AE, ...) AE-26754 REV -

CUMULATIVE TIME _____ hrs _____ min

ELAPSED TIME _____ hrs _____ min

First time for failure at this point? YES NO Test Proc Para No. where failure occurred 4.2.3

Type of test (EXP: T/C 1 FFT HOT) Functional test Para Step No. 5

DESCRIPTION OF ANOMALY (LIST EXPECTED AND RECORDED VALUES):

Found a short between -15V and +10V power supplies lines

TECH/TE NOTIFIED TEAM LEADER NAME NIETO, AL DEFECT CODE SE 3 TECH [Signature] DATE 2/3/98

INSTRUCTIONS:

OPER. STATION 3000 TEST Test to notify inspection of failure/anomaly. (Except engineering, MPI or Pretest.)

3001 INSP Inspection to notify DCMC of failure / anomaly. (GFE)

ROUBLESHOOT/REWORK/RETEST ACTION PLAN:

Troubleshoot to determine cause of problem.

TE [Signature] QEV [Signature] RE [Signature] DATE _____

TEAM LEADER [Signature]

ROUBLESHOOT/REWORK/RETEST/INSTRUCTIONS:

| OPER. STATION | DESCRIPTION | PROD | INSP | RMKS |
|---------------|--|--------------------|--------------------|------|
| <u>2010</u> | <u>TEST</u> | <u>[Signature]</u> | <u>[Signature]</u> | |
| | <u>Troubleshoot short backplane to determine cause of problem</u> | | | |
| | <u>Examine Backplane Assy under magnification for obvious damage</u> | | | |
| <u>3020</u> | <u>MFG</u> | <u>[Signature]</u> | | |
| | <u>Remove bare wire debris</u> | | | |
| <u>3030</u> | <u>Test</u> | <u>[Signature]</u> | | |
| | <u>Reperform power distribution test</u> | | | |
| <u>3040</u> | <u>Test</u> | <u>[Signature]</u> | | |
| | <u>Notify inspection to notify DCMC reinspection of test.</u> | | | |

NOTE: For parts replacement continuation page is MANDATORY

PASSED Retest/Start DATE 2/3/98

FAILED Retest/Start DATE _____

GO TO (3) CONT., OR OPERATION 120 PAGE 10

TECH [Signature] QEV [Signature] RE [Signature] DATE _____

WHAT WAS THE CAUSE OF THE ANOMALY? a piece of bare wire was found across two socket pins on the plugging side of the J326 connector

CORRECTIVE ACTION: NONE REQUIRED

DATE 3/2/98 TEAM LEADER [Signature]

| | |
|---------------|----------------|
| QENO. GU-TEST | DATE: 11/25/9. |
| REVISION: F | DATE: 09/19/9: |
| PAGE 2 OF 3 | |


| | |
|-------------------|-----------------------|
| S/O NO. 492504 | OPERATION NO. 2140 |
|-------------------|-----------------------|

| CEAR NO. | CHARACTERISTIC | INST. STAMP |
|----------|---|-------------|
| | <u>SECTION I: CONTINUED</u> | |
| 6. | IF ESD CERTIFICATION IS SPECIFIED IN THE AE-SPEC, VERIFY THAT THE TEST CONDUCTOR POSSESSES THE REQUIRED CERTIFICATION. | (26) |
| 7. | VERIFY THAT ALL TEST EQUIPMENT IS IN CURRENT CALIBRATION AND THAT NO SEALS ARE BROKEN. COMPLETE THE TEST EQUIPMENT LIST (ATTACHED). FOR S/O'S WITH MULTIPLE TESTS USING THE SAME SPEC, LIST ALL EQUIPMENT ON ONE FORM. IF NECESSARY, REFERENCE THE COMPLETED FORM. NOTE: TEST EQUIPMENT WHICH BEARS A "LIMITED CALIBRATION" STATUS SHALL BE DOCUMENTED ON AN EQCR. TEST ACCEPTANCE SHALL BE WITHHELD UNTIL DISPOSITIONED. | (26) |
| 8. | MONITOR OR VERIFY THE TEST SET-UP IN ACCORDANCE WITH THE AE-SPEC AND SHOP ORDER PLANNING. | (26) |
| 9. | UPON COMPLETION OF STEPS 1-8, NOTIFY THE CUSTOMER OF TEST START PER SHOP ORDER PLANNING REQUIREMENTS. | (26) |
| | <u>SECTION II: TEST MONITOR/WITNESS</u> | |
| 10. | MONITOR/WITNESS TESTING IN ACCORDANCE WITH THE SHOP ORDER PLANNING. REVIEW DATA PRINTOUTS AND/OR DATA SHEETS TO VERIFY DATA IS WITHIN THE AE-SPEC. | (26) |
| 11. | VERIFY THAT THE AE-SPEC IS NOT REDLINED. REDLINES SHALL BE DOCUMENTED ON AN EQCR. | (26) |
| | <u>SECTION III: DATA REVIEW AND ACCEPTANCE</u> | |
| 12. | VERIFY THAT ALL TAR'S OR TRR'S HAVE BEEN CLOSED. | (7A 269) |
| 13. | REVIEW ALL DATA SHEETS AND VERIFY THAT DATA MEETS THE AE-SPEC REQUIREMENTS. | (7A 266) |
| 14. | VERIFY THAT ALL DATA SHEETS ARE STAMPED AND DATED BY TEST, INSPECTION AND THE CUSTOMER/GOVERNMENT AS REQUIRED. | (A 58) |
| 15. | VERIFY THAT ACCEPTANCE TEST REPORTS ARE PRESENT AND SIGNED-OFF AND DATED. | (A 58) |
| 16. | VERIFY THAT ALL EQCR ITEMS HAVE BEEN DISPOSITIONED AND BOUGHT OFF BY INSPECTION. | (7A 268) |
| 17. | VERIFY THAT ALL SHOP ORDER AND II OPERATIONS HAVE BEEN STAMPED AND DATED. | (7A 266) |
| 8. | STAMP AND DATE THE APPLICABLE TEST OPERATION(S) ON THE SHOP ORDER. | (7A 265) |

| | |
|-----------|---------------|
| S/O NO. | OPERATION NO. |
| 299,581-1 | 2140 |

GU-TEST (ATTACHMENT 1)
TEST EQUIPMENT LIST

| <u>EQUIPMENT NAME</u> | <u>MODEL NUMBER</u> | <u>CAL DUE DATE</u> | <u>PROPERTY NUMBER or SERIAL NUMBER</u> |
|---|------------------------------------|---------------------|---|
| AASPTF | SK 1357293 | CNR | 743-5573 |
| O' SCOPE | TEK TDS 380 | 2-13-99 | 200080 |
| METSAT TRU | SK 1357273-001 | CNR | 743-5719 |
| AMSW-A STE | N/A | NDG | 743-5581 |
| MOTOR DRIVER TEST FIX. | SK 1293735 | CNR | 743-5016 |
| CPL AUXILIARY TEST CCA | SK 1357408 | N/A | 743-5573 |
| I/O EXTENDER CARDS | SK 1357847 | N/A | N/A |
| I/O EXTENDER (5') CABLE | SK 1357943 | N/A | N/A |
| I/O EXT./ISS3 INTF. CABLE | SK 1357944 | N/A | N/A |
| PERSONALITY MODULE FOR MEMORY | SK 1357947/1331126 | N/A | N/A |
| PERSONALITY MODULE FOR SCAN CONTROL TEST | SK 1357947/1331124 (-1 thru -2) | N/A | N/A |
| PERSONALITY MODULE FOR TIMING AND CONTROL | SK 1357947/1331135 (-1 thru -4) | N/A | N/A |
| ADAPTOR BOX, 4-3 mV sensor | SK 1358259 | CNR | 743-5759 |
| 1K OHM ISOLATED CLIP LEAD | SK 1358335 | N/A | N/A |
| SCAN DRIVE INTF. CABLE | SK 1358395 | N/A | N/A |
| MOTOR DRIVER ADAPTOR INTF. CABLE | SK 1358701-1 | N/A | N/A |
| UPPER CARD cage FIX. | SK 1359646 | N/A | N/A |
| MEMORY CCA | 1331126/ENG/60LD | N/A | N/A |
| MOTOR/RESOLVER ASSY. | SK 1358657 | CNR | 743-5683 |
| ANALOG. CCA TSI FIX | SK 1357280 | 19 DEC 98 | 743-5006 |
| DVM | HP 3456A | 24 JUL 98 | 48007 |
| Precision DC Source Triple output P.S. | Power Designs 2010 | 7 Feb 99 | 743-3655 |
| P.S. | HP-6237B | 17 OCT. 99 | L-509223 |
| P.S. | 5015T | 29 Aug. 99 | L-509131 |

| | | | |
|--|--|--|------------------|
|  | | <h3>Report Documentation Page</h3> | |
| 1. Report No. --- | 2. Government Accession No. --- | 3. Recipient's Catalog No. --- | |
| 4. Title and Subtitle Integrated Advanced Microwave Sounding Unit-A (AMSU-A), METSAT A1 Sig Processor, S/N F01 | | 5. Report Date 4 May 1998 | |
| | | 6. Performing Organization Code --- | |
| 7. Author(s) A. Nieto | | 8. Performing Organization Report No. 11137 | |
| | | 10. Work Unit No. --- | |
| 9. Performing Organization Name and Address Aerojet 1100 W. Hollyvale Azusa, CA 91702 | | 11. Contract or Grant No. NAS 5-32314 | |
| | | 13. Type of Report and Period Covered Final | |
| 12. Sponsoring Agency Name and Address NASA Goddard Space Flight Center Greenbelt, Maryland 20771 | | 14. Sponsoring Agency Code --- | |
| | | 15. Supplementary Notes --- | |
| 16. ABSTRACT (Maximum 200 words) This is the METSAT A1 Signal Processor Engineering Test Report, P/N 1331670-2, S/N F01 for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A). | | | |
| 17. Key Words (Suggested by Author(s)) Microwave System | | 18. Distribution Statement Unclassified --- Unlimited | |
| 19. Security Classif. (of this report) Unclassified | 20. Security Classif. (of this page) Unclassified | 21. No. of pages | 22. Price --- |

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| 4. TITLE AND SUBTITLE Integrated Advanced Microwave Sounding Unit-A (AMSU-A), METSAT A1 Sig Processor, S/N F01 | | | 5. FUNDING NUMBERS NAS 5-32314 | |
| 6. AUTHOR(S) A. Nieto | | | | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Aerojet 1100 W. Hollyvale Azusa, CA 91702 | | | 8. PERFORMING ORGANIZATION REPORT NUMBER 11137 4 May 1998 | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) NASA Goddard Space Flight Center Greenbelt, Maryland 20771 | | | 10. SPONSORING/MONITORING AGENCY REPORT NUMBER --- | |
| 11. SUPPLEMENTARY NOTES --- | | | | |
| 12a. DISTRIBUTION/AVAILABILITY STATEMENT --- | | | 12b. DISTRIBUTION CODE --- | |
| 13. ABSTRACT (Maximum 200 words) This is the METSAT A1 Signal Processor Engineering Test Report, P/N 1331670-2, S/N F01 for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A). | | | | |
| 14. SUBJECT TERMS Microwave System | | | 15. NUMBER OF PAGES | |
| | | | 16. PRICE CODE --- | |
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