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APOLLO/SATURN
LAUNCH OPERATIONS

PAGE
TEST NO.
VEHICLE

CALIBRATION ERROR ELIMINATION TEST


AS-206

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NASA Systems Engineer

Quality Engineering

KSC OPERATIONS APOLLO/SATURN TEST CATALOG		PAGE 1 OF
1. TEST TITLE CALIBRATION ERROR ELIMINATION TEST AS-206		2. KSC TEST NO. 958-1-IU 206
		3. STAGE, VEHICLE OR GSE IU 206
4. TEST OBJECTIVES To isolate the causes of excessive noise on the Cal Error Detection Channels and to isolate the causes of the DC level shift between the IU and SIVB Telemetry Systems, when additional equipment is turned on and at power transfer.		
5. TEST DESCRIPTION/EQUIPMENT STATUS Two to three 30-minute runs will be made. Each run will be in a different configuration to gather data under varying conditions. One run will be made to simulate a proposed EO to eliminate the Cal Error.		
(CONTINUE ON KSC FORM 23-192 IF REQUIRED)		
6. PREPARED BY 	8. NASA-KSC APPROVAL	10. APPROVAL DATE
7. ORGANIZATION IBM 958	9. ORGANIZATION	11. VEHICLE EFFECTIVITY AS- 206

APOLLO/SATURN TEST CATALOG (Continuation Sheet)		PAGE 2 OF			
1. TEST TITLE <div style="text-align: center; font-weight: bold; padding: 10px 0;">Cal Error Data Collection</div>		2. KSC TEST NO. <hr/> 11. VEHICLE EFFECTIVITY <div style="text-align: center; font-weight: bold; padding: 5px 0;">AS - 206</div>			
12. WHERE TEST PERFORMED	13. COMPUTER/ACE PROG. IDENT. (IF APPLICABLE)	14. EST. TEST TIME			
15. TEST CONFIGURATION					
16. SUPPORT REQUIREMENTS CHECKLIST <i>(Check appropriate boxes and add any additional)</i> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; vertical-align: top;"> <input type="checkbox"/> GROUND POWER <input type="checkbox"/> S-IB OR S-IC STAGE PWR <input type="checkbox"/> S-II STAGE POWER <input type="checkbox"/> S-IVB STAGE POWER <input type="checkbox"/> IU POWER <input type="checkbox"/> LEM POWER <input type="checkbox"/> SM POWER <input type="checkbox"/> CM POWER <input type="checkbox"/> BACK-UP BATTERIES <input type="checkbox"/> TIMING <input type="checkbox"/> COUNTDOWN CLOCK <input type="checkbox"/> ETR SEQUENCER <input type="checkbox"/> ETR COUNTDOWN CLOCK <input type="checkbox"/> ETR S.R.O. <input type="checkbox"/> ETR R.S.O. <input type="checkbox"/> ETR PAD SAFETY <input type="checkbox"/> KSC PAD SAFETY <input type="checkbox"/> SECURITY POLICE <input type="checkbox"/> FIRE FIGHTING <input type="checkbox"/> MEDICAL <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </td> <td style="width: 33%; vertical-align: top;"> <input type="checkbox"/> LCC MEASURING (LVO) <input type="checkbox"/> LCC MEASURING (INS) <input type="checkbox"/> GSE MEASURING (LVO) <input type="checkbox"/> GSE MEASURING (INS) <input type="checkbox"/> LCC DATA DISPLAY <input type="checkbox"/> CIF DATA DISPLAY <input type="checkbox"/> DDAS <input type="checkbox"/> DDAS TAPE RECORDING <input type="checkbox"/> SERVICE STRUCTURE MEAS. <input type="checkbox"/> RCA-110A COMPUTERS <input type="checkbox"/> ACE <input type="checkbox"/> L/V W-G ECS <input type="checkbox"/> CM W-G ECS <input type="checkbox"/> FACILITY ECS (GAS) <input type="checkbox"/> H.P. 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OTHERS: <div style="text-align: center; padding: 10px 0;">*NOTE - See SECTION II for the above information.</div> <div style="text-align: center; padding: 5px 0;"><i>(CONTINUE ON KSC FORM 23-192 IF REQUIRED)</i></div>					
17. OTHER APPLICABLE REFERENCE DOCUMENTATION					

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I. PURPOSE:

To isolate the causes of excessive noise on the Cal Error Detection Channels and to isolate the causes of the DC level shift between the IU and SIVB Telemetry Systems, when additional equipment is turned on and at power transfer.

II. SUPPORT REQUIRED:

1. Approximately eight (8) hours of IU/SIVB stage power with no interference.
2. IU/SIVB Structure Measuring.
3. IU/SIVB Vehicle Networks.
4. IU/SIVB Telemetry.
5. DDAS
6. All G & C for IU:
 - 1) LVDA/LVDC
 - 2) 56 v supply
 - 3) AC supply (inverter)
 - 4) ST-124
 - 5) Control Computer
 - 6) Control Rate Gyros/CSP
7. Permission to come up and down with IU/SIVB Telemetry and Telemetry Transmitters - Open loop frequency clearance required for:

IU:

1) DF1 RF	250.7 MHZ
2) DP1 RF	255.1 MHZ

SIVB:

1) CP1 RF	258.5 MHZ
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8. Permission to come up and down with IU Command System - Open loop frequency clearance required for:

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- 1) Command Decoder/Recorder 450.0 MHZ
9. QCI and QCE
10. Breakout Boxes and cables for second run:
 - 1) J6 (PT07P 18-32s) 602A3 Dist. (pins a, b, Z); IU Electrical Schematics, p. 11.
 - 2) J13 (PT07P 24-61s) 602A3 Dist. (pins M, P, S, U, W, Y, a, d); IU Electrical Schematics, pp. 57 and 58.
 - 3) J6 (PT07P-10-6p) DP1 Mux. (602A446), pin E (+) to B (com.); IU Electrical Schematics, p. 40.
 - 4) J18 (PT07P-18-32s) 602A3 Dist. (pins E, N, and P).
11. CUNP Power Transfer
12. C4NP Power Transfer
13. CUIP Power Transfer
14. C4IP Power Transfer
15. IU OAT Batteries Power Transfer
16. SIVB OAT Batteries Power Transfer
17. BURF Command System

III. PREPARATIONS:

1. Breakout Boxes will be required for Run #2 as called out under Run #2.
2. IU/SIVB Structure Measuring will be required to strip-out the following measurements in a manner so as to read a change of 5 mv or greater. Also, digital printouts will be required when requested by SUTM.
 - 1) IU Stripouts:

CP 1 AO-28-10	5v
CP 1 AO-28-09	0v
DP 1 AO-28-10	5v
DP 1 AO-28-09	0v
DP 1 AO-04-10	5v

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2) SIVB Stripouts:

CP 1 BO-28-10	5v
CP 1 BO-28-09	0v
DP 1 BO-28-10	5v
DP 1 BO-28-09	0v

Starting and stopping of strip recorders will be commanded by SUTM.

3. IU/SIVB Telemetry will conduct test and monitor in Structure Measuring and DDAS areas.
4. DDAS will help visually monitor CALIBRATION ERROR INDICATIONS and the above named measurements as requested.
5. All G & C as specified under support required will be required.
Approximate time on will be 2 to 3, 30-minute runs.
6. All IU/SIVB Telemetry and transmitters will be required for 2 to 3, 30-minute runs. (Open loop)
7. QCI and QCE will monitor test as required.
8. BURF Command System for 2 to 3, 30-minute runs.
9. Repeat Steps 1-7 for Run 2.

IV. OPERATING STEPS:

1. IU/SIVB stage power.
2. Start Structure Measuring stripouts, 5mm/per sec., and digital printouts as required.
3. Bring up G & C in the following order - annotate:
 - 1) RGCC LVDA/LVDC
 - 2) RUPC 56 v power supply
 - 3) RUPC AC supply inverter
 - 4) RUPC ST-124
 - 5) RUFC Control Computer
 - 6) RUFC Control Rate Gyros, CSP

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4. Bring up the remaining IU/SIVB Telemetry Systems - Annotate:

IU:

- | | |
|---------------|----|
| 1) F1 TM | ON |
| 2) Dummy Load | ON |
| 3) F1 RF | ON |
| 4) P1 RF | ON |

SIVB:

- | | |
|----------|----|
| 1) P1 RF | ON |
|----------|----|

5. Bring up Command System:

- | | | |
|---------|------------------|----|
| 1) BURF | Command Carrier | ON |
| 2) BURF | Receiver Decoder | ON |

6. Annotate stripouts as equipment is turned on and off.

7. SUTM-S4TM will notify CUTC, C4TC, CUNP, and C4NP to prepare for power transfer to Internal and report when ready. (Note: Power Transfer will be repeated as many times as necessary to secure sufficient data.)

IU Checkpoints:

- 1) Stage Power
- 2) SUOT - OAT Batteries Connected; full load capability.
- 3) RGCC - Guidance Computer ON and ready for Power Transfer.
- 4) RUPC - ST-124 System ON and ready for Power Transfer.
- 5) RUFC - Flight Control ON and ready for Power Transfer.

SIVB Checkpoints:

- 1) Stage Power
 - 2) Batteries connected in full load capability.
 - 3) Recirculation Pumps Safe.
8. IU Power Transfer to INTERNAL on mark from CUNP or CUTC.
9. SIVB Power Transfer to INTERNAL on mark from C4NP or C4TC.
10. SUTM-S4TM will notify CUTC, C4TC, CUNP, and C4NP to prepare for

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power transfer to EXTERNAL power.

11. IU/SIVB Power Transfer to EXTERNAL on mark from CUNP and C4NP.

12. Bring Down Command System:

1) BURF Recorder Decoder OFF

2) BURF Command Carrier OFF

13. Turn OFF IU/SIVB TM Systems:

IU:

1) P1 RF OFF

2) F1 RF and F1 TM OFF

3) Dummy Load OFF

SIVB:

1) P1 RF OFF

14. Turn OFF G & C in the following order - annotate:

1) RUFC Control Rate Gyros/CSP.

2) RUFC Control Computer

3) RUPC ST-124

4) RUPC 56 v Power Supply

5) RUPC AC Power Supply (Inverter)

6) RGCC LVDA/LVDC

15. Bring down IU/SIVB Stage Power.

16. Reconfigure for Run #2.

17. Bring Up IU/SIVB Stage Power.

18. Breakout Boxes in for Run #2 - Verify.

19. Install Jumpers and Remove Shorting Bars:

Jumpers:

1) J6 (602A3 Dist.) Dist. side to skin a, b, Z.

2) J6 (DP1 Mux. 602A446) pins E (+), B (com.) to Digital Voltmeter.

3) J18 (602A3 Dist.) Jumper pins E to N to P.

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Shorting Bars OUT:

- 1) J6 (602A3 Dist.) pins a, b, Z.
- 2) J13 (602A3 Dist.) pins M, P, S, U, W, Y, a, and d.
- 3) J18 (602A3 Dist.) pins E, N, and P.
20. Adjust IU 5v Supply for 5v into DP 1 Mux. pins E (+), B (com.).
21. Repeat Operating Steps 2 through 13.

V. SECURING STEPS:

1. Secure Stage Power (IU/SIVB).
2. Remove all breakout boxes and test equipment.
3. Return IU/SIVB to Flight Configuration.
4. Release all personnel.

VI. SPECIAL NOTES:

1. DAC needs 45 minutes notice prior to power down.
2. STEPS OF THIS PROCEDURE MAY BE OMITTED, REPEATED, OR INTERCHANGED
UPON NOTICE FROM SUTM AND CONCURRENCE FROM CUTC AND/OR C4TC.

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PREPARATIONS - SIVB VEHICLE NETWORKS

1. Disconnect the following (Ref. 1B62349):

A. Aft. No. 1 Simulator (4D11) (A1 or A2).

406W1P1 From 404A2A1J4
406W3P1 From 404 W15P13 (Cal.)
406W4P1 From 404W208P72 (TM)
404W15P14 From J1 (4D10)

B. Aft. No. 2 Simulator (4D41) (A1 or A2).

406W1P1 From 404A45A1J4
406W3P1 From 404W15P10 (Cal.)
406W4P1 From 404W208P74 (TM)
404W15P9 From J2

C. Fwd Simulator (4D21 + 4D31) (A3).

406W2P1 From 411A99A10A1J4
406W3P1 From 411W17P11 (Cal)
406W4P1 From 411W205P17 (TM) (4D31)
406W5P1 From 411W17P12 (4D20)
406W6P1 From 411W17P13 (Cal.)
406W7P1 From 411W205P18 (TM) (4D20)
411W17P8 From J1

2. Install or verify installed shunt boxes (Ref. 1B62355-New):

A. +4D10 Shunt Box (1615)

404W15P14 to J1
404W208P72 to J2
404W15P13 to J3
173A3W8P2 to J5
1579W3P2 to J6

B. +4D20 Shunt Box (1577)

411W17P12 to J1
411W205P18 to J2
411W17P13 to J3
173A4W3P2 to J5
1577W1P1 to J6

C. +4D30 Shunt Box (1616)

411W17P8 to J1
411W205P16 to J2
411W17P9 to J3
173A4W4P2 to J5
1577W1P2 to J6
411W3P1 to J7
1616W1P1 to J8

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D. +4D40 Shunt Box (1579)

404W15P9 to J1
404W208P74 to J2
404W15P10 to J3
173A3W9P2 to J5
1579W3P1 to J6

3. Connect or Verify Connected:

A. Fwd J-Box (1587)

173A4W1P2 to J1
1587W1P1 to J2
1587W2P1 to J3
1587W4P1 to J6
DM2 (Diode Mod.) to J7

B. Aft. J-Box (1493)

173A3W1P2 to J1
173A3W3P2 to J2
173A3W4P2 to J3
1493W9P1 to J7
1493W3P1 to J8
1493W6P1 to J9
1493W4P1 to J11
1493W8P1 to J15
DM1 (Diode Mod.) to J16

4. Disconnect or Verify Disconnected:

A. AFT

404W7P9 from 404A74A2J1 (LH Recir. INV Input)
404W7P10 from 404A74A1J1 (Lox Recirc. INV Input)
403W3P2 from 403B1J1 (Hyd. Pump)

5. Connect or Verify Connected:

A. Silo Plates

1) Fwd (173A4)

173A4W1P1 to J25
173A4W5P1 to J26
173A4W3P1 to J27
173A4W4P1 to J28

2) Aft (173A3)

173A3W1P1 to J3
173A3W10P1 to J10
173A3W8P1 to J11

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173A3W9P1 to J12
173A3W3P1 to J27
173A3W4P1 to J28

6. Cable to Cable (Connect or verify connected):

1587W4P2 to 1494W15P1
1493W4P2 to 1494W12P1
1579W3P3 to 173A3W10P2
1577W1P3 to 173A4W5P2
1494W12P2 to 404W203P27
1494W12P3 to 404W7J9
1494W12P4 to 404A2J3
404W7J2 to 416W2P1
404W7J4 to 417W2P1
404W7J6 to 418W2P1
1494W19P2 to 411W3P2
1494W19P1 to 411W17P10
1493W8P2 to 404A2J19
1493W8P3 to 404W7P4
1493W3P2 to 404A45J3
1587W2P2 to 411A99A1053
1616W1P2 to 411W205P17

7. SIVB Power Application

A. C4ES obtain clearance from C4TC, then apply SIVB power per DAC procedure, I-21042-SIVB6 1B62242. Report when complete.

8. SIVB OAT Room (152' level)

S40T (Switch Module Panel)

A. Verify all switches are in the down position except S-43 in up position.

B. S40T verify circuit breakers on:

1270A1A4-1
1270A1A4-6
1270A2A6-2
1270A1A4-4

C. Switch 1465S2 (+23D213) ON
1465S1 (+4D114) ON

D. Verify knife switches in OAT Battery Room are set. Observe battery voltage indications on battery monitor panels.

E. Verify event and E & I recorders in operating condition.

F. Event and E & I recorders AC, DC and chart drive switches ON.

G. R4HY Inflt. Mode SW to auto.

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H. S40T turn +4D10, +4D20, +4D30, +4D40 battery power on.

POST TEST OPERATIONS SIVB

1. Disconnect the following & Verify when complete: (C4TC S4CE)
 - A. +4D10 Shunt Box (1615)
 - 404W15P14 to J1
 - 404W208P72 to J2
 - 404W15P13 to J3
 - 173A3W8P2 to J5
 - 1579W3P2 to J6
 - B. +4D20 Shunt Box (1577)
 - 411W17P12 to J1
 - 411W205P18 to J2
 - 411W17P13 to J3
 - 173A4W3P2 to J5
 - 1577W1P1 to J6
 - C. +4D30 Shunt Box (1616)
 - 411W17P8 to J1
 - 411W205P16 to J2
 - 411W17P9 to J3
 - 173A4W4P2 to J5
 - 1577W1P2 to J6
 - 411W3P1 to J7
 - 1616W1P1 to J8
 - D. +4D40 Shunt Box (1579)
 - 404W15P9 to J1
 - 404W208P74 to J2
 - 404W15P10 to J3
 - 173A3W9P2 to J5
 - 1579W3P1 to J6
 - E. Cable to Cable disconnect 1616W1P2 from 411W205P17.
 - F. Remove shunt Boxes (Ref. 1B62355)
2. Install or Verify installed battery simulator boxes (Ref. 1B62349)
Note: Aft Unit A1 may be temporarily suspended. (C4TC S4CE)
3. Connect the following & Verify when complete: (C4TC S4CE)
 - A. Aft No. 1 simulator (4D11) (A1 or A2)
 - 406W1P1 to 404A2A1J4
 - 406W3P1 to 404W15P13 (Cal)

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406W4P1 to 404W208P72 (TM)
404W15P14 to J1 (4D10)

B. Aft No. 2 simulator (4D41) (A1 or A2)

406W1P1 to 404A45A1J4
406W3P1 to 404W15P10 (Ca1)
406W4P1 to 404W208P74 (TM)
404W15P9 to J2

C. Fwd simulator (4D21 & 4D31) (A3)

406W2P1 to 411A99A10A1J4
406W3P1 to 411W17P11 (CAL)
406W4P1 to 411W205P17 (TM) (4D31)
406W5P1 to 411W17P12 (4D20)
406W6P1 to 411W17P13 (CAL)
406W7P1 to 411W205P18 (TM) (4D20)
411W17P8 to J1